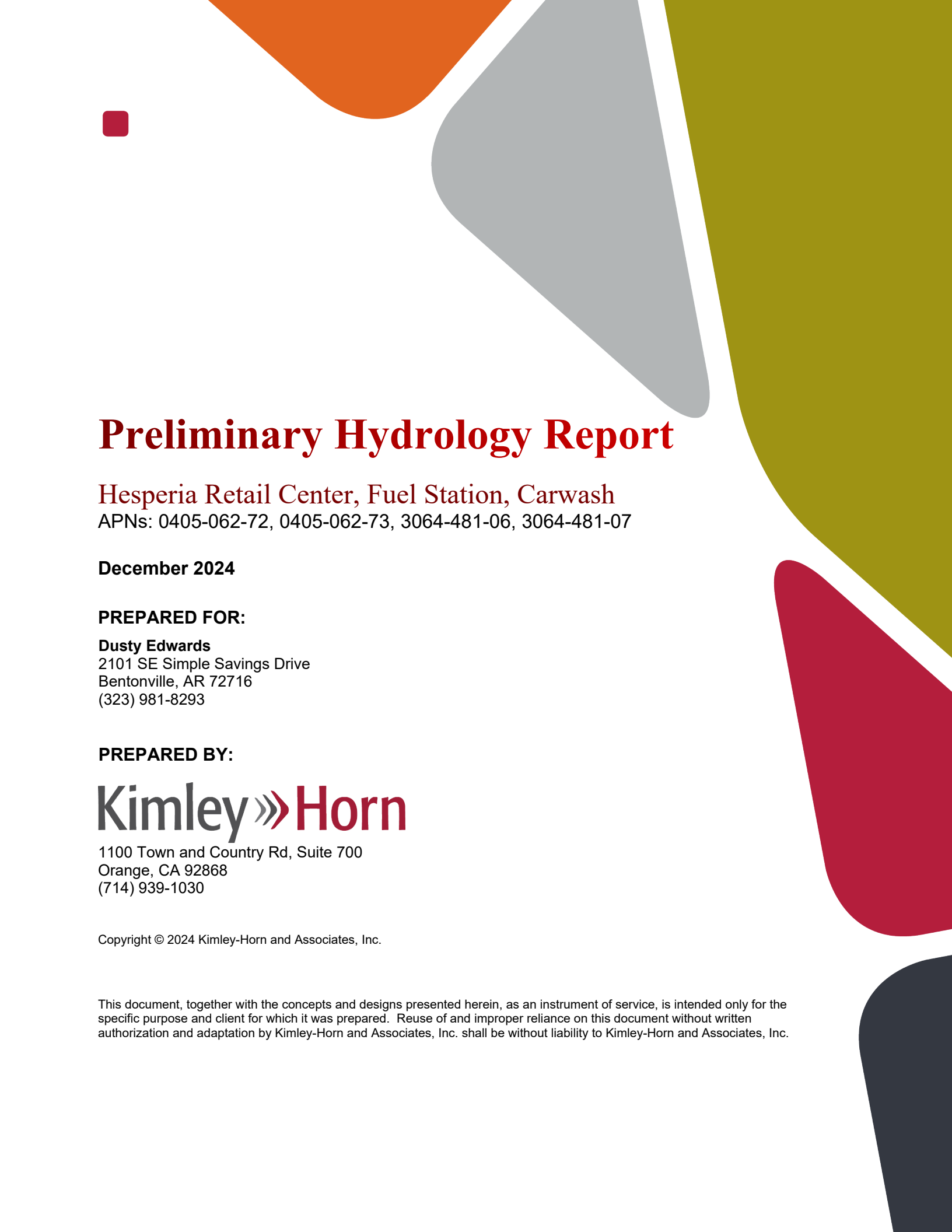


APPENDIX H1

PRELIMINARY HYDROLOGY REPORT



Preliminary Hydrology Report

Hesperia Retail Center, Fuel Station, Carwash

APNs: 0405-062-72, 0405-062-73, 3064-481-06, 3064-481-07

December 2024

PREPARED FOR:

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Certification by Engineer

Jacob Glaze, P.E.

Date

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Appendix F – Soils Reports
Appendix G – Hydrology Exhibits
Appendix H – Rational Method Analysis
Appendix I – Synthetic Unit Hydrograph Method Analysis
Appendix J – Basin Routing Analysis
Appendix K – Hydraulic Analysis

References

Hydrology Manual. County of San Bernardino, August 1986.

100.0 Introduction

Kimley-Horn and Associates has been retained to prepare a Preliminary Hydrology Report for the proposed commercial project in Hesperia, California. 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 potential for hydromodification downstream of the site
- Discuss the pre-development discharge patterns and points
- Discuss the post-development discharge patterns and points
- Determine the pre-development flow rates for the 10-year and 100-year event
- Determine the pre-development volumes for the 10-year and 100-year event
- Determine the post-development unmitigated flow rates for the 10-year and 100-year event
- Determine the post-development volumes for the 10-year and 100-year event
- Analyze the required post-development onsite mitigation for up to the 100-year event
- Determine the design of the infiltration/detention basin to ensure that the volume and flow rate requirements are met

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 reports discuss separate aspects of stormwater. However, portions of the Geotechnical Report are utilized and referenced for the purpose of this report. Similarly, the stormwater mitigation requirements of the WQMP are considered for sizing the BMPs used for this project.

100.1 Project Description

The project site is located on Amargosa Road and is bounded by the California Aqueduct to the north, I-15 to the east, Main Street to the south, and Key Point Avenue to the west. The entire project site measures approximately 25.37 acres and is intended to be developed into a new retail building with associated fuel station and carwash. The existing project site is entirely undeveloped and consists mainly of soil with some vegetation. The soils have a hydrologic soil group classification of "A". The site is relatively flat.

The proposed site is considered a commercial development and intends to develop approximately 25.37 acres into one retail building, one 14-pump fuel station, one carwash, parking areas, loading docks, drive aisles, and landscape areas. Stormwater runoff will be collected by nearby catch basins and conveyed to retention basins within landscape areas where it will infiltrate into the soil. When the required water quality volume is captured within the retention system, excess runoff will be routed offsite onto Amargosa Road and connected to the storm drain system. Stormwater runoff from the fuel area will enter an oil water separator for pretreatment prior to entering the retention basin.

100.2 Methodology

100.2.1 Background

The type of soil and soil conditions are major factors affecting infiltration and storm water runoff as a result. The Natural Resources Conservation Service (NRCS) has classified soil into general hydrologic soil groups for comparing infiltration and runoff rates. Each group is based on properties that influence runoff, such as water infiltration rate, texture, natural discharge, and moisture condition. The runoff potential is based on the amount of runoff at the end of a long duration storm that occurs after wetting and swelling of the soil not protected by vegetation. Using the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey online tool, the hydrologic soil group classification for the area was determined to be A. Soil type A is defined as soils having a high infiltration rate (low runoff potential) when thoroughly wet.

In addition, based on the Percolation/Infiltration Testing prepared by Terracon Consultants, Inc. dated August 25, 2023, the site is suitable for infiltration with a measured infiltration rate of 4.38 in/hr at the location of the infiltration system. Using a factor of safety of 3, the design infiltration rate for this project was computed to be 1.46 in/hr.

For the hydrologic analysis, the Rational Method, Unit Hydrograph Method, and Basin Routing Analysis was used to solve for the time of concentration, flow rates, and volumes following methodology described in the San Bernardino County Hydrology Manual, and the AES Engineering Software was used to compute the data. Utilizing precipitation data from NOAA Atlas 14 along with the proposed site characteristics, the rational method was used to compute the time of concentrations and peak flow rates generated from the existing and proposed 10-year, 25-year, and 100-year storm events. The time of concentration was then used to solve for the Synthetic Unit Hydrograph of the site which returned the total volume generated for the 24-hour duration of the 10-year and 100-year storm events. The Unit Hydrograph is then routed through the basin to perform the Basin Routing Analysis which returns the peak flow out of the proposed underground basin along with the maximum water surface elevation for up to the 100-year storm.

Antecedent moisture conditions (AMCs) II was used to calculate the peak flows and volumes for the 10-year and 25-year storm events, and AMC III was used for the 100-year storm event based on the hydrology manual. In addition, since the project is not located within a location that is HCOC Exempt, hydromodification will be a concern and calculations comparing the pre-development and post-development conditions for a 10-year storm event were performed. Note that for the 10-year storm event, calculations for the pre-development conditions correspond to the natural conditions prior to any development to analyze hydromodification. For the 10-year and 100-year storm events, the pre-development calculations correspond to the existing or current conditions on the project site.

100.2.2 Design Methodology

To prevent potential adverse impacts downstream of the site, the project proposes to retain at minimum the difference in stormwater runoff volume for the 100-year storm between post-development and pre-development conditions. In addition, to meet water quality requirements, the project is required to retain both the Design Capture Volume (DCV) and the hydromodification retention volume onsite. Therefore, the required retention volume for this project is taken to be the greater between the DCV, hydromodification volume, and the difference in runoff between the post-development and pre-development conditions. Refer to the WQMP for more information regarding the water quality retention requirements.

Once the required retention volume is retained onsite, the site is allowed to release stormwater runoff offsite. To prevent adverse impacts downstream of the project site, the project will mitigate peak flows such that it does not exceed existing conditions for up to the 100-year storm event. In addition, for a 100-year storm event, the basins will not be allowed to release more than the existing conditions for a 25-year storm event per the San Bernardino County Detention Basin Design Criteria.

For hydraulic purposes, the storm drain system and inlets are designed to be able to accommodate the design storm of a 100-year storm event.

100.2.3 Calculations Performed

Below is a summary of the calculations that were performed for hydrological and hydraulic analysis. Refer to Appendices H, I, and J for the Rational Method, Unit Hydrograph, and Basin Routing calculations respectively.

1. Rational Method
 - a. 10-year storm event for pre-development and post-development conditions
 - b. 10-year storm event for pre-development and post-development conditions
 - c. 25-year storm event for pre-development conditions
 - i. Used to determine allowable peak flow for the 100-year storm event
 - d. 100-year storm event for pre-development and post-development conditions
 - i. Used to determine peak flows and time of concentration
2. Unit Hydrograph
 - a. 10-year storm event for pre-development and post-development conditions
 - b. 10-year storm event for pre-development and post-development conditions
 - c. 100-year storm event for pre-development and post-development conditions
 - i. Used to determine volume differences and generate inflow hydrograph for the basin analysis
3. Basin Analysis
 - a. 10-year, 100-year storm event
 - i. Used to determine peak flows for each storm event
 - ii. Used to determine max water surface elevation within the basin for the 100-year storm
 - iii. Used to show that the basin will return to the dead storage elevation within 24 hours after the basin reaches its peak depth

100.3 Drainage Characteristics

The site is in Zone X per the Federal Emergency Management Administration (FEMA) Flood Insurance Rate Maps (FIRM) map number 06071C6475H, dated August 28, 2008. For reference, see the FIRM Map in Appendix B.

Flood Zone X is defined by FEMA as areas determined to be outside the 0.2% annual chance floodplain.

100.3.1 Pre-development (Existing) Condition

Under the existing conditions, the project site is undeveloped and primarily consists of exposed soil (Classification A) and some vegetation. The project site primarily drains toward the north. Runoff enters the Oro Grande Wash and will eventually discharge into the Mojave River.

Table 1 shows a summary of the predevelopment (existing) flows and volumes for the project site. See the Pre-Development Hydrology Exhibit in Appendix G for more information, Appendix H for the Rational Method Calculations, and Appendix I for the Unit Hydrograph Calculations.

Table 1: Pre-development Flows and Volumes (Refer to Pre-Development Exhibit)

Area Description	Area (acres)	Q₁₀ (cfs)	V₁₀ (cf)	Q₂₅ (cfs)	Q₁₀₀ (cfs)	V₁₀₀ (cf)
A	16.70	13.81	59,655	19.65	33.23	254,826
B	8.67	12.82	35,397	17.30	26.59	155,074
Total	25.37	26.63	95,052	36.95	59.82	409,900

100.3.2 Post-development Condition

Stormwater runoff will be collected by nearby catch basins and conveyed to retention basins within landscape areas where it will infiltrate into the soil. When the required water quality volume is captured within the retention system, excess runoff will be routed offsite onto Amargosa Road and connected to the storm drain system where it will eventually enter Oro Grande Wash and discharge into the Mojave River. Stormwater runoff from the fuel area will enter an oil water separator for pretreatment prior to entering the retention basin.

Table 2 shows a summary of the post-development flows (unmitigated). For more information, refer to the Post Development Hydrology Exhibit in Appendix G, the Rational Method Calculations in Appendix H, and the Unit Hydrograph Calculations in Appendix I.

Table 2: Onsite Post-development Flows (Unmitigated)

Area Description	Area (acres)	Q₁₀ (cfs)	V₁₀ (cf)	Q₁₀₀ (cfs)	V₁₀₀ (cf)
A	9.10	22.01	113,099	37.08	217,630
B	16.27	35.26	199,413	61.52	391,792
Total	25.37	57.27	312,513	98.60	609,422

For retention purposes, the project proposes to retain the greater between the DCV, hydromodification volume, and the difference between the post- and pre- development volume for the 100-year storm event. The project proposes to utilize an above ground retention basin within landscape areas on the site to retain the required volume. See the below table for a summary of the required retention volume.

Table 3: Retention Requirement

Area Description	DCV (CF)	Hydromodification Volume (CF)	Δ100 (CF)	Retention Required (CF)	Retention Provided (CF)
Total	46,606	201,835	199,522	201,835	211,741

100.4 Stormwater Mitigation

Since infiltration is feasible, the proposed development will be required to retain the required water quality volume onsite and excess runoff will be allowed to be discharged offsite. Per hydromodification requirements, the project will be required to attenuate peak runoff for the 10-year storm event such that it does not exceed existing conditions. To prevent adverse impact downstream of the project site, the project will mitigate peak flows such that the 100-year storm event does not exceed the existing conditions for the 25-year storm event.

The below tables show a summary of the required retention and peak flow mitigation, and a summary of the retention basins. Refer to Appendix J for more information on the proposed BMP.

Table 4: Stormwater Mitigation Requirements

Area Description	Retention Requirement (CF)	10-Year Allowable Outflow (cfs)	100-Year Allowable Outflow (cfs)
Total	201,835	26.63	36.95 (25-Year Existing Peak Flow)

Table 5: Basin Volume Summary

Area Description	BMP	Retention Requirement (CF)	Provided Retention (CF)
A	Above Ground Infiltration Basin #1	-	79,489
B	Above Ground Infiltration Basin #2	-	132,252
Total	-	201,835	211,741

Table 6: Basin Routing Analysis

Area Description	BMP	10-Year Peak Flow Rate (cfs)	100-Year Peak Flow Rate (cfs)
A	Above Ground Infiltration Basin #1	4.56	7.89
B	Above Ground Infiltration Basin #2	13.60	26.04
Total	-	18.16	33.93

To capture the required volume and the outlet peak flows, the outlet structure of Basin #1 will have an 18" diameter orifice placed 4.0' above the bottom of the basin. The outlet structure of Basin #2 will have a 5' weir placed 4.5' above the bottom of the basin. The orifice and weir serve to discharge excess runoff and placing the openings 4.0' and 4.5', respectively, above the bottom of the basins it will prevent runoff volumes below the required retention volume from leaving the site. Refer to the chamber section in the Post Development Exhibit for more information.

100.5 Hydraulic Analysis

Hydraulic calculations for 10-year and 100-year storm conditions to be prepared for final engineering analysis.

100.6 Conclusion

In conclusion, the following was covered in this report:

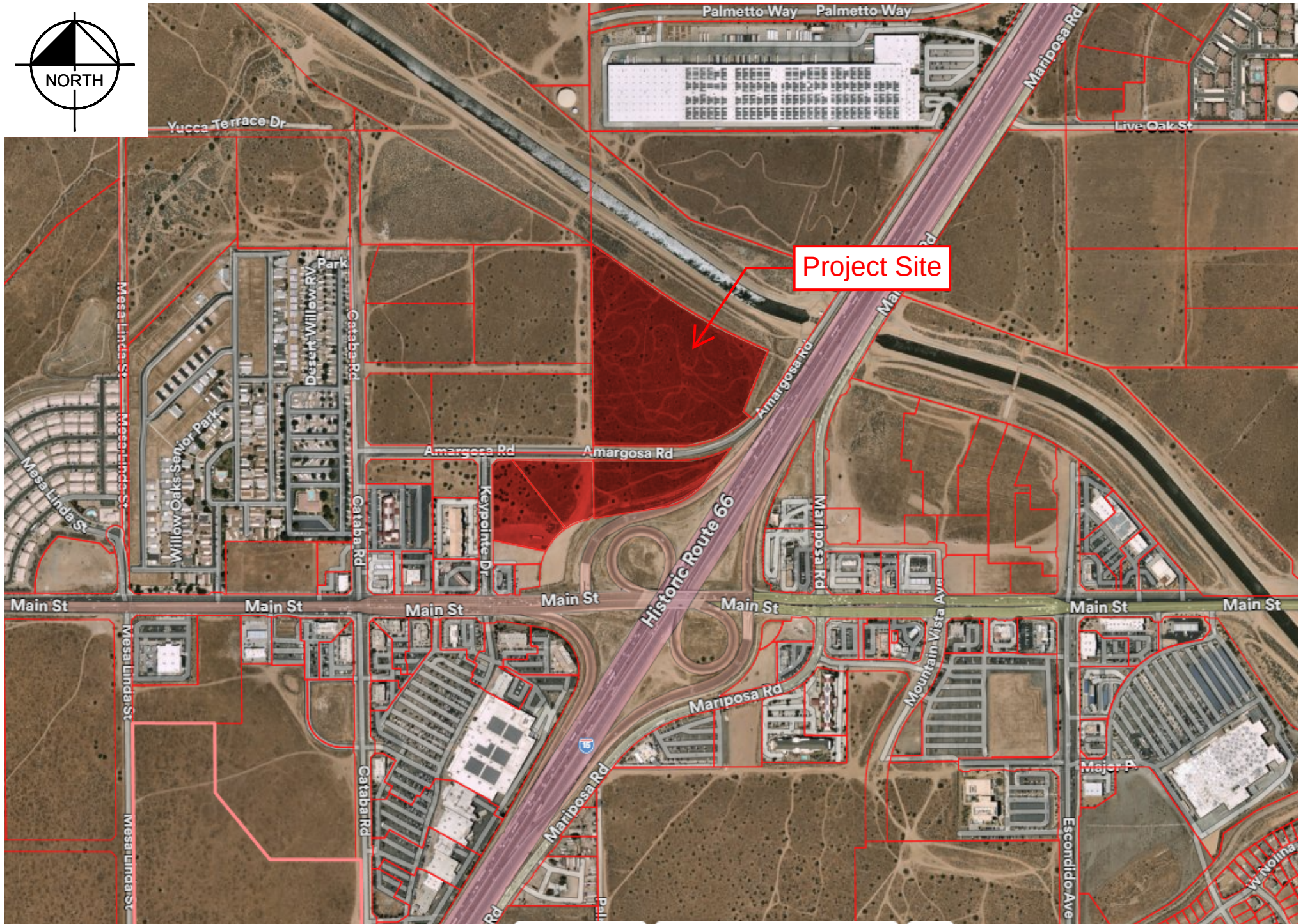
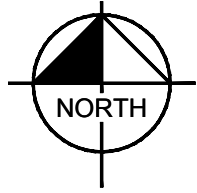
- The potential for hydromodification downstream of the site was discussed
- The pre-development discharge patterns and points were analyzed
- The post-development discharge patterns and points were analyzed
- The pre-development flow rates for the 10-year, 25-year, and 100-year events were determined
- The pre-development volumes for the 10-year and 100-year events were determined
- The post-development unmitigated flows for the 10-year and 100-year events were determined
- The post-development volumes for the 10-year and 100-year events were determined
- The required stormwater mitigation was analyzed
- The infiltration/detention basin was designed to ensure that the volume and flow mitigation requirements are met

As discussed in the contents of this report, the development is not expected to cause a significant impact to downstream systems for storms up to the 100-year storm.

Appendix A

Vicinity Map

VICINITY MAP



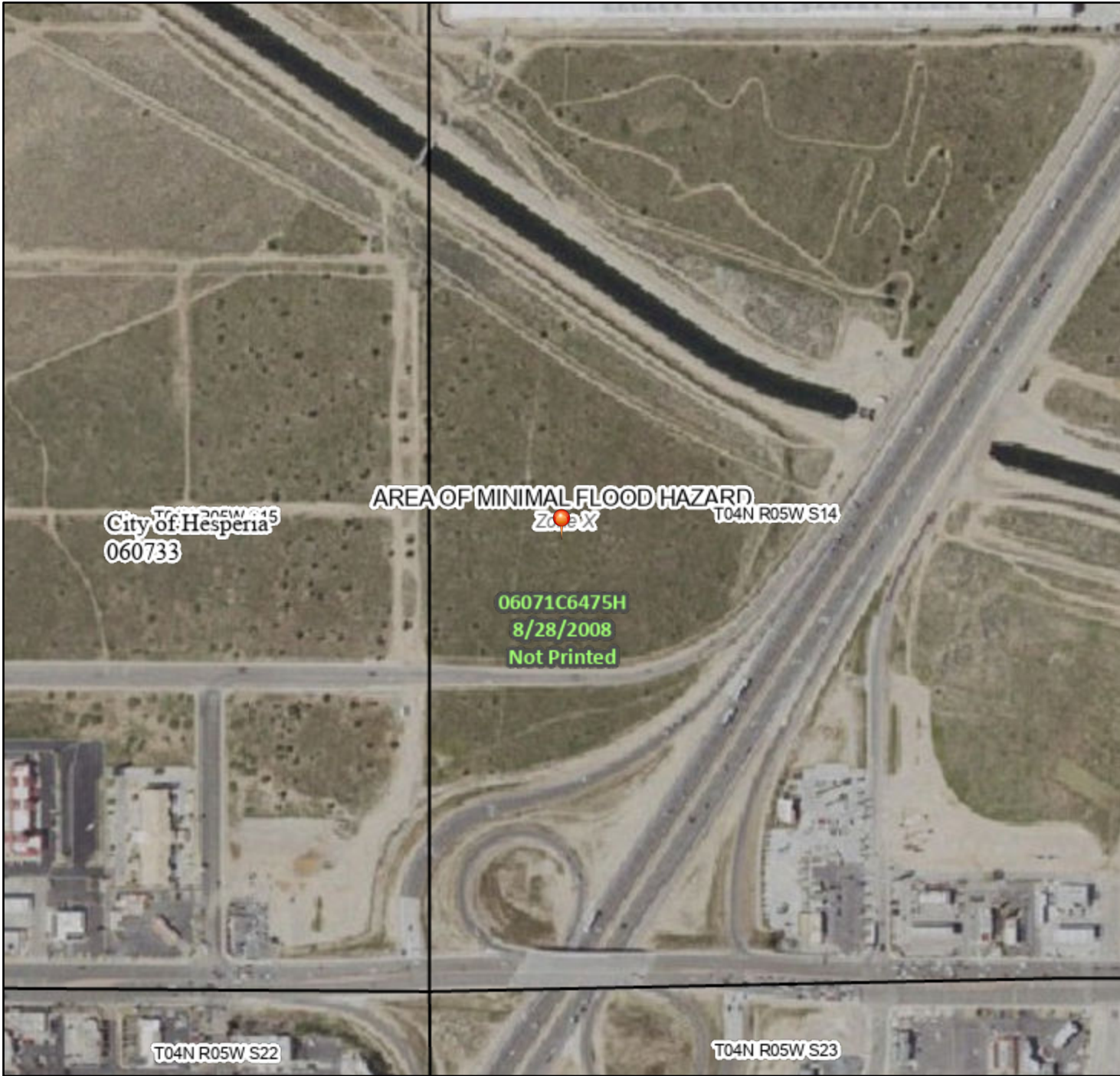
Appendix B

FIRM Map

National Flood Hazard Layer FIRMMette



117°23'9"W 34°26'3"N



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

1:6,000

117°22'31"W 34°25'33"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/3/2024 at 1:43 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Appendix C
Construction Plans

Appendix D

Hydrology Manual and Other Reference Material

Curve (I) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<u>NATURAL COVERS -</u>					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
<u>URBAN COVERS -</u>					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
<u>AGRICULTURAL COVERS -</u>					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

**CURVE NUMBERS
FOR
PERVIOUS AREAS**

Curve (I) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group			
		A	B	C	D
<u>AGRICULTURAL COVERS</u> (Continued)					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87

Notes:

- All curve numbers are for Antecedent Moisture Condition (AMC) II.
- Quality of cover definitions:

 Poor-Heavily grazed, regularly burned areas, or areas of high burn potential. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.

 Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.

 Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
- See Figure C-2 for definition of cover types.

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

**CURVE NUMBERS
FOR
PERVIOUS AREAS**

Appendix E
NOAA Rainfall Data

NOAA Atlas 14, Volume 6, Version 2 BALDY MESA

COUNTY YARD #1

Station ID: 79-6383

Location name: Victorville, California, USA*

Latitude: 34.4683°, Longitude: -117.3932°

Elevation:

Elevation (station metadata): 3320 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 & aerals](#)

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	0.078 (0.064-0.095)	0.113 (0.093-0.138)	0.159 (0.131-0.195)	0.196 (0.160-0.243)	0.247 (0.195-0.316)	0.285 (0.221-0.373)	0.324 (0.245-0.434)	0.365 (0.268-0.502)	0.418 (0.295-0.600)	0.460 (0.313-0.683)
10-min	0.111 (0.092-0.136)	0.162 (0.134-0.198)	0.228 (0.188-0.280)	0.281 (0.230-0.348)	0.354 (0.280-0.452)	0.409 (0.317-0.534)	0.465 (0.351-0.622)	0.523 (0.384-0.719)	0.600 (0.422-0.860)	0.660 (0.449-0.979)
15-min	0.135 (0.111-0.165)	0.196 (0.162-0.240)	0.276 (0.227-0.338)	0.340 (0.278-0.421)	0.428 (0.338-0.547)	0.495 (0.383-0.646)	0.562 (0.425-0.752)	0.632 (0.464-0.869)	0.725 (0.511-1.04)	0.798 (0.543-1.18)
30-min	0.206 (0.171-0.252)	0.300 (0.248-0.367)	0.422 (0.348-0.518)	0.521 (0.426-0.644)	0.655 (0.517-0.837)	0.757 (0.586-0.988)	0.861 (0.650-1.15)	0.967 (0.710-1.33)	1.11 (0.782-1.59)	1.22 (0.831-1.81)
60-min	0.283 (0.234-0.345)	0.411 (0.339-0.503)	0.578 (0.476-0.709)	0.714 (0.583-0.882)	0.897 (0.709-1.15)	1.04 (0.803-1.35)	1.18 (0.890-1.58)	1.32 (0.973-1.82)	1.52 (1.07-2.18)	1.67 (1.14-2.48)
2-hr	0.398 (0.329-0.487)	0.543 (0.448-0.664)	0.739 (0.608-0.906)	0.903 (0.738-1.12)	1.14 (0.897-1.45)	1.32 (1.02-1.72)	1.51 (1.14-2.02)	1.72 (1.26-2.36)	2.00 (1.41-2.87)	2.23 (1.52-3.31)
3-hr	0.503 (0.416-0.614)	0.672 (0.555-0.822)	0.906 (0.746-1.11)	1.10 (0.903-1.37)	1.39 (1.10-1.78)	1.62 (1.26-2.12)	1.87 (1.41-2.50)	2.14 (1.57-2.94)	2.51 (1.77-3.60)	2.82 (1.92-4.19)
6-hr	0.691 (0.571-0.844)	0.914 (0.755-1.12)	1.23 (1.01-1.51)	1.51 (1.23-1.86)	1.91 (1.51-2.45)	2.25 (1.74-2.94)	2.61 (1.97-3.50)	3.01 (2.21-4.15)	3.60 (2.53-5.16)	4.09 (2.78-6.07)
12-hr	0.861 (0.712-1.05)	1.19 (0.982-1.45)	1.66 (1.36-2.03)	2.06 (1.68-2.55)	2.66 (2.10-3.40)	3.16 (2.44-4.12)	3.70 (2.79-4.95)	4.30 (3.16-5.91)	5.17 (3.64-7.41)	5.90 (4.02-8.76)
24-hr	1.18 (1.05-1.36)	1.71 (1.51-1.97)	2.45 (2.16-2.83)	3.10 (2.72-3.62)	4.06 (3.44-4.89)	4.85 (4.03-5.96)	5.71 (4.62-7.19)	6.65 (5.24-8.62)	8.03 (6.07-10.8)	9.18 (6.71-12.8)
2-day	1.27 (1.13-1.46)	1.82 (1.61-2.10)	2.60 (2.30-3.01)	3.30 (2.89-3.84)	4.32 (3.66-5.20)	5.18 (4.30-6.36)	6.11 (4.95-7.70)	7.15 (5.63-9.26)	8.68 (6.56-11.7)	9.97 (7.28-13.9)
3-day	1.36 (1.20-1.56)	1.92 (1.70-2.22)	2.73 (2.41-3.16)	3.45 (3.02-4.02)	4.52 (3.83-5.44)	5.42 (4.49-6.66)	6.40 (5.18-8.06)	7.49 (5.90-9.70)	9.11 (6.89-12.3)	10.5 (7.66-14.6)
4-day	1.46 (1.30-1.69)	2.06 (1.83-2.38)	2.92 (2.58-3.38)	3.68 (3.22-4.29)	4.81 (4.08-5.79)	5.76 (4.78-7.08)	6.80 (5.51-8.57)	7.96 (6.27-10.3)	9.67 (7.31-13.1)	11.1 (8.12-15.5)
7-day	1.60 (1.42-1.84)	2.22 (1.97-2.56)	3.12 (2.75-3.60)	3.90 (3.42-4.55)	5.06 (4.29-6.10)	6.03 (5.01-7.42)	7.09 (5.74-8.93)	8.26 (6.50-10.7)	9.97 (7.54-13.5)	11.4 (8.34-15.9)
10-day	1.72 (1.52-1.98)	2.37 (2.10-2.73)	3.30 (2.92-3.82)	4.12 (3.61-4.80)	5.32 (4.51-6.41)	6.32 (5.24-7.77)	7.40 (5.99-9.32)	8.59 (6.77-11.1)	10.3 (7.81-13.9)	11.8 (8.61-16.5)
20-day	2.10 (1.86-2.42)	2.87 (2.54-3.31)	3.96 (3.50-4.58)	4.91 (4.30-5.72)	6.29 (5.33-7.58)	7.44 (6.17-9.14)	8.67 (7.02-10.9)	10.0 (7.89-13.0)	12.0 (9.06-16.2)	13.6 (9.94-19.0)
30-day	2.48 (2.20-2.85)	3.35 (2.97-3.86)	4.58 (4.04-5.29)	5.65 (4.95-6.58)	7.21 (6.11-8.68)	8.50 (7.05-10.4)	9.88 (8.00-12.4)	11.4 (8.97-14.8)	13.6 (10.3-18.3)	15.4 (11.2-21.5)
45-day	2.92 (2.59-3.36)	3.89 (3.44-4.48)	5.25 (4.64-6.07)	6.43 (5.64-7.50)	8.16 (6.91-9.82)	9.58 (7.95-11.8)	11.1 (8.99-14.0)	12.8 (10.0-16.5)	15.1 (11.4-20.4)	17.1 (12.5-23.9)
60-day	3.30 (2.92-3.80)	4.33 (3.83-4.99)	5.78 (5.10-6.67)	7.03 (6.16-8.19)	8.86 (7.51-10.7)	10.4 (8.60-12.7)	12.0 (9.70-15.1)	13.7 (10.8-17.8)	16.2 (12.3-21.9)	18.3 (13.4-25.6)

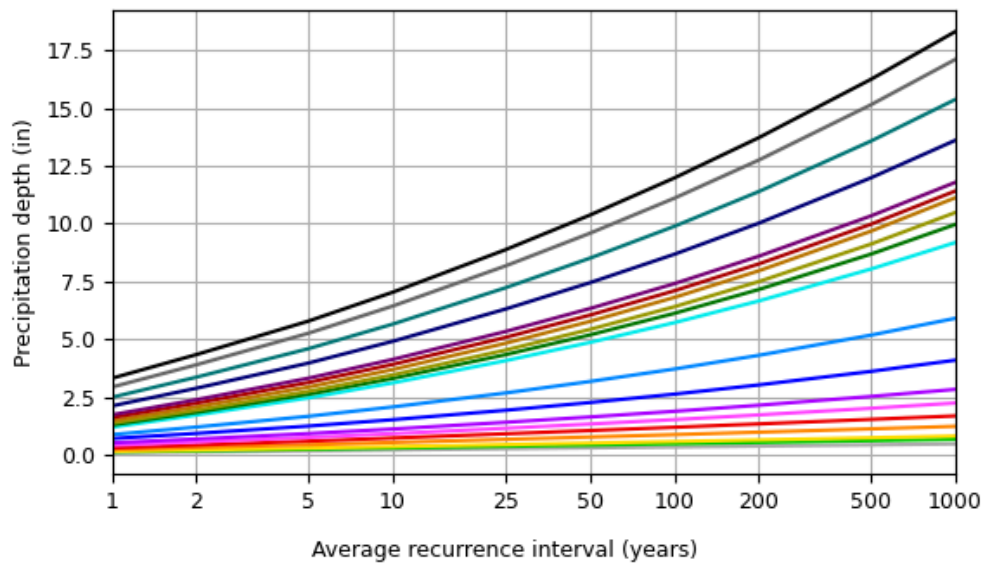
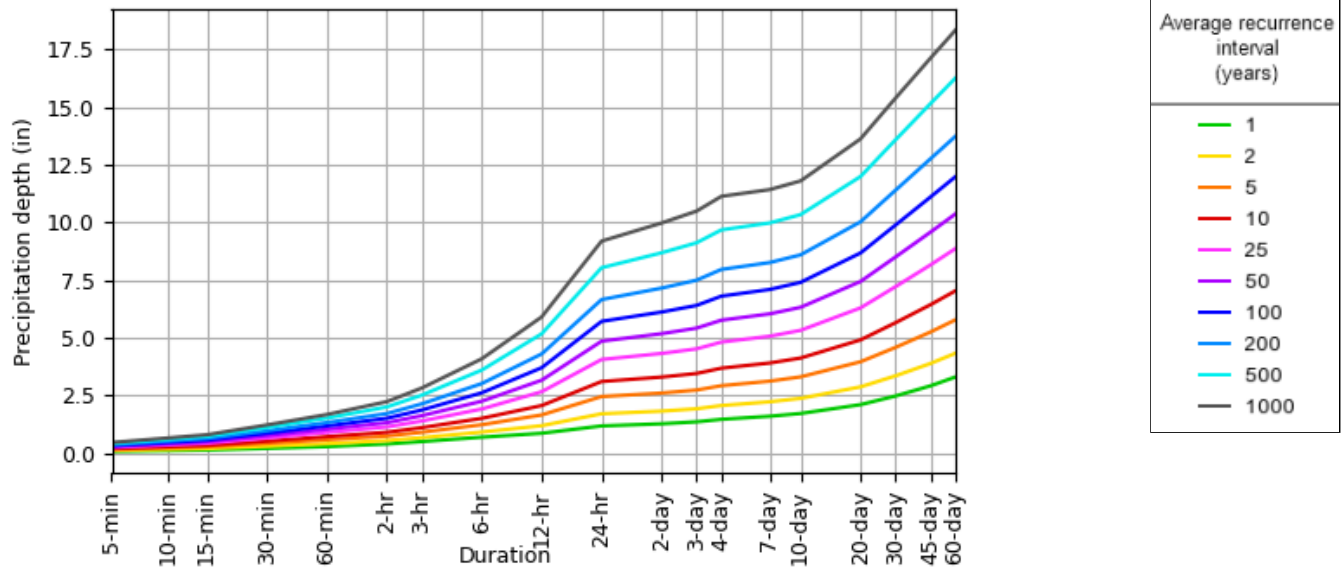
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average 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

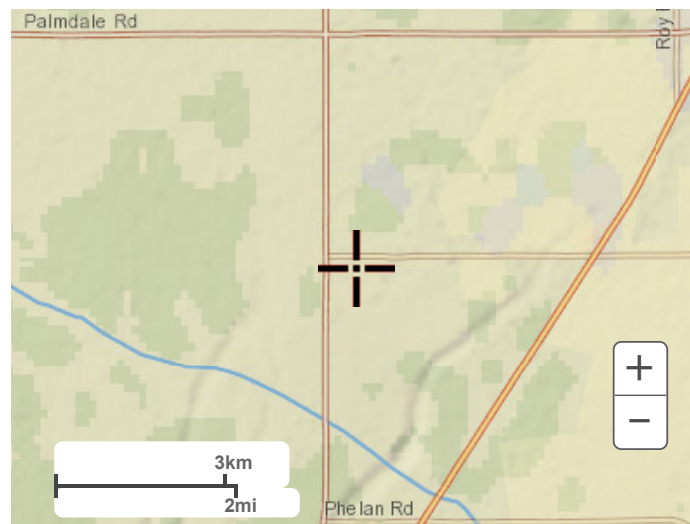
Latitude: 34.4683°, Longitude: -117.3932°



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Thu May 9 19:41:29 2024

[Back to Top](#)**Maps & aerals****Small scale terrain**



Large scale terrain



Large scale map



Large scale aerial



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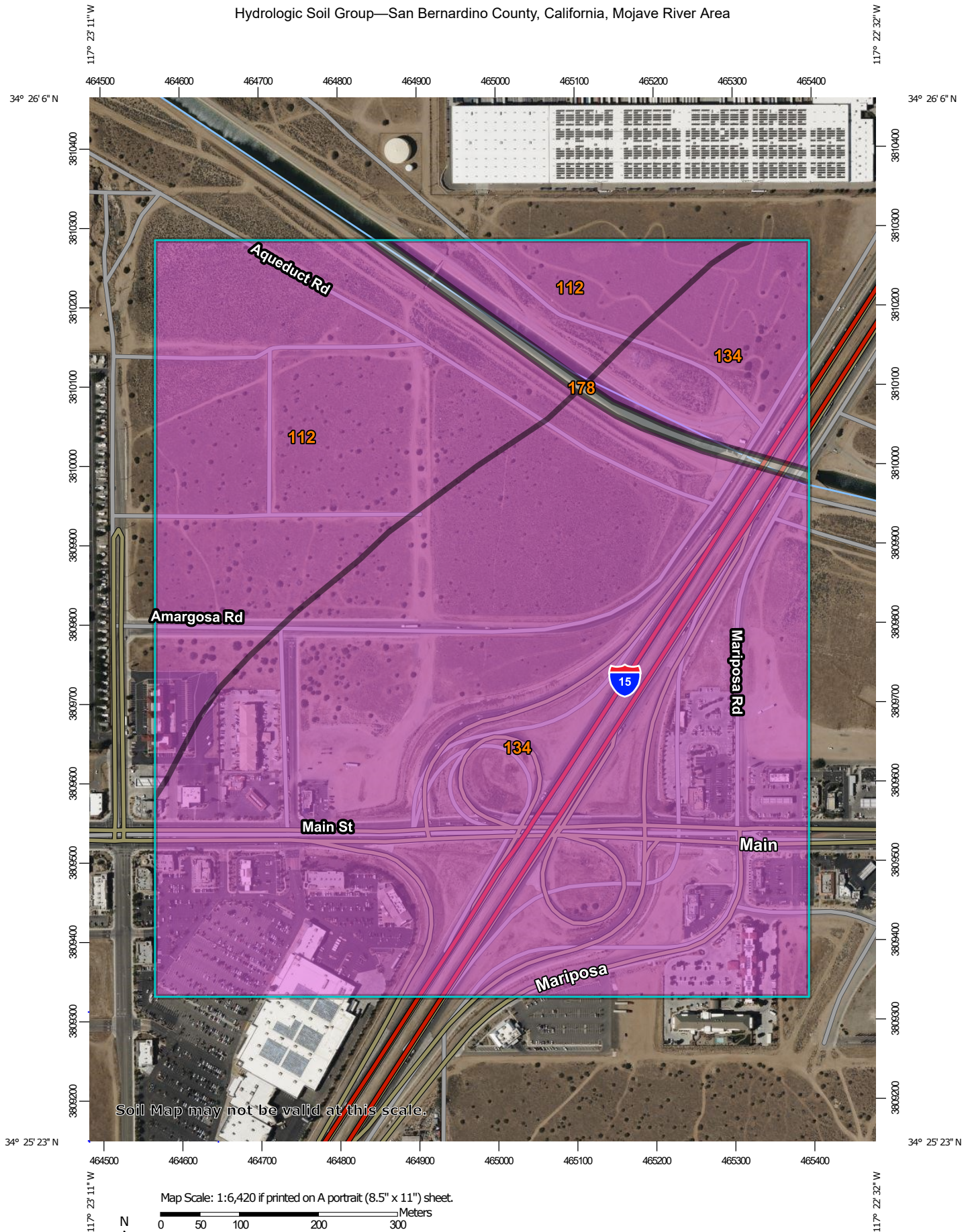
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Questions?: HDSC.Questions@noaa.gov

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Appendix F

Soils Reports

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



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 15, Aug 30, 2023

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

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

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background 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
112	CAJON SAND, 0 TO 2 PERCENT SLOPES	A	57.7	29.4%
134	HESPERIA LOAMY FINE SAND, 2 TO 5 PERCENT SLOPES	A	136.0	69.4%
178	WATER		2.2	1.1%
Totals for Area of Interest			195.9	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

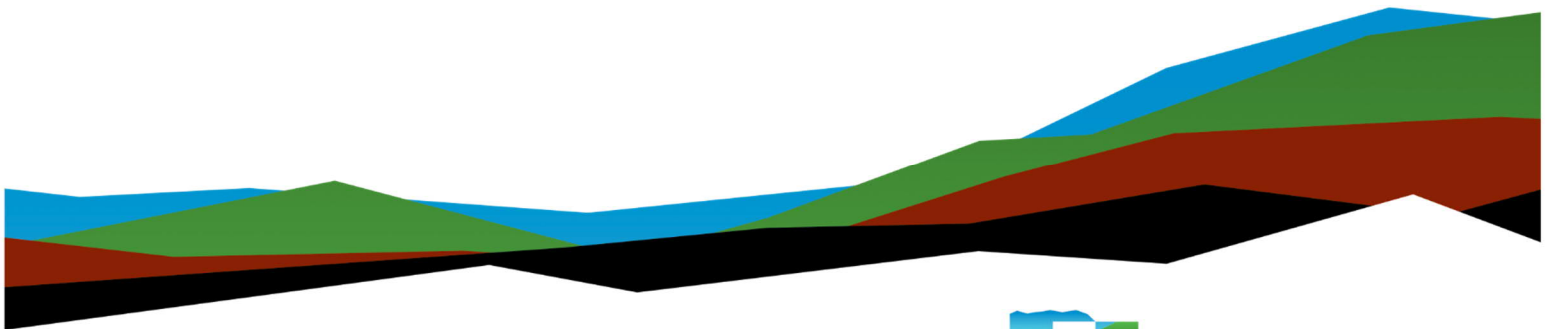
Sam's Club – Hesperia

Geotechnical Engineering Report

August 25, 2023 | Terracon Project No. CB235111

Prepared for:

Sam's Club and Kimley-Horn and Associates Inc.
1100 W Town and County Road, Suite 700
Orange, California



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August 25, 2023

Sam's Club and Kimley-Horn and Associates Inc.
1100 W Town and County Road, Suite 700
Orange, California

Attn: Mr. Ryan Alvarez
P: (714) 786-6322
E: ryan.alvarez@kimley-horn.com

Re: Geotechnical Engineering Report
Sam's Club – Hesperia
North of Amargosa Road and West of Highway I-15
Hesperia, San Bernardino County, California
Terracon Project No. CB235111

Dear Mr. Alvarez:

We have completed the scope of Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PCB235111 dated June 8, 2023. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and floor slabs for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon

A handwritten signature in blue ink, appearing to read 'Ali Tabatabaei', is written over a horizontal line.

Ali Tabatabaei, Ph.D., G.E.

Geotechnical Project Engineer



Keith P. Askew, P.E., G.E.

Department Manager

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Attachments

Exploration and Testing Procedures
Site Location and Exploration Plans
Exploration and Laboratory Results
Supporting Information

Refer to each individual Attachment for a listing of contents.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed Sam's Club to be located North of Amargosa Road and West of Highway I-15 in Hesperia, San Bernardino County, California. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions and historic high groundwater
- 2022 California Building Code (CBC) seismic design parameters
- Subgrade preparation/earthwork recommendations
- Foundation design and construction
- Floor slab design and construction
- Preliminary pavement section design
- Infiltration and drainage

The geotechnical engineering Scope of Services for this project included the advancement of forty-six test borings to depths ranging from approximately 5 to 51½ feet below existing site grades (bgs), laboratory testing, engineering analysis, and preparation of this report. Our scope also includes conducting four percolation tests at depths of 5 and 10 feet bgs.

Drawings showing the site and boring locations are shown on the [Site Location](#) and [Exploration Plan](#), respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the [Exploration Results](#) section.

Project Description

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	An email request for proposal was provided by Kimley Horn on June 1, 2023. The request included conceptual plan drawings of the layout of the planned development.

Item	Description
Project Description	The project will consist of a new single-story Sam's Club store, paved parking and driveway, and a new fuel station with drive-thru canopies and a single-story service building.
Proposed Structure	The project generally consists of the construction of Sam's Club building with footprint area of approximately 167,050 square feet (sf). The project will also include car parking, driveways, and utilities. Fuel station with canopies and service building will be constructed. Buried fuel tanks will also be installed. We assume that stormwater diversion structures such as culverts, open channels, and storm drains will also be constructed on the site. The development will also include on-site Low Impact Development (LID) infiltration system.
Building Construction	We anticipate the Sam's Club building will be a combination of concrete masonry shear walls and steel columns, with a slab-on-grade floor. We anticipate the fuel station service building will be a combination of light gauge steel shear walls and steel columns, with a monolithic interior floor slab. We anticipate the fuel station canopy will be steel columns with a steel canopy roof.
Finished Floor Elevation	Anticipated to be within 3 feet of existing grade
Maximum Loads (assumed)	Structural loads were not provided at the time of this report. We assume that the proposed structures will have the following loads: Sam's Club Building: ■ Columns: 150 kips ■ Walls: 3 kips per linear foot (klf) ■ Slabs: 250 pounds per square foot (psf) Fuel Station Service Building: ■ Columns: 25 kips ■ Walls: 1 kip per linear foot (klf) ■ Slabs: 150 pounds per square foot (psf) Fuel Station Canopy: ■ Columns: 40 kips compression, 25 kips uplift

Item	Description
Grading / Slopes	A preliminary grading plan was not available for review at the time this report was prepared. Proposed finished grade elevation for the building pad is expected to be within 2 feet or less of existing grades, excluding remedial grading requirements. Slopes are not planned.
Below-Grade Structures	We have assumed the proposed fuel tanks will have a maximum depth on the order of 12 feet bgs.
Free-Standing Retaining Walls	None
Pavements	Paved driveway and parking will be constructed on approximately 16.7 acres of the parcel. A preferred pavement surfacing has not been identified to us as part of the preliminary information. Asphalt and concrete surfacing are common in the area for projects of this nature and is the assumed preference. Unless information is provided prior to the report, the anticipated ACI traffic categories and daily truck traffic will be assumed to consist of: ■ Category A: Car parking areas and access lanes, 10 truck per day ■ Category B: Entrance and truck service lanes, 25 trucks per day ■ Category C: Buses ■ Category D: Heavy duty trucks, 10 trucks per day ■ Category E: Garbage or fire truck lanes We assume the following traffic indices (TIs) will be used: ■ Auto Parking Areas: TI = 5.0: ■ Auto Road: TI = 5.5 ■ Truck Parking Areas: TI = 6.0 ■ Truck Ramps and Roads: TI = 8.0 ■ The pavement design period is 20 years.
Infiltration Systems	Based on review of the preliminary site plan, a shallow infiltration system consisting of a retention pond is planned on site.
Building Code	California Building Code 2022

Terracon should be notified if any of the above information is inconsistent with the planned construction, especially the grading limits, as modifications to our recommendations may be necessary.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at North of Amargosa Road and West of Highway I-15 in Hesperia, San Bernardino County, California. The approximate size of the project area is approximately 20 acres. Approximate coordinates of the center of the site: Latitude: 34.4302°, Longitude: -117.3804° See Site Location
Existing Improvements	Currently consists of an undeveloped tract of land.
Current Ground Cover	Exposed soils with a light growth of grass and vegetation.
Existing Topography	Site is relatively flat.

Geotechnical Characterization

We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the data and our understanding of the geologic setting and planned construction. The following table provides our geotechnical characterization. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the [Exploration Results](#). The table below summarizes our geotechnical characterization.

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency / Density
---------	---	----------------------	-----------------------

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency / Density
Stratum I	51 ½	Interbedded layers of silty sand, silty sand with gravel and poorly graded sand with silt and gravel	medium dense to very dense

Groundwater

The borings were advanced using a hollow-stem-auger drilling technique that allows short term groundwater observations to be made while drilling. Groundwater seepage was not encountered within the maximum drilled depth of 51½ feet below ground surface (bgs) at the time of our field exploration. Our review of historical information regarding groundwater levels indicates that historical high groundwater levels are deeper than 50 feet bgs. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed.

Lab Results

Laboratory tests were conducted on selected soil samples and the test results are presented in the [Exploration Results](#) section and on the boring logs. An Expansion Index (EI) test conducted on a near-surface sample from boring B-7 resulted in an EI value of 0 (characterized as “very low” potential).

To evaluate the potential deformation that may be caused by the addition of water to subsurface soils, hydroconsolidation testing was performed on selected, representative relatively undisturbed samples. The result is shown in Exploration Results section. The test result indicates collapse potentials of 1.8% (B-6 at 2.5 feet) and 4% (B-9 at 10 feet), boring number and sample depths summarized in parentheses. All samples were saturated under an axial pressure of 2,000 psf. The risk of hydro collapse can be mitigated by removal and replacement of the top 4 feet of on-site soil with engineered fill.

The soil sample with collapse potential of 4% was retrieved at a depth of 10 feet bgs (B-9). Based on the laboratory density and field blow counts, it is our opinion that sample disturbance may have contributed to the measured hydro-collapse laboratory results. Furthermore, effective stresses at such depths will be lower than 2,000 psf, which is the axial pressure the sample was tested for at.

Seismic Site Class

The 2022 California Building Code (CBC) Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool. This web-based software application calculates seismic design parameters in accordance with ASCE 7-16, and 2022 CBC. The 2022 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_s value greater than or equal 0.2.

However, Section 11.4.8 of ASCE 7-16 includes an exception from such analysis for specific structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) states that “In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites.” Based on our understanding of the proposed structures, it is our assumption that the exception in Section 11.4.8 applies to the proposed structure. However, the structural engineer should verify the applicability of this exception.

Based on this exception, the spectral response accelerations presented below were determined using the site coefficients (F_a and F_v) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2022 CBC.

Description	Value
2019 California Building Code Site Classification (CBC) ¹	D ²
Site Latitude (°N)	34.4302
Site Longitude (°W)	117.3804
S_s Spectral Acceleration for a 0.2-Second Period	1.5
S_1 Spectral Acceleration for a 1-Second Period	0.584
F_a Site Coefficient for a 0.2-Second Period	1.0
F_v Site Coefficient for a 1-Second Period	1.72
Site Modified Peak Ground Acceleration (PGA_M)	0.55g
De-aggregated Modal Magnitude ³	8.09

Description	Value
1. Seismic site classification in general accordance with the <i>2022 California Building Code</i>. 2. The 2022 California Building Code (CBC) requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope does not include the 100-foot soil profile determination. Borings were extended to a maximum depth of 51½ feet, and this seismic site class definition considers that similar or denser soils continue below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration. 3. These values were obtained using on-line Unified Hazard Tool by the USGS (https://earthquake.usgs.gov/hazards/interactive/) for return period of 2% in 50 years accessed	

In some cases, a site-specific ground motion study may generate less conservative coefficients and acceleration values which may reduce construction costs. We recommend consulting with a structural engineer to evaluate the need for such study and its potential impact on construction costs. Terracon should be contacted if a site-specific ground motion study is desired.

Faulting and Estimated Ground Motions

The site is located in southern California, which is a seismically active area. The type and magnitude of seismic hazards affecting the site are dependent on the distance to causative faults, the intensity, and the magnitude of the seismic event. As calculated using the USGS Unified Hazard Tool, the San Andreas (San Bernardino N segment), which is considered to have the most significant effect at the site from a design standpoint, has a maximum magnitude of 7.92 and is located approximately 18.6 kilometers from the site. Furthermore, the site is not located within an Alquist-Priolo Earthquake Fault Zone based on our review of the State Fault Hazard Maps.

Liquefaction

Liquefaction is a mode of ground failure that results from the generation of high pore-water pressures during earthquake ground shaking, causing loss of shear strength, and is typically a hazard where loose sandy soils exist below groundwater. San Bernardino County has designated certain areas as potential liquefaction hazard zones. These are areas considered at a risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of a relatively shallow water table.

According to the County of San Bernardino Geologic Hazard Maps, the site is located within an area having low liquefaction potential. Moreover, historic groundwater levels are deeper than 50 feet. Based on the County mapping and encountered subsurface

conditions, it is our opinion that liquefaction potential/seismic settlement is low for this site.

Geotechnical Overview

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations provided in this report are implemented in the design and construction phases of this project.

On-site soils generally consisted of interbedded layers of silty sand with gravel, poorly graded sand and poorly graded sand with silt and gravel extending to the maximum boring termination depth of about 51½ feet below ground surface (bgs).

Based on the conditions encountered, the proposed buildings can be supported on shallow foundations, such as spread footings, provided the recommendations outlined herein are followed.

Groundwater was not encountered within the maximum depths of exploration during or at the completion of drilling. Groundwater is not expected to affect shallow foundation construction on this site.

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the [Exploration Results](#)), engineering analyses, and our current understanding of the proposed project. The [General Comments](#) section provides an understanding of the report limitations.

Earthwork

Earthwork is anticipated to include clearing and grubbing, excavations, and engineered fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

Site Preparation

Strip and remove existing vegetation, debris, pavements, and other deleterious materials from proposed building and pavement areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction. The site should be initially graded to create a relatively level surface to receive fill and provide for a relatively uniform thickness of fill beneath proposed building structures.

Although no evidence of underground facilities such as septic tanks, cesspools, or basements were observed during the site reconnaissance, such features could be encountered during construction. If unexpected fills, utilities, or underground facilities are encountered, such features should be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Subgrade Preparation

We recommend that the proposed structures be supported on engineered fill extending to a minimum depth of 2 feet below the bottom of foundations, or 4 feet below existing grades, whichever is greater. Engineered fill placed beneath the entire footprint of the structures should extend horizontally a minimum distance of 3 feet beyond the outside edge of perimeter footings.

Subgrade soils beneath exterior slabs and pavements should be removed and replaced with engineered compacted fill to a depth of 1 foot below existing grade, or proposed pavement sections, whichever is greater.

Exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of 10 inches, moisture conditioned, and compacted per the compaction requirements in this report. Compacted fill soils should then be placed to the design elevations per the recommendations of this report. The moisture content and compaction of subgrade soils should be maintained until foundation, slab, or pavement construction.

Based upon the subsurface conditions observed from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable. However, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

Excavation

Due to very dense soil encountered near the surface in some areas, excavation may require the use of specialized heavy-duty equipment. Consideration should be given to obtaining a unit price for difficult excavation in the contract documents for the project.

Individual contractors are responsible for designing and constructing stable, temporary excavations. Excavations should be sloped or shored in the interest of safety following local, and federal regulations, including current OSHA excavation and trench safety standards.

Fill Material Types

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than 3 inches in size. Pea gravel or other similar non-cementitious, poorly-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Clean on-site soils or approved imported materials may be used as fill material for the following:

- general site grading
- foundation areas
- interior floor slab areas
- foundation backfill
- pavement areas
- exterior slab areas

Imported Fill Materials: Imported fill materials should meet the following material property requirements. Regardless of its source, compacted fill should consist of approved materials that are free of organic matter and debris.

	Percent Finer by Weight
<u>Gradation</u>	<u>(ASTM C 136)</u>
3"	100
No. 4 Sieve	50-100
No. 200 Sieve	10-40
■ Liquid Limit	30 (max)
■ Plasticity Index	15 (max)
■ Maximum expansion index*	20 (max)

*ASTM D 4829

The contractor shall notify the Geotechnical Engineer of import sources sufficiently ahead of their use so that the sources can be observed and approved as to the physical characteristic of the import material. For all import material, the contractor shall also submit current verified reports from a recognized analytical laboratory indicating that the import has a "not applicable" (Class S0) potential for sulfate attack based upon current ACI criteria and is "mildly corrosive" to ferrous metal and copper. The reports shall be accompanied by a written statement from the contractor that the laboratory test results are representative of all import material that will be brought to the job.

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed 10 inches loose thickness.

Fill Placement and Compaction Requirements

Engineered fill should meet the following compaction requirements.

Material Type and Location	Per the Modified Proctor Test (ASTM D 1557)		
	Minimum Compaction Requirement (%)	Range of Moisture Contents for Compaction Above Optimum	
		Minimum	Maximum
On-site soils and/or low volume change imported fill:			
Beneath foundations:	90	-2%	+3%
Beneath interior slabs:	90	-2%	+3%
Fill greater than 5 feet in depth:	95	-2%	+3%
Miscellaneous backfill:	90	-2%	+3%
Beneath pavements:	95	-2%	+3%
Utility trenches: ¹	90	-2%	+3%
Bottom of excavation receiving fill:	90	-2%	+3%
Aggregate base (beneath pavements)	95	-2%	+3%

1. Upper 12 inches should be compacted to 95% within pavement and structural areas.

Utility Trench Backfill

Any soft or unsuitable materials encountered at the bottom of utility trench excavations should be removed and replaced with structural fill or bedding material in accordance with public works specifications for the utility to be supported. This recommendation is particularly applicable to utility work requiring grade control and/or in areas where subsequent grade raising could cause settlement in the subgrade supporting the utility. Trench excavation should not be conducted below a downward 1:1 projection from existing foundations or existing utilities without engineering review of shoring requirements and geotechnical observation during construction.

A non-expansive granular material with a sand equivalent greater than 30 should be used for bedding and shading of utilities, unless allowed or specified otherwise by the utility manufacturer. On-site materials are considered suitable for backfill of utility and pipe trenches from 1 foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs or footings, the backfill should satisfy the gradation and expansion index requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

Exterior Slab Design and Construction

Compacted subgrade composed of on-site clayey or silty soils may expand with increasing moisture content; therefore, exterior concrete slabs may heave, resulting in cracking or vertical offsets. The potential for damage would be greatest where exterior slabs are constructed adjacent to the building or other structural elements. To reduce the potential for damage caused by movement, we recommend:

- exterior slabs should be supported directly on subgrade fill (not ABC) with no, or very low expansion potential;
- strict moisture-density control during placement of subgrade fills;
- maintain proper subgrade moisture until placement of slabs;
- placement of effective control joints on relatively close centers and isolation joints between slabs and other structural elements;
- provision for adequate drainage in areas adjoining the slabs;
- use of designs which allow vertical movement between the exterior slabs and adjoining structural elements.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure, a maintenance

program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-supported improvements such as floor slabs and pavements. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local and/or state regulations.

Excavations or other activities resulting in ground disturbance have the potential to affect adjoining properties and structures. Our scope of services does not include review of available final grading information or consider potential temporary grading performed by the contractor for potential effects such as ground movement beyond the project limits. A preconstruction/ precondition survey should be conducted to document nearby property/infrastructure prior to any site development activity. Excavation or ground disturbance activities adjacent or near property lines should be monitored or instrumented for potential ground movements that could negatively affect adjoining property and/or structures.

We recommend that the earthwork portion of this project be completed during extended periods of dry weather if possible. If earthwork is completed during the wet season (typically November through April) it may be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork operations may require additional mitigative measures beyond that which would be expected during the drier summer and fall months. This could include diversion of surface runoff around exposed soils and draining of ponded water on the site. Once subgrades are established, it may be necessary to protect the exposed subgrade soils from construction traffic.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances

shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and pavements), evaluation and remediation of existing fill materials, as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. Where not specified by local ordinance, one density and water content test should be performed for every 50 linear feet of compacted utility trench backfill and a minimum of one test performed for every 12 vertical inches of compacted backfill. This testing frequency criteria may be adjusted during construction as specified by the geotechnical engineer of record.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. If unanticipated conditions are observed, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Shallow Foundations

If the site has been prepared in accordance with the requirements noted in [Earthwork](#), the following design parameters are applicable for mat foundation.

Design Parameters

Item	Description
Foundation Type	Shallow Spread Footings
Net Allowable Bearing Pressure ^{1, 2}	3,000 psf

Foundation Support ³	Engineered fill extending 2 feet below the bottom of foundations, or 4 feet below existing grades, whichever is greater.
Minimum Foundation Dimensions	Continuous: 18 inches wide Columns: 24 inches wide
Minimum Embedment below Finished Grade ⁴	18 inches
Ultimate Passive Resistance ⁵ (Equivalent fluid pressures)	375 pcf
Ultimate Coefficient of Sliding Friction ⁶	0.36
Estimated Static Settlement from Structural Loads ²	About 1 inch
Estimated Differential Settlement ^{2, 7}	About ½ of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation.
2. Values provided are for maximum loads noted in [Project Description](#). Additional geotechnical consultation will be necessary if higher loads are anticipated. Does not include seismically induced settlement.
3. Unsuitable or soft soils should be over excavated and replaced per the recommendations presented in [Earthwork](#).
4. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
5. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed, and compacted structural fill be placed against the vertical footing face. Assumes no hydrostatic pressure.
6. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Frictional resistance for granular materials is dependent on the bearing pressure which may vary due to load combinations.
7. Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet.

Shallow Foundations Designed for Uplift Conditions

Reinforced concrete footings or dead-man foundations, cast against undisturbed subsoils, are recommended for resistance to uplift. Footings may be designed using the cone method. The equation for determining the ultimate uplift capacity as a function of footing dimension, foundation depth, and soil weight is:

$$T_u = 0.8 \cdot \gamma \cdot D^2 \cdot (B + L) + W$$

Where:

Variable	Description	Unit
T_u	Ultimate uplift capacity	pounds
γ	Unit weight of soil ¹	pcf
D	Depth to base of footing/dead-man foundation below final grade	feet
B	Width of footing/dead-man foundation	feet
L	Length of footing/dead-man foundation	feet
W	Weight of footing/dead-man + weight of soil directly over the top of the footing/block	pounds

Notes: ¹A unit weight (γ) of 120 pounds per cubic foot (pcf) is recommended for soil (either undisturbed or compacted backfill) at this site.

The design uplift resistance should be calculated by dividing the ultimate resistance obtained from the equation above by an appropriate factor of safety. A factor of safety of at least 2 is recommended for live uplift loads in the analysis.

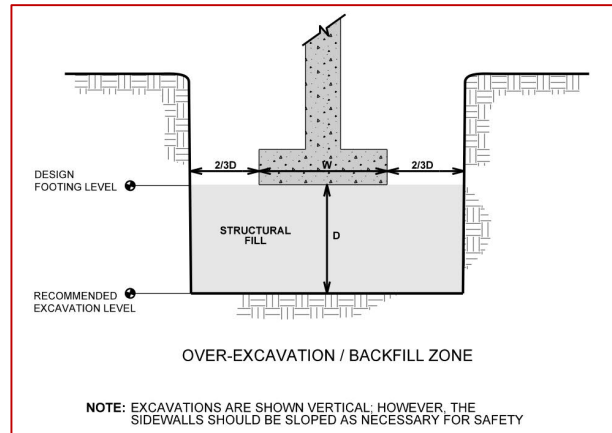
Foundations should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Foundation excavations should be observed by the geotechnical engineer. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

Foundation Construction Considerations

As noted in [Earthwork](#), the footing excavations should be evaluated under the observation of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

Over excavation for engineered fill placement below footings should be conducted as shown below. The over excavation should be backfilled up to the footing base elevation, with low volume change engineered fill placed, as recommended in the [Earthwork](#) section.



Floor Slabs

Design parameters for floor slabs assume the requirements for [Earthwork](#) have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support ¹	Engineered fill extending 2 feet below the bottom of foundations, or 4 feet below existing grades, whichever is greater.
Subbase	Minimum 4 inches of Aggregate Base
Estimated Modulus of Subgrade Reaction ²	200 pounds per square inch per inch (psi/in) for point loads. (The modulus was obtained based on estimates obtained from NAVFAC 7.1 design charts). This value is for a small loaded area (1 Sq. ft or less) such as for forklift wheel loads or point loads and should be adjusted for larger loaded areas.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment 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.

Saw-cut contraction 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.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

Lateral Earth Pressures

Design Parameters

Lateral earth pressures are provided for below grade structures such as loading docks, and retaining walls with a height of less than 6 feet. For engineered fill comprised of on-site soils above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements are:

ITEM	VALUE ^{a, b}
Active Case	40 psf/ft
Passive Case	375 psf/ft
At-Rest Case	60 psf/ft

Coefficient of Friction	0.36
^a Note: The values are based on on-site soils used as backfill. ^b Note: Uniform, horizontal backfill, compacted to at least 90% of the ASTM D 1557 maximum dry density, rendering a maximum unit weight of 125 pcf.	

The lateral earth pressures herein do not include any factor of safety and are not applicable for submerged soils/hydrostatic loading. Additional recommendations may be necessary if such conditions are to be included in the design.

Fill against foundation and retaining walls should be compacted to densities specified in the Earthwork section of this report. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors.

Pavements

General Pavement Comments

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in [Project Description](#) and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the [Earthwork](#) section.

Pavement Design Parameters

Design of asphalt concrete (AC) pavements is based on the procedures outlined in the Caltrans "Highway Design Manual" (Caltrans, 2018). Design of Portland cement concrete (PCC) pavements are based upon American Concrete Institute (ACI) 330R-08; "Guide for Design and Construction of Concrete Parking Lots."

During the field investigation at the site, two samples of the near surface soil taken from our borings were tested in our laboratory to determine the Hveem Stabilometer Value (R-value). The tests produced R-values of 39 and 58. A design R-Value of 35 was used to calculate the AC pavement thickness sections. A modulus of subgrade reaction of 120 pci and a modulus of rupture of 600 psi were used for the PCC pavement designs.

The structural sections are predicated upon proper compaction of the utility trench backfills and the subgrade soils as prescribed by in [Earthwork](#), with the upper 12 inches of subgrade soils and all aggregate base material brought to a minimum relative compaction of 95 percent in accordance with ASTM D 1557 prior to paving. The aggregate base should meet Caltrans requirements for Class 2 base.

The pavement designs were based upon the results of preliminary sampling and testing and should be verified by additional sampling and testing during construction when the actual subgrade soils are exposed.

Pavement Section Thicknesses

The following tables provides our opinion of minimum thickness for AC and PCC sections:

Asphalt Concrete Design		
Usage	Assumed Traffic Index	Recommended Structural Section
Auto Parking Areas	5.0	3" HMA ¹ /5" Class 2 AB ²
Auto Roads	5.5	3" HMA ¹ /6" Class 2 AB ²
Truck Parking Areas	6.0	3.5" HMA ¹ /7" Class 2 AB ²
Truck Ramps and Roads	8.0	4" HMA ¹ /11" Class 2 AB ²
^{1.} HMA = hot mix asphalt ^{2.} AB = aggregate base		

Portland Cement Concrete Design			
Layer	Thickness (inches)		
	Light Duty ¹	Medium Duty ²	Dumpster Pad ³
PCC	5.0	6.0	7.5
Aggregate Base	4.0	4.0	4.0
^{1.} Car Parking and Access Lanes, Average Daily Truck Traffic (ADTT) = 1 (Category A). ^{2.} Truck Parking Areas, Multiple Units, ADTT = 25 (Category B) ^{3.} In areas of anticipated heavy traffic, fire trucks, delivery trucks, or concentrated loads (e.g., dumpster pads), and areas with repeated turning or maneuvering of heavy vehicles, ADTT = 700 (Category C).			

Areas for parking of heavy vehicles, concentrated turn areas, and start/stop maneuvers could require thicker pavement sections. Edge restraints (i.e. concrete curbs or aggregate shoulders) should be planned along curves and areas of maneuvering vehicles.

Although not required for structural support, a minimum 4-inch thick base course layer is recommended to help reduce potential for slab curl, shrinkage cracking, and subgrade pumping through joints. Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign

material and doweled where necessary for load transfer. PCC pavement details for joint spacing, joint reinforcement, and joint sealing should be prepared in accordance with ACI 330 and ACI 325.

Where practical, we recommend early-entry cutting of crack-control joints in PCC pavements. Cutting of the concrete in its “green” state typically reduces the potential for micro-cracking of the pavements prior to the crack control joints being formed, compared to cutting the joints after the concrete has fully set. Micro-cracking of pavements may lead to crack formation in locations other than the sawed joints, and/or reduction of fatigue life of the pavement.

Openings in pavements, such as decorative landscaped areas, are sources for water infiltration into surrounding pavement systems. Water can collect in the islands and migrate into the surrounding subgrade soils thereby degrading support of the pavement. Islands with raised concrete curbs, irrigated foliage, and low permeability near-surface soils are particular areas of concern. The civil design for the pavements with these conditions should include features to restrict or collect and discharge excess water from the islands. Examples of features are edge drains connected to the stormwater collection system, longitudinal subdrains, or other suitable outlets and impermeable barriers preventing lateral migration of water such as a cutoff wall installed to a depth below the pavement structure.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic upkeep should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

Storm Water Management

Four in-situ percolation tests (falling head borehole permeability) were performed at approximate depths of 5 and 10 feet bgs within boreholes drilled with an 8-inch diameter auger. The objective of the testing is to provide infiltration rates for designing the proposed infiltration system. A 2-inch thick, 3/4-inch gravel layer was placed in the bottom of each boring after the borings were drilled to investigate the soil profile. Three-inch diameter perforated pipes were installed on top of the gravel layer and gravel was used to backfill between the perforated pipes and the boring sidewall. The borings were then filled with water for a pre-soak period.

At the beginning of each test, the pipes were refilled with water and readings were taken at periodic time intervals as the water level dropped. The soil at the percolation test locations was classified in the field using a visual/manual procedure. The infiltration velocity is presented as the infiltration rate and is summarized in the following table. The infiltration rates provided do not include safety factors.

Test Location	Boring Depth (ft.) ¹	Test Depth Range (ft.) ¹	Soil Type	Water Head (ft)	Percolation Rate Average (in./hr.)	Infiltration Rate Average (in./hr.) ²
Perc-1	5	0 to 5	SM	5	49.5	1.7

Perc-2	10	5 to 10	SM	5	171.0	6.8
Perc-3	5	0 to 5	SM	5	84.5	3.5
Perc-4	10	5 to 10	SM	5	101.5	5.5

1. Below existing ground surface.
2. If proposed infiltration system will mainly rely on vertical downward seepage, the correlated infiltration rates should be used. The correlation rate is based on the Porchet Method.

The above infiltration rates determined by the percolation test method are based on field test results utilizing clear water. Infiltration rates can be affected by silt buildup, debris, degree of soil saturation, site variability and other factors. The rate obtained at specific location and depth is representative of the location and depth tested and may not be representative of the entire site. Application of an appropriate safety factor is prudent to account for subsoil inconsistencies, possible compaction related to site grading, and potential silting of the percolating soils, depending on the application.

The design engineer should also check with the local agency for the limitation of the infiltration rate allowed in the design. If the maximum allowable design infiltration rate is lower than the above recommended rate, the maximum allowable design infiltration rate should be used. The designer of the basins should also consider other possible site variability in the design.

The percolation tests were performed with clear water, whereas the storm water will likely not be clear, but may contain organics, fines, and grease/oil. The presence of these deleterious materials will tend to decrease the rate that water percolates from the infiltration systems. Design of the storm water infiltration systems should account for the presence of these materials and should incorporate structures/devices to remove these deleterious materials.

Based on the soils encountered in our borings, we expect the percolation rates of the soils could be different than measured in the field due to variations in fines and gravel content. The design elevation and size of the proposed infiltration system should account for this expected variability in infiltration rates.

Infiltration testing should be performed after construction of the infiltration system to verify the design infiltration rates. It should be noted that siltation and vegetation growth along with other factors may affect the infiltration rates of the infiltration areas. The actual infiltration rate may vary from the values reported here. Infiltration systems should be located at least 10 feet from any existing or proposed foundation system.

Corrosivity

The results of laboratory sulfides, soluble sulfate, chlorides, electrical resistivity, redox

potential, total salts, and pH testing are presented in our appendix within the [Exploration Results](#) section. The values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Results of soluble sulfate testing indicate samples of the on-site soils tested possess negligible sulfate concentrations when classified in accordance with Table 19.3.1.1 of the ACI Design Manual. Concrete should be designed in accordance with the exposure class S0 provisions of the ACI Design Manual, Section 318, Chapter 19.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials, or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. The findings and recommendations presented in this report were prepared in a manner consistent with the standards of care and skill ordinarily exercised by members of its profession completing similar studies and practicing under similar conditions in the geographic vicinity and at the time these services have been performed. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Approximate Boring Depth or Refusal (feet) ^{1,2}	Location
10(B-1 to B-6 & B-9 to B-12)	21 ½	Building area
2 (B-7 & B-8)	51 ½	Building area
3 (B-13 to B-15)	16 ½	Fuel Station (Canopy and Tank)
27 (P-1 to P-27)	5 to 11 ½	Parking/Driveway area
4 (Perc-1 to Perc-4)	5 to 10	Percolation Testing

1. Below ground surface.

Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ± 10 feet) and referencing existing site features. If elevations and a more precise boring layout are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: We advanced the borings with a truck-mounted drill rig using continuous flight hollow stem augers. Four samples were generally obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. A 3-inch O.D. split-barrel sampling spoon with 2.5-inch I.D. ring lined sampler was also used for sampling soils at the project site. Ring-lined, split-barrel sampling procedures are similar to standard split spoon sampling procedure. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation

of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- Moisture Content
- Dry Unit Weight
- Particle-size Distribution (Gradation) of Soils Using Sieve Analysis
- Maximum Dry Density/Optimum Moisture Content
- Expansion Index
- Corrosion Suite
- Consolidation
- R-Value

The laboratory testing program often included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.

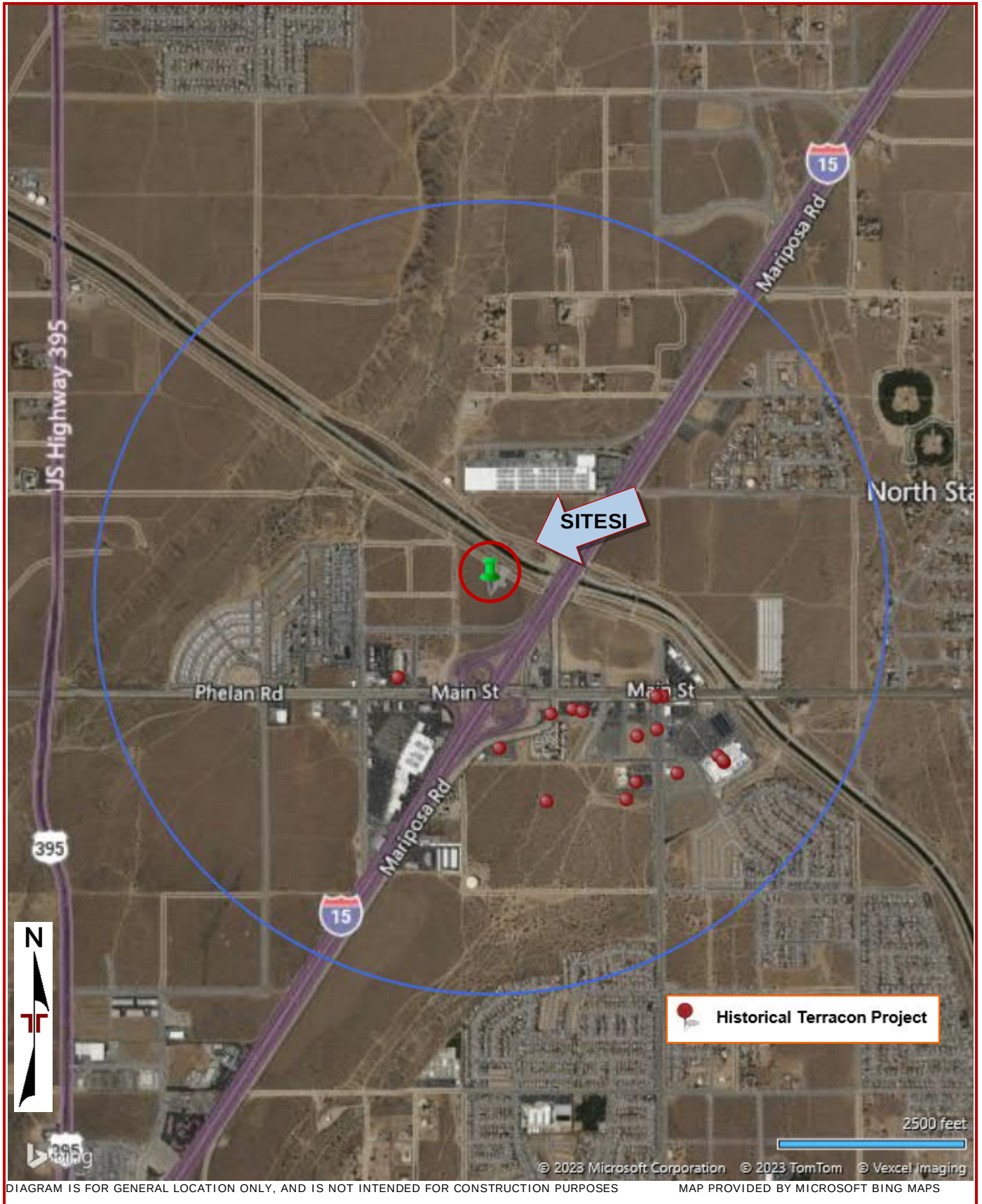
Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

Site Location



Exploration Plan (11x17 Portrait)

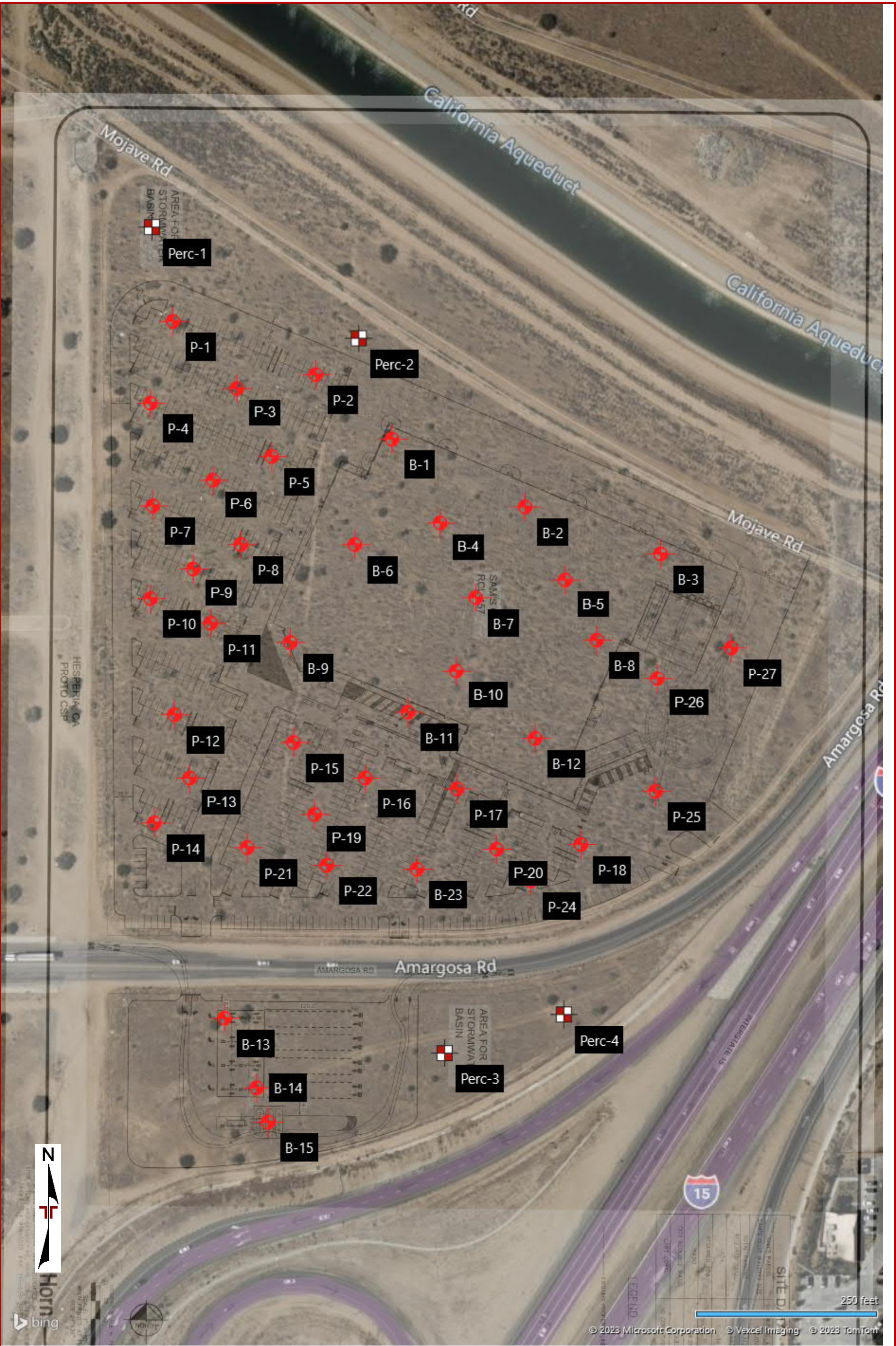


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Exploration and Laboratory Results

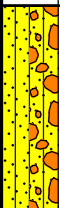
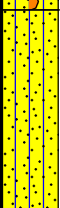
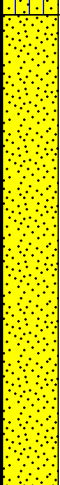
BORING LOG NO. B-1

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	Latitude: 34.4310° Longitude: -117.3805°							
DEPTH								
	SILTY SAND WITH GRAVEL (SM) , brown, very dense	5			22-50/6"	2.7	122	30
	SILTY SAND (SM) , brown, very dense	10			26-50/6"	2.6	127	
	POORLY GRADED SAND (SP) , reddish brown, very dense	15			26-50/6"	1.7	117	16
	POORLY GRADED SAND (SP) , reddish brown, very dense	20			30-50/6"			
	brown, medium dense	21			6-12-13 N=25			5
	dense	21.5			17-19-23 N=42			
Boring Terminated at 21.5 Feet								
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS		 1355 E Cooley Dr, Ste C Colton, CA		Boring Started: 07-14-2023		Boring Completed: 07-14-2023		
Groundwater not encountered				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-1		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

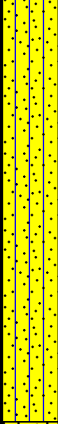
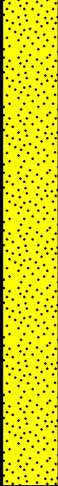
BORING LOG NO. B-2

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4308° Longitude: -117.3799°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (GM) , light brown, very dense, with trace of gravel							
		5			50/6"			23
					50/6"			
	dense				30-37-50			16
		10			31-38-50			
	POORLY GRADED SAND (SP) , dense							
		15			8-12-17 N=29			5
	medium dense	20			15-18-20 N=38			
	Boring Terminated at 21.5 Feet							
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.								
WATER LEVEL OBSERVATIONS Groundwater not encountered				Boring Started: 07-10-2023 Drill Rig: CME 75 Project No.: CB235111		Boring Completed: 07-10-2023 Driller: 2R Exhibit: A-2		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

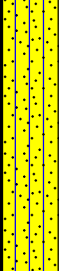
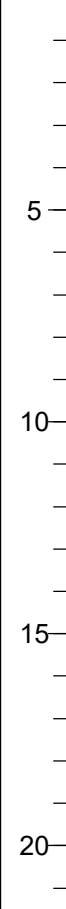
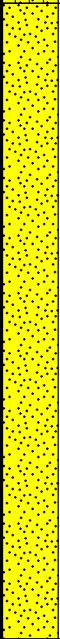
BORING LOG NO. B-3

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES		
	Latitude: 34.4306° Longitude: -117.3792°									
DEPTH										
	SILTY SAND (SM) , brown, very dense, with trace of gravel									
									45-50/6"	
									25-50/6"	16
									25-38-50	
									30-50/6"	6
									11-15-19 N=34	
									12-19-31 N=50	
6.5	POORLY GRADED SAND (SP) , dense									
	very dense									
21.5	Boring Terminated at 21.5 Feet									
Stratification lines are approximate. In-situ, the transition may be gradual.										
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:						
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.								
WATER LEVEL OBSERVATIONS		 1355 E Cooley Dr, Ste C Colton, CA		Boring Started: 07-10-2023		Boring Completed: 07-10-2023				
Groundwater not encountered				Drill Rig: CME 75		Driller: 2R				
				Project No.: CB235111		Exhibit: A-3				

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

BORING LOG NO. B-4

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4307° Longitude: -117.3802°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , brown, medium dense							
		5			15-19-20	2.0	120	21
					20-16-17	1.4	116	
7.5	POORLY GRADED SAND (SP) , brown, dense				24-34-42	2.9	122	
		10			34-43-48			7
	medium dense	15			10-10-15 N=25			7
		20			12-19-21 N=40			
21.5	Boring Terminated at 21.5 Feet							
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS Groundwater not encountered		 1355 E Cooley Dr, Ste C Colton, CA		Boring Started: 07-13-2023		Boring Completed: 07-13-2023		
				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-4		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

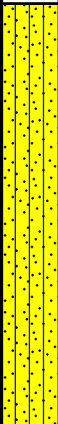
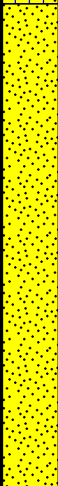
BORING LOG NO. B-5

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4305° Longitude: -117.3797°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , brown, very dense, with trace of gravel							
		5			36-55/6"			28
					45-50/5"			
					21-35-52			13
		10.0			22-26-28			
	POORLY GRADED SAND (SM) , medium dense, with trace of gravel							
		15			12-22-24 N=46			7
		20			13-13-18 N=31			
	21.5							
Boring Terminated at 21.5 Feet								
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.								
WATER LEVEL OBSERVATIONS					Boring Started: 07-10-2023		Boring Completed: 07-10-2023	
Groundwater not encountered					Drill Rig: CME 75		Driller: 2R	
					Project No.: CB235111		Exhibit: A-5	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

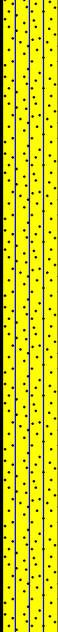
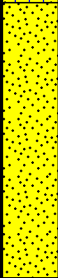
BORING LOG NO. B-6

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	Latitude: 34.4306° Longitude: -117.3806°							
DEPTH								
	SILTY SAND (SM) , brown, medium dense, with trace of gravel							
		5			23-23-23	2.0	124	20
					11-10-17			
		reddish brown, very dense			34-50/4"	2.5	130	
		very dense	10		34-50/6"			19
	15.0							
	POORLY GRADED SAND (SP) , brown, dense	15			11-17-22 N=39			
	21.5							
	POORLY GRADED SAND (SP) , brown, dense	20			17-19-19 N=38			
	Boring Terminated at 21.5 Feet							
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS		 1355 E Cooley Dr, Ste C Colton, CA		Boring Started: 07-13-2023		Boring Completed: 07-13-2023		
Groundwater not encountered				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-6		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. B-7

Page 1 of 2

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4304° Longitude: -117.3801°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	DEPTH							
	SILTY SAND WITH GRAVEL (SM) , very dense							
		5			50/5"			28
					50			
	7.5							
	POORLY GRADED SAND WITH GRAVEL (SP) , reddish brown, medium dense				19-22-25	0.7		7
		10			15-23-36			
		15			10-12-23 N=35			5
		20			23-18-26 N=44			
		25			14-18-21 N=39			
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.								
WATER LEVEL OBSERVATIONS Groundwater not encountered				Boring Started: 07-10-2023 Drill Rig: CME 75 Project No.: CB235111		Boring Completed: 07-10-2023 Driller: 2R Exhibit: A-7		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. B-7

Page 2 of 2

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4304° Longitude: -117.3801°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	DEPTH							
	POORLY GRADED SAND WITH GRAVEL (SP) , reddish brown, medium dense (continued)	30		X	14-16-16 N=32			
		35		X	9-17-16 N=33			
	very dense 40' to 51.5'	40		X	17-23-30 N=53			
		45		X	20-32-32 N=64			
		50		X	18-31-23 N=54			
	51.5 Boring Terminated at 51.5 Feet							
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS				Boring Started: 07-10-2023		Boring Completed: 07-10-2023		
Groundwater not encountered				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-7		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. B-8

Page 1 of 2

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	Latitude: 34.4303° Longitude: -117.3795°							
DEPTH								
	SILTY SAND (SM) , very dense, with trace of gravel							
					50/6"			20
	brown, dense	5			23-25-48	1.9	123	14
					26-23-23			
		10			22-27-40			
					12-16-18 N=34			
					13-16-20 N=36			5
					12-18-13 N=31			
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
		See Appendix B for description of laboratory procedures and additional data (if any).						
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS				Boring Started: 07-10-2023		Boring Completed: 07-10-2023		
<i>Groundwater not encountered</i>				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-8		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. B-8

Page 2 of 2

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4303° Longitude: -117.3795°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	DEPTH							
	SILTY SAND WITH GRAVEL (SM) , light brown, dense (<i>continued</i>)							
	30.0	30						
	POORLY GRADED SAND WITH GRAVEL (SP) , dense				10-15-25 N=40			5
	35.0	35						
	SILTY SAND WITH GRAVEL (SM) , dense				17-20-15 N=35			
		40						
					12-18-27 N=45			
		45						
					17-22-27 N=49			
	very dense	50						
	51.5				19-23-28 N=51			
	Boring Terminated at 51.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-10-2023

Boring Completed: 07-10-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-8

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

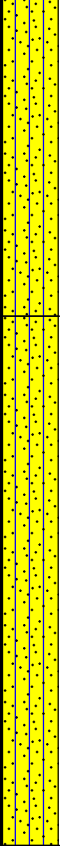
BORING LOG NO. B-9

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	Latitude: 34.4303° Longitude: -117.3809°							
DEPTH								
	SILTY SAND (SM) , medium dense, with trace of gravel							
		5			13-16-16	1.6	121	16
					11-16-20	1.6	119	
	7.5							
	SILTY SAND (SM) , reddish brown, very dense				34-40-50/5"			
		10						
					23-50/5"			13
		dense	15			19-23-24 N=47		
20.0		20						
	POORLY GRADED SAND (SP) , brown, dense				15-15-17 N=32			
21.5								
	Boring Terminated at 21.5 Feet							
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
		See Appendix B for description of laboratory procedures and additional data (if any).						
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS		 1355 E Cooley Dr, Ste C Colton, CA		Boring Started: 07-13-2023		Boring Completed: 07-13-2023		
Groundwater not encountered				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-9		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

BORING LOG NO. B-10

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	Latitude: 34.4301° Longitude: -117.3802°							
DEPTH								
	SILTY SAND (SM) , dark brown, medium dense, with trace of gravel							
5.0		5			12-16-20	2.4		22
	SILTY SAND (SM) , reddish brown, very dense				50/5"			
7.5								
	POORLY GRADED SAND (SP) , reddish brown, dense				30-44-45	1.5	117	
		10			30-42-50			
		15			12-14-18 N=32			4
		20			12-13-17 N=30			
21.5	Boring Terminated at 21.5 Feet							
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS		 1355 E Cooley Dr, Ste C Colton, CA		Boring Started: 07-13-2023		Boring Completed: 07-13-2023		
Groundwater not encountered				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-10		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

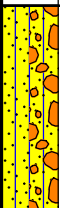
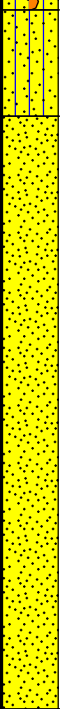
BORING LOG NO. B-11

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	Latitude: 34.4300° Longitude: -117.3804°							
DEPTH								
	SILTY SAND WITH GRAVEL (SM) , dark brown, very dense	5			15-50/4"			28
					50/4"			
	SILTY SAND (SM) , reddish brown, very dense							
	POORLY GRADED SAND (SP) , reddish brown, dense	10			20-40-50	2.1	118	14
	very dense				30-50/6"			
	medium dense	15			11-14-14 N=28			
	light brown, dense	20			19-19-24 N=43			
	Boring Terminated at 21.5 Feet							
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS				Boring Started: 07-13-2023		Boring Completed: 07-13-2023		
Groundwater not encountered				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-11		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

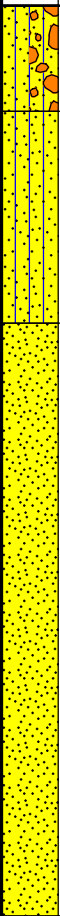
BORING LOG NO. B-12

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	Latitude: 34.4299° Longitude: -117.3798°							
	DEPTH							
	SILTY SAND WITH GRAVEL (SM) , dark brown							
	2.5							
	SILTY SAND (SM) , dark brown, very dense				32-50/6"			24
	reddish brown	5			28-50/6"			22
	7.5							
	POORLY GRADED SAND (SP) , reddish brown, dense				22-39-50	1.7	115	
			10			35-40-48	1.2	118
	brown	15			15-14-19 N=33			
		20			11-15-20 N=35			
	21.5							
	Boring Terminated at 21.5 Feet							
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS				Boring Started: 07-13-2023		Boring Completed: 07-13-2023		
Groundwater not encountered				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-12		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

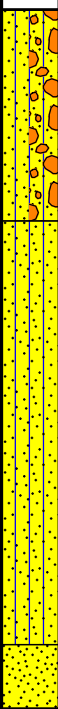
BORING LOG NO. B-14

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PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4286° Longitude: -117.3811°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND WITH GRAVEL (SM) , dark brown, dense							
5.0		5			26-37-47			30
	SILTY SAND (SM) , dark brown, very dense				26-50/6"			27
					50/6"			
	dense	10			26-37-50			
15.0		15			11-15-17 N=32			
16.5	POORLY GRADED SAND (SP) , dark brown, dense							
	Boring Terminated at 16.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-14-2023

Boring Completed: 07-14-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-14

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

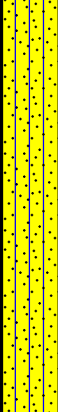
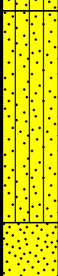
BORING LOG NO. B-15

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4284° Longitude: -117.3810°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown, very dense							
		5			27-50/6"			30
					17-27-36/0"			14
					50/6"			30
		10			35-50/6"			
	SILTY SAND (SM) , trace gravel, dark brown, very dense							
	POORLY GRADED SAND (SP) , trace gravel, dark brown, medium dense	15			8-8-12 N=20			
	Boring Terminated at 16.5 Feet	16.5						
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: 8" Hollow Stem Auger		See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.								
WATER LEVEL OBSERVATIONS Groundwater not encountered					Boring Started: 07-14-2023		Boring Completed: 07-14-2023	
					Drill Rig: CME 75		Driller: 2R	
					Project No.: CB235111		Exhibit: A-15	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

BORING LOG NO. P-1

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4294° Longitude: -117.3804°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							15
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-101

BORING LOG NO. P-2

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CASITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4315° Longitude: -117.3815°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							
5.0		5						
	Boring Terminated at 5 Feet							
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: 8" Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS		 1355 E Cooley Dr, Ste C Colton, CA		Boring Started: 07-13-2023		Boring Completed: 07-13-2023		
Groundwater not encountered				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-102		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. P-3

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4313° Longitude: -117.3808°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							22
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-103

BORING LOG NO. P-4

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4312° Longitude: -117.3812°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).
See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-104

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. P-5

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4312° Longitude: -117.3816°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							18
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).
See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-105

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. P-6

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4310° Longitude: -117.3810°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							27
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-106

BORING LOG NO. P-7

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4309° Longitude: -117.3813°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-107

BORING LOG NO. P-8

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4308° Longitude: -117.3816°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							24
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-108

BORING LOG NO. P-9

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CASITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4306° Longitude: -117.3812°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							25
5.0		5						
	Boring Terminated at 5 Feet							
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: 8" Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS		 1355 E Cooley Dr, Ste C Colton, CA		Boring Started: 07-13-2023		Boring Completed: 07-13-2023		
Groundwater not encountered				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-109		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. P-10

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4305° Longitude: -117.3814°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-110

BORING LOG NO. P-11

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4304° Longitude: -117.3816°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							30
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).
See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-111

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. P-12

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4303° Longitude: -117.3813°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	POORLY GRADED SAND WITH SILT (SP-SM) , trace gravel, brown to reddish brown, very dense							
		5		X	29-34-40 N=74			7
				X	29-27-34 N=61			8
		10		X	24-40-47 N=87			
				X	39-50/6"			
	11.5	Boring Terminated at 11.5 Feet						
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: 8" Hollow Stem Auger		See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.								
WATER LEVEL OBSERVATIONS Groundwater not encountered				Boring Started: 07-13-2023 Drill Rig: CME 75 Project No.: CB235111		Boring Completed: 07-13-2023 Driller: 2R Exhibit: A-112		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

Page 1 of 1

**CLIENT: Kimley-Horn and Associates Inc
Orange, CA**

LOCATION See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
GRAPHIC LOG	Latitude: 34.4296° Longitude: -117.3816°	DEPTH						
	 SILTY SAND (SM), trace gravel, brown, very dense dense 7.5							
 POORLY GRADED SAND (SP), trace gravel, brown, medium dense very dense 11.5								
Boring Terminated at 11.5 Feet								

Advancement Method: 8" Hollow Stem Auger
Abandonment Method: Boring backfilled with auger cuttings upon completion.

Notes:

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Exhibit: A-115

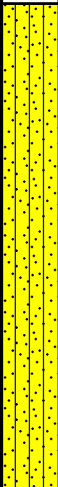
BORING LOG NO. P-16

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

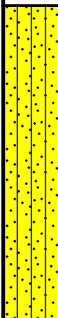
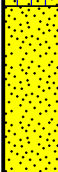
GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4299° Longitude: -117.3809°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown, dense							
	medium dense	5		X	13-20-23 N=43			
				X	9-11-14 N=25			
	very dense			X	32-50/6"			
		10		X	15-24-19 N=43			
	Boring Terminated at 11.5 Feet							
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: 8" Hollow Stem Auger		See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.								
WATER LEVEL OBSERVATIONS Groundwater not encountered					Boring Started: 07-13-2023		Boring Completed: 07-13-2023	
					Drill Rig: CME 75		Driller: 2R	
					Project No.: CB235111		Exhibit: A-116	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

Page 1 of 1

**CLIENT: Kimley-Horn and Associates Inc
Orange, CA**

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4297° Longitude: -117.3806°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	<u>SILTY SAND (SM)</u> , dark brown, dense very dense	5			28-23-26 N=49			18
					30-50/5"			29
	<u>POORLY GRADED SAND (SP)</u> , trace gravel, reddish brown, dense	10			13-17-18 N=35			
					17-17-18 N=35			
	Boring Terminated at 11.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method: 8" Hollow Stem Auger	See Exhibit A-3 for description of field procedures.	Notes:	
	See Appendix B for description of laboratory procedures and additional data (if any).		
Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Appendix C for explanation of symbols and abbreviations.		
WATER LEVEL OBSERVATIONS	 1355 E Cooley Dr, Ste C Colton, CA	Boring Started: 07-13-2023	Boring Completed: 07-13-2023
Groundwater not encountered		Drill Rig: CME 75	Driller: 2R
		Project No.: CB235111	Exhibit: A-117

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB2351111 SAM'S CLUB HESPER.GPJ TERRACON.DATATEMPLATE.GDT 8/24/23

Page 1 of 1

**CLIENT: Kimley-Horn and Associates Inc
Orange, CA**

LOCATION See Exhibit A-2		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
GRAPHIC LOG	DEPTH							
	<u>SILTY SAND (SM)</u>, trace gravel, dark brown, very dense medium dense	5			30-37-42 N=79			25
					7-11-13 N=24			
	<u>POORLY GRADED SAND (SP)</u>, trace silt, dark brown, medium dense	10			11-13-15 N=28			
					8-9-7 N=16			
<i>Boring Terminated at 11.5 Feet</i>								

Exhibit: A-118

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

BORING LOG NO. P-19

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4295° Longitude: -117.3796°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, brown							
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-119

BORING LOG NO. P-20

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4296° Longitude: -117.3808°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, brown							29
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-120

BORING LOG NO. P-21

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4295° Longitude: -117.3800°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-121

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. P-22

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4295° Longitude: -117.3811°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, brown							26
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon

1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-122

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. P-23

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4294° Longitude: -117.3808°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon

1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-123

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. P-24

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4293° Longitude: -117.3798°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							28
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-13-2023

Boring Completed: 07-13-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-124

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

Page 1 of 1

**CLIENT: Kimley-Horn and Associates Inc
Orange, CA**

GRAPHIC LOG	LOCATION See Exhibit A-2	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	Latitude: 34.4297° Longitude: -117.3793°							
	DEPTH							

dense

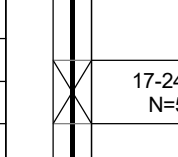


Figure 1: A schematic diagram of a 1D lattice with 10 sites. The lattice is represented by a horizontal line with 10 vertical segments. The sites are numbered 1 to 10 from left to right. A thick vertical line is drawn between sites 5 and 6, representing a boundary. The sites are grouped into three regions: sites 1-5 are labeled '17-24-28 N=52', sites 6-10 are labeled '17-20-25 N=45', and sites 11-15 are labeled '17-21-26 N=45'. The sites are connected by horizontal lines, and the vertical line is labeled '17-24-28 N=52'.

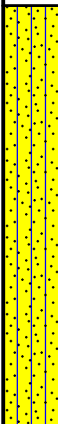
Advancement Method: 8" Hollow Stem Auger	See Exhibit A-3 for description of field procedures.	Notes:	
	See Appendix B for description of laboratory procedures and additional data (if any).		
Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Appendix C for explanation of symbols and abbreviations.		
WATER LEVEL OBSERVATIONS	 1355 E Cooley Dr, Ste C Colton, CA	Boring Started: 07-13-2023	Boring Completed: 07-13-2023
<i>Groundwater not encountered</i>		Drill Rig: CME 75	Driller: 2R
		Project No.: CB235111	Exhibit: A-125

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

Page 1 of 1

**CLIENT: Kimley-Horn and Associates Inc
Orange, CA**

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	See Exhibit A-2							
	Latitude: 34.4301° Longitude: -117.3792°							
	DEPTH							
	SILTY SAND (SM) , trace gravel, reddish brown, very dense							
	medium dense	5		X	26-50/5"			
				X	5-5-5 N=10			
	10.0	10						
	Boring Terminated at 10 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method: 8" Hollow Stem Auger	See Exhibit A-3 for description of field procedures.	Notes:	
Abandonment Method: Boring backfilled with auger cuttings upon completion.	See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.		
WATER LEVEL OBSERVATIONS	 1355 E Cooley Dr, Ste C Colton, CA	Boring Started: 07-13-2023	Boring Completed: 07-13-2023
<i>Groundwater not encountered</i>		Drill Rig: CME 75	Driller: 2R
		Project No.: CB235111	Exhibit: A-126

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT: GEO SMART LOG-NO WELL CB2351111 SAM'S CLUB HESPER.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

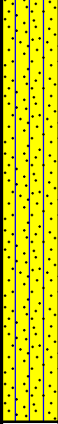
BORING LOG NO. P-27

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4302° Longitude: -117.3789°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, reddish brown to brown, very dense							
		5		X	23-30-30 N=60			8
				X	26-35-45 N=80			
		10.0						
Boring Terminated at 10 Feet								
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: 8" Hollow Stem Auger		See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.								
WATER LEVEL OBSERVATIONS Groundwater not encountered					Boring Started: 07-13-2023		Boring Completed: 07-13-2023	
					Drill Rig: CME 75		Driller: 2R	
					Project No.: CB235111		Exhibit: A-127	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

BORING LOG NO. Perc-1

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4318° Longitude: -117.3816°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							29
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).

See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-14-2023

Boring Completed: 07-14-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-201

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

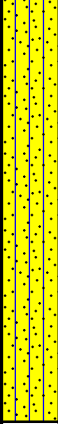
BORING LOG NO. Perc-2

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4314° Longitude: -117.3806°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
	DEPTH							
	SILTY SAND (SM) , trace gravel, dark brown	5						
	10.0	10						
Boring Terminated at 10 Feet								
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: 8" Hollow Stem Auger Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Exhibit A-3 for description of field procedures. See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.		Notes:				
WATER LEVEL OBSERVATIONS Groundwater not encountered				Boring Started: 07-14-2023		Boring Completed: 07-14-2023		
				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-202		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

BORING LOG NO. Perc-3

Page 1 of 1

PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CA

SITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4287° Longitude: -117.3802°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown							18
5.0		5						
	Boring Terminated at 5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
8" Hollow Stem Auger

See Exhibit A-3 for description of field procedures.

Notes:

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Appendix B for description of laboratory
procedures and additional data (if any).
See Appendix C for explanation of symbols and
abbreviations.

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Started: 07-14-2023

Boring Completed: 07-14-2023

Drill Rig: CME 75

Driller: 2R

Project No.: CB235111

Exhibit: A-203

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON_DATATEMPLATE.GDT 8/24/23

BORING LOG NO. Perc-4

Page 1 of 1

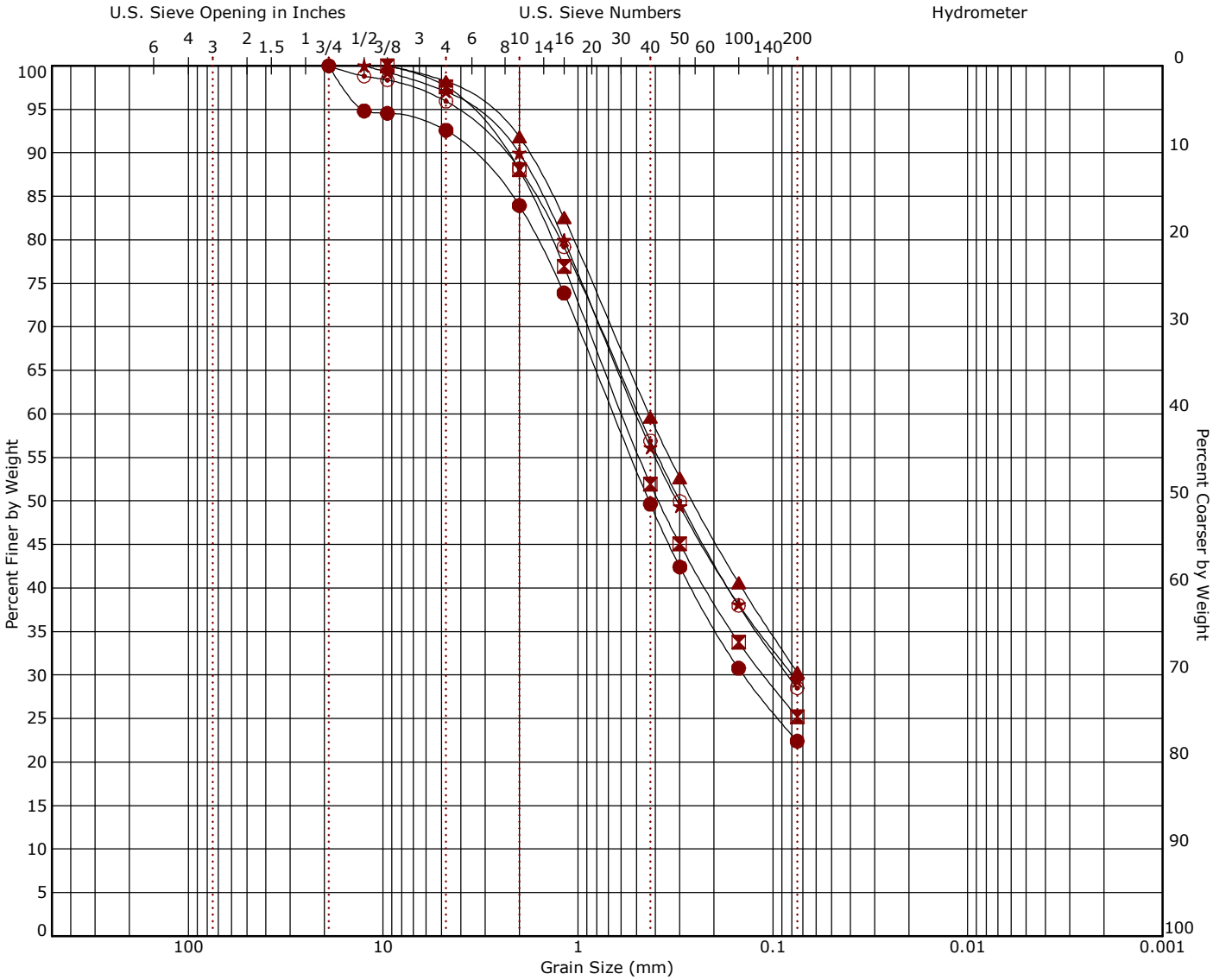
PROJECT: Sam's Club Hesperia

CLIENT: Kimley-Horn and Associates Inc
Orange, CASITE: North of Amargosa Road & West of Highway I-15
Hesperia, CA

GRAPHIC LOG	LOCATION See Exhibit A-2 Latitude: 34.4288° Longitude: -117.3797°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	PERCENT FINES
DEPTH								
	SILTY SAND (SM) , trace gravel, dark brown	5						
10.0	Boring Terminated at 10 Feet	10						
Stratification lines are approximate. In-situ, the transition may be gradual.								
Advancement Method: 8" Hollow Stem Auger		See Exhibit A-3 for description of field procedures.		Notes:				
Abandonment Method: Boring backfilled with auger cuttings upon completion.		See Appendix B for description of laboratory procedures and additional data (if any). See Appendix C for explanation of symbols and abbreviations.						
WATER LEVEL OBSERVATIONS		 1355 E Cooley Dr, Ste C Colton, CA		Boring Started: 07-14-2023		Boring Completed: 07-14-2023		
Groundwater not encountered				Drill Rig: CME 75		Driller: 2R		
				Project No.: CB235111		Exhibit: A-204		

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL CB235111 SAM'S CLUB HESPERIA.GPJ TERRACON DATATEMPLATE.GDT 8/24/23

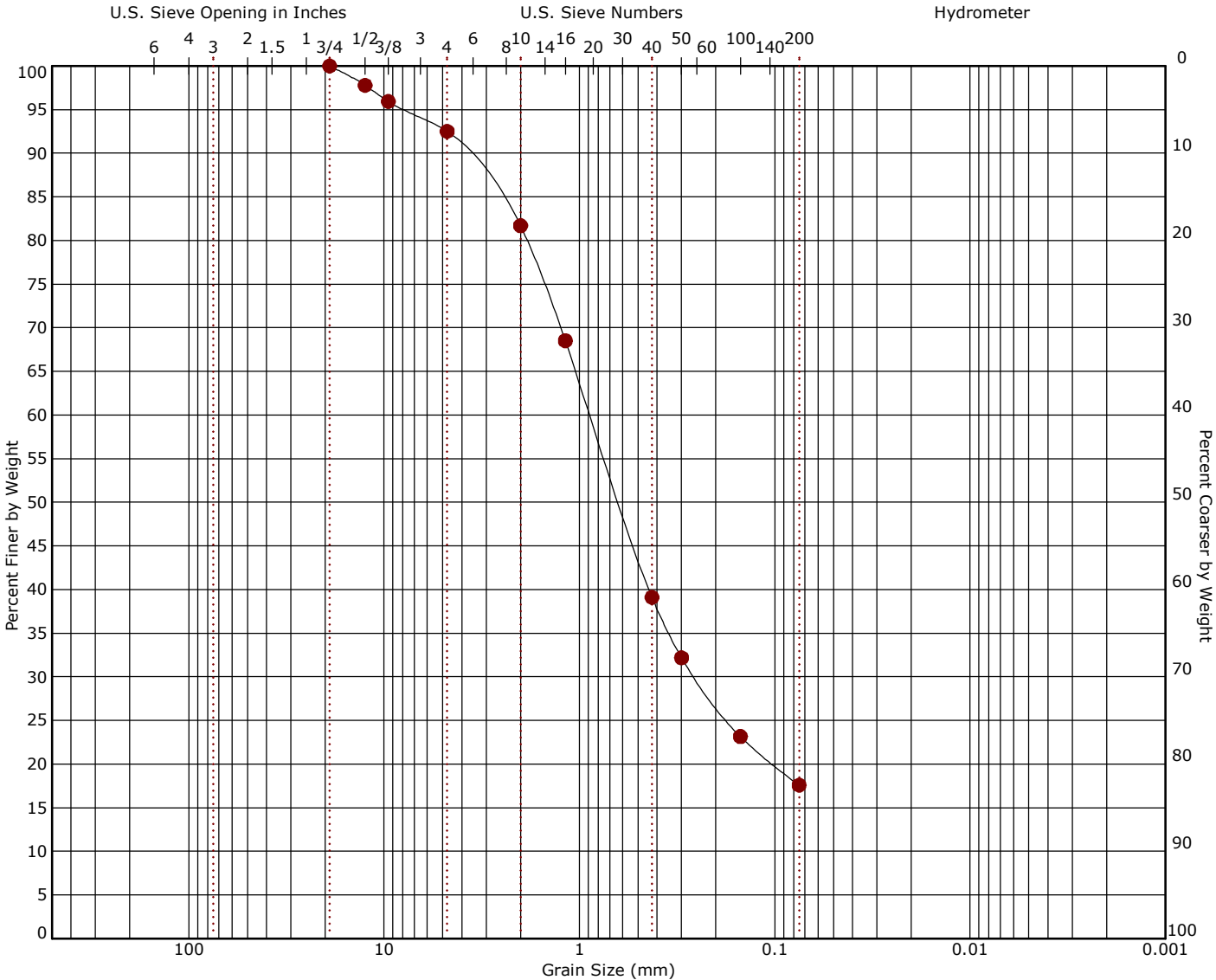
Grain Size Distribution
ASTM D422 / ASTM C136



Boring ID	Depth (Ft)	USCS Classification			USCS	AASHTO	LL	PL	PI	Cc	Cu
● P-3	0 - 5										
⊠ P-9	0 - 5										
▲ P-13	0 - 5										
★ P-20	0 - 5										
⊙ Perc-1	0 - 5										

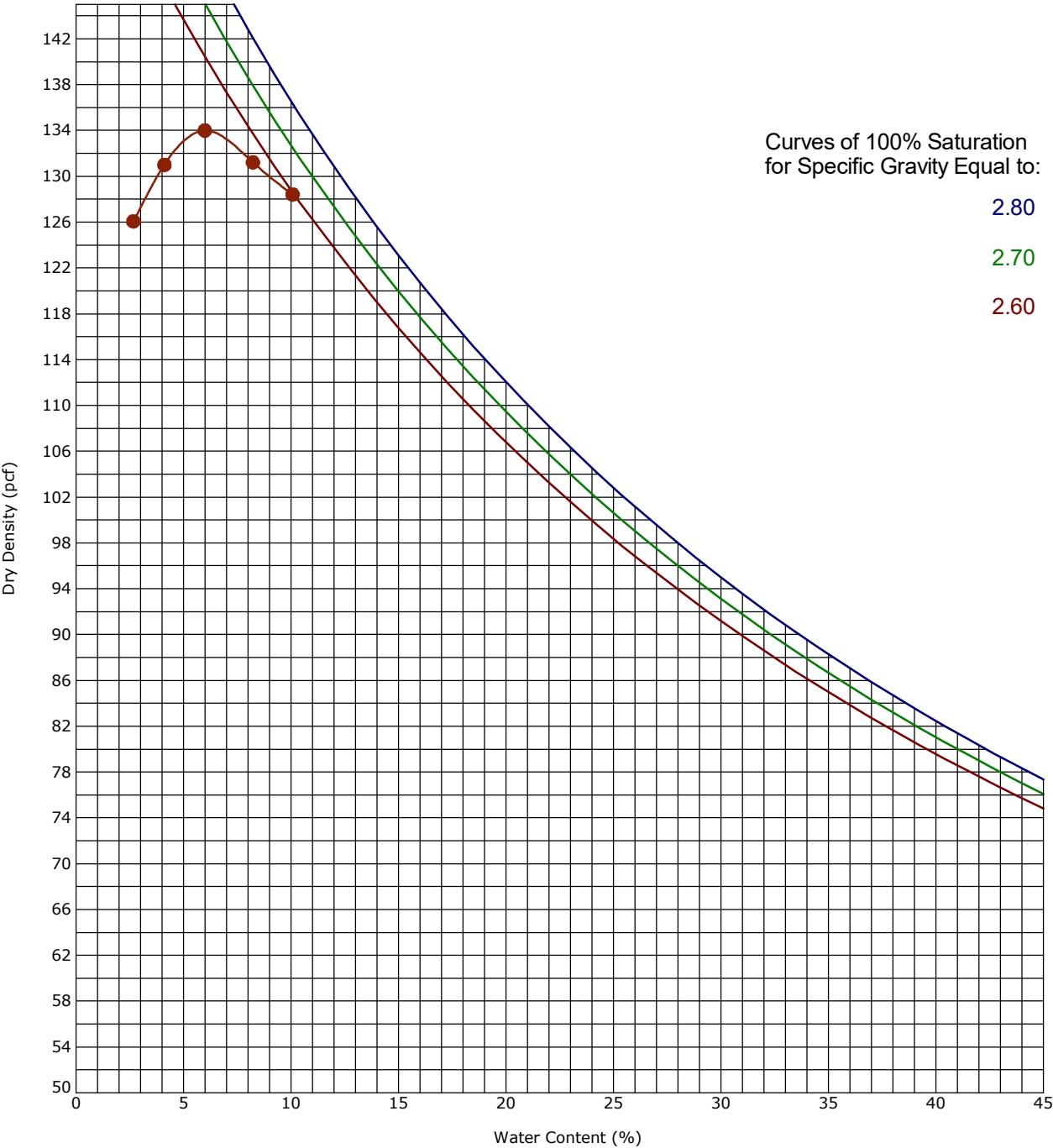
Boring ID	Depth (Ft)	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay
● P-3	0 - 5	19	0.658	0.141		0.0	7.4	70.2	22.4		
⊠ P-9	0 - 5	9.5	0.591	0.11		0.0	2.4	72.4	25.2		
▲ P-13	0 - 5	9.5	0.432			0.0	1.8	67.9	30.3		
★ P-20	0 - 5	12.5	0.501	0.079		0.0	2.9	67.7	29.4		
⊙ Perc-1	0 - 5	19	0.49	0.084		0.0	4.1	67.4	28.5		

Grain Size Distribution
ASTM D422 / ASTM C136



Cobbles		Gravel		Sand			Silt or Clay					
		coarse	fine	coarse	medium	fine						
Boring ID	Depth (Ft)	USCS Classification				USCS	AASHTO	LL	PL	PI	Cc	Cu
Perc-3	0 - 5											
Boring ID	Depth (Ft)	D ₁₀₀	D ₆₀	D ₃₀	D ₁₀	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay	
Perc-3	0 - 5	19	0.878	0.254		0.0	7.5	74.9	17.6			

Moisture-Density Relationship
ASTM D1557-Method D



Boring ID		Depth (Ft)		Description of Materials			
B-5		0 - 5					
Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
	0.0				ASTM D1557-Method D	134.0	6.0

750 Pilot Road, Suite F
Las Vegas, Nevada 89119
(702) 597-9393



Client

Project

Sam's Club Hesperia

Sample Submitted By: Terracon (CB)

Date Received: 7/28/2023

Lab No.: 23-0427

Results of Corrosion Analysis

Sample Number	--
Sample Location	B-7
Sample Depth (ft.)	0.0-5.0
pH Analysis, ASTM G51	7.62
Water Soluble Sulfate (SO ₄), ASTM C 1580 (mg/kg)	23
Sulfides, AWWA 4500-S D, (mg/Kg)	Nil
Chlorides, ASTM D512, (mg/kg)	45
Red-Ox, ASTM G200, (mV)	+736
Total Salts, AWWA 2540, (mg/Kg)	47
As-Received Resistivity, ASTM G-57, (ohm-cm)	271600
Saturated Minimum Resistivity, ASTM G-57, (ohm-cm)	4850

A handwritten signature in black ink, appearing to read 'N. Campo'.

Analyzed By

Nathan Campo
Engineering Technician III

The tests were performed in general accordance with applicable ASTM and AWWA test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

Job No. CB235111
Date. 8/16/2023

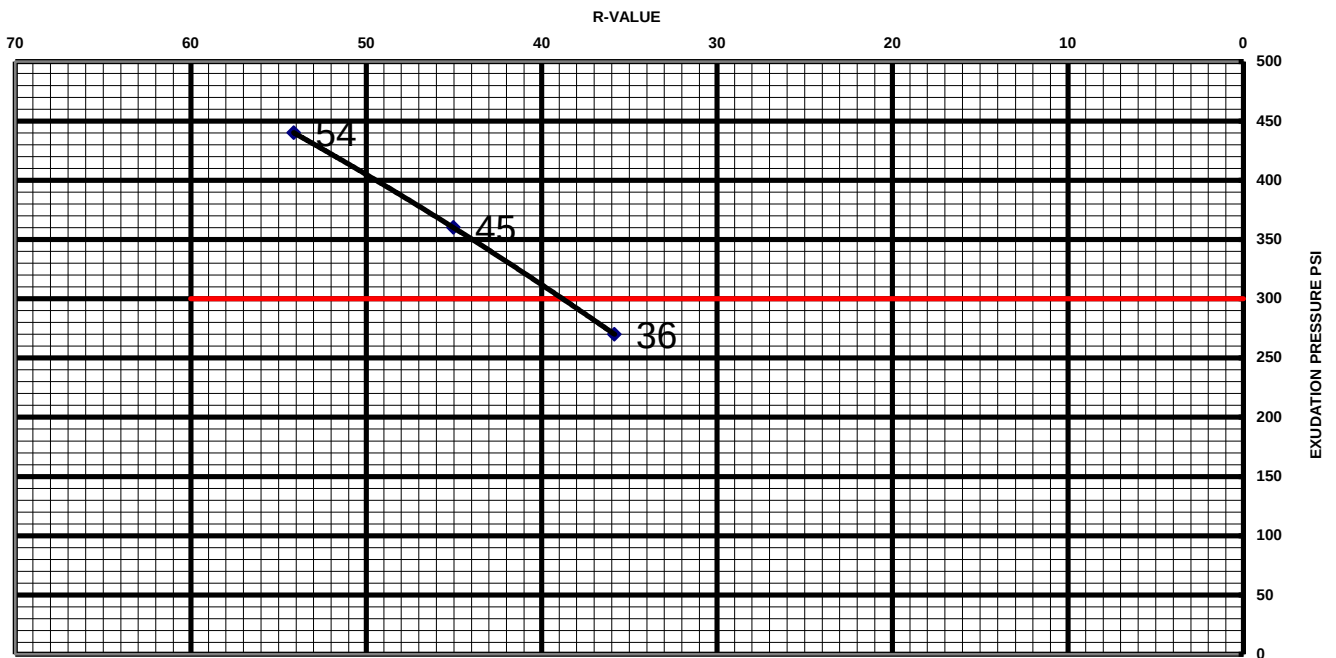
**LABORATORY RECORD OF TESTS MADE ON
BASE, SUBBASE, AND BASEMENT SOILS**

CLIENT: Kimley-Horn and Associate
PROJECT Sam's Club-Hesperia
LOCATION: Hesperia, CA
R-VALUE # : P-25
T.I. :

COMPACTOR AIR PRESSURE P.S.I.
INITIAL MOISTURE %
WATER ADDED, ML
WATER ADDED %
MOISTURE AT COMPACTION %
HEIGHT OF BRIQUETTE
WET WEIGHT OF BRIQUETTE
DENSITY LB. PER CU.FT.
STABILOMETER PH AT 1000 LBS.
2000 LBS.
DISPLACEMENT
R-VALUE
EXUDATION PRESSURE
THICK. INDICATED BY STAB.
EXPANSION PRESSURE
THICK. INDICATED BY E.P.

A	B	C	D
350	350	350	
2.2	2.2	2.2	
75	70	65	
6.5	6.1	5.7	
8.7	8.3	7.9	
2.53	2.49	2.45	
1177	1177	1157	
129.7	132.3	132.6	
38	32	28	
74	63	52	
5.20	4.70	4.40	
36	45	54	
270	360	440	
0.00	0.00	0.00	
0	0	4	
0.00	0.00	0.13	

EXUDATION CHART



R-Value: 39

Job No. CB235111
Date. 8/16/2023

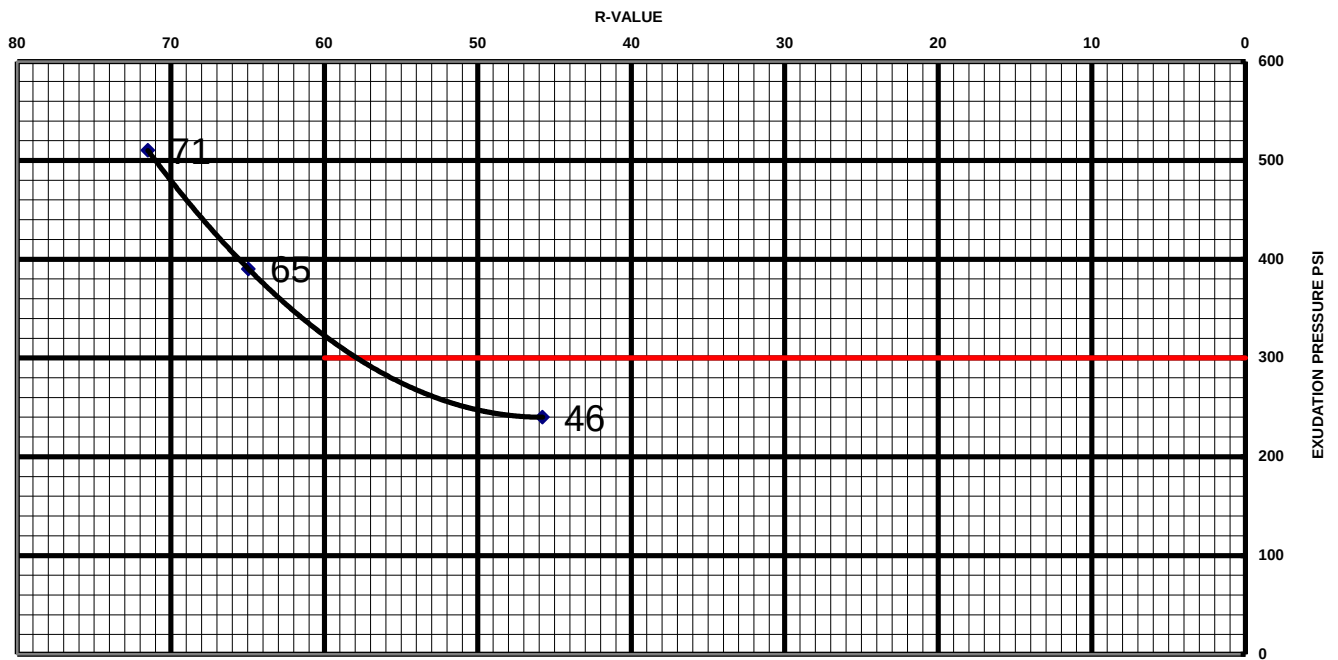
**LABORATORY RECORD OF TESTS MADE ON
BASE, SUBBASE, AND BASEMENT SOILS**

CLIENT: Kimley-Horn and Associate
PROJECT Sam's Club-Hesperia
LOCATION: Hesperia, CA
R-VALUE # : P-6
T.I. :

COMPACTOR AIR PRESSURE P.S.I.
INITIAL MOISTURE %
WATER ADDED, ML
WATER ADDED %
MOISTURE AT COMPACTION %
HEIGHT OF BRIQUETTE
WET WEIGHT OF BRIQUETTE
DENSITY LB. PER CU.FT.
STABILOMETER PH AT 1000 LBS.
2000 LBS.
DISPLACEMENT
R-VALUE
EXUDATION PRESSURE
THICK. INDICATED BY STAB.
EXPANSION PRESSURE
THICK. INDICATED BY E.P.

A	B	C	D
350	350	350	
1.5	1.5	1.5	
85	75	70	
7.4	6.5	6.1	
8.9	8.0	7.6	
2.52	2.54	2.52	
1169	1174	1167	
129.1	129.7	130.4	
34	20	17	
56	32	28	
5.50	5.40	4.70	
46	65	71	
240	390	510	
0.00	0.00	0.00	
0	0	0	
0.00	0.00	0.00	

EXUDATION CHART

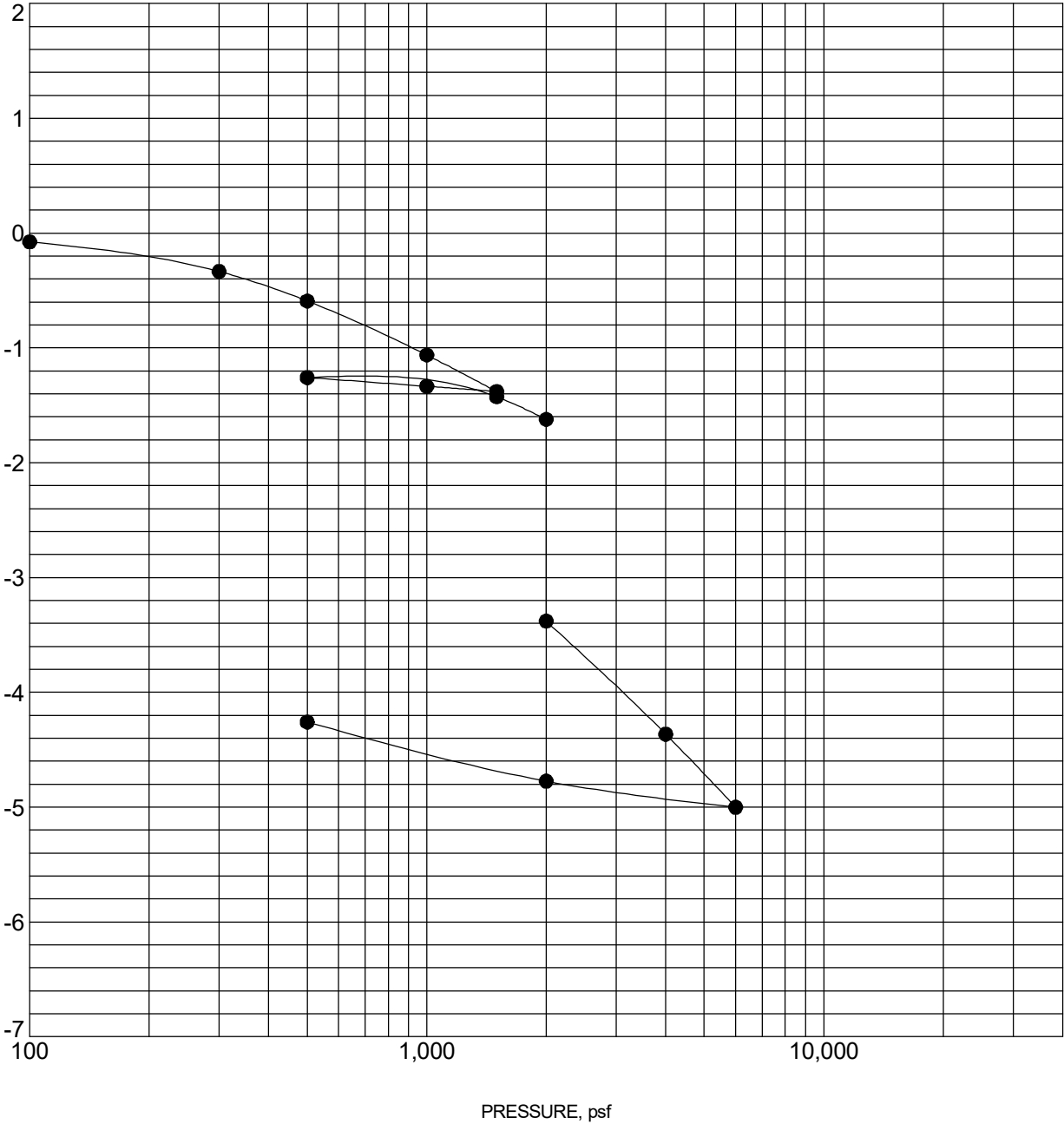


R-Value: 58

SWELL CONSOLIDATION TEST
ASTM D2435

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. TC_CONSOL_STRAIN-USCS CB235111 SAM'S CLUB HESPER.GPJ TERRACON_DATATEMPLATE.GDT 8/23/23

AXIAL STRAIN, %



Specimen Identification			Classification	γ_d , pcf	WC, %
●	B-6	2.5 - 4 ft			

NOTES: sample was saturated at axial pressure of 2,000 psf

PROJECT: Sam's Club Hesperia

SITE: North of Amargosa Road &
West of Highway I-15
Hesperia, CA



PROJECT NUMBER: CB235111

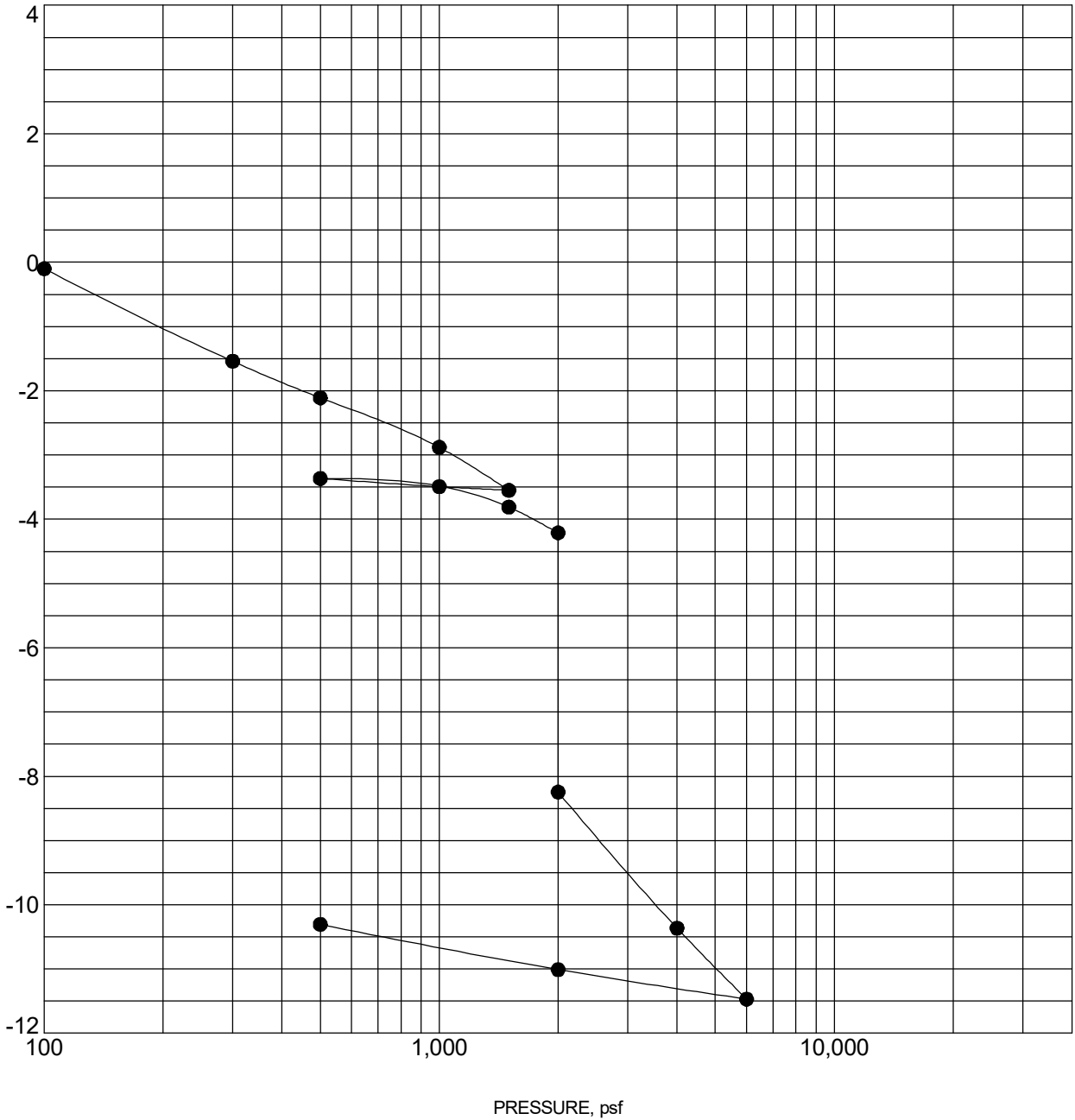
CLIENT: Kimley-Horn and Associates
Inc
Orange, CA

EXHIBIT: B-1

SWELL CONSOLIDATION TEST
ASTM D2435

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. TC_CONSOL_STRAIN-USCS CB235111 SAM'S CLUB HESPER.GPJ TERRACON_DATATEMPLATE.GDT 8/23/23

AXIAL STRAIN, %



Specimen Identification			Classification	γ_d , pcf	WC, %
●	B-9	10 - 11.4 ft			

NOTES: sample was saturated at axial pressure of 2,000 psf

PROJECT: Sam's Club Hesperia

SITE: North of Amargosa Road &
West of Highway I-15
Hesperia, CA

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

PROJECT NUMBER: CB235111

CLIENT: Kimley-Horn and Associates
Inc
Orange, CA

EXHIBIT: B-1

Job No.: CB235111

PERCOLATION TEST DATA

BORING NUMBER: P-1
LOT No: N/A
TRACT No: N/A

CLIENT: Sams Club
PROJECT: Sams Club Hesperia

DATE OF DRILLING:
DATE OF PRESOAK:
DATE OF TEST: July 19, 2023
TESTED BY:

DEPTH BEFORE (ft.): 5.0
DEPTH AFTER (ft.): 5.0
PVC PIPE DIA. (in.): 3.0
PERC HOLE DIA. (in.): 8.0

Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Initial Hole Depth (in.)	Final Hole Depth (in.)	Percolation Rate (in/hr)	Infiltration rate (Porchet Method) (in/hr)
25	25	19.0	36.0	17.0	60.0	60.0	40.8	2.37
25	50	11.0	27.0	16.0	60.0	60.0	38.4	1.79
10	60	7.0	21.5	14.5	60.0	60.0	87.0	3.64
10	70	8.0	27.5	19.5	60.0	60.0	117.0	5.29
10	80	6.5	17.0	10.5	60.0	60.0	63.0	2.51
10	90	3.0	11.0	8.0	60.0	60.0	48.0	1.75
10	100	2.0	10.5	8.5	60.0	60.0	51.0	1.83
10	110	2.0	9.0	7.0	60.0	60.0	42.0	1.49

Final reading: 49.50 1.79

Job No.: CB235111

PERCOLATION TEST DATA

BORING NUMBER: P-2
LOT No: N/A
TRACT No: N/A

CLIENT:	Sams Club
PROJECT:	Sams Club Hesperia

DATE OF DRILLING:	
DATE OF PRESOAK:	
DATE OF TEST:	July 19, 2023
TESTED BY:	

DEPTH BEFORE (ft.):	10.0
DEPTH AFTER (ft.):	10.0
PVC PIPE DIA. (in.):	3.0
PERC HOLE DIA. (in.):	8.0

Time Interval	Total Elapsed Time	Initial Water Level	Final Water Level	Change in Water Level	Initial Hole Depth	Final Hole Depth	Percolation Rate	Infiltration rate (Porchet Method)
(min.)	(min.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in/hr)	(in/hr)
25	25	75.0	120.0	45.0	120.0	120.0	108.0	8.82
25	50	71.0	119.0	48.0	120.0	120.0	115.2	8.53
10	60	73.5	106.0	32.5	120.0	120.0	195.0	12.09
10	70	59.0	96.5	37.5	120.0	120.0	225.0	10.17
10	80	54.5	95.5	41.0	120.0	120.0	246.0	10.47
10	90	55.0	90.0	35.0	120.0	120.0	210.0	8.48
10	100	57.5	86.0	28.5	120.0	120.0	171.0	6.81
10	110	60.0	82.0	22.0	120.0	120.0	132.0	5.18
Final reading:							171.00	6.82

Job No.: CB235111

PERCOLATION TEST DATA

BORING NUMBER: P-3
LOT No: N/A
TRACT No: N/A

CLIENT: Sams Club
PROJECT: Sams Club- Hesperia

DATE OF DRILLING:
DATE OF PRESOAK:
DATE OF TEST: July 19, 2023
TESTED BY:

DEPTH BEFORE (ft.): 5.0
DEPTH AFTER (ft.): 5.0
PVC PIPE DIA. (in.): 3.0
PERC HOLE DIA. (in.): 8.0

Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Initial Hole Depth (in.)	Final Hole Depth (in.)	Percolation Rate (in/hr)	Infiltration rate (Porchet Method) (in/hr)
25	25	25.0	60.0	35.0	60.0	60.0	84.0	8.62
25	50	21.5	60.0	38.5	60.0	60.0	92.4	8.70
10	60	18.8	38.5	19.8	60.0	60.0	118.5	7.10
10	70	11.0	30.0	19.0	60.0	60.0	114.0	5.49
10	80	10.5	26.3	15.8	60.0	60.0	94.5	4.33
10	90	8.5	23.0	14.5	60.0	60.0	87.0	3.76
10	100	7.0	21.3	14.3	60.0	60.0	85.5	3.57
10	110	7.0	20.5	13.5	60.0	60.0	81.0	3.36

Final reading: 84.50 3.56

Job No.: CB235111

PERCOLATION TEST DATA

BORING NUMBER: P-4
LOT No: N/A
TRACT No: N/A

CLIENT: Sams Club
PROJECT: Sams Club- Hesperia

DATE OF DRILLING:
DATE OF PRESOAK:
DATE OF TEST: July 19, 2023
TESTED BY:
DEPTH BEFORE (ft.): 10.0
DEPTH AFTER (ft.): 10.0
PVC PIPE DIA. (in.): 3.0
PERC HOLE DIA. (in.): 8.0

Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Initial Hole Depth (in.)	Final Hole Depth (in.)	Percolation Rate (in/hr)	Infiltration rate (Porchet Method) (in/hr)
25	25	88.0	120.0	32.0	120.0	120.0	76.8	8.53
25	50	85.0	120.0	35.0	120.0	120.0	84.0	8.62
10	60	84.0	108.5	24.5	120.0	120.0	147.0	11.42
10	70	79.3	102.8	23.5	120.0	120.0	141.0	9.10
10	80	80.0	100.5	20.5	120.0	120.0	123.0	7.75
10	90	77.5	95.3	17.8	120.0	120.0	106.5	5.98
10	100	77.0	94.0	17.0	120.0	120.0	102.0	5.59
10	110	75.0	91.0	16.0	120.0	120.0	96.0	4.92

Final reading: 101.50 5.50

Supporting Information

Contents:

General Notes
Unified Soil Classification System

Note: All attachments are one page unless noted above.

General Notes

Sampling	Water Level	Field Tests
 Auger Cuttings  Modified Dames & Moore Ring Sampler  Split Spoon	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time  Cave In Encountered Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance			Consistency of Fine-Grained Soils (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Relative Density	Standard Penetration or N-Value (Blows/Ft.)	Ring Sampler (Blows/Ft.)	Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)	Ring Sampler (Blows/Ft.)
Very Loose	0 - 3	0 - 5	Very Soft	less than 0.25	0 - 1	< 3
Loose	4 - 9	6 - 14	Soft	0.25 to 0.50	2 - 4	3 - 5
Medium Dense	10 - 29	15 - 46	Medium Stiff	0.50 to 1.00	4 - 8	6 - 10
Dense	30 - 50	47 - 79	Stiff	1.00 to 2.00	8 - 15	11 - 18
Very Dense	> 50	> 80	Very Stiff	2.00 to 4.00	15 - 30	19 - 36
			Hard	> 4.00	> 30	> 36

Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification	
				Group Symbol	Group Name ^B
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F
			$Cu < 4$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	GP	Poorly graded gravel ^F
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}
			Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I
			$Cu < 6$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	SP	Poorly graded sand ^I
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots above "A" line ^J	CL	Lean clay ^{K, L, M}
			$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K, L, M}
		Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OL	Organic clay ^{K, L, M, N} Organic silt ^{K, L, M, O}
			Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line
	PI plots below "A" line	MH			Elastic silt ^{K, L, M}
	Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$		OH	Organic clay ^{K, L, M, P} Organic silt ^{K, L, M, Q}
		Highly organic soils:		Primarily organic matter, dark in color, and organic odor	

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$E \quad Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

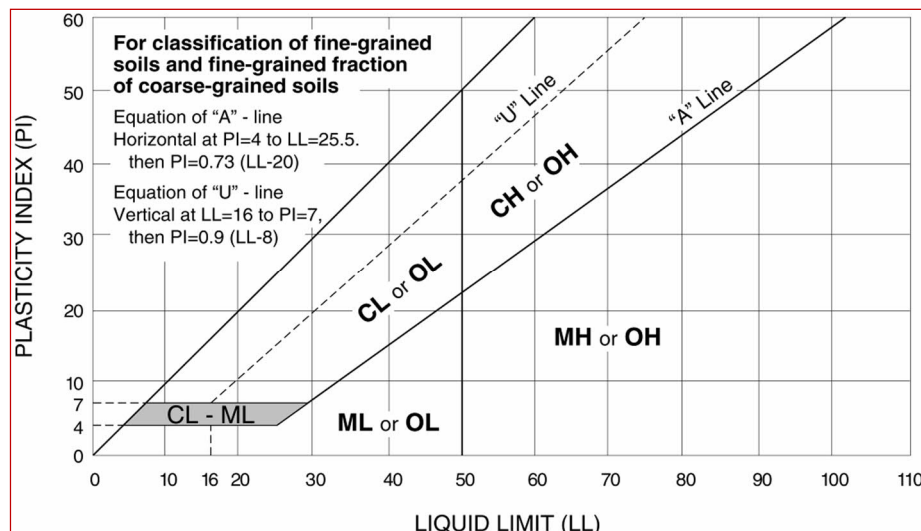
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

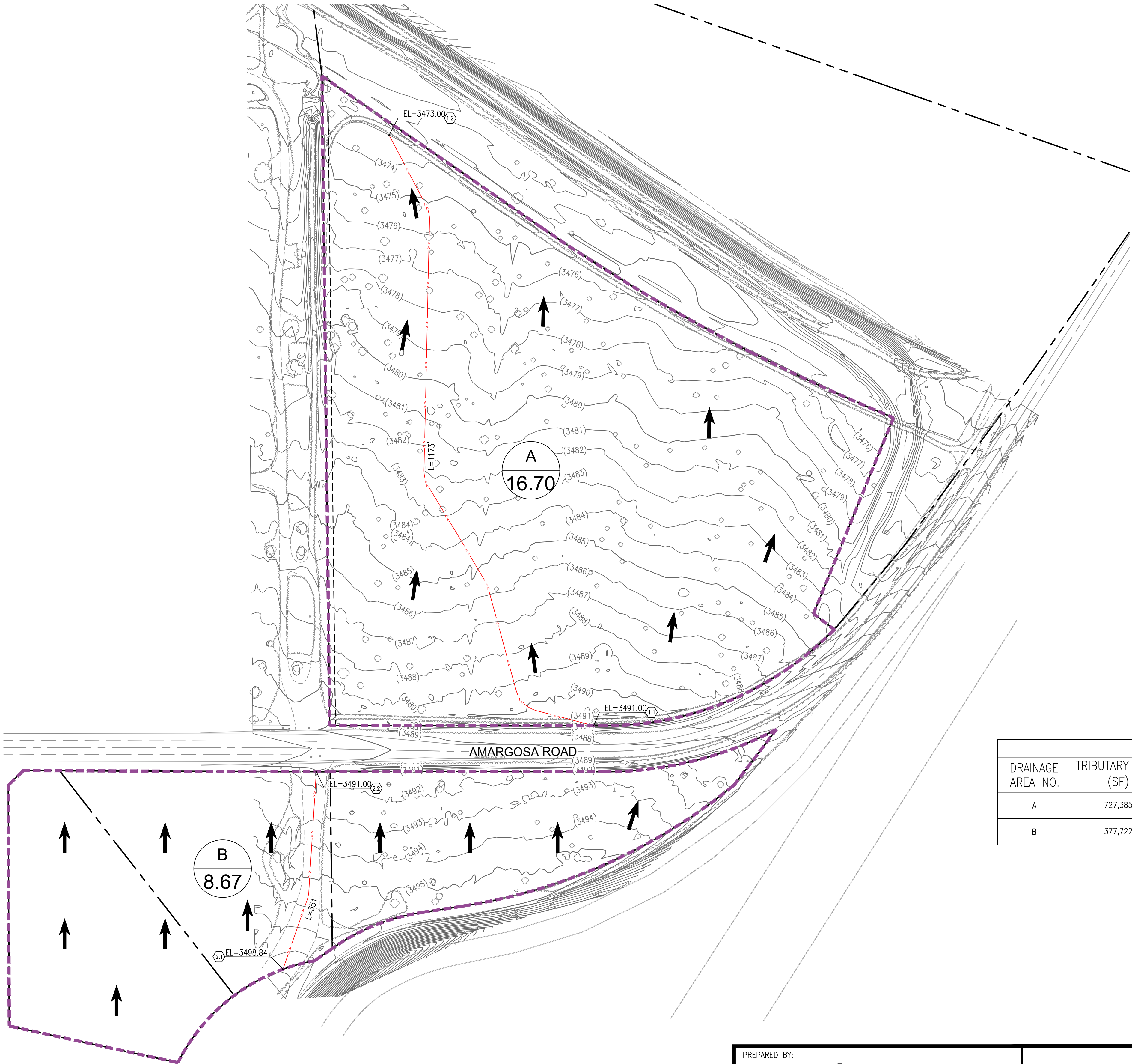
^P PI plots on or above "A" line.

^Q PI plots below "A" line.



Appendix G
Hydrology Exhibits

CITY OF HESPERIA
PRE-DEVELOPMENT HYDROLOGY EXHIBIT



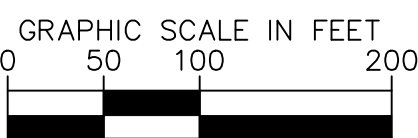
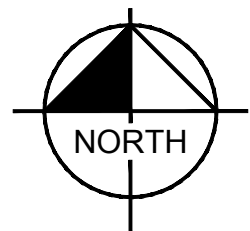
HYDROLOGY INFORMATION

SITE AREA:	25.37 ACRES
SOIL TYPE:	A (NRCS WEB SOIL SURVEY)
IMPERVIOUS:	0% (PER CALCULATIONS)
ISOHYETALS:	0.411 INCH (2-YEAR, 1-HR) 1.18 INCH (100-YEAR, 1-HR)
CURVE NUMBER	32 (SOIL GROUP A)
FREQUENCY:	2-YEAR (FOR STORMWATER QUALITY) 100-YEAR (FOR STORM DRAIN DESIGN)
METHOD:	SAN BERNARDINO COUNTY HYDROLOGY MANUAL

LEGEND:

- DRAINAGE AREA BOUNDARY
- FLOW PATH
- EXISTING FLOW DIRECTION ARROW
- X DRAINAGE AREA DESIGNATION
- X.XX AREA (AC)
- 1:1 NODE

HYDROLOGY SUMMARY						
DRAINAGE AREA NO.	TRIBUTARY AREA (SF)	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	Q ₂₅ (CFS)	Q ₁₀₀ (CFS)	V ₁₀₀ (CF)
A	727,385	16.70	0.00	19.65	33.23	254,826
B	377,722	8.67	0.00	17.30	26.59	155,074



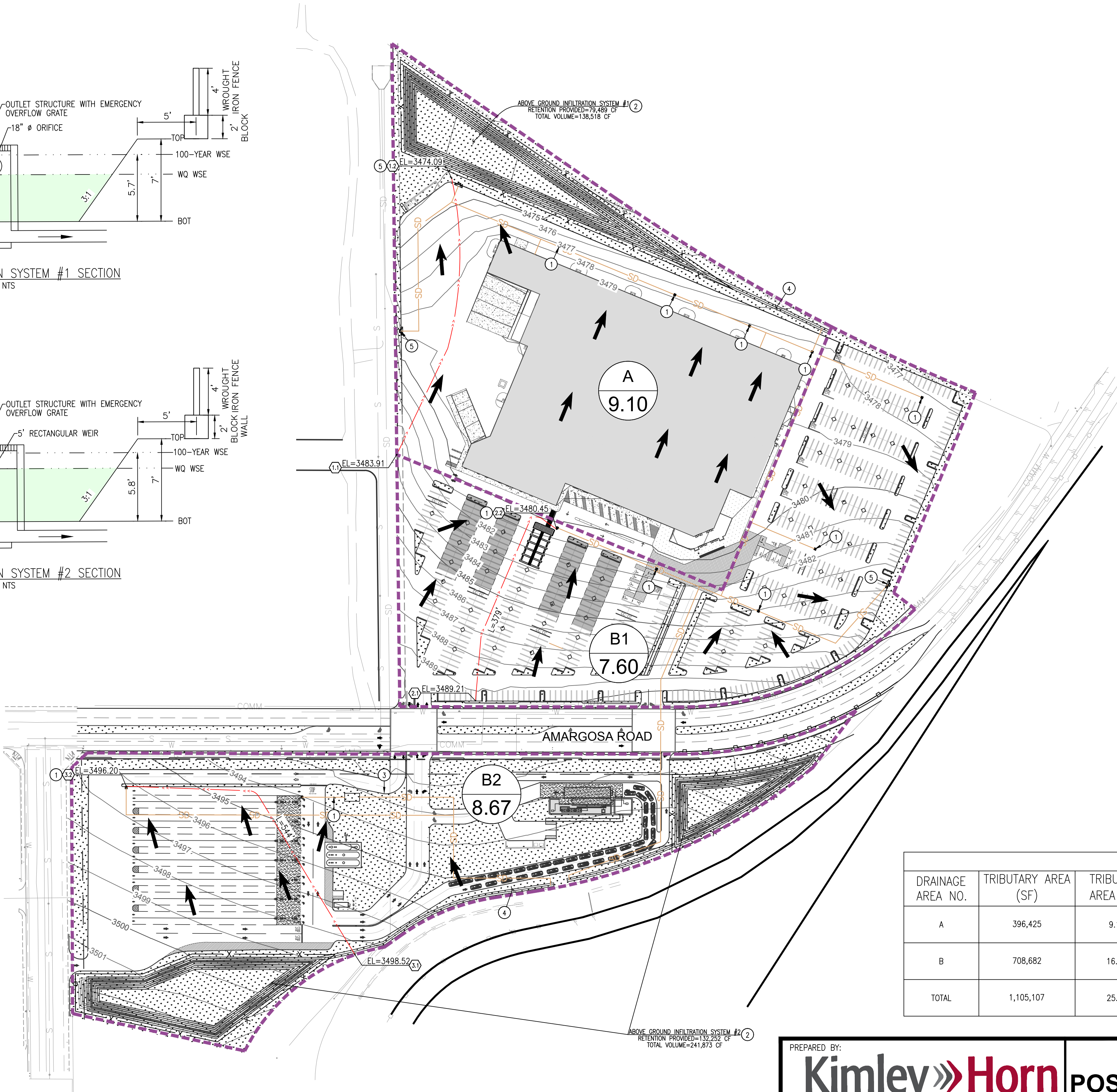
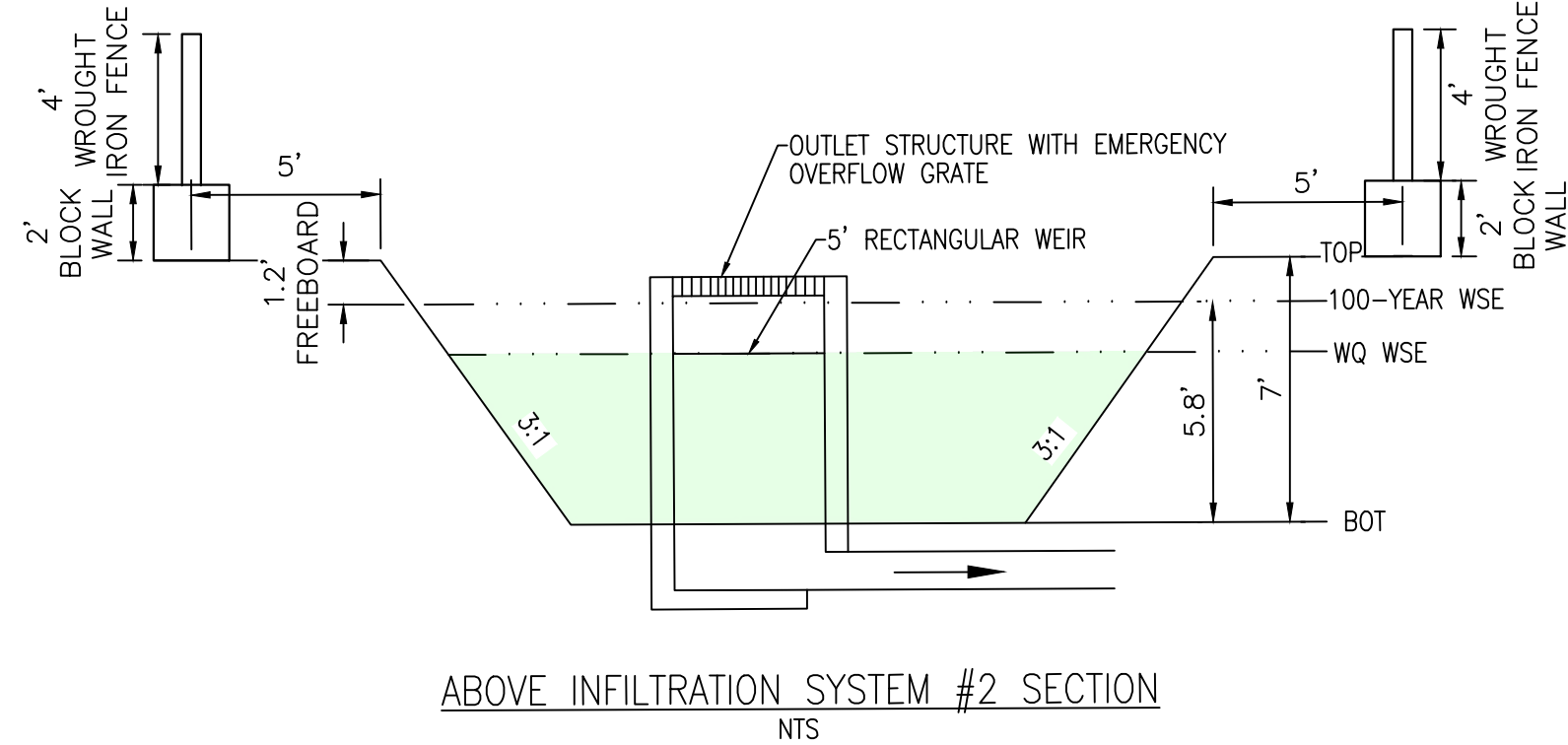
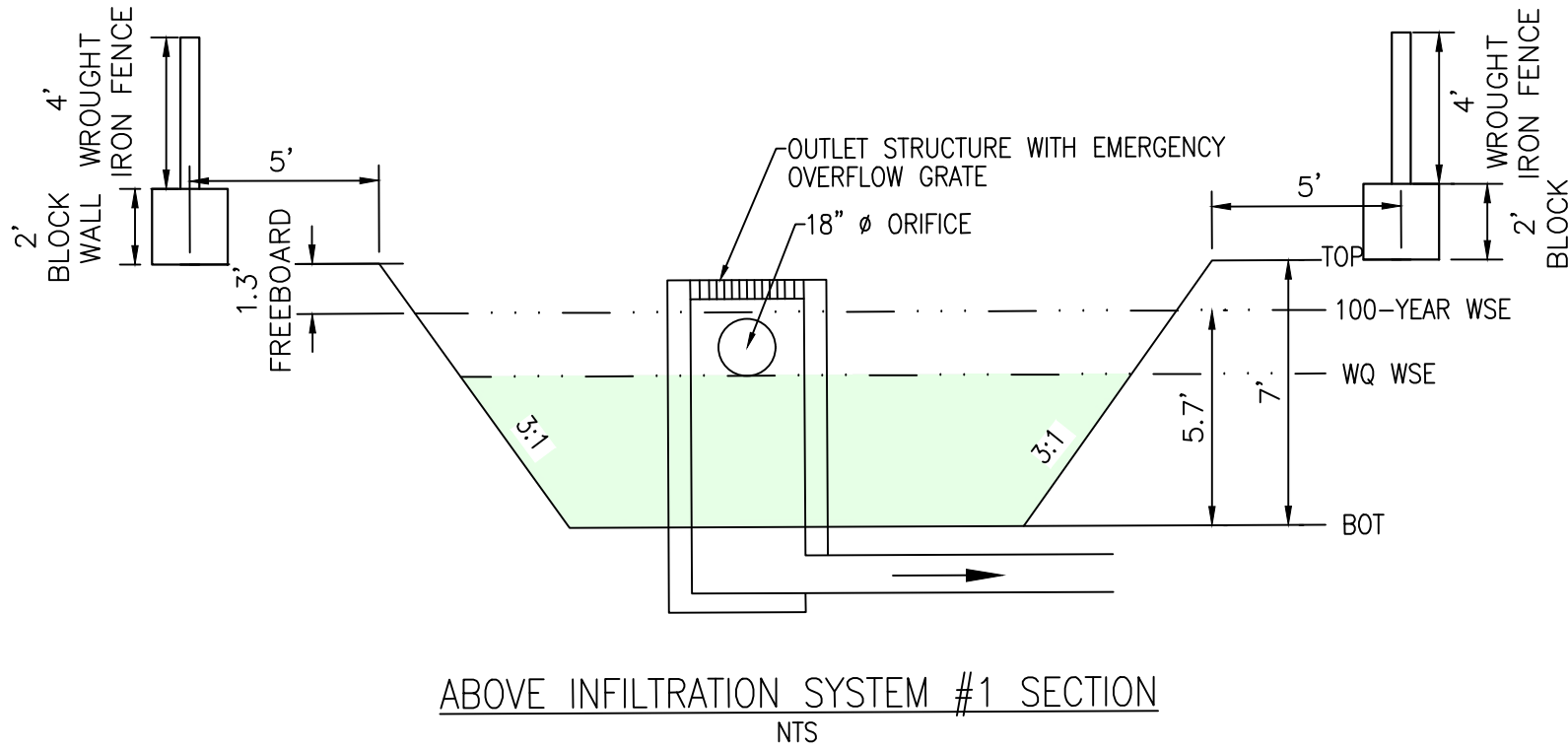
PREPARED BY:
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WWW.KIMLEY-HORN.COM

PRE-DEVELOPMENT HYDROLOGY EXHIBIT

CITY OF HESPERIA

DATE: SEP 2024
SHEET
1
OF 1

CITY OF HESPERIA
POST-DEVELOPMENT HYDROLOGY EXHIBIT



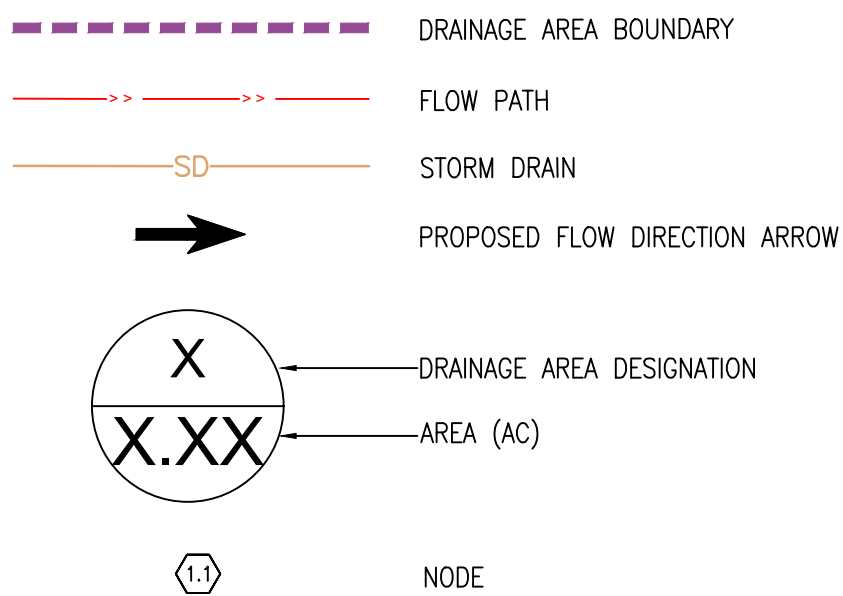
HYDROLOGY INFORMATION

SITE AREA:	25.37 ACRES	
SOIL TYPE:	A	(NRCS WEB SOIL SURVEY)
IMPERVIOUS:	71%	(PER CALCULATIONS)
ISOHYETALS:	0.411 INCH	(2-YEAR, 1-HR)
	1.18 INCH	(100-YEAR, 1-HR)
CURVE NUMBER	32	(SOIL GROUP A)
FREQUENCY:	10-YEAR	(FOR STORMWATER QUALITY)
	100-YEAR	(FOR STORM DRAIN DESIGN)
METHOD:	SAN BERNARDINO COUNTY HYDROLOGY MANUAL	

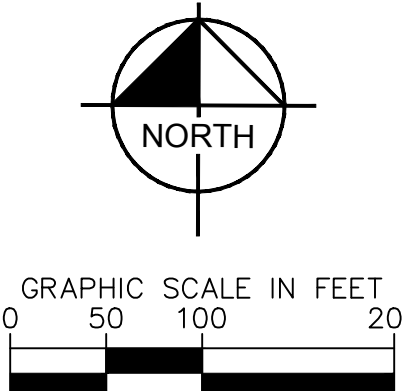
DRAINAGE NOTES:

- ① PROPOSED CATCH BASIN WITH FILTER INSERT
- ② PROPOSED BMP - RETENTION BASIN
- ③ PROPOSED OIL AND WATER SEPARATOR
- ④ PROPOSED SWALE
- ⑤ PROPOSED CURB OPENING CATCH BASIN

LEGEND:



HYDROLOGY SUMMARY							
DRAINAGE AREA NO.	TRIBUTARY AREA (SF)	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	Q ₁₀₀ (CFS)	V ₁₀₀ (CF)	RETENTION PROVIDED (CF)	STORAGE PROVIDED (CF)
A	396,425	9.10	0.81	37.08	217,630	79,489 (ABOVE GROUND INFILTRATION SYSTEM #1)	138,518 (ABOVE GROUND INFILTRATION SYSTEM #1)
B	708,682	16.27	0.65	61.52	391,792	132,252 (ABOVE GROUND INFILTRATION SYSTEM #2)	241,873 (ABOVE GROUND INFILTRATION SYSTEM #2)
TOTAL	1,105,107	25.37	0.71	98.60	609,422	211,741 (ABOVE GROUND INFILTRATION SYSTEM #1 AND #2)	380,391 (ABOVE GROUND INFILTRATION SYSTEM #1 AND #2)



PREPARED BY

Kimley»Horn

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1100 W TOWN AND COUNTRY ROAD, SUITE 700,
ORANGE, CA 92868
PHONE: 714-939-1030 FAX: 714-938-9488
WWW.KIMLEY-HORN.COM

POST-DEVELOPMENT HYDROLOGY EXHIBIT

CITY OF HESPERIA

DATE: DEC 2024

SHEET

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Appendix H
Rational Method Analysis

Appendix H.I

Rational Method Analysis Pre-Development Conditions 10-Year Storm

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 *****
* HESPERIA PRE DEVELOPMENT RATIONAL METHOD *
* *
* *

FILE NAME: RATPRE.DAT
TIME/DATE OF STUDY: 19:00 05/13/2024

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
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) = 0.7140

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (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 1.10 TO NODE 1.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1173.00
ELEVATION DATA: UPSTREAM(FEET) = 3491.00 DOWNSTREAM(FEET) = 3473.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 20.450
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 1.517
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
NATURAL POOR COVER						
"GRASS"	A	16.70	0.60	1.000	67	20.45

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 1.000
SUBAREA RUNOFF(CFS) = 13.81
TOTAL AREA(ACRES) = 16.70 PEAK FLOW RATE(CFS) = 13.81

FLOW PROCESS FROM NODE 2.10 TO NODE 2.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 351.00
ELEVATION DATA: UPSTREAM(FEET) = 3498.84 DOWNSTREAM(FEET) = 3491.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 11.708
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.241
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	F_p (INCH/HR)	A_p (DECIMAL)	SCS CN	T_c (MIN.)
NATURAL POOR COVER						
"GRASS"	A	8.67	0.60	1.000	67	11.71

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 1.000
SUBAREA RUNOFF(CFS) = 12.82
TOTAL AREA(ACRES) = 8.67 PEAK FLOW RATE(CFS) = 12.82

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 8.7 T_c (MIN.) = 11.71
EFFECTIVE AREA(ACRES) = 8.67 AREA-AVERAGED F_m (INCH/HR) = 0.60
AREA-AVERAGED F_p (INCH/HR) = 0.60 AREA-AVERAGED A_p = 1.000

PEAK FLOW RATE(CFS) = 12.82

=====

END OF RATIONAL METHOD ANALYSIS



Appendix H.II

Rational Method Analysis Pre-Development Conditions 25-Year Storm

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 *****
* HESPERIA PRE DEVELOPMENT RATIONAL METHOD *
* *
* *

FILE NAME: RATPRE.DAT
TIME/DATE OF STUDY: 18:47 05/13/2024

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 25.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
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) = 0.8970

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT- / PARK- SIDE / SIDE / WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 1.10 TO NODE 1.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1173.00
ELEVATION DATA: UPSTREAM(FEET) = 3491.00 DOWNSTREAM(FEET) = 3473.00

$T_c = K * [(LENGTH^{**} 3.00) / (ELEVATION\ CHANGE)]^{**0.20}$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 20.450
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 1.906
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	T_c (MIN.)
NATURAL POOR COVER						
"GRASS"	A	16.70	0.60	1.000	67	20.45

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 1.000
SUBAREA RUNOFF(CFS) = 19.65
TOTAL AREA(ACRES) = 16.70 PEAK FLOW RATE(CFS) = 19.65

FLOW PROCESS FROM NODE 2.10 TO NODE 2.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 351.00
ELEVATION DATA: UPSTREAM(FEET) = 3498.84 DOWNSTREAM(FEET) = 3491.00

$T_c = K * [(LENGTH^{**} 3.00) / (ELEVATION\ CHANGE)]^{**0.20}$
SUBAREA ANALYSIS USED MINIMUM T_c (MIN.) = 11.708
* 25 YEAR RAINFALL INTENSITY(INCH/HR) = 2.816
SUBAREA T_c AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	T_c (MIN.)
NATURAL POOR COVER						
"GRASS"	A	8.67	0.60	1.000	67	11.71

SUBAREA AVERAGE PERVIOUS LOSS RATE, F_p (INCH/HR) = 0.60
SUBAREA AVERAGE PERVIOUS AREA FRACTION, A_p = 1.000
SUBAREA RUNOFF(CFS) = 17.30
TOTAL AREA(ACRES) = 8.67 PEAK FLOW RATE(CFS) = 17.30

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 8.7 T_c (MIN.) = 11.71
EFFECTIVE AREA(ACRES) = 8.67 AREA-AVERAGED F_m (INCH/HR) = 0.60
AREA-AVERAGED F_p (INCH/HR) = 0.60 AREA-AVERAGED A_p = 1.000

PEAK FLOW RATE(CFS) = 17.30

=====

END OF RATIONAL METHOD ANALYSIS



Appendix H.III

Rational Method Analysis Pre-Development Conditions 100-Year Storm

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 *****
* BIG BOX RETAIL - HESPERIA *
* RATIONAL METHOD *
* 100-YEAR PRE CONDITIONS *

FILE NAME: ARATPRE.DAT
TIME/DATE OF STUDY: 19:09 05/13/2024

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:									
--*TIME-OF-CONCENTRATION MODEL*--									

=====

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1800

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF- WIDTH (FT)	CROWN TO CROSSFALL (FT)	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT (FT)	GUTTER-GEOMETRIES: WIDTH LIP HIKE (FT) (FT) (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00 0.0313 0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 1.10 TO NODE 1.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1173.00
ELEVATION DATA: UPSTREAM(FEET) = 3491.00 DOWNSTREAM(FEET) = 3473.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 20.450
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.507
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL POOR COVER "GRASS"	A	16.70	0.30	1.000	85	20.45

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) = 33.23
 TOTAL AREA(ACRES) = 16.70 PEAK FLOW RATE(CFS) = 33.23

FLOW PROCESS FROM NODE 2.10 TO NODE 2.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 351.00
 ELEVATION DATA: UPSTREAM(FEET) = 3498.84 DOWNSTREAM(FEET) = 3491.00

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION\ CHANGE)] ** 0.20$

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.708

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.704

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
-------------------------------	-------------------	-----------------	-----------------	-----------------	-----------	--------------

NATURAL POOR COVER

"GRASS"	A	8.67	0.30	1.000	85	11.71
---------	---	------	------	-------	----	-------

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.30

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000

SUBAREA RUNOFF(CFS) = 26.59

TOTAL AREA(ACRES) = 8.67 PEAK FLOW RATE(CFS) = 26.59

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 8.7 TC(MIN.) = 11.71

EFFECTIVE AREA(ACRES) = 8.67 AREA-AVERAGED Fm(INCH/HR) = 0.30

AREA-AVERAGED Fp(INCH/HR) = 0.30 AREA-AVERAGED Ap = 1.000

PEAK FLOW RATE(CFS) = 26.59

=====

=====

END OF RATIONAL METHOD ANALYSIS

▲

Appendix H.IV

Rational Method Analysis Post-Development Conditions 10-year Storm

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 *****
* BIG BOX RETAIL - HESPERIA *
* RATIONAL METHOD *
* 10-YEAR, POST-CONDITIONS, DA A *

FILE NAME: SCH100A.DAT
TIME/DATE OF STUDY: 14:17 08/28/2024

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
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) = 0.7140

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT	GUTTER-GEOMETRIES: WIDTH LIP HIKE	MANNING FACTOR
NO.	(FT)	(FT)		(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 1.10 TO NODE 1.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 347.81
ELEVATION DATA: UPSTREAM(FEET) = 3484.80 DOWNSTREAM(FEET) = 3482.46

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.587
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.784
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	9.10	0.98	0.100	32	8.59

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98

SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.100$
SUBAREA RUNOFF(CFS) = 22.01
TOTAL AREA(ACRES) = 9.10 PEAK FLOW RATE(CFS) = 22.01

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 9.1 TC(MIN.) = 8.59
EFFECTIVE AREA(ACRES) = 9.10 AREA-AVERAGED F_m (INCH/HR)= 0.10
AREA-AVERAGED F_p (INCH/HR) = 0.98 AREA-AVERAGED $A_p = 0.100$
PEAK FLOW RATE(CFS) = 22.01

=====

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 *****
* BIG BOX RETAIL - HESPERIA *
* RATIONAL METHOD *
* 10-YEAR, POST-CONDITIONS, DA B *

FILE NAME: SCH100B.DAT
TIME/DATE OF STUDY: 16:55 08/28/2024

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 10.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
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) = 0.7140

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

	HALF- WIDTH	CROWN TO CROSSFALL	STREET- SIDE / SIDE/	CROSSFALL WAY	CURB HEIGHT	GUTTER- WIDTH	GEOMETRIES: LIP	MANNING HIKE	FACTOR (n)
NO.	(FT)	(FT)			(FT)	(FT)	(FT)	(FT)	
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 2.10 TO NODE 2.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 389.02
ELEVATION DATA: UPSTREAM(FEET) = 3489.01 DOWNSTREAM(FEET) = 3483.34

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.694
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.007
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	7.60	0.98	0.100	32	7.69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 19.90
TOTAL AREA(ACRES) = 7.60 PEAK FLOW RATE(CFS) = 19.90

FLOW PROCESS FROM NODE 2.20 TO NODE 2.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 7.69
RAINFALL INTENSITY(INCH/HR) = 3.01
AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.98
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 7.60
TOTAL STREAM AREA(ACRES) = 7.60
PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.90

FLOW PROCESS FROM NODE 3.10 TO NODE 2.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 389.02
ELEVATION DATA: UPSTREAM(FEET) = 3489.01 DOWNSTREAM(FEET) = 3483.34

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.845
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.530
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						
"5-7 DWELLINGS/ACRE"	A	8.67	0.98	0.500	32	9.85

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500
SUBAREA RUNOFF(CFS) = 15.94
TOTAL AREA(ACRES) = 8.67 PEAK FLOW RATE(CFS) = 15.94

FLOW PROCESS FROM NODE 2.20 TO NODE 2.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.85
RAINFALL INTENSITY(INCH/HR) = 2.53
AREA-AVERAGED Fm(INCH/HR) = 0.49
AREA-AVERAGED Fp(INCH/HR) = 0.97
AREA-AVERAGED Ap = 0.50
EFFECTIVE STREAM AREA(ACRES) = 8.67
TOTAL STREAM AREA(ACRES) = 8.67
PEAK FLOW RATE(CFS) AT CONFLUENCE = 15.94

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (DECIMAL)	Ae (ACRES)	HEADWATER NODE
1	19.90	7.69	3.007	0.98(0.10)	0.10	7.6	2.10
2	15.94	9.85	2.530	0.97(0.49)	0.50	8.7	3.10

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	35.26	7.69	3.007	0.97(0.28)	0.29	14.4	2.10
2	32.58	9.85	2.530	0.97(0.31)	0.31	16.3	3.10

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 35.26 Tc(MIN.) = 7.69
 EFFECTIVE AREA(ACRES) = 14.38 AREA-AVERAGED Fm(INCH/HR) = 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.29
 TOTAL AREA(ACRES) = 16.3
 LONGEST FLOWPATH FROM NODE 2.10 TO NODE 2.20 = 389.02 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 16.3 TC(MIN.) = 7.69
 EFFECTIVE AREA(ACRES) = 14.38 AREA-AVERAGED Fm(INCH/HR)= 0.28
 AREA-AVERAGED Fp(INCH/HR) = 0.97 AREA-AVERAGED Ap = 0.289
 PEAK FLOW RATE(CFS) = 35.26

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	35.26	7.69	3.007	0.97(0.28)	0.29	14.4	2.10
2	32.58	9.85	2.530	0.97(0.31)	0.31	16.3	3.10

END OF RATIONAL METHOD ANALYSIS

↑

Appendix H.V

Rational Method Analysis Post-Development Conditions 100-Year Storm

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 *****
* BIG BOX RETAIL - HESPERIA *
* RATIONAL METHOD *
* 100-YEAR, POST-CONDITIONS, DA A *

FILE NAME: SCH100A.DAT
TIME/DATE OF STUDY: 14:11 08/28/2024

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1800

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

	HALF- WIDTH	CROWN TO CROSSFALL	STREET-CROSSFALL: IN- / OUT-/PARK- SIDE / SIDE/ WAY	CURB HEIGHT	GUTTER-GEOMETRIES: WIDTH LIP HIKE	MANNING FACTOR
NO.	(FT)	(FT)		(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 1.10 TO NODE 1.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 347.81
ELEVATION DATA: UPSTREAM(FEET) = 3484.80 DOWNSTREAM(FEET) = 3482.46

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.587
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.602
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	9.10	0.74	0.100	52	8.59

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74

SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.100$
SUBAREA RUNOFF(CFS) = 37.08
TOTAL AREA(ACRES) = 9.10 PEAK FLOW RATE(CFS) = 37.08

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 9.1 TC(MIN.) = 8.59
EFFECTIVE AREA(ACRES) = 9.10 AREA-AVERAGED F_m (INCH/HR)= 0.07
AREA-AVERAGED F_p (INCH/HR) = 0.74 AREA-AVERAGED $A_p = 0.100$
PEAK FLOW RATE(CFS) = 37.08

=====

END OF RATIONAL METHOD ANALYSIS



RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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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 *****
* BIG BOX RETAIL - HESPERIA *
* RATIONAL METHOD *
* 100-YEAR, POST-CONDITIONS, DA B *

FILE NAME: SCH100B.DAT
TIME/DATE OF STUDY: 16:24 08/28/2024

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.1800

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

	HALF- WIDTH	CROWN TO CROSSFALL	STREET- SIDE / SIDE/ WAY	CURB HEIGHT	GUTTER- WIDTH	GEOMETRIES: LIP	MANNING HIKE	
NO.	(FT)	(FT)		(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 2.10 TO NODE 2.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 389.02
ELEVATION DATA: UPSTREAM(FEET) = 3489.01 DOWNSTREAM(FEET) = 3483.34

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.694
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.969
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	7.60	0.74	0.100	52	7.69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 33.48
 TOTAL AREA(ACRES) = 7.60 PEAK FLOW RATE(CFS) = 33.48

FLOW PROCESS FROM NODE 2.20 TO NODE 2.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.69
 RAINFALL INTENSITY(INCH/HR) = 4.97
 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) = 7.60
 TOTAL STREAM AREA(ACRES) = 7.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 33.48

FLOW PROCESS FROM NODE 3.10 TO NODE 2.20 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 389.02
 ELEVATION DATA: UPSTREAM(FEET) = 3489.01 DOWNSTREAM(FEET) = 3483.34

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.845

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.182

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
RESIDENTIAL						

"5-7 DWELLINGS/ACRE"	A	8.67	0.74	0.500	52	9.85
----------------------	---	------	------	-------	----	------

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.500

SUBAREA RUNOFF(CFS) = 29.73

TOTAL AREA(ACRES) = 8.67 PEAK FLOW RATE(CFS) = 29.73

FLOW PROCESS FROM NODE 2.20 TO NODE 2.20 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.85
 RAINFALL INTENSITY(INCH/HR) = 4.18
 AREA-AVERAGED Fm(INCH/HR) = 0.37
 AREA-AVERAGED Fp(INCH/HR) = 0.74
 AREA-AVERAGED Ap = 0.50
 EFFECTIVE STREAM AREA(ACRES) = 8.67
 TOTAL STREAM AREA(ACRES) = 8.67
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 29.73

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	33.48	7.69	4.969	0.74(0.07)	0.10	7.6	2.10
2	29.73	9.85	4.182	0.74(0.37)	0.50	8.7	3.10

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	61.52	7.69	4.969	0.74(0.21)	0.29	14.4	2.10
2	57.83	9.85	4.182	0.74(0.23)	0.31	16.3	3.10

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 61.52 Tc(MIN.) = 7.69
 EFFECTIVE AREA(ACRES) = 14.38 AREA-AVERAGED Fm(INCH/HR) = 0.21
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.29
 TOTAL AREA(ACRES) = 16.3
 LONGEST FLOWPATH FROM NODE 2.10 TO NODE 2.20 = 389.02 FEET.

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 16.3 TC(MIN.) = 7.69
 EFFECTIVE AREA(ACRES) = 14.38 AREA-AVERAGED Fm(INCH/HR)= 0.21
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.289
 PEAK FLOW RATE(CFS) = 61.52

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	61.52	7.69	4.969	0.74(0.21)	0.29	14.4	2.10
2	57.83	9.85	4.182	0.74(0.23)	0.31	16.3	3.10

END OF RATIONAL METHOD ANALYSIS

↑

Appendix I

Synthetic Unit Hydrograph Method Analysis

Appendix I.I

Synthetic Unit Hydrograph Method Analysis Pre-Development Conditions 10-Year Storm

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:

BIG BOX RETAIL - HESPERIA
UNIT HYDROGRAPH
10-YEAR PRE CONDITIONS, DA A

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.29
TOTAL CATCHMENT AREA(ACRES) = 16.70
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.598
LOW LOSS FRACTION = 0.795
TIME OF CONCENTRATION(MIN.) = 20.45
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.20
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.71
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.10
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.51
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.10

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 1.37
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 2.94

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
-----------------	----------------	------------	----	-----	------	------	------

0.32	0.0042	0.30	Q	.	.	.	.
0.66	0.0126	0.30	Q	.	.	.	.

1.00	0.0210	0.30	Q	.	.	.	.
1.34	0.0296	0.31	Q	.	.	.	.
1.68	0.0382	0.31	Q	.	.	.	.
2.03	0.0470	0.31	Q	.	.	.	.
2.37	0.0558	0.32	Q	.	.	.	.
2.71	0.0648	0.32	Q	.	.	.	.
3.05	0.0738	0.32	Q	.	.	.	.
3.39	0.0830	0.33	Q	.	.	.	.
3.73	0.0923	0.33	Q	.	.	.	.
4.07	0.1017	0.34	Q	.	.	.	.
4.41	0.1113	0.34	Q	.	.	.	.
4.75	0.1209	0.35	Q	.	.	.	.
5.09	0.1308	0.35	Q	.	.	.	.
5.43	0.1407	0.36	Q	.	.	.	.
5.77	0.1508	0.36	Q	.	.	.	.
6.12	0.1611	0.37	Q	.	.	.	.
6.46	0.1715	0.37	Q	.	.	.	.
6.80	0.1822	0.38	Q	.	.	.	.
7.14	0.1930	0.39	Q	.	.	.	.
7.48	0.2040	0.40	Q	.	.	.	.
7.82	0.2152	0.40	Q	.	.	.	.
8.16	0.2266	0.41	Q	.	.	.	.
8.50	0.2382	0.42	Q	.	.	.	.
8.84	0.2501	0.43	Q	.	.	.	.
9.18	0.2623	0.44	Q	.	.	.	.
9.52	0.2748	0.45	Q	.	.	.	.
9.86	0.2875	0.46	Q	.	.	.	.
10.21	0.3006	0.47	Q	.	.	.	.
10.55	0.3140	0.48	Q	.	.	.	.
10.89	0.3279	0.50	.Q	.	.	.	.
11.23	0.3422	0.51	.Q	.	.	.	.
11.57	0.3569	0.54	.Q	.	.	.	.
11.91	0.3722	0.55	.Q	.	.	.	.
12.25	0.3874	0.54	.Q	.	.	.	.
12.59	0.4024	0.53	.Q	.	.	.	.
12.93	0.4177	0.56	.Q	.	.	.	.
13.27	0.4339	0.59	.Q	.	.	.	.
13.61	0.4511	0.64	.Q	.	.	.	.
13.95	0.4696	0.67	.Q	.	.	.	.
14.30	0.4885	0.67	.Q	.	.	.	.
14.64	0.5078	0.70	.Q	.	.	.	.
14.98	0.5296	0.85	.Q	.	.	.	.
15.32	0.5550	0.96	.Q	.	.	.	.
15.66	0.5905	1.56	. Q	.	.	.	.
16.00	0.6447	2.29	. Q	.	.	.	.
16.34	0.8715	13.81	.	.	.	Q	.
16.68	1.0818	1.12	. Q	.	.	.	.
17.02	1.1083	0.77	.Q	.	.	.	.
17.36	1.1290	0.71	.Q	.	.	.	.
17.70	1.1476	0.61	.Q	.	.	.	.

18.05	1.1639	0.54	.Q	.	.	.	.
18.39	1.1794	0.56	.Q	.	.	.	.
18.73	1.1947	0.52	.Q	.	.	.	.
19.07	1.2090	0.49	Q	.	.	.	.
19.41	1.2225	0.46	Q	.	.	.	.
19.75	1.2352	0.44	Q	.	.	.	.
20.09	1.2474	0.42	Q	.	.	.	.
20.43	1.2591	0.41	Q	.	.	.	.
20.77	1.2703	0.39	Q	.	.	.	.
21.11	1.2811	0.38	Q	.	.	.	.
21.45	1.2915	0.36	Q	.	.	.	.
21.79	1.3016	0.35	Q	.	.	.	.
22.14	1.3115	0.34	Q	.	.	.	.
22.48	1.3210	0.33	Q	.	.	.	.
22.82	1.3303	0.33	Q	.	.	.	.
23.16	1.3394	0.32	Q	.	.	.	.
23.50	1.3482	0.31	Q	.	.	.	.
23.84	1.3569	0.30	Q	.	.	.	.
24.18	1.3653	0.30	Q	.	.	.	.
24.52	1.3695	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%	1452.0
10%	61.4
20%	20.5
30%	20.5
40%	20.5
50%	20.5
60%	20.5
70%	20.5
80%	20.5
90%	20.5

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:

BIG BOX RETAIL - HESPERIA
UNIT HYDROGRAPH
10-YEAR PRE CONDITIONS, DA B

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.48
TOTAL CATCHMENT AREA(ACRES) = 8.67
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.598
LOW LOSS FRACTION = 0.795
TIME OF CONCENTRATION(MIN.) = 11.71
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.20
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.71
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.10
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.51
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.10

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.81
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.43

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
-----------------	----------------	------------	----	-----	------	------	------

0.19	0.0014	0.18	Q	.	.	.	.
0.39	0.0043	0.18	Q	.	.	.	.

0.58	0.0071	0.18	Q	.	.	.	.
0.78	0.0100	0.18	Q	.	.	.	.
0.97	0.0129	0.18	Q	.	.	.	.
1.17	0.0159	0.18	Q	.	.	.	.
1.36	0.0188	0.18	Q	.	.	.	.
1.56	0.0218	0.18	Q	.	.	.	.
1.76	0.0247	0.19	Q	.	.	.	.
1.95	0.0277	0.19	Q	.	.	.	.
2.15	0.0308	0.19	Q	.	.	.	.
2.34	0.0338	0.19	Q	.	.	.	.
2.54	0.0368	0.19	Q	.	.	.	.
2.73	0.0399	0.19	Q	.	.	.	.
2.93	0.0430	0.19	Q	.	.	.	.
3.12	0.0462	0.19	Q	.	.	.	.
3.32	0.0493	0.20	Q	.	.	.	.
3.51	0.0525	0.20	Q	.	.	.	.
3.71	0.0557	0.20	Q	.	.	.	.
3.90	0.0589	0.20	Q	.	.	.	.
4.10	0.0621	0.20	Q	.	.	.	.
4.29	0.0654	0.20	Q	.	.	.	.
4.49	0.0687	0.21	Q	.	.	.	.
4.68	0.0720	0.21	Q	.	.	.	.
4.88	0.0754	0.21	Q	.	.	.	.
5.07	0.0787	0.21	Q	.	.	.	.
5.27	0.0821	0.21	Q	.	.	.	.
5.46	0.0856	0.21	Q	.	.	.	.
5.66	0.0890	0.22	Q	.	.	.	.
5.85	0.0925	0.22	Q	.	.	.	.
6.05	0.0961	0.22	Q	.	.	.	.
6.24	0.0996	0.22	Q	.	.	.	.
6.44	0.1032	0.22	Q	.	.	.	.
6.63	0.1068	0.23	Q	.	.	.	.
6.83	0.1105	0.23	Q	.	.	.	.
7.02	0.1142	0.23	Q	.	.	.	.
7.22	0.1179	0.23	Q	.	.	.	.
7.41	0.1217	0.24	Q	.	.	.	.
7.61	0.1255	0.24	Q	.	.	.	.
7.80	0.1294	0.24	Q	.	.	.	.
8.00	0.1333	0.24	Q	.	.	.	.
8.19	0.1373	0.25	Q	.	.	.	.
8.39	0.1413	0.25	Q	.	.	.	.
8.58	0.1453	0.25	Q	.	.	.	.
8.78	0.1494	0.26	Q	.	.	.	.
8.98	0.1536	0.26	Q	.	.	.	.
9.17	0.1578	0.26	Q	.	.	.	.
9.37	0.1620	0.27	Q	.	.	.	.
9.56	0.1663	0.27	Q	.	.	.	.
9.76	0.1707	0.27	Q	.	.	.	.
9.95	0.1752	0.28	Q	.	.	.	.
10.15	0.1797	0.28	Q	.	.	.	.

10.34	0.1843	0.29	Q	.	.	.	.
10.54	0.1889	0.29	Q	.	.	.	.
10.73	0.1937	0.30	Q	.	.	.	.
10.93	0.1985	0.30	Q	.	.	.	.
11.12	0.2034	0.31	Q	.	.	.	.
11.32	0.2084	0.31	Q	.	.	.	.
11.51	0.2135	0.32	Q	.	.	.	.
11.71	0.2187	0.32	Q	.	.	.	.
11.90	0.2240	0.33	Q	.	.	.	.
12.10	0.2294	0.34	Q	.	.	.	.
12.29	0.2347	0.31	Q	.	.	.	.
12.49	0.2397	0.32	Q	.	.	.	.
12.68	0.2449	0.33	Q	.	.	.	.
12.88	0.2502	0.33	Q	.	.	.	.
13.07	0.2558	0.35	Q	.	.	.	.
13.27	0.2615	0.36	Q	.	.	.	.
13.46	0.2674	0.38	Q	.	.	.	.
13.66	0.2736	0.39	Q	.	.	.	.
13.85	0.2800	0.41	Q	.	.	.	.
14.05	0.2867	0.42	Q	.	.	.	.
14.24	0.2933	0.39	Q	.	.	.	.
14.44	0.2998	0.41	Q	.	.	.	.
14.63	0.3067	0.45	Q	.	.	.	.
14.83	0.3143	0.48	Q	.	.	.	.
15.02	0.3225	0.54	.Q	.	.	.	.
15.22	0.3316	0.59	.Q	.	.	.	.
15.41	0.3422	0.72	.Q	.	.	.	.
15.61	0.3554	0.92	.Q	.	.	.	.
15.80	0.3742	1.41	. Q	.	.	.	.
16.00	0.4011	1.93	. Q	.	.	.	.
16.20	0.5201	12.82	.	.	Q	.	.
16.39	0.6320	1.05	. Q	.	.	.	.
16.59	0.6456	0.64	.Q	.	.	.	.
16.78	0.6549	0.51	.Q	.	.	.	.
16.98	0.6624	0.43	Q	.	.	.	.
17.17	0.6692	0.42	Q	.	.	.	.
17.37	0.6758	0.40	Q	.	.	.	.
17.56	0.6820	0.37	Q	.	.	.	.
17.76	0.6877	0.34	Q	.	.	.	.
17.95	0.6931	0.32	Q	.	.	.	.
18.15	0.6982	0.31	Q	.	.	.	.
18.34	0.7034	0.33	Q	.	.	.	.
18.54	0.7086	0.32	Q	.	.	.	.
18.73	0.7136	0.30	Q	.	.	.	.
18.93	0.7184	0.29	Q	.	.	.	.
19.12	0.7231	0.28	Q	.	.	.	.
19.32	0.7276	0.28	Q	.	.	.	.
19.51	0.7320	0.27	Q	.	.	.	.
19.71	0.7362	0.26	Q	.	.	.	.
19.90	0.7404	0.25	Q	.	.	.	.

20.10	0.7444	0.25	Q	.	.	.	.
20.29	0.7484	0.24	Q	.	.	.	.
20.49	0.7522	0.24	Q	.	.	.	.
20.68	0.7560	0.23	Q	.	.	.	.
20.88	0.7597	0.23	Q	.	.	.	.
21.07	0.7633	0.22	Q	.	.	.	.
21.27	0.7669	0.22	Q	.	.	.	.
21.46	0.7704	0.21	Q	.	.	.	.
21.66	0.7738	0.21	Q	.	.	.	.
21.85	0.7772	0.21	Q	.	.	.	.
22.05	0.7805	0.20	Q	.	.	.	.
22.24	0.7838	0.20	Q	.	.	.	.
22.44	0.7870	0.20	Q	.	.	.	.
22.63	0.7902	0.20	Q	.	.	.	.
22.83	0.7933	0.19	Q	.	.	.	.
23.02	0.7964	0.19	Q	.	.	.	.
23.22	0.7994	0.19	Q	.	.	.	.
23.42	0.8024	0.18	Q	.	.	.	.
23.61	0.8054	0.18	Q	.	.	.	.
23.81	0.8083	0.18	Q	.	.	.	.
24.00	0.8112	0.18	Q	.	.	.	.
24.20	0.8126	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%	1440.1
10%	35.1
20%	11.7
30%	11.7
40%	11.7
50%	11.7
60%	11.7
70%	11.7
80%	11.7
90%	11.7

Appendix I.II

Synthetic Unit Hydrograph Method Analysis Pre-Development Conditions 100-Year Storm

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:
pre dev UH

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.02
TOTAL CATCHMENT AREA(ACRES) = 16.70
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.296
LOW LOSS FRACTION = 0.294
TIME OF CONCENTRATION(MIN.) = 20.45
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) = 0.32
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.86
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.18
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.87
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.61
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.71

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 5.85
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 2.10

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
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0.32	0.0228	1.62	. Q	.	.	.	.
0.66	0.0686	1.64	. Q	.	.	.	.

1.00	0.1148	1.65	.	Q	.	.	.	.
1.34	0.1615	1.67	.	Q	.	.	.	.
1.68	0.2086	1.68	.	Q	.	.	.	.
2.03	0.2562	1.70	.	Q	.	.	.	.
2.37	0.3043	1.71	.	Q	.	.	.	.
2.71	0.3529	1.74	.	Q	.	.	.	.
3.05	0.4021	1.75	.	Q	.	.	.	.
3.39	0.4518	1.78	.	Q	.	.	.	.
3.73	0.5021	1.79	.	Q	.	.	.	.
4.07	0.5530	1.82	.	Q	.	.	.	.
4.41	0.6045	1.84	.	Q	.	.	.	.
4.75	0.6567	1.87	.	Q	.	.	.	.
5.09	0.7095	1.88	.	Q	.	.	.	.
5.43	0.7630	1.92	.	Q	.	.	.	.
5.77	0.8173	1.94	.	Q	.	.	.	.
6.12	0.8724	1.97	.	Q	.	.	.	.
6.46	0.9282	1.99	.	Q	.	.	.	.
6.80	0.9849	2.03	.	Q	.	.	.	.
7.14	1.0425	2.06	.	Q	.	.	.	.
7.48	1.1011	2.10	.	Q	.	.	.	.
7.82	1.1606	2.13	.	Q	.	.	.	.
8.16	1.2212	2.18	.	Q	.	.	.	.
8.50	1.2829	2.20	.	Q	.	.	.	.
8.84	1.3458	2.26	.	Q	.	.	.	.
9.18	1.4100	2.29	.	Q	.	.	.	.
9.52	1.4755	2.36	.	Q	.	.	.	.
9.86	1.5425	2.40	.	Q	.	.	.	.
10.21	1.6110	2.47	.	Q	.	.	.	.
10.55	1.6813	2.51	.	Q	.	.	.	.
10.89	1.7534	2.61	.	Q	.	.	.	.
11.23	1.8275	2.66	.	Q	.	.	.	.
11.57	1.9038	2.76	.	Q	.	.	.	.
11.91	1.9825	2.83	.	Q	.	.	.	.
12.25	2.0603	2.70	.	Q	.	.	.	.
12.59	2.1350	2.60	.	Q	.	.	.	.
12.93	2.2108	2.78	.	Q	.	.	.	.
13.27	2.2907	2.89	.	Q	.	.	.	.
13.61	2.3756	3.14	.	Q	.	.	.	.
13.95	2.4662	3.29	.	Q	.	.	.	.
14.30	2.5590	3.30	.	Q	.	.	.	.
14.64	2.6541	3.45	.	Q	.	.	.	.
14.98	2.7609	4.13	.	Q	.	.	.	.
15.32	2.8846	4.65	.	Q	.	.	.	.
15.66	3.0493	7.05	.	Q.	.	.	.	.
16.00	3.2940	10.33	.	Q	.	.	.	.
16.34	3.8602	29.87	.	.	.	.	Q.	.
16.68	4.3567	5.38	.	Q	.	.	.	.
17.02	4.4854	3.75	.	Q	.	.	.	.
17.36	4.5870	3.47	.	Q	.	.	.	.
17.70	4.6782	3.01	.	Q	.	.	.	.

18.05	4.7584	2.69	.	Q	.	.	.	.
18.39	4.8370	2.89	.	Q	.	.	.	.
18.73	4.9159	2.71	.	Q	.	.	.	.
19.07	4.9900	2.56	.	Q	.	.	.	.
19.41	5.0603	2.43	.	Q	.	.	.	.
19.75	5.1274	2.33	.	Q	.	.	.	.
20.09	5.1916	2.23	.	Q	.	.	.	.
20.43	5.2533	2.15	.	Q	.	.	.	.
20.77	5.3129	2.08	.	Q	.	.	.	.
21.11	5.3705	2.01	.	Q	.	.	.	.
21.45	5.4264	1.95	.	Q	.	.	.	.
21.79	5.4806	1.90	.	Q	.	.	.	.
22.14	5.5335	1.85	.	Q	.	.	.	.
22.48	5.5850	1.81	.	Q	.	.	.	.
22.82	5.6353	1.76	.	Q	.	.	.	.
23.16	5.6845	1.73	.	Q	.	.	.	.
23.50	5.7326	1.69	.	Q	.	.	.	.
23.84	5.7797	1.66	.	Q	.	.	.	.
24.18	5.8259	1.63	.	Q	.	.	.	.
24.52	5.8488	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%	1452.0
10%	265.9
20%	61.4
30%	40.9
40%	20.5
50%	20.5
60%	20.5
70%	20.5
80%	20.5
90%	20.5

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.20
TOTAL CATCHMENT AREA(ACRES) = 8.67
SOIL-LOSS RATE, F_m , (INCH/HR) = 0.296
LOW LOSS FRACTION = 0.294
TIME OF CONCENTRATION(MIN.) = 11.71
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) = 0.32
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.86
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.18
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.87
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.61
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.71

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 3.56
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.57

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.19	0.0078	0.99	.Q	.	.	.	.
0.39	0.0238	0.99	.Q	.	.	.	.
0.58	0.0399	1.00	.Q	.	.	.	.
0.78	0.0560	1.00	.Q	.	.	.	.
0.97	0.0722	1.01	.Q	.	.	.	.
1.17	0.0886	1.01	.Q	.	.	.	.
1.36	0.1050	1.02	.Q	.	.	.	.
1.56	0.1215	1.03	.Q	.	.	.	.
1.75	0.1381	1.03	.Q	.	.	.	.
1.95	0.1548	1.04	.Q	.	.	.	.
2.14	0.1716	1.05	.Q	.	.	.	.
2.34	0.1885	1.05	.Q	.	.	.	.
2.53	0.2056	1.06	.Q	.	.	.	.
2.73	0.2227	1.06	.Q	.	.	.	.
2.92	0.2399	1.07	.Q	.	.	.	.
3.12	0.2573	1.08	.Q	.	.	.	.
3.31	0.2747	1.09	.Q	.	.	.	.
3.51	0.2923	1.09	.Q	.	.	.	.
3.70	0.3100	1.10	.Q	.	.	.	.
3.90	0.3278	1.11	.Q	.	.	.	.
4.09	0.3457	1.12	.Q	.	.	.	.
4.29	0.3638	1.12	.Q	.	.	.	.
4.49	0.3820	1.13	.Q	.	.	.	.

4.68	0.4003	1.14	.Q	.	.	.	.
4.88	0.4188	1.15	.Q	.	.	.	.
5.07	0.4374	1.16	.Q	.	.	.	.
5.27	0.4561	1.17	.Q	.	.	.	.
5.46	0.4750	1.17	.Q	.	.	.	.
5.66	0.4940	1.19	.Q	.	.	.	.
5.85	0.5132	1.19	.Q	.	.	.	.
6.05	0.5326	1.21	.Q	.	.	.	.
6.24	0.5521	1.21	.Q	.	.	.	.
6.44	0.5718	1.23	.Q	.	.	.	.
6.63	0.5916	1.23	.Q	.	.	.	.
6.83	0.6117	1.25	.Q	.	.	.	.
7.02	0.6319	1.26	.Q	.	.	.	.
7.22	0.6523	1.27	.Q	.	.	.	.
7.41	0.6729	1.28	.Q	.	.	.	.
7.61	0.6937	1.30	.Q	.	.	.	.
7.80	0.7147	1.31	.Q	.	.	.	.
8.00	0.7359	1.32	.Q	.	.	.	.
8.19	0.7574	1.33	.Q	.	.	.	.
8.39	0.7790	1.35	.Q	.	.	.	.
8.58	0.8010	1.36	.Q	.	.	.	.
8.78	0.8231	1.38	.Q	.	.	.	.
8.97	0.8455	1.40	.Q	.	.	.	.
9.17	0.8682	1.42	.Q	.	.	.	.
9.36	0.8912	1.43	.Q	.	.	.	.
9.56	0.9144	1.45	.Q	.	.	.	.
9.75	0.9380	1.47	.Q	.	.	.	.
9.95	0.9619	1.49	.Q	.	.	.	.
10.15	0.9861	1.51	. Q	.	.	.	.
10.34	1.0106	1.54	. Q	.	.	.	.
10.54	1.0355	1.55	. Q	.	.	.	.
10.73	1.0608	1.58	. Q	.	.	.	.
10.93	1.0865	1.60	. Q	.	.	.	.
11.12	1.1126	1.64	. Q	.	.	.	.
11.32	1.1391	1.65	. Q	.	.	.	.
11.51	1.1661	1.69	. Q	.	.	.	.
11.71	1.1936	1.72	. Q	.	.	.	.
11.90	1.2217	1.76	. Q	.	.	.	.
12.10	1.2503	1.79	. Q	.	.	.	.
12.29	1.2773	1.57	. Q	.	.	.	.
12.49	1.3029	1.60	. Q	.	.	.	.
12.68	1.3292	1.66	. Q	.	.	.	.
12.88	1.3562	1.69	. Q	.	.	.	.
13.07	1.3841	1.77	. Q	.	.	.	.
13.27	1.4130	1.81	. Q	.	.	.	.
13.46	1.4428	1.90	. Q	.	.	.	.
13.66	1.4738	1.95	. Q	.	.	.	.
13.85	1.5061	2.06	. Q	.	.	.	.
14.05	1.5399	2.12	. Q	.	.	.	.
14.24	1.5730	1.99	. Q	.	.	.	.

14.44	1.6057	2.07	. Q	.	.	.	.
14.63	1.6407	2.27	. Q	.	.	.	.
14.83	1.6783	2.40	. Q	.	.	.	.
15.02	1.7195	2.71	. Q	.	.	.	.
15.22	1.7648	2.91	. Q	.	.	.	.
15.41	1.8168	3.53	. Q	.	.	.	.
15.61	1.8794	4.24	. Q	.	.	.	.
15.80	1.9661	6.51	. Q	.	.	.	.
16.00	2.0955	9.55	. Q	.	.	.	.
16.20	2.3692	24.40	.	.	.	. Q	.
16.39	2.6052	4.87	. Q	.	.	.	.
16.59	2.6700	3.17	. Q	.	.	.	.
16.78	2.7160	2.54	. Q	.	.	.	.
16.98	2.7539	2.16	. Q	.	.	.	.
17.17	2.7882	2.09	. Q	.	.	.	.
17.37	2.8212	2.00	. Q	.	.	.	.
17.56	2.8523	1.85	. Q	.	.	.	.
17.76	2.8811	1.73	. Q	.	.	.	.
17.95	2.9082	1.63	. Q	.	.	.	.
18.15	2.9343	1.61	. Q	.	.	.	.
18.34	2.9614	1.74	. Q	.	.	.	.
18.54	2.9889	1.67	. Q	.	.	.	.
18.73	3.0154	1.62	. Q	.	.	.	.
18.93	3.0411	1.57	. Q	.	.	.	.
19.12	3.0660	1.52	. Q	.	.	.	.
19.32	3.0902	1.48	.Q	.	.	.	.
19.51	3.1138	1.44	.Q	.	.	.	.
19.71	3.1368	1.41	.Q	.	.	.	.
19.90	3.1592	1.37	.Q	.	.	.	.
20.10	3.1811	1.34	.Q	.	.	.	.
20.29	3.2025	1.32	.Q	.	.	.	.
20.49	3.2236	1.29	.Q	.	.	.	.
20.68	3.2442	1.27	.Q	.	.	.	.
20.88	3.2644	1.24	.Q	.	.	.	.
21.07	3.2842	1.22	.Q	.	.	.	.
21.27	3.3038	1.20	.Q	.	.	.	.
21.46	3.3230	1.18	.Q	.	.	.	.
21.66	3.3418	1.16	.Q	.	.	.	.
21.86	3.3604	1.14	.Q	.	.	.	.
22.05	3.3788	1.13	.Q	.	.	.	.
22.25	3.3968	1.11	.Q	.	.	.	.
22.44	3.4146	1.10	.Q	.	.	.	.
22.64	3.4322	1.08	.Q	.	.	.	.
22.83	3.4496	1.07	.Q	.	.	.	.
23.03	3.4667	1.05	.Q	.	.	.	.
23.22	3.4836	1.04	.Q	.	.	.	.
23.42	3.5003	1.03	.Q	.	.	.	.
23.61	3.5168	1.02	.Q	.	.	.	.
23.81	3.5332	1.01	.Q	.	.	.	.
24.00	3.5493	1.00	.Q	.	.	.	.

24.20 3.5573 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%	1440.3
10%	117.1
20%	35.1
30%	23.4
40%	11.7
50%	11.7
60%	11.7
70%	11.7
80%	11.7
90%	11.7

Appendix I.III

Synthetic Unit Hydrograph Method Analysis Post-Development Conditions 10-Year Storm

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

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Orange, CA 92868

Problem Descriptions:

BIG BOX RETAIL - HESPERIA
UNIT HYDROGRAPH
10-YEAR, POST-CONDITIONS, DA A

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.47
TOTAL CATCHMENT AREA(ACRES) = 9.10
SOIL-LOSS RATE, F_m (INCH/HR) = 0.190
LOW LOSS FRACTION = 0.255
TIME OF CONCENTRATION(MIN.) = 8.59
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.20
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.71
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.10
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.51
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.10

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.60
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = -0.25

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.11	0.0031	0.67	Q	.	.	.	.
0.26	0.0110	0.67	Q	.	.	.	.
0.40	0.0190	0.67	Q	.	.	.	.
0.54	0.0269	0.67	Q	.	.	.	.
0.69	0.0349	0.68	Q	.	.	.	.
0.83	0.0430	0.68	Q	.	.	.	.
0.97	0.0510	0.68	Q	.	.	.	.
1.12	0.0592	0.69	Q	.	.	.	.
1.26	0.0673	0.69	Q	.	.	.	.
1.40	0.0755	0.69	Q	.	.	.	.
1.55	0.0837	0.70	Q	.	.	.	.
1.69	0.0920	0.70	Q	.	.	.	.
1.83	0.1003	0.70	Q	.	.	.	.
1.97	0.1086	0.71	Q	.	.	.	.
2.12	0.1170	0.71	Q	.	.	.	.
2.26	0.1254	0.71	Q	.	.	.	.
2.40	0.1339	0.72	Q	.	.	.	.
2.55	0.1424	0.72	Q	.	.	.	.
2.69	0.1509	0.73	Q	.	.	.	.
2.83	0.1595	0.73	Q	.	.	.	.
2.98	0.1682	0.73	Q	.	.	.	.

3.12	0.1769	0.74	Q	.	.	.	.
3.26	0.1856	0.74	Q	.	.	.	.
3.41	0.1944	0.74	Q	.	.	.	.
3.55	0.2032	0.75	Q	.	.	.	.
3.69	0.2121	0.75	.Q	.	.	.	.
3.84	0.2210	0.76	.Q	.	.	.	.
3.98	0.2300	0.76	.Q	.	.	.	.
4.12	0.2390	0.77	.Q	.	.	.	.
4.26	0.2481	0.77	.Q	.	.	.	.
4.41	0.2572	0.77	.Q	.	.	.	.
4.55	0.2664	0.78	.Q	.	.	.	.
4.69	0.2756	0.78	.Q	.	.	.	.
4.84	0.2849	0.79	.Q	.	.	.	.
4.98	0.2943	0.79	.Q	.	.	.	.
5.12	0.3037	0.80	.Q	.	.	.	.
5.27	0.3131	0.80	.Q	.	.	.	.
5.41	0.3227	0.81	.Q	.	.	.	.
5.55	0.3322	0.81	.Q	.	.	.	.
5.70	0.3419	0.82	.Q	.	.	.	.
5.84	0.3516	0.83	.Q	.	.	.	.
5.98	0.3614	0.83	.Q	.	.	.	.
6.12	0.3712	0.84	.Q	.	.	.	.
6.27	0.3812	0.84	.Q	.	.	.	.
6.41	0.3911	0.85	.Q	.	.	.	.
6.55	0.4012	0.85	.Q	.	.	.	.
6.70	0.4113	0.86	.Q	.	.	.	.
6.84	0.4215	0.86	.Q	.	.	.	.
6.98	0.4318	0.87	.Q	.	.	.	.
7.13	0.4422	0.88	.Q	.	.	.	.
7.27	0.4526	0.89	.Q	.	.	.	.
7.41	0.4631	0.89	.Q	.	.	.	.
7.56	0.4737	0.90	.Q	.	.	.	.
7.70	0.4844	0.91	.Q	.	.	.	.
7.84	0.4952	0.92	.Q	.	.	.	.
7.99	0.5061	0.92	.Q	.	.	.	.
8.13	0.5170	0.93	.Q	.	.	.	.
8.27	0.5281	0.94	.Q	.	.	.	.
8.41	0.5392	0.95	.Q	.	.	.	.
8.56	0.5505	0.95	.Q	.	.	.	.
8.70	0.5618	0.97	.Q	.	.	.	.
8.84	0.5733	0.97	.Q	.	.	.	.
8.99	0.5849	0.98	.Q	.	.	.	.
9.13	0.5965	0.99	.Q	.	.	.	.
9.27	0.6083	1.00	.Q	.	.	.	.
9.42	0.6203	1.01	.Q	.	.	.	.
9.56	0.6323	1.02	.Q	.	.	.	.
9.70	0.6445	1.03	.Q	.	.	.	.
9.85	0.6568	1.05	.Q	.	.	.	.
9.99	0.6692	1.06	.Q	.	.	.	.
10.13	0.6818	1.07	.Q	.	.	.	.
10.28	0.6945	1.08	.Q	.	.	.	.
10.42	0.7073	1.10	.Q	.	.	.	.
10.56	0.7204	1.11	.Q	.	.	.	.
10.70	0.7336	1.12	.Q	.	.	.	.
10.85	0.7469	1.13	.Q	.	.	.	.
10.99	0.7605	1.15	.Q	.	.	.	.
11.13	0.7742	1.16	.Q	.	.	.	.
11.28	0.7881	1.19	.Q	.	.	.	.
11.42	0.8022	1.20	.Q	.	.	.	.
11.56	0.8165	1.22	.Q	.	.	.	.
11.71	0.8310	1.23	.Q	.	.	.	.
11.85	0.8458	1.26	.Q	.	.	.	.
11.99	0.8608	1.28	.Q	.	.	.	.
12.14	0.8752	1.16	.Q	.	.	.	.
12.28	0.8890	1.17	.Q	.	.	.	.
12.42	0.9029	1.20	.Q	.	.	.	.
12.57	0.9172	1.21	.Q	.	.	.	.
12.71	0.9318	1.25	.Q	.	.	.	.
12.85	0.9467	1.27	.Q	.	.	.	.

12.99	0.9620	1.31	.Q	.	.	.	.
13.14	0.9776	1.34	.Q	.	.	.	.
13.28	0.9937	1.38	.Q	.	.	.	.
13.42	1.0103	1.41	.Q	.	.	.	.
13.57	1.0273	1.47	.Q	.	.	.	.
13.71	1.0448	1.50	.Q	.	.	.	.
13.85	1.0629	1.57	. Q	.	.	.	.
14.00	1.0817	1.60	. Q	.	.	.	.
14.14	1.0998	1.46	.Q	.	.	.	.
14.28	1.1173	1.50	.Q	.	.	.	.
14.43	1.1356	1.60	. Q	.	.	.	.
14.57	1.1549	1.66	. Q	.	.	.	.
14.71	1.1753	1.79	. Q	.	.	.	.
14.86	1.1970	1.87	. Q	.	.	.	.
15.00	1.2203	2.06	. Q	.	.	.	.
15.14	1.2454	2.18	. Q	.	.	.	.
15.28	1.2729	2.48	. Q	.	.	.	.
15.43	1.3034	2.68	. Q	.	.	.	.
15.57	1.3410	3.68	. Q	.	.	.	.
15.71	1.3871	4.11	. Q	.	.	.	.
15.86	1.4505	6.61	. Q	.	.	.	.
16.00	1.5413	8.75	. .Q	.	.	.	.
16.14	1.7232	22.01	.	.	Q.	.	.
16.29	1.8840	5.18	. Q	.	.	.	.
16.43	1.9345	3.35	. Q	.	.	.	.
16.57	1.9681	2.32	. Q	.	.	.	.
16.72	1.9934	1.96	. Q	.	.	.	.
16.86	2.0152	1.72	. Q	.	.	.	.
17.00	2.0345	1.55	. Q	.	.	.	.
17.14	2.0534	1.64	. Q	.	.	.	.
17.29	2.0721	1.53	. Q	.	.	.	.
17.43	2.0897	1.44	.Q	.	.	.	.
17.57	2.1062	1.36	.Q	.	.	.	.
17.72	2.1219	1.29	.Q	.	.	.	.
17.86	2.1368	1.23	.Q	.	.	.	.
18.00	2.1511	1.18	.Q	.	.	.	.
18.15	2.1657	1.29	.Q	.	.	.	.
18.29	2.1807	1.25	.Q	.	.	.	.
18.43	2.1953	1.21	.Q	.	.	.	.
18.58	2.2094	1.18	.Q	.	.	.	.
18.72	2.2231	1.14	.Q	.	.	.	.
18.86	2.2364	1.11	.Q	.	.	.	.
19.01	2.2495	1.09	.Q	.	.	.	.
19.15	2.2622	1.06	.Q	.	.	.	.
19.29	2.2746	1.04	.Q	.	.	.	.
19.43	2.2868	1.02	.Q	.	.	.	.
19.58	2.2987	1.00	.Q	.	.	.	.
19.72	2.3104	0.98	.Q	.	.	.	.
19.86	2.3219	0.96	.Q	.	.	.	.
20.01	2.3331	0.94	.Q	.	.	.	.
20.15	2.3442	0.93	.Q	.	.	.	.
20.29	2.3550	0.91	.Q	.	.	.	.
20.44	2.3657	0.90	.Q	.	.	.	.
20.58	2.3762	0.88	.Q	.	.	.	.
20.72	2.3866	0.87	.Q	.	.	.	.
20.87	2.3968	0.86	.Q	.	.	.	.
21.01	2.4069	0.84	.Q	.	.	.	.
21.15	2.4168	0.83	.Q	.	.	.	.
21.30	2.4266	0.82	.Q	.	.	.	.
21.44	2.4362	0.81	.Q	.	.	.	.
21.58	2.4457	0.80	.Q	.	.	.	.
21.72	2.4551	0.79	.Q	.	.	.	.
21.87	2.4644	0.78	.Q	.	.	.	.
22.01	2.4736	0.77	.Q	.	.	.	.
22.15	2.4827	0.76	.Q	.	.	.	.
22.30	2.4917	0.75	.Q	.	.	.	.
22.44	2.5005	0.75	Q	.	.	.	.
22.58	2.5093	0.74	Q	.	.	.	.
22.73	2.5180	0.73	Q	.	.	.	.

22.87	2.5266	0.72	Q	.	.	.	.
23.01	2.5351	0.72	Q	.	.	.	.
23.16	2.5435	0.71	Q	.	.	.	.
23.30	2.5519	0.70	Q	.	.	.	.
23.44	2.5601	0.70	Q	.	.	.	.
23.59	2.5683	0.69	Q	.	.	.	.
23.73	2.5764	0.68	Q	.	.	.	.
23.87	2.5845	0.68	Q	.	.	.	.
24.01	2.5924	0.67	Q	.	.	.	.
24.16	2.5964	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%	1442.6
10%	85.9
20%	34.3
30%	25.8
40%	8.6
50%	8.6
60%	8.6
70%	8.6
80%	8.6
90%	8.6

 SMALL AREA UNIT HYDROGRAPH MODEL
 =====

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 Ver. 18.0 Release Date: 05/01/2011 License ID 1499

Analysis prepared by:

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 Suite 200
 Orange, CA 92868

Problem Descriptions:

BIG BOX RETAIL - HESPERIA
 UNIT HYDROGRAPH
 10-YEAR, POST-CONDITIONS, DA B

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.12
 TOTAL CATCHMENT AREA(ACRES) = 16.27
 SOIL-LOSS RATE, Fm,(INCH/HR) = 0.003
 LOW LOSS FRACTION = 0.078
 TIME OF CONCENTRATION(MIN.) = 7.69
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 USER SPECIFIED RAINFALL VALUES ARE USED
 RETURN FREQUENCY(YEARS) = 10
 5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.20
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
 1-HOUR POINT RAINFALL VALUE(INCHES) = 0.71
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.10
 6-HOUR POINT RAINFALL VALUE(INCHES) = 1.51
 24-HOUR POINT RAINFALL VALUE(INCHES) = 3.10

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 4.58
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = -0.37

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.11	0.0062	1.17	.Q	.	.	.	.
0.24	0.0186	1.17	.Q	.	.	.	.
0.36	0.0311	1.18	.Q	.	.	.	.
0.49	0.0436	1.18	.Q	.	.	.	.
0.62	0.0561	1.19	.Q	.	.	.	.
0.75	0.0687	1.19	.Q	.	.	.	.
0.88	0.0814	1.20	.Q	.	.	.	.
1.00	0.0941	1.20	.Q	.	.	.	.
1.13	0.1069	1.21	.Q	.	.	.	.
1.26	0.1197	1.21	.Q	.	.	.	.
1.39	0.1326	1.22	.Q	.	.	.	.
1.52	0.1455	1.23	.Q	.	.	.	.
1.65	0.1585	1.23	.Q	.	.	.	.
1.77	0.1716	1.24	.Q	.	.	.	.
1.90	0.1847	1.24	.Q	.	.	.	.
2.03	0.1979	1.25	.Q	.	.	.	.
2.16	0.2111	1.25	.Q	.	.	.	.
2.29	0.2244	1.26	.Q	.	.	.	.
2.41	0.2378	1.26	.Q	.	.	.	.
2.54	0.2512	1.27	.Q	.	.	.	.
2.67	0.2647	1.27	.Q	.	.	.	.

2.80	0.2782	1.28	.Q	.	.	.	.
2.93	0.2918	1.29	.Q	.	.	.	.
3.06	0.3055	1.30	.Q	.	.	.	.
3.18	0.3193	1.30	.Q	.	.	.	.
3.31	0.3331	1.31	.Q	.	.	.	.
3.44	0.3470	1.31	.Q	.	.	.	.
3.57	0.3609	1.32	.Q	.	.	.	.
3.70	0.3749	1.33	.Q	.	.	.	.
3.82	0.3891	1.34	.Q	.	.	.	.
3.95	0.4032	1.34	.Q	.	.	.	.
4.08	0.4175	1.35	.Q	.	.	.	.
4.21	0.4318	1.35	.Q	.	.	.	.
4.34	0.4462	1.36	.Q	.	.	.	.
4.46	0.4607	1.37	.Q	.	.	.	.
4.59	0.4753	1.38	.Q	.	.	.	.
4.72	0.4899	1.39	.Q	.	.	.	.
4.85	0.5046	1.40	.Q	.	.	.	.
4.98	0.5194	1.40	.Q	.	.	.	.
5.11	0.5343	1.41	.Q	.	.	.	.
5.23	0.5493	1.42	.Q	.	.	.	.
5.36	0.5644	1.43	.Q	.	.	.	.
5.49	0.5795	1.43	.Q	.	.	.	.
5.62	0.5948	1.45	.Q	.	.	.	.
5.75	0.6101	1.45	.Q	.	.	.	.
5.87	0.6256	1.46	.Q	.	.	.	.
6.00	0.6411	1.47	.Q	.	.	.	.
6.13	0.6568	1.48	.Q	.	.	.	.
6.26	0.6725	1.49	.Q	.	.	.	.
6.39	0.6883	1.50	.Q	.	.	.	.
6.52	0.7043	1.51	.Q	.	.	.	.
6.64	0.7203	1.52	.Q	.	.	.	.
6.77	0.7365	1.53	.Q	.	.	.	.
6.90	0.7528	1.54	.Q	.	.	.	.
7.03	0.7692	1.55	.Q	.	.	.	.
7.16	0.7857	1.57	.Q	.	.	.	.
7.28	0.8023	1.57	.Q	.	.	.	.
7.41	0.8190	1.59	.Q	.	.	.	.
7.54	0.8359	1.60	.Q	.	.	.	.
7.67	0.8529	1.61	.Q	.	.	.	.
7.80	0.8700	1.62	.Q	.	.	.	.
7.93	0.8872	1.64	.Q	.	.	.	.
8.05	0.9046	1.65	.Q	.	.	.	.
8.18	0.9222	1.66	.Q	.	.	.	.
8.31	0.9398	1.67	.Q	.	.	.	.
8.44	0.9576	1.69	.Q	.	.	.	.
8.57	0.9756	1.70	.Q	.	.	.	.
8.69	0.9937	1.72	.Q	.	.	.	.
8.82	1.0120	1.73	.Q	.	.	.	.
8.95	1.0304	1.75	.Q	.	.	.	.
9.08	1.0490	1.76	.Q	.	.	.	.
9.21	1.0677	1.78	.Q	.	.	.	.
9.34	1.0867	1.79	.Q	.	.	.	.
9.46	1.1058	1.82	.Q	.	.	.	.
9.59	1.1251	1.83	.Q	.	.	.	.
9.72	1.1446	1.85	.Q	.	.	.	.
9.85	1.1642	1.86	.Q	.	.	.	.
9.98	1.1841	1.89	.Q	.	.	.	.
10.10	1.2042	1.90	.Q	.	.	.	.
10.23	1.2245	1.93	.Q	.	.	.	.
10.36	1.2450	1.94	.Q	.	.	.	.
10.49	1.2658	1.97	.Q	.	.	.	.
10.62	1.2868	1.99	.Q	.	.	.	.
10.75	1.3080	2.02	. Q	.	.	.	.
10.87	1.3295	2.04	. Q	.	.	.	.
11.00	1.3512	2.07	. Q	.	.	.	.
11.13	1.3732	2.09	. Q	.	.	.	.
11.26	1.3955	2.12	. Q	.	.	.	.
11.39	1.4181	2.14	. Q	.	.	.	.
11.51	1.4410	2.18	. Q	.	.	.	.

11.64	1.4642	2.20	. Q	.	.	.	.
11.77	1.4877	2.24	. Q	.	.	.	.
11.90	1.5116	2.27	. Q	.	.	.	.
12.03	1.5359	2.31	. Q	.	.	.	.
12.15	1.5593	2.11	. Q	.	.	.	.
12.28	1.5816	2.10	. Q	.	.	.	.
12.41	1.6040	2.13	. Q	.	.	.	.
12.54	1.6269	2.19	. Q	.	.	.	.
12.67	1.6502	2.22	. Q	.	.	.	.
12.80	1.6740	2.28	. Q	.	.	.	.
12.92	1.6983	2.31	. Q	.	.	.	.
13.05	1.7232	2.39	. Q	.	.	.	.
13.18	1.7487	2.42	. Q	.	.	.	.
13.31	1.7748	2.51	. Q	.	.	.	.
13.44	1.8016	2.55	. Q	.	.	.	.
13.56	1.8291	2.64	. Q	.	.	.	.
13.69	1.8574	2.69	. Q	.	.	.	.
13.82	1.8865	2.81	. Q	.	.	.	.
13.95	1.9165	2.87	. Q	.	.	.	.
14.08	1.9467	2.82	. Q	.	.	.	.
14.21	1.9756	2.64	. Q	.	.	.	.
14.33	2.0044	2.80	. Q	.	.	.	.
14.46	2.0346	2.89	. Q	.	.	.	.
14.59	2.0662	3.09	. Q	.	.	.	.
14.72	2.0995	3.20	. Q	.	.	.	.
14.85	2.1348	3.47	. Q	.	.	.	.
14.97	2.1724	3.62	. Q	.	.	.	.
15.10	2.2127	4.00	. Q	.	.	.	.
15.23	2.2563	4.23	. Q	.	.	.	.
15.36	2.3042	4.82	. Q	.	.	.	.
15.49	2.3607	5.85	. Q	.	.	.	.
15.62	2.4294	7.13	. Q	.	.	.	.
15.74	2.5093	7.96	. Q	.	.	.	.
15.87	2.6188	12.71	.	. Q	.	.	.
16.00	2.7717	16.18	.	.	. Q	.	.
16.13	3.0441	35.26	.	.	.	. Q	.
16.26	3.2875	10.70	.	. Q	.	.	.
16.38	3.3786	6.50	. Q	.	.	.	.
16.51	3.4369	4.50	. Q	.	.	.	.
16.64	3.4808	3.80	. Q	.	.	.	.
16.77	3.5185	3.33	. Q	.	.	.	.
16.90	3.5520	2.98	. Q	.	.	.	.
17.03	3.5822	2.72	. Q	.	.	.	.
17.15	3.6121	2.93	. Q	.	.	.	.
17.28	3.6421	2.75	. Q	.	.	.	.
17.41	3.6704	2.60	. Q	.	.	.	.
17.54	3.6972	2.46	. Q	.	.	.	.
17.67	3.7227	2.35	. Q	.	.	.	.
17.79	3.7471	2.25	. Q	.	.	.	.
17.92	3.7704	2.16	. Q	.	.	.	.
18.05	3.7928	2.08	. Q	.	.	.	.
18.18	3.8160	2.29	. Q	.	.	.	.
18.31	3.8399	2.22	. Q	.	.	.	.
18.44	3.8631	2.16	. Q	.	.	.	.
18.56	3.8857	2.10	. Q	.	.	.	.
18.69	3.9077	2.05	. Q	.	.	.	.
18.82	3.9292	2.00	. Q	.	.	.	.
18.95	3.9502	1.96	. Q	.	.	.	.
19.08	3.9707	1.92	. Q	.	.	.	.
19.20	3.9908	1.88	. Q	.	.	.	.
19.33	4.0105	1.84	. Q	.	.	.	.
19.46	4.0298	1.80	. Q	.	.	.	.
19.59	4.0487	1.77	. Q	.	.	.	.
19.72	4.0673	1.74	. Q	.	.	.	.
19.84	4.0855	1.71	. Q	.	.	.	.
19.97	4.1035	1.68	. Q	.	.	.	.
20.10	4.1212	1.65	. Q	.	.	.	.
20.23	4.1386	1.63	. Q	.	.	.	.
20.36	4.1557	1.60	. Q	.	.	.	.

20.49	4.1725	1.58	.Q	.	.	.	.
20.61	4.1892	1.56	.Q	.	.	.	.
20.74	4.2055	1.54	.Q	.	.	.	.
20.87	4.2217	1.52	.Q	.	.	.	.
21.00	4.2377	1.50	.Q	.	.	.	.
21.13	4.2534	1.48	.Q	.	.	.	.
21.25	4.2689	1.46	.Q	.	.	.	.
21.38	4.2843	1.44	.Q	.	.	.	.
21.51	4.2994	1.42	.Q	.	.	.	.
21.64	4.3144	1.41	.Q	.	.	.	.
21.77	4.3292	1.39	.Q	.	.	.	.
21.90	4.3439	1.37	.Q	.	.	.	.
22.02	4.3584	1.36	.Q	.	.	.	.
22.15	4.3727	1.35	.Q	.	.	.	.
22.28	4.3869	1.33	.Q	.	.	.	.
22.41	4.4009	1.32	.Q	.	.	.	.
22.54	4.4148	1.30	.Q	.	.	.	.
22.66	4.4285	1.29	.Q	.	.	.	.
22.79	4.4421	1.28	.Q	.	.	.	.
22.92	4.4556	1.27	.Q	.	.	.	.
23.05	4.4690	1.26	.Q	.	.	.	.
23.18	4.4822	1.24	.Q	.	.	.	.
23.31	4.4953	1.23	.Q	.	.	.	.
23.43	4.5083	1.22	.Q	.	.	.	.
23.56	4.5212	1.21	.Q	.	.	.	.
23.69	4.5340	1.20	.Q	.	.	.	.
23.82	4.5467	1.19	.Q	.	.	.	.
23.95	4.5592	1.18	.Q	.	.	.	.
24.07	4.5717	1.17	.Q	.	.	.	.
24.20	4.5779	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%	1445.7
10%	107.7
20%	46.1
30%	30.8
40%	15.4
50%	7.7
60%	7.7
70%	7.7
80%	7.7
90%	7.7

Appendix I.IV

Synthetic Unit Hydrograph Method Analysis Post-Development Conditions 100-Year Storm

SMALL AREA UNIT HYDROGRAPH MODEL

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Problem Descriptions:

BIG BOX RETAIL - HESPERIA
UNIT HYDROGRPAH
100-YEAR, POST-CONDITIONS, DA A

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.41
TOTAL CATCHMENT AREA(ACRES) = 9.10
SOIL-LOSS RATE, F_m (INCH/HR) = 0.145
LOW LOSS FRACTION = 0.190
TIME OF CONCENTRATION(MIN.) = 8.59
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) = 0.32
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.86
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.18
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.87
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.61
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.71

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 5.00
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = -0.67

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.11	0.0063	1.40	.Q	.	.	.	.
0.25	0.0228	1.40	.Q	.	.	.	.
0.39	0.0394	1.41	.Q	.	.	.	.
0.54	0.0560	1.41	.Q	.	.	.	.
0.68	0.0727	1.42	.Q	.	.	.	.
0.82	0.0895	1.42	.Q	.	.	.	.
0.97	0.1064	1.43	.Q	.	.	.	.
1.11	0.1233	1.43	.Q	.	.	.	.
1.25	0.1403	1.44	.Q	.	.	.	.
1.40	0.1574	1.44	.Q	.	.	.	.
1.54	0.1745	1.45	.Q	.	.	.	.
1.68	0.1917	1.46	.Q	.	.	.	.
1.83	0.2090	1.47	.Q	.	.	.	.
1.97	0.2263	1.47	.Q	.	.	.	.
2.11	0.2438	1.48	.Q	.	.	.	.
2.26	0.2613	1.48	.Q	.	.	.	.
2.40	0.2789	1.49	.Q	.	.	.	.
2.54	0.2966	1.50	.Q	.	.	.	.
2.69	0.3143	1.51	.Q	.	.	.	.
2.83	0.3322	1.51	.Q	.	.	.	.
2.97	0.3501	1.52	.Q	.	.	.	.

3.12	0.3681	1.52	.Q	.	.	.	.
3.26	0.3862	1.53	.Q	.	.	.	.
3.40	0.4044	1.54	.Q	.	.	.	.
3.54	0.4226	1.55	.Q	.	.	.	.
3.69	0.4410	1.55	.Q	.	.	.	.
3.83	0.4595	1.56	.Q	.	.	.	.
3.97	0.4780	1.57	.Q	.	.	.	.
4.12	0.4966	1.58	.Q	.	.	.	.
4.26	0.5154	1.59	.Q	.	.	.	.
4.40	0.5342	1.60	.Q	.	.	.	.
4.55	0.5532	1.60	.Q	.	.	.	.
4.69	0.5722	1.62	.Q	.	.	.	.
4.83	0.5913	1.62	.Q	.	.	.	.
4.98	0.6106	1.63	.Q	.	.	.	.
5.12	0.6300	1.64	.Q	.	.	.	.
5.26	0.6494	1.65	.Q	.	.	.	.
5.41	0.6690	1.66	.Q	.	.	.	.
5.55	0.6887	1.67	.Q	.	.	.	.
5.69	0.7085	1.68	.Q	.	.	.	.
5.84	0.7285	1.69	.Q	.	.	.	.
5.98	0.7485	1.70	.Q	.	.	.	.
6.12	0.7687	1.71	.Q	.	.	.	.
6.26	0.7890	1.72	.Q	.	.	.	.
6.41	0.8094	1.73	.Q	.	.	.	.
6.55	0.8300	1.74	.Q	.	.	.	.
6.69	0.8507	1.76	.Q	.	.	.	.
6.84	0.8715	1.76	.Q	.	.	.	.
6.98	0.8925	1.78	.Q	.	.	.	.
7.12	0.9136	1.79	.Q	.	.	.	.
7.27	0.9349	1.81	.Q	.	.	.	.
7.41	0.9563	1.81	.Q	.	.	.	.
7.55	0.9779	1.83	.Q	.	.	.	.
7.70	0.9996	1.84	.Q	.	.	.	.
7.84	1.0215	1.86	.Q	.	.	.	.
7.98	1.0435	1.87	.Q	.	.	.	.
8.13	1.0657	1.89	.Q	.	.	.	.
8.27	1.0881	1.90	.Q	.	.	.	.
8.41	1.1107	1.92	.Q	.	.	.	.
8.56	1.1335	1.93	.Q	.	.	.	.
8.70	1.1564	1.95	.Q	.	.	.	.
8.84	1.1796	1.96	.Q	.	.	.	.
8.98	1.2029	1.98	.Q	.	.	.	.
9.13	1.2264	2.00	.Q	.	.	.	.
9.27	1.2502	2.02	. Q	.	.	.	.
9.41	1.2742	2.03	. Q	.	.	.	.
9.56	1.2984	2.06	. Q	.	.	.	.
9.70	1.3228	2.07	. Q	.	.	.	.
9.84	1.3475	2.10	. Q	.	.	.	.
9.99	1.3724	2.11	. Q	.	.	.	.
10.13	1.3975	2.14	. Q	.	.	.	.
10.27	1.4230	2.16	. Q	.	.	.	.
10.42	1.4487	2.19	. Q	.	.	.	.
10.56	1.4747	2.20	. Q	.	.	.	.
10.70	1.5009	2.24	. Q	.	.	.	.
10.85	1.5275	2.26	. Q	.	.	.	.
10.99	1.5544	2.29	. Q	.	.	.	.
11.13	1.5816	2.31	. Q	.	.	.	.
11.28	1.6092	2.35	. Q	.	.	.	.
11.42	1.6371	2.37	. Q	.	.	.	.
11.56	1.6654	2.41	. Q	.	.	.	.
11.70	1.6941	2.44	. Q	.	.	.	.
11.85	1.7232	2.48	. Q	.	.	.	.
11.99	1.7528	2.51	. Q	.	.	.	.
12.13	1.7807	2.22	. Q	.	.	.	.
12.28	1.8069	2.21	. Q	.	.	.	.
12.42	1.8334	2.27	. Q	.	.	.	.
12.56	1.8604	2.30	. Q	.	.	.	.
12.71	1.8880	2.37	. Q	.	.	.	.
12.85	1.9162	2.40	. Q	.	.	.	.

12.99	1.9451	2.48	. Q	.	.	.	.
13.14	1.9746	2.52	. Q	.	.	.	.
13.28	2.0049	2.60	. Q	.	.	.	.
13.42	2.0360	2.65	. Q	.	.	.	.
13.57	2.0680	2.75	. Q	.	.	.	.
13.71	2.1009	2.81	. Q	.	.	.	.
13.85	2.1349	2.93	. Q	.	.	.	.
14.00	2.1700	3.00	. Q	.	.	.	.
14.14	2.2040	2.76	. Q	.	.	.	.
14.28	2.2371	2.83	. Q	.	.	.	.
14.43	2.2716	3.01	. Q	.	.	.	.
14.57	2.3079	3.11	. Q	.	.	.	.
14.71	2.3462	3.36	. Q	.	.	.	.
14.85	2.3867	3.50	. Q	.	.	.	.
15.00	2.4301	3.84	. Q	.	.	.	.
15.14	2.4768	4.05	. Q	.	.	.	.
15.28	2.5279	4.58	. Q	.	.	.	.
15.43	2.5841	4.93	. Q	.	.	.	.
15.57	2.6508	6.35	. Q	.	.	.	.
15.71	2.7303	7.09	. Q	.	.	.	.
15.86	2.8445	12.21	. Q	.	.	.	.
16.00	3.0116	16.04	. Q	.	.	.	.
16.14	3.3258	37.08	.	.	.	Q	.
16.29	3.5995	9.17	. Q	.	.	.	.
16.43	3.6880	5.79	. Q	.	.	.	.
16.57	3.7476	4.29	. Q	.	.	.	.
16.72	3.7947	3.66	. Q	.	.	.	.
16.86	3.8354	3.23	. Q	.	.	.	.
17.00	3.8718	2.91	. Q	.	.	.	.
17.15	3.9072	3.07	. Q	.	.	.	.
17.29	3.9423	2.87	. Q	.	.	.	.
17.43	3.9753	2.70	. Q	.	.	.	.
17.57	4.0064	2.56	. Q	.	.	.	.
17.72	4.0360	2.44	. Q	.	.	.	.
17.86	4.0642	2.33	. Q	.	.	.	.
18.00	4.0912	2.24	. Q	.	.	.	.
18.15	4.1195	2.53	. Q	.	.	.	.
18.29	4.1490	2.46	. Q	.	.	.	.
18.43	4.1777	2.39	. Q	.	.	.	.
18.58	4.2056	2.33	. Q	.	.	.	.
18.72	4.2328	2.27	. Q	.	.	.	.
18.86	4.2594	2.22	. Q	.	.	.	.
19.01	4.2854	2.17	. Q	.	.	.	.
19.15	4.3109	2.13	. Q	.	.	.	.
19.29	4.3358	2.08	. Q	.	.	.	.
19.44	4.3602	2.04	. Q	.	.	.	.
19.58	4.3842	2.01	. Q	.	.	.	.
19.72	4.4077	1.97	. Q	.	.	.	.
19.87	4.4309	1.94	. Q	.	.	.	.
20.01	4.4536	1.91	. Q	.	.	.	.
20.15	4.4760	1.88	. Q	.	.	.	.
20.30	4.4981	1.85	. Q	.	.	.	.
20.44	4.5198	1.82	. Q	.	.	.	.
20.58	4.5412	1.80	. Q	.	.	.	.
20.72	4.5623	1.77	. Q	.	.	.	.
20.87	4.5832	1.75	. Q	.	.	.	.
21.01	4.6037	1.73	. Q	.	.	.	.
21.15	4.6240	1.71	. Q	.	.	.	.
21.30	4.6441	1.68	. Q	.	.	.	.
21.44	4.6639	1.66	. Q	.	.	.	.
21.58	4.6835	1.65	. Q	.	.	.	.
21.73	4.7029	1.63	. Q	.	.	.	.
21.87	4.7220	1.61	. Q	.	.	.	.
22.01	4.7409	1.59	. Q	.	.	.	.
22.16	4.7597	1.58	. Q	.	.	.	.
22.30	4.7782	1.56	. Q	.	.	.	.
22.44	4.7966	1.54	. Q	.	.	.	.
22.59	4.8148	1.53	. Q	.	.	.	.
22.73	4.8328	1.51	. Q	.	.	.	.

22.87	4.8506	1.50	.Q	.	.	.	.
23.02	4.8683	1.49	.Q	.	.	.	.
23.16	4.8858	1.47	.Q	.	.	.	.
23.30	4.9032	1.46	.Q	.	.	.	.
23.44	4.9204	1.45	.Q	.	.	.	.
23.59	4.9375	1.44	.Q	.	.	.	.
23.73	4.9544	1.42	.Q	.	.	.	.
23.87	4.9712	1.41	.Q	.	.	.	.
24.02	4.9878	1.40	.Q	.	.	.	.
24.16	4.9961	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%	1443.1
10%	103.1
20%	34.4
30%	25.8
40%	17.2
50%	8.6
60%	8.6
70%	8.6
80%	8.6
90%	8.6

SMALL AREA UNIT HYDROGRAPH MODEL

=====

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Ver. 18.0 Release Date: 05/01/2011 License ID 1499

Analysis prepared by:

Kimley-Horn and Associates, Inc.
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Suite 200
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Problem Descriptions:

BIG BOX RETAIL - HESPERIA
UNIT HYDROGRAPH
100-YEAR, POST-CONDITIONS, DA B

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.18
TOTAL CATCHMENT AREA(ACRES) = 16.27
SOIL-LOSS RATE, F_m (INCH/HR) = 0.003
LOW LOSS FRACTION = 0.044
TIME OF CONCENTRATION(MIN.) = 7.69
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) = 0.32
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.86
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.18
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.87
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.61
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.71

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 8.99
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = -1.25

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	17.5	35.0	52.5	70.0
0.11	0.0134	2.53	.Q	.	.	.	.
0.24	0.0403	2.54	.Q	.	.	.	.
0.36	0.0672	2.55	.Q	.	.	.	.
0.49	0.0942	2.56	.Q	.	.	.	.
0.62	0.1214	2.57	.Q	.	.	.	.
0.75	0.1486	2.58	.Q	.	.	.	.
0.88	0.1760	2.58	.Q	.	.	.	.
1.00	0.2034	2.60	.Q	.	.	.	.
1.13	0.2310	2.60	.Q	.	.	.	.
1.26	0.2586	2.62	.Q	.	.	.	.
1.39	0.2864	2.62	.Q	.	.	.	.
1.52	0.3142	2.64	.Q	.	.	.	.
1.65	0.3422	2.64	.Q	.	.	.	.
1.77	0.3703	2.66	.Q	.	.	.	.
1.90	0.3985	2.67	.Q	.	.	.	.
2.03	0.4268	2.68	.Q	.	.	.	.
2.16	0.4552	2.69	.Q	.	.	.	.
2.29	0.4838	2.70	.Q	.	.	.	.
2.41	0.5124	2.71	.Q	.	.	.	.
2.54	0.5412	2.72	.Q	.	.	.	.
2.67	0.5701	2.73	.Q	.	.	.	.

2.80	0.5991	2.75	.Q	.	.	.	.
2.93	0.6283	2.76	.Q	.	.	.	.
3.06	0.6576	2.77	.Q	.	.	.	.
3.18	0.6870	2.78	.Q	.	.	.	.
3.31	0.7165	2.80	.Q	.	.	.	.
3.44	0.7462	2.80	.Q	.	.	.	.
3.57	0.7760	2.82	.Q	.	.	.	.
3.70	0.8059	2.83	.Q	.	.	.	.
3.82	0.8360	2.85	.Q	.	.	.	.
3.95	0.8662	2.86	.Q	.	.	.	.
4.08	0.8965	2.87	.Q	.	.	.	.
4.21	0.9270	2.88	.Q	.	.	.	.
4.34	0.9577	2.90	.Q	.	.	.	.
4.46	0.9885	2.91	.Q	.	.	.	.
4.59	1.0194	2.93	.Q	.	.	.	.
4.72	1.0505	2.94	.Q	.	.	.	.
4.85	1.0818	2.96	.Q	.	.	.	.
4.98	1.1132	2.97	.Q	.	.	.	.
5.11	1.1448	2.99	.Q	.	.	.	.
5.23	1.1765	3.00	.Q	.	.	.	.
5.36	1.2084	3.02	.Q	.	.	.	.
5.49	1.2405	3.03	.Q	.	.	.	.
5.62	1.2727	3.06	.Q	.	.	.	.
5.75	1.3051	3.07	.Q	.	.	.	.
5.87	1.3377	3.09	.Q	.	.	.	.
6.00	1.3705	3.10	.Q	.	.	.	.
6.13	1.4035	3.12	.Q	.	.	.	.
6.26	1.4366	3.14	.Q	.	.	.	.
6.39	1.4700	3.16	.Q	.	.	.	.
6.52	1.5035	3.17	.Q	.	.	.	.
6.64	1.5372	3.20	.Q	.	.	.	.
6.77	1.5712	3.21	.Q	.	.	.	.
6.90	1.6053	3.24	.Q	.	.	.	.
7.03	1.6397	3.25	.Q	.	.	.	.
7.16	1.6743	3.28	.Q	.	.	.	.
7.28	1.7091	3.29	.Q	.	.	.	.
7.41	1.7441	3.32	.Q	.	.	.	.
7.54	1.7793	3.34	.Q	.	.	.	.
7.67	1.8148	3.36	.Q	.	.	.	.
7.80	1.8505	3.38	.Q	.	.	.	.
7.93	1.8865	3.41	.Q	.	.	.	.
8.05	1.9227	3.43	.Q	.	.	.	.
8.18	1.9592	3.46	.Q	.	.	.	.
8.31	1.9959	3.48	.Q	.	.	.	.
8.44	2.0329	3.51	. Q	.	.	.	.
8.57	2.0702	3.53	. Q	.	.	.	.
8.69	2.1078	3.56	. Q	.	.	.	.
8.82	2.1456	3.58	. Q	.	.	.	.
8.95	2.1838	3.62	. Q	.	.	.	.
9.08	2.2222	3.64	. Q	.	.	.	.
9.21	2.2610	3.68	. Q	.	.	.	.
9.34	2.3001	3.70	. Q	.	.	.	.
9.46	2.3395	3.74	. Q	.	.	.	.
9.59	2.3792	3.76	. Q	.	.	.	.
9.72	2.4193	3.81	. Q	.	.	.	.
9.85	2.4598	3.83	. Q	.	.	.	.
9.98	2.5006	3.88	. Q	.	.	.	.
10.10	2.5418	3.90	. Q	.	.	.	.
10.23	2.5834	3.95	. Q	.	.	.	.
10.36	2.6253	3.98	. Q	.	.	.	.
10.49	2.6677	4.03	. Q	.	.	.	.
10.62	2.7106	4.06	. Q	.	.	.	.
10.75	2.7539	4.11	. Q	.	.	.	.
10.87	2.7976	4.14	. Q	.	.	.	.
11.00	2.8418	4.20	. Q	.	.	.	.
11.13	2.8865	4.24	. Q	.	.	.	.
11.26	2.9317	4.30	. Q	.	.	.	.
11.39	2.9775	4.34	. Q	.	.	.	.
11.51	3.0238	4.41	. Q	.	.	.	.

11.64	3.0707	4.44	. Q	.	.	.	.
11.77	3.1181	4.52	. Q	.	.	.	.
11.90	3.1662	4.56	. Q	.	.	.	.
12.03	3.2150	4.64	. Q	.	.	.	.
12.15	3.2614	4.12	. Q	.	.	.	.
12.28	3.3048	4.08	. Q	.	.	.	.
12.41	3.3482	4.13	. Q	.	.	.	.
12.54	3.3925	4.23	. Q	.	.	.	.
12.67	3.4376	4.29	. Q	.	.	.	.
12.80	3.4837	4.40	. Q	.	.	.	.
12.92	3.5306	4.46	. Q	.	.	.	.
13.05	3.5786	4.59	. Q	.	.	.	.
13.18	3.6276	4.66	. Q	.	.	.	.
13.31	3.6778	4.81	. Q	.	.	.	.
13.44	3.7292	4.89	. Q	.	.	.	.
13.56	3.7820	5.06	. Q	.	.	.	.
13.69	3.8361	5.16	. Q	.	.	.	.
13.82	3.8918	5.36	. Q	.	.	.	.
13.95	3.9491	5.47	. Q	.	.	.	.
14.08	4.0067	5.40	. Q	.	.	.	.
14.21	4.0622	5.09	. Q	.	.	.	.
14.33	4.1177	5.38	. Q	.	.	.	.
14.46	4.1755	5.54	. Q	.	.	.	.
14.59	4.2361	5.90	. Q	.	.	.	.
14.72	4.2997	6.11	. Q	.	.	.	.
14.85	4.3669	6.59	. Q	.	.	.	.
14.97	4.4382	6.87	. Q	.	.	.	.
15.10	4.5145	7.55	. Q	.	.	.	.
15.23	4.5967	7.96	. Q	.	.	.	.
15.36	4.6866	9.01	. Q	.	.	.	.
15.49	4.7891	10.35	. Q	.	.	.	.
15.62	4.9099	12.46	. Q	.	.	.	.
15.74	5.0496	13.92	. Q	.	.	.	.
15.87	5.2408	22.19	. Q	.	.	.	.
16.00	5.5079	28.24	. Q	.	.	.	.
16.13	5.9832	61.52	.	.	.	Q	.
16.26	6.4080	18.69	. Q	.	.	.	.
16.38	6.5673	11.37	. Q	.	.	.	.
16.51	6.6722	8.44	. Q	.	.	.	.
16.64	6.7549	7.19	. Q	.	.	.	.
16.77	6.8266	6.34	. Q	.	.	.	.
16.90	6.8904	5.71	. Q	.	.	.	.
17.03	6.9483	5.23	. Q	.	.	.	.
17.15	7.0056	5.58	. Q	.	.	.	.
17.28	7.0630	5.25	. Q	.	.	.	.
17.41	7.1171	4.98	. Q	.	.	.	.
17.54	7.1686	4.74	. Q	.	.	.	.
17.67	7.2176	4.53	. Q	.	.	.	.
17.79	7.2646	4.34	. Q	.	.	.	.
17.92	7.3098	4.18	. Q	.	.	.	.
18.05	7.3533	4.03	. Q	.	.	.	.
18.18	7.3990	4.60	. Q	.	.	.	.
18.31	7.4471	4.48	. Q	.	.	.	.
18.44	7.4940	4.37	. Q	.	.	.	.
18.56	7.5397	4.27	. Q	.	.	.	.
18.69	7.5844	4.17	. Q	.	.	.	.
18.82	7.6282	4.09	. Q	.	.	.	.
18.95	7.6710	4.00	. Q	.	.	.	.
19.08	7.7130	3.93	. Q	.	.	.	.
19.20	7.7542	3.85	. Q	.	.	.	.
19.33	7.7947	3.78	. Q	.	.	.	.
19.46	7.8344	3.72	. Q	.	.	.	.
19.59	7.8735	3.66	. Q	.	.	.	.
19.72	7.9120	3.60	. Q	.	.	.	.
19.84	7.9498	3.55	. Q	.	.	.	.
19.97	7.9871	3.49	.Q	.	.	.	.
20.10	8.0238	3.44	.Q	.	.	.	.
20.23	8.0600	3.40	.Q	.	.	.	.
20.36	8.0958	3.35	.Q	.	.	.	.

20.49	8.1310	3.31	.Q	.	.	.	.
20.61	8.1658	3.26	.Q	.	.	.	.
20.74	8.2002	3.22	.Q	.	.	.	.
20.87	8.2341	3.19	.Q	.	.	.	.
21.00	8.2677	3.15	.Q	.	.	.	.
21.13	8.3008	3.11	.Q	.	.	.	.
21.25	8.3336	3.08	.Q	.	.	.	.
21.38	8.3660	3.04	.Q	.	.	.	.
21.51	8.3981	3.01	.Q	.	.	.	.
21.64	8.4298	2.98	.Q	.	.	.	.
21.77	8.4612	2.95	.Q	.	.	.	.
21.90	8.4923	2.92	.Q	.	.	.	.
22.02	8.5231	2.89	.Q	.	.	.	.
22.15	8.5536	2.87	.Q	.	.	.	.
22.28	8.5838	2.84	.Q	.	.	.	.
22.41	8.6138	2.81	.Q	.	.	.	.
22.54	8.6434	2.79	.Q	.	.	.	.
22.66	8.6728	2.76	.Q	.	.	.	.
22.79	8.7020	2.74	.Q	.	.	.	.
22.92	8.7309	2.72	.Q	.	.	.	.
23.05	8.7596	2.69	.Q	.	.	.	.
23.18	8.7880	2.67	.Q	.	.	.	.
23.31	8.8162	2.65	.Q	.	.	.	.
23.43	8.8442	2.63	.Q	.	.	.	.
23.56	8.8719	2.61	.Q	.	.	.	.
23.69	8.8995	2.59	.Q	.	.	.	.
23.82	8.9268	2.57	.Q	.	.	.	.
23.95	8.9540	2.55	.Q	.	.	.	.
24.07	8.9809	2.53	.Q	.	.	.	.
24.20	8.9943	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%	1445.7
10%	123.0
20%	46.1
30%	30.8
40%	15.4
50%	7.7
60%	7.7
70%	7.7
80%	7.7
90%	7.7

Appendix J
BMP Analysis

Appendix J.I

BMP Analysis BMP Details and Outlet Structure Summary

[illegible]

Pond Report

Pond No. 2 - BASIN #2 - DA B

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	100.00	n/a	0	0
1.00	101.00	n/a	23,264	23,264
2.00	102.00	n/a	26,825	50,089
3.00	103.00	n/a	30,618	80,707
4.00	104.00	n/a	34,646	115,353
4.50	104.50	n/a	18,909	134,262
5.00	105.00	n/a	20,001	154,263
6.00	106.00	n/a	43,379	197,642
7.00	107.00	n/a	48,055	245,697

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	0.00	0.00
Crest El. (ft)	= 104.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	100.00	---	---	---	---	0.00	---	---	---	---	---	0.000
1.00	23,264	101.00	---	---	---	---	0.00	---	---	---	---	---	0.000
2.00	50,089	102.00	---	---	---	---	0.00	---	---	---	---	---	0.000
3.00	80,707	103.00	---	---	---	---	0.00	---	---	---	---	---	0.000
4.00	115,353	104.00	---	---	---	---	0.00	---	---	---	---	---	0.000
4.50	134,262	104.50	---	---	---	---	0.00	---	---	---	---	---	0.000
5.00	154,263	105.00	---	---	---	---	5.89	---	---	---	---	---	5.887
6.00	197,642	106.00	---	---	---	---	30.59	---	---	---	---	---	30.59
7.00	245,697	107.00	---	---	---	---	65.81	---	---	---	---	---	65.81

Appendix J.II
BMP Analysis
10-Year Storm Event

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

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Problem Descriptions:

BIG BOX RETAIL - HESPERIA
UNIT HYDROGRAPH
10-YEAR, POST-CONDITIONS, DA A

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.47
TOTAL CATCHMENT AREA(ACRES) = 9.10
SOIL-LOSS RATE, F_m (INCH/HR) = 0.190
LOW LOSS FRACTION = 0.255
TIME OF CONCENTRATION(MIN.) = 8.59
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.20
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.71
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.10
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.51
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.10

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.60
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = -0.25

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	7.5	15.0	22.5	30.0
0.11	0.0031	0.67	Q	.	.	.	.
0.26	0.0110	0.67	Q	.	.	.	.
0.40	0.0190	0.67	Q	.	.	.	.
0.54	0.0269	0.67	Q	.	.	.	.
0.69	0.0349	0.68	Q	.	.	.	.
0.83	0.0430	0.68	Q	.	.	.	.
0.97	0.0510	0.68	Q	.	.	.	.
1.12	0.0592	0.69	Q	.	.	.	.
1.26	0.0673	0.69	Q	.	.	.	.
1.40	0.0755	0.69	Q	.	.	.	.
1.55	0.0837	0.70	Q	.	.	.	.
1.69	0.0920	0.70	Q	.	.	.	.
1.83	0.1003	0.70	Q	.	.	.	.
1.97	0.1086	0.71	Q	.	.	.	.
2.12	0.1170	0.71	Q	.	.	.	.
2.26	0.1254	0.71	Q	.	.	.	.
2.40	0.1339	0.72	Q	.	.	.	.
2.55	0.1424	0.72	Q	.	.	.	.
2.69	0.1509	0.73	Q	.	.	.	.
2.83	0.1595	0.73	Q	.	.	.	.
2.98	0.1682	0.73	Q	.	.	.	.

3.12	0.1769	0.74	Q	.	.	.	.
3.26	0.1856	0.74	Q	.	.	.	.
3.41	0.1944	0.74	Q	.	.	.	.
3.55	0.2032	0.75	Q	.	.	.	.
3.69	0.2121	0.75	.Q	.	.	.	.
3.84	0.2210	0.76	.Q	.	.	.	.
3.98	0.2300	0.76	.Q	.	.	.	.
4.12	0.2390	0.77	.Q	.	.	.	.
4.26	0.2481	0.77	.Q	.	.	.	.
4.41	0.2572	0.77	.Q	.	.	.	.
4.55	0.2664	0.78	.Q	.	.	.	.
4.69	0.2756	0.78	.Q	.	.	.	.
4.84	0.2849	0.79	.Q	.	.	.	.
4.98	0.2943	0.79	.Q	.	.	.	.
5.12	0.3037	0.80	.Q	.	.	.	.
5.27	0.3131	0.80	.Q	.	.	.	.
5.41	0.3227	0.81	.Q	.	.	.	.
5.55	0.3322	0.81	.Q	.	.	.	.
5.70	0.3419	0.82	.Q	.	.	.	.
5.84	0.3516	0.83	.Q	.	.	.	.
5.98	0.3614	0.83	.Q	.	.	.	.
6.12	0.3712	0.84	.Q	.	.	.	.
6.27	0.3812	0.84	.Q	.	.	.	.
6.41	0.3911	0.85	.Q	.	.	.	.
6.55	0.4012	0.85	.Q	.	.	.	.
6.70	0.4113	0.86	.Q	.	.	.	.
6.84	0.4215	0.86	.Q	.	.	.	.
6.98	0.4318	0.87	.Q	.	.	.	.
7.13	0.4422	0.88	.Q	.	.	.	.
7.27	0.4526	0.89	.Q	.	.	.	.
7.41	0.4631	0.89	.Q	.	.	.	.
7.56	0.4737	0.90	.Q	.	.	.	.
7.70	0.4844	0.91	.Q	.	.	.	.
7.84	0.4952	0.92	.Q	.	.	.	.
7.99	0.5061	0.92	.Q	.	.	.	.
8.13	0.5170	0.93	.Q	.	.	.	.
8.27	0.5281	0.94	.Q	.	.	.	.
8.41	0.5392	0.95	.Q	.	.	.	.
8.56	0.5505	0.95	.Q	.	.	.	.
8.70	0.5618	0.97	.Q	.	.	.	.
8.84	0.5733	0.97	.Q	.	.	.	.
8.99	0.5849	0.98	.Q	.	.	.	.
9.13	0.5965	0.99	.Q	.	.	.	.
9.27	0.6083	1.00	.Q	.	.	.	.
9.42	0.6203	1.01	.Q	.	.	.	.
9.56	0.6323	1.02	.Q	.	.	.	.
9.70	0.6445	1.03	.Q	.	.	.	.
9.85	0.6568	1.05	.Q	.	.	.	.
9.99	0.6692	1.06	.Q	.	.	.	.
10.13	0.6818	1.07	.Q	.	.	.	.
10.28	0.6945	1.08	.Q	.	.	.	.
10.42	0.7073	1.10	.Q	.	.	.	.
10.56	0.7204	1.11	.Q	.	.	.	.
10.70	0.7336	1.12	.Q	.	.	.	.
10.85	0.7469	1.13	.Q	.	.	.	.
10.99	0.7605	1.15	.Q	.	.	.	.
11.13	0.7742	1.16	.Q	.	.	.	.
11.28	0.7881	1.19	.Q	.	.	.	.
11.42	0.8022	1.20	.Q	.	.	.	.
11.56	0.8165	1.22	.Q	.	.	.	.
11.71	0.8310	1.23	.Q	.	.	.	.
11.85	0.8458	1.26	.Q	.	.	.	.
11.99	0.8608	1.28	.Q	.	.	.	.
12.14	0.8752	1.16	.Q	.	.	.	.
12.28	0.8890	1.17	.Q	.	.	.	.
12.42	0.9029	1.20	.Q	.	.	.	.
12.57	0.9172	1.21	.Q	.	.	.	.
12.71	0.9318	1.25	.Q	.	.	.	.
12.85	0.9467	1.27	.Q	.	.	.	.

12.99	0.9620	1.31	.Q	.	.	.	.
13.14	0.9776	1.34	.Q	.	.	.	.
13.28	0.9937	1.38	.Q	.	.	.	.
13.42	1.0103	1.41	.Q	.	.	.	.
13.57	1.0273	1.47	.Q	.	.	.	.
13.71	1.0448	1.50	.Q	.	.	.	.
13.85	1.0629	1.57	. Q	.	.	.	.
14.00	1.0817	1.60	. Q	.	.	.	.
14.14	1.0998	1.46	.Q	.	.	.	.
14.28	1.1173	1.50	.Q	.	.	.	.
14.43	1.1356	1.60	. Q	.	.	.	.
14.57	1.1549	1.66	. Q	.	.	.	.
14.71	1.1753	1.79	. Q	.	.	.	.
14.86	1.1970	1.87	. Q	.	.	.	.
15.00	1.2203	2.06	. Q	.	.	.	.
15.14	1.2454	2.18	. Q	.	.	.	.
15.28	1.2729	2.48	. Q	.	.	.	.
15.43	1.3034	2.68	. Q	.	.	.	.
15.57	1.3410	3.68	. Q	.	.	.	.
15.71	1.3871	4.11	. Q	.	.	.	.
15.86	1.4505	6.61	. Q	.	.	.	.
16.00	1.5413	8.75	. .Q	.	.	.	.
16.14	1.7232	22.01	.	.	Q.	.	.
16.29	1.8840	5.18	. Q	.	.	.	.
16.43	1.9345	3.35	. Q	.	.	.	.
16.57	1.9681	2.32	. Q	.	.	.	.
16.72	1.9934	1.96	. Q	.	.	.	.
16.86	2.0152	1.72	. Q	.	.	.	.
17.00	2.0345	1.55	. Q	.	.	.	.
17.14	2.0534	1.64	. Q	.	.	.	.
17.29	2.0721	1.53	. Q	.	.	.	.
17.43	2.0897	1.44	.Q	.	.	.	.
17.57	2.1062	1.36	.Q	.	.	.	.
17.72	2.1219	1.29	.Q	.	.	.	.
17.86	2.1368	1.23	.Q	.	.	.	.
18.00	2.1511	1.18	.Q	.	.	.	.
18.15	2.1657	1.29	.Q	.	.	.	.
18.29	2.1807	1.25	.Q	.	.	.	.
18.43	2.1953	1.21	.Q	.	.	.	.
18.58	2.2094	1.18	.Q	.	.	.	.
18.72	2.2231	1.14	.Q	.	.	.	.
18.86	2.2364	1.11	.Q	.	.	.	.
19.01	2.2495	1.09	.Q	.	.	.	.
19.15	2.2622	1.06	.Q	.	.	.	.
19.29	2.2746	1.04	.Q	.	.	.	.
19.43	2.2868	1.02	.Q	.	.	.	.
19.58	2.2987	1.00	.Q	.	.	.	.
19.72	2.3104	0.98	.Q	.	.	.	.
19.86	2.3219	0.96	.Q	.	.	.	.
20.01	2.3331	0.94	.Q	.	.	.	.
20.15	2.3442	0.93	.Q	.	.	.	.
20.29	2.3550	0.91	.Q	.	.	.	.
20.44	2.3657	0.90	.Q	.	.	.	.
20.58	2.3762	0.88	.Q	.	.	.	.
20.72	2.3866	0.87	.Q	.	.	.	.
20.87	2.3968	0.86	.Q	.	.	.	.
21.01	2.4069	0.84	.Q	.	.	.	.
21.15	2.4168	0.83	.Q	.	.	.	.
21.30	2.4266	0.82	.Q	.	.	.	.
21.44	2.4362	0.81	.Q	.	.	.	.
21.58	2.4457	0.80	.Q	.	.	.	.
21.72	2.4551	0.79	.Q	.	.	.	.
21.87	2.4644	0.78	.Q	.	.	.	.
22.01	2.4736	0.77	.Q	.	.	.	.
22.15	2.4827	0.76	.Q	.	.	.	.
22.30	2.4917	0.75	.Q	.	.	.	.
22.44	2.5005	0.75	Q	.	.	.	.
22.58	2.5093	0.74	Q	.	.	.	.
22.73	2.5180	0.73	Q	.	.	.	.

22.87	2.5266	0.72	Q	.	.	.	.
23.01	2.5351	0.72	Q	.	.	.	.
23.16	2.5435	0.71	Q	.	.	.	.
23.30	2.5519	0.70	Q	.	.	.	.
23.44	2.5601	0.70	Q	.	.	.	.
23.59	2.5683	0.69	Q	.	.	.	.
23.73	2.5764	0.68	Q	.	.	.	.
23.87	2.5845	0.68	Q	.	.	.	.
24.01	2.5924	0.67	Q	.	.	.	.
24.16	2.5964	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)

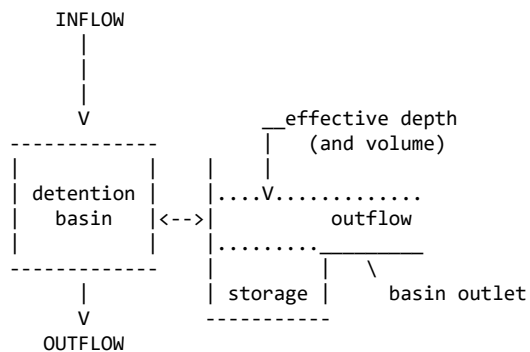
Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1442.6
10%	85.9
20%	34.3
30%	25.8
40%	8.6
50%	8.6
60%	8.6
70%	8.6
80%	8.6
90%	8.6

Problem Descriptions:
 BIG BOX RETAIL - HESPERIA
 BASIN ROUTING
 10-YEAR, POST-CONDITIONS, DA A

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FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
 CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 8.587
 DEAD STORAGE(AF) = 0.00
 SPECIFIED DEAD STORAGE(AF) FILLED = 0.00
 ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:
 TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 3

*BASIN-DEPTH	STORAGE	OUTFLOW	**BASIN-DEPTH	STORAGE	OUTFLOW
*(FEET)	(ACRE-FEET)	(CFS)	*(FEET)	(ACRE-FEET)	(CFS)
* 0.000	0.000	0.000**	1.000	0.770	2.674*
* 2.000	1.632	4.631**			

 BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	DEPTH (FEET)	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00	0.00000	0.00000
2	1.00	0.75430	0.78592
3	2.00	1.60492	1.65970

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES
 OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE
 AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.114	0.000	0.67	0.01	0.01	0.008
0.257	0.000	0.67	0.02	0.04	0.015
0.400	0.000	0.67	0.03	0.07	0.022
0.543	0.000	0.67	0.04	0.09	0.029
0.687	0.000	0.68	0.05	0.11	0.036
0.830	0.000	0.68	0.06	0.14	0.042
0.973	0.000	0.68	0.06	0.16	0.049
1.116	0.000	0.69	0.07	0.18	0.055
1.259	0.000	0.69	0.08	0.20	0.060
1.402	0.000	0.69	0.09	0.22	0.066
1.545	0.000	0.70	0.09	0.24	0.071
1.688	0.000	0.70	0.10	0.26	0.077
1.831	0.000	0.70	0.11	0.28	0.082
1.975	0.000	0.71	0.11	0.29	0.087
2.118	0.000	0.71	0.12	0.31	0.091
2.261	0.000	0.71	0.12	0.33	0.096
2.404	0.000	0.72	0.13	0.34	0.100
2.547	0.000	0.72	0.14	0.36	0.105
2.690	0.000	0.73	0.14	0.37	0.109
2.833	0.000	0.73	0.15	0.39	0.113
2.976	0.000	0.73	0.15	0.40	0.117
3.120	0.000	0.74	0.16	0.41	0.121
3.263	0.000	0.74	0.16	0.43	0.124
3.406	0.000	0.74	0.17	0.44	0.128
3.549	0.000	0.75	0.17	0.45	0.132
3.692	0.000	0.75	0.18	0.46	0.135
3.835	0.000	0.76	0.18	0.47	0.138
3.978	0.000	0.76	0.18	0.49	0.142
4.121	0.000	0.77	0.19	0.50	0.145
4.264	0.000	0.77	0.19	0.51	0.148
4.408	0.000	0.77	0.20	0.52	0.151
4.551	0.000	0.78	0.20	0.53	0.154
4.694	0.000	0.78	0.20	0.54	0.157
4.837	0.000	0.79	0.21	0.55	0.160
4.980	0.000	0.79	0.21	0.56	0.162
5.123	0.000	0.80	0.21	0.57	0.165
5.266	0.000	0.80	0.22	0.58	0.168
5.409	0.000	0.81	0.22	0.59	0.170
5.552	0.000	0.81	0.22	0.60	0.173
5.696	0.000	0.82	0.23	0.60	0.175
5.839	0.000	0.83	0.23	0.61	0.178
5.982	0.000	0.83	0.23	0.62	0.180
6.125	0.000	0.84	0.24	0.63	0.183
6.268	0.000	0.84	0.24	0.64	0.185
6.411	0.000	0.85	0.24	0.65	0.188
6.554	0.000	0.85	0.25	0.66	0.190
6.697	0.000	0.86	0.25	0.66	0.192
6.841	0.000	0.86	0.25	0.67	0.195
6.984	0.000	0.87	0.26	0.68	0.197
7.127	0.000	0.88	0.26	0.69	0.199
7.270	0.000	0.89	0.26	0.70	0.201
7.413	0.000	0.89	0.26	0.70	0.204

7.556	0.000	0.90	0.27	0.71	0.206
7.699	0.000	0.91	0.27	0.72	0.208
7.842	0.000	0.92	0.27	0.73	0.210
7.985	0.000	0.92	0.28	0.73	0.213
8.129	0.000	0.93	0.28	0.74	0.215
8.272	0.000	0.94	0.28	0.75	0.217
8.415	0.000	0.95	0.28	0.76	0.219
8.558	0.000	0.95	0.29	0.77	0.221
8.701	0.000	0.97	0.29	0.77	0.224
8.844	0.000	0.97	0.29	0.78	0.226
8.987	0.000	0.98	0.30	0.79	0.228
9.130	0.000	0.99	0.30	0.80	0.231
9.274	0.000	1.00	0.30	0.80	0.233
9.417	0.000	1.01	0.31	0.81	0.235
9.560	0.000	1.02	0.31	0.82	0.238
9.703	0.000	1.03	0.31	0.83	0.240
9.846	0.000	1.05	0.32	0.84	0.243
9.989	0.000	1.06	0.32	0.85	0.245
10.132	0.000	1.07	0.32	0.86	0.248
10.275	0.000	1.08	0.32	0.86	0.250
10.418	0.000	1.10	0.33	0.87	0.253
10.562	0.000	1.11	0.33	0.88	0.255
10.705	0.000	1.12	0.34	0.89	0.258
10.848	0.000	1.13	0.34	0.90	0.261
10.991	0.000	1.15	0.34	0.91	0.264
11.134	0.000	1.16	0.35	0.92	0.267
11.277	0.000	1.19	0.35	0.93	0.270
11.420	0.000	1.20	0.35	0.94	0.273
11.563	0.000	1.22	0.36	0.95	0.276
11.707	0.000	1.23	0.36	0.96	0.279
11.850	0.000	1.26	0.37	0.98	0.283
11.993	0.000	1.28	0.37	0.99	0.286
12.136	0.000	1.16	0.37	1.00	0.288
12.279	0.000	1.17	0.38	1.00	0.290
12.422	0.000	1.20	0.38	1.01	0.292
12.565	0.000	1.21	0.38	1.02	0.294
12.708	0.000	1.25	0.39	1.03	0.297
12.851	0.000	1.27	0.39	1.04	0.300
12.995	0.000	1.31	0.39	1.05	0.303
13.138	0.000	1.34	0.40	1.06	0.306
13.281	0.000	1.38	0.40	1.07	0.310
13.424	0.000	1.41	0.41	1.08	0.314
13.567	0.000	1.47	0.41	1.10	0.318
13.710	0.000	1.50	0.42	1.11	0.323
13.853	0.000	1.57	0.43	1.13	0.328
13.996	0.000	1.60	0.43	1.15	0.333
14.139	0.000	1.46	0.44	1.16	0.337
14.283	0.000	1.50	0.44	1.18	0.341
14.426	0.000	1.60	0.45	1.19	0.345
14.569	0.000	1.66	0.46	1.21	0.351
14.712	0.000	1.79	0.46	1.23	0.357
14.855	0.000	1.87	0.47	1.25	0.365
14.998	0.000	2.06	0.49	1.28	0.374
15.141	0.000	2.18	0.50	1.32	0.384
15.284	0.000	2.48	0.52	1.36	0.398
15.428	0.000	2.68	0.54	1.41	0.413
15.571	0.000	3.68	0.57	1.48	0.439
15.714	0.000	4.11	0.61	1.58	0.469
15.857	0.000	6.61	0.68	1.73	0.526
16.000	0.000	8.75	0.79	1.97	0.607
16.143	0.000	22.01	1.08	2.47	0.838
16.286	0.000	5.18	1.11	2.86	0.865
16.429	0.000	3.35	1.12	2.90	0.871
16.572	0.000	2.32	1.11	2.89	0.864
16.716	0.000	1.96	1.10	2.87	0.853
16.859	0.000	1.72	1.08	2.85	0.840
17.002	0.000	1.55	1.06	2.81	0.825
17.145	0.000	1.64	1.05	2.78	0.811
17.288	0.000	1.53	1.03	2.75	0.797

17.431	0.000	1.44	1.01	2.72	0.782
17.574	0.000	1.36	0.99	2.68	0.766
17.717	0.000	1.29	0.97	2.63	0.750
17.861	0.000	1.23	0.95	2.58	0.734
18.004	0.000	1.18	0.93	2.52	0.718
18.147	0.000	1.29	0.91	2.47	0.704
18.290	0.000	1.25	0.90	2.42	0.691
18.433	0.000	1.21	0.88	2.37	0.677
18.576	0.000	1.18	0.86	2.33	0.663
18.719	0.000	1.14	0.84	2.28	0.650
18.862	0.000	1.11	0.83	2.23	0.637
19.005	0.000	1.09	0.81	2.19	0.624
19.149	0.000	1.06	0.79	2.14	0.611
19.292	0.000	1.04	0.78	2.10	0.598
19.435	0.000	1.02	0.76	2.06	0.586
19.578	0.000	1.00	0.75	2.01	0.574
19.721	0.000	0.98	0.73	1.97	0.562
19.864	0.000	0.96	0.72	1.93	0.551
20.007	0.000	0.94	0.70	1.89	0.539
20.150	0.000	0.93	0.69	1.85	0.528
20.293	0.000	0.91	0.67	1.82	0.518
20.437	0.000	0.90	0.66	1.78	0.507
20.580	0.000	0.88	0.65	1.74	0.497
20.723	0.000	0.87	0.63	1.71	0.487
20.866	0.000	0.86	0.62	1.67	0.478
21.009	0.000	0.84	0.61	1.64	0.468
21.152	0.000	0.83	0.60	1.61	0.459
21.295	0.000	0.82	0.58	1.58	0.450
21.438	0.000	0.81	0.57	1.55	0.441
21.582	0.000	0.80	0.56	1.52	0.433
21.725	0.000	0.79	0.55	1.49	0.424
21.868	0.000	0.78	0.54	1.46	0.416
22.011	0.000	0.77	0.53	1.43	0.409
22.154	0.000	0.76	0.52	1.41	0.401
22.297	0.000	0.75	0.51	1.38	0.394
22.440	0.000	0.75	0.50	1.35	0.386
22.583	0.000	0.74	0.49	1.33	0.379
22.726	0.000	0.73	0.48	1.31	0.373
22.870	0.000	0.72	0.48	1.28	0.366
23.013	0.000	0.72	0.47	1.26	0.360
23.156	0.000	0.71	0.46	1.24	0.353
23.299	0.000	0.70	0.45	1.22	0.347
23.442	0.000	0.70	0.44	1.20	0.341
23.585	0.000	0.69	0.44	1.18	0.336
23.728	0.000	0.68	0.43	1.16	0.330
23.871	0.000	0.68	0.42	1.14	0.325
24.015	0.000	0.67	0.41	1.12	0.319
24.158	0.000	0.00	0.40	1.09	0.306

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:

BIG BOX RETAIL - HESPERIA
BASIN ROUTING ANALYSIS
10-YEAR, POST-CONDITIONS, DA B

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.12
TOTAL CATCHMENT AREA(ACRES) = 16.27
SOIL-LOSS RATE, F_m (INCH/HR) = 0.003
LOW LOSS FRACTION = 0.078
TIME OF CONCENTRATION(MIN.) = 7.69
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 10
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.20
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.52
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.71
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.10
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.51
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.10

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 4.58
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = -0.37

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.11	0.0062	1.17	.Q	.	.	.	.
0.24	0.0186	1.17	.Q	.	.	.	.
0.36	0.0311	1.18	.Q	.	.	.	.
0.49	0.0436	1.18	.Q	.	.	.	.
0.62	0.0561	1.19	.Q	.	.	.	.
0.75	0.0687	1.19	.Q	.	.	.	.
0.88	0.0814	1.20	.Q	.	.	.	.
1.00	0.0941	1.20	.Q	.	.	.	.
1.13	0.1069	1.21	.Q	.	.	.	.
1.26	0.1197	1.21	.Q	.	.	.	.
1.39	0.1326	1.22	.Q	.	.	.	.
1.52	0.1455	1.23	.Q	.	.	.	.
1.65	0.1585	1.23	.Q	.	.	.	.
1.77	0.1716	1.24	.Q	.	.	.	.
1.90	0.1847	1.24	.Q	.	.	.	.
2.03	0.1979	1.25	.Q	.	.	.	.
2.16	0.2111	1.25	.Q	.	.	.	.
2.29	0.2244	1.26	.Q	.	.	.	.
2.41	0.2378	1.26	.Q	.	.	.	.
2.54	0.2512	1.27	.Q	.	.	.	.
2.67	0.2647	1.28	.Q	.	.	.	.

2.80	0.2782	1.28	.Q	.	.	.	.
2.93	0.2918	1.29	.Q	.	.	.	.
3.06	0.3055	1.30	.Q	.	.	.	.
3.18	0.3193	1.30	.Q	.	.	.	.
3.31	0.3331	1.31	.Q	.	.	.	.
3.44	0.3470	1.31	.Q	.	.	.	.
3.57	0.3609	1.32	.Q	.	.	.	.
3.70	0.3750	1.33	.Q	.	.	.	.
3.82	0.3891	1.34	.Q	.	.	.	.
3.95	0.4032	1.34	.Q	.	.	.	.
4.08	0.4175	1.35	.Q	.	.	.	.
4.21	0.4318	1.35	.Q	.	.	.	.
4.34	0.4462	1.36	.Q	.	.	.	.
4.46	0.4607	1.37	.Q	.	.	.	.
4.59	0.4753	1.38	.Q	.	.	.	.
4.72	0.4899	1.39	.Q	.	.	.	.
4.85	0.5046	1.40	.Q	.	.	.	.
4.98	0.5195	1.40	.Q	.	.	.	.
5.11	0.5343	1.41	.Q	.	.	.	.
5.23	0.5493	1.42	.Q	.	.	.	.
5.36	0.5644	1.43	.Q	.	.	.	.
5.49	0.5796	1.43	.Q	.	.	.	.
5.62	0.5948	1.45	.Q	.	.	.	.
5.75	0.6102	1.45	.Q	.	.	.	.
5.87	0.6256	1.46	.Q	.	.	.	.
6.00	0.6412	1.47	.Q	.	.	.	.
6.13	0.6568	1.48	.Q	.	.	.	.
6.26	0.6725	1.49	.Q	.	.	.	.
6.39	0.6884	1.50	.Q	.	.	.	.
6.52	0.7043	1.51	.Q	.	.	.	.
6.64	0.7204	1.52	.Q	.	.	.	.
6.77	0.7365	1.53	.Q	.	.	.	.
6.90	0.7528	1.54	.Q	.	.	.	.
7.03	0.7692	1.55	.Q	.	.	.	.
7.16	0.7857	1.57	.Q	.	.	.	.
7.28	0.8023	1.57	.Q	.	.	.	.
7.41	0.8191	1.59	.Q	.	.	.	.
7.54	0.8359	1.60	.Q	.	.	.	.
7.67	0.8529	1.61	.Q	.	.	.	.
7.80	0.8700	1.62	.Q	.	.	.	.
7.93	0.8873	1.64	.Q	.	.	.	.
8.05	0.9047	1.65	.Q	.	.	.	.
8.18	0.9222	1.66	.Q	.	.	.	.
8.31	0.9398	1.67	.Q	.	.	.	.
8.44	0.9577	1.69	.Q	.	.	.	.
8.57	0.9756	1.70	.Q	.	.	.	.
8.69	0.9937	1.72	.Q	.	.	.	.
8.82	1.0120	1.73	.Q	.	.	.	.
8.95	1.0304	1.75	.Q	.	.	.	.
9.08	1.0490	1.76	.Q	.	.	.	.
9.21	1.0678	1.78	.Q	.	.	.	.
9.34	1.0867	1.79	.Q	.	.	.	.
9.46	1.1058	1.82	.Q	.	.	.	.
9.59	1.1251	1.83	.Q	.	.	.	.
9.72	1.1446	1.85	.Q	.	.	.	.
9.85	1.1643	1.86	.Q	.	.	.	.
9.98	1.1842	1.89	.Q	.	.	.	.
10.10	1.2042	1.90	.Q	.	.	.	.
10.23	1.2245	1.93	.Q	.	.	.	.
10.36	1.2451	1.94	.Q	.	.	.	.
10.49	1.2658	1.97	.Q	.	.	.	.
10.62	1.2868	1.99	.Q	.	.	.	.
10.75	1.3080	2.02	. Q	.	.	.	.
10.87	1.3295	2.04	. Q	.	.	.	.
11.00	1.3513	2.07	. Q	.	.	.	.
11.13	1.3733	2.09	. Q	.	.	.	.
11.26	1.3956	2.12	. Q	.	.	.	.
11.39	1.4181	2.14	. Q	.	.	.	.
11.51	1.4410	2.18	. Q	.	.	.	.

11.64	1.4643	2.20	. Q	.	.	.	.
11.77	1.4878	2.24	. Q	.	.	.	.
11.90	1.5117	2.27	. Q	.	.	.	.
12.03	1.5359	2.31	. Q	.	.	.	.
12.15	1.5593	2.11	. Q	.	.	.	.
12.28	1.5816	2.10	. Q	.	.	.	.
12.41	1.6041	2.13	. Q	.	.	.	.
12.54	1.6269	2.19	. Q	.	.	.	.
12.67	1.6502	2.22	. Q	.	.	.	.
12.80	1.6741	2.28	. Q	.	.	.	.
12.92	1.6984	2.31	. Q	.	.	.	.
13.05	1.7233	2.39	. Q	.	.	.	.
13.18	1.7488	2.42	. Q	.	.	.	.
13.31	1.7749	2.51	. Q	.	.	.	.
13.44	1.8016	2.55	. Q	.	.	.	.
13.56	1.8291	2.64	. Q	.	.	.	.
13.69	1.8574	2.69	. Q	.	.	.	.
13.82	1.8865	2.81	. Q	.	.	.	.
13.95	1.9166	2.87	. Q	.	.	.	.
14.08	1.9467	2.82	. Q	.	.	.	.
14.21	1.9757	2.64	. Q	.	.	.	.
14.33	2.0045	2.80	. Q	.	.	.	.
14.46	2.0346	2.89	. Q	.	.	.	.
14.59	2.0663	3.09	. Q	.	.	.	.
14.72	2.0996	3.20	. Q	.	.	.	.
14.85	2.1349	3.47	. Q	.	.	.	.
14.97	2.1724	3.62	. Q	.	.	.	.
15.10	2.2128	4.00	. Q	.	.	.	.
15.23	2.2564	4.23	. Q	.	.	.	.
15.36	2.3043	4.82	. Q	.	.	.	.
15.49	2.3608	5.85	. Q	.	.	.	.
15.62	2.4295	7.13	. Q	.	.	.	.
15.74	2.5094	7.96	. Q	.	.	.	.
15.87	2.6188	12.71	.	. Q	.	.	.
16.00	2.7718	16.18	.	.	. Q	.	.
16.13	3.0442	35.26	.	.	.	. Q	.
16.26	3.2876	10.70	.	. Q	.	.	.
16.38	3.3787	6.50	. Q	.	.	.	.
16.51	3.4370	4.50	. Q	.	.	.	.
16.64	3.4809	3.80	. Q	.	.	.	.
16.77	3.5187	3.33	. Q	.	.	.	.
16.90	3.5521	2.98	. Q	.	.	.	.
17.03	3.5823	2.72	. Q	.	.	.	.
17.15	3.6122	2.93	. Q	.	.	.	.
17.28	3.6423	2.75	. Q	.	.	.	.
17.41	3.6706	2.60	. Q	.	.	.	.
17.54	3.6974	2.46	. Q	.	.	.	.
17.67	3.7228	2.35	. Q	.	.	.	.
17.79	3.7472	2.25	. Q	.	.	.	.
17.92	3.7705	2.16	. Q	.	.	.	.
18.05	3.7930	2.08	. Q	.	.	.	.
18.18	3.8161	2.29	. Q	.	.	.	.
18.31	3.8400	2.22	. Q	.	.	.	.
18.44	3.8632	2.16	. Q	.	.	.	.
18.56	3.8858	2.10	. Q	.	.	.	.
18.69	3.9078	2.05	. Q	.	.	.	.
18.82	3.9293	2.00	. Q	.	.	.	.
18.95	3.9503	1.96	. Q	.	.	.	.
19.08	3.9708	1.92	. Q	.	.	.	.
19.20	3.9909	1.88	. Q	.	.	.	.
19.33	4.0106	1.84	. Q	.	.	.	.
19.46	4.0299	1.80	. Q	.	.	.	.
19.59	4.0488	1.77	. Q	.	.	.	.
19.72	4.0674	1.74	. Q	.	.	.	.
19.84	4.0857	1.71	. Q	.	.	.	.
19.97	4.1036	1.68	. Q	.	.	.	.
20.10	4.1213	1.65	. Q	.	.	.	.
20.23	4.1387	1.63	. Q	.	.	.	.
20.36	4.1558	1.60	. Q	.	.	.	.

20.49	4.1727	1.58	.Q	.	.	.	.
20.61	4.1893	1.56	.Q	.	.	.	.
20.74	4.2057	1.54	.Q	.	.	.	.
20.87	4.2218	1.52	.Q	.	.	.	.
21.00	4.2378	1.50	.Q	.	.	.	.
21.13	4.2535	1.48	.Q	.	.	.	.
21.25	4.2691	1.46	.Q	.	.	.	.
21.38	4.2844	1.44	.Q	.	.	.	.
21.51	4.2996	1.42	.Q	.	.	.	.
21.64	4.3146	1.41	.Q	.	.	.	.
21.77	4.3294	1.39	.Q	.	.	.	.
21.90	4.3440	1.37	.Q	.	.	.	.
22.02	4.3585	1.36	.Q	.	.	.	.
22.15	4.3728	1.35	.Q	.	.	.	.
22.28	4.3870	1.33	.Q	.	.	.	.
22.41	4.4010	1.32	.Q	.	.	.	.
22.54	4.4149	1.30	.Q	.	.	.	.
22.66	4.4287	1.29	.Q	.	.	.	.
22.79	4.4423	1.28	.Q	.	.	.	.
22.92	4.4558	1.27	.Q	.	.	.	.
23.05	4.4691	1.26	.Q	.	.	.	.
23.18	4.4824	1.24	.Q	.	.	.	.
23.31	4.4955	1.23	.Q	.	.	.	.
23.43	4.5085	1.22	.Q	.	.	.	.
23.56	4.5214	1.21	.Q	.	.	.	.
23.69	4.5341	1.20	.Q	.	.	.	.
23.82	4.5468	1.19	.Q	.	.	.	.
23.95	4.5594	1.18	.Q	.	.	.	.
24.07	4.5718	1.17	.Q	.	.	.	.
24.20	4.5780	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%	1445.7
10%	107.7
20%	46.1
30%	30.8
40%	15.4
50%	7.7
60%	7.7
70%	7.7
80%	7.7
90%	7.7

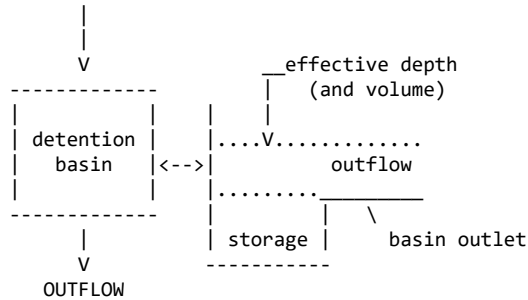
Problem Descriptions:
 BIG BOX RETAIL - HESPERIA
 BASIN ROUTING ANALYSIS
 10-YEAR, POST-CONDITIONS, DA B

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FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
 CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 7.690
 DEAD STORAGE(AF) = 0.00
 SPECIFIED DEAD STORAGE(AF) FILLED = 0.00
 ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00

INFLOW
 |



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:

TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 5

*BASIN-DEPTH	STORAGE	OUTFLOW	**BASIN-DEPTH	STORAGE	OUTFLOW
*(FEET)	(ACRE-FEET)	(CFS)	*(FEET)	(ACRE-FEET)	(CFS)
* 0.000	0.000	0.000	** 0.500	0.427	0.730
* 1.000	0.879	6.610	** 2.000	1.859	31.320
* 3.000	2.944	66.540	** 3.000	2.944	66.540

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL	DEPTH	{S-O*DT/2}	{S+O*DT/2}
NUMBER	(FEET)	(ACRE-FEET)	(ACRE-FEET)
1	0.00	0.00000	0.00000
2	0.50	0.42323	0.43097
3	1.00	0.84389	0.91391
4	2.00	1.69262	2.02438
5	3.00	2.59129	3.29611

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME	DEAD-STORAGE	INFLOW	EFFECTIVE	OUTFLOW	EFFECTIVE
(HRS)	FILLED(AF)	(CFS)	DEPTH(FT)	(CFS)	VOLUME(AF)
0.107	0.000	1.17	0.01	0.01	0.012
0.235	0.000	1.17	0.03	0.03	0.024
0.364	0.000	1.18	0.04	0.05	0.036
0.492	0.000	1.18	0.06	0.07	0.048
0.620	0.000	1.19	0.07	0.09	0.060
0.748	0.000	1.19	0.08	0.11	0.071
0.876	0.000	1.20	0.10	0.13	0.082
1.004	0.000	1.20	0.11	0.15	0.094
1.133	0.000	1.21	0.12	0.17	0.105
1.261	0.000	1.21	0.14	0.19	0.115
1.389	0.000	1.22	0.15	0.21	0.126
1.517	0.000	1.23	0.16	0.22	0.137
1.645	0.000	1.23	0.17	0.24	0.147
1.773	0.000	1.24	0.18	0.26	0.158
1.902	0.000	1.24	0.20	0.28	0.168
2.030	0.000	1.25	0.21	0.30	0.178
2.158	0.000	1.25	0.22	0.31	0.188
2.286	0.000	1.26	0.23	0.33	0.198
2.414	0.000	1.26	0.24	0.35	0.207
2.542	0.000	1.27	0.25	0.36	0.217
2.671	0.000	1.28	0.27	0.38	0.226
2.799	0.000	1.28	0.28	0.40	0.236
2.927	0.000	1.29	0.29	0.41	0.245
3.055	0.000	1.30	0.30	0.43	0.254
3.183	0.000	1.30	0.31	0.44	0.263
3.311	0.000	1.31	0.32	0.46	0.272
3.440	0.000	1.31	0.33	0.47	0.281
3.568	0.000	1.32	0.34	0.49	0.290
3.696	0.000	1.33	0.35	0.50	0.299

3.824	0.000	1.34	0.36	0.52	0.308
3.952	0.000	1.34	0.37	0.53	0.316
4.081	0.000	1.35	0.38	0.55	0.325
4.209	0.000	1.35	0.39	0.56	0.333
4.337	0.000	1.36	0.40	0.58	0.341
4.465	0.000	1.37	0.41	0.59	0.350
4.593	0.000	1.38	0.42	0.60	0.358
4.721	0.000	1.39	0.43	0.62	0.366
4.850	0.000	1.40	0.44	0.63	0.374
4.978	0.000	1.40	0.45	0.65	0.382
5.106	0.000	1.41	0.46	0.66	0.390
5.234	0.000	1.42	0.47	0.67	0.398
5.362	0.000	1.43	0.47	0.69	0.406
5.490	0.000	1.43	0.48	0.70	0.414
5.618	0.000	1.45	0.49	0.71	0.421
5.747	0.000	1.45	0.50	0.74	0.429
5.875	0.000	1.46	0.51	0.80	0.436
6.003	0.000	1.47	0.52	0.88	0.442
6.131	0.000	1.48	0.52	0.96	0.448
6.259	0.000	1.49	0.53	1.03	0.452
6.387	0.000	1.50	0.53	1.09	0.457
6.516	0.000	1.51	0.54	1.14	0.461
6.644	0.000	1.52	0.54	1.19	0.464
6.772	0.000	1.53	0.54	1.23	0.467
6.900	0.000	1.54	0.55	1.27	0.470
7.028	0.000	1.55	0.55	1.31	0.473
7.156	0.000	1.57	0.55	1.34	0.475
7.285	0.000	1.57	0.56	1.37	0.477
7.413	0.000	1.59	0.56	1.40	0.479
7.541	0.000	1.60	0.56	1.42	0.481
7.669	0.000	1.61	0.56	1.45	0.483
7.797	0.000	1.62	0.56	1.47	0.485
7.925	0.000	1.64	0.57	1.49	0.486
8.054	0.000	1.65	0.57	1.51	0.488
8.182	0.000	1.66	0.57	1.53	0.489
8.310	0.000	1.67	0.57	1.55	0.490
8.438	0.000	1.69	0.57	1.56	0.492
8.566	0.000	1.70	0.57	1.58	0.493
8.694	0.000	1.72	0.57	1.60	0.494
8.823	0.000	1.73	0.58	1.61	0.496
8.951	0.000	1.75	0.58	1.63	0.497
9.079	0.000	1.76	0.58	1.65	0.498
9.207	0.000	1.78	0.58	1.66	0.499
9.335	0.000	1.79	0.58	1.68	0.501
9.464	0.000	1.82	0.58	1.69	0.502
9.592	0.000	1.83	0.58	1.71	0.503
9.720	0.000	1.85	0.59	1.73	0.504
9.848	0.000	1.86	0.59	1.74	0.506
9.976	0.000	1.89	0.59	1.76	0.507
10.104	0.000	1.90	0.59	1.78	0.508
10.233	0.000	1.93	0.59	1.80	0.510
10.361	0.000	1.94	0.59	1.81	0.511
10.489	0.000	1.97	0.59	1.83	0.513
10.617	0.000	1.99	0.60	1.85	0.514
10.745	0.000	2.02	0.60	1.87	0.516
10.873	0.000	2.04	0.60	1.89	0.517
11.002	0.000	2.07	0.60	1.91	0.519
11.130	0.000	2.09	0.60	1.93	0.520
11.258	0.000	2.12	0.61	1.96	0.522
11.386	0.000	2.14	0.61	1.98	0.524
11.514	0.000	2.18	0.61	2.00	0.526
11.642	0.000	2.20	0.61	2.03	0.528
11.770	0.000	2.24	0.61	2.05	0.530
11.899	0.000	2.27	0.62	2.08	0.532
12.027	0.000	2.31	0.62	2.11	0.534
12.155	0.000	2.11	0.62	2.12	0.534
12.283	0.000	2.10	0.62	2.12	0.534
12.411	0.000	2.13	0.62	2.12	0.534
12.540	0.000	2.19	0.62	2.12	0.534

12.668	0.000	2.22	0.62	2.13	0.535
12.796	0.000	2.28	0.62	2.15	0.537
12.924	0.000	2.31	0.62	2.17	0.538
13.052	0.000	2.39	0.63	2.19	0.540
13.180	0.000	2.42	0.63	2.22	0.543
13.309	0.000	2.51	0.63	2.25	0.545
13.437	0.000	2.55	0.63	2.29	0.548
13.565	0.000	2.64	0.64	2.33	0.551
13.693	0.000	2.69	0.64	2.37	0.555
13.821	0.000	2.81	0.65	2.42	0.559
13.949	0.000	2.87	0.65	2.47	0.563
14.078	0.000	2.82	0.65	2.52	0.566
14.206	0.000	2.64	0.66	2.55	0.567
14.334	0.000	2.80	0.66	2.57	0.570
14.462	0.000	2.89	0.66	2.61	0.573
14.590	0.000	3.09	0.67	2.66	0.577
14.718	0.000	3.20	0.67	2.72	0.582
14.846	0.000	3.47	0.68	2.80	0.590
14.975	0.000	3.62	0.69	2.89	0.597
15.103	0.000	4.00	0.70	3.01	0.608
15.231	0.000	4.23	0.71	3.15	0.619
15.359	0.000	4.82	0.73	3.33	0.635
15.487	0.000	5.85	0.76	3.59	0.659
15.615	0.000	7.13	0.79	3.96	0.692
15.744	0.000	7.96	0.83	4.42	0.730
15.872	0.000	12.71	0.92	5.19	0.809
16.000	0.000	16.18	1.03	6.56	0.911
16.128	0.000	35.26	1.30	10.70	1.171
16.256	0.000	10.70	1.27	13.60	1.141
16.385	0.000	6.50	1.20	12.42	1.078
16.513	0.000	4.50	1.14	10.79	1.011
16.641	0.000	3.80	1.08	9.22	0.954
16.769	0.000	3.33	1.03	7.89	0.905
16.897	0.000	2.98	0.98	6.85	0.864
17.025	0.000	2.72	0.94	6.18	0.828
17.153	0.000	2.93	0.91	5.75	0.798
17.282	0.000	2.75	0.88	5.37	0.770
17.410	0.000	2.60	0.85	5.03	0.744
17.538	0.000	2.46	0.82	4.70	0.721
17.666	0.000	2.35	0.80	4.41	0.699
17.794	0.000	2.25	0.78	4.14	0.679
17.922	0.000	2.16	0.76	3.89	0.660
18.051	0.000	2.08	0.74	3.66	0.644
18.179	0.000	2.29	0.73	3.47	0.631
18.307	0.000	2.22	0.71	3.31	0.620
18.435	0.000	2.16	0.70	3.17	0.609
18.563	0.000	2.10	0.69	3.03	0.599
18.691	0.000	2.05	0.68	2.91	0.590
18.820	0.000	2.00	0.67	2.80	0.582
18.948	0.000	1.96	0.66	2.69	0.574
19.076	0.000	1.92	0.65	2.59	0.567
19.204	0.000	1.88	0.65	2.50	0.560
19.332	0.000	1.84	0.64	2.42	0.554
19.461	0.000	1.80	0.63	2.34	0.548
19.589	0.000	1.77	0.63	2.27	0.543
19.717	0.000	1.74	0.62	2.21	0.538
19.845	0.000	1.71	0.62	2.14	0.533
19.973	0.000	1.68	0.61	2.09	0.529
20.101	0.000	1.65	0.61	2.03	0.525
20.229	0.000	1.63	0.60	1.98	0.521
20.358	0.000	1.60	0.60	1.93	0.518
20.486	0.000	1.58	0.60	1.89	0.515
20.614	0.000	1.56	0.59	1.85	0.512
20.742	0.000	1.54	0.59	1.81	0.509
20.870	0.000	1.52	0.59	1.77	0.506
20.999	0.000	1.50	0.58	1.74	0.503
21.127	0.000	1.48	0.58	1.71	0.501
21.255	0.000	1.46	0.58	1.68	0.499
21.383	0.000	1.44	0.58	1.65	0.496

21.511	0.000	1.42	0.57	1.62	0.494
21.639	0.000	1.41	0.57	1.59	0.492
21.767	0.000	1.39	0.57	1.57	0.490
21.896	0.000	1.37	0.57	1.54	0.489
22.024	0.000	1.36	0.57	1.52	0.487
22.152	0.000	1.35	0.56	1.50	0.485
22.280	0.000	1.33	0.56	1.48	0.484
22.408	0.000	1.32	0.56	1.46	0.482
22.537	0.000	1.30	0.56	1.44	0.481
22.665	0.000	1.29	0.56	1.42	0.480
22.793	0.000	1.28	0.56	1.40	0.478
22.921	0.000	1.27	0.56	1.39	0.477
23.049	0.000	1.26	0.55	1.37	0.476
23.177	0.000	1.24	0.55	1.36	0.475
23.306	0.000	1.23	0.55	1.34	0.473
23.434	0.000	1.22	0.55	1.33	0.472
23.562	0.000	1.21	0.55	1.31	0.471
23.690	0.000	1.20	0.55	1.30	0.470
23.818	0.000	1.19	0.55	1.28	0.469
23.946	0.000	1.18	0.55	1.27	0.468
24.074	0.000	1.17	0.54	1.26	0.467
24.203	0.000	0.00	0.53	1.17	0.455
24.331	0.000	0.00	0.52	1.02	0.444
24.459	0.000	0.00	0.51	0.89	0.435
24.587	0.000	0.00	0.50	0.78	0.426
24.715	0.000	0.00	0.49	0.72	0.419
24.843	0.000	0.00	0.48	0.71	0.411
24.972	0.000	0.00	0.47	0.70	0.404
25.100	0.000	0.00	0.46	0.68	0.397
25.228	0.000	0.00	0.46	0.67	0.390
25.356	0.000	0.00	0.45	0.66	0.383
25.484	0.000	0.00	0.44	0.65	0.376
25.612	0.000	0.00	0.43	0.64	0.369
25.741	0.000	0.00	0.42	0.62	0.362
25.869	0.000	0.00	0.42	0.61	0.356
25.997	0.000	0.00	0.41	0.60	0.349
26.125	0.000	0.00	0.40	0.59	0.343
26.253	0.000	0.00	0.39	0.58	0.337
26.381	0.000	0.00	0.39	0.57	0.331
26.510	0.000	0.00	0.38	0.56	0.325
26.638	0.000	0.00	0.37	0.55	0.319
26.766	0.000	0.00	0.37	0.54	0.313
26.894	0.000	0.00	0.36	0.53	0.308
27.022	0.000	0.00	0.35	0.52	0.302
27.150	0.000	0.00	0.35	0.51	0.297
27.279	0.000	0.00	0.34	0.50	0.292
27.407	0.000	0.00	0.34	0.49	0.286
27.535	0.000	0.00	0.33	0.48	0.281
27.663	0.000	0.00	0.32	0.48	0.276
27.791	0.000	0.00	0.32	0.47	0.271
27.919	0.000	0.00	0.31	0.46	0.266
28.048	0.000	0.00	0.31	0.45	0.262
28.176	0.000	0.00	0.30	0.44	0.257
28.304	0.000	0.00	0.30	0.44	0.252
28.432	0.000	0.00	0.29	0.43	0.248
28.560	0.000	0.00	0.28	0.42	0.243
28.688	0.000	0.00	0.28	0.41	0.239
28.817	0.000	0.00	0.27	0.40	0.235
28.945	0.000	0.00	0.27	0.40	0.230
29.073	0.000	0.00	0.26	0.39	0.226
29.201	0.000	0.00	0.26	0.38	0.222
29.329	0.000	0.00	0.26	0.38	0.218
29.457	0.000	0.00	0.25	0.37	0.214
29.586	0.000	0.00	0.25	0.36	0.210
29.714	0.000	0.00	0.24	0.36	0.207
29.842	0.000	0.00	0.24	0.35	0.203
29.970	0.000	0.00	0.23	0.34	0.199
30.098	0.000	0.00	0.23	0.34	0.196
30.226	0.000	0.00	0.23	0.33	0.192

30.355	0.000	0.00	0.22	0.33	0.189
30.483	0.000	0.00	0.22	0.32	0.185
30.611	0.000	0.00	0.21	0.31	0.182
30.739	0.000	0.00	0.21	0.31	0.179
30.867	0.000	0.00	0.21	0.30	0.176
30.995	0.000	0.00	0.20	0.30	0.172
31.124	0.000	0.00	0.20	0.29	0.169
31.252	0.000	0.00	0.19	0.29	0.166
31.380	0.000	0.00	0.19	0.28	0.163
31.508	0.000	0.00	0.19	0.28	0.160
31.636	0.000	0.00	0.18	0.27	0.158
31.764	0.000	0.00	0.18	0.27	0.155
31.893	0.000	0.00	0.18	0.26	0.152
32.021	0.000	0.00	0.17	0.26	0.149
32.149	0.000	0.00	0.17	0.25	0.147
32.277	0.000	0.00	0.17	0.25	0.144
32.405	0.000	0.00	0.17	0.24	0.141
32.533	0.000	0.00	0.16	0.24	0.139
32.662	0.000	0.00	0.16	0.24	0.136
32.790	0.000	0.00	0.16	0.23	0.134
32.918	0.000	0.00	0.15	0.23	0.131
33.046	0.000	0.00	0.15	0.22	0.129
33.174	0.000	0.00	0.15	0.22	0.127
33.302	0.000	0.00	0.15	0.21	0.124
33.431	0.000	0.00	0.14	0.21	0.122
33.559	0.000	0.00	0.14	0.21	0.120
33.687	0.000	0.00	0.14	0.20	0.118
33.815	0.000	0.00	0.14	0.20	0.116
33.943	0.000	0.00	0.13	0.20	0.114
34.071	0.000	0.00	0.13	0.19	0.112
34.200	0.000	0.00	0.13	0.19	0.110
34.328	0.000	0.00	0.13	0.19	0.108
34.456	0.000	0.00	0.12	0.18	0.106
34.584	0.000	0.00	0.12	0.18	0.104
34.712	0.000	0.00	0.12	0.18	0.102
34.840	0.000	0.00	0.12	0.17	0.100
34.969	0.000	0.00	0.12	0.17	0.098
35.097	0.000	0.00	0.11	0.17	0.097
35.225	0.000	0.00	0.11	0.16	0.095
35.353	0.000	0.00	0.11	0.16	0.093
35.481	0.000	0.00	0.11	0.16	0.092
35.609	0.000	0.00	0.11	0.16	0.090
35.738	0.000	0.00	0.10	0.15	0.088
35.866	0.000	0.00	0.10	0.15	0.087
35.994	0.000	0.00	0.10	0.15	0.085
36.122	0.000	0.00	0.10	0.14	0.084
36.250	0.000	0.00	0.10	0.14	0.082
36.378	0.000	0.00	0.09	0.14	0.081
36.507	0.000	0.00	0.09	0.14	0.079
36.635	0.000	0.00	0.09	0.13	0.078
36.763	0.000	0.00	0.09	0.13	0.076
36.891	0.000	0.00	0.09	0.13	0.075
37.019	0.000	0.00	0.09	0.13	0.074
37.147	0.000	0.00	0.08	0.12	0.072
37.276	0.000	0.00	0.08	0.12	0.071
37.404	0.000	0.00	0.08	0.12	0.070
37.532	0.000	0.00	0.08	0.12	0.068
37.660	0.000	0.00	0.08	0.12	0.067
37.788	0.000	0.00	0.08	0.11	0.066
37.916	0.000	0.00	0.08	0.11	0.065
38.045	0.000	0.00	0.07	0.11	0.064
38.173	0.000	0.00	0.07	0.11	0.063
38.301	0.000	0.00	0.07	0.11	0.061
38.429	0.000	0.00	0.07	0.10	0.060
38.557	0.000	0.00	0.07	0.10	0.059
38.685	0.000	0.00	0.07	0.10	0.058
38.814	0.000	0.00	0.07	0.10	0.057
38.942	0.000	0.00	0.07	0.10	0.056
39.070	0.000	0.00	0.06	0.10	0.055

39.198	0.000	0.00	0.06	0.09	0.054
39.326	0.000	0.00	0.06	0.09	0.053
39.454	0.000	0.00	0.06	0.09	0.052
39.583	0.000	0.00	0.06	0.09	0.051
39.711	0.000	0.00	0.06	0.09	0.050
39.839	0.000	0.00	0.06	0.09	0.049
39.967	0.000	0.00	0.06	0.08	0.049
40.095	0.000	0.00	0.06	0.08	0.048
40.223	0.000	0.00	0.05	0.08	0.047
40.352	0.000	0.00	0.05	0.08	0.046
40.480	0.000	0.00	0.05	0.08	0.045
40.608	0.000	0.00	0.05	0.08	0.044
40.736	0.000	0.00	0.05	0.08	0.044
40.864	0.000	0.00	0.05	0.07	0.043
40.992	0.000	0.00	0.05	0.07	0.042
41.121	0.000	0.00	0.05	0.07	0.041
41.249	0.000	0.00	0.05	0.07	0.041
41.377	0.000	0.00	0.05	0.07	0.040
41.505	0.000	0.00	0.05	0.07	0.039
41.633	0.000	0.00	0.04	0.07	0.038
41.761	0.000	0.00	0.04	0.07	0.038
41.890	0.000	0.00	0.04	0.06	0.037
42.018	0.000	0.00	0.04	0.06	0.036
42.146	0.000	0.00	0.04	0.06	0.036
42.274	0.000	0.00	0.04	0.06	0.035
42.402	0.000	0.00	0.04	0.06	0.034
42.530	0.000	0.00	0.04	0.06	0.034
42.659	0.000	0.00	0.04	0.06	0.033
42.787	0.000	0.00	0.04	0.06	0.033
42.915	0.000	0.00	0.04	0.06	0.032
43.043	0.000	0.00	0.04	0.05	0.031
43.171	0.000	0.00	0.04	0.05	0.031
43.299	0.000	0.00	0.04	0.05	0.030
43.428	0.000	0.00	0.03	0.05	0.030
43.556	0.000	0.00	0.03	0.05	0.029
43.684	0.000	0.00	0.03	0.05	0.029
43.812	0.000	0.00	0.03	0.05	0.028
43.940	0.000	0.00	0.03	0.05	0.028
44.068	0.000	0.00	0.03	0.05	0.027
44.197	0.000	0.00	0.03	0.05	0.027
44.325	0.000	0.00	0.03	0.05	0.026
44.453	0.000	0.00	0.03	0.04	0.026
44.581	0.000	0.00	0.03	0.04	0.025
44.709	0.000	0.00	0.03	0.04	0.025
44.837	0.000	0.00	0.03	0.04	0.024
44.966	0.000	0.00	0.03	0.04	0.024
45.094	0.000	0.00	0.03	0.04	0.024
45.222	0.000	0.00	0.03	0.04	0.023
45.350	0.000	0.00	0.03	0.04	0.023
45.478	0.000	0.00	0.03	0.04	0.022
45.606	0.000	0.00	0.03	0.04	0.022
45.735	0.000	0.00	0.03	0.04	0.022
45.863	0.000	0.00	0.02	0.04	0.021
45.991	0.000	0.00	0.02	0.04	0.021
46.119	0.000	0.00	0.02	0.04	0.020
46.247	0.000	0.00	0.02	0.03	0.020
46.375	0.000	0.00	0.02	0.03	0.020
46.504	0.000	0.00	0.02	0.03	0.019
46.632	0.000	0.00	0.02	0.03	0.019
46.760	0.000	0.00	0.02	0.03	0.019
46.888	0.000	0.00	0.02	0.03	0.018
47.016	0.000	0.00	0.02	0.03	0.018
47.144	0.000	0.00	0.02	0.03	0.018
47.273	0.000	0.00	0.02	0.03	0.017
47.401	0.000	0.00	0.02	0.03	0.017
47.529	0.000	0.00	0.02	0.03	0.017
47.657	0.000	0.00	0.02	0.03	0.016
47.785	0.000	0.00	0.02	0.03	0.016
47.913	0.000	0.00	0.02	0.03	0.016

48.042	0.000	0.00	0.02	0.03	0.016
48.170	0.000	0.00	0.02	0.03	0.015
48.298	0.000	0.00	0.02	0.03	0.015
48.426	0.000	0.00	0.02	0.03	0.015
48.554	0.000	0.00	0.02	0.02	0.014
48.682	0.000	0.00	0.02	0.02	0.014
48.811	0.000	0.00	0.02	0.02	0.014
48.939	0.000	0.00	0.02	0.02	0.014
49.067	0.000	0.00	0.02	0.02	0.013
49.195	0.000	0.00	0.02	0.02	0.013
49.323	0.000	0.00	0.02	0.02	0.013
49.451	0.000	0.00	0.01	0.02	0.013
49.580	0.000	0.00	0.01	0.02	0.012
49.708	0.000	0.00	0.01	0.02	0.012
49.836	0.000	0.00	0.01	0.02	0.012
49.964	0.000	0.00	0.01	0.02	0.012
50.092	0.000	0.00	0.01	0.02	0.012
50.220	0.000	0.00	0.01	0.02	0.011
50.349	0.000	0.00	0.01	0.02	0.011
50.477	0.000	0.00	0.01	0.02	0.011
50.605	0.000	0.00	0.01	0.02	0.011
50.733	0.000	0.00	0.01	0.02	0.011
50.861	0.000	0.00	0.01	0.02	0.010
50.989	0.000	0.00	0.01	0.02	0.010
51.118	0.000	0.00	0.01	0.02	0.010
51.246	0.000	0.00	0.01	0.02	0.010
51.374	0.000	0.00	0.01	0.02	0.010
51.502	0.000	0.00	0.01	0.02	0.010
51.630	0.000	0.00	0.01	0.02	0.009
51.758	0.000	0.00	0.01	0.02	0.009
51.887	0.000	0.00	0.01	0.02	0.009
52.015	0.000	0.00	0.01	0.02	0.009
52.143	0.000	0.00	0.01	0.01	0.009
52.271	0.000	0.00	0.01	0.01	0.009
52.399	0.000	0.00	0.01	0.01	0.008
52.527	0.000	0.00	0.01	0.01	0.008
52.656	0.000	0.00	0.01	0.01	0.008
52.784	0.000	0.00	0.01	0.01	0.008
52.912	0.000	0.00	0.01	0.01	0.008
53.040	0.000	0.00	0.01	0.01	0.008
53.168	0.000	0.00	0.01	0.01	0.008
53.296	0.000	0.00	0.01	0.01	0.007
53.425	0.000	0.00	0.01	0.01	0.007
53.553	0.000	0.00	0.01	0.01	0.007
53.681	0.000	0.00	0.01	0.01	0.007
53.809	0.000	0.00	0.01	0.01	0.007
53.937	0.000	0.00	0.01	0.01	0.007
54.065	0.000	0.00	0.01	0.01	0.007
54.194	0.000	0.00	0.01	0.01	0.007
54.322	0.000	0.00	0.01	0.01	0.006
54.450	0.000	0.00	0.01	0.01	0.006
54.578	0.000	0.00	0.01	0.01	0.006
54.706	0.000	0.00	0.01	0.01	0.006
54.834	0.000	0.00	0.01	0.01	0.006
54.963	0.000	0.00	0.01	0.01	0.006
55.091	0.000	0.00	0.01	0.01	0.006
55.219	0.000	0.00	0.01	0.01	0.006
55.347	0.000	0.00	0.01	0.01	0.006
55.475	0.000	0.00	0.01	0.01	0.005
55.603	0.000	0.00	0.01	0.01	0.005
55.732	0.000	0.00	0.01	0.01	0.005
55.860	0.000	0.00	0.01	0.01	0.005
55.988	0.000	0.00	0.01	0.01	0.005
56.116	0.000	0.00	0.01	0.01	0.005
56.244	0.000	0.00	0.01	0.01	0.005
56.372	0.000	0.00	0.01	0.01	0.005
56.501	0.000	0.00	0.01	0.01	0.005
56.629	0.000	0.00	0.01	0.01	0.005
56.757	0.000	0.00	0.01	0.01	0.005

56.885	0.000	0.00	0.01	0.01	0.004
57.013	0.000	0.00	0.01	0.01	0.004
57.141	0.000	0.00	0.01	0.01	0.004
57.270	0.000	0.00	0.00	0.01	0.004
57.398	0.000	0.00	0.00	0.01	0.004
57.526	0.000	0.00	0.00	0.01	0.004
57.654	0.000	0.00	0.00	0.01	0.004
57.782	0.000	0.00	0.00	0.01	0.004
57.910	0.000	0.00	0.00	0.01	0.004
58.039	0.000	0.00	0.00	0.01	0.004
58.167	0.000	0.00	0.00	0.01	0.004
58.295	0.000	0.00	0.00	0.01	0.004
58.423	0.000	0.00	0.00	0.01	0.004
58.551	0.000	0.00	0.00	0.01	0.004
58.679	0.000	0.00	0.00	0.01	0.003
58.808	0.000	0.00	0.00	0.01	0.003
58.936	0.000	0.00	0.00	0.01	0.003
59.064	0.000	0.00	0.00	0.01	0.003
59.192	0.000	0.00	0.00	0.01	0.003
59.320	0.000	0.00	0.00	0.01	0.003
59.448	0.000	0.00	0.00	0.01	0.003
59.577	0.000	0.00	0.00	0.01	0.003
59.705	0.000	0.00	0.00	0.01	0.003
59.833	0.000	0.00	0.00	0.01	0.003
59.961	0.000	0.00	0.00	0.00	0.003
60.089	0.000	0.00	0.00	0.00	0.003
60.217	0.000	0.00	0.00	0.00	0.003
60.346	0.000	0.00	0.00	0.00	0.003
60.474	0.000	0.00	0.00	0.00	0.003
60.602	0.000	0.00	0.00	0.00	0.003
60.730	0.000	0.00	0.00	0.00	0.003
60.858	0.000	0.00	0.00	0.00	0.003
60.986	0.000	0.00	0.00	0.00	0.002
61.115	0.000	0.00	0.00	0.00	0.002
61.243	0.000	0.00	0.00	0.00	0.002
61.371	0.000	0.00	0.00	0.00	0.002
61.499	0.000	0.00	0.00	0.00	0.002
61.627	0.000	0.00	0.00	0.00	0.002
61.755	0.000	0.00	0.00	0.00	0.002
61.884	0.000	0.00	0.00	0.00	0.002
62.012	0.000	0.00	0.00	0.00	0.002
62.140	0.000	0.00	0.00	0.00	0.002
62.268	0.000	0.00	0.00	0.00	0.002
62.396	0.000	0.00	0.00	0.00	0.002
62.524	0.000	0.00	0.00	0.00	0.002
62.653	0.000	0.00	0.00	0.00	0.002
62.781	0.000	0.00	0.00	0.00	0.002
62.909	0.000	0.00	0.00	0.00	0.002
63.037	0.000	0.00	0.00	0.00	0.002
63.165	0.000	0.00	0.00	0.00	0.002
63.293	0.000	0.00	0.00	0.00	0.002
63.422	0.000	0.00	0.00	0.00	0.002
63.550	0.000	0.00	0.00	0.00	0.002
63.678	0.000	0.00	0.00	0.00	0.002
63.806	0.000	0.00	0.00	0.00	0.002
63.934	0.000	0.00	0.00	0.00	0.002
64.062	0.000	0.00	0.00	0.00	0.002
64.191	0.000	0.00	0.00	0.00	0.002
64.319	0.000	0.00	0.00	0.00	0.002
64.447	0.000	0.00	0.00	0.00	0.002
64.575	0.000	0.00	0.00	0.00	0.002
64.703	0.000	0.00	0.00	0.00	0.001
64.831	0.000	0.00	0.00	0.00	0.001
64.960	0.000	0.00	0.00	0.00	0.001
65.088	0.000	0.00	0.00	0.00	0.001
65.216	0.000	0.00	0.00	0.00	0.001
65.344	0.000	0.00	0.00	0.00	0.001
65.472	0.000	0.00	0.00	0.00	0.001
65.600	0.000	0.00	0.00	0.00	0.001

65.729	0.000	0.00	0.00	0.00	0.001
65.857	0.000	0.00	0.00	0.00	0.001
65.985	0.000	0.00	0.00	0.00	0.001
66.113	0.000	0.00	0.00	0.00	0.001
66.241	0.000	0.00	0.00	0.00	0.001
66.369	0.000	0.00	0.00	0.00	0.001
66.498	0.000	0.00	0.00	0.00	0.001
66.626	0.000	0.00	0.00	0.00	0.001
66.754	0.000	0.00	0.00	0.00	0.001
66.882	0.000	0.00	0.00	0.00	0.001
67.010	0.000	0.00	0.00	0.00	0.001
67.138	0.000	0.00	0.00	0.00	0.001
67.267	0.000	0.00	0.00	0.00	0.001
67.395	0.000	0.00	0.00	0.00	0.001

Appendix J.III

BMP Analysis 100-Year Storm Event

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

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Suite 200
Orange, CA 92868

Problem Descriptions:

BIG BOX RETAIL - HESPERIA

UNIT HYDROGRAPH

100-YEAR, POST-CONDITIONS, DA A

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.41
TOTAL CATCHMENT AREA(ACRES) = 9.10
SOIL-LOSS RATE, F_m (INCH/HR) = 0.145
LOW LOSS FRACTION = 0.190
TIME OF CONCENTRATION(MIN.) = 8.59
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) = 0.32
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.86
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.18
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.87
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.61
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.71

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 5.00
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = -0.67

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.11	0.0063	1.40	.Q	.	.	.	.
0.25	0.0228	1.40	.Q	.	.	.	.
0.39	0.0394	1.41	.Q	.	.	.	.
0.54	0.0560	1.41	.Q	.	.	.	.
0.68	0.0727	1.42	.Q	.	.	.	.
0.82	0.0895	1.42	.Q	.	.	.	.
0.97	0.1064	1.43	.Q	.	.	.	.
1.11	0.1233	1.43	.Q	.	.	.	.
1.25	0.1403	1.44	.Q	.	.	.	.
1.40	0.1574	1.44	.Q	.	.	.	.
1.54	0.1745	1.45	.Q	.	.	.	.
1.68	0.1917	1.46	.Q	.	.	.	.
1.83	0.2090	1.47	.Q	.	.	.	.
1.97	0.2263	1.47	.Q	.	.	.	.
2.11	0.2438	1.48	.Q	.	.	.	.
2.26	0.2613	1.48	.Q	.	.	.	.
2.40	0.2789	1.49	.Q	.	.	.	.
2.54	0.2966	1.50	.Q	.	.	.	.
2.69	0.3143	1.51	.Q	.	.	.	.
2.83	0.3322	1.51	.Q	.	.	.	.
2.97	0.3501	1.52	.Q	.	.	.	.

3.12	0.3681	1.52	.Q	.	.	.	.
3.26	0.3862	1.53	.Q	.	.	.	.
3.40	0.4044	1.54	.Q	.	.	.	.
3.54	0.4226	1.55	.Q	.	.	.	.
3.69	0.4410	1.55	.Q	.	.	.	.
3.83	0.4595	1.56	.Q	.	.	.	.
3.97	0.4780	1.57	.Q	.	.	.	.
4.12	0.4966	1.58	.Q	.	.	.	.
4.26	0.5154	1.59	.Q	.	.	.	.
4.40	0.5342	1.60	.Q	.	.	.	.
4.55	0.5532	1.60	.Q	.	.	.	.
4.69	0.5722	1.62	.Q	.	.	.	.
4.83	0.5913	1.62	.Q	.	.	.	.
4.98	0.6106	1.63	.Q	.	.	.	.
5.12	0.6300	1.64	.Q	.	.	.	.
5.26	0.6494	1.65	.Q	.	.	.	.
5.41	0.6690	1.66	.Q	.	.	.	.
5.55	0.6887	1.67	.Q	.	.	.	.
5.69	0.7085	1.68	.Q	.	.	.	.
5.84	0.7285	1.69	.Q	.	.	.	.
5.98	0.7485	1.70	.Q	.	.	.	.
6.12	0.7687	1.71	.Q	.	.	.	.
6.26	0.7890	1.72	.Q	.	.	.	.
6.41	0.8094	1.73	.Q	.	.	.	.
6.55	0.8300	1.74	.Q	.	.	.	.
6.69	0.8507	1.76	.Q	.	.	.	.
6.84	0.8715	1.76	.Q	.	.	.	.
6.98	0.8925	1.78	.Q	.	.	.	.
7.12	0.9136	1.79	.Q	.	.	.	.
7.27	0.9349	1.81	.Q	.	.	.	.
7.41	0.9563	1.81	.Q	.	.	.	.
7.55	0.9779	1.83	.Q	.	.	.	.
7.70	0.9996	1.84	.Q	.	.	.	.
7.84	1.0215	1.86	.Q	.	.	.	.
7.98	1.0435	1.87	.Q	.	.	.	.
8.13	1.0657	1.89	.Q	.	.	.	.
8.27	1.0881	1.90	.Q	.	.	.	.
8.41	1.1107	1.92	.Q	.	.	.	.
8.56	1.1335	1.93	.Q	.	.	.	.
8.70	1.1564	1.95	.Q	.	.	.	.
8.84	1.1796	1.96	.Q	.	.	.	.
8.98	1.2029	1.98	.Q	.	.	.	.
9.13	1.2264	2.00	.Q	.	.	.	.
9.27	1.2502	2.02	. Q	.	.	.	.
9.41	1.2742	2.03	. Q	.	.	.	.
9.56	1.2984	2.06	. Q	.	.	.	.
9.70	1.3228	2.07	. Q	.	.	.	.
9.84	1.3475	2.10	. Q	.	.	.	.
9.99	1.3724	2.11	. Q	.	.	.	.
10.13	1.3975	2.14	. Q	.	.	.	.
10.27	1.4230	2.16	. Q	.	.	.	.
10.42	1.4487	2.19	. Q	.	.	.	.
10.56	1.4747	2.20	. Q	.	.	.	.
10.70	1.5009	2.24	. Q	.	.	.	.
10.85	1.5275	2.26	. Q	.	.	.	.
10.99	1.5544	2.29	. Q	.	.	.	.
11.13	1.5816	2.31	. Q	.	.	.	.
11.28	1.6092	2.35	. Q	.	.	.	.
11.42	1.6371	2.37	. Q	.	.	.	.
11.56	1.6654	2.41	. Q	.	.	.	.
11.70	1.6941	2.44	. Q	.	.	.	.
11.85	1.7232	2.48	. Q	.	.	.	.
11.99	1.7528	2.51	. Q	.	.	.	.
12.13	1.7807	2.22	. Q	.	.	.	.
12.28	1.8069	2.21	. Q	.	.	.	.
12.42	1.8334	2.27	. Q	.	.	.	.
12.56	1.8604	2.30	. Q	.	.	.	.
12.71	1.8880	2.37	. Q	.	.	.	.
12.85	1.9162	2.40	. Q	.	.	.	.

12.99	1.9451	2.48	. Q	.	.	.	.
13.14	1.9746	2.52	. Q	.	.	.	.
13.28	2.0049	2.60	. Q	.	.	.	.
13.42	2.0360	2.65	. Q	.	.	.	.
13.57	2.0680	2.75	. Q	.	.	.	.
13.71	2.1009	2.81	. Q	.	.	.	.
13.85	2.1349	2.93	. Q	.	.	.	.
14.00	2.1700	3.00	. Q	.	.	.	.
14.14	2.2040	2.76	. Q	.	.	.	.
14.28	2.2371	2.83	. Q	.	.	.	.
14.43	2.2716	3.01	. Q	.	.	.	.
14.57	2.3079	3.11	. Q	.	.	.	.
14.71	2.3462	3.36	. Q	.	.	.	.
14.85	2.3867	3.50	. Q	.	.	.	.
15.00	2.4301	3.84	. Q	.	.	.	.
15.14	2.4768	4.05	. Q	.	.	.	.
15.28	2.5279	4.58	. Q	.	.	.	.
15.43	2.5841	4.93	. Q	.	.	.	.
15.57	2.6508	6.35	. Q	.	.	.	.
15.71	2.7303	7.09	. Q	.	.	.	.
15.86	2.8445	12.21	. Q	.	.	.	.
16.00	3.0116	16.04	. Q	.	.	.	.
16.14	3.3258	37.08	.	.	.	Q	.
16.29	3.5995	9.17	. Q	.	.	.	.
16.43	3.6880	5.79	. Q	.	.	.	.
16.57	3.7476	4.29	. Q	.	.	.	.
16.72	3.7947	3.66	. Q	.	.	.	.
16.86	3.8354	3.23	. Q	.	.	.	.
17.00	3.8718	2.91	. Q	.	.	.	.
17.15	3.9072	3.07	. Q	.	.	.	.
17.29	3.9423	2.87	. Q	.	.	.	.
17.43	3.9753	2.70	. Q	.	.	.	.
17.57	4.0064	2.56	. Q	.	.	.	.
17.72	4.0360	2.44	. Q	.	.	.	.
17.86	4.0642	2.33	. Q	.	.	.	.
18.00	4.0912	2.24	. Q	.	.	.	.
18.15	4.1195	2.53	. Q	.	.	.	.
18.29	4.1490	2.46	. Q	.	.	.	.
18.43	4.1777	2.39	. Q	.	.	.	.
18.58	4.2056	2.33	. Q	.	.	.	.
18.72	4.2328	2.27	. Q	.	.	.	.
18.86	4.2594	2.22	. Q	.	.	.	.
19.01	4.2854	2.17	. Q	.	.	.	.
19.15	4.3109	2.13	. Q	.	.	.	.
19.29	4.3358	2.08	. Q	.	.	.	.
19.44	4.3602	2.04	. Q	.	.	.	.
19.58	4.3842	2.01	. Q	.	.	.	.
19.72	4.4077	1.97	.Q	.	.	.	.
19.87	4.4309	1.94	.Q	.	.	.	.
20.01	4.4536	1.91	.Q	.	.	.	.
20.15	4.4760	1.88	.Q	.	.	.	.
20.30	4.4981	1.85	.Q	.	.	.	.
20.44	4.5198	1.82	.Q	.	.	.	.
20.58	4.5412	1.80	.Q	.	.	.	.
20.72	4.5623	1.77	.Q	.	.	.	.
20.87	4.5832	1.75	.Q	.	.	.	.
21.01	4.6037	1.73	.Q	.	.	.	.
21.15	4.6240	1.71	.Q	.	.	.	.
21.30	4.6441	1.68	.Q	.	.	.	.
21.44	4.6639	1.66	.Q	.	.	.	.
21.58	4.6835	1.65	.Q	.	.	.	.
21.73	4.7029	1.63	.Q	.	.	.	.
21.87	4.7220	1.61	.Q	.	.	.	.
22.01	4.7409	1.59	.Q	.	.	.	.
22.16	4.7597	1.58	.Q	.	.	.	.
22.30	4.7782	1.56	.Q	.	.	.	.
22.44	4.7966	1.54	.Q	.	.	.	.
22.59	4.8148	1.53	.Q	.	.	.	.
22.73	4.8328	1.51	.Q	.	.	.	.

22.87	4.8506	1.50	.Q	.	.	.	.
23.02	4.8683	1.49	.Q	.	.	.	.
23.16	4.8858	1.47	.Q	.	.	.	.
23.30	4.9032	1.46	.Q	.	.	.	.
23.44	4.9204	1.45	.Q	.	.	.	.
23.59	4.9375	1.44	.Q	.	.	.	.
23.73	4.9544	1.42	.Q	.	.	.	.
23.87	4.9712	1.41	.Q	.	.	.	.
24.02	4.9878	1.40	.Q	.	.	.	.
24.16	4.9961	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)

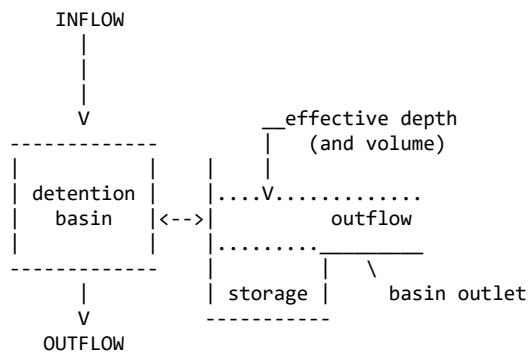
Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1443.1
10%	103.1
20%	34.4
30%	25.8
40%	17.2
50%	8.6
60%	8.6
70%	8.6
80%	8.6
90%	8.6

Problem Descriptions:
 BIG BOX RETAIL - HESPERIA
 BASIN ROUTING
 100-YEAR, POST-CONDITIONS, DA A

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FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
 CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 8.590
 DEAD STORAGE(AF) = 0.00
 SPECIFIED DEAD STORAGE(AF) FILLED = 0.00
 ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:
 TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 4

*BASIN-DEPTH	STORAGE	OUTFLOW	**BASIN-DEPTH	STORAGE	OUTFLOW
(FEET)	(ACRE-FEET)	(CFS)	(FEET)	(ACRE-FEET)	(CFS)
* 0.000	0.000	0.000**	1.000	0.637	4.625*
* 2.000	1.355	9.512**	3.000	2.161	12.760*

 BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	DEPTH (FEET)	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00	0.00000	0.00000
2	1.00	0.60916	0.66388
3	2.00	1.29885	1.41139
4	3.00	2.08530	2.23628

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)

 DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES
 OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE
 AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	EFFECTIVE DEPTH(FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
0.108	0.000	1.40	0.02	0.06	0.016
0.252	0.000	1.40	0.05	0.17	0.030
0.395	0.000	1.41	0.07	0.27	0.044
0.538	0.000	1.41	0.09	0.36	0.056
0.681	0.000	1.42	0.11	0.45	0.068
0.824	0.000	1.42	0.12	0.53	0.078
0.967	0.000	1.43	0.14	0.60	0.088
1.111	0.000	1.43	0.15	0.67	0.097
1.254	0.000	1.44	0.17	0.73	0.105
1.397	0.000	1.44	0.18	0.79	0.113
1.540	0.000	1.45	0.19	0.85	0.120
1.683	0.000	1.46	0.20	0.90	0.127
1.826	0.000	1.47	0.21	0.94	0.133
1.970	0.000	1.47	0.22	0.99	0.139
2.113	0.000	1.48	0.23	1.03	0.144
2.256	0.000	1.48	0.23	1.06	0.149
2.399	0.000	1.49	0.24	1.10	0.154
2.542	0.000	1.50	0.25	1.13	0.158
2.685	0.000	1.51	0.25	1.16	0.162
2.829	0.000	1.51	0.26	1.19	0.166
2.972	0.000	1.52	0.27	1.22	0.169
3.115	0.000	1.52	0.27	1.24	0.173
3.258	0.000	1.53	0.28	1.27	0.176
3.401	0.000	1.54	0.28	1.29	0.179
3.544	0.000	1.55	0.29	1.31	0.182
3.688	0.000	1.55	0.29	1.33	0.184
3.831	0.000	1.56	0.29	1.35	0.187
3.974	0.000	1.57	0.30	1.37	0.189
4.117	0.000	1.58	0.30	1.38	0.192
4.260	0.000	1.59	0.30	1.40	0.194
4.404	0.000	1.60	0.31	1.42	0.196
4.547	0.000	1.60	0.31	1.43	0.198
4.690	0.000	1.62	0.31	1.45	0.200
4.833	0.000	1.62	0.32	1.46	0.202
4.976	0.000	1.63	0.32	1.47	0.204
5.119	0.000	1.64	0.32	1.49	0.206
5.262	0.000	1.65	0.33	1.50	0.207
5.406	0.000	1.66	0.33	1.51	0.209
5.549	0.000	1.67	0.33	1.53	0.211
5.692	0.000	1.68	0.33	1.54	0.212
5.835	0.000	1.69	0.34	1.55	0.214
5.978	0.000	1.70	0.34	1.56	0.216
6.121	0.000	1.71	0.34	1.57	0.217
6.265	0.000	1.72	0.34	1.59	0.219
6.408	0.000	1.73	0.35	1.60	0.221
6.551	0.000	1.74	0.35	1.61	0.222
6.694	0.000	1.76	0.35	1.62	0.224
6.837	0.000	1.76	0.35	1.63	0.225
6.980	0.000	1.78	0.36	1.64	0.227
7.124	0.000	1.79	0.36	1.66	0.229
7.267	0.000	1.81	0.36	1.67	0.230

7.410	0.000	1.81	0.36	1.68	0.232
7.553	0.000	1.83	0.37	1.69	0.233
7.696	0.000	1.84	0.37	1.70	0.235
7.839	0.000	1.86	0.37	1.71	0.237
7.983	0.000	1.87	0.37	1.73	0.239
8.126	0.000	1.89	0.38	1.74	0.240
8.269	0.000	1.90	0.38	1.75	0.242
8.412	0.000	1.92	0.38	1.76	0.244
8.555	0.000	1.93	0.39	1.78	0.246
8.698	0.000	1.95	0.39	1.79	0.247
8.842	0.000	1.96	0.39	1.80	0.249
8.985	0.000	1.98	0.39	1.82	0.251
9.128	0.000	2.00	0.40	1.83	0.253
9.271	0.000	2.02	0.40	1.85	0.255
9.414	0.000	2.03	0.40	1.86	0.257
9.557	0.000	2.06	0.41	1.88	0.259
9.701	0.000	2.07	0.41	1.89	0.262
9.844	0.000	2.10	0.41	1.91	0.264
9.987	0.000	2.11	0.42	1.92	0.266
10.130	0.000	2.14	0.42	1.94	0.268
10.273	0.000	2.16	0.43	1.96	0.271
10.417	0.000	2.19	0.43	1.98	0.273
10.560	0.000	2.20	0.43	1.99	0.276
10.703	0.000	2.24	0.44	2.01	0.278
10.846	0.000	2.26	0.44	2.03	0.281
10.989	0.000	2.29	0.45	2.05	0.284
11.132	0.000	2.31	0.45	2.07	0.287
11.275	0.000	2.35	0.46	2.09	0.290
11.419	0.000	2.37	0.46	2.12	0.293
11.562	0.000	2.41	0.46	2.14	0.296
11.705	0.000	2.44	0.47	2.16	0.299
11.848	0.000	2.48	0.48	2.19	0.303
11.991	0.000	2.51	0.48	2.21	0.306
12.135	0.000	2.22	0.48	2.22	0.306
12.278	0.000	2.21	0.48	2.22	0.306
12.421	0.000	2.27	0.48	2.22	0.306
12.564	0.000	2.30	0.48	2.23	0.307
12.707	0.000	2.37	0.49	2.24	0.309
12.850	0.000	2.40	0.49	2.25	0.311
12.993	0.000	2.48	0.49	2.27	0.313
13.137	0.000	2.52	0.50	2.28	0.316
13.280	0.000	2.60	0.50	2.31	0.319
13.423	0.000	2.65	0.51	2.33	0.323
13.566	0.000	2.75	0.51	2.36	0.328
13.709	0.000	2.81	0.52	2.40	0.333
13.852	0.000	2.93	0.53	2.44	0.338
13.996	0.000	3.00	0.54	2.48	0.345
14.139	0.000	2.76	0.55	2.51	0.347
14.282	0.000	2.83	0.55	2.54	0.351
14.425	0.000	3.01	0.56	2.57	0.356
14.568	0.000	3.11	0.57	2.61	0.362
14.712	0.000	3.36	0.58	2.66	0.370
14.855	0.000	3.50	0.60	2.72	0.380
14.998	0.000	3.84	0.62	2.80	0.392
15.141	0.000	4.05	0.64	2.90	0.405
15.284	0.000	4.58	0.67	3.01	0.424
15.427	0.000	4.93	0.70	3.16	0.445
15.570	0.000	6.35	0.75	3.36	0.480
15.714	0.000	7.09	0.82	3.64	0.521
15.857	0.000	12.21	0.97	4.13	0.617
16.000	0.000	16.04	1.16	4.93	0.748
16.143	0.000	37.08	1.66	6.61	1.109
16.286	0.000	9.17	1.68	7.89	1.124
16.430	0.000	5.79	1.64	7.86	1.099
16.573	0.000	4.29	1.59	7.64	1.060
16.716	0.000	3.66	1.53	7.35	1.016
16.859	0.000	3.23	1.47	7.05	0.971
17.002	0.000	2.91	1.40	6.74	0.925
17.145	0.000	3.07	1.35	6.45	0.885

17.289	0.000	2.87	1.29	6.18	0.846
17.432	0.000	2.70	1.24	5.92	0.808
17.575	0.000	2.56	1.19	5.67	0.771
17.718	0.000	2.44	1.14	5.42	0.736
17.861	0.000	2.33	1.09	5.19	0.702
18.004	0.000	2.24	1.05	4.96	0.670
18.147	0.000	2.53	1.01	4.76	0.644
18.291	0.000	2.46	0.97	4.58	0.619
18.434	0.000	2.39	0.93	4.41	0.595
18.577	0.000	2.33	0.90	4.24	0.572
18.720	0.000	2.27	0.87	4.08	0.551
18.863	0.000	2.22	0.83	3.93	0.531
19.007	0.000	2.17	0.80	3.79	0.511
19.150	0.000	2.13	0.78	3.65	0.493
19.293	0.000	2.08	0.75	3.52	0.476
19.436	0.000	2.04	0.72	3.40	0.460
19.579	0.000	2.01	0.70	3.29	0.445
19.722	0.000	1.97	0.68	3.18	0.431
19.866	0.000	1.94	0.66	3.08	0.417
20.009	0.000	1.91	0.64	2.99	0.405
20.152	0.000	1.88	0.62	2.90	0.393
20.295	0.000	1.85	0.60	2.81	0.381
20.438	0.000	1.82	0.58	2.73	0.370
20.581	0.000	1.80	0.57	2.65	0.360
20.724	0.000	1.77	0.55	2.58	0.351
20.868	0.000	1.75	0.54	2.52	0.342
21.011	0.000	1.73	0.52	2.45	0.333
21.154	0.000	1.71	0.51	2.39	0.325
21.297	0.000	1.68	0.50	2.33	0.317
21.440	0.000	1.66	0.49	2.28	0.310
21.583	0.000	1.65	0.48	2.23	0.303
21.727	0.000	1.63	0.47	2.18	0.297
21.870	0.000	1.61	0.46	2.13	0.290
22.013	0.000	1.59	0.45	2.09	0.285
22.156	0.000	1.58	0.44	2.05	0.279
22.299	0.000	1.56	0.43	2.01	0.274
22.443	0.000	1.54	0.42	1.97	0.269
22.586	0.000	1.53	0.41	1.93	0.264
22.729	0.000	1.51	0.41	1.90	0.259
22.872	0.000	1.50	0.40	1.87	0.255
23.015	0.000	1.49	0.39	1.84	0.251
23.158	0.000	1.47	0.39	1.81	0.247
23.302	0.000	1.46	0.38	1.78	0.243
23.445	0.000	1.45	0.38	1.75	0.239
23.588	0.000	1.44	0.37	1.73	0.236
23.731	0.000	1.42	0.37	1.70	0.233
23.874	0.000	1.41	0.36	1.68	0.230
24.017	0.000	1.40	0.36	1.66	0.227
24.160	0.000	0.00	0.33	1.58	0.208

SMALL AREA UNIT HYDROGRAPH MODEL

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Analysis prepared by:

Problem Descriptions:

BIG BOX RETAIL - HESPERIA
BASIN ROUTING ANALYSIS
100-YEAR, POST-CONDITIONS, DA B

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.18
TOTAL CATCHMENT AREA(ACRES) = 16.27
SOIL-LOSS RATE, F_m (INCH/HR) = 0.003
LOW LOSS FRACTION = 0.044
TIME OF CONCENTRATION(MIN.) = 7.69
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) = 0.32
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.86
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.18
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.87
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.61
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.71

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 8.99
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = -1.25

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	17.5	35.0	52.5	70.0
0.11	0.0134	2.53	.Q	.	.	.	.
0.24	0.0403	2.54	.Q	.	.	.	.
0.36	0.0672	2.55	.Q	.	.	.	.
0.49	0.0942	2.56	.Q	.	.	.	.
0.62	0.1214	2.57	.Q	.	.	.	.
0.75	0.1486	2.58	.Q	.	.	.	.
0.88	0.1760	2.58	.Q	.	.	.	.
1.00	0.2034	2.60	.Q	.	.	.	.
1.13	0.2310	2.60	.Q	.	.	.	.
1.26	0.2586	2.62	.Q	.	.	.	.
1.39	0.2864	2.62	.Q	.	.	.	.
1.52	0.3142	2.64	.Q	.	.	.	.
1.65	0.3422	2.64	.Q	.	.	.	.
1.77	0.3703	2.66	.Q	.	.	.	.
1.90	0.3985	2.67	.Q	.	.	.	.
2.03	0.4268	2.68	.Q	.	.	.	.
2.16	0.4552	2.69	.Q	.	.	.	.
2.29	0.4838	2.70	.Q	.	.	.	.
2.41	0.5125	2.71	.Q	.	.	.	.
2.54	0.5412	2.72	.Q	.	.	.	.
2.67	0.5701	2.73	.Q	.	.	.	.

2.80	0.5992	2.75	.Q	.	.	.	.
2.93	0.6283	2.76	.Q	.	.	.	.
3.06	0.6576	2.77	.Q	.	.	.	.
3.18	0.6870	2.78	.Q	.	.	.	.
3.31	0.7165	2.80	.Q	.	.	.	.
3.44	0.7462	2.80	.Q	.	.	.	.
3.57	0.7760	2.82	.Q	.	.	.	.
3.70	0.8059	2.83	.Q	.	.	.	.
3.82	0.8360	2.85	.Q	.	.	.	.
3.95	0.8662	2.86	.Q	.	.	.	.
4.08	0.8966	2.87	.Q	.	.	.	.
4.21	0.9271	2.88	.Q	.	.	.	.
4.34	0.9577	2.90	.Q	.	.	.	.
4.46	0.9885	2.91	.Q	.	.	.	.
4.59	1.0195	2.93	.Q	.	.	.	.
4.72	1.0505	2.94	.Q	.	.	.	.
4.85	1.0818	2.96	.Q	.	.	.	.
4.98	1.1132	2.97	.Q	.	.	.	.
5.11	1.1448	2.99	.Q	.	.	.	.
5.23	1.1765	3.00	.Q	.	.	.	.
5.36	1.2084	3.02	.Q	.	.	.	.
5.49	1.2405	3.03	.Q	.	.	.	.
5.62	1.2727	3.06	.Q	.	.	.	.
5.75	1.3052	3.07	.Q	.	.	.	.
5.87	1.3378	3.09	.Q	.	.	.	.
6.00	1.3705	3.10	.Q	.	.	.	.
6.13	1.4035	3.12	.Q	.	.	.	.
6.26	1.4367	3.14	.Q	.	.	.	.
6.39	1.4700	3.16	.Q	.	.	.	.
6.52	1.5035	3.17	.Q	.	.	.	.
6.64	1.5373	3.20	.Q	.	.	.	.
6.77	1.5712	3.21	.Q	.	.	.	.
6.90	1.6054	3.24	.Q	.	.	.	.
7.03	1.6397	3.25	.Q	.	.	.	.
7.16	1.6743	3.28	.Q	.	.	.	.
7.28	1.7091	3.29	.Q	.	.	.	.
7.41	1.7441	3.32	.Q	.	.	.	.
7.54	1.7794	3.34	.Q	.	.	.	.
7.67	1.8149	3.36	.Q	.	.	.	.
7.80	1.8506	3.38	.Q	.	.	.	.
7.93	1.8866	3.41	.Q	.	.	.	.
8.05	1.9228	3.43	.Q	.	.	.	.
8.18	1.9592	3.46	.Q	.	.	.	.
8.31	1.9960	3.48	.Q	.	.	.	.
8.44	2.0330	3.51	. Q	.	.	.	.
8.57	2.0703	3.53	. Q	.	.	.	.
8.69	2.1078	3.56	. Q	.	.	.	.
8.82	2.1457	3.58	. Q	.	.	.	.
8.95	2.1838	3.62	. Q	.	.	.	.
9.08	2.2223	3.64	. Q	.	.	.	.
9.21	2.2610	3.68	. Q	.	.	.	.
9.34	2.3001	3.70	. Q	.	.	.	.
9.46	2.3395	3.74	. Q	.	.	.	.
9.59	2.3793	3.76	. Q	.	.	.	.
9.72	2.4194	3.81	. Q	.	.	.	.
9.85	2.4598	3.83	. Q	.	.	.	.
9.98	2.5006	3.88	. Q	.	.	.	.
10.10	2.5418	3.90	. Q	.	.	.	.
10.23	2.5834	3.95	. Q	.	.	.	.
10.36	2.6254	3.98	. Q	.	.	.	.
10.49	2.6678	4.03	. Q	.	.	.	.
10.62	2.7107	4.06	. Q	.	.	.	.
10.75	2.7539	4.11	. Q	.	.	.	.
10.87	2.7977	4.14	. Q	.	.	.	.
11.00	2.8419	4.20	. Q	.	.	.	.
11.13	2.8866	4.24	. Q	.	.	.	.
11.26	2.9318	4.30	. Q	.	.	.	.
11.39	2.9776	4.34	. Q	.	.	.	.
11.51	3.0239	4.41	. Q	.	.	.	.

11.64	3.0707	4.44	. Q	.	.	.	.
11.77	3.1182	4.52	. Q	.	.	.	.
11.90	3.1663	4.56	. Q	.	.	.	.
12.03	3.2151	4.64	. Q	.	.	.	.
12.15	3.2615	4.12	. Q	.	.	.	.
12.28	3.3049	4.08	. Q	.	.	.	.
12.41	3.3483	4.13	. Q	.	.	.	.
12.54	3.3926	4.23	. Q	.	.	.	.
12.67	3.4377	4.29	. Q	.	.	.	.
12.80	3.4838	4.40	. Q	.	.	.	.
12.92	3.5307	4.46	. Q	.	.	.	.
13.05	3.5787	4.59	. Q	.	.	.	.
13.18	3.6277	4.66	. Q	.	.	.	.
13.31	3.6779	4.81	. Q	.	.	.	.
13.44	3.7293	4.89	. Q	.	.	.	.
13.56	3.7821	5.06	. Q	.	.	.	.
13.69	3.8362	5.16	. Q	.	.	.	.
13.82	3.8919	5.36	. Q	.	.	.	.
13.95	3.9492	5.47	. Q	.	.	.	.
14.08	4.0068	5.40	. Q	.	.	.	.
14.21	4.0624	5.09	. Q	.	.	.	.
14.33	4.1178	5.38	. Q	.	.	.	.
14.46	4.1756	5.54	. Q	.	.	.	.
14.59	4.2362	5.90	. Q	.	.	.	.
14.72	4.2998	6.11	. Q	.	.	.	.
14.85	4.3670	6.59	. Q	.	.	.	.
14.97	4.4383	6.87	. Q	.	.	.	.
15.10	4.5147	7.55	. Q	.	.	.	.
15.23	4.5968	7.96	. Q	.	.	.	.
15.36	4.6867	9.01	. Q	.	.	.	.
15.49	4.7892	10.35	. Q	.	.	.	.
15.62	4.9100	12.46	. Q	.	.	.	.
15.74	5.0497	13.92	. Q	.	.	.	.
15.87	5.2410	22.19	. Q	.	.	.	.
16.00	5.5080	28.24	. Q	.	.	.	.
16.13	5.9834	61.52	.	.	.	Q	.
16.26	6.4082	18.69	. Q	.	.	.	.
16.38	6.5675	11.37	. Q	.	.	.	.
16.51	6.6724	8.44	. Q	.	.	.	.
16.64	6.7551	7.19	. Q	.	.	.	.
16.77	6.8268	6.34	. Q	.	.	.	.
16.90	6.8906	5.71	. Q	.	.	.	.
17.03	6.9485	5.23	. Q	.	.	.	.
17.15	7.0058	5.58	. Q	.	.	.	.
17.28	7.0632	5.25	. Q	.	.	.	.
17.41	7.1174	4.98	. Q	.	.	.	.
17.54	7.1688	4.74	. Q	.	.	.	.
17.67	7.2179	4.53	. Q	.	.	.	.
17.79	7.2649	4.34	. Q	.	.	.	.
17.92	7.3100	4.18	. Q	.	.	.	.
18.05	7.3535	4.03	. Q	.	.	.	.
18.18	7.3992	4.60	. Q	.	.	.	.
18.31	7.4473	4.48	. Q	.	.	.	.
18.44	7.4942	4.37	. Q	.	.	.	.
18.56	7.5400	4.27	. Q	.	.	.	.
18.69	7.5847	4.17	. Q	.	.	.	.
18.82	7.6284	4.09	. Q	.	.	.	.
18.95	7.6713	4.00	. Q	.	.	.	.
19.08	7.7133	3.93	. Q	.	.	.	.
19.20	7.7545	3.85	. Q	.	.	.	.
19.33	7.7949	3.79	. Q	.	.	.	.
19.46	7.8347	3.72	. Q	.	.	.	.
19.59	7.8737	3.66	. Q	.	.	.	.
19.72	7.9122	3.60	. Q	.	.	.	.
19.84	7.9501	3.55	. Q	.	.	.	.
19.97	7.9873	3.49	.Q	.	.	.	.
20.10	8.0241	3.44	.Q	.	.	.	.
20.23	8.0603	3.40	.Q	.	.	.	.
20.36	8.0960	3.35	.Q	.	.	.	.

20.49	8.1313	3.31	.Q	.	.	.	.
20.61	8.1661	3.26	.Q	.	.	.	.
20.74	8.2004	3.22	.Q	.	.	.	.
20.87	8.2344	3.19	.Q	.	.	.	.
21.00	8.2679	3.15	.Q	.	.	.	.
21.13	8.3011	3.11	.Q	.	.	.	.
21.25	8.3339	3.08	.Q	.	.	.	.
21.38	8.3663	3.04	.Q	.	.	.	.
21.51	8.3983	3.01	.Q	.	.	.	.
21.64	8.4301	2.98	.Q	.	.	.	.
21.77	8.4615	2.95	.Q	.	.	.	.
21.90	8.4926	2.92	.Q	.	.	.	.
22.02	8.5234	2.89	.Q	.	.	.	.
22.15	8.5539	2.87	.Q	.	.	.	.
22.28	8.5841	2.84	.Q	.	.	.	.
22.41	8.6140	2.81	.Q	.	.	.	.
22.54	8.6437	2.79	.Q	.	.	.	.
22.66	8.6731	2.76	.Q	.	.	.	.
22.79	8.7023	2.74	.Q	.	.	.	.
22.92	8.7312	2.72	.Q	.	.	.	.
23.05	8.7598	2.69	.Q	.	.	.	.
23.18	8.7883	2.67	.Q	.	.	.	.
23.31	8.8165	2.65	.Q	.	.	.	.
23.43	8.8444	2.63	.Q	.	.	.	.
23.56	8.8722	2.61	.Q	.	.	.	.
23.69	8.8997	2.59	.Q	.	.	.	.
23.82	8.9271	2.57	.Q	.	.	.	.
23.95	8.9542	2.55	.Q	.	.	.	.
24.07	8.9812	2.53	.Q	.	.	.	.
24.20	8.9946	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%	1445.7
10%	123.0
20%	46.1
30%	30.8
40%	15.4
50%	7.7
60%	7.7
70%	7.7
80%	7.7
90%	7.7

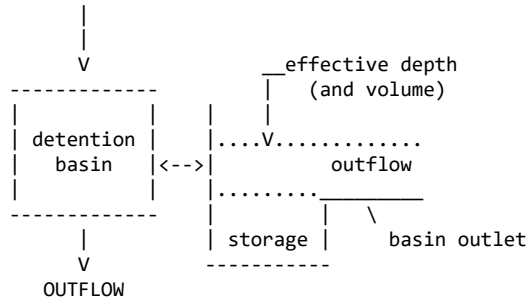
Problem Descriptions:
 BIG BOX RETAIL - HESPERIA
 BASIN ROUTING ANALYSIS
 100-YEAR, POST-CONDITIONS, DA B

=====

FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
 CONSTANT HYDROGRAPH TIME UNIT(MINUTES) = 7.690
 DEAD STORAGE(AF) = 0.00
 SPECIFIED DEAD STORAGE(AF) FILLED = 0.00
 ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN = 0.00

INFLOW
 |



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:

TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 7

*BASIN-DEPTH	STORAGE	OUTFLOW	**BASIN-DEPTH	STORAGE	OUTFLOW
(FEET)	(ACRE-FEET)	(CFS)	(FEET)	(ACRE-FEET)	(CFS)
* 0.000	0.000	0.000	** 0.500	0.427	0.730
* 1.000	0.879	6.610	** 2.000	1.859	31.320
* 3.000	2.944	66.540	** 4.000	3.387	29.790
* 5.000	4.490	63.250	** 5.000	4.490	63.250

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL	DEPTH	{S-O*DT/2}	{S+O*DT/2}
NUMBER	(FEET)	(ACRE-FEET)	(ACRE-FEET)
1	0.00	0.00000	0.00000
2	0.50	0.42323	0.43097
3	1.00	0.84389	0.91391
4	2.00	1.69262	2.02438
5	3.00	2.59129	3.29611
6	4.00	3.22963	3.54517
7	5.00	4.15552	4.82548

WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME	DEAD-STORAGE	INFLOW	EFFECTIVE	OUTFLOW	EFFECTIVE
(HRS)	FILLED(AF)	(CFS)	DEPTH(FT)	(CFS)	VOLUME(AF)
0.107	0.000	2.53	0.03	0.02	0.027
0.235	0.000	2.54	0.06	0.07	0.053
0.364	0.000	2.55	0.09	0.11	0.079
0.492	0.000	2.56	0.12	0.16	0.104
0.620	0.000	2.57	0.15	0.20	0.129
0.748	0.000	2.58	0.18	0.24	0.154
0.876	0.000	2.58	0.21	0.28	0.178
1.004	0.000	2.60	0.24	0.33	0.202
1.133	0.000	2.60	0.26	0.37	0.226
1.261	0.000	2.62	0.29	0.41	0.249
1.389	0.000	2.62	0.32	0.45	0.272
1.517	0.000	2.64	0.35	0.49	0.295
1.645	0.000	2.64	0.37	0.52	0.318
1.773	0.000	2.66	0.40	0.56	0.340
1.902	0.000	2.67	0.42	0.60	0.362
2.030	0.000	2.68	0.45	0.64	0.383
2.158	0.000	2.69	0.47	0.67	0.405
2.286	0.000	2.70	0.50	0.71	0.426
2.414	0.000	2.71	0.52	0.85	0.446
2.542	0.000	2.72	0.54	1.08	0.463
2.671	0.000	2.73	0.56	1.30	0.478
2.799	0.000	2.75	0.57	1.48	0.492
2.927	0.000	2.76	0.58	1.65	0.503
3.055	0.000	2.77	0.60	1.79	0.514
3.183	0.000	2.78	0.61	1.92	0.523
3.311	0.000	2.80	0.62	2.03	0.531

3.440	0.000	2.80	0.62	2.13	0.538
3.568	0.000	2.82	0.63	2.22	0.545
3.696	0.000	2.83	0.64	2.30	0.550
3.824	0.000	2.85	0.64	2.37	0.555
3.952	0.000	2.86	0.65	2.43	0.560
4.081	0.000	2.87	0.65	2.49	0.564
4.209	0.000	2.88	0.66	2.54	0.568
4.337	0.000	2.90	0.66	2.58	0.571
4.465	0.000	2.91	0.66	2.62	0.574
4.593	0.000	2.93	0.67	2.66	0.577
4.721	0.000	2.94	0.67	2.70	0.580
4.850	0.000	2.96	0.67	2.73	0.582
4.978	0.000	2.97	0.67	2.76	0.584
5.106	0.000	2.99	0.68	2.79	0.586
5.234	0.000	3.00	0.68	2.82	0.588
5.362	0.000	3.02	0.68	2.84	0.590
5.490	0.000	3.03	0.68	2.87	0.592
5.618	0.000	3.06	0.68	2.89	0.594
5.747	0.000	3.07	0.69	2.91	0.595
5.875	0.000	3.09	0.69	2.93	0.597
6.003	0.000	3.10	0.69	2.95	0.599
6.131	0.000	3.12	0.69	2.97	0.600
6.259	0.000	3.14	0.69	2.99	0.602
6.387	0.000	3.16	0.70	3.01	0.603
6.516	0.000	3.17	0.70	3.03	0.605
6.644	0.000	3.20	0.70	3.05	0.606
6.772	0.000	3.21	0.70	3.07	0.608
6.900	0.000	3.24	0.70	3.09	0.609
7.028	0.000	3.25	0.70	3.11	0.611
7.156	0.000	3.28	0.71	3.13	0.612
7.285	0.000	3.29	0.71	3.15	0.614
7.413	0.000	3.32	0.71	3.17	0.615
7.541	0.000	3.34	0.71	3.19	0.617
7.669	0.000	3.36	0.71	3.21	0.619
7.797	0.000	3.38	0.71	3.23	0.620
7.925	0.000	3.41	0.72	3.25	0.622
8.054	0.000	3.43	0.72	3.27	0.623
8.182	0.000	3.46	0.72	3.30	0.625
8.310	0.000	3.48	0.72	3.32	0.627
8.438	0.000	3.51	0.72	3.34	0.629
8.566	0.000	3.53	0.72	3.36	0.630
8.694	0.000	3.56	0.73	3.39	0.632
8.823	0.000	3.58	0.73	3.41	0.634
8.951	0.000	3.62	0.73	3.44	0.636
9.079	0.000	3.64	0.73	3.46	0.638
9.207	0.000	3.68	0.74	3.49	0.640
9.335	0.000	3.70	0.74	3.51	0.642
9.464	0.000	3.74	0.74	3.54	0.644
9.592	0.000	3.76	0.74	3.57	0.646
9.720	0.000	3.81	0.74	3.60	0.648
9.848	0.000	3.83	0.75	3.62	0.651
9.976	0.000	3.88	0.75	3.65	0.653
10.104	0.000	3.90	0.75	3.68	0.655
10.233	0.000	3.95	0.76	3.72	0.658
10.361	0.000	3.98	0.76	3.75	0.660
10.489	0.000	4.03	0.76	3.78	0.663
10.617	0.000	4.06	0.76	3.81	0.665
10.745	0.000	4.11	0.77	3.85	0.668
10.873	0.000	4.14	0.77	3.89	0.671
11.002	0.000	4.20	0.77	3.92	0.674
11.130	0.000	4.24	0.78	3.96	0.677
11.258	0.000	4.30	0.78	4.00	0.680
11.386	0.000	4.34	0.78	4.04	0.683
11.514	0.000	4.41	0.79	4.08	0.687
11.642	0.000	4.44	0.79	4.13	0.690
11.770	0.000	4.52	0.79	4.17	0.694
11.899	0.000	4.56	0.80	4.22	0.697
12.027	0.000	4.64	0.80	4.27	0.701
12.155	0.000	4.12	0.80	4.28	0.699

12.283	0.000	4.08	0.80	4.26	0.697
12.411	0.000	4.13	0.80	4.24	0.696
12.540	0.000	4.23	0.80	4.23	0.696
12.668	0.000	4.29	0.80	4.24	0.697
12.796	0.000	4.40	0.80	4.25	0.698
12.924	0.000	4.46	0.80	4.27	0.700
13.052	0.000	4.59	0.81	4.31	0.703
13.180	0.000	4.66	0.81	4.35	0.707
13.309	0.000	4.81	0.81	4.40	0.711
13.437	0.000	4.89	0.82	4.46	0.716
13.565	0.000	5.06	0.83	4.52	0.722
13.693	0.000	5.16	0.83	4.60	0.727
13.821	0.000	5.36	0.84	4.68	0.735
13.949	0.000	5.47	0.85	4.78	0.742
14.078	0.000	5.40	0.85	4.86	0.748
14.206	0.000	5.09	0.86	4.91	0.749
14.334	0.000	5.38	0.86	4.95	0.754
14.462	0.000	5.54	0.87	5.02	0.759
14.590	0.000	5.90	0.88	5.11	0.768
14.718	0.000	6.11	0.89	5.22	0.777
14.846	0.000	6.59	0.90	5.37	0.790
14.975	0.000	6.87	0.92	5.55	0.804
15.103	0.000	7.55	0.94	5.76	0.823
15.231	0.000	7.96	0.96	6.02	0.844
15.359	0.000	9.01	0.99	6.34	0.872
15.487	0.000	10.35	1.03	6.93	0.908
15.615	0.000	12.46	1.08	7.95	0.956
15.744	0.000	13.92	1.13	9.19	1.006
15.872	0.000	22.19	1.25	11.28	1.122
16.000	0.000	28.24	1.40	14.56	1.267
16.128	0.000	61.52	1.83	21.71	1.688
16.256	0.000	18.69	1.75	26.04	1.610
16.385	0.000	11.37	1.62	23.45	1.482
16.513	0.000	8.44	1.49	20.26	1.357
16.641	0.000	7.19	1.38	17.32	1.250
16.769	0.000	6.34	1.29	14.83	1.160
16.897	0.000	5.71	1.21	12.76	1.085
17.025	0.000	5.23	1.15	11.04	1.024
17.153	0.000	5.58	1.10	9.71	0.980
17.282	0.000	5.25	1.07	8.70	0.944
17.410	0.000	4.98	1.03	7.86	0.913
17.538	0.000	4.74	1.01	7.15	0.887
17.666	0.000	4.53	0.98	6.63	0.865
17.794	0.000	4.34	0.96	6.30	0.845
17.922	0.000	4.18	0.94	6.03	0.825
18.051	0.000	4.03	0.92	5.79	0.806
18.179	0.000	4.60	0.91	5.60	0.796
18.307	0.000	4.48	0.90	5.46	0.785
18.435	0.000	4.37	0.89	5.33	0.775
18.563	0.000	4.27	0.87	5.20	0.765
18.691	0.000	4.17	0.86	5.07	0.756
18.820	0.000	4.09	0.85	4.95	0.747
18.948	0.000	4.00	0.84	4.83	0.738
19.076	0.000	3.93	0.83	4.72	0.730
19.204	0.000	3.85	0.83	4.61	0.722
19.332	0.000	3.79	0.82	4.51	0.714
19.461	0.000	3.72	0.81	4.41	0.706
19.589	0.000	3.66	0.80	4.32	0.699
19.717	0.000	3.60	0.79	4.23	0.693
19.845	0.000	3.55	0.79	4.15	0.686
19.973	0.000	3.49	0.78	4.07	0.680
20.101	0.000	3.44	0.77	3.99	0.675
20.229	0.000	3.40	0.77	3.92	0.669
20.358	0.000	3.35	0.76	3.85	0.664
20.486	0.000	3.31	0.76	3.78	0.659
20.614	0.000	3.26	0.75	3.71	0.654
20.742	0.000	3.22	0.75	3.65	0.650
20.870	0.000	3.19	0.74	3.60	0.645
20.999	0.000	3.15	0.74	3.54	0.641

21.127	0.000	3.11	0.73	3.49	0.637
21.255	0.000	3.08	0.73	3.44	0.633
21.383	0.000	3.04	0.72	3.39	0.630
21.511	0.000	3.01	0.72	3.34	0.626
21.639	0.000	2.98	0.72	3.30	0.623
21.767	0.000	2.95	0.71	3.25	0.619
21.896	0.000	2.92	0.71	3.21	0.616
22.024	0.000	2.89	0.71	3.17	0.613
22.152	0.000	2.87	0.70	3.14	0.611
22.280	0.000	2.84	0.70	3.10	0.608
22.408	0.000	2.81	0.70	3.06	0.605
22.537	0.000	2.79	0.69	3.03	0.603
22.665	0.000	2.76	0.69	3.00	0.600
22.793	0.000	2.74	0.69	2.97	0.598
22.921	0.000	2.72	0.69	2.94	0.595
23.049	0.000	2.69	0.68	2.91	0.593
23.177	0.000	2.67	0.68	2.88	0.591
23.306	0.000	2.65	0.68	2.85	0.589
23.434	0.000	2.63	0.68	2.82	0.587
23.562	0.000	2.61	0.67	2.80	0.585
23.690	0.000	2.59	0.67	2.77	0.583
23.818	0.000	2.57	0.67	2.75	0.581
23.946	0.000	2.55	0.67	2.72	0.579
24.074	0.000	2.53	0.67	2.70	0.578
24.203	0.000	0.00	0.64	2.52	0.551
24.331	0.000	0.00	0.61	2.19	0.528
24.459	0.000	0.00	0.59	1.91	0.508
24.587	0.000	0.00	0.57	1.66	0.490
24.715	0.000	0.00	0.55	1.45	0.475
24.843	0.000	0.00	0.54	1.26	0.461
24.972	0.000	0.00	0.52	1.10	0.450
25.100	0.000	0.00	0.51	0.96	0.439
25.228	0.000	0.00	0.50	0.83	0.431
25.356	0.000	0.00	0.49	0.75	0.423
25.484	0.000	0.00	0.49	0.72	0.415
25.612	0.000	0.00	0.48	0.70	0.408
25.741	0.000	0.00	0.47	0.69	0.400
25.869	0.000	0.00	0.46	0.68	0.393
25.997	0.000	0.00	0.45	0.67	0.386
26.125	0.000	0.00	0.44	0.65	0.379
26.253	0.000	0.00	0.44	0.64	0.372
26.381	0.000	0.00	0.43	0.63	0.366
26.510	0.000	0.00	0.42	0.62	0.359
26.638	0.000	0.00	0.41	0.61	0.353
26.766	0.000	0.00	0.41	0.60	0.346
26.894	0.000	0.00	0.40	0.59	0.340
27.022	0.000	0.00	0.39	0.58	0.334
27.150	0.000	0.00	0.38	0.57	0.328
27.279	0.000	0.00	0.38	0.56	0.322
27.407	0.000	0.00	0.37	0.55	0.316
27.535	0.000	0.00	0.36	0.54	0.311
27.663	0.000	0.00	0.36	0.53	0.305
27.791	0.000	0.00	0.35	0.52	0.300
27.919	0.000	0.00	0.34	0.51	0.294
28.048	0.000	0.00	0.34	0.50	0.289
28.176	0.000	0.00	0.33	0.49	0.284
28.304	0.000	0.00	0.33	0.48	0.279
28.432	0.000	0.00	0.32	0.47	0.274
28.560	0.000	0.00	0.31	0.46	0.269
28.688	0.000	0.00	0.31	0.46	0.264
28.817	0.000	0.00	0.30	0.45	0.259
28.945	0.000	0.00	0.30	0.44	0.255
29.073	0.000	0.00	0.29	0.43	0.250
29.201	0.000	0.00	0.29	0.42	0.246
29.329	0.000	0.00	0.28	0.42	0.241
29.457	0.000	0.00	0.28	0.41	0.237
29.586	0.000	0.00	0.27	0.40	0.233
29.714	0.000	0.00	0.27	0.39	0.228
29.842	0.000	0.00	0.26	0.39	0.224

29.970	0.000	0.00	0.26	0.38	0.220
30.098	0.000	0.00	0.25	0.37	0.216
30.226	0.000	0.00	0.25	0.37	0.212
30.355	0.000	0.00	0.24	0.36	0.209
30.483	0.000	0.00	0.24	0.35	0.205
30.611	0.000	0.00	0.24	0.35	0.201
30.739	0.000	0.00	0.23	0.34	0.198
30.867	0.000	0.00	0.23	0.33	0.194
30.995	0.000	0.00	0.22	0.33	0.191
31.124	0.000	0.00	0.22	0.32	0.187
31.252	0.000	0.00	0.22	0.32	0.184
31.380	0.000	0.00	0.21	0.31	0.180
31.508	0.000	0.00	0.21	0.31	0.177
31.636	0.000	0.00	0.20	0.30	0.174
31.764	0.000	0.00	0.20	0.29	0.171
31.893	0.000	0.00	0.20	0.29	0.168
32.021	0.000	0.00	0.19	0.28	0.165
32.149	0.000	0.00	0.19	0.28	0.162
32.277	0.000	0.00	0.19	0.27	0.159
32.405	0.000	0.00	0.18	0.27	0.156
32.533	0.000	0.00	0.18	0.26	0.153
32.662	0.000	0.00	0.18	0.26	0.151
32.790	0.000	0.00	0.17	0.26	0.148
32.918	0.000	0.00	0.17	0.25	0.145
33.046	0.000	0.00	0.17	0.25	0.143
33.174	0.000	0.00	0.16	0.24	0.140
33.302	0.000	0.00	0.16	0.24	0.138
33.431	0.000	0.00	0.16	0.23	0.135
33.559	0.000	0.00	0.16	0.23	0.133
33.687	0.000	0.00	0.15	0.22	0.130
33.815	0.000	0.00	0.15	0.22	0.128
33.943	0.000	0.00	0.15	0.22	0.126
34.071	0.000	0.00	0.14	0.21	0.123
34.200	0.000	0.00	0.14	0.21	0.121
34.328	0.000	0.00	0.14	0.21	0.119
34.456	0.000	0.00	0.14	0.20	0.117
34.584	0.000	0.00	0.13	0.20	0.115
34.712	0.000	0.00	0.13	0.19	0.113
34.840	0.000	0.00	0.13	0.19	0.111
34.969	0.000	0.00	0.13	0.19	0.109
35.097	0.000	0.00	0.12	0.18	0.107
35.225	0.000	0.00	0.12	0.18	0.105
35.353	0.000	0.00	0.12	0.18	0.103
35.481	0.000	0.00	0.12	0.17	0.101
35.609	0.000	0.00	0.12	0.17	0.099
35.738	0.000	0.00	0.11	0.17	0.098
35.866	0.000	0.00	0.11	0.17	0.096
35.994	0.000	0.00	0.11	0.16	0.094
36.122	0.000	0.00	0.11	0.16	0.092
36.250	0.000	0.00	0.11	0.16	0.091
36.378	0.000	0.00	0.10	0.15	0.089
36.507	0.000	0.00	0.10	0.15	0.087
36.635	0.000	0.00	0.10	0.15	0.086
36.763	0.000	0.00	0.10	0.15	0.084
36.891	0.000	0.00	0.10	0.14	0.083
37.019	0.000	0.00	0.10	0.14	0.081
37.147	0.000	0.00	0.09	0.14	0.080
37.276	0.000	0.00	0.09	0.14	0.078
37.404	0.000	0.00	0.09	0.13	0.077
37.532	0.000	0.00	0.09	0.13	0.076
37.660	0.000	0.00	0.09	0.13	0.074
37.788	0.000	0.00	0.09	0.13	0.073
37.916	0.000	0.00	0.08	0.12	0.072
38.045	0.000	0.00	0.08	0.12	0.070
38.173	0.000	0.00	0.08	0.12	0.069
38.301	0.000	0.00	0.08	0.12	0.068
38.429	0.000	0.00	0.08	0.12	0.067
38.557	0.000	0.00	0.08	0.11	0.065
38.685	0.000	0.00	0.08	0.11	0.064

38.814	0.000	0.00	0.07	0.11	0.063
38.942	0.000	0.00	0.07	0.11	0.062
39.070	0.000	0.00	0.07	0.11	0.061
39.198	0.000	0.00	0.07	0.10	0.060
39.326	0.000	0.00	0.07	0.10	0.059
39.454	0.000	0.00	0.07	0.10	0.058
39.583	0.000	0.00	0.07	0.10	0.057
39.711	0.000	0.00	0.07	0.10	0.056
39.839	0.000	0.00	0.06	0.09	0.055
39.967	0.000	0.00	0.06	0.09	0.054
40.095	0.000	0.00	0.06	0.09	0.053
40.223	0.000	0.00	0.06	0.09	0.052
40.352	0.000	0.00	0.06	0.09	0.051
40.480	0.000	0.00	0.06	0.09	0.050
40.608	0.000	0.00	0.06	0.08	0.049
40.736	0.000	0.00	0.06	0.08	0.048
40.864	0.000	0.00	0.06	0.08	0.047
40.992	0.000	0.00	0.05	0.08	0.046
41.121	0.000	0.00	0.05	0.08	0.046
41.249	0.000	0.00	0.05	0.08	0.045
41.377	0.000	0.00	0.05	0.08	0.044
41.505	0.000	0.00	0.05	0.07	0.043
41.633	0.000	0.00	0.05	0.07	0.042
41.761	0.000	0.00	0.05	0.07	0.042
41.890	0.000	0.00	0.05	0.07	0.041
42.018	0.000	0.00	0.05	0.07	0.040
42.146	0.000	0.00	0.05	0.07	0.039
42.274	0.000	0.00	0.05	0.07	0.039
42.402	0.000	0.00	0.04	0.07	0.038
42.530	0.000	0.00	0.04	0.06	0.037
42.659	0.000	0.00	0.04	0.06	0.037
42.787	0.000	0.00	0.04	0.06	0.036
42.915	0.000	0.00	0.04	0.06	0.035
43.043	0.000	0.00	0.04	0.06	0.035
43.171	0.000	0.00	0.04	0.06	0.034
43.299	0.000	0.00	0.04	0.06	0.034
43.428	0.000	0.00	0.04	0.06	0.033
43.556	0.000	0.00	0.04	0.06	0.032
43.684	0.000	0.00	0.04	0.05	0.032
43.812	0.000	0.00	0.04	0.05	0.031
43.940	0.000	0.00	0.04	0.05	0.031
44.068	0.000	0.00	0.04	0.05	0.030
44.197	0.000	0.00	0.03	0.05	0.030
44.325	0.000	0.00	0.03	0.05	0.029
44.453	0.000	0.00	0.03	0.05	0.028
44.581	0.000	0.00	0.03	0.05	0.028
44.709	0.000	0.00	0.03	0.05	0.027
44.837	0.000	0.00	0.03	0.05	0.027
44.966	0.000	0.00	0.03	0.05	0.026
45.094	0.000	0.00	0.03	0.04	0.026
45.222	0.000	0.00	0.03	0.04	0.026
45.350	0.000	0.00	0.03	0.04	0.025
45.478	0.000	0.00	0.03	0.04	0.025
45.606	0.000	0.00	0.03	0.04	0.024
45.735	0.000	0.00	0.03	0.04	0.024
45.863	0.000	0.00	0.03	0.04	0.023
45.991	0.000	0.00	0.03	0.04	0.023
46.119	0.000	0.00	0.03	0.04	0.023
46.247	0.000	0.00	0.03	0.04	0.022
46.375	0.000	0.00	0.03	0.04	0.022
46.504	0.000	0.00	0.02	0.04	0.021
46.632	0.000	0.00	0.02	0.04	0.021
46.760	0.000	0.00	0.02	0.04	0.021
46.888	0.000	0.00	0.02	0.03	0.020
47.016	0.000	0.00	0.02	0.03	0.020
47.144	0.000	0.00	0.02	0.03	0.019
47.273	0.000	0.00	0.02	0.03	0.019
47.401	0.000	0.00	0.02	0.03	0.019
47.529	0.000	0.00	0.02	0.03	0.018

47.657	0.000	0.00	0.02	0.03	0.018
47.785	0.000	0.00	0.02	0.03	0.018
47.913	0.000	0.00	0.02	0.03	0.017
48.042	0.000	0.00	0.02	0.03	0.017
48.170	0.000	0.00	0.02	0.03	0.017
48.298	0.000	0.00	0.02	0.03	0.017
48.426	0.000	0.00	0.02	0.03	0.016
48.554	0.000	0.00	0.02	0.03	0.016
48.682	0.000	0.00	0.02	0.03	0.016
48.811	0.000	0.00	0.02	0.03	0.015
48.939	0.000	0.00	0.02	0.03	0.015
49.067	0.000	0.00	0.02	0.03	0.015
49.195	0.000	0.00	0.02	0.03	0.015
49.323	0.000	0.00	0.02	0.02	0.014
49.451	0.000	0.00	0.02	0.02	0.014
49.580	0.000	0.00	0.02	0.02	0.014
49.708	0.000	0.00	0.02	0.02	0.014
49.836	0.000	0.00	0.02	0.02	0.013
49.964	0.000	0.00	0.02	0.02	0.013
50.092	0.000	0.00	0.02	0.02	0.013
50.220	0.000	0.00	0.01	0.02	0.013
50.349	0.000	0.00	0.01	0.02	0.012
50.477	0.000	0.00	0.01	0.02	0.012
50.605	0.000	0.00	0.01	0.02	0.012
50.733	0.000	0.00	0.01	0.02	0.012
50.861	0.000	0.00	0.01	0.02	0.012
50.989	0.000	0.00	0.01	0.02	0.011
51.118	0.000	0.00	0.01	0.02	0.011
51.246	0.000	0.00	0.01	0.02	0.011
51.374	0.000	0.00	0.01	0.02	0.011
51.502	0.000	0.00	0.01	0.02	0.011
51.630	0.000	0.00	0.01	0.02	0.010
51.758	0.000	0.00	0.01	0.02	0.010
51.887	0.000	0.00	0.01	0.02	0.010
52.015	0.000	0.00	0.01	0.02	0.010
52.143	0.000	0.00	0.01	0.02	0.010
52.271	0.000	0.00	0.01	0.02	0.009
52.399	0.000	0.00	0.01	0.02	0.009
52.527	0.000	0.00	0.01	0.02	0.009
52.656	0.000	0.00	0.01	0.02	0.009
52.784	0.000	0.00	0.01	0.02	0.009
52.912	0.000	0.00	0.01	0.01	0.009
53.040	0.000	0.00	0.01	0.01	0.008
53.168	0.000	0.00	0.01	0.01	0.008
53.296	0.000	0.00	0.01	0.01	0.008
53.425	0.000	0.00	0.01	0.01	0.008
53.553	0.000	0.00	0.01	0.01	0.008
53.681	0.000	0.00	0.01	0.01	0.008
53.809	0.000	0.00	0.01	0.01	0.008
53.937	0.000	0.00	0.01	0.01	0.007
54.065	0.000	0.00	0.01	0.01	0.007
54.194	0.000	0.00	0.01	0.01	0.007
54.322	0.000	0.00	0.01	0.01	0.007
54.450	0.000	0.00	0.01	0.01	0.007
54.578	0.000	0.00	0.01	0.01	0.007
54.706	0.000	0.00	0.01	0.01	0.007
54.834	0.000	0.00	0.01	0.01	0.007
54.963	0.000	0.00	0.01	0.01	0.006
55.091	0.000	0.00	0.01	0.01	0.006
55.219	0.000	0.00	0.01	0.01	0.006
55.347	0.000	0.00	0.01	0.01	0.006
55.475	0.000	0.00	0.01	0.01	0.006
55.603	0.000	0.00	0.01	0.01	0.006
55.732	0.000	0.00	0.01	0.01	0.006
55.860	0.000	0.00	0.01	0.01	0.006
55.988	0.000	0.00	0.01	0.01	0.006
56.116	0.000	0.00	0.01	0.01	0.005
56.244	0.000	0.00	0.01	0.01	0.005
56.372	0.000	0.00	0.01	0.01	0.005

56.501	0.000	0.00	0.01	0.01	0.005
56.629	0.000	0.00	0.01	0.01	0.005
56.757	0.000	0.00	0.01	0.01	0.005
56.885	0.000	0.00	0.01	0.01	0.005
57.013	0.000	0.00	0.01	0.01	0.005
57.141	0.000	0.00	0.01	0.01	0.005
57.270	0.000	0.00	0.01	0.01	0.005
57.398	0.000	0.00	0.01	0.01	0.005
57.526	0.000	0.00	0.01	0.01	0.004
57.654	0.000	0.00	0.01	0.01	0.004
57.782	0.000	0.00	0.01	0.01	0.004
57.910	0.000	0.00	0.00	0.01	0.004
58.039	0.000	0.00	0.00	0.01	0.004
58.167	0.000	0.00	0.00	0.01	0.004
58.295	0.000	0.00	0.00	0.01	0.004
58.423	0.000	0.00	0.00	0.01	0.004
58.551	0.000	0.00	0.00	0.01	0.004
58.679	0.000	0.00	0.00	0.01	0.004
58.808	0.000	0.00	0.00	0.01	0.004
58.936	0.000	0.00	0.00	0.01	0.004
59.064	0.000	0.00	0.00	0.01	0.004
59.192	0.000	0.00	0.00	0.01	0.004
59.320	0.000	0.00	0.00	0.01	0.003
59.448	0.000	0.00	0.00	0.01	0.003
59.577	0.000	0.00	0.00	0.01	0.003
59.705	0.000	0.00	0.00	0.01	0.003
59.833	0.000	0.00	0.00	0.01	0.003
59.961	0.000	0.00	0.00	0.01	0.003
60.089	0.000	0.00	0.00	0.01	0.003
60.217	0.000	0.00	0.00	0.01	0.003
60.346	0.000	0.00	0.00	0.01	0.003
60.474	0.000	0.00	0.00	0.01	0.003
60.602	0.000	0.00	0.00	0.01	0.003
60.730	0.000	0.00	0.00	0.00	0.003
60.858	0.000	0.00	0.00	0.00	0.003
60.986	0.000	0.00	0.00	0.00	0.003
61.115	0.000	0.00	0.00	0.00	0.003
61.243	0.000	0.00	0.00	0.00	0.003
61.371	0.000	0.00	0.00	0.00	0.003
61.499	0.000	0.00	0.00	0.00	0.003
61.627	0.000	0.00	0.00	0.00	0.003
61.755	0.000	0.00	0.00	0.00	0.002
61.884	0.000	0.00	0.00	0.00	0.002
62.012	0.000	0.00	0.00	0.00	0.002
62.140	0.000	0.00	0.00	0.00	0.002
62.268	0.000	0.00	0.00	0.00	0.002
62.396	0.000	0.00	0.00	0.00	0.002
62.524	0.000	0.00	0.00	0.00	0.002
62.653	0.000	0.00	0.00	0.00	0.002
62.781	0.000	0.00	0.00	0.00	0.002
62.909	0.000	0.00	0.00	0.00	0.002
63.037	0.000	0.00	0.00	0.00	0.002
63.165	0.000	0.00	0.00	0.00	0.002
63.293	0.000	0.00	0.00	0.00	0.002
63.422	0.000	0.00	0.00	0.00	0.002
63.550	0.000	0.00	0.00	0.00	0.002
63.678	0.000	0.00	0.00	0.00	0.002
63.806	0.000	0.00	0.00	0.00	0.002
63.934	0.000	0.00	0.00	0.00	0.002
64.062	0.000	0.00	0.00	0.00	0.002
64.191	0.000	0.00	0.00	0.00	0.002
64.319	0.000	0.00	0.00	0.00	0.002
64.447	0.000	0.00	0.00	0.00	0.002
64.575	0.000	0.00	0.00	0.00	0.002
64.703	0.000	0.00	0.00	0.00	0.002
64.831	0.000	0.00	0.00	0.00	0.002
64.960	0.000	0.00	0.00	0.00	0.002
65.088	0.000	0.00	0.00	0.00	0.002
65.216	0.000	0.00	0.00	0.00	0.002

65.344	0.000	0.00	0.00	0.00	0.001
65.472	0.000	0.00	0.00	0.00	0.001
65.600	0.000	0.00	0.00	0.00	0.001
65.729	0.000	0.00	0.00	0.00	0.001
65.857	0.000	0.00	0.00	0.00	0.001
65.985	0.000	0.00	0.00	0.00	0.001
66.113	0.000	0.00	0.00	0.00	0.001
66.241	0.000	0.00	0.00	0.00	0.001
66.369	0.000	0.00	0.00	0.00	0.001
66.498	0.000	0.00	0.00	0.00	0.001
66.626	0.000	0.00	0.00	0.00	0.001
66.754	0.000	0.00	0.00	0.00	0.001
66.882	0.000	0.00	0.00	0.00	0.001
67.010	0.000	0.00	0.00	0.00	0.001
67.138	0.000	0.00	0.00	0.00	0.001
67.267	0.000	0.00	0.00	0.00	0.001
67.395	0.000	0.00	0.00	0.00	0.001
67.523	0.000	0.00	0.00	0.00	0.001
67.651	0.000	0.00	0.00	0.00	0.001
67.779	0.000	0.00	0.00	0.00	0.001
67.907	0.000	0.00	0.00	0.00	0.001
68.036	0.000	0.00	0.00	0.00	0.001
68.164	0.000	0.00	0.00	0.00	0.001

Appendix K

Hydraulic Analysis

(To be prepared in final engineering analysis)