HYDROLOGY REPORT

for

PALMDALE LOGISTICS PARK

South of West Avenue M,
West of Division Street,
City of Palmdale, CA

Prepared For:

Covington Development Partners, LLC
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Prepared By:

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Professional Engineer License No. 91029

Prepared: September 2023
Langan Project No. 722010501

LANGAN

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1. INTRODUCTION

The purpose of this Hydrology Report is to analyze the existing and proposed surface-water hydrology and identify impacts that are associated with the proposed development. This report provides analysis for designing the proposed on-site and off-site drainage systems and on-site proposed infiltration basins.

According to the analysis, the proposed development will not create and additional impacts to the downstream storm drain infrastructure. Furthermore, the proposed development will be protected against flooding in a 50-year, 24-hour storm event.

2. PROJECT DESCRIPTION

2.1. Existing Site Description

The project site is approximately 71.34 acres and is located in the City of Palmdale, County of Los Angeles, California. The site is bounded to the north by Avenue M, to the east by Division Street, to the west by Amargosa Creek, and to the south by an undeveloped lot. The site is currently undeveloped with open bush, buckwheat, and trees. See Figure 1 for the site vicinity map.

The existing drainage pattern generally drains from south to north and splits into 2 separate drainage areas. Stormwater runoff from Area A drains to the northeast corner of the site and discharges to Avenue M. This runoff flows east along Avenue M and discharges into an existing catch basin at the southwest corner of Sierra Highway and Avenue M. This existing catch basin conveys stormwater east and into an existing M-RR Basin, per the City of Palmdale Master Drainage Plan. The M-RR Basin is located southeast of the intersection of Avenue M and the existing railroad east of Sierra Highway. See Figure 3 for the Pre-Development Hydrology Map.

Stormwater runoff from Area B drains to the northwest corner of the site and discharges directly into the Amargosa Creek. The site also accepts offsite stormwater runoff from a ±140-acre undeveloped lot to the south of the site and north of Avenue N.

Based on site observations and available public information, there are no existing public storm drain facilities along the perimeter of the project site.

2.2. Proposed Site Description

The proposed development is two separate industrial sites. The western site is 38.41 acres and will consist of a 716,930 square foot industrial warehouse with auto parking and trailer parking spaces. The eastern site is 32.93 acres and will consist of a 703,140 square foot industrial warehouse with auto parking and trailer parking spaces. Truck docking areas will be located along the north and south of both buildings. The project site will dedicate right-of-way for Avenue M, Division Street, proposed public street A, and proposed public street B. According to the City of

Palmdale's zoning map, the project site is designated as General Industrial (M2). See Figure 2 for the proposed site plan.

Off-site roadway improvements are proposed as part of this project development. Half-width improvements are proposed on Avenue M, Division Street and proposed public street A. Full-width improvements are proposed on public street B and will divide the 2 proposed industrial parcels.

The proposed on-site stormwater system will capture runoff and store it on-site in aboveground infiltration basins. The on-site basins will be sized to mitigate the increased runoff and fully retain the 50-yr storm event. The off-site runoff captured along the new public streets will gutter flow to the northeast of the site and drain into the proposed catch basin located at the southwest corner of the intersection of Division St and Avenue M. This catch basin will discharge into the proposed 36-inch storm drain in Division Street. This stormwater runoff will ultimately discharge to the M-RR Basin shown in the City of Palmdale Master Plan of Drainage for the Anaverde Watershed (See Appendix D). However, due to lack of existing storm drain infrastructure, the project currently proposes that the 36-inch storm drain discharges into the existing catch basin directly north of the intersection of Division St and Avenue M as an interim condition until the City builds the proposed master planned storm drain facilities adjacent to the project frontage.

A temporary drainage channel is proposed along the south edge of the half-width proposed public street A. This drainage channel will capture off-site runoff from the undeveloped lot to the south, convey flow to the east, inlet into a proposed catch basin, and discharge into the proposed 36-inch storm drain in Division Street. The temporary drainage channel will be removed when the southern half of proposed public street A gets developed in the future.

3. PROJECT ANALYSIS

3.1. Methodology

The hydrology analysis was performed using the Los Angeles County Hydrology Manual for the 50-year storm event. The Modified Rational (MODRAT) method was used to calculate the stormwater runoff for the pre- and post-development conditions. The LA County HydroCalc software was used to compute all MODRAT calculations for the project.

The 50-year, 24-hour rainfall depth is 3.10 inches per the LA County Hydrology Map shown in Appendix A. The soil type for this project is classified as Type 124 per the LA County Hydrology Map shown in Appendix B.

3.2. Hydrology Results & Analysis

The tables below provide a summary of the peak flow rates and runoff volumes for the 50-year storm event for pre- and post-development conditions. See Appendices E and F for the HydroCalc calculations for each sub-area.

Table 3.2.1 Pre-Development Hydrology Summary - 50-Year				
Drainage Area ID	**Area (acres)**	**Peak Flow Rate (cfs)**	**Runoff Volume (cf)**	**Discharge Point**
A (On-site)	64.22	10.29	77,404	Existing Catch Basin (SW Corner of Avenue M and Sierra Highway)
A (Off-site)	125.38	20.09	151,120	
A (Total)	**189.59**	**30.39**	**228,524**	
B (On-site)	17.53	2.81	21,129	Amargosa Creek
B (Off-site)	14.55	2.33	17,537	
B (Total)	**32.08**	**5.14**	**38,666**	

Table 3.2.2 Post-Development Hydrology Summary - 50-Year				
Drainage Area ID	**Area (acres)**	**Peak Flow Rate (cfs)**	**Runoff Volume (cf)**	**Basin Designation / Discharge Point**
A	17.28	14.58	155,599	Basin A
B	16.51	10.80	144,725	Basin B
C	16.69	13.92	144,397	Basin C
D	16.24	10.55	142,580	Basin D
E	149.49	28.61	255,290	Proposed Catch Basin (SW Corner of Avenue M and Division St)
F	5.46	1.17	13,335	Amargosa Creek

Based on the 50-year storm event hydrologic analysis, the proposed project site will result in an increased flow rate and runoff volume due to an increase in impervious area for the project development. In order to mitigate this increase in flow rate and volume, the project proposes aboveground infiltration basins to fully retain and infiltrate the on-site runoff for the 50-year storm. Therefore, the proposed project site will not discharge any stormwater off the property for the 50-year storm. See Figure 4 for the post-development hydrology map.

Off-site street runoff (proposed Area E1) and off-site runoff from the undeveloped southern lot (proposed Area E2) will discharge into the proposed 36-inch storm drain in Division Street. This 36-inch is identified as a local facility in the City of Palmdale Master Plan on Drainage (MPD). The MPD shows this 36-inch storm drain discharging into a 60-inch regional facility in Avenue M. This 60-inch facility does not appear to be constructed. Therefore, due to lack of existing storm drain infrastructure, the project currently proposes that the 36-inch storm drain discharges into the existing catch basin directly north of the intersection of Division St and Avenue M as an interim condition until the City builds the proposed master planned storm drain facilities adjacent to the project frontage.

3.3. Basin Analysis

An infiltration report was prepared by Southern California Geotechnical dated August 23, 2022 (See Appendix J). Based on the report, the design infiltration rates at the basins range from 1.7 to 2.2 inches/hour which exceed the LA County minimum of 0.3 inches/hour for infiltration. Therefore, the project proposes a total of 4 aboveground infiltration basins, 2 for each parcel. Each basin was sized to fully retain the 50-year storm for each respective drainage area. In

addition, the basin depth was sized for a maximum drawdown of 72 hours per City of Palmdale design standards. See Table 3.3.1 for the infiltration basin analysis summary. Refer to Appendix G for all basin sizing calculations.

Table 3.3.1 Infiltration Basin Analysis Summary

Drainage Area ID	50-Year Runoff Volume (cf)	Basin Volume Provided (cf)	Basin Bottom Area (sf)	Basin Depth (ft)	Infiltration Rate (in/hr)	Drawdown Time (hours)	Basin Designation
A	155,882	189,429	15,319	6.0	1.7	42.4	Basin A
B	148,839	158,014	12,610	7.0	1.7	49.4	Basin B
C	144,397	169,568	12,547	6.0	1.7	42.4	Basin C
D	142,580	147,289	12,369	8.0	1.7	56.5	Basin D

3.4. Hydraulics Analysis

Preliminary hydraulic calculations were performed using the Hydraflow Express software in Autodesk Civil 3D. This analysis determined whether the proposed pipe sizes will be adequate to support the on-site drainage system during a 50-year storm event. The preliminary storm pipes discharging into the basins were sized to full flow capacity with a minimum slope of 0.50% and a roughness coefficient of 0.012 for HDPE pipes. In the final design, a hydraulic analysis of the off-site streets will be provided to ensure that the 10-year runoff is contained curb to curb, and the 25-year runoff is contained within the right-of-way.

The proposed 36-inch storm drain in Division Street is sized per the City of Palmdale Master Plan of Drainage. Per node 268D in the MPD, the 36-inch storm drain is allowed up to 41 cfs for the 10-year storm. The off-site runoff in the post-development condition will discharge 19.8 cfs into the 36-inch storm drain for the 10-year storm. Refer to Appendix H for preliminary hydraulic calculations.

4. CONCLUSION

The proposed development will not contribute runoff that would exceed the capacity of the existing downstream storm drain facilities. Furthermore, the proposed on-site infiltration basins will be designed to mitigate the increased flow rate and fully capture the runoff volume for a 50-year storm event. Once construction is complete, there will not be any substantial increase in flood boundaries, levels, or frequencies in any areas outside of the development.

5. REFERENCES

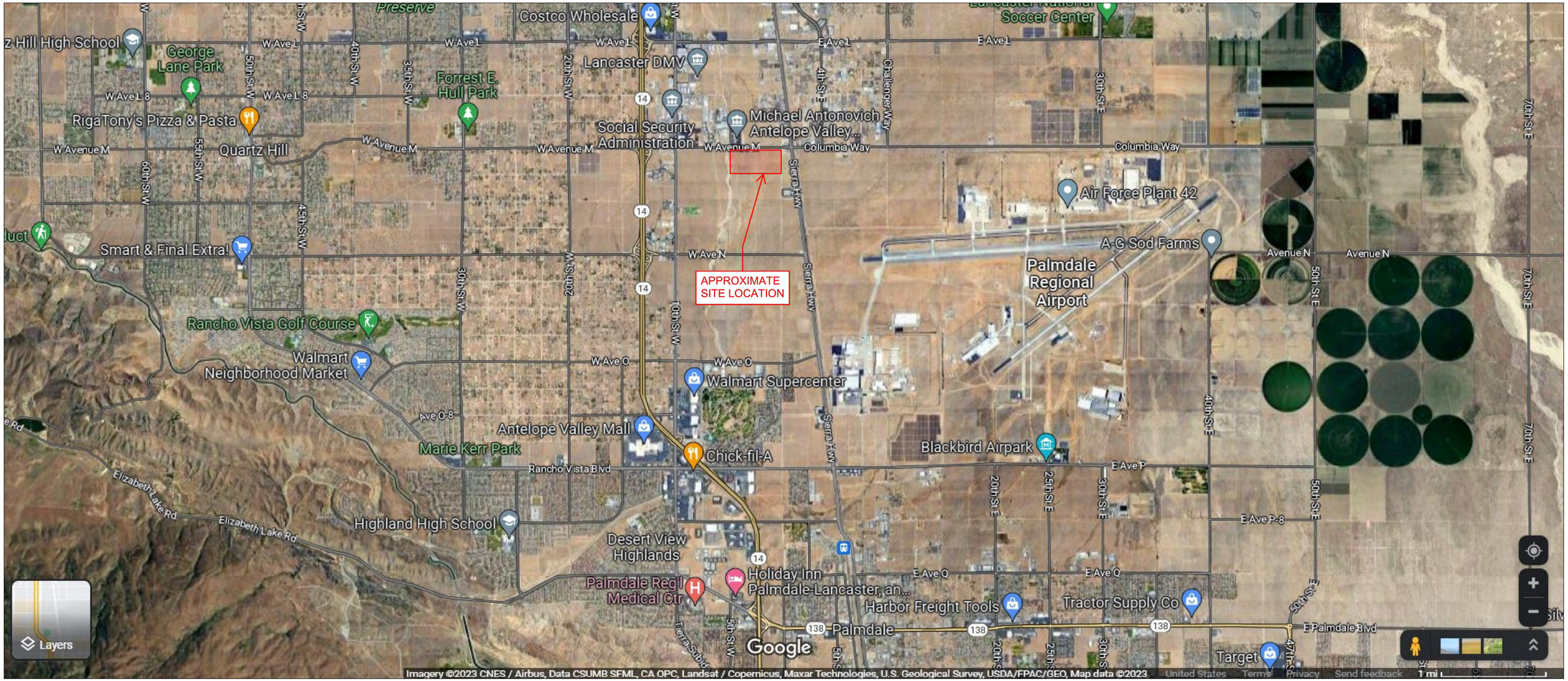
1. Los Angeles County Department of Public Works Hydrology Manual, January 2006

2. Los Angeles County Flood Control Design Manual, 1982

3. City of Palmdale Master Plan of Drainage, August 1996

4. City of Palmdale Master Plan of Drainage Anaverde Watershed Facility Map, January 19

FIGURES



Date	Description	No.
Revisions		

Signature Date

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Project
PALMDALE LOGISTICS PARK
CITY OF PALMDALE
LOS ANGELES COUNTY CALIFORNIA

Drawing Title
SITE VICNITY MAP

Project No.	722010501
Date	03/28/2023
Drawn By	DMB
Checked By	MRG

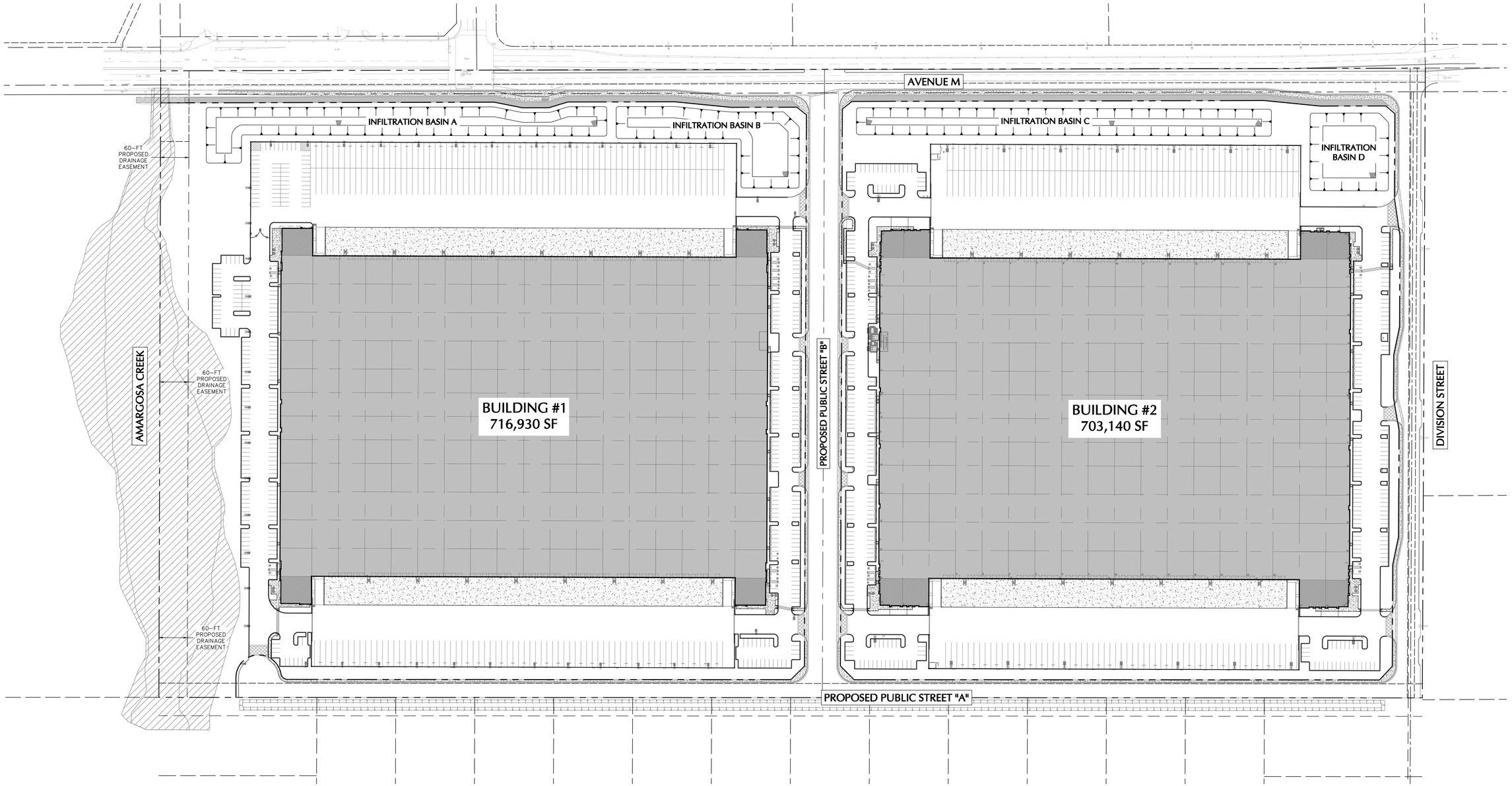
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Sheet 1 of 1

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Date	Description	No.
Revisions		

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Project
PALMDALE LOGISTICS PARK
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LOS ANGELES COUNTY CALIFORNIA

Drawing Title
PROPOSED SITE PLAN

Project No.	722010501
Date	09/08/2023
Drawn By	DMB
Checked By	MRG

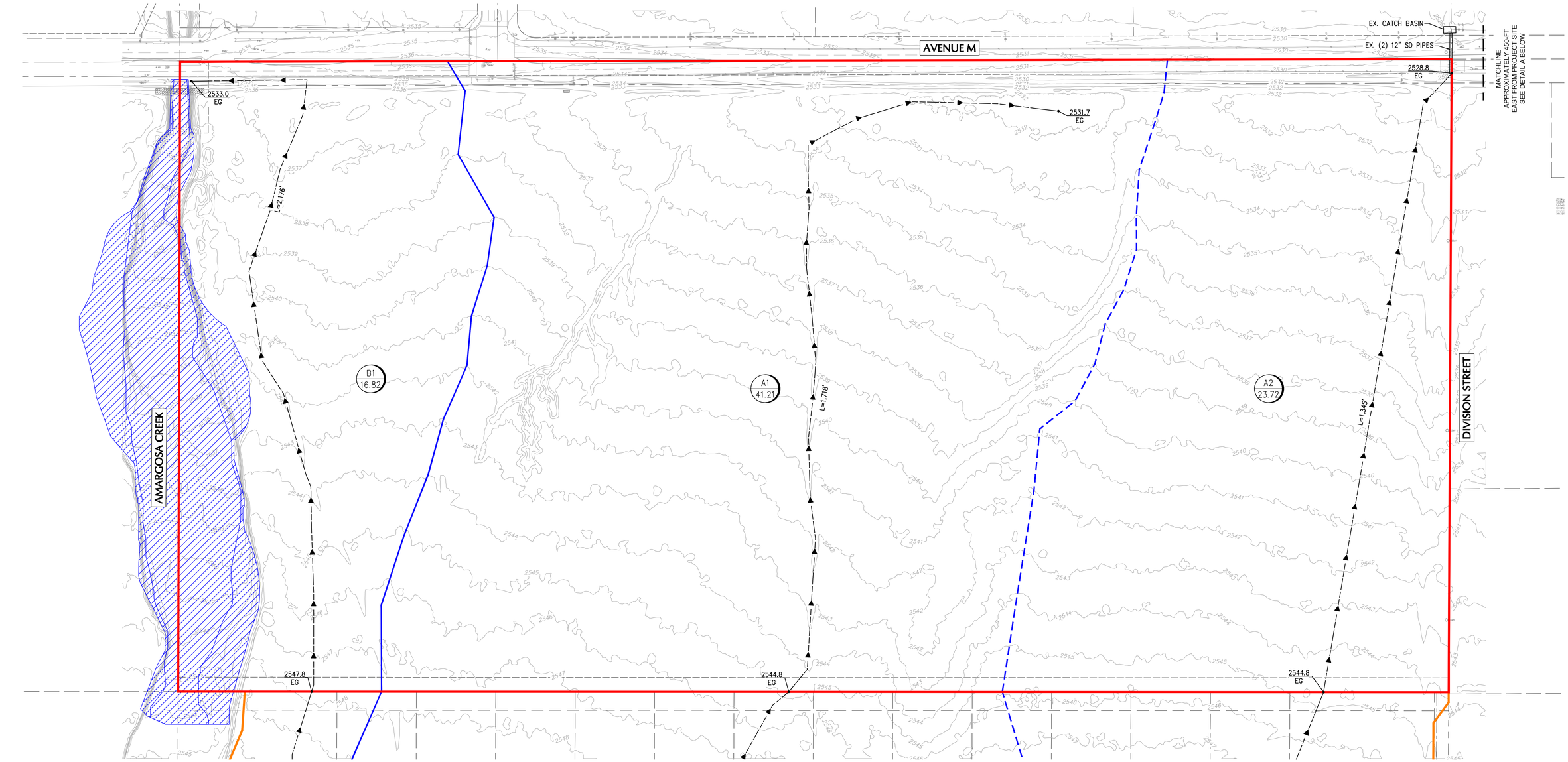
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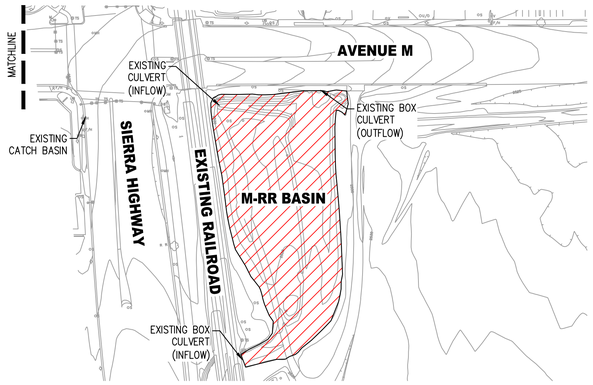
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LANGAN Project No. 722010501





DETAIL A
SCALE: 1"=100'

Pre-Development Hydrology Summary Table				
Drainage Area ID	Drainage Area (acres)	Impervious Ratio	50-Year Peak Flow (cfs)	50-Year Runoff Volume (cf)
A1	41.21	0.0	6.60	49,670
A2	23.72	0.0	3.80	28,590
A1 (Offsite)	98.37	0.0	15.77	118,565
A2 (Offsite)	38.94	0.0	6.24	46,934
Total A	**202.24**	**--**	**32.41**	**243,759**
B1	16.82	0.0	2.70	20,273
B1 (Offsite)	2.61	0.0	0.42	3,146
Total B	**19.43**	**--**	**3.11**	**23,419**

GENERAL NOTES

1. SEE PRELIMINARY HYDROLOGY REPORT, PREPARED BY LANGAN, FOR COMPLETE POST-DEVELOPMENT HYDROLOGY CALCULATIONS.
2. CALCULATIONS WERE BASED ON THE REQUIREMENTS ON THE LOS ANGELES COUNTY HYDROLOGY MANUAL FOR THE 50-YEAR STORM EVENT.
3. ALL EXISTING ELEVATIONS AND INVERT ELEVATIONS ARE APPROXIMATE.

PROJECT SITE SUMMARY

SITE AREA (GROSS):	81.75 ACRES
SITE AREA (NET):	71.33 ACRES
IMPERVIOUS COVERAGE:	0% (PRE-DEVELOPMENT)
SOIL GROUP:	124
ISOHYETALS:	3.10 INCHES (50-YEAR, 24-HOUR)
FREQUENCY:	50-YEAR (FOR STORM DRAIN DESIGN)
METHOD:	LOS ANGELES COUNTY HYDROLOGY MANUAL

LEGEND

- PROJECT AREA BOUNDARY
- OFF-SITE TRIBUTARY AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- DRAINAGE SUB-AREA BOUNDARY
- FLOW PATH
- DRAINAGE SUB-AREA ID
- ID / AREA — DRAINAGE SUB-AREA (ACRE)
- AMARGOSA CREEK FLOODPLAIN
- M-RR APPROXIMATE BASIN AREA

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SCALE: 1 INCH = 100 FEET

Date	Description	No.
Revisions		

Signature Date

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Project
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Drawing Title
PRE-DEVELOPMENT HYDROLOGY MAP

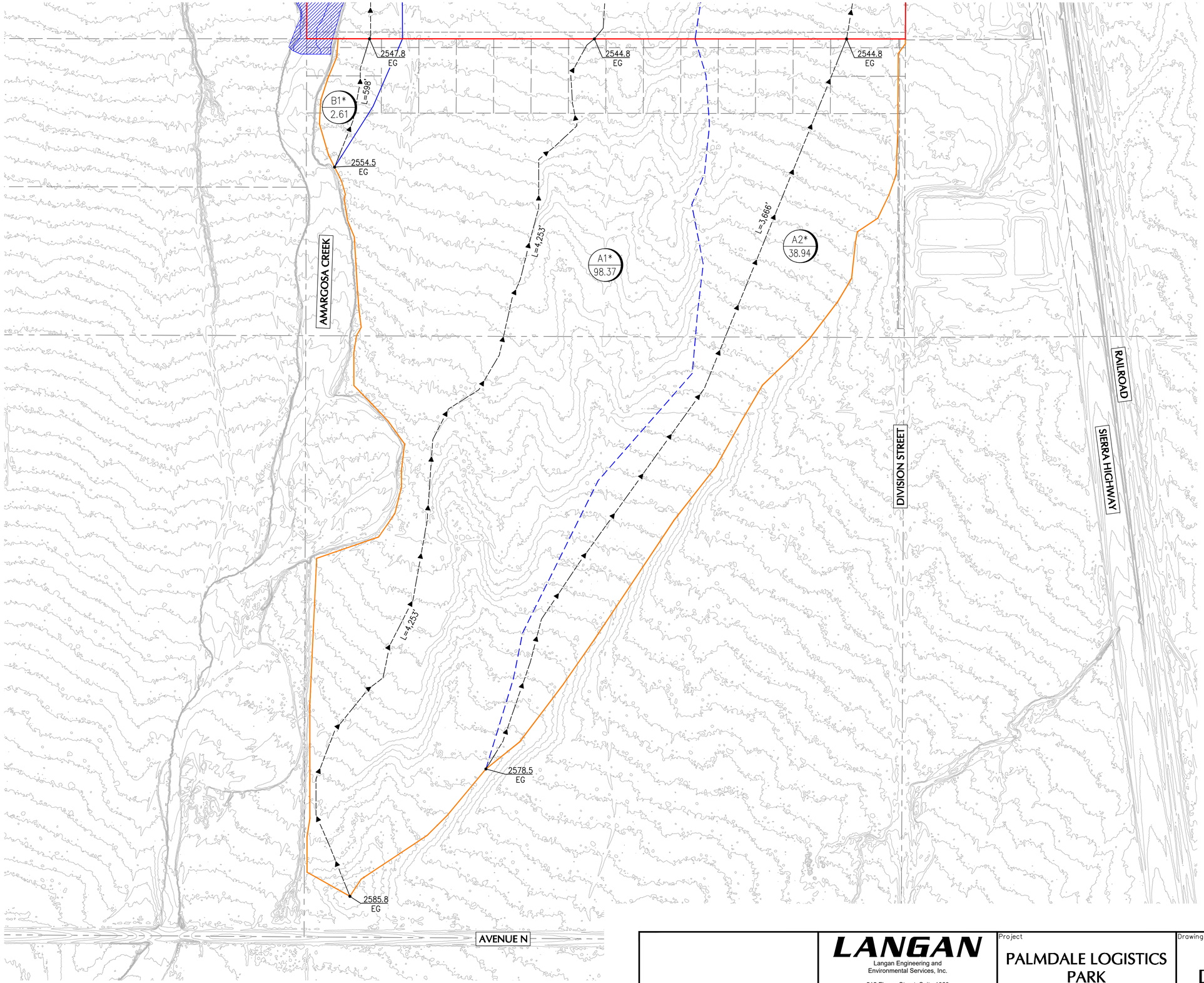
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Checked By	MRG

Figure No. 3
Sheet 1 of 2

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LANGAN Project No. 722010501



LEGEND

- PROJECT AREA BOUNDARY
- OFF-SITE TRIBUTARY AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- DRAINAGE SUB-AREA BOUNDARY
- FLOW PATH
- DRAINAGE SUB-AREA ID
- ID / AREA — DRAINAGE SUB-AREA (ACRE)
- AMARGOSA CREEK FLOODPLAIN
- M-RR APPROXIMATE BASIN AREA

GENERAL NOTES

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SOIL GROUP:	124
ISOHYETALS:	3.10 INCHES (50-YEAR, 24-HOUR)
FREQUENCY:	50-YEAR (FOR STORM DRAIN DESIGN)
METHOD:	LOS ANGELES COUNTY HYDROLOGY MANUAL

Pre-Development Hydrology Summary Table

Drainage Area ID	Drainage Area (acres)	Impervious Ratio	50-Year Peak Flow (cfs)	50-Year Runoff Volume (cf)
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A2	23.72	0.0	3.80	28,590
A1 (Offsite)	98.37	0.0	15.77	118,565
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Total A	**202.24**	**--**	**32.41**	**243,759**
B1	16.82	0.0	2.70	20,273
B1 (Offsite)	2.61	0.0	0.42	3,146
Total B	**19.43**	**--**	**3.11**	**23,419**

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Revisions		

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Project
PALMDALE LOGISTICS PARK
CITY OF PALMDALE
LOS ANGELES COUNTY CALIFORNIA

Drawing Title
PRE-DEVELOPMENT HYDROLOGY MAP

Project No. 722010501
Date 08/08/2023
Drawn By DMB
Checked By MRG

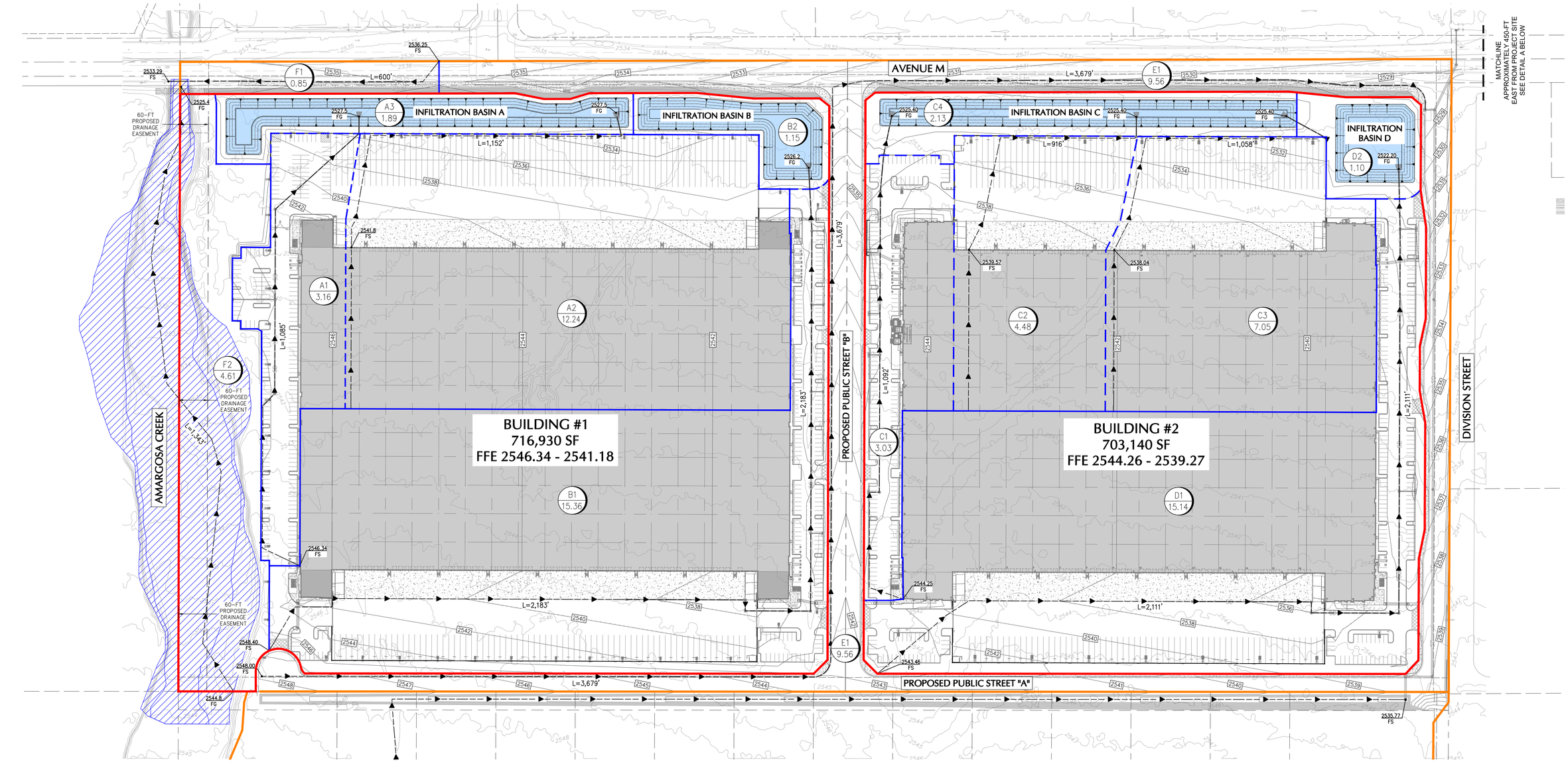
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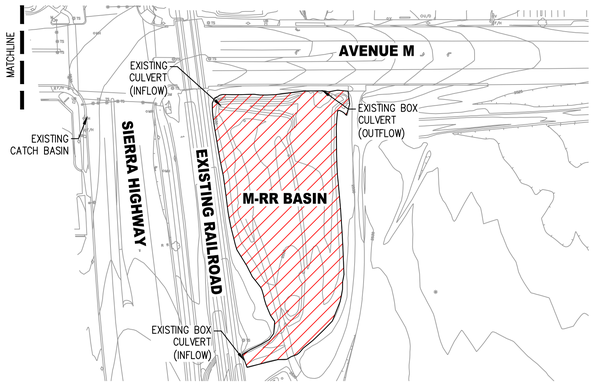
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LANGAN Project No. 722010501





DETAIL A
SCALE: 1"=100'

Post-Development Hydrology Summary Table

Drainage Area ID	Drainage Area (acres)	Impervious Ratio	50-Year Peak Flow (cfs)	50-Year Runoff Volume (cf)	Basin Designation / Discharge Point	Required Volume (cf)	Provided Volume (cf)
A1	3.16	0.95	2.75	30,329	Basin A	155,599	189,429
A2	12.24	1.00	11.16	122,939			
A3	1.89	0.00	0.67	2,332			
B1	15.36	0.92	10.40	143,307	Basin B	144,725	158,014
B2	1.15	0.00	0.41	1,419			
C1	3.03	0.84	2.26	26,213	Basin C	144,397	169,568
C2	4.48	1.00	4.32	44,997			
C3	7.05	1.00	6.58	70,559			
C4	2.13	0.00	0.76	2,628			
D1	15.14	0.92	10.42	141,254	Basin D	142,580	147,289
D2	1.10	0.00	0.13	1,326			
E1	9.56	0.94	6.19	86,633	Off-Site Drainage - Proposed Catch Basin (SW Corner of Ave M and Sierra Hwy)	-	-
E2	139.93	0.00	22.43	168,657	Amargosa Creek	-	-
F1	0.85	0.97	0.77	7,779			
F2	4.61	0.00	0.40	5,556			

GENERAL NOTES

1. SEE PRELIMINARY HYDROLOGY REPORT, PREPARED BY LANGAN, FOR COMPLETE POST-DEVELOPMENT HYDROLOGY CALCULATIONS.
2. CALCULATIONS WERE BASED ON THE REQUIREMENTS ON THE LOS ANGELES COUNTY HYDROLOGY MANUAL FOR THE 50-YEAR STORM EVENT.
3. PROPOSED ON-SITE DRAINAGE SYSTEM LAYOUT IS PRELIMINARY.
4. ALL EXISTING ELEVATIONS AND INVERT ELEVATIONS ARE APPROXIMATE.

PROJECT SITE SUMMARY

SITE AREA (GROSS):	81.75 ACRES
SITE AREA (NET):	71.33 ACRES
IMPERVIOUS COVERAGE:	81% (POST-DEVELOPMENT)
SOIL GROUP:	124
ISOHYETALS:	3.10 INCHES (50-YEAR, 24-HOUR)
FREQUENCY:	50-YEAR (FOR STORM DRAIN DESIGN)
METHOD:	LOS ANGELES COUNTY HYDROLOGY MANUAL

LEGEND

- PROJECT AREA BOUNDARY
- OFF-SITE TRIBUTARY DRAINAGE BOUNDARY
- BASIN DRAINAGE AREA BOUNDARY
- BASIN DRAINAGE SUB-AREA BOUNDARY
- FLOW PATH
- DRAINAGE SUB-AREA ID
- ID / AREA — DRAINAGE SUB-AREA (ACRE)
- AMARGOSA CREEK FLOODPLAIN
- M-RR APPROXIMATE BASIN AREA
- PROPOSED INFILTRATION BASIN AREA
- PROPOSED BUILDING AREA

100 0 50 100
SCALE: 1 INCH = 100 FEET

Date	Description	No.
Revisions		

Signature Date

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Project
PALMDALE LOGISTICS PARK
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Drawing Title
POST-DEVELOPMENT HYDROLOGY MAP

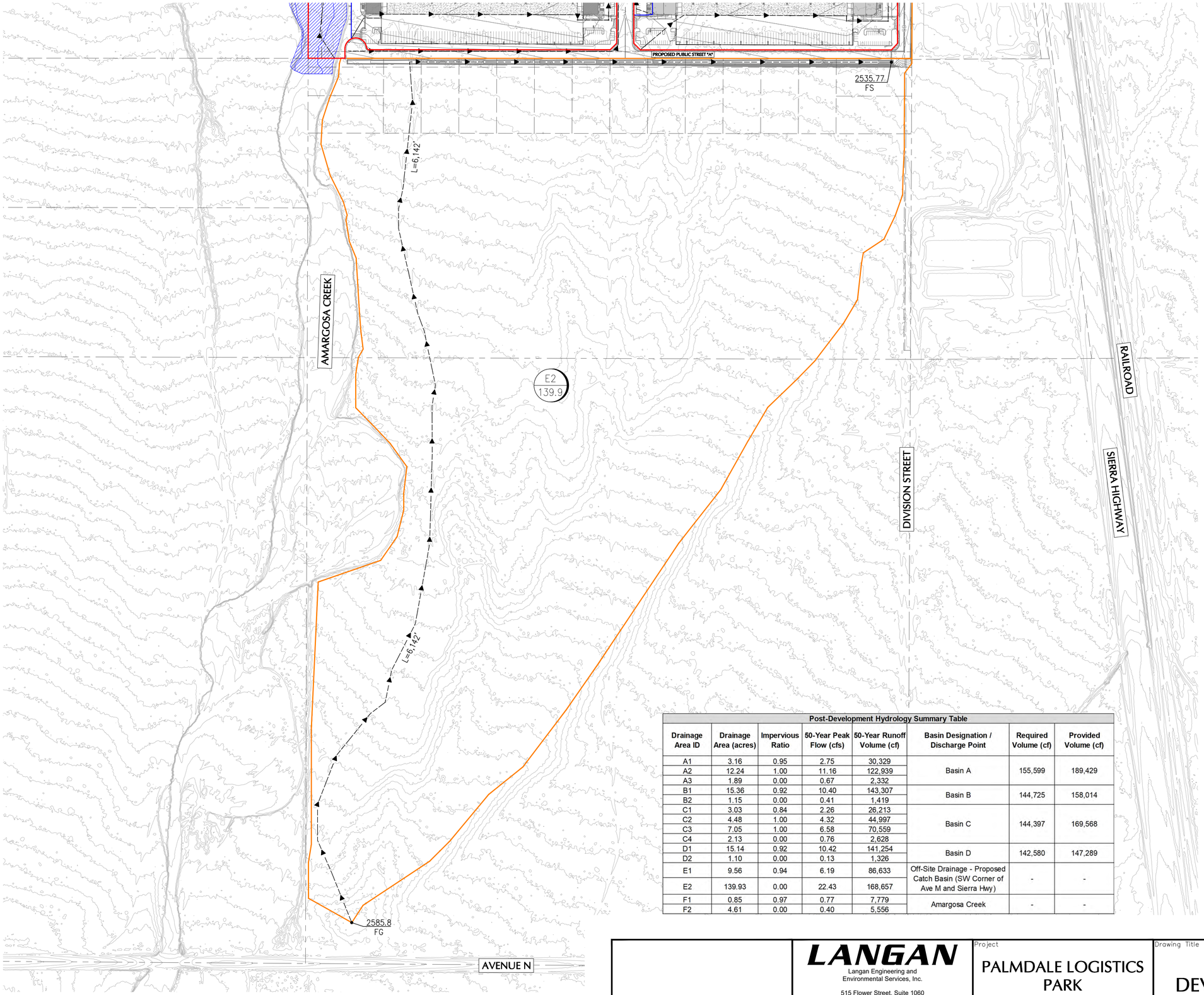
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Date 09/11/2023
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Checked By MRG

Figure No. 4

Sheet 1 of 2

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LEGEND

- PROJECT AREA BOUNDARY
- OFF-SITE TRIBUTARY DRAINAGE BOUNDARY
- BASIN DRAINAGE AREA BOUNDARY
- BASIN DRAINAGE SUB-AREA BOUNDARY
- FLOW PATH
- DRAINAGE SUB-AREA ID (ID / AREA)
- DRAINAGE SUB-AREA (ACRE)
- AMARGOSA CREEK FLOODPLAIN
- M-RR APPROXIMATE BASIN AREA
- PROPOSED INFILTRATION BASIN AREA
- PROPOSED BUILDING AREA

GENERAL NOTES

1. SEE PRELIMINARY HYDROLOGY REPORT, PREPARED BY LANGAN, FOR COMPLETE POST-DEVELOPMENT HYDROLOGY CALCULATIONS.
2. CALCULATIONS WERE BASED ON THE REQUIREMENTS ON THE LOS ANGELES COUNTY HYDROLOGY MANUAL FOR THE 50-YEAR STORM EVENT.
3. PROPOSED ON-SITE DRAINAGE SYSTEM LAYOUT IS PRELIMINARY.
4. ALL EXISTING ELEVATIONS AND INVERT ELEVATIONS ARE APPROXIMATE.

PROJECT SITE SUMMARY

SITE AREA (GROSS):	81.75 ACRES
SITE AREA (NET):	71.33 ACRES
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SOIL GROUP:	124
ISOHYETALS:	3.10 INCHES (50-YEAR, 24-HOUR)
FREQUENCY:	50-YEAR (FOR STORM DRAIN DESIGN)
METHOD:	LOS ANGELES COUNTY HYDROLOGY MANUAL

Post-Development Hydrology Summary Table

Drainage Area ID	Drainage Area (acres)	Impervious Ratio	50-Year Peak Flow (cfs)	50-Year Runoff Volume (cf)	Basin Designation / Discharge Point	Required Volume (cf)	Provided Volume (cf)
A1	3.16	0.95	2.75	30,329	Basin A	155,599	189,429
A2	12.24	1.00	11.16	122,939			
A3	1.89	0.00	0.67	2,332			
B1	15.36	0.92	10.40	143,307	Basin B	144,725	158,014
B2	1.15	0.00	0.41	1,419			
C1	3.03	0.84	2.26	26,213	Basin C	144,397	169,568
C2	4.48	1.00	4.32	44,997			
C3	7.05	1.00	6.58	70,559			
C4	2.13	0.00	0.76	2,628			
D1	15.14	0.92	10.42	141,254	Basin D	142,580	147,289
D2	1.10	0.00	0.13	1,326			
E1	9.56	0.94	6.19	86,633	Off-Site Drainage - Proposed Catch Basin (SW Corner of Ave M and Sierra Hwy)	-	-
E2	139.93	0.00	22.43	168,657			
F1	0.85	0.97	0.77	7,779	Amargosa Creek	-	-
F2	4.61	0.00	0.40	5,556			

200 0 100 200
SCALE: 1 INCH = 200 FEET

Date	Description	No.
Revisions		

Signature Date

LANGAN
Langan Engineering and Environmental Services, Inc.
515 Flower Street, Suite 1060
Los Angeles, CA 90071
T: 213.314.8100 www.langan.com

Project
PALMDALE LOGISTICS PARK
CITY OF PALMDALE
LOS ANGELES COUNTY CALIFORNIA

Drawing Title
POST-DEVELOPMENT HYDROLOGY MAP

Project No. 722010501
Date 09/11/2023
Drawn By DMB
Checked By MRG

Figure No. 4
Sheet 2 of 2

LANGAN
Project No. 722010501

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Date: 9/11/2023 Time: 13:34 User: dburgess Style Table: Langan.stb Layout: Fig 4.2 Document Code: 722010501-0201-CA104-0103

APPENDIX A

LA COUNTY HYDROLOGY MAP – 50-YEAR, 24-HOUR STORM

LA County Hydrology Map

Find address or place

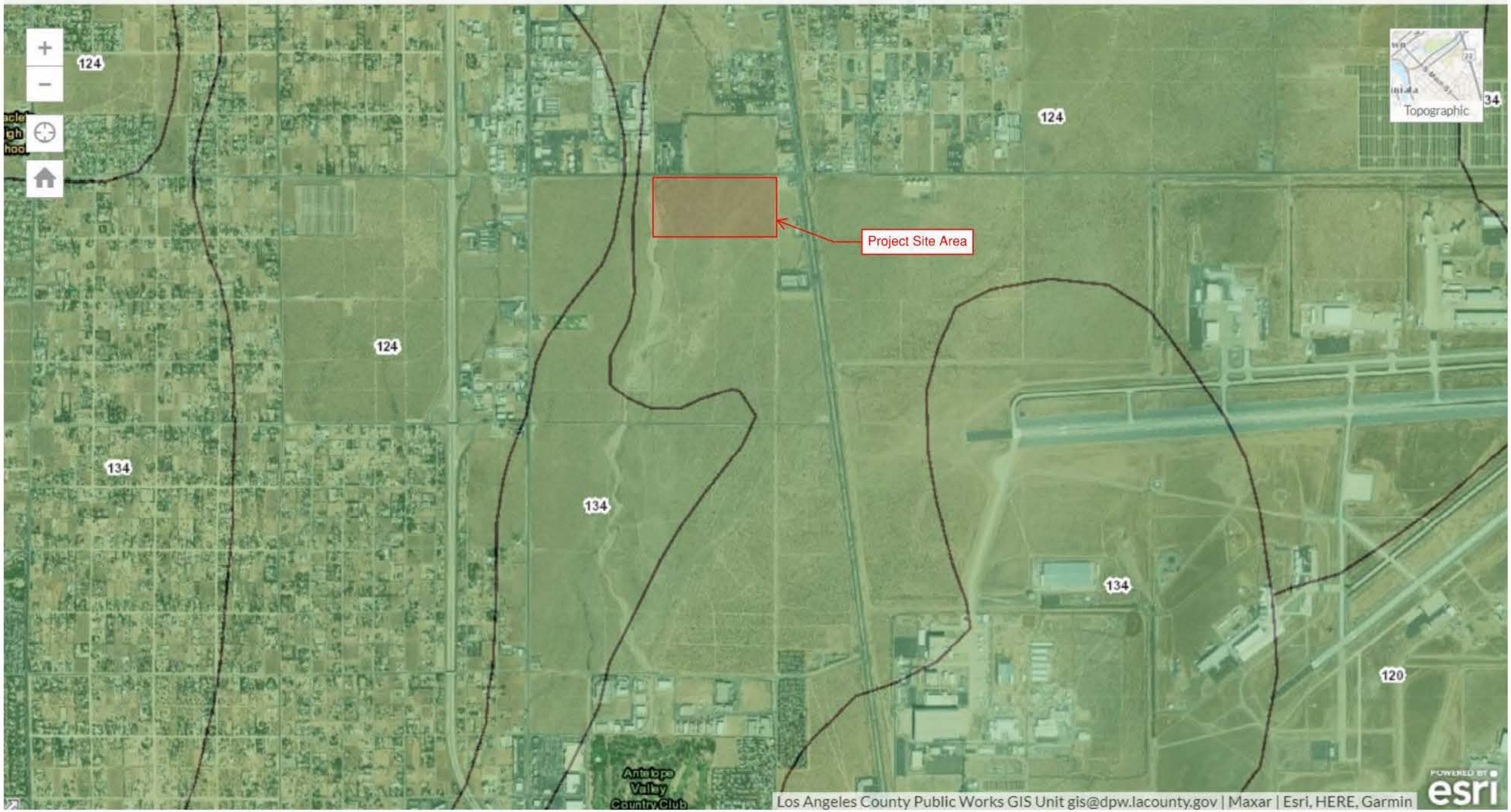


APPENDIX B

LA COUNTY HYDROLOGY MAP – SOILS MAP

LA County Hydrology Map

Find address or place



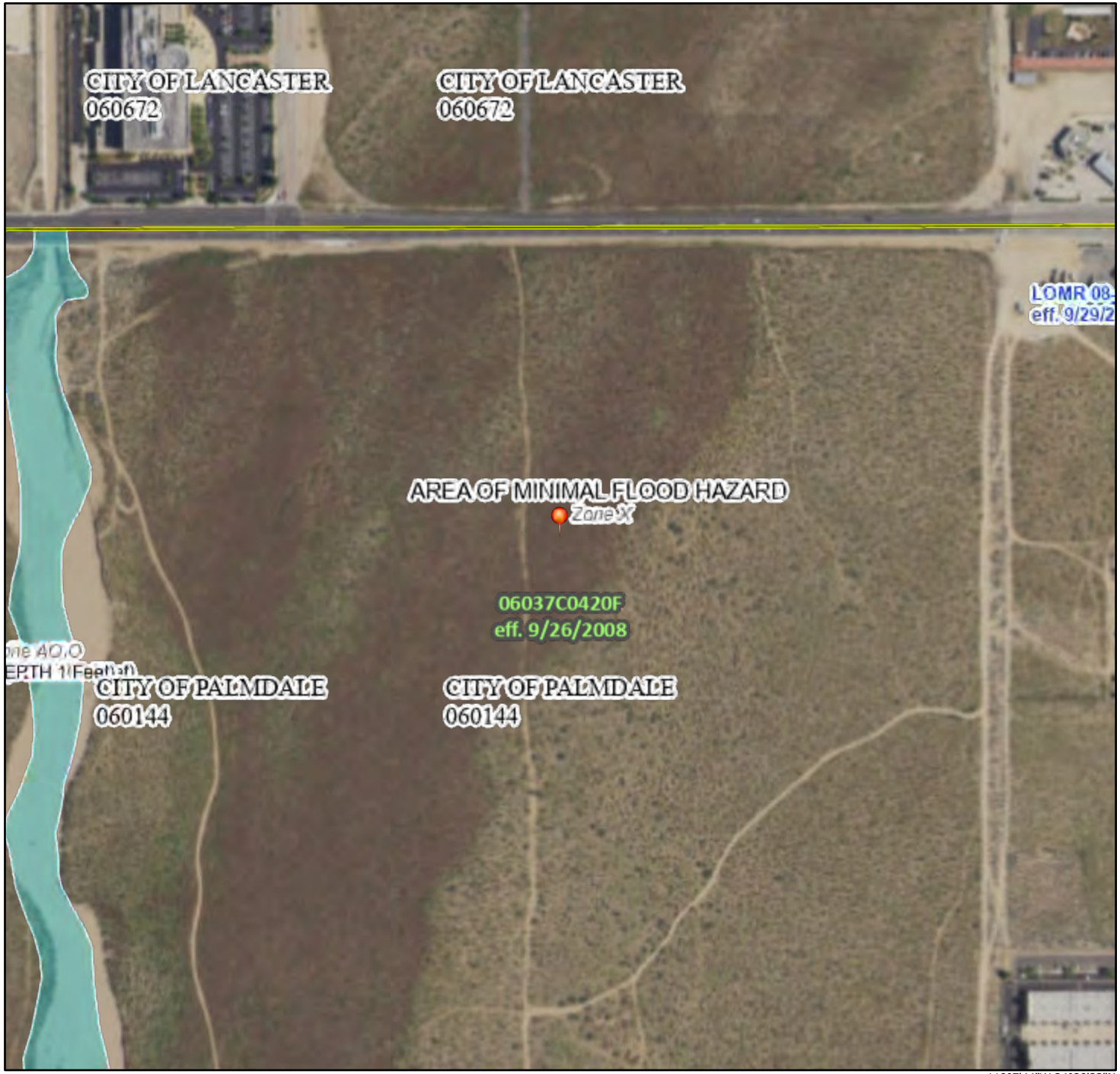
APPENDIX C

FEMA FLOOD INSURANCE RATE MAP

National Flood Hazard Layer FIRMette

FEMA

118°8'21"W 34°38'51"N



118°7'44"W 34°38'22"N

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

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/28/2023 at 2:50 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

APPENDIX D

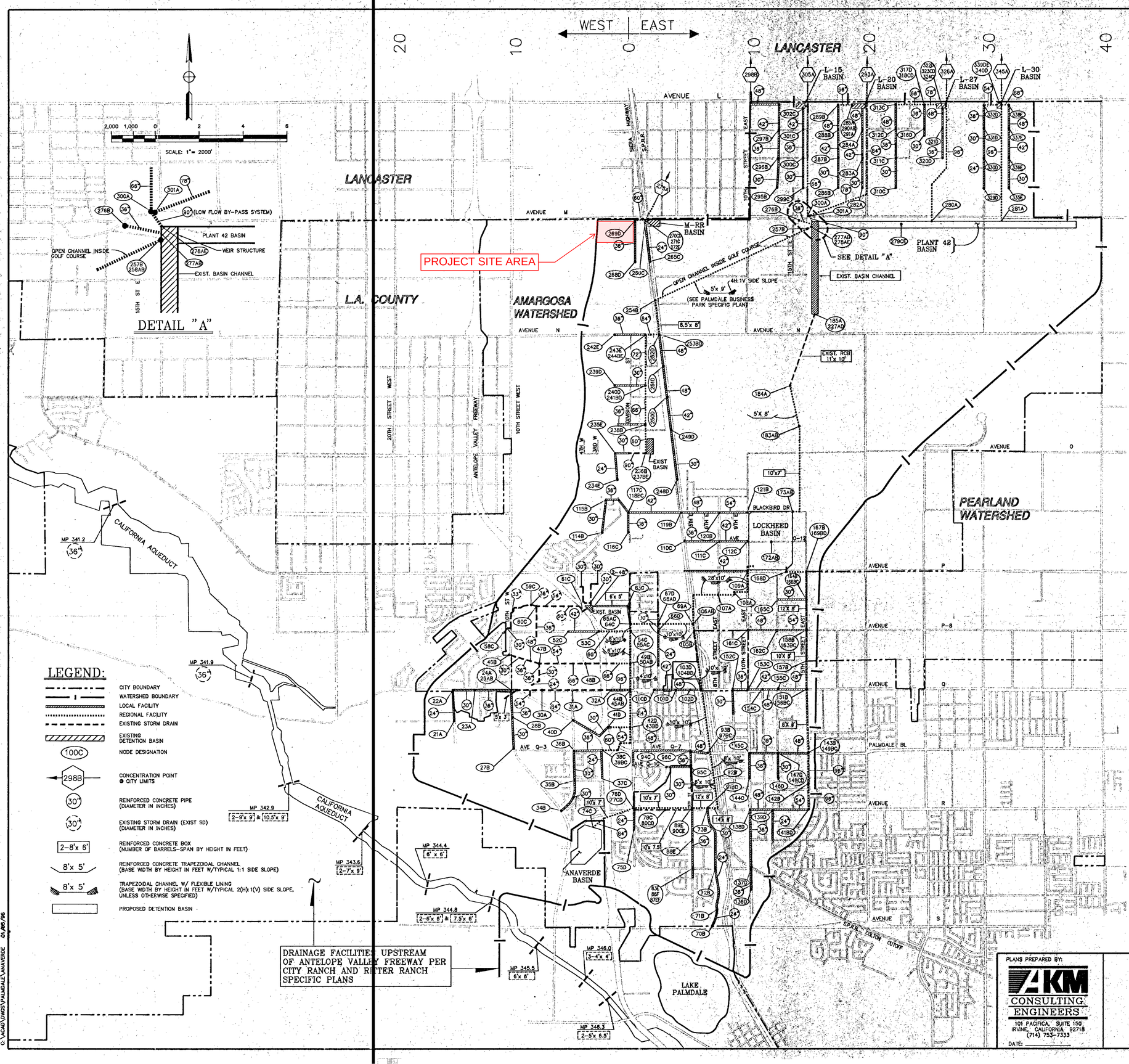
CITY OF PALMDALE
MASTER PLAN OF DRAINAGE FACILITY MAP

CITY OF PALMDALE
MASTER PLAN OF DRAINAGE UPDATE
ANAVERDE WATERSHED
DOWNSTREAM OF ANTELOPE VALLEY FREEWAY

REGIONAL FACILITIES	
NODE DESIGNATION	DISCHARGE Q50 (CFS)
32A	515
39BC	247
41D	141
43BD	411
45AB	945
48B	208
49B	265
50AB	1173
53C	196
54C	255
59AC	1299
65AC	1572
68AD	1640
69A	1644
74C (IN) (ANAVERDE BASIN)	Qb=6610 Qw=5746
74C (OUT) (ANAVERDE BASIN)	687
77CD	693
80CD	705
90CE	1013
91BC	1224
92B	1240
93B	1232
97BC	1451
104BD	1480
105B	1480
106AB	2894
107A	2894
108A	2894
109A	2894
141BD	344
142B	387
143B	444
149BC	694
150B	725
151B	762
156BC	962
157B	972
158B	978
163BC	1215
164B	1221
166BC	1242
167B	1269
169BD	1282
172AB (IN) (LOCKHEED BASIN)	4426
173A (OUT) (LOCKHEED BASIN)	634
183AB	1070
184A	1152
227AD	1286
237BE	146
238B	232
241BD	349
244BE	504
253BD	757
254B	874
257B	874
269D	193
270CD (IN) (M-RR BASIN)	249
271C (M-RR) (BY-PASS)	65
275A (M-RR) (TOTAL OUTLET)	71
276B	33
277AB	2199
278AE (BY-PASS) (PLANT 42 BASIN)	500
279CE (IN) (PLANT 42 BASIN)	3732
280A (OUT) (PLANT 42 BASIN)	414
281A (OUT) (PLANT 42 BASIN)	414
289B	211
290AB (IN) (L-20 BASIN)	435
291A (L-20) (BY-PASS)	100
293A (L-20) (TOTAL OUTLET)	490
300A (PLANT 42) (BY-PASS)	200
301A (PLANT 42) (BY-PASS)	300
302C (IN) (L-15 BASIN)	224
303C (L-15) (BY-PASS)	50
305A (L-15) (TOTAL OUTLET)	275
313C	225
318CD	355
323CD (IN) (L-27 BASIN)	645
324C (L-27) (BY-PASS)	200
326A (L-27) (TOTAL OUTLET)	735
332D	121
338E	198
339DE (IN) (L-30 BASIN)	316
340D (L-30) (BY-PASS)	150
345A (L-30) (TOTAL OUTLET)	610

LOCAL FACILITIES	
NODE DESIGNATION	DISCHARGE Q10 (CFS)
21A	27
22A	57
23A	90
24A	128
26B	51
27B	77
28B	91
29AB	219
30A	276
31A	306
34B	53
35B	86
36B	97
37C	18
38C	29
40D	37
46B	25
47B	70
48B	131
52C	74
58C	52
59C	102
60C	134
61C	170
62C	195
63C	215
64C	243
66D	23
67D	49
71B	36
72B	54
73B	66
75D	19
76D	28
83E	28
86F	32
87EF	60
88E	72
89E	91
94C	19
95C	35
96C	98
100D	14
101D	28
102D	44
103D	61
110C	45
111C	74
112C	98
114B	34
115B	43
116C	34
117C	51
118BC	90
119B	120
120B	141
121B	158
136D	24
137D	49
138D	90
139D	104
144C	28
145C	57
146D	19
147D	42
148CD	96
152C	34
153C	55
154C	72
155C	89
161C	77
162C	108
165C	29
168D	23
234E	12
235E	34
236B	28
239D	32
240D	59
242E	39
243E	80
248D	32
249D	68
250D	88
251D	103
252D	115
265C	15
266C	24
268D	41

LOCAL FACILITIES	
NODE DESIGNATION	DISCHARGE Q10 (CFS)
269D	85
282A	26
283A	52
284A	76
285A	97
286B	25
287B	49
288B	72
295B	27
296B	51
297B	73
298B	94
299C	24
300C	49
301C	71
310C	26
311C	50
312C	71
316D	46
317D	68
320D	47
321D	94
322D	138
329D	14
330D	28
331D	40
335E	28
336E	52
337E	78



LEGEND:

- CITY BOUNDARY
- WATERSHED BOUNDARY
- LOCAL FACILITY
- REGIONAL FACILITY
- EXISTING STORM DRAIN
- EXISTING DETENTION BASIN
- 100C — NODE DESIGNATION
- 298B — CONCENTRATION POINT; CITY LIMITS
- 30" — REINFORCED CONCRETE PIPE (DIAMETER IN INCHES)
- (30") — EXISTING STORM DRAIN (EXIST SD) (DIAMETER IN INCHES)
- 2-8'x 6' — REINFORCED CONCRETE BOX (NUMBER OF BARRELS-SPAN BY HEIGHT IN FEET)
- 8'x 5' — REINFORCED CONCRETE TRAPEZOIDAL CHANNEL (BASE WIDTH BY HEIGHT IN FEET W/TYPICAL 1:1 SIDE SLOPE)
- 8'x 5' — TRAPEZOIDAL CHANNEL W/ FLEXIBLE LINING (BASE WIDTH BY HEIGHT IN FEET W/TYPICAL 2(H):1(V) SIDE SLOPE, UNLESS OTHERWISE SPECIFIED)
- PROPOSED DETENTION BASIN

DRAINAGE FACILITIES UPSTREAM OF ANTELOPE VALLEY FREEWAY PER CITY RANCH AND RITTER RANCH SPECIFIC PLANS

PLANS PREPARED BY:
AKM CONSULTING ENGINEERS
101 PACIFICA, SUITE 150
IRVINE, CALIFORNIA 92718
(714) 753-7333
DATE:

CITY OF PALMDALE

MASTER PLAN OF DRAINAGE
ANAVERDE WATERSHED
FACILITY MAP

EXHIBIT 3

PROJECT NUMBER:

C:\ACAD\DWGS\PALMDALE\ANAVERDE 01/APR/96

APPENDIX E

PRE-DEVELOPMENT HYDROCALC CALCULATIONS – 50-YEAR

Pre-Development Hydrology Summary Table									
Drainage Area ID	Drainage Area (acres)	2-Year		10-Year		25-Year		50-Year	
		Q_2 (cfs)	V_2 (cf)	Q_{10} (cfs)	V_{10} (cf)	Q_{25} (cfs)	V_{25} (cf)	Q_{50} (cfs)	V_{50} (cf)
A1	40.50	2.25	18,891	4.47	34,853	5.62	42,859	6.49	48,814
A2	23.72	1.31	11,064	2.62	20,413	3.29	25,102	3.80	28,590
A (On-site)	**64.22**	**3.56**	**29,955**	**7.08**	**55,266**	**8.91**	**67,961**	**10.29**	**77,404**
A3 (Offsite)	125.38	6.95	58,483	13.82	107,899	17.40	132,683	20.09	151,120
A (Total)	**189.59**	**10.51**	**88,439**	**20.90**	**163,166**	**26.31**	**200,644**	**30.39**	**228,524**
B1	17.53	0.97	8,177	1.93	15,086	2.43	18,551	2.81	21,129
B2 (Offsite)	14.55	0.81	6,787	1.60	12,521	2.02	15,398	2.33	17,537
B (Total)	**32.08**	**0.97**	**8,177**	**1.93**	**15,086**	**2.43**	**18,551**	**2.81**	**21,129**

Peak Flow Hydrologic Analysis

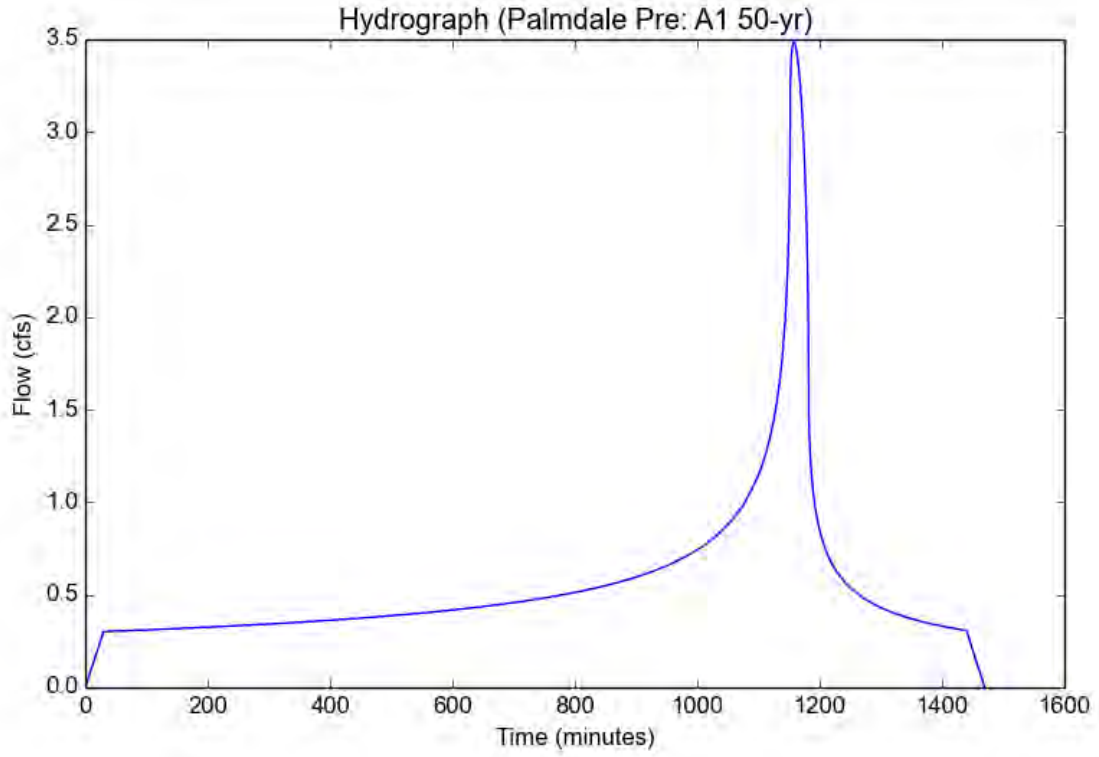
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Pre
Subarea ID	A1 50-yr
Area (ac)	40.5
Flow Path Length (ft)	2088.0
Flow Path Slope (vft/hft)	0.0074
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	0.7968
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	3.4851
Burned Peak Flow Rate (cfs)	6.4908
24-Hr Clear Runoff Volume (ac-ft)	1.1206
24-Hr Clear Runoff Volume (cu-ft)	48814.4005



Peak Flow Hydrologic Analysis

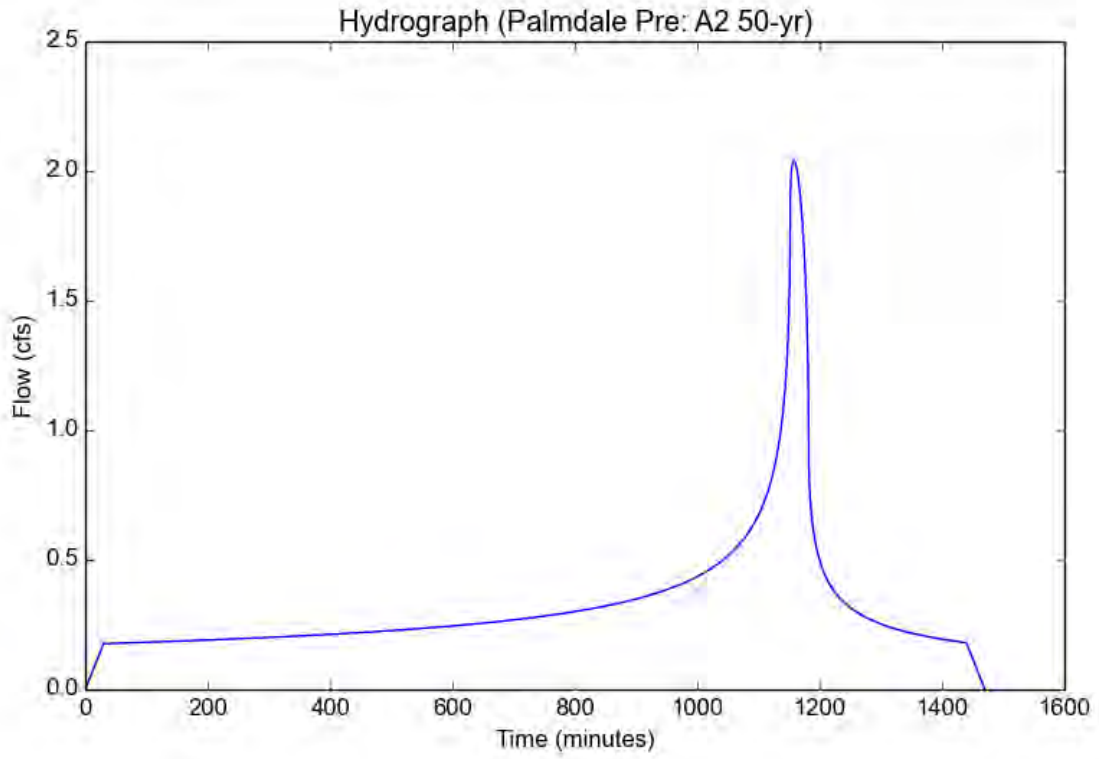
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Pre
Subarea ID	A2 50-yr
Area (ac)	23.72
Flow Path Length (ft)	1758.0
Flow Path Slope (vft/hft)	0.0097
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	0.7968
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	2.0411
Burned Peak Flow Rate (cfs)	3.8015
24-Hr Clear Runoff Volume (ac-ft)	0.6563
24-Hr Clear Runoff Volume (cu-ft)	28589.5698



Peak Flow Hydrologic Analysis

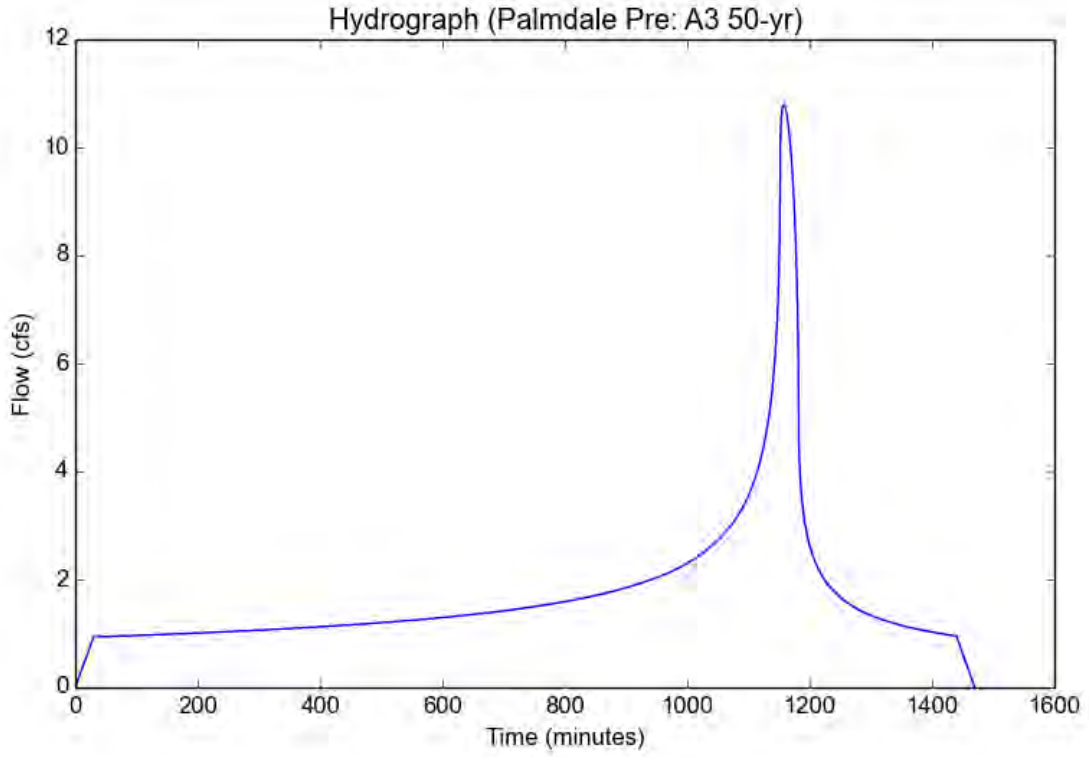
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Pre
Subarea ID	A3 50-yr
Area (ac)	125.38
Flow Path Length (ft)	4253.0
Flow Path Slope (vft/hft)	0.0096
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	0.7968
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	10.7891
Burned Peak Flow Rate (cfs)	20.0943
24-Hr Clear Runoff Volume (ac-ft)	3.4692
24-Hr Clear Runoff Volume (cu-ft)	151119.7414



Peak Flow Hydrologic Analysis

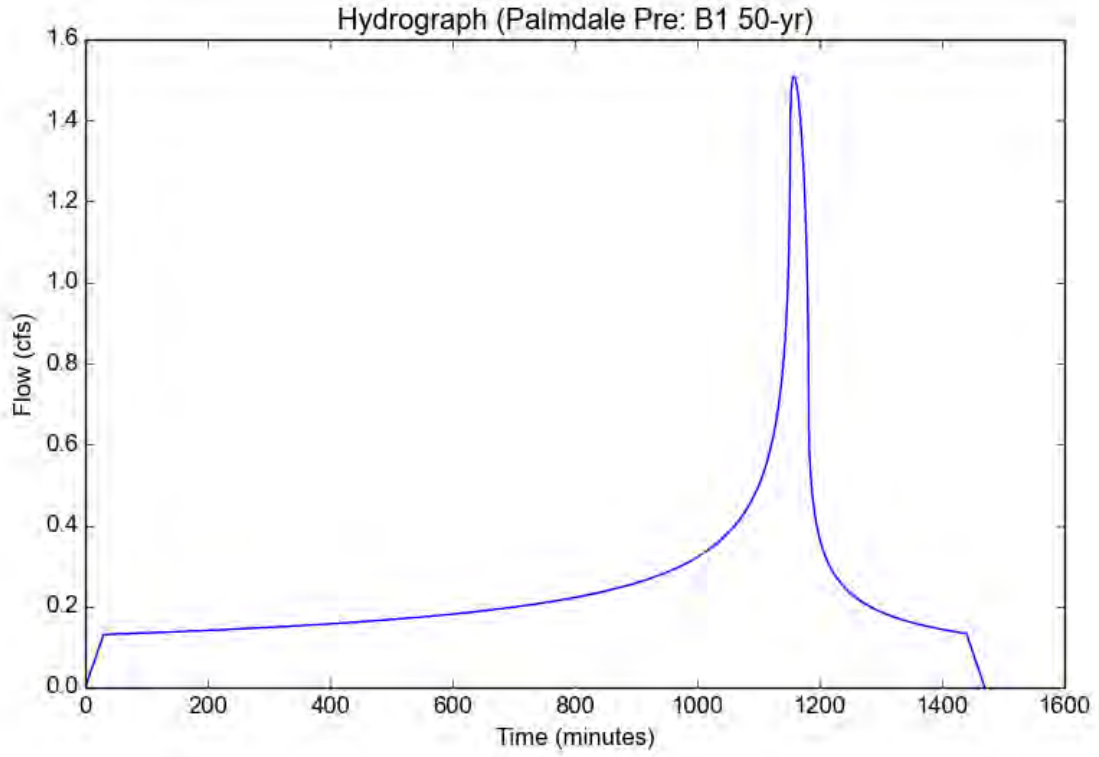
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Pre
Subarea ID	B1 50-yr
Area (ac)	17.53
Flow Path Length (ft)	1610.0
Flow Path Slope (vft/hft)	0.0088
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	0.7968
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.5085
Burned Peak Flow Rate (cfs)	2.8095
24-Hr Clear Runoff Volume (ac-ft)	0.4851
24-Hr Clear Runoff Volume (cu-ft)	21128.801



Peak Flow Hydrologic Analysis

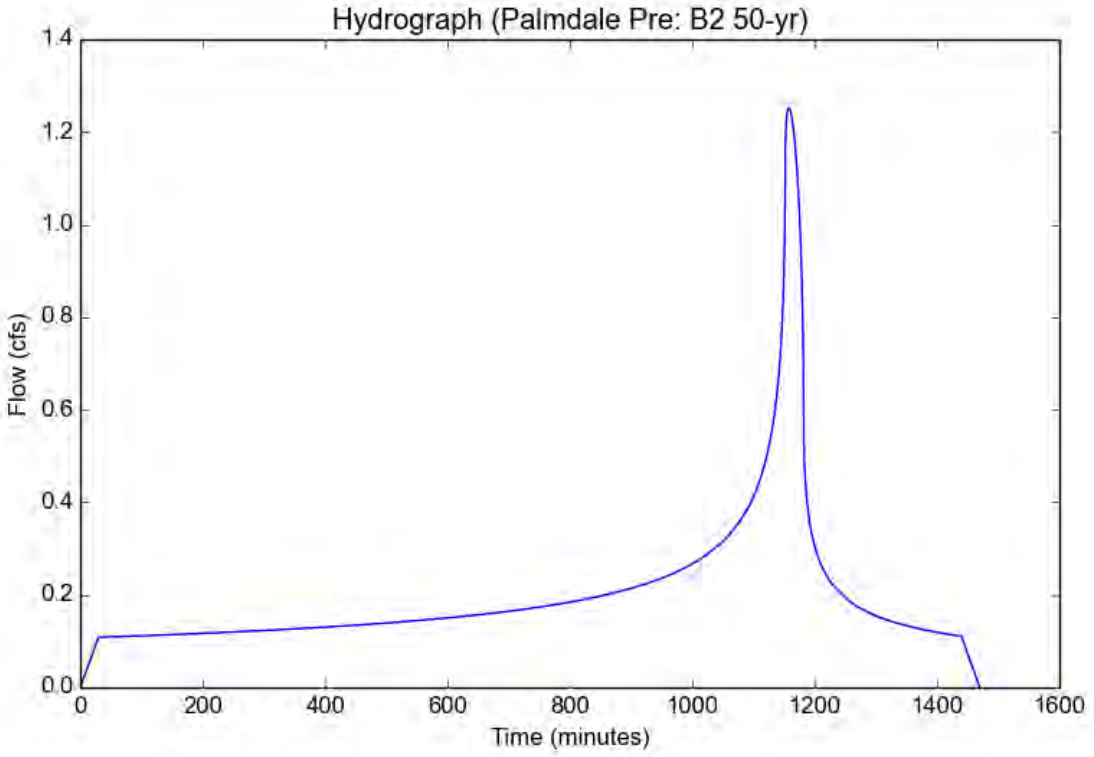
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Pre
Subarea ID	B2 50-yr
Area (ac)	14.55
Flow Path Length (ft)	1890.0
Flow Path Slope (vft/hft)	0.0089
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	0.7968
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	1.252
Burned Peak Flow Rate (cfs)	2.3319
24-Hr Clear Runoff Volume (ac-ft)	0.4026
24-Hr Clear Runoff Volume (cu-ft)	17537.0253



APPENDIX F

POST-DEVELOPMENT HYDROCALC CALCULATIONS – 50-YEAR

Post-Development Hydrology Summary Table									
Drainage Area ID	Drainage Area (acres)	2-Year		10-Year		25-Year		50-Year	
		Q_2 (cfs)	V_2 (cf)	Q_{10} (cfs)	V_{10} (cf)	Q_{25} (cfs)	V_{25} (cf)	Q_{50} (cfs)	V_{50} (cf)
A1	3.16	0.84	11,737	1.75	21,655	2.30	26,628	2.75	30,329
A2	12.24	3.40	47,578	7.10	87,779	9.32	107,941	11.16	122,939
A3	1.89	0.10	882	0.23	1,626	0.46	2,019	0.67	2,332
Basin A	**17.28**	**4.34**	**60,197**	**9.08**	**111,060**	**12.09**	**136,588**	**14.58**	**155,599**
B1	15.36	3.96	55,460	7.31	102,321	8.98	125,823	10.40	143,307
B2	1.15	0.06	536	0.14	990	0.28	1,229	0.41	1,419
Basin B	**16.51**	**4.02**	**55,996**	**7.45**	**103,311**	**9.26**	**127,052**	**10.80**	**144,725**
C1	3.03	0.72	10,145	1.46	18,716	1.94	23,015	2.26	26,213
C2	4.48	1.24	17,414	2.78	32,128	3.68	39,508	4.32	44,997
C3	7.05	1.95	27,306	4.16	50,379	5.48	61,951	6.58	70,559
C4	2.13	0.10	994	0.22	1,833	0.30	2,254	0.76	2,628
Basin C	**16.69**	**4.02**	**55,859**	**8.61**	**103,057**	**11.41**	**126,728**	**13.92**	**144,397**
D1	15.14	3.90	54,665	7.20	100,855	8.85	124,021	10.42	141,254
D2	1.10	0.04	513	0.09	947	0.11	1,164	0.13	1,326
Basin D	**16.24**	**3.94**	**55,178**	**7.29**	**101,802**	**8.97**	**125,185**	**10.55**	**142,580**
E1	9.56	2.39	33,527	4.42	61,856	5.43	76,064	6.19	86,633
E2	139.93	7.76	65,270	15.43	120,421	19.42	148,081	22.43	168,657
Area E	**149.49**	**10.15**	**98,797**	**19.84**	**182,277**	**24.85**	**224,144**	**28.61**	**255,290**
F1	0.85	0.22	3,010	0.50	5,554	0.66	6,830	0.77	7,779
F2	4.61	0.15	2,150	0.28	3,967	0.35	4,879	0.40	5,556
Area F	**5.46**	**0.38**	**5,161**	**0.79**	**9,521**	**1.00**	**11,708**	**1.17**	**13,335**

Peak Flow Hydrologic Analysis

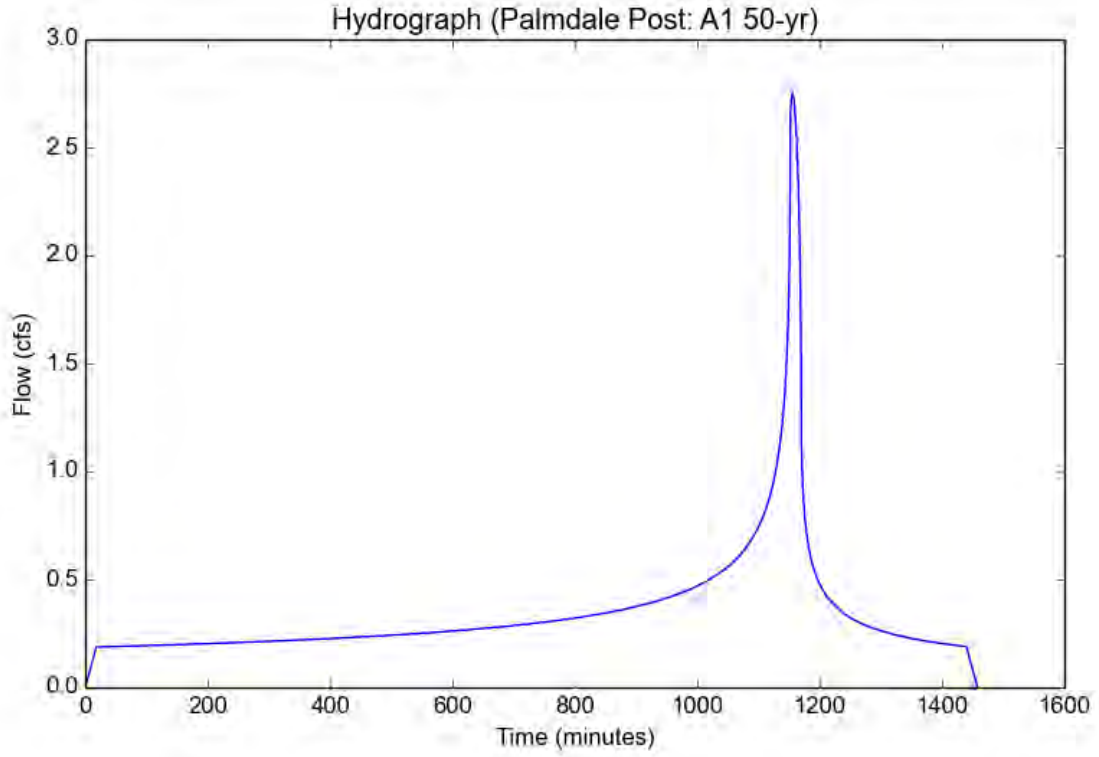
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	A1 50-yr
Area (ac)	3.16
Flow Path Length (ft)	1085.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.95
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	1.013
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.86
Time of Concentration (min)	18.0
Clear Peak Flow Rate (cfs)	2.7529
Burned Peak Flow Rate (cfs)	2.7529
24-Hr Clear Runoff Volume (ac-ft)	0.6962
24-Hr Clear Runoff Volume (cu-ft)	30328.5404



Peak Flow Hydrologic Analysis

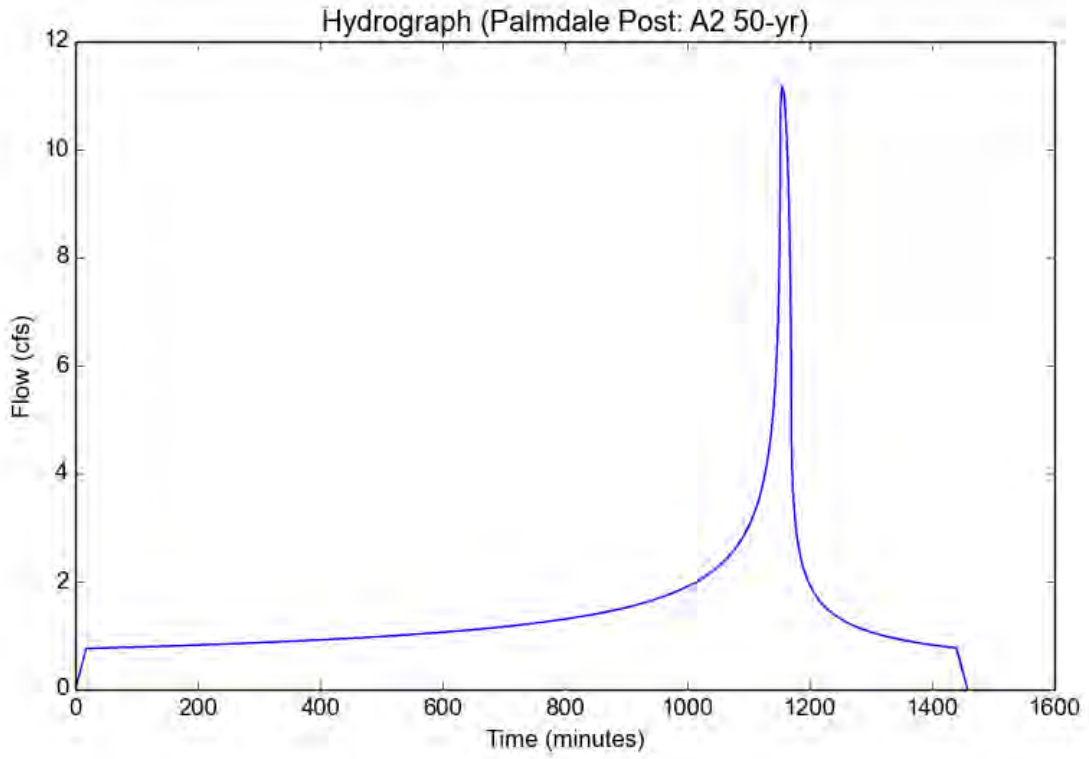
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	A2 50-yr
Area (ac)	12.24
Flow Path Length (ft)	1144.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	1.0
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	1.013
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	18.0
Clear Peak Flow Rate (cfs)	11.159
Burned Peak Flow Rate (cfs)	11.159
24-Hr Clear Runoff Volume (ac-ft)	2.8223
24-Hr Clear Runoff Volume (cu-ft)	122939.0642



Peak Flow Hydrologic Analysis

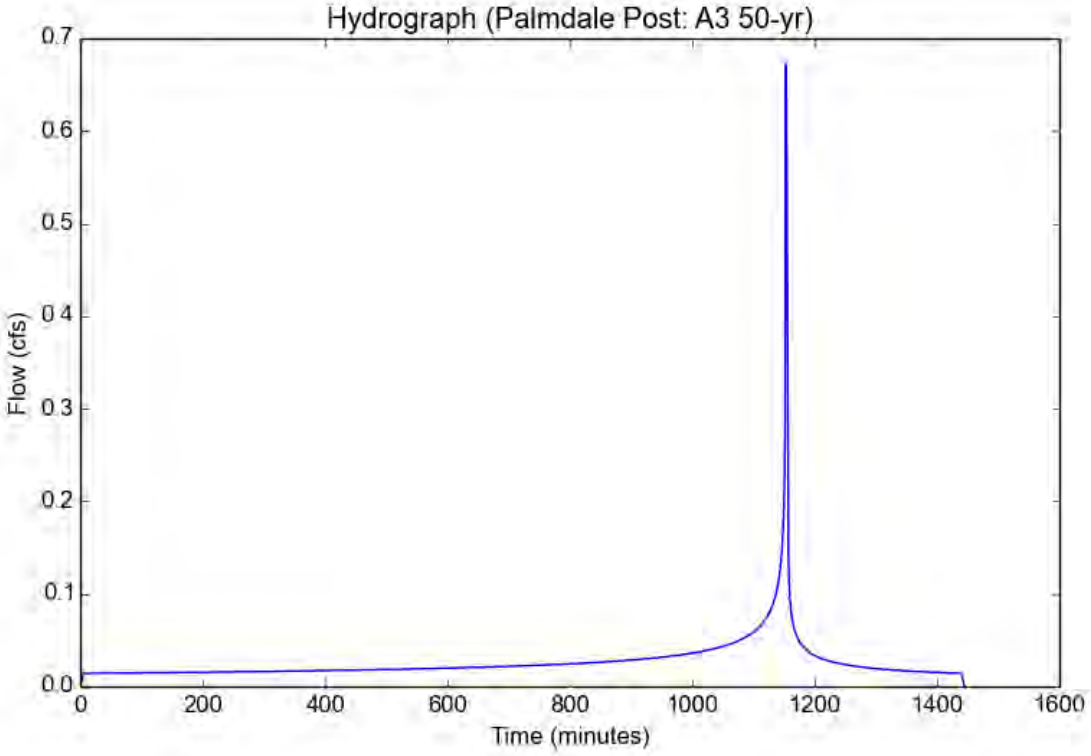
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	A3 50-yr
Area (ac)	1.89
Flow Path Length (ft)	20.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	1.8495
Undeveloped Runoff Coefficient (Cu)	0.1852
Developed Runoff Coefficient (Cd)	0.1923
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.6724
Burned Peak Flow Rate (cfs)	0.6724
24-Hr Clear Runoff Volume (ac-ft)	0.0535
24-Hr Clear Runoff Volume (cu-ft)	2331.8357



Peak Flow Hydrologic Analysis

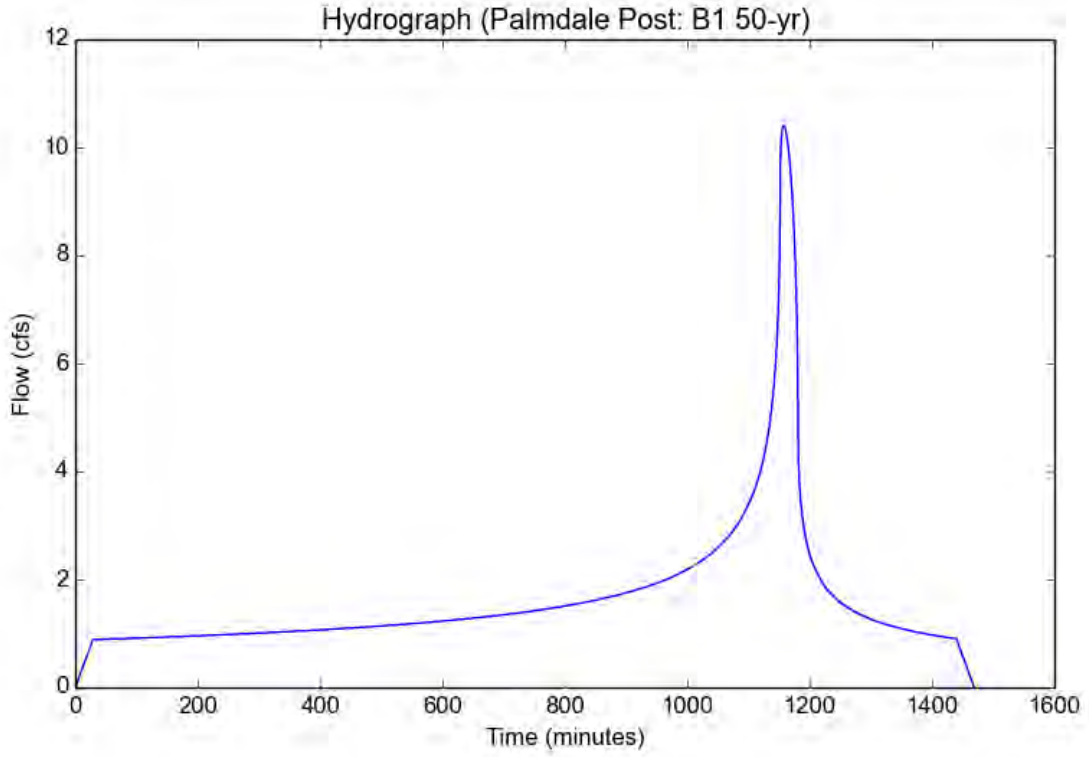
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	B1 50-yr
Area (ac)	15.36
Flow Path Length (ft)	2183.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.92
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	0.8096
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.836
Time of Concentration (min)	29.0
Clear Peak Flow Rate (cfs)	10.3956
Burned Peak Flow Rate (cfs)	10.3956
24-Hr Clear Runoff Volume (ac-ft)	3.2899
24-Hr Clear Runoff Volume (cu-ft)	143306.6501



Peak Flow Hydrologic Analysis

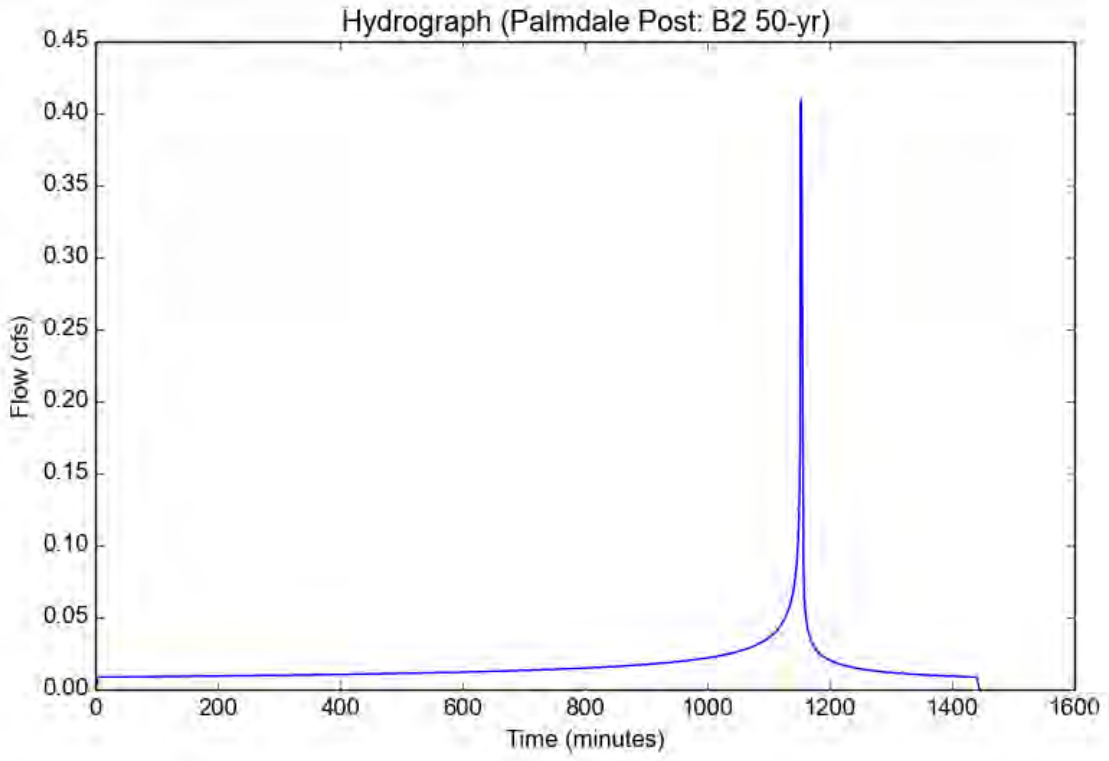
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	B2 50-yr
Area (ac)	1.15
Flow Path Length (ft)	20.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	1.8495
Undeveloped Runoff Coefficient (Cu)	0.1852
Developed Runoff Coefficient (Cd)	0.1923
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.4091
Burned Peak Flow Rate (cfs)	0.4091
24-Hr Clear Runoff Volume (ac-ft)	0.0326
24-Hr Clear Runoff Volume (cu-ft)	1418.8418



Peak Flow Hydrologic Analysis

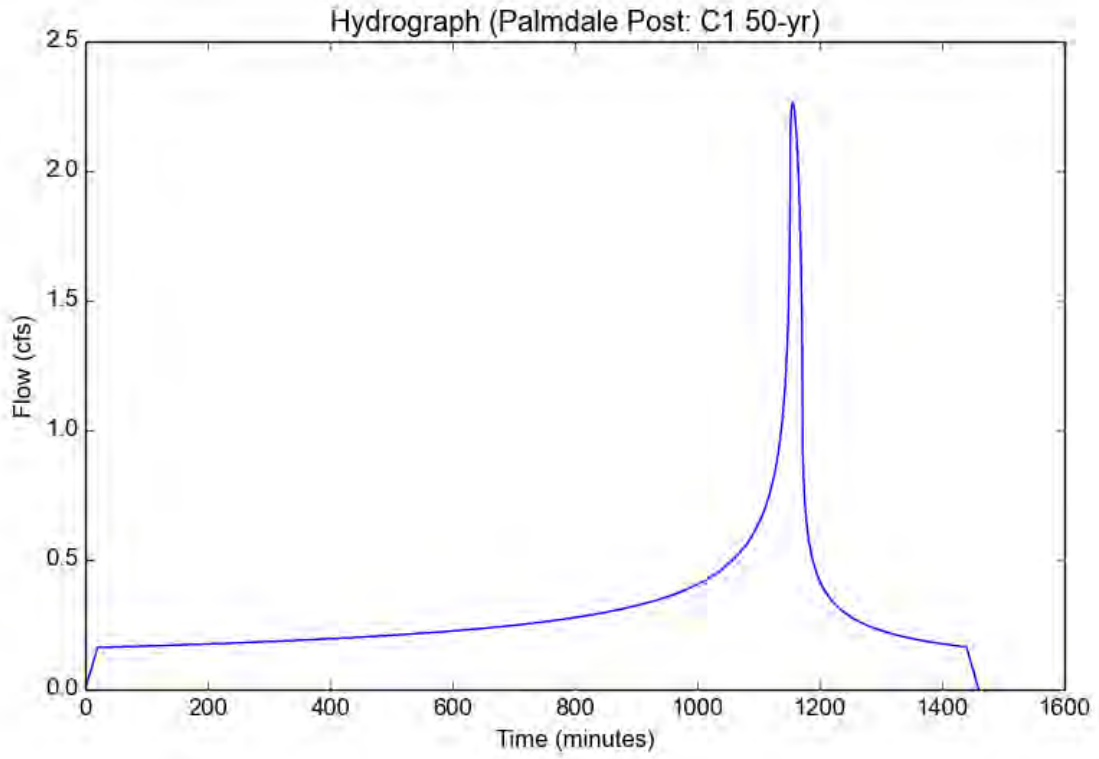
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	C1 50-yr
Area (ac)	3.03
Flow Path Length (ft)	1092.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.844
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	0.964
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.7752
Time of Concentration (min)	20.0
Clear Peak Flow Rate (cfs)	2.2644
Burned Peak Flow Rate (cfs)	2.2644
24-Hr Clear Runoff Volume (ac-ft)	0.6018
24-Hr Clear Runoff Volume (cu-ft)	26213.3659



Peak Flow Hydrologic Analysis

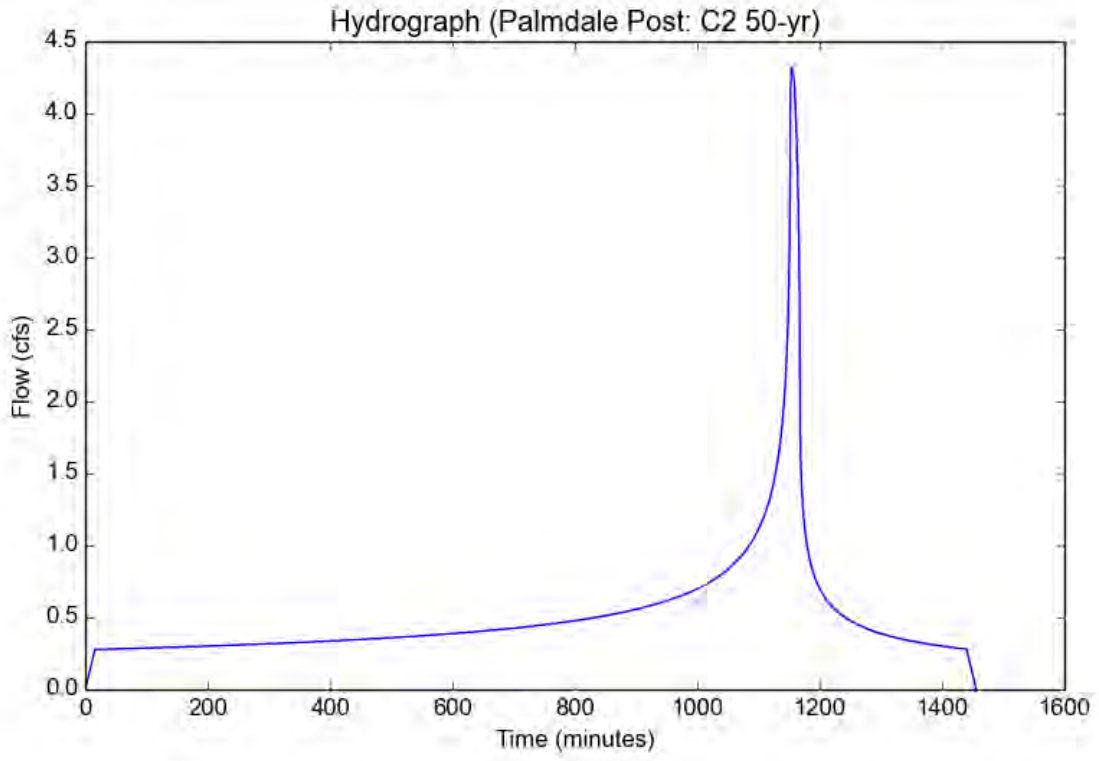
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	C2 50-yr
Area (ac)	4.48
Flow Path Length (ft)	916.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	1.0
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	1.0706
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	16.0
Clear Peak Flow Rate (cfs)	4.3168
Burned Peak Flow Rate (cfs)	4.3168
24-Hr Clear Runoff Volume (ac-ft)	1.033
24-Hr Clear Runoff Volume (cu-ft)	44997.2656



Peak Flow Hydrologic Analysis

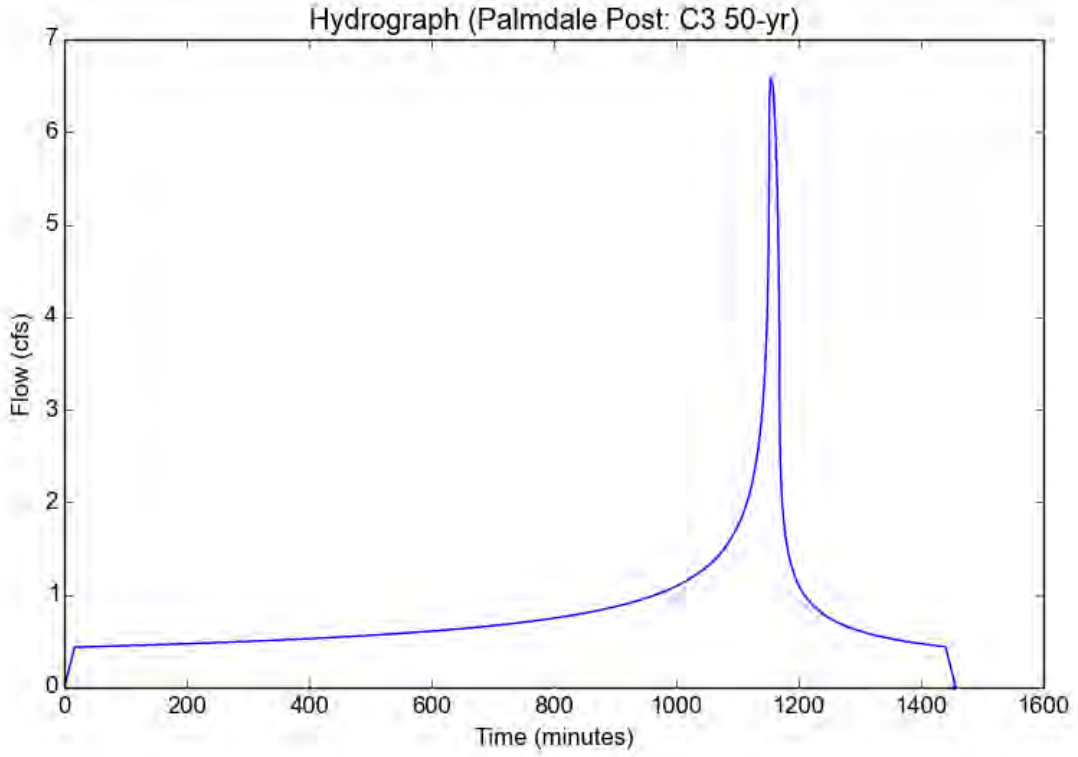
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	C3 50-yr
Area (ac)	7.05
Flow Path Length (ft)	1058.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.996
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	1.0406
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.8968
Time of Concentration (min)	17.0
Clear Peak Flow Rate (cfs)	6.5789
Burned Peak Flow Rate (cfs)	6.5789
24-Hr Clear Runoff Volume (ac-ft)	1.6198
24-Hr Clear Runoff Volume (cu-ft)	70558.6883



Peak Flow Hydrologic Analysis

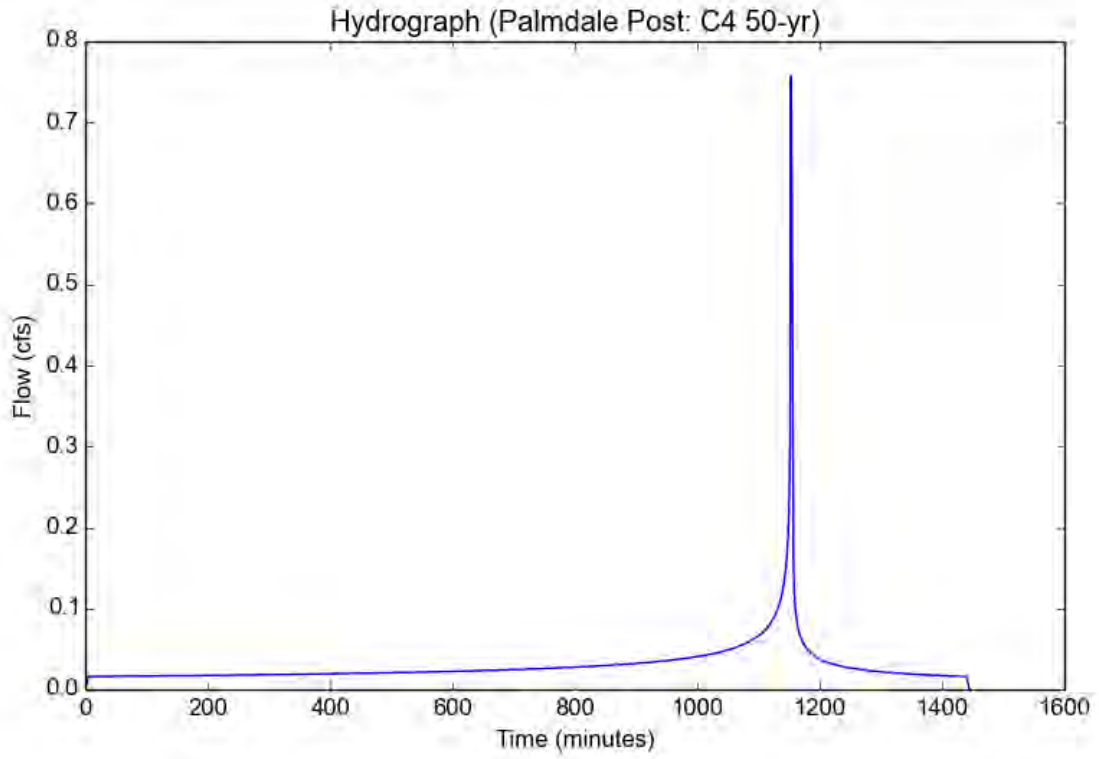
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	C4 50-yr
Area (ac)	2.13
Flow Path Length (ft)	30.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	1.8495
Undeveloped Runoff Coefficient (Cu)	0.1852
Developed Runoff Coefficient (Cd)	0.1923
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	0.7577
Burned Peak Flow Rate (cfs)	0.7577
24-Hr Clear Runoff Volume (ac-ft)	0.0603
24-Hr Clear Runoff Volume (cu-ft)	2627.9418



Peak Flow Hydrologic Analysis

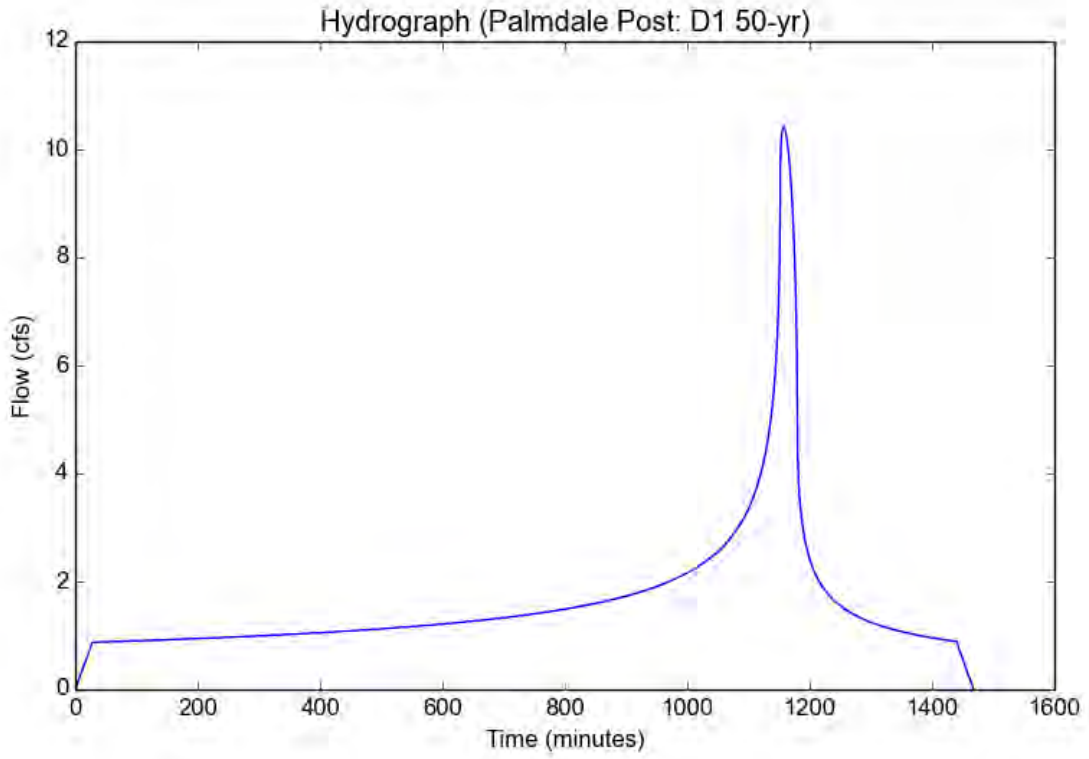
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Input Parameters

Project Name	Palmdale Post
Subarea ID	D1 50-yr
Area (ac)	15.14
Flow Path Length (ft)	2111.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.92
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	0.823
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.836
Time of Concentration (min)	28.0
Clear Peak Flow Rate (cfs)	10.4171
Burned Peak Flow Rate (cfs)	10.4171
24-Hr Clear Runoff Volume (ac-ft)	3.2427
24-Hr Clear Runoff Volume (cu-ft)	141253.9773



Peak Flow Hydrologic Analysis

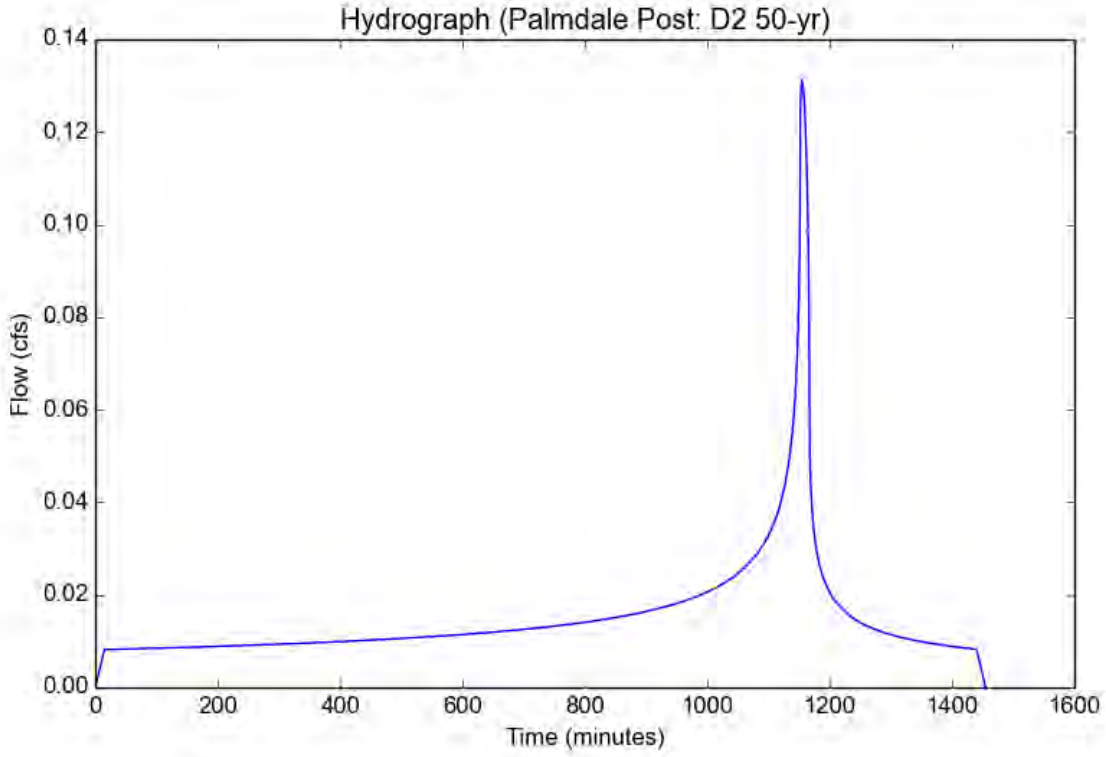
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	D2 50-yr
Area (ac)	1.1
Flow Path Length (ft)	83.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	1.1036
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	0.1311
Burned Peak Flow Rate (cfs)	0.1311
24-Hr Clear Runoff Volume (ac-ft)	0.0304
24-Hr Clear Runoff Volume (cu-ft)	1325.8118



Peak Flow Hydrologic Analysis

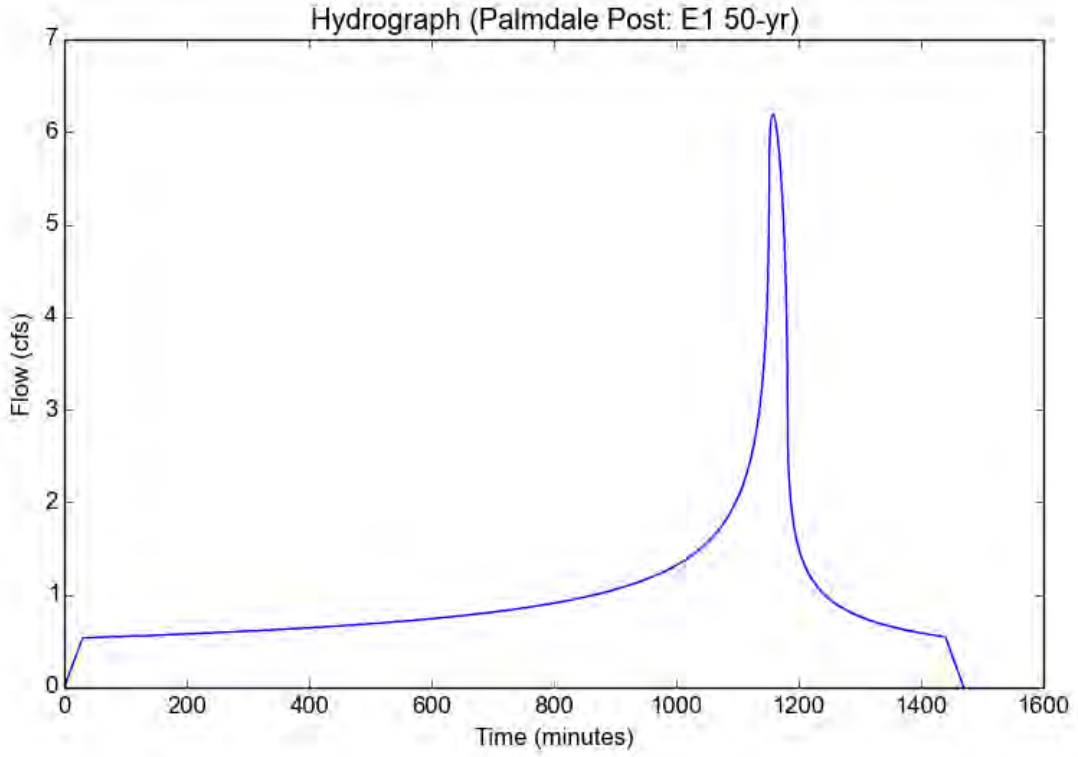
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	E1 50-yr
Area (ac)	9.56
Flow Path Length (ft)	3679.0
Flow Path Slope (vft/hft)	0.004
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.89
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	0.7968
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.812
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	6.1851
Burned Peak Flow Rate (cfs)	6.1851
24-Hr Clear Runoff Volume (ac-ft)	1.9888
24-Hr Clear Runoff Volume (cu-ft)	86632.9499



Peak Flow Hydrologic Analysis

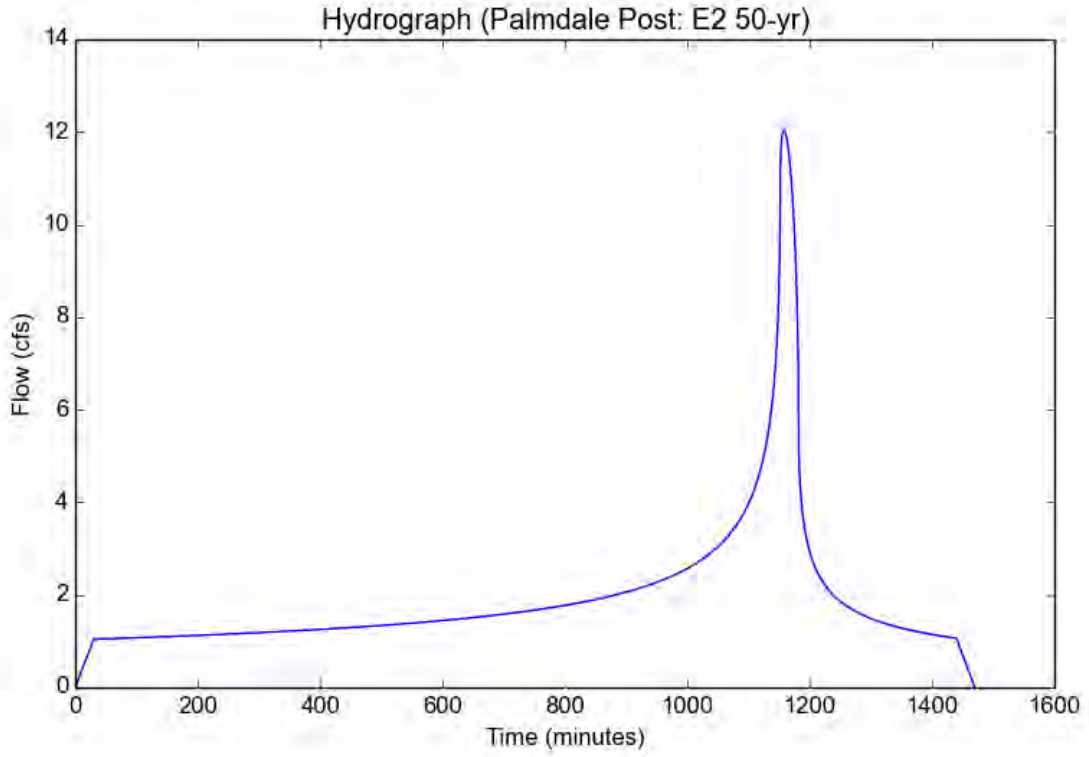
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Input Parameters

Project Name	Palmdale Post
Subarea ID	E2 50-yr
Area (ac)	139.93
Flow Path Length (ft)	6173.0
Flow Path Slope (vft/hft)	0.009
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0.34
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	0.7968
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	12.0412
Burned Peak Flow Rate (cfs)	22.4262
24-Hr Clear Runoff Volume (ac-ft)	3.8718
24-Hr Clear Runoff Volume (cu-ft)	168656.7668



Peak Flow Hydrologic Analysis

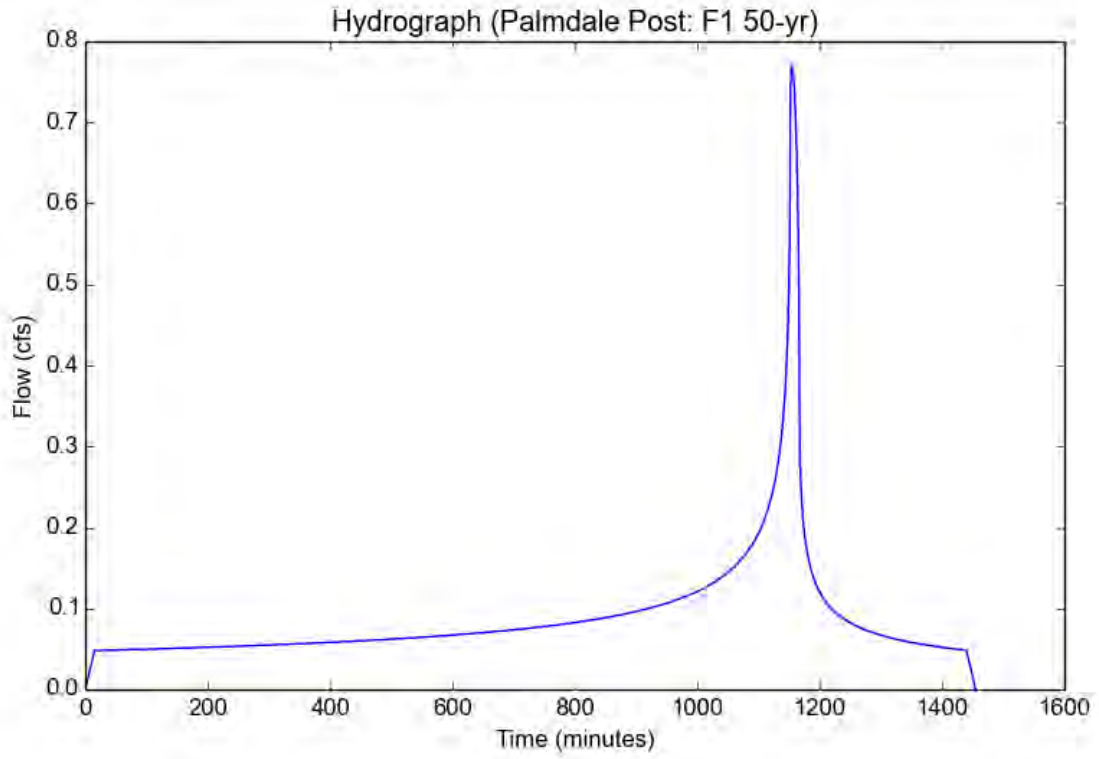
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	F1 50-yr
Area (ac)	0.85
Flow Path Length (ft)	600.0
Flow Path Slope (vft/hft)	0.005
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.9
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	1.1036
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.82
Time of Concentration (min)	15.0
Clear Peak Flow Rate (cfs)	0.7692
Burned Peak Flow Rate (cfs)	0.7692
24-Hr Clear Runoff Volume (ac-ft)	0.1786
24-Hr Clear Runoff Volume (cu-ft)	7778.5421



Peak Flow Hydrologic Analysis

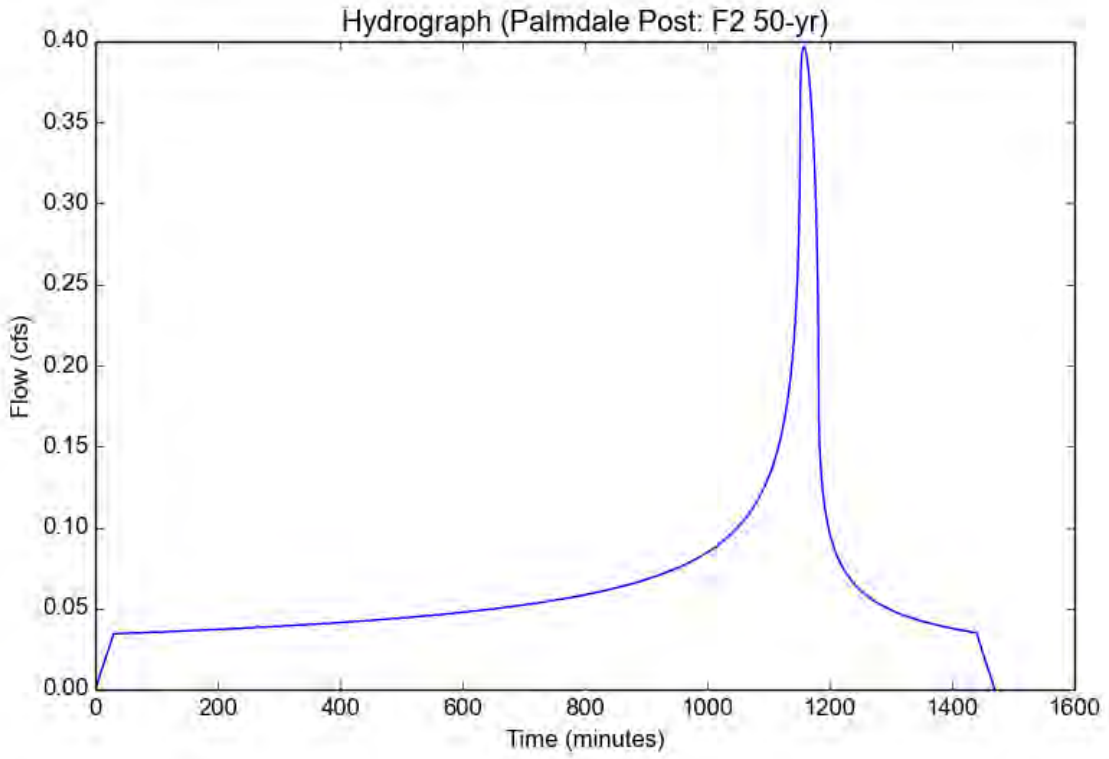
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Version: HydroCalc 1.0.3

Input Parameters

Project Name	Palmdale Post
Subarea ID	F2 50-yr
Area (ac)	4.61
Flow Path Length (ft)	1343.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	3.1
Percent Impervious	0.01
Soil Type	124
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	3.1
Peak Intensity (in/hr)	0.7968
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.108
Time of Concentration (min)	30.0
Clear Peak Flow Rate (cfs)	0.3967
Burned Peak Flow Rate (cfs)	0.3967
24-Hr Clear Runoff Volume (ac-ft)	0.1276
24-Hr Clear Runoff Volume (cu-ft)	5556.4046



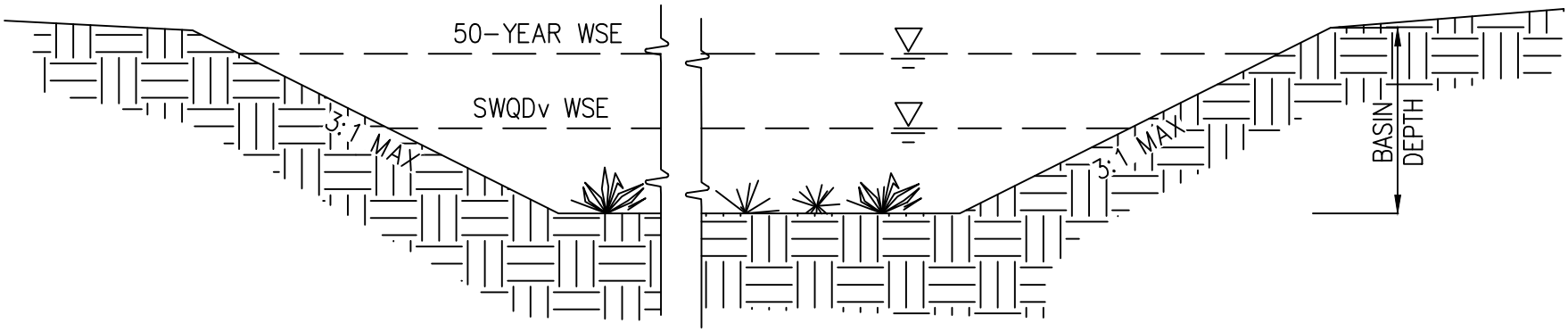
APPENDIX G

BASIN SIZING CALCULATIONS

Infiltration Basin Sizing Summary									
Drainage Area ID	**Drainage Area (acres)**	**SWQDv (cf)**	**50-Year Storm Volume (cf)**	**Basin Volume Provided (cf)**	**Basin Bottom Area (sf)**	**Basin Depth (ft)**	**Infiltration Rate (in/hr)**	**Drawdown Time (hours)**	**Basin Designation**
A	17.28	37,701	155,882	189,429	15,319	6.0	1.7	42.4	Basin A
B	16.51	36,004	148,839	158,014	12,610	7.0	1.7	49.4	Basin B
C	16.69	34,921	144,397	169,568	12,547	6.0	1.7	42.4	Basin C
D	16.24	34,497	142,580	147,289	12,369	8.0	1.7	56.5	Basin D
Total	**66.73**	**143,123**	**591,698**	**664,300**					

Infiltration Basin WSE Summary					
Drainage Area ID	**Basin Bottom Elevation (ft)**	**Basin Top Elevation (ft)**	**SWQDv WSE (ft)**	**50-Year Storm WSE (ft)**	**Basin Designation**
A	2,527.50	2,533.50	2529.30	2532.70	Basin A
B	2,526.20	2,533.20	2528.60	2533.00	Basin B
C	2,525.40	2,531.40	2528.30	2531.90	Basin C
D	2,522.20	2,530.20	2524.30	2530.10	Basin D

NOTE:
- Area E and F2 is off-site drainage. No retention is needed for the off-site improvements.
- Area F1 is 100% pervious and area and will not be disturbed unless it is for grading tie-in purposes.
- Water Surface Elevation was obtained from the Stage-Storage Tables by corresponding to the volume of each storm event.
- See Hydrology Report for the 50-year storm volume for each sub-area.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Thursday, 05 / 4 / 2023

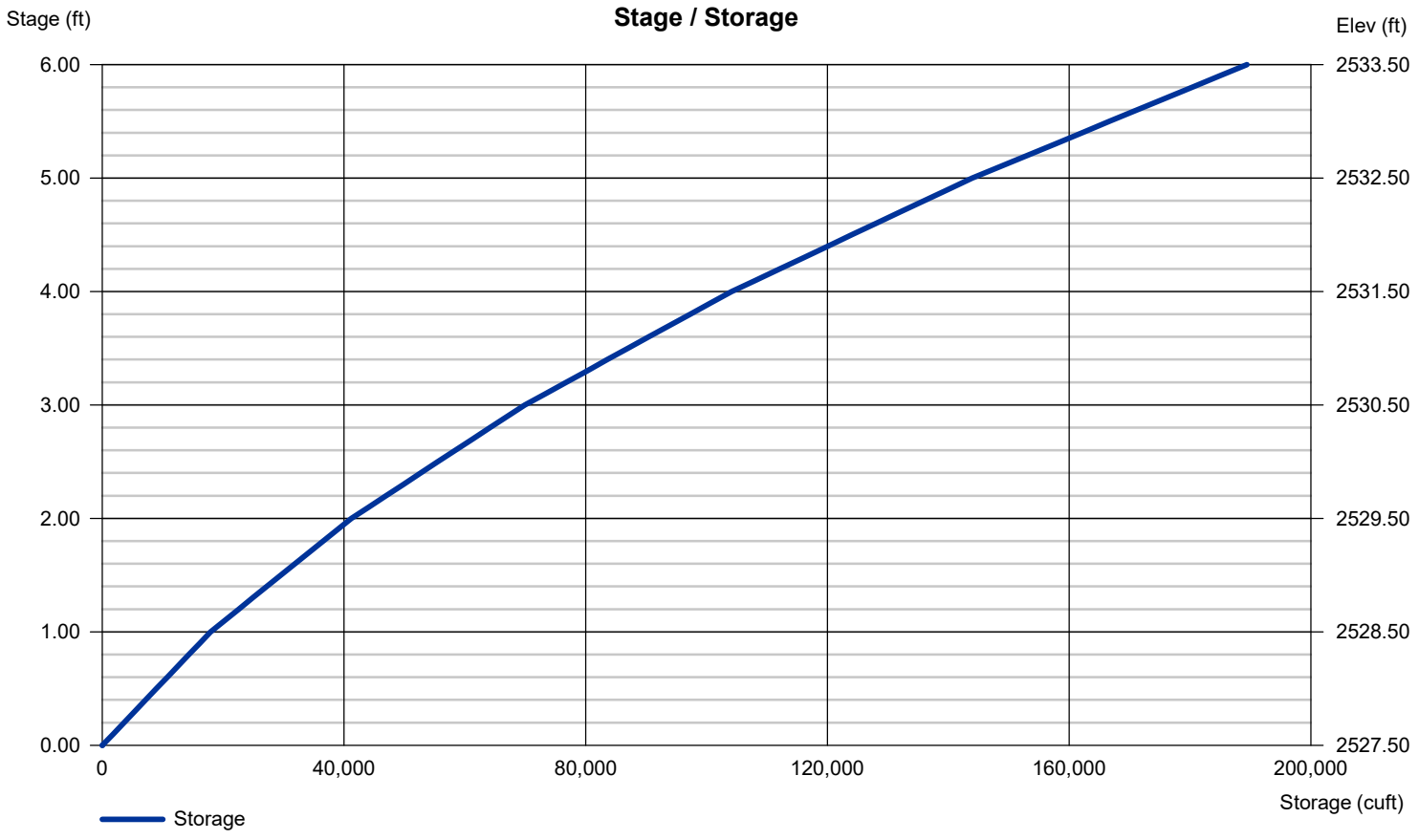
Pond No. 1 - Basin A

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2527.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2527.50	15,319	0	0
1.00	2528.50	20,636	17,910	17,910
2.00	2529.50	26,029	23,278	41,188
3.00	2530.50	31,498	28,717	69,905
4.00	2531.50	37,043	34,230	104,135
5.00	2532.50	42,664	39,817	143,951
6.00	2533.50	48,360	45,478	189,429



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Thursday, 05 / 4 / 2023

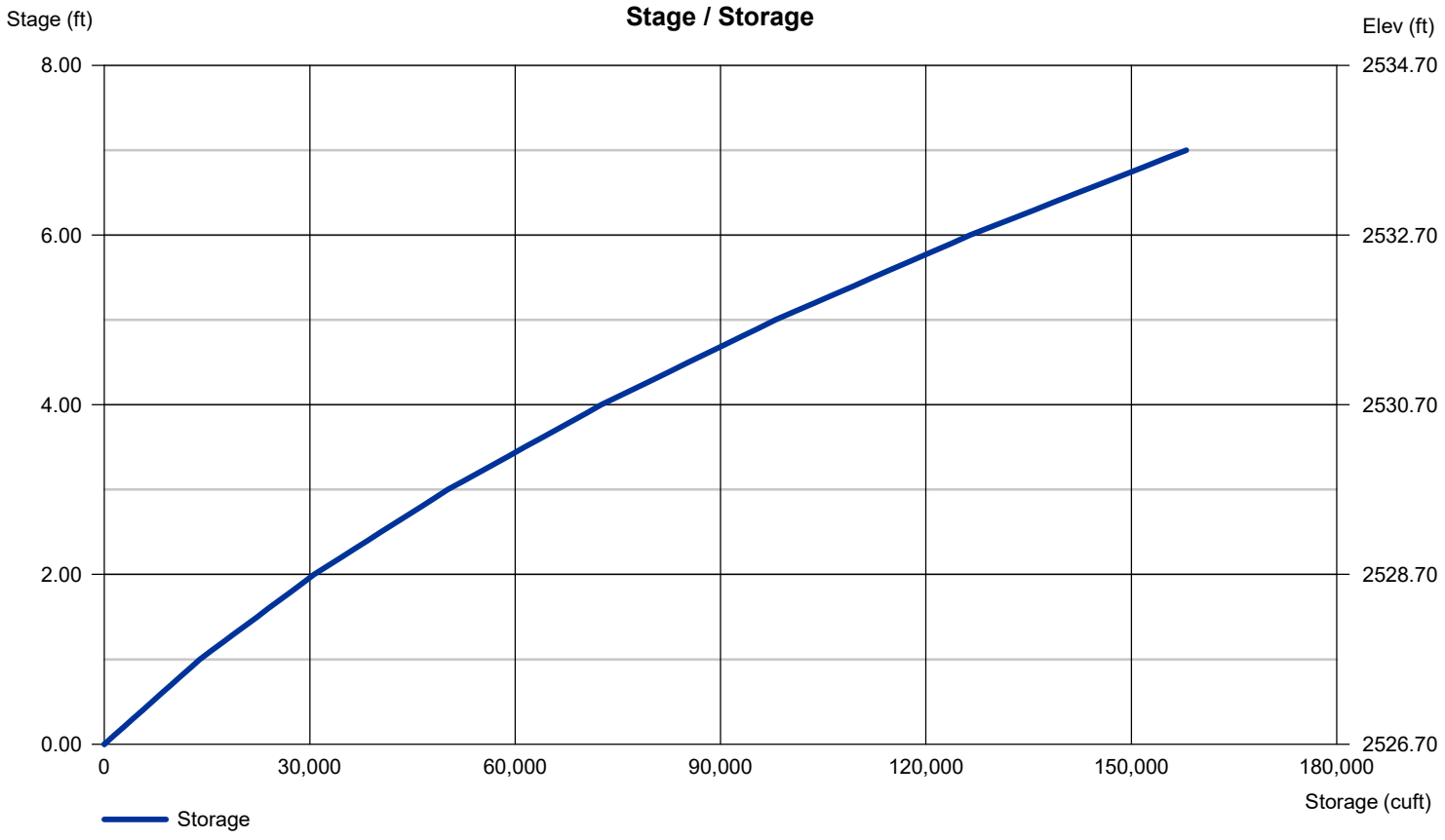
Pond No. 2 - Basin B

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2526.70 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2526.70	12,609	0	0
1.00	2527.70	15,327	13,945	13,945
2.00	2528.70	18,116	16,700	30,645
3.00	2529.70	20,979	19,528	50,173
4.00	2530.70	23,915	22,429	72,602
5.00	2531.70	26,923	25,402	98,003
6.00	2532.70	30,004	28,447	126,450
7.00	2533.70	33,157	31,564	158,014



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Thursday, 05 / 4 / 2023

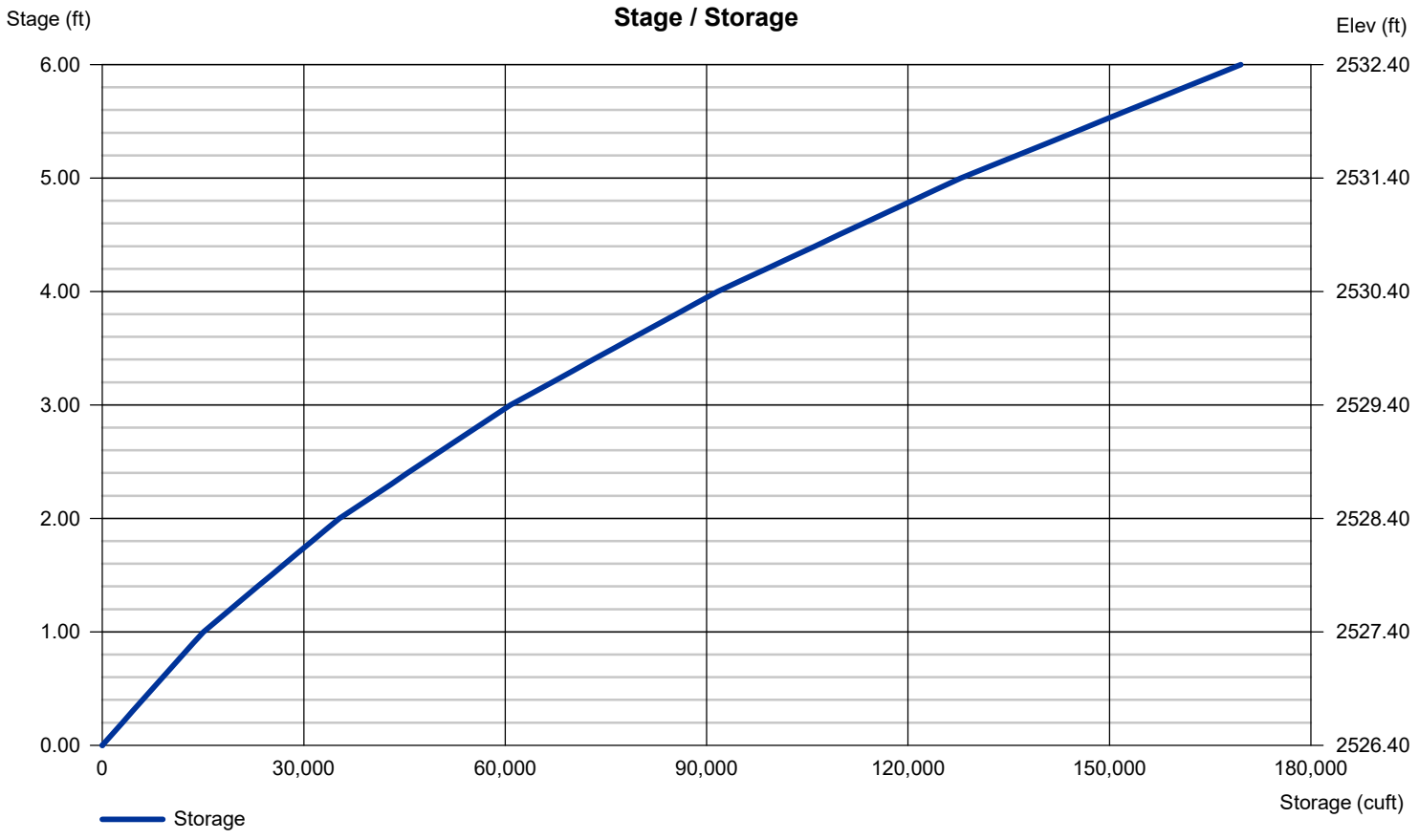
Pond No. 3 - Basin C

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2526.40 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2526.40	12,546	0	0
1.00	2527.40	17,691	15,044	15,044
2.00	2528.40	22,908	20,241	35,285
3.00	2529.40	28,197	25,504	60,789
4.00	2530.40	33,557	30,835	91,624
5.00	2531.40	38,990	36,236	127,860
6.00	2532.40	44,495	41,708	169,568



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Thursday, 05 / 4 / 2023

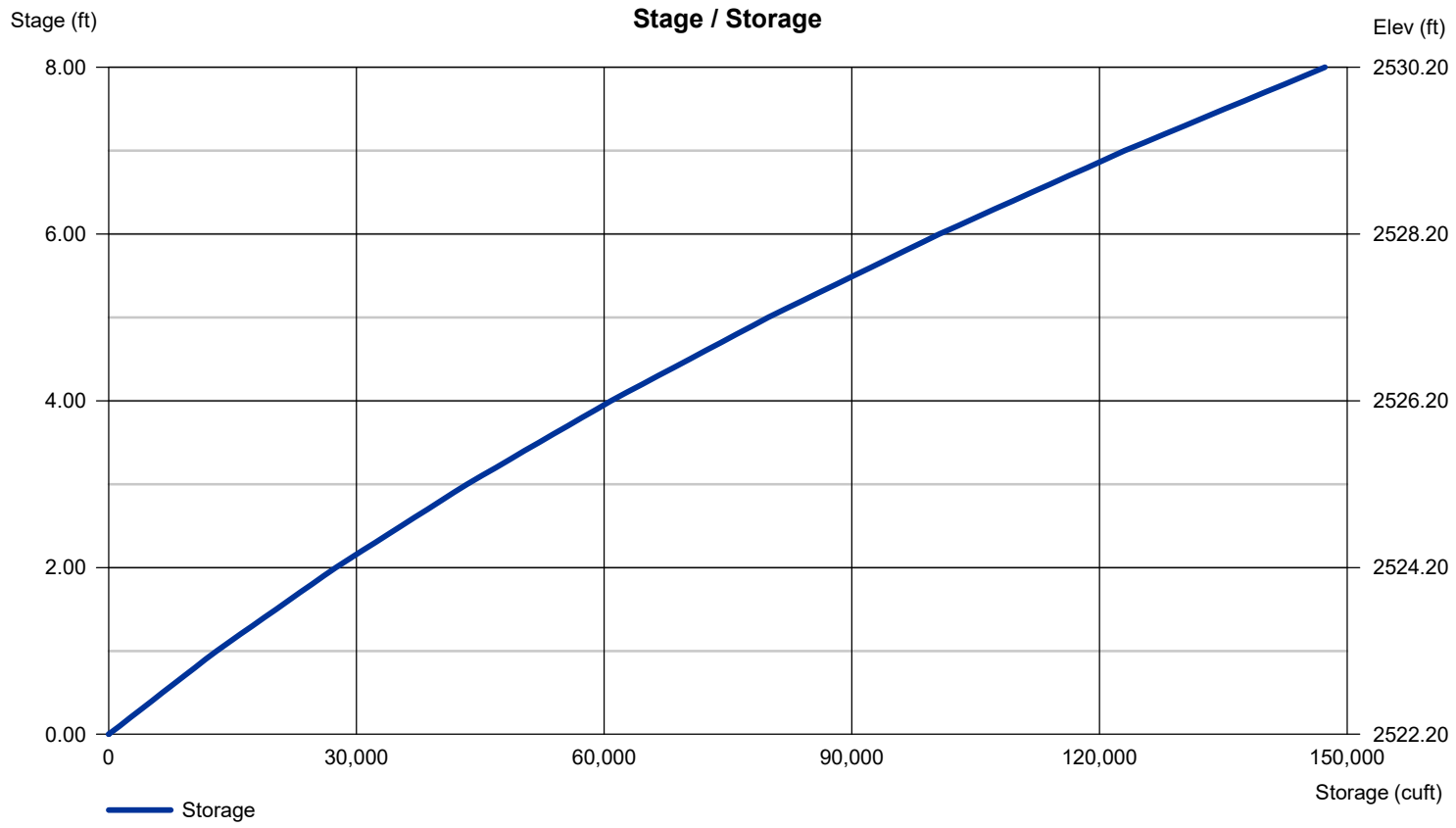
Pond No. 4 - Basin D

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2522.20 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2522.20	12,369	0	0
1.00	2523.20	13,731	13,043	13,043
2.00	2524.20	15,161	14,439	27,481
3.00	2525.20	16,661	15,904	43,385
4.00	2526.20	18,229	17,437	60,822
5.00	2527.20	19,867	19,040	79,863
6.00	2528.20	21,573	20,712	100,575
7.00	2529.20	23,348	22,452	123,027
8.00	2530.20	25,192	24,262	147,289



APPENDIX H

PRELIMINARY HYDRAULIC CALCULATIONS

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, May 5 2023

36-inch SD - Division Street

Circular

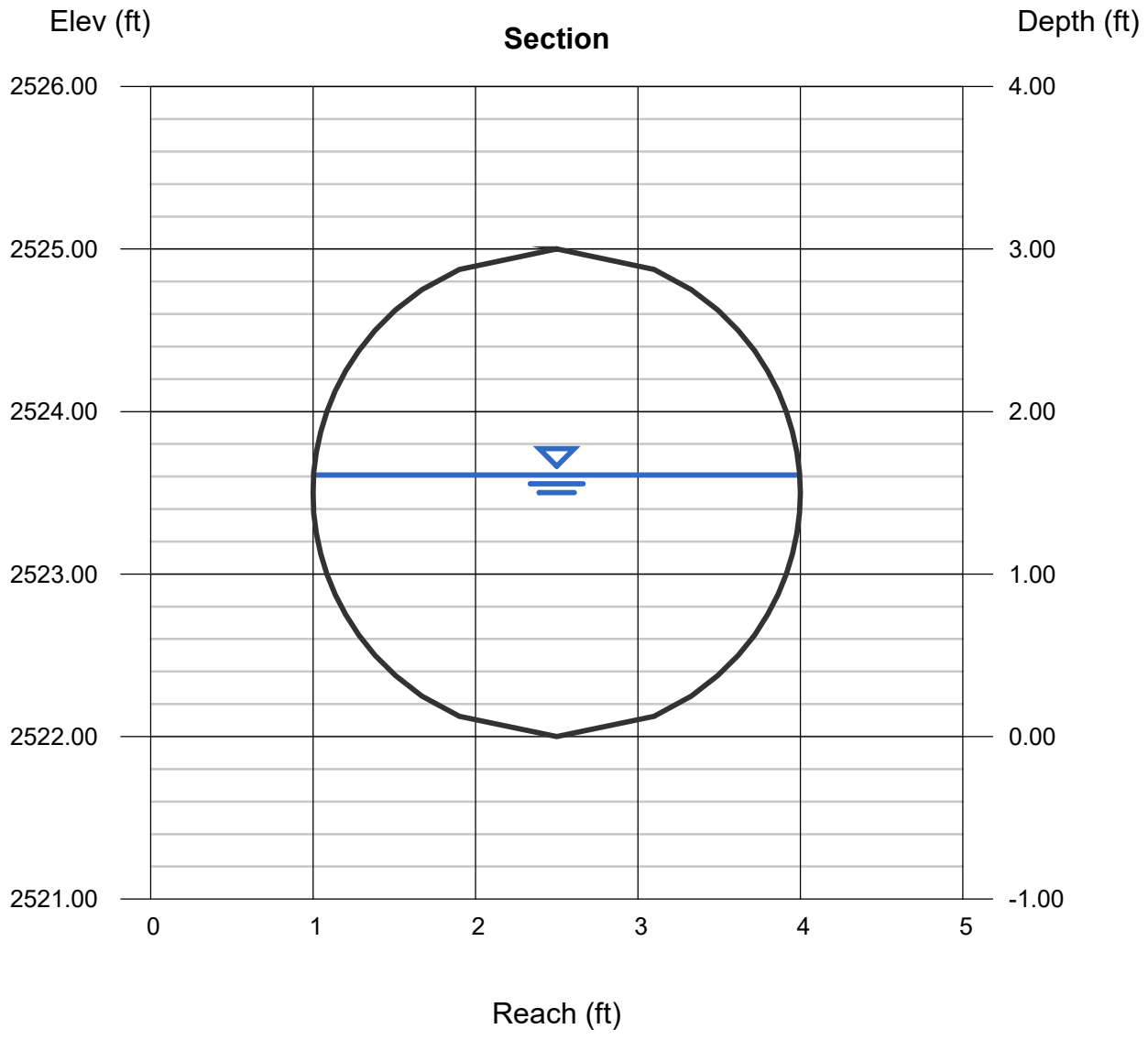
Diameter (ft)	= 3.00
Invert Elev (ft)	= 2522.00
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 28.61

Highlighted

Depth (ft)	= 1.61
Q (cfs)	= 28.61
Area (sqft)	= 3.87
Velocity (ft/s)	= 7.40
Wetted Perim (ft)	= 4.93
Crit Depth, Yc (ft)	= 1.74
Top Width (ft)	= 2.99
EGL (ft)	= 2.46



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, May 5 2023

Area A1

Circular

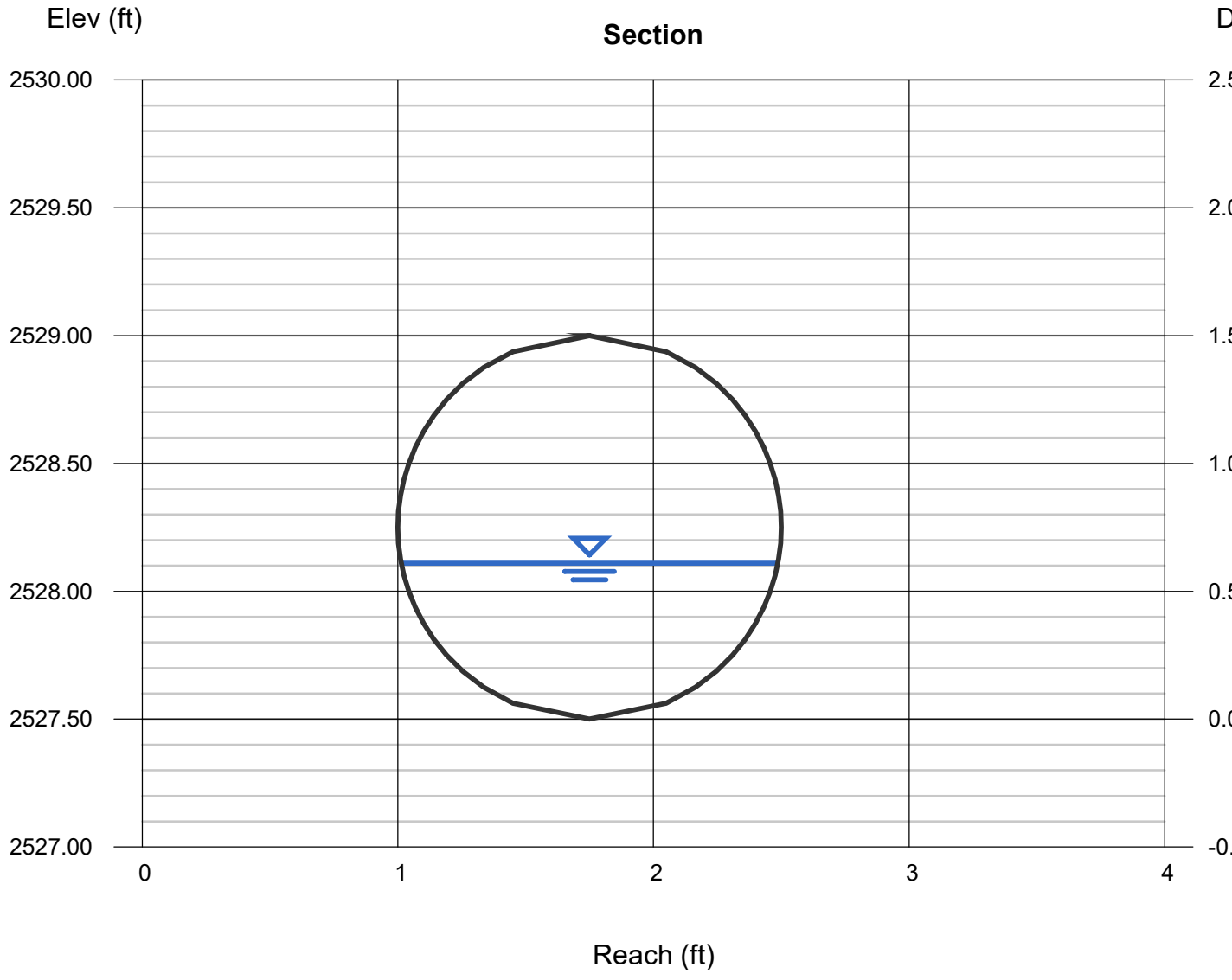
Diameter (ft)	= 1.50
Invert Elev (ft)	= 2527.50
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.75

Highlighted

Depth (ft)	= 0.61
Q (cfs)	= 2.750
Area (sqft)	= 0.68
Velocity (ft/s)	= 4.06
Wetted Perim (ft)	= 2.08
Crit Depth, Yc (ft)	= 0.63
Top Width (ft)	= 1.47
EGL (ft)	= 0.87



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, May 5 2023

Area A2

Circular

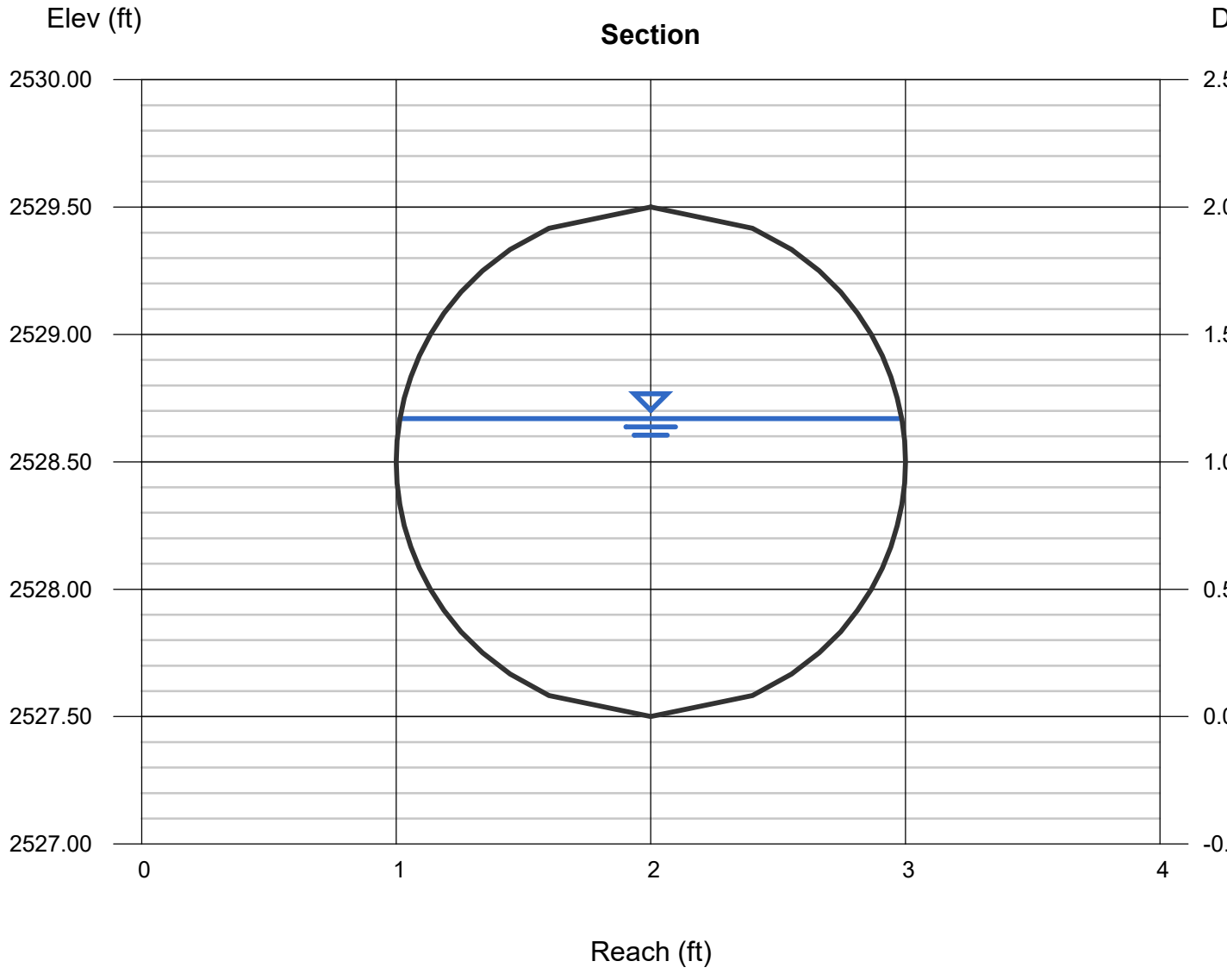
Diameter (ft)	= 2.00
Invert Elev (ft)	= 2527.50
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 11.16

Highlighted

Depth (ft)	= 1.17
Q (cfs)	= 11.16
Area (sqft)	= 1.92
Velocity (ft/s)	= 5.83
Wetted Perim (ft)	= 3.49
Crit Depth, Yc (ft)	= 1.20
Top Width (ft)	= 1.97
EGL (ft)	= 1.70



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, May 5 2023

Area B1

Circular

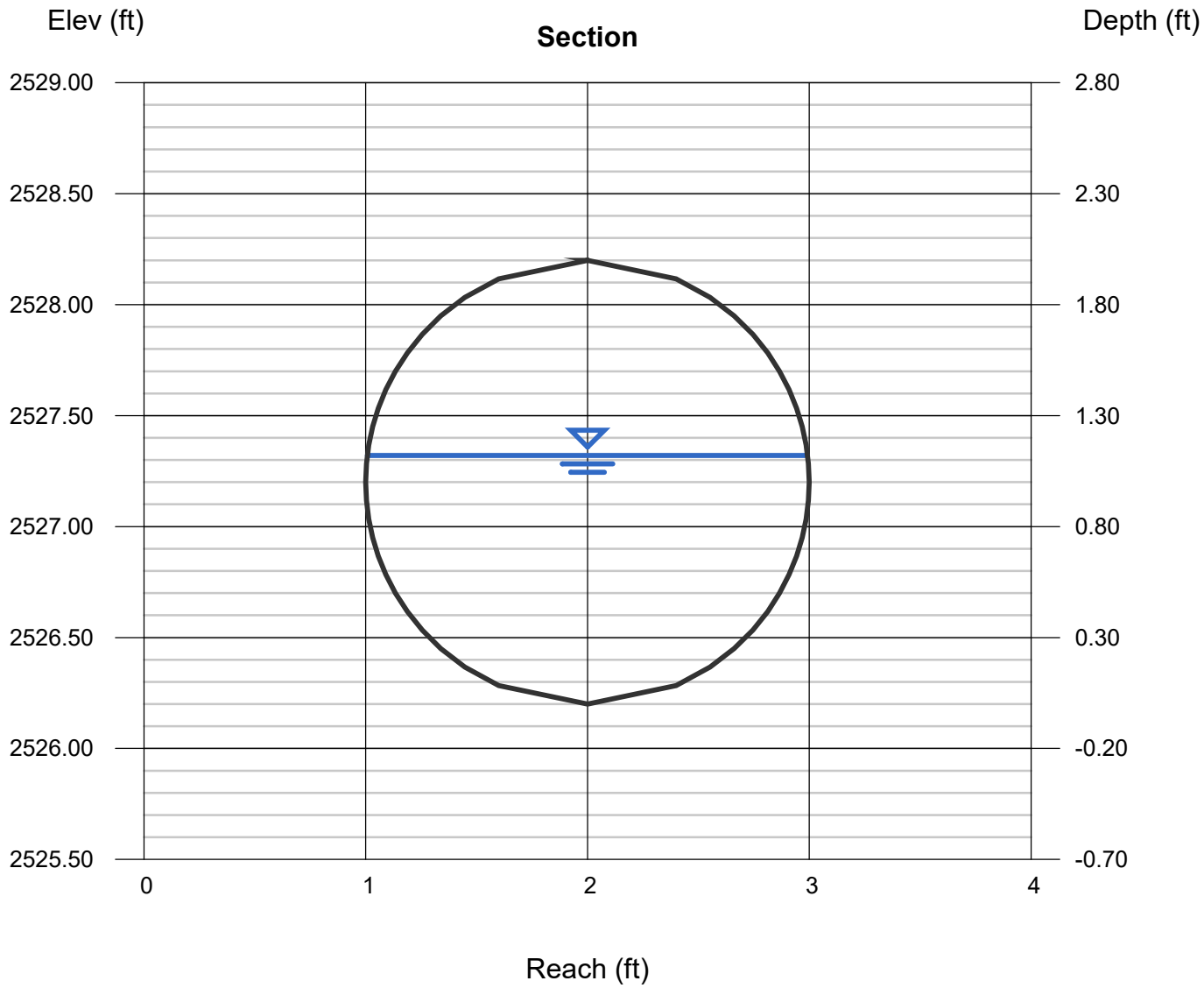
Diameter (ft)	= 2.00
Invert Elev (ft)	= 2526.20
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.40

Highlighted

Depth (ft)	= 1.12
Q (cfs)	= 10.40
Area (sqft)	= 1.82
Velocity (ft/s)	= 5.72
Wetted Perim (ft)	= 3.39
Crit Depth, Yc (ft)	= 1.16
Top Width (ft)	= 1.98
EGL (ft)	= 1.63



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, May 5 2023

Area C1

Circular

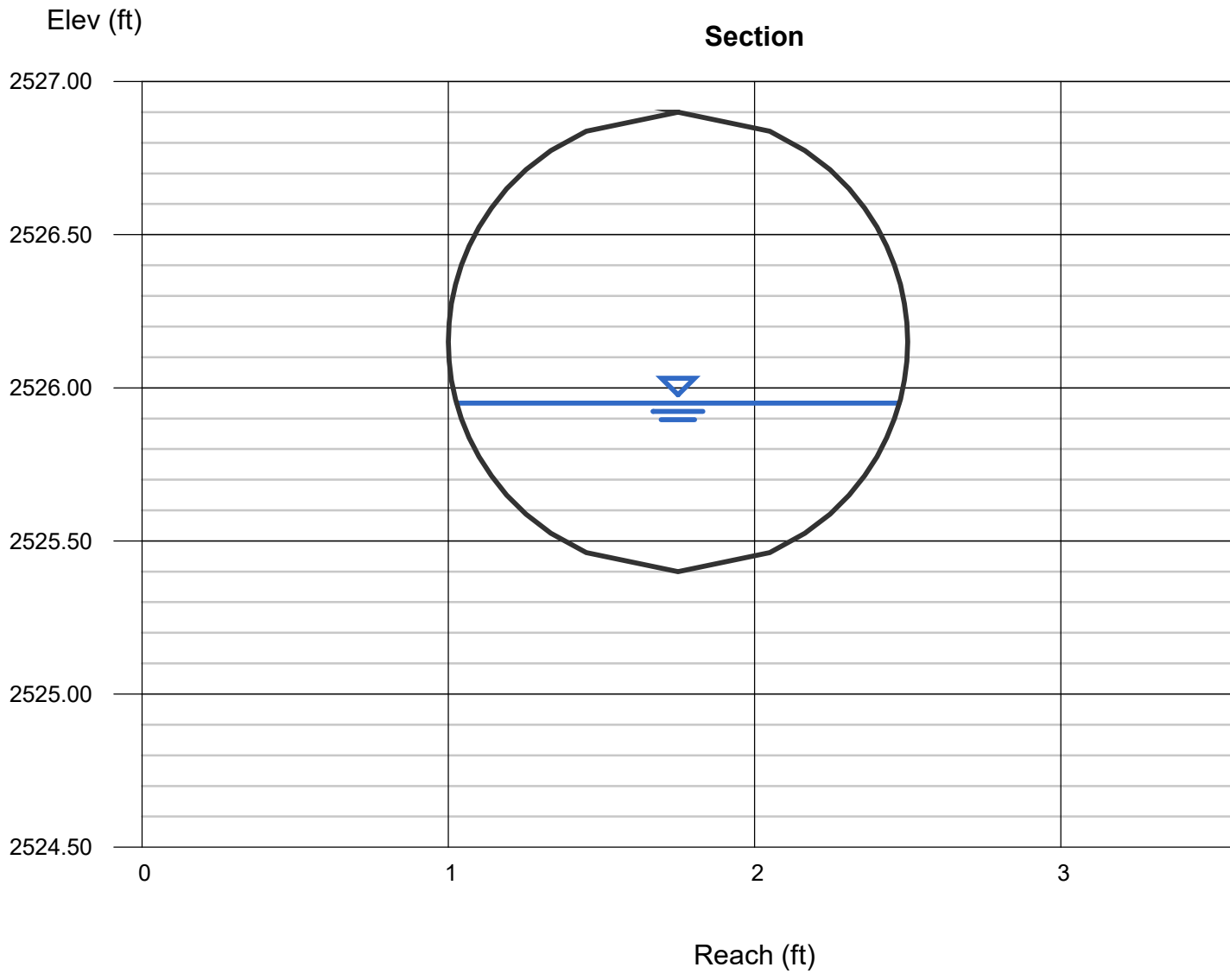
Diameter (ft)	= 1.50
Invert Elev (ft)	= 2525.40
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.26

Highlighted

Depth (ft)	= 0.55
Q (cfs)	= 2.260
Area (sqft)	= 0.59
Velocity (ft/s)	= 3.82
Wetted Perim (ft)	= 1.96
Crit Depth, Yc (ft)	= 0.57
Top Width (ft)	= 1.45
EGL (ft)	= 0.78



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, May 5 2023

Area C2

Circular

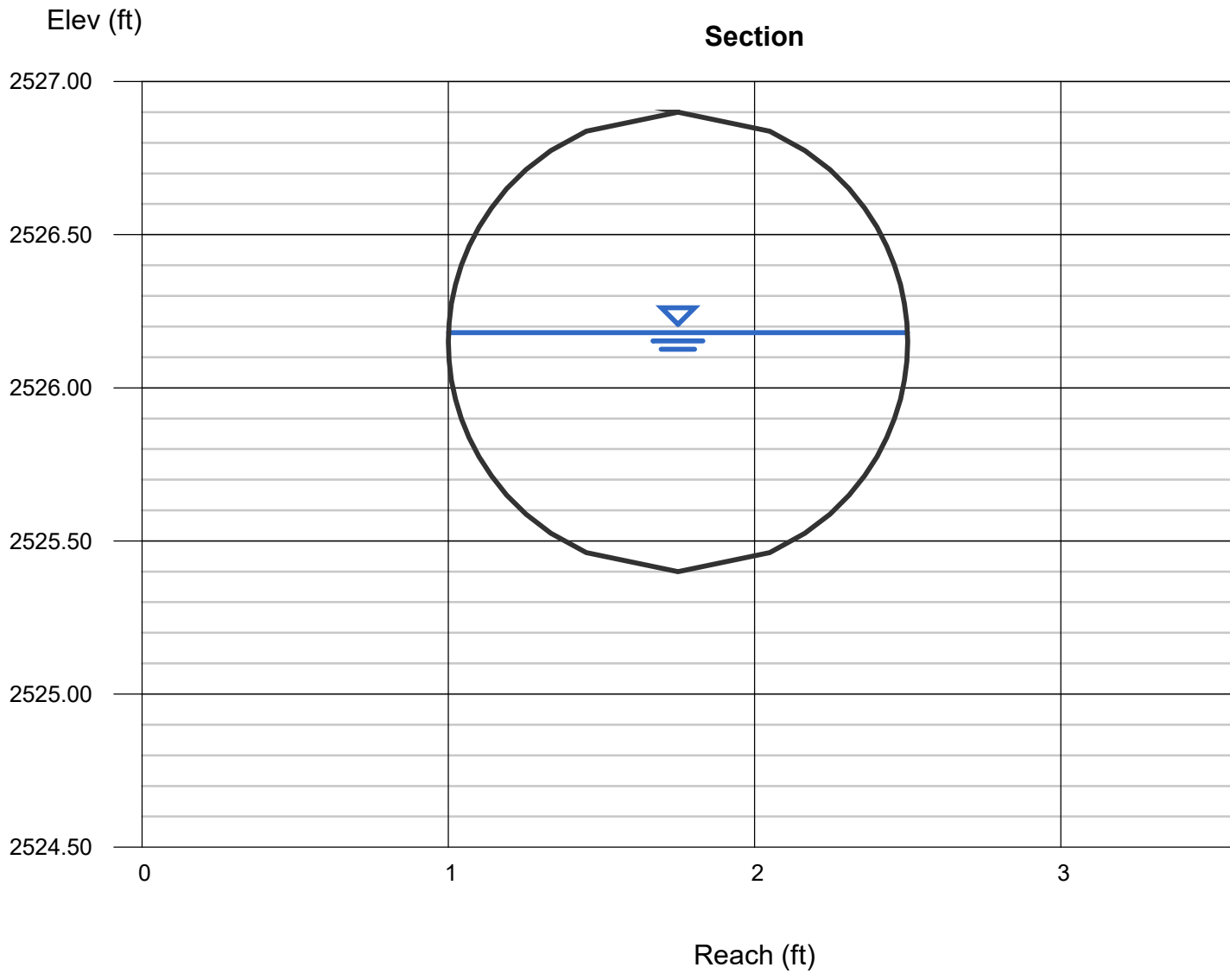
Diameter (ft)	= 1.50
Invert Elev (ft)	= 2525.40
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.32

Highlighted

Depth (ft)	= 0.78
Q (cfs)	= 4.320
Area (sqft)	= 0.93
Velocity (ft/s)	= 4.63
Wetted Perim (ft)	= 2.42
Crit Depth, Yc (ft)	= 0.80
Top Width (ft)	= 1.50
EGL (ft)	= 1.11



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, May 5 2023

Area C3

Circular

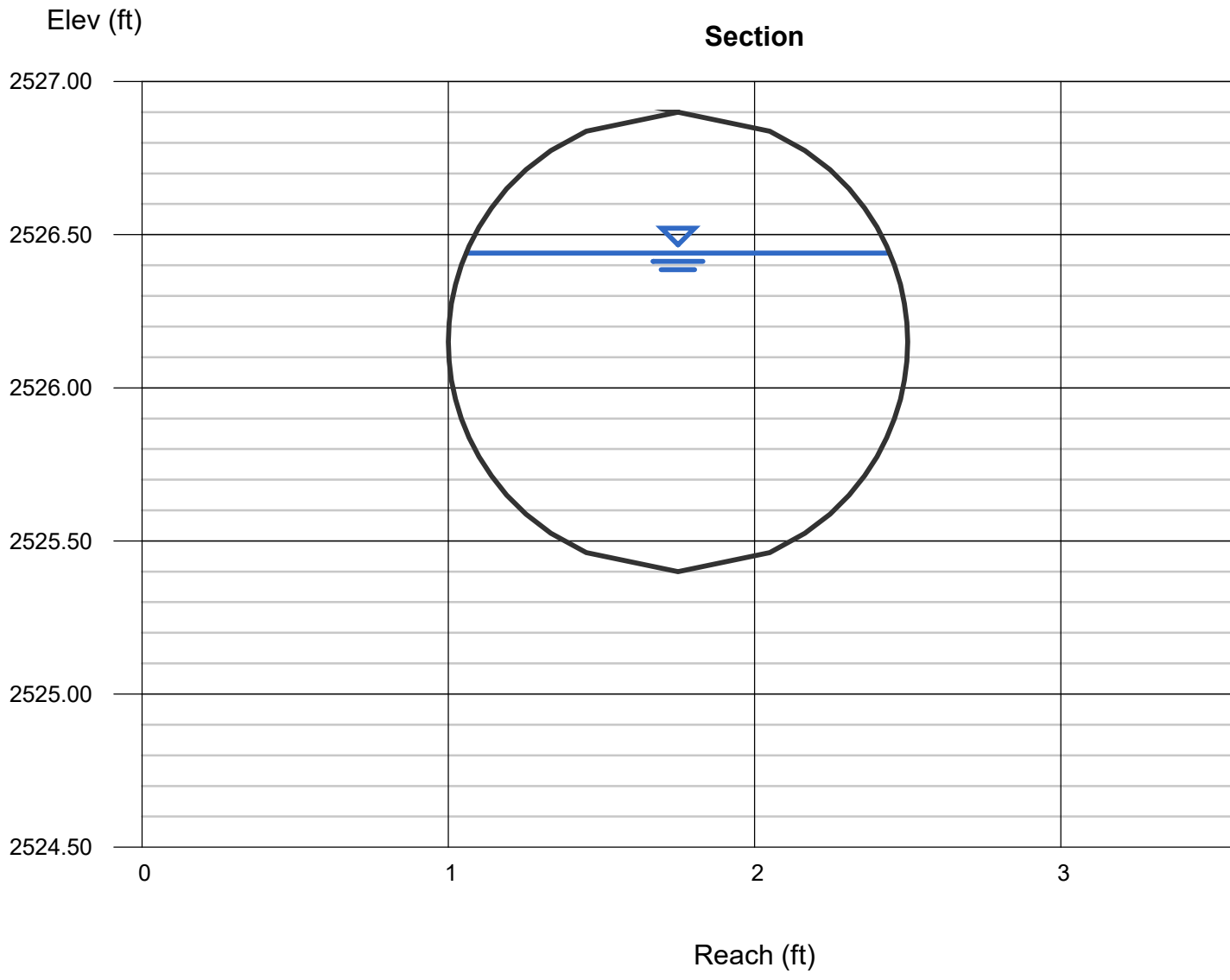
Diameter (ft)	= 1.50
Invert Elev (ft)	= 2525.40
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 6.58

Highlighted

Depth (ft)	= 1.04
Q (cfs)	= 6.580
Area (sqft)	= 1.31
Velocity (ft/s)	= 5.02
Wetted Perim (ft)	= 2.95
Crit Depth, Yc (ft)	= 1.00
Top Width (ft)	= 1.38
EGL (ft)	= 1.43



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, May 5 2023

Area D1

Circular

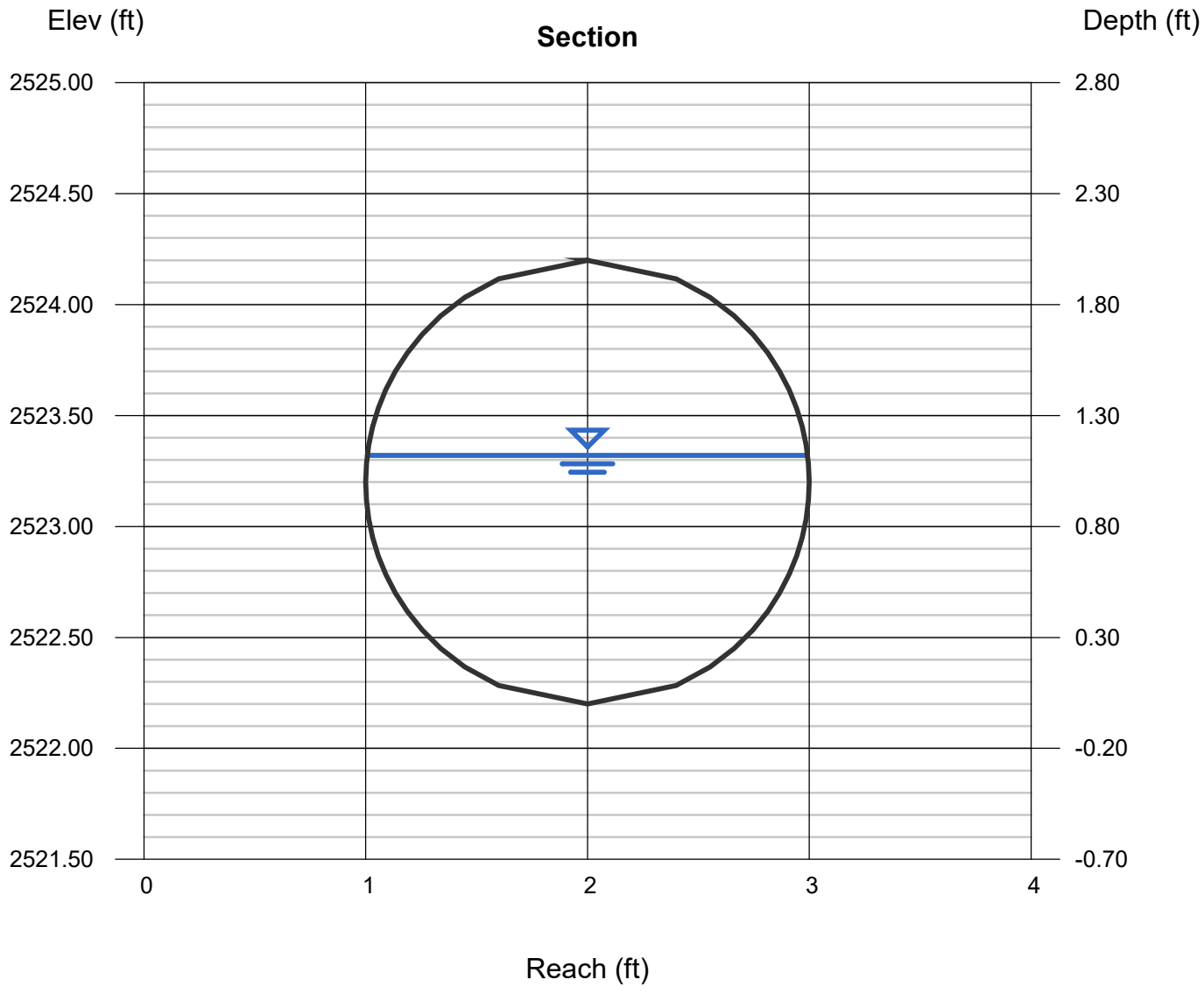
Diameter (ft)	= 2.00
Invert Elev (ft)	= 2522.20
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 10.42

Highlighted

Depth (ft)	= 1.12
Q (cfs)	= 10.42
Area (sqft)	= 1.82
Velocity (ft/s)	= 5.73
Wetted Perim (ft)	= 3.39
Crit Depth, Yc (ft)	= 1.16
Top Width (ft)	= 1.98
EGL (ft)	= 1.63



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, May 5 2023

Temporary Drainage Channel

Trapezoidal

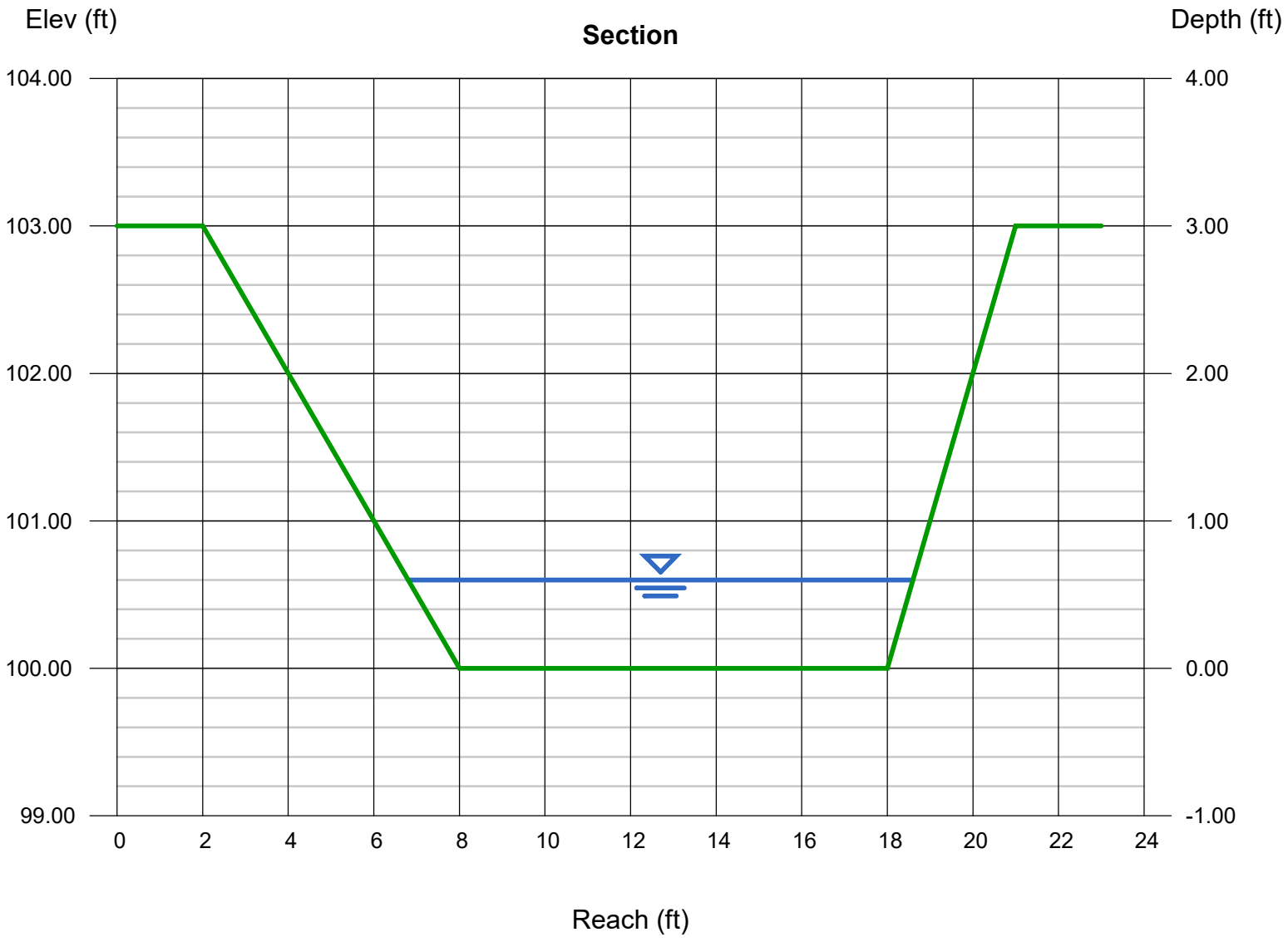
Bottom Width (ft)	= 10.00
Side Slopes (z:1)	= 2.00, 1.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.40
N-Value	= 0.018

Calculations

Compute by:	Known Q
Known Q (cfs)	= 22.43

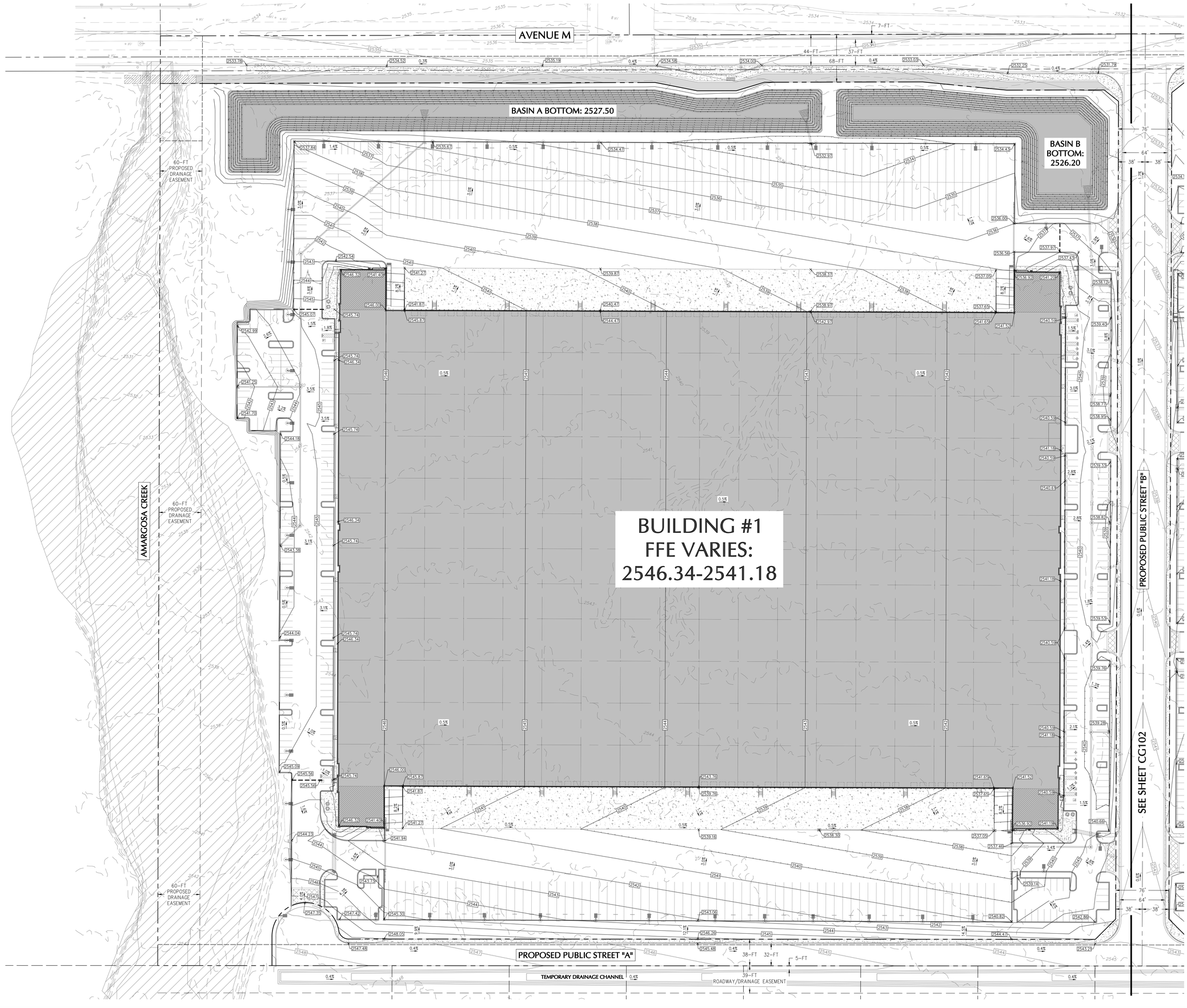
Highlighted

Depth (ft)	= 0.60
Q (cfs)	= 22.43
Area (sqft)	= 6.54
Velocity (ft/s)	= 3.43
Wetted Perim (ft)	= 12.19
Crit Depth, Yc (ft)	= 0.53
Top Width (ft)	= 11.80
EGL (ft)	= 0.78



APPENDIX I

CONCEPTUAL GRADING & DRAINAGE PLAN



PRELIMINARY EARTHWORK:

CUT:	192,991 CY
FILL	192,991 CY
NET (EXPORT):	BALANCED

NOTE: A SHRINK VALUE OF 10% AND A SWELL VALUE OF 0% ARE USED

SCALE: 1 INCH = 50 FEET

Date	Description	No.
Revisions		

Signature Date

LANGAN
Langan Engineering and Environmental Services, Inc.
515 Flower Street, Suite 1060
Los Angeles, California 90071
T: 213.314.8100 www.langan.com

Project

PALMDALE LOGISTICS PARK

PALMDALE

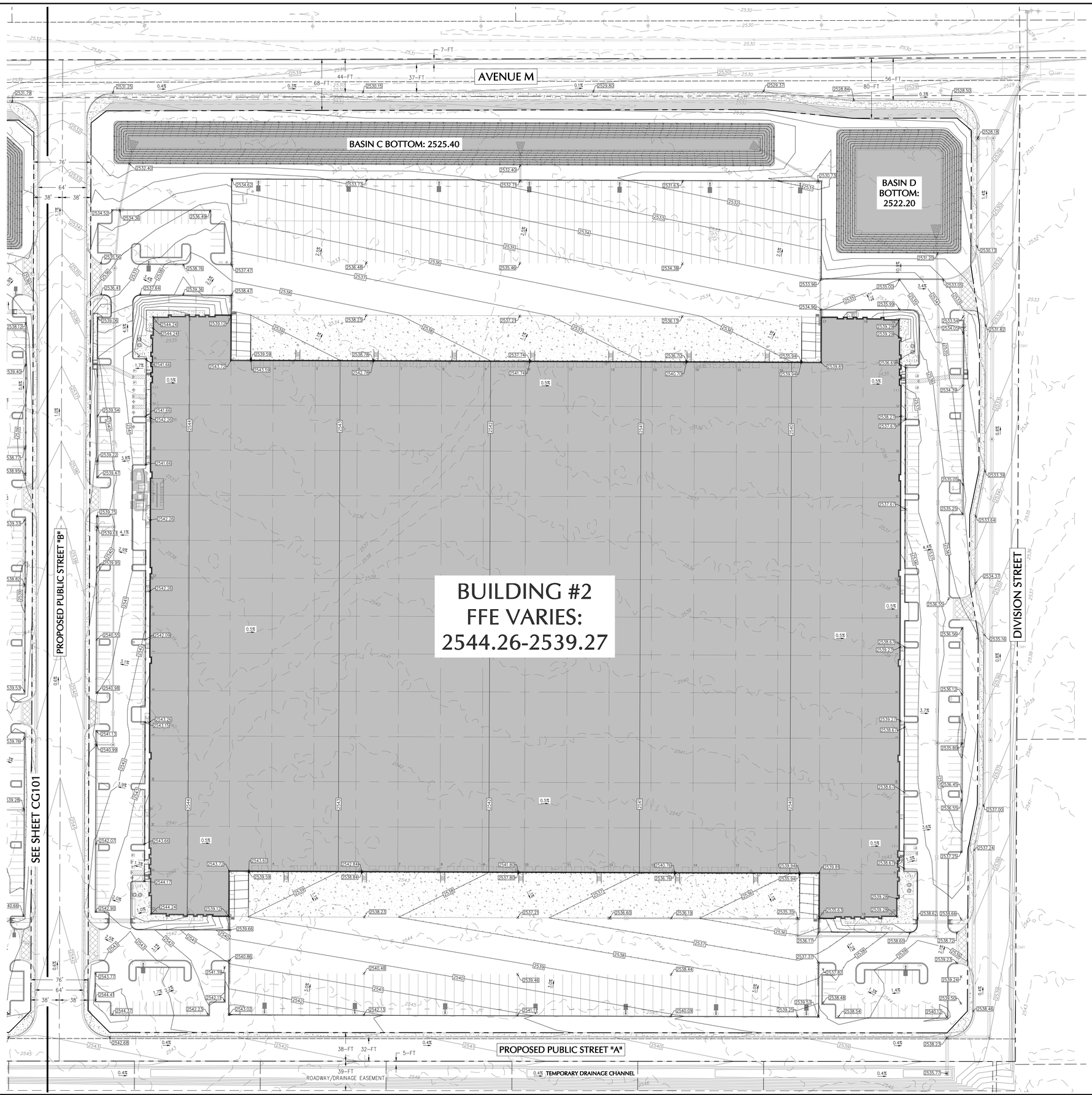
LOS ANGELES COUNTY CALIFORNIA

Drawing Title

CONCEPTUAL GRADING PLAN

Project No. 722010501	Drawing No. CG101
Date 09/08/2023	
Drawn By DMB	
Checked By MRG	Sheet 2 of 12

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PRELIMINARY EARTHWORK:

CUT:	192,991 CY
FILL	192,991 CY
NET (EXPORT):	BALANCED

NOTE: A SHRINK VALUE OF 10% AND A SWELL VALUE OF 0% ARE USED

SCALE: 1 INCH = 50 FEET

No.	Description	Date
	Revisions	

Signature Date

LANGAN
Langan Engineering and Environmental Services, Inc.
515 Flower Street, Suite 1060
Los Angeles, California 90071
T: 213.314.8100 www.langan.com

Project

PALMDALE LOGISTICS PARK

PALMDALE

LOS ANGELES COUNTY CALIFORNIA

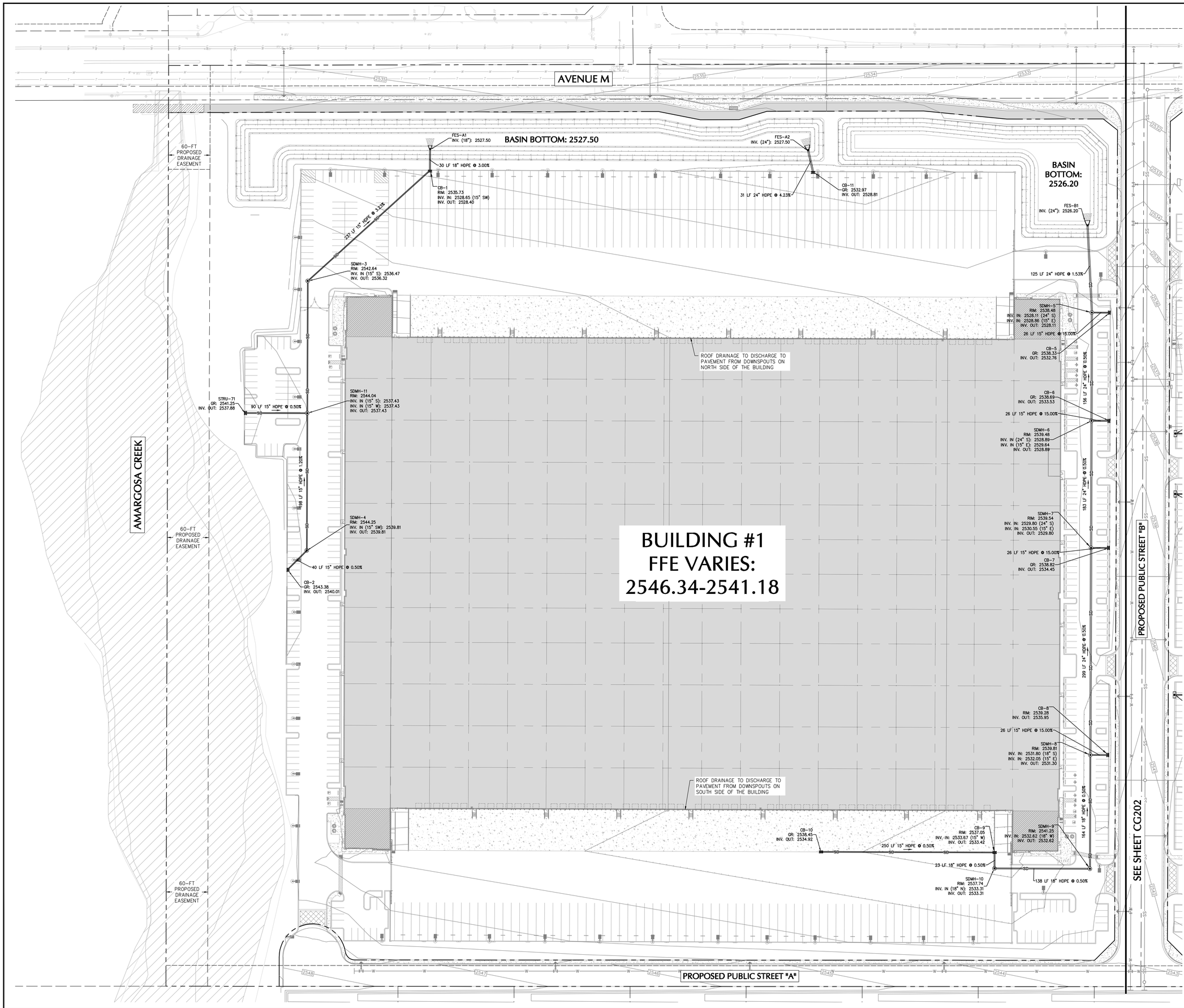
Drawing Title

CONCEPTUAL GRADING PLAN

Project No. 722010501	Drawing No. CG102
Date 09/08/2023	
Drawn By DMB	
Checked By MRG	Sheet 3 of 12

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Date: 9/11/2023 Time: 11:23 User: dburgess Style Table: Langan.stb Layout: CG102 Document Code: 722010501-0101-CG101-0101



50 0 25 50
SCALE: 1 INCH = 50 FEET

Date	Description	No.
Revisions		

Signature Date

LANGAN
Langan Engineering and Environmental Services, Inc.
515 Flower Street, Suite 1060
Los Angeles, California 90071
T: 213.314.8100 www.langan.com

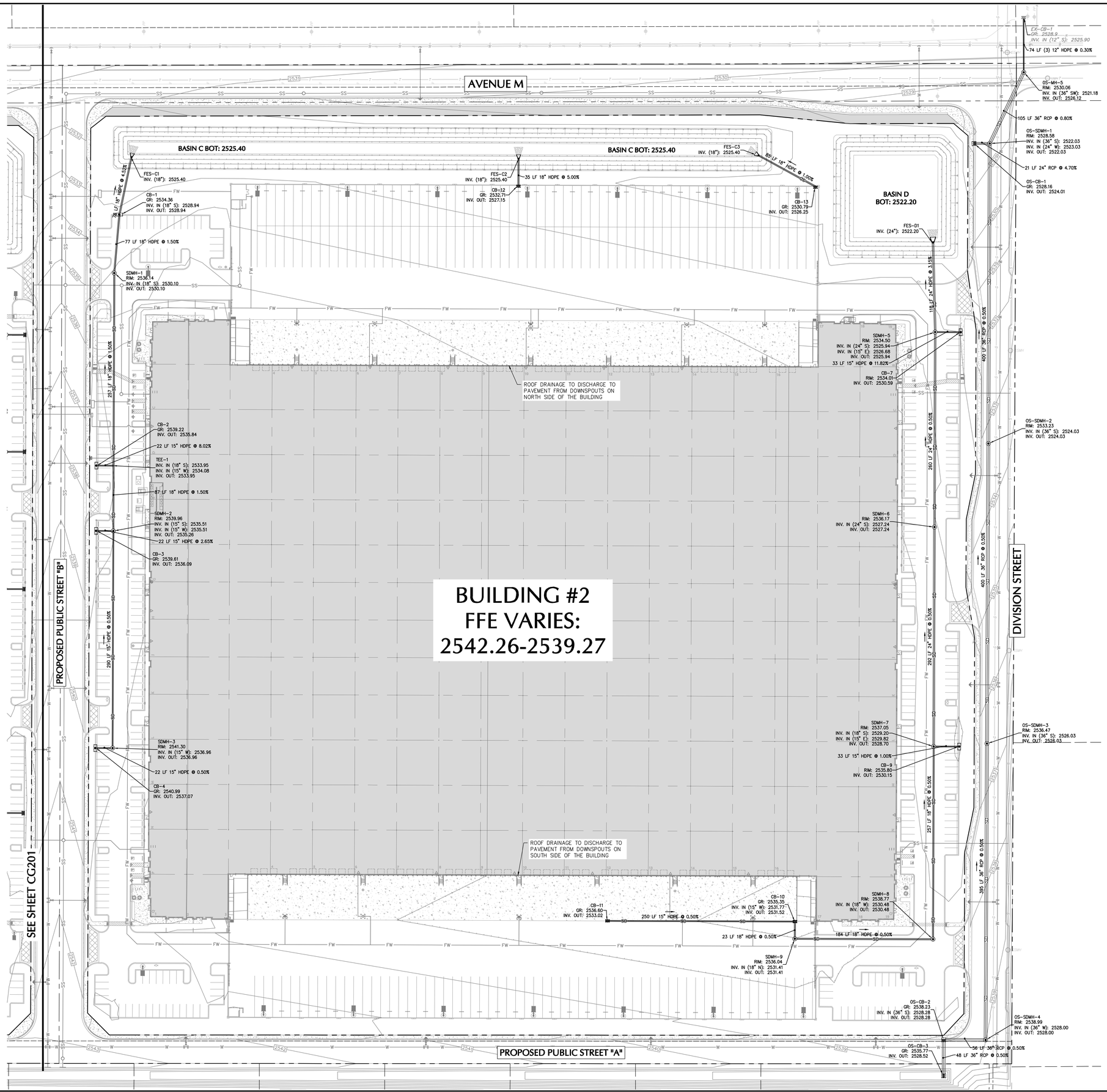
Project
PALMDALE LOGISTICS PARK
PALMDALE
LOS ANGELES COUNTY CALIFORNIA

Drawing Title
CONCEPTUAL DRAINAGE PLAN

Project No.	Drawing No.
722010501	CG201
Date: 09/08/2023	
Drawn By: DMB	
Checked By: MRG	Sheet 6 of 12

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Date: 9/8/2023 Time: 13:15 User: klao Style Table: Langan.stb Layout: CG201 Document Code: 722010501-0101-CG102-0101



50 0 25 50
SCALE: 1 INCH = 50 FEET

Date	Description	No.
Revisions		

Signature Date

LANGAN
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515 Flower Street, Suite 1060
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Project
PALMDALE LOGISTICS PARK
PALMDALE
LOS ANGELES COUNTY CALIFORNIA

Drawing Title
CONCEPTUAL DRAINAGE PLAN

Project No.	Drawing No.
722010501	CG202
Date: 09/08/2023	
Drawn By: DMB	
Checked By: MRG	Sheet 7 of 12

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APPENDIX J

INFILTRATION REPORT

August 23, 2022

Covington Development Group, Inc.
3 Corporate Plaza, Suite 230
Newport Beach, California 92660

Attention: Mr. Michael Di Sano
Sr. Director - Entitlements

Project No.: **22G164-2**

Subject: **Results of Infiltration Testing**
Proposed Warehouse Development
SWC West Avenue M and Division Street
Palmdale, California

Reference: Geotechnical Investigation, Proposed Warehouse Development, SWC West Avenue M and Division Street, Palmdale, California, Prepared by Southern California Geotechnical, Inc. (SCG) for Covington Development Group, Inc., SCG Project No. 22G164-1, dated August 22, 2022.

Mr. Di Sano:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in accordance with our Proposal No. 22P122, dated January 11, 2022. The scope of the infiltration testing consisted of site reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the on-site soils. The infiltration testing was performed in general accordance with the guidelines published by the County of Los Angeles – Department of Public Works Geotechnical and Materials Engineering Division. These guidelines are dated June 30, 2021 and titled Guidelines for Design, Investigation, and Reporting Low Impact Development Stormwater Infiltration, GS200.1.

Site Description

The subject site is located at the southwest corner of West Avenue M and Division Street in Palmdale, California. The site is bounded to the north by West Avenue M, to the east by a dirt road (the future continuation of Division Street), to the south by a vacant lot, and to the west by portions of the Amargosa Creek. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site consists of a rectangular-shaped property 78.68± acres in size. The site is currently vacant and undeveloped. The ground surface consists of exposed soil with sparse native vegetation, including minor shrubs and few Joshua trees spread throughout the site. A few dirt

roads are present on the site, trending north to south, and along the eastern boundary of the site.

Detailed topographic information was not available at the time of this report. Based on the elevations obtained from Google Earth, and visual observations made at the time of the subsurface investigation, the overall site topography slopes downward to the north at a gradient of 1± percent. It should be noted that portions of the existing Amargosa Creek are within the project boundary. However, the proposed development will exclude any construction within these areas.

Proposed Development

A conceptual site plan prepared by HPA, Inc., has been provided to our office by the client. Based on this plan, the subject site will be developed with two (2) warehouses (identified as Building 1 and Building 2). Building 1 will be 716,930± ft² in size and will be located in the western region of the site. Building 2 will be 712,770± ft² in size and will be located in the eastern region of the site. Dock-high doors will be constructed on the south and north sides of the buildings. The proposed buildings are expected to be surrounded by asphaltic concrete pavements in the parking and drive areas, Portland cement concrete pavements in the loading dock areas, and concrete flatwork and landscaped planters throughout the site.

We understand that this project may include on-site storm water infiltration. The conceptual site plan indicates that two (2) detention basins will be included with the proposed development. The proposed basins will be located north of the proposed buildings. The depths of the proposed basins were unknown at the time of this report. Based on our experience with similar projects, the bottom of each basin is expected to be 15± feet below the existing site grades.

Concurrent Study

SCG concurrently conducted a geotechnical investigation at the subject site, referenced above. As a part of this study, twelve (12) borings (identified as Boring Nos. B-1 through B-12) were advanced to depths of 15 to 25± feet below the existing site grades.

Native alluvium was encountered at the ground surface at all of the boring locations, extending to at least the maximum depth explored of 25± feet. Most of the borings encountered loose sands and silty sands with varying clay content, extending to depths of 3 to 5½± feet, and occasional loose sands between 5½ to 10½± feet. At greater depths and extending to at least the maximum depth explored of 25± feet, the alluvium generally consists of medium dense to dense sands and silty sands with varying fine to coarse gravel and clay content, and occasional medium dense gravelly sands. Boring No. B-8 encountered a stratum consisting of medium dense silty sands to sandy silts at a depth of 5½ to 8± feet. Boring No. B-11 encountered a stratum consisting of medium dense clayey sands at a depth of 12 to 20± feet.

Groundwater

Free water was not encountered during the drilling of any of the borings. Based on the moisture content of the recovered soil samples and the lack of free water in the borings, the static groundwater table is at a greater depth than 25± feet below existing site grades.

As part of our research, we reviewed available groundwater data in order to determine the historic high groundwater level for the site. The primary reference used to determine the historic groundwater depths in this area is the California Geological Survey (CGS) Seismic Hazard Zone Report 095, Seismic Hazard Zone Report for the Lancaster West 7.5-Minute Quadrangle, which indicates that the historic high groundwater level for the site is approximately 400 feet below the ground surface.

As a part of our research, we reviewed available groundwater data in order to determine groundwater levels for the site. Water level data was obtained from the California Department of Water Resources website, https://wdl.water.ca.gov/waterdatalibrary/. Several monitoring wells are located within 1 mile radius of the site. Water level readings within these monitoring wells indicate a high groundwater level of 121± feet below the ground surface in February 1922. medium

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of four (4) infiltration test borings advanced to a depth of 15± feet below the existing site grades. The borings were logged during drilling by a member of our staff and were advanced using a truck-mounted drilling rig, equipped with 8-inch-diameter hollow stem augers. The approximate locations of the infiltration test borings (identified as Infiltration Test Nos. I-1 through I-4) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Upon the completion of the infiltration borings, the bottom of each test boring was covered with 2± inches of clean ¾-inch gravel. A sufficient length of 3-inch-diameter perforated PVC casing was then placed into each test hole so that the PVC casing extended from the bottom of the test hole to the ground surface. Clean ¾-inch gravel was then installed in the annulus surrounding the PVC casing.

Geotechnical Conditions

Native alluvium was encountered at the ground surface at all of the infiltration test locations, extending to at least the maximum depth explored of 15± feet below the existing site grades. The alluvium generally consists of loose to medium dense fine to coarse sands and silty sands with varying fine to coarse gravel and clay content, and occasional dense silty sands with trace clay. Infiltration Test No. I-3 encountered a stratum consisting of gravelly sands at a depth of 8 to 15± feet. The Boring Logs, which illustrate the conditions encountered at each test location are included within this report.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration systems that will be used at the subject site. The infiltration testing was performed in general accordance with the guidelines published by the County of Los Angeles – Department of Public Works Geotechnical and Materials Engineering Division. These guidelines are dated June 30, 2021 and titled Guidelines for Design, Investigation, and Reporting Low Impact Development Stormwater Infiltration, GS200.1.

Pre-soaking

The infiltration test boring was pre-soaked for at least 1 hour to ensure the sand around the annulus of the perforated pipe was fully saturated. The pre-soaking procedure consisted of filling each test boring with clean potable water to an elevation of at least 12± inches above the bottom of each test boring. In accordance with the Los Angeles County guidelines, since the water in the infiltration test borings did not completely infiltrate within a 30-minute time period after filling each boring, a falling head test was the appropriate test method. Based on the conditions encountered at each of the infiltration test borings, 14-minute measurement intervals were assigned at Infiltration Test No. I-1, and 30-minute measurement intervals were assigned at Infiltration Test Nos. I-2, I-3 and I-4.

Infiltration Testing Procedure

After the completion of the pre-soaking process, SCG performed the infiltration testing. A sufficient amount of water was added to the test borings so that the water level was approximately 3± feet higher than the bottom of the borings and less than or equal to the water level used during the pre-soaking process. As indicated above, 14-minute measurement intervals were assigned at Infiltration Test No. I-1, and 30-minute measurement intervals were assigned at Infiltration Test Nos. I-2, I-3 and I-4. A stabilized rate of drop, where the highest and lowest readings from three consecutive readings are within 10 percent of each other, was obtained for each of the test borings. These water level readings are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on the spreadsheets.

The infiltration rates for the tests are tabulated in inches per hour. In accordance with the typically accepted practice, it is recommended that the most conservative reading from the latter part of the infiltration tests be used for design. These rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Measured Infiltration Rate (inches/hour)
I-1	15	Light Gray Brown to Gray Brown fine to coarse Sand, trace to little Silt	15.0
I-2	15	Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, trace Clay	6.6
I-3	15	Light Gray Brown Gravelly fine to coarse Sand, trace Silt	5.1
I-4	15	Brown Silty fine to coarse Sand, trace Clay	5.8

Laboratory Testing

Moisture Content

The moisture contents for the recovered soil samples within the borings were determined in accordance with ASTM D-2216 and are expressed as a percentage of the dry weight. These test results are presented on the Boring Logs.

Grain Size Analysis

The grain size distribution of selected soils collected from the base of each infiltration test boring have been determined using a range of wire mesh screens. These tests were performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of these tests are presented on Plates C-1 through C-4 of this report.

Design Recommendations

Four (4) infiltration tests were performed in the northwestern, north of Building 1, and northeastern, north of Building 2, areas of the site. The measured infiltration rates at these infiltration test locations ranged from 5.1 to 15.0 inches per hour. The Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration, GS200.1 prepared by the County of Los Angeles, Department of Public Works, Geotechnical and Materials Division (GMED) on June 30, 2021 dictate that a reduction factor be utilized in the design infiltration rate. The following reduction factors are considered in the design infiltration rate (DIR):

Reduction Factors	
Small Diameter Boring	$RF_t = 1$
Site Variability, number of tests, and thoroughness of subsurface investigation	$RF_v = 1$
Long-term siltation plugging and maintenance	$RF_s = 1$
Total Reduction Factor, $RF = RF_t + RF_v + RF_s$	$RF = 3$
Design Infiltration Rate (DIR) = Measured Percolation Rate/RF	DIR = See Below

Based on the results of the infiltration testing, the following infiltration rates should be used in the design of the infiltration systems in their respective locations and depths:

Infiltration System	Design Infiltration Rate (inches/hour)
Detention Basin "A"	2.2
Detention Basin "B"	1.7

The design of the proposed storm water infiltration systems should be performed by the project civil engineer, in accordance with the City of Palmdale and/or County of Los Angeles guidelines. However, it is recommended that the systems be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the systems. The presence of such materials would decrease the effective infiltration rates. **It is recommended that the project civil engineer apply an appropriate factor of safety. The infiltration rate recommended above is based on the assumption that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rates.** It should be noted that the recommended infiltration rates are based on infiltration testing at four (4) discrete locations and the overall infiltration rates of the storm water infiltration systems could vary considerably.

Infiltration Rate Considerations

The infiltration rates presented herein were determined in accordance with the Los Angeles County guidelines and are considered valid only for the time and place of the actual tests. Varying subsurface conditions will exist in other areas of the site, which could alter the recommended infiltration rates presented above. The infiltration rates will decline over time between maintenance cycles as silt or clay particles accumulate on the BMP surface. The infiltration rate is highly dependent upon a number of factors, including density, silt and clay content, grainsize distribution throughout the range of particle sizes, and particle shape. Small changes in these factors can cause large changes in the infiltration rates.

Infiltration rates are based on unsaturated flow. As water is introduced into soils by infiltration, the soils become saturated and the wetting front advances from the unsaturated zone to the saturated zone. Once the soils become saturated, infiltration rates become zero, and water can only move through soils by hydraulic conductivity at a rate determined by pressure head and soil permeability. Changes in soil moisture content will affect the infiltration rate. Infiltration rates should be expected to decrease until the soils become saturated. Soil permeability values will then govern groundwater movement. Permeability values may be on the order of 10 to 20 times less than infiltration rates. The system designer should incorporate adequate factors of safety and allow for overflow design into appropriate traditional storm drain systems, which would transport storm water off-site.

Construction Considerations

The infiltration rates presented in this report are specific to the tested locations and tested depths. Infiltration rates can be significantly reduced if the soils are exposed to excessive disturbance or compaction during construction. Compaction of the soils at the bottom of the infiltration systems can significantly reduce the infiltration ability of the systems. Therefore, the subgrade soils within proposed infiltration system areas should not be over-excavated, undercut or compacted in any significant manner. **It is recommended that a note to this effect be added to the project plans and/or specifications.**

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration systems to identify the soil classification at the base of each infiltration system. The infiltration rate of the system will likely vary significantly if the composition of the soil located beneath the system is not consistent with the tested soils.

We recommend that scrapers and other rubber-tired heavy equipment not be operated on the system bottom, or at levels lower than 2 feet above the bottom of the system, particularly within basins. As such, the bottom 24 inches of the infiltration systems should be excavated with non-rubber-tired equipment, such as excavators.

Basin Maintenance

The proposed project will include infiltration basins. Water flowing into these basins will carry some level of sediment. Wind-blown sediments and erosion of the basin side walls will also contribute to sediment deposition at the bottom of the basin. This layer has the potential to significantly reduce the infiltration rate of the basin subgrade soils. Therefore, a formal basin maintenance program should be established to ensure that these silt and clay deposits are

removed from the basin on a regular basis. Appropriate vegetation on the basin sidewalls and bottom may reduce erosion and sediment deposition.

Basin maintenance should also include measures to prevent animal burrows, and to repair any burrows or damage caused by such. Animal burrows in the basin sidewalls can significantly increase the risk of erosion and piping failures.

Location of Infiltration Systems

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration area could potentially be damaged due to saturation of the subgrade soils. **The proposed infiltration systems for this site should be located at least 25 feet away from any structures, including retaining walls.** Even with this provision of locating the infiltration system at least 25 feet from the building(s), it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to collect storm water can also serve as conduits to transmit storm water toward the structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration systems.

The infiltration system designer should also give special consideration to the effect that the proposed infiltration systems may have on nearby subterranean structures, open excavations, or descending slopes. In particular, infiltration systems should not be located near the crest of descending slopes, particularly where the slopes are comprised of granular soils. Such systems will require specialized design and analysis to evaluate the potential for slope instability, piping failures and other phenomena that typically apply to earthen dam design. This type of analysis is beyond the scope of this infiltration test report, but these factors should be considered by the infiltration system designer when locating the infiltration systems.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the proposed storm water infiltration system is the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rate contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the proposed storm water infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted. The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

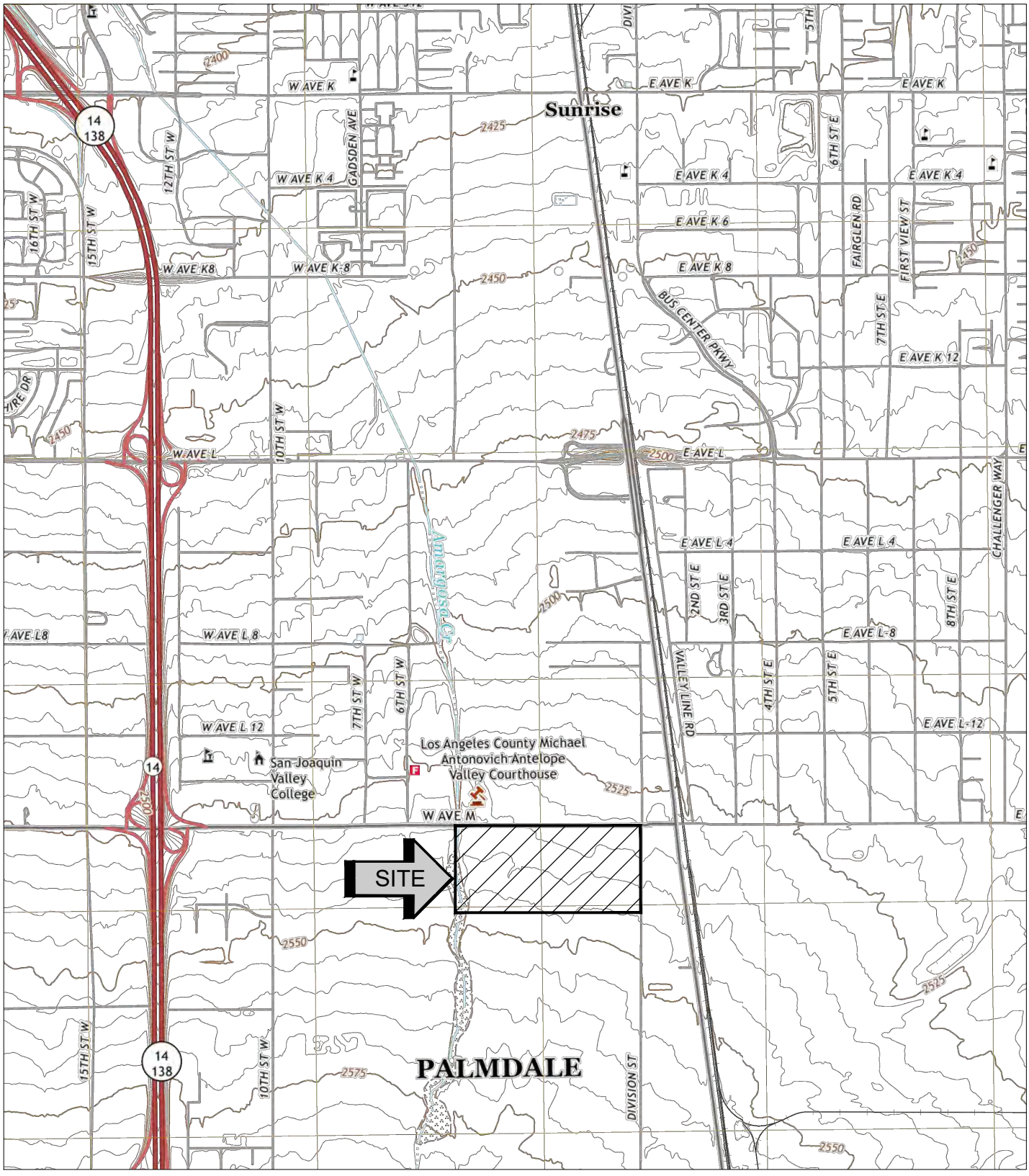
Joseph Lozano Leon
Staff Engineer



Gregory K. Mitchell, GE 2364
Principal Engineer

Distribution: (1) Addressee

Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Boring Log Legend and Logs (6 pages)
Infiltration Test Results Spreadsheets (4 pages)
Grain Size Distribution Graphs (4 pages)



SOURCE: USGS TOPOGRAPHIC MAPS OF THE LANCASTER EAST QUADRANGLE AND LANCASTER WEST QUADRANGLE, LOS ANGELES COUNTY, CALIFORNIA, 2021.

SITE LOCATION MAP

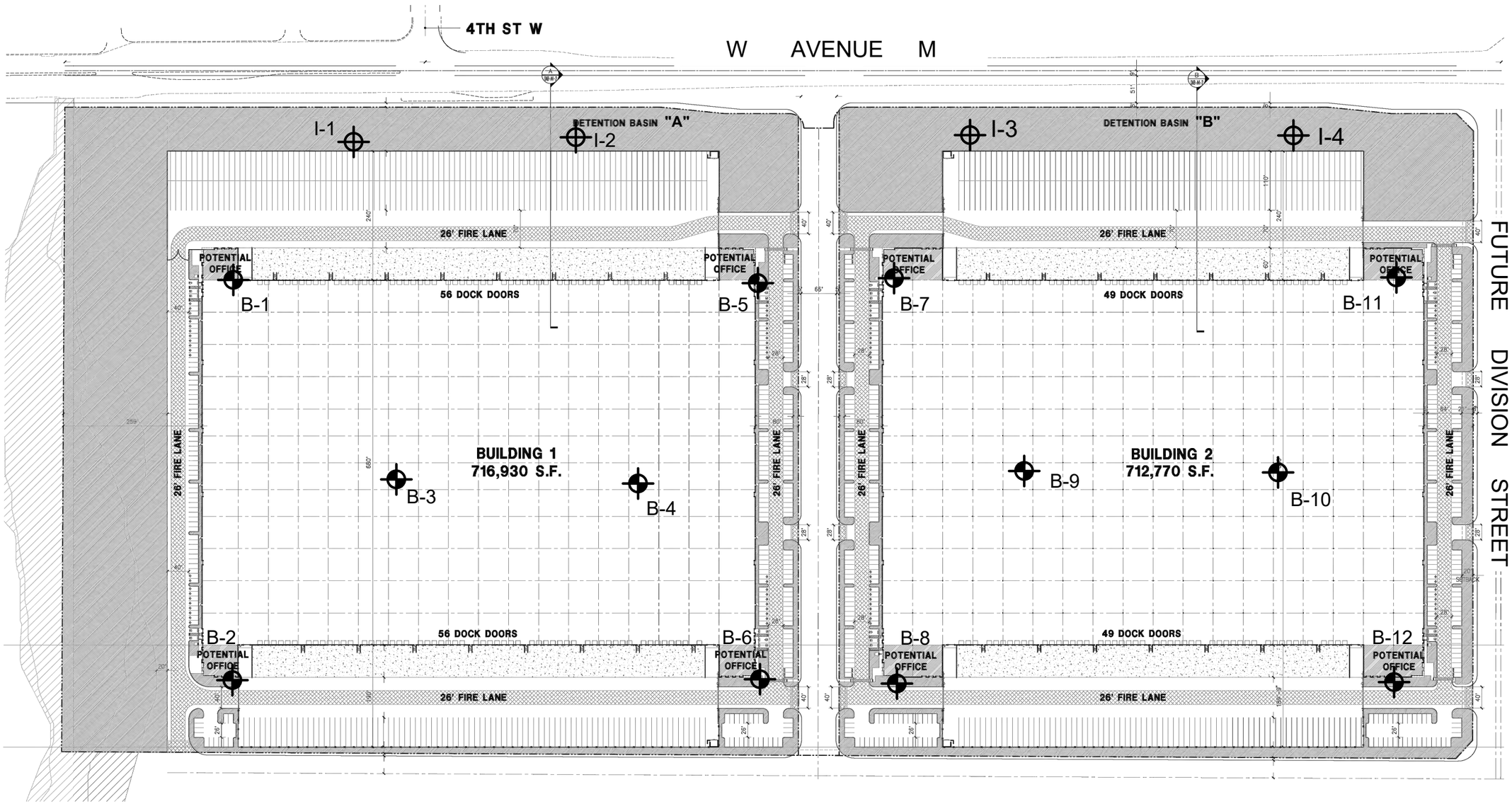
PROPOSED WAREHOUSE DEVELOPMENT

PALMDALE, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: JLL CHKD: GKM	
SCG PROJECT 22G164-2	
PLATE 1	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- APPROXIMATE BORING LOCATION FROM CONCURRENT STUDY (SCG PROJECT NO. 22G164-1)

NORTH

NOTE: CONCEPTUAL SITE PLAN PROVIDED BY HPA, INC.

INFILTRATION TEST LOCATION PLAN

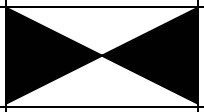
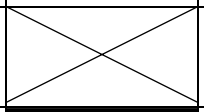
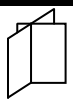
PROPOSED WAREHOUSE DEVELOPMENT

PALMDALE, CALIFORNIA

SCALE: 1" = 200'	
DRAWN: JLL CHKD: GKM	
SCG PROJECT 22G164-2	
PLATE 2	

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

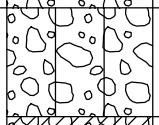
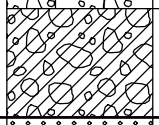
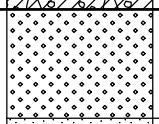
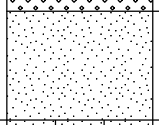
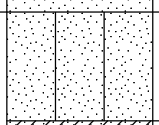
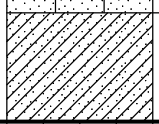
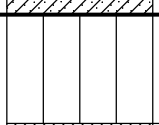
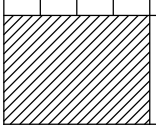
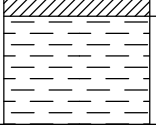
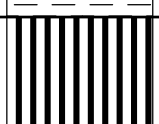
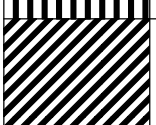
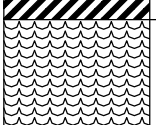
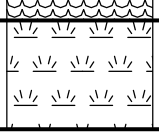
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-1

JOB NO.: 22G164-2
PROJECT: Proposed Warehouse Development
LOCATION: Palmdale, California

DRILLING DATE: 7/19/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Michelle Krizek

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		8			ALLUVIUM: Light Brown to Brown Silty fine Sand, trace medium to coarse Sand, trace fine to coarse Gravel, loose-dry		1					
		13			Light Brown to Brown Silty fine to medium Sand, trace coarse Sand, trace fine to coarse Gravel, medium dense-dry		2					
5		14			Light Gray Brown to Gray Brown fine to coarse Sand, trace to little Silt, medium dense-dry		1					
		18					1					
10												
		22					1			7		
15					Boring Terminated at 15'							

TBL 22G164-2.GPJ SOCALGEO.GDT 8/23/22

TEST BORING LOG

PLATE B-1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-2

JOB NO.: 22G164-2
PROJECT: Proposed Warehouse Development
LOCATION: Palmdale, California

DRILLING DATE: 7/19/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Michelle Krizek

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		6			ALLUVIUM: Light Brown to Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, trace fine root fibers, medium dense-dry		1					
		6			Light Brown to Brown fine to coarse Sand, little Silt, trace fine to coarse Gravel, loose-dry		1					
5		43			Light Gray Brown fine to coarse Sand, little Silt, little fine Gravel, medium dense to dense-dry		2					
		22					2					
10												
		30			Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, trace Clay, dense-damp		4			29		
15					Boring Terminated at 15'							

TBL 22G164-2.GPJ SOCALGEO.GDT 8/23/22

TEST BORING LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-3

JOB NO.: 22G164-2
PROJECT: Proposed Warehouse Development
LOCATION: Palmdale, California

DRILLING DATE: 7/19/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Michelle Krizek

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		8			ALLUVIUM: Light Brown to Brown Silty fine Sand, trace medium Sand, loose-dry		2					
		11			Light Gray Brown Silty fine to coarse Sand, trace fine Gravel, medium dense-dry		1					
5		14			Brown fine to coarse Sand, trace fine Gravel, little Silt, medium dense-dry		1					
		16			Light Gray Brown Gravelly fine to coarse Sand, trace Silt, medium dense-dry		1					
10												
		20					1			3		
15					Boring Terminated at 15'							

TBL 22G164-2.GPJ SOCALGEO.GDT 8/23/22

TEST BORING LOG **PLATE B-3**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-4

JOB NO.: 22G164-2
PROJECT: Proposed Warehouse Development
LOCATION: Palmdale, California

DRILLING DATE: 7/19/22
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Michelle Krizek

WATER DEPTH: Dry
CAVE DEPTH: ---
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		10			ALLUVIUM: Light Brown to Brown Silty fine to medium Sand, trace coarse sand, trace fine Gravel, medium dense-dry		2					
		6			Brown fine to medium Sand, trace coarse Sand, trace fine Gravel, little Silt, loose to medium dense-dry		2					
5		10					1					
		29					2					
10					Brown Silty fine to coarse Sand, trace Clay, dense-dry							
		30					1			28		
15					Boring Terminated at 15'							

TBL 22G164-2.GPJ SOCALGEO.GDT 8/23/22

TEST BORING LOG

PLATE B-4

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse Development
Project Location	Palmdale, California
Project Number	22G164-2
Engineer	Michelle Krizek

Test Hole Radius	4.00	(in)
Test Depth	14.92	(ft)

Infiltration Test Hole: I-1

Start Time for Pre-Soak	8:48 AM	Water Remaining in Boring (Y/N)	N
Start Time for Standard	9:48 AM	Time Interal Between Readings	14

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Measured Infiltration Rate Q (in/hr)	Reduction Factor (RF)	Design Infiltration Rate Q (in/hr)
1	Initial	11:10 AM	14.0	11.92	2.99	1.5	15.3	3.0	5.1
	Final	11:24 AM		14.91					
2	Initial	11:24 AM	14.0	11.92	3.00	1.5	15.4	3.0	5.1
	Final	11:38 AM		14.92					
3	Initial	11:38 AM	14.0	11.92	2.98	1.5	15.2	3.0	5.1
	Final	11:52 AM		14.90					
4	Initial	11:52 AM	14.0	11.92	2.96	1.5	15.0	3.0	5.0
	Final	12:06 PM		14.88					
5	Initial	12:06 PM	14.0	11.92	2.96	1.5	15.0	3.0	5.0
	Final	12:20 PM		14.88					
6	Initial	12:20 PM	14.0	11.92	2.96	1.5	15.0	3.0	5.0
	Final	12:34 PM		14.88					

Design Infiltration Rate = (Measured Infiltration Rate)/(Reduction Factor)

Reduction Factor (RF) = $RF_t+RF_v+RF_s$

Reduction Factors	
Double-ring Infiltrometer	RF_t = 1 to 3
Shallow Test Pit	
Small Diameter Boring	
Large Diameter Boring	
High Fow-rate	RF_t = 3
Grain Size Analysis Method	RF_t = 2 to 3
Site variability, number of tests and	RF_v = 1 to 3
Long-term siltation, plugging, and maintenance	RF_s = 1 to 3

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where:

- Q = Measured Infiltration Rate (in inches per hour)
- ΔH = Change in Height (Water Level) over the time interval
- r = Test Hole (Borehole) Radius
- Δt = Time Interval
- H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse Development
Project Location	Palmdale, California
Project Number	22G164-2
Engineer	Michelle Krizek

Test Hole Radius	4.00	(in)
Test Depth	14.85	(ft)

Infiltration Test Hole: I-2

Start Time for Pre-Soak	2:09 PM	Water Remaining in Boring (Y/N)	Y
Start Time for Standard	5:16 PM	Time Interal Between Readings	30

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Measured Infiltration Rate Q (in/hr)	Reduction Factor (RF)	Design Infiltration Rate Q (in/hr)
1	Initial	5:16 PM	30.0	11.85	2.91	1.5	6.8	3.0	2.3
	Final	5:46 PM		14.76					
2	Initial	5:49 PM	30.0	11.85	2.89	1.6	6.7	3.0	2.2
	Final	6:19 PM		14.74					
3	Initial	6:21 PM	30.0	11.85	2.88	1.6	6.7	3.0	2.2
	Final	6:51 PM		14.73					
4	Initial	6:54 PM	30.0	11.85	2.87	1.6	6.6	3.0	2.2
	Final	7:24 PM		14.72					
5	Initial	7:27 PM	30.0	11.85	2.87	1.6	6.6	3.0	2.2
	Final	7:57 PM		14.72					
6	Initial	8:00 PM	30.0	11.85	2.87	1.6	6.6	3.0	2.2
	Final	8:30 PM		14.72					

Design Infiltration Rate = (Measured Infiltration Rate)/(Reduction Factor)

Reduction Factor (RF) = $RF_t+RF_v+RF_s$

Reduction Factors	
Double-ring Infiltrometer	RF_t = 1 to 3
Shallow Test Pit	
Small Diameter Boring	
Large Diameter Boring	
High Fow-rate	RF_t = 3
Grain Size Analysis Method	RF_t = 2 to 3
Site variability, number of tests and	RF_v = 1 to 3
Long-term siltation, plugging, and maintenance	RF_s = 1 to 3

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where:

- Q = Measured Infiltration Rate (in inches per hour)
- ΔH = Change in Height (Water Level) over the time interval
- r = Test Hole (Borehole) Radius
- Δt = Time Interval
- H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse Development
Project Location	Palmdale, California
Project Number	22G164-2
Engineer	Michelle Krizek

Test Hole Radius	4.00	(in)
Test Depth	14.94	(ft)

Infiltration Test Hole: I-3

Start Time for Pre-Soak	2:09 PM	Water Remaining in Boring (Y/N)	Y
Start Time for Standard	5:16 PM	Time Interal Between Readings	30

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Measured Infiltration Rate Q (in/hr)	Reduction Factor (RF)	Design Infiltration Rate Q (in/hr)
1	Initial	5:16 PM	30.0	11.94	2.66	1.7	5.8	3.0	1.9
	Final	5:46 PM		14.60					
2	Initial	5:49 PM	30.0	11.94	2.60	1.7	5.6	3.0	1.9
	Final	6:19 PM		14.54					
3	Initial	6:21 PM	30.0	11.94	2.56	1.7	5.4	3.0	1.8
	Final	6:51 PM		14.50					
4	Initial	6:54 PM	30.0	11.94	2.49	1.8	5.2	3.0	1.7
	Final	7:24 PM		14.43					
5	Initial	7:27 PM	30.0	11.94	2.48	1.8	5.1	3.0	1.7
	Final	7:57 PM		14.42					
6	Initial	8:00 PM	30.0	11.94	2.48	1.8	5.1	3.0	1.7
	Final	8:30 PM		14.42					

Design Infiltration Rate = (Measured Infiltration Rate)/(Reduction Factor)

Reduction Factor (RF) = $RF_t+RF_v+RF_s$

Reduction Factors	
Double-ring Infiltrometer	RF_t = 1 to 3
Shallow Test Pit	
Small Diameter Boring	
Large Diameter Boring	
High Fow-rate	RF_t = 3
Grain Size Analysis Method	RF_t = 2 to 3
Site variability, number of tests and	RF_v = 1 to 3
Long-term siltation, plugging, and maintenance	RF_s = 1 to 3

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where:

- Q = Measured Infiltration Rate (in inches per hour)
- ΔH = Change in Height (Water Level) over the time interval
- r = Test Hole (Borehole) Radius
- Δt = Time Interval
- H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed Warehouse Development
Project Location	Palmdale, California
Project Number	22G164-2
Engineer	Michelle Krizek

Test Hole Radius	4.00	(in)
Test Depth	14.88	(ft)

Infiltration Test Hole: I-4

Start Time for Pre-Soak	2:09 PM	Water Remaining in Boring (Y/N)	Y
Start Time for Standard	5:16 PM	Time Interal Between Readings	30

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Measured Infiltration Rate Q (in/hr)	Reduction Factor (RF)	Design Infiltration Rate Q (in/hr)
1	Initial	5:16 PM	30.0	11.88	2.71	1.6	6.0	3.0	2.0
	Final	5:46 PM		14.59					
2	Initial	5:49 PM	30.0	11.88	2.69	1.7	5.9	3.0	2.0
	Final	6:19 PM		14.57					
3	Initial	6:21 PM	30.0	11.88	2.68	1.7	5.9	3.0	2.0
	Final	6:51 PM		14.56					
4	Initial	6:54 PM	30.0	11.88	2.67	1.7	5.8	3.0	1.9
	Final	7:24 PM		14.55					
5	Initial	7:27 PM	30.0	11.88	2.66	1.7	5.8	3.0	1.9
	Final	7:57 PM		14.54					
6	Initial	8:00 PM	30.0	11.88	2.66	1.7	5.8	3.0	1.9
	Final	8:30 PM		14.54					

Design Infiltration Rate = (Measured Infiltration Rate)/(Reduction Factor)

Reduction Factor (RF) = $RF_t+RF_v+RF_s$

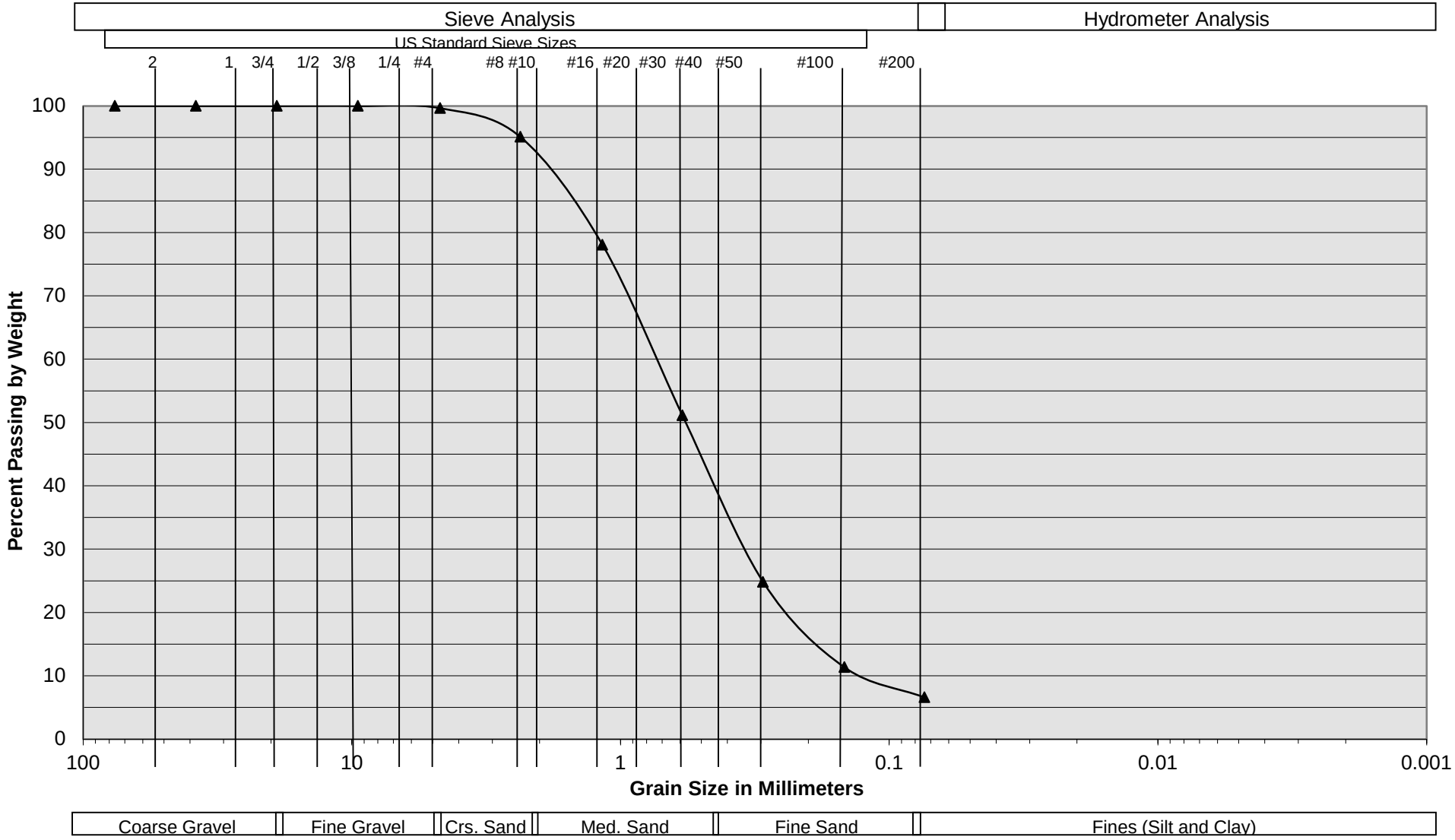
Reduction Factors	
Double-ring Infiltrometer	RF_t = 1 to 3
Shallow Test Pit	
Small Diameter Boring	
Large Diameter Boring	
High Fow-rate	RF_t = 3
Grain Size Analysis Method	RF_t = 2 to 3
Site variability, number of tests and	RF_v = 1 to 3
Long-term siltation, plugging, and maintenance	RF_s = 1 to 3

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where:

- Q = Measured Infiltration Rate (in inches per hour)
- ΔH = Change in Height (Water Level) over the time interval
- r = Test Hole (Borehole) Radius
- Δt = Time Interval
- H_{avg} = Average Head Height over the time interval

Grain Size Distribution

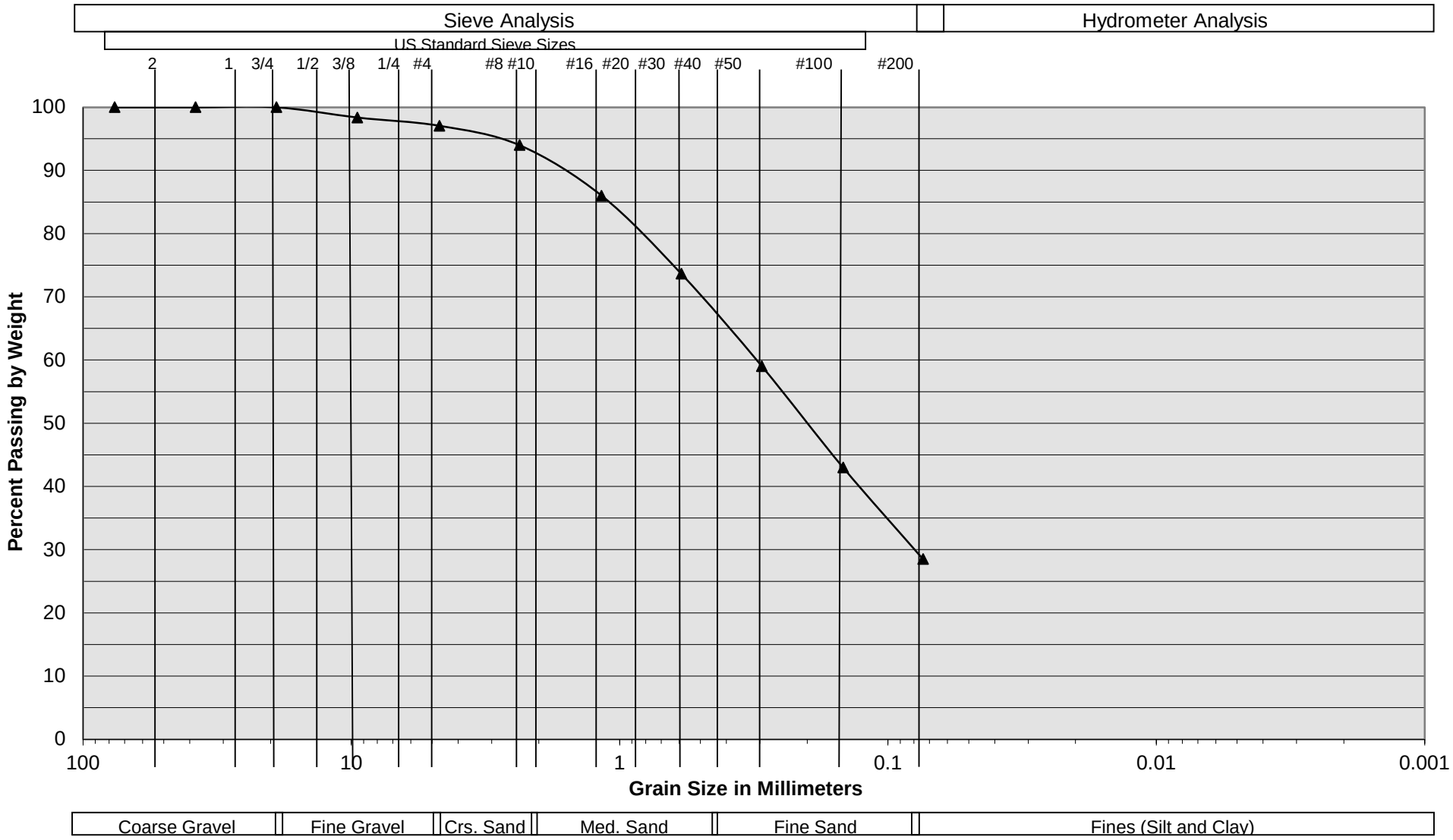


Sample Description	I-1 @ 13½'
Soil Classification	Light Gray Brown to Gray Brown fine to coarse Sand, trace to little Silt

Proposed Warehouse Deveopment
Palmdale, California
Project No. 22G164-2
PLATE C- 1

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Grain Size Distribution

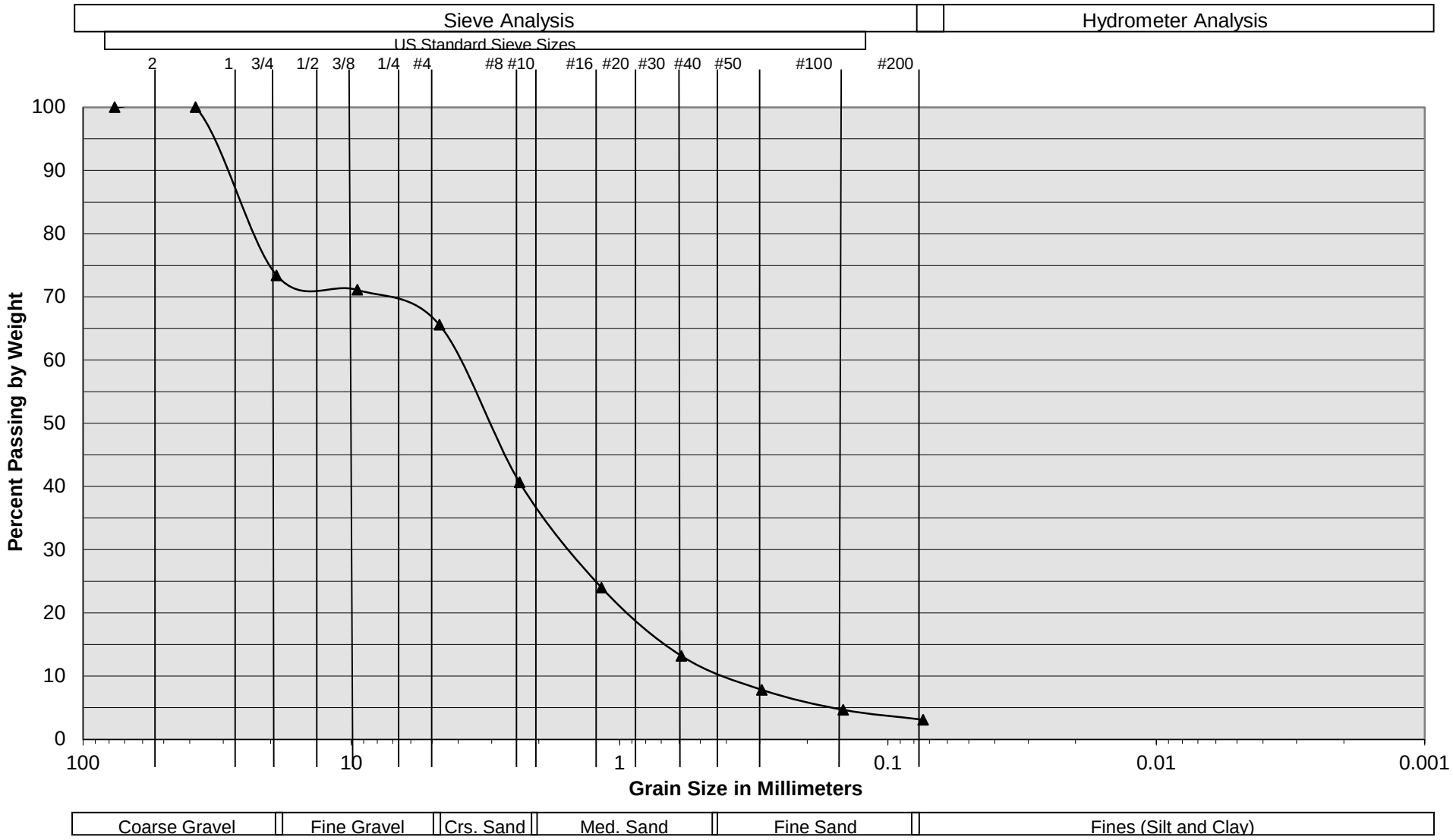


Sample Description	I-2 @ 13½'
Soil Classification	Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, trace Clay

Proposed Warehouse Deveopment
Palmdale, California
Project No. 22G164-2
PLATE C- 2

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Grain Size Distribution

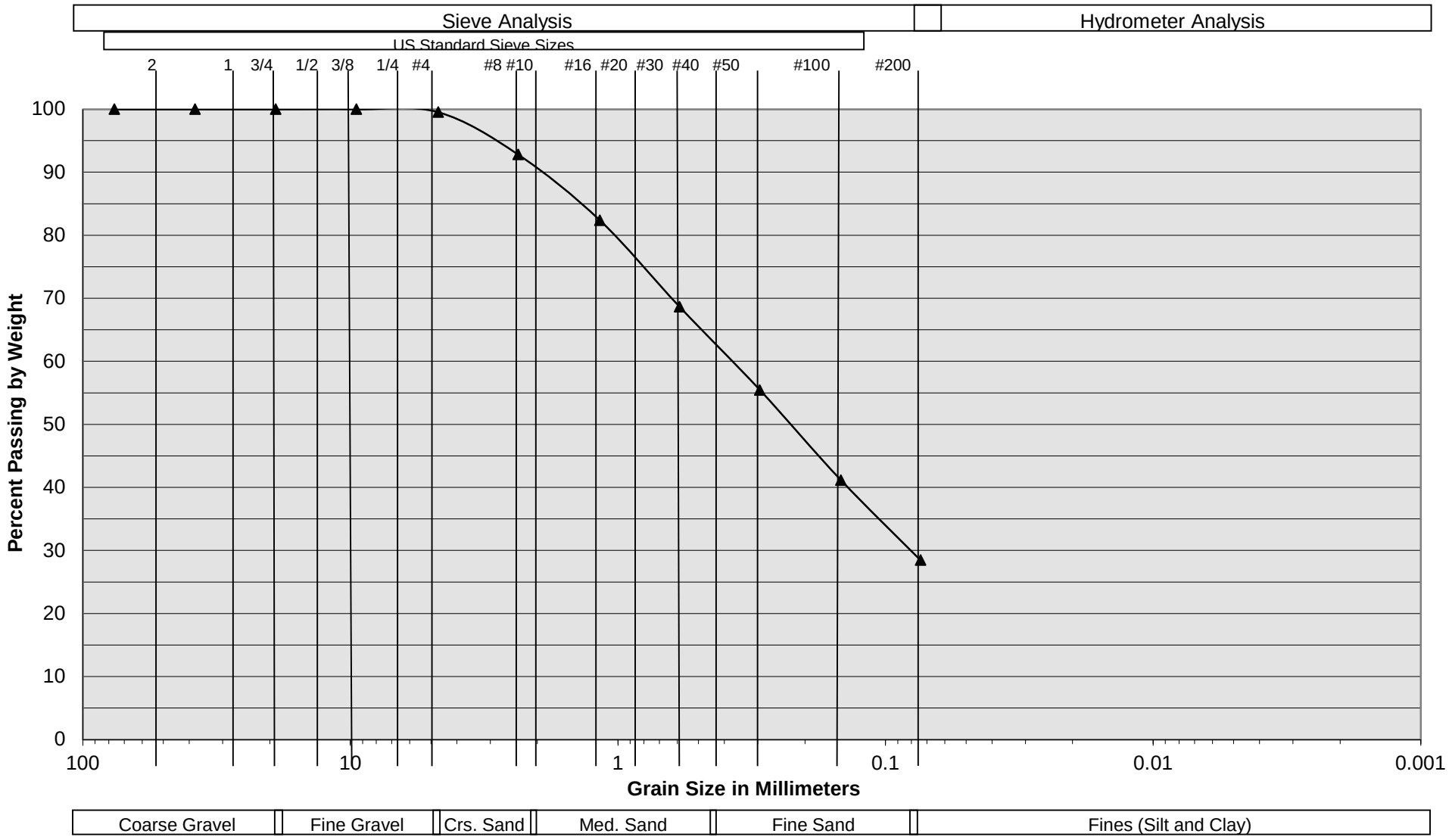


Sample Description	I-3 @ 13½'
Soil Classification	Light Gray Brown Gravelly fine to coarse Sand, trace Silt

Proposed Warehouse Deveopment
Palmdale, California
Project No. 22G164-2
PLATE C- 3

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Grain Size Distribution



Sample Description	I-4 @ 13½'
Soil Classification	Brown Silty fine to coarse Sand, trace Clay

Proposed Warehouse Deveopment
Palmdale, California
Project No. 22G164-2
PLATE C- 4

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