
Dec-2023
2022-260

Watson High Desert Logistics West (Apple Valley 45)

N/W Corner of Navajo Road and Los Padres Road
Town of Apple Valley, CA

Preliminary Hydrology Study Report

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Prepared For:

Watson Land Company
22010 S. Wilmington Ave.
Carson, CA 90745
310-952-6400

Prepared By:

West**LAND** Group, Inc.
4150 Concours, Suite 100
Ontario, CA 91764
909-989-9789

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1. INTRODUCTION

The purpose of this study is to demonstrate that the proposed project site can be designed to provide adequate flood protection without adversely impacting existing off-site drainage systems or adjacent properties. The scope of this analysis includes the pre-developed and post-developed runoff analysis.

2. EXISTING SITE DESCRIPTION

2.1. EXISTING SITE TOPOGRAPHY & HYDROLOGIC PATTERNS

The project site is located at the northwest corner of Navajo Road and Los Padres Road in the Town of Apple Valley, County of San Bernardino, State of California. The site is currently bounded to the north by an existing industrial development, to the east by Navajo Road, to the south by Los Padres Road, and to the west by existing dirt road.

The total area of the project site is 47.70 Acres and is currently undeveloped land. The natural drainage pattern for the existing condition of the site is northeast to southwest. Stormwater sheet flows and eventually meets Los Padres Road and continues west along the road, draining into local low points and evaporating or infiltrating into the ground. The existing site receives offsite flows at the northwest corner of the site boundary, from the industrial development to the north. See Appendix A for the pre-development drainage map.

3. PROJECT SITE DESCRIPTION

3.1. PROJECT DESCRIPTION & HYDROLOGIC PATTERNS

The project site will be developed into an industrial site and will maintain the same natural drainage pattern as the existing condition. After dedication, only 45.25 acres of the site will be developed. Stormwater will sheet flow from northeast to southwest and will be captured by proposed on-site catch basins.

The proposed on-site storm drain system will convey the flow west and into a proposed above ground basins, Basin 1 and Basin 2 or proposed underground infiltration chamber. This system will be designed to meet project's water quality requirements and provide sufficient storage to meet the 100-year storm hydrology requirement. In a large storm event, stormwater will bypass the underground chamber system via storm drain pipes and will utilize open storage in Basins 1 and 2. Basin 2 will be equipped with emergency spillway that ultimately discharges southwest into undeveloped land, terminating at local low points and evaporating or infiltrating into the ground.

The proposed site will receive offsite flows coming from existing development to the North and immediately redirect the flows to the west, past the above ground basin, allowing the runoff to continue southwest to maintain the natural drainage pattern. See Appendix A for the post-development drainage map.

4. RESULTS & ANALYSIS

4.1. METHODOLOGY

The proposed drainage areas were analyzed using the San Bernardino (SB) County Hydrology Manual for the 100-year storm event. The main methods used for this project were the Rational Method, Synthetic Unit Hydrograph Method, and Basin Routing Analysis. Civil Design software was used to compute the data. Solving for the Rational Method returns the peak flow rate. Unit Hydrograph analysis will determine the total volume generated from a storm event. Basin Routing Analysis will determine the water surface elevation for the proposed retention system(s).

According to the USDA Hydrologic Soils Map, via Web Soil Survey, the site is entirely composed of type A soil (See Appendix E). The proposed land use is indicated as industrial for both the pre- and post-development condition according to the Apple Valley Zoning Map and the North Apple Valley Industrial Specific Plan. According to the San Bernardino County manual, Antecedent Moisture Condition (AMC) I is used for the 2-year storm event, AMC II is used for the 10-year storm event, and AMC III was used for the 100-year storm event in order to give more confidence to mitigate any increase runoff, if needed.

For the rational method analysis, the runoff coefficient is determined by the land use for each condition. The rainfall intensities are based on the time of concentration for each drainage area and the intensity-duration curves provided in the county's manual. The flow lengths and terrain elevations were determined using existing topography for the pre-development condition and the conceptual grading plans for the post-development condition.

For the unit hydrograph analysis, the lag time was determined by using the time of concentration based on the rational method analysis. Rainfall depths were obtained from the National Oceanic and Atmospheric Administration (NOAA) Point Precipitation Frequency Estimates. The rainfall depth data are included in Appendix E. The rainfall used in the hydrology calculations are summarized on Table 4.1.

Storm Event & Duration	Rainfall Depth (inches)
2-Year, 1-Hour	0.336
2-Year, 6-Hour	0.744
2-Year, 24-Hour	1.28
10-Year, 1-Hour	0.594
10-Year, 6-Hour	1.20
10-Year, 24-Hour	2.07
100-Year, 1-Hour	1.06
100-Year, 6-Hour	1.97
100-Year, 24-Hour	3.34

For the basin routing analysis, the results from the unit hydrograph analysis were used to determine the amount of stormwater entering the proposed underground infiltration chamber at each time interval. The staging data table is provided in Appendix D.

4.2. HYDROLOGY RESULTS & ANALYSIS

The complete rational method analysis and results are included in Appendix B. The complete unit hydrograph analysis and results are included in Appendix C. The tables below provide a summary of the peak flow rate and runoff volume for the pre-developed and post-developed condition for the 2- and 100-year storm.

Table 4.2.1: Pre-Development Hydrology Summary Table					
Storm Event	Area (Acres)	Tc (min.)	Intensity (in/hr)	Flow Rate (cfs) (Rational Method)	Volume (cf) (Unit Hydrograph)
2-Year	47.70	33.34	0.631	0.00	12,288
10-Year			1.115	18.60	127,897
100-Year			1.990	62.66	460,699

Table 4.2.2: Post-Development Hydrology Summary Table					
Storm Event	Area (Acres)	Tc (min.)	Intensity (in/hr)	Flow Rate (cfs) (Rational Method)	Volume (cf) (Unit Hydrograph)
2-Year	45.25	13.14	1.238	35.17	75,864
10-Year			2.188	69.98	277,442
100-Year			3.905	130.82	460,839

Table 4.2.3: Result Analysis Summary Table	
Hydrology Results & Analysis Summary Table:	Project Site Drainage Area = 1,970 ,945 SF (45.25 Acres) $Q_{100, PRE} = 62.66 \text{ CFS}$ $Q_{100, POST} = 130.82 \text{ CFS}$ $\Delta Q_{100} = 68.16 \text{ CFS}$ $\Delta V_{100} = 260 \text{ CF}$ Hydromodification $V_{10} = 135,674 \text{ CF}$ DCV = 88,502 CF (See Water Quality Management Plan) Hydromodification > DCV > ΔV_{100} 135,674 CF = Site Design Storage Requirement Volume Provided = 463,360 CF (Aboveground Retention Basin)

Based on the 100-year rational method analysis, the post-development flow rate within the disturbed area increased compare to the pre-development flow rate. Furthermore, the post-development runoff volume increased compare to the pre-development runoff volume. The increase in flow rate and runoff volume was a result from a decrease in time of concentration.

Based on the Water Quality Management Plan for this project, the design capture volume (DCV) for the site is 88,502 cubic feet (cf) and the Hydromodification volume is 135,674 cf. Since the Hydromodification volume is higher than the DCV and the difference between the pre- and post-development 100-year storm runoff volume, the Hydromodification volume is the minimum storm runoff storage required for the proposed development.

To mitigate the increase storm runoff volume within the disturbed area, an underground infiltration chamber with a storage volume of 161,656 cf is proposed for the project. The infiltration chamber will work together with two above ground basins for Water Quality retention and detention for the 100-year storm. Since there are no public storm drain systems around the frontage of the site, the proposed chamber system will provide sufficient storage volume to mitigate the full 100-year storm runoff volume to promote on-site infiltration and to mitigate any flooding potential. In an extreme storm event, an emergency spillway is proposed for the project site.

A preliminary basin staging analysis was performed to analyze the proposed above ground basin and chamber system to determine the water surface elevation in a 100-year storm event. The results of the basin staging analysis are included in Appendix D and is summarized on Table 4.2.4.

Basin ID	Peak Flow In – Q_{100} (cfs)	Peak Flow Out – Q_{100} (cfs)	Effective Storage Volume (cf)	Maximum Ponding Depth (ft)	100-year Storm Water Surface Elevation (ft)	Freeboard (ft)
Basin 1	35.7	0.00	200,768	5	3006.75	3
Basin 2	29.6	0.00	101,320	4.5	3006.5	1
Underground Infiltration Chamber A	65.5	0.00	161,656	6	3006.5	1

5. CONCLUSION

The proposed redevelopment of the disturbed area would not create or contribute runoff that would exceed the capacity of the existing downstream storm drain system. Furthermore, the aboveground and underground infiltration system will be designed to accommodate the 100-year storm event. Once construction is complete, there would not be any substantial increase in flood boundaries, levels or frequencies in any areas outside the development. The hydrologic analyses and calculations are performed in accordance with the San Bernardino County Hydrology Manual. The results from the analysis will be the basis for the grading and on-site storm-drain construction documents for the project.

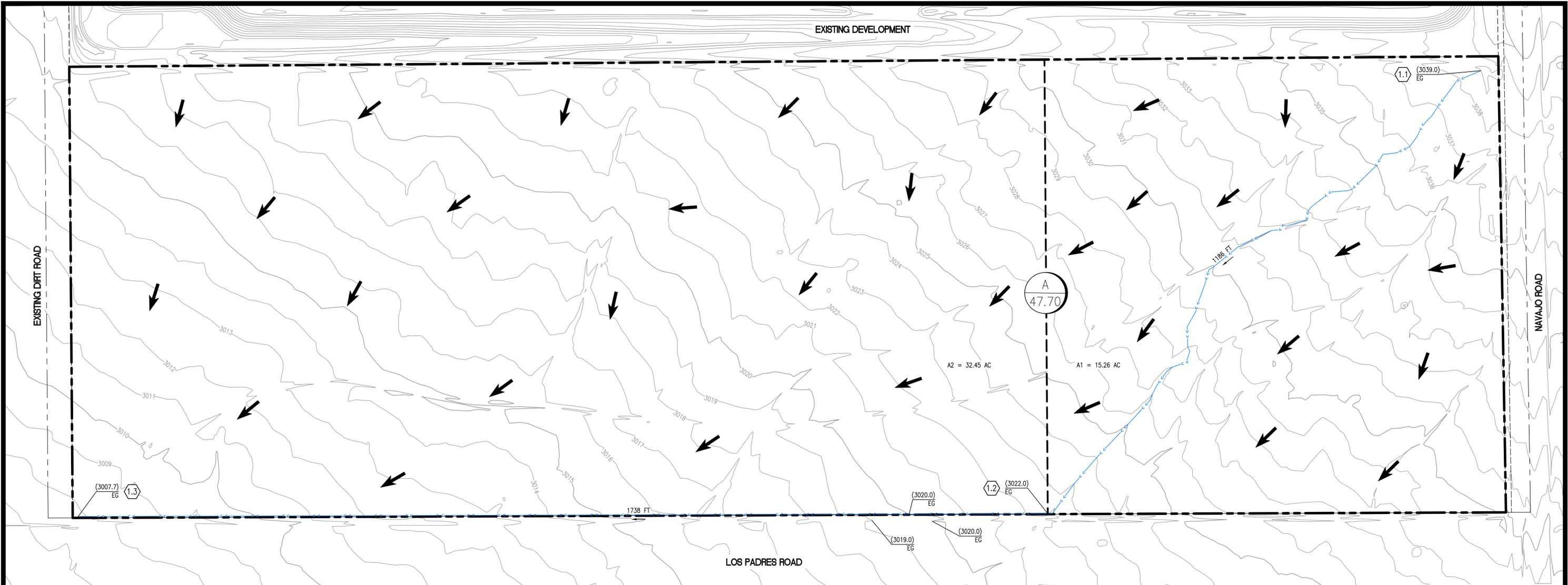
Evaluation of the appropriateness of guidelines and the accuracy of County data was beyond the scope of this study. Usage of this report is limited to address the purpose and scope previously defined by the project owner. The contents of this report are professional opinion and as such, are not to be considered a guaranty or warranty.

6. REFERENCES

1. City of Fontana Water Quality Management Plan Handbook dated September 2016
2. National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Point Precipitation Frequency Estimates
3. San Bernardino County Hydrology Manual dated August 1986

APPENDIX A

HYDROLOGY EXHIBITS



HYDROLOGY SUMMARY TABLE

SUBAREAS ID	RUNOFF COEFFICIENT "C"	TIME OF CONC. "T _{c100} " (MIN.)	RAINFALL INTENSITY "i ₁₀₀ " (IN/HR)	DRAINAGE AREA (AC)	RUNOFF FLOW RATE "Q ₁₀₀ " (CFS)	RUNOFF VOLUME "V ₁₀₀ " (CF)
A1	0.837	24.39	1.99	15.26		
A2	0.821	8.95	1.599	32.45		
TOTAL				47.71	62.66	460,699

LEGEND

- PROJECT DRAINAGE BOUNDARY
- SUB-AREA BOUNDARY
- PROPOSED STORM DRAIN
- FLOW PATH
- SUB-DRAINAGE AREA ID
- SUB-DRAINAGE AREA IDENTIFIER
- SUB-DRAINAGE SURFACE AREA (ACRE)
- FLOW ARROW
- SURFACE FLOW NODE

HYDROLOGY INFORMATION

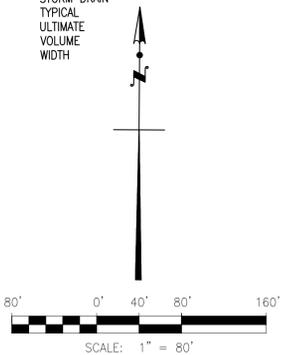
SITE AREA: 47.70 ACRE
 SOIL GROUP: A (PER USDA WEB SOIL SURVEY)
 IMPERVIOUS: 0.00%
 ISOHYETALS: 3.34" (100-YEAR, 24-HOUR)
 2.07" (10-YEAR, 24-HOUR)
 1.28" (2-YEAR, 24-HOUR)
 FREQUENCY: 100 YEAR (FOR STORM DRAIN DESIGN)
 10 YEAR (FOR WATER QUALITY)
 METHOD: SAN BERNARDINO COUNTY HYDROLOGY MANUAL

GENERAL NOTES

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

ABBREVIATIONS

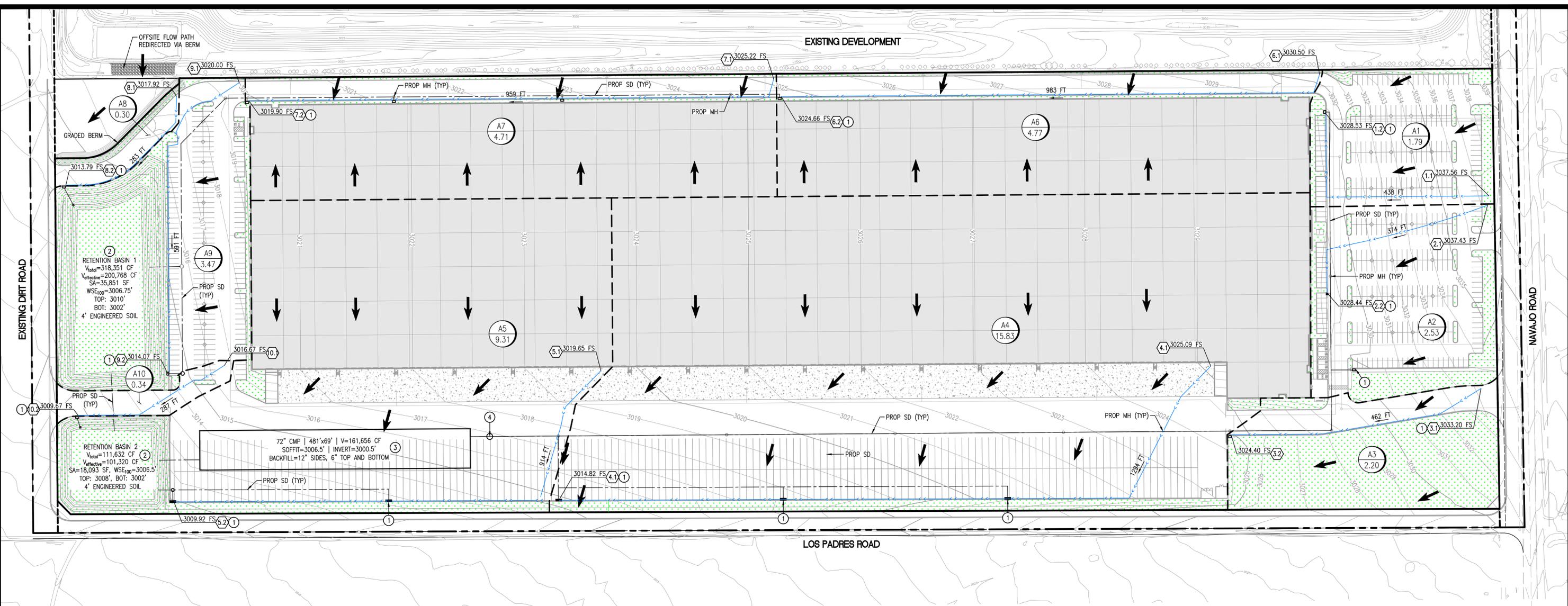
- CF CUBIC FEET
- C&G CURB AND GUTTER
- CL OR Ć CENTERLINE
- CMP CORRUGATED METAL PIPE
- DA DRAINAGE AREA
- EX EXISTING
- FS FINISHED SURFACE ELEVATION
- HR HOUR
- IN INCH/INCHES
- INV INVERT ELEVATION
- L LENGTH
- R/W RIGHT OF WAY
- PL OR Ć PROPERTY LINE
- PROP PROPOSED
- SD STORM DRAIN
- TYP TYPICAL
- ULT ULTIMATE
- V VOLUME
- W WIDTH



PREPARED BY:
WestLAND
 Group, Inc. Engineering • Geospatial • Land Planning
 4150 CONOURS, ONTARIO, CA 91764
 PHONE: (909) 989-9789 FAX: (909) 989-9660
 JOB NO: XXXX-XXX

WATSON HIGH DESERT LOGISTICS
HYDROLOGY EXHIBIT
EXISTING CONDITION
TOWN OF APPLE VALLEY

DATE: SEP 2023
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 OF 1



HYDROLOGY SUMMARY TABLE

SUBAREAS ID	RUNOFF COEFFICIENT "C"	TIME OF CONC. "T _{C100} " (MIN.)	RAINFALL INTENSITY "I ₁₀₀ " (IN/HR)	DRAINAGE AREA (AC)	RUNOFF FLOW RATE "Q ₁₀₀ " (CFS)	RUNOFF VOLUME "V ₁₀₀ " (CF)	DCV (CF)	HYDROMODIFICATION VOLUME (CF)	VOLUME PROVIDED (CF)
A1	0.875	7.87	4.491	1.794	6.88				
A2	0.879	7.40	4.753	2.526	10.05				
A3	0.735	11.93	3.306	2.198	5.30				
A4	0.894	13.14	3.323	15.831	43.27				
SUBTOTAL 1 (A1-A4)				22.349	65.60	227,009			
A5	0.880	11.33	3.190	9.311	27.92				
A10	0.899	5.5	5.575	0.338	1.72				
SUBTOTAL 2 (A5 AND A10)				9.549	29.63	100,462			
A6	0.887	12.69	3.144	4.774	13.31				
A7	0.886	12.74	3.136	4.706	13.08				
A8	0.859	7.54	4.526	0.304	1.18				
A9	0.765	13.30	2.973	3.466	8.12				
SUBTOTAL 3 (A6-A9)				13.249	35.69	133,368			
TOTAL				45.25	130.82	460,839	88,502	135,674	463,744

LEGEND

- PROJECT DRAINAGE BOUNDARY
- SUB-AREA BOUNDARY
- PROPOSED STORM DRAIN
- FLOW PATH
- SUB-DRAINAGE AREA ID
- SUB-DRAINAGE AREA IDENTIFIER
- SUB-DRAINAGE SURFACE AREA (ACRE)
- FLOW ARROW
- SURFACE FLOW NODE

HYDROLOGY INFORMATION

SITE AREA: 47.70 ACRE
 SOIL GROUP: A (PER USDA WEB SOIL SURVEY)
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 ISOHYETALS: 3.34" (100-YEAR, 24-HOUR)
 2.07" (10-YEAR, 24-HOUR)
 1.28" (2-YEAR, 24-HOUR)
 FREQUENCY: 100 YEAR (FOR STORM DRAIN DESIGN)
 10 YEAR (FOR WATER QUALITY)
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GENERAL NOTES

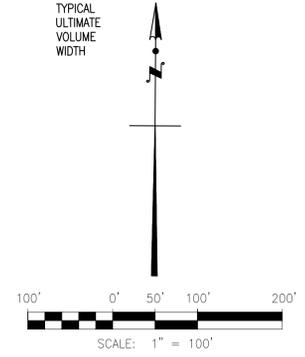
1. SEE PRELIMINARY HYDROLOGY REPORT, PREPARED BY WESTLAND GROUP, FOR THE COMPLETE POST-DEVELOPMENT HYDROLOGY CALCULATIONS.
2. CALCULATIONS WERE BASED ON THE REQUIREMENTS ON THE LOS ANGELES COUNTY HYDROLOGY MANUAL FOR 50 YEAR STORM.
3. PROPOSED ON-SITE DRAINAGE SYSTEM LAYOUT IS PRELIMINARY.
4. ALL FINISH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

BMP NOTES

1. PROPOSED STORM DRAIN CATCH BASIN
2. PROPOSED ABOVE GROUND RETENTION BASIN
3. PROPOSED UNDERGROUND RETENTION CMP (CORRUGATED METAL PIPE)
4. PROPOSED CDS HYDRODYNAMIC SEPARATOR

ABBREVIATIONS

- CF CUBIC FEET
- C&G CURB AND GUTTER
- CL OR E CENTERLINE
- CMP CORRUGATED METAL PIPE
- DA DRAINAGE AREA
- EX EXISTING
- FS FINISHED SURFACE ELEVATION
- HR HOUR
- IN INCH/INCHES
- INV INVERT ELEVATION
- L LENGTH
- R/W RIGHT OF WAY
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- PROP SD PROPOSED STORM DRAIN
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PREPARED BY:
WestLAND
 Group, Inc. Engineering • Geospatial • Land Planning
 450 CONOURS, ONTARIO, CA 91764
 PHONE: (909) 989-9789 FAX: (909) 989-9660
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WATSON HIGH DESERT LOGISTICS WEST
HYDROLOGY EXHIBIT
PROPOSED CONDITION

TOWN OF APPLE VALLEY

DATE: DEC 2023
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1
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2022-260 Watson High Desert Logistics - West, HYDROLOGY Calculations

Pre Development									
Area ID	Area (sf)	Area (ac)	Pervious (sf)	Impervious (sf)	Pervious Ratio	HP	LP	Length	Slope
A1	664,611	15.26	664,611	0.00	1.00	3039.00	3022.00	1186	0.01433
A2	1,413,324	32.45	1,413,324	0.00	1.00	3022.00	3007.70	1738	0.00823
TOTAL	2,077,895	47.70	2,077,895	0.00	1.00				

	Q25 (cfs)	Q100 (cfs)	V100 (ac-ft)	V100 (cf)	Q10 (cfs)	V10 (ac-ft)	V10 (cf)	Q2 (cfs)	V2 (ac-ft)	V2 (cf)
TC	35.46	33.34	0.556	min hr	36.78	0.613	min hr	24.392	0.407	min hr
	14.238	25.413			9.777					
	16.025	37.246			8.825					
	30.263	62.66	10.5762	460,699	18.601	2.9361	127,897	0.000	0.2821	12,288

Post Development									
Area ID	Area (sf)	Area (ac)	Pervious	Impervious	Pervious Ratio	HP	LP	Length	Slope
A1	78,160	1.794	13,501	64,659	0.17	3037.27	3028.47	438	0.020
A2	110,016	2.526	22,735	87,281	0.21	3037.14	3028.44	374	0.023
A3	95,747	2.198	73,765	21,982	0.77	3033.20	3024.40	462	0.019
A4	689,587	15.831	25,529	664,058	0.04	3025.09	3014.82	1294	0.008
SUBTOTAL 1 (A1-A4)	973,510	22.349	135,529	837,981	0.14				
A5	405,587	9.311	50,233	355,354	0.12	3020.54	3009.92	914	0.012
A10	14,712	0.338	0	14,712	0.00	3017.32	3009.67	287	0.027
SUBTOTAL 1 (A1-A4)	420,300	9.649	50,233	370,067	0.12				
A6	207,939	4.774	11,718	196,220	0.06	3030.50	3024.66	983	0.006
A7	205,004	4.706	11,394	193,611	0.06	3025.22	3019.90	959	0.006
A8	13,228	0.304	3,503	9,725	0.26	3017.92	3013.79	283	0.015
A9	150,964	3.466	84,607	66,357	0.56	3020.00	3014.07	591	0.010
SUBTOTAL 3 (A6-A10)	577,135	13.249	111,222	465,913	0.19				
TOTAL	1,970,945	45.25	296,985	1,673,961	0.15				

TC (MIN) (HR)

7.875 0.131

7.403 0.123

11.933 0.199

13.144 0.219

11.333 0.189

5.501 0.092

12.694 0.212

12.742 0.212

7.544 0.126

13.300 0.222

	Q25 (cfs)	Q100 (cfs)	V100 (ac-ft)	V100 (cf)	Q10 (cfs)	V10 (ac-ft)	V10 (cf)	Q2 (cfs)	V2 (ac-ft)	V2 (cf)
		6.88			3.71			1.97		
		10.05			5.38			2.83		
		5.30			2.15			0.54		
		43.27			23.94			13.30		
		65.50	5.211	227,009	35.17	3.137	136,643	18.64	1.742	75,864
		27.92			15.10			8.09		
		1.72			0.96			0.54		
		29.63	2.306	100,462	16.06	1.392	60,636	8.63	0.774	33,711
		13.31			7.32			4.03		
		13.08			7.19			3.96		
		1.18			0.62			0.32		
		8.12			3.61			1.32		
		35.69	3.062	133,368	18.75	1.840	80,163	9.63	1.021	0
		130.82	10.58	460,839	69.98	6.37	277,442	36.90	3.54	154,050

NOAA Atlas 14 Rainfall Data

	2Yr	10 Yr	25 Yr	100 Yr
1hr	0.336	0.594	0.767	1.060
6hr	0.744	1.200	1.490	1.970
24hr	1.280	2.070	2.560	3.340

Curve #	78	Pre
	32	Post

2022-260 Watson High Desert Logistics - West, WQMP Calculations

1.7, 2.0, 4.7	Infiltration Rates (in/hr) (Field)
2.8	Infiltration Rate AVG (in/hr)

Basin 1	WQMP Form 4.3-3		
	Item #		
Infiltration Rate	2	2.8	in/hr
Factor of Safety	3	2	
Safety Infiltration Rate	4	1.4	in/hr
Drawdown Time	5	48	hr
Max Ponding Depth	6	5	ft
Ponding Depth	7	5	(min of ITEM6 or (ITEM4*ITEM5/12)) = 5.6
Infiltrating Surface Area	8	35,851	sf
Depth of Engineered Soil	9	4	ft
Soil Porosity	10	0.35	
Gravel Depth	11	0	ft
Gravel Porosity	12	0	
Duration of Storm (typ. 3hr)	13	3	
			DCV = 88,502
Above Ground Retention Volume (CF)	14	241,997	% of DCV Covered = 100%

NOAA Atlas 14 Rainfall Data				
	2Yr	10 Yr	25 Yr	100 Yr
1hr	0.336	0.594	0.767	1.060
6hr	0.744	1.200	1.490	1.970
24hr	1.280	2.070	2.560	3.340

WQMP Form 4.2-1				
DCV	88,502	cf	Design Capture Volume	
1	1,970,945	sf	Site Area	
2	0.85		Imperviousness of Site	
3	0.66		Runoff Coefficient (Rc)	
4	0.336	in	1hr 2Yr Rainfall	Valley Desert
5	0.416	in	Mean 6-hr Precipitation, C1=	1.4807 1.2371
6	48	hr	Drawdown Time	
C2=	1.582	24 hr		
	1.963	48 hr		

Basin 2	WQMP Form 4.3-3		
	Item #		
Infiltration Rate	2	2.8	in/hr
Factor of Safety	3	2	
Safety Infiltration Rate	4	1.4	in/hr
Drawdown Time	5	48	hr
Max Ponding Depth	6	5	ft
Ponding Depth	7	5	(min of ITEM6 or (ITEM4*ITEM5/12)) = 5.6
Infiltrating Surface Area	8	18,093	sf
Depth of Engineered Soil	9	4	ft
Soil Porosity	10	0.35	
Gravel Depth	11	0	ft
Gravel Porosity	12	0	
Duration of Storm (typ. 3hr)	13	3	
Above Ground Retention Volume (CF)	14	122,127	

Hydromodification (10 Yr Storm)			
Condition	Volume (cf)	Tc (min)	Peak Q (cfs)
Pre	127,897	36.78	18.60
Post	277,442	13.30	69.98
Delta	149,546	23.48	51.38
	117%	64%	276%
95%Post - Pre	135,674	21.64	47.88
Δ (% of Pre)	106%	59%	257%

ΔV100	139
Pre	460,699
Post	460,839

DCV	88,502	cf
Hydromodification	135,674	cf
ΔV100	139	cf

Controlling WQMP Volume	135,674	cf
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APPENDIX B

RATIONAL METHOD ANALYSIS (10/100 YEAR STORM)

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/04/22

JOB NO 2022-260
APPLE VALLEY 45 INDUSTRIAL BUILDING
10 YR STORM RATIONAL METHOD, PRE CONDITION
SITE

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.594 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 78.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.404(In/Hr)
Initial subarea data:
Initial area flow distance = 1186.000(Ft.)
Top (of initial area) elevation = 3039.000(Ft.)
Bottom (of initial area) elevation = 3022.000(Ft.)
Difference in elevation = 17.000(Ft.)
Slope = 0.01433 s(%)= 1.43
TC = k(0.615)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 24.392 min.
Rainfall intensity = 1.115(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.574
Subarea runoff = 9.777(CFS)
Total initial stream area = 15.260(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.404(In/Hr)

+++++
Process from Point/Station 1.200 to Point/Station 1.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)
Depth of flow = 0.727(Ft.), Average velocity = 2.339(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 1.00
2 11.50 0.00
3 23.00 1.00
Manning's 'N' friction factor = 0.030

Sub-Channel flow = 14.226(CFS)
' ' flow top width = 16.728(Ft.)
' ' velocity = 2.339(Ft/s)
' ' area = 6.083(Sq.Ft)
' ' Froude number = 0.683

Upstream point elevation = 3022.000(Ft.)
Downstream point elevation = 3007.000(Ft.)
Flow length = 1738.000(Ft.)
Travel time = 12.39 min.
Time of concentration = 36.78 min.
Depth of flow = 0.727(Ft.)
Average velocity = 2.339(Ft/s)
Total irregular channel flow = 14.226(CFS)
Irregular channel normal depth above invert elev. = 0.727(Ft.)
Average velocity of channel(s) = 2.339(Ft/s)
Adding area flow to channel
Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 78.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.404(In/Hr)
Rainfall intensity = 0.837(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.466
Subarea runoff = 8.825(CFS) for 32.450(Ac.)
Total runoff = 18.601(CFS)
Effective area this stream = 47.71(Ac.)
Total Study Area (Main Stream No. 1) = 47.71(Ac.)
Area averaged Fm value = 0.404(In/Hr)
Depth of flow = 0.804(Ft.), Average velocity = 2.501(Ft/s)
End of computations, Total Study Area = 47.71 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 1.000

Area averaged SCS curve number = 78.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/04/22

JOB NO 2022-260
APPLE VALLEY 45 INDUSTRIAL BUILDING
100 YR RATIONAL METHOD, PRE CONDITION
SITE

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.060 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 78.00
Adjusted SCS curve number for AMC 3 = 92.80
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.140(In/Hr)
Initial subarea data:
Initial area flow distance = 1186.000(Ft.)
Top (of initial area) elevation = 3039.000(Ft.)
Bottom (of initial area) elevation = 3022.000(Ft.)
Difference in elevation = 17.000(Ft.)
Slope = 0.01433 s(%)= 1.43
TC = k(0.615)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 24.392 min.
Rainfall intensity = 1.990(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.837
Subarea runoff = 25.413(CFS)
Total initial stream area = 15.260(Ac.)
Pervious area fraction = 1.000

Initial area Fm value = 0.140(In/Hr)

++++
Process from Point/Station 1.200 to Point/Station 1.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)
Depth of flow = 1.092(Ft.), Average velocity = 3.237(Ft/s)
!!Warning: Water is above left or right bank elevations
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 1.00
2 11.50 0.00
3 23.00 1.00
Manning's 'N' friction factor = 0.030

Sub-Channel flow = 44.085(CFS)
' ' flow top width = 23.000(Ft.)
' ' velocity = 3.237(Ft/s)
' ' area = 13.620(Sq.Ft)
' ' Froude number = 0.741

Upstream point elevation = 3022.000(Ft.)
Downstream point elevation = 3007.000(Ft.)
Flow length = 1738.000(Ft.)
Travel time = 8.95 min.
Time of concentration = 33.34 min.
Depth of flow = 1.092(Ft.)
Average velocity = 3.237(Ft/s)
Total irregular channel flow = 44.084(CFS)
Irregular channel normal depth above invert elev. = 1.092(Ft.)
Average velocity of channel(s) = 3.237(Ft/s)
!!Warning: Water is above left or right bank elevations
Adding area flow to channel
Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 78.00
Adjusted SCS curve number for AMC 3 = 92.80
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.140(In/Hr)
Rainfall intensity = 1.599(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.821
Subarea runoff = 37.246(CFS) for 32.450(Ac.)
Total runoff = 62.660(CFS)
Effective area this stream = 47.71(Ac.)
Total Study Area (Main Stream No. 1) = 47.71(Ac.)
Area averaged Fm value = 0.140(In/Hr)

Depth of flow = 1.231(Ft.), Average velocity = 3.726(Ft/s)

!!Warning: Water is above left or right bank elevations

End of computations, Total Study Area = 47.71 (Ac.)

The following figures may

be used for a unit hydrograph study of the same area.

Note: These figures do not consider reduced effective area effects caused by confluences in the rational equation.

Area averaged pervious area fraction(A_p) = 1.000

Area averaged SCS curve number = 78.0

RATIONAL METHOD ANALYSIS
PRE-DEVELOPMENT CONDITIONS

RATIONAL METHOD ANALYSIS
POST-DEVELOPMENT CONDITIONS

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
10 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A1

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.594 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1700 Max loss rate(Fm)= 0.166(In/Hr)
Initial subarea data:
Initial area flow distance = 438.000(Ft.)
Top (of initial area) elevation = 3037.270(Ft.)
Bottom (of initial area) elevation = 3028.470(Ft.)
Difference in elevation = 8.800(Ft.)
Slope = 0.02009 s(%)= 2.01
TC = k(0.316)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.875 min.
Rainfall intensity = 2.461(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.839
Subarea runoff = 3.705(CFS)
Total initial stream area = 1.794(Ac.)
Pervious area fraction = 0.170
Initial area Fm value = 0.166(In/Hr)
End of computations, Total Study Area = 1.79 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.170
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
10 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A2

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.594 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.2100 Max loss rate(Fm)= 0.205(In/Hr)
Initial subarea data:
Initial area flow distance = 374.000(Ft.)
Top (of initial area) elevation = 3037.140(Ft.)
Bottom (of initial area) elevation = 3028.440(Ft.)
Difference in elevation = 8.700(Ft.)
Slope = 0.02326 s(%)= 2.33
TC = k(0.326)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.403 min.
Rainfall intensity = 2.570(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.828
Subarea runoff = 5.375(CFS)
Total initial stream area = 2.526(Ac.)
Pervious area fraction = 0.210
Initial area Fm value = 0.205(In/Hr)
End of computations, Total Study Area = 2.53 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.210
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
10 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A3

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.594 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 3.100 to Point/Station 3.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.7700 Max loss rate(Fm)= 0.753(In/Hr)
Initial subarea data:
Initial area flow distance = 462.000(Ft.)
Top (of initial area) elevation = 3033.200(Ft.)
Bottom (of initial area) elevation = 3024.400(Ft.)
Difference in elevation = 8.800(Ft.)
Slope = 0.01905 s(%)= 1.90
TC = $k(0.464)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 11.933 min.
Rainfall intensity = 1.840(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.532
Subarea runoff = 2.150(CFS)
Total initial stream area = 2.198(Ac.)
Pervious area fraction = 0.770
Initial area Fm value = 0.753(In/Hr)
End of computations, Total Study Area = 2.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.770
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
10 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A4

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.594 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 4.100 to Point/Station 4.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.0400 Max loss rate(Fm)= 0.039(In/Hr)
Initial subarea data:
Initial area flow distance = 1294.000(Ft.)
Top (of initial area) elevation = 3025.090(Ft.)
Bottom (of initial area) elevation = 3014.820(Ft.)
Difference in elevation = 10.270(Ft.)
Slope = 0.00794 s(%)= 0.79
TC = k(0.284)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.144 min.
Rainfall intensity = 1.719(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.880
Subarea runoff = 23.941(CFS)
Total initial stream area = 15.831(Ac.)
Pervious area fraction = 0.040
Initial area Fm value = 0.039(In/Hr)
End of computations, Total Study Area = 15.83 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.040
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

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CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
10 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A5

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.594 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 5.100 to Point/Station 5.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1200 Max loss rate(Fm)= 0.117(In/Hr)
Initial subarea data:
Initial area flow distance = 914.000(Ft.)
Top (of initial area) elevation = 3020.540(Ft.)
Bottom (of initial area) elevation = 3009.920(Ft.)
Difference in elevation = 10.620(Ft.)
Slope = 0.01162 s(%)= 1.16
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.333 min.
Rainfall intensity = 1.907(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.845
Subarea runoff = 15.101(CFS)
Total initial stream area = 9.373(Ac.)
Pervious area fraction = 0.120
Initial area Fm value = 0.117(In/Hr)
End of computations, Total Study Area = 9.37 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.120
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 09/21/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
10 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A6

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.594 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 6.100 to Point/Station 6.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.0600 Max loss rate(Fm)= 0.059(In/Hr)
Initial subarea data:
Initial area flow distance = 983.000(Ft.)
Top (of initial area) elevation = 3030.500(Ft.)
Bottom (of initial area) elevation = 3024.660(Ft.)
Difference in elevation = 5.840(Ft.)
Slope = 0.00594 s(%)= 0.59
TC = k(0.289)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.694 min.
Rainfall intensity = 1.762(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff = 7.318(CFS)
Total initial stream area = 4.774(Ac.)
Pervious area fraction = 0.060
Initial area Fm value = 0.059(In/Hr)
End of computations, Total Study Area = 4.77 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.060
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 09/21/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
10 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A7

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.594 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 7.100 to Point/Station 7.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.0600 Max loss rate(Fm)= 0.059(In/Hr)
Initial subarea data:
Initial area flow distance = 959.000(Ft.)
Top (of initial area) elevation = 3025.220(Ft.)
Bottom (of initial area) elevation = 3019.900(Ft.)
Difference in elevation = 5.320(Ft.)
Slope = 0.00555 s(%)= 0.55
TC = $k(0.289)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 12.742 min.
Rainfall intensity = 1.757(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff = 7.194(CFS)
Total initial stream area = 4.706(Ac.)
Pervious area fraction = 0.060
Initial area Fm value = 0.059(In/Hr)
End of computations, Total Study Area = 4.71 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.060
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 09/21/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
10 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A8

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.594 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 8.100 to Point/Station 8.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.2600 Max loss rate(Fm)= 0.254(In/Hr)
Initial subarea data:
Initial area flow distance = 283.000(Ft.)
Top (of initial area) elevation = 3017.920(Ft.)
Bottom (of initial area) elevation = 3013.790(Ft.)
Difference in elevation = 4.130(Ft.)
Slope = 0.01459 s(%)= 1.46
TC = k(0.339)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.544 min.
Rainfall intensity = 2.536(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.810
Subarea runoff = 0.624(CFS)
Total initial stream area = 0.304(Ac.)
Pervious area fraction = 0.260
Initial area Fm value = 0.254(In/Hr)
End of computations, Total Study Area = 0.30 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.260
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
10 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A9

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.594 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 9.100 to Point/Station 9.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.5600 Max loss rate(Fm)= 0.548(In/Hr)
Initial subarea data:
Initial area flow distance = 591.000(Ft.)
Top (of initial area) elevation = 3020.000(Ft.)
Bottom (of initial area) elevation = 3014.070(Ft.)
Difference in elevation = 5.930(Ft.)
Slope = 0.01003 s(%)= 1.00
TC = k(0.413)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.300 min.
Rainfall intensity = 1.705(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.611
Subarea runoff = 3.611(CFS)
Total initial stream area = 3.466(Ac.)
Pervious area fraction = 0.560
Initial area Fm value = 0.548(In/Hr)
End of computations, Total Study Area = 3.47 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.560
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
10 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A10

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.594 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

+++++
Process from Point/Station 10.100 to Point/Station 10.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.010(In/Hr)
Initial subarea data:
Initial area flow distance = 287.000(Ft.)
Top (of initial area) elevation = 3017.320(Ft.)
Bottom (of initial area) elevation = 3009.670(Ft.)
Difference in elevation = 7.650(Ft.)
Slope = 0.02666 s(%)= 2.67
TC = k(0.277)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.501 min.
Rainfall intensity = 3.164(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.897
Subarea runoff = 0.959(CFS)
Total initial stream area = 0.338(Ac.)
Pervious area fraction = 0.010
Initial area Fm value = 0.010(In/Hr)
End of computations, Total Study Area = 0.34 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.010
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A1

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.060 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1700 Max loss rate(Fm)= 0.133(In/Hr)
Initial subarea data:
Initial area flow distance = 438.000(Ft.)
Top (of initial area) elevation = 3037.270(Ft.)
Bottom (of initial area) elevation = 3028.470(Ft.)
Difference in elevation = 8.800(Ft.)
Slope = 0.02009 s(%)= 2.01
TC = $k(0.316)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 7.875 min.
Rainfall intensity = 4.392(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.873
Subarea runoff = 6.875(CFS)
Total initial stream area = 1.794(Ac.)
Pervious area fraction = 0.170
Initial area Fm value = 0.133(In/Hr)
End of computations, Total Study Area = 1.79 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.170
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A2

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.060 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.2100 Max loss rate(Fm)= 0.165(In/Hr)
Initial subarea data:
Initial area flow distance = 374.000(Ft.)
Top (of initial area) elevation = 3037.140(Ft.)
Bottom (of initial area) elevation = 3028.440(Ft.)
Difference in elevation = 8.700(Ft.)
Slope = 0.02326 s(%)= 2.33
TC = $k(0.326)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 7.403 min.
Rainfall intensity = 4.586(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.868
Subarea runoff = 10.051(CFS)
Total initial stream area = 2.526(Ac.)
Pervious area fraction = 0.210
Initial area Fm value = 0.165(In/Hr)
End of computations, Total Study Area = 2.53 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.210
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A3

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.060 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 3.100 to Point/Station 3.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.7700 Max loss rate(Fm)= 0.605(In/Hr)
Initial subarea data:
Initial area flow distance = 462.000(Ft.)
Top (of initial area) elevation = 3033.200(Ft.)
Bottom (of initial area) elevation = 3024.400(Ft.)
Difference in elevation = 8.800(Ft.)
Slope = 0.01905 s(%)= 1.90
TC = k(0.464)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.933 min.
Rainfall intensity = 3.283(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.734
Subarea runoff = 5.299(CFS)
Total initial stream area = 2.198(Ac.)
Pervious area fraction = 0.770
Initial area Fm value = 0.605(In/Hr)
End of computations, Total Study Area = 2.20 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.770
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A4

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.060 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 4.100 to Point/Station 4.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.0400 Max loss rate(Fm)= 0.031(In/Hr)
Initial subarea data:
Initial area flow distance = 1294.000(Ft.)
Top (of initial area) elevation = 3025.090(Ft.)
Bottom (of initial area) elevation = 3014.820(Ft.)
Difference in elevation = 10.270(Ft.)
Slope = 0.00794 s(%)= 0.79
TC = $k(0.284)*[(\text{length}^3)/(\text{elevation change})]^{0.2}$
Initial area time of concentration = 13.144 min.
Rainfall intensity = 3.068(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.891
Subarea runoff = 43.270(CFS)
Total initial stream area = 15.831(Ac.)
Pervious area fraction = 0.040
Initial area Fm value = 0.031(In/Hr)
End of computations, Total Study Area = 15.83 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.040
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

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Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A5

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.060 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 5.100 to Point/Station 5.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1200 Max loss rate(Fm)= 0.094(In/Hr)
Initial subarea data:
Initial area flow distance = 914.000(Ft.)
Top (of initial area) elevation = 3020.540(Ft.)
Bottom (of initial area) elevation = 3009.920(Ft.)
Difference in elevation = 10.620(Ft.)
Slope = 0.01162 s(%)= 1.16
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.333 min.
Rainfall intensity = 3.404(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.875
Subarea runoff = 27.919(CFS)
Total initial stream area = 9.373(Ac.)
Pervious area fraction = 0.120
Initial area Fm value = 0.094(In/Hr)
End of computations, Total Study Area = 9.37 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.120
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 09/21/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A6

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.060 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 6.100 to Point/Station 6.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.0600 Max loss rate(Fm)= 0.047(In/Hr)
Initial subarea data:
Initial area flow distance = 983.000(Ft.)
Top (of initial area) elevation = 3030.500(Ft.)
Bottom (of initial area) elevation = 3024.660(Ft.)
Difference in elevation = 5.840(Ft.)
Slope = 0.00594 s(%)= 0.59
TC = k(0.289)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.694 min.
Rainfall intensity = 3.144(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.887
Subarea runoff = 13.307(CFS)
Total initial stream area = 4.774(Ac.)
Pervious area fraction = 0.060
Initial area Fm value = 0.047(In/Hr)
End of computations, Total Study Area = 4.77 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.060
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 09/21/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A7

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.060 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 7.100 to Point/Station 7.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.0600 Max loss rate(Fm)= 0.047(In/Hr)
Initial subarea data:
Initial area flow distance = 959.000(Ft.)
Top (of initial area) elevation = 3025.220(Ft.)
Bottom (of initial area) elevation = 3019.900(Ft.)
Difference in elevation = 5.320(Ft.)
Slope = 0.00555 s(%)= 0.55
TC = k(0.289)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 12.742 min.
Rainfall intensity = 3.136(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.886
Subarea runoff = 13.081(CFS)
Total initial stream area = 4.706(Ac.)
Pervious area fraction = 0.060
Initial area Fm value = 0.047(In/Hr)
End of computations, Total Study Area = 4.71 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.060
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

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Rational Hydrology Study Date: 09/21/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A8

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.060 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 8.100 to Point/Station 8.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.2600 Max loss rate(Fm)= 0.204(In/Hr)
Initial subarea data:
Initial area flow distance = 283.000(Ft.)
Top (of initial area) elevation = 3017.920(Ft.)
Bottom (of initial area) elevation = 3013.790(Ft.)
Difference in elevation = 4.130(Ft.)
Slope = 0.01459 s(%)= 1.46
TC = k(0.339)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 7.544 min.
Rainfall intensity = 4.526(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.859
Subarea runoff = 1.182(CFS)
Total initial stream area = 0.304(Ac.)
Pervious area fraction = 0.260
Initial area Fm value = 0.204(In/Hr)
End of computations, Total Study Area = 0.30 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.260
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

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Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A9

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.060 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 9.100 to Point/Station 9.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.5600 Max loss rate(Fm)= 0.440(In/Hr)
Initial subarea data:
Initial area flow distance = 591.000(Ft.)
Top (of initial area) elevation = 3020.000(Ft.)
Bottom (of initial area) elevation = 3014.070(Ft.)
Difference in elevation = 5.930(Ft.)
Slope = 0.01003 s(%)= 1.00
TC = k(0.413)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.300 min.
Rainfall intensity = 3.043(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.770
Subarea runoff = 8.121(CFS)
Total initial stream area = 3.466(Ac.)
Pervious area fraction = 0.560
Initial area Fm value = 0.440(In/Hr)
End of computations, Total Study Area = 3.47 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.560
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

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Rational Hydrology Study Date: 11/30/23

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM RATIONAL METHOD, POST CONDITION
AREA A10

Program License Serial Number 6277

***** Hydrology Study Control Information *****

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.060 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

+++++
Process from Point/Station 10.100 to Point/Station 10.200
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.0100 Max loss rate(Fm)= 0.008(In/Hr)
Initial subarea data:
Initial area flow distance = 287.000(Ft.)
Top (of initial area) elevation = 3017.320(Ft.)
Bottom (of initial area) elevation = 3009.670(Ft.)
Difference in elevation = 7.650(Ft.)
Slope = 0.02666 s(%)= 2.67
TC = k(0.277)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.501 min.
Rainfall intensity = 5.646(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.899
Subarea runoff = 1.715(CFS)
Total initial stream area = 0.338(Ac.)
Pervious area fraction = 0.010
Initial area Fm value = 0.008(In/Hr)
End of computations, Total Study Area = 0.34 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.010
Area averaged SCS curve number = 32.0

APPENDIX C

UNIT HYDROGRAPH ANALYSIS (24 HOUR, 100-YEAR STORM)

UNIT HYDROGRAPH ANALYSIS (24 HOUR, 100-YEAR STORM)

PRE-DEVELOPMENT CONDITION

U n i t H y d r o g r a p h A n a l y s i s

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Study date 10/04/22

+++++

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6277

JOB NO 2022-260
APPLE VALLEY 45 INDUSTRIAL BUILDING
100 YR STORM UNIT HYDROGRAPH, PRE CONDITION
SITE

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
47.70	1	0.59

Rainfall data for year 2
47.70 6 0.74

Rainfall data for year 2
47.70 24 1.28

Rainfall data for year 100

47.70	1	1.06

Rainfall data for year 100		
47.70	6	1.97

Rainfall data for year 100		
47.70	24	3.34

+++++

***** Area-averaged max loss rate, Fm *****

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
78.0	92.8	47.70	1.000	0.140	1.000	0.140

Area-averaged adjusted loss rate Fm (In/Hr) = 0.140

***** Area-Averaged low loss rate fraction, Yb *****

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
47.70	1.000	78.0	92.8	0.78	0.767

Area-averaged catchment yield fraction, Y = 0.767

Area-averaged low loss fraction, Yb = 0.233

User entry of time of concentration = 0.556 (hours)

+++++

Watershed area = 47.70(Ac.)
 Catchment Lag time = 0.445 hours
 Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 18.7350
 Hydrograph baseflow = 0.00(CFS)
 Average maximum watershed loss rate(Fm) = 0.140(In/Hr)
 Average low loss rate fraction (Yb) = 0.233 (decimal)
 DESERT S-Graph Selected
 Computed peak 5-minute rainfall = 0.503(In)
 Computed peak 30-minute rainfall = 0.861(In)
 Specified peak 1-hour rainfall = 1.060(In)
 Computed peak 3-hour rainfall = 1.550(In)
 Specified peak 6-hour rainfall = 1.970(In)
 Specified peak 24-hour rainfall = 3.340(In)

Rainfall depth area reduction factors:

Using a total area of 47.70(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998	Adjusted rainfall = 0.502(In)
30-minute factor = 0.998	Adjusted rainfall = 0.859(In)

1-hour factor = 0.998 Adjusted rainfall = 1.058(In)
 3-hour factor = 1.000 Adjusted rainfall = 1.550(In)
 6-hour factor = 1.000 Adjusted rainfall = 1.970(In)
 24-hour factor = 1.000 Adjusted rainfall = 3.340(In)

U n i t H y d r o g r a p h

++++++
 Interval 'S' Graph Unit Hydrograph
 Number Mean values ((CFS))

(K = 576.87 (CFS))

1	0.907	5.234
2	4.053	18.148
3	9.750	32.862
4	22.052	70.970
5	39.047	98.040
6	51.454	71.570
7	59.990	49.242
8	65.944	34.345
9	70.679	27.320
10	74.499	22.033
11	77.713	18.542
12	80.340	15.153
13	82.592	12.994
14	84.567	11.393
15	86.364	10.363
16	87.931	9.044
17	89.248	7.593
18	90.356	6.393
19	91.402	6.035
20	92.336	5.389
21	93.199	4.978
22	93.984	4.527
23	94.632	3.741
24	95.269	3.675
25	95.834	3.259
26	96.321	2.810
27	96.801	2.768
28	97.174	2.150
29	97.511	1.945
30	97.817	1.767
31	98.014	1.136
32	98.202	1.081
33	98.407	1.183
34	98.631	1.297
35	98.856	1.297
36	99.081	1.297
37	99.306	1.297

38	99.509	1.171
39	99.633	0.716
40	99.750	0.675
41	99.867	0.675
42	100.000	0.338

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5019	0.5019
2	0.6179	0.1160
3	0.6978	0.0799
4	0.7607	0.0629
5	0.8133	0.0527
6	0.8591	0.0457
7	0.8997	0.0407
8	0.9365	0.0368
9	0.9702	0.0337
10	1.0013	0.0312
11	1.0304	0.0290
12	1.0576	0.0273
13	1.0875	0.0298
14	1.1159	0.0284
15	1.1429	0.0271
16	1.1689	0.0259
17	1.1938	0.0249
18	1.2177	0.0240
19	1.2409	0.0231
20	1.2632	0.0223
21	1.2848	0.0216
22	1.3057	0.0209
23	1.3261	0.0203
24	1.3458	0.0198
25	1.3651	0.0192
26	1.3838	0.0187
27	1.4021	0.0183
28	1.4199	0.0178
29	1.4374	0.0174
30	1.4544	0.0170
31	1.4711	0.0167
32	1.4874	0.0163
33	1.5034	0.0160
34	1.5191	0.0157
35	1.5345	0.0154
36	1.5496	0.0151
37	1.5644	0.0148
38	1.5789	0.0145
39	1.5931	0.0143
40	1.6071	0.0140
41	1.6209	0.0138
42	1.6345	0.0136

43	1.6479	0.0134
44	1.6610	0.0132
45	1.6740	0.0130
46	1.6868	0.0128
47	1.6994	0.0126
48	1.7118	0.0124
49	1.7241	0.0123
50	1.7362	0.0121
51	1.7481	0.0119
52	1.7599	0.0118
53	1.7715	0.0116
54	1.7830	0.0115
55	1.7944	0.0114
56	1.8056	0.0112
57	1.8167	0.0111
58	1.8277	0.0110
59	1.8385	0.0108
60	1.8493	0.0107
61	1.8599	0.0106
62	1.8704	0.0105
63	1.8807	0.0104
64	1.8910	0.0103
65	1.9012	0.0102
66	1.9113	0.0101
67	1.9212	0.0100
68	1.9311	0.0099
69	1.9409	0.0098
70	1.9506	0.0097
71	1.9602	0.0096
72	1.9697	0.0095
73	1.9801	0.0104
74	1.9904	0.0103
75	2.0006	0.0102
76	2.0107	0.0101
77	2.0207	0.0100
78	2.0307	0.0100
79	2.0406	0.0099
80	2.0504	0.0098
81	2.0601	0.0097
82	2.0697	0.0097
83	2.0793	0.0096
84	2.0888	0.0095
85	2.0983	0.0094
86	2.1076	0.0094
87	2.1169	0.0093
88	2.1262	0.0092
89	2.1353	0.0092
90	2.1444	0.0091
91	2.1535	0.0090
92	2.1625	0.0090

93	2.1714	0.0089
94	2.1803	0.0089
95	2.1891	0.0088
96	2.1978	0.0087
97	2.2065	0.0087
98	2.2151	0.0086
99	2.2237	0.0086
100	2.2322	0.0085
101	2.2407	0.0085
102	2.2491	0.0084
103	2.2575	0.0084
104	2.2658	0.0083
105	2.2741	0.0083
106	2.2823	0.0082
107	2.2905	0.0082
108	2.2987	0.0081
109	2.3067	0.0081
110	2.3148	0.0080
111	2.3228	0.0080
112	2.3307	0.0079
113	2.3386	0.0079
114	2.3465	0.0079
115	2.3543	0.0078
116	2.3621	0.0078
117	2.3698	0.0077
118	2.3775	0.0077
119	2.3852	0.0077
120	2.3928	0.0076
121	2.4003	0.0076
122	2.4079	0.0075
123	2.4154	0.0075
124	2.4228	0.0075
125	2.4303	0.0074
126	2.4377	0.0074
127	2.4450	0.0074
128	2.4523	0.0073
129	2.4596	0.0073
130	2.4668	0.0072
131	2.4741	0.0072
132	2.4812	0.0072
133	2.4884	0.0071
134	2.4955	0.0071
135	2.5026	0.0071
136	2.5096	0.0070
137	2.5166	0.0070
138	2.5236	0.0070
139	2.5306	0.0069
140	2.5375	0.0069
141	2.5444	0.0069
142	2.5512	0.0069

143	2.5580	0.0068
144	2.5648	0.0068
145	2.5716	0.0068
146	2.5784	0.0067
147	2.5851	0.0067
148	2.5918	0.0067
149	2.5984	0.0067
150	2.6050	0.0066
151	2.6116	0.0066
152	2.6182	0.0066
153	2.6248	0.0065
154	2.6313	0.0065
155	2.6378	0.0065
156	2.6442	0.0065
157	2.6507	0.0064
158	2.6571	0.0064
159	2.6635	0.0064
160	2.6699	0.0064
161	2.6762	0.0063
162	2.6825	0.0063
163	2.6888	0.0063
164	2.6951	0.0063
165	2.7013	0.0062
166	2.7076	0.0062
167	2.7138	0.0062
168	2.7199	0.0062
169	2.7261	0.0062
170	2.7322	0.0061
171	2.7383	0.0061
172	2.7444	0.0061
173	2.7505	0.0061
174	2.7565	0.0060
175	2.7626	0.0060
176	2.7686	0.0060
177	2.7746	0.0060
178	2.7805	0.0060
179	2.7865	0.0059
180	2.7924	0.0059
181	2.7983	0.0059
182	2.8041	0.0059
183	2.8100	0.0059
184	2.8158	0.0058
185	2.8217	0.0058
186	2.8275	0.0058
187	2.8332	0.0058
188	2.8390	0.0058
189	2.8447	0.0057
190	2.8505	0.0057
191	2.8562	0.0057
192	2.8619	0.0057

193	2.8675	0.0057
194	2.8732	0.0057
195	2.8788	0.0056
196	2.8844	0.0056
197	2.8900	0.0056
198	2.8956	0.0056
199	2.9012	0.0056
200	2.9067	0.0055
201	2.9122	0.0055
202	2.9177	0.0055
203	2.9232	0.0055
204	2.9287	0.0055
205	2.9342	0.0055
206	2.9396	0.0054
207	2.9450	0.0054
208	2.9505	0.0054
209	2.9559	0.0054
210	2.9612	0.0054
211	2.9666	0.0054
212	2.9719	0.0053
213	2.9773	0.0053
214	2.9826	0.0053
215	2.9879	0.0053
216	2.9932	0.0053
217	2.9984	0.0053
218	3.0037	0.0053
219	3.0089	0.0052
220	3.0142	0.0052
221	3.0194	0.0052
222	3.0246	0.0052
223	3.0298	0.0052
224	3.0349	0.0052
225	3.0401	0.0052
226	3.0452	0.0051
227	3.0503	0.0051
228	3.0555	0.0051
229	3.0606	0.0051
230	3.0656	0.0051
231	3.0707	0.0051
232	3.0758	0.0051
233	3.0808	0.0050
234	3.0858	0.0050
235	3.0909	0.0050
236	3.0959	0.0050
237	3.1008	0.0050
238	3.1058	0.0050
239	3.1108	0.0050
240	3.1157	0.0050
241	3.1207	0.0049
242	3.1256	0.0049

243	3.1305	0.0049
244	3.1354	0.0049
245	3.1403	0.0049
246	3.1452	0.0049
247	3.1500	0.0049
248	3.1549	0.0049
249	3.1597	0.0048
250	3.1646	0.0048
251	3.1694	0.0048
252	3.1742	0.0048
253	3.1790	0.0048
254	3.1838	0.0048
255	3.1885	0.0048
256	3.1933	0.0048
257	3.1980	0.0047
258	3.2028	0.0047
259	3.2075	0.0047
260	3.2122	0.0047
261	3.2169	0.0047
262	3.2216	0.0047
263	3.2263	0.0047
264	3.2309	0.0047
265	3.2356	0.0047
266	3.2402	0.0046
267	3.2449	0.0046
268	3.2495	0.0046
269	3.2541	0.0046
270	3.2587	0.0046
271	3.2633	0.0046
272	3.2679	0.0046
273	3.2724	0.0046
274	3.2770	0.0046
275	3.2816	0.0046
276	3.2861	0.0045
277	3.2906	0.0045
278	3.2951	0.0045
279	3.2997	0.0045
280	3.3042	0.0045
281	3.3086	0.0045
282	3.3131	0.0045
283	3.3176	0.0045
284	3.3221	0.0045
285	3.3265	0.0045
286	3.3309	0.0044
287	3.3354	0.0044
288	3.3398	0.0044

Unit
Period
(number)

Unit
Rainfall
(In)

Unit
Soil-Loss
(In)

Effective
Rainfall
(In)

1	0.0044	0.0010	0.0034
2	0.0044	0.0010	0.0034
3	0.0045	0.0010	0.0034
4	0.0045	0.0010	0.0034
5	0.0045	0.0010	0.0034
6	0.0045	0.0010	0.0034
7	0.0045	0.0011	0.0035
8	0.0045	0.0011	0.0035
9	0.0045	0.0011	0.0035
10	0.0046	0.0011	0.0035
11	0.0046	0.0011	0.0035
12	0.0046	0.0011	0.0035
13	0.0046	0.0011	0.0035
14	0.0046	0.0011	0.0035
15	0.0046	0.0011	0.0036
16	0.0046	0.0011	0.0036
17	0.0047	0.0011	0.0036
18	0.0047	0.0011	0.0036
19	0.0047	0.0011	0.0036
20	0.0047	0.0011	0.0036
21	0.0047	0.0011	0.0036
22	0.0047	0.0011	0.0036
23	0.0048	0.0011	0.0037
24	0.0048	0.0011	0.0037
25	0.0048	0.0011	0.0037
26	0.0048	0.0011	0.0037
27	0.0048	0.0011	0.0037
28	0.0049	0.0011	0.0037
29	0.0049	0.0011	0.0037
30	0.0049	0.0011	0.0037
31	0.0049	0.0011	0.0038
32	0.0049	0.0011	0.0038
33	0.0050	0.0012	0.0038
34	0.0050	0.0012	0.0038
35	0.0050	0.0012	0.0038
36	0.0050	0.0012	0.0038
37	0.0050	0.0012	0.0039
38	0.0050	0.0012	0.0039
39	0.0051	0.0012	0.0039
40	0.0051	0.0012	0.0039
41	0.0051	0.0012	0.0039
42	0.0051	0.0012	0.0039
43	0.0052	0.0012	0.0040
44	0.0052	0.0012	0.0040
45	0.0052	0.0012	0.0040
46	0.0052	0.0012	0.0040
47	0.0052	0.0012	0.0040
48	0.0053	0.0012	0.0040
49	0.0053	0.0012	0.0041

50	0.0053	0.0012	0.0041
51	0.0053	0.0012	0.0041
52	0.0053	0.0012	0.0041
53	0.0054	0.0013	0.0041
54	0.0054	0.0013	0.0041
55	0.0054	0.0013	0.0042
56	0.0054	0.0013	0.0042
57	0.0055	0.0013	0.0042
58	0.0055	0.0013	0.0042
59	0.0055	0.0013	0.0042
60	0.0055	0.0013	0.0043
61	0.0056	0.0013	0.0043
62	0.0056	0.0013	0.0043
63	0.0056	0.0013	0.0043
64	0.0057	0.0013	0.0043
65	0.0057	0.0013	0.0044
66	0.0057	0.0013	0.0044
67	0.0057	0.0013	0.0044
68	0.0058	0.0013	0.0044
69	0.0058	0.0014	0.0044
70	0.0058	0.0014	0.0045
71	0.0059	0.0014	0.0045
72	0.0059	0.0014	0.0045
73	0.0059	0.0014	0.0045
74	0.0059	0.0014	0.0046
75	0.0060	0.0014	0.0046
76	0.0060	0.0014	0.0046
77	0.0060	0.0014	0.0046
78	0.0061	0.0014	0.0047
79	0.0061	0.0014	0.0047
80	0.0061	0.0014	0.0047
81	0.0062	0.0014	0.0047
82	0.0062	0.0014	0.0048
83	0.0062	0.0015	0.0048
84	0.0063	0.0015	0.0048
85	0.0063	0.0015	0.0048
86	0.0063	0.0015	0.0049
87	0.0064	0.0015	0.0049
88	0.0064	0.0015	0.0049
89	0.0065	0.0015	0.0050
90	0.0065	0.0015	0.0050
91	0.0065	0.0015	0.0050
92	0.0066	0.0015	0.0050
93	0.0066	0.0015	0.0051
94	0.0067	0.0016	0.0051
95	0.0067	0.0016	0.0051
96	0.0067	0.0016	0.0052
97	0.0068	0.0016	0.0052
98	0.0068	0.0016	0.0052
99	0.0069	0.0016	0.0053

100	0.0069	0.0016	0.0053
101	0.0070	0.0016	0.0054
102	0.0070	0.0016	0.0054
103	0.0071	0.0017	0.0054
104	0.0071	0.0017	0.0055
105	0.0072	0.0017	0.0055
106	0.0072	0.0017	0.0055
107	0.0073	0.0017	0.0056
108	0.0073	0.0017	0.0056
109	0.0074	0.0017	0.0057
110	0.0074	0.0017	0.0057
111	0.0075	0.0017	0.0057
112	0.0075	0.0018	0.0058
113	0.0076	0.0018	0.0058
114	0.0077	0.0018	0.0059
115	0.0077	0.0018	0.0059
116	0.0078	0.0018	0.0060
117	0.0079	0.0018	0.0060
118	0.0079	0.0018	0.0061
119	0.0080	0.0019	0.0061
120	0.0080	0.0019	0.0062
121	0.0081	0.0019	0.0062
122	0.0082	0.0019	0.0063
123	0.0083	0.0019	0.0063
124	0.0083	0.0019	0.0064
125	0.0084	0.0020	0.0065
126	0.0085	0.0020	0.0065
127	0.0086	0.0020	0.0066
128	0.0086	0.0020	0.0066
129	0.0087	0.0020	0.0067
130	0.0088	0.0021	0.0068
131	0.0089	0.0021	0.0068
132	0.0090	0.0021	0.0069
133	0.0091	0.0021	0.0070
134	0.0092	0.0021	0.0070
135	0.0093	0.0022	0.0071
136	0.0094	0.0022	0.0072
137	0.0095	0.0022	0.0073
138	0.0096	0.0022	0.0073
139	0.0097	0.0023	0.0075
140	0.0098	0.0023	0.0075
141	0.0100	0.0023	0.0076
142	0.0100	0.0023	0.0077
143	0.0102	0.0024	0.0078
144	0.0103	0.0024	0.0079
145	0.0095	0.0022	0.0073
146	0.0096	0.0022	0.0074
147	0.0098	0.0023	0.0075
148	0.0099	0.0023	0.0076
149	0.0101	0.0023	0.0077

150	0.0102	0.0024	0.0078
151	0.0104	0.0024	0.0080
152	0.0105	0.0024	0.0080
153	0.0107	0.0025	0.0082
154	0.0108	0.0025	0.0083
155	0.0111	0.0026	0.0085
156	0.0112	0.0026	0.0086
157	0.0115	0.0027	0.0088
158	0.0116	0.0027	0.0089
159	0.0119	0.0028	0.0092
160	0.0121	0.0028	0.0093
161	0.0124	0.0029	0.0095
162	0.0126	0.0029	0.0097
163	0.0130	0.0030	0.0099
164	0.0132	0.0031	0.0101
165	0.0136	0.0032	0.0104
166	0.0138	0.0032	0.0106
167	0.0143	0.0033	0.0109
168	0.0145	0.0034	0.0111
169	0.0151	0.0035	0.0116
170	0.0154	0.0036	0.0118
171	0.0160	0.0037	0.0123
172	0.0163	0.0038	0.0125
173	0.0170	0.0040	0.0131
174	0.0174	0.0041	0.0134
175	0.0183	0.0043	0.0140
176	0.0187	0.0044	0.0144
177	0.0198	0.0046	0.0152
178	0.0203	0.0047	0.0156
179	0.0216	0.0050	0.0166
180	0.0223	0.0052	0.0171
181	0.0240	0.0056	0.0184
182	0.0249	0.0058	0.0191
183	0.0271	0.0063	0.0208
184	0.0284	0.0066	0.0218
185	0.0273	0.0064	0.0209
186	0.0290	0.0068	0.0223
187	0.0337	0.0079	0.0258
188	0.0368	0.0086	0.0282
189	0.0457	0.0107	0.0351
190	0.0527	0.0117	0.0410
191	0.0799	0.0117	0.0682
192	0.1160	0.0117	0.1043
193	0.5019	0.0117	0.4902
194	0.0629	0.0117	0.0512
195	0.0407	0.0095	0.0312
196	0.0312	0.0073	0.0239
197	0.0298	0.0070	0.0229
198	0.0259	0.0060	0.0199
199	0.0231	0.0054	0.0177

200	0.0209	0.0049	0.0161
201	0.0192	0.0045	0.0148
202	0.0178	0.0042	0.0137
203	0.0167	0.0039	0.0128
204	0.0157	0.0037	0.0120
205	0.0148	0.0034	0.0113
206	0.0140	0.0033	0.0108
207	0.0134	0.0031	0.0102
208	0.0128	0.0030	0.0098
209	0.0123	0.0029	0.0094
210	0.0118	0.0027	0.0090
211	0.0114	0.0026	0.0087
212	0.0110	0.0026	0.0084
213	0.0106	0.0025	0.0081
214	0.0103	0.0024	0.0079
215	0.0100	0.0023	0.0076
216	0.0097	0.0023	0.0074
217	0.0104	0.0024	0.0080
218	0.0101	0.0024	0.0078
219	0.0099	0.0023	0.0076
220	0.0097	0.0023	0.0074
221	0.0094	0.0022	0.0072
222	0.0092	0.0022	0.0071
223	0.0090	0.0021	0.0069
224	0.0089	0.0021	0.0068
225	0.0087	0.0020	0.0067
226	0.0085	0.0020	0.0065
227	0.0084	0.0020	0.0064
228	0.0082	0.0019	0.0063
229	0.0081	0.0019	0.0062
230	0.0079	0.0019	0.0061
231	0.0078	0.0018	0.0060
232	0.0077	0.0018	0.0059
233	0.0076	0.0018	0.0058
234	0.0075	0.0017	0.0057
235	0.0074	0.0017	0.0056
236	0.0072	0.0017	0.0056
237	0.0071	0.0017	0.0055
238	0.0070	0.0016	0.0054
239	0.0069	0.0016	0.0053
240	0.0069	0.0016	0.0053
241	0.0068	0.0016	0.0052
242	0.0067	0.0016	0.0051
243	0.0066	0.0015	0.0051
244	0.0065	0.0015	0.0050
245	0.0064	0.0015	0.0049
246	0.0064	0.0015	0.0049
247	0.0063	0.0015	0.0048
248	0.0062	0.0015	0.0048
249	0.0062	0.0014	0.0047

250	0.0061	0.0014	0.0047
251	0.0060	0.0014	0.0046
252	0.0060	0.0014	0.0046
253	0.0059	0.0014	0.0045
254	0.0058	0.0014	0.0045
255	0.0058	0.0013	0.0044
256	0.0057	0.0013	0.0044
257	0.0057	0.0013	0.0043
258	0.0056	0.0013	0.0043
259	0.0056	0.0013	0.0043
260	0.0055	0.0013	0.0042
261	0.0055	0.0013	0.0042
262	0.0054	0.0013	0.0041
263	0.0054	0.0013	0.0041
264	0.0053	0.0012	0.0041
265	0.0053	0.0012	0.0040
266	0.0052	0.0012	0.0040
267	0.0052	0.0012	0.0040
268	0.0051	0.0012	0.0039
269	0.0051	0.0012	0.0039
270	0.0051	0.0012	0.0039
271	0.0050	0.0012	0.0038
272	0.0050	0.0012	0.0038
273	0.0049	0.0012	0.0038
274	0.0049	0.0011	0.0038
275	0.0049	0.0011	0.0037
276	0.0048	0.0011	0.0037
277	0.0048	0.0011	0.0037
278	0.0048	0.0011	0.0036
279	0.0047	0.0011	0.0036
280	0.0047	0.0011	0.0036
281	0.0047	0.0011	0.0036
282	0.0046	0.0011	0.0035
283	0.0046	0.0011	0.0035
284	0.0046	0.0011	0.0035
285	0.0045	0.0011	0.0035
286	0.0045	0.0010	0.0035
287	0.0045	0.0010	0.0034
288	0.0044	0.0010	0.0034

Total soil rain loss = 0.65(In)
Total effective rainfall = 2.69(In)
Peak flow rate in flood hydrograph = 69.78(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume	Ac.Ft	Q(CFS)	0	17.5	35.0	52.5	70.0
0+ 5	0.0001		0.02	Q				
0+10	0.0007		0.08	Q				
0+15	0.0020		0.19	Q				
0+20	0.0050		0.43	Q				
0+25	0.0102		0.77	Q				
0+30	0.0172		1.01	Q				
0+35	0.0253		1.18	Q				
0+40	0.0343		1.30	Q				
0+45	0.0439		1.40	Q				
0+50	0.0541		1.48	Q				
0+55	0.0647		1.54	Q				
1+ 0	0.0758		1.60	Q				
1+ 5	0.0871		1.65	Q				
1+10	0.0988		1.69	Q				
1+15	0.1108		1.74	Q				
1+20	0.1230		1.77	VQ				
1+25	0.1354		1.80	VQ				
1+30	0.1480		1.83	VQ				
1+35	0.1608		1.86	VQ				
1+40	0.1738		1.88	VQ				
1+45	0.1869		1.91	VQ				
1+50	0.2002		1.93	VQ				
1+55	0.2136		1.95	VQ				
2+ 0	0.2272		1.97	VQ				
2+ 5	0.2408		1.99	VQ				
2+10	0.2546		2.00	VQ				
2+15	0.2685		2.02	Q				
2+20	0.2825		2.03	Q				
2+25	0.2966		2.05	Q				
2+30	0.3108		2.06	Q				
2+35	0.3251		2.07	Q				
2+40	0.3394		2.08	Q				
2+45	0.3539		2.10	Q				
2+50	0.3684		2.11	Q				
2+55	0.3830		2.12	Q				
3+ 0	0.3977		2.13	Q				
3+ 5	0.4124		2.14	Q				
3+10	0.4273		2.16	Q				
3+15	0.4422		2.17	Q				
3+20	0.4572		2.18	Q				
3+25	0.4723		2.19	Q				
3+30	0.4874		2.20	Q				
3+35	0.5026		2.21	Q				
3+40	0.5179		2.22	Q				
3+45	0.5332		2.22	Q				
3+50	0.5486		2.23	QV				

3+55	0.5640	2.24	QV
4+ 0	0.5795	2.25	QV
4+ 5	0.5951	2.26	QV
4+10	0.6107	2.27	QV
4+15	0.6264	2.28	QV
4+20	0.6422	2.29	QV
4+25	0.6580	2.30	QV
4+30	0.6739	2.31	QV
4+35	0.6899	2.32	QV
4+40	0.7059	2.33	QV
4+45	0.7220	2.34	QV
4+50	0.7382	2.35	QV
4+55	0.7545	2.36	QV
5+ 0	0.7708	2.37	QV
5+ 5	0.7872	2.38	QV
5+10	0.8036	2.39	Q V
5+15	0.8202	2.40	Q V
5+20	0.8368	2.41	Q V
5+25	0.8535	2.42	Q V
5+30	0.8702	2.43	Q V
5+35	0.8871	2.45	Q V
5+40	0.9040	2.46	Q V
5+45	0.9210	2.47	Q V
5+50	0.9381	2.48	Q V
5+55	0.9552	2.49	Q V
6+ 0	0.9725	2.50	Q V
6+ 5	0.9898	2.52	Q V
6+10	1.0072	2.53	Q V
6+15	1.0247	2.54	Q V
6+20	1.0423	2.55	Q V
6+25	1.0600	2.57	Q V
6+30	1.0777	2.58	Q V
6+35	1.0956	2.59	Q V
6+40	1.1135	2.61	Q V
6+45	1.1316	2.62	Q V
6+50	1.1497	2.63	Q V
6+55	1.1679	2.65	Q V
7+ 0	1.1863	2.66	Q V
7+ 5	1.2047	2.68	Q V
7+10	1.2232	2.69	Q V
7+15	1.2418	2.70	Q V
7+20	1.2606	2.72	Q V
7+25	1.2794	2.73	Q V
7+30	1.2983	2.75	Q V
7+35	1.3174	2.77	Q V
7+40	1.3365	2.78	Q V
7+45	1.3558	2.80	Q V
7+50	1.3752	2.81	Q V
7+55	1.3947	2.83	Q V
8+ 0	1.4143	2.85	Q V

8+ 5	1.4340	2.86	Q	V				
8+10	1.4538	2.88	Q	V				
8+15	1.4738	2.90	Q	V				
8+20	1.4939	2.92	Q	V				
8+25	1.5141	2.94	Q	V				
8+30	1.5345	2.95	Q	V				
8+35	1.5549	2.97	Q	V				
8+40	1.5755	2.99	Q	V				
8+45	1.5963	3.01	Q	V				
8+50	1.6171	3.03	Q	V				
8+55	1.6382	3.05	Q	V				
9+ 0	1.6593	3.07	Q	V				
9+ 5	1.6806	3.09	Q	V				
9+10	1.7020	3.11	Q	V				
9+15	1.7236	3.14	Q	V				
9+20	1.7454	3.16	Q	V				
9+25	1.7673	3.18	Q	V				
9+30	1.7893	3.20	Q	V				
9+35	1.8115	3.23	Q	V				
9+40	1.8339	3.25	Q	V				
9+45	1.8565	3.27	Q	V				
9+50	1.8792	3.30	Q	V				
9+55	1.9021	3.32	Q	V				
10+ 0	1.9251	3.35	Q	V				
10+ 5	1.9484	3.38	Q	V				
10+10	1.9718	3.40	Q	V				
10+15	1.9954	3.43	Q	V				
10+20	2.0192	3.46	Q	V				
10+25	2.0432	3.49	Q	V				
10+30	2.0674	3.51	Q	V				
10+35	2.0919	3.54	Q	V				
10+40	2.1165	3.57	Q	V				
10+45	2.1413	3.61	Q	V				
10+50	2.1664	3.64	Q	V				
10+55	2.1917	3.67	Q	V				
11+ 0	2.2172	3.70	Q	V				
11+ 5	2.2429	3.74	Q	V				
11+10	2.2689	3.77	Q	V				
11+15	2.2951	3.81	Q	V				
11+20	2.3216	3.85	Q	V				
11+25	2.3484	3.88	Q	V				
11+30	2.3754	3.92	Q	V				
11+35	2.4027	3.96	Q	V				
11+40	2.4303	4.00	Q	V				
11+45	2.4581	4.05	Q	V				
11+50	2.4863	4.09	Q	V				
11+55	2.5147	4.13	Q	V				
12+ 0	2.5435	4.18	Q	V				
12+ 5	2.5726	4.22	Q	V				
12+10	2.6019	4.26	Q	V				

12+15	2.6314	4.28	Q	V				
12+20	2.6609	4.28	Q	V				
12+25	2.6903	4.26	Q	V				
12+30	2.7197	4.27	Q	V				
12+35	2.7492	4.29	Q	V				
12+40	2.7790	4.32	Q	V				
12+45	2.8090	4.36	Q	V				
12+50	2.8393	4.40	Q	V				
12+55	2.8700	4.45	Q	V				
13+ 0	2.9010	4.51	Q	V				
13+ 5	2.9325	4.57	Q	V				
13+10	2.9643	4.63	Q	V				
13+15	2.9967	4.70	Q	V				
13+20	3.0295	4.77	Q	V				
13+25	3.0629	4.84	Q	V				
13+30	3.0967	4.92	Q	V				
13+35	3.1312	5.00	Q	V				
13+40	3.1663	5.09	Q	V				
13+45	3.2020	5.18	Q	V				
13+50	3.2384	5.28	Q	V				
13+55	3.2755	5.39	Q	V				
14+ 0	3.3133	5.50	Q	V				
14+ 5	3.3520	5.61	Q	V				
14+10	3.3915	5.74	Q	V				
14+15	3.4319	5.87	Q	V				
14+20	3.4733	6.01	Q	V				
14+25	3.5158	6.17	Q	V				
14+30	3.5594	6.33	Q	V				
14+35	3.6041	6.50	Q	V				
14+40	3.6502	6.69	Q	V				
14+45	3.6977	6.89	Q	V				
14+50	3.7466	7.10	Q	V				
14+55	3.7971	7.34	Q	V				
15+ 0	3.8494	7.59	Q	V				
15+ 5	3.9037	7.88	Q	V				
15+10	3.9601	8.19	Q	V				
15+15	4.0188	8.53	Q	V				
15+20	4.0802	8.92	Q	V				
15+25	4.1446	9.34	Q	V				
15+30	4.2120	9.78	Q	V				
15+35	4.2826	10.26	Q	V				
15+40	4.3564	10.71	Q	V				
15+45	4.4336	11.21	Q	V				
15+50	4.5162	11.99	Q	V				
15+55	4.6072	13.22	Q	V				
16+ 0	4.7123	15.26	Q	V				
16+ 5	4.8529	20.42	Q	V				
16+10	5.0574	29.68	Q	V				
16+15	5.3368	40.58		V	Q			
16+20	5.7458	59.39		V		Q		

16+25	6.2264	69.78				V		Q
16+30	6.6112	55.86				V		
16+35	6.9090	43.25				QV		Q
16+40	7.1463	34.45			Q	V		
16+45	7.3501	29.58				V		
16+50	7.5276	25.78				V		
16+55	7.6856	22.93				V		
17+ 0	7.8256	20.33			Q	V		
17+ 5	7.9525	18.42			Q	V		
17+10	8.0688	16.89			Q	V		
17+15	8.1766	15.66			Q	V		
17+20	8.2756	14.37			Q	V		
17+25	8.3659	13.10			Q	V		
17+30	8.4488	12.04			Q	V		
17+35	8.5272	11.39			Q	V		
17+40	8.6007	10.67			Q	V		
17+45	8.6701	10.08			Q	V		
17+50	8.7354	9.49			Q	V		
17+55	8.7961	8.81			Q	V		
18+ 0	8.8543	8.45			Q	V		
18+ 5	8.9092	7.97			Q	V		
18+10	8.9610	7.51			Q	V		
18+15	9.0108	7.23			Q	V		
18+20	9.0574	6.77			Q	V		
18+25	9.1022	6.51			Q	V		
18+30	9.1453	6.25			Q	V		
18+35	9.1854	5.83			Q	V		
18+40	9.2245	5.67			Q	V		
18+45	9.2631	5.60			Q	V		
18+50	9.3012	5.53			Q	V		
18+55	9.3384	5.41			Q	V		
19+ 0	9.3749	5.29			Q	V		
19+ 5	9.4104	5.16			Q	V		
19+10	9.4445	4.96			Q	V		
19+15	9.4764	4.63			Q	V		
19+20	9.5073	4.49			Q	V		
19+25	9.5373	4.35			Q	V		
19+30	9.5654	4.08			Q	V		
19+35	9.5918	3.83			Q	V		
19+40	9.6176	3.74			Q	V		
19+45	9.6429	3.67			Q	V		
19+50	9.6676	3.60			Q	V		
19+55	9.6920	3.53			Q	V		
20+ 0	9.7158	3.47			Q	V		
20+ 5	9.7393	3.41			Q	V		
20+10	9.7624	3.35			Q	V		
20+15	9.7851	3.30			Q	V		
20+20	9.8075	3.25			Q	V		
20+25	9.8296	3.20			Q	V		
20+30	9.8513	3.16			Q	V		

20+35	9.8727	3.11	Q				V
20+40	9.8939	3.07	Q				V
20+45	9.9147	3.03	Q				V
20+50	9.9353	2.99	Q				V
20+55	9.9556	2.95	Q				V
21+ 0	9.9756	2.91	Q				V
21+ 5	9.9954	2.88	Q				V
21+10	10.0150	2.84	Q				V
21+15	10.0343	2.81	Q				V
21+20	10.0535	2.78	Q				V
21+25	10.0724	2.74	Q				V
21+30	10.0911	2.71	Q				V
21+35	10.1095	2.68	Q				V
21+40	10.1278	2.65	Q				V
21+45	10.1459	2.63	Q				V
21+50	10.1638	2.60	Q				V
21+55	10.1815	2.57	Q				V
22+ 0	10.1991	2.55	Q				V
22+ 5	10.2164	2.52	Q				V
22+10	10.2336	2.50	Q				V
22+15	10.2507	2.47	Q				V
22+20	10.2675	2.45	Q				V
22+25	10.2842	2.43	Q				V
22+30	10.3008	2.40	Q				V
22+35	10.3172	2.38	Q				V
22+40	10.3335	2.36	Q				V
22+45	10.3496	2.34	Q				V
22+50	10.3655	2.32	Q				V
22+55	10.3814	2.30	Q				V
23+ 0	10.3971	2.28	Q				V
23+ 5	10.4127	2.26	Q				V
23+10	10.4281	2.24	Q				V
23+15	10.4435	2.23	Q				V
23+20	10.4587	2.21	Q				V
23+25	10.4738	2.19	Q				V
23+30	10.4887	2.17	Q				V
23+35	10.5036	2.16	Q				V
23+40	10.5183	2.14	Q				V
23+45	10.5329	2.12	Q				V
23+50	10.5475	2.11	Q				V
23+55	10.5619	2.09	Q				V
24+ 0	10.5762	2.08	Q				V

UNIT HYDROGRAPH ANALYSIS (24 HOUR, 100-YEAR STORM)
POST-DEVELOPMENT CONDITION

Unit Hydrograph Analysis

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 11/30/23

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6277

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM UNIT HYDROGRAPH, POST CONDITION
AREA A1 TO A4

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
22.35	1	0.59

Rainfall data for year 2		
22.35	6	0.74

Rainfall data for year 2		
22.35	24	1.28

Rainfall data for year 100		
22.35	1	1.06

Rainfall data for year 100		
22.35	6	1.97

Rainfall data for year 100		
22.35	24	3.34

***** Area-averaged max loss rate, Fm *****

SCS curve SCS curve Area Area Fp(Fig C6) Ap Fm

No.(AMCII)	NO.(AMC 3)	(Ac.)	Fraction	(In/Hr)	(dec.)	(In/Hr)
32.0	52.0	22.35	1.000	0.785	0.140	0.110

Area-averaged adjusted loss rate Fm (In/Hr) = 0.110

***** Area-Averaged low loss rate fraction, Yb *****

Area	Area	SCS CN	SCS CN	S	Pervious
(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
3.13	0.140	32.0	52.0	9.23	0.062
19.22	0.860	98.0	98.0	0.20	0.930

Area-averaged catchment yield fraction, Y = 0.809

Area-averaged low loss fraction, Yb = 0.191

User entry of time of concentration = 0.219 (hours)

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Watershed area = 22.35(Ac.)

Catchment Lag time = 0.175 hours

Unit interval = 5.000 minutes

Unit interval percentage of lag time = 47.5647

Hydrograph baseflow = 0.00(CFS)

Average maximum watershed loss rate(Fm) = 0.110(In/Hr)

Average low loss rate fraction (Yb) = 0.191 (decimal)

DESERT S-Graph Selected

Computed peak 5-minute rainfall = 0.503(In)

Computed peak 30-minute rainfall = 0.861(In)

Specified peak 1-hour rainfall = 1.060(In)

Computed peak 3-hour rainfall = 1.550(In)

Specified peak 6-hour rainfall = 1.970(In)

Specified peak 24-hour rainfall = 3.340(In)

Rainfall depth area reduction factors:

Using a total area of 22.35(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999	Adjusted rainfall = 0.502(In)
30-minute factor = 0.999	Adjusted rainfall = 0.860(In)
1-hour factor = 0.999	Adjusted rainfall = 1.059(In)
3-hour factor = 1.000	Adjusted rainfall = 1.550(In)
6-hour factor = 1.000	Adjusted rainfall = 1.970(In)
24-hour factor = 1.000	Adjusted rainfall = 3.340(In)

U n i t H y d r o g r a p h

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Interval	'S' Graph	Unit Hydrograph
Number	Mean values	((CFS))

(K = 270.28 (CFS))

1	3.649	9.862
2	27.631	64.820
3	58.250	82.759
4	72.057	37.319
5	80.076	21.673
6	85.377	14.328
7	89.203	10.339
8	91.898	7.284
9	94.006	5.700
10	95.608	4.329
11	96.840	3.329
12	97.710	2.351
13	98.253	1.468
14	98.805	1.494

15	99.365	1.513
16	99.733	0.993
17	100.000	0.722

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5025	0.5025
2	0.6186	0.1161
3	0.6986	0.0800
4	0.7616	0.0630
5	0.8143	0.0527
6	0.8601	0.0458
7	0.9008	0.0407
8	0.9376	0.0368
9	0.9713	0.0337
10	1.0025	0.0312
11	1.0316	0.0291
12	1.0589	0.0273
13	1.0887	0.0298
14	1.1170	0.0283
15	1.1441	0.0270
16	1.1700	0.0259
17	1.1948	0.0249
18	1.2187	0.0239
19	1.2418	0.0231
20	1.2641	0.0223
21	1.2856	0.0216
22	1.3065	0.0209
23	1.3268	0.0203
24	1.3466	0.0197
25	1.3658	0.0192
26	1.3845	0.0187
27	1.4027	0.0182
28	1.4205	0.0178
29	1.4379	0.0174
30	1.4549	0.0170
31	1.4715	0.0166
32	1.4878	0.0163
33	1.5038	0.0160
34	1.5194	0.0156
35	1.5348	0.0153
36	1.5498	0.0151
37	1.5646	0.0148
38	1.5791	0.0145
39	1.5933	0.0143
40	1.6074	0.0140
41	1.6212	0.0138
42	1.6347	0.0136
43	1.6481	0.0134
44	1.6613	0.0132
45	1.6742	0.0130
46	1.6870	0.0128
47	1.6996	0.0126
48	1.7120	0.0124
49	1.7243	0.0123
50	1.7364	0.0121
51	1.7483	0.0119
52	1.7601	0.0118
53	1.7717	0.0116
54	1.7832	0.0115
55	1.7946	0.0114
56	1.8058	0.0112
57	1.8169	0.0111
58	1.8279	0.0110

59	1.8387	0.0108
60	1.8494	0.0107
61	1.8600	0.0106
62	1.8705	0.0105
63	1.8809	0.0104
64	1.8912	0.0103
65	1.9014	0.0102
66	1.9114	0.0101
67	1.9214	0.0100
68	1.9313	0.0099
69	1.9411	0.0098
70	1.9508	0.0097
71	1.9604	0.0096
72	1.9699	0.0095
73	1.9802	0.0104
74	1.9905	0.0103
75	2.0007	0.0102
76	2.0108	0.0101
77	2.0209	0.0100
78	2.0308	0.0100
79	2.0407	0.0099
80	2.0505	0.0098
81	2.0602	0.0097
82	2.0699	0.0097
83	2.0795	0.0096
84	2.0890	0.0095
85	2.0984	0.0094
86	2.1078	0.0094
87	2.1171	0.0093
88	2.1263	0.0092
89	2.1355	0.0092
90	2.1446	0.0091
91	2.1536	0.0090
92	2.1626	0.0090
93	2.1715	0.0089
94	2.1804	0.0089
95	2.1892	0.0088
96	2.1980	0.0087
97	2.2067	0.0087
98	2.2153	0.0086
99	2.2239	0.0086
100	2.2324	0.0085
101	2.2409	0.0085
102	2.2493	0.0084
103	2.2577	0.0084
104	2.2660	0.0083
105	2.2743	0.0083
106	2.2825	0.0082
107	2.2907	0.0082
108	2.2988	0.0081
109	2.3069	0.0081
110	2.3149	0.0080
111	2.3229	0.0080
112	2.3309	0.0079
113	2.3388	0.0079
114	2.3466	0.0079
115	2.3544	0.0078
116	2.3622	0.0078
117	2.3700	0.0077
118	2.3777	0.0077
119	2.3853	0.0077
120	2.3929	0.0076
121	2.4005	0.0076
122	2.4080	0.0075

123	2.4155	0.0075
124	2.4230	0.0075
125	2.4304	0.0074
126	2.4378	0.0074
127	2.4452	0.0074
128	2.4525	0.0073
129	2.4597	0.0073
130	2.4670	0.0072
131	2.4742	0.0072
132	2.4814	0.0072
133	2.4885	0.0071
134	2.4956	0.0071
135	2.5027	0.0071
136	2.5098	0.0070
137	2.5168	0.0070
138	2.5237	0.0070
139	2.5307	0.0069
140	2.5376	0.0069
141	2.5445	0.0069
142	2.5514	0.0069
143	2.5582	0.0068
144	2.5650	0.0068
145	2.5718	0.0068
146	2.5785	0.0067
147	2.5852	0.0067
148	2.5919	0.0067
149	2.5985	0.0067
150	2.6052	0.0066
151	2.6118	0.0066
152	2.6184	0.0066
153	2.6249	0.0065
154	2.6314	0.0065
155	2.6379	0.0065
156	2.6444	0.0065
157	2.6508	0.0064
158	2.6572	0.0064
159	2.6636	0.0064
160	2.6700	0.0064
161	2.6763	0.0063
162	2.6827	0.0063
163	2.6890	0.0063
164	2.6952	0.0063
165	2.7015	0.0062
166	2.7077	0.0062
167	2.7139	0.0062
168	2.7201	0.0062
169	2.7262	0.0062
170	2.7324	0.0061
171	2.7385	0.0061
172	2.7446	0.0061
173	2.7506	0.0061
174	2.7567	0.0060
175	2.7627	0.0060
176	2.7687	0.0060
177	2.7747	0.0060
178	2.7806	0.0060
179	2.7866	0.0059
180	2.7925	0.0059
181	2.7984	0.0059
182	2.8043	0.0059
183	2.8101	0.0059
184	2.8160	0.0058
185	2.8218	0.0058
186	2.8276	0.0058

187	2.8334	0.0058
188	2.8391	0.0058
189	2.8449	0.0057
190	2.8506	0.0057
191	2.8563	0.0057
192	2.8620	0.0057
193	2.8677	0.0057
194	2.8733	0.0056
195	2.8789	0.0056
196	2.8846	0.0056
197	2.8902	0.0056
198	2.8957	0.0056
199	2.9013	0.0056
200	2.9068	0.0055
201	2.9124	0.0055
202	2.9179	0.0055
203	2.9234	0.0055
204	2.9288	0.0055
205	2.9343	0.0055
206	2.9397	0.0054
207	2.9452	0.0054
208	2.9506	0.0054
209	2.9560	0.0054
210	2.9614	0.0054
211	2.9667	0.0054
212	2.9721	0.0053
213	2.9774	0.0053
214	2.9827	0.0053
215	2.9880	0.0053
216	2.9933	0.0053
217	2.9986	0.0053
218	3.0038	0.0053
219	3.0091	0.0052
220	3.0143	0.0052
221	3.0195	0.0052
222	3.0247	0.0052
223	3.0299	0.0052
224	3.0351	0.0052
225	3.0402	0.0052
226	3.0453	0.0051
227	3.0505	0.0051
228	3.0556	0.0051
229	3.0607	0.0051
230	3.0658	0.0051
231	3.0708	0.0051
232	3.0759	0.0051
233	3.0809	0.0050
234	3.0860	0.0050
235	3.0910	0.0050
236	3.0960	0.0050
237	3.1010	0.0050
238	3.1059	0.0050
239	3.1109	0.0050
240	3.1159	0.0050
241	3.1208	0.0049
242	3.1257	0.0049
243	3.1306	0.0049
244	3.1355	0.0049
245	3.1404	0.0049
246	3.1453	0.0049
247	3.1502	0.0049
248	3.1550	0.0049
249	3.1599	0.0048
250	3.1647	0.0048

251	3.1695	0.0048
252	3.1743	0.0048
253	3.1791	0.0048
254	3.1839	0.0048
255	3.1886	0.0048
256	3.1934	0.0048
257	3.1981	0.0047
258	3.2029	0.0047
259	3.2076	0.0047
260	3.2123	0.0047
261	3.2170	0.0047
262	3.2217	0.0047
263	3.2264	0.0047
264	3.2310	0.0047
265	3.2357	0.0047
266	3.2403	0.0046
267	3.2450	0.0046
268	3.2496	0.0046
269	3.2542	0.0046
270	3.2588	0.0046
271	3.2634	0.0046
272	3.2680	0.0046
273	3.2726	0.0046
274	3.2771	0.0046
275	3.2817	0.0046
276	3.2862	0.0045
277	3.2907	0.0045
278	3.2953	0.0045
279	3.2998	0.0045
280	3.3043	0.0045
281	3.3088	0.0045
282	3.3132	0.0045
283	3.3177	0.0045
284	3.3222	0.0045
285	3.3266	0.0045
286	3.3311	0.0044
287	3.3355	0.0044
288	3.3399	0.0044

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
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1	0.0044	0.0008	0.0036
2	0.0044	0.0008	0.0036
3	0.0045	0.0009	0.0036
4	0.0045	0.0009	0.0036
5	0.0045	0.0009	0.0036
6	0.0045	0.0009	0.0036
7	0.0045	0.0009	0.0036
8	0.0045	0.0009	0.0037
9	0.0045	0.0009	0.0037
10	0.0046	0.0009	0.0037
11	0.0046	0.0009	0.0037
12	0.0046	0.0009	0.0037
13	0.0046	0.0009	0.0037
14	0.0046	0.0009	0.0037
15	0.0046	0.0009	0.0037
16	0.0046	0.0009	0.0038
17	0.0047	0.0009	0.0038
18	0.0047	0.0009	0.0038
19	0.0047	0.0009	0.0038
20	0.0047	0.0009	0.0038
21	0.0047	0.0009	0.0038

22	0.0047	0.0009	0.0038
23	0.0048	0.0009	0.0039
24	0.0048	0.0009	0.0039
25	0.0048	0.0009	0.0039
26	0.0048	0.0009	0.0039
27	0.0048	0.0009	0.0039
28	0.0049	0.0009	0.0039
29	0.0049	0.0009	0.0039
30	0.0049	0.0009	0.0040
31	0.0049	0.0009	0.0040
32	0.0049	0.0009	0.0040
33	0.0050	0.0009	0.0040
34	0.0050	0.0009	0.0040
35	0.0050	0.0010	0.0040
36	0.0050	0.0010	0.0040
37	0.0050	0.0010	0.0041
38	0.0050	0.0010	0.0041
39	0.0051	0.0010	0.0041
40	0.0051	0.0010	0.0041
41	0.0051	0.0010	0.0041
42	0.0051	0.0010	0.0041
43	0.0052	0.0010	0.0042
44	0.0052	0.0010	0.0042
45	0.0052	0.0010	0.0042
46	0.0052	0.0010	0.0042
47	0.0052	0.0010	0.0042
48	0.0053	0.0010	0.0043
49	0.0053	0.0010	0.0043
50	0.0053	0.0010	0.0043
51	0.0053	0.0010	0.0043
52	0.0053	0.0010	0.0043
53	0.0054	0.0010	0.0043
54	0.0054	0.0010	0.0044
55	0.0054	0.0010	0.0044
56	0.0054	0.0010	0.0044
57	0.0055	0.0010	0.0044
58	0.0055	0.0011	0.0044
59	0.0055	0.0011	0.0045
60	0.0055	0.0011	0.0045
61	0.0056	0.0011	0.0045
62	0.0056	0.0011	0.0045
63	0.0056	0.0011	0.0046
64	0.0056	0.0011	0.0046
65	0.0057	0.0011	0.0046
66	0.0057	0.0011	0.0046
67	0.0057	0.0011	0.0046
68	0.0058	0.0011	0.0047
69	0.0058	0.0011	0.0047
70	0.0058	0.0011	0.0047
71	0.0059	0.0011	0.0047
72	0.0059	0.0011	0.0048
73	0.0059	0.0011	0.0048
74	0.0059	0.0011	0.0048
75	0.0060	0.0011	0.0048
76	0.0060	0.0011	0.0049
77	0.0060	0.0012	0.0049
78	0.0061	0.0012	0.0049
79	0.0061	0.0012	0.0049
80	0.0061	0.0012	0.0050
81	0.0062	0.0012	0.0050
82	0.0062	0.0012	0.0050
83	0.0062	0.0012	0.0051
84	0.0063	0.0012	0.0051
85	0.0063	0.0012	0.0051

86	0.0063	0.0012	0.0051
87	0.0064	0.0012	0.0052
88	0.0064	0.0012	0.0052
89	0.0065	0.0012	0.0052
90	0.0065	0.0012	0.0053
91	0.0065	0.0013	0.0053
92	0.0066	0.0013	0.0053
93	0.0066	0.0013	0.0054
94	0.0067	0.0013	0.0054
95	0.0067	0.0013	0.0054
96	0.0067	0.0013	0.0055
97	0.0068	0.0013	0.0055
98	0.0068	0.0013	0.0055
99	0.0069	0.0013	0.0056
100	0.0069	0.0013	0.0056
101	0.0070	0.0013	0.0056
102	0.0070	0.0013	0.0057
103	0.0071	0.0014	0.0057
104	0.0071	0.0014	0.0057
105	0.0072	0.0014	0.0058
106	0.0072	0.0014	0.0058
107	0.0073	0.0014	0.0059
108	0.0073	0.0014	0.0059
109	0.0074	0.0014	0.0060
110	0.0074	0.0014	0.0060
111	0.0075	0.0014	0.0061
112	0.0075	0.0014	0.0061
113	0.0076	0.0015	0.0062
114	0.0077	0.0015	0.0062
115	0.0077	0.0015	0.0063
116	0.0078	0.0015	0.0063
117	0.0079	0.0015	0.0064
118	0.0079	0.0015	0.0064
119	0.0080	0.0015	0.0065
120	0.0080	0.0015	0.0065
121	0.0081	0.0016	0.0066
122	0.0082	0.0016	0.0066
123	0.0083	0.0016	0.0067
124	0.0083	0.0016	0.0067
125	0.0084	0.0016	0.0068
126	0.0085	0.0016	0.0069
127	0.0086	0.0016	0.0069
128	0.0086	0.0017	0.0070
129	0.0087	0.0017	0.0071
130	0.0088	0.0017	0.0071
131	0.0089	0.0017	0.0072
132	0.0090	0.0017	0.0073
133	0.0091	0.0017	0.0074
134	0.0092	0.0018	0.0074
135	0.0093	0.0018	0.0075
136	0.0094	0.0018	0.0076
137	0.0095	0.0018	0.0077
138	0.0096	0.0018	0.0077
139	0.0097	0.0019	0.0079
140	0.0098	0.0019	0.0079
141	0.0100	0.0019	0.0081
142	0.0100	0.0019	0.0081
143	0.0102	0.0020	0.0083
144	0.0103	0.0020	0.0083
145	0.0095	0.0018	0.0077
146	0.0096	0.0018	0.0078
147	0.0098	0.0019	0.0079
148	0.0099	0.0019	0.0080
149	0.0101	0.0019	0.0081

150	0.0102	0.0019	0.0082
151	0.0104	0.0020	0.0084
152	0.0105	0.0020	0.0085
153	0.0107	0.0021	0.0087
154	0.0108	0.0021	0.0088
155	0.0111	0.0021	0.0090
156	0.0112	0.0021	0.0091
157	0.0115	0.0022	0.0093
158	0.0116	0.0022	0.0094
159	0.0119	0.0023	0.0097
160	0.0121	0.0023	0.0098
161	0.0124	0.0024	0.0100
162	0.0126	0.0024	0.0102
163	0.0130	0.0025	0.0105
164	0.0132	0.0025	0.0106
165	0.0136	0.0026	0.0110
166	0.0138	0.0026	0.0112
167	0.0143	0.0027	0.0115
168	0.0145	0.0028	0.0117
169	0.0151	0.0029	0.0122
170	0.0153	0.0029	0.0124
171	0.0160	0.0031	0.0129
172	0.0163	0.0031	0.0132
173	0.0170	0.0033	0.0137
174	0.0174	0.0033	0.0141
175	0.0182	0.0035	0.0147
176	0.0187	0.0036	0.0151
177	0.0197	0.0038	0.0160
178	0.0203	0.0039	0.0164
179	0.0216	0.0041	0.0174
180	0.0223	0.0043	0.0180
181	0.0239	0.0046	0.0193
182	0.0249	0.0048	0.0201
183	0.0270	0.0052	0.0219
184	0.0283	0.0054	0.0229
185	0.0273	0.0052	0.0221
186	0.0291	0.0056	0.0235
187	0.0337	0.0065	0.0273
188	0.0368	0.0070	0.0298
189	0.0458	0.0088	0.0370
190	0.0527	0.0092	0.0436
191	0.0800	0.0092	0.0709
192	0.1161	0.0092	0.1070
193	0.5025	0.0092	0.4933
194	0.0630	0.0092	0.0538
195	0.0407	0.0078	0.0329
196	0.0312	0.0060	0.0252
197	0.0298	0.0057	0.0241
198	0.0259	0.0050	0.0209
199	0.0231	0.0044	0.0187
200	0.0209	0.0040	0.0169
201	0.0192	0.0037	0.0155
202	0.0178	0.0034	0.0144
203	0.0166	0.0032	0.0135
204	0.0156	0.0030	0.0127
205	0.0148	0.0028	0.0119
206	0.0140	0.0027	0.0113
207	0.0134	0.0026	0.0108
208	0.0128	0.0024	0.0103
209	0.0123	0.0023	0.0099
210	0.0118	0.0023	0.0095
211	0.0114	0.0022	0.0092
212	0.0110	0.0021	0.0089
213	0.0106	0.0020	0.0086

214	0.0103	0.0020	0.0083
215	0.0100	0.0019	0.0081
216	0.0097	0.0019	0.0078
217	0.0104	0.0020	0.0084
218	0.0101	0.0019	0.0082
219	0.0099	0.0019	0.0080
220	0.0097	0.0018	0.0078
221	0.0094	0.0018	0.0076
222	0.0092	0.0018	0.0075
223	0.0090	0.0017	0.0073
224	0.0089	0.0017	0.0072
225	0.0087	0.0017	0.0070
226	0.0085	0.0016	0.0069
227	0.0084	0.0016	0.0068
228	0.0082	0.0016	0.0067
229	0.0081	0.0015	0.0065
230	0.0079	0.0015	0.0064
231	0.0078	0.0015	0.0063
232	0.0077	0.0015	0.0062
233	0.0076	0.0014	0.0061
234	0.0075	0.0014	0.0060
235	0.0074	0.0014	0.0059
236	0.0072	0.0014	0.0059
237	0.0071	0.0014	0.0058
238	0.0070	0.0013	0.0057
239	0.0069	0.0013	0.0056
240	0.0069	0.0013	0.0055
241	0.0068	0.0013	0.0055
242	0.0067	0.0013	0.0054
243	0.0066	0.0013	0.0053
244	0.0065	0.0012	0.0053
245	0.0064	0.0012	0.0052
246	0.0064	0.0012	0.0051
247	0.0063	0.0012	0.0051
248	0.0062	0.0012	0.0050
249	0.0062	0.0012	0.0050
250	0.0061	0.0012	0.0049
251	0.0060	0.0012	0.0049
252	0.0060	0.0011	0.0048
253	0.0059	0.0011	0.0048
254	0.0058	0.0011	0.0047
255	0.0058	0.0011	0.0047
256	0.0057	0.0011	0.0046
257	0.0057	0.0011	0.0046
258	0.0056	0.0011	0.0045
259	0.0056	0.0011	0.0045
260	0.0055	0.0011	0.0045
261	0.0055	0.0010	0.0044
262	0.0054	0.0010	0.0044
263	0.0054	0.0010	0.0043
264	0.0053	0.0010	0.0043
265	0.0053	0.0010	0.0043
266	0.0052	0.0010	0.0042
267	0.0052	0.0010	0.0042
268	0.0051	0.0010	0.0042
269	0.0051	0.0010	0.0041
270	0.0051	0.0010	0.0041
271	0.0050	0.0010	0.0041
272	0.0050	0.0010	0.0040
273	0.0049	0.0009	0.0040
274	0.0049	0.0009	0.0040
275	0.0049	0.0009	0.0039
276	0.0048	0.0009	0.0039
277	0.0048	0.0009	0.0039

278	0.0048	0.0009	0.0038
279	0.0047	0.0009	0.0038
280	0.0047	0.0009	0.0038
281	0.0047	0.0009	0.0038
282	0.0046	0.0009	0.0037
283	0.0046	0.0009	0.0037
284	0.0046	0.0009	0.0037
285	0.0045	0.0009	0.0037
286	0.0045	0.0009	0.0036
287	0.0045	0.0009	0.0036
288	0.0044	0.0008	0.0036

Total soil rain loss = 0.53(In)
Total effective rainfall = 2.81(In)
Peak flow rate in flood hydrograph = 51.90(CFS)

+++++
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	15.0	30.0	45.0	60.0
0+ 5	0.0002	0.04	Q				
0+10	0.0021	0.27	Q				
0+15	0.0060	0.56	Q				
0+20	0.0108	0.70	Q				
0+25	0.0161	0.78	Q				
0+30	0.0219	0.83	Q				
0+35	0.0279	0.87	Q				
0+40	0.0341	0.90	Q				
0+45	0.0404	0.92	Q				
0+50	0.0469	0.94	Q				
0+55	0.0535	0.96	Q				
1+ 0	0.0602	0.97	Q				
1+ 5	0.0670	0.98	Q				
1+10	0.0737	0.99	Q				
1+15	0.0806	1.00	Q				
1+20	0.0875	1.00	Q				
1+25	0.0945	1.01	Q				
1+30	0.1014	1.01	Q				
1+35	0.1084	1.02	Q				
1+40	0.1154	1.02	Q				
1+45	0.1225	1.02	Q				
1+50	0.1296	1.03	Q				
1+55	0.1366	1.03	QV				
2+ 0	0.1438	1.03	QV				
2+ 5	0.1509	1.04	QV				
2+10	0.1581	1.04	QV				
2+15	0.1653	1.05	QV				
2+20	0.1725	1.05	QV				
2+25	0.1798	1.05	QV				
2+30	0.1870	1.06	QV				
2+35	0.1943	1.06	QV				
2+40	0.2017	1.06	QV				
2+45	0.2090	1.07	QV				
2+50	0.2164	1.07	QV				
2+55	0.2238	1.08	QV				
3+ 0	0.2313	1.08	QV				
3+ 5	0.2388	1.09	QV				
3+10	0.2463	1.09	QV				

3+15	0.2538	1.09	QV
3+20	0.2614	1.10	QV
3+25	0.2690	1.10	Q V
3+30	0.2766	1.11	Q V
3+35	0.2842	1.11	Q V
3+40	0.2919	1.12	Q V
3+45	0.2996	1.12	Q V
3+50	0.3074	1.13	Q V
3+55	0.3152	1.13	Q V
4+ 0	0.3230	1.13	Q V
4+ 5	0.3308	1.14	Q V
4+10	0.3387	1.14	Q V
4+15	0.3466	1.15	Q V
4+20	0.3546	1.15	Q V
4+25	0.3626	1.16	Q V
4+30	0.3706	1.16	Q V
4+35	0.3786	1.17	Q V
4+40	0.3867	1.17	Q V
4+45	0.3948	1.18	Q V
4+50	0.4030	1.18	Q V
4+55	0.4112	1.19	Q V
5+ 0	0.4194	1.20	Q V
5+ 5	0.4277	1.20	Q V
5+10	0.4360	1.21	Q V
5+15	0.4444	1.21	Q V
5+20	0.4528	1.22	Q V
5+25	0.4612	1.22	Q V
5+30	0.4697	1.23	Q V
5+35	0.4782	1.24	Q V
5+40	0.4867	1.24	Q V
5+45	0.4953	1.25	Q V
5+50	0.5039	1.25	Q V
5+55	0.5126	1.26	Q V
6+ 0	0.5213	1.27	Q V
6+ 5	0.5301	1.27	Q V
6+10	0.5389	1.28	Q V
6+15	0.5478	1.29	Q V
6+20	0.5567	1.29	Q V
6+25	0.5656	1.30	Q V
6+30	0.5746	1.31	Q V
6+35	0.5837	1.31	Q V
6+40	0.5927	1.32	Q V
6+45	0.6019	1.33	Q V
6+50	0.6111	1.33	Q V
6+55	0.6203	1.34	Q V
7+ 0	0.6296	1.35	Q V
7+ 5	0.6389	1.36	Q V
7+10	0.6483	1.36	Q V
7+15	0.6578	1.37	Q V
7+20	0.6673	1.38	Q V
7+25	0.6768	1.39	Q V
7+30	0.6864	1.40	Q V
7+35	0.6961	1.40	Q V
7+40	0.7058	1.41	Q V
7+45	0.7156	1.42	Q V
7+50	0.7255	1.43	Q V
7+55	0.7354	1.44	Q V
8+ 0	0.7453	1.45	Q V
8+ 5	0.7553	1.46	Q V
8+10	0.7654	1.47	Q V
8+15	0.7756	1.47	Q V
8+20	0.7858	1.48	Q V
8+25	0.7961	1.49	Q V
8+30	0.8065	1.50	Q V

8+35	0.8169	1.51	Q	V				
8+40	0.8274	1.52	Q	V				
8+45	0.8379	1.53	Q	V				
8+50	0.8486	1.54	Q	V				
8+55	0.8593	1.56	Q	V				
9+ 0	0.8701	1.57	Q	V				
9+ 5	0.8809	1.58	Q	V				
9+10	0.8919	1.59	Q	V				
9+15	0.9029	1.60	Q	V				
9+20	0.9140	1.61	Q	V				
9+25	0.9252	1.62	Q	V				
9+30	0.9365	1.64	Q	V				
9+35	0.9478	1.65	Q	V				
9+40	0.9593	1.66	Q	V				
9+45	0.9708	1.67	Q	V				
9+50	0.9824	1.69	Q	V				
9+55	0.9941	1.70	Q	V				
10+ 0	1.0059	1.72	Q	V				
10+ 5	1.0179	1.73	Q	V				
10+10	1.0299	1.74	Q	V				
10+15	1.0420	1.76	Q	V				
10+20	1.0542	1.77	Q	V				
10+25	1.0665	1.79	Q	V				
10+30	1.0790	1.81	Q	V				
10+35	1.0915	1.82	Q	V				
10+40	1.1042	1.84	Q	V				
10+45	1.1169	1.86	Q	V				
10+50	1.1298	1.87	Q	V				
10+55	1.1429	1.89	Q	V				
11+ 0	1.1560	1.91	Q	V				
11+ 5	1.1693	1.93	Q	V				
11+10	1.1827	1.95	Q	V				
11+15	1.1962	1.97	Q	V				
11+20	1.2099	1.99	Q	V				
11+25	1.2237	2.01	Q	V				
11+30	1.2377	2.03	Q	V				
11+35	1.2518	2.05	Q	V				
11+40	1.2661	2.07	Q	V				
11+45	1.2806	2.10	Q	V				
11+50	1.2952	2.12	Q	V				
11+55	1.3100	2.15	Q	V				
12+ 0	1.3249	2.17	Q	V				
12+ 5	1.3400	2.19	Q	V				
12+10	1.3549	2.17	Q	V				
12+15	1.3696	2.13	Q	V				
12+20	1.3843	2.13	Q	V				
12+25	1.3990	2.14	Q	V				
12+30	1.4139	2.16	Q	V				
12+35	1.4290	2.19	Q	V				
12+40	1.4442	2.21	Q	V				
12+45	1.4597	2.24	Q	V				
12+50	1.4753	2.27	Q	V				
12+55	1.4912	2.31	Q	V				
13+ 0	1.5074	2.34	Q	V				
13+ 5	1.5238	2.38	Q	V				
13+10	1.5404	2.42	Q	V				
13+15	1.5574	2.46	Q	V				
13+20	1.5747	2.51	Q	V				
13+25	1.5923	2.55	Q	V				
13+30	1.6102	2.60	Q	V				
13+35	1.6285	2.66	Q	V				
13+40	1.6471	2.71	Q	V				
13+45	1.6662	2.77	Q	V				
13+50	1.6857	2.83	Q	V				

13+55	1.7056	2.89	Q	V				
14+ 0	1.7260	2.96	Q	V				
14+ 5	1.7469	3.03	Q	V				
14+10	1.7683	3.11	Q	V				
14+15	1.7903	3.20	Q	V				
14+20	1.8130	3.29	Q	V				
14+25	1.8362	3.38	Q	V				
14+30	1.8602	3.48	Q	V				
14+35	1.8850	3.59	Q	V				
14+40	1.9106	3.71	Q	V				
14+45	1.9370	3.84	Q	V				
14+50	1.9645	3.99	Q	V				
14+55	1.9930	4.14	Q	V				
15+ 0	2.0227	4.32	Q	V				
15+ 5	2.0538	4.51	Q	V				
15+10	2.0864	4.73	Q	V				
15+15	2.1207	4.98	Q	V				
15+20	2.1569	5.26	Q	V				
15+25	2.1952	5.56	Q	V				
15+30	2.2347	5.73	Q	V				
15+35	2.2754	5.91	Q	V				
15+40	2.3191	6.35	Q	V				
15+45	2.3672	6.99	Q	V				
15+50	2.4218	7.93	Q	V				
15+55	2.4868	9.44	Q	V				
16+ 0	2.5730	12.52	Q	V				
16+ 5	2.7206	21.43		Q	V			
16+10	3.0406	46.46			V	Q		
16+15	3.3980	51.90			V		Q	
16+20	3.6035	29.85			Q	V		
16+25	3.7447	20.50		Q		V		
16+30	3.8525	15.65		Q		V		
16+35	3.9405	12.77		Q		V		
16+40	4.0127	10.48		Q		V		
16+45	4.0745	8.98		Q		V		
16+50	4.1277	7.72		Q		V		
16+55	4.1739	6.71		Q		V		
17+ 0	4.2138	5.81		Q		V		
17+ 5	4.2487	5.06		Q		V		
17+10	4.2813	4.74		Q		V		
17+15	4.3120	4.45		Q		V		
17+20	4.3392	3.95		Q		V		
17+25	4.3639	3.57		Q		V		
17+30	4.3850	3.07		Q		V		
17+35	4.4050	2.90		Q		V		
17+40	4.4240	2.77		Q		V		
17+45	4.4422	2.65		Q		V		
17+50	4.4598	2.54		Q		V		
17+55	4.4766	2.45		Q		V		
18+ 0	4.4929	2.36		Q		V		
18+ 5	4.5087	2.29		Q		V		
18+10	4.5243	2.27		Q		V		
18+15	4.5399	2.27		Q		V		
18+20	4.5553	2.23		Q		V		
18+25	4.5704	2.19		Q		V		
18+30	4.5852	2.15		Q		V		
18+35	4.5997	2.11		Q		V		
18+40	4.6139	2.06		Q		V		
18+45	4.6278	2.02		Q		V		
18+50	4.6415	1.98		Q		V		
18+55	4.6549	1.94		Q		V		
19+ 0	4.6680	1.91		Q		V		
19+ 5	4.6809	1.87		Q		V		
19+10	4.6936	1.84		Q		V		

19+15	4.7060	1.81	Q	V
19+20	4.7182	1.78	Q	V
19+25	4.7303	1.75	Q	V
19+30	4.7421	1.72	Q	V
19+35	4.7537	1.69	Q	V
19+40	4.7652	1.66	Q	V
19+45	4.7765	1.64	Q	V
19+50	4.7876	1.61	Q	V
19+55	4.7985	1.59	Q	V
20+ 0	4.8093	1.57	Q	V
20+ 5	4.8200	1.55	Q	V
20+10	4.8305	1.52	Q	V
20+15	4.8408	1.50	Q	V
20+20	4.8510	1.48	Q	V
20+25	4.8611	1.47	Q	V
20+30	4.8711	1.45	Q	V
20+35	4.8810	1.43	Q	V
20+40	4.8907	1.41	Q	V
20+45	4.9003	1.40	Q	V
20+50	4.9098	1.38	Q	V
20+55	4.9192	1.36	Q	V
21+ 0	4.9285	1.35	Q	V
21+ 5	4.9377	1.33	Q	V
21+10	4.9468	1.32	Q	V
21+15	4.9558	1.31	Q	V
21+20	4.9647	1.29	Q	V
21+25	4.9735	1.28	Q	V
21+30	4.9822	1.27	Q	V
21+35	4.9908	1.25	Q	V
21+40	4.9994	1.24	Q	V
21+45	5.0078	1.23	Q	V
21+50	5.0162	1.22	Q	V
21+55	5.0245	1.21	Q	V
22+ 0	5.0328	1.20	Q	V
22+ 5	5.0409	1.18	Q	V
22+10	5.0490	1.17	Q	V
22+15	5.0570	1.16	Q	V
22+20	5.0650	1.15	Q	V
22+25	5.0729	1.14	Q	V
22+30	5.0807	1.13	Q	V
22+35	5.0884	1.13	Q	V
22+40	5.0961	1.12	Q	V
22+45	5.1037	1.11	Q	V
22+50	5.1113	1.10	Q	V
22+55	5.1188	1.09	Q	V
23+ 0	5.1263	1.08	Q	V
23+ 5	5.1336	1.07	Q	V
23+10	5.1410	1.06	Q	V
23+15	5.1483	1.06	Q	V
23+20	5.1555	1.05	Q	V
23+25	5.1626	1.04	Q	V
23+30	5.1698	1.03	Q	V
23+35	5.1768	1.03	Q	V
23+40	5.1839	1.02	Q	V
23+45	5.1908	1.01	Q	V
23+50	5.1977	1.00	Q	V
23+55	5.2046	1.00	Q	V
24+ 0	5.2114	0.99	Q	V

Unit Hydrograph Analysis

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Study date 11/30/23

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6277

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM UNIT HYDROGRAPH, POST CONDITION
AREA A5 AND A10

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
9.71	1	0.59

Rainfall data for year 2		
9.71	6	0.74

Rainfall data for year 2		
9.71	24	1.28

Rainfall data for year 100		
9.71	1	1.06

Rainfall data for year 100		
9.71	6	1.97

Rainfall data for year 100		
9.71	24	3.34

***** Area-averaged max loss rate, Fm *****

SCS curve SCS curve Area Area Fp(Fig C6) Ap Fm

No.(AMCII)	NO.(AMC 3)	(Ac.)	Fraction	(In/Hr)	(dec.)	(In/Hr)
32.0	52.0	9.71	1.000	0.785	0.120	0.094

Area-averaged adjusted loss rate Fm (In/Hr) = 0.094

***** Area-Averaged low loss rate fraction, Yb *****

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
1.17	0.120	32.0	52.0	9.23	0.062
8.54	0.880	98.0	98.0	0.20	0.930

Area-averaged catchment yield fraction, Y = 0.826

Area-averaged low loss fraction, Yb = 0.174

User entry of time of concentration = 0.189 (hours)

+++++

Watershed area = 9.71(Ac.)

Catchment Lag time = 0.151 hours

Unit interval = 5.000 minutes

Unit interval percentage of lag time = 55.1146

Hydrograph baseflow = 0.00(CFS)

Average maximum watershed loss rate(Fm) = 0.094(In/Hr)

Average low loss rate fraction (Yb) = 0.174 (decimal)

DESERT S-Graph Selected

Computed peak 5-minute rainfall = 0.503(In)

Computed peak 30-minute rainfall = 0.861(In)

Specified peak 1-hour rainfall = 1.060(In)

Computed peak 3-hour rainfall = 1.550(In)

Specified peak 6-hour rainfall = 1.970(In)

Specified peak 24-hour rainfall = 3.340(In)

Rainfall depth area reduction factors:

Using a total area of 9.71(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.503(In)

30-minute factor = 1.000 Adjusted rainfall = 0.861(In)

1-hour factor = 1.000 Adjusted rainfall = 1.060(In)

3-hour factor = 1.000 Adjusted rainfall = 1.550(In)

6-hour factor = 1.000 Adjusted rainfall = 1.970(In)

24-hour factor = 1.000 Adjusted rainfall = 3.340(In)

U n i t H y d r o g r a p h

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Interval Number	'S' Graph Mean values	Unit Hydrograph (CFS)
--------------------	--------------------------	--------------------------

(K = 117.43 (CFS))

1	4.721	5.544
2	36.328	37.116
3	64.749	33.374
4	76.915	14.287
5	84.010	8.332
6	88.778	5.600
7	91.964	3.741
8	94.336	2.785
9	96.074	2.041
10	97.323	1.467
11	98.088	0.898
12	98.706	0.726
13	99.353	0.760
14	99.775	0.496

15

100.000

0.264

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5028	0.5028
2	0.6190	0.1162
3	0.6990	0.0801
4	0.7620	0.0630
5	0.8148	0.0528
6	0.8606	0.0458
7	0.9013	0.0407
8	0.9382	0.0368
9	0.9719	0.0337
10	1.0031	0.0312
11	1.0322	0.0291
12	1.0595	0.0273
13	1.0893	0.0298
14	1.1176	0.0283
15	1.1446	0.0270
16	1.1705	0.0259
17	1.1953	0.0248
18	1.2192	0.0239
19	1.2423	0.0230
20	1.2645	0.0223
21	1.2861	0.0215
22	1.3069	0.0209
23	1.3272	0.0203
24	1.3469	0.0197
25	1.3661	0.0192
26	1.3848	0.0187
27	1.4030	0.0182
28	1.4208	0.0178
29	1.4381	0.0174
30	1.4551	0.0170
31	1.4717	0.0166
32	1.4880	0.0163
33	1.5039	0.0159
34	1.5196	0.0156
35	1.5349	0.0153
36	1.5499	0.0150
37	1.5647	0.0148
38	1.5792	0.0145
39	1.5935	0.0143
40	1.6075	0.0140
41	1.6213	0.0138
42	1.6348	0.0136
43	1.6482	0.0134
44	1.6614	0.0132
45	1.6743	0.0130
46	1.6871	0.0128
47	1.6997	0.0126
48	1.7121	0.0124
49	1.7244	0.0123
50	1.7365	0.0121
51	1.7484	0.0119
52	1.7602	0.0118
53	1.7718	0.0116
54	1.7833	0.0115
55	1.7947	0.0114
56	1.8059	0.0112
57	1.8170	0.0111
58	1.8280	0.0110
59	1.8388	0.0108
60	1.8495	0.0107

61	1.8601	0.0106
62	1.8706	0.0105
63	1.8810	0.0104
64	1.8913	0.0103
65	1.9015	0.0102
66	1.9115	0.0101
67	1.9215	0.0100
68	1.9314	0.0099
69	1.9411	0.0098
70	1.9508	0.0097
71	1.9604	0.0096
72	1.9699	0.0095
73	1.9803	0.0104
74	1.9906	0.0103
75	2.0008	0.0102
76	2.0109	0.0101
77	2.0210	0.0100
78	2.0309	0.0100
79	2.0408	0.0099
80	2.0506	0.0098
81	2.0603	0.0097
82	2.0700	0.0097
83	2.0795	0.0096
84	2.0891	0.0095
85	2.0985	0.0094
86	2.1079	0.0094
87	2.1172	0.0093
88	2.1264	0.0092
89	2.1356	0.0092
90	2.1447	0.0091
91	2.1537	0.0090
92	2.1627	0.0090
93	2.1716	0.0089
94	2.1805	0.0089
95	2.1893	0.0088
96	2.1980	0.0087
97	2.2067	0.0087
98	2.2154	0.0086
99	2.2239	0.0086
100	2.2325	0.0085
101	2.2410	0.0085
102	2.2494	0.0084
103	2.2577	0.0084
104	2.2661	0.0083
105	2.2743	0.0083
106	2.2826	0.0082
107	2.2907	0.0082
108	2.2989	0.0081
109	2.3070	0.0081
110	2.3150	0.0080
111	2.3230	0.0080
112	2.3309	0.0079
113	2.3388	0.0079
114	2.3467	0.0079
115	2.3545	0.0078
116	2.3623	0.0078
117	2.3700	0.0077
118	2.3777	0.0077
119	2.3854	0.0077
120	2.3930	0.0076
121	2.4006	0.0076
122	2.4081	0.0075
123	2.4156	0.0075
124	2.4231	0.0075

125	2.4305	0.0074
126	2.4379	0.0074
127	2.4452	0.0074
128	2.4525	0.0073
129	2.4598	0.0073
130	2.4671	0.0072
131	2.4743	0.0072
132	2.4815	0.0072
133	2.4886	0.0071
134	2.4957	0.0071
135	2.5028	0.0071
136	2.5098	0.0070
137	2.5168	0.0070
138	2.5238	0.0070
139	2.5308	0.0069
140	2.5377	0.0069
141	2.5446	0.0069
142	2.5514	0.0069
143	2.5583	0.0068
144	2.5651	0.0068
145	2.5718	0.0068
146	2.5786	0.0067
147	2.5853	0.0067
148	2.5920	0.0067
149	2.5986	0.0067
150	2.6052	0.0066
151	2.6118	0.0066
152	2.6184	0.0066
153	2.6250	0.0065
154	2.6315	0.0065
155	2.6380	0.0065
156	2.6445	0.0065
157	2.6509	0.0064
158	2.6573	0.0064
159	2.6637	0.0064
160	2.6701	0.0064
161	2.6764	0.0063
162	2.6827	0.0063
163	2.6890	0.0063
164	2.6953	0.0063
165	2.7015	0.0062
166	2.7078	0.0062
167	2.7140	0.0062
168	2.7202	0.0062
169	2.7263	0.0062
170	2.7324	0.0061
171	2.7385	0.0061
172	2.7446	0.0061
173	2.7507	0.0061
174	2.7567	0.0060
175	2.7628	0.0060
176	2.7688	0.0060
177	2.7748	0.0060
178	2.7807	0.0060
179	2.7867	0.0059
180	2.7926	0.0059
181	2.7985	0.0059
182	2.8043	0.0059
183	2.8102	0.0059
184	2.8160	0.0058
185	2.8219	0.0058
186	2.8277	0.0058
187	2.8334	0.0058
188	2.8392	0.0058

189	2.8449	0.0057
190	2.8507	0.0057
191	2.8564	0.0057
192	2.8621	0.0057
193	2.8677	0.0057
194	2.8734	0.0056
195	2.8790	0.0056
196	2.8846	0.0056
197	2.8902	0.0056
198	2.8958	0.0056
199	2.9014	0.0056
200	2.9069	0.0055
201	2.9124	0.0055
202	2.9179	0.0055
203	2.9234	0.0055
204	2.9289	0.0055
205	2.9344	0.0055
206	2.9398	0.0054
207	2.9452	0.0054
208	2.9506	0.0054
209	2.9560	0.0054
210	2.9614	0.0054
211	2.9668	0.0054
212	2.9721	0.0053
213	2.9775	0.0053
214	2.9828	0.0053
215	2.9881	0.0053
216	2.9934	0.0053
217	2.9986	0.0053
218	3.0039	0.0053
219	3.0091	0.0052
220	3.0144	0.0052
221	3.0196	0.0052
222	3.0248	0.0052
223	3.0299	0.0052
224	3.0351	0.0052
225	3.0403	0.0052
226	3.0454	0.0051
227	3.0505	0.0051
228	3.0556	0.0051
229	3.0607	0.0051
230	3.0658	0.0051
231	3.0709	0.0051
232	3.0759	0.0051
233	3.0810	0.0050
234	3.0860	0.0050
235	3.0910	0.0050
236	3.0960	0.0050
237	3.1010	0.0050
238	3.1060	0.0050
239	3.1110	0.0050
240	3.1159	0.0050
241	3.1209	0.0049
242	3.1258	0.0049
243	3.1307	0.0049
244	3.1356	0.0049
245	3.1405	0.0049
246	3.1454	0.0049
247	3.1502	0.0049
248	3.1551	0.0049
249	3.1599	0.0048
250	3.1647	0.0048
251	3.1696	0.0048
252	3.1744	0.0048

253	3.1791	0.0048
254	3.1839	0.0048
255	3.1887	0.0048
256	3.1935	0.0048
257	3.1982	0.0047
258	3.2029	0.0047
259	3.2077	0.0047
260	3.2124	0.0047
261	3.2171	0.0047
262	3.2218	0.0047
263	3.2264	0.0047
264	3.2311	0.0047
265	3.2358	0.0047
266	3.2404	0.0046
267	3.2450	0.0046
268	3.2497	0.0046
269	3.2543	0.0046
270	3.2589	0.0046
271	3.2635	0.0046
272	3.2680	0.0046
273	3.2726	0.0046
274	3.2772	0.0046
275	3.2817	0.0045
276	3.2863	0.0045
277	3.2908	0.0045
278	3.2953	0.0045
279	3.2998	0.0045
280	3.3043	0.0045
281	3.3088	0.0045
282	3.3133	0.0045
283	3.3178	0.0045
284	3.3222	0.0045
285	3.3267	0.0045
286	3.3311	0.0044
287	3.3355	0.0044
288	3.3400	0.0044

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0044	0.0008	0.0037
2	0.0044	0.0008	0.0037
3	0.0045	0.0008	0.0037
4	0.0045	0.0008	0.0037
5	0.0045	0.0008	0.0037
6	0.0045	0.0008	0.0037
7	0.0045	0.0008	0.0037
8	0.0045	0.0008	0.0037
9	0.0045	0.0008	0.0038
10	0.0045	0.0008	0.0038
11	0.0046	0.0008	0.0038
12	0.0046	0.0008	0.0038
13	0.0046	0.0008	0.0038
14	0.0046	0.0008	0.0038
15	0.0046	0.0008	0.0038
16	0.0046	0.0008	0.0038
17	0.0047	0.0008	0.0039
18	0.0047	0.0008	0.0039
19	0.0047	0.0008	0.0039
20	0.0047	0.0008	0.0039
21	0.0047	0.0008	0.0039
22	0.0047	0.0008	0.0039
23	0.0048	0.0008	0.0039

24	0.0048	0.0008	0.0039
25	0.0048	0.0008	0.0040
26	0.0048	0.0008	0.0040
27	0.0048	0.0008	0.0040
28	0.0049	0.0008	0.0040
29	0.0049	0.0008	0.0040
30	0.0049	0.0009	0.0040
31	0.0049	0.0009	0.0041
32	0.0049	0.0009	0.0041
33	0.0050	0.0009	0.0041
34	0.0050	0.0009	0.0041
35	0.0050	0.0009	0.0041
36	0.0050	0.0009	0.0041
37	0.0050	0.0009	0.0042
38	0.0050	0.0009	0.0042
39	0.0051	0.0009	0.0042
40	0.0051	0.0009	0.0042
41	0.0051	0.0009	0.0042
42	0.0051	0.0009	0.0042
43	0.0052	0.0009	0.0043
44	0.0052	0.0009	0.0043
45	0.0052	0.0009	0.0043
46	0.0052	0.0009	0.0043
47	0.0052	0.0009	0.0043
48	0.0053	0.0009	0.0043
49	0.0053	0.0009	0.0044
50	0.0053	0.0009	0.0044
51	0.0053	0.0009	0.0044
52	0.0053	0.0009	0.0044
53	0.0054	0.0009	0.0044
54	0.0054	0.0009	0.0045
55	0.0054	0.0009	0.0045
56	0.0054	0.0009	0.0045
57	0.0055	0.0010	0.0045
58	0.0055	0.0010	0.0045
59	0.0055	0.0010	0.0046
60	0.0055	0.0010	0.0046
61	0.0056	0.0010	0.0046
62	0.0056	0.0010	0.0046
63	0.0056	0.0010	0.0047
64	0.0056	0.0010	0.0047
65	0.0057	0.0010	0.0047
66	0.0057	0.0010	0.0047
67	0.0057	0.0010	0.0047
68	0.0058	0.0010	0.0048
69	0.0058	0.0010	0.0048
70	0.0058	0.0010	0.0048
71	0.0059	0.0010	0.0048
72	0.0059	0.0010	0.0049
73	0.0059	0.0010	0.0049
74	0.0059	0.0010	0.0049
75	0.0060	0.0010	0.0049
76	0.0060	0.0010	0.0050
77	0.0060	0.0011	0.0050
78	0.0061	0.0011	0.0050
79	0.0061	0.0011	0.0050
80	0.0061	0.0011	0.0051
81	0.0062	0.0011	0.0051
82	0.0062	0.0011	0.0051
83	0.0062	0.0011	0.0052
84	0.0063	0.0011	0.0052
85	0.0063	0.0011	0.0052
86	0.0063	0.0011	0.0052
87	0.0064	0.0011	0.0053

88	0.0064	0.0011	0.0053
89	0.0065	0.0011	0.0053
90	0.0065	0.0011	0.0054
91	0.0065	0.0011	0.0054
92	0.0066	0.0011	0.0054
93	0.0066	0.0012	0.0055
94	0.0067	0.0012	0.0055
95	0.0067	0.0012	0.0055
96	0.0067	0.0012	0.0056
97	0.0068	0.0012	0.0056
98	0.0068	0.0012	0.0056
99	0.0069	0.0012	0.0057
100	0.0069	0.0012	0.0057
101	0.0070	0.0012	0.0058
102	0.0070	0.0012	0.0058
103	0.0071	0.0012	0.0058
104	0.0071	0.0012	0.0059
105	0.0072	0.0012	0.0059
106	0.0072	0.0013	0.0060
107	0.0073	0.0013	0.0060
108	0.0073	0.0013	0.0060
109	0.0074	0.0013	0.0061
110	0.0074	0.0013	0.0061
111	0.0075	0.0013	0.0062
112	0.0075	0.0013	0.0062
113	0.0076	0.0013	0.0063
114	0.0077	0.0013	0.0063
115	0.0077	0.0013	0.0064
116	0.0078	0.0014	0.0064
117	0.0079	0.0014	0.0065
118	0.0079	0.0014	0.0065
119	0.0080	0.0014	0.0066
120	0.0080	0.0014	0.0066
121	0.0081	0.0014	0.0067
122	0.0082	0.0014	0.0068
123	0.0083	0.0014	0.0068
124	0.0083	0.0014	0.0069
125	0.0084	0.0015	0.0070
126	0.0085	0.0015	0.0070
127	0.0086	0.0015	0.0071
128	0.0086	0.0015	0.0071
129	0.0087	0.0015	0.0072
130	0.0088	0.0015	0.0073
131	0.0089	0.0016	0.0074
132	0.0090	0.0016	0.0074
133	0.0091	0.0016	0.0075
134	0.0092	0.0016	0.0076
135	0.0093	0.0016	0.0077
136	0.0094	0.0016	0.0077
137	0.0095	0.0017	0.0079
138	0.0096	0.0017	0.0079
139	0.0097	0.0017	0.0080
140	0.0098	0.0017	0.0081
141	0.0100	0.0017	0.0082
142	0.0100	0.0017	0.0083
143	0.0102	0.0018	0.0084
144	0.0103	0.0018	0.0085
145	0.0095	0.0017	0.0079
146	0.0096	0.0017	0.0079
147	0.0098	0.0017	0.0081
148	0.0099	0.0017	0.0082
149	0.0101	0.0018	0.0083
150	0.0102	0.0018	0.0084
151	0.0104	0.0018	0.0086

152	0.0105	0.0018	0.0087
153	0.0107	0.0019	0.0089
154	0.0108	0.0019	0.0090
155	0.0111	0.0019	0.0092
156	0.0112	0.0020	0.0093
157	0.0115	0.0020	0.0095
158	0.0116	0.0020	0.0096
159	0.0119	0.0021	0.0099
160	0.0121	0.0021	0.0100
161	0.0124	0.0022	0.0103
162	0.0126	0.0022	0.0104
163	0.0130	0.0023	0.0107
164	0.0132	0.0023	0.0109
165	0.0136	0.0024	0.0112
166	0.0138	0.0024	0.0114
167	0.0143	0.0025	0.0118
168	0.0145	0.0025	0.0120
169	0.0150	0.0026	0.0124
170	0.0153	0.0027	0.0127
171	0.0159	0.0028	0.0132
172	0.0163	0.0028	0.0134
173	0.0170	0.0030	0.0140
174	0.0174	0.0030	0.0143
175	0.0182	0.0032	0.0150
176	0.0187	0.0032	0.0154
177	0.0197	0.0034	0.0163
178	0.0203	0.0035	0.0167
179	0.0215	0.0037	0.0178
180	0.0223	0.0039	0.0184
181	0.0239	0.0042	0.0197
182	0.0248	0.0043	0.0205
183	0.0270	0.0047	0.0223
184	0.0283	0.0049	0.0234
185	0.0273	0.0047	0.0226
186	0.0291	0.0051	0.0240
187	0.0337	0.0059	0.0279
188	0.0368	0.0064	0.0304
189	0.0458	0.0079	0.0380
190	0.0528	0.0079	0.0449
191	0.0801	0.0079	0.0722
192	0.1162	0.0079	0.1084
193	0.5028	0.0079	0.4949
194	0.0630	0.0079	0.0552
195	0.0407	0.0071	0.0336
196	0.0312	0.0054	0.0258
197	0.0298	0.0052	0.0246
198	0.0259	0.0045	0.0214
199	0.0230	0.0040	0.0190
200	0.0209	0.0036	0.0173
201	0.0192	0.0033	0.0158
202	0.0178	0.0031	0.0147
203	0.0166	0.0029	0.0137
204	0.0156	0.0027	0.0129
205	0.0148	0.0026	0.0122
206	0.0140	0.0024	0.0116
207	0.0134	0.0023	0.0110
208	0.0128	0.0022	0.0106
209	0.0123	0.0021	0.0101
210	0.0118	0.0020	0.0097
211	0.0114	0.0020	0.0094
212	0.0110	0.0019	0.0091
213	0.0106	0.0018	0.0088
214	0.0103	0.0018	0.0085
215	0.0100	0.0017	0.0082

216	0.0097	0.0017	0.0080
217	0.0104	0.0018	0.0086
218	0.0101	0.0018	0.0084
219	0.0099	0.0017	0.0082
220	0.0097	0.0017	0.0080
221	0.0094	0.0016	0.0078
222	0.0092	0.0016	0.0076
223	0.0090	0.0016	0.0075
224	0.0089	0.0015	0.0073
225	0.0087	0.0015	0.0072
226	0.0085	0.0015	0.0070
227	0.0084	0.0015	0.0069
228	0.0082	0.0014	0.0068
229	0.0081	0.0014	0.0067
230	0.0079	0.0014	0.0066
231	0.0078	0.0014	0.0065
232	0.0077	0.0013	0.0064
233	0.0076	0.0013	0.0063
234	0.0075	0.0013	0.0062
235	0.0074	0.0013	0.0061
236	0.0072	0.0013	0.0060
237	0.0071	0.0012	0.0059
238	0.0070	0.0012	0.0058
239	0.0069	0.0012	0.0057
240	0.0069	0.0012	0.0057
241	0.0068	0.0012	0.0056
242	0.0067	0.0012	0.0055
243	0.0066	0.0011	0.0055
244	0.0065	0.0011	0.0054
245	0.0064	0.0011	0.0053
246	0.0064	0.0011	0.0053
247	0.0063	0.0011	0.0052
248	0.0062	0.0011	0.0051
249	0.0062	0.0011	0.0051
250	0.0061	0.0011	0.0050
251	0.0060	0.0010	0.0050
252	0.0060	0.0010	0.0049
253	0.0059	0.0010	0.0049
254	0.0058	0.0010	0.0048
255	0.0058	0.0010	0.0048
256	0.0057	0.0010	0.0047
257	0.0057	0.0010	0.0047
258	0.0056	0.0010	0.0046
259	0.0056	0.0010	0.0046
260	0.0055	0.0010	0.0046
261	0.0055	0.0009	0.0045
262	0.0054	0.0009	0.0045
263	0.0054	0.0009	0.0044
264	0.0053	0.0009	0.0044
265	0.0053	0.0009	0.0044
266	0.0052	0.0009	0.0043
267	0.0052	0.0009	0.0043
268	0.0051	0.0009	0.0042
269	0.0051	0.0009	0.0042
270	0.0051	0.0009	0.0042
271	0.0050	0.0009	0.0041
272	0.0050	0.0009	0.0041
273	0.0049	0.0009	0.0041
274	0.0049	0.0009	0.0040
275	0.0049	0.0008	0.0040
276	0.0048	0.0008	0.0040
277	0.0048	0.0008	0.0040
278	0.0048	0.0008	0.0039
279	0.0047	0.0008	0.0039

280	0.0047	0.0008	0.0039
281	0.0047	0.0008	0.0038
282	0.0046	0.0008	0.0038
283	0.0046	0.0008	0.0038
284	0.0046	0.0008	0.0038
285	0.0045	0.0008	0.0037
286	0.0045	0.0008	0.0037
287	0.0045	0.0008	0.0037
288	0.0044	0.0008	0.0037

Total soil rain loss = 0.48(In)
Total effective rainfall = 2.86(In)
Peak flow rate in flood hydrograph = 24.25(CFS)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0001	0.02	Q				
0+10	0.0012	0.16	Q				
0+15	0.0031	0.28	Q				
0+20	0.0054	0.33	Q				
0+25	0.0079	0.36	Q				
0+30	0.0106	0.38	Q				
0+35	0.0133	0.40	Q				
0+40	0.0161	0.41	Q				
0+45	0.0190	0.42	Q				
0+50	0.0220	0.43	Q				
0+55	0.0249	0.43	Q				
1+ 0	0.0279	0.44	Q				
1+ 5	0.0309	0.44	Q				
1+10	0.0340	0.44	Q				
1+15	0.0371	0.45	Q				
1+20	0.0401	0.45	Q				
1+25	0.0432	0.45	Q				
1+30	0.0463	0.45	Q				
1+35	0.0494	0.45	Q				
1+40	0.0526	0.45	Q				
1+45	0.0557	0.45	Q				
1+50	0.0588	0.46	QV				
1+55	0.0620	0.46	QV				
2+ 0	0.0651	0.46	QV				
2+ 5	0.0683	0.46	QV				
2+10	0.0715	0.46	QV				
2+15	0.0747	0.46	QV				
2+20	0.0779	0.47	QV				
2+25	0.0811	0.47	QV				
2+30	0.0844	0.47	QV				
2+35	0.0876	0.47	QV				
2+40	0.0909	0.47	QV				
2+45	0.0942	0.48	QV				
2+50	0.0974	0.48	QV				
2+55	0.1007	0.48	QV				
3+ 0	0.1040	0.48	QV				
3+ 5	0.1074	0.48	QV				
3+10	0.1107	0.48	QV				
3+15	0.1141	0.49	QV				
3+20	0.1174	0.49	Q V				

3+25	0.1208	0.49	Q V
3+30	0.1242	0.49	Q V
3+35	0.1276	0.49	Q V
3+40	0.1310	0.50	Q V
3+45	0.1344	0.50	Q V
3+50	0.1379	0.50	Q V
3+55	0.1413	0.50	Q V
4+ 0	0.1448	0.50	Q V
4+ 5	0.1483	0.51	Q V
4+10	0.1518	0.51	Q V
4+15	0.1553	0.51	Q V
4+20	0.1589	0.51	Q V
4+25	0.1624	0.52	Q V
4+30	0.1660	0.52	Q V
4+35	0.1695	0.52	Q V
4+40	0.1731	0.52	Q V
4+45	0.1768	0.52	Q V
4+50	0.1804	0.53	Q V
4+55	0.1840	0.53	Q V
5+ 0	0.1877	0.53	Q V
5+ 5	0.1914	0.53	Q V
5+10	0.1951	0.54	Q V
5+15	0.1988	0.54	Q V
5+20	0.2025	0.54	Q V
5+25	0.2063	0.54	Q V
5+30	0.2100	0.55	Q V
5+35	0.2138	0.55	Q V
5+40	0.2176	0.55	Q V
5+45	0.2214	0.55	Q V
5+50	0.2253	0.56	Q V
5+55	0.2291	0.56	Q V
6+ 0	0.2330	0.56	Q V
6+ 5	0.2369	0.57	Q V
6+10	0.2408	0.57	Q V
6+15	0.2448	0.57	Q V
6+20	0.2487	0.57	Q V
6+25	0.2527	0.58	Q V
6+30	0.2567	0.58	Q V
6+35	0.2607	0.58	Q V
6+40	0.2648	0.59	Q V
6+45	0.2688	0.59	Q V
6+50	0.2729	0.59	Q V
6+55	0.2770	0.60	Q V
7+ 0	0.2811	0.60	Q V
7+ 5	0.2853	0.60	Q V
7+10	0.2895	0.61	Q V
7+15	0.2937	0.61	Q V
7+20	0.2979	0.61	Q V
7+25	0.3022	0.62	Q V
7+30	0.3064	0.62	Q V
7+35	0.3107	0.62	Q V
7+40	0.3151	0.63	Q V
7+45	0.3194	0.63	Q V
7+50	0.3238	0.64	Q V
7+55	0.3282	0.64	Q V
8+ 0	0.3326	0.64	Q V
8+ 5	0.3371	0.65	Q V
8+10	0.3416	0.65	Q V
8+15	0.3461	0.66	Q V
8+20	0.3507	0.66	Q V
8+25	0.3552	0.66	Q V
8+30	0.3598	0.67	Q V
8+35	0.3645	0.67	Q V
8+40	0.3691	0.68	Q V

8+45	0.3738	0.68	Q	V
8+50	0.3786	0.69	Q	V
8+55	0.3833	0.69	Q	V
9+ 0	0.3881	0.70	Q	V
9+ 5	0.3930	0.70	Q	V
9+10	0.3979	0.71	Q	V
9+15	0.4028	0.71	Q	V
9+20	0.4077	0.72	Q	V
9+25	0.4127	0.72	Q	V
9+30	0.4177	0.73	Q	V
9+35	0.4228	0.73	Q	V
9+40	0.4278	0.74	Q	V
9+45	0.4330	0.75	Q	V
9+50	0.4382	0.75	Q	V
9+55	0.4434	0.76	Q	V
10+ 0	0.4486	0.76	Q	V
10+ 5	0.4539	0.77	Q	V
10+10	0.4593	0.78	Q	V
10+15	0.4647	0.78	Q	V
10+20	0.4701	0.79	Q	V
10+25	0.4756	0.80	Q	V
10+30	0.4812	0.80	Q	V
10+35	0.4867	0.81	Q	V
10+40	0.4924	0.82	Q	V
10+45	0.4981	0.83	Q	V
10+50	0.5038	0.83	Q	V
10+55	0.5096	0.84	Q	V
11+ 0	0.5155	0.85	Q	V
11+ 5	0.5214	0.86	Q	V
11+10	0.5274	0.87	Q	V
11+15	0.5334	0.88	Q	V
11+20	0.5395	0.89	Q	V
11+25	0.5457	0.89	Q	V
11+30	0.5519	0.90	Q	V
11+35	0.5582	0.91	Q	V
11+40	0.5646	0.92	Q	V
11+45	0.5710	0.93	Q	V
11+50	0.5775	0.95	Q	V
11+55	0.5841	0.96	Q	V
12+ 0	0.5908	0.97	Q	V
12+ 5	0.5975	0.98	Q	V
12+10	0.6041	0.96	Q	V
12+15	0.6106	0.94	Q	V
12+20	0.6171	0.95	Q	V
12+25	0.6237	0.95	Q	V
12+30	0.6303	0.96	Q	V
12+35	0.6370	0.97	Q	V
12+40	0.6438	0.99	Q	V
12+45	0.6507	1.00	Q	V
12+50	0.6577	1.01	Q	V
12+55	0.6647	1.03	Q	V
13+ 0	0.6719	1.05	Q	V
13+ 5	0.6793	1.06	Q	V
13+10	0.6867	1.08	Q	V
13+15	0.6943	1.10	Q	V
13+20	0.7020	1.12	Q	V
13+25	0.7099	1.14	Q	V
13+30	0.7179	1.16	Q	V
13+35	0.7261	1.19	Q	V
13+40	0.7344	1.21	Q	V
13+45	0.7429	1.24	Q	V
13+50	0.7517	1.27	Q	V
13+55	0.7606	1.29	Q	V
14+ 0	0.7697	1.33	Q	V

14+ 5	0.7791	1.36	Q		V				
14+10	0.7887	1.39	Q		V				
14+15	0.7985	1.43	Q		V				
14+20	0.8087	1.47	Q		V				
14+25	0.8191	1.51	Q		V				
14+30	0.8299	1.56	Q		V				
14+35	0.8410	1.61	Q		V				
14+40	0.8524	1.67	Q		V				
14+45	0.8643	1.73	Q		V				
14+50	0.8767	1.79	Q		V				
14+55	0.8895	1.86	Q		V				
15+ 0	0.9029	1.94	Q		V				
15+ 5	0.9169	2.03	Q		V				
15+10	0.9316	2.14	Q		V				
15+15	0.9471	2.25	Q		V				
15+20	0.9635	2.38	Q		V				
15+25	0.9808	2.51	Q		V				
15+30	0.9985	2.57	Q		V				
15+35	1.0169	2.67	Q		V				
15+40	1.0368	2.89	Q		V				
15+45	1.0588	3.19	Q		V				
15+50	1.0841	3.67	Q		V				
15+55	1.1145	4.42	Q		V				
16+ 0	1.1560	6.02		Q		V			
16+ 5	1.2291	10.62			Q	V			
16+10	1.3961	24.25				V		Q	
16+15	1.5445	21.54				V	Q		
16+20	1.6275	12.06			Q		V		
16+25	1.6849	8.33				Q	V		
16+30	1.7293	6.44		Q			V		
16+35	1.7646	5.14		Q			V		
16+40	1.7942	4.29		Q			V		
16+45	1.8191	3.62		Q			V		
16+50	1.8403	3.07		Q			V		
16+55	1.8582	2.60		Q			V		
17+ 0	1.8743	2.34		Q			V		
17+ 5	1.8893	2.18		Q			V		
17+10	1.9025	1.92		Q			V		
17+15	1.9140	1.68		Q			V		
17+20	1.9241	1.46	Q				V		
17+25	1.9336	1.38	Q				V		
17+30	1.9426	1.31	Q				V		
17+35	1.9512	1.25	Q				V		
17+40	1.9595	1.19	Q				V		
17+45	1.9673	1.15	Q				V		
17+50	1.9749	1.10	Q				V		
17+55	1.9823	1.06	Q				V		
18+ 0	1.9894	1.03	Q				V		
18+ 5	1.9962	1.00	Q				V		
18+10	2.0031	1.00	Q				V		
18+15	2.0100	1.00	Q				V		
18+20	2.0168	0.98	Q				V		
18+25	2.0234	0.96	Q				V		
18+30	2.0299	0.95	Q				V		
18+35	2.0363	0.93	Q				V		
18+40	2.0425	0.91	Q				V		
18+45	2.0487	0.89	Q				V		
18+50	2.0547	0.87	Q				V		
18+55	2.0606	0.86	Q				V		
19+ 0	2.0664	0.84	Q				V		
19+ 5	2.0720	0.82	Q				V		
19+10	2.0776	0.81	Q				V		
19+15	2.0831	0.80	Q				V		
19+20	2.0885	0.78	Q				V		

19+25	2.0938	0.77	Q	V
19+30	2.0990	0.76	Q	V
19+35	2.1041	0.74	Q	V
19+40	2.1092	0.73	Q	V
19+45	2.1141	0.72	Q	V
19+50	2.1190	0.71	Q	V
19+55	2.1238	0.70	Q	V
20+ 0	2.1286	0.69	Q	V
20+ 5	2.1333	0.68	Q	V
20+10	2.1379	0.67	Q	V
20+15	2.1425	0.66	Q	V
20+20	2.1470	0.65	Q	V
20+25	2.1515	0.65	Q	V
20+30	2.1559	0.64	Q	V
20+35	2.1602	0.63	Q	V
20+40	2.1645	0.62	Q	V
20+45	2.1687	0.62	Q	V
20+50	2.1729	0.61	Q	V
20+55	2.1771	0.60	Q	V
21+ 0	2.1812	0.60	Q	V
21+ 5	2.1852	0.59	Q	V
21+10	2.1893	0.58	Q	V
21+15	2.1932	0.58	Q	V
21+20	2.1972	0.57	Q	V
21+25	2.2011	0.57	Q	V
21+30	2.2049	0.56	Q	V
21+35	2.2087	0.55	Q	V
21+40	2.2125	0.55	Q	V
21+45	2.2162	0.54	Q	V
21+50	2.2199	0.54	Q	V
21+55	2.2236	0.53	Q	V
22+ 0	2.2273	0.53	Q	V
22+ 5	2.2309	0.52	Q	V
22+10	2.2344	0.52	Q	V
22+15	2.2380	0.51	Q	V
22+20	2.2415	0.51	Q	V
22+25	2.2450	0.51	Q	V
22+30	2.2484	0.50	Q	V
22+35	2.2519	0.50	Q	V
22+40	2.2553	0.49	Q	V
22+45	2.2586	0.49	Q	V
22+50	2.2620	0.49	Q	V
22+55	2.2653	0.48	Q	V
23+ 0	2.2686	0.48	Q	V
23+ 5	2.2719	0.47	Q	V
23+10	2.2751	0.47	Q	V
23+15	2.2783	0.47	Q	V
23+20	2.2815	0.46	Q	V
23+25	2.2847	0.46	Q	V
23+30	2.2878	0.46	Q	V
23+35	2.2910	0.45	Q	V
23+40	2.2941	0.45	Q	V
23+45	2.2972	0.45	Q	V
23+50	2.3002	0.44	Q	V
23+55	2.3033	0.44	Q	V
24+ 0	2.3063	0.44	Q	V

Unit Hydrograph Analysis

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Study date 11/30/23

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6277

JOB NO 2022-260
WATSON HIGH DESERT LOGISTICS WEST
100 YEAR STORM UNIT HYDROGRAPH, POST CONDITION
AREA A6 TO A9

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
13.25	1	0.59

Rainfall data for year 2		
13.25	6	0.74

Rainfall data for year 2		
13.25	24	1.28

Rainfall data for year 100		
13.25	1	1.06

Rainfall data for year 100		
13.25	6	1.97

Rainfall data for year 100		
13.25	24	3.34

***** Area-averaged max loss rate, Fm *****

SCS curve SCS curve Area Area Fp(Fig C6) Ap Fm

No.(AMCII)	NO.(AMC 3)	(Ac.)	Fraction	(In/Hr)	(dec.)	(In/Hr)
32.0	52.0	13.25	1.000	0.785	0.150	0.118

Area-averaged adjusted loss rate Fm (In/Hr) = 0.118

***** Area-Averaged low loss rate fraction, Yb *****

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
1.99	0.150	32.0	52.0	9.23	0.062
11.26	0.850	98.0	98.0	0.20	0.930

Area-averaged catchment yield fraction, Y = 0.800

Area-averaged low loss fraction, Yb = 0.200

User entry of time of concentration = 0.222 (hours)

+++++

Watershed area = 13.25(Ac.)

Catchment Lag time = 0.178 hours

Unit interval = 5.000 minutes

Unit interval percentage of lag time = 46.9219

Hydrograph baseflow = 0.00(CFS)

Average maximum watershed loss rate(Fm) = 0.118(In/Hr)

Average low loss rate fraction (Yb) = 0.200 (decimal)

DESERT S-Graph Selected

Computed peak 5-minute rainfall = 0.503(In)

Computed peak 30-minute rainfall = 0.861(In)

Specified peak 1-hour rainfall = 1.060(In)

Computed peak 3-hour rainfall = 1.550(In)

Specified peak 6-hour rainfall = 1.970(In)

Specified peak 24-hour rainfall = 3.340(In)

Rainfall depth area reduction factors:

Using a total area of 13.25(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.503(In)

30-minute factor = 0.999 Adjusted rainfall = 0.860(In)

1-hour factor = 0.999 Adjusted rainfall = 1.059(In)

3-hour factor = 1.000 Adjusted rainfall = 1.550(In)

6-hour factor = 1.000 Adjusted rainfall = 1.970(In)

24-hour factor = 1.000 Adjusted rainfall = 3.340(In)

U n i t H y d r o g r a p h

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Interval Number	'S' Graph Mean values	Unit Hydrograph (CFS)
--------------------	--------------------------	--------------------------

(K = 160.23 (CFS))

1	3.568	5.716
2	26.867	37.333
3	57.596	49.236
4	71.581	22.408
5	79.690	12.993
6	85.037	8.568
7	88.926	6.232
8	91.652	4.368
9	93.796	3.435
10	95.424	2.609
11	96.687	2.024
12	97.598	1.459
13	98.167	0.912
14	98.701	0.856

15	99.264	0.901
16	99.671	0.652
17	100.000	0.528

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5027	0.5027
2	0.6189	0.1162
3	0.6989	0.0800
4	0.7619	0.0630
5	0.8147	0.0528
6	0.8605	0.0458
7	0.9012	0.0407
8	0.9380	0.0368
9	0.9717	0.0337
10	1.0030	0.0312
11	1.0320	0.0291
12	1.0593	0.0273
13	1.0891	0.0298
14	1.1174	0.0283
15	1.1445	0.0270
16	1.1703	0.0259
17	1.1952	0.0248
18	1.2191	0.0239
19	1.2421	0.0230
20	1.2644	0.0223
21	1.2859	0.0216
22	1.3068	0.0209
23	1.3271	0.0203
24	1.3468	0.0197
25	1.3660	0.0192
26	1.3847	0.0187
27	1.4029	0.0182
28	1.4207	0.0178
29	1.4381	0.0174
30	1.4551	0.0170
31	1.4717	0.0166
32	1.4879	0.0163
33	1.5039	0.0159
34	1.5195	0.0156
35	1.5349	0.0153
36	1.5499	0.0151
37	1.5647	0.0148
38	1.5792	0.0145
39	1.5934	0.0143
40	1.6074	0.0140
41	1.6212	0.0138
42	1.6348	0.0136
43	1.6482	0.0134
44	1.6613	0.0132
45	1.6743	0.0130
46	1.6871	0.0128
47	1.6997	0.0126
48	1.7121	0.0124
49	1.7244	0.0123
50	1.7365	0.0121
51	1.7484	0.0119
52	1.7602	0.0118
53	1.7718	0.0116
54	1.7833	0.0115
55	1.7947	0.0114
56	1.8059	0.0112
57	1.8170	0.0111
58	1.8279	0.0110

59	1.8388	0.0108
60	1.8495	0.0107
61	1.8601	0.0106
62	1.8706	0.0105
63	1.8810	0.0104
64	1.8913	0.0103
65	1.9014	0.0102
66	1.9115	0.0101
67	1.9215	0.0100
68	1.9313	0.0099
69	1.9411	0.0098
70	1.9508	0.0097
71	1.9604	0.0096
72	1.9699	0.0095
73	1.9803	0.0104
74	1.9906	0.0103
75	2.0008	0.0102
76	2.0109	0.0101
77	2.0209	0.0100
78	2.0309	0.0100
79	2.0408	0.0099
80	2.0506	0.0098
81	2.0603	0.0097
82	2.0699	0.0097
83	2.0795	0.0096
84	2.0890	0.0095
85	2.0985	0.0094
86	2.1078	0.0094
87	2.1171	0.0093
88	2.1264	0.0092
89	2.1355	0.0092
90	2.1446	0.0091
91	2.1537	0.0090
92	2.1627	0.0090
93	2.1716	0.0089
94	2.1805	0.0089
95	2.1893	0.0088
96	2.1980	0.0087
97	2.2067	0.0087
98	2.2153	0.0086
99	2.2239	0.0086
100	2.2325	0.0085
101	2.2409	0.0085
102	2.2494	0.0084
103	2.2577	0.0084
104	2.2660	0.0083
105	2.2743	0.0083
106	2.2825	0.0082
107	2.2907	0.0082
108	2.2989	0.0081
109	2.3069	0.0081
110	2.3150	0.0080
111	2.3230	0.0080
112	2.3309	0.0079
113	2.3388	0.0079
114	2.3467	0.0079
115	2.3545	0.0078
116	2.3623	0.0078
117	2.3700	0.0077
118	2.3777	0.0077
119	2.3854	0.0077
120	2.3930	0.0076
121	2.4005	0.0076
122	2.4081	0.0075

123	2.4156	0.0075
124	2.4230	0.0075
125	2.4305	0.0074
126	2.4379	0.0074
127	2.4452	0.0074
128	2.4525	0.0073
129	2.4598	0.0073
130	2.4670	0.0072
131	2.4743	0.0072
132	2.4814	0.0072
133	2.4886	0.0071
134	2.4957	0.0071
135	2.5028	0.0071
136	2.5098	0.0070
137	2.5168	0.0070
138	2.5238	0.0070
139	2.5307	0.0069
140	2.5377	0.0069
141	2.5446	0.0069
142	2.5514	0.0069
143	2.5582	0.0068
144	2.5650	0.0068
145	2.5718	0.0068
146	2.5785	0.0067
147	2.5853	0.0067
148	2.5919	0.0067
149	2.5986	0.0067
150	2.6052	0.0066
151	2.6118	0.0066
152	2.6184	0.0066
153	2.6249	0.0065
154	2.6315	0.0065
155	2.6380	0.0065
156	2.6444	0.0065
157	2.6509	0.0064
158	2.6573	0.0064
159	2.6637	0.0064
160	2.6701	0.0064
161	2.6764	0.0063
162	2.6827	0.0063
163	2.6890	0.0063
164	2.6953	0.0063
165	2.7015	0.0062
166	2.7078	0.0062
167	2.7140	0.0062
168	2.7201	0.0062
169	2.7263	0.0062
170	2.7324	0.0061
171	2.7385	0.0061
172	2.7446	0.0061
173	2.7507	0.0061
174	2.7567	0.0060
175	2.7628	0.0060
176	2.7688	0.0060
177	2.7747	0.0060
178	2.7807	0.0060
179	2.7866	0.0059
180	2.7926	0.0059
181	2.7985	0.0059
182	2.8043	0.0059
183	2.8102	0.0059
184	2.8160	0.0058
185	2.8218	0.0058
186	2.8276	0.0058

187	2.8334	0.0058
188	2.8392	0.0058
189	2.8449	0.0057
190	2.8507	0.0057
191	2.8564	0.0057
192	2.8620	0.0057
193	2.8677	0.0057
194	2.8734	0.0056
195	2.8790	0.0056
196	2.8846	0.0056
197	2.8902	0.0056
198	2.8958	0.0056
199	2.9013	0.0056
200	2.9069	0.0055
201	2.9124	0.0055
202	2.9179	0.0055
203	2.9234	0.0055
204	2.9289	0.0055
205	2.9344	0.0055
206	2.9398	0.0054
207	2.9452	0.0054
208	2.9506	0.0054
209	2.9560	0.0054
210	2.9614	0.0054
211	2.9668	0.0054
212	2.9721	0.0053
213	2.9774	0.0053
214	2.9828	0.0053
215	2.9881	0.0053
216	2.9933	0.0053
217	2.9986	0.0053
218	3.0039	0.0053
219	3.0091	0.0052
220	3.0143	0.0052
221	3.0195	0.0052
222	3.0247	0.0052
223	3.0299	0.0052
224	3.0351	0.0052
225	3.0402	0.0052
226	3.0454	0.0051
227	3.0505	0.0051
228	3.0556	0.0051
229	3.0607	0.0051
230	3.0658	0.0051
231	3.0709	0.0051
232	3.0759	0.0051
233	3.0810	0.0050
234	3.0860	0.0050
235	3.0910	0.0050
236	3.0960	0.0050
237	3.1010	0.0050
238	3.1060	0.0050
239	3.1109	0.0050
240	3.1159	0.0050
241	3.1208	0.0049
242	3.1258	0.0049
243	3.1307	0.0049
244	3.1356	0.0049
245	3.1405	0.0049
246	3.1453	0.0049
247	3.1502	0.0049
248	3.1551	0.0049
249	3.1599	0.0048
250	3.1647	0.0048

251	3.1695	0.0048
252	3.1743	0.0048
253	3.1791	0.0048
254	3.1839	0.0048
255	3.1887	0.0048
256	3.1934	0.0048
257	3.1982	0.0047
258	3.2029	0.0047
259	3.2076	0.0047
260	3.2123	0.0047
261	3.2170	0.0047
262	3.2217	0.0047
263	3.2264	0.0047
264	3.2311	0.0047
265	3.2357	0.0047
266	3.2404	0.0046
267	3.2450	0.0046
268	3.2496	0.0046
269	3.2543	0.0046
270	3.2589	0.0046
271	3.2634	0.0046
272	3.2680	0.0046
273	3.2726	0.0046
274	3.2772	0.0046
275	3.2817	0.0045
276	3.2862	0.0045
277	3.2908	0.0045
278	3.2953	0.0045
279	3.2998	0.0045
280	3.3043	0.0045
281	3.3088	0.0045
282	3.3133	0.0045
283	3.3177	0.0045
284	3.3222	0.0045
285	3.3267	0.0045
286	3.3311	0.0044
287	3.3355	0.0044
288	3.3399	0.0044

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0044	0.0009	0.0035
2	0.0044	0.0009	0.0035
3	0.0045	0.0009	0.0036
4	0.0045	0.0009	0.0036
5	0.0045	0.0009	0.0036
6	0.0045	0.0009	0.0036
7	0.0045	0.0009	0.0036
8	0.0045	0.0009	0.0036
9	0.0045	0.0009	0.0036
10	0.0045	0.0009	0.0036
11	0.0046	0.0009	0.0037
12	0.0046	0.0009	0.0037
13	0.0046	0.0009	0.0037
14	0.0046	0.0009	0.0037
15	0.0046	0.0009	0.0037
16	0.0046	0.0009	0.0037
17	0.0047	0.0009	0.0037
18	0.0047	0.0009	0.0037
19	0.0047	0.0009	0.0038
20	0.0047	0.0009	0.0038
21	0.0047	0.0009	0.0038

22	0.0047	0.0009	0.0038
23	0.0048	0.0010	0.0038
24	0.0048	0.0010	0.0038
25	0.0048	0.0010	0.0038
26	0.0048	0.0010	0.0039
27	0.0048	0.0010	0.0039
28	0.0049	0.0010	0.0039
29	0.0049	0.0010	0.0039
30	0.0049	0.0010	0.0039
31	0.0049	0.0010	0.0039
32	0.0049	0.0010	0.0039
33	0.0050	0.0010	0.0040
34	0.0050	0.0010	0.0040
35	0.0050	0.0010	0.0040
36	0.0050	0.0010	0.0040
37	0.0050	0.0010	0.0040
38	0.0050	0.0010	0.0040
39	0.0051	0.0010	0.0041
40	0.0051	0.0010	0.0041
41	0.0051	0.0010	0.0041
42	0.0051	0.0010	0.0041
43	0.0052	0.0010	0.0041
44	0.0052	0.0010	0.0041
45	0.0052	0.0010	0.0042
46	0.0052	0.0010	0.0042
47	0.0052	0.0010	0.0042
48	0.0053	0.0011	0.0042
49	0.0053	0.0011	0.0042
50	0.0053	0.0011	0.0042
51	0.0053	0.0011	0.0043
52	0.0053	0.0011	0.0043
53	0.0054	0.0011	0.0043
54	0.0054	0.0011	0.0043
55	0.0054	0.0011	0.0043
56	0.0054	0.0011	0.0044
57	0.0055	0.0011	0.0044
58	0.0055	0.0011	0.0044
59	0.0055	0.0011	0.0044
60	0.0055	0.0011	0.0044
61	0.0056	0.0011	0.0045
62	0.0056	0.0011	0.0045
63	0.0056	0.0011	0.0045
64	0.0056	0.0011	0.0045
65	0.0057	0.0011	0.0045
66	0.0057	0.0011	0.0046
67	0.0057	0.0011	0.0046
68	0.0058	0.0012	0.0046
69	0.0058	0.0012	0.0046
70	0.0058	0.0012	0.0047
71	0.0059	0.0012	0.0047
72	0.0059	0.0012	0.0047
73	0.0059	0.0012	0.0047
74	0.0059	0.0012	0.0048
75	0.0060	0.0012	0.0048
76	0.0060	0.0012	0.0048
77	0.0060	0.0012	0.0048
78	0.0061	0.0012	0.0049
79	0.0061	0.0012	0.0049
80	0.0061	0.0012	0.0049
81	0.0062	0.0012	0.0049
82	0.0062	0.0012	0.0050
83	0.0062	0.0012	0.0050
84	0.0063	0.0013	0.0050
85	0.0063	0.0013	0.0051

86	0.0063	0.0013	0.0051
87	0.0064	0.0013	0.0051
88	0.0064	0.0013	0.0051
89	0.0065	0.0013	0.0052
90	0.0065	0.0013	0.0052
91	0.0065	0.0013	0.0052
92	0.0066	0.0013	0.0053
93	0.0066	0.0013	0.0053
94	0.0067	0.0013	0.0053
95	0.0067	0.0013	0.0054
96	0.0067	0.0013	0.0054
97	0.0068	0.0014	0.0054
98	0.0068	0.0014	0.0055
99	0.0069	0.0014	0.0055
100	0.0069	0.0014	0.0055
101	0.0070	0.0014	0.0056
102	0.0070	0.0014	0.0056
103	0.0071	0.0014	0.0057
104	0.0071	0.0014	0.0057
105	0.0072	0.0014	0.0057
106	0.0072	0.0014	0.0058
107	0.0073	0.0015	0.0058
108	0.0073	0.0015	0.0059
109	0.0074	0.0015	0.0059
110	0.0074	0.0015	0.0059
111	0.0075	0.0015	0.0060
112	0.0075	0.0015	0.0060
113	0.0076	0.0015	0.0061
114	0.0077	0.0015	0.0061
115	0.0077	0.0015	0.0062
116	0.0078	0.0016	0.0062
117	0.0079	0.0016	0.0063
118	0.0079	0.0016	0.0063
119	0.0080	0.0016	0.0064
120	0.0080	0.0016	0.0064
121	0.0081	0.0016	0.0065
122	0.0082	0.0016	0.0065
123	0.0083	0.0017	0.0066
124	0.0083	0.0017	0.0067
125	0.0084	0.0017	0.0067
126	0.0085	0.0017	0.0068
127	0.0086	0.0017	0.0069
128	0.0086	0.0017	0.0069
129	0.0087	0.0017	0.0070
130	0.0088	0.0018	0.0070
131	0.0089	0.0018	0.0071
132	0.0090	0.0018	0.0072
133	0.0091	0.0018	0.0073
134	0.0092	0.0018	0.0073
135	0.0093	0.0019	0.0074
136	0.0094	0.0019	0.0075
137	0.0095	0.0019	0.0076
138	0.0096	0.0019	0.0077
139	0.0097	0.0019	0.0078
140	0.0098	0.0020	0.0078
141	0.0100	0.0020	0.0080
142	0.0100	0.0020	0.0080
143	0.0102	0.0020	0.0082
144	0.0103	0.0021	0.0082
145	0.0095	0.0019	0.0076
146	0.0096	0.0019	0.0077
147	0.0098	0.0020	0.0078
148	0.0099	0.0020	0.0079
149	0.0101	0.0020	0.0081

150	0.0102	0.0020	0.0081
151	0.0104	0.0021	0.0083
152	0.0105	0.0021	0.0084
153	0.0107	0.0021	0.0086
154	0.0108	0.0022	0.0087
155	0.0111	0.0022	0.0089
156	0.0112	0.0022	0.0090
157	0.0115	0.0023	0.0092
158	0.0116	0.0023	0.0093
159	0.0119	0.0024	0.0096
160	0.0121	0.0024	0.0097
161	0.0124	0.0025	0.0099
162	0.0126	0.0025	0.0101
163	0.0130	0.0026	0.0104
164	0.0132	0.0026	0.0105
165	0.0136	0.0027	0.0109
166	0.0138	0.0028	0.0110
167	0.0143	0.0029	0.0114
168	0.0145	0.0029	0.0116
169	0.0151	0.0030	0.0120
170	0.0153	0.0031	0.0123
171	0.0159	0.0032	0.0128
172	0.0163	0.0033	0.0130
173	0.0170	0.0034	0.0136
174	0.0174	0.0035	0.0139
175	0.0182	0.0036	0.0146
176	0.0187	0.0037	0.0149
177	0.0197	0.0039	0.0158
178	0.0203	0.0041	0.0162
179	0.0216	0.0043	0.0172
180	0.0223	0.0045	0.0178
181	0.0239	0.0048	0.0191
182	0.0248	0.0050	0.0199
183	0.0270	0.0054	0.0216
184	0.0283	0.0057	0.0227
185	0.0273	0.0055	0.0218
186	0.0291	0.0058	0.0233
187	0.0337	0.0067	0.0270
188	0.0368	0.0074	0.0295
189	0.0458	0.0092	0.0366
190	0.0528	0.0098	0.0429
191	0.0800	0.0098	0.0702
192	0.1162	0.0098	0.1064
193	0.5027	0.0098	0.4929
194	0.0630	0.0098	0.0532
195	0.0407	0.0081	0.0326
196	0.0312	0.0062	0.0250
197	0.0298	0.0060	0.0238
198	0.0259	0.0052	0.0207
199	0.0230	0.0046	0.0184
200	0.0209	0.0042	0.0167
201	0.0192	0.0038	0.0153
202	0.0178	0.0036	0.0142
203	0.0166	0.0033	0.0133
204	0.0156	0.0031	0.0125
205	0.0148	0.0030	0.0118
206	0.0140	0.0028	0.0112
207	0.0134	0.0027	0.0107
208	0.0128	0.0026	0.0102
209	0.0123	0.0025	0.0098
210	0.0118	0.0024	0.0094
211	0.0114	0.0023	0.0091
212	0.0110	0.0022	0.0088
213	0.0106	0.0021	0.0085

214	0.0103	0.0021	0.0082
215	0.0100	0.0020	0.0080
216	0.0097	0.0019	0.0077
217	0.0104	0.0021	0.0083
218	0.0101	0.0020	0.0081
219	0.0099	0.0020	0.0079
220	0.0097	0.0019	0.0077
221	0.0094	0.0019	0.0075
222	0.0092	0.0018	0.0074
223	0.0090	0.0018	0.0072
224	0.0089	0.0018	0.0071
225	0.0087	0.0017	0.0070
226	0.0085	0.0017	0.0068
227	0.0084	0.0017	0.0067
228	0.0082	0.0016	0.0066
229	0.0081	0.0016	0.0065
230	0.0079	0.0016	0.0064
231	0.0078	0.0016	0.0063
232	0.0077	0.0015	0.0062
233	0.0076	0.0015	0.0061
234	0.0075	0.0015	0.0060
235	0.0074	0.0015	0.0059
236	0.0072	0.0014	0.0058
237	0.0071	0.0014	0.0057
238	0.0070	0.0014	0.0056
239	0.0069	0.0014	0.0056
240	0.0069	0.0014	0.0055
241	0.0068	0.0014	0.0054
242	0.0067	0.0013	0.0053
243	0.0066	0.0013	0.0053
244	0.0065	0.0013	0.0052
245	0.0064	0.0013	0.0052
246	0.0064	0.0013	0.0051
247	0.0063	0.0013	0.0050
248	0.0062	0.0012	0.0050
249	0.0062	0.0012	0.0049
250	0.0061	0.0012	0.0049
251	0.0060	0.0012	0.0048
252	0.0060	0.0012	0.0048
253	0.0059	0.0012	0.0047
254	0.0058	0.0012	0.0047
255	0.0058	0.0012	0.0046
256	0.0057	0.0011	0.0046
257	0.0057	0.0011	0.0045
258	0.0056	0.0011	0.0045
259	0.0056	0.0011	0.0044
260	0.0055	0.0011	0.0044
261	0.0055	0.0011	0.0044
262	0.0054	0.0011	0.0043
263	0.0054	0.0011	0.0043
264	0.0053	0.0011	0.0043
265	0.0053	0.0011	0.0042
266	0.0052	0.0010	0.0042
267	0.0052	0.0010	0.0041
268	0.0051	0.0010	0.0041
269	0.0051	0.0010	0.0041
270	0.0051	0.0010	0.0040
271	0.0050	0.0010	0.0040
272	0.0050	0.0010	0.0040
273	0.0049	0.0010	0.0040
274	0.0049	0.0010	0.0039
275	0.0049	0.0010	0.0039
276	0.0048	0.0010	0.0039
277	0.0048	0.0010	0.0038

278	0.0048	0.0010	0.0038
279	0.0047	0.0009	0.0038
280	0.0047	0.0009	0.0038
281	0.0047	0.0009	0.0037
282	0.0046	0.0009	0.0037
283	0.0046	0.0009	0.0037
284	0.0046	0.0009	0.0036
285	0.0045	0.0009	0.0036
286	0.0045	0.0009	0.0036
287	0.0045	0.0009	0.0036
288	0.0044	0.0009	0.0036

Total soil rain loss = 0.55(In)
Total effective rainfall = 2.79(In)
Peak flow rate in flood hydrograph = 30.76(CFS)

+++++
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	10.0	20.0	30.0	40.0
0+ 5	0.0001	0.02	Q				
0+10	0.0012	0.15	Q				
0+15	0.0034	0.33	Q				
0+20	0.0062	0.41	Q				
0+25	0.0094	0.45	Q				
0+30	0.0127	0.49	Q				
0+35	0.0162	0.51	Q				
0+40	0.0199	0.53	Q				
0+45	0.0236	0.54	Q				
0+50	0.0274	0.55	Q				
0+55	0.0312	0.56	Q				
1+ 0	0.0352	0.57	Q				
1+ 5	0.0391	0.57	Q				
1+10	0.0431	0.58	Q				
1+15	0.0471	0.58	Q				
1+20	0.0511	0.59	Q				
1+25	0.0552	0.59	Q				
1+30	0.0593	0.59	Q				
1+35	0.0634	0.60	Q				
1+40	0.0675	0.60	Q				
1+45	0.0717	0.60	Q				
1+50	0.0758	0.60	Q				
1+55	0.0800	0.60	QV				
2+ 0	0.0841	0.61	QV				
2+ 5	0.0883	0.61	QV				
2+10	0.0925	0.61	QV				
2+15	0.0968	0.61	QV				
2+20	0.1010	0.62	QV				
2+25	0.1052	0.62	QV				
2+30	0.1095	0.62	QV				
2+35	0.1138	0.62	QV				
2+40	0.1181	0.62	QV				
2+45	0.1224	0.63	QV				
2+50	0.1267	0.63	QV				
2+55	0.1311	0.63	QV				
3+ 0	0.1355	0.63	QV				
3+ 5	0.1398	0.64	QV				
3+10	0.1442	0.64	QV				

3+15	0.1487	0.64	QV
3+20	0.1531	0.64	QV
3+25	0.1575	0.65	Q V
3+30	0.1620	0.65	Q V
3+35	0.1665	0.65	Q V
3+40	0.1710	0.65	Q V
3+45	0.1755	0.66	Q V
3+50	0.1801	0.66	Q V
3+55	0.1846	0.66	Q V
4+ 0	0.1892	0.67	Q V
4+ 5	0.1938	0.67	Q V
4+10	0.1984	0.67	Q V
4+15	0.2031	0.67	Q V
4+20	0.2077	0.68	Q V
4+25	0.2124	0.68	Q V
4+30	0.2171	0.68	Q V
4+35	0.2219	0.69	Q V
4+40	0.2266	0.69	Q V
4+45	0.2314	0.69	Q V
4+50	0.2361	0.69	Q V
4+55	0.2410	0.70	Q V
5+ 0	0.2458	0.70	Q V
5+ 5	0.2506	0.70	Q V
5+10	0.2555	0.71	Q V
5+15	0.2604	0.71	Q V
5+20	0.2653	0.71	Q V
5+25	0.2703	0.72	Q V
5+30	0.2752	0.72	Q V
5+35	0.2802	0.72	Q V
5+40	0.2852	0.73	Q V
5+45	0.2903	0.73	Q V
5+50	0.2953	0.74	Q V
5+55	0.3004	0.74	Q V
6+ 0	0.3055	0.74	Q V
6+ 5	0.3107	0.75	Q V
6+10	0.3158	0.75	Q V
6+15	0.3210	0.75	Q V
6+20	0.3262	0.76	Q V
6+25	0.3315	0.76	Q V
6+30	0.3368	0.77	Q V
6+35	0.3421	0.77	Q V
6+40	0.3474	0.77	Q V
6+45	0.3527	0.78	Q V
6+50	0.3581	0.78	Q V
6+55	0.3635	0.79	Q V
7+ 0	0.3690	0.79	Q V
7+ 5	0.3745	0.80	Q V
7+10	0.3800	0.80	Q V
7+15	0.3855	0.80	Q V
7+20	0.3911	0.81	Q V
7+25	0.3967	0.81	Q V
7+30	0.4023	0.82	Q V
7+35	0.4080	0.82	Q V
7+40	0.4137	0.83	Q V
7+45	0.4194	0.83	Q V
7+50	0.4252	0.84	Q V
7+55	0.4310	0.84	Q V
8+ 0	0.4368	0.85	Q V
8+ 5	0.4427	0.85	Q V
8+10	0.4486	0.86	Q V
8+15	0.4546	0.86	Q V
8+20	0.4606	0.87	Q V
8+25	0.4666	0.88	Q V
8+30	0.4727	0.88	Q V

8+35	0.4788	0.89	Q	V				
8+40	0.4850	0.89	Q	V				
8+45	0.4911	0.90	Q	V				
8+50	0.4974	0.91	Q	V				
8+55	0.5037	0.91	Q	V				
9+ 0	0.5100	0.92	Q	V				
9+ 5	0.5164	0.92	Q	V				
9+10	0.5228	0.93	Q	V				
9+15	0.5292	0.94	Q	V				
9+20	0.5357	0.95	Q	V				
9+25	0.5423	0.95	Q	V				
9+30	0.5489	0.96	Q	V				
9+35	0.5556	0.97	Q	V				
9+40	0.5623	0.97	Q	V				
9+45	0.5690	0.98	Q	V				
9+50	0.5759	0.99	Q	V				
9+55	0.5827	1.00	Q	V				
10+ 0	0.5897	1.01	Q	V				
10+ 5	0.5966	1.01	Q	V				
10+10	0.6037	1.02	Q	V				
10+15	0.6108	1.03	Q	V				
10+20	0.6179	1.04	Q	V				
10+25	0.6252	1.05	Q	V				
10+30	0.6325	1.06	Q	V				
10+35	0.6398	1.07	Q	V				
10+40	0.6472	1.08	Q	V				
10+45	0.6547	1.09	Q	V				
10+50	0.6623	1.10	Q	V				
10+55	0.6699	1.11	Q	V				
11+ 0	0.6776	1.12	Q	V				
11+ 5	0.6854	1.13	Q	V				
11+10	0.6933	1.14	Q	V				
11+15	0.7012	1.15	Q	V				
11+20	0.7092	1.16	Q	V				
11+25	0.7173	1.18	Q	V				
11+30	0.7255	1.19	Q	V				
11+35	0.7338	1.20	Q	V				
11+40	0.7422	1.22	Q	V				
11+45	0.7506	1.23	Q	V				
11+50	0.7592	1.24	Q	V				
11+55	0.7679	1.26	Q	V				
12+ 0	0.7766	1.27	Q	V				
12+ 5	0.7855	1.28	Q	V				
12+10	0.7942	1.27	Q	V				
12+15	0.8028	1.25	Q	V				
12+20	0.8114	1.25	Q	V				
12+25	0.8201	1.26	Q	V				
12+30	0.8288	1.27	Q	V				
12+35	0.8377	1.28	Q	V				
12+40	0.8466	1.30	Q	V				
12+45	0.8556	1.31	Q	V				
12+50	0.8648	1.33	Q	V				
12+55	0.8741	1.35	Q	V				
13+ 0	0.8836	1.37	Q	V				
13+ 5	0.8932	1.40	Q	V				
13+10	0.9030	1.42	Q	V				
13+15	0.9129	1.44	Q	V				
13+20	0.9230	1.47	Q	V				
13+25	0.9334	1.50	Q	V				
13+30	0.9439	1.53	Q	V				
13+35	0.9546	1.56	Q	V				
13+40	0.9655	1.59	Q	V				
13+45	0.9767	1.62	Q	V				
13+50	0.9881	1.66	Q	V				

13+55	0.9998	1.69	Q		V				
14+ 0	1.0117	1.73	Q		V				
14+ 5	1.0240	1.78	Q		V				
14+10	1.0365	1.82	Q		V				
14+15	1.0494	1.87	Q		V				
14+20	1.0626	1.92	Q		V				
14+25	1.0763	1.98	Q		V				
14+30	1.0903	2.04	Q		V				
14+35	1.1048	2.10	Q		V				
14+40	1.1198	2.17	Q		V				
14+45	1.1353	2.25	Q		V				
14+50	1.1513	2.33	Q		V				
14+55	1.1680	2.42	Q		V				
15+ 0	1.1854	2.53	Q		V				
15+ 5	1.2036	2.64	Q		V				
15+10	1.2227	2.77	Q		V				
15+15	1.2427	2.91	Q		V				
15+20	1.2639	3.08	Q		V				
15+25	1.2863	3.25	Q		V				
15+30	1.3094	3.36	Q		V				
15+35	1.3333	3.46	Q		V				
15+40	1.3589	3.71	Q		V				
15+45	1.3870	4.09	Q		V				
15+50	1.4189	4.63	Q		V				
15+55	1.4568	5.51	Q		V				
16+ 0	1.5070	7.29	Q		V				
16+ 5	1.5930	12.48		Q	V				
16+10	1.7787	26.97				V	Q		
16+15	1.9906	30.76				V		Q	
16+20	2.1129	17.76			Q		V		
16+25	2.1968	12.18		Q			V		
16+30	2.2607	9.28		Q			V		
16+35	2.3129	7.59		Q			V		
16+40	2.3557	6.21		Q			V		
16+45	2.3924	5.33		Q			V		
16+50	2.4239	4.57		Q			V		
16+55	2.4513	3.98		Q			V		
17+ 0	2.4751	3.45		Q			V		
17+ 5	2.4958	3.00		Q			V		
17+10	2.5150	2.79		Q			V		
17+15	2.5331	2.63		Q			V		
17+20	2.5494	2.36		Q			V		
17+25	2.5642	2.15		Q			V		
17+30	2.5766	1.81	Q				V		
17+35	2.5884	1.71	Q				V		
17+40	2.5996	1.63	Q				V		
17+45	2.6103	1.56	Q				V		
17+50	2.6206	1.49	Q				V		
17+55	2.6305	1.44	Q				V		
18+ 0	2.6401	1.39	Q				V		
18+ 5	2.6493	1.35	Q				V		
18+10	2.6585	1.33	Q				V		
18+15	2.6677	1.33	Q				V		
18+20	2.6767	1.31	Q				V		
18+25	2.6856	1.29	Q				V		
18+30	2.6943	1.26	Q				V		
18+35	2.7028	1.24	Q				V		
18+40	2.7111	1.21	Q				V		
18+45	2.7193	1.19	Q				V		
18+50	2.7273	1.16	Q				V		
18+55	2.7352	1.14	Q				V		
19+ 0	2.7429	1.12	Q				V		
19+ 5	2.7504	1.10	Q				V		
19+10	2.7579	1.08	Q				V		

19+15	2.7652	1.06	Q	V
19+20	2.7723	1.04	Q	V
19+25	2.7794	1.02	Q	V
19+30	2.7864	1.01	Q	V
19+35	2.7932	0.99	Q	V
19+40	2.7999	0.98	Q	V
19+45	2.8065	0.96	Q	V
19+50	2.8130	0.95	Q	V
19+55	2.8195	0.93	Q	V
20+ 0	2.8258	0.92	Q	V
20+ 5	2.8321	0.91	Q	V
20+10	2.8382	0.89	Q	V
20+15	2.8443	0.88	Q	V
20+20	2.8503	0.87	Q	V
20+25	2.8562	0.86	Q	V
20+30	2.8621	0.85	Q	V
20+35	2.8678	0.84	Q	V
20+40	2.8736	0.83	Q	V
20+45	2.8792	0.82	Q	V
20+50	2.8848	0.81	Q	V
20+55	2.8903	0.80	Q	V
21+ 0	2.8957	0.79	Q	V
21+ 5	2.9011	0.78	Q	V
21+10	2.9065	0.77	Q	V
21+15	2.9117	0.77	Q	V
21+20	2.9170	0.76	Q	V
21+25	2.9221	0.75	Q	V
21+30	2.9272	0.74	Q	V
21+35	2.9323	0.74	Q	V
21+40	2.9373	0.73	Q	V
21+45	2.9423	0.72	Q	V
21+50	2.9472	0.71	Q	V
21+55	2.9521	0.71	Q	V
22+ 0	2.9569	0.70	Q	V
22+ 5	2.9617	0.70	Q	V
22+10	2.9665	0.69	Q	V
22+15	2.9712	0.68	Q	V
22+20	2.9758	0.68	Q	V
22+25	2.9804	0.67	Q	V
22+30	2.9850	0.67	Q	V
22+35	2.9896	0.66	Q	V
22+40	2.9941	0.65	Q	V
22+45	2.9986	0.65	Q	V
22+50	3.0030	0.64	Q	V
22+55	3.0074	0.64	Q	V
23+ 0	3.0118	0.63	Q	V
23+ 5	3.0161	0.63	Q	V
23+10	3.0204	0.62	Q	V
23+15	3.0247	0.62	Q	V
23+20	3.0289	0.62	Q	V
23+25	3.0331	0.61	Q	V
23+30	3.0373	0.61	Q	V
23+35	3.0414	0.60	Q	V
23+40	3.0456	0.60	Q	V
23+45	3.0496	0.59	Q	V
23+50	3.0537	0.59	Q	V
23+55	3.0577	0.59	Q	V
24+ 0	3.0617	0.58	Q	V

APPENDIX D

BMP DEVICES AND DETAILS

BASIN STAGING ANALYSIS

2022-260 Watson High Desert Logistics - West, Basin Calculations

Basin 1 Staging (A6 to A9)

Elevation	Depth (Ft)	Surface Area (SF)	Volume Engineered Soil (CF)	Above Ground Volume (CF)	Total Volume (Ac-Ft)	Outflow (cfs)	NOTES
3002	0	35,851	50,192	0	0.000	0.000	
3003	1	38,444	50,192	37,148	0.853	0.000	
3004	2	41,096	50,192	76,917	1.766	0.000	
3005	3	43,810	50,192	119,371	2.740	0.000	
3006	4	46,584	50,192	164,568	3.778	0.000	
3006.5	4.50	48,001	50,192	188,568	4.329	0.000	
3006.75	4.75	48,710	50,192	200,569	4.604	0.000	Estimated 100 yr Water Surface Elevation (WSE)
3007	5	49,419	50,192	212,569	4.880	0.000	
3008	6	52,721	50,192	263,639	6.052	0.000	
3009	7	56,704	50,192	318,351	7.308	0.000	
3010	8						
3,007.00	4.75	100-Yr WSE (ft)					V ₁₀₀ = 133,368
	3.25	Freeboard (ft)					V _{EFFECTIVE} = 200,768
							V _{OPEN} = 67,401

Basin 2 Staging (A5 and A10)

Elevation	Depth (Ft)	Surface Area (SF)	Volume Engineered Soil (CF)	Above Ground Volume (CF)	Total Volume (Ac-Ft)	Outflow (cfs)	NOTES
3002	0	18,093	25,330	0	0.000	0.000	
3003	1	19,716	25,330	18,905			
3004	2	21,398	25,330	39,462	0.906	0.000	
3005	3	23,138	25,330	61,730	1.417	0.000	
3006	4	24,936	25,330	85,767	1.969	0.000	
3006.5	4.5	25,865	25,330	98,700	2.266	0.000	Estimated 100 yr Water Surface Elevation (WSE)
3006.75	4.75	26,329	25,330	105,166	2.414	0.000	
3007	5	26,793	25,330	111,632	2.563	0.000	
3008	6						
3,007.00	4.50	100-Yr WSE (ft)					V ₁₀₀ = 100,462
	1.50	Freeboard (ft)					V _{EFFECTIVE} = 101,320
							V _{OPEN} = 858

Underground Chamber (A1 to A4)

Basin ID	Model	Dimensions	Surface Area	Volume
UG1	CMP (72")	481' x 69'	34,293	161,656
			V ₁₀₀ =	227,009
			V _{EFFECTIVE} =	161,656
			V _{LEFTOVER} =	65,353
*leftover volume to utilize Basin 1 V _{OPEN} *				

Drawdown Calculations (48 hrs) for 100 Yr Storm

Infiltration Rates (Field)	1.7, 2.0, 4.7	in/hr	48 hr Drawdown
Infiltration Rate AVG	2.8		
FS	2		
Design Infiltration Rate	1.4	in/hr	ft/hr
	0.1167		
48 Hr Drawdown / Area	5.6	ft	

Basin ID	Model	Surface Area	Infiltration Capacity (48 Hrs), (cf)
AG1	-	35,851	200,768
AG2	-	18,093	101,320
UG1	CMP	34,293	192,041
Provided	-	88,237	494,129
Required*	-	82,293	460,839
*Required Surface Area calculated by dividing 100yr storm volume by drawdown (ft)			

UNDERGROUND INFILTRATION CHAMBER (CMP)



Date: 12/1/2023
 Project Name: Full Retention Chamber - 22342 (12-1-2023 19-0-38)

CMP: Underground Detention System Storage Volume Estimation

City / County:
 State:

Designed By:
 Company:
 Telephone:

=Adjustable Input Cells

Contech Engineered Solutions, LLC is pleased to offer the following estimate of storage volume for the above named project. The results are submitted as an estimate only, without liability on the part of Contech Engineered Solutions, LLC for accuracy or suitability to any particular application and are subject to verification of the Engineer of Record. **This tool is only applicable for rectangular shaped systems.**

Summary of Inputs

System Information		Backfill Information		Pipe & Analysis Information	
Out-to-out length (ft):	481.0	Backfill Porosity (%):	40%	System Diameter (in):	72
Out-to-out width (ft):	69.0	Depth Above Pipe (in):	6.0	Pipe Spacing (in):	36
Number of Manifolds (ea):	1.0	Depth Below Pipe (in):	6.0	Incremental Analysis (in):	2
Number of Barrels (ea):	8.0	Width At Ends (ft):	1.0	System Invert (Elevation):	6000
		Width At Sides (ft):	1.0		

Storage Volume Estimation

System		Pipe		Stone		Total System		Miscellaneous	
Depth (ft)	Elevation (ft)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Incremental Storage (cf)	Cumulative Storage (cf)	Percent Open Storage (%)	Ave. Surface Area (sf)
0.00	6000.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	13,717.2
0.17	6000.16	0.0	0.0	2,286.2	2,286.2	2,286.2	2,286.2	0.0%	13,717.2
0.33	6000.33	0.0	0.0	2,286.2	4,572.4	2,286.2	4,572.4	0.0%	13,717.2
0.50	6000.50	0.0	0.0	2,286.2	6,858.6	2,286.2	6,858.6	0.0%	13,717.2
0.67	6000.66	852.6	852.6	1,945.2	8,803.8	2,797.7	9,656.3	8.8%	18,295.1
0.83	6000.83	1,538.3	2,390.9	1,670.9	10,474.6	3,209.2	12,865.5	18.6%	20,098.1
1.00	6001.00	1,963.3	4,354.1	1,500.9	11,975.5	3,464.2	16,329.7	26.7%	21,416.4
1.17	6001.16	2,290.1	6,644.2	1,370.2	13,345.7	3,660.2	19,989.9	33.2%	22,471.7
1.33	6001.33	2,557.4	9,201.6	1,263.2	14,609.0	3,820.6	23,810.5	38.6%	23,350.9
1.50	6001.50	2,782.6	11,984.2	1,173.2	15,782.1	3,955.8	27,766.3	43.2%	24,098.8
1.67	6001.66	2,975.3	14,959.5	1,096.1	16,878.2	4,071.4	31,837.7	47.0%	24,742.2
1.83	6001.83	3,141.6	18,101.1	1,029.6	17,907.8	4,171.2	36,008.8	50.3%	25,298.4
2.00	6002.00	3,285.4	21,386.5	972.0	18,879.8	4,257.5	40,266.3	53.1%	25,779.5
2.17	6002.16	3,409.7	24,796.2	922.3	19,802.1	4,332.0	44,598.3	55.6%	26,194.4
2.33	6002.33	3,516.5	28,312.7	879.6	20,681.7	4,396.1	48,994.4	57.8%	26,549.2
2.50	6002.50	3,607.3	31,920.1	843.3	21,525.0	4,450.6	53,445.0	59.7%	26,849.0
2.67	6002.66	3,683.4	35,603.4	812.8	22,337.8	4,496.2	57,941.3	61.4%	27,097.5
2.83	6002.83	3,745.6	39,349.0	788.0	23,125.8	4,533.6	62,474.8	63.0%	27,297.3
3.00	6003.00	3,794.6	43,143.7	768.3	23,894.1	4,563.0	67,037.8	64.4%	27,450.8
3.17	6003.16	3,831.0	46,974.7	753.8	24,647.9	4,584.8	71,622.6	65.6%	27,559.4
3.33	6003.33	3,855.0	50,829.7	744.2	25,392.1	4,599.2	76,221.8	66.7%	27,624.1
3.50	6003.50	3,867.0	54,696.7	739.4	26,131.5	4,606.4	80,828.2	67.7%	27,645.6
3.67	6003.66	3,867.0	58,563.7	739.4	26,870.9	4,606.4	85,434.6	68.5%	27,624.1
3.83	6003.83	3,855.0	62,418.7	744.2	27,615.1	4,599.2	90,033.8	69.3%	27,559.4
4.00	6004.00	3,831.0	66,249.7	753.8	28,368.9	4,584.8	94,618.6	70.0%	27,450.8
4.17	6004.16	3,794.6	70,044.4	768.3	29,137.3	4,563.0	99,181.6	70.6%	27,297.3
4.33	6004.33	3,745.6	73,790.0	788.0	29,925.2	4,533.6	103,715.2	71.1%	27,097.5
4.50	6004.50	3,683.4	77,473.3	812.8	30,738.1	4,496.2	108,211.4	71.6%	26,849.0
4.67	6004.66	3,607.3	81,080.7	843.3	31,581.3	4,450.6	112,662.0	72.0%	26,549.2
4.83	6004.83	3,516.5	84,597.1	879.6	32,460.9	4,396.1	117,058.1	72.3%	26,194.4
5.00	6005.00	3,409.7	88,006.9	922.3	33,383.3	4,332.0	121,390.1	72.5%	25,779.5
5.17	6005.16	3,285.4	91,292.3	972.0	34,355.3	4,257.5	125,647.6	72.7%	25,298.4
5.33	6005.33	3,141.6	94,433.9	1,029.6	35,384.8	4,171.2	129,818.7	72.7%	24,742.2
5.50	6005.50	2,975.3	97,409.2	1,096.1	36,480.9	4,071.4	133,890.1	72.8%	24,098.8
5.67	6005.66	2,782.6	100,191.8	1,173.2	37,654.1	3,955.8	137,845.9	72.7%	23,350.9
5.83	6005.83	2,557.4	102,749.2	1,263.2	38,917.3	3,820.6	141,666.5	72.5%	22,471.7
6.00	6006.00	2,290.1	105,039.3	1,370.2	40,287.5	3,660.2	145,326.8	72.3%	21,416.4
6.17	6006.16	1,963.3	107,002.5	1,500.9	41,788.4	3,464.2	148,790.9	71.9%	20,098.1

These results are submitted to you as a guideline only, without liability on the part of CONTECH Engineered Solutions, LLC for accuracy or suitability to any particular application, and are subject to your verification.

6.33	6006.33	1,538.3	108,540.8	1,670.9	43,459.3	3,209.2	152,000.1	71.4%	18,295.1
6.50	6006.50	852.6	109,393.4	1,945.2	45,404.4	2,797.7	154,797.8	70.7%	13,717.2
6.67	6006.66	0.0	109,393.4	2,286.2	47,690.6	2,286.2	157,084.0	69.6%	13,717.2
6.83	6006.83	0.0	109,393.4	2,286.2	49,976.8	2,286.2	159,370.2	68.6%	13,717.2
7.00	6007.00	0.0	109,393.4	2,286.2	52,263.0	2,286.2	161,656.4	67.7%	13,717.2

These results are submitted to you as a guideline only, without liability on the part of CONTECH Engineered Solutions, LLC for accuracy or suitability to any particular application, and are subject to your verification.

PROJECT SUMMARY

CALCULATION DETAILS

- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 3,869 LF

STORAGE SUMMARY

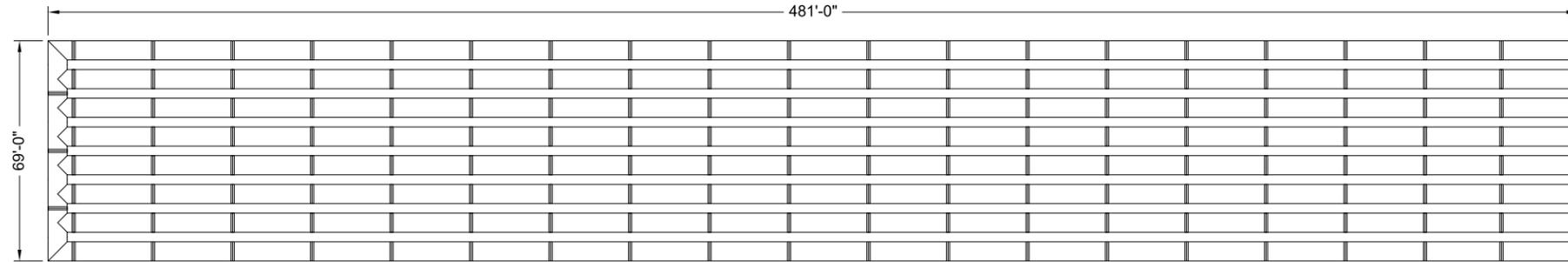
- STORAGE VOLUME REQUIRED = 161,500 CF
- PIPE STORAGE VOLUME = 109,393 CF
- BACKFILL STORAGE VOLUME = 52,263 CF
- TOTAL STORAGE PROVIDED = 161,656 CF

PIPE DETAILS

- DIAMETER = 72"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 36"

BACKFILL DETAILS

- WIDTH AT ENDS = 12"
- ABOVE PIPE = 6"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 6"



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE 2²/₃" x 1¹/₂" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
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ASSEMBLY
SCALE: 1" = 50'

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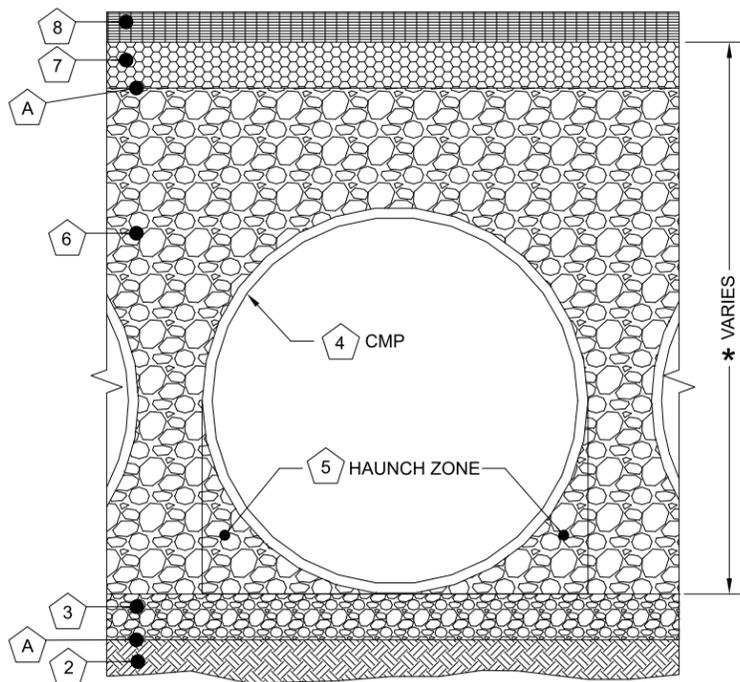
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DATE	REVISION DESCRIPTION	BY

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
CMP DETENTION SYSTEMS
CONTECH
DYODS
DRAWING

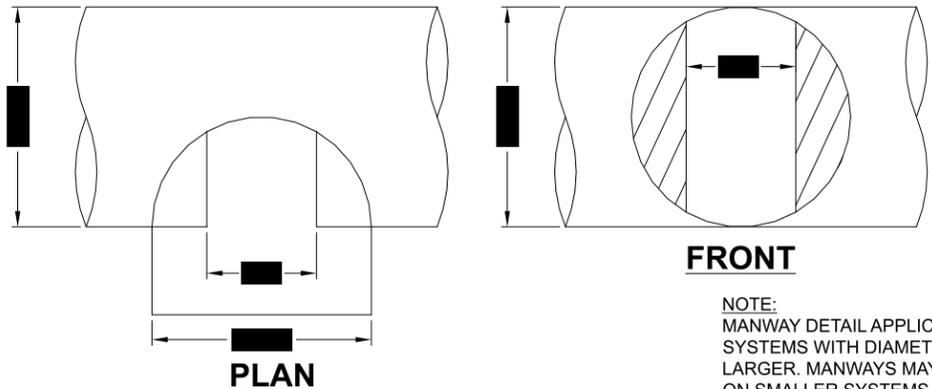
DY022342 2022-260 Watson High Desert Logistics West (Apple Valley 45)
Full Retention Chamber
Apple Valley, CA
DETENTION SYSTEM

PROJECT No.: 14675	SEQ. No.: 22342	DATE: 12/1/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.:		1



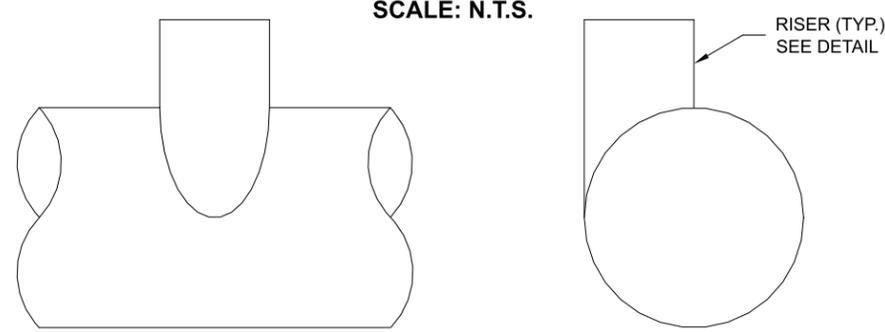
Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)		
7	Road Base (if applicable)		
A	Geotextile Layer	Non-Woven Geotextile CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6	Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of 1/2" - 2 1/2" diameter is recommended. AASHTO M 145-A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3" AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A	Geotextile Layer	None	Contech does not recommend geotextiles be placed under the invert of infiltration systems due to the propensity for geotextiles to clog over time.

* Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.



TYPICAL MANWAY DETAIL

NOTE: MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



TYPICAL RISER DETAIL

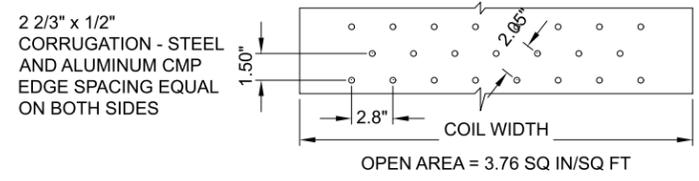
NOTE: LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.

- 1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.
- 2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.
- 5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

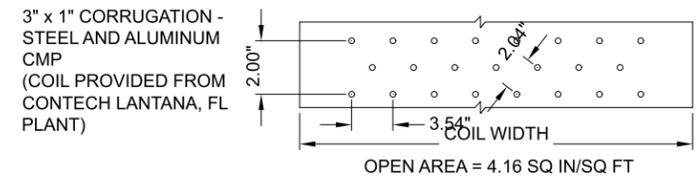
BACKFILL
MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

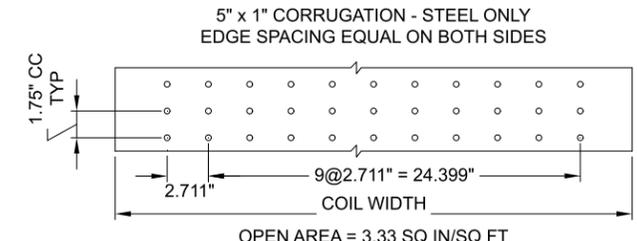
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.



OPEN AREA = 3.76 SQ IN/SQ FT



OPEN AREA = 4.16 SQ IN/SQ FT

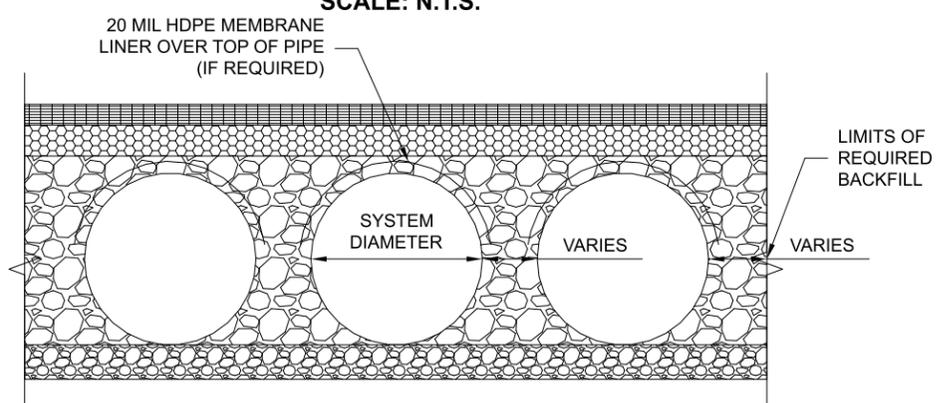


OPEN AREA = 3.33 SQ IN/SQ FT

- NOTES:
- PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
 - PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
 - ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
 - ALL HOLES \varnothing 3/8".

TYPICAL PERFORATION DETAIL

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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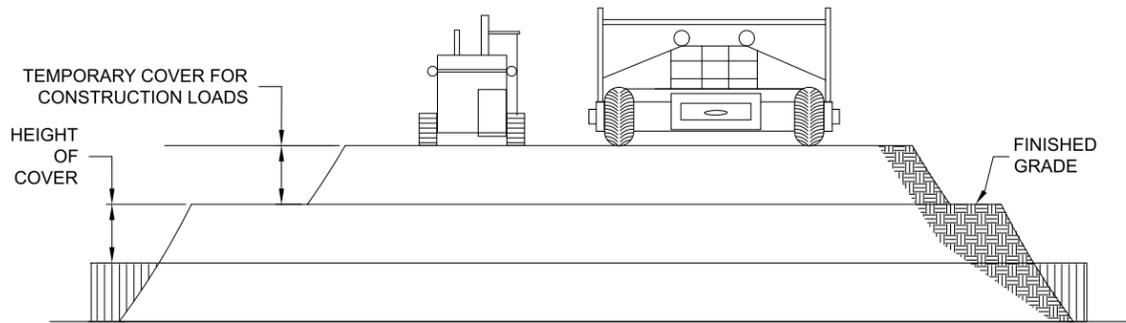
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CMP DETENTION SYSTEMS
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DRAWING

DYO22342 2022-260 Watson High Desert Logistics West (Apple Valley 45)
Full Retention Chamber
Apple Valley, CA
DETENTION SYSTEM

PROJECT No.: 14675	SEQ. No.: 22342	DATE: 12/1/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.:		1



CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPE GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

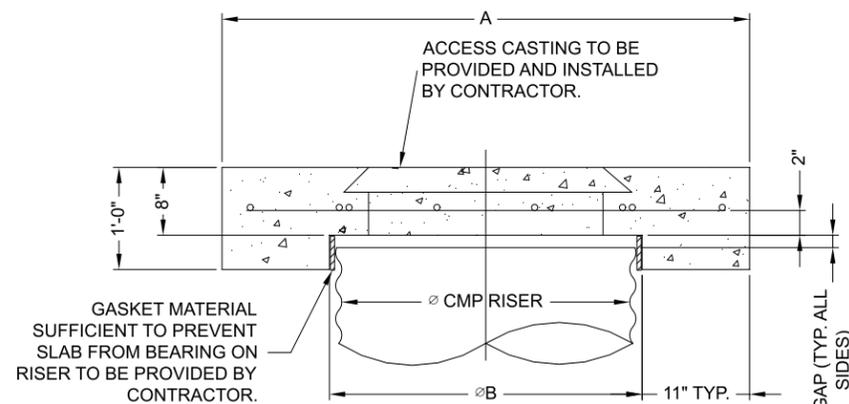
POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

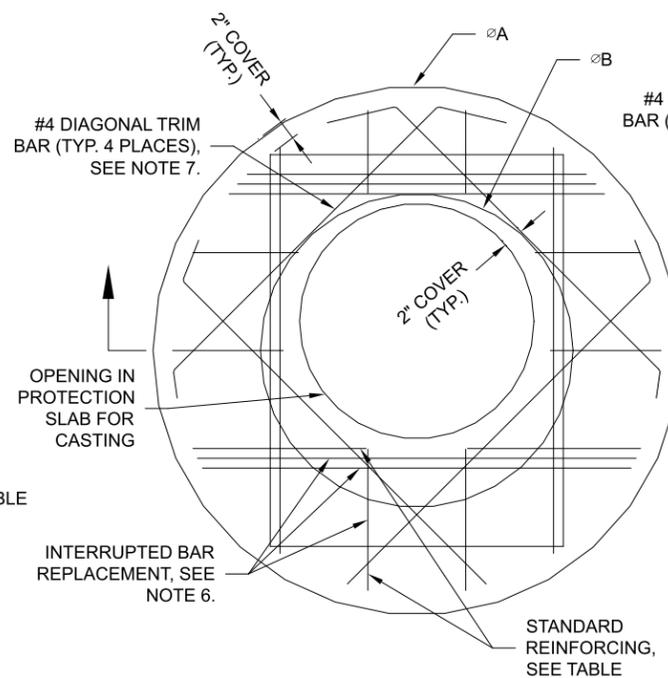
HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

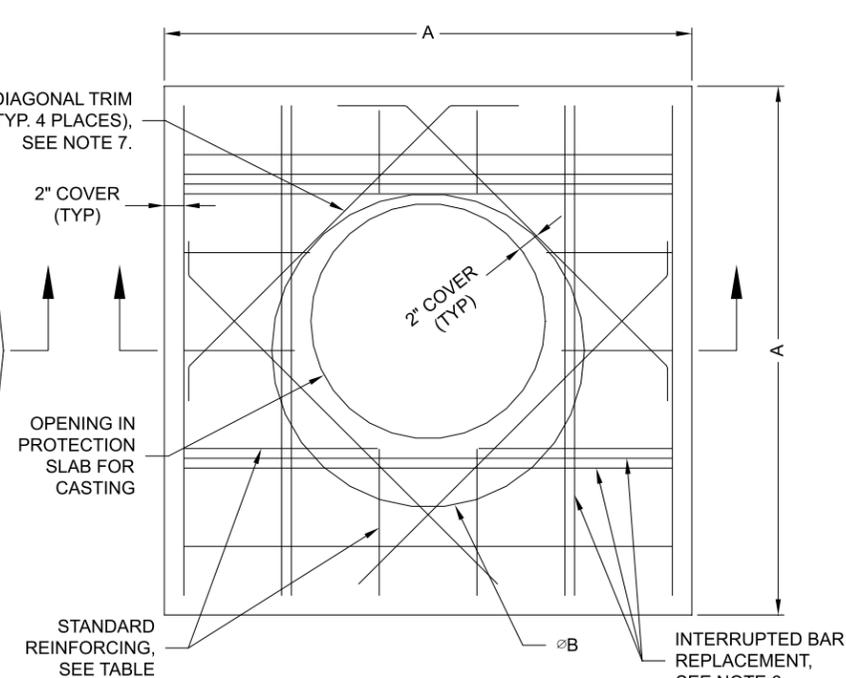
IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.



SECTION VIEW



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

- DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
- DESIGN LOAD HS25.
- EARTH COVER = 1' MAX.
- CONCRETE STRENGTH = 3,500 psi
- REINFORCING STEEL = ASTM A615, GRADE 60.
- PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
- TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
- PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
- DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

REINFORCING TABLE				
Ø CMP RISER	A	Ø B	REINFORCING	**BEARING PRESSURE (PSF)
24"	Ø 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	Ø 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	Ø 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	Ø 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	Ø 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY

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DY022342 2022-260 Watson High Desert Logistics West (Apple Valley 45)
Full Retention Chamber
Apple Valley, CA
DETENTION SYSTEM

PROJECT No.: 14675	SEQ. No.: 22342	DATE: 12/1/2023
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SHEET NO.:		1

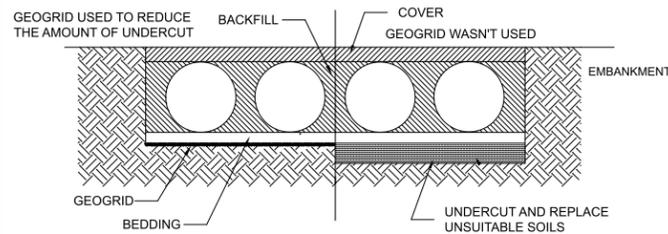
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

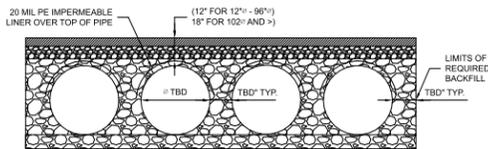


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

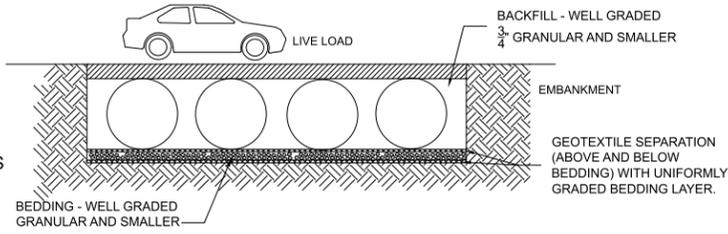
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

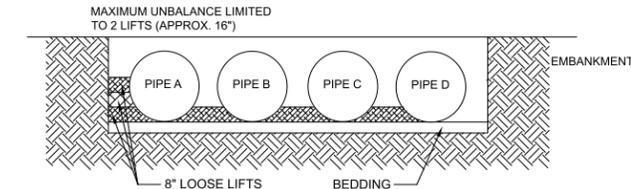
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



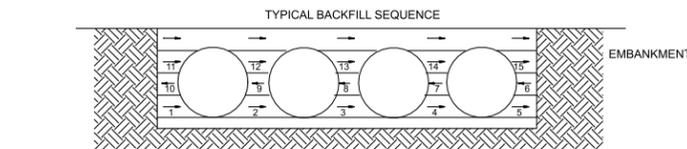
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

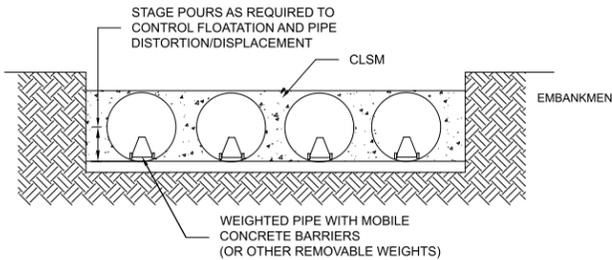


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10- FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

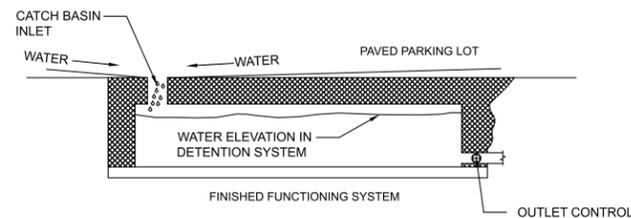


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
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DYODS
DRAWING

DY022342 2022-260 Watson High Desert Logistics West (Apple Valley 45)
Full Retention Chamber
Apple Valley, CA
DETENTION SYSTEM

PROJECT No.: 14675	SEQ. No.: 22342	DATE: 12/1/2023
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.:		1

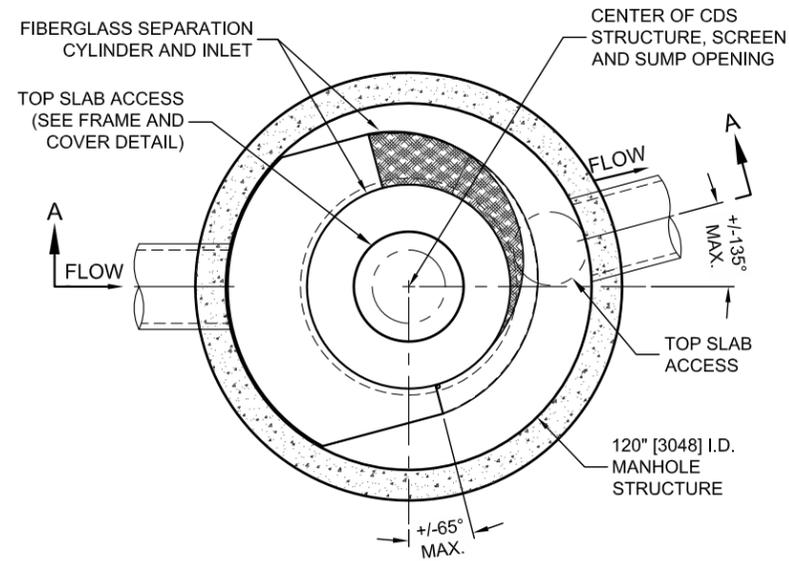
CDS HYDRODYNAMIC SEPARATOR

CDS5653-10-C DESIGN NOTES

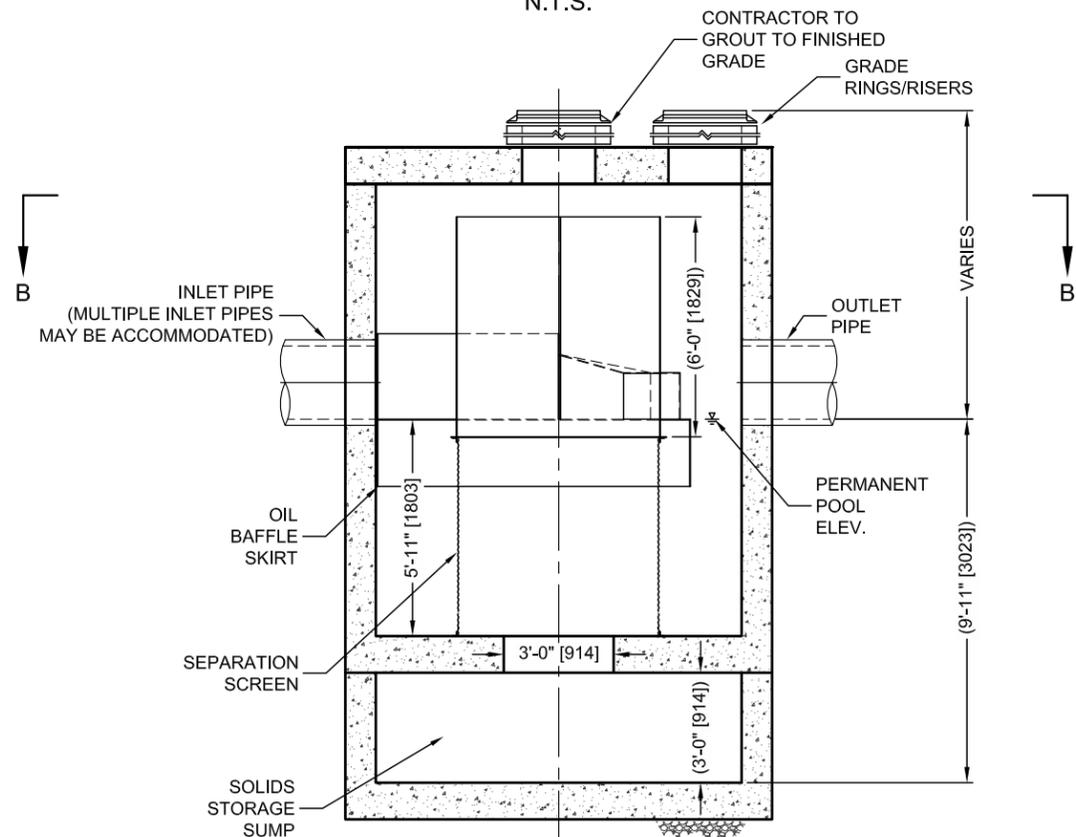
THE STANDARD CDS5653-10-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION

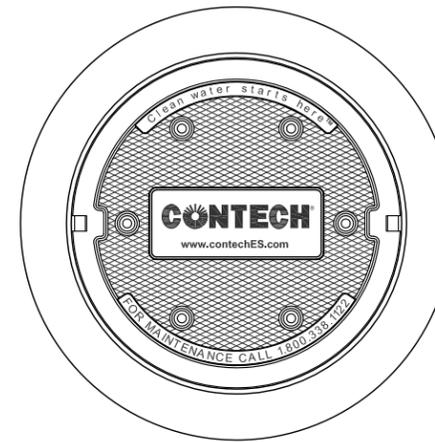
- GRATED INLET ONLY (NO INLET PIPE)
- GRATED INLET WITH INLET PIPE OR PIPES
- CURB INLET ONLY (NO INLET PIPE)
- CURB INLET WITH INLET PIPE OR PIPES
- SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
- SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID				
WATER QUALITY FLOW RATE (CFS OR L/s)				*
PEAK FLOW RATE (CFS OR L/s)				*
RETURN PERIOD OF PEAK FLOW (YRS)				*
SCREEN APERTURE (2400 OR 4700)				*
PIPE DATA:	I.E.	MATERIAL	DIAMETER	
INLET PIPE 1	*	*	*	
INLET PIPE 2	*	*	*	
OUTLET PIPE	*	*	*	
RIM ELEVATION				*
ANTI-FLOTATION BALLAST	WIDTH	HEIGHT		
	*	*		
NOTES/SPECIAL REQUIREMENTS:				
* PER ENGINEER OF RECORD				

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET HS20 (AASHTO M 306) AND BE CAST WITH THE CONTECH LOGO.
6. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES

- A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
- C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
- D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
- E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH
ENGINEERED SOLUTIONS LLC

www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS5653-10-C
INLINE CDS
STANDARD DETAIL



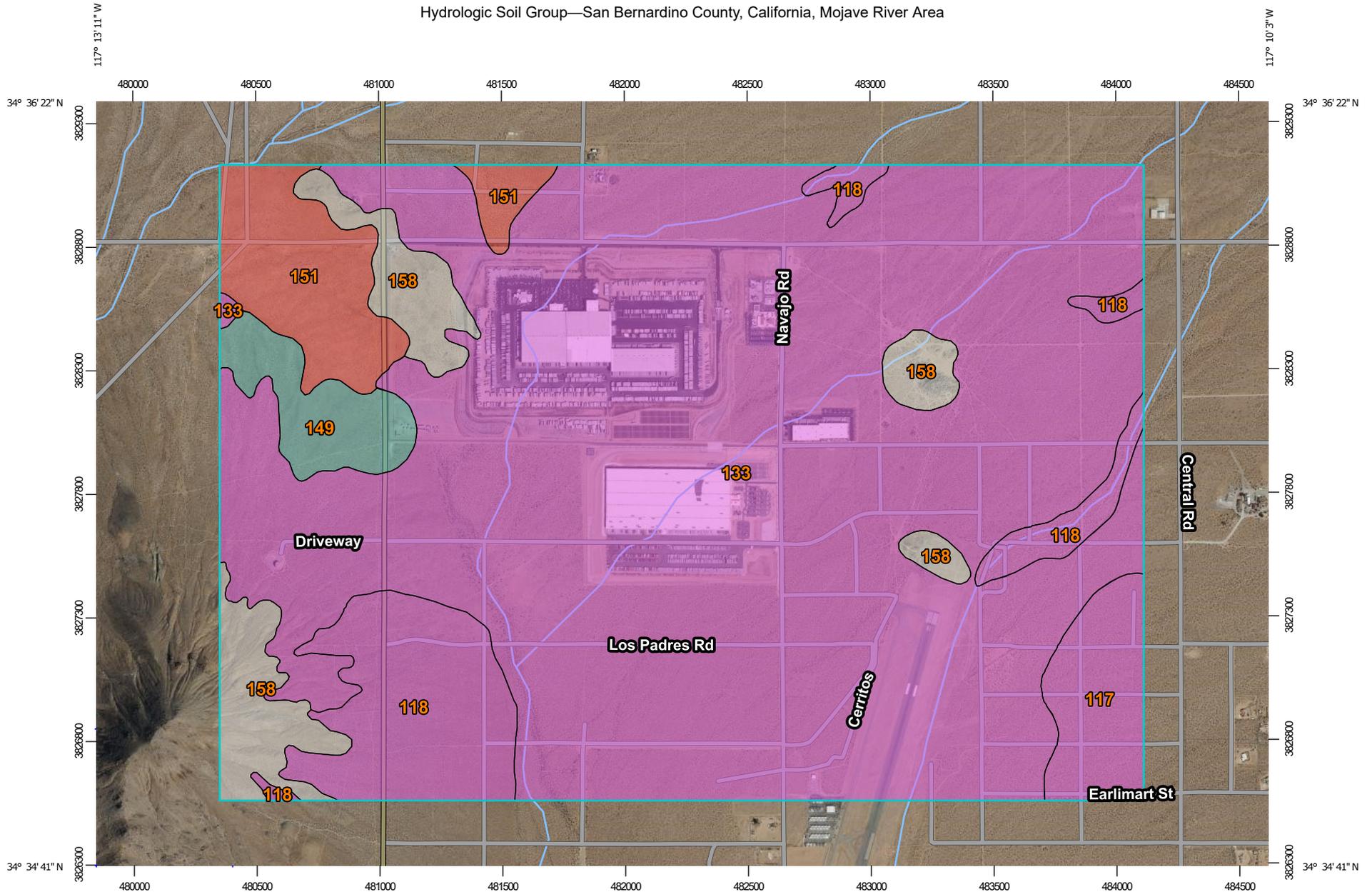
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 6,788,848; 6,841,722; 6,911,585; 6,981,762; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

APPENDIX E

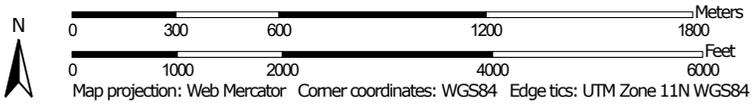
SUPPORTING DOCUMENTS

SOILS MAP

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



Map Scale: 1:21,800 if printed on A landscape (11" x 8.5") sheet.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

-  A
-  A/D
-  B
-  B/D

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

Water Features

 Streams and Canals

Transportation

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

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: San Bernardino County, California, Mojave River Area
 Survey Area Data: Version 14, Sep 1, 2022

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
117	CAJON LOAMY SAND, LOAMY SUBSTRATUM, 0 TO 2 PERCENT SLOPES	A	77.5	3.2%
118	CAJON-ARIZO COMPLEX, 2 TO 15 PERCENT SLOPES*	A	191.7	8.0%
133	HELENDALE-BRYMAN LOAMY SANDS, 2 TO 5 PERCENT SLOPES*	A	1,804.3	75.2%
149	MIRAGE-JOSHUA COMPLEX, 2 TO 5 PERCENT SLOPES*	C	63.7	2.7%
151	NEBONA-CUDEDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*	D	125.9	5.2%
158	ROCK OUTCROP- LITHIC TORRIORTHENTS COMPLEX, 15 TO 50 PERCENT SLOPES*		137.6	5.7%
Totals for Area of Interest			2,400.9	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOAA ATLAS 14 DATA



NOAA Atlas 14, Volume 6, Version 2
Location name: Apple Valley, California, USA*
Latitude: 34.5875°, Longitude: -117.1936°
Elevation: 3023.21 ft**



* source: ESRI Maps
 ** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

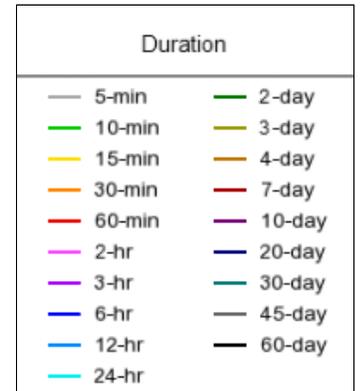
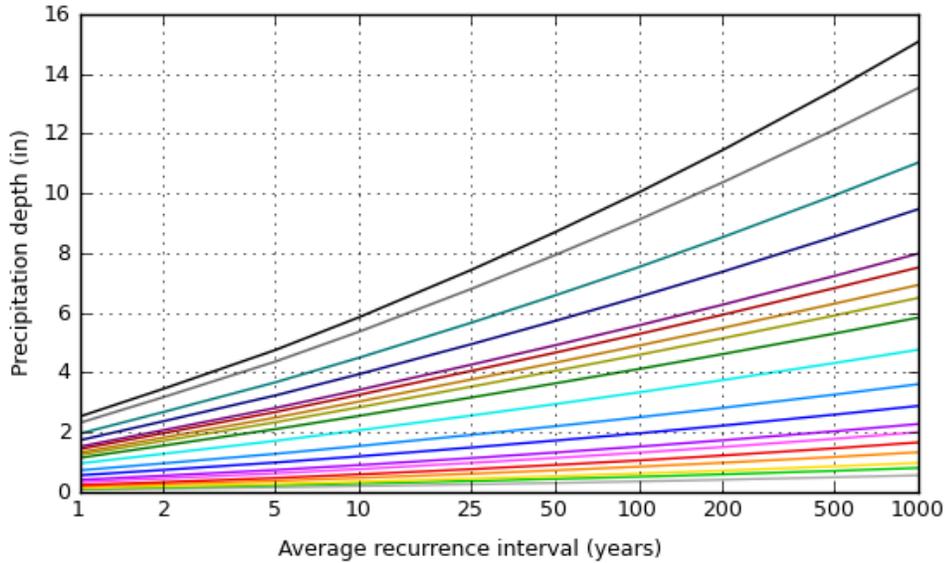
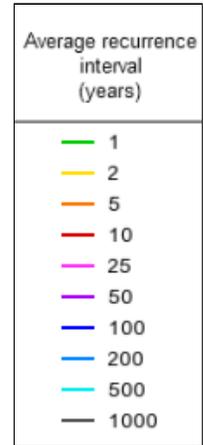
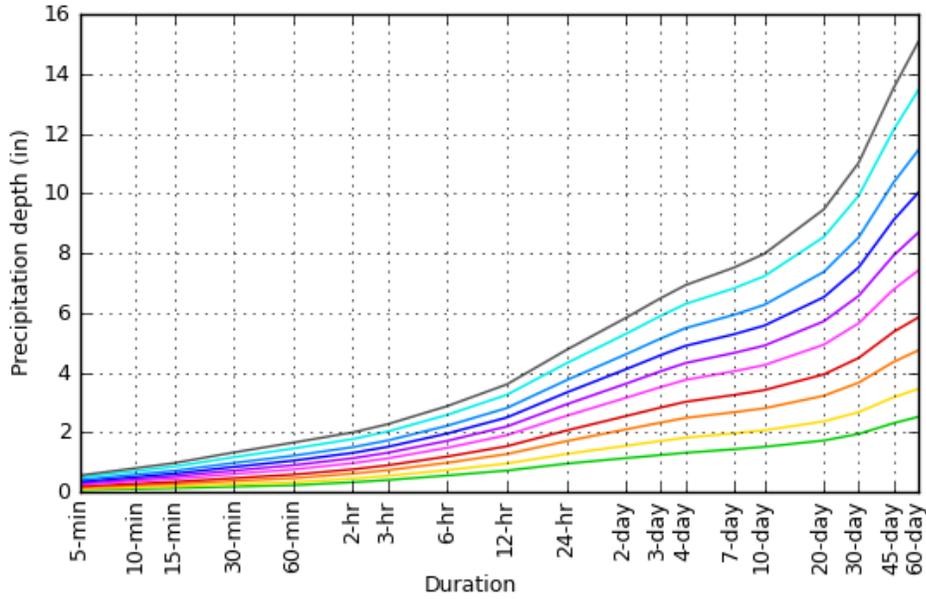
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.081 (0.066-0.099)	0.114 (0.094-0.140)	0.161 (0.132-0.198)	0.202 (0.164-0.250)	0.260 (0.205-0.334)	0.308 (0.238-0.404)	0.360 (0.271-0.483)	0.416 (0.305-0.574)	0.498 (0.350-0.714)	0.565 (0.384-0.839)
10-min	0.116 (0.095-0.142)	0.164 (0.135-0.201)	0.231 (0.189-0.284)	0.289 (0.235-0.358)	0.373 (0.294-0.478)	0.442 (0.341-0.578)	0.516 (0.389-0.692)	0.597 (0.438-0.822)	0.713 (0.502-1.02)	0.810 (0.551-1.20)
15-min	0.140 (0.115-0.171)	0.198 (0.163-0.243)	0.279 (0.229-0.344)	0.349 (0.285-0.433)	0.451 (0.356-0.578)	0.535 (0.413-0.700)	0.624 (0.471-0.837)	0.722 (0.529-0.994)	0.863 (0.607-1.24)	0.979 (0.666-1.45)
30-min	0.190 (0.157-0.233)	0.270 (0.222-0.331)	0.380 (0.312-0.468)	0.476 (0.388-0.591)	0.615 (0.485-0.788)	0.729 (0.563-0.953)	0.851 (0.641-1.14)	0.984 (0.721-1.36)	1.18 (0.828-1.69)	1.34 (0.908-1.98)
60-min	0.238 (0.196-0.291)	0.336 (0.277-0.413)	0.474 (0.389-0.584)	0.594 (0.483-0.737)	0.767 (0.604-0.983)	0.909 (0.701-1.19)	1.06 (0.800-1.42)	1.23 (0.900-1.69)	1.47 (1.03-2.10)	1.66 (1.13-2.47)
2-hr	0.339 (0.279-0.415)	0.459 (0.378-0.564)	0.627 (0.515-0.771)	0.770 (0.627-0.955)	0.976 (0.769-1.25)	1.14 (0.882-1.50)	1.32 (0.995-1.77)	1.51 (1.11-2.08)	1.78 (1.25-2.56)	2.01 (1.37-2.98)
3-hr	0.412 (0.339-0.505)	0.551 (0.453-0.676)	0.742 (0.609-0.913)	0.905 (0.737-1.12)	1.14 (0.896-1.46)	1.32 (1.02-1.73)	1.52 (1.15-2.04)	1.74 (1.27-2.39)	2.04 (1.43-2.92)	2.28 (1.55-3.38)
6-hr	0.564 (0.464-0.691)	0.744 (0.613-0.913)	0.990 (0.813-1.22)	1.20 (0.975-1.49)	1.49 (1.17-1.91)	1.72 (1.33-2.25)	1.97 (1.48-2.64)	2.23 (1.63-3.07)	2.59 (1.83-3.72)	2.89 (1.96-4.28)
12-hr	0.729 (0.600-0.893)	0.964 (0.793-1.18)	1.28 (1.05-1.58)	1.54 (1.26-1.92)	1.91 (1.51-2.45)	2.20 (1.70-2.88)	2.50 (1.89-3.36)	2.82 (2.07-3.89)	3.26 (2.30-4.68)	3.61 (2.46-5.36)
24-hr	0.960 (0.852-1.11)	1.28 (1.14-1.48)	1.71 (1.51-1.98)	2.07 (1.81-2.41)	2.56 (2.17-3.08)	2.94 (2.44-3.62)	3.34 (2.70-4.20)	3.75 (2.95-4.86)	4.32 (3.26-5.83)	4.76 (3.48-6.66)
2-day	1.15 (1.02-1.32)	1.56 (1.38-1.80)	2.11 (1.86-2.43)	2.55 (2.24-2.97)	3.16 (2.68-3.81)	3.63 (3.02-4.47)	4.12 (3.34-5.19)	4.62 (3.64-5.98)	5.30 (4.01-7.16)	5.84 (4.26-8.15)
3-day	1.25 (1.11-1.44)	1.72 (1.52-1.98)	2.34 (2.06-2.70)	2.84 (2.49-3.31)	3.52 (2.99-4.24)	4.05 (3.36-4.98)	4.59 (3.72-5.78)	5.15 (4.06-6.67)	5.91 (4.46-7.97)	6.50 (4.75-9.08)
4-day	1.32 (1.17-1.52)	1.83 (1.62-2.11)	2.49 (2.20-2.88)	3.03 (2.65-3.53)	3.76 (3.19-4.53)	4.33 (3.59-5.32)	4.90 (3.97-6.17)	5.49 (4.33-7.12)	6.30 (4.76-8.51)	6.93 (5.06-9.68)
7-day	1.44 (1.28-1.66)	1.97 (1.75-2.27)	2.68 (2.37-3.09)	3.26 (2.85-3.79)	4.05 (3.43-4.87)	4.66 (3.87-5.73)	5.29 (4.28-6.66)	5.94 (4.68-7.69)	6.82 (5.16-9.21)	7.52 (5.49-10.5)
10-day	1.52 (1.35-1.75)	2.08 (1.84-2.39)	2.81 (2.49-3.25)	3.42 (3.00-3.98)	4.26 (3.61-5.13)	4.91 (4.08-6.03)	5.58 (4.52-7.02)	6.27 (4.94-8.12)	7.23 (5.46-9.76)	7.98 (5.83-11.1)
20-day	1.73 (1.54-2.00)	2.37 (2.10-2.73)	3.23 (2.86-3.73)	3.95 (3.46-4.60)	4.94 (4.19-5.95)	5.72 (4.75-7.03)	6.53 (5.29-8.22)	7.38 (5.81-9.55)	8.54 (6.46-11.5)	9.47 (6.92-13.2)
30-day	1.96 (1.73-2.25)	2.68 (2.38-3.09)	3.67 (3.24-4.24)	4.50 (3.94-5.24)	5.66 (4.80-6.81)	6.57 (5.46-8.08)	7.53 (6.10-9.48)	8.53 (6.72-11.0)	9.92 (7.50-13.4)	11.0 (8.05-15.4)
45-day	2.31 (2.05-2.66)	3.18 (2.82-3.66)	4.36 (3.86-5.04)	5.37 (4.70-6.25)	6.79 (5.75-8.17)	7.92 (6.58-9.74)	9.11 (7.38-11.5)	10.4 (8.17-13.4)	12.1 (9.16-16.4)	13.5 (9.88-18.9)
60-day	2.53 (2.24-2.91)	3.46 (3.06-3.98)	4.75 (4.20-5.49)	5.85 (5.13-6.81)	7.42 (6.29-8.93)	8.69 (7.21-10.7)	10.0 (8.12-12.6)	11.4 (9.02-14.8)	13.5 (10.2-18.2)	15.1 (11.0-21.0)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

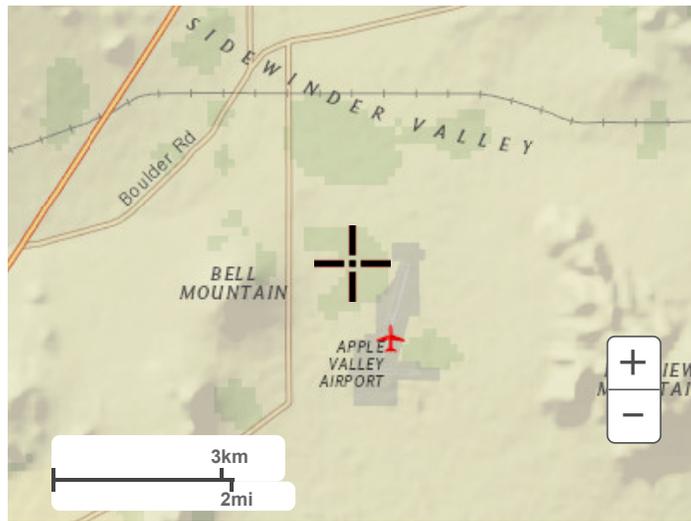
PDS-based depth-duration-frequency (DDF) curves
 Latitude: 34.5875°, Longitude: -117.1936°



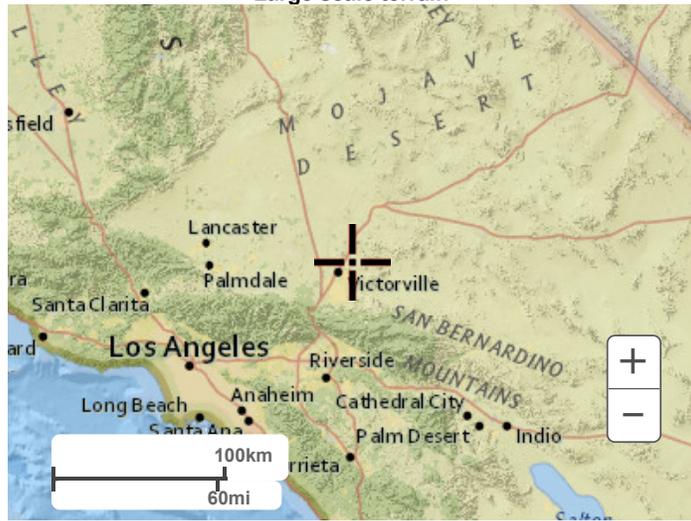
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Maps & arials

Small scale terrain



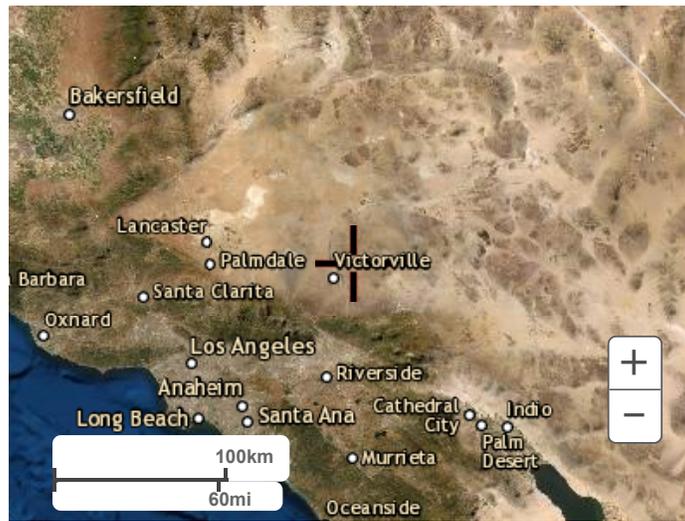
Large scale terrain



Large scale map



Large scale aerial



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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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APPENDIX F

INFILTRATION REPORT

July 1, 2022

Watson Land Development
22010 Wilmington Avenue
Carson, California 90745



**SOUTHERN
CALIFORNIA
GEOTECHNICAL**
A California Corporation

Attention: Mr. Craig B. Halverson
Executive Vice President

Project No.: **22G197-1**

Subject: **Results of Infiltration Testing**
Proposed Industrial Building
NWC Los Padres Road and Navajo Road
Apple Valley, California

Mr. Halverson:

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 general accordance with our Proposal No. 22P244, dated May 24, 2022. The scope of services included 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 in the Riverside County – Low Impact Development BMP Design Handbook – Section 2.3 of Appendix A, prepared for the Riverside County Department of Environmental Health (RCDEH), dated December, 2013. The San Bernardino County standards defer to the guidelines published by the RCDEH.

Site and Project Description

The subject site is located at the northwest corner of Los Padres Road and Navajo Road in Apple Valley, California. The site is bounded to the north by a Big Lots distribution building, to the west by a vacant lot, to the south by Los Padres Road, and to the east by Navajo Road. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site consists of several parcels, which total 45± acres in size. The site is presently vacant and undeveloped. The ground surface consists of exposed soil with sparse native weed and shrub growth.

Detailed topographic information was not available at the time of this report. Based on visual observations made at the time of the subsurface investigation, the overall site slopes to the southwest at a gradient of 1± percent.

Proposed Development

SCG was provided with a preliminary site plan. Based on this site plan, the site will be developed with one (1) industrial building, 1,048,000± ft² in size, located in the central area of the site. The building will be constructed with dock-high doors along the north and south building walls. The building will be surrounded by asphaltic concrete pavements in the automobile parking and drive areas, Portland cement concrete pavements in the truck court, and areas of concrete flatwork and landscape planters.

The proposed development is expected to include on-site stormwater infiltration. The size and type of infiltration system(s) was not known at the time of this report. Based on an exhibit provided by the client, we expected the bottom of the infiltration system(s) to be 12± feet below ground surface located in the western area of the site.

Subsurface Exploration

Scope of Exploration

The subsurface exploration conducted for the infiltration testing consisted of three (3) infiltration test borings, advanced to depths of 12± feet below the existing site grades. In addition to the infiltration testing, one (1) exploratory boring was extended to a depth of 25± feet below site grades to verify the underlying soil types and verify that groundwater was at a depth greater than 10± feet below the bottom of the proposed infiltration chamber system. The infiltration borings were advanced using a truck-mounted drilling rig, equipped with 8-inch-diameter hollow-stem augers and were logged during drilling by a member of our staff. The approximate locations of the infiltration test borings (identified as I-4 through I-6) and the exploratory boring (identified as B-2) 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 each boring location, extending to at least the maximum depth explored of 25± feet below ground surface. The alluvial soils generally consist of medium dense to very dense silty fine sands, silty fine to medium sands, clayey fine sands and clayey fine to medium sands. Occasional layers of hard fine sandy clay were encountered. The alluvial soils occasionally possess calcareous nodules and cementation.

Infiltration Testing

As previously mentioned, the infiltration testing was performed in general accordance with the guidelines published in Riverside County – Low Impact Development BMP Design Handbook – Section 2.3 of Appendix A, which apply to San Bernardino County.

Pre-soaking

In accordance with the county infiltration standards for sandy soils, all infiltration test borings were pre-soaked 2 hours prior to the infiltration testing or until all of the water had percolated through the test holes. The pre-soaking process consisted of filling test borings by inverting a full 5-gallon bottle of clear water supported over each hole so that the water flow into the hole holds constant at a level at least 5 times the hole's radius above the gravel at the bottom of each hole. Pre-soaking was completed after all of the water had percolated through the test holes.

Infiltration Testing

Following the pre-soaking process of the infiltration test borings, SCG performed the infiltration testing. Each test hole was filled with water to a depth of at least 5 times the hole's radius above the gravel at the bottom of each test hole. In accordance with the Riverside County guidelines, in areas where "sandy soils" were encountered at the bottom of the infiltration test borings (where 6 inches of water infiltrated into the surrounding soils in less than 25 minutes for two (2) consecutive readings), readings were taken at 10-minute intervals for 1 hour at the test locations. The 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 from 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 as the design infiltration rate. The rates are summarized below:

<u>Infiltration Test No.</u>	<u>Depth (feet)</u>	<u>Soil Description</u>	<u>Infiltration Rate (inches/hour)</u>
I-4	12	Silty fine to medium Sand, little Clay, little to some coarse Sand	1.7
I-5	12	Silty fine to medium Sand, little Clay, little to some coarse Sand	2.0
I-6	12	Silty fine to medium Sand, trace Clay, little to some coarse Sand	4.7

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-3 of this report.

Design Recommendations

Three (3) infiltration tests were performed at the subject site. As noted above, the infiltration rates at these locations vary from 1.7 to 4.7 inches per hour. **Based on the results of the infiltration testing, we recommend the following infiltration rates for each test location:**

Infiltration Test	Depth (ft.)	Infiltration Rate (Inches per Hour)
I-4	12	1.7
I-5	12	2.0
I-6	12	4.7

The design of the storm water infiltration systems should be performed by the project civil engineer, in accordance with the City of Apple Valley and/or County of San Bernardino guidelines. It is recommended that the system 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 rates 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 rate.** It should be noted that the recommended infiltration rates are based on infiltration testing at three (3) discrete locations and that the overall infiltration rates of the proposed infiltration systems could vary considerably.

Infiltration Rate Considerations

The infiltration rates presented herein was determined in accordance with the San Bernardino County guidelines and are considered valid only for the time and place of the actual test. 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, grain size 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 system can significantly reduce the infiltration ability of the basins. 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 system. It should be confirmed that the soils at the base of the proposed infiltration systems correspond with those presented in this report to ensure that the performance of the systems will be consistent with the rates reported herein.

We recommend that scrapers and other rubber-tired heavy equipment not be operated on the basin 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 may 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,

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 system.

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.



Jamie Hayward
Staff Geologist

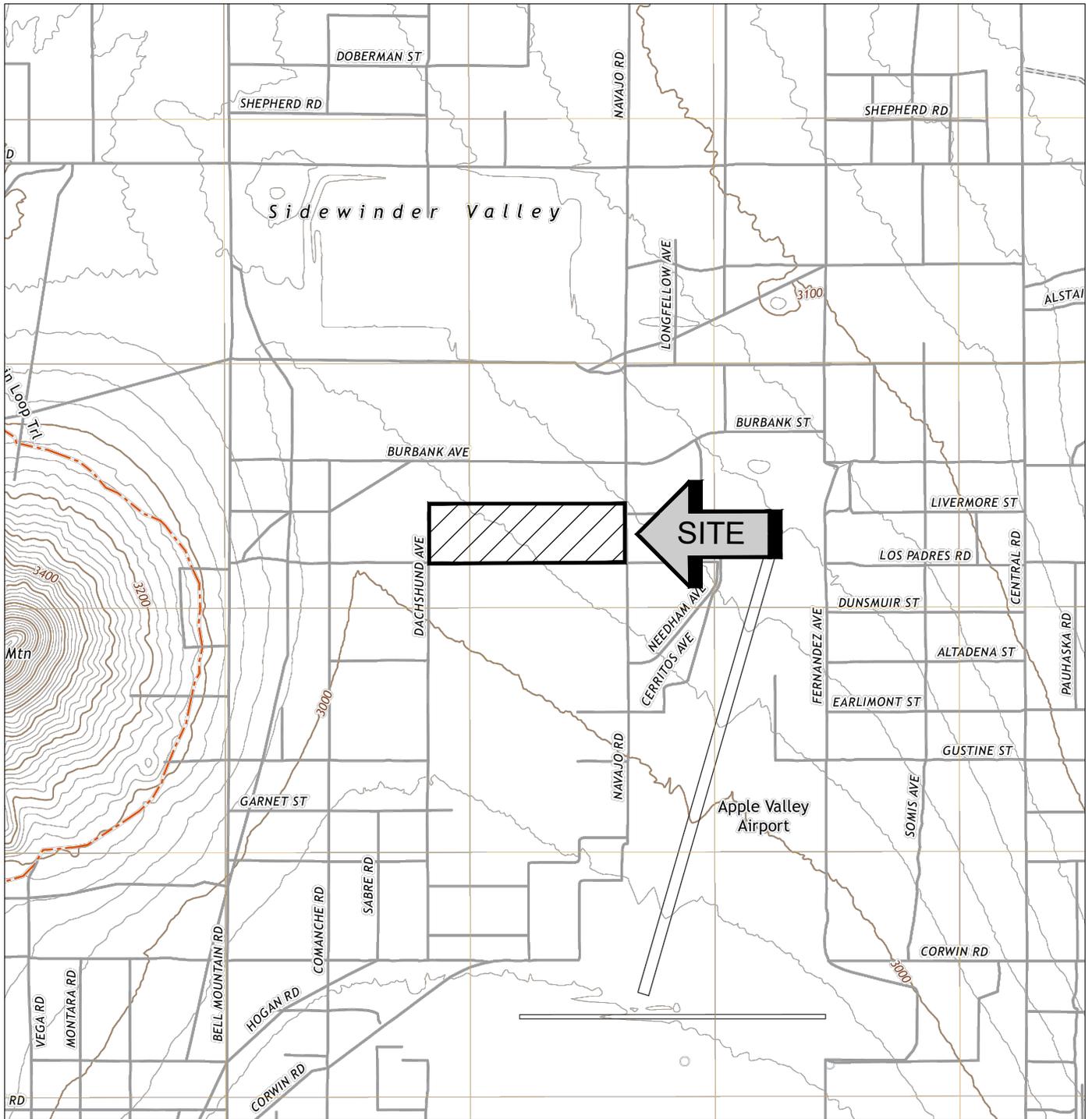


Robert G. Trazo, GE 2655
Principal Engineer



Distribution: (1) Addressee

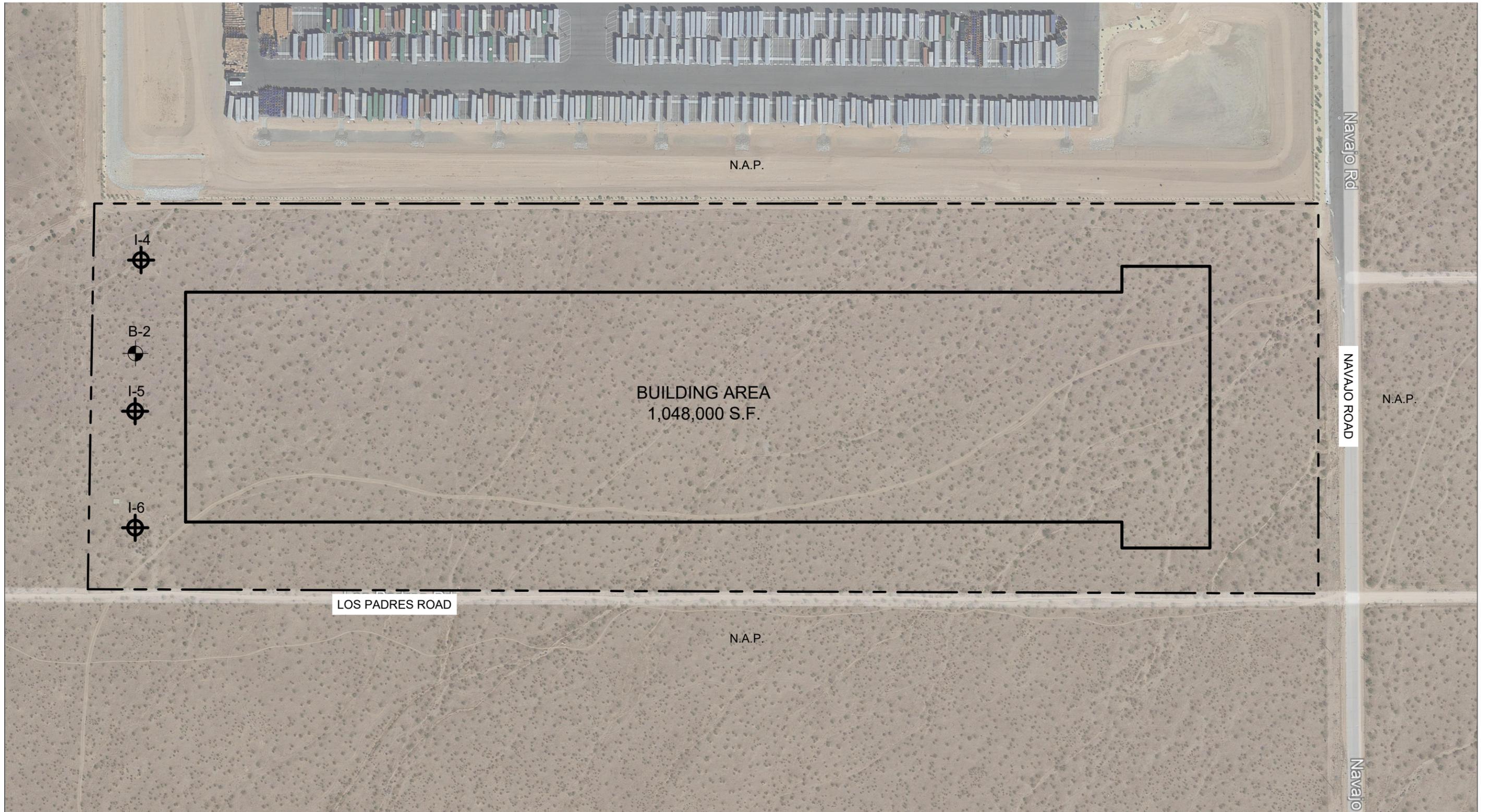
Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Boring Log Legend and Logs (6 pages)
Infiltration Test Results Spreadsheets (3 pages)
Grain Size Distribution Graphs (3 pages)



SOURCE: USGS TOPOGRAPHIC MAPS OF THE APPLE VALLEY QUADRANGLE, SAN BERNARDINO COUNTY, CALIFORNIA, 2022.



SITE LOCATION MAP	
PROPOSED INDUSTRIAL BUILDING	
APPLE VALLEY, CALIFORNIA	
SCALE: 1" = 2000'	
DRAWN: JAH	
CHKD: RGT	
SCG PROJECT 22G197-1	
PLATE 1	SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

-  APPROXIMATE INFILTRATION TEST LOCATION
-  APPROXIMATE BORING LOCATION

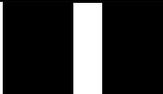
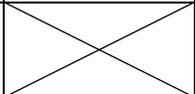
-  PROPERTY LINE
-  BUILDING OUTLINE



NOTE: CONCEPTUAL SITE PLAN PREPARED BY RGA ARCHITECTS.
AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH.

INFILTRATION TEST LOCATION PLAN	
PROPOSED INDUSTRIAL BUILDING	
APPLE VALLEY, CALIFORNIA	
SCALE: 1" = 200'	 SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: MD CHKD: RGT	
SCG PROJECT 22G197-1	
PLATE 2	

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/ft³.

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS



JOB NO.: 22G197-1	DRILLING DATE: 6/6/22	WATER DEPTH: Dry
PROJECT: Proposed Industrial Building	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: 19 feet
LOCATION: Apple Valley, California	LOGGED BY: Michelle Esparza	READING TAKEN: At Completion

FIELD RESULTS				DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)		GRAPHIC LOG	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	
SURFACE ELEVATION: --- MSL											
		13			ALLUVIUM: Light Brown Silty fine Sand, little medium to coarse Sand, trace Calcareous veins, trace fine root fibers, trace fine Gravel, medium dense-damp		2				
5		81/10"			Red Brown Clayey fine to medium Sand, trace fine Gravel, trace coarse Sand, little Silt, very dense-damp		3				
		84			Light Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, trace Clay, little Calcareous nodules and veining, very dense-damp		4				
10		74					4				
15		85/11"					5				
20		82/10"					4				
25		50/5"					4				
Boring Terminated at 25'											

TBL 22G197-1.GPJ_SOCALGEO.GDT 7/15/22



JOB NO.: 22G197-1	DRILLING DATE: 6/6/22	WATER DEPTH: Dry
PROJECT: Proposed Industrial Building	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: ---
LOCATION: Apple Valley, California	LOGGED BY: Michelle Esparza	READING TAKEN: At Completion

FIELD RESULTS				GRAPHIC LOG	DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
SURFACE ELEVATION: --- MSL												
5		68/11"	4.5	[Hatched Pattern]	ALLUVIUM: Light Red Brown Clayey fine Sand, little medium Sand, little Silt, little Calcareous nodules and veining, trace fine root fibers, moderately cemented, very dense-damp		3					
10		83/9"		[Dotted Pattern]	Light Brown Silty fine to medium Sand, little Clay, little to some coarse Sand, little Calcareous nodules and veining, very dense-damp		4					
		68		[Dotted Pattern]			6		34			
Boring Terminated at 12'												

TBL 22G197-1.GPJ_SOCALGEO.GDT 7/15/22



JOB NO.: 22G197-1	DRILLING DATE: 6/6/22	WATER DEPTH: Dry
PROJECT: Proposed Industrial Building	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: ---
LOCATION: Apple Valley, California	LOGGED BY: Michelle Esparza	READING TAKEN: At Completion

FIELD RESULTS				GRAPHIC LOG	DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
SURFACE ELEVATION: --- MSL												
5		26			ALLUVIUM Red Brown Silty fine Sand, trace medium Sand, medium dense-damp		3					
10		69	4.5		Light Brown fine Sandy Clay, little medium Sand, little Calcareous nodules and veining, hard-damp		4					
		75/9"	3.5		Light Red Brown Silty fine to medium Sand, little Clay, little to some coarse Sand, very dense-damp		5		24			
Boring Terminated at 12'												

TBL_22G197-1.GPJ_SOCALGEO.GDT 7/15/22



JOB NO.: 22G197-1	DRILLING DATE: 6/6/22	WATER DEPTH: Dry
PROJECT: Proposed Industrial Building	DRILLING METHOD: Hollow Stem Auger	CAVE DEPTH: ---
LOCATION: Apple Valley, California	LOGGED BY: Michelle Esparza	READING TAKEN: At Completion

FIELD RESULTS				GRAPHIC LOG	DESCRIPTION	LABORATORY RESULTS						COMMENTS
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	
SURFACE ELEVATION: --- MSL												
5		37			<u>ALLUVIUM</u> : Red Brown Clayey fine to medium Sand, trace coarse Sand, trace fine Gravel, little Silt, dense to very dense-damp		4					
10		80/10*			Brown Silty fine to medium Sand, trace Clay, little to some coarse Sand, very dense-damp		5					
		67					3		17			
Boring Terminated at 12'												

TBL_22G197-1.GPJ_SOCALGEO.GDT 7/15/22

INFILTRATION CALCULATIONS

Project Name	Proposed Industrial Building
Project Location	Apple Valley, California
Project Number	22G197-1
Engineer	Caleb Brackett

Test Hole Radius	4 (in)
Test Depth	11.90 (ft)

Infiltration Test Hole	I-4
------------------------	-----

Soil Criteria Test							
Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (in)	Did 6 inches of water seep away in less than 25 minutes?	Sandy Soils or Non-Sandy Soils?
1	Initial	8:00 AM	25.00	9.60	10.68	YES	SANDY SOILS
	Final	8:25 AM		10.49			
2	Initial	8:25 AM	25.00	9.60	9.00	YES	SANDY SOILS
	Final	8:50 AM		10.35			

Test Data							
Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	8:51 AM	10.00	9.60	0.23	2.19	1.17
	Final	9:01 AM		9.83			
2	Initial	9:01 AM	10.00	9.60	0.36	2.12	1.89
	Final	9:11 AM		9.96			
3	Initial	9:11 AM	10.00	9.60	0.21	2.20	1.07
	Final	9:21 AM		9.81			
4	Initial	9:21 AM	10.00	9.60	0.33	2.14	1.72
	Final	9:31 AM		9.93			
5	Initial	9:31 AM	10.00	9.60	0.33	2.14	1.72
	Final	9:41 AM		9.93			
6	Initial	9:41 AM	10.00	9.60	0.32	2.14	1.66
	Final	9:51 AM		9.92			

Per County Standards, Infiltration Rate calculated as follows:

Where:

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

Q = 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 Industrial Building
Project Location	Apple Valley, California
Project Number	22G197-1
Engineer	Caleb Brackett

Test Hole Radius	4 (in)
Test Depth	11.90 (ft)

Infiltration Test Hole I-5

Soil Criteria Test							
Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (in)	Did 6 inches of water seep away in less than 25 minutes?	Sandy Soils or Non-Sandy Soils?
1	Initial	8:14 AM	25.00	9.40	15.48	YES	SANDY SOILS
	Final	8:39 AM		10.69			
2	Initial	8:40 AM	25.00	9.40	8.52	YES	SANDY SOILS
	Final	9:05 AM		10.11			

Test Data							
Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	9:06 AM	10.00	9.40	0.41	2.30	2.00
	Final	9:16 AM		9.81			
2	Initial	9:17 AM	10.00	9.40	0.42	2.29	2.05
	Final	9:27 AM		9.82			
3	Initial	9:28 AM	10.00	9.40	0.42	2.29	2.05
	Final	9:38 AM		9.82			
4	Initial	9:38 AM	10.00	9.40	0.42	2.29	2.05
	Final	9:48 AM		9.82			
5	Initial	9:48 AM	10.00	9.40	0.41	2.30	2.00
	Final	9:58 AM		9.81			
6	Initial	9:58 AM	10.00	9.40	0.41	2.30	2.00
	Final	10:08 AM		9.81			

Per County Standards, Infiltration Rate calculated as follows:

Where:

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

- Q = 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 Industrial Building
Project Location	Apple Valley, California
Project Number	22G197-1
Engineer	Caleb Brackett

Test Hole Radius	4 (in)
Test Depth	12.30 (ft)

Infiltration Test Hole	I-6
------------------------	-----

Soil Criteria Test							
Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (in)	Did 6 inches of water seep away in less than 25 minutes?	Sandy Soils or Non-Sandy Soils?
1	Initial	10:05 AM	25.00	10.00	19.20	YES	SANDY SOILS
	Final	10:30 AM		11.60			
2	Initial	10:30 AM	25.00	10.00	27.60	YES	SANDY SOILS
	Final	10:55 AM		12.30			

Test Data							
Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)
1	Initial	11:00 AM	10.00	10.00	0.82	1.89	4.78
	Final	11:10 AM		10.82			
2	Initial	11:10 AM	10.00	10.00	0.82	1.89	4.78
	Final	11:20 AM		10.82			
3	Initial	11:20 AM	10.00	10.00	0.81	1.90	4.71
	Final	11:30 AM		10.81			
4	Initial	11:30 AM	10.00	10.00	0.81	1.90	4.71
	Final	11:40 AM		10.81			
5	Initial	11:40 AM	10.00	10.00	0.81	1.90	4.71
	Final	11:50 AM		10.81			
6	Initial	11:50 AM	10.00	10.00	0.80	1.90	4.65
	Final	12:00 PM		10.80			

6

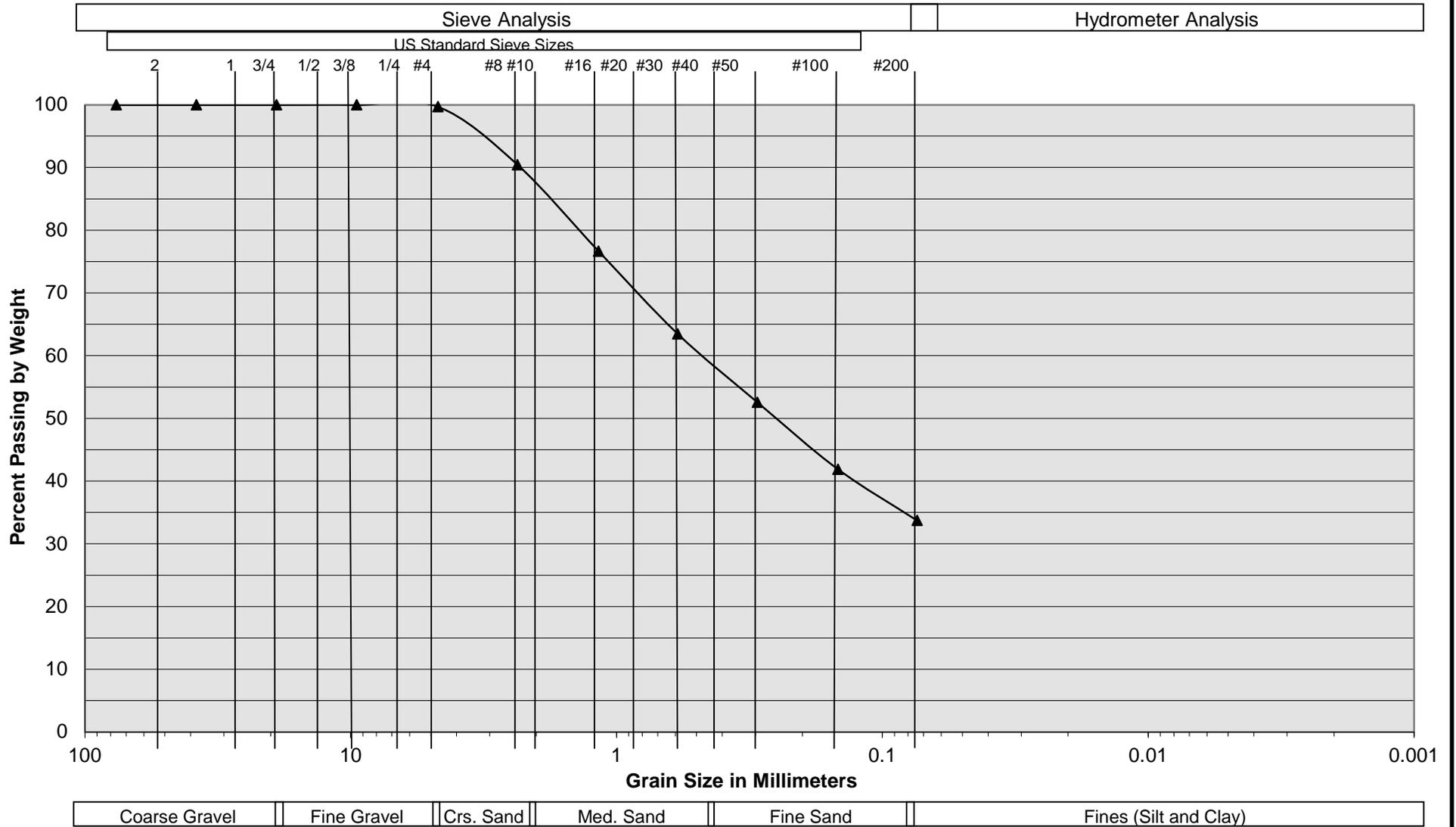
Per County Standards, Infiltration Rate calculated as follows:

Where:

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

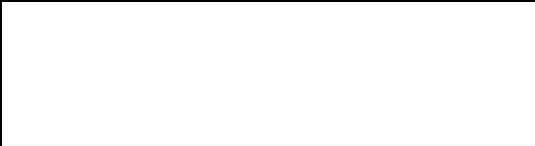
Q = Infiltration Rate (in inches per hour)
 ΔH = Change in Height (Water Level) over the time interval
 r = Test Hole (Borehole) Radius
 Δt = Time Interval
 H_{avg} = Average Head Height over the time interval

Grain Size Distribution



Sample Description	I-4 @ 10½ feet
Soil Classification	Silty fine to medium Sand, little Clay, little to some coarse Sand

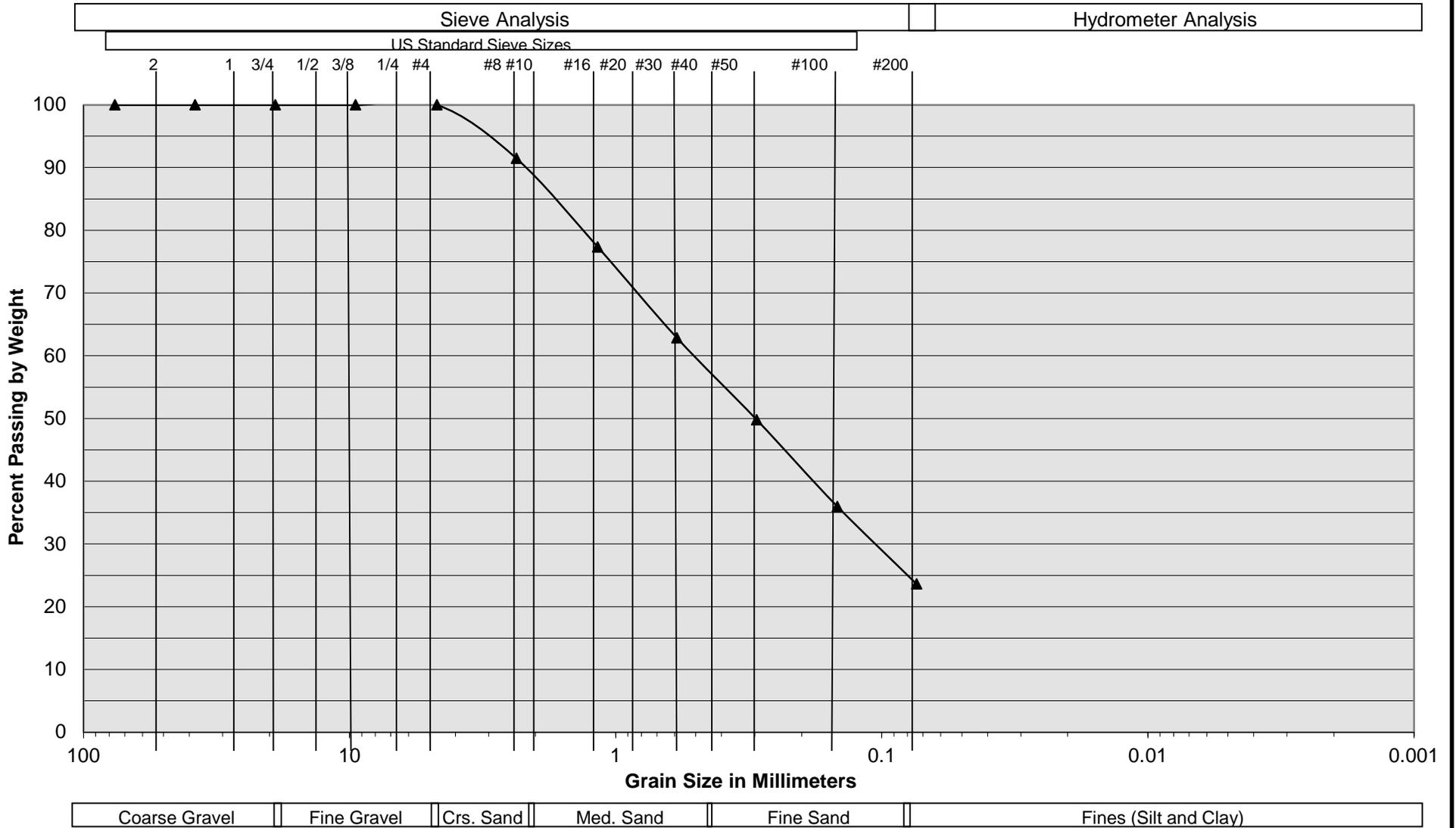
Proposed Industrial Building
 Apple Valley, CA
 Project No. 22G197-1
PLATE C- 1





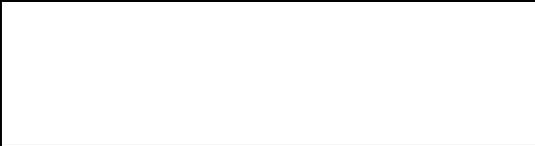
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-5 @ 10½ feet
Soil Classification	Silty fine to medium Sand, little Clay, little to some coarse Sand

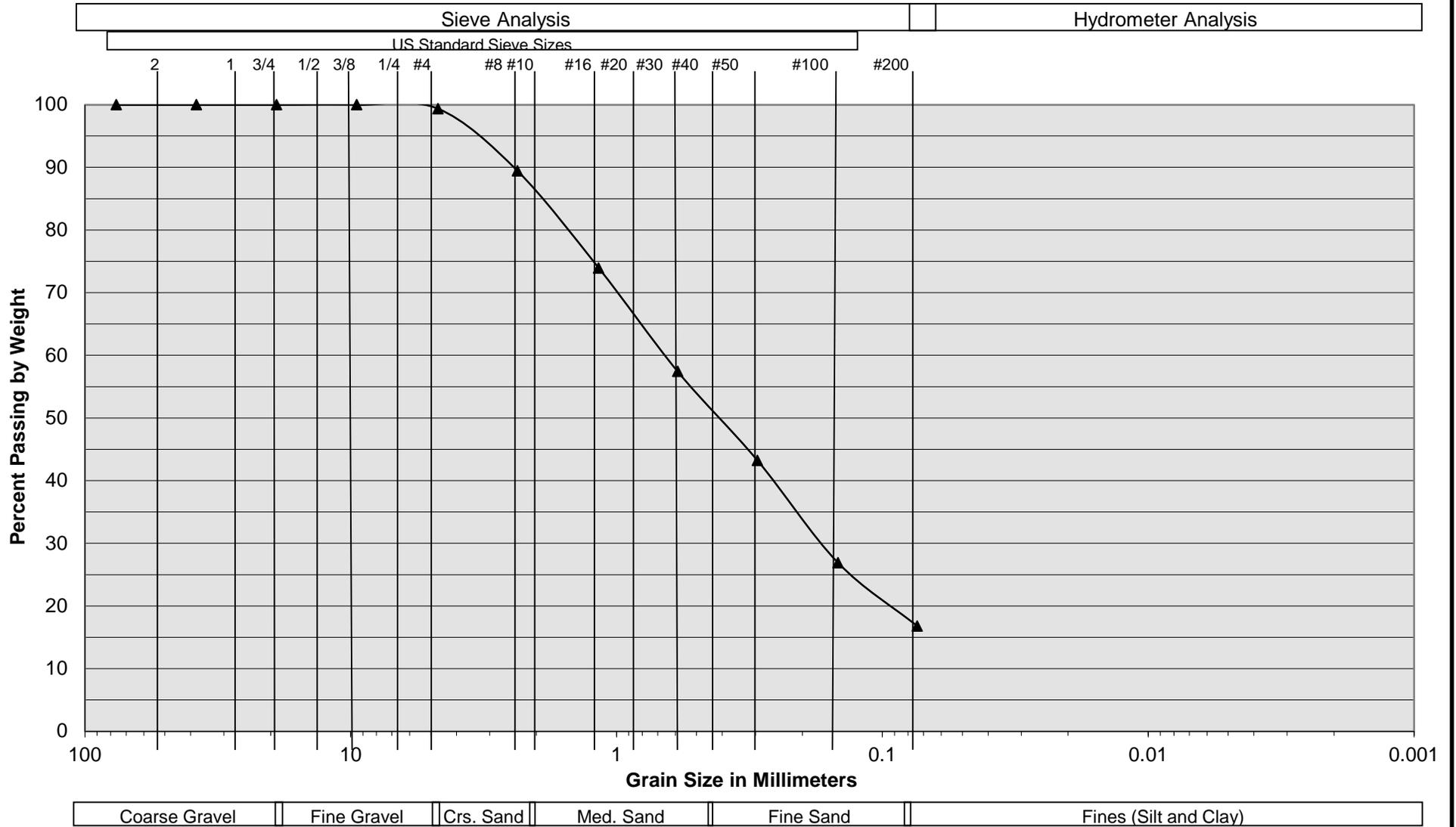
Proposed Industrial Building
 Apple Valley, CA
 Project No. 22G197-1
PLATE C-2





SOUTHERN CALIFORNIA GEOTECHNICAL
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Grain Size Distribution



Sample Description	I-6 @ 10½ feet
Soil Classification	Silty fine to medium Sand, trace Clay, little to some coarse Sand

Proposed Industrial Building
 Apple Valley, CA
 Project No. 22G197-1
PLATE C- 3



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