APPENDIX H1

PRELIMINARY DRAINAGE REPORT

Preliminary Drainage Report

Locust Gateway Logistics
Rialto, California

PPD#2023-0041

Prepared for:

Brookfield Properties

LOCUST GATEWAY LOGISTICS

Preliminary Drainage Report
PPD# 2023-0041

JUNE 17, 2025

Prepared By:

Kimley»Horn

This Preliminary Drainage Report has been prepared by Kimley-Horn and Associates, Inc. under the direct supervision of the following Registered Civil engineer. The undersigned attests to the technical data contained in this study, and to the qualifications of technical specialists providing engineering computations upon which the recommendations and conclusions are based.



Eugene D. Cowan III

Registered Civil Engineer

6/17/25
Date

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1 INTRODUCTION

1.1 PROJECT DESCRIPTION AND PURPOSE

This Drainage Report is provided in support of the grading permit submittal for the proposed Locust Gateway Logistics Project in Rialto, California.

The existing project site is approximately 39.91 acres and is located at the southwest corner of N Locust Avenue and W Lowell Street. One warehouse building with a total of ±664,859 square feet of building footprint is proposed. The project will also include sidewalk improvements along the project frontage, trailer, and vehicular parking, landscaping, below-ground detention basins, and six driveways (one on N. Locust Avenue, three on N Locust Avenue, and one on Lake Padden Lane).

The project site is currently undeveloped with a paved road that connects to N Locust Avenue and W Lowell Street. See **Figure 1-1** for the Project Location Map.

This drainage report includes the hydrologic analysis for the existing and proposed conditions, an analysis of the onsite underground/aboveground chambers used to detain peak flows and infiltrate the water quality design capture volume, and a hydraulic analysis of the onsite storm drain network.

Figure 1–1 Project Location Map



2 PROJECT SETTING

2.1 TOPOGRAPHY

The site existing topography is broken up into two areas. The northeast area generally drains from the northeast (elevation 1638.0) to the southeast (elevation 1616.3') with approximately 21.7' of fall across the site. The second area generally drains from the northwest (elevation 1642.9) to the southeast (elevation 1596.0) with approximately 46.9' of fall across the site. The drainage of the first area exists into N Locust Avenue where runoff is conveyed by curb and gutter, whereas the second area drains towards the existing two-foot channel between the project site and the existing Radial warehouse. Refer to the existing drainage exhibit located in **Appendix D** for more information.

2.2 PRECIPITATION

Precipitation values for the hydrologic analysis were determined from site specific precipitation frequency estimates published online in the NOAA Atlas 14. For this site (Rialto, California) the 100-year, 1-hour storm precipitation depth equal to 1.81 inches was used in both the storm water flow and volume calculations. The 100-year 6-hour and 100-year 24-hour depths equal to 4.82 inches and 9.20 inches respectively were used in the volume calculations. **Appendix A** contains the site-specific tabular output from NOAA Atlas 14.

2.3 WATERSHED DESCRIPTION

The regional topography generally slopes to the southeast. The project site is part of a larger drainage area tributary to the San Bernardino County Flood Control District Cactus Basin System. The Cactus Basin System is a network of five detention basins that are located between Cactus Avenue and Ayala Drive. Runoff from this project will eventually flow into Cactus Basin #3.

2.4 SOIL TYPES

The type of soil and soil conditions are major factors affecting infiltration and resultant storm water runoff. The Natural Resources Conservation Service (NRCS) has classified soils into four general hydrologic soil groups for comparing infiltration and runoff rates. The groups are based on properties that influence runoff, such as water infiltration rate, texture, natural discharge and moisture condition. The runoff potential is based on the amount of runoff at the end of a long duration storm that occurs after wetting and swelling of the soil not protected by vegetation.

Using the NRCS GIS soil data, this site was identified as predominately Soboba stony loamy sand (SpC). Correlating this soil type name to the hydrologic classifications per San Bernardino Hydrology Manual Page C-47 the soil is classified as Type A soil. Group A soils typically have low runoff potential with high infiltration rates when thoroughly wetted and consisting chiefly of deep, well-drained sands or gravels. **See Appendix B** for soil type classifications.

2.5 LAND USE

The project site is located within the City of Rialto's Airport Specific Plan and is designated as General Manufacturing land use I-GM, which includes uses for most intensive industrial uses.

2.6 GROUNDWATER

According to “Results of Infiltration Testing” report performed by Southern California Geotechnical (SoCalGeo), Inc., Project No. 23G146-2, dated June 26, 2023, groundwater was not encountered during infiltration testing. It was mentioned that the static groundwater table was considered to have existed at a depth in excess of ± 25 feet below existing grades. SoCalGeo, however, analyzed a recorded monitor well about ± 3,700 feet east-northeast of the site and resulted in a high groundwater level of ± 279 feet below the ground surface in June of 1993.

2.7 FEMA MAPPING

The project site is covered by Map Number 06071C7920H of the FEMA Flood Insurance Rate Map (FIRM) for San Bernardino County, California and Incorporated Areas. The City of Rialto, community number 060280, is included in this FIRM. None of the project area is within a FEMA–mapped special flood hazard area. The site is classified as Zone X, which is an area of minimal flooding. The effective FEMA map is dated August 28, 2008 and is provided in **Appendix C.**

3 SITE CONDITIONS

3.1 EXISTING SITE CONDITIONS

The site is located at the southwest corner of the intersection of N Locust Avenue and W Lowell Street. Based upon survey and field observation, the site is broken up into two drainage areas. The northeast area generally flows from the northeast to southeast and eventually into existing curb and gutter along N locust Avenue. The second area of the site primarily drains northwest to southeast towards the existing two-foot channel between the project site and the existing Radial warehouse. Refer to the existing drainage exhibit included in **Appendix D** for more information.

3.2 PROPOSED SITE CONDITIONS

Stormwater generated by the proposed development will be captured through a network of underground piping and conveyed to three on-site underground infiltration basins. The proposed basins will serve as both a water quality BMP as well as an underground storage facility to detain and mitigate the peak flow rate. The project proposes to overflow from the underground basin in the truck trailer parking lot by Locust Avenue will be routed to a concrete flume that would discharge to the southeast corner of the site on locust avenue. For all water quality calculations and documentation refer to the Preliminary Water Quality Management Plan. The site hydrologic basins were delineated based on the proposed grading. Refer to the Proposed Drainage Exhibit, included within **Appendix D**.

3.3 EXISTING OFFSITE CONDITIONS

The project site does not collect any offsite flows from neighboring properties. The northern property generally drains southeast and runoff that exists into the W Lowell right-of-way is collected into catch basins via curb and gutter with general street flows going from west to east towards N Locust Avenue. Stormwater that exists into Lake Padden Lane right-of-way, on the western side of the site, also gets collected via the existing curb and gutter with runoff flowing southerly and not into the site.

4 HYDROLOGIC ANALYSIS

4.1 METHODOLOGY

Runoff calculations were prepared using the Modified Rational Method and the methodology described in Section D of the San Bernardino County Hydrology Manual (August 1986). The CivilDesign (CivilD) software (San Bernardino module) was used to estimate time of concentrations and 100 & 2-year peak flow rates generated from the existing and proposed conditions (see **Appendix E** and **Appendix F**).

Unit hydrographs were prepared using the CivilD software (San Bernardino module) for pre and post 3-hr, 6-hr, and 24-hr storm events. 100 year 1-hr analysis was also requested but the CivilD software does not allow for 1hr storm analysis in the San Bernadino County Module, only for Riverside County. Thus 3-hr, 6-hr,and 24-hr storm events were prepared and were used to size proposed onsite storage facilities; by considering the most conservative value of the incremental increase of flood volume (existing vs proposed).

A stage-storage analysis in conjunction with the peak flow rates and volumes from CivilD was prepared for the purposes of sizing and analyzing the proposed underground basin characteristics. The stage-storage analysis and the hydrographs from CivilD were imported into PondPack to determine the 100-year mitigated flow rates, stored volumes and maximum water surface depths.

4.1.1 GEOMETRY

Drainage Basin Areas were delineated for the project site's existing and proposed drainage conditions. Existing elevations, slopes and flow paths were established from the topography available at the time of this drainage study. Proposed elevations, slopes and flow paths were based on the proposed site grading plan. These hydrologic parameters are shown for existing and proposed conditions on Hydrology Exhibits in **Appendix D**.

4.1.2 INTENSITY AND TIME OF CONCENTRATION

Rainfall depths were gathered from the NOAA Atlas 14 precipitation frequency table for the project site location. The existing conditions and proposed conditions time of concentrations were calculated within CivilD given the drainage areas characteristics. The time of concentration for proposed conditions with small drainage areas were assumed to be 5 minutes as a conservative approach which is a valid assumption given that the basins travel relatively short distances.

The time of concentration calculated from the Modified Rational Method was used to calculate the lag time necessary to develop the unit hydrographs within the CivilD software.

4.1.3 CURVE NUMBERS AND LOSS RATES

The Antecedent Moisture Condition (AMC) is a common index used to describe how saturated a soil is before the design storm occurs. AMC III, which assumes the watershed is already saturated, was used for the 100-year storm analysis. AMC II was used for the 2-year analysis. The San Bernardino County Hydrology Manual provides Curve Numbers of Hydrologic Soil-Cover for AMC II. These AMC II Curve Numbers can be converted to AMC III Curve Numbers manually by use of Table C.1 from the San Bernardino County Hydrology Manual. However, AES automatically does this conversion within the program analysis. The existing condition's land use consists of natural barren ground cover. The proposed condition's land use is predominantly impervious with some commercial landscaping.

Loss Rates were calculated by using the methodology presented in Section C.6 of the San Bernardino County Hydrology Manual. The Loss Rate calculation is a function of the Curve Number, Initial Abstraction and 24-hour rainfall depth, and was used to develop the unit hydrographs.

4.2 HYDROLOGIC RESULTS

Rational Method hydrologic results are summarized below for the existing conditions and proposed conditions in **Table 4-1** and **Table 4-2**. Refer to **Appendix E** and **Appendix F** for the existing and proposed conditions hydrology analysis, respectively.

Table 4–1 Existing Conditions Modified Rational Method Hydrology Results Summary

Existing Conditions Rational Method Onsite Flow Rates			
DMA ID	**Area (acre)**	**Q_2 (cfs)**	**Q_{100} (cfs)**
DA 1.1	5.35	1.38	11.82
DA 1.2	24.80	0.00	37.45
DMA 1 TOTAL	**30.15**	**1.38**	**49.27**
DA 2.1	1.21	0.52	3.19
DA 2.2	8.42	0.00	14.99
DMA 2 TOTAL	**9.63**	**0.52**	**18.18**
TOTAL (OVERALL)	**39.78**	**1.90**	**67.45**

Table 4–2 Proposed Conditions Modified Rational Method Hydrology Results Summary

Proposed Conditions Rational Method Onsite Flow Rates			
DMA ID	**Area (acre)**	**Q_2 (cfs)**	**Q_{100} (cfs)**
DA 1.1	0.88	2.90	6.53
DA 1.2	0.35	0.65	2.74
DA 1.3	1.03	2.92	7.48
DA 1.4	0.28	0.74	2.17
DA 1.5	2.55	5.17	16.22
DA 1.6	8.61	9.13	61.07
DA 1.7	4.49	7.66	22.44
DA 1.8	1.68	6.99	11.02
DA 1.9	3.00	11.12	17.55
DMA 1 TOTAL	**22.87**	**93.37**	**174.01**
DA 2.1	4.68	18.20	28.72
DA 2.2	2.70	11.85	18.67
DMA 2 TOTAL	**7.38**	**30.05**	**67.67**
DA 3.1	5.23	20.52	32.50
DA 3.2	3.19	7.98	12.60
DMA 3 TOTAL	**9.52**	**28.50**	**45.10**
TOTAL (OVERALL)	**39.77**	**151.92**	**239.71**

**The Rational Method was performed to analyze the 2-year and 100-year peak flows for DAs 1 – 3. The Rational Method Equation is as follows:*

Q=CiA, where
Q = the peak discharge in cubic feet per second (cfs)
i = the time-averaged rainfall intensity for a storm duration equal to the Tc (inches/hr)
A = drainage area (acres)

*Runoff coefficients (C-values) were calculated for each drainage area with equation D.3 in the San Bernardino Hydrology Manual using the pervious and impervious areas in each DMA. For these small drainage management areas, a conservative time of concentration of 5 minutes was used in the analysis. See **Appendix F** for a summary of these calculations.*

Below, results shown in **Table 4-3** are the proposed loss rate estimation from the unit hydrograph method. Refer to **Appendix G** for the proposed conditions hydrology hydrograph method analysis. The CivilD computer program was used to develop these hydrographs based on the Rational Method analysis results,

which will later be inputted into PondPack for detention routing. Additionally, the total mitigated outflow for the project and PondPack results we be provided in the final drainage report.

Table 4–3 Proposed Unit Hydrograph Method Loss Rate Estimation Summary

Proposed Unit Hydrograph Method Loss Rate Estimation		
Storm Event	**Average Loss Rate, $F\bar{m}$ (in/hr)**	**Average Low Loss Fraction, $\bar{Y}$**
2 Year (DA 1, 2, & 3)	0.100	0.153
100 Year (DA 1, 2, & 3)	0.079	0.088

Table 4-4 below summarizes the incremental difference results for the 3-, 6-, and 24-hour storm. Since drainage areas do not discharge to the same outlet in existing and proposed conditions, an acre-per-volume calculation was performed to determine the ultimate incremental difference for each drainage area. Refer to Appendix H for more information.

Additionally, the most conservative value of the incremental increase of flood volume (existing vs proposed) for DA 1 and DA 2 was found to be the 100-year 24-hour storm event, however, DA 3 correlated to the 100-year 6-hour incremental volume. Each basin was designed for the most conservative value of the incremental increase of flood volume and is summarized in Section 5.2.3 below.

Table 4-4 below provides a summary of the highest incremental volume required for each drainage area and the volume provided for its corresponding infiltration basin BMP. Provided volumes reflects the infiltration rate assumed to the basin based on the infiltration rates provided in the geotech report. Refer to Section 5.2.3 for basin analysis and Appendix H for incremental difference calculations and PondPack results.

Table 4–4 Incremental Difference Analysis Summary

Incremental Difference Analysis Summary					
DA ID	**AREA (AC)**	**24 HR VOLUME (CF)**	**6 HR VOLUME (CF**	**3 HR VOLUME (CF**	**PROVIDED VOLUME (CF)**
DA 1	22.87	350,153*	176,291	121,124	287,706
DA 2	7.38	107,812*	54,515	37,502	106,321
DA 3	9.52	127,577	63,816*	43,305	187,517
TOTAL	39.77	-	-	-	-

* Indicates the most conservative incremental volume difference of the storm event for each DA

5 WATER QUALITY AND LOW IMPACT DEVELOPMENT REQUIREMENTS

5.1 STORMWATER MITIGATION

5.1.1 STORMWATER TREATMENT

The proposed project will provide water quality by means of infiltration. Sediment bays are located within the underground chamber system for pretreatment of larger sediments and pollutants. The underground chambers will treat the remaining pollutants of concerns by means of infiltration. The site's 100-year peak volume will be detained by means of underground storage.

5.1.2 STORMWATER MAINTENANCE

Stormwater facilities require routine maintenance to operate efficiently. It is recommended that facilities be inspected prior to the rainy season (fall) and after each runoff producing storm event. Sediment and debris shall be removed from the pre-treatment system to maintain the systems effectiveness. The underground chambers shall be routinely inspected and sediment/debris build up removed to maintain efficient operation of the basin.

5.2 UNDERGROUND CHAMBER

5.2.1 UNDERGROUND CHAMBER STANDARDS

The proposed underground chambers were designed using the methodology described in San Bernardino County's Technical Guidance Document for Water Quality Management Plans. This document states that:

- The Water Quality Design Capture Volume (DCV) must be drawn down within 48 hours after the basin is filled. See **Appendix L** for DCV calculations.
- An energy dissipating inlet must be provided.
- An emergency overflow pipe to control excess flows must be provided.
- A forebay settling basin or separate treatment control measure must be provided as pretreatment.

5.2.2 UNDERGROUND CHAMBER ANALYSIS

Basin Inflow Hydrographs were created using the CivilD computer software for the 100-year and 2-year storm events. The resulting hydrographs have been manually imported into the PondPack computer software to analyze the underground basin. The underground basins were sized taking infiltration rates provided in the Geotech report.

5.2.3 UNDERGROUND CHAMBER RESULTS

The proposed underground basins will provide the entire infiltration volume required to retain the Design Capture Volume and detain the most conservative value of the incremental increase of flood volume (existing vs proposed) associated with the 100-year 3-, 6-, and 24-hour storm. A summary of basin routing calculations is shown below in Table 5. **Table 5** Underground Basin BMP Results

Underground Basin BMP Results						
BMP ID	**Storm Event**	**Max Storage Required (CF)**	**Provided Storage (CF)***	**Max Water Surface Elevation (FT)**	**Allowable Discharge (CFS)**	**Proposed Basin Outflow (CFS)**
BMP 1	100 Year	350,153	287,706	5.47	132.57	0
BMP 2	100 Year	107,812	96,286	6.10	42.91	0
BMP 3	100 Year	127,577	115,999	5.77	50.39	0

*Provided CMP storage does not account for infiltration thus, the provided storage does not need to be greater than the max storage required in this case. Refer to Appendix H for PondPack results.

As shown in Table 5 above, the basins are sized to adequately to retain the Design Capture Volume and detain the 100-year incremental volume while discharging less than allowable. Please note that a conservative infiltration rate of 3 in/hr was utilized for this analysis which is less than the recorded rates as discussed in the infiltration report prepared by Southern California Geotechnical in June of 2023.

6 HYDRAULICS ANALYSIS

6.1 HYDRAULIC ANALYSIS

6.1.1 PIPE SIZING

The Bentley Flowmaster program will be utilized to provide pipe sizing calculations. The program calculates the normal depth based on various input parameters: Manning's coefficient, slope, and diameter. The calculations will be provided in the final drainage report and will show the depth of flow in the pipe based on the pipe size and slope as shown per plan.

6.1.2 INLET SIZING

The Bentley Flowmaster program will be utilized to provide inlet sizing calculations. The program calculates spread for inlets in sag and efficiency for inlets on grade. Calculations are based on if the inlet is grated or a curb opening, the size of the openings, road cross slope, gutter cross slope, and slope. Results will be provided in the final drainage report.

6.1.3 HGL ANALYSIS

Pipe peak flows, velocities, and HGL elevations will be provided in the final drainage report. See **Appendix M** for as-built information for the existing storm drain along N Locust Ave.

6.1.4 EMERGENCY SPILLWAY

The underground chambers provide storage for flow attenuation in the 100-year storm event. The system will be designed to provide overland relief via a gravity overflow system. For storm events greater than the 100-year peak storm, the proposed 2.5 foot channel southeast of the site between the site and the Radial warehouse will be used as the overflow method.

7 CONCLUSION

Per the analysis, the project proposes to capture and detain the 100-year peak volume and mitigate project outflows into the existing storm drain in Locust Avenue. The project is consistent with the allowable discharge compared to the existing condition.

APPENDICES

APPENDIX A

NOAA ALTAS 14 PRECIPITATION ESTIMATES

NOAA Atlas 14, Volume 6, Version 2
Location name: Rialto, California, USA*
Latitude: 34.1511°, Longitude: -117.4153°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.138** (0.115-0.168)	**0.183** (0.152-0.223)	**0.242** (0.200-0.295)	**0.289** (0.237-0.355)	**0.353** (0.280-0.449)	**0.401** (0.312-0.522)	**0.451** (0.342-0.601)	**0.502** (0.369-0.688)	**0.570** (0.402-0.817)	**0.624** (0.425-0.925)
10-min	**0.198** (0.165-0.241)	**0.263** (0.219-0.320)	**0.347** (0.287-0.422)	**0.414** (0.340-0.509)	**0.505** (0.401-0.643)	**0.575** (0.447-0.748)	**0.646** (0.490-0.861)	**0.719** (0.529-0.986)	**0.817** (0.577-1.17)	**0.894** (0.609-1.33)
15-min	**0.240** (0.200-0.291)	**0.318** (0.264-0.387)	**0.419** (0.347-0.511)	**0.501** (0.412-0.616)	**0.611** (0.485-0.778)	**0.696** (0.541-0.904)	**0.781** (0.592-1.04)	**0.869** (0.640-1.19)	**0.989** (0.697-1.42)	**1.08** (0.736-1.60)
30-min	**0.363** (0.302-0.441)	**0.481** (0.400-0.585)	**0.635** (0.526-0.774)	**0.758** (0.623-0.932)	**0.925** (0.735-1.18)	**1.05** (0.818-1.37)	**1.18** (0.896-1.58)	**1.32** (0.969-1.81)	**1.50** (1.06-2.14)	**1.64** (1.12-2.43)
60-min	**0.555** (0.462-0.674)	**0.736** (0.612-0.895)	**0.970** (0.804-1.18)	**1.16** (0.952-1.42)	**1.41** (1.12-1.80)	**1.61** (1.25-2.09)	**1.81** (1.37-2.41)	**2.01** (1.48-2.76)	**2.29** (1.61-3.28)	**2.50** (1.70-3.71)
2-hr	**0.843** (0.701-1.02)	**1.10** (0.917-1.34)	**1.44** (1.19-1.75)	**1.71** (1.40-2.10)	**2.07** (1.64-2.64)	**2.35** (1.82-3.05)	**2.62** (1.99-3.50)	**2.91** (2.14-3.99)	**3.29** (2.32-4.71)	**3.58** (2.44-5.31)
3-hr	**1.08** (0.899-1.31)	**1.41** (1.17-1.71)	**1.83** (1.52-2.23)	**2.17** (1.78-2.66)	**2.62** (2.08-3.33)	**2.96** (2.30-3.85)	**3.30** (2.50-4.40)	**3.65** (2.69-5.01)	**4.12** (2.90-5.89)	**4.47** (3.05-6.64)
6-hr	**1.61** (1.34-1.95)	**2.09** (1.73-2.54)	**2.70** (2.24-3.29)	**3.19** (2.62-3.92)	**3.84** (3.05-4.89)	**4.33** (3.36-5.63)	**4.82** (3.65-6.42)	**5.31** (3.91-7.29)	**5.97** (4.21-8.54)	**6.46** (4.40-9.59)
12-hr	**2.20** (1.83-2.67)	**2.88** (2.39-3.50)	**3.73** (3.09-4.54)	**4.40** (3.62-5.41)	**5.29** (4.20-6.73)	**5.95** (4.62-7.73)	**6.60** (5.00-8.80)	**7.26** (5.34-9.96)	**8.12** (5.73-11.6)	**8.77** (5.98-13.0)
24-hr	**3.00** (2.65-3.45)	**3.95** (3.50-4.56)	**5.16** (4.55-5.97)	**6.11** (5.35-7.13)	**7.36** (6.24-8.87)	**8.29** (6.88-10.2)	**9.20** (7.45-11.6)	**10.1** (7.97-13.1)	**11.3** (8.56-15.3)	**12.2** (8.93-17.0)
2-day	**3.68** (3.26-4.24)	**4.94** (4.37-5.70)	**6.58** (5.80-7.61)	**7.89** (6.91-9.20)	**9.66** (8.18-11.6)	**11.0** (9.12-13.5)	**12.3** (9.99-15.5)	**13.7** (10.8-17.8)	**15.5** (11.8-21.0)	**17.0** (12.4-23.7)
3-day	**3.94** (3.49-4.54)	**5.39** (4.77-6.22)	**7.31** (6.45-8.46)	**8.90** (7.78-10.4)	**11.1** (9.38-13.3)	**12.8** (10.6-15.7)	**14.5** (11.8-18.3)	**16.3** (12.9-21.1)	**18.8** (14.3-25.4)	**20.8** (15.2-29.1)
4-day	**4.21** (3.72-4.85)	**5.82** (5.15-6.71)	**7.98** (7.04-9.23)	**9.78** (8.56-11.4)	**12.3** (10.4-14.8)	**14.3** (11.8-17.6)	**16.3** (13.2-20.6)	**18.5** (14.6-24.0)	**21.6** (16.3-29.1)	**24.0** (17.6-33.5)
7-day	**4.82** (4.27-5.56)	**6.74** (5.96-7.78)	**9.33** (8.23-10.8)	**11.5** (10.1-13.4)	**14.5** (12.3-17.5)	**16.9** (14.1-20.8)	**19.5** (15.8-24.5)	**22.1** (17.4-28.6)	**25.9** (19.6-34.9)	**28.9** (21.1-40.3)
10-day	**5.20** (4.61-5.99)	**7.32** (6.47-8.44)	**10.2** (8.98-11.8)	**12.6** (11.0-14.7)	**16.0** (13.5-19.2)	**18.7** (15.5-23.0)	**21.5** (17.4-27.1)	**24.5** (19.3-31.7)	**28.7** (21.7-38.8)	**32.1** (23.5-44.8)
20-day	**6.21** (5.50-7.16)	**8.82** (7.80-10.2)	**12.4** (10.9-14.3)	**15.4** (13.5-18.0)	**19.8** (16.7-23.8)	**23.3** (19.3-28.6)	**26.9** (21.8-33.9)	**30.9** (24.3-40.0)	**36.5** (27.6-49.2)	**41.0** (30.0-57.3)
30-day	**7.25** (6.42-8.35)	**10.3** (9.12-11.9)	**14.5** (12.8-16.8)	**18.2** (15.9-21.2)	**23.4** (19.8-28.1)	**27.6** (22.9-33.9)	**32.1** (26.0-40.4)	**36.9** (29.1-47.8)	**43.8** (33.1-59.1)	**49.5** (36.2-69.0)
45-day	**8.66** (7.67-9.98)	**12.3** (10.8-14.1)	**17.3** (15.2-20.0)	**21.6** (18.9-25.2)	**27.8** (23.6-33.5)	**32.9** (27.3-40.5)	**38.4** (31.1-48.4)	**44.4** (35.0-57.4)	**52.9** (40.0-71.4)	**60.0** (43.9-83.7)
60-day	**10.1** (8.91-11.6)	**14.1** (12.5-16.3)	**19.8** (17.5-22.9)	**24.7** (21.6-28.8)	**31.9** (27.0-38.4)	**37.8** (31.3-46.5)	**44.1** (35.7-55.6)	**51.0** (40.2-66.1)	**61.0** (46.2-82.3)	**69.3** (50.7-96.7)

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

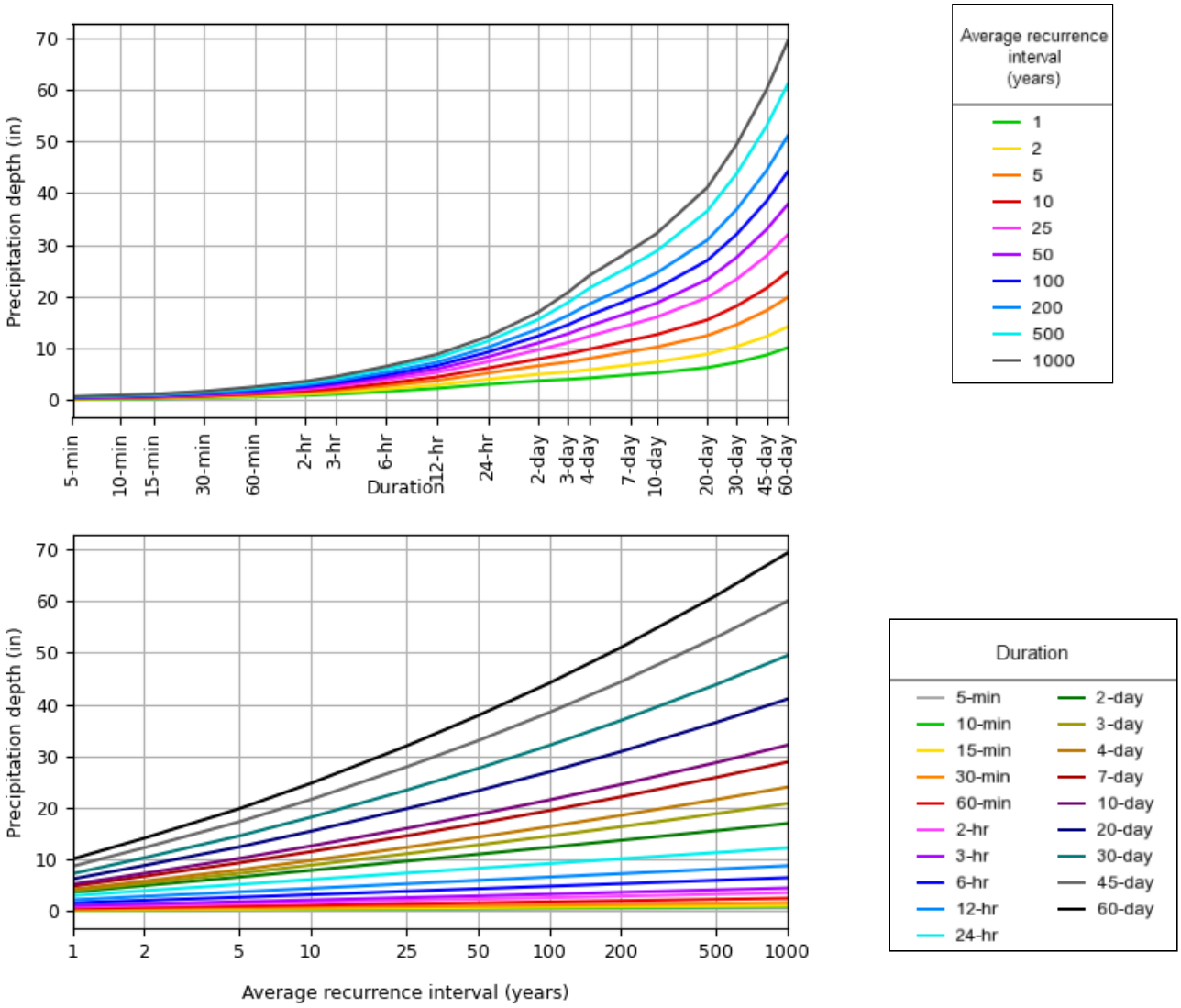
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper 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: 34.1511°, Longitude: -117.4153°



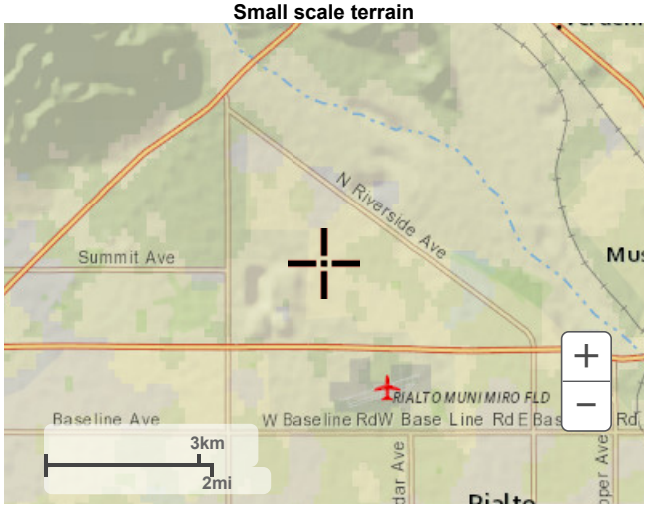
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Fri Oct 6 18:16:41 2023

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Maps & aerials

Small scale terrain



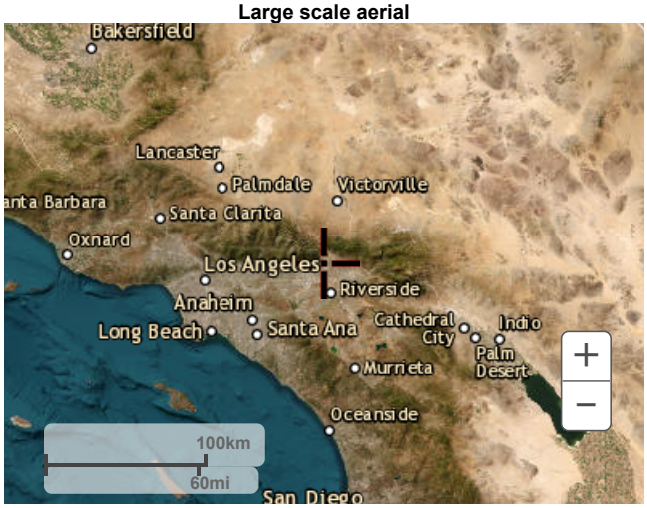
Large scale terrain



Large scale map



Large scale aerial



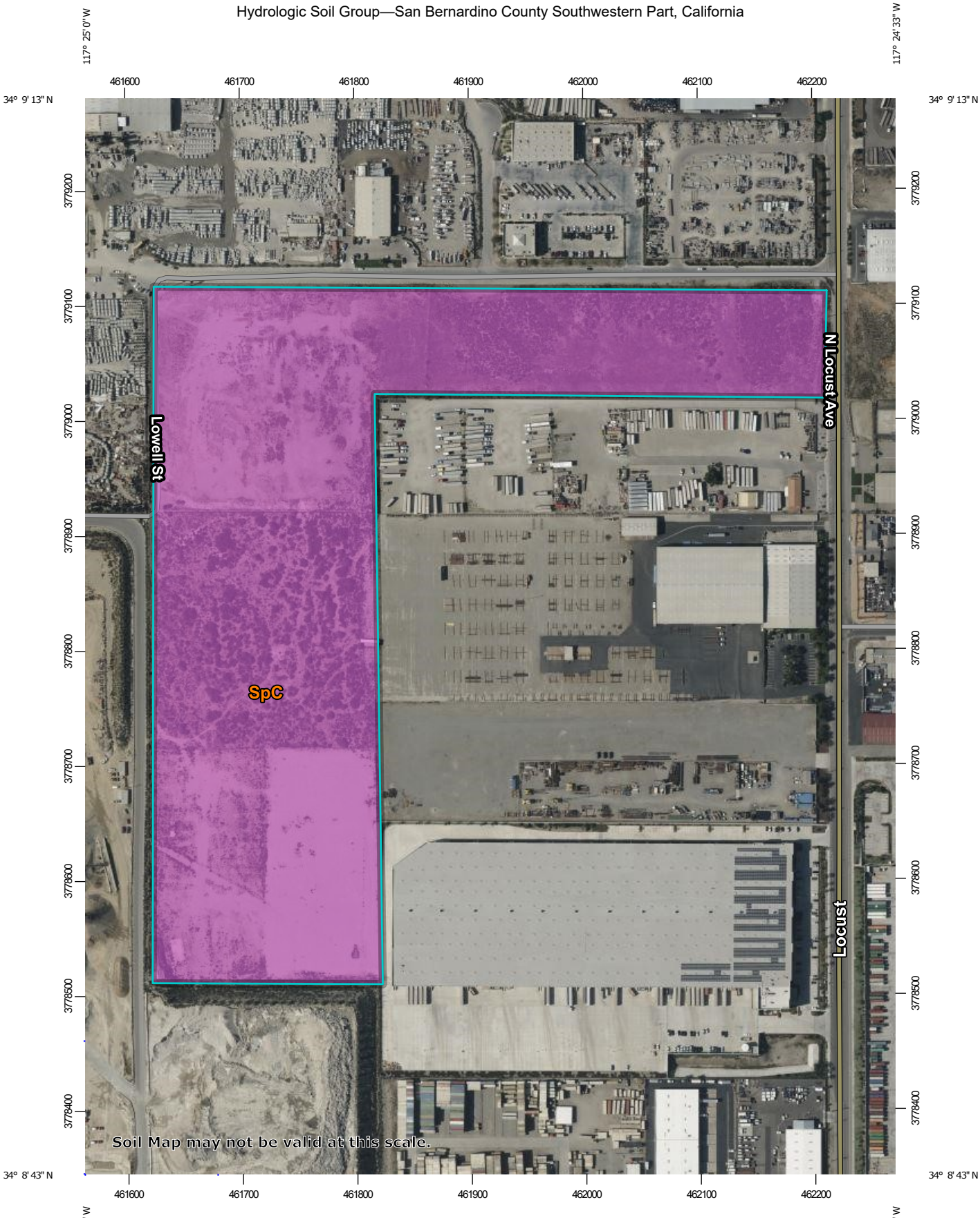
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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX B

HYDROLOGIC SOIL TYPE CLASSIFICATION



Map Scale: 1:4,560 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Bernardino County Southwestern Part, California
Survey Area Data: Version 15, Aug 30, 2023

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
SpC	Soboba stony loamy sand, 2 to 9 percent slopes	A	38.6	100.0%
Totals for Area of Interest			**38.6**	**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

SIMEON	A	SNOW	B	SQUALICUM	B	STISSING	C	SURGH	B
SIMMLER	D	SNOWDEN	C	SQUAM	B	STIVERSVILLE	B	SURPRISE	B
SIMMONT	C	SNOWLIN	B	SQUILLCHUCK	B	STOCKBRIDGE	B	SURRENCY	B/D
SIMNER	A	SNOWVILLE	D	SQUIMER	B	STOCKLAND	B	SURVYA	C
SIMON	C	SNOWY	A	SQUIRES	B	STOCKPEN	D	SUSIE CREEK	D
SIMONA	D	SOAKPAK	B	ST. ALBANS	B	STOCKTON	D	SUSITNA	B
SIMOTE	C	SOAP LAKE	B	ST. CHARLES	B	STODICK	D	SUSQUEHANNA	D
SIMPERS	B	SOBOBA	A	ST. CLAIR	D	STOKES	D	SUTHER	C
SIMPSON	C	SOBRANTE	C	ST. ELMO	A	STOMAR	C	SUTHERLIN	C
SIMS	D	SODA LAKE	B	ST. GEORGE	C	STONER	B	SUTLEW	B/C
SINAI	C	SODHOUSE	D	ST. HELENS	A	STONEWALL	A	SUTPHEN	D
SINCLAIR	C	SODUS	C	ST. IGNACE	C	STONO	B/D	SUTTLER	B
SINE	C	SOELBERG	B	ST. JOE	B/D	STONYFORD	D	SUTTON	B
SINGLETREE	C	SOFIA	B	ST. JOHNS	B/D	STOOKEY	B	SVEA	B
SINGSAAS	B	SOGN	D	ST. LUCIE	A	STORDEN	B	SVERDRUP	B
SINNIGAM	C	SOGZIE	B	ST. MARTIN	C	STORLA	B	SVOLD	C
SINOMAX	B	SOKOLOF	B	ST. MARYS	B	STORMITT	B	SWAGER	C
SINTON	B	SOLAND	D	ST. NICHOLAS	D	STORM KING	D	SWAKANE	C
SINUK	D	SOLDATNA	B	ST. PAUL	B	STORY	C	SWAN	C
SION	B	SOLDIER	C	ST. THOMAS	D	STOSSEL	C	SWANBOY	D
SIOUX	A	SOL DUC	B	STAATSBURG		STOUGH	C	SWANNER	D
SIPPLE	A	SOLDUC	B	STABLER	B	STOWELL	D	SWANSON	B
SIRI	B	SOLLEKS	C	STACY	B	STOY	B	SWANTON	B/D
SISKIYOU	B	SOLLER	D	STADY	B	STRAIGHT	C	SWANTOWN	C
SISSETON	B	SOLOMON	D	STAFFORD	C	STRAIN	B	SWAPPS	C
SISSON	B	SOLONA	B	STAGECOACH	B	STRASBURG	C	SWARTSWOOD	C
SITES	C	SOMBRERO	D	STAHL	C	STRATFORD	B	SWARTZ	D
SITKA	B	SOMERS	B	STALEY	C	STRAUSS	C	SWASEY	D
SIXMILE	B	SOMERSET	D	STAMBAUGH	B	STRAW	B	SWASTIKA	C
SIZEMORE	B	SOMERVELL	B	STAMFORD	D	STRAWN	B	SWATARA	A
SIZER	B	SOMSEN	C	STAMPEDE	D	STREATOR	C	SWAUK	C
SKAGGS	B	SONOITA	B	STAN	B	STROLE	B	SWAZILLIA	A
SKAGIT	B/C	SONOMA	D	STANDISH	C/D	STRONGHURST	B	SWEATMAN	C
SKAHA	A	SONTAG	D	STANEY	D	STRONTIA	B	SWEDE	B
SKALAN	C	SOPER	B/C	STANFIELD	C	STROUPE	C	SWEDEN	B
SKAMANIA	B	SOQUEL	B	STANLEY	C	STRYKER	B	SWEEN	C
SKAMOKAWA	B	SORDO	C	STANSBURY	D	STUBBS	C	SWEENEY	B
SKANEE	C	SORF	C	STANTON	D	STUCKCREEK	B	SWEET	C
SKELLOCK	B	SORRENTO	B	STAPLETON	B	STUKEL	D	SWEETGRASS	B
SKERRY	C	SORTER	B/D	STARBUCK	D	STUKEY	B	SWEETWATER	D
SKIDMORE	B	SOSA	C	STARGO	B	STUMBLE	A	SWENODA	B
SKIFLET	C	SOTELLA	C	STARICHKOF	D	STUMPP	D	SWIFTCREEK	B
SKINNER	C	SOTIN	B	STARKS	C	STUMP SPRINGS	B	SWIFTON	A
SKIYOU	C	SOUTHFORK	D	STARLEY	D	STUNNER	B	SWIMS	A
SKOKOMISH	B/C	SOUTHGATE	D	STARR	B	STUTTGART	D	SWINGLER	C
SKOOKUMCHUCK	B	SOUTHWICK	C	STASER	B	STUTZMAN	C	SWINK	D
SKOWHEGAN	B	SPAA	D	STATE	B	STUTZVILLE	B/C	SWISBOO	D
SKULL CREEK	D	SPACE CITY	A	STATEN	D	SUBLETTE	B	SWITCHBACK	C
SKUMPAH	D	SPAGE	B	STATLER	B	SUDBURY	B	SWITZERLAND	B
SKUTUM	C	SPALDING	D	STAVE	D	SUDDUTH	C	SWOPE	C
SKYBERG	C	SPAN	D	STAYTON	D	SUFFIELD	C	SWYGERT	C
SKYHAVEN	D	SPANAWAY	B	STEAMBOAT	D	SUGARLOAF	B	SYCAMORE	B/C
SKYKOMISH	B	SPANEL	D	STEARNS	D	SUISUN	D	SYCAN	A
SKYLICK	C	SPARTA	A	STECUM	A	SULA	B	SYLACAUGA	B/D
SKYLINE	D	SPEARFISH	B	STEED	A	SULLY	B	SYLVAN	B
SKYWAY	B	SPEARMAN	C	STEEDMAN	D	SULPHURA	D	SYMERTON	B
SLAB	D	SPEARVILLE	C	STEEKEE	C	SULTAN	B	SYNAREP	B
SLATE CREEK	C	SPECK	D	STEELE	B	SUMAS	B/C	SYRACUSE	B
SLAUGHTER	C	SPECTER	D	STEESE	C	SUMDUM	D	SYRENE	D
SLAVEN	D	SPEELYAI	C	STEFF	C	SUMMA	B	SYRETT	C
SLAWSON	B	SPEIGLE	B	STEGALL	C	SUMMERFIELD	C		
SLAYTON	D	SPENARD	D	STEIGER	A	SUMMERS	B	TABERNASH	B
SLEETH	C	SPENCER	B	STEINAUER	B	SUMMERVILLE	C	TABIONA	B
SLETTEN	D	SPENLO	B	STEINBECK	B	SUMMIT	C	TABLE MOUNTAIN	B
SLICKROCK	B	SPERRY	C	STEINMETZ	D	SUMMITVILLE	B	TABLER	D
SLIGHTS	D	SPICER	C	STEINSBURG	C	SUMTER	C	TABOR	D
SLIGO	B	SPILLVILLE	B	STEIWER	C	SUN	D	TACAN	B
SLIKOK	D	SPINKS	A	STELLAR	C	SUNBURST	C	TACOMA	D
SLIP	B	SPIRES	D	STEMILT	C	SUNBURY	B	TACOOSH	D
SLIPMAN	B/C	SPIRIT	B	STENDAL	C	SUNCOCK	A	TAFT	C
SLOAN	D	SPIRO	B	STEPHEN	C	SUND	C	TAGGERT	C
SLOCUM	B	SPLENDORA	C	STEPHENSBURG	B	SUNDELL	C	TAHOMA	B
SLOOUC	C	SPLITRO	D	STEPHENVILLE	B	SUNDERLAND	C/D	TAHQUAMENON	D
SLOSS	C	SPOFFORD	C	STERLING	B	SUNDOWN	B	TAHQUATS	C
SLUICE	B	SPOKANE	B	STERLINGTON	B	SUNFIELD	B	TAINTOR	C
SMARTS	B	SPONSELLER	B	STETSON	B	SUNNILAND	C	TAJO	C
SMITH CREEK	A	SPOON BUTTE	D	STETTER	D	SUNNYHAY	D	TAKEUCHI	C
SMITHDALE	B	SPOONER	C	STEUBEN	B	SUNNYSIDE	B	TAKILMA	B
SMITHNECK	B	SPOTTSWOOD	B	STEVENS	B	SUNNYVALE	C	TAKOTNA	B
SMITHTON	D	SPRAGUE	B/C	STEVENSON	B	SUNRAY	B	TALAG	D
SMOLAN	C	SPRECKELS	C	STEWART	D	SUNRISE	D	TALANTE	C
SMOOT	D	SPRING	C/D	STICKNEY	C	SUNSET	B	TALAPUS	B
SNAG	B	SPRING CREEK	C	STIDHAM	A	SUNSHINE	C	TALBOTT	C
SNAHOPISH	B	SPRINGDALE	B	STIGLER	C	SUNSWEET	C	TALCOT	C
SNAKE	C	SPRINGER	B	STILLMAN	A	SUNUP	D	TALIHINA	D
SNAKE HOLLOW	B	SPRINGERVILLE	D	STILLWATER	D	SUPAN	B	TALKEETNA	C
SNAKELUM	B	SPRINGFIELD	D	STILSON	B	SUPERIOR	C	TALLAC	B
SNEAD	D	SPRINGMEYER	C	STIMSON	B/C	SUPERSTITION	A	TALLADEGA	C
SNELL	C	SPRINGTOWN	C	STINGAL	B	SUPERVISOR	C	TALLAPOOSA	C
SNELLING	B	SPROUL	D	STINSON	C	SUPPLEE	B	TALLEYVILLE	B
SNOHOMISH	D	SPUR	B	STIRK	D	SUR	B	TALLS	B
SNOQUALMIE	B	SPURLOCK	B	STIRUM	B	SURGEM	C	TALLULA	B

NOTES A BLANK HYDROLOGIC SOIL GROUP INDICATES THE SOIL GROUP HAS NOT BEEN DETERMINED
TWO SOIL GROUPS SUCH AS B/C INDICATES THE DRAINED/UNDRAINED SITUATION

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

S.C.S. SOIL NAMES FOR HYDROLOGIC CLASSIFICATIONS

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

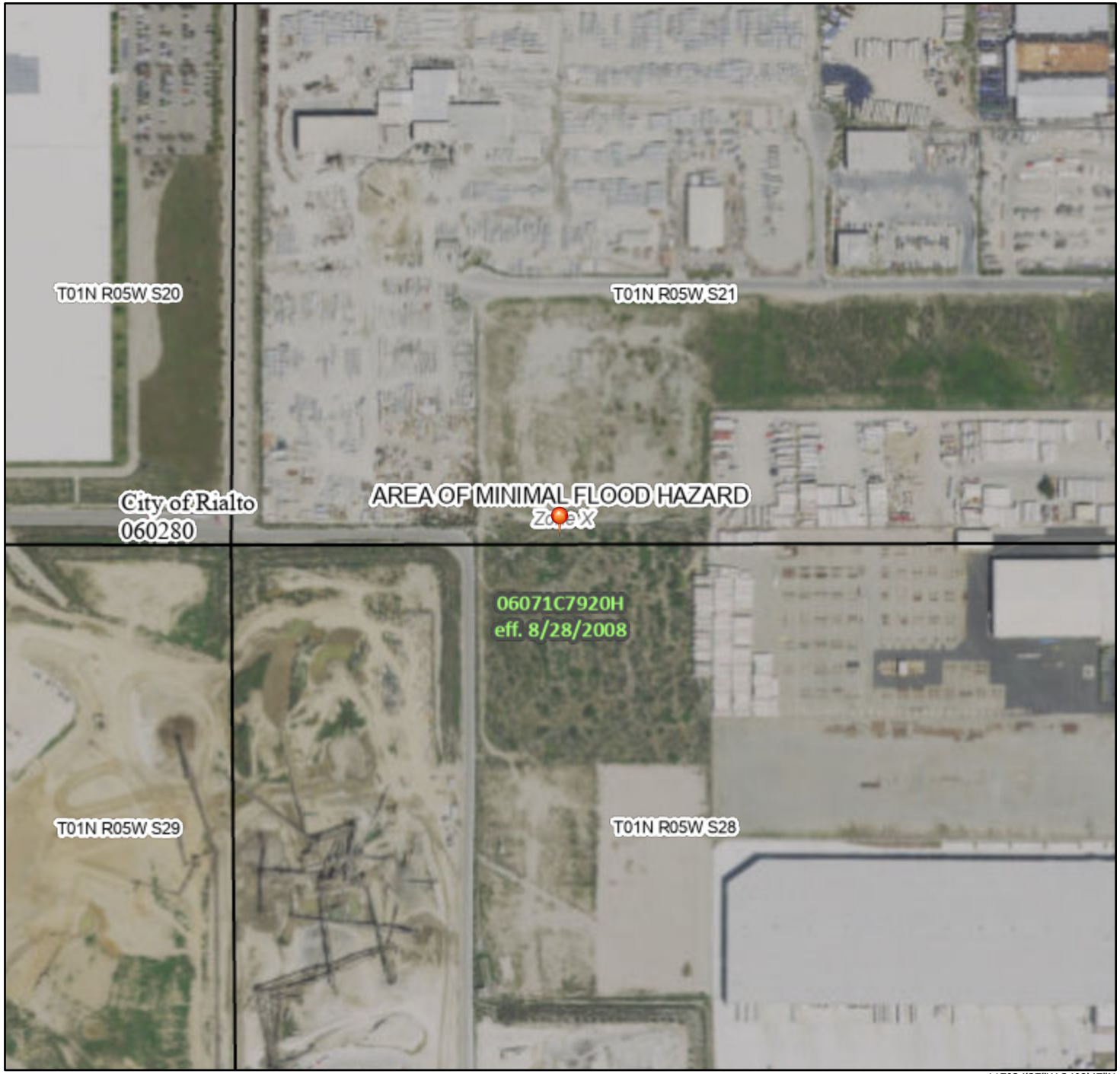
APPENDIX C

FEMA FIRMETTE

National Flood Hazard Layer FIRMette

FEMA

117°25'15"W 34°9'16"N



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

1:6,000

117°24'37"W 34°8'47"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/30/2023 at 7:55 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11 North. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography collected by the U.S. Department of Agriculture Farm Service Agency. This imagery was flown in 2005 and was produced with a 1-meter ground sample distance.

This map may reflect more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

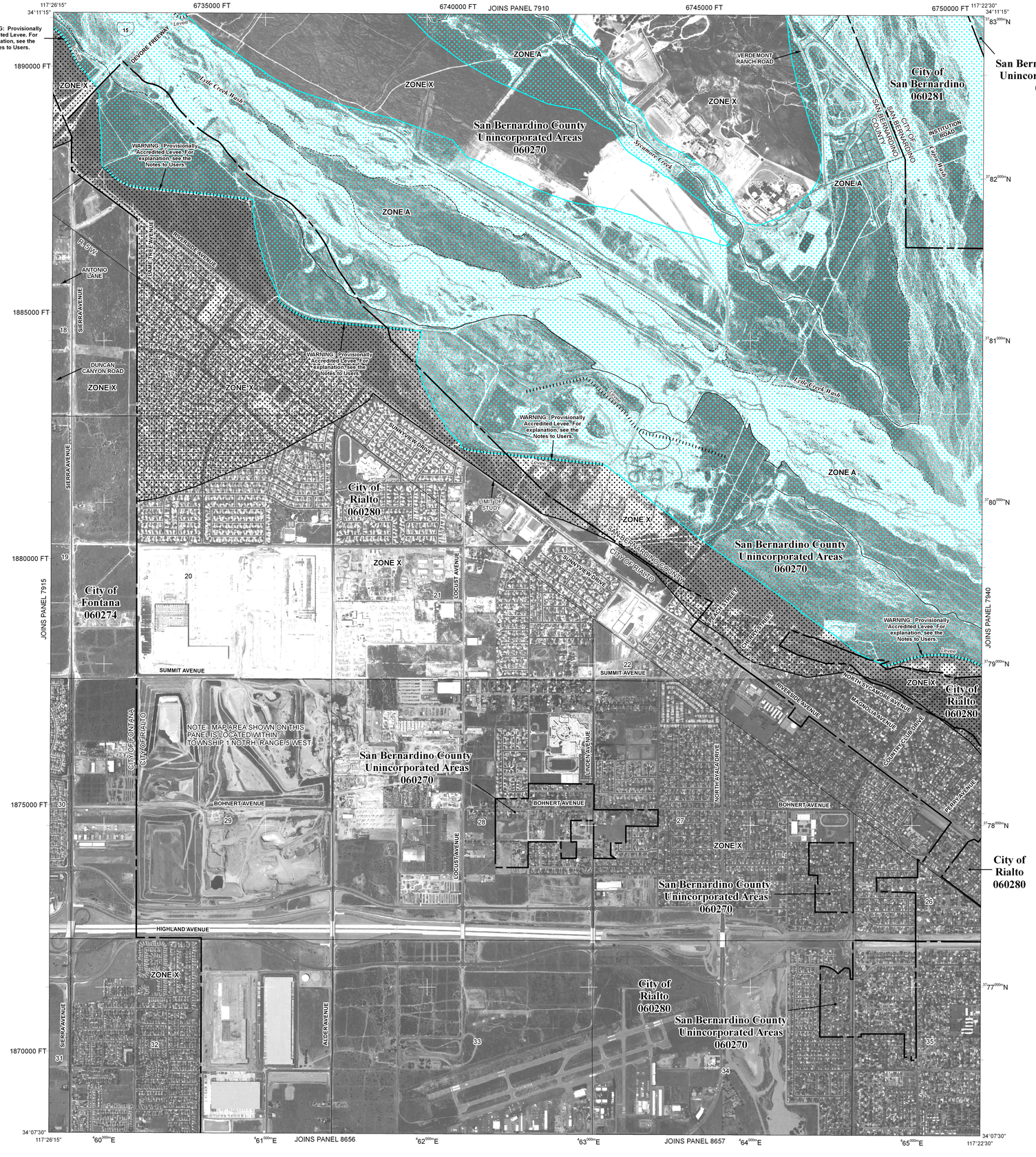
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

WARNING: This map contains levees, dikes, or other structures that have been provisionally accredited and mapped as providing protection from the 1-percent–annual-chance flood. To maintain accreditation, the levee owner or community is required to submit documentation necessary to comply with 44 CFR Section 65.10 by August 8, 2009. Because of the risk of overtopping or failure of the structure, communities should take proper precautions to protect lives and minimize damages in these areas, such as issuing an evacuation plan and encouraging property owners to purchase flood insurance.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- A — A — Cross section line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 3776000mN — 1000-meter Universal Transverse Mercator grid values, zone 11N
- 600000 FT — 5000-foot grid ticks: California State Plane coordinate system, zone V (FIPSZONE 0405), Lambert Conformal Conic projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- ●M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
March 18, 1996

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 28, 2008 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 7920H

FIRM

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 7920 OF 9400

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FONTANA, CITY OF	060274	7920	H
RIALTO, CITY OF	060280	7920	H
SAN BERNARDINO COUNTY	060270	7920	H
SAN BERNARDINO, CITY OF	060281	7920	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

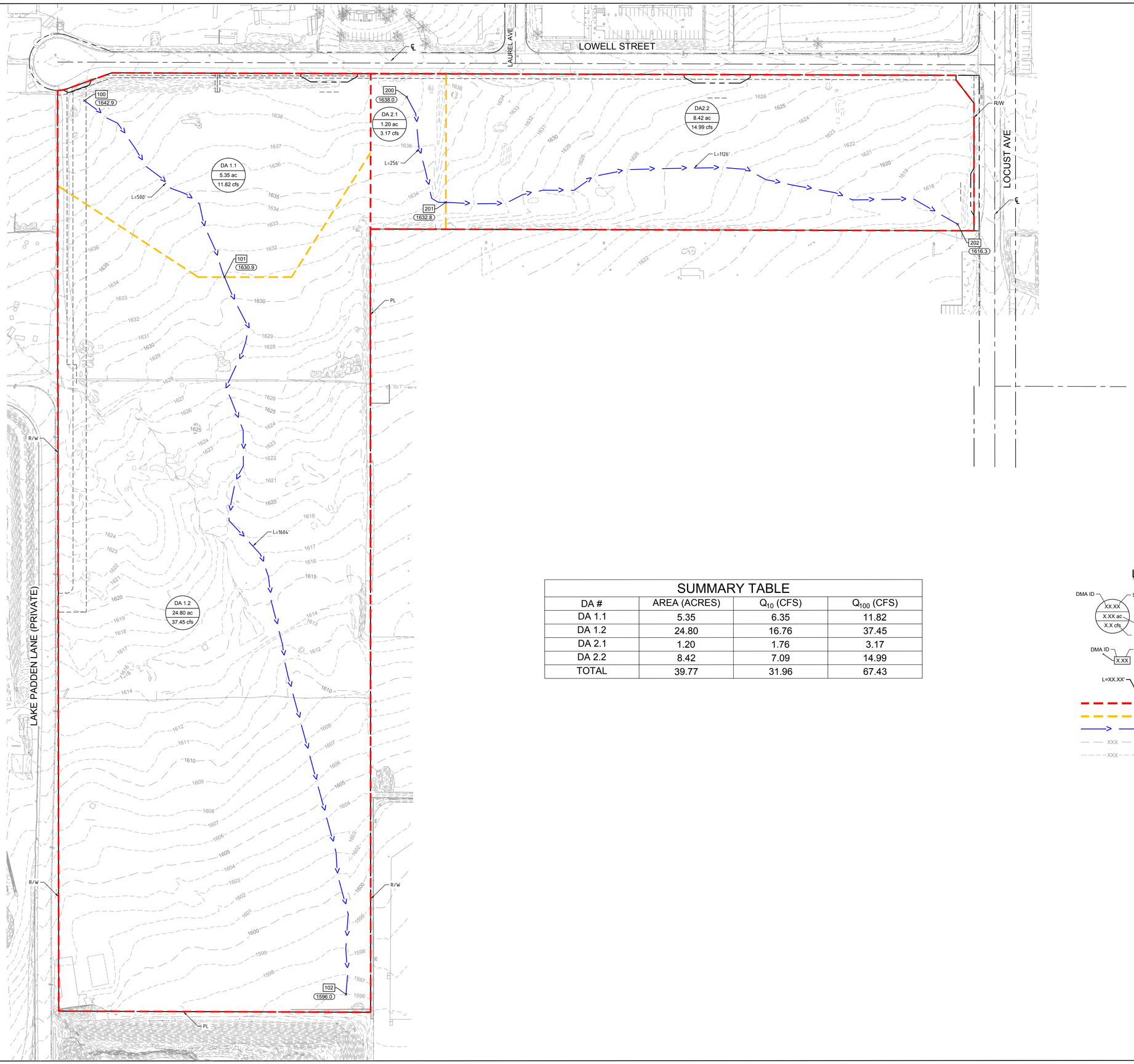
MAP NUMBER
06071C7920H

MAP REVISED
AUGUST 28, 2008

Federal Emergency Management Agency

APPENDIX D

DRAINAGE EXHIBITS



SUMMARY TABLE			
DA #	AREA (ACRES)	Q_{10} (CFS)	Q_{100} (CFS)
DA 1.1	5.35	6.35	11.82
DA 1.2	24.80	16.76	37.45
DA 2.1	1.20	1.76	3.17
DA 2.2	8.42	7.09	14.99
TOTAL	39.77	31.96	67.43

LEGEND

DMA ID — XX.XX — SUB-DMA ID
X.XX ac — ACREAGE
X.X cfs

DMA ID — X.XX — SUB-DMA ID

L=XX.XX' — FLOW PATH LENGTH (FEET)

OVERALL DMA BOUNDARY

SUB-DMA BOUNDARY

FLOWLINE

EX MAJOR CONTOURS

EX MINOR CONTOURS

NORTH

GRAPHIC SCALE IN FEET
0 40 80 160

Kimley»Horn
401 B STREET, SUITE 600,
SAN DIEGO, CA 92101
PHONE: (619) 234-9411
WWW.KIMLEY-HORN.COM

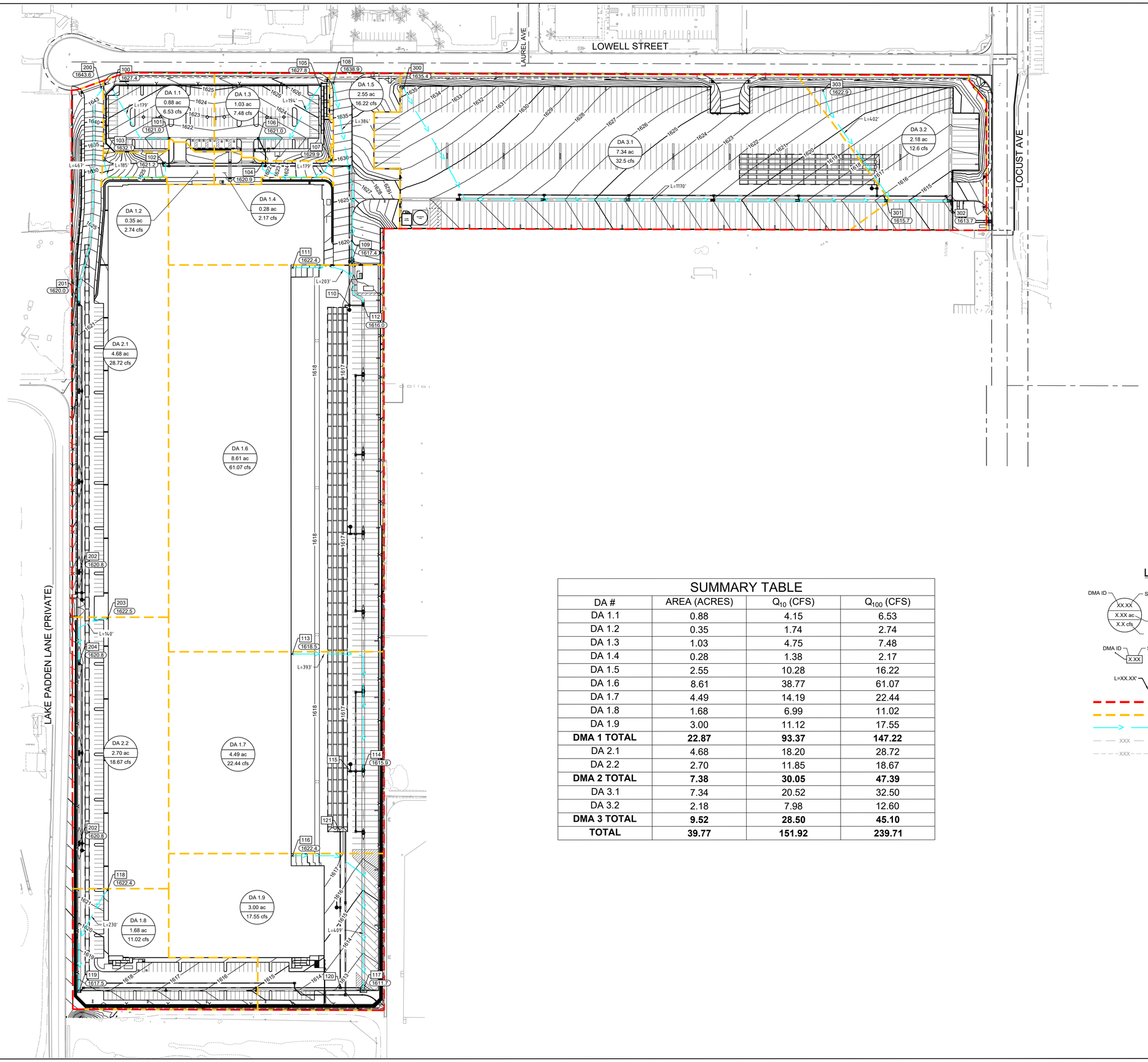
KIMLEY-HORN SHALL HAVE NO LIABILITY WHATSOEVER FOR ANY COSTS ARISING OF THE REUSE OF THESE PLANS FOR ANY PURPOSE OTHER THAN THE SPECIFIC PROJECT FOR WHICH THEY WERE PREPARED, INCLUDING, BUT NOT LIMITED TO, USE ON ANY EXTENSION OF THIS PROJECT OR ON ANY OTHER PROJECT. WITHOUT LIMITING THE FOREGOING, REUSE OF THESE PLANS FOR ANY PURPOSE WITHOUT THE EXPRESS WRITTEN CONSENT OF KIMLEY-HORN SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO KIMLEY-HORN. BY USING ANY OF THESE PLANS AND SPECIFICATIONS, THE CLIENT ACKNOWLEDGES THAT ALL PRELIMINARY PLANS ARE NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES UNTIL THEY ARE FULLY APPROVED AND ALL PERMITS OBTAINED.

LOCUST GATEWAY LOGISTICS CENTER

JOB NO.: 195504001
DATE: 4/24/2024

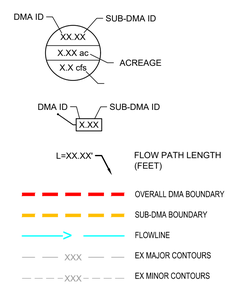
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RUNOFF



SUMMARY TABLE			
DA #	AREA (ACRES)	Q_{10} (CFS)	Q_{100} (CFS)
DA 1.1	0.88	4.15	6.53
DA 1.2	0.35	1.74	2.74
DA 1.3	1.03	4.75	7.48
DA 1.4	0.28	1.38	2.17
DA 1.5	2.55	10.28	16.22
DA 1.6	8.61	38.77	61.07
DA 1.7	4.49	14.19	22.44
DA 1.8	1.68	6.99	11.02
DA 1.9	3.00	11.12	17.55
DMA 1 TOTAL	**22.87**	**93.37**	**147.22**
DA 2.1	4.68	18.20	28.72
DA 2.2	2.70	11.85	18.67
DMA 2 TOTAL	**7.38**	**30.05**	**47.39**
DA 3.1	7.34	20.52	32.50
DA 3.2	2.18	7.98	12.60
DMA 3 TOTAL	**9.52**	**28.50**	**45.10**
TOTAL	**39.77**	**151.92**	**239.71**

LEGEND





GRAPHIC SCALE IN FEET
0 40 80 160

Kimley»Horn
401 B STREET, SUITE 600,
SAN DIEGO, CA 92101
PHONE: (619) 234-9411
WWW.KIMLEY-HORN.COM

KIMLEY-HORN SHALL HAVE NO LIABILITY WHATSOEVER FOR ANY COSTS ARISING OF THE REMOVAL OR REPLACEMENT OF UNSUITABLE MATERIALS, OR PROCEED WITH CONSTRUCTION WORK AND/OR USE MATERIALS NOT SHOWN ON FULLY-APPROVED PLANS AND SPECIFICATIONS. THE CLIENT ACKNOWLEDGES THAT ALL PRELIMINARY PLANS ARE SUBJECT TO CHANGE AND REVISION UNTIL PLANS ARE FULLY APPROVED AND ALL PERMITS OBTAINED.

LOCUST GATEWAY LOGISTICS CENTER

JOB NO.: 195504001
DATE: 6/13/2025

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APPENDIX E

EXISITING CONDITIONS HYDROLOGY CIVILD RATIONAL METHOD RESULTS

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 04/24/24

LOCUST GATEWAY LOGISTICS
EXISITING CONDITION RATIONAL METHOD ANALYSIS
10-YR DESIGN STORM
BY LUIS PEREZ 10/06/23

Program License Serial Number 6443

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 1.160 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 38.00
Adjusted SCS curve number for AMC 3 = 58.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.707(In/Hr)
Initial subarea data:
Initial area flow distance = 500.000(Ft.)
Top (of initial area) elevation = 1642.900(Ft.)
Bottom (of initial area) elevation = 1630.900(Ft.)
Difference in elevation = 12.000(Ft.)
Slope = 0.02400 s(%)= 2.40
TC = k(0.935)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 23.679 min.
Rainfall intensity = 2.026(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.586

```
Subarea runoff =      6.352(CFS)
Total initial stream area =        5.350(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.707(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.299(Ft.), Average velocity =   2.060(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2            100.00              0.50
        3            140.00              0.00
        4            180.00              0.50
        5            280.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =     14.774(CFS)
  '     '        flow top width =     47.906(Ft.)
  '     '    velocity=    2.060(Ft/s)
  '     '        area =      7.172(Sq.Ft)
  '     '        Froude number =     0.938

Upstream point elevation =  1630.900(Ft.)
Downstream point elevation =  1596.000(Ft.)
Flow length =  1604.000(Ft.)
Travel time  =   12.98 min.
Time of concentration =   36.66 min.
Depth of flow =   0.299(Ft.)
Average velocity =   2.060(Ft/s)
Total irregular channel flow =    14.773(CFS)
Irregular channel normal depth above invert elev. =   0.299(Ft.)
Average velocity of channel(s) =   2.060(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 38.00
Adjusted SCS curve number for AMC 3 = 58.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.707(In/Hr)
Rainfall intensity =      1.559(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
```

```
rational method)(Q=KCIA) is C = 0.492
Subarea runoff =     16.762(CFS) for   24.800(Ac.)
Total runoff =     23.115(CFS)
Effective area this stream =       30.15(Ac.)
Total Study Area (Main Stream No. 1) =       30.15(Ac.)
Area averaged Fm value =    0.707(In/Hr)
Depth of flow =   0.354(Ft.), Average velocity =   2.304(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 38.00
Adjusted SCS curve number for AMC 3 = 58.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.707(In/Hr)
Initial subarea data:
Initial area flow distance =   256.000(Ft.)
Top (of initial area) elevation =  1638.000(Ft.)
Bottom (of initial area) elevation =  1632.800(Ft.)
Difference in elevation =     5.200(Ft.)
Slope =    0.02031  s(%)=       2.03
TC = k(0.935)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   18.731 min.
Rainfall intensity =      2.332(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.627
Subarea runoff =      1.755(CFS)
Total initial stream area =        1.200(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.707(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.262(Ft.), Average velocity =   1.548(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2            100.00              0.50
        3            125.00              0.00
```

```
        4            150.00              0.50
        5            250.00              1.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =      5.332(CFS)
  '     '        flow top width =     26.246(Ft.)
  '     '    velocity=    1.548(Ft/s)
  '     '        area =      3.444(Sq.Ft)
  '     '        Froude number =     0.753

Upstream point elevation =  1632.800(Ft.)
Downstream point elevation =  1616.300(Ft.)
Flow length =  1126.000(Ft.)
Travel time  =   12.12 min.
Time of concentration =   30.85 min.
Depth of flow =   0.262(Ft.)
Average velocity =   1.548(Ft/s)
Total irregular channel flow =     5.332(CFS)
Irregular channel normal depth above invert elev. =   0.262(Ft.)
Average velocity of channel(s) =   1.548(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 38.00
Adjusted SCS curve number for AMC 3 = 58.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.707(In/Hr)
Rainfall intensity =      1.729(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.532
Subarea runoff =      7.091(CFS) for    8.420(Ac.)
Total runoff =      8.846(CFS)
Effective area this stream =        9.62(Ac.)
Total Study Area (Main Stream No. 1) =       39.77(Ac.)
Area averaged Fm value =    0.707(In/Hr)
Depth of flow =   0.317(Ft.), Average velocity =   1.757(Ft/s)
End of computations, Total Study Area =           39.77 (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) = 1.000
Area averaged SCS curve number =  38.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 04/24/24

LOCUST GATEWAY LOGISTICS
EXISITING CONDITION RATIONAL METHOD ANALYSIS
100-YR DESIGN STORM
BY LUIS PEREZ 10/02/23

Program License Serial Number 6443

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.810 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 38.00
Adjusted SCS curve number for AMC 3 = 58.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.707(In/Hr)
Initial subarea data:
Initial area flow distance = 500.000(Ft.)
Top (of initial area) elevation = 1642.900(Ft.)
Bottom (of initial area) elevation = 1630.900(Ft.)
Difference in elevation = 12.000(Ft.)
Slope = 0.02400 s(%)= 2.40
TC = k(0.935)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 23.679 min.
Rainfall intensity = 3.162(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.699

```
Subarea runoff =     11.820(CFS)
Total initial stream area =        5.350(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.707(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.393(Ft.), Average velocity =   2.471(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2            100.00              0.50
        3            140.00              0.00
        4            180.00              0.50
        5            280.00              1.00
Manning's 'N' friction factor =   0.030
------------------------------------------------------------------
Sub-Channel flow  =     30.592(CFS)
  '     '        flow top width =     62.942(Ft.)
  '     '    velocity=    2.471(Ft/s)
  '     '        area =     12.380(Sq.Ft)
  '     '        Froude number =     0.982

Upstream point elevation =  1630.900(Ft.)
Downstream point elevation =  1596.000(Ft.)
Flow length =  1604.000(Ft.)
Travel time  =   10.82 min.
Time of concentration =   34.50 min.
Depth of flow =   0.393(Ft.)
Average velocity =   2.471(Ft/s)
Total irregular channel flow =    30.592(CFS)
Irregular channel normal depth above invert elev. =   0.393(Ft.)
Average velocity of channel(s) =   2.471(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 38.00
Adjusted SCS curve number for AMC 3 = 58.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.707(In/Hr)
Rainfall intensity =      2.523(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
```

```
rational method)(Q=KCIA) is C = 0.648
Subarea runoff =     37.449(CFS) for   24.800(Ac.)
Total runoff =     49.269(CFS)
Effective area this stream =       30.15(Ac.)
Total Study Area (Main Stream No. 1) =       30.15(Ac.)
Area averaged Fm value =    0.707(In/Hr)
Depth of flow =   0.470(Ft.), Average velocity =   2.784(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 38.00
Adjusted SCS curve number for AMC 3 = 58.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.707(In/Hr)
Initial subarea data:
Initial area flow distance =   256.000(Ft.)
Top (of initial area) elevation =  1638.000(Ft.)
Bottom (of initial area) elevation =  1632.800(Ft.)
Difference in elevation =     5.200(Ft.)
Slope =    0.02031  s(%)=       2.03
TC = k(0.935)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   18.731 min.
Rainfall intensity =      3.639(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.725
Subarea runoff =      3.167(CFS)
Total initial stream area =        1.200(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.707(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.341(Ft.), Average velocity =   1.843(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.00
        2            100.00              0.50
        3            125.00              0.00
```

```
        4            150.00              0.50
        5            250.00              1.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     10.703(CFS)
  '     '        flow top width =     34.082(Ft.)
  '     '    velocity=    1.843(Ft/s)
  '     '        area =      5.808(Sq.Ft)
  '     '        Froude number =     0.787

Upstream point elevation =  1632.800(Ft.)
Downstream point elevation =  1616.300(Ft.)
Flow length =  1126.000(Ft.)
Travel time  =   10.18 min.
Time of concentration =   28.91 min.
Depth of flow =   0.341(Ft.)
Average velocity =   1.843(Ft/s)
Total irregular channel flow =    10.703(CFS)
Irregular channel normal depth above invert elev. =   0.341(Ft.)
Average velocity of channel(s) =   1.843(Ft/s)
 Adding area flow to channel
UNDEVELOPED (dense cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 38.00
Adjusted SCS curve number for AMC 3 = 58.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.707(In/Hr)
Rainfall intensity =      2.805(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.673
Subarea runoff =     14.994(CFS) for    8.420(Ac.)
Total runoff =     18.161(CFS)
Effective area this stream =        9.62(Ac.)
Total Study Area (Main Stream No. 1) =       39.77(Ac.)
Area averaged Fm value =    0.707(In/Hr)
Depth of flow =   0.416(Ft.), Average velocity =   2.103(Ft/s)
End of computations, Total Study Area =           39.77 (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) = 1.000
Area averaged SCS curve number =  38.0
```

APPENDIX G

PROPOSED CONDITIONS HYDROLOGY CIVILD HYDROGRAPH RESULTS

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 06/12/25

LOCUST GATEWAY LOGISTICS
PROPOSED CONDITION RATIONAL METHOD ANALYSIS
10-YR DESIGN STORM
BY ROLANDO HERNANDEZ 06/12/2025

Program License Serial Number 6443

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 1.160 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 179.000(Ft.)
Top (of initial area) elevation = 1627.400(Ft.)
Bottom (of initial area) elevation = 1621.000(Ft.)
Difference in elevation = 6.400(Ft.)
Slope = 0.03575 s(%)= 3.58
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 4.714 min.
Rainfall intensity = 5.338(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff = 4.150(CFS)
Total initial stream area = 0.880(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)

++
Process from Point/Station 101.000 to Point/Station 102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1618.100(Ft.)
Downstream point/station elevation = 1617.600(Ft.)
Pipe length = 59.00(Ft.) Manning's N = 0.012
No. of pipes = 1 Required pipe flow = 4.150(CFS)

```
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.150(CFS)
Normal flow depth in pipe =    8.75(In.)
Flow top width inside pipe =   14.79(In.)
Critical Depth =    9.90(In.)
Pipe flow velocity =      5.58(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =     4.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      102.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.880(Ac.)
Runoff from this stream =      4.150(CFS)
Time of concentration =    4.89 min.
Rainfall intensity =     5.221(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   185.000(Ft.)
Top (of initial area) elevation =  1632.100(Ft.)
Bottom (of initial area) elevation =  1621.200(Ft.)
Difference in elevation =    10.900(Ft.)
Slope =    0.05892  s(%)=       5.89
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.322 min.
Rainfall intensity =      5.623(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff =      1.740(CFS)
Total initial stream area =        0.350(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      102.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.350(Ac.)
Runoff from this stream =      1.740(CFS)
Time of concentration =    4.32 min.
Rainfall intensity =     5.623(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:
```

```
Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1      4.15     0.880      4.89    0.098      5.221
2      1.74     0.350      4.32    0.098      5.623
Qmax(1) =
          1.000 *    1.000 *     4.150) +
          0.927 *    1.000 *     1.740) + =       5.764
Qmax(2) =
          1.078 *    0.884 *     4.150) +
          1.000 *    1.000 *     1.740) + =       5.696

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.150       1.740
Maximum flow rates at confluence using above data:
        5.764        5.696
Area of streams before confluence:
        0.880        0.350
Effective area values after confluence:
        1.230        1.128
Results of confluence:
Total flow rate =      5.764(CFS)
Time of concentration =     4.890 min.
Effective stream area after confluence =      1.230(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       1.23(Ac.)


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Process from Point/Station      102.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1618.600(Ft.)
Downstream point/station elevation =  1618.100(Ft.)
Pipe length  =   230.00(Ft.)   Manning's N = 0.012
No. of pipes = 2  Required pipe flow  =     5.764(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     2.882(CFS)
Normal flow depth in pipe =   10.95(In.)
Flow top width inside pipe =   13.32(In.)
Critical Depth =    8.19(In.)
Pipe flow velocity =      3.00(Ft/s)
Travel time through pipe =    1.28 min.
Time of concentration (TC) =     6.17 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.230(Ac.)
Runoff from this stream =      5.764(CFS)
Time of concentration =    6.17 min.
Rainfall intensity =     4.543(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   194.000(Ft.)
Top (of initial area) elevation =  1627.800(Ft.)
Bottom (of initial area) elevation =  1621.000(Ft.)
Difference in elevation =     6.800(Ft.)
Slope =    0.03505  s(%)=       3.51
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.887 min.
Rainfall intensity =      5.223(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.883
Subarea runoff =      4.751(CFS)
Total initial stream area =        1.030(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station      106.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1618.100(Ft.)
Downstream point/station elevation =  1617.600(Ft.)
Pipe length  =   215.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     4.751(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.751(CFS)
Normal flow depth in pipe =   12.94(In.)
Flow top width inside pipe =   16.19(In.)
Critical Depth =   10.05(In.)
Pipe flow velocity =      3.50(Ft/s)
Travel time through pipe =    1.03 min.
Time of concentration (TC) =     5.91 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.030(Ac.)
Runoff from this stream =      4.751(CFS)
Time of concentration =    5.91 min.
Rainfall intensity =     4.659(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   179.000(Ft.)
Top (of initial area) elevation =  1629.900(Ft.)
Bottom (of initial area) elevation =  1620.900(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.05028  s(%)=       5.03
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.403 min.
Rainfall intensity =      5.560(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff =      1.377(CFS)
Total initial stream area =        0.280(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      0.280(Ac.)
Runoff from this stream =      1.377(CFS)
Time of concentration =    4.40 min.
Rainfall intensity =     5.560(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1      5.76     1.230      6.17    0.098      4.543
2      4.75     1.030      5.91    0.098      4.659
3      1.38     0.280      4.40    0.098      5.560
Qmax(1) =
          1.000 *    1.000 *     5.764) +
          0.974 *    1.000 *     4.751) +
          0.814 *    1.000 *     1.377) + =      11.513
Qmax(2) =
          1.026 *    0.959 *     5.764) +
          1.000 *    1.000 *     4.751) +
          0.835 *    1.000 *     1.377) + =      11.571
Qmax(3) =
          1.229 *    0.714 *     5.764) +
          1.198 *    0.745 *     4.751) +
          1.000 *    1.000 *     1.377) + =      10.671

Total of 3 streams to confluence:
Flow rates before confluence point:
       5.764       4.751       1.377
Maximum flow rates at confluence using above data:
       11.513       11.571       10.671
Area of streams before confluence:
        1.230        1.030        0.280
Effective area values after confluence:
        2.540        2.489        1.925
```

```
Results of confluence:
Total flow rate =     11.571(CFS)
Time of concentration =     5.912 min.
Effective stream area after confluence =      2.489(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       2.54(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1621.400(Ft.)
Downstream point/station elevation =  1620.900(Ft.)
Pipe length  =   380.00(Ft.)   Manning's N = 0.012
No. of pipes = 4  Required pipe flow  =    11.571(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     2.893(CFS)
Normal flow depth in pipe =   11.11(In.)
Flow top width inside pipe =   17.50(In.)
Critical Depth =    7.75(In.)
Pipe flow velocity =      2.53(Ft/s)
Travel time through pipe =    2.50 min.
Time of concentration (TC) =     8.42 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.489(Ac.)
Runoff from this stream =     11.571(CFS)
Time of concentration =    8.42 min.
Rainfall intensity =     3.769(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area     TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     11.57     2.489      8.42    0.098      3.769
Qmax(1) =
          1.000 *    1.000 *    11.571) + =      11.571

Total of 1 streams to confluence:
Flow rates before confluence point:
      11.571
Maximum flow rates at confluence using above data:
       11.571
Area of streams before confluence:
        2.489
Effective area values after confluence:
        2.489
Results of confluence:
Total flow rate =     11.571(CFS)
Time of concentration =     8.417 min.
Effective stream area after confluence =      2.489(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
```

```
Study area total (this main stream) =       2.49(Ac.)


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Process from Point/Station      108.000 to Point/Station      109.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   398.000(Ft.)
Top (of initial area) elevation =  1637.600(Ft.)
Bottom (of initial area) elevation =  1618.000(Ft.)
Difference in elevation =    19.600(Ft.)
Slope =    0.04925  s(%)=       4.92
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.086 min.
Rainfall intensity =      4.579(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.881
Subarea runoff =     10.284(CFS)
Total initial stream area =        2.550(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.550(Ac.)
Runoff from this stream =     10.284(CFS)
Time of concentration =    6.09 min.
Rainfall intensity =     4.579(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area     TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     11.57     2.489      8.42    0.098      3.769
Qmax(1) =
          1.000 *    1.000 *    11.571) + =      11.571

Total of 1 streams to confluence:
Flow rates before confluence point:
      11.571
Maximum flow rates at confluence using above data:
       11.571
Area of streams before confluence:
        2.489
Effective area values after confluence:
        2.489
Results of confluence:
Total flow rate =     11.571(CFS)
Time of concentration =     8.417 min.
```

```
Effective stream area after confluence =      2.489(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       2.49(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1615.000(Ft.)
Downstream point/station elevation =  1609.000(Ft.)
Pipe length  =    92.70(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    11.571(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    11.571(CFS)
Normal flow depth in pipe =    8.81(In.)
Flow top width inside pipe =   14.77(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.45(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     8.52 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.489(Ac.)
Runoff from this stream =     11.571(CFS)
Time of concentration =    8.52 min.
Rainfall intensity =     3.743(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      111.000 to Point/Station      112.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   203.000(Ft.)
Top (of initial area) elevation =  1622.400(Ft.)
Bottom (of initial area) elevation =  1616.000(Ft.)
Difference in elevation =     6.400(Ft.)
Slope =    0.03153  s(%)=       3.15
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.083 min.
Rainfall intensity =      5.101(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.883
Subarea runoff =     38.771(CFS)
Total initial stream area =        8.610(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)
```

```
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Process from Point/Station      112.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1616.200(Ft.)
Downstream point/station elevation =  1614.800(Ft.)
Pipe length  =    27.50(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    38.771(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    38.771(CFS)
Normal flow depth in pipe =   17.22(In.)
Flow top width inside pipe =   16.14(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.36(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     5.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      8.610(Ac.)
Runoff from this stream =     38.771(CFS)
Time of concentration =    5.11 min.
Rainfall intensity =     5.086(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     11.57     2.489      8.52    0.098      3.743
2     38.77     8.610      5.11    0.098      5.086
Qmax(1) =
          1.000 *    1.000 *    11.571) +
          0.731 *    1.000 *    38.771) + =      39.899
Qmax(2) =
          1.369 *    0.600 *    11.571) +
          1.000 *    1.000 *    38.771) + =      48.269

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.571      38.771
Maximum flow rates at confluence using above data:
       39.899       48.269
Area of streams before confluence:
        2.489        8.610
Effective area values after confluence:
       11.099       10.103
Results of confluence:
Total flow rate =     48.269(CFS)
Time of concentration =     5.108 min.
Effective stream area after confluence =     10.103(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =      11.10(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      114.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   393.000(Ft.)
Top (of initial area) elevation =  1618.500(Ft.)
Bottom (of initial area) elevation =  1615.900(Ft.)
Difference in elevation =     2.600(Ft.)
Slope =    0.00662  s(%)=       0.66
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.047 min.
Rainfall intensity =      3.609(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.876
Subarea runoff =     14.191(CFS)
Total initial stream area =        4.490(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1615.900(Ft.)
Downstream point/station elevation =  1610.000(Ft.)
Pipe length  =    25.50(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    14.191(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =    14.191(CFS)
Normal flow depth in pipe =    7.86(In.)
Flow top width inside pipe =   11.41(In.)
Critical depth could not be calculated.
Pipe flow velocity =     26.04(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     9.06 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      116.000 to Point/Station      117.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   409.000(Ft.)
Top (of initial area) elevation =  1622.400(Ft.)
Bottom (of initial area) elevation =  1611.700(Ft.)
Difference in elevation =    10.700(Ft.)
Slope =    0.02616  s(%)=       2.62
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =    6.983 min.
Rainfall intensity =      4.216(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.879
Subarea runoff =     11.120(CFS)
Total initial stream area =        3.000(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station      117.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------------
Upstream point/station elevation =  1611.700(Ft.)
Downstream point/station elevation =  1609.000(Ft.)
Pipe length  =    43.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    11.120(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    11.120(CFS)
Normal flow depth in pipe =    8.67(In.)
Flow top width inside pipe =   14.82(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.13(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     7.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.000(Ac.)
Runoff from this stream =     11.120(CFS)
Time of concentration =    7.03 min.
Rainfall intensity =     4.199(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station      118.000 to Point/Station      119.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   230.000(Ft.)
Top (of initial area) elevation =  1622.400(Ft.)
Bottom (of initial area) elevation =  1617.500(Ft.)
Difference in elevation =     4.900(Ft.)
Slope =    0.02130  s(%)=       2.13
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.779 min.
Rainfall intensity =      4.723(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.881
Subarea runoff =      6.993(CFS)
Total initial stream area =        1.680(Ac.)
```

```
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station      119.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1616.000(Ft.)
Downstream point/station elevation =  1609.000(Ft.)
Pipe length  =   545.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     6.993(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.993(CFS)
Normal flow depth in pipe =   10.95(In.)
Flow top width inside pipe =   13.32(In.)
Critical Depth =   12.71(In.)
Pipe flow velocity =      7.29(Ft/s)
Travel time through pipe =    1.25 min.
Time of concentration (TC) =     7.02 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.680(Ac.)
Runoff from this stream =      6.993(CFS)
Time of concentration =    7.02 min.
Rainfall intensity =     4.201(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     11.12     3.000      7.03    0.098      4.199
2      6.99     1.680      7.02    0.098      4.201
Qmax(1) =
          1.000 *    1.000 *    11.120) +
          0.999 *    1.000 *     6.993) + =      18.110
Qmax(2) =
          1.001 *    0.999 *    11.120) +
          1.000 *    1.000 *     6.993) + =      18.110

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.120       6.993
Maximum flow rates at confluence using above data:
       18.110       18.110
Area of streams before confluence:
        3.000        1.680
Effective area values after confluence:
        4.680        4.678
Results of confluence:
Total flow rate =     18.110(CFS)
Time of concentration =     7.024 min.
Effective stream area after confluence =      4.678(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
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Study area total (this main stream) =       4.68(Ac.)


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Process from Point/Station      120.000 to Point/Station      121.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1609.000(Ft.)
Downstream point/station elevation =  1607.000(Ft.)
Pipe length  =   331.50(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    18.110(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    18.110(CFS)
Normal flow depth in pipe =   18.70(In.)
Flow top width inside pipe =   19.91(In.)
Critical Depth =   18.39(In.)
Pipe flow velocity =      6.90(Ft/s)
Travel time through pipe =    0.80 min.
Time of concentration (TC) =     7.83 min.


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Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   467.000(Ft.)
Top (of initial area) elevation =  1643.600(Ft.)
Bottom (of initial area) elevation =  1620.000(Ft.)
Difference in elevation =    23.600(Ft.)
Slope =    0.05054  s(%)=       5.05
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.455 min.
Rainfall intensity =      4.420(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.880
Subarea runoff =     18.205(CFS)
Total initial stream area =        4.680(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1617.000(Ft.)
Downstream point/station elevation =  1615.000(Ft.)
Pipe length  =   564.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    18.205(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    18.205(CFS)
Normal flow depth in pipe =   20.25(In.)
Flow top width inside pipe =   23.38(In.)
Critical Depth =   17.91(In.)
Pipe flow velocity =      5.70(Ft/s)
Travel time through pipe =    1.65 min.
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Time of concentration (TC) =     8.11 min.


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Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.680(Ac.)
Runoff from this stream =     18.205(CFS)
Time of concentration =    8.11 min.
Rainfall intensity =     3.856(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


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Process from Point/Station      203.000 to Point/Station      204.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   140.000(Ft.)
Top (of initial area) elevation =  1622.500(Ft.)
Bottom (of initial area) elevation =  1620.800(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.01214  s(%)=       1.21
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.302 min.
Rainfall intensity =      4.974(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.882
Subarea runoff =     11.848(CFS)
Total initial stream area =        2.700(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      202.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1620.800(Ft.)
Downstream point/station elevation =  1615.000(Ft.)
Pipe length  =   378.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    11.848(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.848(CFS)
Normal flow depth in pipe =   12.63(In.)
Flow top width inside pipe =   16.47(In.)
Critical Depth =   15.69(In.)
Pipe flow velocity =      8.94(Ft/s)
Travel time through pipe =    0.70 min.
Time of concentration (TC) =     6.01 min.
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Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MAIN STREAMS ****
------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.700(Ac.)
Runoff from this stream =     11.848(CFS)
Time of concentration =    6.01 min.
Rainfall intensity =     4.615(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     18.21     4.680      8.11    0.098      3.856
2     11.85     2.700      6.01    0.098      4.615
Qmax(1) =
          1.000 *    1.000 *    18.205) +
          0.832 *    1.000 *    11.848) + =      28.062
Qmax(2) =
          1.202 *    0.741 *    18.205) +
          1.000 *    1.000 *    11.848) + =      28.067

Total of 2 main streams to confluence:
Flow rates before confluence point:
      19.205      12.848
Maximum flow rates at confluence using above data:
       28.062       28.067
Area of streams before confluence:
        4.680        2.700
Effective area values after confluence:
        7.380        6.169


Results of confluence:
Total flow rate =     28.067(CFS)
Time of concentration =     6.007 min.
Effective stream area after confluence  =      6.169(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total =       7.38(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =  1170.000(Ft.)
Top (of initial area) elevation =  1635.400(Ft.)
Bottom (of initial area) elevation =  1610.000(Ft.)
Difference in elevation =    25.400(Ft.)
```

```
Slope =    0.02171  s(%)=       2.17
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.036 min.
Rainfall intensity =      3.204(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.873
Subarea runoff =     20.518(CFS)
Total initial stream area =        7.340(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      301.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.340(Ac.)
Runoff from this stream =     20.518(CFS)
Time of concentration =   11.04 min.
Rainfall intensity =     3.204(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   402.000(Ft.)
Top (of initial area) elevation =  1622.900(Ft.)
Bottom (of initial area) elevation =  1613.700(Ft.)
Difference in elevation =     9.200(Ft.)
Slope =    0.02289  s(%)=       2.29
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.123 min.
Rainfall intensity =      4.166(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.879
Subarea runoff =      7.983(CFS)
Total initial stream area =        2.180(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


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Process from Point/Station      302.000 to Point/Station      301.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1611.000(Ft.)
Downstream point/station elevation =  1610.000(Ft.)
Pipe length  =   132.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     7.983(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.983(CFS)
```

```
Normal flow depth in pipe =   12.25(In.)
Flow top width inside pipe =   16.79(In.)
Critical Depth =   13.13(In.)
Pipe flow velocity =      6.24(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =     7.48 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      301.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.180(Ac.)
Runoff from this stream =      7.983(CFS)
Time of concentration =    7.48 min.
Rainfall intensity =     4.047(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     20.52     7.340     11.04    0.098      3.204
2      7.98     2.180      7.48    0.098      4.047
Qmax(1) =
          1.000 *    1.000 *    20.518) +
          0.786 *    1.000 *     7.983) + =      26.796
Qmax(2) =
          1.272 *    0.677 *    20.518) +
          1.000 *    1.000 *     7.983) + =      25.655

Total of 2 main streams to confluence:
Flow rates before confluence point:
      21.518       8.983
Maximum flow rates at confluence using above data:
       26.796       25.655
Area of streams before confluence:
        7.340        2.180
Effective area values after confluence:
        9.520        7.152


Results of confluence:
Total flow rate =     26.796(CFS)
Time of concentration =    11.036 min.
Effective stream area after confluence  =      9.520(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total =       9.52(Ac.)
End of computations, Total Study Area =           39.77 (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) = 0.100
Area averaged SCS curve number =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2018 Version 9.0
Rational Hydrology Study Date: 06/13/25

LOCUST GATEWAY LOGISTICS
PROPOSED CONDITION RATIONAL METHOD ANALYSIS
10-YR DESIGN STORM
BY ROLANDO HERNANDEZ 06/12/2025

Program License Serial Number 6443

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.810 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++
Process from Point/Station 100.000 to Point/Station 101.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.079(In/Hr)
Initial subarea data:
Initial area flow distance = 179.000(Ft.)
Top (of initial area) elevation = 1627.400(Ft.)
Bottom (of initial area) elevation = 1621.000(Ft.)
Difference in elevation = 6.400(Ft.)
Slope = 0.03575 s(%)= 3.58
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 4.714 min.
Rainfall intensity = 8.328(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff = 6.534(CFS)
Total initial stream area = 0.880(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.079(In/Hr)

++
Process from Point/Station 101.000 to Point/Station 102.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 1618.100(Ft.)
Downstream point/station elevation = 1617.600(Ft.)
Pipe length = 59.00(Ft.) Manning's N = 0.012

```
No. of pipes = 1  Required pipe flow  =     6.534(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     6.534(CFS)
Normal flow depth in pipe =   10.30(In.)
Flow top width inside pipe =   17.81(In.)
Critical Depth =   11.85(In.)
Pipe flow velocity =      6.25(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =     4.87 min.


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Process from Point/Station      102.000 to Point/Station      102.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      0.880(Ac.)
Runoff from this stream =      6.534(CFS)
Time of concentration =    4.87 min.
Rainfall intensity =     8.166(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station      103.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   185.000(Ft.)
Top (of initial area) elevation =  1632.100(Ft.)
Bottom (of initial area) elevation =  1621.200(Ft.)
Difference in elevation =    10.900(Ft.)
Slope =    0.05892  s(%)=       5.89
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.322 min.
Rainfall intensity =      8.773(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =      2.739(CFS)
Total initial stream area =        0.350(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


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Process from Point/Station      102.000 to Point/Station      102.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.350(Ac.)
Runoff from this stream =      2.739(CFS)
Time of concentration =    4.32 min.
Rainfall intensity =     8.773(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
```

Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	6.53	0.880	4.87	0.079	8.166
2	2.74	0.350	4.32	0.079	8.773

```
Qmax(1) =
          1.000 *    1.000 *     6.534) +
          0.930 *    1.000 *     2.739) + =       9.081
Qmax(2) =
          1.075 *    0.887 *     6.534) +
          1.000 *    1.000 *     2.739) + =       8.972

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.534       2.739
Maximum flow rates at confluence using above data:
        9.081        8.972
Area of streams before confluence:
        0.880        0.350
Effective area values after confluence:
        1.230        1.131
Results of confluence:
Total flow rate =      9.081(CFS)
Time of concentration =     4.871 min.
Effective stream area after confluence =      1.230(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       1.23(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1618.600(Ft.)
Downstream point/station elevation =  1618.100(Ft.)
Pipe length  =   230.00(Ft.)   Manning's N = 0.012
No. of pipes = 2  Required pipe flow  =     9.081(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     4.541(CFS)
Normal flow depth in pipe =   12.82(In.)
Flow top width inside pipe =   16.30(In.)
Critical Depth =    9.82(In.)
Pipe flow velocity =      3.37(Ft/s)
Travel time through pipe =    1.14 min.
Time of concentration (TC) =     6.01 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.230(Ac.)
Runoff from this stream =      9.081(CFS)
Time of concentration =    6.01 min.
Rainfall intensity =     7.201(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
----------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   194.000(Ft.)
Top (of initial area) elevation =  1627.800(Ft.)
Bottom (of initial area) elevation =  1621.000(Ft.)
Difference in elevation =     6.800(Ft.)
Slope =    0.03505  s(%)=       3.51
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.887 min.
Rainfall intensity =      8.150(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.891
Subarea runoff =      7.482(CFS)
Total initial stream area =        1.030(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      104.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
----------------------------------------------------------------------
Upstream point/station elevation =  1618.100(Ft.)
Downstream point/station elevation =  1617.600(Ft.)
Pipe length  =   215.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     7.482(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     7.482(CFS)
Normal flow depth in pipe =   15.63(In.)
Flow top width inside pipe =   18.32(In.)
Critical Depth =   12.16(In.)
Pipe flow velocity =      3.90(Ft/s)
Travel time through pipe =    0.92 min.
Time of concentration (TC) =     5.81 min.


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Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****
----------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.030(Ac.)
Runoff from this stream =      7.482(CFS)
Time of concentration =    5.81 min.
Rainfall intensity =     7.349(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station      107.000 to Point/Station      104.000
**** INITIAL AREA EVALUATION ****
```

```
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   179.000(Ft.)
Top (of initial area) elevation =  1629.900(Ft.)
Bottom (of initial area) elevation =  1620.900(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.05028  s(%)=       5.03
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.403 min.
Rainfall intensity =      8.676(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =      2.167(CFS)
Total initial stream area =        0.280(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


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Process from Point/Station      104.000 to Point/Station      104.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      0.280(Ac.)
Runoff from this stream =      2.167(CFS)
Time of concentration =    4.40 min.
Rainfall intensity =     8.676(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area     TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1      9.08     1.230      6.01    0.079      7.201
2      7.48     1.030      5.81    0.079      7.349
3      2.17     0.280      4.40    0.079      8.676
Qmax(1) =
          1.000 *    1.000 *     9.081) +
          0.980 *    1.000 *     7.482) +
          0.828 *    1.000 *     2.167) + =      18.206
Qmax(2) =
          1.021 *    0.967 *     9.081) +
          1.000 *    1.000 *     7.482) +
          0.846 *    1.000 *     2.167) + =      18.275
Qmax(3) =
          1.207 *    0.733 *     9.081) +
          1.183 *    0.758 *     7.482) +
          1.000 *    1.000 *     2.167) + =      16.911

Total of 3 streams to confluence:
Flow rates before confluence point:
       9.081       7.482       2.167
Maximum flow rates at confluence using above data:
       18.206       18.275       16.911
```

```
Area of streams before confluence:
        1.230        1.030        0.280
Effective area values after confluence:
        2.540        2.499        1.963
Results of confluence:
Total flow rate =     18.275(CFS)
Time of concentration =     5.807 min.
Effective stream area after confluence =      2.499(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       2.54(Ac.)


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Process from Point/Station      104.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1621.400(Ft.)
Downstream point/station elevation =  1620.900(Ft.)
Pipe length  =   380.00(Ft.)   Manning's N = 0.012
No. of pipes = 4  Required pipe flow  =    18.275(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     4.569(CFS)
Normal flow depth in pipe =   13.36(In.)
Flow top width inside pipe =   20.21(In.)
Critical Depth =    9.38(In.)
Pipe flow velocity =      2.83(Ft/s)
Travel time through pipe =    2.24 min.
Time of concentration (TC) =     8.05 min.


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.499(Ac.)
Runoff from this stream =     18.275(CFS)
Time of concentration =    8.05 min.
Rainfall intensity =     6.043(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area     TC      Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min)  (In/Hr)      (In/Hr)


1     18.28     2.499      8.05    0.079      6.043
Qmax(1) =
          1.000 *    1.000 *    18.275) + =      18.275

Total of 1 streams to confluence:
Flow rates before confluence point:
      18.275
Maximum flow rates at confluence using above data:
       18.275
Area of streams before confluence:
        2.499
Effective area values after confluence:
        2.499
Results of confluence:
Total flow rate =     18.275(CFS)
```

```
Time of concentration =     8.046 min.
Effective stream area after confluence =      2.499(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       2.50(Ac.)


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Process from Point/Station      108.000 to Point/Station      109.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   398.000(Ft.)
Top (of initial area) elevation =  1637.600(Ft.)
Bottom (of initial area) elevation =  1618.000(Ft.)
Difference in elevation =    19.600(Ft.)
Slope =    0.04925  s(%)=       4.92
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.086 min.
Rainfall intensity =      7.144(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff =     16.216(CFS)
Total initial stream area =        2.550(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


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Process from Point/Station      109.000 to Point/Station      109.000
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.550(Ac.)
Runoff from this stream =     16.216(CFS)
Time of concentration =    6.09 min.
Rainfall intensity =     7.144(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     18.28     2.499      8.05    0.079      6.043
Qmax(1) =
          1.000 *    1.000 *    18.275) + =      18.275

Total of 1 streams to confluence:
Flow rates before confluence point:
      18.275
Maximum flow rates at confluence using above data:
       18.275
Area of streams before confluence:
        2.499
```

```
Effective area values after confluence:
        2.499
Results of confluence:
Total flow rate =     18.275(CFS)
Time of concentration =     8.046 min.
Effective stream area after confluence =      2.499(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       2.50(Ac.)


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Process from Point/Station      109.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1615.000(Ft.)
Downstream point/station elevation =  1609.000(Ft.)
Pipe length  =    92.70(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    18.275(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    18.275(CFS)
Normal flow depth in pipe =   10.37(In.)
Flow top width inside pipe =   17.79(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.32(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =     8.14 min.


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Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.499(Ac.)
Runoff from this stream =     18.275(CFS)
Time of concentration =    8.14 min.
Rainfall intensity =     6.003(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station      111.000 to Point/Station      112.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   203.000(Ft.)
Top (of initial area) elevation =  1622.400(Ft.)
Bottom (of initial area) elevation =  1616.000(Ft.)
Difference in elevation =     6.400(Ft.)
Slope =    0.03153  s(%)=       3.15
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.083 min.
Rainfall intensity =      7.960(In/Hr) for a   100.0 year storm
```

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.891
Subarea runoff =     61.070(CFS)
Total initial stream area =        8.610(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


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Process from Point/Station      112.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1616.200(Ft.)
Downstream point/station elevation =  1614.800(Ft.)
Pipe length  =    27.50(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    61.070(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    61.070(CFS)
Normal flow depth in pipe =   18.38(In.)
Flow top width inside pipe =   25.18(In.)
Critical depth could not be calculated.
Pipe flow velocity =     21.18(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     5.10 min.


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Process from Point/Station      110.000 to Point/Station      110.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      8.610(Ac.)
Runoff from this stream =     61.070(CFS)
Time of concentration =    5.10 min.
Rainfall intensity =     7.939(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     18.28     2.499      8.14    0.079      6.003
2     61.07     8.610      5.10    0.079      7.939
Qmax(1) =
          1.000 *    1.000 *    18.275) +
          0.754 *    1.000 *    61.070) + =      64.300
Qmax(2) =
          1.327 *    0.627 *    18.275) +
          1.000 *    1.000 *    61.070) + =      76.286

Total of 2 streams to confluence:
Flow rates before confluence point:
      18.275      61.070
Maximum flow rates at confluence using above data:
       64.300       76.286
Area of streams before confluence:
        2.499        8.610
Effective area values after confluence:
       11.109       10.178
Results of confluence:
Total flow rate =     76.286(CFS)
Time of concentration =     5.105 min.
```

```
Effective stream area after confluence =     10.178(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =      11.11(Ac.)


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Process from Point/Station      113.000 to Point/Station      114.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   393.000(Ft.)
Top (of initial area) elevation =  1618.500(Ft.)
Bottom (of initial area) elevation =  1615.900(Ft.)
Difference in elevation =     2.600(Ft.)
Slope =    0.00662  s(%)=       0.66
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.047 min.
Rainfall intensity =      5.632(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.887
Subarea runoff =     22.442(CFS)
Total initial stream area =        4.490(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


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Process from Point/Station      114.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  1615.900(Ft.)
Downstream point/station elevation =  1610.000(Ft.)
Pipe length  =    25.50(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    22.442(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    22.442(CFS)
Normal flow depth in pipe =    8.95(In.)
Flow top width inside pipe =   14.72(In.)
Critical depth could not be calculated.
Pipe flow velocity =     29.36(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =     9.06 min.


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Process from Point/Station      116.000 to Point/Station      117.000
**** INITIAL AREA EVALUATION ****
------------------------------------------------------------------------
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
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Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   409.000(Ft.)
Top (of initial area) elevation =  1622.400(Ft.)
Bottom (of initial area) elevation =  1611.700(Ft.)
Difference in elevation =    10.700(Ft.)
Slope =    0.02616  s(%)=       2.62
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.983 min.
Rainfall intensity =      6.579(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.889
Subarea runoff =     17.551(CFS)
Total initial stream area =        3.000(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


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Process from Point/Station      117.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1611.700(Ft.)
Downstream point/station elevation =  1609.000(Ft.)
Pipe length  =    43.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    17.551(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    17.551(CFS)
Normal flow depth in pipe =   12.30(In.)
Flow top width inside pipe =   11.53(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.29(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     7.03 min.


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Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      3.000(Ac.)
Runoff from this stream =     17.551(CFS)
Time of concentration =    7.03 min.
Rainfall intensity =     6.554(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


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Process from Point/Station      118.000 to Point/Station      119.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   230.000(Ft.)
Top (of initial area) elevation =  1622.400(Ft.)
```

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Bottom (of initial area) elevation =  1617.500(Ft.)
Difference in elevation =     4.900(Ft.)
Slope =    0.02130  s(%)=       2.13
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.779 min.
Rainfall intensity =      7.370(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff =     11.024(CFS)
Total initial stream area =        1.680(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


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Process from Point/Station      119.000 to Point/Station      120.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1616.000(Ft.)
Downstream point/station elevation =  1609.000(Ft.)
Pipe length  =   545.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    11.024(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.024(CFS)
Normal flow depth in pipe =   12.80(In.)
Flow top width inside pipe =   16.32(In.)
Critical Depth =   15.26(In.)
Pipe flow velocity =      8.20(Ft/s)
Travel time through pipe =    1.11 min.
Time of concentration (TC) =     6.89 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      120.000
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.680(Ac.)
Runoff from this stream =     11.024(CFS)
Time of concentration =    6.89 min.
Rainfall intensity =     6.634(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     17.55     3.000      7.03    0.079      6.554
2     11.02     1.680      6.89    0.079      6.634
Qmax(1) =
          1.000 *    1.000 *    17.551) +
          0.988 *    1.000 *    11.024) + =      28.442
Qmax(2) =
          1.012 *    0.980 *    17.551) +
          1.000 *    1.000 *    11.024) + =      28.437

Total of 2 streams to confluence:
Flow rates before confluence point:
      17.551      11.024
Maximum flow rates at confluence using above data:
       28.442       28.437
Area of streams before confluence:
```

```
        3.000        1.680
Effective area values after confluence:
        4.680        4.620
Results of confluence:
Total flow rate =     28.442(CFS)
Time of concentration =     7.027 min.
Effective stream area after confluence =      4.680(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       4.68(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      121.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1609.000(Ft.)
Downstream point/station elevation =  1607.000(Ft.)
Pipe length  =   331.50(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    28.442(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    28.442(CFS)
Normal flow depth in pipe =   20.74(In.)
Flow top width inside pipe =   27.71(In.)
Critical Depth =   21.82(In.)
Pipe flow velocity =      7.85(Ft/s)
Travel time through pipe =    0.70 min.
Time of concentration (TC) =     7.73 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      200.000 to Point/Station      201.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   467.000(Ft.)
Top (of initial area) elevation =  1643.600(Ft.)
Bottom (of initial area) elevation =  1620.000(Ft.)
Difference in elevation =    23.600(Ft.)
Slope =    0.05054  s(%)=       5.05
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.455 min.
Rainfall intensity =      6.897(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff =     28.718(CFS)
Total initial stream area =        4.680(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1617.000(Ft.)
```

```
Downstream point/station elevation =  1615.000(Ft.)
Pipe length  =   564.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    28.718(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    28.718(CFS)
Normal flow depth in pipe =   23.20(In.)
Flow top width inside pipe =   30.15(In.)
Critical Depth =   21.37(In.)
Pipe flow velocity =      6.44(Ft/s)
Travel time through pipe =    1.46 min.
Time of concentration (TC) =     7.91 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.680(Ac.)
Runoff from this stream =     28.718(CFS)
Time of concentration =    7.91 min.
Rainfall intensity =     6.102(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   140.000(Ft.)
Top (of initial area) elevation =  1622.500(Ft.)
Bottom (of initial area) elevation =  1620.800(Ft.)
Difference in elevation =     1.700(Ft.)
Slope =    0.01214  s(%)=       1.21
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.302 min.
Rainfall intensity =      7.761(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.891
Subarea runoff =     18.667(CFS)
Total initial stream area =        2.700(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      202.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  1620.800(Ft.)
Downstream point/station elevation =  1615.000(Ft.)
Pipe length  =   378.00(Ft.)   Manning's N = 0.012
```

```
No. of pipes = 1  Required pipe flow  =    18.667(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    18.667(CFS)
Normal flow depth in pipe =   15.26(In.)
Flow top width inside pipe =   18.72(In.)
Critical Depth =   18.77(In.)
Pipe flow velocity =      9.97(Ft/s)
Travel time through pipe =    0.63 min.
Time of concentration (TC) =     5.93 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      202.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.700(Ac.)
Runoff from this stream =     18.667(CFS)
Time of concentration =    5.93 min.
Rainfall intensity =     7.254(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     28.72     4.680      7.91    0.079      6.102
2     18.67     2.700      5.93    0.079      7.254
Qmax(1) =
          1.000 *    1.000 *    28.718) +
          0.840 *    1.000 *    18.667) + =      44.390
Qmax(2) =
          1.191 *    0.750 *    28.718) +
          1.000 *    1.000 *    18.667) + =      44.313

Total of 2 main streams to confluence:
Flow rates before confluence point:
      29.718      19.667
Maximum flow rates at confluence using above data:
       44.390       44.313
Area of streams before confluence:
        4.680        2.700
Effective area values after confluence:
        7.380        6.209


Results of confluence:
Total flow rate =     44.390(CFS)
Time of concentration =     7.915 min.
Effective stream area after confluence  =      7.380(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total =       7.38(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      300.000 to Point/Station      301.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
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```
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =  1170.000(Ft.)
Top (of initial area) elevation =  1635.400(Ft.)
Bottom (of initial area) elevation =  1610.000(Ft.)
Difference in elevation =    25.400(Ft.)
Slope =    0.02171  s(%)=       2.17
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.036 min.
Rainfall intensity =      4.999(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.886
Subarea runoff =     32.504(CFS)
Total initial stream area =        7.340(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      301.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      7.340(Ac.)
Runoff from this stream =     32.504(CFS)
Time of concentration =   11.04 min.
Rainfall intensity =     4.999(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Initial subarea data:
Initial area flow distance =   402.000(Ft.)
Top (of initial area) elevation =  1622.900(Ft.)
Bottom (of initial area) elevation =  1613.700(Ft.)
Difference in elevation =     9.200(Ft.)
Slope =    0.02289  s(%)=       2.29
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.123 min.
Rainfall intensity =      6.501(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.889
Subarea runoff =     12.601(CFS)
Total initial stream area =        2.180(Ac.)
Pervious area fraction = 0.100
```

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Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      301.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1611.000(Ft.)
Downstream point/station elevation =  1610.000(Ft.)
Pipe length  =   132.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    12.601(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    12.601(CFS)
Normal flow depth in pipe =   14.79(In.)
Flow top width inside pipe =   19.17(In.)
Critical Depth =   15.86(In.)
Pipe flow velocity =      6.96(Ft/s)
Travel time through pipe =    0.32 min.
Time of concentration (TC) =     7.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      301.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.180(Ac.)
Runoff from this stream =     12.601(CFS)
Time of concentration =    7.44 min.
Rainfall intensity =     6.334(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     32.50     7.340     11.04    0.079      4.999
2     12.60     2.180      7.44    0.079      6.334
Qmax(1) =
          1.000 *    1.000 *    32.504) +
          0.787 *    1.000 *    12.601) + =      42.416
Qmax(2) =
          1.271 *    0.674 *    32.504) +
          1.000 *    1.000 *    12.601) + =      40.454

Total of 2 main streams to confluence:
Flow rates before confluence point:
      33.504      13.601
Maximum flow rates at confluence using above data:
       42.416       40.454
Area of streams before confluence:
        7.340        2.180
Effective area values after confluence:
        9.520        7.127


Results of confluence:
Total flow rate =     42.416(CFS)
Time of concentration =    11.036 min.
Effective stream area after confluence  =      9.520(Ac.)
```

Study area average Pervious fraction(Ap) = 0.100
Study area average soil loss rate(Fm) = 0.079(In/Hr)
Study area total = 9.52(Ac.)
End of computations, Total Study Area = 39.77 (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) = 0.100
Area averaged SCS curve number = 32.0

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 06/13/25

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

Program License Serial Number 6443

LOCUST GATEWAY
PROPOSED UNIT HYDROGRAPH ANALYSIS (DMA 1)
100-YR DESIGN STORM
KIMLEY-HORN

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 100		
22.87	1	1.81
Rainfall data for year 100		
22.87	6	4.82
Rainfall data for year 100		
22.87	24	9.20

++

******** 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)
32.0	52.0	22.87	1.000	0.785	0.075	0.059

Area-averaged adjusted loss rate Fm (In/Hr) = 0.059

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

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
1.72	0.075	32.0	52.0	9.23	0.354
21.15	0.925	98.0	98.0	0.20	0.974

Area-averaged catchment yield fraction, Y = 0.927
Area-averaged low loss fraction, Yb = 0.073
Direct entry of lag time by user
++
Watershed area = 22.87(Ac.)
Catchment Lag time = 0.080 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 104.1667
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.059(In/Hr)
Average low loss rate fraction (Yb) = 0.073 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.670(In)
Computed peak 30-minute rainfall = 1.372(In)
Specified peak 1-hour rainfall = 1.810(In)
Computed peak 3-hour rainfall = 3.300(In)
Specified peak 6-hour rainfall = 4.820(In)
Specified peak 24-hour rainfall = 9.200(In)

Rainfall depth area reduction factors:
Using a total area of 22.87(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.669(In)
30-minute factor = 0.999 Adjusted rainfall = 1.370(In)
1-hour factor = 0.999 Adjusted rainfall = 1.808(In)
3-hour factor = 1.000 Adjusted rainfall = 3.299(In)
6-hour factor = 1.000 Adjusted rainfall = 4.820(In)
24-hour factor = 1.000 Adjusted rainfall = 9.200(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 276.58 (CFS))		
1	18.562	51.339
2	81.754	174.779
3	98.260	45.655
4	100.000	4.811

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6692	0.6692
2	0.8830	0.2138
3	1.0385	0.1555
4	1.1651	0.1266
5	1.2739	0.1088
6	1.3703	0.0964
7	1.4574	0.0871
8	1.5374	0.0800
9	1.6115	0.0742
10	1.6809	0.0694
11	1.7462	0.0653
12	1.8081	0.0618
13	1.8891	0.0810
14	1.9673	0.0782

15	2.0430	0.0757
16	2.1165	0.0735
17	2.1879	0.0714
18	2.2575	0.0696
19	2.3253	0.0678
20	2.3915	0.0662
21	2.4563	0.0647
22	2.5196	0.0634
23	2.5817	0.0621
24	2.6426	0.0609
25	2.7023	0.0597
26	2.7609	0.0587
27	2.8186	0.0576
28	2.8753	0.0567
29	2.9310	0.0558
30	2.9859	0.0549
31	3.0400	0.0541
32	3.0933	0.0533
33	3.1459	0.0526
34	3.1977	0.0518
35	3.2489	0.0512
36	3.2994	0.0505
37	3.3492	0.0498
38	3.3984	0.0492
39	3.4470	0.0486
40	3.4950	0.0480
41	3.5425	0.0475
42	3.5895	0.0470
43	3.6360	0.0465
44	3.6820	0.0460
45	3.7275	0.0455
46	3.7726	0.0451
47	3.8172	0.0446
48	3.8614	0.0442
49	3.9051	0.0438
50	3.9485	0.0434
51	3.9915	0.0430
52	4.0341	0.0426
53	4.0763	0.0422
54	4.1182	0.0419
55	4.1597	0.0415
56	4.2009	0.0412
57	4.2418	0.0408
58	4.2823	0.0405
59	4.3225	0.0402
60	4.3624	0.0399
61	4.4020	0.0396
62	4.4413	0.0393
63	4.4803	0.0390
64	4.5191	0.0387
65	4.5575	0.0385
66	4.5957	0.0382
67	4.6337	0.0379
68	4.6714	0.0377
69	4.7088	0.0374
70	4.7460	0.0372
71	4.7829	0.0369
72	4.8197	0.0367
73	4.8508	0.0311
74	4.8816	0.0309
75	4.9123	0.0307
76	4.9427	0.0304
77	4.9729	0.0302

78	5.0030	0.0300
79	5.0328	0.0298
80	5.0624	0.0296
81	5.0918	0.0294
82	5.1210	0.0292
83	5.1500	0.0290
84	5.1789	0.0288
85	5.2075	0.0287
86	5.2360	0.0285
87	5.2643	0.0283
88	5.2925	0.0281
89	5.3204	0.0280
90	5.3482	0.0278
91	5.3758	0.0276
92	5.4033	0.0275
93	5.4306	0.0273
94	5.4578	0.0272
95	5.4848	0.0270
96	5.5116	0.0268
97	5.5383	0.0267
98	5.5649	0.0266
99	5.5913	0.0264
100	5.6175	0.0263
101	5.6437	0.0261
102	5.6697	0.0260
103	5.6955	0.0259
104	5.7212	0.0257
105	5.7468	0.0256
106	5.7723	0.0255
107	5.7976	0.0253
108	5.8228	0.0252
109	5.8479	0.0251
110	5.8729	0.0250
111	5.8977	0.0248
112	5.9224	0.0247
113	5.9470	0.0246
114	5.9715	0.0245
115	5.9959	0.0244
116	6.0201	0.0243
117	6.0443	0.0241
118	6.0683	0.0240
119	6.0922	0.0239
120	6.1160	0.0238
121	6.1398	0.0237
122	6.1634	0.0236
123	6.1869	0.0235
124	6.2103	0.0234
125	6.2336	0.0233
126	6.2568	0.0232
127	6.2799	0.0231
128	6.3029	0.0230
129	6.3258	0.0229
130	6.3487	0.0228
131	6.3714	0.0227
132	6.3940	0.0226
133	6.4166	0.0225
134	6.4390	0.0225
135	6.4614	0.0224
136	6.4837	0.0223
137	6.5058	0.0222
138	6.5279	0.0221
139	6.5500	0.0220
140	6.5719	0.0219

141	6.5937	0.0218
142	6.6155	0.0218
143	6.6372	0.0217
144	6.6588	0.0216
145	6.6803	0.0215
146	6.7018	0.0214
147	6.7231	0.0214
148	6.7444	0.0213
149	6.7656	0.0212
150	6.7868	0.0211
151	6.8078	0.0211
152	6.8288	0.0210
153	6.8497	0.0209
154	6.8706	0.0208
155	6.8913	0.0208
156	6.9120	0.0207
157	6.9327	0.0206
158	6.9532	0.0206
159	6.9737	0.0205
160	6.9941	0.0204
161	7.0145	0.0204
162	7.0348	0.0203
163	7.0550	0.0202
164	7.0751	0.0202
165	7.0952	0.0201
166	7.1152	0.0200
167	7.1352	0.0200
168	7.1551	0.0199
169	7.1749	0.0198
170	7.1947	0.0198
171	7.2144	0.0197
172	7.2340	0.0196
173	7.2536	0.0196
174	7.2731	0.0195
175	7.2926	0.0195
176	7.3120	0.0194
177	7.3314	0.0193
178	7.3506	0.0193
179	7.3699	0.0192
180	7.3890	0.0192
181	7.4082	0.0191
182	7.4272	0.0191
183	7.4462	0.0190
184	7.4652	0.0189
185	7.4841	0.0189
186	7.5029	0.0188
187	7.5217	0.0188
188	7.5404	0.0187
189	7.5591	0.0187
190	7.5777	0.0186
191	7.5963	0.0186
192	7.6148	0.0185
193	7.6333	0.0185
194	7.6517	0.0184
195	7.6701	0.0184
196	7.6884	0.0183
197	7.7066	0.0183
198	7.7249	0.0182
199	7.7430	0.0182
200	7.7611	0.0181
201	7.7792	0.0181
202	7.7972	0.0180
203	7.8152	0.0180

204	7.8332	0.0179
205	7.8510	0.0179
206	7.8689	0.0178
207	7.8867	0.0178
208	7.9044	0.0177
209	7.9221	0.0177
210	7.9398	0.0177
211	7.9574	0.0176
212	7.9749	0.0176
213	7.9925	0.0175
214	8.0099	0.0175
215	8.0274	0.0174
216	8.0448	0.0174
217	8.0621	0.0173
218	8.0794	0.0173
219	8.0967	0.0173
220	8.1139	0.0172
221	8.1311	0.0172
222	8.1482	0.0171
223	8.1653	0.0171
224	8.1823	0.0171
225	8.1994	0.0170
226	8.2163	0.0170
227	8.2333	0.0169
228	8.2502	0.0169
229	8.2670	0.0169
230	8.2838	0.0168
231	8.3006	0.0168
232	8.3173	0.0167
233	8.3340	0.0167
234	8.3507	0.0167
235	8.3673	0.0166
236	8.3839	0.0166
237	8.4005	0.0165
238	8.4170	0.0165
239	8.4334	0.0165
240	8.4499	0.0164
241	8.4663	0.0164
242	8.4826	0.0164
243	8.4990	0.0163
244	8.5153	0.0163
245	8.5315	0.0163
246	8.5477	0.0162
247	8.5639	0.0162
248	8.5801	0.0162
249	8.5962	0.0161
250	8.6123	0.0161
251	8.6283	0.0160
252	8.6443	0.0160
253	8.6603	0.0160
254	8.6763	0.0159
255	8.6922	0.0159
256	8.7081	0.0159
257	8.7239	0.0158
258	8.7397	0.0158
259	8.7555	0.0158
260	8.7712	0.0157
261	8.7870	0.0157
262	8.8026	0.0157
263	8.8183	0.0157
264	8.8339	0.0156
265	8.8495	0.0156
266	8.8651	0.0156

267	8.8806	0.0155
268	8.8961	0.0155
269	8.9116	0.0155
270	8.9270	0.0154
271	8.9424	0.0154
272	8.9578	0.0154
273	8.9731	0.0153
274	8.9884	0.0153
275	9.0037	0.0153
276	9.0190	0.0153
277	9.0342	0.0152
278	9.0494	0.0152
279	9.0645	0.0152
280	9.0797	0.0151
281	9.0948	0.0151
282	9.1099	0.0151
283	9.1249	0.0151
284	9.1399	0.0150
285	9.1549	0.0150
286	9.1699	0.0150
287	9.1848	0.0149
288	9.1997	0.0149

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0149	0.0011	0.0138
2	0.0149	0.0011	0.0139
3	0.0150	0.0011	0.0139
4	0.0150	0.0011	0.0139
5	0.0151	0.0011	0.0140
6	0.0151	0.0011	0.0140
7	0.0152	0.0011	0.0141
8	0.0152	0.0011	0.0141
9	0.0153	0.0011	0.0141
10	0.0153	0.0011	0.0142
11	0.0153	0.0011	0.0142
12	0.0154	0.0011	0.0143
13	0.0154	0.0011	0.0143
14	0.0155	0.0011	0.0143
15	0.0155	0.0011	0.0144
16	0.0156	0.0011	0.0144
17	0.0156	0.0011	0.0145
18	0.0157	0.0011	0.0145
19	0.0157	0.0011	0.0146
20	0.0157	0.0011	0.0146
21	0.0158	0.0011	0.0147
22	0.0158	0.0012	0.0147
23	0.0159	0.0012	0.0148
24	0.0159	0.0012	0.0148
25	0.0160	0.0012	0.0149
26	0.0160	0.0012	0.0149
27	0.0161	0.0012	0.0149
28	0.0162	0.0012	0.0150
29	0.0162	0.0012	0.0150
30	0.0163	0.0012	0.0151
31	0.0163	0.0012	0.0151
32	0.0164	0.0012	0.0152
33	0.0164	0.0012	0.0152
34	0.0165	0.0012	0.0153
35	0.0165	0.0012	0.0153
36	0.0166	0.0012	0.0154

37	0.0167	0.0012	0.0155
38	0.0167	0.0012	0.0155
39	0.0168	0.0012	0.0156
40	0.0168	0.0012	0.0156
41	0.0169	0.0012	0.0157
42	0.0169	0.0012	0.0157
43	0.0170	0.0012	0.0158
44	0.0171	0.0012	0.0158
45	0.0171	0.0012	0.0159
46	0.0172	0.0012	0.0159
47	0.0173	0.0013	0.0160
48	0.0173	0.0013	0.0160
49	0.0174	0.0013	0.0161
50	0.0174	0.0013	0.0162
51	0.0175	0.0013	0.0162
52	0.0176	0.0013	0.0163
53	0.0177	0.0013	0.0164
54	0.0177	0.0013	0.0164
55	0.0178	0.0013	0.0165
56	0.0178	0.0013	0.0165
57	0.0179	0.0013	0.0166
58	0.0180	0.0013	0.0167
59	0.0181	0.0013	0.0168
60	0.0181	0.0013	0.0168
61	0.0182	0.0013	0.0169
62	0.0183	0.0013	0.0169
63	0.0184	0.0013	0.0170
64	0.0184	0.0013	0.0171
65	0.0185	0.0013	0.0172
66	0.0186	0.0013	0.0172
67	0.0187	0.0014	0.0173
68	0.0187	0.0014	0.0174
69	0.0188	0.0014	0.0175
70	0.0189	0.0014	0.0175
71	0.0190	0.0014	0.0176
72	0.0191	0.0014	0.0177
73	0.0192	0.0014	0.0178
74	0.0192	0.0014	0.0178
75	0.0193	0.0014	0.0179
76	0.0194	0.0014	0.0180
77	0.0195	0.0014	0.0181
78	0.0196	0.0014	0.0182
79	0.0197	0.0014	0.0183
80	0.0198	0.0014	0.0183
81	0.0199	0.0014	0.0184
82	0.0200	0.0014	0.0185
83	0.0201	0.0015	0.0186
84	0.0202	0.0015	0.0187
85	0.0203	0.0015	0.0188
86	0.0204	0.0015	0.0189
87	0.0205	0.0015	0.0190
88	0.0206	0.0015	0.0191
89	0.0207	0.0015	0.0192
90	0.0208	0.0015	0.0193
91	0.0209	0.0015	0.0194
92	0.0210	0.0015	0.0195
93	0.0211	0.0015	0.0196
94	0.0212	0.0015	0.0197
95	0.0214	0.0016	0.0198
96	0.0214	0.0016	0.0199
97	0.0216	0.0016	0.0200
98	0.0217	0.0016	0.0201
99	0.0218	0.0016	0.0203

100	0.0219	0.0016	0.0203
101	0.0221	0.0016	0.0205
102	0.0222	0.0016	0.0206
103	0.0224	0.0016	0.0207
104	0.0225	0.0016	0.0208
105	0.0226	0.0016	0.0210
106	0.0227	0.0016	0.0211
107	0.0229	0.0017	0.0213
108	0.0230	0.0017	0.0213
109	0.0232	0.0017	0.0215
110	0.0233	0.0017	0.0216
111	0.0235	0.0017	0.0218
112	0.0236	0.0017	0.0219
113	0.0238	0.0017	0.0221
114	0.0239	0.0017	0.0222
115	0.0241	0.0018	0.0224
116	0.0243	0.0018	0.0225
117	0.0245	0.0018	0.0227
118	0.0246	0.0018	0.0228
119	0.0248	0.0018	0.0230
120	0.0250	0.0018	0.0231
121	0.0252	0.0018	0.0234
122	0.0253	0.0018	0.0235
123	0.0256	0.0019	0.0237
124	0.0257	0.0019	0.0239
125	0.0260	0.0019	0.0241
126	0.0261	0.0019	0.0242
127	0.0264	0.0019	0.0245
128	0.0266	0.0019	0.0246
129	0.0268	0.0019	0.0249
130	0.0270	0.0020	0.0250
131	0.0273	0.0020	0.0253
132	0.0275	0.0020	0.0255
133	0.0278	0.0020	0.0258
134	0.0280	0.0020	0.0259
135	0.0283	0.0021	0.0262
136	0.0285	0.0021	0.0264
137	0.0288	0.0021	0.0267
138	0.0290	0.0021	0.0269
139	0.0294	0.0021	0.0273
140	0.0296	0.0021	0.0275
141	0.0300	0.0022	0.0278
142	0.0302	0.0022	0.0280
143	0.0307	0.0022	0.0284
144	0.0309	0.0022	0.0286
145	0.0367	0.0027	0.0340
146	0.0369	0.0027	0.0343
147	0.0374	0.0027	0.0347
148	0.0377	0.0027	0.0349
149	0.0382	0.0028	0.0354
150	0.0385	0.0028	0.0357
151	0.0390	0.0028	0.0362
152	0.0393	0.0029	0.0365
153	0.0399	0.0029	0.0370
154	0.0402	0.0029	0.0373
155	0.0408	0.0030	0.0379
156	0.0412	0.0030	0.0382
157	0.0419	0.0030	0.0388
158	0.0422	0.0031	0.0392
159	0.0430	0.0031	0.0399
160	0.0434	0.0031	0.0402
161	0.0442	0.0032	0.0410
162	0.0446	0.0032	0.0414

163	0.0455	0.0033	0.0422
164	0.0460	0.0033	0.0427
165	0.0470	0.0034	0.0436
166	0.0475	0.0034	0.0441
167	0.0486	0.0035	0.0451
168	0.0492	0.0036	0.0456
169	0.0505	0.0037	0.0468
170	0.0512	0.0037	0.0474
171	0.0526	0.0038	0.0487
172	0.0533	0.0039	0.0494
173	0.0549	0.0040	0.0509
174	0.0558	0.0040	0.0517
175	0.0576	0.0042	0.0535
176	0.0587	0.0043	0.0544
177	0.0609	0.0044	0.0564
178	0.0621	0.0045	0.0576
179	0.0647	0.0047	0.0600
180	0.0662	0.0048	0.0614
181	0.0696	0.0049	0.0646
182	0.0714	0.0049	0.0665
183	0.0757	0.0049	0.0708
184	0.0782	0.0049	0.0733
185	0.0618	0.0045	0.0574
186	0.0653	0.0047	0.0606
187	0.0742	0.0049	0.0693
188	0.0800	0.0049	0.0751
189	0.0964	0.0049	0.0915
190	0.1088	0.0049	0.1039
191	0.1555	0.0049	0.1506
192	0.2138	0.0049	0.2089
193	0.6692	0.0049	0.6643
194	0.1266	0.0049	0.1217
195	0.0871	0.0049	0.0822
196	0.0694	0.0049	0.0645
197	0.0810	0.0049	0.0761
198	0.0735	0.0049	0.0686
199	0.0678	0.0049	0.0629
200	0.0634	0.0046	0.0588
201	0.0597	0.0043	0.0554
202	0.0567	0.0041	0.0526
203	0.0541	0.0039	0.0502
204	0.0518	0.0038	0.0481
205	0.0498	0.0036	0.0462
206	0.0480	0.0035	0.0446
207	0.0465	0.0034	0.0431
208	0.0451	0.0033	0.0418
209	0.0438	0.0032	0.0406
210	0.0426	0.0031	0.0395
211	0.0415	0.0030	0.0385
212	0.0405	0.0029	0.0376
213	0.0396	0.0029	0.0367
214	0.0387	0.0028	0.0359
215	0.0379	0.0028	0.0352
216	0.0372	0.0027	0.0345
217	0.0311	0.0023	0.0288
218	0.0304	0.0022	0.0282
219	0.0298	0.0022	0.0276
220	0.0292	0.0021	0.0271
221	0.0287	0.0021	0.0266
222	0.0281	0.0020	0.0261
223	0.0276	0.0020	0.0256
224	0.0272	0.0020	0.0252
225	0.0267	0.0019	0.0248

226	0.0263	0.0019	0.0244
227	0.0259	0.0019	0.0240
228	0.0255	0.0018	0.0236
229	0.0251	0.0018	0.0233
230	0.0247	0.0018	0.0229
231	0.0244	0.0018	0.0226
232	0.0240	0.0017	0.0223
233	0.0237	0.0017	0.0220
234	0.0234	0.0017	0.0217
235	0.0231	0.0017	0.0214
236	0.0228	0.0017	0.0212
237	0.0225	0.0016	0.0209
238	0.0223	0.0016	0.0207
239	0.0220	0.0016	0.0204
240	0.0218	0.0016	0.0202
241	0.0215	0.0016	0.0200
242	0.0213	0.0015	0.0197
243	0.0211	0.0015	0.0195
244	0.0208	0.0015	0.0193
245	0.0206	0.0015	0.0191
246	0.0204	0.0015	0.0189
247	0.0202	0.0015	0.0187
248	0.0200	0.0015	0.0186
249	0.0198	0.0014	0.0184
250	0.0196	0.0014	0.0182
251	0.0195	0.0014	0.0180
252	0.0193	0.0014	0.0179
253	0.0191	0.0014	0.0177
254	0.0189	0.0014	0.0176
255	0.0188	0.0014	0.0174
256	0.0186	0.0014	0.0173
257	0.0185	0.0013	0.0171
258	0.0183	0.0013	0.0170
259	0.0182	0.0013	0.0169
260	0.0180	0.0013	0.0167
261	0.0179	0.0013	0.0166
262	0.0177	0.0013	0.0165
263	0.0176	0.0013	0.0163
264	0.0175	0.0013	0.0162
265	0.0173	0.0013	0.0161
266	0.0172	0.0013	0.0160
267	0.0171	0.0012	0.0159
268	0.0170	0.0012	0.0157
269	0.0169	0.0012	0.0156
270	0.0167	0.0012	0.0155
271	0.0166	0.0012	0.0154
272	0.0165	0.0012	0.0153
273	0.0164	0.0012	0.0152
274	0.0163	0.0012	0.0151
275	0.0162	0.0012	0.0150
276	0.0161	0.0012	0.0149
277	0.0160	0.0012	0.0148
278	0.0159	0.0012	0.0147
279	0.0158	0.0011	0.0146
280	0.0157	0.0011	0.0145
281	0.0156	0.0011	0.0145
282	0.0155	0.0011	0.0144
283	0.0154	0.0011	0.0143
284	0.0153	0.0011	0.0142
285	0.0152	0.0011	0.0141
286	0.0151	0.0011	0.0140
287	0.0151	0.0011	0.0140
288	0.0150	0.0011	0.0139

Total soil rain loss = 0.59(In)
Total effective rainfall = 8.61(In)
Peak flow rate in flood hydrograph = 132.61(CFS)

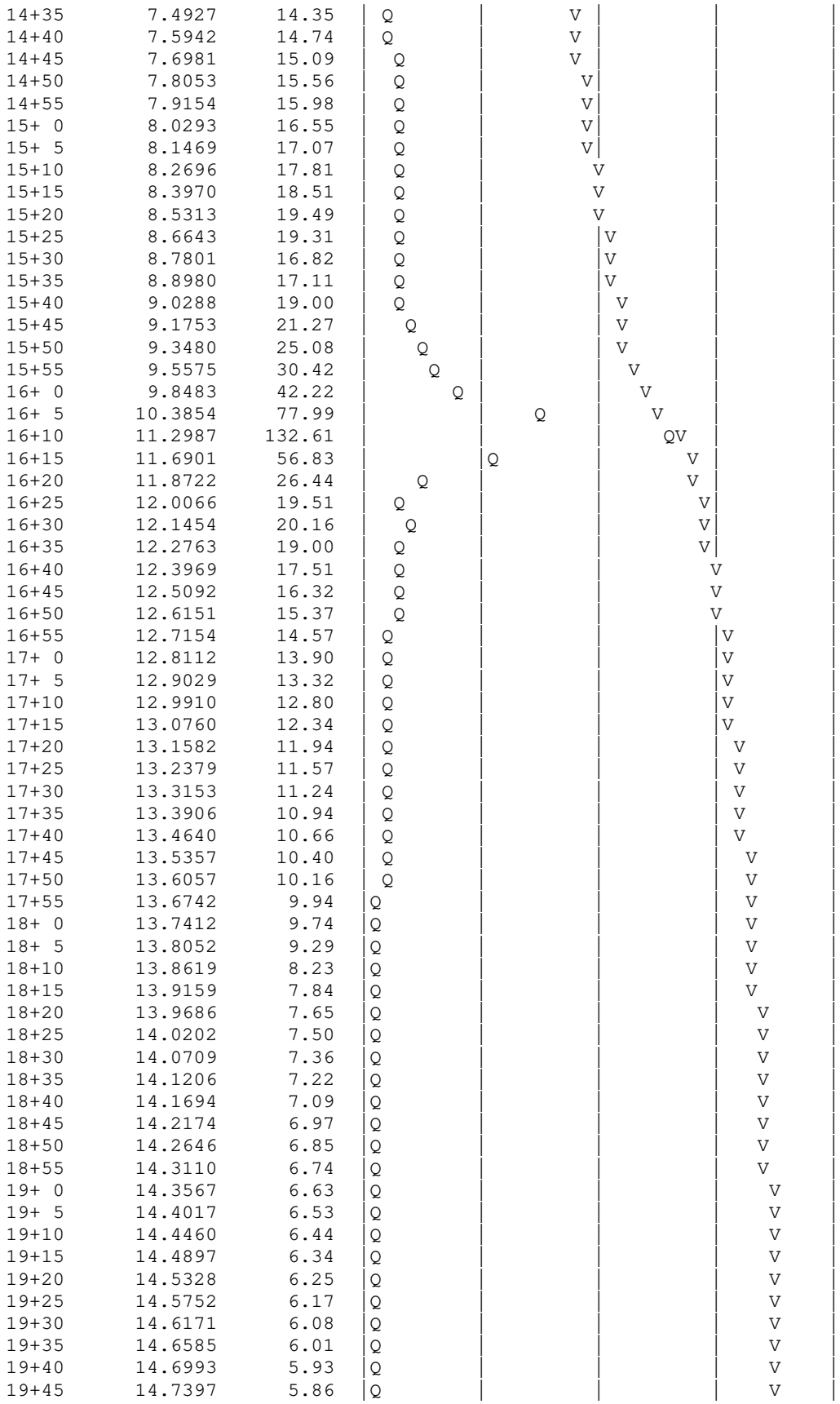
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	50.0	100.0	150.0	200.0
0+ 5	0.0049	0.71	Q				
0+10	0.0264	3.13	Q				
0+15	0.0524	3.77	Q				
0+20	0.0788	3.84	Q				
0+25	0.1054	3.85	Q				
0+30	0.1320	3.87	Q				
0+35	0.1587	3.88	Q				
0+40	0.1855	3.89	Q				
0+45	0.2124	3.90	Q				
0+50	0.2393	3.91	Q				
0+55	0.2663	3.92	Q				
1+ 0	0.2934	3.93	Q				
1+ 5	0.3206	3.94	Q				
1+10	0.3478	3.96	Q				
1+15	0.3751	3.97	Q				
1+20	0.4025	3.98	Q				
1+25	0.4300	3.99	QV				
1+30	0.4576	4.01	QV				
1+35	0.4853	4.02	QV				
1+40	0.5130	4.03	QV				
1+45	0.5409	4.04	QV				
1+50	0.5688	4.05	QV				
1+55	0.5968	4.07	QV				
2+ 0	0.6249	4.08	QV				
2+ 5	0.6531	4.09	QV				
2+10	0.6813	4.11	QV				
2+15	0.7097	4.12	QV				
2+20	0.7382	4.13	QV				
2+25	0.7667	4.14	QV				
2+30	0.7953	4.16	QV				
2+35	0.8241	4.17	Q V				
2+40	0.8529	4.19	Q V				
2+45	0.8818	4.20	Q V				
2+50	0.9109	4.21	Q V				
2+55	0.9400	4.23	Q V				
3+ 0	0.9692	4.24	Q V				
3+ 5	0.9985	4.26	Q V				
3+10	1.0279	4.27	Q V				
3+15	1.0574	4.28	Q V				
3+20	1.0870	4.30	Q V				
3+25	1.1168	4.31	Q V				
3+30	1.1466	4.33	Q V				
3+35	1.1765	4.35	Q V				
3+40	1.2066	4.36	Q V				
3+45	1.2367	4.38	Q V				
3+50	1.2670	4.39	Q V				
3+55	1.2973	4.41	Q V				
4+ 0	1.3278	4.43	Q V				

4+ 5	1.3584	4.44	Q V	|	|	|	|
4+10	1.3891	4.46	Q V	|	|	|	|
4+15	1.4199	4.47	Q V	|	|	|	|
4+20	1.4508	4.49	Q V	|	|	|	|
4+25	1.4819	4.51	Q V	|	|	|	|
4+30	1.5130	4.53	Q V	|	|	|	|
4+35	1.5443	4.54	Q V	|	|	|	|
4+40	1.5757	4.56	Q V	|	|	|	|
4+45	1.6073	4.58	Q V	|	|	|	|
4+50	1.6389	4.60	Q V	|	|	|	|
4+55	1.6707	4.61	Q V	|	|	|	|
5+ 0	1.7026	4.63	Q V	|	|	|	|
5+ 5	1.7346	4.65	Q V	|	|	|	|
5+10	1.7668	4.67	Q V	|	|	|	|
5+15	1.7991	4.69	Q V	|	|	|	|
5+20	1.8315	4.71	Q V	|	|	|	|
5+25	1.8641	4.73	Q V	|	|	|	|
5+30	1.8968	4.75	Q V	|	|	|	|
5+35	1.9296	4.77	Q V	|	|	|	|
5+40	1.9626	4.79	Q V	|	|	|	|
5+45	1.9957	4.81	Q V	|	|	|	|
5+50	2.0289	4.83	Q V	|	|	|	|
5+55	2.0623	4.85	Q V	|	|	|	|
6+ 0	2.0959	4.87	Q V	|	|	|	|
6+ 5	2.1295	4.89	Q V	|	|	|	|
6+10	2.1634	4.91	Q V	|	|	|	|
6+15	2.1974	4.93	Q V	|	|	|	|
6+20	2.2315	4.96	Q V	|	|	|	|
6+25	2.2658	4.98	Q V	|	|	|	|
6+30	2.3003	5.00	|Q V	|	|	|	|
6+35	2.3349	5.03	|Q V	|	|	|	|
6+40	2.3697	5.05	|Q V	|	|	|	|
6+45	2.4046	5.07	|Q V	|	|	|	|
6+50	2.4397	5.10	|Q V	|	|	|	|
6+55	2.4750	5.12	|Q V	|	|	|	|
7+ 0	2.5105	5.15	|Q V	|	|	|	|
7+ 5	2.5461	5.17	|Q V	|	|	|	|
7+10	2.5819	5.20	|Q V	|	|	|	|
7+15	2.6179	5.22	|Q V	|	|	|	|
7+20	2.6540	5.25	|Q V	|	|	|	|
7+25	2.6904	5.28	|Q V	|	|	|	|
7+30	2.7269	5.31	|Q V	|	|	|	|
7+35	2.7636	5.33	|Q V	|	|	|	|
7+40	2.8006	5.36	|Q V	|	|	|	|
7+45	2.8376	5.39	|Q V	|	|	|	|
7+50	2.8750	5.42	|Q V	|	|	|	|
7+55	2.9125	5.44	|Q V	|	|	|	|
8+ 0	2.9502	5.48	|Q V	|	|	|	|
8+ 5	2.9881	5.50	|Q V	|	|	|	|
8+10	3.0262	5.54	|Q V	|	|	|	|
8+15	3.0646	5.57	|Q V	|	|	|	|
8+20	3.1031	5.60	|Q V	|	|	|	|
8+25	3.1419	5.63	|Q V	|	|	|	|
8+30	3.1809	5.67	|Q V	|	|	|	|
8+35	3.2201	5.70	|Q V	|	|	|	|
8+40	3.2596	5.73	|Q V	|	|	|	|
8+45	3.2993	5.76	|Q V	|	|	|	|
8+50	3.3393	5.80	|Q V	|	|	|	|
8+55	3.3794	5.83	|Q V	|	|	|	|
9+ 0	3.4199	5.87	|Q V	|	|	|	|
9+ 5	3.4606	5.91	|Q V	|	|	|	|
9+10	3.5015	5.95	|Q V	|	|	|	|
9+15	3.5427	5.98	|Q V	|	|	|	|

9+20	3.5842	6.02	Q V				
9+25	3.6259	6.06	Q V				
9+30	3.6680	6.10	Q V				
9+35	3.7103	6.14	Q V				
9+40	3.7529	6.19	Q V				
9+45	3.7958	6.23	Q V				
9+50	3.8390	6.27	Q V				
9+55	3.8825	6.31	Q V				
10+ 0	3.9263	6.37	Q V				
10+ 5	3.9705	6.41	Q V				
10+10	4.0149	6.46	Q V				
10+15	4.0597	6.50	Q V				
10+20	4.1049	6.56	Q V				
10+25	4.1504	6.60	Q V				
10+30	4.1962	6.66	Q V				
10+35	4.2424	6.71	Q V				
10+40	4.2890	6.77	Q V				
10+45	4.3360	6.82	Q V				
10+50	4.3834	6.88	Q V				
10+55	4.4311	6.93	Q V				
11+ 0	4.4793	7.00	Q V				
11+ 5	4.5279	7.05	Q V				
11+10	4.5769	7.12	Q V				
11+15	4.6263	7.18	Q V				
11+20	4.6763	7.25	Q V				
11+25	4.7267	7.31	Q V				
11+30	4.7775	7.39	Q V				
11+35	4.8289	7.45	Q V				
11+40	4.8808	7.53	Q V				
11+45	4.9331	7.60	Q V				
11+50	4.9861	7.69	Q V				
11+55	5.0395	7.76	Q V				
12+ 0	5.0936	7.85	Q V				
12+ 5	5.1500	8.19	Q V				
12+10	5.2130	9.15	Q V				
12+15	5.2782	9.46	Q V				
12+20	5.3443	9.59	Q V				
12+25	5.4109	9.68	Q V				
12+30	5.4783	9.79	Q V				
12+35	5.5464	9.88	Q V				
12+40	5.6152	10.00	Q V				
12+45	5.6847	10.10	Q V				
12+50	5.7551	10.22	Q V				
12+55	5.8262	10.33	Q V				
13+ 0	5.8983	10.46	Q V				
13+ 5	5.9711	10.58	Q V				
13+10	6.0450	10.72	Q V				
13+15	6.1197	10.85	Q V				
13+20	6.1955	11.01	Q V				
13+25	6.2723	11.14	Q V				
13+30	6.3502	11.32	Q V				
13+35	6.4292	11.46	Q V				
13+40	6.5094	11.65	Q V				
13+45	6.5908	11.82	Q V				
13+50	6.6736	12.03	Q V				
13+55	6.7577	12.21	Q V				
14+ 0	6.8434	12.44	Q V				
14+ 5	6.9305	12.65	Q V				
14+10	7.0195	12.92	Q V				
14+15	7.1101	13.15	Q V				
14+20	7.2027	13.45	Q V				
14+25	7.2971	13.71	Q V				
14+30	7.3938	14.05	Q V				



19+50	14.7795	5.78	|Q	|	|	|	V |
19+55	14.8188	5.72	|Q	|	|	|	V |
20+ 0	14.8578	5.65	|Q	|	|	|	V |
20+ 5	14.8962	5.58	|Q	|	|	|	V |
20+10	14.9342	5.52	|Q	|	|	|	V |
20+15	14.9719	5.46	|Q	|	|	|	V |
20+20	15.0091	5.40	|Q	|	|	|	V |
20+25	15.0459	5.35	|Q	|	|	|	V |
20+30	15.0823	5.29	|Q	|	|	|	V |
20+35	15.1184	5.24	|Q	|	|	|	V |
20+40	15.1542	5.19	|Q	|	|	|	V |
20+45	15.1895	5.14	|Q	|	|	|	V |
20+50	15.2246	5.09	|Q	|	|	|	V |
20+55	15.2593	5.04	|Q	|	|	|	V |
21+ 0	15.2937	4.99	Q	|	|	|	V |
21+ 5	15.3277	4.95	Q	|	|	|	V |
21+10	15.3615	4.90	Q	|	|	|	V |
21+15	15.3950	4.86	Q	|	|	|	V |
21+20	15.4282	4.82	Q	|	|	|	V |
21+25	15.4611	4.78	Q	|	|	|	V |
21+30	15.4937	4.74	Q	|	|	|	V |
21+35	15.5261	4.70	Q	|	|	|	V |
21+40	15.5582	4.66	Q	|	|	|	V |
21+45	15.5900	4.62	Q	|	|	|	V |
21+50	15.6216	4.59	Q	|	|	|	V |
21+55	15.6530	4.55	Q	|	|	|	V |
22+ 0	15.6841	4.52	Q	|	|	|	V |
22+ 5	15.7150	4.48	Q	|	|	|	V |
22+10	15.7456	4.45	Q	|	|	|	V |
22+15	15.7760	4.42	Q	|	|	|	V |
22+20	15.8062	4.39	Q	|	|	|	V |
22+25	15.8362	4.35	Q	|	|	|	V |
22+30	15.8660	4.32	Q	|	|	|	V |
22+35	15.8956	4.29	Q	|	|	|	V |
22+40	15.9249	4.26	Q	|	|	|	V |
22+45	15.9541	4.24	Q	|	|	|	V |
22+50	15.9831	4.21	Q	|	|	|	V |
22+55	16.0119	4.18	Q	|	|	|	V|
23+ 0	16.0405	4.15	Q	|	|	|	V|
23+ 5	16.0689	4.13	Q	|	|	|	V|
23+10	16.0971	4.10	Q	|	|	|	V|
23+15	16.1252	4.07	Q	|	|	|	V|
23+20	16.1531	4.05	Q	|	|	|	V|
23+25	16.1808	4.02	Q	|	|	|	V|
23+30	16.2083	4.00	Q	|	|	|	V|
23+35	16.2357	3.97	Q	|	|	|	V|
23+40	16.2629	3.95	Q	|	|	|	V|
23+45	16.2900	3.93	Q	|	|	|	V|
23+50	16.3168	3.91	Q	|	|	|	V|
23+55	16.3436	3.88	Q	|	|	|	V|
24+ 0	16.3702	3.86	Q	|	|	|	V|
24+ 5	16.3917	3.13	Q	|	|	|	V|
24+10	16.3966	0.70	Q	|	|	|	V|
24+15	16.3970	0.07	Q	|	|	|	V|

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 06/13/25

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

Program License Serial Number 6443

LOCUST GATEWAY
PROPOSED UNIT HYDROGRAPH ANALYSIS (DMA 2)
100-YR DESIGN STORM
KIMLEY-HORN

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 100		
7.38	1	1.81
Rainfall data for year 100		
7.38	6	4.82
Rainfall data for year 100		
7.38	24	9.20

++

******** 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)
32.0	52.0	7.38	1.000	0.785	0.110	0.086

Area-averaged adjusted loss rate Fm (In/Hr) = 0.086

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

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
0.81	0.110	32.0	52.0	9.23	0.354
6.57	0.890	98.0	98.0	0.20	0.974

Area-averaged catchment yield fraction, Y = 0.906
Area-averaged low loss fraction, Yb = 0.094
Direct entry of lag time by user
++
Watershed area = 7.38(Ac.)
Catchment Lag time = 0.074 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 112.6126
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.086(In/Hr)
Average low loss rate fraction (Yb) = 0.094 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.670(In)
Computed peak 30-minute rainfall = 1.372(In)
Specified peak 1-hour rainfall = 1.810(In)
Computed peak 3-hour rainfall = 3.300(In)
Specified peak 6-hour rainfall = 4.820(In)
Specified peak 24-hour rainfall = 9.200(In)

Rainfall depth area reduction factors:
Using a total area of 7.38(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.670(In)
30-minute factor = 1.000 Adjusted rainfall = 1.371(In)
1-hour factor = 1.000 Adjusted rainfall = 1.809(In)
3-hour factor = 1.000 Adjusted rainfall = 3.300(In)
6-hour factor = 1.000 Adjusted rainfall = 4.820(In)
24-hour factor = 1.000 Adjusted rainfall = 9.200(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 89.25 (CFS))		
1	21.432	19.129
2	85.843	57.487
3	98.830	11.591
4	100.000	1.044

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6697	0.6697
2	0.8836	0.2140
3	1.0392	0.1556
4	1.1659	0.1267
5	1.2748	0.1089
6	1.3712	0.0964
7	1.4585	0.0872
8	1.5385	0.0800
9	1.6127	0.0742
10	1.6821	0.0694
11	1.7475	0.0654
12	1.8094	0.0619
13	1.8903	0.0810
14	1.9685	0.0782

15	2.0442	0.0757
16	2.1177	0.0734
17	2.1891	0.0714
18	2.2586	0.0695
19	2.3264	0.0678
20	2.3925	0.0662
21	2.4573	0.0647
22	2.5206	0.0633
23	2.5826	0.0620
24	2.6434	0.0608
25	2.7031	0.0597
26	2.7617	0.0586
27	2.8193	0.0576
28	2.8759	0.0566
29	2.9317	0.0557
30	2.9865	0.0549
31	3.0406	0.0540
32	3.0938	0.0533
33	3.1463	0.0525
34	3.1981	0.0518
35	3.2492	0.0511
36	3.2997	0.0504
37	3.3495	0.0498
38	3.3987	0.0492
39	3.4473	0.0486
40	3.4953	0.0480
41	3.5428	0.0475
42	3.5898	0.0470
43	3.6363	0.0465
44	3.6823	0.0460
45	3.7278	0.0455
46	3.7728	0.0451
47	3.8175	0.0446
48	3.8617	0.0442
49	3.9054	0.0438
50	3.9488	0.0434
51	3.9918	0.0430
52	4.0344	0.0426
53	4.0766	0.0422
54	4.1185	0.0419
55	4.1600	0.0415
56	4.2012	0.0412
57	4.2420	0.0408
58	4.2825	0.0405
59	4.3228	0.0402
60	4.3627	0.0399
61	4.4023	0.0396
62	4.4416	0.0393
63	4.4806	0.0390
64	4.5193	0.0387
65	4.5578	0.0385
66	4.5960	0.0382
67	4.6339	0.0379
68	4.6716	0.0377
69	4.7090	0.0374
70	4.7462	0.0372
71	4.7832	0.0369
72	4.8199	0.0367
73	4.8510	0.0311
74	4.8819	0.0309
75	4.9125	0.0307
76	4.9430	0.0304
77	4.9732	0.0302

78	5.0032	0.0300
79	5.0330	0.0298
80	5.0626	0.0296
81	5.0920	0.0294
82	5.1212	0.0292
83	5.1503	0.0290
84	5.1791	0.0288
85	5.2078	0.0287
86	5.2362	0.0285
87	5.2646	0.0283
88	5.2927	0.0281
89	5.3206	0.0280
90	5.3484	0.0278
91	5.3761	0.0276
92	5.4035	0.0275
93	5.4308	0.0273
94	5.4580	0.0272
95	5.4850	0.0270
96	5.5118	0.0268
97	5.5385	0.0267
98	5.5651	0.0266
99	5.5915	0.0264
100	5.6178	0.0263
101	5.6439	0.0261
102	5.6699	0.0260
103	5.6957	0.0259
104	5.7215	0.0257
105	5.7471	0.0256
106	5.7725	0.0255
107	5.7978	0.0253
108	5.8230	0.0252
109	5.8481	0.0251
110	5.8731	0.0250
111	5.8979	0.0248
112	5.9226	0.0247
113	5.9472	0.0246
114	5.9717	0.0245
115	5.9961	0.0244
116	6.0204	0.0243
117	6.0445	0.0241
118	6.0685	0.0240
119	6.0925	0.0239
120	6.1163	0.0238
121	6.1400	0.0237
122	6.1636	0.0236
123	6.1871	0.0235
124	6.2105	0.0234
125	6.2338	0.0233
126	6.2570	0.0232
127	6.2801	0.0231
128	6.3031	0.0230
129	6.3261	0.0229
130	6.3489	0.0228
131	6.3716	0.0227
132	6.3942	0.0226
133	6.4168	0.0225
134	6.4392	0.0225
135	6.4616	0.0224
136	6.4839	0.0223
137	6.5061	0.0222
138	6.5282	0.0221
139	6.5502	0.0220
140	6.5721	0.0219

141	6.5940	0.0218
142	6.6157	0.0218
143	6.6374	0.0217
144	6.6590	0.0216
145	6.6805	0.0215
146	6.7020	0.0214
147	6.7234	0.0214
148	6.7446	0.0213
149	6.7659	0.0212
150	6.7870	0.0211
151	6.8081	0.0211
152	6.8290	0.0210
153	6.8500	0.0209
154	6.8708	0.0208
155	6.8916	0.0208
156	6.9123	0.0207
157	6.9329	0.0206
158	6.9534	0.0206
159	6.9739	0.0205
160	6.9944	0.0204
161	7.0147	0.0204
162	7.0350	0.0203
163	7.0552	0.0202
164	7.0754	0.0202
165	7.0954	0.0201
166	7.1155	0.0200
167	7.1354	0.0200
168	7.1553	0.0199
169	7.1751	0.0198
170	7.1949	0.0198
171	7.2146	0.0197
172	7.2343	0.0196
173	7.2538	0.0196
174	7.2734	0.0195
175	7.2928	0.0195
176	7.3122	0.0194
177	7.3316	0.0193
178	7.3509	0.0193
179	7.3701	0.0192
180	7.3893	0.0192
181	7.4084	0.0191
182	7.4274	0.0191
183	7.4464	0.0190
184	7.4654	0.0189
185	7.4843	0.0189
186	7.5031	0.0188
187	7.5219	0.0188
188	7.5406	0.0187
189	7.5593	0.0187
190	7.5779	0.0186
191	7.5965	0.0186
192	7.6150	0.0185
193	7.6335	0.0185
194	7.6519	0.0184
195	7.6703	0.0184
196	7.6886	0.0183
197	7.7069	0.0183
198	7.7251	0.0182
199	7.7432	0.0182
200	7.7614	0.0181
201	7.7794	0.0181
202	7.7975	0.0180
203	7.8154	0.0180

204	7.8334	0.0179
205	7.8512	0.0179
206	7.8691	0.0178
207	7.8869	0.0178
208	7.9046	0.0177
209	7.9223	0.0177
210	7.9400	0.0177
211	7.9576	0.0176
212	7.9751	0.0176
213	7.9927	0.0175
214	8.0101	0.0175
215	8.0276	0.0174
216	8.0450	0.0174
217	8.0623	0.0173
218	8.0796	0.0173
219	8.0969	0.0173
220	8.1141	0.0172
221	8.1313	0.0172
222	8.1484	0.0171
223	8.1655	0.0171
224	8.1825	0.0171
225	8.1996	0.0170
226	8.2165	0.0170
227	8.2335	0.0169
228	8.2504	0.0169
229	8.2672	0.0169
230	8.2840	0.0168
231	8.3008	0.0168
232	8.3175	0.0167
233	8.3342	0.0167
234	8.3509	0.0167
235	8.3675	0.0166
236	8.3841	0.0166
237	8.4007	0.0165
238	8.4172	0.0165
239	8.4336	0.0165
240	8.4501	0.0164
241	8.4665	0.0164
242	8.4828	0.0164
243	8.4992	0.0163
244	8.5155	0.0163
245	8.5317	0.0163
246	8.5479	0.0162
247	8.5641	0.0162
248	8.5803	0.0162
249	8.5964	0.0161
250	8.6125	0.0161
251	8.6285	0.0160
252	8.6445	0.0160
253	8.6605	0.0160
254	8.6765	0.0159
255	8.6924	0.0159
256	8.7082	0.0159
257	8.7241	0.0158
258	8.7399	0.0158
259	8.7557	0.0158
260	8.7714	0.0157
261	8.7872	0.0157
262	8.8028	0.0157
263	8.8185	0.0157
264	8.8341	0.0156
265	8.8497	0.0156
266	8.8653	0.0156

267	8.8808	0.0155
268	8.8963	0.0155
269	8.9117	0.0155
270	8.9272	0.0154
271	8.9426	0.0154
272	8.9579	0.0154
273	8.9733	0.0153
274	8.9886	0.0153
275	9.0039	0.0153
276	9.0191	0.0153
277	9.0344	0.0152
278	9.0496	0.0152
279	9.0647	0.0152
280	9.0799	0.0151
281	9.0950	0.0151
282	9.1100	0.0151
283	9.1251	0.0150
284	9.1401	0.0150
285	9.1551	0.0150
286	9.1701	0.0150
287	9.1850	0.0149
288	9.1999	0.0149

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0149	0.0014	0.0135
2	0.0149	0.0014	0.0135
3	0.0150	0.0014	0.0136
4	0.0150	0.0014	0.0136
5	0.0151	0.0014	0.0137
6	0.0151	0.0014	0.0137
7	0.0152	0.0014	0.0137
8	0.0152	0.0014	0.0138
9	0.0153	0.0014	0.0138
10	0.0153	0.0014	0.0138
11	0.0153	0.0014	0.0139
12	0.0154	0.0014	0.0139
13	0.0154	0.0015	0.0140
14	0.0155	0.0015	0.0140
15	0.0155	0.0015	0.0141
16	0.0156	0.0015	0.0141
17	0.0156	0.0015	0.0141
18	0.0157	0.0015	0.0142
19	0.0157	0.0015	0.0142
20	0.0157	0.0015	0.0143
21	0.0158	0.0015	0.0143
22	0.0158	0.0015	0.0144
23	0.0159	0.0015	0.0144
24	0.0159	0.0015	0.0144
25	0.0160	0.0015	0.0145
26	0.0160	0.0015	0.0145
27	0.0161	0.0015	0.0146
28	0.0162	0.0015	0.0146
29	0.0162	0.0015	0.0147
30	0.0163	0.0015	0.0147
31	0.0163	0.0015	0.0148
32	0.0164	0.0015	0.0148
33	0.0164	0.0015	0.0149
34	0.0165	0.0016	0.0149
35	0.0165	0.0016	0.0150
36	0.0166	0.0016	0.0150

37	0.0167	0.0016	0.0151
38	0.0167	0.0016	0.0151
39	0.0168	0.0016	0.0152
40	0.0168	0.0016	0.0152
41	0.0169	0.0016	0.0153
42	0.0169	0.0016	0.0153
43	0.0170	0.0016	0.0154
44	0.0171	0.0016	0.0154
45	0.0171	0.0016	0.0155
46	0.0172	0.0016	0.0156
47	0.0173	0.0016	0.0156
48	0.0173	0.0016	0.0157
49	0.0174	0.0016	0.0157
50	0.0174	0.0016	0.0158
51	0.0175	0.0017	0.0159
52	0.0176	0.0017	0.0159
53	0.0177	0.0017	0.0160
54	0.0177	0.0017	0.0160
55	0.0178	0.0017	0.0161
56	0.0178	0.0017	0.0162
57	0.0179	0.0017	0.0162
58	0.0180	0.0017	0.0163
59	0.0181	0.0017	0.0164
60	0.0181	0.0017	0.0164
61	0.0182	0.0017	0.0165
62	0.0183	0.0017	0.0165
63	0.0184	0.0017	0.0166
64	0.0184	0.0017	0.0167
65	0.0185	0.0017	0.0168
66	0.0186	0.0018	0.0168
67	0.0187	0.0018	0.0169
68	0.0187	0.0018	0.0170
69	0.0188	0.0018	0.0171
70	0.0189	0.0018	0.0171
71	0.0190	0.0018	0.0172
72	0.0191	0.0018	0.0173
73	0.0192	0.0018	0.0174
74	0.0192	0.0018	0.0174
75	0.0193	0.0018	0.0175
76	0.0194	0.0018	0.0176
77	0.0195	0.0018	0.0177
78	0.0196	0.0018	0.0177
79	0.0197	0.0019	0.0178
80	0.0198	0.0019	0.0179
81	0.0199	0.0019	0.0180
82	0.0200	0.0019	0.0181
83	0.0201	0.0019	0.0182
84	0.0202	0.0019	0.0183
85	0.0203	0.0019	0.0184
86	0.0204	0.0019	0.0184
87	0.0205	0.0019	0.0186
88	0.0206	0.0019	0.0186
89	0.0207	0.0020	0.0187
90	0.0208	0.0020	0.0188
91	0.0209	0.0020	0.0189
92	0.0210	0.0020	0.0190
93	0.0211	0.0020	0.0191
94	0.0212	0.0020	0.0192
95	0.0214	0.0020	0.0194
96	0.0214	0.0020	0.0194
97	0.0216	0.0020	0.0196
98	0.0217	0.0020	0.0196
99	0.0218	0.0021	0.0198

100	0.0219	0.0021	0.0199
101	0.0221	0.0021	0.0200
102	0.0222	0.0021	0.0201
103	0.0224	0.0021	0.0203
104	0.0225	0.0021	0.0203
105	0.0226	0.0021	0.0205
106	0.0227	0.0021	0.0206
107	0.0229	0.0022	0.0208
108	0.0230	0.0022	0.0208
109	0.0232	0.0022	0.0210
110	0.0233	0.0022	0.0211
111	0.0235	0.0022	0.0213
112	0.0236	0.0022	0.0214
113	0.0238	0.0022	0.0216
114	0.0239	0.0023	0.0217
115	0.0241	0.0023	0.0219
116	0.0243	0.0023	0.0220
117	0.0245	0.0023	0.0222
118	0.0246	0.0023	0.0223
119	0.0248	0.0023	0.0225
120	0.0250	0.0024	0.0226
121	0.0252	0.0024	0.0228
122	0.0253	0.0024	0.0229
123	0.0256	0.0024	0.0232
124	0.0257	0.0024	0.0233
125	0.0260	0.0025	0.0235
126	0.0261	0.0025	0.0237
127	0.0264	0.0025	0.0239
128	0.0266	0.0025	0.0240
129	0.0268	0.0025	0.0243
130	0.0270	0.0025	0.0245
131	0.0273	0.0026	0.0247
132	0.0275	0.0026	0.0249
133	0.0278	0.0026	0.0252
134	0.0280	0.0026	0.0253
135	0.0283	0.0027	0.0256
136	0.0285	0.0027	0.0258
137	0.0288	0.0027	0.0261
138	0.0290	0.0027	0.0263
139	0.0294	0.0028	0.0266
140	0.0296	0.0028	0.0268
141	0.0300	0.0028	0.0272
142	0.0302	0.0028	0.0274
143	0.0307	0.0029	0.0278
144	0.0309	0.0029	0.0280
145	0.0367	0.0035	0.0333
146	0.0369	0.0035	0.0335
147	0.0374	0.0035	0.0339
148	0.0377	0.0036	0.0341
149	0.0382	0.0036	0.0346
150	0.0385	0.0036	0.0348
151	0.0390	0.0037	0.0353
152	0.0393	0.0037	0.0356
153	0.0399	0.0038	0.0361
154	0.0402	0.0038	0.0364
155	0.0408	0.0039	0.0370
156	0.0412	0.0039	0.0373
157	0.0419	0.0039	0.0379
158	0.0422	0.0040	0.0382
159	0.0430	0.0041	0.0389
160	0.0434	0.0041	0.0393
161	0.0442	0.0042	0.0400
162	0.0446	0.0042	0.0404

163	0.0455	0.0043	0.0412
164	0.0460	0.0043	0.0417
165	0.0470	0.0044	0.0426
166	0.0475	0.0045	0.0430
167	0.0486	0.0046	0.0440
168	0.0492	0.0046	0.0446
169	0.0504	0.0048	0.0457
170	0.0511	0.0048	0.0463
171	0.0525	0.0050	0.0476
172	0.0533	0.0050	0.0482
173	0.0549	0.0052	0.0497
174	0.0557	0.0053	0.0505
175	0.0576	0.0054	0.0522
176	0.0586	0.0055	0.0531
177	0.0608	0.0057	0.0551
178	0.0620	0.0058	0.0562
179	0.0647	0.0061	0.0586
180	0.0662	0.0062	0.0599
181	0.0695	0.0066	0.0630
182	0.0714	0.0067	0.0647
183	0.0757	0.0071	0.0686
184	0.0782	0.0072	0.0710
185	0.0619	0.0058	0.0561
186	0.0654	0.0062	0.0592
187	0.0742	0.0070	0.0672
188	0.0800	0.0072	0.0728
189	0.0964	0.0072	0.0892
190	0.1089	0.0072	0.1017
191	0.1556	0.0072	0.1484
192	0.2140	0.0072	0.2068
193	0.6697	0.0072	0.6625
194	0.1267	0.0072	0.1195
195	0.0872	0.0072	0.0800
196	0.0694	0.0065	0.0629
197	0.0810	0.0072	0.0738
198	0.0734	0.0069	0.0665
199	0.0678	0.0064	0.0614
200	0.0633	0.0060	0.0574
201	0.0597	0.0056	0.0541
202	0.0566	0.0053	0.0513
203	0.0540	0.0051	0.0489
204	0.0518	0.0049	0.0469
205	0.0498	0.0047	0.0451
206	0.0480	0.0045	0.0435
207	0.0465	0.0044	0.0421
208	0.0451	0.0042	0.0408
209	0.0438	0.0041	0.0396
210	0.0426	0.0040	0.0386
211	0.0415	0.0039	0.0376
212	0.0405	0.0038	0.0367
213	0.0396	0.0037	0.0359
214	0.0387	0.0037	0.0351
215	0.0379	0.0036	0.0344
216	0.0372	0.0035	0.0337
217	0.0311	0.0029	0.0282
218	0.0304	0.0029	0.0276
219	0.0298	0.0028	0.0270
220	0.0292	0.0028	0.0265
221	0.0287	0.0027	0.0260
222	0.0281	0.0027	0.0255
223	0.0276	0.0026	0.0250
224	0.0272	0.0026	0.0246
225	0.0267	0.0025	0.0242

226	0.0263	0.0025	0.0238
227	0.0259	0.0024	0.0234
228	0.0255	0.0024	0.0231
229	0.0251	0.0024	0.0227
230	0.0247	0.0023	0.0224
231	0.0244	0.0023	0.0221
232	0.0240	0.0023	0.0218
233	0.0237	0.0022	0.0215
234	0.0234	0.0022	0.0212
235	0.0231	0.0022	0.0209
236	0.0228	0.0022	0.0207
237	0.0225	0.0021	0.0204
238	0.0223	0.0021	0.0202
239	0.0220	0.0021	0.0199
240	0.0218	0.0021	0.0197
241	0.0215	0.0020	0.0195
242	0.0213	0.0020	0.0193
243	0.0211	0.0020	0.0191
244	0.0208	0.0020	0.0189
245	0.0206	0.0019	0.0187
246	0.0204	0.0019	0.0185
247	0.0202	0.0019	0.0183
248	0.0200	0.0019	0.0181
249	0.0198	0.0019	0.0180
250	0.0196	0.0019	0.0178
251	0.0195	0.0018	0.0176
252	0.0193	0.0018	0.0175
253	0.0191	0.0018	0.0173
254	0.0189	0.0018	0.0172
255	0.0188	0.0018	0.0170
256	0.0186	0.0018	0.0169
257	0.0185	0.0017	0.0167
258	0.0183	0.0017	0.0166
259	0.0182	0.0017	0.0165
260	0.0180	0.0017	0.0163
261	0.0179	0.0017	0.0162
262	0.0177	0.0017	0.0161
263	0.0176	0.0017	0.0159
264	0.0175	0.0016	0.0158
265	0.0173	0.0016	0.0157
266	0.0172	0.0016	0.0156
267	0.0171	0.0016	0.0155
268	0.0170	0.0016	0.0154
269	0.0169	0.0016	0.0153
270	0.0167	0.0016	0.0152
271	0.0166	0.0016	0.0151
272	0.0165	0.0016	0.0150
273	0.0164	0.0015	0.0149
274	0.0163	0.0015	0.0148
275	0.0162	0.0015	0.0147
276	0.0161	0.0015	0.0146
277	0.0160	0.0015	0.0145
278	0.0159	0.0015	0.0144
279	0.0158	0.0015	0.0143
280	0.0157	0.0015	0.0142
281	0.0156	0.0015	0.0141
282	0.0155	0.0015	0.0140
283	0.0154	0.0015	0.0140
284	0.0153	0.0014	0.0139
285	0.0152	0.0014	0.0138
286	0.0151	0.0014	0.0137
287	0.0150	0.0014	0.0136
288	0.0150	0.0014	0.0136

Total soil rain loss = 0.78(In)
Total effective rainfall = 8.42(In)
Peak flow rate in flood hydrograph = 42.92(CFS)

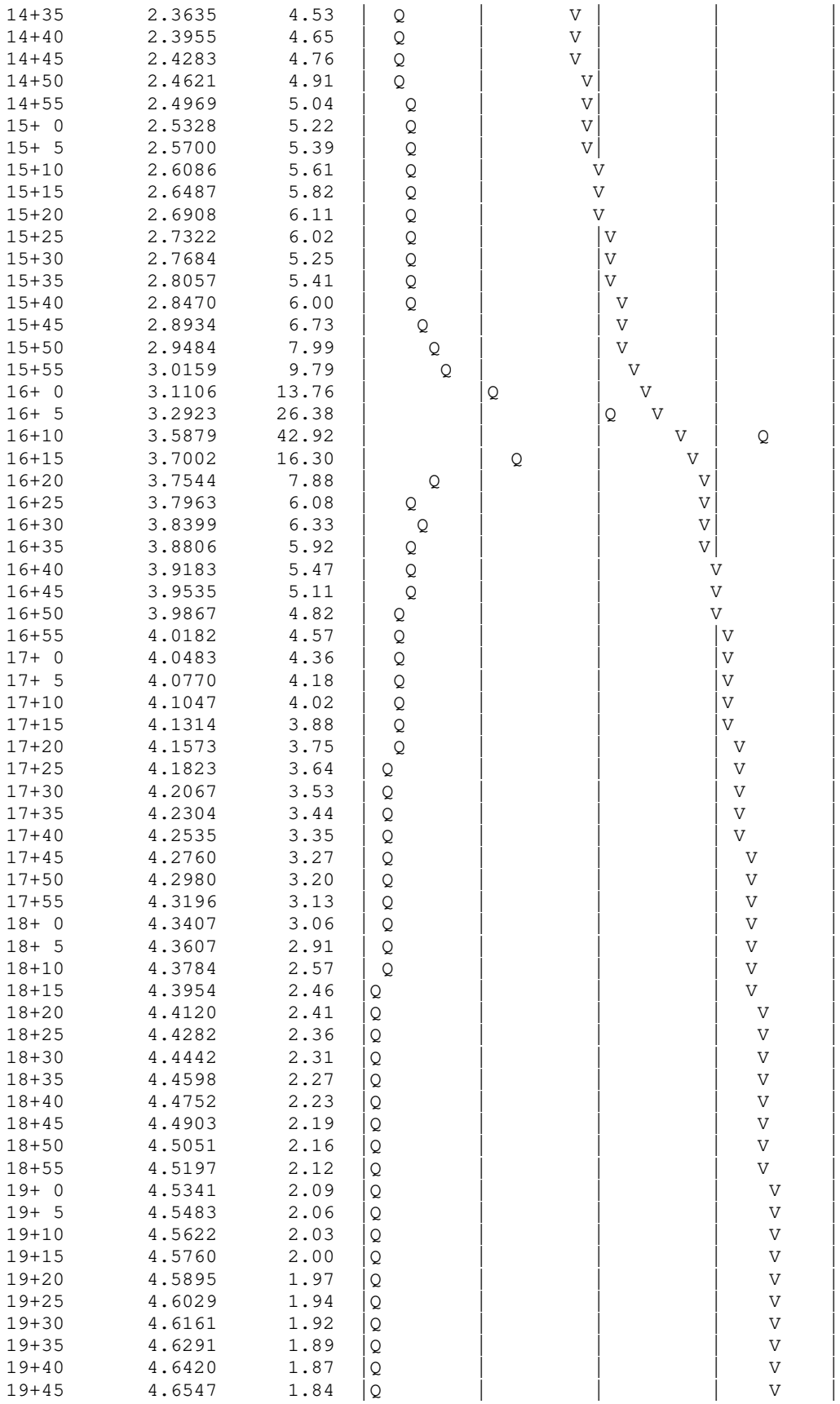
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	12.5	25.0	37.5	50.0
0+ 5	0.0018	0.26	Q				
0+10	0.0089	1.04	Q				
0+15	0.0171	1.19	Q				
0+20	0.0255	1.21	Q				
0+25	0.0338	1.21	Q				
0+30	0.0422	1.22	Q				
0+35	0.0507	1.22	Q				
0+40	0.0591	1.23	Q				
0+45	0.0676	1.23	Q				
0+50	0.0760	1.23	Q				
0+55	0.0846	1.24	Q				
1+ 0	0.0931	1.24	Q				
1+ 5	0.1017	1.24	Q				
1+10	0.1103	1.25	Q				
1+15	0.1189	1.25	VQ				
1+20	0.1275	1.25	VQ				
1+25	0.1362	1.26	|Q				
1+30	0.1449	1.26	|Q				
1+35	0.1536	1.27	|Q				
1+40	0.1623	1.27	|Q				
1+45	0.1711	1.27	|Q				
1+50	0.1799	1.28	|Q				
1+55	0.1887	1.28	|Q				
2+ 0	0.1976	1.29	|Q				
2+ 5	0.2065	1.29	|Q				
2+10	0.2154	1.29	|Q				
2+15	0.2243	1.30	|Q				
2+20	0.2333	1.30	|Q				
2+25	0.2423	1.31	|Q				
2+30	0.2513	1.31	|Q				
2+35	0.2604	1.31	|QV				
2+40	0.2695	1.32	|QV				
2+45	0.2786	1.32	|QV				
2+50	0.2877	1.33	|QV				
2+55	0.2969	1.33	|QV				
3+ 0	0.3061	1.34	|QV				
3+ 5	0.3154	1.34	|QV				
3+10	0.3246	1.35	|QV				
3+15	0.3339	1.35	|QV				
3+20	0.3433	1.36	|QV				
3+25	0.3526	1.36	|QV				
3+30	0.3620	1.37	|QV				
3+35	0.3715	1.37	|QV				
3+40	0.3810	1.38	|QV				
3+45	0.3905	1.38	|Q V				
3+50	0.4000	1.39	|Q V				
3+55	0.4096	1.39	|Q V				
4+ 0	0.4192	1.40	|Q V				

4+ 5	0.4288	1.40	Q V			
4+10	0.4385	1.41	Q V			
4+15	0.4482	1.41	Q V			
4+20	0.4580	1.42	Q V			
4+25	0.4677	1.42	Q V			
4+30	0.4776	1.43	Q V			
4+35	0.4874	1.43	Q V			
4+40	0.4973	1.44	Q V			
4+45	0.5073	1.44	Q V			
4+50	0.5172	1.45	Q V			
4+55	0.5273	1.45	Q V			
5+ 0	0.5373	1.46	Q V			
5+ 5	0.5474	1.47	Q V			
5+10	0.5576	1.47	Q V			
5+15	0.5677	1.48	Q V			
5+20	0.5780	1.48	Q V			
5+25	0.5882	1.49	Q V			
5+30	0.5985	1.50	Q V			
5+35	0.6089	1.50	Q V			
5+40	0.6193	1.51	Q V			
5+45	0.6297	1.52	Q V			
5+50	0.6402	1.52	Q V			
5+55	0.6507	1.53	Q V			
6+ 0	0.6613	1.54	Q V			
6+ 5	0.6719	1.54	Q V			
6+10	0.6826	1.55	Q V			
6+15	0.6933	1.56	Q V			
6+20	0.7041	1.56	Q V			
6+25	0.7149	1.57	Q V			
6+30	0.7257	1.58	Q V			
6+35	0.7367	1.58	Q V			
6+40	0.7476	1.59	Q V			
6+45	0.7586	1.60	Q V			
6+50	0.7697	1.61	Q V			
6+55	0.7808	1.61	Q V			
7+ 0	0.7920	1.62	Q V			
7+ 5	0.8032	1.63	Q V			
7+10	0.8145	1.64	Q V			
7+15	0.8259	1.65	Q V			
7+20	0.8373	1.66	Q V			
7+25	0.8487	1.66	Q V			
7+30	0.8602	1.67	Q V			
7+35	0.8718	1.68	Q V			
7+40	0.8835	1.69	Q V			
7+45	0.8951	1.70	Q V			
7+50	0.9069	1.71	Q V			
7+55	0.9187	1.72	Q V			
8+ 0	0.9306	1.73	Q V			
8+ 5	0.9426	1.74	Q V			
8+10	0.9546	1.75	Q V			
8+15	0.9667	1.75	Q V			
8+20	0.9788	1.77	Q V			
8+25	0.9911	1.77	Q V			
8+30	1.0034	1.79	Q V			
8+35	1.0157	1.80	Q V			
8+40	1.0282	1.81	Q V			
8+45	1.0407	1.82	Q V			
8+50	1.0533	1.83	Q V			
8+55	1.0660	1.84	Q V			
9+ 0	1.0787	1.85	Q V			
9+ 5	1.0915	1.86	Q V			
9+10	1.1045	1.88	Q V			
9+15	1.1174	1.89	Q V			

9+20	1.1305	1.90	Q V				
9+25	1.1437	1.91	Q V				
9+30	1.1569	1.92	Q V				
9+35	1.1703	1.94	Q V				
9+40	1.1837	1.95	Q V				
9+45	1.1972	1.96	Q V				
9+50	1.2109	1.98	Q V				
9+55	1.2246	1.99	Q V				
10+ 0	1.2384	2.01	Q V				
10+ 5	1.2523	2.02	Q V				
10+10	1.2663	2.04	Q V				
10+15	1.2805	2.05	Q V				
10+20	1.2947	2.07	Q V				
10+25	1.3090	2.08	Q V				
10+30	1.3235	2.10	Q V				
10+35	1.3381	2.12	Q V				
10+40	1.3528	2.13	Q V				
10+45	1.3676	2.15	Q V				
10+50	1.3825	2.17	Q V				
10+55	1.3976	2.19	Q V				
11+ 0	1.4128	2.21	Q V				
11+ 5	1.4281	2.22	Q V				
11+10	1.4436	2.25	Q V				
11+15	1.4591	2.26	Q V				
11+20	1.4749	2.29	Q V				
11+25	1.4908	2.31	Q V				
11+30	1.5068	2.33	Q V				
11+35	1.5230	2.35	Q V				
11+40	1.5394	2.38	Q V				
11+45	1.5559	2.40	Q V				
11+50	1.5726	2.43	Q V				
11+55	1.5895	2.45	Q V				
12+ 0	1.6065	2.48	Q V				
12+ 5	1.6244	2.59	Q V				
12+10	1.6444	2.90	Q V				
12+15	1.6650	2.99	Q V				
12+20	1.6858	3.02	Q V				
12+25	1.7068	3.05	Q V				
12+30	1.7281	3.09	Q V				
12+35	1.7495	3.12	Q V				
12+40	1.7712	3.15	Q V				
12+45	1.7932	3.18	Q V				
12+50	1.8154	3.22	Q V				
12+55	1.8378	3.26	Q V				
13+ 0	1.8605	3.30	Q V				
13+ 5	1.8835	3.34	Q V				
13+10	1.9068	3.38	Q V				
13+15	1.9304	3.42	Q V				
13+20	1.9543	3.47	Q V				
13+25	1.9785	3.52	Q V				
13+30	2.0031	3.57	Q V				
13+35	2.0280	3.62	Q V				
13+40	2.0533	3.68	Q V				
13+45	2.0790	3.73	Q V				
13+50	2.1051	3.79	Q V				
13+55	2.1317	3.85	Q V				
14+ 0	2.1587	3.93	Q V				
14+ 5	2.1862	3.99	Q V				
14+10	2.2142	4.07	Q V				
14+15	2.2428	4.15	Q V				
14+20	2.2720	4.24	Q V				
14+25	2.3018	4.32	Q V				
14+30	2.3323	4.43	Q V				



19+50	4.6672	1.82	Q				V
19+55	4.6796	1.80	Q				V
20+ 0	4.6919	1.78	Q				V
20+ 5	4.7040	1.76	Q				V
20+10	4.7160	1.74	Q				V
20+15	4.7278	1.72	Q				V
20+20	4.7395	1.70	Q				V
20+25	4.7511	1.68	Q				V
20+30	4.7626	1.67	Q				V
20+35	4.7740	1.65	Q				V
20+40	4.7852	1.63	Q				V
20+45	4.7963	1.62	Q				V
20+50	4.8074	1.60	Q				V
20+55	4.8183	1.59	Q				V
21+ 0	4.8291	1.57	Q				V
21+ 5	4.8399	1.56	Q				V
21+10	4.8505	1.54	Q				V
21+15	4.8610	1.53	Q				V
21+20	4.8715	1.52	Q				V
21+25	4.8819	1.50	Q				V
21+30	4.8921	1.49	Q				V
21+35	4.9023	1.48	Q				V
21+40	4.9124	1.47	Q				V
21+45	4.9225	1.46	Q				V
21+50	4.9324	1.44	Q				V
21+55	4.9423	1.43	Q				V
22+ 0	4.9521	1.42	Q				V
22+ 5	4.9618	1.41	Q				V
22+10	4.9715	1.40	Q				V
22+15	4.9811	1.39	Q				V
22+20	4.9906	1.38	Q				V
22+25	5.0000	1.37	Q				V
22+30	5.0094	1.36	Q				V
22+35	5.0187	1.35	Q				V
22+40	5.0280	1.34	Q				V
22+45	5.0372	1.33	Q				V
22+50	5.0463	1.33	Q				V
22+55	5.0553	1.32	Q				V
23+ 0	5.0644	1.31	Q				V
23+ 5	5.0733	1.30	Q				V
23+10	5.0822	1.29	Q				V
23+15	5.0910	1.28	Q				V
23+20	5.0998	1.28	Q				V
23+25	5.1085	1.27	Q				V
23+30	5.1172	1.26	Q				V
23+35	5.1258	1.25	Q				V
23+40	5.1344	1.24	Q				V
23+45	5.1429	1.24	Q				V
23+50	5.1514	1.23	Q				V
23+55	5.1598	1.22	Q				V
24+ 0	5.1682	1.22	Q				V
24+ 5	5.1748	0.95	Q				V
24+10	5.1759	0.17	Q				V
24+15	5.1760	0.01	Q				V

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 06/13/25

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

Program License Serial Number 6443

LOCUST GATEWAY
PROPOSED UNIT HYDROGRAPH ANALYSIS (DMA 3)
100-YR DESIGN STORM
KIMLEY-HORN

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 100		
9.52	1	1.81
Rainfall data for year 100		
9.52	6	4.82
Rainfall data for year 100		
9.52	24	9.20

++

******** 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)
32.0	52.0	9.52	1.000	0.785	0.173	0.136

Area-averaged adjusted loss rate Fm (In/Hr) = 0.136

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

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
1.65	0.173	32.0	52.0	9.23	0.354
7.87	0.827	98.0	98.0	0.20	0.974

Area-averaged catchment yield fraction, Y = 0.867
Area-averaged low loss fraction, Yb = 0.133
Direct entry of lag time by user
++
Watershed area = 9.52(Ac.)
Catchment Lag time = 0.100 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 83.3333
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.136(In/Hr)
Average low loss rate fraction (Yb) = 0.133 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.670(In)
Computed peak 30-minute rainfall = 1.372(In)
Specified peak 1-hour rainfall = 1.810(In)
Computed peak 3-hour rainfall = 3.300(In)
Specified peak 6-hour rainfall = 4.820(In)
Specified peak 24-hour rainfall = 9.200(In)

Rainfall depth area reduction factors:
Using a total area of 9.52(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.670(In)
30-minute factor = 1.000 Adjusted rainfall = 1.371(In)
1-hour factor = 1.000 Adjusted rainfall = 1.809(In)
3-hour factor = 1.000 Adjusted rainfall = 3.300(In)
6-hour factor = 1.000 Adjusted rainfall = 4.820(In)
24-hour factor = 1.000 Adjusted rainfall = 9.200(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 115.13 (CFS))		
1	12.207	14.054
2	66.918	62.990
3	94.948	32.272
4	99.050	4.722
5	100.000	1.094

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6696	0.6696
2	0.8835	0.2139
3	1.0391	0.1556
4	1.1658	0.1267
5	1.2747	0.1088
6	1.3711	0.0964
7	1.4583	0.0872
8	1.5383	0.0800
9	1.6125	0.0742
10	1.6819	0.0694
11	1.7473	0.0654
12	1.8092	0.0619
13	1.8902	0.0810

14	1.9684	0.0782
15	2.0441	0.0757
16	2.1175	0.0734
17	2.1889	0.0714
18	2.2584	0.0695
19	2.3262	0.0678
20	2.3924	0.0662
21	2.4571	0.0647
22	2.5204	0.0633
23	2.5825	0.0620
24	2.6433	0.0608
25	2.7030	0.0597
26	2.7616	0.0586
27	2.8192	0.0576
28	2.8758	0.0566
29	2.9316	0.0557
30	2.9865	0.0549
31	3.0405	0.0540
32	3.0938	0.0533
33	3.1463	0.0525
34	3.1981	0.0518
35	3.2492	0.0511
36	3.2996	0.0505
37	3.3494	0.0498
38	3.3986	0.0492
39	3.4472	0.0486
40	3.4953	0.0480
41	3.5428	0.0475
42	3.5898	0.0470
43	3.6362	0.0465
44	3.6822	0.0460
45	3.7277	0.0455
46	3.7728	0.0451
47	3.8174	0.0446
48	3.8616	0.0442
49	3.9054	0.0438
50	3.9488	0.0434
51	3.9917	0.0430
52	4.0343	0.0426
53	4.0766	0.0422
54	4.1184	0.0419
55	4.1600	0.0415
56	4.2011	0.0412
57	4.2420	0.0408
58	4.2825	0.0405
59	4.3227	0.0402
60	4.3626	0.0399
61	4.4022	0.0396
62	4.4415	0.0393
63	4.4805	0.0390
64	4.5193	0.0387
65	4.5578	0.0385
66	4.5960	0.0382
67	4.6339	0.0379
68	4.6716	0.0377
69	4.7090	0.0374
70	4.7462	0.0372
71	4.7831	0.0369
72	4.8199	0.0367
73	4.8510	0.0311
74	4.8818	0.0309
75	4.9125	0.0307
76	4.9429	0.0304

77	4.9731	0.0302
78	5.0032	0.0300
79	5.0330	0.0298
80	5.0626	0.0296
81	5.0920	0.0294
82	5.1212	0.0292
83	5.1502	0.0290
84	5.1791	0.0288
85	5.2077	0.0287
86	5.2362	0.0285
87	5.2645	0.0283
88	5.2927	0.0281
89	5.3206	0.0280
90	5.3484	0.0278
91	5.3760	0.0276
92	5.4035	0.0275
93	5.4308	0.0273
94	5.4580	0.0272
95	5.4850	0.0270
96	5.5118	0.0268
97	5.5385	0.0267
98	5.5651	0.0266
99	5.5915	0.0264
100	5.6177	0.0263
101	5.6439	0.0261
102	5.6699	0.0260
103	5.6957	0.0259
104	5.7214	0.0257
105	5.7470	0.0256
106	5.7725	0.0255
107	5.7978	0.0253
108	5.8230	0.0252
109	5.8481	0.0251
110	5.8731	0.0250
111	5.8979	0.0248
112	5.9226	0.0247
113	5.9472	0.0246
114	5.9717	0.0245
115	5.9961	0.0244
116	6.0203	0.0243
117	6.0445	0.0241
118	6.0685	0.0240
119	6.0924	0.0239
120	6.1162	0.0238
121	6.1400	0.0237
122	6.1636	0.0236
123	6.1871	0.0235
124	6.2105	0.0234
125	6.2338	0.0233
126	6.2570	0.0232
127	6.2801	0.0231
128	6.3031	0.0230
129	6.3260	0.0229
130	6.3489	0.0228
131	6.3716	0.0227
132	6.3942	0.0226
133	6.4168	0.0225
134	6.4392	0.0225
135	6.4616	0.0224
136	6.4838	0.0223
137	6.5060	0.0222
138	6.5281	0.0221
139	6.5502	0.0220

140	6.5721	0.0219
141	6.5939	0.0218
142	6.6157	0.0218
143	6.6374	0.0217
144	6.6590	0.0216
145	6.6805	0.0215
146	6.7020	0.0214
147	6.7233	0.0214
148	6.7446	0.0213
149	6.7658	0.0212
150	6.7870	0.0211
151	6.8080	0.0211
152	6.8290	0.0210
153	6.8499	0.0209
154	6.8708	0.0208
155	6.8915	0.0208
156	6.9122	0.0207
157	6.9329	0.0206
158	6.9534	0.0206
159	6.9739	0.0205
160	6.9943	0.0204
161	7.0147	0.0204
162	7.0350	0.0203
163	7.0552	0.0202
164	7.0753	0.0202
165	7.0954	0.0201
166	7.1154	0.0200
167	7.1354	0.0200
168	7.1553	0.0199
169	7.1751	0.0198
170	7.1949	0.0198
171	7.2146	0.0197
172	7.2342	0.0196
173	7.2538	0.0196
174	7.2733	0.0195
175	7.2928	0.0195
176	7.3122	0.0194
177	7.3315	0.0193
178	7.3508	0.0193
179	7.3701	0.0192
180	7.3892	0.0192
181	7.4083	0.0191
182	7.4274	0.0191
183	7.4464	0.0190
184	7.4653	0.0189
185	7.4842	0.0189
186	7.5031	0.0188
187	7.5219	0.0188
188	7.5406	0.0187
189	7.5593	0.0187
190	7.5779	0.0186
191	7.5965	0.0186
192	7.6150	0.0185
193	7.6335	0.0185
194	7.6519	0.0184
195	7.6702	0.0184
196	7.6886	0.0183
197	7.7068	0.0183
198	7.7250	0.0182
199	7.7432	0.0182
200	7.7613	0.0181
201	7.7794	0.0181
202	7.7974	0.0180

203	7.8154	0.0180
204	7.8333	0.0179
205	7.8512	0.0179
206	7.8690	0.0178
207	7.8868	0.0178
208	7.9046	0.0177
209	7.9223	0.0177
210	7.9399	0.0177
211	7.9575	0.0176
212	7.9751	0.0176
213	7.9926	0.0175
214	8.0101	0.0175
215	8.0275	0.0174
216	8.0449	0.0174
217	8.0623	0.0173
218	8.0796	0.0173
219	8.0968	0.0173
220	8.1141	0.0172
221	8.1312	0.0172
222	8.1484	0.0171
223	8.1655	0.0171
224	8.1825	0.0171
225	8.1995	0.0170
226	8.2165	0.0170
227	8.2334	0.0169
228	8.2503	0.0169
229	8.2672	0.0169
230	8.2840	0.0168
231	8.3008	0.0168
232	8.3175	0.0167
233	8.3342	0.0167
234	8.3509	0.0167
235	8.3675	0.0166
236	8.3841	0.0166
237	8.4006	0.0165
238	8.4171	0.0165
239	8.4336	0.0165
240	8.4501	0.0164
241	8.4665	0.0164
242	8.4828	0.0164
243	8.4991	0.0163
244	8.5154	0.0163
245	8.5317	0.0163
246	8.5479	0.0162
247	8.5641	0.0162
248	8.5802	0.0162
249	8.5964	0.0161
250	8.6124	0.0161
251	8.6285	0.0160
252	8.6445	0.0160
253	8.6605	0.0160
254	8.6764	0.0159
255	8.6923	0.0159
256	8.7082	0.0159
257	8.7241	0.0158
258	8.7399	0.0158
259	8.7557	0.0158
260	8.7714	0.0157
261	8.7871	0.0157
262	8.8028	0.0157
263	8.8185	0.0157
264	8.8341	0.0156
265	8.8497	0.0156

266	8.8652	0.0156
267	8.8808	0.0155
268	8.8962	0.0155
269	8.9117	0.0155
270	8.9271	0.0154
271	8.9425	0.0154
272	8.9579	0.0154
273	8.9733	0.0153
274	8.9886	0.0153
275	9.0039	0.0153
276	9.0191	0.0153
277	9.0343	0.0152
278	9.0495	0.0152
279	9.0647	0.0152
280	9.0798	0.0151
281	9.0949	0.0151
282	9.1100	0.0151
283	9.1251	0.0151
284	9.1401	0.0150
285	9.1551	0.0150
286	9.1700	0.0150
287	9.1850	0.0149
288	9.1999	0.0149

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0149	0.0020	0.0129
2	0.0149	0.0020	0.0129
3	0.0150	0.0020	0.0130
4	0.0150	0.0020	0.0130
5	0.0151	0.0020	0.0131
6	0.0151	0.0020	0.0131
7	0.0152	0.0020	0.0131
8	0.0152	0.0020	0.0132
9	0.0153	0.0020	0.0132
10	0.0153	0.0020	0.0132
11	0.0153	0.0020	0.0133
12	0.0154	0.0020	0.0133
13	0.0154	0.0021	0.0134
14	0.0155	0.0021	0.0134
15	0.0155	0.0021	0.0135
16	0.0156	0.0021	0.0135
17	0.0156	0.0021	0.0135
18	0.0157	0.0021	0.0136
19	0.0157	0.0021	0.0136
20	0.0157	0.0021	0.0136
21	0.0158	0.0021	0.0137
22	0.0158	0.0021	0.0137
23	0.0159	0.0021	0.0138
24	0.0159	0.0021	0.0138
25	0.0160	0.0021	0.0139
26	0.0160	0.0021	0.0139
27	0.0161	0.0021	0.0140
28	0.0162	0.0022	0.0140
29	0.0162	0.0022	0.0141
30	0.0163	0.0022	0.0141
31	0.0163	0.0022	0.0142
32	0.0164	0.0022	0.0142
33	0.0164	0.0022	0.0142
34	0.0165	0.0022	0.0143
35	0.0165	0.0022	0.0143

36	0.0166	0.0022	0.0144
37	0.0167	0.0022	0.0144
38	0.0167	0.0022	0.0145
39	0.0168	0.0022	0.0145
40	0.0168	0.0022	0.0146
41	0.0169	0.0023	0.0146
42	0.0169	0.0023	0.0147
43	0.0170	0.0023	0.0147
44	0.0171	0.0023	0.0148
45	0.0171	0.0023	0.0149
46	0.0172	0.0023	0.0149
47	0.0173	0.0023	0.0150
48	0.0173	0.0023	0.0150
49	0.0174	0.0023	0.0151
50	0.0174	0.0023	0.0151
51	0.0175	0.0023	0.0152
52	0.0176	0.0023	0.0152
53	0.0177	0.0024	0.0153
54	0.0177	0.0024	0.0153
55	0.0178	0.0024	0.0154
56	0.0178	0.0024	0.0155
57	0.0179	0.0024	0.0155
58	0.0180	0.0024	0.0156
59	0.0181	0.0024	0.0157
60	0.0181	0.0024	0.0157
61	0.0182	0.0024	0.0158
62	0.0183	0.0024	0.0158
63	0.0184	0.0024	0.0159
64	0.0184	0.0025	0.0160
65	0.0185	0.0025	0.0161
66	0.0186	0.0025	0.0161
67	0.0187	0.0025	0.0162
68	0.0187	0.0025	0.0162
69	0.0188	0.0025	0.0163
70	0.0189	0.0025	0.0164
71	0.0190	0.0025	0.0165
72	0.0191	0.0025	0.0165
73	0.0192	0.0026	0.0166
74	0.0192	0.0026	0.0167
75	0.0193	0.0026	0.0168
76	0.0194	0.0026	0.0168
77	0.0195	0.0026	0.0169
78	0.0196	0.0026	0.0170
79	0.0197	0.0026	0.0171
80	0.0198	0.0026	0.0171
81	0.0199	0.0027	0.0172
82	0.0200	0.0027	0.0173
83	0.0201	0.0027	0.0174
84	0.0202	0.0027	0.0175
85	0.0203	0.0027	0.0176
86	0.0204	0.0027	0.0176
87	0.0205	0.0027	0.0178
88	0.0206	0.0027	0.0178
89	0.0207	0.0028	0.0179
90	0.0208	0.0028	0.0180
91	0.0209	0.0028	0.0181
92	0.0210	0.0028	0.0182
93	0.0211	0.0028	0.0183
94	0.0212	0.0028	0.0184
95	0.0214	0.0028	0.0185
96	0.0214	0.0029	0.0186
97	0.0216	0.0029	0.0187
98	0.0217	0.0029	0.0188

99	0.0218	0.0029	0.0189
100	0.0219	0.0029	0.0190
101	0.0221	0.0029	0.0192
102	0.0222	0.0030	0.0192
103	0.0224	0.0030	0.0194
104	0.0225	0.0030	0.0195
105	0.0226	0.0030	0.0196
106	0.0227	0.0030	0.0197
107	0.0229	0.0031	0.0199
108	0.0230	0.0031	0.0199
109	0.0232	0.0031	0.0201
110	0.0233	0.0031	0.0202
111	0.0235	0.0031	0.0204
112	0.0236	0.0031	0.0205
113	0.0238	0.0032	0.0206
114	0.0239	0.0032	0.0207
115	0.0241	0.0032	0.0209
116	0.0243	0.0032	0.0210
117	0.0245	0.0033	0.0212
118	0.0246	0.0033	0.0213
119	0.0248	0.0033	0.0215
120	0.0250	0.0033	0.0216
121	0.0252	0.0034	0.0218
122	0.0253	0.0034	0.0220
123	0.0256	0.0034	0.0222
124	0.0257	0.0034	0.0223
125	0.0260	0.0035	0.0225
126	0.0261	0.0035	0.0226
127	0.0264	0.0035	0.0229
128	0.0266	0.0035	0.0230
129	0.0268	0.0036	0.0233
130	0.0270	0.0036	0.0234
131	0.0273	0.0036	0.0237
132	0.0275	0.0037	0.0238
133	0.0278	0.0037	0.0241
134	0.0280	0.0037	0.0242
135	0.0283	0.0038	0.0245
136	0.0285	0.0038	0.0247
137	0.0288	0.0038	0.0250
138	0.0290	0.0039	0.0252
139	0.0294	0.0039	0.0255
140	0.0296	0.0039	0.0257
141	0.0300	0.0040	0.0260
142	0.0302	0.0040	0.0262
143	0.0307	0.0041	0.0266
144	0.0309	0.0041	0.0268
145	0.0367	0.0049	0.0318
146	0.0369	0.0049	0.0320
147	0.0374	0.0050	0.0324
148	0.0377	0.0050	0.0327
149	0.0382	0.0051	0.0331
150	0.0385	0.0051	0.0333
151	0.0390	0.0052	0.0338
152	0.0393	0.0052	0.0341
153	0.0399	0.0053	0.0346
154	0.0402	0.0054	0.0348
155	0.0408	0.0054	0.0354
156	0.0412	0.0055	0.0357
157	0.0419	0.0056	0.0363
158	0.0422	0.0056	0.0366
159	0.0430	0.0057	0.0373
160	0.0434	0.0058	0.0376
161	0.0442	0.0059	0.0383

162	0.0446	0.0059	0.0387
163	0.0455	0.0061	0.0394
164	0.0460	0.0061	0.0399
165	0.0470	0.0063	0.0407
166	0.0475	0.0063	0.0412
167	0.0486	0.0065	0.0421
168	0.0492	0.0066	0.0426
169	0.0505	0.0067	0.0437
170	0.0511	0.0068	0.0443
171	0.0525	0.0070	0.0455
172	0.0533	0.0071	0.0462
173	0.0549	0.0073	0.0476
174	0.0557	0.0074	0.0483
175	0.0576	0.0077	0.0499
176	0.0586	0.0078	0.0508
177	0.0608	0.0081	0.0527
178	0.0620	0.0083	0.0538
179	0.0647	0.0086	0.0561
180	0.0662	0.0088	0.0574
181	0.0695	0.0093	0.0603
182	0.0714	0.0095	0.0619
183	0.0757	0.0101	0.0656
184	0.0782	0.0104	0.0678
185	0.0619	0.0082	0.0536
186	0.0654	0.0087	0.0566
187	0.0742	0.0099	0.0643
188	0.0800	0.0107	0.0693
189	0.0964	0.0113	0.0851
190	0.1088	0.0113	0.0975
191	0.1556	0.0113	0.1443
192	0.2139	0.0113	0.2026
193	0.6696	0.0113	0.6583
194	0.1267	0.0113	0.1154
195	0.0872	0.0113	0.0759
196	0.0694	0.0093	0.0602
197	0.0810	0.0108	0.0702
198	0.0734	0.0098	0.0637
199	0.0678	0.0090	0.0588
200	0.0633	0.0084	0.0549
201	0.0597	0.0080	0.0517
202	0.0566	0.0076	0.0491
203	0.0540	0.0072	0.0468
204	0.0518	0.0069	0.0449
205	0.0498	0.0066	0.0432
206	0.0480	0.0064	0.0416
207	0.0465	0.0062	0.0403
208	0.0451	0.0060	0.0391
209	0.0438	0.0058	0.0379
210	0.0426	0.0057	0.0369
211	0.0415	0.0055	0.0360
212	0.0405	0.0054	0.0351
213	0.0396	0.0053	0.0343
214	0.0387	0.0052	0.0336
215	0.0379	0.0051	0.0329
216	0.0372	0.0050	0.0322
217	0.0311	0.0041	0.0270
218	0.0304	0.0041	0.0264
219	0.0298	0.0040	0.0258
220	0.0292	0.0039	0.0253
221	0.0287	0.0038	0.0248
222	0.0281	0.0037	0.0244
223	0.0276	0.0037	0.0239
224	0.0272	0.0036	0.0235

225	0.0267	0.0036	0.0231
226	0.0263	0.0035	0.0228
227	0.0259	0.0034	0.0224
228	0.0255	0.0034	0.0221
229	0.0251	0.0033	0.0217
230	0.0247	0.0033	0.0214
231	0.0244	0.0032	0.0211
232	0.0240	0.0032	0.0208
233	0.0237	0.0032	0.0206
234	0.0234	0.0031	0.0203
235	0.0231	0.0031	0.0200
236	0.0228	0.0030	0.0198
237	0.0225	0.0030	0.0195
238	0.0223	0.0030	0.0193
239	0.0220	0.0029	0.0191
240	0.0218	0.0029	0.0189
241	0.0215	0.0029	0.0187
242	0.0213	0.0028	0.0185
243	0.0211	0.0028	0.0183
244	0.0208	0.0028	0.0181
245	0.0206	0.0027	0.0179
246	0.0204	0.0027	0.0177
247	0.0202	0.0027	0.0175
248	0.0200	0.0027	0.0174
249	0.0198	0.0026	0.0172
250	0.0196	0.0026	0.0170
251	0.0195	0.0026	0.0169
252	0.0193	0.0026	0.0167
253	0.0191	0.0025	0.0166
254	0.0189	0.0025	0.0164
255	0.0188	0.0025	0.0163
256	0.0186	0.0025	0.0161
257	0.0185	0.0025	0.0160
258	0.0183	0.0024	0.0159
259	0.0182	0.0024	0.0157
260	0.0180	0.0024	0.0156
261	0.0179	0.0024	0.0155
262	0.0177	0.0024	0.0154
263	0.0176	0.0023	0.0153
264	0.0175	0.0023	0.0151
265	0.0173	0.0023	0.0150
266	0.0172	0.0023	0.0149
267	0.0171	0.0023	0.0148
268	0.0170	0.0023	0.0147
269	0.0169	0.0022	0.0146
270	0.0167	0.0022	0.0145
271	0.0166	0.0022	0.0144
272	0.0165	0.0022	0.0143
273	0.0164	0.0022	0.0142
274	0.0163	0.0022	0.0141
275	0.0162	0.0022	0.0140
276	0.0161	0.0021	0.0139
277	0.0160	0.0021	0.0138
278	0.0159	0.0021	0.0138
279	0.0158	0.0021	0.0137
280	0.0157	0.0021	0.0136
281	0.0156	0.0021	0.0135
282	0.0155	0.0021	0.0134
283	0.0154	0.0021	0.0133
284	0.0153	0.0020	0.0133
285	0.0152	0.0020	0.0132
286	0.0151	0.0020	0.0131
287	0.0151	0.0020	0.0130

288 0.0150 0.0020 0.0130

Total soil rain loss = 1.11(In)
Total effective rainfall = 8.09(In)
Peak flow rate in flood hydrograph = 50.41(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	15.0	30.0	45.0	60.0
0+ 5	0.0013	0.18	Q				
0+10	0.0081	1.00	Q				
0+15	0.0179	1.42	Q				
0+20	0.0281	1.48	Q				
0+25	0.0384	1.50	Q				
0+30	0.0487	1.50	VQ				
0+35	0.0591	1.51	VQ				
0+40	0.0695	1.51	VQ				
0+45	0.0799	1.52	VQ				
0+50	0.0904	1.52	VQ				
0+55	0.1009	1.52	VQ				
1+ 0	0.1114	1.53	VQ				
1+ 5	0.1220	1.53	VQ				
1+10	0.1326	1.54	VQ				
1+15	0.1432	1.54	VQ				
1+20	0.1539	1.55	VQ				
1+25	0.1646	1.55	Q				
1+30	0.1753	1.56	Q				
1+35	0.1860	1.56	Q				
1+40	0.1968	1.57	Q				
1+45	0.2076	1.57	Q				
1+50	0.2185	1.58	Q				
1+55	0.2294	1.58	Q				
2+ 0	0.2403	1.59	Q				
2+ 5	0.2513	1.59	Q				
2+10	0.2623	1.60	Q				
2+15	0.2733	1.60	Q				
2+20	0.2843	1.61	Q				
2+25	0.2954	1.61	Q				
2+30	0.3066	1.62	Q				
2+35	0.3177	1.62	Q				
2+40	0.3289	1.63	QV				
2+45	0.3402	1.63	QV				
2+50	0.3515	1.64	QV				
2+55	0.3628	1.64	QV				
3+ 0	0.3741	1.65	QV				
3+ 5	0.3855	1.65	QV				
3+10	0.3970	1.66	QV				
3+15	0.4084	1.67	QV				
3+20	0.4199	1.67	QV				
3+25	0.4315	1.68	QV				
3+30	0.4431	1.68	QV				
3+35	0.4547	1.69	QV				
3+40	0.4664	1.70	QV				
3+45	0.4781	1.70	QV				
3+50	0.4899	1.71	Q V				
3+55	0.5017	1.71	Q V				

4+ 0	0.5135	1.72	Q V			
4+ 5	0.5254	1.73	Q V			
4+10	0.5373	1.73	Q V			
4+15	0.5493	1.74	Q V			
4+20	0.5613	1.75	Q V			
4+25	0.5734	1.75	Q V			
4+30	0.5855	1.76	Q V			
4+35	0.5977	1.77	Q V			
4+40	0.6099	1.77	Q V			
4+45	0.6221	1.78	Q V			
4+50	0.6344	1.79	Q V			
4+55	0.6468	1.79	Q V			
5+ 0	0.6592	1.80	Q V			
5+ 5	0.6716	1.81	Q V			
5+10	0.6841	1.81	Q V			
5+15	0.6967	1.82	Q V			
5+20	0.7093	1.83	Q V			
5+25	0.7219	1.84	Q V			
5+30	0.7346	1.84	Q V			
5+35	0.7474	1.85	Q V			
5+40	0.7602	1.86	Q V			
5+45	0.7731	1.87	Q V			
5+50	0.7860	1.88	Q V			
5+55	0.7990	1.88	Q V			
6+ 0	0.8120	1.89	Q V			
6+ 5	0.8251	1.90	Q V			
6+10	0.8382	1.91	Q V			
6+15	0.8514	1.92	Q V			
6+20	0.8647	1.93	Q V			
6+25	0.8780	1.94	Q V			
6+30	0.8914	1.94	Q V			
6+35	0.9049	1.95	Q V			
6+40	0.9184	1.96	Q V			
6+45	0.9320	1.97	Q V			
6+50	0.9456	1.98	Q V			
6+55	0.9593	1.99	Q V			
7+ 0	0.9731	2.00	Q V			
7+ 5	0.9869	2.01	Q V			
7+10	1.0008	2.02	Q V			
7+15	1.0148	2.03	Q V			
7+20	1.0289	2.04	Q V			
7+25	1.0430	2.05	Q V			
7+30	1.0572	2.06	Q V			
7+35	1.0715	2.07	Q V			
7+40	1.0858	2.08	Q V			
7+45	1.1002	2.09	Q V			
7+50	1.1147	2.10	Q V			
7+55	1.1293	2.12	Q V			
8+ 0	1.1439	2.13	Q V			
8+ 5	1.1586	2.14	Q V			
8+10	1.1735	2.15	Q V			
8+15	1.1884	2.16	Q V			
8+20	1.2033	2.18	Q V			
8+25	1.2184	2.19	Q V			
8+30	1.2335	2.20	Q V			
8+35	1.2488	2.21	Q V			
8+40	1.2641	2.23	Q V			
8+45	1.2795	2.24	Q V			
8+50	1.2951	2.25	Q V			
8+55	1.3107	2.27	Q V			
9+ 0	1.3264	2.28	Q V			
9+ 5	1.3422	2.29	Q V			
9+10	1.3581	2.31	Q V			

9+15	1.3741	2.32	Q V				
9+20	1.3902	2.34	Q V				
9+25	1.4064	2.35	Q V				
9+30	1.4227	2.37	Q V				
9+35	1.4392	2.39	Q V				
9+40	1.4557	2.40	Q V				
9+45	1.4724	2.42	Q V				
9+50	1.4891	2.44	Q V				
9+55	1.5060	2.45	Q V				
10+ 0	1.5231	2.47	Q V				
10+ 5	1.5402	2.49	Q V				
10+10	1.5575	2.51	Q V				
10+15	1.5749	2.53	Q V				
10+20	1.5924	2.55	Q V				
10+25	1.6100	2.56	Q V				
10+30	1.6278	2.59	Q V				
10+35	1.6458	2.60	Q V				
10+40	1.6639	2.63	Q V				
10+45	1.6821	2.65	Q V				
10+50	1.7005	2.67	Q V				
10+55	1.7190	2.69	Q V				
11+ 0	1.7377	2.72	Q V				
11+ 5	1.7566	2.74	Q V				
11+10	1.7756	2.76	Q V				
11+15	1.7948	2.79	Q V				
11+20	1.8142	2.81	Q V				
11+25	1.8337	2.84	Q V				
11+30	1.8535	2.87	Q V				
11+35	1.8734	2.89	Q V				
11+40	1.8936	2.92	Q V				
11+45	1.9139	2.95	Q V				
11+50	1.9344	2.98	Q V				
11+55	1.9552	3.01	Q V				
12+ 0	1.9761	3.05	Q V				
12+ 5	1.9978	3.14	Q V				
12+10	2.0217	3.47	Q V				
12+15	2.0469	3.66	Q V				
12+20	2.0725	3.72	Q V				
12+25	2.0983	3.76	Q V				
12+30	2.1245	3.80	Q V				
12+35	2.1509	3.83	Q V				
12+40	2.1776	3.88	Q V				
12+45	2.2045	3.92	Q V				
12+50	2.2318	3.96	Q V				
12+55	2.2594	4.01	Q V				
13+ 0	2.2874	4.06	Q V				
13+ 5	2.3156	4.10	Q V				
13+10	2.3443	4.16	Q V				
13+15	2.3732	4.21	Q V				
13+20	2.4026	4.27	Q V				
13+25	2.4324	4.32	Q V				
13+30	2.4626	4.39	Q V				
13+35	2.4932	4.44	Q V				
13+40	2.5243	4.52	Q V				
13+45	2.5558	4.58	Q V				
13+50	2.5879	4.66	Q V				
13+55	2.6205	4.73	Q V				
14+ 0	2.6537	4.82	Q V				
14+ 5	2.6874	4.90	Q V				
14+10	2.7218	5.00	Q V				
14+15	2.7569	5.09	Q V				
14+20	2.7927	5.20	Q V				
14+25	2.8292	5.30	Q V				

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 06/17/25

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

Program License Serial Number 6443

LOCUST GATEWAY
PROPOSED UNIT HYDROGRAPH ANALYSIS (DMA 1)
100-YR, 6-HR DESIGN STORM
KIMLEY-HORN

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 100		
22.87	1	1.81
Rainfall data for year 100		
22.87	6	4.82
Rainfall data for year 100		
22.87	24	9.20

++

******** 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)
32.0	52.0	22.87	1.000	0.785	0.075	0.059

Area-averaged adjusted loss rate Fm (In/Hr) = 0.059

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

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
1.72	0.075	32.0	52.0	9.23	0.354
21.15	0.925	98.0	98.0	0.20	0.974

Area-averaged catchment yield fraction, Y = 0.927
Area-averaged low loss fraction, Yb = 0.073
Direct entry of lag time by user
++
Watershed area = 22.87(Ac.)
Catchment Lag time = 0.080 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 104.1667
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.059(In/Hr)
Average low loss rate fraction (Yb) = 0.073 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.670(In)
Computed peak 30-minute rainfall = 1.372(In)
Specified peak 1-hour rainfall = 1.810(In)
Computed peak 3-hour rainfall = 3.300(In)
Specified peak 6-hour rainfall = 4.820(In)
Specified peak 24-hour rainfall = 9.200(In)

Rainfall depth area reduction factors:
Using a total area of 22.87(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.669(In)
30-minute factor = 0.999 Adjusted rainfall = 1.370(In)
1-hour factor = 0.999 Adjusted rainfall = 1.808(In)
3-hour factor = 1.000 Adjusted rainfall = 3.299(In)
6-hour factor = 1.000 Adjusted rainfall = 4.820(In)
24-hour factor = 1.000 Adjusted rainfall = 9.200(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 = 276.58 (CFS))		
1	18.562	51.339
2	81.754	174.779
3	98.260	45.655
4	100.000	4.811

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6692	0.6692
2	0.8830	0.2138
3	1.0385	0.1555
4	1.1651	0.1266
5	1.2739	0.1088
6	1.3703	0.0964
7	1.4574	0.0871
8	1.5374	0.0800
9	1.6115	0.0742
10	1.6809	0.0694
11	1.7462	0.0653
12	1.8081	0.0618
13	1.8891	0.0810
14	1.9673	0.0782

15	2.0430	0.0757
16	2.1165	0.0735
17	2.1879	0.0714
18	2.2575	0.0696
19	2.3253	0.0678
20	2.3915	0.0662
21	2.4563	0.0647
22	2.5196	0.0634
23	2.5817	0.0621
24	2.6426	0.0609
25	2.7023	0.0597
26	2.7609	0.0587
27	2.8186	0.0576
28	2.8753	0.0567
29	2.9310	0.0558
30	2.9859	0.0549
31	3.0400	0.0541
32	3.0933	0.0533
33	3.1459	0.0526
34	3.1977	0.0518
35	3.2489	0.0512
36	3.2994	0.0505
37	3.3492	0.0498
38	3.3984	0.0492
39	3.4470	0.0486
40	3.4950	0.0480
41	3.5425	0.0475
42	3.5895	0.0470
43	3.6360	0.0465
44	3.6820	0.0460
45	3.7275	0.0455
46	3.7726	0.0451
47	3.8172	0.0446
48	3.8614	0.0442
49	3.9051	0.0438
50	3.9485	0.0434
51	3.9915	0.0430
52	4.0341	0.0426
53	4.0763	0.0422
54	4.1182	0.0419
55	4.1597	0.0415
56	4.2009	0.0412
57	4.2418	0.0408
58	4.2823	0.0405
59	4.3225	0.0402
60	4.3624	0.0399
61	4.4020	0.0396
62	4.4413	0.0393
63	4.4803	0.0390
64	4.5191	0.0387
65	4.5575	0.0385
66	4.5957	0.0382
67	4.6337	0.0379
68	4.6714	0.0377
69	4.7088	0.0374
70	4.7460	0.0372
71	4.7829	0.0369
72	4.8197	0.0367

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)

1	0.0367	0.0027	0.0340
2	0.0369	0.0027	0.0343
3	0.0374	0.0027	0.0347
4	0.0377	0.0027	0.0349
5	0.0382	0.0028	0.0354
6	0.0385	0.0028	0.0357
7	0.0390	0.0028	0.0362
8	0.0393	0.0029	0.0365
9	0.0399	0.0029	0.0370
10	0.0402	0.0029	0.0373
11	0.0408	0.0030	0.0379
12	0.0412	0.0030	0.0382
13	0.0419	0.0030	0.0388
14	0.0422	0.0031	0.0392
15	0.0430	0.0031	0.0399
16	0.0434	0.0031	0.0402
17	0.0442	0.0032	0.0410
18	0.0446	0.0032	0.0414
19	0.0455	0.0033	0.0422
20	0.0460	0.0033	0.0427
21	0.0470	0.0034	0.0436
22	0.0475	0.0034	0.0441
23	0.0486	0.0035	0.0451
24	0.0492	0.0036	0.0456
25	0.0505	0.0037	0.0468
26	0.0512	0.0037	0.0474
27	0.0526	0.0038	0.0487
28	0.0533	0.0039	0.0494
29	0.0549	0.0040	0.0509
30	0.0558	0.0040	0.0517
31	0.0576	0.0042	0.0535
32	0.0587	0.0043	0.0544
33	0.0609	0.0044	0.0564
34	0.0621	0.0045	0.0576
35	0.0647	0.0047	0.0600
36	0.0662	0.0048	0.0614
37	0.0696	0.0049	0.0646
38	0.0714	0.0049	0.0665
39	0.0757	0.0049	0.0708
40	0.0782	0.0049	0.0733
41	0.0618	0.0045	0.0574
42	0.0653	0.0047	0.0606
43	0.0742	0.0049	0.0693
44	0.0800	0.0049	0.0751
45	0.0964	0.0049	0.0915
46	0.1088	0.0049	0.1039
47	0.1555	0.0049	0.1506
48	0.2138	0.0049	0.2089
49	0.6692	0.0049	0.6643
50	0.1266	0.0049	0.1217
51	0.0871	0.0049	0.0822
52	0.0694	0.0049	0.0645
53	0.0810	0.0049	0.0761
54	0.0735	0.0049	0.0686
55	0.0678	0.0049	0.0629
56	0.0634	0.0046	0.0588
57	0.0597	0.0043	0.0554
58	0.0567	0.0041	0.0526
59	0.0541	0.0039	0.0502
60	0.0518	0.0038	0.0481
61	0.0498	0.0036	0.0462
62	0.0480	0.0035	0.0446
63	0.0465	0.0034	0.0431

64	0.0451	0.0033	0.0418
65	0.0438	0.0032	0.0406
66	0.0426	0.0031	0.0395
67	0.0415	0.0030	0.0385
68	0.0405	0.0029	0.0376
69	0.0396	0.0029	0.0367
70	0.0387	0.0028	0.0359
71	0.0379	0.0028	0.0352
72	0.0372	0.0027	0.0345

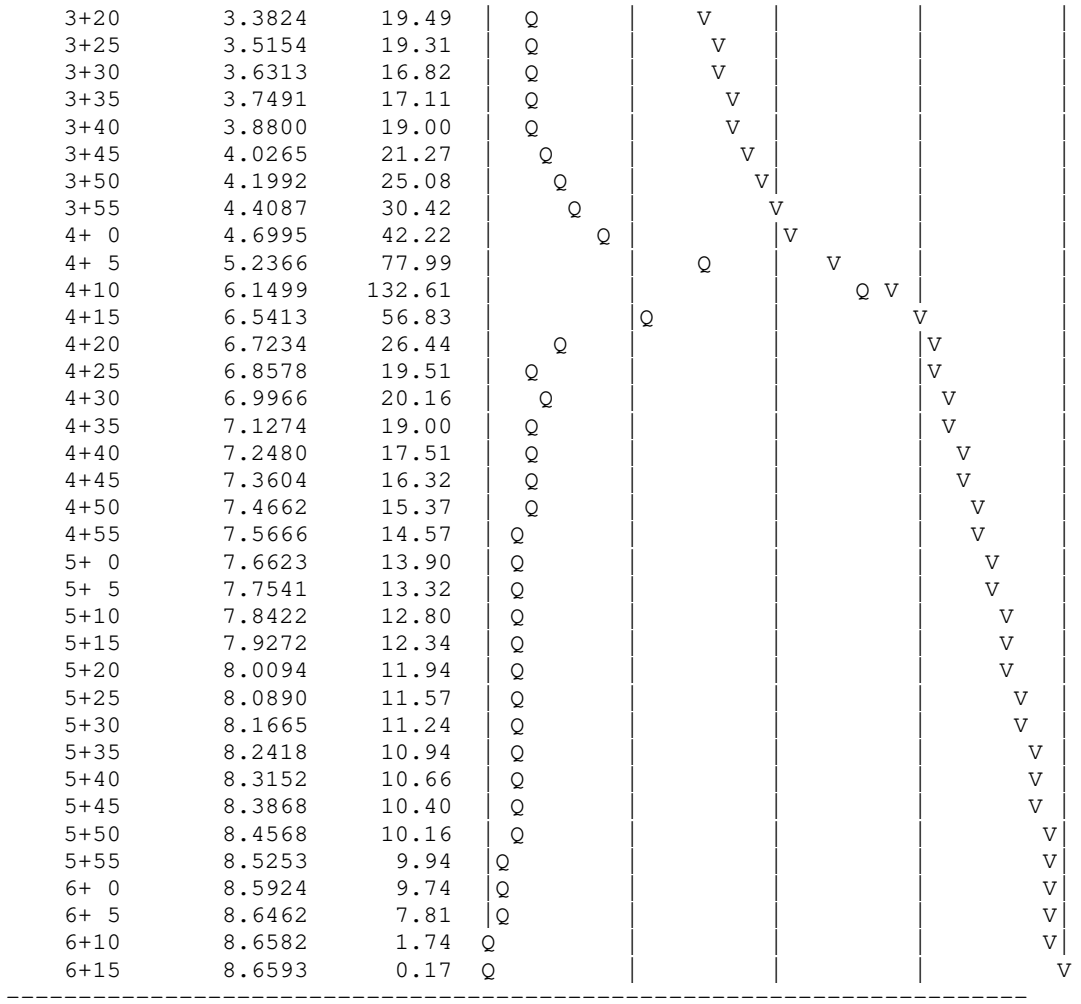
Total soil rain loss = 0.27(In)
Total effective rainfall = 4.55(In)
Peak flow rate in flood hydrograph = 132.61(CFS)

++

6 - 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 50.0 100.0 150.0 200.0
0+ 5	0.0120	1.75	Q | | | |
0+10	0.0651	7.71	VQ | | | |
0+15	0.1294	9.33	VQ | | | |
0+20	0.1954	9.59	VQ | | | |
0+25	0.2621	9.68	|Q | | | |
0+30	0.3295	9.79	|Q | | | |
0+35	0.3975	9.88	|Q | | | |
0+40	0.4663	10.00	|QV | | | |
0+45	0.5359	10.10	| Q | | | |
0+50	0.6063	10.22	| Q | | | |
0+55	0.6774	10.33	| QV | | | |
1+ 0	0.7494	10.46	| QV | | | |
1+ 5	0.8223	10.58	| QV | | | |
1+10	0.8962	10.72	| Q V | | | |
1+15	0.9709	10.85	| Q V | | | |
1+20	1.0467	11.01	| Q V | | | |
1+25	1.1234	11.14	| Q V | | | |
1+30	1.2013	11.32	| Q V | | | |
1+35	1.2803	11.46	| Q V | | | |
1+40	1.3606	11.65	| Q V | | | |
1+45	1.4420	11.82	| Q V | | | |
1+50	1.5248	12.03	| Q V | | | |
1+55	1.6089	12.21	| Q V | | | |
2+ 0	1.6946	12.44	| Q V | | | |
2+ 5	1.7817	12.65	| Q V | | | |
2+10	1.8706	12.92	| Q V | | | |
2+15	1.9612	13.15	| Q V| | | |
2+20	2.0538	13.45	| Q V| | | |
2+25	2.1482	13.71	| Q V| | | |
2+30	2.2450	14.05	| Q V | | |
2+35	2.3438	14.35	| Q V | | |
2+40	2.4453	14.74	| Q |V | | |
2+45	2.5493	15.09	| Q |V | | |
2+50	2.6565	15.56	| Q | V | | |
2+55	2.7665	15.98	| Q | V | | |
3+ 0	2.8805	16.55	| Q | V | | |
3+ 5	2.9981	17.07	| Q | V | | |
3+10	3.1207	17.81	| Q | V | | |
3+15	3.2482	18.51	| Q | V | | |


3+20 3.3824 19.49
3+25 3.5154 19.31
3+30 3.6313 16.82
3+35 3.7491 17.11
3+40 3.8800 19.00
3+45 4.0265 21.27
3+50 4.1992 25.08
3+55 4.4087 30.42
4+ 0 4.6995 42.22
4+ 5 5.2366 77.99
4+10 6.1499 132.61
4+15 6.5413 56.83
4+20 6.7234 26.44
4+25 6.8578 19.51
4+30 6.9966 20.16
4+35 7.1274 19.00
4+40 7.2480 17.51
4+45 7.3604 16.32
4+50 7.4662 15.37
4+55 7.5666 14.57
5+ 0 7.6623 13.90
5+ 5 7.7541 13.32
5+10 7.8422 12.80
5+15 7.9272 12.34
5+20 8.0094 11.94
5+25 8.0890 11.57
5+30 8.1665 11.24
5+35 8.2418 10.94
5+40 8.3152 10.66
5+45 8.3868 10.40
5+50 8.4568 10.16
5+55 8.5253 9.94
6+ 0 8.5924 9.74
6+ 5 8.6462 7.81
6+10 8.6582 1.74
6+15 8.6593 0.17

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 06/17/25

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

Program License Serial Number 6443

LOCUST GATEWAY
PROPOSED UNIT HYDROGRAPH ANALYSIS (DMA 2)
100-YR, 6-HR DESIGN STORM
KIMLEY-HORN

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 100		
7.38	1	1.81
Rainfall data for year 100		
7.38	6	4.82
Rainfall data for year 100		
7.38	24	9.20

++

******** 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)
32.0	52.0	7.38	1.000	0.785	0.110	0.086

Area-averaged adjusted loss rate Fm (In/Hr) = 0.086

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

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
0.81	0.110	32.0	52.0	9.23	0.354
6.57	0.890	98.0	98.0	0.20	0.974

Area-averaged catchment yield fraction, Y = 0.906
Area-averaged low loss fraction, Yb = 0.094
Direct entry of lag time by user
++
Watershed area = 7.38(Ac.)
Catchment Lag time = 0.074 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 112.6126
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.086(In/Hr)
Average low loss rate fraction (Yb) = 0.094 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.670(In)
Computed peak 30-minute rainfall = 1.372(In)
Specified peak 1-hour rainfall = 1.810(In)
Computed peak 3-hour rainfall = 3.300(In)
Specified peak 6-hour rainfall = 4.820(In)
Specified peak 24-hour rainfall = 9.200(In)

Rainfall depth area reduction factors:
Using a total area of 7.38(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.670(In)
30-minute factor = 1.000 Adjusted rainfall = 1.371(In)
1-hour factor = 1.000 Adjusted rainfall = 1.809(In)
3-hour factor = 1.000 Adjusted rainfall = 3.300(In)
6-hour factor = 1.000 Adjusted rainfall = 4.820(In)
24-hour factor = 1.000 Adjusted rainfall = 9.200(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 89.25 (CFS))		
1	21.432	19.129
2	85.843	57.487
3	98.830	11.591
4	100.000	1.044

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6697	0.6697
2	0.8836	0.2140
3	1.0392	0.1556
4	1.1659	0.1267
5	1.2748	0.1089
6	1.3712	0.0964
7	1.4585	0.0872
8	1.5385	0.0800
9	1.6127	0.0742
10	1.6821	0.0694
11	1.7475	0.0654
12	1.8094	0.0619
13	1.8903	0.0810
14	1.9685	0.0782

15	2.0442	0.0757
16	2.1177	0.0734
17	2.1891	0.0714
18	2.2586	0.0695
19	2.3264	0.0678
20	2.3925	0.0662
21	2.4573	0.0647
22	2.5206	0.0633
23	2.5826	0.0620
24	2.6434	0.0608
25	2.7031	0.0597
26	2.7617	0.0586
27	2.8193	0.0576
28	2.8759	0.0566
29	2.9317	0.0557
30	2.9865	0.0549
31	3.0406	0.0540
32	3.0938	0.0533
33	3.1463	0.0525
34	3.1981	0.0518
35	3.2492	0.0511
36	3.2997	0.0504
37	3.3495	0.0498
38	3.3987	0.0492
39	3.4473	0.0486
40	3.4953	0.0480
41	3.5428	0.0475
42	3.5898	0.0470
43	3.6363	0.0465
44	3.6823	0.0460
45	3.7278	0.0455
46	3.7728	0.0451
47	3.8175	0.0446
48	3.8617	0.0442
49	3.9054	0.0438
50	3.9488	0.0434
51	3.9918	0.0430
52	4.0344	0.0426
53	4.0766	0.0422
54	4.1185	0.0419
55	4.1600	0.0415
56	4.2012	0.0412
57	4.2420	0.0408
58	4.2825	0.0405
59	4.3228	0.0402
60	4.3627	0.0399
61	4.4023	0.0396
62	4.4416	0.0393
63	4.4806	0.0390
64	4.5193	0.0387
65	4.5578	0.0385
66	4.5960	0.0382
67	4.6339	0.0379
68	4.6716	0.0377
69	4.7090	0.0374
70	4.7462	0.0372
71	4.7832	0.0369
72	4.8199	0.0367

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)

1	0.0367	0.0035	0.0333
2	0.0369	0.0035	0.0335
3	0.0374	0.0035	0.0339
4	0.0377	0.0036	0.0341
5	0.0382	0.0036	0.0346
6	0.0385	0.0036	0.0348
7	0.0390	0.0037	0.0353
8	0.0393	0.0037	0.0356
9	0.0399	0.0038	0.0361
10	0.0402	0.0038	0.0364
11	0.0408	0.0039	0.0370
12	0.0412	0.0039	0.0373
13	0.0419	0.0039	0.0379
14	0.0422	0.0040	0.0382
15	0.0430	0.0041	0.0389
16	0.0434	0.0041	0.0393
17	0.0442	0.0042	0.0400
18	0.0446	0.0042	0.0404
19	0.0455	0.0043	0.0412
20	0.0460	0.0043	0.0417
21	0.0470	0.0044	0.0426
22	0.0475	0.0045	0.0430
23	0.0486	0.0046	0.0440
24	0.0492	0.0046	0.0446
25	0.0504	0.0048	0.0457
26	0.0511	0.0048	0.0463
27	0.0525	0.0050	0.0476
28	0.0533	0.0050	0.0482
29	0.0549	0.0052	0.0497
30	0.0557	0.0053	0.0505
31	0.0576	0.0054	0.0522
32	0.0586	0.0055	0.0531
33	0.0608	0.0057	0.0551
34	0.0620	0.0058	0.0562
35	0.0647	0.0061	0.0586
36	0.0662	0.0062	0.0599
37	0.0695	0.0066	0.0630
38	0.0714	0.0067	0.0647
39	0.0757	0.0071	0.0686
40	0.0782	0.0072	0.0710
41	0.0619	0.0058	0.0561
42	0.0654	0.0062	0.0592
43	0.0742	0.0070	0.0672
44	0.0800	0.0072	0.0728
45	0.0964	0.0072	0.0892
46	0.1089	0.0072	0.1017
47	0.1556	0.0072	0.1484
48	0.2140	0.0072	0.2068
49	0.6697	0.0072	0.6625
50	0.1267	0.0072	0.1195
51	0.0872	0.0072	0.0800
52	0.0694	0.0065	0.0629
53	0.0810	0.0072	0.0738
54	0.0734	0.0069	0.0665
55	0.0678	0.0064	0.0614
56	0.0633	0.0060	0.0574
57	0.0597	0.0056	0.0541
58	0.0566	0.0053	0.0513
59	0.0540	0.0051	0.0489
60	0.0518	0.0049	0.0469
61	0.0498	0.0047	0.0451
62	0.0480	0.0045	0.0435
63	0.0465	0.0044	0.0421

64	0.0451	0.0042	0.0408
65	0.0438	0.0041	0.0396
66	0.0426	0.0040	0.0386
67	0.0415	0.0039	0.0376
68	0.0405	0.0038	0.0367
69	0.0396	0.0037	0.0359
70	0.0387	0.0037	0.0351
71	0.0379	0.0036	0.0344
72	0.0372	0.0035	0.0337

Total soil rain loss = 0.37(In)
Total effective rainfall = 4.45(In)
Peak flow rate in flood hydrograph = 42.92(CFS)

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6 - 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 12.5 25.0 37.5 50.0
0+ 5	0.0044	0.64	Q | | | |
0+10	0.0220	2.55	V Q | | | |
0+15	0.0423	2.96	V Q | | | |
0+20	0.0632	3.02	V Q | | | |
0+25	0.0842	3.05	|VQ | | | |
0+30	0.1054	3.09	|VQ | | | |
0+35	0.1269	3.12	|VQ | | | |
0+40	0.1486	3.15	| Q | | | |
0+45	0.1705	3.18	| Q | | | |
0+50	0.1927	3.22	| Q | | | |
0+55	0.2152	3.26	| QV | | | |
1+ 0	0.2379	3.30	| QV | | | |
1+ 5	0.2609	3.34	| QV | | | |
1+10	0.2842	3.38	| Q V | | | |
1+15	0.3077	3.42	| Q V | | | |
1+20	0.3316	3.47	| Q V | | | |
1+25	0.3559	3.52	| Q V | | | |
1+30	0.3804	3.57	| Q V | | | |
1+35	0.4053	3.62	| Q V | | | |
1+40	0.4307	3.68	| Q V | | | |
1+45	0.4564	3.73	| Q V | | | |
1+50	0.4825	3.79	| Q V | | | |
1+55	0.5090	3.85	| Q V | | | |
2+ 0	0.5361	3.93	| Q V | | | |
2+ 5	0.5635	3.99	| Q V | | | |
2+10	0.5916	4.07	| Q V | | | |
2+15	0.6202	4.15	| Q V| | | |
2+20	0.6494	4.24	| Q V| | | |
2+25	0.6791	4.32	| Q V| | | |
2+30	0.7097	4.43	| Q V | | |
2+35	0.7408	4.53	| Q V | | |
2+40	0.7729	4.65	| Q |V | | |
2+45	0.8057	4.76	| Q |V | | |
2+50	0.8395	4.91	| Q | V | | |
2+55	0.8742	5.04	| Q | V | | |
3+ 0	0.9102	5.22	| Q | V | | |
3+ 5	0.9473	5.39	| Q | V | | |
3+10	0.9860	5.61	| Q | V | | |
3+15	1.0261	5.82	| Q | V | | |

3+20	1.0682	6.11	Q	V				
3+25	1.1096	6.02	Q	V				
3+30	1.1458	5.25	Q	V				
3+35	1.1830	5.41	Q	V				
3+40	1.2244	6.00	Q	V				
3+45	1.2708	6.73	Q	V				
3+50	1.3258	7.99	Q	V				
3+55	1.3932	9.79	Q	V				
4+ 0	1.4880	13.76	Q	V				
4+ 5	1.6697	26.38	Q	V				
4+10	1.9653	42.92	Q	V				
4+15	2.0775	16.30	Q	V				
4+20	2.1318	7.88	Q	V				
4+25	2.1737	6.08	Q	V				
4+30	2.2172	6.33	Q	V				
4+35	2.2580	5.92	Q	V				
4+40	2.2957	5.47	Q	V				
4+45	2.3309	5.11	Q	V				
4+50	2.3641	4.82	Q	V				
4+55	2.3956	4.57	Q	V				
5+ 0	2.4256	4.36	Q	V				
5+ 5	2.4544	4.18	Q	V				
5+10	2.4821	4.02	Q	V				
5+15	2.5088	3.88	Q	V				
5+20	2.5346	3.75	Q	V				
5+25	2.5597	3.64	Q	V				
5+30	2.5840	3.53	Q	V				
5+35	2.6077	3.44	Q	V				
5+40	2.6308	3.35	Q	V				
5+45	2.6534	3.27	Q	V				
5+50	2.6754	3.20	Q	V				
5+55	2.6969	3.13	Q	V				
6+ 0	2.7180	3.06	Q	V				
6+ 5	2.7344	2.37	Q	V				
6+10	2.7373	0.43	Q	V				
6+15	2.7375	0.04	Q	V				

```
       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  06/17/25

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

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


Program License Serial Number 6443

------------------------------------------------------------------------
LOCUST GATEWAY
PROPOSED UNIT HYDROGRAPH ANALYSIS (DMA 3)
100-YR, 6-YR DESIGN STORM
KIMLEY-HORN
------------------------------------------------------------------------

       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        Duration        Isohyetal
       (Ac.)            (hours)         (In)
Rainfall data for year 100
            9.52            1           1.81
------------------------------------------------------------------------
Rainfall data for year 100
            9.52            6           4.82
------------------------------------------------------------------------
Rainfall data for year 100
            9.52           24           9.20
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

******** 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          9.52      1.000     0.785    0.173    0.136

Area-averaged adjusted loss rate Fm (In/Hr) =  0.136

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

Area       Area          SCS CN    SCS CN      S     Pervious
```

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
1.65	0.173	32.0	52.0	9.23	0.354
7.87	0.827	98.0	98.0	0.20	0.974

Area-averaged catchment yield fraction, Y = 0.867
Area-averaged low loss fraction, Yb = 0.133
Direct entry of lag time by user
++
Watershed area = 9.52(Ac.)
Catchment Lag time = 0.100 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 83.3333
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.136(In/Hr)
Average low loss rate fraction (Yb) = 0.133 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.670(In)
Computed peak 30-minute rainfall = 1.372(In)
Specified peak 1-hour rainfall = 1.810(In)
Computed peak 3-hour rainfall = 3.300(In)
Specified peak 6-hour rainfall = 4.820(In)
Specified peak 24-hour rainfall = 9.200(In)

Rainfall depth area reduction factors:
Using a total area of 9.52(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.670(In)
30-minute factor = 1.000 Adjusted rainfall = 1.371(In)
1-hour factor = 1.000 Adjusted rainfall = 1.809(In)
3-hour factor = 1.000 Adjusted rainfall = 3.300(In)
6-hour factor = 1.000 Adjusted rainfall = 4.820(In)
24-hour factor = 1.000 Adjusted rainfall = 9.200(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 115.13 (CFS))		
1	12.207	14.054
2	66.918	62.990
3	94.948	32.272
4	99.050	4.722
5	100.000	1.094

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6696	0.6696
2	0.8835	0.2139
3	1.0391	0.1556
4	1.1658	0.1267
5	1.2747	0.1088
6	1.3711	0.0964
7	1.4583	0.0872
8	1.5383	0.0800
9	1.6125	0.0742
10	1.6819	0.0694
11	1.7473	0.0654
12	1.8092	0.0619
13	1.8902	0.0810

14	1.9684	0.0782	
15	2.0441	0.0757	
16	2.1175	0.0734	
17	2.1889	0.0714	
18	2.2584	0.0695	
19	2.3262	0.0678	
20	2.3924	0.0662	
21	2.4571	0.0647	
22	2.5204	0.0633	
23	2.5825	0.0620	
24	2.6433	0.0608	
25	2.7030	0.0597	
26	2.7616	0.0586	
27	2.8192	0.0576	
28	2.8758	0.0566	
29	2.9316	0.0557	
30	2.9865	0.0549	
31	3.0405	0.0540	
32	3.0938	0.0533	
33	3.1463	0.0525	
34	3.1981	0.0518	
35	3.2492	0.0511	
36	3.2996	0.0505	
37	3.3494	0.0498	
38	3.3986	0.0492	
39	3.4472	0.0486	
40	3.4953	0.0480	
41	3.5428	0.0475	
42	3.5898	0.0470	
43	3.6362	0.0465	
44	3.6822	0.0460	
45	3.7277	0.0455	
46	3.7728	0.0451	
47	3.8174	0.0446	
48	3.8616	0.0442	
49	3.9054	0.0438	
50	3.9488	0.0434	
51	3.9917	0.0430	
52	4.0343	0.0426	
53	4.0766	0.0422	
54	4.1184	0.0419	
55	4.1600	0.0415	
56	4.2011	0.0412	
57	4.2420	0.0408	
58	4.2825	0.0405	
59	4.3227	0.0402	
60	4.3626	0.0399	
61	4.4022	0.0396	
62	4.4415	0.0393	
63	4.4805	0.0390	
64	4.5193	0.0387	
65	4.5578	0.0385	
66	4.5960	0.0382	
67	4.6339	0.0379	
68	4.6716	0.0377	
69	4.7090	0.0374	
70	4.7462	0.0372	
71	4.7831	0.0369	
72	4.8199	0.0367	

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)

1	0.0367	0.0049	0.0318
2	0.0369	0.0049	0.0320
3	0.0374	0.0050	0.0324
4	0.0377	0.0050	0.0327
5	0.0382	0.0051	0.0331
6	0.0385	0.0051	0.0333
7	0.0390	0.0052	0.0338
8	0.0393	0.0052	0.0341
9	0.0399	0.0053	0.0346
10	0.0402	0.0054	0.0348
11	0.0408	0.0054	0.0354
12	0.0412	0.0055	0.0357
13	0.0419	0.0056	0.0363
14	0.0422	0.0056	0.0366
15	0.0430	0.0057	0.0373
16	0.0434	0.0058	0.0376
17	0.0442	0.0059	0.0383
18	0.0446	0.0059	0.0387
19	0.0455	0.0061	0.0394
20	0.0460	0.0061	0.0399
21	0.0470	0.0063	0.0407
22	0.0475	0.0063	0.0412
23	0.0486	0.0065	0.0421
24	0.0492	0.0066	0.0426
25	0.0505	0.0067	0.0437
26	0.0511	0.0068	0.0443
27	0.0525	0.0070	0.0455
28	0.0533	0.0071	0.0462
29	0.0549	0.0073	0.0476
30	0.0557	0.0074	0.0483
31	0.0576	0.0077	0.0499
32	0.0586	0.0078	0.0508
33	0.0608	0.0081	0.0527
34	0.0620	0.0083	0.0538
35	0.0647	0.0086	0.0561
36	0.0662	0.0088	0.0574
37	0.0695	0.0093	0.0603
38	0.0714	0.0095	0.0619
39	0.0757	0.0101	0.0656
40	0.0782	0.0104	0.0678
41	0.0619	0.0082	0.0536
42	0.0654	0.0087	0.0566
43	0.0742	0.0099	0.0643
44	0.0800	0.0107	0.0693
45	0.0964	0.0113	0.0851
46	0.1088	0.0113	0.0975
47	0.1556	0.0113	0.1443
48	0.2139	0.0113	0.2026
49	0.6696	0.0113	0.6583
50	0.1267	0.0113	0.1154
51	0.0872	0.0113	0.0759
52	0.0694	0.0093	0.0602
53	0.0810	0.0108	0.0702
54	0.0734	0.0098	0.0637
55	0.0678	0.0090	0.0588
56	0.0633	0.0084	0.0549
57	0.0597	0.0080	0.0517
58	0.0566	0.0076	0.0491
59	0.0540	0.0072	0.0468
60	0.0518	0.0069	0.0449
61	0.0498	0.0066	0.0432
62	0.0480	0.0064	0.0416

63	0.0465	0.0062	0.0403
64	0.0451	0.0060	0.0391
65	0.0438	0.0058	0.0379
66	0.0426	0.0057	0.0369
67	0.0415	0.0055	0.0360
68	0.0405	0.0054	0.0351
69	0.0396	0.0053	0.0343
70	0.0387	0.0052	0.0336
71	0.0379	0.0051	0.0329
72	0.0372	0.0050	0.0322

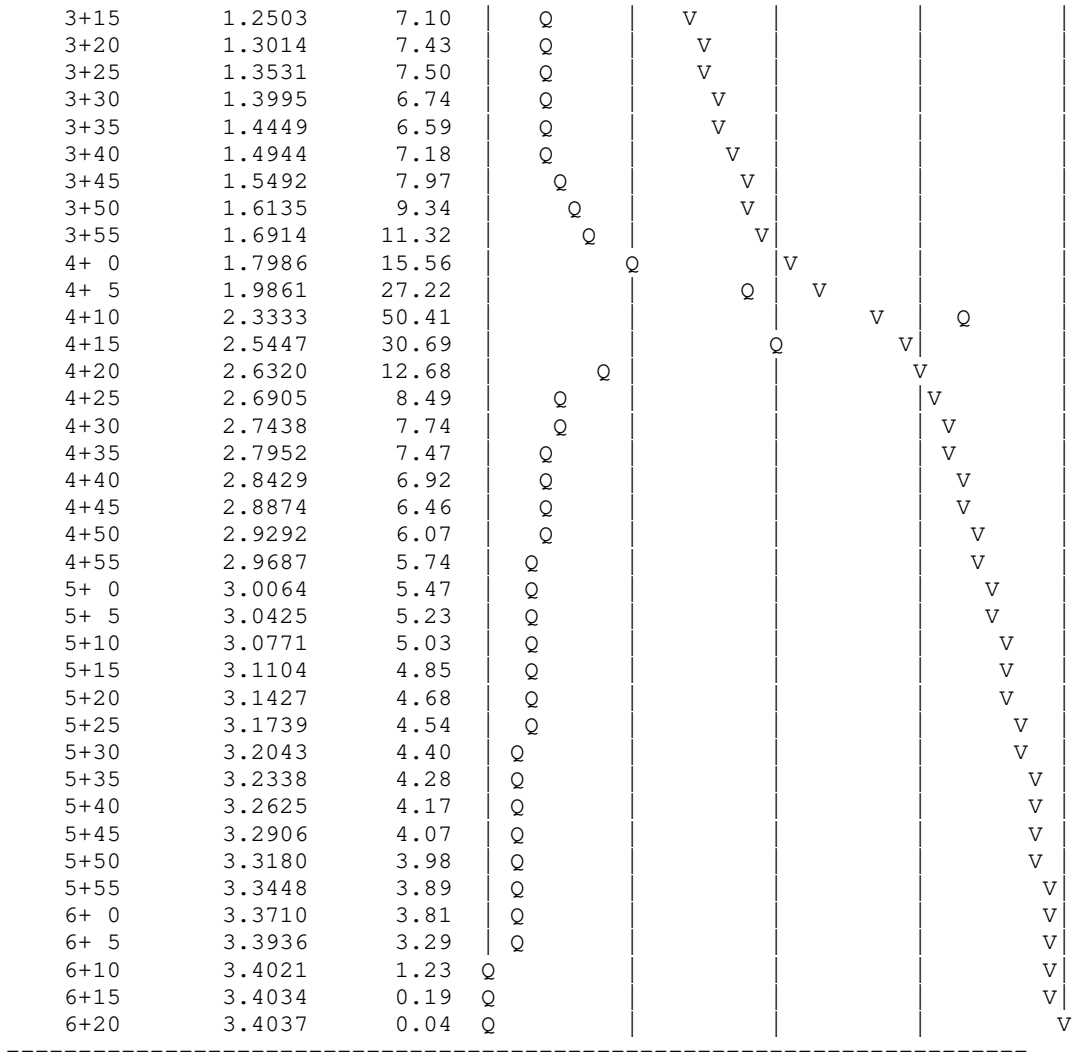
Total soil rain loss = 0.53(In)
Total effective rainfall = 4.29(In)
Peak flow rate in flood hydrograph = 50.41(CFS)

++

6 - 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	0.0031	0.45	Q				
0+10	0.0200	2.45	VQ				
0+15	0.0441	3.50	V Q				
0+20	0.0695	3.69	V Q				
0+25	0.0953	3.76	|VQ				
0+30	0.1215	3.80	|VQ				
0+35	0.1479	3.83	|VQ				
0+40	0.1746	3.88	| Q				
0+45	0.2016	3.92	| Q				
0+50	0.2289	3.96	| Q				
0+55	0.2565	4.01	| QV				
1+ 0	0.2844	4.06	| QV				
1+ 5	0.3127	4.10	| QV				
1+10	0.3413	4.16	| Q V				
1+15	0.3703	4.21	| Q V				
1+20	0.3996	4.27	| Q V				
1+25	0.4294	4.32	| Q V				
1+30	0.4596	4.39	| Q V				
1+35	0.4902	4.44	| Q V				
1+40	0.5213	4.52	| Q V				
1+45	0.5529	4.58	| Q V				
1+50	0.5849	4.66	| Q V				
1+55	0.6175	4.73	| Q V				
2+ 0	0.6507	4.82	| Q V				
2+ 5	0.6844	4.90	| Q V				
2+10	0.7188	5.00	| Q V				
2+15	0.7539	5.09	| Q V				
2+20	0.7897	5.20	| Q V|				
2+25	0.8262	5.30	| Q V|				
2+30	0.8636	5.43	| Q V				
2+35	0.9018	5.55	| Q V				
2+40	0.9410	5.69	| Q |V				
2+45	0.9812	5.83	| Q |V				
2+50	1.0225	6.00	| Q | V				
2+55	1.0650	6.17	| Q | V				
3+ 0	1.1089	6.38	| Q | V				
3+ 5	1.1543	6.58	| Q | V				
3+10	1.2014	6.84	| Q | V				



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 06/17/25

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

Program License Serial Number 6443

LOCUST GATEWAY
PROPOSED UNIT HYDROGRAPH ANALYSIS (DMA 1)
100-YR, 3-HR DESIGN STORM
KIMLEY-HORN

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 100	22.87	1	1.81
Rainfall data for year 100	22.87	6	4.82
Rainfall data for year 100	22.87	24	9.20

++

******** 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)
32.0	52.0	22.87	1.000	0.785	0.075	0.059

Area-averaged adjusted loss rate Fm (In/Hr) = 0.059

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

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
1.72	0.075	32.0	52.0	9.23	0.354
21.15	0.925	98.0	98.0	0.20	0.974

Area-averaged catchment yield fraction, Y = 0.927
Area-averaged low loss fraction, Yb = 0.073
Direct entry of lag time by user
++
Watershed area = 22.87(Ac.)
Catchment Lag time = 0.080 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 104.1667
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.059(In/Hr)
Average low loss rate fraction (Yb) = 0.073 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.670(In)
Computed peak 30-minute rainfall = 1.372(In)
Specified peak 1-hour rainfall = 1.810(In)
Computed peak 3-hour rainfall = 3.300(In)
Specified peak 6-hour rainfall = 4.820(In)
Specified peak 24-hour rainfall = 9.200(In)

Rainfall depth area reduction factors:
Using a total area of 22.87(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.669(In)
30-minute factor = 0.999 Adjusted rainfall = 1.370(In)
1-hour factor = 0.999 Adjusted rainfall = 1.808(In)
3-hour factor = 1.000 Adjusted rainfall = 3.299(In)
6-hour factor = 1.000 Adjusted rainfall = 4.820(In)
24-hour factor = 1.000 Adjusted rainfall = 9.200(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 276.58 (CFS))		
1	18.562	51.339
2	81.754	174.779
3	98.260	45.655
4	100.000	4.811

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6692	0.6692
2	0.8830	0.2138
3	1.0385	0.1555
4	1.1651	0.1266
5	1.2739	0.1088
6	1.3703	0.0964
7	1.4574	0.0871
8	1.5374	0.0800
9	1.6115	0.0742
10	1.6809	0.0694
11	1.7462	0.0653
12	1.8081	0.0618
13	1.8891	0.0810
14	1.9673	0.0782

15	2.0430	0.0757
16	2.1165	0.0735
17	2.1879	0.0714
18	2.2575	0.0696
19	2.3253	0.0678
20	2.3915	0.0662
21	2.4563	0.0647
22	2.5196	0.0634
23	2.5817	0.0621
24	2.6426	0.0609
25	2.7023	0.0597
26	2.7609	0.0587
27	2.8186	0.0576
28	2.8753	0.0567
29	2.9310	0.0558
30	2.9859	0.0549
31	3.0400	0.0541
32	3.0933	0.0533
33	3.1459	0.0526
34	3.1977	0.0518
35	3.2489	0.0512
36	3.2994	0.0505

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0505	0.0037	0.0468
2	0.0512	0.0037	0.0474
3	0.0526	0.0038	0.0487
4	0.0533	0.0039	0.0494
5	0.0549	0.0040	0.0509
6	0.0558	0.0040	0.0517
7	0.0576	0.0042	0.0535
8	0.0587	0.0043	0.0544
9	0.0609	0.0044	0.0564
10	0.0621	0.0045	0.0576
11	0.0647	0.0047	0.0600
12	0.0662	0.0048	0.0614
13	0.0696	0.0049	0.0646
14	0.0714	0.0049	0.0665
15	0.0757	0.0049	0.0708
16	0.0782	0.0049	0.0733
17	0.0618	0.0045	0.0574
18	0.0653	0.0047	0.0606
19	0.0742	0.0049	0.0693
20	0.0800	0.0049	0.0751
21	0.0964	0.0049	0.0915
22	0.1088	0.0049	0.1039
23	0.1555	0.0049	0.1506
24	0.2138	0.0049	0.2089
25	0.6692	0.0049	0.6643
26	0.1266	0.0049	0.1217
27	0.0871	0.0049	0.0822
28	0.0694	0.0049	0.0645
29	0.0810	0.0049	0.0761
30	0.0735	0.0049	0.0686
31	0.0678	0.0049	0.0629
32	0.0634	0.0046	0.0588
33	0.0597	0.0043	0.0554
34	0.0567	0.0041	0.0526
35	0.0541	0.0039	0.0502
36	0.0518	0.0038	0.0481

Total soil rain loss = 0.16(In)
Total effective rainfall = 3.14(In)
Peak flow rate in flood hydrograph = 132.61(CFS)

3 - 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 50.0 100.0 150.0 200.0
0+ 5	0.0166	2.40	Q
0+10	0.0897	10.62	V Q
0+15	0.1788	12.93	VQ
0+20	0.2714	13.45	VQ
0+25	0.3658	13.71	Q
0+30	0.4625	14.05	QV
0+35	0.5614	14.35	QV
0+40	0.6629	14.74	Q V
0+45	0.7668	15.09	Q V
0+50	0.8740	15.56	Q V
0+55	0.9841	15.98	Q V
1+ 0	1.0980	16.55	Q V
1+ 5	1.2156	17.07	Q V
1+10	1.3383	17.81	Q V
1+15	1.4657	18.51	Q V
1+20	1.6000	19.49	Q V
1+25	1.7330	19.31	Q V
1+30	1.8488	16.82	Q V
1+35	1.9667	17.11	Q V
1+40	2.0975	19.00	Q V
1+45	2.2440	21.27	Q V
1+50	2.4167	25.08	Q V
1+55	2.6262	30.42	Q V
2+ 0	2.9170	42.22	Q V
2+ 5	3.4541	77.99	Q V
2+10	4.3674	132.61	Q V
2+15	4.7588	56.83	Q V
2+20	4.9409	26.44	Q V
2+25	5.0753	19.51	Q V
2+30	5.2141	20.16	Q V
2+35	5.3450	19.00	Q V
2+40	5.4656	17.51	Q V
2+45	5.5779	16.32	Q V
2+50	5.6838	15.37	Q V
2+55	5.7841	14.57	Q V
3+ 0	5.8799	13.90	Q V
3+ 5	5.9553	10.95	Q V
3+10	5.9721	2.44	Q V
3+15	5.9736	0.23	Q V

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 06/17/25

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

Program License Serial Number 6443

LOCUST GATEWAY
PROPOSED UNIT HYDROGRAPH ANALYSIS (DMA 2)
100-YR, 3-HR DESIGN STORM
KIMLEY-HORN

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 100		
7.38	1	1.81
Rainfall data for year 100		
7.38	6	4.82
Rainfall data for year 100		
7.38	24	9.20

++

******** 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)
32.0	52.0	7.38	1.000	0.785	0.110	0.086

Area-averaged adjusted loss rate Fm (In/Hr) = 0.086

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

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
0.81	0.110	32.0	52.0	9.23	0.354
6.57	0.890	98.0	98.0	0.20	0.974

Area-averaged catchment yield fraction, Y = 0.906
Area-averaged low loss fraction, Yb = 0.094
Direct entry of lag time by user
++
Watershed area = 7.38(Ac.)
Catchment Lag time = 0.074 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 112.6126
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.086(In/Hr)
Average low loss rate fraction (Yb) = 0.094 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.670(In)
Computed peak 30-minute rainfall = 1.372(In)
Specified peak 1-hour rainfall = 1.810(In)
Computed peak 3-hour rainfall = 3.300(In)
Specified peak 6-hour rainfall = 4.820(In)
Specified peak 24-hour rainfall = 9.200(In)

Rainfall depth area reduction factors:
Using a total area of 7.38(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.670(In)
30-minute factor = 1.000 Adjusted rainfall = 1.371(In)
1-hour factor = 1.000 Adjusted rainfall = 1.809(In)
3-hour factor = 1.000 Adjusted rainfall = 3.300(In)
6-hour factor = 1.000 Adjusted rainfall = 4.820(In)
24-hour factor = 1.000 Adjusted rainfall = 9.200(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 89.25 (CFS))		
1	21.432	19.129
2	85.843	57.487
3	98.830	11.591
4	100.000	1.044

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6697	0.6697
2	0.8836	0.2140
3	1.0392	0.1556
4	1.1659	0.1267
5	1.2748	0.1089
6	1.3712	0.0964
7	1.4585	0.0872
8	1.5385	0.0800
9	1.6127	0.0742
10	1.6821	0.0694
11	1.7475	0.0654
12	1.8094	0.0619
13	1.8903	0.0810
14	1.9685	0.0782

15	2.0442	0.0757
16	2.1177	0.0734
17	2.1891	0.0714
18	2.2586	0.0695
19	2.3264	0.0678
20	2.3925	0.0662
21	2.4573	0.0647
22	2.5206	0.0633
23	2.5826	0.0620
24	2.6434	0.0608
25	2.7031	0.0597
26	2.7617	0.0586
27	2.8193	0.0576
28	2.8759	0.0566
29	2.9317	0.0557
30	2.9865	0.0549
31	3.0406	0.0540
32	3.0938	0.0533
33	3.1463	0.0525
34	3.1981	0.0518
35	3.2492	0.0511
36	3.2997	0.0504

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0504	0.0048	0.0457
2	0.0511	0.0048	0.0463
3	0.0525	0.0050	0.0476
4	0.0533	0.0050	0.0482
5	0.0549	0.0052	0.0497
6	0.0557	0.0053	0.0505
7	0.0576	0.0054	0.0522
8	0.0586	0.0055	0.0531
9	0.0608	0.0057	0.0551
10	0.0620	0.0058	0.0562
11	0.0647	0.0061	0.0586
12	0.0662	0.0062	0.0599
13	0.0695	0.0066	0.0630
14	0.0714	0.0067	0.0647
15	0.0757	0.0071	0.0686
16	0.0782	0.0072	0.0710
17	0.0619	0.0058	0.0561
18	0.0654	0.0062	0.0592
19	0.0742	0.0070	0.0672
20	0.0800	0.0072	0.0728
21	0.0964	0.0072	0.0892
22	0.1089	0.0072	0.1017
23	0.1556	0.0072	0.1484
24	0.2140	0.0072	0.2068
25	0.6697	0.0072	0.6625
26	0.1267	0.0072	0.1195
27	0.0872	0.0072	0.0800
28	0.0694	0.0065	0.0629
29	0.0810	0.0072	0.0738
30	0.0734	0.0069	0.0665
31	0.0678	0.0064	0.0614
32	0.0633	0.0060	0.0574
33	0.0597	0.0056	0.0541
34	0.0566	0.0053	0.0513
35	0.0540	0.0051	0.0489
36	0.0518	0.0049	0.0469

Total soil rain loss = 0.22(In)
Total effective rainfall = 3.08(In)
Peak flow rate in flood hydrograph = 42.92(CFS)

3 - 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 12.5 25.0 37.5 50.0
0+ 5	0.0060	0.87	Q
0+10	0.0302	3.51	V Q
0+15	0.0584	4.10	V Q
0+20	0.0877	4.24	V Q
0+25	0.1174	4.32	VQ
0+30	0.1479	4.43	Q
0+35	0.1791	4.53	Q
0+40	0.2111	4.65	QV
0+45	0.2440	4.76	Q V
0+50	0.2778	4.91	Q V
0+55	0.3125	5.04	Q V
1+ 0	0.3485	5.22	Q V
1+ 5	0.3856	5.39	Q V
1+10	0.4243	5.61	Q V
1+15	0.4644	5.82	Q V
1+20	0.5065	6.11	Q V
1+25	0.5479	6.02	Q V
1+30	0.5840	5.25	Q V
1+35	0.6213	5.41	Q V
1+40	0.6627	6.00	Q V
1+45	0.7090	6.73	Q V
1+50	0.7641	7.99	Q V
1+55	0.8315	9.79	Q V
2+ 0	0.9263	13.76	Q V
2+ 5	1.1080	26.38	Q V
2+10	1.4036	42.92	V Q
2+15	1.5158	16.30	Q V
2+20	1.5701	7.88	Q V
2+25	1.6120	6.08	Q V
2+30	1.6555	6.33	Q V
2+35	1.6963	5.92	Q V
2+40	1.7340	5.47	Q V
2+45	1.7692	5.11	Q V
2+50	1.8024	4.82	Q V
2+55	1.8339	4.57	Q V
3+ 0	1.8639	4.36	Q V
3+ 5	1.8868	3.32	Q V
3+10	1.8908	0.59	Q V
3+15	1.8912	0.05	Q V

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 06/17/25

++

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

Program License Serial Number 6443

LOCUST GATEWAY
PROPOSED UNIT HYDROGRAPH ANALYSIS (DMA 3)
100-YR. 3-HR DESIGN STORM
KIMLEY-HORN

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 100		
9.52	1	1.81
Rainfall data for year 100		
9.52	6	4.82
Rainfall data for year 100		
9.52	24	9.20

++

******** 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)
32.0	52.0	9.52	1.000	0.785	0.173	0.136

Area-averaged adjusted loss rate Fm (In/Hr) = 0.136

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

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC3)		Yield Fr
1.65	0.173	32.0	52.0	9.23	0.354
7.87	0.827	98.0	98.0	0.20	0.974

Area-averaged catchment yield fraction, Y = 0.867
Area-averaged low loss fraction, Yb = 0.133
Direct entry of lag time by user
++
Watershed area = 9.52(Ac.)
Catchment Lag time = 0.100 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 83.3333
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.136(In/Hr)
Average low loss rate fraction (Yb) = 0.133 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.670(In)
Computed peak 30-minute rainfall = 1.372(In)
Specified peak 1-hour rainfall = 1.810(In)
Computed peak 3-hour rainfall = 3.300(In)
Specified peak 6-hour rainfall = 4.820(In)
Specified peak 24-hour rainfall = 9.200(In)

Rainfall depth area reduction factors:
Using a total area of 9.52(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.670(In)
30-minute factor = 1.000 Adjusted rainfall = 1.371(In)
1-hour factor = 1.000 Adjusted rainfall = 1.809(In)
3-hour factor = 1.000 Adjusted rainfall = 3.300(In)
6-hour factor = 1.000 Adjusted rainfall = 4.820(In)
24-hour factor = 1.000 Adjusted rainfall = 9.200(In)

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

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 115.13 (CFS))		
1	12.207	14.054
2	66.918	62.990
3	94.948	32.272
4	99.050	4.722
5	100.000	1.094

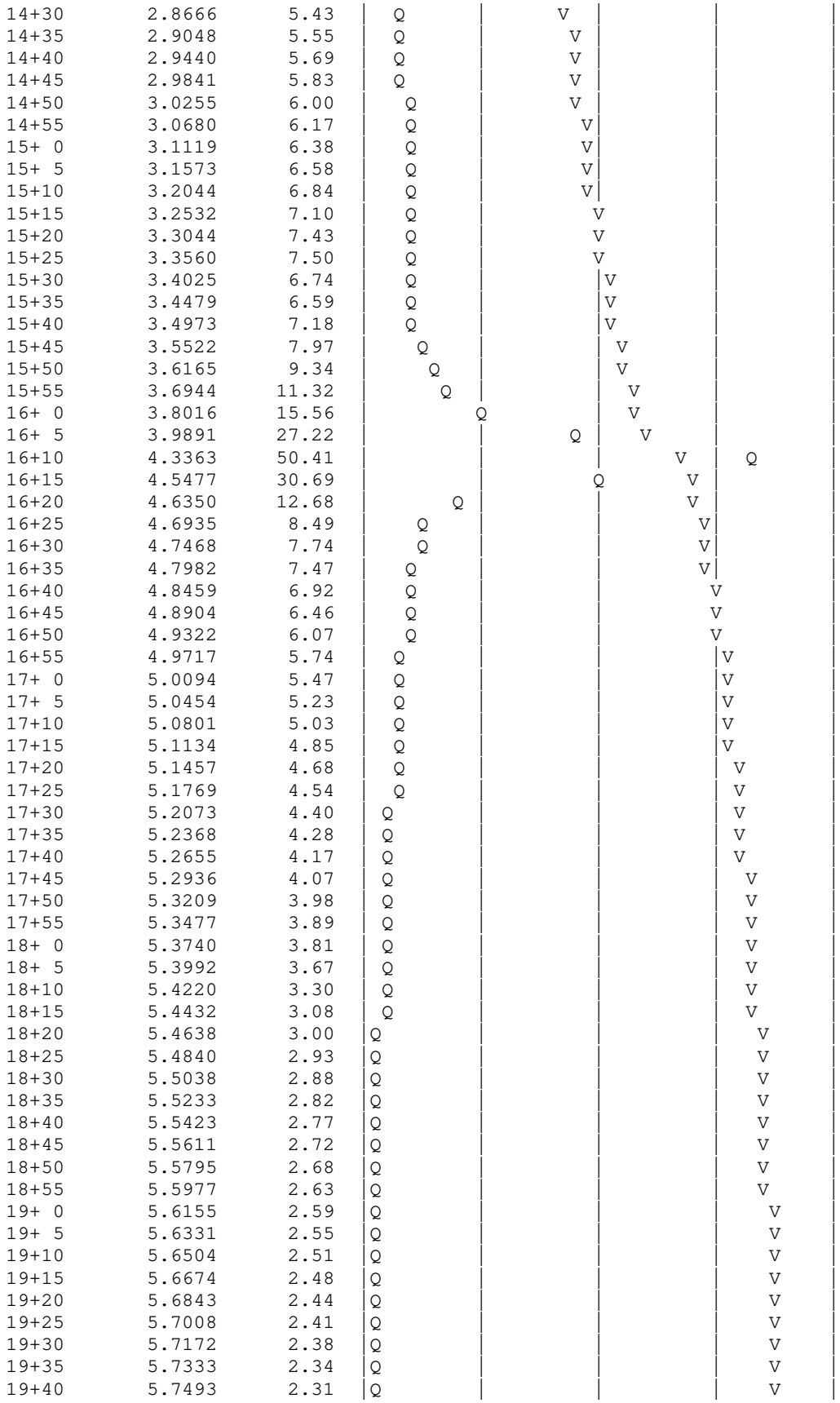
Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6696	0.6696
2	0.8835	0.2139
3	1.0391	0.1556
4	1.1658	0.1267
5	1.2747	0.1088
6	1.3711	0.0964
7	1.4583	0.0872
8	1.5383	0.0800
9	1.6125	0.0742
10	1.6819	0.0694
11	1.7473	0.0654
12	1.8092	0.0619
13	1.8902	0.0810

14	1.9684	0.0782
15	2.0441	0.0757
16	2.1175	0.0734
17	2.1889	0.0714
18	2.2584	0.0695
19	2.3262	0.0678
20	2.3924	0.0662
21	2.4571	0.0647
22	2.5204	0.0633
23	2.5825	0.0620
24	2.6433	0.0608
25	2.7030	0.0597
26	2.7616	0.0586
27	2.8192	0.0576
28	2.8758	0.0566
29	2.9316	0.0557
30	2.9865	0.0549
31	3.0405	0.0540
32	3.0938	0.0533
33	3.1463	0.0525
34	3.1981	0.0518
35	3.2492	0.0511
36	3.2996	0.0505

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0505	0.0067	0.0437
2	0.0511	0.0068	0.0443
3	0.0525	0.0070	0.0455
4	0.0533	0.0071	0.0462
5	0.0549	0.0073	0.0476
6	0.0557	0.0074	0.0483
7	0.0576	0.0077	0.0499
8	0.0586	0.0078	0.0508
9	0.0608	0.0081	0.0527
10	0.0620	0.0083	0.0538
11	0.0647	0.0086	0.0561
12	0.0662	0.0088	0.0574
13	0.0695	0.0093	0.0603
14	0.0714	0.0095	0.0619
15	0.0757	0.0101	0.0656
16	0.0782	0.0104	0.0678
17	0.0619	0.0082	0.0536
18	0.0654	0.0087	0.0566
19	0.0742	0.0099	0.0643
20	0.0800	0.0107	0.0693
21	0.0964	0.0113	0.0851
22	0.1088	0.0113	0.0975
23	0.1556	0.0113	0.1443
24	0.2139	0.0113	0.2026
25	0.6696	0.0113	0.6583
26	0.1267	0.0113	0.1154
27	0.0872	0.0113	0.0759
28	0.0694	0.0093	0.0602
29	0.0810	0.0108	0.0702
30	0.0734	0.0098	0.0637
31	0.0678	0.0090	0.0588
32	0.0633	0.0084	0.0549
33	0.0597	0.0080	0.0517
34	0.0566	0.0076	0.0491
35	0.0540	0.0072	0.0468

```
 36              0.0518           0.0069              0.0449
--------------------------------------------------------------------------
--------------------------------------------------------------------------
Total soil rain loss =      0.32(In)
Total effective rainfall =      2.97(In)
Peak flow rate in flood hydrograph =     50.41(CFS)
--------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    3 - 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       0.0042      0.61  Q         |         |         |         |
  0+10       0.0275      3.38  V Q       |         |         |         |
  0+15       0.0608      4.84  |V Q      |         |         |         |
  0+20       0.0963      5.15  |V Q      |         |         |         |
  0+25       0.1328      5.30  | VQ      |         |         |         |
  0+30       0.1702      5.43  | VQ      |         |         |         |
  0+35       0.2084      5.55  |  Q      |         |         |         |
  0+40       0.2476      5.69  |  QV     |         |         |         |
  0+45       0.2878      5.83  |  QV     |         |         |         |
  0+50       0.3291      6.00  |   QV    |         |         |         |
  0+55       0.3716      6.17  |   Q V   |         |         |         |
  1+ 0       0.4156      6.38  |   Q  V  |         |         |         |
  1+ 5       0.4609      6.58  |   Q  V  |         |         |         |
  1+10       0.5080      6.84  |   Q   V |         |         |         |
  1+15       0.5569      7.10  |   Q    V|         |         |         |
  1+20       0.6080      7.43  |   Q     V         |         |         |
  1+25       0.6597      7.50  |   Q     |V        |         |         |
  1+30       0.7061      6.74  |   Q     |V        |         |         |
  1+35       0.7515      6.59  |   Q     | V       |         |         |
  1+40       0.8010      7.18  |   Q     |  V      |         |         |
  1+45       0.8558      7.97  |    Q    |   V     |         |         |
  1+50       0.9201      9.34  |     Q   |    V    |         |         |
  1+55       0.9981     11.32  |      Q  |     V   |         |         |
  2+ 0       1.1052     15.56  |         Q      V  |         |         |
  2+ 5       1.2927     27.22  |         |      Q |V        |         |
  2+10       1.6399     50.41  |         |        |      V  |  Q      |
  2+15       1.8513     30.69  |         |        Q         |V        |
  2+20       1.9386     12.68  |       Q |         |        | V       |
  2+25       1.9971      8.49  |    Q    |         |        |  V      |
  2+30       2.0504      7.74  |    Q    |         |        |   V     |
  2+35       2.1019      7.47  |   Q     |         |        |    V    |
  2+40       2.1495      6.92  |   Q     |         |        |     V   |
  2+45       2.1940      6.46  |   Q     |         |        |      V  |
  2+50       2.2358      6.07  |   Q     |         |        |      V  |
  2+55       2.2754      5.74  |  Q      |         |        |       V |
  3+ 0       2.3130      5.47  |  Q      |         |        |        V|
  3+ 5       2.3449      4.63  |  Q      |         |        |        V|
  3+10       2.3568      1.72  |Q        |         |        |        V|
  3+15       2.3586      0.26  Q         |         |        |        V|
  3+20       2.3589      0.05  Q         |         |        |         V
--------------------------------------------------------------------------
```



14+30	2.8666	5.43	
14+35	2.9048	5.55	
14+40	2.9440	5.69	
14+45	2.9841	5.83	
14+50	3.0255	6.00	
14+55	3.0680	6.17	
15+ 0	3.1119	6.38	
15+ 5	3.1573	6.58	
15+10	3.2044	6.84	
15+15	3.2532	7.10	
15+20	3.3044	7.43	
15+25	3.3560	7.50	
15+30	3.4025	6.74	
15+35	3.4479	6.59	
15+40	3.4973	7.18	
15+45	3.5522	7.97	
15+50	3.6165	9.34	
15+55	3.6944	11.32	
16+ 0	3.8016	15.56	
16+ 5	3.9891	27.22	
16+10	4.3363	50.41	
16+15	4.5477	30.69	
16+20	4.6350	12.68	
16+25	4.6935	8.49	
16+30	4.7468	7.74	
16+35	4.7982	7.47	
16+40	4.8459	6.92	
16+45	4.8904	6.46	
16+50	4.9322	6.07	
16+55	4.9717	5.74	
17+ 0	5.0094	5.47	
17+ 5	5.0454	5.23	
17+10	5.0801	5.03	
17+15	5.1134	4.85	
17+20	5.1457	4.68	
17+25	5.1769	4.54	
17+30	5.2073	4.40	
17+35	5.2368	4.28	
17+40	5.2655	4.17	
17+45	5.2936	4.07	
17+50	5.3209	3.98	
17+55	5.3477	3.89	
18+ 0	5.3740	3.81	
18+ 5	5.3992	3.67	
18+10	5.4220	3.30	
18+15	5.4432	3.08	
18+20	5.4638	3.00	
18+25	5.4840	2.93	
18+30	5.5038	2.88	
18+35	5.5233	2.82	
18+40	5.5423	2.77	
18+45	5.5611	2.72	
18+50	5.5795	2.68	
18+55	5.5977	2.63	
19+ 0	5.6155	2.59	
19+ 5	5.6331	2.55	
19+10	5.6504	2.51	
19+15	5.6674	2.48	
19+20	5.6843	2.44	
19+25	5.7008	2.41	
19+30	5.7172	2.38	
19+35	5.7333	2.34	
19+40	5.7493	2.31	

19+45	5.7650	2.29	Q			V	
19+50	5.7806	2.26	Q			V	
19+55	5.7959	2.23	Q			V	
20+ 0	5.8111	2.20	Q			V	
20+ 5	5.8261	2.18	Q			V	
20+10	5.8409	2.15	Q			V	
20+15	5.8556	2.13	Q			V	
20+20	5.8701	2.11	Q			V	
20+25	5.8845	2.09	Q			V	
20+30	5.8987	2.06	Q			V	
20+35	5.9128	2.04	Q			V	
20+40	5.9267	2.02	Q			V	
20+45	5.9405	2.00	Q			V	
20+50	5.9542	1.98	Q			V	
20+55	5.9677	1.97	Q			V	
21+ 0	5.9811	1.95	Q			V	
21+ 5	5.9944	1.93	Q			V	
21+10	6.0076	1.91	Q			V	
21+15	6.0206	1.90	Q			V	
21+20	6.0336	1.88	Q			V	
21+25	6.0464	1.86	Q			V	
21+30	6.0591	1.85	Q			V	
21+35	6.0717	1.83	Q			V	
21+40	6.0842	1.82	Q			V	
21+45	6.0967	1.80	Q			V	
21+50	6.1090	1.79	Q			V	
21+55	6.1212	1.77	Q			V	
22+ 0	6.1333	1.76	Q			V	
22+ 5	6.1454	1.75	Q			V	
22+10	6.1573	1.73	Q			V	
22+15	6.1692	1.72	Q			V	
22+20	6.1809	1.71	Q			V	
22+25	6.1926	1.70	Q			V	
22+30	6.2042	1.69	Q			V	
22+35	6.2157	1.67	Q			V	
22+40	6.2272	1.66	Q			V	
22+45	6.2386	1.65	Q			V	
22+50	6.2498	1.64	Q			V	
22+55	6.2611	1.63	Q			V	
23+ 0	6.2722	1.62	Q			V	
23+ 5	6.2833	1.61	Q			V	
23+10	6.2943	1.60	Q			V	
23+15	6.3052	1.59	Q			V	
23+20	6.3161	1.58	Q			V	
23+25	6.3269	1.57	Q			V	
23+30	6.3376	1.56	Q			V	
23+35	6.3483	1.55	Q			V	
23+40	6.3589	1.54	Q			V	
23+45	6.3694	1.53	Q			V	
23+50	6.3799	1.52	Q			V	
23+55	6.3903	1.51	Q			V	
24+ 0	6.4007	1.50	Q			V	
24+ 5	6.4097	1.31	Q			V	
24+10	6.4131	0.49	Q			V	
24+15	6.4136	0.08	Q			V	
24+20	6.4137	0.01	Q			V	

APPENDIX H

BASIN ANALYSIS, PONDPACK BASIN ROUTING RESULTS

Project Summary	
Title	Locust Gateway
Engineer	
Company	Kimley-Horn
Date	2/28/2025

Notes	100 year - 24 hour Basin Routing

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Diverted Hydrograph 70

Subsection: User Notifications

User Notifications?	No user notifications generated.

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft^3)	Time to Peak (min)	Peak Flow (ft^3/s)
DA 1	100-YR	0	714,136.000	970.00	132.57
DA 2	100-YR	0	225,429.000	970.00	42.91
DA 3	100-YR	0	279,367.000	970.00	50.39

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft^3)	Time to Peak (min)	Peak Flow (ft^3/s)
O-1	100-YR	0	0.000	0.00	0.00
O-2	100-YR	0	0.000	0.00	0.00
O-3	100-YR	0	0.000	0.00	0.00

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft^3)	Time to Peak (min)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft^3)
BMP 3 (IN)	100-YR	0	280,246.000	970.00	50.39	(N/A)	(N/A)
BMP 3 (OUT)	100-YR	0	0.000	0.00	0.00	1,607.77	86,357.000
BMP1 (IN)	100-YR	0	714,232.000	970.00	132.57	(N/A)	(N/A)
BMP1 (OUT)	100-YR	0	0.000	0.00	0.00	1,603.47	202,706.000
BMP2 (IN)	100-YR	0	225,467.000	970.00	42.91	(N/A)	(N/A)
BMP2 (OUT)	100-YR	0	0.000	0.00	0.00	1,611.10	76,118.000

Peak Discharge	132.57 ft³/s
Time to Peak	970.00 min
Hydrograph Volume	714,135.619 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
5.00	0.71	3.13	3.77	3.84	3.85
30.00	3.87	3.88	3.89	3.90	3.91
55.00	3.92	3.93	3.94	3.96	3.97
80.00	3.98	3.99	4.01	4.02	4.03
105.00	4.04	4.05	4.07	4.08	4.09
130.00	4.11	4.12	4.13	4.14	4.16
155.00	4.17	4.19	4.20	4.21	4.23
180.00	4.24	4.26	4.27	4.28	4.30
205.00	4.31	4.33	4.35	4.36	4.38
230.00	4.39	4.41	4.43	4.44	4.46
255.00	4.47	4.49	4.51	4.53	4.54
280.00	4.56	4.58	4.60	4.61	4.63
305.00	4.65	4.67	4.69	4.71	4.73
330.00	4.75	4.77	4.79	4.81	4.83
355.00	4.85	4.87	4.89	4.91	4.93
380.00	4.96	4.98	5.00	5.03	5.05
405.00	5.07	5.10	5.12	5.15	5.17
430.00	5.20	5.22	5.25	5.28	5.31
455.00	5.33	5.36	5.39	5.42	5.44
480.00	5.48	5.50	5.54	5.57	5.60
505.00	5.63	5.67	5.70	5.73	5.76
530.00	5.80	5.83	5.87	5.91	5.95
555.00	5.98	6.02	6.06	6.10	6.14
580.00	6.19	6.23	6.27	6.31	6.37
605.00	6.41	6.46	6.50	6.56	6.60
630.00	6.66	6.71	6.77	6.82	6.88
655.00	6.93	7.00	7.05	7.12	7.18
680.00	7.25	7.31	7.39	7.45	7.53
705.00	7.60	7.69	7.76	7.85	8.19
730.00	9.15	9.46	9.59	9.68	9.79
755.00	9.88	10.00	10.10	10.22	10.33
780.00	10.46	10.58	10.72	10.85	11.01
805.00	11.14	11.32	11.46	11.65	11.82
830.00	12.03	12.21	12.44	12.65	12.92
855.00	13.15	13.45	13.71	14.05	14.35
880.00	14.74	15.09	15.56	15.98	16.55
905.00	17.07	17.81	18.51	19.49	19.31
930.00	16.82	17.11	19.00	21.27	25.08
955.00	30.42	42.22	77.99	132.57	56.86

Subsection: Read Hydrograph
Scenario: 100-YR
Label: DA 1

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
980.00	26.44	19.52	20.16	19.00	17.51
1,005.00	16.32	15.37	14.57	13.90	13.32
1,030.00	12.80	12.34	11.94	11.57	11.24
1,055.00	10.94	10.66	10.40	10.16	9.94
1,080.00	9.74	9.29	8.23	7.84	7.65
1,105.00	7.50	7.36	7.22	7.09	6.97
1,130.00	6.85	6.74	6.63	6.53	6.44
1,155.00	6.34	6.25	6.17	6.08	6.01
1,180.00	5.93	5.86	5.78	5.72	5.65
1,205.00	5.58	5.52	5.46	5.40	5.35
1,230.00	5.29	5.24	5.19	5.14	5.09
1,255.00	5.04	4.99	4.95	4.90	4.86
1,280.00	4.82	4.78	4.74	4.70	4.66
1,305.00	4.62	4.59	4.55	4.52	4.48
1,330.00	4.45	4.42	4.39	4.35	4.32
1,355.00	4.29	4.26	4.24	4.21	4.18
1,380.00	4.15	4.13	4.10	4.07	4.05
1,405.00	4.02	4.00	3.97	3.95	3.93
1,430.00	3.91	3.88	3.86	3.13	0.70
1,455.00	0.07	(N/A)	(N/A)	(N/A)	(N/A)

Peak Discharge	42.91 ft³/s
Time to Peak	970.00 min
Hydrograph Volume	225,429.143 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
5.00	0.26	1.04	1.19	1.21	1.21
30.00	1.22	1.22	1.23	1.23	1.23
55.00	1.24	1.24	1.24	1.25	1.25
80.00	1.25	1.26	1.26	1.27	1.27
105.00	1.27	1.28	1.28	1.29	1.29
130.00	1.29	1.30	1.30	1.31	1.31
155.00	1.31	1.32	1.32	1.33	1.33
180.00	1.34	1.34	1.35	1.35	1.36
205.00	1.36	1.37	1.37	1.38	1.38
230.00	1.39	1.39	1.40	1.40	1.41
255.00	1.41	1.42	1.42	1.43	1.43
280.00	1.44	1.44	1.45	1.45	1.46
305.00	1.47	1.47	1.48	1.48	1.49
330.00	1.50	1.50	1.51	1.52	1.52
355.00	1.53	1.54	1.54	1.55	1.56
380.00	1.56	1.57	1.58	1.58	1.59
405.00	1.60	1.61	1.61	1.62	1.63
430.00	1.64	1.65	1.66	1.66	1.67
455.00	1.68	1.69	1.70	1.71	1.72
480.00	1.73	1.74	1.75	1.75	1.77
505.00	1.77	1.79	1.80	1.81	1.82
530.00	1.83	1.84	1.85	1.86	1.88
555.00	1.89	1.90	1.91	1.92	1.94
580.00	1.95	1.96	1.98	1.99	2.01
605.00	2.02	2.04	2.05	2.07	2.08
630.00	2.10	2.12	2.13	2.15	2.17
655.00	2.19	2.21	2.22	2.25	2.26
680.00	2.29	2.31	2.33	2.35	2.38
705.00	2.40	2.43	2.45	2.48	2.59
730.00	2.90	2.99	3.02	3.05	3.09
755.00	3.12	3.15	3.18	3.22	3.26
780.00	3.30	3.34	3.38	3.42	3.47
805.00	3.52	3.57	3.62	3.68	3.73
830.00	3.79	3.85	3.93	3.99	4.07
855.00	4.15	4.24	4.32	4.43	4.53
880.00	4.65	4.76	4.91	5.04	5.22
905.00	5.39	5.61	5.82	6.11	6.02
930.00	5.25	5.41	6.00	6.73	7.99
955.00	9.79	13.76	26.38	42.91	16.31

Subsection: Read Hydrograph
Scenario: 100-YR
Label: DA 2

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
980.00	7.88	6.08	6.33	5.92	5.47
1,005.00	5.11	4.82	4.57	4.36	4.18
1,030.00	4.02	3.88	3.75	3.64	3.53
1,055.00	3.44	3.35	3.27	3.20	3.13
1,080.00	3.06	2.91	2.57	2.46	2.41
1,105.00	2.36	2.31	2.27	2.23	2.19
1,130.00	2.16	2.12	2.09	2.06	2.03
1,155.00	2.00	1.97	1.94	1.92	1.89
1,180.00	1.87	1.84	1.82	1.80	1.78
1,205.00	1.76	1.74	1.72	1.70	1.68
1,230.00	1.67	1.65	1.63	1.62	1.60
1,255.00	1.59	1.57	1.56	1.54	1.53
1,280.00	1.52	1.50	1.49	1.48	1.47
1,305.00	1.46	1.44	1.43	1.42	1.41
1,330.00	1.40	1.39	1.38	1.37	1.36
1,355.00	1.35	1.34	1.33	1.33	1.32
1,380.00	1.31	1.30	1.29	1.28	1.28
1,405.00	1.27	1.26	1.25	1.24	1.24
1,430.00	1.23	1.22	1.22	0.95	0.17
1,455.00	0.01	(N/A)	(N/A)	(N/A)	(N/A)

Peak Discharge	50.39 ft³/s
Time to Peak	970.00 min
Hydrograph Volume	279,367.326 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
5.00	0.18	1.00	1.42	1.48	1.50
30.00	1.50	1.51	1.51	1.52	1.52
55.00	1.52	1.53	1.53	1.54	1.54
80.00	1.55	1.55	1.56	1.56	1.57
105.00	1.57	1.58	1.58	1.59	1.59
130.00	1.60	1.60	1.61	1.61	1.62
155.00	1.62	1.63	1.63	1.64	1.64
180.00	1.65	1.65	1.66	1.67	1.67
205.00	1.68	1.68	1.69	1.70	1.70
230.00	1.71	1.71	1.72	1.73	1.73
255.00	1.74	1.75	1.75	1.76	1.77
280.00	1.77	1.78	1.79	1.79	1.80
305.00	1.81	1.81	1.82	1.83	1.84
330.00	1.84	1.85	1.86	1.87	1.88
355.00	1.88	1.89	1.90	1.91	1.92
380.00	1.93	1.94	1.94	1.95	1.96
405.00	1.97	1.98	1.99	2.00	2.01
430.00	2.02	2.03	2.04	2.05	2.06
455.00	2.07	2.08	2.09	2.10	2.12
480.00	2.13	2.14	2.15	2.16	2.18
505.00	2.19	2.20	2.21	2.23	2.24
530.00	2.25	2.27	2.28	2.29	2.31
555.00	2.32	2.34	2.35	2.37	2.39
580.00	2.40	2.42	2.44	2.45	2.47
605.00	2.49	2.51	2.53	2.55	2.56
630.00	2.59	2.60	2.63	2.65	2.67
655.00	2.69	2.72	2.74	2.76	2.79
680.00	2.81	2.84	2.87	2.89	2.92
705.00	2.95	2.98	3.01	3.05	3.14
730.00	3.47	3.66	3.72	3.76	3.80
755.00	3.83	3.88	3.92	3.96	4.01
780.00	4.06	4.10	4.16	4.21	4.27
805.00	4.32	4.39	4.44	4.52	4.58
830.00	4.66	4.73	4.82	4.90	5.00
855.00	5.09	5.20	5.30	5.43	5.55
880.00	5.69	5.83	6.00	6.17	6.38
905.00	6.58	6.84	7.10	7.43	7.50
930.00	6.74	6.59	7.18	7.97	9.34
955.00	11.32	15.56	27.22	50.39	30.70

Subsection: Read Hydrograph
Scenario: 100-YR
Label: DA 3

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
980.00	12.68	8.49	7.74	7.47	6.92
1,005.00	6.46	6.07	5.74	5.47	5.23
1,030.00	5.03	4.85	4.68	4.54	4.40
1,055.00	4.28	4.17	4.07	3.98	3.89
1,080.00	3.81	3.67	3.30	3.08	3.00
1,105.00	2.93	2.88	2.82	2.77	2.72
1,130.00	2.68	2.63	2.59	2.55	2.51
1,155.00	2.48	2.44	2.41	2.38	2.34
1,180.00	2.31	2.29	2.26	2.23	2.20
1,205.00	2.18	2.15	2.13	2.11	2.09
1,230.00	2.06	2.04	2.02	2.00	1.98
1,255.00	1.97	1.95	1.93	1.91	1.90
1,280.00	1.88	1.86	1.85	1.83	1.82
1,305.00	1.80	1.79	1.77	1.76	1.75
1,330.00	1.73	1.72	1.71	1.70	1.69
1,355.00	1.67	1.66	1.65	1.64	1.63
1,380.00	1.62	1.61	1.60	1.59	1.58
1,405.00	1.57	1.56	1.55	1.54	1.53
1,430.00	1.52	1.51	1.50	1.31	0.49
1,455.00	0.08	0.01	(N/A)	(N/A)	(N/A)

Summary for Hydrograph Addition at 'O-1'

Upstream Link	Upstream Node
Outlet-1	BMP1

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	Outlet-1	0.000	0.00	0.00
Flow (In)	O-1	0.000	0.00	0.00

Summary for Hydrograph Addition at 'O-2'

Upstream Link	Upstream Node
Outlet-2	BMP2

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	Outlet-2	0.000	0.00	0.00
Flow (In)	O-2	0.000	0.00	0.00

Summary for Hydrograph Addition at 'O-3'

Upstream Link	Upstream Node
Outlet-3	BMP 3

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	Outlet-3	0.000	0.00	0.00
Flow (In)	O-3	0.000	0.00	0.00

Subsection: Time vs. Elevation
Label: BMP 3 (IN)

Scenario: 100-YR

Time vs. Elevation (ft)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.00	1,602.00	1,602.00	1,602.02	1,602.05	1,602.08
25.00	1,602.10	1,602.13	1,602.14	1,602.16	1,602.17
50.00	1,602.19	1,602.20	1,602.20	1,602.21	1,602.22
75.00	1,602.22	1,602.23	1,602.23	1,602.23	1,602.24
100.00	1,602.24	1,602.24	1,602.24	1,602.25	1,602.25
125.00	1,602.25	1,602.25	1,602.25	1,602.25	1,602.25
150.00	1,602.25	1,602.26	1,602.26	1,602.26	1,602.26
175.00	1,602.26	1,602.26	1,602.26	1,602.26	1,602.26
200.00	1,602.26	1,602.27	1,602.27	1,602.27	1,602.27
225.00	1,602.27	1,602.27	1,602.27	1,602.27	1,602.27
250.00	1,602.27	1,602.27	1,602.28	1,602.28	1,602.28
275.00	1,602.28	1,602.28	1,602.28	1,602.28	1,602.28
300.00	1,602.28	1,602.29	1,602.29	1,602.29	1,602.29
325.00	1,602.29	1,602.29	1,602.29	1,602.29	1,602.29
350.00	1,602.30	1,602.30	1,602.30	1,602.30	1,602.30
375.00	1,602.30	1,602.30	1,602.30	1,602.31	1,602.31
400.00	1,602.31	1,602.31	1,602.31	1,602.31	1,602.31
425.00	1,602.32	1,602.32	1,602.32	1,602.32	1,602.32
450.00	1,602.32	1,602.32	1,602.33	1,602.33	1,602.33
475.00	1,602.33	1,602.33	1,602.34	1,602.34	1,602.34
500.00	1,602.34	1,602.34	1,602.34	1,602.35	1,602.35
525.00	1,602.35	1,602.35	1,602.35	1,602.36	1,602.36
550.00	1,602.36	1,602.36	1,602.36	1,602.37	1,602.37
575.00	1,602.37	1,602.37	1,602.38	1,602.38	1,602.38
600.00	1,602.38	1,602.39	1,602.39	1,602.39	1,602.39
625.00	1,602.40	1,602.40	1,602.40	1,602.41	1,602.41
650.00	1,602.41	1,602.42	1,602.42	1,602.42	1,602.43
675.00	1,602.43	1,602.43	1,602.44	1,602.44	1,602.44
700.00	1,602.45	1,602.45	1,602.46	1,602.46	1,602.47
725.00	1,602.47	1,602.48	1,602.50	1,602.51	1,602.53
750.00	1,602.54	1,602.56	1,602.58	1,602.60	1,602.62
775.00	1,602.64	1,602.66	1,602.68	1,602.71	1,602.73
800.00	1,602.76	1,602.79	1,602.82	1,602.85	1,602.88
825.00	1,602.91	1,602.95	1,602.99	1,603.02	1,603.06
850.00	1,603.10	1,603.14	1,603.19	1,603.23	1,603.28
875.00	1,603.33	1,603.39	1,603.44	1,603.50	1,603.56
900.00	1,603.63	1,603.70	1,603.77	1,603.85	1,603.93
925.00	1,604.02	1,604.10	1,604.17	1,604.24	1,604.33
950.00	1,604.43	1,604.57	1,604.77	1,605.11	1,605.77
975.00	1,606.46	1,606.80	1,606.94	1,607.04	1,607.12
1,000.00	1,607.20	1,607.27	1,607.32	1,607.38	1,607.42
1,025.00	1,607.47	1,607.51	1,607.54	1,607.57	1,607.60
1,050.00	1,607.63	1,607.65	1,607.68	1,607.70	1,607.71

Subsection: Time vs. Elevation
Scenario: 100-YR
Label: BMP 3 (IN)

Time vs. Elevation (ft)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
1,075.00	1,607.73	1,607.74	1,607.76	1,607.76	1,607.77
1,100.00	1,607.76	1,607.76	1,607.76	1,607.75	1,607.75
1,125.00	1,607.74	1,607.73	1,607.72	1,607.71	1,607.70
1,150.00	1,607.69	1,607.68	1,607.67	1,607.66	1,607.64
1,175.00	1,607.63	1,607.61	1,607.60	1,607.58	1,607.56
1,200.00	1,607.55	1,607.53	1,607.51	1,607.49	1,607.47
1,225.00	1,607.46	1,607.44	1,607.42	1,607.40	1,607.38
1,250.00	1,607.36	1,607.33	1,607.31	1,607.29	1,607.27
1,275.00	1,607.25	1,607.22	1,607.20	1,607.18	1,607.15
1,300.00	1,607.13	1,607.10	1,607.08	1,607.05	1,607.03
1,325.00	1,607.00	1,606.98	1,606.95	1,606.93	1,606.90
1,350.00	1,606.88	1,606.85	1,606.82	1,606.80	1,606.77
1,375.00	1,606.74	1,606.71	1,606.69	1,606.66	1,606.63
1,400.00	1,606.60	1,606.58	1,606.55	1,606.52	1,606.49
1,425.00	1,606.46	1,606.43	1,606.40	1,606.37	1,606.34
1,450.00	1,606.30	1,606.25	1,606.19	1,606.14	1,606.08
1,475.00	1,606.02	1,605.97	1,605.91	1,605.85	1,605.80
1,500.00	1,605.74	1,605.68	1,605.63	1,605.57	1,605.51
1,525.00	1,605.46	1,605.40	1,605.34	1,605.28	1,605.23
1,550.00	1,605.17	1,605.11	1,605.05	1,605.00	1,604.94
1,575.00	1,604.88	1,604.82	1,604.76	1,604.71	1,604.65
1,600.00	1,604.59	1,604.53	1,604.47	1,604.41	1,604.35
1,625.00	1,604.29	1,604.23	1,604.17	1,604.11	1,604.05
1,650.00	1,603.99	1,603.93	1,603.87	1,603.80	1,603.74
1,675.00	1,603.68	1,603.62	1,603.55	1,603.49	1,603.43
1,700.00	1,603.36	1,603.29	1,603.23	1,603.16	1,603.09
1,725.00	1,603.03	1,602.96	1,602.88	1,602.81	1,602.74
1,750.00	1,602.67	1,602.59	1,602.52	1,602.44	1,602.37
1,775.00	1,602.31	1,602.26	1,602.22	1,602.18	1,602.15
1,800.00	1,602.13	1,602.11	1,602.09	1,602.08	1,602.06
1,825.00	1,602.05	1,602.05	1,602.04	1,602.03	1,602.03
1,850.00	1,602.02	1,602.02	1,602.02	1,602.01	1,602.01
1,875.00	1,602.01	1,602.01	1,602.01	1,602.01	1,602.01
1,900.00	1,602.01	1,602.00	1,602.00	1,602.00	1,602.00
1,925.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
1,950.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
1,975.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,000.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,025.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,050.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,075.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,100.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,125.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00

Subsection: Time vs. Elevation
Scenario: 100-YR
Label: BMP 3 (IN)

Time vs. Elevation (ft)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
2,150.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,175.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,200.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,225.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,250.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,275.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,300.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,325.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,350.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,375.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,400.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,425.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,450.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,475.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,500.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,525.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,550.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,575.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,600.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,625.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,650.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,675.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,700.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,725.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,750.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,775.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,800.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,825.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,850.00	1,602.00	1,602.00	1,602.00	1,602.00	1,602.00
2,875.00	1,602.00	1,602.00	(N/A)	(N/A)	(N/A)

Subsection: Time vs. Elevation
Scenario: 100-YR
Label: BMP1 (IN)

Time vs. Elevation (ft)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.00	1,598.00	1,598.00	1,598.02	1,598.05	1,598.08
25.00	1,598.11	1,598.13	1,598.15	1,598.16	1,598.17
50.00	1,598.18	1,598.19	1,598.20	1,598.20	1,598.21
75.00	1,598.21	1,598.21	1,598.22	1,598.22	1,598.22
100.00	1,598.22	1,598.23	1,598.23	1,598.23	1,598.23
125.00	1,598.23	1,598.23	1,598.23	1,598.23	1,598.24
150.00	1,598.24	1,598.24	1,598.24	1,598.24	1,598.24
175.00	1,598.24	1,598.24	1,598.24	1,598.24	1,598.24
200.00	1,598.24	1,598.25	1,598.25	1,598.25	1,598.25
225.00	1,598.25	1,598.25	1,598.25	1,598.25	1,598.25
250.00	1,598.25	1,598.25	1,598.26	1,598.26	1,598.26
275.00	1,598.26	1,598.26	1,598.26	1,598.26	1,598.26
300.00	1,598.26	1,598.26	1,598.27	1,598.27	1,598.27
325.00	1,598.27	1,598.27	1,598.27	1,598.27	1,598.27
350.00	1,598.27	1,598.28	1,598.28	1,598.28	1,598.28
375.00	1,598.28	1,598.28	1,598.28	1,598.28	1,598.28
400.00	1,598.29	1,598.29	1,598.29	1,598.29	1,598.29
425.00	1,598.29	1,598.29	1,598.30	1,598.30	1,598.30
450.00	1,598.30	1,598.30	1,598.30	1,598.30	1,598.31
475.00	1,598.31	1,598.31	1,598.31	1,598.31	1,598.31
500.00	1,598.32	1,598.32	1,598.32	1,598.32	1,598.32
525.00	1,598.32	1,598.33	1,598.33	1,598.33	1,598.33
550.00	1,598.33	1,598.34	1,598.34	1,598.34	1,598.34
575.00	1,598.34	1,598.35	1,598.35	1,598.35	1,598.35
600.00	1,598.36	1,598.36	1,598.36	1,598.36	1,598.37
625.00	1,598.37	1,598.37	1,598.37	1,598.38	1,598.38
650.00	1,598.38	1,598.39	1,598.39	1,598.39	1,598.40
675.00	1,598.40	1,598.40	1,598.41	1,598.41	1,598.41
700.00	1,598.42	1,598.42	1,598.42	1,598.43	1,598.43
725.00	1,598.44	1,598.45	1,598.47	1,598.48	1,598.50
750.00	1,598.51	1,598.52	1,598.53	1,598.54	1,598.56
775.00	1,598.57	1,598.59	1,598.61	1,598.63	1,598.65
800.00	1,598.67	1,598.69	1,598.72	1,598.75	1,598.77
825.00	1,598.80	1,598.83	1,598.87	1,598.90	1,598.94
850.00	1,598.98	1,599.02	1,599.06	1,599.10	1,599.15
875.00	1,599.20	1,599.25	1,599.30	1,599.36	1,599.42
900.00	1,599.49	1,599.55	1,599.63	1,599.70	1,599.79
925.00	1,599.88	1,599.95	1,600.02	1,600.09	1,600.18
950.00	1,600.30	1,600.45	1,600.66	1,601.05	1,601.77
975.00	1,602.41	1,602.65	1,602.76	1,602.84	1,602.93
1,000.00	1,603.00	1,603.06	1,603.11	1,603.16	1,603.21
1,025.00	1,603.24	1,603.28	1,603.31	1,603.33	1,603.36
1,050.00	1,603.38	1,603.40	1,603.41	1,603.43	1,603.44

Subsection: Time vs. Elevation
Label: BMP1 (IN)

Scenario: 100-YR

Time vs. Elevation (ft)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
1,075.00	1,603.45	1,603.46	1,603.47	1,603.47	1,603.46
1,100.00	1,603.46	1,603.45	1,603.44	1,603.43	1,603.42
1,125.00	1,603.41	1,603.39	1,603.38	1,603.36	1,603.35
1,150.00	1,603.33	1,603.32	1,603.30	1,603.28	1,603.26
1,175.00	1,603.24	1,603.22	1,603.20	1,603.18	1,603.16
1,200.00	1,603.13	1,603.11	1,603.09	1,603.06	1,603.04
1,225.00	1,603.02	1,602.99	1,602.96	1,602.94	1,602.91
1,250.00	1,602.89	1,602.86	1,602.83	1,602.81	1,602.78
1,275.00	1,602.75	1,602.72	1,602.69	1,602.66	1,602.64
1,300.00	1,602.61	1,602.58	1,602.55	1,602.52	1,602.49
1,325.00	1,602.45	1,602.42	1,602.39	1,602.36	1,602.33
1,350.00	1,602.30	1,602.27	1,602.23	1,602.20	1,602.17
1,375.00	1,602.14	1,602.10	1,602.07	1,602.04	1,602.00
1,400.00	1,601.97	1,601.93	1,601.90	1,601.87	1,601.83
1,425.00	1,601.80	1,601.76	1,601.73	1,601.69	1,601.65
1,450.00	1,601.60	1,601.54	1,601.48	1,601.41	1,601.35
1,475.00	1,601.28	1,601.22	1,601.16	1,601.09	1,601.03
1,500.00	1,600.96	1,600.90	1,600.83	1,600.77	1,600.70
1,525.00	1,600.63	1,600.57	1,600.50	1,600.44	1,600.37
1,550.00	1,600.30	1,600.23	1,600.17	1,600.10	1,600.03
1,575.00	1,599.96	1,599.89	1,599.82	1,599.75	1,599.68
1,600.00	1,599.61	1,599.54	1,599.47	1,599.39	1,599.32
1,625.00	1,599.24	1,599.17	1,599.09	1,599.02	1,598.94
1,650.00	1,598.86	1,598.78	1,598.69	1,598.61	1,598.53
1,675.00	1,598.44	1,598.36	1,598.30	1,598.24	1,598.20
1,700.00	1,598.16	1,598.13	1,598.11	1,598.09	1,598.07
1,725.00	1,598.06	1,598.05	1,598.04	1,598.03	1,598.03
1,750.00	1,598.02	1,598.02	1,598.02	1,598.01	1,598.01
1,775.00	1,598.01	1,598.01	1,598.01	1,598.00	1,598.00
1,800.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
1,825.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
1,850.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
1,875.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
1,900.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
1,925.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
1,950.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
1,975.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,000.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,025.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,050.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,075.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,100.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,125.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00

Subsection: Time vs. Elevation
Scenario: 100-YR
Label: BMP1 (IN)

Time vs. Elevation (ft)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
2,150.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,175.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,200.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,225.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,250.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,275.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,300.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,325.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,350.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,375.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,400.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,425.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,450.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,475.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,500.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,525.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,550.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,575.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,600.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,625.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,650.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,675.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,700.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,725.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,750.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,775.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,800.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,825.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,850.00	1,598.00	1,598.00	1,598.00	1,598.00	1,598.00
2,875.00	1,598.00	1,598.00	(N/A)	(N/A)	(N/A)

Subsection: Time vs. Elevation
Scenario: 100-YR
Label: BMP2 (IN)

Time vs. Elevation (ft)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.00	1,605.00	1,605.00	1,605.02	1,605.06	1,605.09
25.00	1,605.11	1,605.14	1,605.16	1,605.17	1,605.19
50.00	1,605.20	1,605.21	1,605.22	1,605.23	1,605.24
75.00	1,605.24	1,605.25	1,605.25	1,605.26	1,605.26
100.00	1,605.26	1,605.27	1,605.27	1,605.27	1,605.27
125.00	1,605.28	1,605.28	1,605.28	1,605.28	1,605.28
150.00	1,605.28	1,605.29	1,605.29	1,605.29	1,605.29
175.00	1,605.29	1,605.29	1,605.29	1,605.29	1,605.30
200.00	1,605.30	1,605.30	1,605.30	1,605.30	1,605.30
225.00	1,605.30	1,605.30	1,605.30	1,605.31	1,605.31
250.00	1,605.31	1,605.31	1,605.31	1,605.31	1,605.31
275.00	1,605.31	1,605.32	1,605.32	1,605.32	1,605.32
300.00	1,605.32	1,605.32	1,605.32	1,605.32	1,605.32
325.00	1,605.33	1,605.33	1,605.33	1,605.33	1,605.33
350.00	1,605.33	1,605.33	1,605.34	1,605.34	1,605.34
375.00	1,605.34	1,605.34	1,605.34	1,605.34	1,605.35
400.00	1,605.35	1,605.35	1,605.35	1,605.35	1,605.35
425.00	1,605.35	1,605.36	1,605.36	1,605.36	1,605.36
450.00	1,605.36	1,605.37	1,605.37	1,605.37	1,605.37
475.00	1,605.37	1,605.37	1,605.38	1,605.38	1,605.38
500.00	1,605.38	1,605.38	1,605.39	1,605.39	1,605.39
525.00	1,605.39	1,605.40	1,605.40	1,605.40	1,605.40
550.00	1,605.41	1,605.41	1,605.41	1,605.41	1,605.41
575.00	1,605.42	1,605.42	1,605.42	1,605.43	1,605.43
600.00	1,605.43	1,605.43	1,605.44	1,605.44	1,605.44
625.00	1,605.45	1,605.45	1,605.45	1,605.46	1,605.46
650.00	1,605.46	1,605.47	1,605.47	1,605.47	1,605.48
675.00	1,605.48	1,605.49	1,605.49	1,605.49	1,605.50
700.00	1,605.50	1,605.51	1,605.51	1,605.52	1,605.53
725.00	1,605.53	1,605.55	1,605.57	1,605.59	1,605.61
750.00	1,605.64	1,605.66	1,605.69	1,605.72	1,605.74
775.00	1,605.77	1,605.80	1,605.83	1,605.87	1,605.90
800.00	1,605.93	1,605.97	1,606.01	1,606.04	1,606.08
825.00	1,606.12	1,606.16	1,606.20	1,606.24	1,606.29
850.00	1,606.33	1,606.38	1,606.43	1,606.49	1,606.54
875.00	1,606.59	1,606.65	1,606.71	1,606.77	1,606.84
900.00	1,606.91	1,606.99	1,607.06	1,607.14	1,607.23
925.00	1,607.32	1,607.40	1,607.47	1,607.55	1,607.65
950.00	1,607.76	1,607.91	1,608.13	1,608.52	1,609.24
975.00	1,609.84	1,610.06	1,610.17	1,610.26	1,610.35
1,000.00	1,610.43	1,610.50	1,610.56	1,610.62	1,610.67
1,025.00	1,610.72	1,610.76	1,610.80	1,610.84	1,610.87
1,050.00	1,610.90	1,610.93	1,610.96	1,610.99	1,611.01

Subsection: Time vs. Elevation
Label: BMP2 (IN)

Scenario: 100-YR

Time vs. Elevation (ft)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
1,075.00	1,611.03	1,611.05	1,611.07	1,611.08	1,611.09
1,100.00	1,611.10	1,611.10	1,611.10	1,611.10	1,611.10
1,125.00	1,611.10	1,611.10	1,611.10	1,611.10	1,611.09
1,150.00	1,611.09	1,611.08	1,611.08	1,611.07	1,611.06
1,175.00	1,611.06	1,611.05	1,611.04	1,611.03	1,611.02
1,200.00	1,611.01	1,611.00	1,610.99	1,610.97	1,610.96
1,225.00	1,610.95	1,610.94	1,610.92	1,610.91	1,610.89
1,250.00	1,610.88	1,610.87	1,610.85	1,610.83	1,610.82
1,275.00	1,610.80	1,610.79	1,610.77	1,610.75	1,610.74
1,300.00	1,610.72	1,610.70	1,610.68	1,610.66	1,610.64
1,325.00	1,610.63	1,610.61	1,610.59	1,610.57	1,610.55
1,350.00	1,610.53	1,610.51	1,610.49	1,610.47	1,610.45
1,375.00	1,610.43	1,610.40	1,610.38	1,610.36	1,610.34
1,400.00	1,610.32	1,610.30	1,610.28	1,610.25	1,610.23
1,425.00	1,610.21	1,610.19	1,610.16	1,610.14	1,610.11
1,450.00	1,610.08	1,610.03	1,609.98	1,609.93	1,609.88
1,475.00	1,609.83	1,609.78	1,609.73	1,609.68	1,609.63
1,500.00	1,609.58	1,609.53	1,609.48	1,609.43	1,609.38
1,525.00	1,609.34	1,609.29	1,609.24	1,609.19	1,609.14
1,550.00	1,609.09	1,609.04	1,608.99	1,608.94	1,608.89
1,575.00	1,608.84	1,608.79	1,608.75	1,608.70	1,608.65
1,600.00	1,608.60	1,608.55	1,608.50	1,608.45	1,608.40
1,625.00	1,608.35	1,608.30	1,608.25	1,608.20	1,608.15
1,650.00	1,608.10	1,608.05	1,608.00	1,607.95	1,607.90
1,675.00	1,607.85	1,607.80	1,607.75	1,607.70	1,607.65
1,700.00	1,607.60	1,607.55	1,607.50	1,607.45	1,607.40
1,725.00	1,607.34	1,607.29	1,607.24	1,607.19	1,607.14
1,750.00	1,607.08	1,607.03	1,606.98	1,606.92	1,606.87
1,775.00	1,606.82	1,606.76	1,606.71	1,606.65	1,606.60
1,800.00	1,606.55	1,606.49	1,606.43	1,606.37	1,606.32
1,825.00	1,606.26	1,606.20	1,606.14	1,606.09	1,606.03
1,850.00	1,605.97	1,605.90	1,605.84	1,605.78	1,605.71
1,875.00	1,605.65	1,605.59	1,605.52	1,605.45	1,605.39
1,900.00	1,605.33	1,605.28	1,605.24	1,605.21	1,605.18
1,925.00	1,605.15	1,605.13	1,605.11	1,605.10	1,605.08
1,950.00	1,605.07	1,605.06	1,605.05	1,605.04	1,605.04
1,975.00	1,605.03	1,605.03	1,605.02	1,605.02	1,605.02
2,000.00	1,605.01	1,605.01	1,605.01	1,605.01	1,605.01
2,025.00	1,605.01	1,605.01	1,605.01	1,605.00	1,605.00
2,050.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,075.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,100.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,125.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00

Subsection: Time vs. Elevation
Scenario: 100-YR
Label: BMP2 (IN)

Time vs. Elevation (ft)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
2,150.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,175.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,200.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,225.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,250.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,275.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,300.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,325.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,350.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,375.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,400.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,425.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,450.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,475.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,500.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,525.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,550.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,575.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,600.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,625.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,650.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,675.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,700.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,725.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,750.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,775.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,800.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,825.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,850.00	1,605.00	1,605.00	1,605.00	1,605.00	1,605.00
2,875.00	1,605.00	1,605.00	(N/A)	(N/A)	(N/A)

Subsection: Time vs. Volume
Label: BMP 3

Scenario: 100-YR

Time vs. Volume (ft³)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
0.00	0.000	22.000	160.000	425.000	705.000
25.00	949.000	1,156.000	1,331.000	1,478.000	1,611.000
50.00	1,740.000	1,847.000	1,939.000	2,017.000	2,085.000
75.00	2,142.000	2,192.000	2,235.000	2,273.000	2,306.000
100.00	2,335.000	2,361.000	2,384.000	2,405.000	2,424.000
125.00	2,441.000	2,457.000	2,472.000	2,486.000	2,499.000
150.00	2,512.000	2,524.000	2,535.000	2,546.000	2,557.000
175.00	2,567.000	2,577.000	2,587.000	2,597.000	2,608.000
200.00	2,619.000	2,630.000	2,640.000	2,650.000	2,662.000
225.00	2,672.000	2,683.000	2,694.000	2,704.000	2,715.000
250.00	2,726.000	2,737.000	2,749.000	2,760.000	2,771.000
275.00	2,783.000	2,795.000	2,806.000	2,819.000	2,830.000
300.00	2,842.000	2,854.000	2,866.000	2,878.000	2,890.000
325.00	2,903.000	2,916.000	2,928.000	2,941.000	2,955.000
350.00	2,969.000	2,983.000	2,996.000	3,010.000	3,024.000
375.00	3,039.000	3,055.000	3,070.000	3,085.000	3,099.000
400.00	3,114.000	3,129.000	3,144.000	3,160.000	3,177.000
425.00	3,193.000	3,210.000	3,227.000	3,244.000	3,261.000
450.00	3,279.000	3,296.000	3,314.000	3,332.000	3,349.000
475.00	3,369.000	3,390.000	3,410.000	3,430.000	3,450.000
500.00	3,471.000	3,493.000	3,514.000	3,535.000	3,557.000
525.00	3,580.000	3,602.000	3,625.000	3,649.000	3,672.000
550.00	3,695.000	3,719.000	3,744.000	3,769.000	3,795.000
575.00	3,822.000	3,849.000	3,877.000	3,906.000	3,934.000
600.00	3,963.000	3,992.000	4,023.000	4,055.000	4,087.000
625.00	4,119.000	4,152.000	4,185.000	4,218.000	4,254.000
650.00	4,290.000	4,326.000	4,363.000	4,402.000	4,441.000
675.00	4,480.000	4,521.000	4,562.000	4,606.000	4,650.000
700.00	4,694.000	4,740.000	4,787.000	4,836.000	4,887.000
725.00	4,949.000	5,063.000	5,236.000	5,411.000	5,592.000
750.00	5,784.000	5,985.000	6,198.000	6,424.000	6,661.000
775.00	6,911.000	7,175.000	7,466.000	7,789.000	8,128.000
800.00	8,485.000	8,860.000	9,253.000	9,659.000	10,080.000
825.00	10,523.000	10,988.000	11,475.000	11,966.000	12,470.000
850.00	13,001.000	13,559.000	14,166.000	14,839.000	15,547.000
875.00	16,293.000	17,052.000	17,853.000	18,698.000	19,561.000
900.00	20,479.000	21,488.000	22,617.000	23,815.000	25,059.000
925.00	26,355.000	27,524.000	28,561.000	29,741.000	31,140.000
950.00	32,794.000	34,922.000	38,047.000	43,499.000	54,264.000
975.00	65,501.000	71,111.000	73,332.000	74,808.000	76,142.000
1,000.00	77,379.000	78,502.000	79,491.000	80,316.000	81,047.000
1,025.00	81,704.000	82,298.000	82,845.000	83,340.000	83,789.000
1,050.00	84,197.000	84,565.000	84,904.000	85,223.000	85,512.000

Subsection: Time vs. Volume
Label: BMP 3

Scenario: 100-YR

Time vs. Volume (ft³)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
1,075.00	85,774.000	86,008.000	86,208.000	86,329.000	86,357.000
1,100.00	86,338.000	86,296.000	86,235.000	86,157.000	86,061.000
1,125.00	85,950.000	85,825.000	85,686.000	85,533.000	85,367.000
1,150.00	85,189.000	85,000.000	84,801.000	84,600.000	84,390.000
1,175.00	84,170.000	83,940.000	83,702.000	83,456.000	83,202.000
1,200.00	82,939.000	82,668.000	82,390.000	82,107.000	81,821.000
1,225.00	81,529.000	81,230.000	80,923.000	80,611.000	80,293.000
1,250.00	79,969.000	79,640.000	79,289.000	78,926.000	78,557.000
1,275.00	78,184.000	77,805.000	77,421.000	77,032.000	76,653.000
1,300.00	76,275.000	75,893.000	75,506.000	75,115.000	74,720.000
1,325.00	74,321.000	73,922.000	73,520.000	73,114.000	72,705.000
1,350.00	72,294.000	71,878.000	71,451.000	70,999.000	70,544.000
1,375.00	70,086.000	69,625.000	69,161.000	68,703.000	68,259.000
1,400.00	67,811.000	67,361.000	66,908.000	66,451.000	65,993.000
1,425.00	65,534.000	65,071.000	64,606.000	64,137.000	63,639.000
1,450.00	62,964.000	62,085.000	61,130.000	60,196.000	59,286.000
1,475.00	58,376.000	57,466.000	56,556.000	55,646.000	54,703.000
1,500.00	53,737.000	52,771.000	51,851.000	50,943.000	50,036.000
1,525.00	49,125.000	48,212.000	47,300.000	46,344.000	45,378.000
1,550.00	44,413.000	43,508.000	42,603.000	41,698.000	40,783.000
1,575.00	39,867.000	38,945.000	37,979.000	37,013.000	36,072.000
1,600.00	35,170.000	34,268.000	33,358.000	32,439.000	31,520.000
1,625.00	30,572.000	29,606.000	28,639.000	27,739.000	26,840.000
1,650.00	25,939.000	25,015.000	24,092.000	23,151.000	22,185.000
1,675.00	21,219.000	20,314.000	19,420.000	18,522.000	17,591.000
1,700.00	16,661.000	15,710.000	14,744.000	13,789.000	12,903.000
1,725.00	12,016.000	11,097.000	10,153.000	9,203.000	8,235.000
1,750.00	7,272.000	6,401.000	5,529.000	4,626.000	3,818.000
1,775.00	3,143.000	2,583.000	2,114.000	1,720.000	1,421.000
1,800.00	1,194.000	1,003.000	843.000	709.000	596.000
1,825.00	502.000	423.000	357.000	302.000	255.000
1,850.00	216.000	184.000	156.000	134.000	114.000
1,875.00	98.000	85.000	73.000	64.000	56.000
1,900.00	49.000	44.000	39.000	35.000	32.000
1,925.00	29.000	27.000	25.000	23.000	22.000
1,950.00	21.000	20.000	19.000	18.000	18.000
1,975.00	17.000	17.000	17.000	16.000	16.000
2,000.00	16.000	16.000	16.000	15.000	15.000
2,025.00	15.000	15.000	15.000	15.000	15.000
2,050.00	15.000	15.000	15.000	15.000	15.000
2,075.00	15.000	15.000	15.000	15.000	15.000
2,100.00	15.000	15.000	15.000	15.000	15.000
2,125.00	15.000	15.000	15.000	15.000	15.000

Subsection: Time vs. Volume
Label: BMP 3

Scenario: 100-YR

Time vs. Volume (ft³)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
2,150.00	15.000	15.000	15.000	15.000	15.000
2,175.00	15.000	15.000	15.000	15.000	15.000
2,200.00	15.000	15.000	15.000	15.000	15.000
2,225.00	15.000	15.000	15.000	15.000	15.000
2,250.00	15.000	15.000	15.000	15.000	15.000
2,275.00	15.000	15.000	15.000	15.000	15.000
2,300.00	15.000	15.000	15.000	15.000	15.000
2,325.00	15.000	15.000	15.000	15.000	15.000
2,350.00	15.000	15.000	15.000	15.000	15.000
2,375.00	15.000	15.000	15.000	15.000	15.000
2,400.00	15.000	15.000	15.000	15.000	15.000
2,425.00	15.000	15.000	15.000	15.000	15.000
2,450.00	15.000	15.000	15.000	15.000	15.000
2,475.00	15.000	15.000	15.000	15.000	15.000
2,500.00	15.000	15.000	15.000	15.000	15.000
2,525.00	15.000	15.000	15.000	15.000	15.000
2,550.00	15.000	15.000	15.000	15.000	15.000
2,575.00	15.000	15.000	15.000	15.000	15.000
2,600.00	15.000	15.000	15.000	15.000	15.000
2,625.00	15.000	15.000	15.000	15.000	15.000
2,650.00	15.000	15.000	15.000	15.000	15.000
2,675.00	15.000	15.000	15.000	15.000	15.000
2,700.00	15.000	15.000	15.000	15.000	15.000
2,725.00	15.000	15.000	15.000	15.000	15.000
2,750.00	15.000	15.000	15.000	15.000	15.000
2,775.00	15.000	15.000	15.000	15.000	15.000
2,800.00	15.000	15.000	15.000	15.000	15.000
2,825.00	15.000	15.000	15.000	15.000	15.000
2,850.00	15.000	15.000	15.000	15.000	15.000
2,875.00	15.000	15.000	(N/A)	(N/A)	(N/A)

Subsection: Time vs. Volume
Label: BMP1

Scenario: 100-YR

Time vs. Volume (ft³)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
0.00	0.000	90.000	559.000	1,330.000	2,052.000
25.00	2,654.000	3,152.000	3,564.000	3,906.000	4,209.000
50.00	4,459.000	4,668.000	4,841.000	4,986.000	5,109.000
75.00	5,214.000	5,303.000	5,378.000	5,444.000	5,502.000
100.00	5,553.000	5,597.000	5,636.000	5,671.000	5,705.000
125.00	5,735.000	5,764.000	5,792.000	5,817.000	5,841.000
150.00	5,864.000	5,887.000	5,911.000	5,934.000	5,955.000
175.00	5,977.000	5,999.000	6,021.000	6,043.000	6,064.000
200.00	6,085.000	6,107.000	6,128.000	6,152.000	6,175.000
225.00	6,198.000	6,221.000	6,244.000	6,268.000	6,292.000
250.00	6,316.000	6,339.000	6,362.000	6,387.000	6,413.000
275.00	6,438.000	6,462.000	6,488.000	6,514.000	6,540.000
300.00	6,565.000	6,591.000	6,618.000	6,646.000	6,674.000
325.00	6,702.000	6,731.000	6,759.000	6,789.000	6,818.000
350.00	6,847.000	6,877.000	6,907.000	6,937.000	6,966.000
375.00	6,996.000	7,028.000	7,060.000	7,092.000	7,125.000
400.00	7,159.000	7,193.000	7,227.000	7,261.000	7,297.000
425.00	7,332.000	7,368.000	7,405.000	7,441.000	7,480.000
450.00	7,519.000	7,558.000	7,597.000	7,637.000	7,678.000
475.00	7,718.000	7,760.000	7,802.000	7,844.000	7,889.000
500.00	7,933.000	7,978.000	8,024.000	8,072.000	8,118.000
525.00	8,165.000	8,213.000	8,262.000	8,312.000	8,367.000
550.00	8,424.000	8,481.000	8,539.000	8,597.000	8,657.000
575.00	8,717.000	8,780.000	8,845.000	8,910.000	8,975.000
600.00	9,043.000	9,113.000	9,184.000	9,255.000	9,328.000
625.00	9,403.000	9,479.000	9,557.000	9,637.000	9,719.000
650.00	9,802.000	9,887.000	9,974.000	10,062.000	10,153.000
675.00	10,246.000	10,341.000	10,439.000	10,539.000	10,642.000
700.00	10,746.000	10,854.000	10,966.000	11,081.000	11,199.000
725.00	11,359.000	11,680.000	12,130.000	12,563.000	12,950.000
750.00	13,302.000	13,664.000	14,056.000	14,482.000	14,941.000
775.00	15,434.000	15,963.000	16,529.000	17,135.000	17,781.000
800.00	18,464.000	19,185.000	19,951.000	20,764.000	21,626.000
825.00	22,542.000	23,517.000	24,583.000	25,712.000	26,908.000
850.00	28,177.000	29,521.000	30,944.000	32,453.000	34,052.000
875.00	35,707.000	37,448.000	39,299.000	41,292.000	43,443.000
900.00	45,742.000	48,246.000	50,953.000	53,811.000	56,863.000
925.00	60,058.000	62,879.000	65,396.000	68,307.000	71,816.000
950.00	76,096.000	81,768.000	90,267.000	105,571.000	134,666.000
975.00	160,397.000	170,504.000	174,745.000	178,040.000	181,246.000
1,000.00	184,065.000	186,664.000	188,935.000	190,923.000	192,572.000
1,025.00	194,038.000	195,341.000	196,501.000	197,532.000	198,444.000
1,050.00	199,254.000	199,972.000	200,606.000	201,160.000	201,642.000

Subsection: Time vs. Volume
Scenario: 100-YR
Label: BMP1

Time vs. Volume (ft³)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
1,075.00	202,056.000	202,410.000	202,668.000	202,706.000	202,532.000
1,100.00	202,274.000	201,966.000	201,616.000	201,225.000	200,794.000
1,125.00	200,327.000	199,825.000	199,290.000	198,722.000	198,124.000
1,150.00	197,498.000	196,840.000	196,153.000	195,441.000	194,704.000
1,175.00	193,943.000	193,160.000	192,356.000	191,529.000	190,673.000
1,200.00	189,746.000	188,797.000	187,827.000	186,839.000	185,832.000
1,225.00	184,807.000	183,794.000	182,809.000	181,809.000	180,794.000
1,250.00	179,765.000	178,721.000	177,663.000	176,586.000	175,496.000
1,275.00	174,393.000	173,278.000	172,151.000	171,013.000	169,798.000
1,300.00	168,559.000	167,307.000	166,044.000	164,770.000	163,525.000
1,325.00	162,312.000	161,089.000	159,857.000	158,616.000	157,363.000
1,350.00	156,102.000	154,829.000	153,548.000	152,259.000	150,963.000
1,375.00	149,598.000	148,201.000	146,796.000	145,383.000	143,961.000
1,400.00	142,609.000	141,256.000	139,896.000	138,528.000	137,153.000
1,425.00	135,773.000	134,387.000	132,994.000	131,593.000	130,067.000
1,450.00	127,972.000	125,389.000	122,745.000	120,196.000	117,647.000
1,475.00	115,106.000	112,567.000	110,018.000	107,333.000	104,648.000
1,500.00	102,038.000	99,481.000	96,924.000	94,385.000	91,846.000
1,525.00	89,252.000	86,576.000	83,900.000	81,329.000	78,762.000
1,550.00	76,208.000	73,668.000	71,129.000	68,474.000	65,808.000
1,575.00	63,189.000	60,610.000	58,036.000	55,496.000	52,956.000
1,600.00	50,337.000	47,685.000	45,057.000	42,458.000	39,868.000
1,625.00	37,327.000	34,787.000	32,167.000	29,538.000	26,903.000
1,650.00	24,266.000	21,692.000	19,149.000	16,579.000	13,992.000
1,675.00	11,442.000	9,207.000	7,442.000	6,049.000	4,907.000
1,700.00	3,970.000	3,250.000	2,664.000	2,184.000	1,791.000
1,725.00	1,468.000	1,204.000	987.000	809.000	663.000
1,750.00	544.000	446.000	366.000	300.000	246.000
1,775.00	201.000	165.000	135.000	111.000	91.000
1,800.00	75.000	61.000	50.000	41.000	34.000
1,825.00	28.000	23.000	19.000	15.000	12.000
1,850.00	10.000	8.000	7.000	6.000	5.000
1,875.00	4.000	3.000	3.000	0.000	0.000
1,900.00	0.000	0.000	0.000	0.000	0.000
1,925.00	0.000	0.000	0.000	0.000	0.000
1,950.00	0.000	0.000	0.000	0.000	0.000
1,975.00	0.000	0.000	0.000	0.000	0.000
2,000.00	0.000	0.000	0.000	0.000	0.000
2,025.00	0.000	0.000	0.000	0.000	0.000
2,050.00	0.000	0.000	0.000	0.000	0.000
2,075.00	0.000	0.000	0.000	0.000	0.000
2,100.00	0.000	0.000	0.000	0.000	0.000
2,125.00	0.000	0.000	0.000	0.000	0.000

Time vs. Volume (ft³)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
2,150.00	0.000	0.000	0.000	0.000	0.000
2,175.00	0.000	0.000	0.000	0.000	0.000
2,200.00	0.000	0.000	0.000	0.000	0.000
2,225.00	0.000	0.000	0.000	0.000	0.000
2,250.00	0.000	0.000	0.000	0.000	0.000
2,275.00	0.000	0.000	0.000	0.000	0.000
2,300.00	0.000	0.000	0.000	0.000	0.000
2,325.00	0.000	0.000	0.000	0.000	0.000
2,350.00	0.000	0.000	0.000	0.000	0.000
2,375.00	0.000	0.000	0.000	0.000	0.000
2,400.00	0.000	0.000	0.000	0.000	0.000
2,425.00	0.000	0.000	0.000	0.000	0.000
2,450.00	0.000	0.000	0.000	0.000	0.000
2,475.00	0.000	0.000	0.000	0.000	0.000
2,500.00	0.000	0.000	0.000	0.000	0.000
2,525.00	0.000	0.000	0.000	0.000	0.000
2,550.00	0.000	0.000	0.000	0.000	0.000
2,575.00	0.000	0.000	0.000	0.000	0.000
2,600.00	0.000	0.000	0.000	0.000	0.000
2,625.00	0.000	0.000	0.000	0.000	0.000
2,650.00	0.000	0.000	0.000	0.000	0.000
2,675.00	0.000	0.000	0.000	0.000	0.000
2,700.00	0.000	0.000	0.000	0.000	0.000
2,725.00	0.000	0.000	0.000	0.000	0.000
2,750.00	0.000	0.000	0.000	0.000	0.000
2,775.00	0.000	0.000	0.000	0.000	0.000
2,800.00	0.000	0.000	0.000	0.000	0.000
2,825.00	0.000	0.000	0.000	0.000	0.000
2,850.00	0.000	0.000	0.000	0.000	0.000
2,875.00	0.000	0.000	(N/A)	(N/A)	(N/A)

Subsection: Time vs. Volume
Label: BMP2

Scenario: 100-YR

Time vs. Volume (ft³)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
0.00	0.000	33.000	195.000	452.000	695.000
25.00	905.000	1,086.000	1,242.000	1,386.000	1,512.000
50.00	1,621.000	1,715.000	1,797.000	1,867.000	1,929.000
75.00	1,983.000	2,029.000	2,070.000	2,107.000	2,139.000
100.00	2,169.000	2,194.000	2,217.000	2,238.000	2,257.000
125.00	2,275.000	2,290.000	2,305.000	2,319.000	2,332.000
150.00	2,345.000	2,356.000	2,366.000	2,377.000	2,387.000
175.00	2,398.000	2,408.000	2,418.000	2,428.000	2,438.000
200.00	2,448.000	2,458.000	2,468.000	2,477.000	2,487.000
225.00	2,497.000	2,507.000	2,517.000	2,526.000	2,536.000
250.00	2,546.000	2,555.000	2,565.000	2,575.000	2,584.000
275.00	2,594.000	2,604.000	2,613.000	2,623.000	2,633.000
300.00	2,642.000	2,653.000	2,664.000	2,675.000	2,686.000
325.00	2,696.000	2,708.000	2,719.000	2,730.000	2,743.000
350.00	2,756.000	2,769.000	2,782.000	2,796.000	2,809.000
375.00	2,823.000	2,836.000	2,849.000	2,863.000	2,877.000
400.00	2,890.000	2,904.000	2,920.000	2,934.000	2,948.000
425.00	2,963.000	2,979.000	2,995.000	3,013.000	3,029.000
450.00	3,044.000	3,060.000	3,077.000	3,095.000	3,112.000
475.00	3,131.000	3,150.000	3,169.000	3,188.000	3,206.000
500.00	3,224.000	3,243.000	3,262.000	3,283.000	3,304.000
525.00	3,325.000	3,345.000	3,366.000	3,387.000	3,408.000
550.00	3,430.000	3,454.000	3,477.000	3,500.000	3,523.000
575.00	3,547.000	3,572.000	3,596.000	3,621.000	3,648.000
600.00	3,674.000	3,702.000	3,730.000	3,759.000	3,788.000
625.00	3,817.000	3,847.000	3,878.000	3,909.000	3,941.000
650.00	3,973.000	4,008.000	4,043.000	4,077.000	4,113.000
675.00	4,150.000	4,187.000	4,226.000	4,266.000	4,306.000
700.00	4,348.000	4,396.000	4,451.000	4,514.000	4,584.000
725.00	4,675.000	4,830.000	5,043.000	5,275.000	5,516.000
750.00	5,768.000	6,029.000	6,296.000	6,571.000	6,857.000
775.00	7,155.000	7,464.000	7,787.000	8,133.000	8,491.000
800.00	8,862.000	9,250.000	9,651.000	10,067.000	10,499.000
825.00	10,948.000	11,414.000	11,883.000	12,372.000	12,881.000
850.00	13,412.000	13,979.000	14,571.000	15,189.000	15,844.000
875.00	16,535.000	17,260.000	17,993.000	18,760.000	19,570.000
900.00	20,437.000	21,357.000	22,361.000	23,437.000	24,546.000
925.00	25,674.000	26,686.000	27,608.000	28,670.000	29,952.000
950.00	31,472.000	33,439.000	36,350.000	41,652.000	51,437.000
975.00	59,628.000	62,578.000	64,064.000	65,234.000	66,378.000
1,000.00	67,389.000	68,282.000	69,143.000	69,922.000	70,619.000
1,025.00	71,220.000	71,770.000	72,276.000	72,741.000	73,167.000
1,050.00	73,561.000	73,925.000	74,264.000	74,578.000	74,880.000

Subsection: Time vs. Volume
Scenario: 100-YR
Label: BMP2

Time vs. Volume (ft³)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
1,075.00	75,177.000	75,452.000	75,692.000	75,854.000	75,945.000
1,100.00	76,010.000	76,059.000	76,093.000	76,112.000	76,118.000
1,125.00	76,112.000	76,094.000	76,066.000	76,026.000	75,977.000
1,150.00	75,918.000	75,850.000	75,772.000	75,684.000	75,589.000
1,175.00	75,486.000	75,375.000	75,255.000	75,128.000	74,995.000
1,200.00	74,855.000	74,713.000	74,574.000	74,428.000	74,277.000
1,225.00	74,120.000	73,959.000	73,793.000	73,622.000	73,446.000
1,250.00	73,266.000	73,081.000	72,893.000	72,699.000	72,500.000
1,275.00	72,295.000	72,088.000	71,876.000	71,660.000	71,441.000
1,300.00	71,218.000	70,993.000	70,764.000	70,530.000	70,278.000
1,325.00	70,021.000	69,760.000	69,496.000	69,229.000	68,959.000
1,350.00	68,685.000	68,409.000	68,144.000	67,883.000	67,620.000
1,375.00	67,356.000	67,089.000	66,819.000	66,546.000	66,270.000
1,400.00	65,992.000	65,711.000	65,427.000	65,140.000	64,850.000
1,425.00	64,559.000	64,266.000	63,971.000	63,656.000	63,296.000
1,450.00	62,770.000	62,095.000	61,414.000	60,761.000	60,108.000
1,475.00	59,455.000	58,799.000	58,143.000	57,487.000	56,806.000
1,500.00	56,106.000	55,406.000	54,722.000	54,067.000	53,412.000
1,525.00	52,757.000	52,101.000	51,445.000	50,789.000	50,115.000
1,550.00	49,417.000	48,720.000	48,029.000	47,372.000	46,716.000
1,575.00	46,059.000	45,403.000	44,747.000	44,090.000	43,424.000
1,600.00	42,728.000	42,033.000	41,338.000	40,678.000	40,020.000
1,625.00	39,361.000	38,704.000	38,048.000	37,392.000	36,730.000
1,650.00	36,036.000	35,343.000	34,649.000	33,985.000	33,325.000
1,675.00	32,664.000	32,006.000	31,349.000	30,693.000	30,031.000
1,700.00	29,339.000	28,648.000	27,957.000	27,294.000	26,630.000
1,725.00	25,967.000	25,309.000	24,653.000	23,996.000	23,325.000
1,750.00	22,636.000	21,948.000	21,268.000	20,601.000	19,934.000
1,775.00	19,270.000	18,613.000	17,957.000	17,297.000	16,613.000
1,800.00	15,928.000	15,245.000	14,573.000	13,901.000	13,232.000
1,825.00	12,576.000	11,919.000	11,256.000	10,578.000	9,899.000
1,850.00	9,218.000	8,536.000	7,853.000	7,192.000	6,535.000
1,875.00	5,876.000	5,209.000	4,541.000	3,872.000	3,266.000
1,900.00	2,747.000	2,336.000	1,985.000	1,684.000	1,426.000
1,925.00	1,211.000	1,037.000	887.000	760.000	650.000
1,950.00	557.000	477.000	408.000	349.000	299.000
1,975.00	256.000	219.000	188.000	161.000	138.000
2,000.00	118.000	101.000	86.000	74.000	63.000
2,025.00	54.000	46.000	40.000	34.000	29.000
2,050.00	25.000	21.000	18.000	16.000	13.000
2,075.00	11.000	10.000	8.000	7.000	6.000
2,100.00	5.000	5.000	4.000	3.000	3.000
2,125.00	2.000	2.000	2.000	2.000	1.000

Time vs. Volume (ft³)

Output Time increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
2,150.00	1.000	1.000	1.000	0.000	0.000
2,175.00	0.000	0.000	0.000	0.000	0.000
2,200.00	0.000	0.000	0.000	0.000	0.000
2,225.00	0.000	0.000	0.000	0.000	0.000
2,250.00	0.000	0.000	0.000	0.000	0.000
2,275.00	0.000	0.000	0.000	0.000	0.000
2,300.00	0.000	0.000	0.000	0.000	0.000
2,325.00	0.000	0.000	0.000	0.000	0.000
2,350.00	0.000	0.000	0.000	0.000	0.000
2,375.00	0.000	0.000	0.000	0.000	0.000
2,400.00	0.000	0.000	0.000	0.000	0.000
2,425.00	0.000	0.000	0.000	0.000	0.000
2,450.00	0.000	0.000	0.000	0.000	0.000
2,475.00	0.000	0.000	0.000	0.000	0.000
2,500.00	0.000	0.000	0.000	0.000	0.000
2,525.00	0.000	0.000	0.000	0.000	0.000
2,550.00	0.000	0.000	0.000	0.000	0.000
2,575.00	0.000	0.000	0.000	0.000	0.000
2,600.00	0.000	0.000	0.000	0.000	0.000
2,625.00	0.000	0.000	0.000	0.000	0.000
2,650.00	0.000	0.000	0.000	0.000	0.000
2,675.00	0.000	0.000	0.000	0.000	0.000
2,700.00	0.000	0.000	0.000	0.000	0.000
2,725.00	0.000	0.000	0.000	0.000	0.000
2,750.00	0.000	0.000	0.000	0.000	0.000
2,775.00	0.000	0.000	0.000	0.000	0.000
2,800.00	0.000	0.000	0.000	0.000	0.000
2,825.00	0.000	0.000	0.000	0.000	0.000
2,850.00	0.000	0.000	0.000	0.000	0.000
2,875.00	0.000	0.000	(N/A)	(N/A)	(N/A)

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
1,602.00	0.000
1,602.17	1,565.300
1,602.33	3,352.800
1,602.50	5,279.600
1,602.67	7,315.300
1,602.83	9,441.400
1,603.00	11,645.000
1,603.17	13,916.600
1,603.33	16,248.100
1,603.50	18,633.100
1,603.67	21,066.000
1,603.83	23,541.800
1,604.00	26,056.000
1,604.17	28,604.800
1,604.33	31,184.400
1,604.50	33,791.400
1,604.67	36,422.500
1,604.83	39,074.800
1,605.00	41,745.300
1,605.17	44,431.100
1,605.33	47,129.800
1,605.50	49,838.500
1,605.67	52,554.700
1,605.83	55,275.900
1,606.00	57,999.600
1,606.17	60,723.400
1,606.33	63,444.600
1,606.50	66,160.800
1,606.67	68,869.500
1,606.83	71,568.100
1,607.00	74,254.000
1,607.17	76,924.500
1,607.33	79,576.800
1,607.50	82,207.900
1,607.67	84,814.900
1,607.83	87,394.500
1,608.00	89,943.200
1,608.17	92,457.500
1,608.33	94,933.300
1,608.50	97,366.200
1,608.67	99,751.200
1,608.83	102,082.700
1,609.00	104,354.300
1,609.17	106,557.900
1,609.33	108,684.000

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
1,609.50	110,719.700
1,609.67	112,646.500
1,609.83	114,433.900
1,610.00	115,999.300

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
1,598.00	0.000
1,598.16	3,875.400
1,598.33	8,303.400
1,598.50	13,078.400
1,598.66	18,124.100
1,598.83	23,394.900
1,599.00	28,858.800
1,599.16	34,491.500
1,599.33	40,273.600
1,599.50	46,188.700
1,599.66	52,223.000
1,599.83	58,364.000
1,600.00	64,600.800
1,600.16	70,923.500
1,600.33	77,322.900
1,600.50	83,790.400
1,600.66	90,318.100
1,600.83	96,898.200
1,601.00	103,523.800
1,601.16	110,187.700
1,601.33	116,883.200
1,601.50	123,603.900
1,601.66	130,343.300
1,601.83	137,095.100
1,602.00	143,853.200
1,602.16	150,611.200
1,602.33	157,363.000
1,602.50	164,102.500
1,602.66	170,823.100
1,602.83	177,518.700
1,603.00	184,182.600
1,603.16	190,808.100
1,603.33	197,388.300
1,603.50	203,915.900
1,603.66	210,383.400
1,603.83	216,782.800
1,604.00	223,105.500
1,604.16	229,342.400
1,604.33	235,483.400
1,604.50	241,517.600
1,604.66	247,432.800
1,604.83	253,214.900
1,605.00	258,847.600
1,605.16	264,311.500
1,605.33	269,582.200

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
1,605.50	274,628.000
1,605.66	279,403.000
1,605.83	283,831.000
1,606.00	287,706.400

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
1,605.00	0.000
1,605.16	1,270.200
1,605.33	2,732.300
1,605.50	4,314.900
1,605.66	5,991.600
1,605.83	7,746.400
1,606.00	9,568.300
1,606.16	11,448.800
1,606.33	13,381.200
1,606.50	15,359.900
1,606.66	17,379.800
1,606.83	19,436.900
1,607.00	21,527.300
1,607.16	23,647.500
1,607.33	25,794.300
1,607.50	27,964.700
1,607.66	30,156.100
1,607.83	32,365.700
1,608.00	34,591.000
1,608.16	36,829.700
1,608.33	39,079.400
1,608.50	41,337.800
1,608.66	43,602.700
1,608.83	45,871.900
1,609.00	48,143.300
1,609.16	50,414.700
1,609.33	52,683.900
1,609.50	54,948.800
1,609.66	57,207.200
1,609.83	59,456.900
1,610.00	61,695.500
1,610.16	63,920.900
1,610.33	66,130.500
1,610.50	68,321.900
1,610.66	70,492.300
1,610.83	72,639.100
1,611.00	74,759.300
1,611.16	76,849.700
1,611.33	78,906.700
1,611.50	80,926.700
1,611.66	82,905.400
1,611.83	84,837.800
1,612.00	86,718.300
1,612.16	88,540.200
1,612.33	90,295.000

Elevation-Volume

Pond Elevation (ft)	Pond Volume (ft^3)
1,612.50	91,971.700
1,612.66	93,554.300
1,612.83	95,016.400
1,613.00	96,286.600

Requested Pond Water Surface Elevations	
Minimum (Headwater)	1,598.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	1,606.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	1,606.00	1,606.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	1,606.00 ft
Orifice Diameter	36.0 in
Orifice Coefficient	0.600

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

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 1 (Orifice-Circular)

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

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
1,598.00	0.00	(N/A)	0.00
1,598.50	0.00	(N/A)	0.00
1,599.00	0.00	(N/A)	0.00
1,599.50	0.00	(N/A)	0.00
1,600.00	0.00	(N/A)	0.00
1,600.50	0.00	(N/A)	0.00
1,601.00	0.00	(N/A)	0.00
1,601.50	0.00	(N/A)	0.00
1,602.00	0.00	(N/A)	0.00
1,602.50	0.00	(N/A)	0.00
1,603.00	0.00	(N/A)	0.00
1,603.50	0.00	(N/A)	0.00
1,604.00	0.00	(N/A)	0.00
1,604.50	0.00	(N/A)	0.00
1,605.00	0.00	(N/A)	0.00
1,605.50	0.00	(N/A)	0.00
1,606.00	0.00	(N/A)	0.00

Computation Messages
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
Upstream HW & DNstream TW < Inv.El

Subsection: Composite Rating Curve
Label: Composite Outlet Structure - 1

Scenario: 100-YR

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
1,598.00	0.00	(N/A)	0.00
1,598.50	0.00	(N/A)	0.00
1,599.00	0.00	(N/A)	0.00
1,599.50	0.00	(N/A)	0.00
1,600.00	0.00	(N/A)	0.00
1,600.50	0.00	(N/A)	0.00
1,601.00	0.00	(N/A)	0.00
1,601.50	0.00	(N/A)	0.00
1,602.00	0.00	(N/A)	0.00
1,602.50	0.00	(N/A)	0.00
1,603.00	0.00	(N/A)	0.00
1,603.50	0.00	(N/A)	0.00
1,604.00	0.00	(N/A)	0.00
1,604.50	0.00	(N/A)	0.00
1,605.00	0.00	(N/A)	0.00
1,605.50	0.00	(N/A)	0.00
1,606.00	0.00	(N/A)	0.00

Contributing Structures
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing

Requested Pond Water Surface Elevations	
Minimum (Headwater)	1,605.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	1,613.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 2	Forward	TW	1,613.00	1,613.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice - 2 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	1,613.00 ft
Orifice Diameter	36.0 in
Orifice Coefficient	0.600

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

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 2

Scenario: 100-YR

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Orifice - 2 (Orifice-Circular)

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

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
1,605.00	0.00	(N/A)	0.00
1,605.50	0.00	(N/A)	0.00
1,606.00	0.00	(N/A)	0.00
1,606.50	0.00	(N/A)	0.00
1,607.00	0.00	(N/A)	0.00
1,607.50	0.00	(N/A)	0.00
1,608.00	0.00	(N/A)	0.00
1,608.50	0.00	(N/A)	0.00
1,609.00	0.00	(N/A)	0.00
1,609.50	0.00	(N/A)	0.00
1,610.00	0.00	(N/A)	0.00
1,610.50	0.00	(N/A)	0.00
1,611.00	0.00	(N/A)	0.00
1,611.50	0.00	(N/A)	0.00
1,612.00	0.00	(N/A)	0.00
1,612.50	0.00	(N/A)	0.00
1,613.00	0.00	(N/A)	0.00

Computation Messages
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
HW & TW below invert
Upstream HW & DNstream TW < Inv.El

Subsection: Composite Rating Curve
Label: Composite Outlet Structure - 2

Scenario: 100-YR

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
1,605.00	0.00	(N/A)	0.00
1,605.50	0.00	(N/A)	0.00
1,606.00	0.00	(N/A)	0.00
1,606.50	0.00	(N/A)	0.00
1,607.00	0.00	(N/A)	0.00
1,607.50	0.00	(N/A)	0.00
1,608.00	0.00	(N/A)	0.00
1,608.50	0.00	(N/A)	0.00
1,609.00	0.00	(N/A)	0.00
1,609.50	0.00	(N/A)	0.00
1,610.00	0.00	(N/A)	0.00
1,610.50	0.00	(N/A)	0.00
1,611.00	0.00	(N/A)	0.00
1,611.50	0.00	(N/A)	0.00
1,612.00	0.00	(N/A)	0.00
1,612.50	0.00	(N/A)	0.00
1,613.00	0.00	(N/A)	0.00

Contributing Structures
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing

Requested Pond Water Surface Elevations	
Minimum (Headwater)	1,602.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	1,610.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward	TW	1,609.00	1,610.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	1,609.00 ft
Weir Length	6.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

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

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

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

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

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
1,602.00	0.00	(N/A)	0.00
1,602.50	0.00	(N/A)	0.00
1,603.00	0.00	(N/A)	0.00
1,603.50	0.00	(N/A)	0.00
1,604.00	0.00	(N/A)	0.00
1,604.50	0.00	(N/A)	0.00
1,605.00	0.00	(N/A)	0.00
1,605.50	0.00	(N/A)	0.00
1,606.00	0.00	(N/A)	0.00
1,606.50	0.00	(N/A)	0.00
1,607.00	0.00	(N/A)	0.00
1,607.50	0.00	(N/A)	0.00
1,608.00	0.00	(N/A)	0.00
1,608.50	0.00	(N/A)	0.00
1,609.00	0.00	(N/A)	0.00
1,609.50	6.36	(N/A)	0.00
1,610.00	18.00	(N/A)	0.00

Computation Messages
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000

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

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

Computation Messages
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000
HW & TW below Inv.El.=1609.000
H=.00; Htw=.00; Qfree=.00;
H=.50; Htw=.00; Qfree=6.36;
H=1.00; Htw=.00; Qfree=18.00;

Subsection: Composite Rating Curve
Label: Composite Outlet Structure - 3

Scenario: 100-YR

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)	Contributing Structures
1,602.00	0.00	(N/A)	0.00	None Contributing
1,602.50	0.00	(N/A)	0.00	None Contributing
1,603.00	0.00	(N/A)	0.00	None Contributing
1,603.50	0.00	(N/A)	0.00	None Contributing
1,604.00	0.00	(N/A)	0.00	None Contributing
1,604.50	0.00	(N/A)	0.00	None Contributing
1,605.00	0.00	(N/A)	0.00	None Contributing
1,605.50	0.00	(N/A)	0.00	None Contributing
1,606.00	0.00	(N/A)	0.00	None Contributing
1,606.50	0.00	(N/A)	0.00	None Contributing
1,607.00	0.00	(N/A)	0.00	None Contributing
1,607.50	0.00	(N/A)	0.00	None Contributing
1,608.00	0.00	(N/A)	0.00	None Contributing
1,608.50	0.00	(N/A)	0.00	None Contributing
1,609.00	0.00	(N/A)	0.00	None Contributing
1,609.50	6.36	(N/A)	0.00	Weir - 1
1,610.00	18.00	(N/A)	0.00	Weir - 1
				Weir - 1

Subsection: Elevation-Volume-Flow Table (Pond) Scenario: 100-YR
Label: BMP 3

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	3.10 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	1,602.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	5.00 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (acres)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
1,602.00	0.00	0.000	0.000	0.00	0.00	0.00
1,602.50	0.00	5,279.600	0.000	3.10	3.10	38.30
1,603.00	0.00	11,645.000	0.000	3.10	3.10	80.73
1,603.50	0.00	18,633.100	0.000	3.10	3.10	127.32
1,604.00	0.00	26,056.000	0.000	3.10	3.10	176.81
1,604.50	0.00	33,791.400	0.000	3.10	3.10	228.38
1,605.00	0.00	41,745.300	0.000	3.10	3.10	281.40
1,605.50	0.00	49,838.500	0.000	3.10	3.10	335.36
1,606.00	0.00	57,999.600	0.000	3.10	3.10	389.76
1,606.50	0.00	66,160.800	0.000	3.10	3.10	444.17
1,607.00	0.00	74,254.000	0.000	3.10	3.10	498.13
1,607.50	0.00	82,207.900	0.000	3.10	3.10	551.15
1,608.00	0.00	89,943.200	0.000	3.10	3.10	602.72
1,608.50	0.00	97,366.200	0.000	3.10	3.10	652.21
1,609.00	0.00	104,354.300	0.000	3.10	3.10	698.80
1,609.50	6.36	110,719.700	0.000	3.10	9.46	747.60
1,610.00	18.00	115,999.300	0.000	3.10	21.10	794.43

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	3.10 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	1,602.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	5.00 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	50.39 ft³/s	Time to Peak (Flow, In)	970.00 min
Infiltration (Peak)	3.10 ft³/s	Time to Peak (Infiltration)	740.00 min
Flow (Peak Outlet)	0.00 ft³/s	Time to Peak (Flow, Outlet)	0.00 min

Elevation (Water Surface, Peak)	1,607.77 ft
Volume (Peak)	86,356.712 ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	280,246.000 ft³
Volume (Total Infiltration)	280,232.000 ft³
Volume (Total Outlet Outflow)	0.000 ft³
Volume (Retained)	12.000 ft³
Volume (Unrouted)	-2.000 ft³
Error (Mass Balance)	0.0 %

Peak Discharge	3.10 ft³/s
Time to Peak	1,420.00 min
Hydrograph Volume	280,229.289 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.00	0.00	0.01	0.11	0.29	0.47
25.00	0.64	0.78	0.90	1.00	1.08
50.00	1.15	1.21	1.26	1.30	1.34
75.00	1.37	1.40	1.43	1.45	1.47
100.00	1.48	1.50	1.51	1.52	1.53
125.00	1.54	1.55	1.56	1.57	1.57
150.00	1.58	1.59	1.59	1.60	1.60
175.00	1.61	1.62	1.62	1.63	1.63
200.00	1.64	1.64	1.65	1.66	1.66
225.00	1.67	1.67	1.68	1.69	1.69
250.00	1.70	1.70	1.71	1.72	1.72
275.00	1.73	1.74	1.74	1.75	1.76
300.00	1.76	1.77	1.78	1.78	1.79
325.00	1.80	1.80	1.81	1.82	1.83
350.00	1.83	1.84	1.85	1.86	1.86
375.00	1.87	1.88	1.89	1.90	1.91
400.00	1.91	1.92	1.93	1.94	1.95
425.00	1.96	1.97	1.98	1.99	2.00
450.00	2.00	2.01	2.02	2.03	2.04
475.00	2.05	2.07	2.08	2.09	2.10
500.00	2.11	2.12	2.13	2.15	2.16
525.00	2.17	2.18	2.19	2.21	2.22
550.00	2.23	2.25	2.26	2.27	2.29
575.00	2.30	2.32	2.33	2.35	2.36
600.00	2.38	2.40	2.41	2.43	2.45
625.00	2.47	2.48	2.50	2.52	2.54
650.00	2.56	2.58	2.60	2.62	2.64
675.00	2.66	2.68	2.71	2.73	2.76
700.00	2.78	2.80	2.83	2.86	2.89
725.00	2.92	2.98	3.08	3.10	3.10
750.00	3.10	3.10	3.10	3.10	3.10
775.00	3.10	3.10	3.10	3.10	3.10
800.00	3.10	3.10	3.10	3.10	3.10
825.00	3.10	3.10	3.10	3.10	3.10
850.00	3.10	3.10	3.10	3.10	3.10
875.00	3.10	3.10	3.10	3.10	3.10
900.00	3.10	3.10	3.10	3.10	3.10
925.00	3.10	3.10	3.10	3.10	3.10
950.00	3.10	3.10	3.10	3.10	3.10

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
975.00	3.10	3.10	3.10	3.10	3.10
1,000.00	3.10	3.10	3.10	3.10	3.10
1,025.00	3.10	3.10	3.10	3.10	3.10
1,050.00	3.10	3.10	3.10	3.10	3.10
1,075.00	3.10	3.10	3.10	3.10	3.10
1,100.00	3.10	3.10	3.10	3.10	3.10
1,125.00	3.10	3.10	3.10	3.10	3.10
1,150.00	3.10	3.10	3.10	3.10	3.10
1,175.00	3.10	3.10	3.10	3.10	3.10
1,200.00	3.10	3.10	3.10	3.10	3.10
1,225.00	3.10	3.10	3.10	3.10	3.10
1,250.00	3.10	3.10	3.10	3.10	3.10
1,275.00	3.10	3.10	3.10	3.10	3.10
1,300.00	3.10	3.10	3.10	3.10	3.10
1,325.00	3.10	3.10	3.10	3.10	3.10
1,350.00	3.10	3.10	3.10	3.10	3.10
1,375.00	3.10	3.10	3.10	3.10	3.10
1,400.00	3.10	3.10	3.10	3.10	3.10
1,425.00	3.10	3.10	3.10	3.10	3.10
1,450.00	3.10	3.10	3.10	3.10	3.10
1,475.00	3.10	3.10	3.10	3.10	3.10
1,500.00	3.10	3.10	3.10	3.10	3.10
1,525.00	3.10	3.10	3.10	3.10	3.10
1,550.00	3.10	3.10	3.10	3.10	3.10
1,575.00	3.10	3.10	3.10	3.10	3.10
1,600.00	3.10	3.10	3.10	3.10	3.10
1,625.00	3.10	3.10	3.10	3.10	3.10
1,650.00	3.10	3.10	3.10	3.10	3.10
1,675.00	3.10	3.10	3.10	3.10	3.10
1,700.00	3.10	3.10	3.10	3.10	3.10
1,725.00	3.10	3.10	3.10	3.10	3.10
1,750.00	3.10	3.10	3.10	2.74	2.30
1,775.00	1.93	1.62	1.36	1.14	0.96
1,800.00	0.80	0.68	0.57	0.48	0.40
1,825.00	0.34	0.29	0.24	0.20	0.17
1,850.00	0.15	0.12	0.11	0.09	0.08
1,875.00	0.07	0.06	0.05	0.04	0.04
1,900.00	0.03	0.03	0.03	0.02	0.02
1,925.00	0.02	0.02	0.02	0.02	0.01
1,950.00	0.01	0.01	0.01	0.01	0.01
1,975.00	0.01	0.01	0.01	0.01	0.01
2,000.00	0.01	0.01	0.01	0.01	0.01
2,025.00	0.01	0.01	0.01	0.01	0.01
2,050.00	0.01	0.01	0.01	0.01	0.01

Subsection: Pond Infiltration Hydrograph
Scenario: 100-YR
Label: BMP 3 (INF)

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
2,075.00	0.01	0.01	0.01	0.01	0.01
2,100.00	0.01	0.01	0.01	0.01	0.01
2,125.00	0.01	0.01	0.01	0.01	0.01
2,150.00	0.01	0.01	0.01	0.01	0.01
2,175.00	0.01	0.01	0.01	0.01	0.01
2,200.00	0.01	0.01	0.01	0.01	0.01
2,225.00	0.01	0.01	0.01	0.01	0.01
2,250.00	0.01	0.01	0.01	0.01	0.01
2,275.00	0.01	0.01	0.01	0.01	0.01
2,300.00	0.01	0.01	0.01	0.01	0.01
2,325.00	0.01	0.01	0.01	0.01	0.01
2,350.00	0.01	0.01	0.01	0.01	0.01
2,375.00	0.01	0.01	0.01	0.01	0.01
2,400.00	0.01	0.01	0.01	0.01	0.01
2,425.00	0.01	0.01	0.01	0.01	0.01
2,450.00	0.01	0.01	0.01	0.01	0.01
2,475.00	0.01	0.01	0.01	0.01	0.01
2,500.00	0.01	0.01	0.01	0.01	0.01
2,525.00	0.01	0.01	0.01	0.01	0.01
2,550.00	0.01	0.01	0.01	0.01	0.01
2,575.00	0.01	0.01	0.01	0.01	0.01
2,600.00	0.01	0.01	0.01	0.01	0.01
2,625.00	0.01	0.01	0.01	0.01	0.01
2,650.00	0.01	0.01	0.01	0.01	0.01
2,675.00	0.01	0.01	0.01	0.01	0.01
2,700.00	0.01	0.01	0.01	0.01	0.01
2,725.00	0.01	0.01	0.01	0.01	0.01
2,750.00	0.01	0.01	0.01	0.01	0.01
2,775.00	0.01	0.01	0.01	0.01	0.01
2,800.00	0.01	0.01	0.01	0.01	0.01
2,825.00	0.01	0.01	0.01	0.01	0.01
2,850.00	0.01	0.01	0.01	0.01	0.01
2,875.00	0.01	0.01	(N/A)	(N/A)	(N/A)

Subsection: Pond Routed Hydrograph (total out) Scenario: 100-YR
Label: BMP 3 (OUT)

Peak Discharge	0.00 ft³/s
Time to Peak	955.00 min
Hydrograph Volume	0.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.00	0.00	0.00	(N/A)	(N/A)	(N/A)

Summary for Hydrograph Addition at 'BMP 3'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	DA 3

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	DA 3	279,367.326	970.00	50.39
Flow (In)	BMP 3	280,246.326	970.00	50.39

Subsection: Elevation-Volume-Flow Table (Pond) Scenario: 100-YR
Label: BMP1

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	8.63 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	1,598.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	5.00 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (acres)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
1,598.00	0.00	0.000	0.000	0.00	0.00	0.00
1,598.50	0.00	13,078.400	0.000	8.63	8.63	95.82
1,599.00	0.00	28,858.800	0.000	8.63	8.63	201.02
1,599.50	0.00	46,188.700	0.000	8.63	8.63	316.55
1,600.00	0.00	64,600.800	0.000	8.63	8.63	439.30
1,600.50	0.00	83,790.400	0.000	8.63	8.63	567.23
1,601.00	0.00	103,523.800	0.000	8.63	8.63	698.79
1,601.50	0.00	123,603.900	0.000	8.63	8.63	832.66
1,602.00	0.00	143,853.200	0.000	8.63	8.63	967.65
1,602.50	0.00	164,102.500	0.000	8.63	8.63	1,102.65
1,603.00	0.00	184,182.600	0.000	8.63	8.63	1,236.51
1,603.50	0.00	203,915.900	0.000	8.63	8.63	1,368.07
1,604.00	0.00	223,105.500	0.000	8.63	8.63	1,496.00
1,604.50	0.00	241,517.600	0.000	8.63	8.63	1,618.75
1,605.00	0.00	258,847.600	0.000	8.63	8.63	1,734.28
1,605.50	0.00	274,628.000	0.000	8.63	8.63	1,839.48
1,606.00	0.00	287,706.400	0.000	8.63	8.63	1,926.67

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	8.63 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	1,598.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	5.00 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	132.57 ft³/s	Time to Peak (Flow, In)	970.00 min
Infiltration (Peak)	8.63 ft³/s	Time to Peak (Infiltration)	750.00 min
Flow (Peak Outlet)	0.00 ft³/s	Time to Peak (Flow, Outlet)	0.00 min

Elevation (Water Surface, Peak)	1,603.47 ft
Volume (Peak)	202,706.013 ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	714,232.000 ft³
Volume (Total Infiltration)	714,232.000 ft³
Volume (Total Outlet Outflow)	0.000 ft³
Volume (Retained)	0.000 ft³
Volume (Unrouted)	0.000 ft³
Error (Mass Balance)	0.0 %

Peak Discharge	8.63 ft³/s
Time to Peak	1,360.00 min
Hydrograph Volume	714,230.069 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.00	0.00	0.06	0.40	0.95	1.46
25.00	1.89	2.25	2.54	2.78	2.98
50.00	3.15	3.29	3.40	3.50	3.58
75.00	3.65	3.71	3.76	3.80	3.84
100.00	3.87	3.90	3.93	3.95	3.97
125.00	3.99	4.01	4.03	4.05	4.06
150.00	4.08	4.09	4.11	4.13	4.14
175.00	4.15	4.17	4.18	4.20	4.21
200.00	4.23	4.24	4.25	4.27	4.29
225.00	4.30	4.32	4.33	4.35	4.36
250.00	4.38	4.39	4.41	4.43	4.44
275.00	4.46	4.48	4.49	4.51	4.53
300.00	4.54	4.56	4.58	4.60	4.62
325.00	4.63	4.65	4.67	4.69	4.71
350.00	4.73	4.75	4.77	4.79	4.81
375.00	4.83	4.85	4.87	4.89	4.92
400.00	4.94	4.96	4.98	5.01	5.03
425.00	5.05	5.08	5.10	5.12	5.15
450.00	5.18	5.20	5.23	5.25	5.28
475.00	5.31	5.34	5.36	5.39	5.42
500.00	5.45	5.48	5.51	5.54	5.57
525.00	5.60	5.64	5.67	5.70	5.73
550.00	5.77	5.81	5.84	5.88	5.91
575.00	5.95	5.99	6.03	6.07	6.11
600.00	6.15	6.19	6.24	6.28	6.33
625.00	6.37	6.42	6.47	6.52	6.57
650.00	6.62	6.67	6.72	6.78	6.83
675.00	6.89	6.95	7.01	7.07	7.13
700.00	7.20	7.26	7.33	7.40	7.48
725.00	7.57	7.77	8.05	8.31	8.55
750.00	8.63	8.63	8.63	8.63	8.63
775.00	8.63	8.63	8.63	8.63	8.63
800.00	8.63	8.63	8.63	8.63	8.63
825.00	8.63	8.63	8.63	8.63	8.63
850.00	8.63	8.63	8.63	8.63	8.63
875.00	8.63	8.63	8.63	8.63	8.63
900.00	8.63	8.63	8.63	8.63	8.63
925.00	8.63	8.63	8.63	8.63	8.63
950.00	8.63	8.63	8.63	8.63	8.63

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
975.00	8.63	8.63	8.63	8.63	8.63
1,000.00	8.63	8.63	8.63	8.63	8.63
1,025.00	8.63	8.63	8.63	8.63	8.63
1,050.00	8.63	8.63	8.63	8.63	8.63
1,075.00	8.63	8.63	8.63	8.63	8.63
1,100.00	8.63	8.63	8.63	8.63	8.63
1,125.00	8.63	8.63	8.63	8.63	8.63
1,150.00	8.63	8.63	8.63	8.63	8.63
1,175.00	8.63	8.63	8.63	8.63	8.63
1,200.00	8.63	8.63	8.63	8.63	8.63
1,225.00	8.63	8.63	8.63	8.63	8.63
1,250.00	8.63	8.63	8.63	8.63	8.63
1,275.00	8.63	8.63	8.63	8.63	8.63
1,300.00	8.63	8.63	8.63	8.63	8.63
1,325.00	8.63	8.63	8.63	8.63	8.63
1,350.00	8.63	8.63	8.63	8.63	8.63
1,375.00	8.63	8.63	8.63	8.63	8.63
1,400.00	8.63	8.63	8.63	8.63	8.63
1,425.00	8.63	8.63	8.63	8.63	8.63
1,450.00	8.63	8.63	8.63	8.63	8.63
1,475.00	8.63	8.63	8.63	8.63	8.63
1,500.00	8.63	8.63	8.63	8.63	8.63
1,525.00	8.63	8.63	8.63	8.63	8.63
1,550.00	8.63	8.63	8.63	8.63	8.63
1,575.00	8.63	8.63	8.63	8.63	8.63
1,600.00	8.63	8.63	8.63	8.63	8.63
1,625.00	8.63	8.63	8.63	8.63	8.63
1,650.00	8.63	8.63	8.63	8.63	8.63
1,675.00	7.62	6.25	5.13	4.20	3.45
1,700.00	2.82	2.32	1.90	1.56	1.28
1,725.00	1.05	0.86	0.70	0.58	0.47
1,750.00	0.39	0.32	0.26	0.21	0.18
1,775.00	0.14	0.12	0.10	0.08	0.06
1,800.00	0.05	0.04	0.04	0.03	0.02
1,825.00	0.02	0.02	0.01	0.01	0.01
1,850.00	0.01	0.01	0.00	0.00	0.00
1,875.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Pond Routed Hydrograph (total out) Scenario: 100-YR
Label: BMP1 (OUT)

Peak Discharge	0.00 ft³/s
Time to Peak	955.00 min
Hydrograph Volume	0.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.00	0.00	0.00	(N/A)	(N/A)	(N/A)

Summary for Hydrograph Addition at 'BMP1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	DA 1

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	DA 1	714,135.619	970.00	132.57
Flow (In)	BMP1	714,231.581	970.00	132.57

Subsection: Elevation-Volume-Flow Table (Pond) Scenario: 100-YR

Label: BMP2

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	2.23 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	1,605.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	5.00 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (acres)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
1,605.00	0.00	0.000	0.000	0.00	0.00	0.00
1,605.50	0.00	4,314.900	0.000	2.23	2.23	31.00
1,606.00	0.00	9,568.300	0.000	2.23	2.23	66.02
1,606.50	0.00	15,359.900	0.000	2.23	2.23	104.63
1,607.00	0.00	21,527.300	0.000	2.23	2.23	145.75
1,607.50	0.00	27,964.700	0.000	2.23	2.23	188.66
1,608.00	0.00	34,591.000	0.000	2.23	2.23	232.84
1,608.50	0.00	41,337.800	0.000	2.23	2.23	277.82
1,609.00	0.00	48,143.300	0.000	2.23	2.23	323.19
1,609.50	0.00	54,948.800	0.000	2.23	2.23	368.56
1,610.00	0.00	61,695.500	0.000	2.23	2.23	413.53
1,610.50	0.00	68,321.900	0.000	2.23	2.23	457.71
1,611.00	0.00	74,759.300	0.000	2.23	2.23	500.63
1,611.50	0.00	80,926.700	0.000	2.23	2.23	541.74
1,612.00	0.00	86,718.300	0.000	2.23	2.23	580.35
1,612.50	0.00	91,971.700	0.000	2.23	2.23	615.37
1,613.00	0.00	96,286.600	0.000	2.23	2.23	644.14

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	2.23 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	1,605.00 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	5.00 min

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	42.91 ft³/s	Time to Peak (Flow, In)	970.00 min
Infiltration (Peak)	2.23 ft³/s	Time to Peak (Infiltration)	700.00 min
Flow (Peak Outlet)	0.00 ft³/s	Time to Peak (Flow, Outlet)	0.00 min

Elevation (Water Surface, Peak)	1,611.10 ft
Volume (Peak)	76,118.046 ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	225,467.000 ft³
Volume (Total Infiltration)	225,467.000 ft³
Volume (Total Outlet Outflow)	0.000 ft³
Volume (Retained)	0.000 ft³
Volume (Unrouted)	0.000 ft³
Error (Mass Balance)	0.0 %

Peak Discharge	2.23 ft³/s
Time to Peak	1,425.00 min
Hydrograph Volume	225,464.705 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.00	0.00	0.02	0.11	0.25	0.39
25.00	0.51	0.61	0.70	0.77	0.84
50.00	0.90	0.94	0.99	1.02	1.06
75.00	1.08	1.11	1.13	1.15	1.16
100.00	1.18	1.19	1.20	1.22	1.23
125.00	1.23	1.24	1.25	1.26	1.26
150.00	1.27	1.28	1.28	1.29	1.29
175.00	1.30	1.30	1.31	1.31	1.32
200.00	1.32	1.33	1.33	1.34	1.34
225.00	1.35	1.35	1.36	1.36	1.37
250.00	1.38	1.38	1.39	1.39	1.40
275.00	1.40	1.41	1.41	1.42	1.42
300.00	1.43	1.43	1.44	1.44	1.45
325.00	1.45	1.46	1.46	1.47	1.48
350.00	1.48	1.49	1.50	1.50	1.51
375.00	1.52	1.52	1.53	1.53	1.54
400.00	1.55	1.55	1.56	1.57	1.58
425.00	1.58	1.59	1.60	1.61	1.61
450.00	1.62	1.63	1.64	1.65	1.65
475.00	1.66	1.67	1.68	1.69	1.70
500.00	1.71	1.72	1.73	1.74	1.75
525.00	1.76	1.77	1.78	1.79	1.80
550.00	1.81	1.82	1.83	1.84	1.85
575.00	1.86	1.87	1.89	1.90	1.91
600.00	1.92	1.94	1.95	1.96	1.98
625.00	1.99	2.01	2.02	2.04	2.05
650.00	2.07	2.08	2.10	2.12	2.13
675.00	2.15	2.17	2.19	2.21	2.23
700.00	2.23	2.23	2.23	2.23	2.23
725.00	2.23	2.23	2.23	2.23	2.23
750.00	2.23	2.23	2.23	2.23	2.23
775.00	2.23	2.23	2.23	2.23	2.23
800.00	2.23	2.23	2.23	2.23	2.23
825.00	2.23	2.23	2.23	2.23	2.23
850.00	2.23	2.23	2.23	2.23	2.23
875.00	2.23	2.23	2.23	2.23	2.23
900.00	2.23	2.23	2.23	2.23	2.23
925.00	2.23	2.23	2.23	2.23	2.23
950.00	2.23	2.23	2.23	2.23	2.23

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
975.00	2.23	2.23	2.23	2.23	2.23
1,000.00	2.23	2.23	2.23	2.23	2.23
1,025.00	2.23	2.23	2.23	2.23	2.23
1,050.00	2.23	2.23	2.23	2.23	2.23
1,075.00	2.23	2.23	2.23	2.23	2.23
1,100.00	2.23	2.23	2.23	2.23	2.23
1,125.00	2.23	2.23	2.23	2.23	2.23
1,150.00	2.23	2.23	2.23	2.23	2.23
1,175.00	2.23	2.23	2.23	2.23	2.23
1,200.00	2.23	2.23	2.23	2.23	2.23
1,225.00	2.23	2.23	2.23	2.23	2.23
1,250.00	2.23	2.23	2.23	2.23	2.23
1,275.00	2.23	2.23	2.23	2.23	2.23
1,300.00	2.23	2.23	2.23	2.23	2.23
1,325.00	2.23	2.23	2.23	2.23	2.23
1,350.00	2.23	2.23	2.23	2.23	2.23
1,375.00	2.23	2.23	2.23	2.23	2.23
1,400.00	2.23	2.23	2.23	2.23	2.23
1,425.00	2.23	2.23	2.23	2.23	2.23
1,450.00	2.23	2.23	2.23	2.23	2.23
1,475.00	2.23	2.23	2.23	2.23	2.23
1,500.00	2.23	2.23	2.23	2.23	2.23
1,525.00	2.23	2.23	2.23	2.23	2.23
1,550.00	2.23	2.23	2.23	2.23	2.23
1,575.00	2.23	2.23	2.23	2.23	2.23
1,600.00	2.23	2.23	2.23	2.23	2.23
1,625.00	2.23	2.23	2.23	2.23	2.23
1,650.00	2.23	2.23	2.23	2.23	2.23
1,675.00	2.23	2.23	2.23	2.23	2.23
1,700.00	2.23	2.23	2.23	2.23	2.23
1,725.00	2.23	2.23	2.23	2.23	2.23
1,750.00	2.23	2.23	2.23	2.23	2.23
1,775.00	2.23	2.23	2.23	2.23	2.23
1,800.00	2.23	2.23	2.23	2.23	2.23
1,825.00	2.23	2.23	2.23	2.23	2.23
1,850.00	2.23	2.23	2.23	2.23	2.23
1,875.00	2.23	2.23	2.23	2.02	1.73
1,900.00	1.48	1.27	1.08	0.93	0.79
1,925.00	0.68	0.58	0.50	0.43	0.37
1,950.00	0.31	0.27	0.23	0.20	0.17
1,975.00	0.14	0.12	0.11	0.09	0.08
2,000.00	0.07	0.06	0.05	0.04	0.04
2,025.00	0.03	0.03	0.02	0.02	0.02
2,050.00	0.01	0.01	0.01	0.01	0.01

Subsection: Pond Infiltration Hydrograph
Scenario: 100-YR
Label: BMP2 (INF)

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
2,075.00	0.01	0.01	0.00	0.00	0.00
2,100.00	0.00	0.00	0.00	0.00	0.00
2,125.00	0.00	0.00	0.00	(N/A)	(N/A)

Subsection: Pond Routed Hydrograph (total out) Scenario: 100-YR
Label: BMP2 (OUT)

Peak Discharge	0.00 ft³/s
Time to Peak	955.00 min
Hydrograph Volume	0.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.00	0.00	0.00	(N/A)	(N/A)	(N/A)

Summary for Hydrograph Addition at 'BMP2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	DA 2

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (min)	Flow (Peak) (ft^3/s)
Flow (From)	DA 2	225,429.143	970.00	42.91
Flow (In)	BMP2	225,466.634	970.00	42.91

Subsection: Diverted Hydrograph
Label: Outlet-1

Scenario: 100-YR

Peak Discharge	0.00 ft³/s
Time to Peak	955.00 min
Hydrograph Volume	0.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.00	0.00	0.00	(N/A)	(N/A)	(N/A)

Subsection: Diverted Hydrograph
Label: Outlet-2

Scenario: 100-YR

Peak Discharge	0.00 ft³/s
Time to Peak	955.00 min
Hydrograph Volume	0.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.00	0.00	0.00	(N/A)	(N/A)	(N/A)

Subsection: Diverted Hydrograph
Label: Outlet-3

Scenario: 100-YR

Peak Discharge	0.00 ft³/s
Time to Peak	955.00 min
Hydrograph Volume	0.000 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 5.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.00	0.00	0.00	(N/A)	(N/A)	(N/A)

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Date: 2/20/2025
Project Name: BMP 1 - 69401 (2-20-2025 23-39-24)

City / County:
State:

Designed By:
Company:
Telephone:

CMP: Underground Detention System
Storage Volume Estimation

=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 applicaton 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):	1,112.0	Backfill Porosity (%):	40%	System Diameter (in):	96
Out-to-out width (ft):	41.0	Depth Above Pipe (in):	0.0	Pipe Spacing (in):	36
Number of Manifolds (ea):	1.0	Depth Below Pipe (in):	0.0	Incremental Analysis (in):	2
Number of Barrels (ea):	4.0	Width At Ends (ft):	1.0	System Invert (Elevation):	1598
		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	1598.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	19,160.8
0.17	1598.16	1,136.5	1,136.5	2,738.9	2,738.9	3,875.4	3,875.4	29.3%	25,271.9
0.33	1598.33	2,057.5	3,194.0	2,370.4	5,109.3	4,428.0	8,303.4	38.5%	27,710.8
0.50	1598.50	2,635.9	5,830.0	2,139.1	7,248.4	4,775.0	13,078.4	44.6%	29,517.9
0.67	1598.66	3,087.1	8,917.1	1,958.6	9,207.0	5,045.7	18,124.1	49.2%	30,986.6
0.83	1598.83	3,462.2	12,379.3	1,808.6	11,015.6	5,270.8	23,394.9	52.9%	32,231.3
1.00	1599.00	3,784.0	16,163.3	1,679.9	12,695.5	5,463.9	28,858.8	56.0%	33,311.3
1.17	1599.16	4,065.4	20,228.7	1,567.3	14,262.8	5,632.7	34,491.5	58.6%	34,262.1
1.33	1599.33	4,314.3	24,543.1	1,467.7	15,730.5	5,782.1	40,273.6	60.9%	35,106.6
1.50	1599.50	4,536.1	29,079.2	1,379.0	17,109.5	5,915.1	46,188.7	63.0%	35,861.2
1.67	1599.66	4,734.6	33,813.8	1,299.6	18,409.1	6,034.2	52,223.0	64.7%	36,537.4
1.83	1599.83	4,912.6	38,726.4	1,228.4	19,637.6	6,141.0	58,364.0	66.4%	37,144.1
2.00	1600.00	5,072.3	43,798.7	1,164.5	20,802.1	6,236.9	64,600.8	67.8%	37,688.2
2.17	1600.16	5,215.4	49,014.1	1,107.3	21,909.4	6,322.7	70,923.5	69.1%	38,175.0
2.33	1600.33	5,343.2	54,357.3	1,056.2	22,965.6	6,399.4	77,322.9	70.3%	38,608.9
2.50	1600.50	5,456.7	59,814.0	1,010.8	23,976.4	6,467.5	83,790.4	71.4%	38,993.2
2.67	1600.66	5,557.0	65,371.0	970.7	24,947.1	6,527.6	90,318.1	72.4%	39,330.9
2.83	1600.83	5,644.5	71,015.5	935.6	25,882.7	6,580.2	96,898.2	73.3%	39,624.2
3.00	1601.00	5,720.1	76,735.6	905.4	26,788.2	6,625.5	103,523.8	74.1%	39,875.1
3.17	1601.16	5,784.0	82,519.7	879.8	27,668.0	6,663.9	110,187.7	74.9%	40,085.0
3.33	1601.33	5,836.8	88,356.5	858.7	28,526.7	6,695.6	116,883.2	75.6%	40,255.2
3.50	1601.50	5,878.7	94,235.2	842.0	29,368.7	6,720.7	123,603.9	76.2%	40,386.6
3.67	1601.66	5,909.9	100,145.1	829.5	30,198.2	6,739.4	130,343.3	76.8%	40,480.0
3.83	1601.83	5,930.6	106,075.7	821.2	31,019.5	6,751.8	137,095.1	77.4%	40,535.8
4.00	1602.00	5,940.9	112,016.6	817.1	31,836.5	6,758.0	143,853.2	77.9%	40,554.4
4.17	1602.16	5,940.9	117,957.6	817.1	32,653.6	6,758.0	150,611.2	78.3%	40,535.8
4.33	1602.33	5,930.6	123,888.2	821.2	33,474.9	6,751.8	157,363.0	78.7%	40,480.0
4.50	1602.50	5,909.9	129,798.1	829.5	34,304.4	6,739.4	164,102.5	79.1%	40,386.6
4.67	1602.66	5,878.7	135,676.8	842.0	35,146.4	6,720.7	170,823.1	79.4%	40,255.2
4.83	1602.83	5,836.8	141,513.6	858.7	36,005.1	6,695.6	177,518.7	79.7%	40,085.0
5.00	1603.00	5,784.0	147,297.6	879.8	36,884.9	6,663.9	184,182.6	80.0%	39,875.1
5.17	1603.16	5,720.1	153,017.7	905.4	37,790.4	6,625.5	190,808.1	80.2%	39,624.2
5.33	1603.33	5,644.5	158,662.3	935.6	38,726.0	6,580.2	197,388.3	80.4%	39,330.9
5.50	1603.50	5,557.0	164,219.2	970.7	39,696.7	6,527.6	203,915.9	80.5%	38,993.2
5.67	1603.66	5,456.7	169,676.0	1,010.8	40,707.5	6,467.5	210,383.4	80.7%	38,608.9
5.83	1603.83	5,343.2	175,019.1	1,056.2	41,763.7	6,399.4	216,782.8	80.7%	38,175.0
6.00	1604.00	5,215.4	180,234.5	1,107.3	42,871.0	6,322.7	223,105.5	80.8%	37,688.2

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.

6.17	1604.16	5,072.3	185,306.8	1,164.5	44,035.5	6,236.9	229,342.4	80.8%	37,144.1
6.33	1604.33	4,912.6	190,219.4	1,228.4	45,264.0	6,141.0	235,483.4	80.8%	36,537.4
6.50	1604.50	4,734.6	194,954.1	1,299.6	46,563.6	6,034.2	241,517.6	80.7%	35,861.2
6.67	1604.66	4,536.1	199,490.2	1,379.0	47,942.6	5,915.1	247,432.8	80.6%	35,106.6
6.83	1604.83	4,314.3	203,804.5	1,467.7	49,410.3	5,782.1	253,214.9	80.5%	34,262.1
7.00	1605.00	4,065.4	207,870.0	1,567.3	50,977.6	5,632.7	258,847.6	80.3%	33,311.3
7.17	1605.16	3,784.0	211,654.0	1,679.9	52,657.5	5,463.9	264,311.5	80.1%	32,231.3
7.33	1605.33	3,462.2	215,116.2	1,808.6	54,466.1	5,270.8	269,582.2	79.8%	30,986.6
7.50	1605.50	3,087.1	218,203.3	1,958.6	56,424.7	5,045.7	274,628.0	79.5%	29,517.9
7.67	1605.66	2,635.9	220,839.2	2,139.1	58,563.8	4,775.0	279,403.0	79.0%	27,710.8
7.83	1605.83	2,057.5	222,896.8	2,370.4	60,934.2	4,428.0	283,831.0	78.5%	25,271.9
8.00	1606.00	1,136.5	224,033.3	2,738.9	63,673.1	3,875.4	287,706.4	77.9%	19,160.8

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.

Date: 2/20/2025
Project Name: BMP 2 - 69373 (2-20-2025 23-10-15)

City / County:
State:

Designed By:
Company:
Telephone:

CMP: Underground Detention System
Storage Volume Estimation

=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 applicaton 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):	1,548.0	Backfill Porosity (%):	40%	System Diameter (in):	96
Out-to-out width (ft):	8.0	Depth Above Pipe (in):	0.0	Pipe Spacing (in):	36
Number of Manifolds (ea):	1.0	Depth Below Pipe (in):	0.0	Incremental Analysis (in):	2
Number of Barrels (ea):	1.0	Width At Ends (ft):	1.0	System Invert (Elevation):	1605
		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	1605.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	6,200.0
0.17	1605.16	394.7	394.7	875.4	875.4	1,270.2	1,270.2	31.1%	8,322.5
0.33	1605.33	714.6	1,109.3	747.5	1,622.9	1,462.1	2,732.3	40.6%	9,169.6
0.50	1605.50	915.5	2,024.9	667.1	2,290.1	1,582.6	4,314.9	46.9%	9,797.2
0.67	1605.66	1,072.2	3,097.1	604.4	2,894.5	1,676.7	5,991.6	51.7%	10,307.3
0.83	1605.83	1,202.5	4,299.5	552.3	3,446.8	1,754.8	7,746.4	55.5%	10,739.6
1.00	1606.00	1,314.3	5,613.8	507.6	3,954.5	1,821.9	9,568.3	58.7%	11,114.7
1.17	1606.16	1,412.0	7,025.8	468.5	4,423.0	1,880.5	11,448.8	61.4%	11,445.0
1.33	1606.33	1,498.5	8,524.3	434.0	4,857.0	1,932.4	13,381.2	63.7%	11,738.3
1.50	1606.50	1,575.5	10,099.8	403.1	5,260.1	1,978.6	15,359.9	65.8%	12,000.4
1.67	1606.66	1,644.4	11,744.2	375.6	5,635.7	2,020.0	17,379.8	67.6%	12,235.2
1.83	1606.83	1,706.2	13,450.4	350.8	5,986.5	2,057.1	19,436.9	69.2%	12,445.9
2.00	1607.00	1,761.7	15,212.1	328.6	6,315.1	2,090.4	21,527.3	70.7%	12,634.9
2.17	1607.16	1,811.4	17,023.5	308.8	6,623.9	2,120.2	23,647.5	72.0%	12,804.0
2.33	1607.33	1,855.8	18,879.3	291.0	6,914.9	2,146.8	25,794.3	73.2%	12,954.7
2.50	1607.50	1,895.2	20,774.5	275.2	7,190.2	2,170.5	27,964.7	74.3%	13,088.2
2.67	1607.66	1,930.0	22,704.6	261.3	7,451.5	2,191.4	30,156.1	75.3%	13,205.4
2.83	1607.83	1,960.5	24,665.0	249.2	7,700.7	2,209.6	32,365.7	76.2%	13,307.3
3.00	1608.00	1,986.7	26,651.7	238.7	7,939.3	2,225.3	34,591.0	77.0%	13,394.5
3.17	1608.16	2,008.9	28,660.6	229.8	8,169.1	2,238.7	36,829.7	77.8%	13,467.4
3.33	1608.33	2,027.2	30,687.9	222.4	8,391.5	2,249.7	39,079.4	78.5%	13,526.5
3.50	1608.50	2,041.8	32,729.6	216.6	8,608.1	2,258.4	41,337.8	79.2%	13,572.1
3.67	1608.66	2,052.6	34,782.3	212.3	8,820.4	2,264.9	43,602.7	79.8%	13,604.6
3.83	1608.83	2,059.8	36,842.1	209.4	9,029.8	2,269.2	45,871.9	80.3%	13,623.9
4.00	1609.00	2,063.4	38,905.5	208.0	9,237.8	2,271.4	48,143.3	80.8%	13,630.4
4.17	1609.16	2,063.4	40,968.9	208.0	9,445.8	2,271.4	50,414.7	81.3%	13,623.9
4.33	1609.33	2,059.8	43,028.7	209.4	9,655.2	2,269.2	52,683.9	81.7%	13,604.6
4.50	1609.50	2,052.6	45,081.3	212.3	9,867.5	2,264.9	54,948.8	82.0%	13,572.1
4.67	1609.66	2,041.8	47,123.1	216.6	10,084.1	2,258.4	57,207.2	82.4%	13,526.5
4.83	1609.83	2,027.2	49,150.3	222.4	10,306.5	2,249.7	59,456.9	82.7%	13,467.4
5.00	1610.00	2,008.9	51,159.2	229.8	10,536.3	2,238.7	61,695.5	82.9%	13,394.5
5.17	1610.16	1,986.7	53,145.9	238.7	10,775.0	2,225.3	63,920.9	83.1%	13,307.3
5.33	1610.33	1,960.5	55,106.4	249.2	11,024.1	2,209.6	66,130.5	83.3%	13,205.4
5.50	1610.50	1,930.0	57,036.4	261.3	11,285.4	2,191.4	68,321.9	83.5%	13,088.2
5.67	1610.66	1,895.2	58,931.7	275.2	11,560.7	2,170.5	70,492.3	83.6%	12,954.7
5.83	1610.83	1,855.8	60,787.4	291.0	11,851.7	2,146.8	72,639.1	83.7%	12,804.0
6.00	1611.00	1,811.4	62,598.8	308.8	12,160.5	2,120.2	74,759.3	83.7%	12,634.9

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.

6.17	1611.16	1,761.7	64,360.5	328.6	12,489.1	2,090.4	76,849.7	83.7%	12,445.9
6.33	1611.33	1,706.2	66,066.8	350.8	12,839.9	2,057.1	78,906.7	83.7%	12,235.2
6.50	1611.50	1,644.4	67,711.2	375.6	13,215.5	2,020.0	80,926.7	83.7%	12,000.4
6.67	1611.66	1,575.5	69,286.7	403.1	13,618.7	1,978.6	82,905.4	83.6%	11,738.3
6.83	1611.83	1,498.5	70,785.2	434.0	14,052.6	1,932.4	84,837.8	83.4%	11,445.0
7.00	1612.00	1,412.0	72,197.2	468.5	14,521.1	1,880.5	86,718.3	83.3%	11,114.7
7.17	1612.16	1,314.3	73,511.4	507.6	15,028.8	1,821.9	88,540.2	83.0%	10,739.6
7.33	1612.33	1,202.5	74,713.9	552.3	15,581.1	1,754.8	90,295.0	82.7%	10,307.3
7.50	1612.50	1,072.2	75,786.1	604.4	16,185.6	1,676.7	91,971.7	82.4%	9,797.2
7.67	1612.66	915.5	76,701.6	667.1	16,852.7	1,582.6	93,554.3	82.0%	9,169.6
7.83	1612.83	714.6	77,416.2	747.5	17,600.2	1,462.1	95,016.4	81.5%	8,322.5
8.00	1613.00	394.7	77,811.0	875.4	18,475.6	1,270.2	96,286.6	80.8%	6,200.0

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.

Date: 2/20/2025
Project Name: BMP 3 - 69378 (2-20-2025 21-36-47)

City / County:
State:

Designed By:
Company:
Telephone:

CMP: Underground Detention System
Storage Volume Estimation

=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 applicaton 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):	296.0	Backfill Porosity (%):	40%	System Diameter (in):	96
Out-to-out width (ft):	63.0	Depth Above Pipe (in):	0.0	Pipe Spacing (in):	36
Number of Manifolds (ea):	1.0	Depth Below Pipe (in):	0.0	Incremental Analysis (in):	2
Number of Barrels (ea):	6.0	Width At Ends (ft):	1.0	System Invert (Elevation):	1602
		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	1602.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	7,748.0
0.17	1602.16	456.7	456.7	1,108.7	1,108.7	1,565.3	1,565.3	29.2%	10,203.7
0.33	1602.33	826.8	1,283.5	960.6	2,069.3	1,787.4	3,352.8	38.3%	11,183.7
0.50	1602.50	1,059.2	2,342.7	867.6	2,936.9	1,926.9	5,279.6	44.4%	11,909.9
0.67	1602.66	1,240.5	3,583.2	795.1	3,732.0	2,035.6	7,315.3	49.0%	12,500.1
0.83	1602.83	1,391.2	4,974.5	734.8	4,466.9	2,126.1	9,441.4	52.7%	13,000.2
1.00	1603.00	1,520.6	6,495.1	683.1	5,150.0	2,203.7	11,645.0	55.8%	13,434.2
1.17	1603.16	1,633.7	8,128.7	637.9	5,787.9	2,271.5	13,916.6	58.4%	13,816.3
1.33	1603.33	1,733.7	9,862.4	597.9	6,385.7	2,331.5	16,248.1	60.7%	14,155.7
1.50	1603.50	1,822.8	11,685.2	562.2	6,947.9	2,385.0	18,633.1	62.7%	14,458.9
1.67	1603.66	1,902.6	13,587.7	530.3	7,478.2	2,432.9	21,066.0	64.5%	14,730.6
1.83	1603.83	1,974.1	15,561.8	501.7	7,979.9	2,475.8	23,541.8	66.1%	14,974.4
2.00	1604.00	2,038.3	17,600.1	476.0	8,456.0	2,514.3	26,056.0	67.5%	15,193.0
2.17	1604.16	2,095.7	19,695.8	453.0	8,909.0	2,548.8	28,604.8	68.9%	15,388.7
2.33	1604.33	2,147.1	21,842.9	432.5	9,341.5	2,579.6	31,184.4	70.0%	15,563.0
2.50	1604.50	2,192.7	24,035.7	414.2	9,755.7	2,607.0	33,791.4	71.1%	15,717.4
2.67	1604.66	2,233.0	26,268.7	398.1	10,153.9	2,631.1	36,422.5	72.1%	15,853.1
2.83	1604.83	2,268.2	28,536.9	384.1	10,537.9	2,652.3	39,074.8	73.0%	15,971.0
3.00	1605.00	2,298.6	30,835.4	371.9	10,909.8	2,670.5	41,745.3	73.9%	16,071.8
3.17	1605.16	2,324.3	33,159.7	361.6	11,271.5	2,685.9	44,431.1	74.6%	16,156.2
3.33	1605.33	2,345.5	35,505.1	353.1	11,624.6	2,698.6	47,129.8	75.3%	16,224.6
3.50	1605.50	2,362.3	37,867.4	346.4	11,971.0	2,708.7	49,838.5	76.0%	16,277.4
3.67	1605.66	2,374.8	40,242.3	341.4	12,312.4	2,716.2	52,554.7	76.6%	16,314.9
3.83	1605.83	2,383.2	42,625.4	338.1	12,650.5	2,721.2	55,275.9	77.1%	16,337.3
4.00	1606.00	2,387.3	45,012.7	336.4	12,986.9	2,723.7	57,999.6	77.6%	16,344.8
4.17	1606.16	2,387.3	47,400.0	336.4	13,323.3	2,723.7	60,723.4	78.1%	16,337.3
4.33	1606.33	2,383.2	49,783.2	338.1	13,661.4	2,721.2	63,444.6	78.5%	16,314.9
4.50	1606.50	2,374.8	52,158.0	341.4	14,002.8	2,716.2	66,160.8	78.8%	16,277.4
4.67	1606.66	2,362.3	54,520.3	346.4	14,349.2	2,708.7	68,869.5	79.2%	16,224.6
4.83	1606.83	2,345.5	56,865.8	353.1	14,702.3	2,698.6	71,568.1	79.5%	16,156.2
5.00	1607.00	2,324.3	59,190.1	361.6	15,064.0	2,685.9	74,254.0	79.7%	16,071.8
5.17	1607.16	2,298.6	61,488.6	371.9	15,435.9	2,670.5	76,924.5	79.9%	15,971.0
5.33	1607.33	2,268.2	63,756.8	384.1	15,819.9	2,652.3	79,576.8	80.1%	15,853.1
5.50	1607.50	2,233.0	65,989.8	398.1	16,218.1	2,631.1	82,207.9	80.3%	15,717.4
5.67	1607.66	2,192.7	68,182.6	414.2	16,632.3	2,607.0	84,814.9	80.4%	15,563.0
5.83	1607.83	2,147.1	70,329.6	432.5	17,064.8	2,579.6	87,394.5	80.5%	15,388.7
6.00	1608.00	2,095.7	72,425.4	453.0	17,517.8	2,548.8	89,943.2	80.5%	15,193.0

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.

6.17	1608.16	2,038.3	74,463.7	476.0	17,993.9	2,514.3	92,457.5	80.5%	14,974.4
6.33	1608.33	1,974.1	76,437.7	501.7	18,495.6	2,475.8	94,933.3	80.5%	14,730.6
6.50	1608.50	1,902.6	78,340.3	530.3	19,025.9	2,432.9	97,366.2	80.5%	14,458.9
6.67	1608.66	1,822.8	80,163.1	562.2	19,588.1	2,385.0	99,751.2	80.4%	14,155.7
6.83	1608.83	1,733.7	81,896.8	597.9	20,186.0	2,331.5	102,082.7	80.2%	13,816.3
7.00	1609.00	1,633.7	83,530.4	637.9	20,823.8	2,271.5	104,354.3	80.0%	13,434.2
7.17	1609.16	1,520.6	85,051.0	683.1	21,506.9	2,203.7	106,557.9	79.8%	13,000.2
7.33	1609.33	1,391.2	86,442.2	734.8	22,241.8	2,126.1	108,684.0	79.5%	12,500.1
7.50	1609.50	1,240.5	87,682.8	795.1	23,036.9	2,035.6	110,719.7	79.2%	11,909.9
7.67	1609.66	1,059.2	88,742.0	867.6	23,904.5	1,926.9	112,646.5	78.8%	11,183.7
7.83	1609.83	826.8	89,568.8	960.6	24,865.2	1,787.4	114,433.9	78.3%	10,203.7
8.00	1610.00	456.7	90,025.5	1,108.7	25,973.8	1,565.3	115,999.3	77.6%	7,748.0

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.

Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1	0.25
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1
B	Design	Tributary area size	0.25	3	0.75
		Level of pretreatment/ expected sediment loads	0.25	3	0.75
		Redundancy	0.25	2	0.5
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, $S_B = \Sigma p$			2.25
Combined Safety Factor, $S_{TOT} = S_A \times S_B$					2.25
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)					17.5
Design Infiltration Rate, in/hr, $K_{DESIGN} = S_{TOT} \times K_M$					7.78

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

Per the infiltration study conducted by Southern California Geotechnical dated June 26, 2023, the Double Ring Infiltrometer method was performed at four locations within the subject site. Results of infiltration testing demonstrated that a measured rate of 17.5 inches/hour should be used for below-grade systems. As shown above, a factor of safety was calculated in order to provide a more conservative estimate due to site variability.
For more details regarding infiltration testing, refer to Appendix E.

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	2	0.5
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.25
B	Design	Tributary area size	0.25	3	0.75
		Level of pretreatment/ expected sediment loads	0.25	3	0.75
		Redundancy	0.25	2	0.5
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, $S_B = \Sigma p$			2.25
Combined Safety Factor, $S_{TOT} = S_A \times S_B$					2.81
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)					17.5
Design Infiltration Rate, in/hr, $K_{DESIGN} = S_{TOT} \times K_M$					6.22

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

Per the infiltration study conducted by Southern California Geotechnical dated June 26, 2023, the Double Ring Infiltrometer method was performed at four locations within the subject site. Results of infiltration testing demonstrated that a measured rate of 17.5 inches/hour should be used for below-grade systems. As shown above, a factor of safety was calculated in order to provide a more conservative estimate due to site variability. Note that a factor of 2 was applied to the "soil assessment methods" category due to proximity of infiltration testing. For more details regarding infiltration testing, refer to Appendix E.

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A	Suitability Assessment	Soil assessment methods	0.25	2	0.5
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.25
B	Design	Tributary area size	0.25	3	0.75
		Level of pretreatment/ expected sediment loads	0.25	3	0.75
		Redundancy	0.25	2	0.5
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, $S_B = \Sigma p$			2.25
Combined Safety Factor, $S_{TOT} = S_A \times S_B$					2.8
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)					17.5
Design Infiltration Rate, in/hr, $K_{DESIGN} = S_{TOT} \times K_M$					6.22

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

Per the infiltration study conducted by Southern California Geotechnical dated June 26, 2023, the Double Ring Infiltrometer method was performed at four locations within the subject site. Results of infiltration testing demonstrated that a measured rate of 17.5 inches/hour should be used for below-grade systems. As shown above, a factor of safety was calculated in order to provide a more conservative estimate due to site variability. Note that a factor of 2 was applied to the "soil assessment methods" category due to proximity of infiltration testing. For more details regarding infiltration testing, refer to Appendix E.

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Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	2	0.5
		Predominant soil texture	0.25	1	0.25
		Site soil variability	0.25	1	0.25
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.25
B	Design	Tributary area size	0.25	3	0.75
		Level of pretreatment/ expected sediment loads	0.25	3	0.75
		Redundancy	0.25	2	0.5
		Compaction during construction	0.25	1	0.25
		Design Safety Factor, $S_B = \Sigma p$			2.25
Combined Safety Factor, $S_{TOT} = S_A \times S_B$					2.8
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)					17.5
Design Infiltration Rate, in/hr, $K_{DESIGN} = S_{TOT} \times K_M$					6.22

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

Per the infiltration study conducted by Southern California Geotechnical dated June 26, 2023, the Double Ring Infiltrometer method was performed at four locations within the subject site. Results of infiltration testing demonstrated that a measured rate of 17.5 inches/hour should be used for below-grade systems. As shown above, a factor of safety was calculated in order to provide a more conservative estimate due to site variability. Note that a factor of 2 was applied to the "soil assessment methods" category due to proximity of infiltration testing. For more details regarding infiltration testing, refer to Appendix E.

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

PROJECT NAME: LOCUST GATEWAY
DRAW-DOWN TIME CHECK

DRAW-DOWN TIME for DCV

INFILTRATION BMP	Total Storage Volume (V)	Design Infiltration Rate *	Total Basin Footprint (Area) **	Total Percolation	Draw-Down Time
-	(ft^3)	(in/hr)	(sf)	(CFS)	(hr)
BASIN 1	287,706	7.8	47,902	8.627	9.26

GOOD < 48 Hours

DRAW-DOWN TIME for DCV

INFILTRATION BMP	Total Storage Volume (V)	Design Infiltration Rate *	Total Basin Footprint (Area) **	Total Percolation	Draw-Down Time
-	(ft^3)	(in/hr)	(sf)	(CFS)	(hr)
BASIN 2	96,287	6.2	15,500	2.232	11.98

GOOD < 48 Hours

DRAW-DOWN TIME for DCV

INFILTRATION BMP	Total Storage Volume (V)	Design Infiltration Rate *	Total Basin Footprint (Area) **	Total Percolation	Draw-Down Time
-	(ft^3)	(in/hr)	(sf)	(CFS)	(hr)
BASIN 3A	187,517	6.2	21,625	3.104	16.78

GOOD < 48 Hours

DRAW-DOWN TIME for DCV

INFILTRATION BMP	Total Storage Volume (V)	Design Infiltration Rate *	Total Basin Footprint (Area) **	Total Percolation	Draw-Down Time
-	(ft^3)	(in/hr)	(sf)	(CFS)	(hr)
BASIN 4	10,034	6.2	4,730	0.681	4.09

GOOD < 48 Hours

APPENDIX I

FLOWMASTER PIPE AND INLET SIZING RESULTS

101 to 102 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.056	ft/ft
Diameter	18.0	in
Discharge	6.77	cfs

Results		
Normal Depth	6.2	in
Flow Area	0.5	ft²
Wetted Perimeter	1.9	ft
Hydraulic Radius	3.4	in
Top Width	1.42	ft
Critical Depth	12.1	in
Percent Full	34.2	%
Critical Slope	0.006	ft/ft
Velocity	12.65	ft/s
Velocity Head	2.49	ft
Specific Energy	3.00	ft
Froude Number	3.639	
Maximum Discharge	28.86	cfs
Discharge Full	26.83	cfs
Slope Full	0.004	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	34.2	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.2	in
Critical Depth	12.1	in
Channel Slope	0.056	ft/ft
Critical Slope	0.006	ft/ft

102 to 104 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.006	ft/ft
Diameter	24.0	in
Discharge	8.16	cfs

Results		
Normal Depth	11.0	in
Flow Area	1.4	ft²
Wetted Perimeter	3.0	ft
Hydraulic Radius	5.7	in
Top Width	1.99	ft
Critical Depth	12.2	in
Percent Full	45.8	%
Critical Slope	0.004	ft/ft
Velocity	5.81	ft/s
Velocity Head	0.52	ft
Specific Energy	1.44	ft
Froude Number	1.221	
Maximum Discharge	20.42	cfs
Discharge Full	18.98	cfs
Slope Full	0.001	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	45.8	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	11.0	in
Critical Depth	12.2	in
Channel Slope	0.006	ft/ft
Critical Slope	0.004	ft/ft

106 to 104 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.020	ft/ft
Diameter	18.0	in
Discharge	7.09	cfs

Results		
Normal Depth	8.4	in
Flow Area	0.8	ft²
Wetted Perimeter	2.2	ft
Hydraulic Radius	4.3	in
Top Width	1.50	ft
Critical Depth	12.4	in
Percent Full	46.4	%
Critical Slope	0.006	ft/ft
Velocity	8.82	ft/s
Velocity Head	1.21	ft
Specific Energy	1.91	ft
Froude Number	2.122	
Maximum Discharge	17.31	cfs
Discharge Full	16.09	cfs
Slope Full	0.004	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	46.4	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.4	in
Critical Depth	12.4	in
Channel Slope	0.020	ft/ft
Critical Slope	0.006	ft/ft

104 to 108 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.006	ft/ft
Diameter	24.0	in
Discharge	17.76	cfs

Results		
Normal Depth	18.4	in
Flow Area	2.6	ft²
Wetted Perimeter	4.3	ft
Hydraulic Radius	7.3	in
Top Width	1.69	ft
Critical Depth	18.2	in
Percent Full	76.7	%
Critical Slope	0.006	ft/ft
Velocity	6.87	ft/s
Velocity Head	0.73	ft
Specific Energy	2.27	ft
Froude Number	0.979	
Maximum Discharge	20.42	cfs
Discharge Full	18.98	cfs
Slope Full	0.005	ft/ft
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	44.3	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	18.4	in
Critical Depth	18.2	in
Channel Slope	0.006	ft/ft
Critical Slope	0.006	ft/ft

108 to 110 MH - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.006	ft/ft
Diameter	30.0	in
Discharge	21.45	cfs

Results		
Normal Depth	17.2	in
Flow Area	2.9	ft²
Wetted Perimeter	4.3	ft
Hydraulic Radius	8.1	in
Top Width	2.47	ft
Critical Depth	18.9	in
Percent Full	57.2	%
Critical Slope	0.004	ft/ft
Velocity	7.39	ft/s
Velocity Head	0.85	ft
Specific Energy	2.28	ft
Froude Number	1.204	
Maximum Discharge	37.02	cfs
Discharge Full	34.42	cfs
Slope Full	0.002	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	57.2	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	17.2	in
Critical Depth	18.9	in
Channel Slope	0.006	ft/ft
Critical Slope	0.004	ft/ft

112 to 110 MH - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.082	ft/ft
Diameter	18.0	in
Discharge	22.54	cfs

Results		
Normal Depth	11.0	in
Flow Area	1.1	ft²
Wetted Perimeter	2.7	ft
Hydraulic Radius	5.0	in
Top Width	1.46	ft
Critical Depth	17.8	in
Percent Full	61.1	%
Critical Slope	0.036	ft/ft
Velocity	19.92	ft/s
Velocity Head	6.17	ft
Specific Energy	7.08	ft
Froude Number	3.992	
Maximum Discharge	35.09	cfs
Discharge Full	32.62	cfs
Slope Full	0.039	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	61.1	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	11.0	in
Critical Depth	17.8	in
Channel Slope	0.082	ft/ft
Critical Slope	0.036	ft/ft

110 MH to 110 BMP - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.020	ft/ft
Diameter	36.0	in
Discharge	40.82	cfs

Results		
Normal Depth	15.8	in
Flow Area	3.0	ft²
Wetted Perimeter	4.3	ft
Hydraulic Radius	8.3	in
Top Width	2.98	ft
Critical Depth	25.0	in
Percent Full	44.0	%
Critical Slope	0.005	ft/ft
Velocity	13.65	ft/s
Velocity Head	2.89	ft
Specific Energy	4.21	ft
Froude Number	2.400	
Maximum Discharge	109.92	cfs
Discharge Full	102.18	cfs
Slope Full	0.003	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	44.0	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	15.8	in
Critical Depth	25.0	in
Channel Slope	0.020	ft/ft
Critical Slope	0.005	ft/ft

114 to 115 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.005	ft/ft
Diameter	24.0	in
Discharge	10.69	cfs

Results		
Normal Depth	13.6	in
Flow Area	1.8	ft²
Wetted Perimeter	3.4	ft
Hydraulic Radius	6.5	in
Top Width	1.98	ft
Critical Depth	14.1	in
Percent Full	56.8	%
Critical Slope	0.005	ft/ft
Velocity	5.80	ft/s
Velocity Head	0.52	ft
Specific Energy	1.66	ft
Froude Number	1.061	
Maximum Discharge	18.64	cfs
Discharge Full	17.33	cfs
Slope Full	0.002	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	56.8	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	13.6	in
Critical Depth	14.1	in
Channel Slope	0.005	ft/ft
Critical Slope	0.005	ft/ft

115 to 117 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.005	ft/ft
Diameter	30.0	in
Discharge	21.09	cfs

Results		
Normal Depth	18.0	in
Flow Area	3.1	ft²
Wetted Perimeter	4.4	ft
Hydraulic Radius	8.3	in
Top Width	2.45	ft
Critical Depth	18.7	in
Percent Full	60.0	%
Critical Slope	0.004	ft/ft
Velocity	6.86	ft/s
Velocity Head	0.73	ft
Specific Energy	2.23	ft
Froude Number	1.080	
Maximum Discharge	33.80	cfs
Discharge Full	31.42	cfs
Slope Full	0.002	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	60.0	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	18.0	in
Critical Depth	18.7	in
Channel Slope	0.005	ft/ft
Critical Slope	0.004	ft/ft

119 to 117 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.010	ft/ft
Diameter	18.0	in
Discharge	10.71	cfs

Results		
Normal Depth	13.9	in
Flow Area	1.5	ft²
Wetted Perimeter	3.2	ft
Hydraulic Radius	5.5	in
Top Width	1.26	ft
Critical Depth	15.1	in
Percent Full	77.1	%
Critical Slope	0.009	ft/ft
Velocity	7.32	ft/s
Velocity Head	0.83	ft
Specific Energy	1.99	ft
Froude Number	1.198	
Maximum Discharge	12.24	cfs
Discharge Full	11.38	cfs
Slope Full	0.009	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	77.1	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	13.9	in
Critical Depth	15.1	in
Channel Slope	0.010	ft/ft
Critical Slope	0.009	ft/ft

117 to 110 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.030	ft/ft
Diameter	24.0	in
Discharge	42.09	cfs

Results		
Normal Depth	19.5	in
Flow Area	2.7	ft²
Wetted Perimeter	4.5	ft
Hydraulic Radius	7.3	in
Top Width	1.56	ft
Critical Depth	23.5	in
Percent Full	81.2	%
Critical Slope	0.026	ft/ft
Velocity	15.40	ft/s
Velocity Head	3.69	ft
Specific Energy	5.31	ft
Froude Number	2.053	
Maximum Discharge	45.66	cfs
Discharge Full	42.45	cfs
Slope Full	0.029	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	81.2	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	19.5	in
Critical Depth	23.5	in
Channel Slope	0.030	ft/ft
Critical Slope	0.026	ft/ft

121 to 122 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.005	ft/ft
Diameter	24.0	in
Discharge	10.69	cfs

Results		
Normal Depth	13.6	in
Flow Area	1.8	ft²
Wetted Perimeter	3.4	ft
Hydraulic Radius	6.5	in
Top Width	1.98	ft
Critical Depth	14.1	in
Percent Full	56.8	%
Critical Slope	0.005	ft/ft
Velocity	5.80	ft/s
Velocity Head	0.52	ft
Specific Energy	1.66	ft
Froude Number	1.061	
Maximum Discharge	18.64	cfs
Discharge Full	17.33	cfs
Slope Full	0.002	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	56.8	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	13.6	in
Critical Depth	14.1	in
Channel Slope	0.005	ft/ft
Critical Slope	0.005	ft/ft

125 to 122 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.005	ft/ft
Diameter	18.0	in
Discharge	7.09	cfs

Results		
Normal Depth	13.1	in
Flow Area	1.4	ft²
Wetted Perimeter	3.1	ft
Hydraulic Radius	5.4	in
Top Width	1.33	ft
Critical Depth	12.4	in
Percent Full	72.9	%
Critical Slope	0.006	ft/ft
Velocity	5.14	ft/s
Velocity Head	0.41	ft
Specific Energy	1.50	ft
Froude Number	0.890	
Maximum Discharge	8.66	cfs
Discharge Full	8.05	cfs
Slope Full	0.004	ft/ft
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	56.9	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	13.1	in
Critical Depth	12.4	in
Channel Slope	0.005	ft/ft
Critical Slope	0.006	ft/ft

127 to 128 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.010	ft/ft
Diameter	18.0	in
Discharge	5.07	cfs

Results		
Normal Depth	8.4	in
Flow Area	0.8	ft²
Wetted Perimeter	2.3	ft
Hydraulic Radius	4.3	in
Top Width	1.50	ft
Critical Depth	10.4	in
Percent Full	46.8	%
Critical Slope	0.005	ft/ft
Velocity	6.25	ft/s
Velocity Head	0.61	ft
Specific Energy	1.31	ft
Froude Number	1.498	
Maximum Discharge	12.24	cfs
Discharge Full	11.38	cfs
Slope Full	0.002	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	46.8	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.4	in
Critical Depth	10.4	in
Channel Slope	0.010	ft/ft
Critical Slope	0.005	ft/ft

128 to 130 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.010	ft/ft
Diameter	18.0	in
Discharge	6.41	cfs

Results		
Normal Depth	9.7	in
Flow Area	1.0	ft²
Wetted Perimeter	2.5	ft
Hydraulic Radius	4.7	in
Top Width	1.50	ft
Critical Depth	11.7	in
Percent Full	53.7	%
Critical Slope	0.005	ft/ft
Velocity	6.63	ft/s
Velocity Head	0.68	ft
Specific Energy	1.49	ft
Froude Number	1.455	
Maximum Discharge	12.24	cfs
Discharge Full	11.38	cfs
Slope Full	0.003	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	53.7	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	9.7	in
Critical Depth	11.7	in
Channel Slope	0.010	ft/ft
Critical Slope	0.005	ft/ft

130 to 132 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.009	ft/ft
Diameter	24.0	in
Discharge	8.65	cfs

Results		
Normal Depth	10.1	in
Flow Area	1.3	ft²
Wetted Perimeter	2.8	ft
Hydraulic Radius	5.3	in
Top Width	1.98	ft
Critical Depth	12.6	in
Percent Full	42.2	%
Critical Slope	0.004	ft/ft
Velocity	6.85	ft/s
Velocity Head	0.73	ft
Specific Energy	1.57	ft
Froude Number	1.512	
Maximum Discharge	25.01	cfs
Discharge Full	23.25	cfs
Slope Full	0.001	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	42.2	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	10.1	in
Critical Depth	12.6	in
Channel Slope	0.009	ft/ft
Critical Slope	0.004	ft/ft

132 to 134 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.005	ft/ft
Diameter	24.0	in
Discharge	11.24	cfs

Results		
Normal Depth	14.1	in
Flow Area	1.9	ft²
Wetted Perimeter	3.5	ft
Hydraulic Radius	6.6	in
Top Width	1.97	ft
Critical Depth	14.4	in
Percent Full	58.7	%
Critical Slope	0.005	ft/ft
Velocity	5.87	ft/s
Velocity Head	0.54	ft
Specific Energy	1.71	ft
Froude Number	1.049	
Maximum Discharge	18.64	cfs
Discharge Full	17.33	cfs
Slope Full	0.002	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	58.7	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	14.1	in
Critical Depth	14.4	in
Channel Slope	0.005	ft/ft
Critical Slope	0.005	ft/ft

136 to 134 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.037	ft/ft
Diameter	18.0	in
Discharge	13.32	cfs

Results		
Normal Depth	10.2	in
Flow Area	1.0	ft²
Wetted Perimeter	2.5	ft
Hydraulic Radius	4.8	in
Top Width	1.49	ft
Critical Depth	16.3	in
Percent Full	56.4	%
Critical Slope	0.012	ft/ft
Velocity	12.96	ft/s
Velocity Head	2.61	ft
Specific Energy	3.46	ft
Froude Number	2.749	
Maximum Discharge	23.48	cfs
Discharge Full	21.83	cfs
Slope Full	0.014	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	56.4	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	10.2	in
Critical Depth	16.3	in
Channel Slope	0.037	ft/ft
Critical Slope	0.012	ft/ft

134 to 110 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.005	ft/ft
Diameter	30.0	in
Discharge	24.51	cfs

Results		
Normal Depth	20.5	in
Flow Area	3.6	ft²
Wetted Perimeter	4.9	ft
Hydraulic Radius	8.8	in
Top Width	2.32	ft
Critical Depth	20.2	in
Percent Full	68.5	%
Critical Slope	0.005	ft/ft
Velocity	6.84	ft/s
Velocity Head	0.73	ft
Specific Energy	2.44	ft
Froude Number	0.971	
Maximum Discharge	32.42	cfs
Discharge Full	30.14	cfs
Slope Full	0.003	ft/ft
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	73.3	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	20.5	in
Critical Depth	20.2	in
Channel Slope	0.005	ft/ft
Critical Slope	0.005	ft/ft

201 to 202 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.005	ft/ft
Diameter	24.0	in
Discharge	9.42	cfs

Results		
Normal Depth	12.3	in
Flow Area	1.6	ft²
Wetted Perimeter	3.2	ft
Hydraulic Radius	6.1	in
Top Width	2.00	ft
Critical Depth	13.2	in
Percent Full	51.3	%
Critical Slope	0.004	ft/ft
Velocity	5.80	ft/s
Velocity Head	0.52	ft
Specific Energy	1.55	ft
Froude Number	1.134	
Maximum Discharge	19.37	cfs
Discharge Full	18.01	cfs
Slope Full	0.001	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	51.3	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	12.3	in
Critical Depth	13.2	in
Channel Slope	0.005	ft/ft
Critical Slope	0.004	ft/ft

202 to 204 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.005	ft/ft
Diameter	24.0	in
Discharge	14.28	cfs

Results		
Normal Depth	16.6	in
Flow Area	2.3	ft²
Wetted Perimeter	3.9	ft
Hydraulic Radius	7.1	in
Top Width	1.85	ft
Critical Depth	16.3	in
Percent Full	69.2	%
Critical Slope	0.005	ft/ft
Velocity	6.16	ft/s
Velocity Head	0.59	ft
Specific Energy	1.97	ft
Froude Number	0.969	
Maximum Discharge	18.64	cfs
Discharge Full	17.33	cfs
Slope Full	0.003	ft/ft
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	52.9	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	16.6	in
Critical Depth	16.3	in
Channel Slope	0.005	ft/ft
Critical Slope	0.005	ft/ft

207 to 208 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.023	ft/ft
Diameter	18.0	in
Discharge	1.49	cfs

Results		
Normal Depth	3.6	in
Flow Area	0.2	ft²
Wetted Perimeter	1.4	ft
Hydraulic Radius	2.2	in
Top Width	1.20	ft
Critical Depth	5.5	in
Percent Full	19.8	%
Critical Slope	0.004	ft/ft
Velocity	6.00	ft/s
Velocity Head	0.56	ft
Specific Energy	0.86	ft
Froude Number	2.321	
Maximum Discharge	18.64	cfs
Discharge Full	17.33	cfs
Slope Full	0.000	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	19.8	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	3.6	in
Critical Depth	5.5	in
Channel Slope	0.023	ft/ft
Critical Slope	0.004	ft/ft

208 to 204 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.008	ft/ft
Diameter	18.0	in
Discharge	6.63	cfs

Results		
Normal Depth	10.6	in
Flow Area	1.1	ft²
Wetted Perimeter	2.6	ft
Hydraulic Radius	4.9	in
Top Width	1.48	ft
Critical Depth	12.0	in
Percent Full	58.8	%
Critical Slope	0.006	ft/ft
Velocity	6.13	ft/s
Velocity Head	0.58	ft
Specific Energy	1.47	ft
Froude Number	1.264	
Maximum Discharge	10.95	cfs
Discharge Full	10.18	cfs
Slope Full	0.003	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	58.8	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	10.6	in
Critical Depth	12.0	in
Channel Slope	0.008	ft/ft
Critical Slope	0.006	ft/ft

204 to 210 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.194	ft/ft
Diameter	18.0	in
Discharge	26.83	cfs

Results		
Normal Depth	9.4	in
Flow Area	0.9	ft²
Wetted Perimeter	2.4	ft
Hydraulic Radius	4.6	in
Top Width	1.50	ft
Critical Depth	17.9	in
Percent Full	52.1	%
Critical Slope	0.052	ft/ft
Velocity	28.85	ft/s
Velocity Head	12.94	ft
Specific Energy	13.72	ft
Froude Number	6.457	
Maximum Discharge	53.93	cfs
Discharge Full	50.13	cfs
Slope Full	0.056	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	52.1	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	9.4	in
Critical Depth	17.9	in
Channel Slope	0.194	ft/ft
Critical Slope	0.052	ft/ft

212 to 213 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.009	ft/ft
Diameter	18.0	in
Discharge	6.13	cfs

Results		
Normal Depth	9.6	in
Flow Area	1.0	ft²
Wetted Perimeter	2.5	ft
Hydraulic Radius	4.7	in
Top Width	1.50	ft
Critical Depth	11.5	in
Percent Full	53.2	%
Critical Slope	0.005	ft/ft
Velocity	6.41	ft/s
Velocity Head	0.64	ft
Specific Energy	1.44	ft
Froude Number	1.413	
Maximum Discharge	11.87	cfs
Discharge Full	11.03	cfs
Slope Full	0.003	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	53.2	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	9.6	in
Critical Depth	11.5	in
Channel Slope	0.009	ft/ft
Critical Slope	0.005	ft/ft

216 to 217 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.012	ft/ft
Diameter	18.0	in
Discharge	3.94	cfs

Results		
Normal Depth	7.0	in
Flow Area	0.6	ft²
Wetted Perimeter	2.0	ft
Hydraulic Radius	3.8	in
Top Width	1.46	ft
Critical Depth	9.1	in
Percent Full	38.6	%
Critical Slope	0.005	ft/ft
Velocity	6.25	ft/s
Velocity Head	0.61	ft
Specific Energy	1.19	ft
Froude Number	1.679	
Maximum Discharge	13.41	cfs
Discharge Full	12.47	cfs
Slope Full	0.001	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	38.6	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	7.0	in
Critical Depth	9.1	in
Channel Slope	0.012	ft/ft
Critical Slope	0.005	ft/ft

217 to 213 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.012	ft/ft
Diameter	18.0	in
Discharge	9.91	cfs

Results		
Normal Depth	12.1	in
Flow Area	1.3	ft²
Wetted Perimeter	2.9	ft
Hydraulic Radius	5.3	in
Top Width	1.41	ft
Critical Depth	14.6	in
Percent Full	67.3	%
Critical Slope	0.008	ft/ft
Velocity	7.83	ft/s
Velocity Head	0.95	ft
Specific Energy	1.96	ft
Froude Number	1.455	
Maximum Discharge	13.41	cfs
Discharge Full	12.47	cfs
Slope Full	0.008	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	67.3	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	12.1	in
Critical Depth	14.6	in
Channel Slope	0.012	ft/ft
Critical Slope	0.008	ft/ft

213 to 210 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.216	ft/ft
Diameter	18.0	in
Discharge	21.57	cfs

Results		
Normal Depth	8.0	in
Flow Area	0.8	ft²
Wetted Perimeter	2.2	ft
Hydraulic Radius	4.2	in
Top Width	1.49	ft
Critical Depth	17.7	in
Percent Full	44.5	%
Critical Slope	0.032	ft/ft
Velocity	28.40	ft/s
Velocity Head	12.53	ft
Specific Energy	13.20	ft
Froude Number	7.013	
Maximum Discharge	56.88	cfs
Discharge Full	52.87	cfs
Slope Full	0.036	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	44.5	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.0	in
Critical Depth	17.7	in
Channel Slope	0.216	ft/ft
Critical Slope	0.032	ft/ft

301 to 302 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.013	ft/ft
Diameter	18.0	in
Discharge	3.94	cfs

Results		
Normal Depth	6.8	in
Flow Area	0.6	ft²
Wetted Perimeter	2.0	ft
Hydraulic Radius	3.7	in
Top Width	1.45	ft
Critical Depth	9.1	in
Percent Full	37.8	%
Critical Slope	0.005	ft/ft
Velocity	6.44	ft/s
Velocity Head	0.64	ft
Specific Energy	1.21	ft
Froude Number	1.751	
Maximum Discharge	13.96	cfs
Discharge Full	12.97	cfs
Slope Full	0.001	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	37.8	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.8	in
Critical Depth	9.1	in
Channel Slope	0.013	ft/ft
Critical Slope	0.005	ft/ft

302 to 304 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.013	ft/ft
Diameter	18.0	in
Discharge	10.34	cfs

Results		
Normal Depth	12.1	in
Flow Area	1.3	ft²
Wetted Perimeter	2.9	ft
Hydraulic Radius	5.3	in
Top Width	1.41	ft
Critical Depth	14.8	in
Percent Full	67.5	%
Critical Slope	0.008	ft/ft
Velocity	8.15	ft/s
Velocity Head	1.03	ft
Specific Energy	2.04	ft
Froude Number	1.513	
Maximum Discharge	13.96	cfs
Discharge Full	12.97	cfs
Slope Full	0.008	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	67.5	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	12.1	in
Critical Depth	14.8	in
Channel Slope	0.013	ft/ft
Critical Slope	0.008	ft/ft

304 to 306 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.014	ft/ft
Diameter	24.0	in
Discharge	16.68	cfs

Results		
Normal Depth	13.1	in
Flow Area	1.7	ft²
Wetted Perimeter	3.3	ft
Hydraulic Radius	6.3	in
Top Width	1.99	ft
Critical Depth	17.7	in
Percent Full	54.4	%
Critical Slope	0.006	ft/ft
Velocity	9.55	ft/s
Velocity Head	1.42	ft
Specific Energy	2.51	ft
Froude Number	1.799	
Maximum Discharge	31.19	cfs
Discharge Full	29.00	cfs
Slope Full	0.005	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	54.4	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	13.1	in
Critical Depth	17.7	in
Channel Slope	0.014	ft/ft
Critical Slope	0.006	ft/ft

306 to 308 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.014	ft/ft
Diameter	24.0	in
Discharge	24.78	cfs

Results		
Normal Depth	17.1	in
Flow Area	2.4	ft²
Wetted Perimeter	4.0	ft
Hydraulic Radius	7.1	in
Top Width	1.81	ft
Critical Depth	21.1	in
Percent Full	71.1	%
Critical Slope	0.009	ft/ft
Velocity	10.37	ft/s
Velocity Head	1.67	ft
Specific Energy	3.09	ft
Froude Number	1.592	
Maximum Discharge	31.19	cfs
Discharge Full	29.00	cfs
Slope Full	0.010	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	71.1	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	17.1	in
Critical Depth	21.1	in
Channel Slope	0.014	ft/ft
Critical Slope	0.009	ft/ft

308 to 310 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.006	ft/ft
Diameter	30.0	in
Discharge	32.96	cfs

Results		
Normal Depth	24.6	in
Flow Area	4.3	ft²
Wetted Perimeter	5.7	ft
Hydraulic Radius	9.1	in
Top Width	1.92	ft
Critical Depth	23.4	in
Percent Full	82.0	%
Critical Slope	0.006	ft/ft
Velocity	7.65	ft/s
Velocity Head	0.91	ft
Specific Energy	2.96	ft
Froude Number	0.901	
Maximum Discharge	35.45	cfs
Discharge Full	32.95	cfs
Slope Full	0.006	ft/ft
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	29.5	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	24.6	in
Critical Depth	23.4	in
Channel Slope	0.006	ft/ft
Critical Slope	0.006	ft/ft

313 to 310 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.012	ft/ft
Diameter	18.0	in
Discharge	3.28	cfs

Results		
Normal Depth	6.4	in
Flow Area	0.6	ft²
Wetted Perimeter	1.9	ft
Hydraulic Radius	3.5	in
Top Width	1.43	ft
Critical Depth	8.3	in
Percent Full	35.4	%
Critical Slope	0.004	ft/ft
Velocity	5.86	ft/s
Velocity Head	0.53	ft
Specific Energy	1.06	ft
Froude Number	1.653	
Maximum Discharge	13.13	cfs
Discharge Full	12.20	cfs
Slope Full	0.001	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	35.4	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.4	in
Critical Depth	8.3	in
Channel Slope	0.012	ft/ft
Critical Slope	0.004	ft/ft

316 to 314 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.005	ft/ft
Diameter	24.0	in
Discharge	6.07	cfs

Results		
Normal Depth	9.9	in
Flow Area	1.2	ft²
Wetted Perimeter	2.8	ft
Hydraulic Radius	5.2	in
Top Width	1.97	ft
Critical Depth	10.5	in
Percent Full	41.1	%
Critical Slope	0.004	ft/ft
Velocity	4.99	ft/s
Velocity Head	0.39	ft
Specific Energy	1.21	ft
Froude Number	1.119	
Maximum Discharge	18.45	cfs
Discharge Full	17.15	cfs
Slope Full	0.001	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	41.1	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	9.9	in
Critical Depth	10.5	in
Channel Slope	0.005	ft/ft
Critical Slope	0.004	ft/ft

310 to 314 - Circular Pipe

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.012	
Channel Slope	0.012	ft/ft
Diameter	24.0	in
Discharge	15.30	cfs

Results		
Normal Depth	13.2	in
Flow Area	1.8	ft²
Wetted Perimeter	3.3	ft
Hydraulic Radius	6.3	in
Top Width	1.99	ft
Critical Depth	16.9	in
Percent Full	54.8	%
Critical Slope	0.005	ft/ft
Velocity	8.68	ft/s
Velocity Head	1.17	ft
Specific Energy	2.27	ft
Froude Number	1.627	
Maximum Discharge	28.27	cfs
Discharge Full	26.28	cfs
Slope Full	0.004	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	54.8	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	13.2	in
Critical Depth	16.9	in
Channel Slope	0.012	ft/ft
Critical Slope	0.005	ft/ft

DA 1.1 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	6.77 cfs
Gutter Width	4.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	4.3 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	25.2 ft
Depth	6.1 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	5.8 ft²
Active Grate Weir Length	7.3 ft

DA 1.2 - Curb Inlet

Project Description	
Solve For	Spread

Input Data		
Discharge	1.45	cfs
Gutter Width	1.50	ft
Gutter Cross Slope	0.083	ft/ft
Road Cross Slope	0.026	ft/ft
Curb Opening Length	7.0	ft
Opening Height	0.5	ft
Curb Throat Type	Horizontal	
Local Depression	0.0	in
Local Depression Width	0.0	in
Throat Incline Angle	90.00	degrees

Results		
Spread	6.5	ft
Depth	3.0	in
Gutter Depression	1.0	in
Total Depression	1.0	in

DA 1.3 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	7.09 cfs
Gutter Width	4.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	4.3 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	26.0 ft
Depth	6.2 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	5.8 ft²
Active Grate Weir Length	7.3 ft

DA 1.4 - Curb Inlet

Project Description	
Solve For	Spread

Input Data		
Discharge	2.86	cfs
Gutter Width	1.50	ft
Gutter Cross Slope	0.083	ft/ft
Road Cross Slope	0.026	ft/ft
Curb Opening Length	7.0	ft
Opening Height	0.5	ft
Curb Throat Type	Horizontal	
Local Depression	0.0	in
Local Depression Width	0.0	in
Throat Incline Angle	90.00	degrees

Results		
Spread	10.2	ft
Depth	4.2	in
Gutter Depression	1.0	in
Total Depression	1.0	in

DA 1.5 - Curb Inlet On Grade

Project Description	
Solve For	Efficiency

Input Data	
Discharge	15.12 cfs
Slope	0.060 ft/ft
Gutter Width	6.00 ft
Gutter Cross Slope	0.083 ft/ft
Road Cross Slope	0.010 ft/ft
Roughness Coefficient	0.013
Curb Opening Length	7.0 ft
Local Depression	0.0 in
Local Depression Width	0.0 in

Results	
Efficiency	24.39 %
Intercepted Flow	3.69 cfs
Bypass Flow	11.43 cfs
Spread	5.4 ft
Depth	5.4 in
Flow Area	1.2 ft²
Gutter Depression	5.3 in
Total Depression	5.3 in
Velocity	12.37 ft/s
Equivalent Cross Slope	0.083 ft/ft
Length Factor	0.144
Total Interception Length	48.7 ft

DA 1.6 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	22.54 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	40.0 ft
Depth	9.6 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 1.7 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	10.69 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	25.3 ft
Depth	6.1 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 1.8 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	10.69 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	25.3 ft
Depth	6.1 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 1.9 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	10.71 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	25.4 ft
Depth	6.1 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 1.10 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	10.71 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	25.4 ft
Depth	6.1 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 1.11 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	10.69 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	25.3 ft
Depth	6.1 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 1.12 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	10.73 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	25.4 ft
Depth	6.1 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 1.13 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	7.09 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	19.9 ft
Depth	4.8 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 1.14 - Curb Inlet

Project Description	
Solve For	Spread

Input Data		
Discharge	5.07	cfs
Gutter Width	3.00	ft
Gutter Cross Slope	0.083	ft/ft
Road Cross Slope	0.010	ft/ft
Curb Opening Length	7.0	ft
Opening Height	0.5	ft
Curb Throat Type	Horizontal	
Local Depression	0.0	in
Local Depression Width	0.0	in
Throat Incline Angle	90.00	degrees

Results		
Spread	38.8	ft
Depth	7.3	in
Gutter Depression	2.6	in
Total Depression	2.6	in

DA 1.15 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	1.50 cfs
Gutter Width	3.00 ft
Gutter Cross Slope	0.083 ft/ft
Road Cross Slope	0.018 ft/ft
Grate Width	3.00 ft
Grate Length	4.3 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	9.1 ft
Depth	4.3 in
Gutter Depression	2.3 in
Total Depression	2.3 in
Open Grate Area	5.8 ft²
Active Grate Weir Length	7.3 ft

DA 1.16 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	2.28 cfs
Gutter Width	3.00 ft
Gutter Cross Slope	0.083 ft/ft
Road Cross Slope	0.018 ft/ft
Grate Width	3.00 ft
Grate Length	4.3 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	12.2 ft
Depth	5.0 in
Gutter Depression	2.3 in
Total Depression	2.3 in
Open Grate Area	5.8 ft²
Active Grate Weir Length	7.3 ft

DA 1.17 - Curb Inlet

Project Description	
Solve For	Spread

Input Data		
Discharge	3.15	cfs
Gutter Width	6.00	ft
Gutter Cross Slope	0.020	ft/ft
Road Cross Slope	0.010	ft/ft
Curb Opening Length	7.0	ft
Opening Height	0.5	ft
Curb Throat Type	Horizontal	
Local Depression	0.0	in
Local Depression Width	0.0	in
Throat Incline Angle	90.00	degrees

Results		
Spread	28.2	ft
Depth	4.1	in
Gutter Depression	0.7	in
Total Depression	0.7	in

DA 1.18 - Curb Inlet

Project Description	
Solve For	Spread

Input Data		
Discharge	13.32	cfs
Gutter Width	6.00	ft
Gutter Cross Slope	0.020	ft/ft
Road Cross Slope	0.020	ft/ft
Curb Opening Length	14.0	ft
Opening Height	0.5	ft
Curb Throat Type	Horizontal	
Local Depression	0.0	in
Local Depression Width	0.0	in
Throat Incline Angle	90.00	degrees

Results		
Spread	23.3	ft
Depth	5.6	in
Gutter Depression	0.0	in
Total Depression	0.0	in

DA 2.1 - Curb Inlet

Project Description	
Solve For	Spread

Input Data		
Discharge	9.42	cfs
Gutter Width	1.50	ft
Gutter Cross Slope	0.083	ft/ft
Road Cross Slope	0.010	ft/ft
Curb Opening Length	7.0	ft
Opening Height	0.5	ft
Curb Throat Type	Horizontal	
Local Depression	0.0	in
Local Depression Width	0.0	in
Throat Incline Angle	90.00	degrees

Results		
Spread	58.6	ft
Depth	8.3	in
Gutter Depression	1.3	in
Total Depression	1.3	in

DA 2.2 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	5.27 cfs
Gutter Width	3.00 ft
Gutter Cross Slope	0.083 ft/ft
Road Cross Slope	0.018 ft/ft
Grate Width	2.13 ft
Grate Length	9.8 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	13.5 ft
Depth	5.3 in
Gutter Depression	2.3 in
Total Depression	2.3 in
Open Grate Area	9.4 ft²
Active Grate Weir Length	12.0 ft

DA 2.3 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	7.03 cfs
Gutter Width	3.00 ft
Gutter Cross Slope	0.083 ft/ft
Road Cross Slope	0.032 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	12.7 ft
Depth	6.7 in
Gutter Depression	1.8 in
Total Depression	1.8 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 2.4 - Grate Inlet On Grade

Project Description	
Solve For	Efficiency

Input Data	
Discharge	1.49 cfs
Slope	0.022 ft/ft
Gutter Width	3.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Roughness Coefficient	0.013
Grate Width	2.13 ft
Grate Length	3.0 ft
Grate Type	P-50 mm (P-1 -7/8")
Clogging	0.0 %

Options	
Grate Flow Option	Exclude None

Results	
Efficiency	69.78 %
Intercepted Flow	1.04 cfs
Bypass Flow	0.45 cfs
Spread	6.7 ft
Depth	1.6 in
Flow Area	0.4 ft²
Gutter Depression	0.0 in
Total Depression	0.0 in
Velocity	3.34 ft/s
Splash Over Velocity	9.97 ft/s
Frontal Flow Factor	1.000
Side Flow Factor	0.160
Grate Flow Ratio	0.640
Active Grate Length	3.0 ft

DA 2.5 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	5.48 cfs
Gutter Width	3.00 ft
Gutter Cross Slope	0.083 ft/ft
Road Cross Slope	0.032 ft/ft
Grate Width	2.13 ft
Grate Length	9.8 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	9.1 ft
Depth	5.3 in
Gutter Depression	1.8 in
Total Depression	1.8 in
Open Grate Area	9.4 ft²
Active Grate Weir Length	12.0 ft

DA 2.6 - Curb Inlet

Project Description	
Solve For	Spread

Input Data		
Discharge	6.13	cfs
Gutter Width	6.00	ft
Gutter Cross Slope	0.020	ft/ft
Road Cross Slope	0.020	ft/ft
Curb Opening Length	7.0	ft
Opening Height	0.5	ft
Curb Throat Type	Horizontal	
Local Depression	0.0	in
Local Depression Width	0.0	in
Throat Incline Angle	90.00	degrees

Results		
Spread	22.0	ft
Depth	5.3	in
Gutter Depression	0.0	in
Total Depression	0.0	in

DA 2.7 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	5.53 cfs
Gutter Width	3.00 ft
Gutter Cross Slope	0.083 ft/ft
Road Cross Slope	0.032 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	11.1 ft
Depth	6.1 in
Gutter Depression	1.8 in
Total Depression	1.8 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 2.8 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	5.76 cfs
Gutter Width	3.00 ft
Gutter Cross Slope	0.083 ft/ft
Road Cross Slope	0.021 ft/ft
Grate Width	2.13 ft
Grate Length	9.8 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	12.8 ft
Depth	5.5 in
Gutter Depression	2.2 in
Total Depression	2.2 in
Open Grate Area	9.4 ft²
Active Grate Weir Length	12.0 ft

DA 2.9 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	4.26 cfs
Gutter Width	3.00 ft
Gutter Cross Slope	0.083 ft/ft
Road Cross Slope	0.021 ft/ft
Grate Width	2.13 ft
Grate Length	9.8 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	10.2 ft
Depth	4.8 in
Gutter Depression	2.2 in
Total Depression	2.2 in
Open Grate Area	9.4 ft²
Active Grate Weir Length	12.0 ft

DA 3.1 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	3.94 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	14.3 ft
Depth	3.4 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 3.2 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	6.69 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.016 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	22.5 ft
Depth	4.6 in
Gutter Depression	0.3 in
Total Depression	0.3 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 3.3 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	6.54 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.015 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	23.3 ft
Depth	4.6 in
Gutter Depression	0.4 in
Total Depression	0.4 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 3.4 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	8.24 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	21.7 ft
Depth	5.2 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 3.5 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	8.65 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	22.3 ft
Depth	5.4 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 3.6 - Grate Inlet

Project Description	
Solve For	Spread

Input Data	
Discharge	12.02 cfs
Gutter Width	6.00 ft
Gutter Cross Slope	0.020 ft/ft
Road Cross Slope	0.020 ft/ft
Grate Width	3.00 ft
Grate Length	8.6 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm (P-1 -7/8")
Clogging	50.0 %

Results	
Spread	27.2 ft
Depth	6.5 in
Gutter Depression	0.0 in
Total Depression	0.0 in
Open Grate Area	11.7 ft²
Active Grate Weir Length	11.6 ft

DA 3.7 - Curb Inlet

Project Description	
Solve For	Spread

Input Data		
Discharge	3.28	cfs
Gutter Width	1.50	ft
Gutter Cross Slope	0.083	ft/ft
Road Cross Slope	0.020	ft/ft
Curb Opening Length	3.5	ft
Opening Height	0.5	ft
Curb Throat Type	Horizontal	
Local Depression	0.0	in
Local Depression Width	0.0	in
Throat Incline Angle	90.00	degrees

Results		
Spread	23.0	ft
Depth	6.7	in
Gutter Depression	1.1	in
Total Depression	1.1	in

CDS UNIT	TRIBUTARY DA ID	DA AREA (AC)	Flow Capacity (cfs/imp acre)	Estimated Impervious Decimal	**Treatment Flow required**
CDS 1	1.1	0.91	0.14	0.925	**0.85**
	1.2	0.21			
	1.3	0.97			
	1.4	0.41			
	1.5	2.26			
	1.6	1.82			
CDS 2	1.7	1.76			**0.91**
	1.8	1.76			
	1.9	1.76			
	1.10	1.76			
CDS 3	1.11	1.76			**0.58**
	1.12	1.76			
	1.13	0.98			
CDS 4	1.14	0.77			**0.53**
	1.15	0.21			
	1.16	0.37			
	1.17	0.44			
	1.18	2.27			
CDS 5	2.1	1.47		0.887	**0.55**
	2.2	0.78			
	2.3	1.04			
	2.4	0.32			
	2.5	0.81			
CDS 6	2.6	0.78			**0.36**
	2.7	0.82			
	2.8	0.73			
	2.9	0.54			
CDS 7	3.1	0.63		0.827	**1.01**
	3.2	1.2			
	3.3	1.17			
	3.4	1.53			
	3.5	1.58			
	3.6	2.11			
	3.7	0.48			
CDS 8	4.1	0.77		0.62	**0.07**

Orifice Calculations

	CDS 1	CDS 2	CDS 3	CDS 4	CDS 5	CDS 6	CDS 7
Q BMP (cfs)	**0.73**	**0.70**	**0.45**	**0.53**	**0.82**	**0.51**	**1.01**
Orifice (in)	5.00	5.00	4.00	4.00	5.00	4.00	5.00
A (sf)	0.14	0.14	0.09	0.09	0.14	0.09	0.14
WSE depth (ft)	1.80	2.00	2.00	3.20	2.59	2.29	2.70
H (ft)	1.59	1.79	1.83	3.03	2.38	2.12	2.49
Orifice Q (cfs)	**0.83**	**0.88**	**0.57**	**0.73**	**1.01**	**0.61**	**1.04**

Submerged Orifice Equation $Q=CA(2g(H1)^{(1/2)}$

C= 0.6

g= 32.2 ft/s^2

APPENDIX J

RESULTS OF INFILTRATION TESTING

June 26, 2023

Brookfield Properties
2101 Rosecrans Avenue, Suite 6250
El Segundo, California 90245

Attention: Mr. Amir Latifian
Associate, Development | Logistics

Project No.: **23G146-2**

Subject: **Results of Infiltration Testing**
Proposed Industrial Building – SWC West Lowell Street and North Locust Avenue
Rialto, California

Reference: Geotechnical Investigation, Proposed Industrial Building – SWC West Lowell Street and North Locust Avenue, Rialto, California, prepared for Brookfield Properties, by Southern California Geotechnical, Inc. (SCG), SCG Project No. 23G146-1, dated June 26, 2023.

Mr. Latifian:

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. 23P123, dated January 31, 2023. 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 ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Site and Project Description

The subject site is located at the southwest corner of West Lowell Street and North Locust Avenue in Rialto, California. The site is bounded to the north by West Lowell Street, to the west by a truck yard lot and Lake Padden Lane, to the south by a vacant lot used for stockpiling concrete mix materials, and to the east by commercial development and North Locust Avenue. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 of this report.

The subject site is an L-shaped property consisting of several rectangular-shaped parcels, which total 39.92± acres in size. The majority of the site is vacant and undeveloped except for portions of the northern and southern parcels which appear to have been graded. Ground surface coverage in the undeveloped areas consists of exposed soil with sparse to moderate native grass and weed growth. Ground surface coverage in the graded areas consists of crushed aggregate base (CAB). Remnants of two previous structures are located in the southwest corner of the site.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth, and visual observations made at the time of the subsurface investigation, the overall site topography slopes downward to the south and southeast at gradients of 1½ to 2½± percent.

Proposed Development

A conceptual site plan was provided to our office by the client. Based on this plan, the subject site will be developed with a 750,560± ft² industrial building, located in the western area of the site. Dock-high doors will be constructed along a portion of the east building wall. The new building is expected to be surrounded by asphaltic concrete (AC) pavements in the parking and drive areas, and Portland cement concrete (PCC) pavements in the loading dock area. Several landscaped planters and concrete flatwork are also expected to be included throughout the site.

The proposed development will use on-site storm water infiltration. Based on our experience with similar projects in the area, the infiltration system is assumed to consist of a below-grade chamber located in the truck-court areas of the site. The bottom of the infiltration systems is expected to be 10± feet below the existing site grades.

Concurrent Study

SCG concurrently conducted a geotechnical investigation at the subject site, which is referenced above. As part of this study, twelve (12) borings were advanced to depths of 4 to 25± feet below existing site grades. Additionally, ten (10) backhoe-excavated trenches were dug to depths ranging from 6½ to 10± feet below existing site grades.

Artificial fill soils were encountered at the ground surface at most of the boring and trench locations extending to depths of 2 to 4½± feet below the existing site grades. The fill soils generally consist of medium dense to very dense silty sands and gravelly sands, and occasional loose silty sands. The fill soils possess a disturbed appearance and some samples contain artificial debris, such as plastic, metal, and clothing fragments, resulting in their classification as artificial fill. Native alluvial soils were encountered at the ground surface or beneath the fill soils at the all of the boring and trench locations, extending to at least the maximum depth explored of 25± feet below the existing site grades. The alluvium generally consists of dense to very dense gravelly sands and sandy gravels, and occasional medium dense to very dense sands and silty sands. Occasional to extensive cobbles were encountered at the boring and trench locations at various depths. Occasional boulders were encountered at all of the trench locations at depths of 2½ to 4½± feet.

Groundwater

Groundwater was not encountered at any of the borings or trenches. Based on the lack of any water within the borings and trenches, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of at least 25± feet below existing site grades, at the time of the subsurface investigation.

Subsurface Exploration

Scope of Exploration

The subsurface exploration for the infiltration testing consisted of four (4) backhoe-excavated trenches, extending to a depth 10± feet below existing site grades. The trenches were logged during excavation by a member of our staff. The approximate locations of the infiltration trenches (identified as Infiltration Trench Nos. I-1 through I-4) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Geotechnical Conditions

A surficial (6±-inch thick) layer of crushed miscellaneous base (CMB) was encountered at Infiltration Trench Nos. I-1 and I-4. Artificial fill soils were encountered beneath the CMB at both of these infiltration trenches extending to depths of 1 to 2± feet below existing site grades. The fill soils consist dense silty fine sands and silty fine to medium sands. Native alluvial soils were encountered at the ground surface or beneath the fill soils at all of the infiltration trench locations. The alluvial soils consist of medium dense silty fine sands with vary amounts of medium to coarse sands, dense gravelly fine to coarse sands and fine to coarse sandy gravel with occasional to extensive cobles extending to the maximum depth explored of 10± feet. The Trench Logs, which illustrate the conditions encountered at the infiltration test locations, are presented in this report.

Groundwater was not encountered at any of the boring and trenches during the geotechnical investigation or any of the infiltration trenches during the infiltration testing. Based on the lack of any water within the borings and trenches, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 25± feet below existing site grades, at the time of the subsurface investigation

As part of our research, we reviewed readily available groundwater data in order to determine regional groundwater depths. Recent water level data was obtained from the California Department of Water Resources, Water Data Library Station Map, website, https://wdl.water.ca.gov/waterdatalibrary/. One monitoring well on record is located as close as 3,700 feet east-northeast of the site. Water level readings within this monitoring well indicate a high groundwater level of 279± feet below the ground surface in June 1993.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the storm water infiltration system that will be used at the subject site. As previously mentioned, the infiltration testing was performed in general accordance with ASTM Test Method D-3385-03, Standard Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometer.

Two stainless steel infiltration rings were used for the infiltration testing. The outer infiltration ring is 2 feet in diameter and 20 inches in height. The inner infiltration ring is 1 foot in diameter and 20 inches in height. At the test locations, the outer ring was driven 3± inches into the soil at the base of each trench. The inner ring was centered inside the outer ring and subsequently driven 3± inches into the soil at the base of the trench. The rings were driven into the soil using

a ten-pound sledge hammer. The soil surrounding the wall of the infiltration rings was only slightly disturbed during the driving process.

Infiltration Testing Procedure

Infiltration testing was performed at all of the trench locations. The infiltration testing consisted of filling the inner ring and the annular space (the space between the inner and outer rings) with water, approximately 3 to 4 inches above the soil. To prevent the flow of water from one ring to the other, the water level in both the inner ring and the annular space between the rings was maintained using constant-head float valves. The volume of water that was added to maintain a constant head in the inner ring and the annular space during each time interval was determined and recorded.

The schedule for readings was determined based on the observed soil type at the base of each backhoe-excavated trench. Based on the existing soils at the trench locations, the volumetric measurements were made at 5-minute increments. The water volume measurements are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on these spreadsheets.

The infiltration rates for the infiltration tests are calculated in centimeters per hour and then converted to inches per hour. The rates are summarized below:

Infiltration Test No.	Depth (feet)	Soil Description	Measured Infiltration Rate (inches/hour)
I-1	10	Light Brown Gravelly fine to coarse Sand/fine to coarse Sandy Gravel	19.4
I-2	10	Brown fine to coarse Sandy Gravel	22.3
I-3	10	Light Brown Gravelly fine to coarse Sand	23.6
I-4	10	Brown Gravelly fine to coarse Sand/fine to coarse Sandy Gravel	17.5

Design Recommendations

Four (4) infiltration tests were performed at the subject site. As noted above, the calculated infiltration rates at the infiltration test locations range between 17.5 and 23.6 inches per hour. Based on the infiltration test results, the design infiltration rate for the proposed below-grade infiltration system located in the southwestern area of the site will be 17.5 inches per hour.

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration system to identify the soil classification at the base of the infiltration basin. It should be confirmed that the soils at the base of the proposed infiltration system corresponds with those presented in this report to ensure that the performance of the system will be consistent with the rates reported herein.

The design of storm water disposal systems should be performed by the project civil engineer, in accordance with the City of Rialto and/or County of San Bernardino guidelines. It is recommended

any such systems be designed and constructed to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the system. The presence of such materials would decrease the flow rates through the system. It should be noted that the recommended infiltration rates are based on infiltration testing at four (4) discrete locations and that the overall infiltration rates of the proposed infiltration system 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, grainsize distribution throughout the range of particle sizes, and particle shape. Small changes in these factors can cause large changes in the infiltration rates.

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

Construction Considerations

The infiltration rates presented in this report are specific to the tested locations and tested depths. Infiltration rates can be significantly reduced if the soils are exposed to excessive disturbance or compaction during construction. Compaction of the soils at the bottom of the infiltration 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.

Chamber Maintenance

The proposed project may include below-grade infiltration chambers. Water flowing into these chambers will carry some level of sediment. This layer has the potential to significantly reduce the infiltration rate of the basin subgrade soils. Therefore, a formal chamber maintenance program should be established to ensure that these silt and clay deposits are removed from the chamber on a regular basis.

Location of Infiltration Systems

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

Closure

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

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

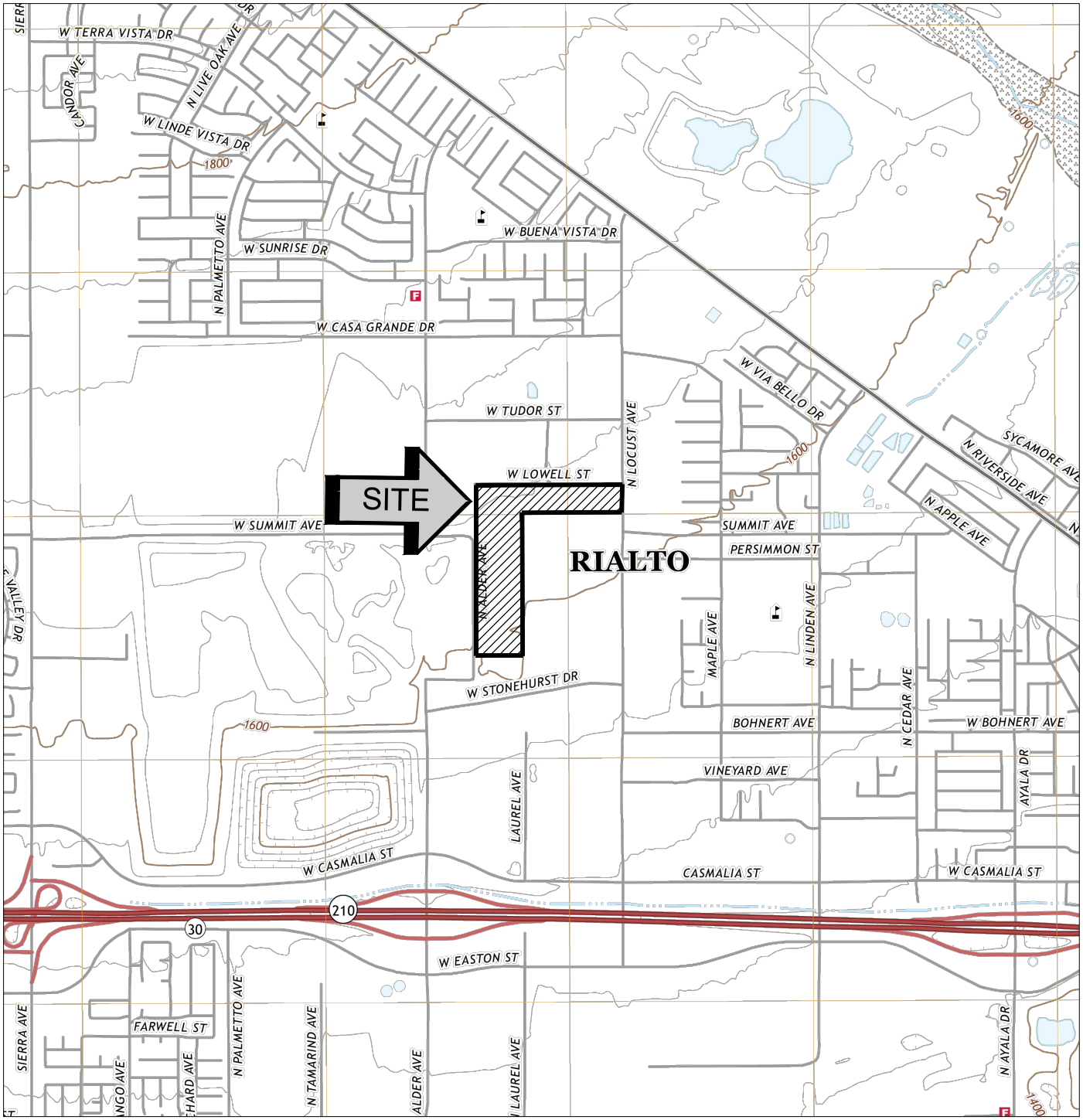
Joseph Hernandez
Staff Geologist

Robert G. Trazo, GE 2655
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
ROBERT TRAZO
No. 2655
GEOTECHNICAL
STATE OF CALIFORNIA

Distribution: (1) Addressee

Enclosures: Plate 1: Site Location Map
Plate 2: Infiltration Test Location Plan
Trench Log Legend and Logs (4 pages)
Infiltration Test Results Spreadsheets (4 pages)
Grainsize Distribution Graphs (4 pages)



SOURCE: USGS TOPOGRAPHIC MAP OF THE DEVORE QUADRANGLE, SAN BERNARDINO COUNTY, CALIFORNIA, 2021.

SITE LOCATION MAP

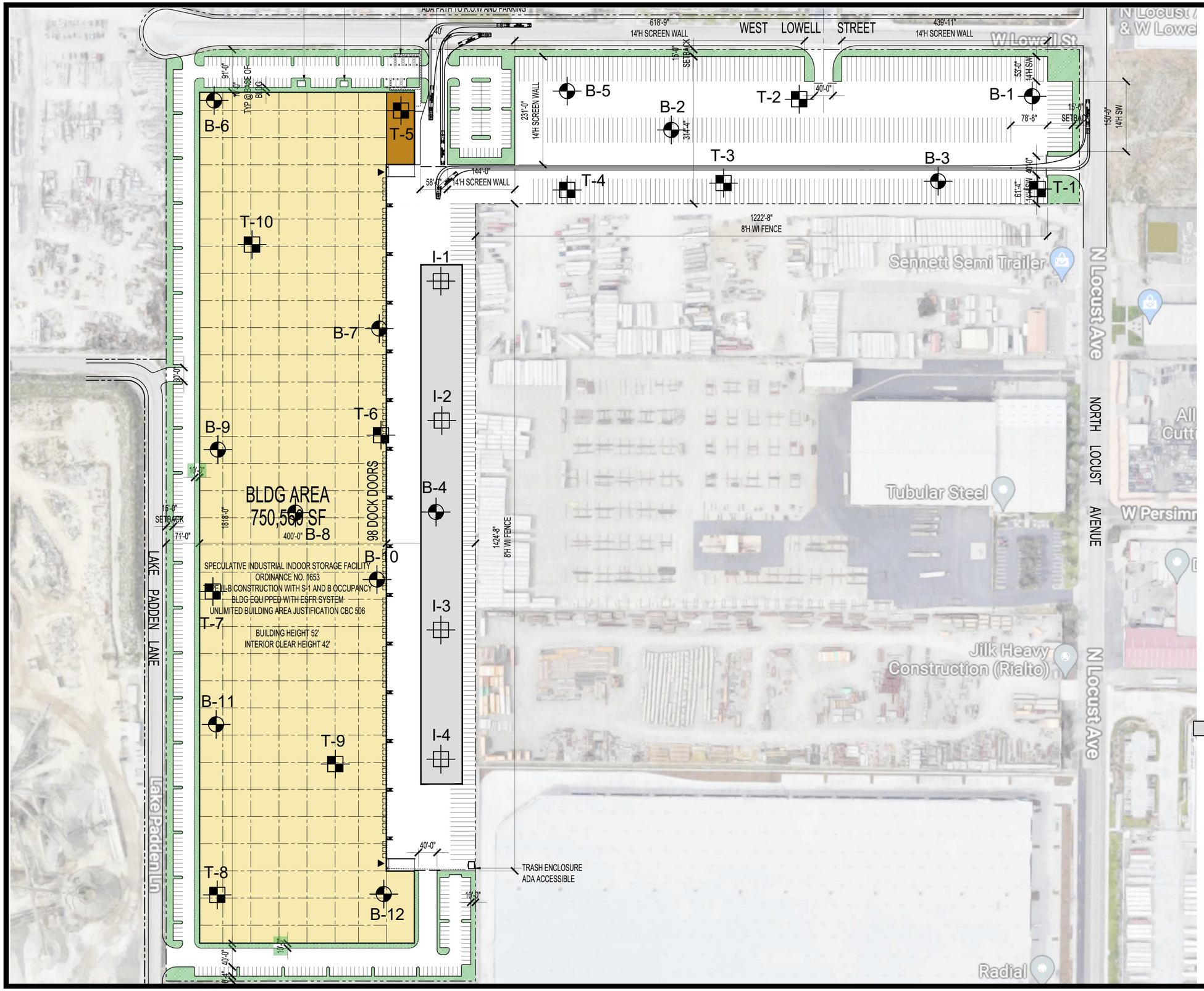
PROPOSED INDUSTRIAL BUILDING

RIALTO, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: MK CHKD: RGT	
SCG PROJECT 23G146-2	
PLATE 1	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- APPROXIMATE BORING LOCATION (SCG. PROJECT NO, 23G146-1)
- APPROXIMATE TRENCH LOCATION (SCG. PROJECT NO, 23G146-1)
- PROPOSED INFILTRATION SYSTEM

NOTE: CONCEPTUAL SITE PLAN PREPARED BY SKH. AERIAL PHOTO OBTAINED FROM GOOGLE EARTH.

INFILTRATION TEST LOCATION PLAN

PROPOSED INDUSTRIAL BUILDING

RIALTO, CALIFORNIA

SCALE: 1" = 200'	
DRAWN: MK CHKD: RGT	
SCG PROJECT 23G146-2	
PLATE 2	

SOUTHERN CALIFORNIA GEOTECHNICAL

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO.
I-1

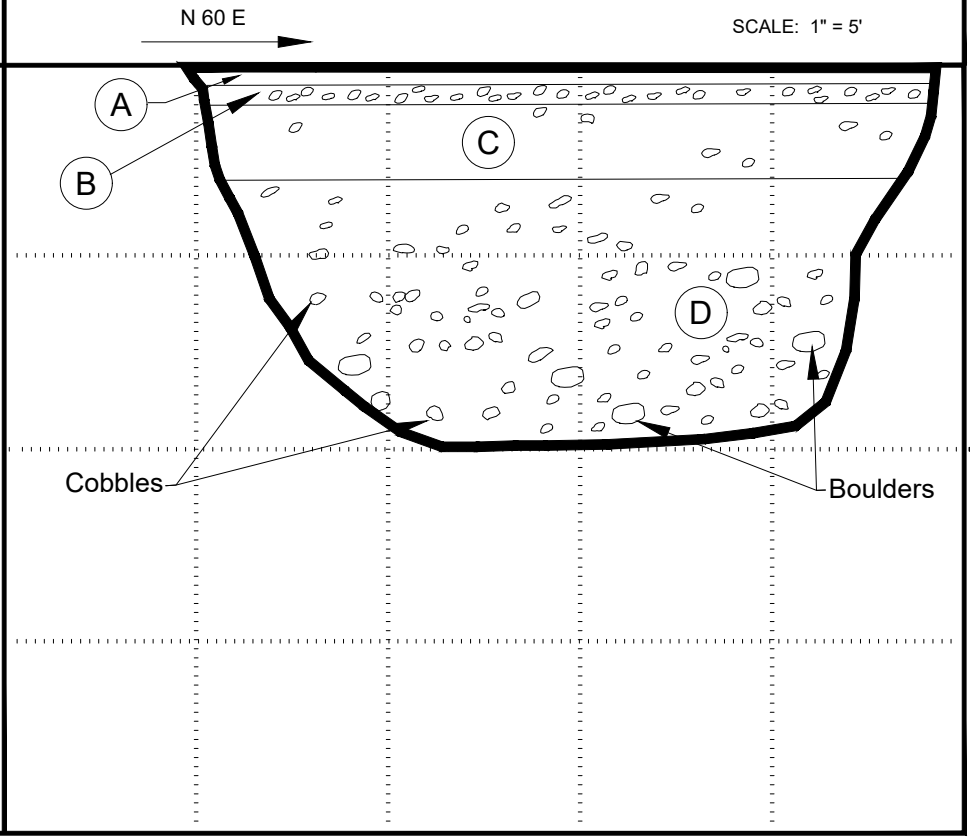
JOB NO.: 23G146-2
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-24-2023

EQUIPMENT USED: Backhoe
LOGGED BY: Joseph Hernandez
ORIENTATION: N 60 E
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		1	A: Crushed Miscellaneous Base, 6± thick
	b		4	B: FILL: Light Brown Silty fine Sand, little medium to coarse Sand, trace coarse Gravel, extensive Cobbles, dense - damp
				C: ALLUVIUM: Brown Silty fine to coarse Sand, trace fine to coarse Gravel, occasional Cobbles, medium dense - dry to damp
5				
	b		1	D: ALLUVIUM: Light Brown Gravelly fine to coarse Sand/fine to coarse Sandy Gravel, extensive Cobbles, occasional Boulders, dense - dry to damp
	b		2	
10				Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-1

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. I-2

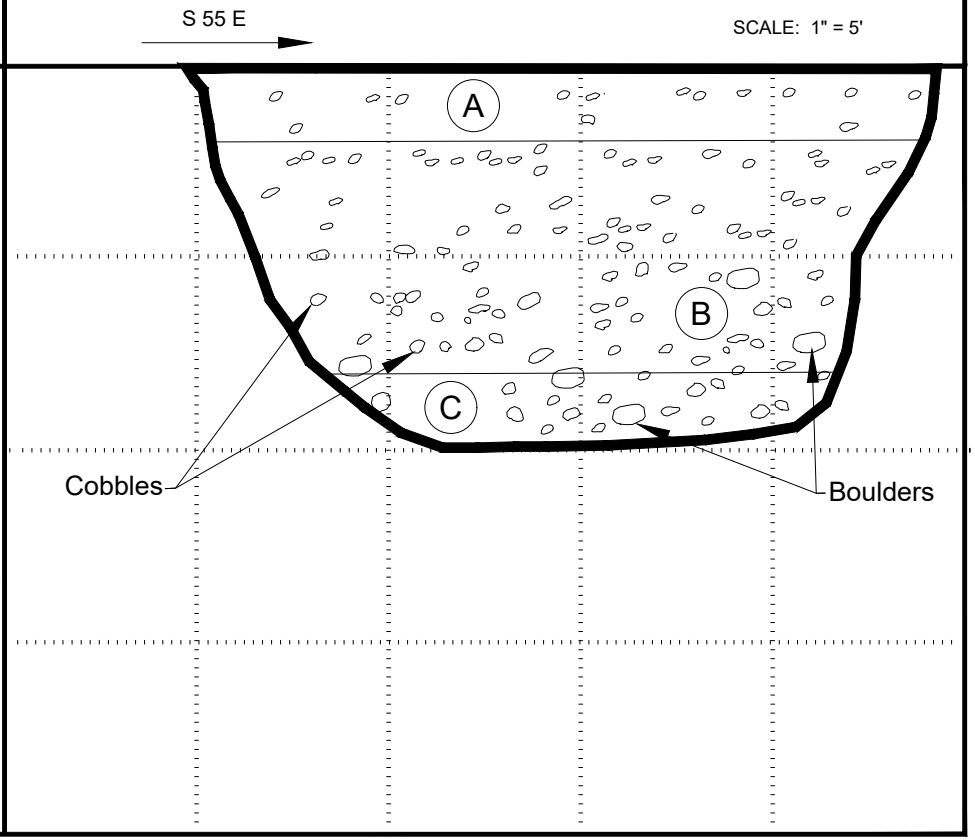
JOB NO.: 23G146-2
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-24-2023

EQUIPMENT USED: Backhoe
LOGGED BY: Joseph Hernandez
ORIENTATION: S 55 E
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		1	A: ALLUVIUM: Gray Brown Silty fine to medium Sand, little coarse Sand, trace fine to coarse Gravel, occasional Cobbles, dense - dry
5	b		1	B: ALLUVIUM: Gray Gravelly fine to coarse Sand, extensive Cobbles, occasional Boulders, dense - dry
	b		2	C: ALLUVIUM: Brown fine to coarse Sandy Gravel, extensive Cobbles, occasional Boulders, dense - dry to damp
10				Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO.
I-3

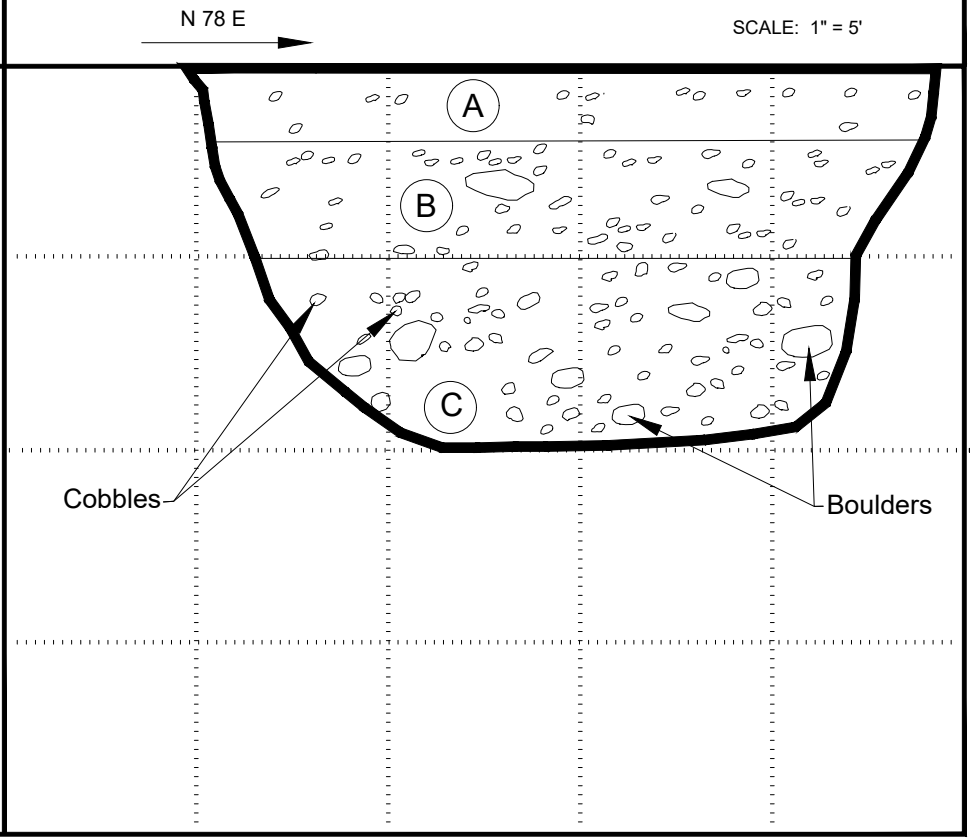
JOB NO.: 23G146-2
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-23-2023

EQUIPMENT USED: Backhoe
LOGGED BY: Joseph Hernandez
ORIENTATION: N 78 E
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		3	A: ALLUVIUM: Brown Silty fine to medium Sand, little coarse Sand, trace trace fine to coarse Gravel, trace fine root fibers, medium dense - damp
	b		2	B: ALLUVIUM: Brown Gravelly fine to medium Sand, little Silt, little coarse Sand, extensive Cobbles, trace Boulders, dense - dry to damp
5				
	b		2	C: ALLUVIUM: Light Brown Gravelly fine to coarse Sand, extensive Cobbles, trace Boulders, dense - dry to damp
10				Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER
(RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-3

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. I-4

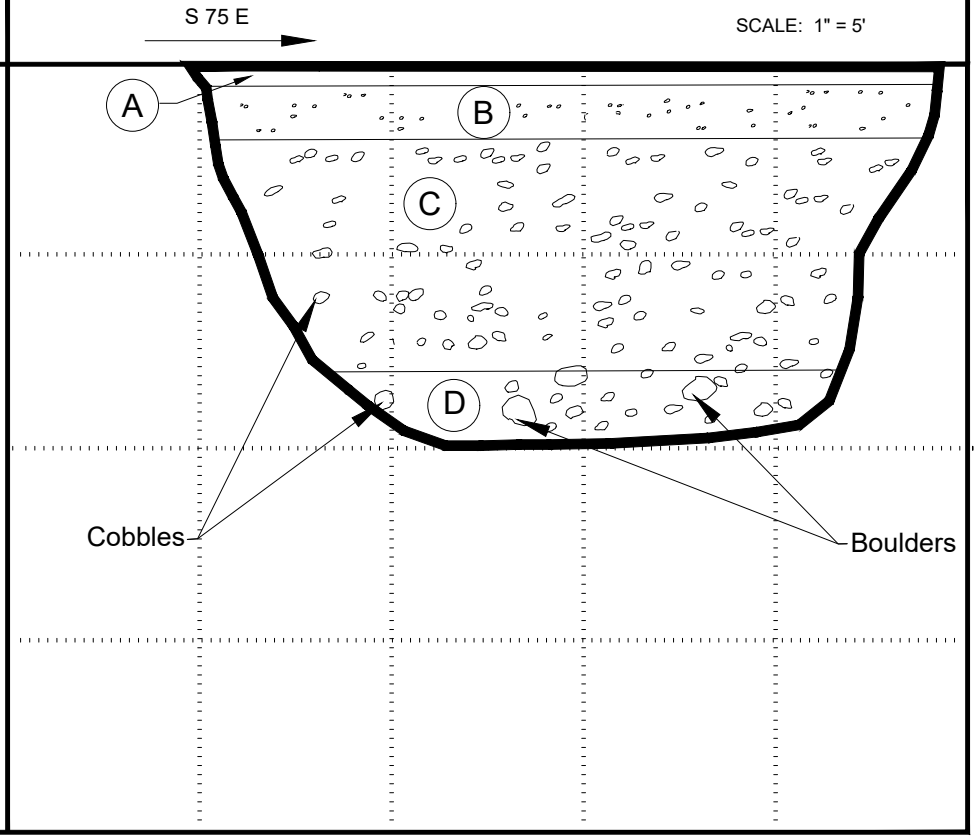
JOB NO.: 23G146-2
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-22-2023

EQUIPMENT USED: Backhoe
LOGGED BY: Joseph Hernandez
ORIENTATION: S 75 E
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		1	A: Crushed Miscellaneous Base, 6±-inch thick
	b		1	B: FILL: Gray Brown Silty fine to medium Sand, little coarse Sand, little fine to coarse Gravel, dense - dry
				C: ALLUVIUM: Light Gray Brown Gravelly fine to coarse Sand, extensive Cobbles, dense - dry
5	b		1	
				D: ALLUVIUM: Brown Gravelly fine to coarse Sand/fine to coarse Sandy Gravel, extensive Cobbles, occasional Boulders, dense - dry to damp
10	b		2	
				Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-4

INFILTRATION CALCULATIONS

Project Name	Proposed Industrial Building
Project Location	Rialto, California
Project Number	23G146-2
Engineer	JJH

Infiltration Test No: I-1

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.785	730
Anlr. Spac	2	2.356	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	8:22 AM	5	0	3900	0	13000	64.14	71.27	25.25	28.06
	Final	8:27 AM	**5**	3900		13000					
2	Initial	8:28 AM	5	0	3750	0	12900	61.67	70.72	24.28	27.84
	Final	8:33 AM	**10**	3750		12900					
3	Initial	8:34 AM	5	0	3600	0	12900	59.21	70.72	23.31	27.84
	Final	8:39 AM	**15**	3600		12900					
4	Initial	8:40 AM	5	0	3450	0	12800	56.74	70.17	22.34	27.63
	Final	8:45 AM	**20**	3450		12800					
5	Initial	8:46 AM	5	0	3300	0	12700	54.27	69.62	21.37	27.41
	Final	8:51 AM	**25**	3300		12700					
6	Initial	8:52 AM	5	0	3200	0	12600	52.63	69.08	20.72	27.20
	Final	8:57 AM	**30**	3200		12600					
7	Initial	8:58 AM	5	0	3150	0	12500	51.81	68.53	20.40	26.98
	Final	9:03 AM	**35**	3150		12500					
8	Initial	9:04 AM	5	0	3100	0	12400	50.98	67.98	20.07	26.76
	Final	9:09 AM	**40**	3100		12400					
9	Initial	9:10 AM	5	0	3100	0	12300	50.98	67.43	20.07	26.55
	Final	9:15 AM	**45**	3100		12300					
10	Initial	9:16 AM	5	0	3000	0	12400	49.34	67.98	19.43	26.76
	Final	9:21 AM	**50**	3000		12400					
11	Initial	9:22 AM	5	0	3000	0	12300	49.34	67.43	19.43	26.55
	Final	9:27 AM	**55**	3000		12300					
12	Initial	9:28 AM	5	0	3000	0	12300	49.34	67.43	19.43	26.55
	Final	9:33 AM	**60**	3000		12300					

INFILTRATION CALCULATIONS

Project Name	Proposed Industrial Building
Project Location	Rialto, California
Project Number	23G146-2
Engineer	JJH

Infiltration Test No: I-2

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.785	730
Anlr. Spac	2	2.356	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	10:32 AM	5	0	4200	0	13000	69.08	71.27	27.20	28.06
	Final	10:37 AM	**5**	4200		13000					
2	Initial	10:38 AM	5	0	4000	0	13000	65.79	71.27	25.90	28.06
	Final	10:43 AM	**10**	4000		13000					
3	Initial	10:44 AM	5	0	3950	0	12950	64.96	70.99	25.58	27.95
	Final	10:49 AM	**15**	3950		12950					
4	Initial	10:50 AM	5	0	3800	0	12900	62.50	70.72	24.61	27.84
	Final	10:55 AM	**20**	3800		12900					
5	Initial	10:56 AM	5	0	3750	0	12900	61.67	70.72	24.28	27.84
	Final	11:01 AM	**25**	3750		12900					
6	Initial	11:02 AM	5	0	3650	0	12800	60.03	70.17	23.63	27.63
	Final	11:07 AM	**30**	3650		12800					
7	Initial	11:08 AM	5	0	3700	0	12700	60.85	69.62	23.96	27.41
	Final	11:13 AM	**35**	3700		12700					
8	Initial	11:14 AM	5	0	3600	0	12600	59.21	69.08	23.31	27.20
	Final	11:19 AM	**40**	3600		12600					
9	Initial	11:20 AM	5	0	3450	0	12650	56.74	69.35	22.34	27.30
	Final	11:25 AM	**45**	3450		12650					
10	Initial	11:26 AM	5	0	3500	0	12600	57.56	69.08	22.66	27.20
	Final	11:31 AM	**50**	3500		12600					
11	Initial	11:32 AM	5	0	3450	0	12500	56.74	68.53	22.34	26.98
	Final	11:37 AM	**55**	3450		12500					
12	Initial	11:38 AM	5	0	3450	0	12500	56.74	68.53	22.34	26.98
	Final	11:43 AM	**60**	3450		12500					

INFILTRATION CALCULATIONS

Project Name	Proposed Industrial Building
Project Location	Rialto, California
Project Number	23G146-2
Engineer	JJH

Infiltration Test No: I-3

Constants	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.785	730
Anlr. Spac	2	2.356	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Ring Flow (cm^3)	Annular Ring (ml)	Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Annular Space* (cm/hr)	Inner Ring* (in/hr)	Annular Space* (in/hr)
1	Initial	9:42 AM	5	0	4050	0	12950	66.61	70.99	26.22	27.95
	Final	9:47 AM	**5**	4050		12950					
2	Initial	9:48 AM	5	0	3950	0	12900	64.96	70.72	25.58	27.84
	Final	9:53 AM	**10**	3950		12900					
3	Initial	9:54 AM	5	0	3900	0	12800	64.14	70.17	25.25	27.63
	Final	9:59 AM	**15**	3900		12800					
4	Initial	10:00 AM	5	0	3850	0	12700	63.32	69.62	24.93	27.41
	Final	10:05 AM	**20**	3850		12700					
5	Initial	10:06 AM	5	0	3800	0	12750	62.50	69.90	24.61	27.52
	Final	10:11 AM	**25**	3800		12750					
6	Initial	10:12 AM	5	0	3850	0	12600	63.32	69.08	24.93	27.20
	Final	10:17 AM	**30**	3850		12600					
7	Initial	10:18 AM	5	0	3750	0	12500	61.67	68.53	24.28	26.98
	Final	10:23 AM	**35**	3750		12500					
8	Initial	10:24 AM	5	0	3800	0	12400	62.50	67.98	24.61	26.76
	Final	10:29 AM	**40**	3800		12400					
9	Initial	10:30 AM	5	0	3750	0	12450	61.67	68.25	24.28	26.87
	Final	10:35 AM	**45**	3750		12450					
10	Initial	10:36 AM	5	0	3700	0	12400	60.85	67.98	23.96	26.76
	Final	10:41 AM	**50**	3700		12400					
11	Initial	10:42 AM	5	0	3650	0	12300	60.03	67.43	23.63	26.55
	Final	10:47 AM	**55**	3650		12300					
12	Initial	10:48 AM	5	0	3650	0	12300	60.03	67.43	23.63	26.55
	Final	10:53 AM	**60**	3650		12300					

INFILTRATION CALCULATIONS

Project Name	Proposed Industrial Building
Project Location	Rialto, California
Project Number	23G146-2
Engineer	JJH

Infiltration Test No: I-4

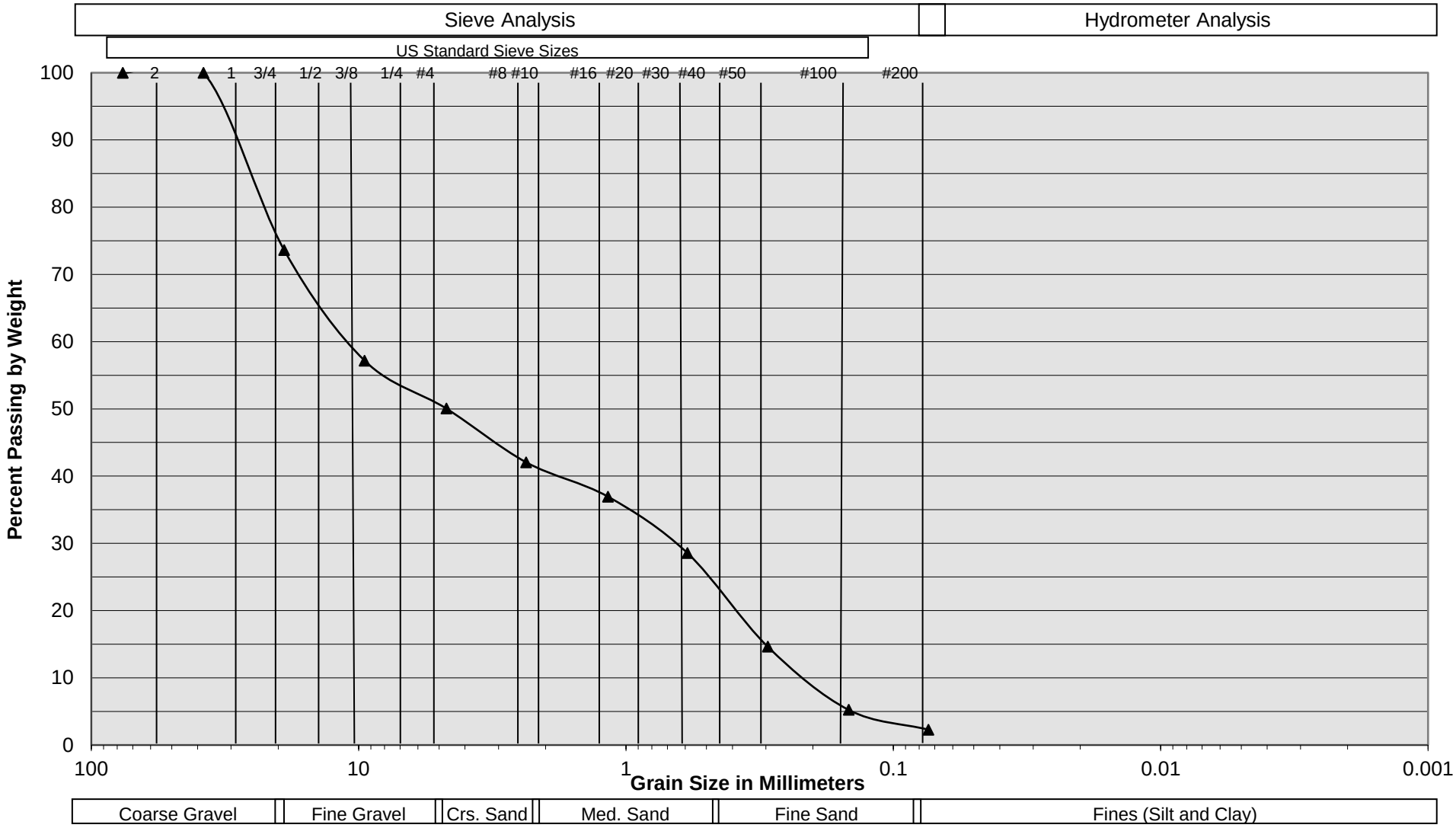
Constants

	Diameter (ft)	Area (ft^2)	Area (cm^2)
Inner	1	0.785	730
Anlr. Spac	2	2.356	2189

*Note: The infiltration rate was calculated based on current time interval

Test Interval		Time (hr)	Interval **Elapsed** (min)	Flow Readings: Inner Ring (ml)	Flow Readings: Ring Flow (cm^3)	Flow Readings: Annular Ring (ml)	Flow Readings: Space Flow (cm^3)	Infiltration Rates: Inner Ring* (cm/hr)	Infiltration Rates: Annular Space* (cm/hr)	Infiltration Rates: Inner Ring* (in/hr)	Infiltration Rates: Annular Space* (in/hr)
1	Initial	12:35 PM	5	0	3400	0	11500	55.92	63.05	22.02	24.82
	Final	12:40 PM	**5**	3400		11500					
2	Initial	12:41 PM	5	0	3250	0	11400	53.45	62.50	21.04	24.61
	Final	12:46 PM	**10**	3250		11400					
3	Initial	12:47 PM	5	0	3150	0	11300	51.81	61.95	20.40	24.39
	Final	12:52 PM	**15**	3150		11300					
4	Initial	12:53 PM	5	0	3000	0	11200	49.34	61.40	19.43	24.17
	Final	12:58 PM	**20**	3000		11200					
5	Initial	12:59 PM	5	0	2950	0	11200	48.52	61.40	19.10	24.17
	Final	1:04 PM	**25**	2950		11200					
6	Initial	1:05 PM	5	0	2900	0	11000	47.70	60.30	18.78	23.74
	Final	1:10 PM	**30**	2900		11000					
7	Initial	1:11 PM	5	0	2750	0	10000	45.23	54.82	17.81	21.58
	Final	1:16 PM	**35**	2750		10000					
8	Initial	1:17 PM	5	0	2800	0	11000	46.05	60.30	18.13	23.74
	Final	1:22 PM	**40**	2800		11000					
9	Initial	1:23 PM	5	0	2750	0	10000	45.23	54.82	17.81	21.58
	Final	1:28 PM	**45**	2750		10000					
10	Initial	1:29 PM	5	0	2700	0	10000	44.41	54.82	17.48	21.58
	Final	1:34 PM	**50**	2700		10000					
11	Initial	1:35 PM	5	0	2700	0	9900	44.41	54.27	17.48	21.37
	Final	1:40 PM	**55**	2700		9900					
12	Initial	1:41 PM	5	0	2700	0	9950	44.41	54.55	17.48	21.48
	Final	1:46 PM	**60**	2700		9950					

Grain Size Distribution

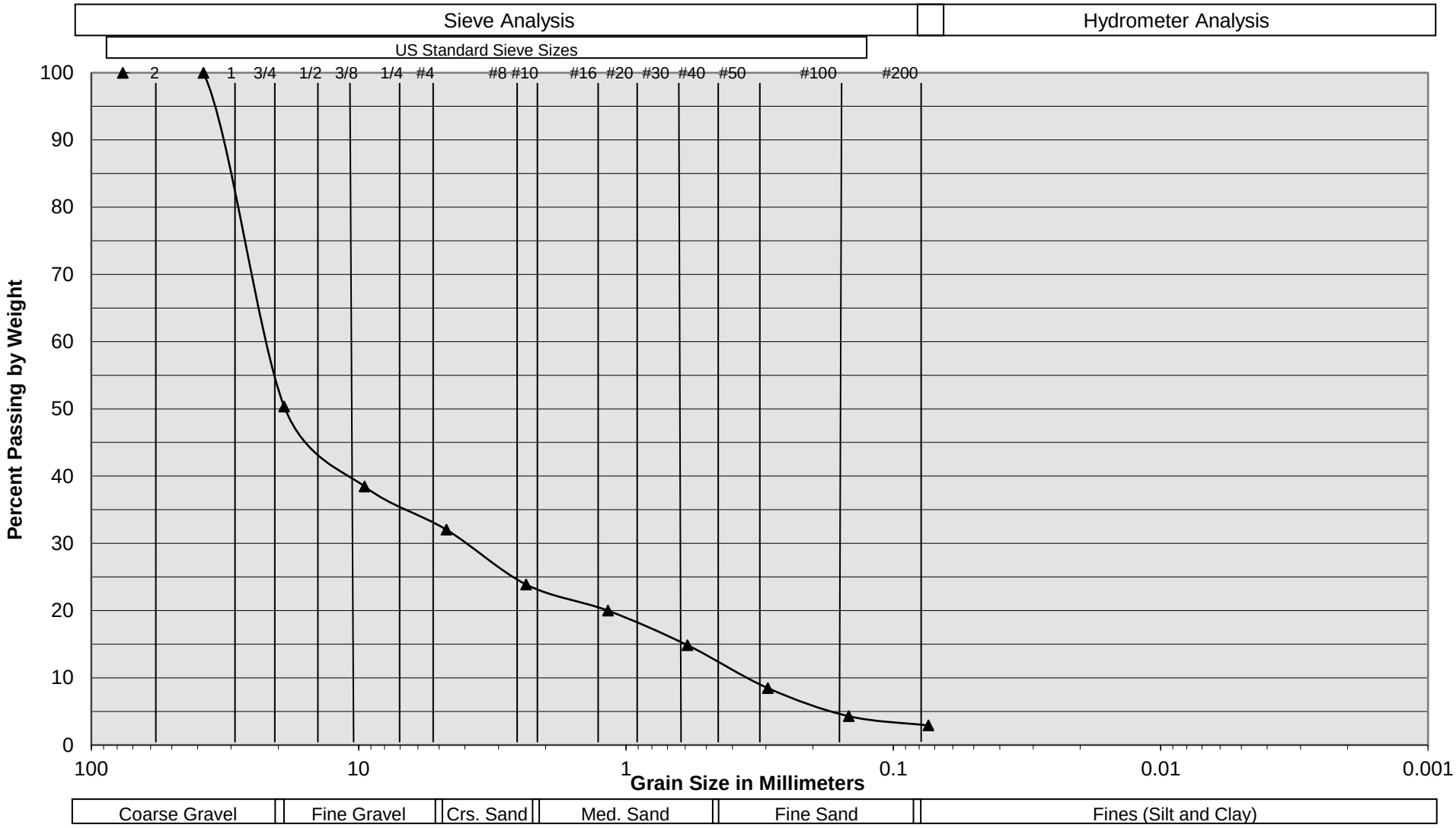


Sample Description	I-1 @ 10'
Soil Classification	Light Brown Gravelly fine to coarse Sand/fine to coarse Sandy Gravel

Proposed Industrial Building
Rialto, California
Project No. 23G146-2
PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution

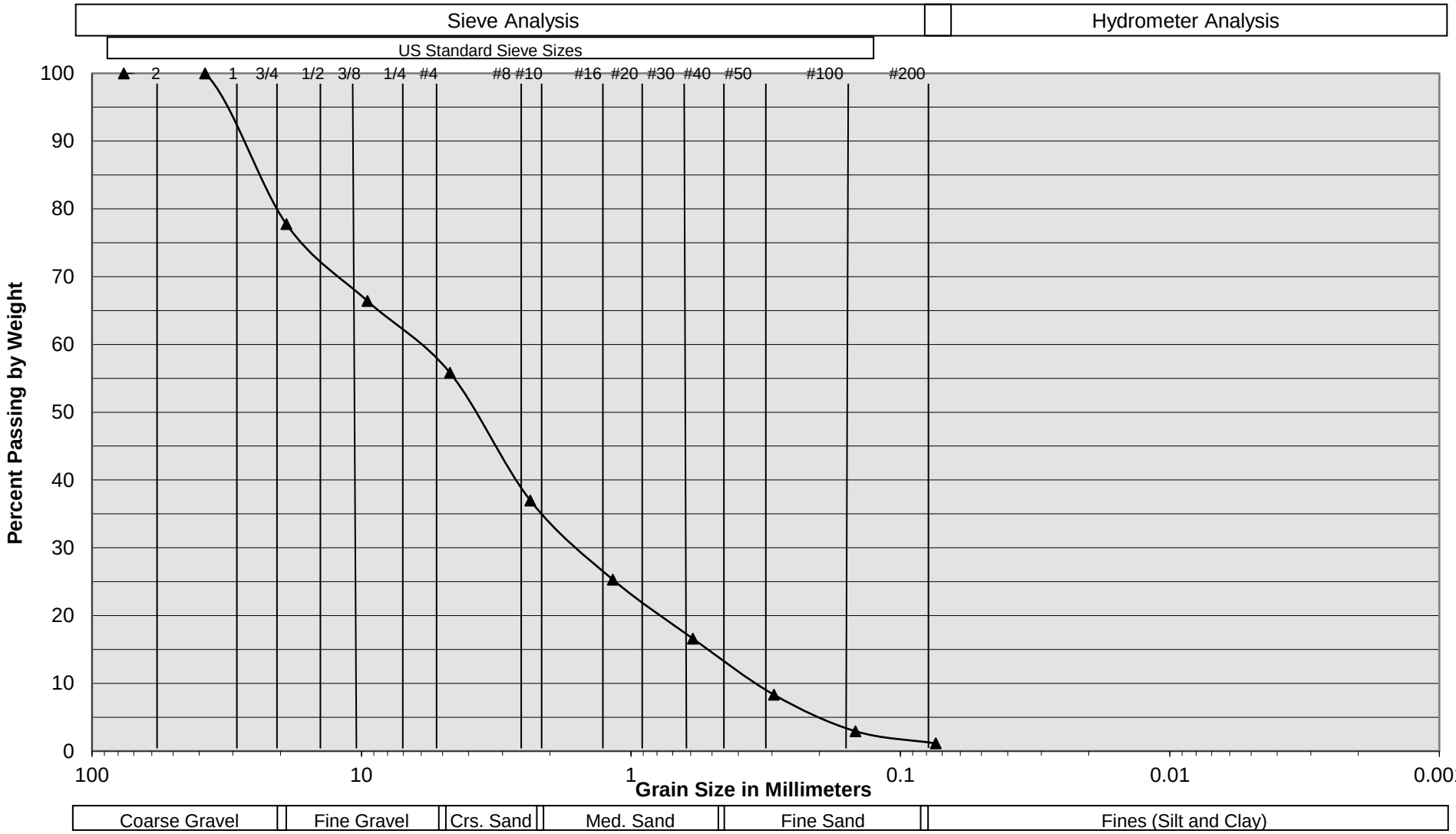


Sample Description	I-2 @ 10'
Soil Classification	Brown fine to coarse Sandy Gravel

Proposed Industrial Building
Rialto, California
Project No. 23G146-2
PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution

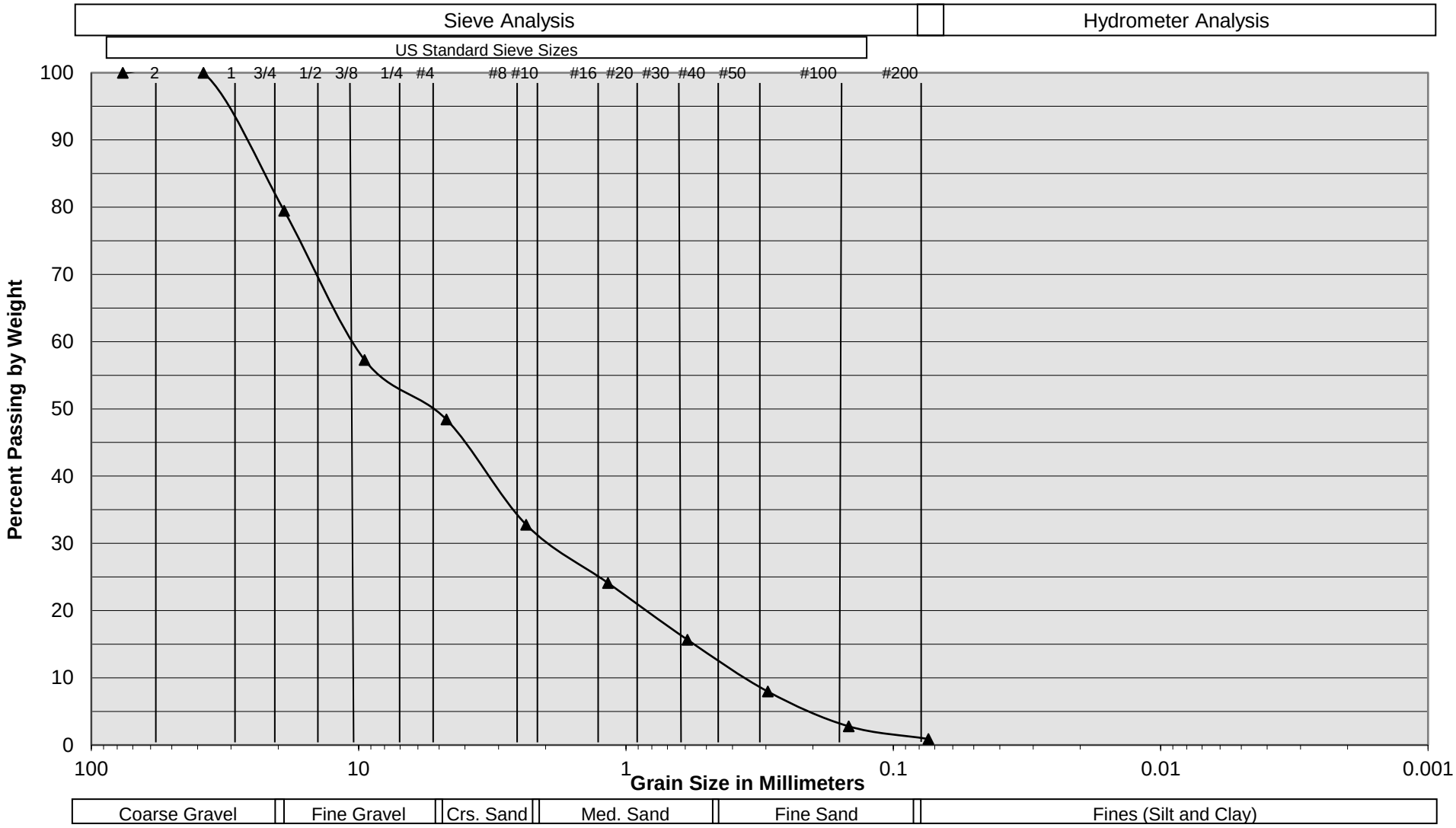


Sample Description	I-3 @ 10'
Soil Classification	Light Brown Gravelly fine to coarse Sand

Proposed Industrial Building
Rialto, California
Project No. 23G146-2
PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Grain Size Distribution



Sample Description	I-4 @ 10'
Soil Classification	Brown Gravelly fine to coarse Sand/fine to coarse Sandy Gravel

Proposed Industrial Building
Rialto, California
Project No. 23G146-2
PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

GEOTECHNICAL INVESTIGATION
PROPOSED INDUSTRIAL BUILDING

SWC West Lowell Street and North Locust Avenue
Rialto, California
for
Brookfield Properties

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

June 26, 2023

Brookfield Properties
2101 Rosecrans Avenue, Suite 6250
El Segundo, California 90245

Attention: Mr. Amir Latifian
Associate, Development | Logistics

Project No.: **23G146-1**

Subject: **Geotechnical Investigation**
Proposed Industrial Building
SWC West Lowell Street and North Locust Avenue
Rialto, California

Mr. Latifian:

In accordance with your request, we have conducted a geotechnical investigation at the subject site. We are pleased to present this report summarizing the conclusions and recommendations developed from our investigation.

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

Respectfully Submitted,

SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Joseph Lozano Leon
Staff Engineer

Robert G. Trazo, GE 2655
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
ROBERT TRAZO
No. 2655
GEOTECHNICAL
STATE OF CALIFORNIA

Distribution: (1) Addressee

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A Plate 1: Site Location Map
Plate 2: Boring and Trench Location Plan
B Boring and Trench Logs
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D Grading Guide Specifications
E Seismic Design Parameters

1.0 EXECUTIVE SUMMARY

Presented below is a brief summary of the conclusions and recommendations of this investigation. Since this summary is not all inclusive, it should be read in complete context with the entire report.

Geotechnical Design Considerations

- Artificial fill soils were encountered at the ground surface at all of the boring and trench locations, extending to depths of 2 to 4½± feet below the existing site grades.
- Results of laboratory testing indicate that the fill soils are compressible when loaded and may be subject to significant hydrocollapse when inundated with water. Based on a lack of documentation regarding the placement and compaction of the existing fill materials, these soils are considered to be undocumented fill. Therefore, the fill soils are not suitable for the support of the foundation loads of the proposed building.
- The fill soils and near-surface alluvial soils possess varying strengths. The fill soils are underlain by native alluvium which possesses favorable consolidation/collapse characteristics.
- Based on these conditions, remedial grading is considered warranted within the proposed building area in order to remove all of the undocumented fill soils and a portion of the near-surface native alluvial soils.
- The on-site soils contain significant amounts of oversized materials, including cobbles and boulders. Where grading will require excavation into these materials, selective grading techniques will be required to remove the cobbles and/or boulders from these soils prior to reuse as fill.

Site Preparation Recommendations

- Initial site preparation should include stripping of any surficial vegetation. The surficial vegetation, and any organic soils should be properly disposed of off-site.
- Remedial grading is recommended to be performed within the proposed building area in order to remove all of the undocumented fill soils in their entirety and the upper portion of the near-surface native alluvial soils, and replace these materials as compacted structural fill soils. The soils within the proposed building area should be overexcavated to a depth of 4 feet below existing grade and to a depth of at least 3 feet below proposed building pad subgrade elevations, whichever is greater.
- The depth of overexcavation should also be sufficient to remove any existing fill soils. The proposed foundation influence zones should be overexcavated to a depth of at least 3 feet below proposed foundation bearing grade.
- The overexcavation areas should extend at least 5 feet beyond the building and foundation perimeters, and to an extent equal to the depth of fill placed below the foundation bearing grade, whichever is greater.
- Following completion of the overexcavation, the exposed soils should be scarified to a depth of at least 12 inches, and thoroughly flooded to raise the moisture content of the underlying soils to at least 0 to 4 percent above optimum moisture content, extending to a depth of at least 24 inches. The overexcavation subgrade soils should then be recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.

- It is recommended that materials greater than 6-inches in size be excluded from the upper 1 foot of the surface of any compacted fills. Materials greater than 6-inches may also be excluded in planned utility trench locations, if desired, to aid in future trench excavation and backfill. Materials greater than 6-inches in size but smaller than 12-inches in size can be placed within the upper 8 feet of any compacted fills. Larger boulders (24±-inches in size and larger) should be sorted, hauled off-site or stockpiled. A portion of the 24-inch and greater diameter material can be placed at the bottom of the deeper overexcavations (10 feet or greater below the proposed grades). On-site sandy soils should then be thoroughly wetted around the oversize material that was placed at the bottom of the overexcavation.
- The new pavement and flatwork subgrade soils are recommended to be scarified to a depth of 12± inches, thoroughly moisture conditioned and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Foundation Design Recommendations

- Conventional shallow foundations, supported in newly placed compacted fill.
- 3,000 lbs/ft^2 maximum allowable soil bearing pressure.
- Maximum, net allowable soil bearing pressure: 2,000 lbs/ft^2 for new footings if the full lateral extent of remedial grading cannot be achieved.
- Reinforcement consisting of at least two (2) No. 5 rebars (1 top and 1 bottom) in strip footings. Additional reinforcement may be necessary for structural considerations.

Building Floor Slab Design Recommendations

- Conventional Slab-on-Grade: minimum 6-inch thickness.
- Modulus of Subgrade Reaction: k = 150 psi/in.
- Reinforcement is not expected to be necessary for geotechnical considerations.
- The actual thickness and reinforcement of the floor slab should be determined by the structural engineer.

Pavement Design Recommendations

ASPHALT PAVEMENTS (R=50)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	3	4	5	5	7
Compacted Subgrade	12	12	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R=50)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in accordance with our Proposal No. 23P123, dated January 31, 2023. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analysis to provide criteria for preparing the design of the building foundations, building floor slab, and parking lot pavements along with site preparation recommendations and construction considerations for the proposed development. The evaluation of the environmental aspects of this site was beyond the scope of services for this geotechnical investigation.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The subject site is located at the southwest corner of West Lowell Street and North Locust Avenue in Rialto, California. The site is bounded to the north by West Lowell Street, to the west by a truck yard lot and Lake Padden Lane, to the south by a vacant lot used for stockpiling concrete mix materials, and to the east by commercial development and North Locust Avenue. The general location of the site is illustrated on the Site Location Map, enclosed as Plate 1 in Appendix A of this report.

The subject site is an L-shaped property consisting of several rectangular-shaped parcels, which total 39.92± acres in size. The majority of the site is vacant and undeveloped except for portions of the northern and southern parcels which appear to have been graded. Ground surface coverage in the undeveloped areas consists of exposed soil with sparse to moderate native grass and weed growth. Ground surface coverage in the graded areas consists of crushed aggregate base (CAB). Remnants of two previous structures are located in the southwest corner of the site.

Detailed topographic information was not available at the time of this report. Based on elevations obtained from Google Earth, and visual observations made at the time of the subsurface investigation, the overall site topography slopes downward to the south and southeast at gradients of 1½ to 2½± percent.

3.2 Proposed Development

A conceptual site plan was provided to our office by the client. Based on this plan, the subject site will be developed with a 750,560± ft² industrial building, located in the western area of the site. Dock-high doors will be constructed along a portion of the east building wall. The new building is expected to be surrounded by asphaltic concrete (AC) pavements in the parking and drive areas, and Portland cement concrete (PCC) pavements in the loading dock area. Several landscaped planters and concrete flatwork are also expected to be included throughout the site.

Detailed structural information has not been provided. It is assumed that the new building will be a single-story structure of tilt-up concrete construction, supported on a conventional shallow foundation system with a concrete slab-on-grade floor. Based on the assumed construction, maximum column and wall loads are expected to be on the order of 100 kips and 4 to 7 kips per linear foot, respectively.

No significant amounts of below grade construction, such as basements or crawl spaces, are expected to be included in the proposed development. Based on the assumed topography, cuts and fills of up to 5 to 7± feet are expected to be necessary to achieve the proposed site grades. It should be noted that this estimate does not include any remedial grading, recommendations for which are presented in a subsequent section of this report.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of twelve (12) borings (identified as Boring Nos. B-1 through B-12) advanced to depths of 4 to 25± feet below the existing site grades, and ten (10) trenches (identified as Trench Nos. T-1 through T-10) excavated to depths of 6½ to 10± feet. Most of the borings were terminated at depths shallower than proposed after encountering refusal on very dense cobbles. All of the borings and trenches were logged during the drilling and excavation by members of our staff.

Please note that Boring Nos. B-2, B-4, and B-8 as well as Trench Nos. T-9 and T-10 were drilled and excavated in May 2023. All of the other borings and trenches were drilled and excavated in May 2016. Based on recent visual observation and comparison of site photographs from 2016 and now, the surface grades between 2016 and 2023 are considered to be generally similar.

The borings were advanced with hollow-stem augers, by a truck-mounted drilling rig. The trenches were excavated using a backhoe with a 36-inch-wide bucket. Representative bulk and undisturbed soil samples were taken during drilling. Relatively undisturbed samples were taken with a split barrel "California Sampler" containing a series of one inch long, 2.416± inch diameter brass rings. This sampling method is described in ASTM Test Method D-3550. Samples were also taken using a 1.4± inch inside diameter split spoon sampler, in general accordance with ASTM D-1586. Both of these samplers are driven into the ground with successive blows of a 140-pound weight falling 30 inches. The blow counts obtained during driving are recorded for further analysis. Bulk samples were collected in plastic bags to retain their original moisture content. The relatively undisturbed ring samples were placed in molded plastic sleeves that were then sealed and transported to our laboratory.

The approximate locations of the borings and trenches are indicated on the Boring and Trench Location Plan, included as Plate 2 in Appendix A of this report. The Boring and Trench Logs, which illustrate the conditions encountered at the boring and trench locations, as well as the results of some of the laboratory testing, are included in Appendix B.

4.2 Geotechnical Conditions

Artificial Fill

Artificial fill soils were encountered at the ground surface at most of the boring and trench locations, with the exception of Boring Nos. B-4, B-6, B-10 and B-11 and Trench No. T-10, extending to depths of 2 to 4½± feet below the existing site grades. The fill soils generally consist of medium dense to very dense silty sands and gravelly sands, and occasional loose silty sands. The fill soils possess a disturbed appearance and some samples contain artificial debris, such as plastic, metal, and clothing fragments, resulting in their classification as artificial fill.

Alluvium

Native alluvial soils were encountered at the ground surface at Boring Nos. B-4, B-6, B-10 and B-11 and Trench No. T-10, and beneath the fill soils at the remaining boring and trench locations, extending to at least the maximum depth explored of 25± feet below the existing site grades. The alluvium generally consists of dense to very dense gravelly sands and sandy gravels, and occasional medium dense to very dense sands and silty sands. Occasional to extensive cobbles were encountered at the boring and trench locations at various depths. Occasional boulders were encountered at all of the trench locations at depths of 2½ to 4½± feet.

Groundwater

Free water was not encountered during the drilling of any of the borings nor during the excavation of the trenches. Based on the lack of any water within the borings and trench, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 25± feet at the time of the subsurface exploration.

As part of our research, we reviewed readily available groundwater data in order to determine regional groundwater depths. Recent water level data was obtained from the California Department of Water Resources, Water Data Library Station Map, website, https://wdl.water.ca.gov/waterdatalibrary/. One monitoring well on record is located as close as 3,700 feet east-northeast of the site. Water level readings within this monitoring well indicate a high groundwater level of 279± feet below the ground surface in June 1993.

5.0 LABORATORY TESTING

The soil samples recovered from the subsurface exploration were returned to our laboratory for further testing to determine selected physical and engineering properties of the soils. The tests are briefly discussed below. It should be noted that the test results are specific to the actual samples tested, and variations could be expected at other locations and depths.

Classification

All recovered soil samples were classified using the Unified Soil Classification System (USCS), in accordance with ASTM D-2488. The field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring and Trench Logs and are periodically referenced throughout this report.

Density and Moisture Content

The density has been determined for selected relatively undisturbed ring samples. These densities were determined in general accordance with the method presented in ASTM D-2937. The results are recorded as dry unit weight in pounds per cubic foot. The moisture contents are 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 and Trench Logs.

Consolidation

Selected soil samples were tested to determine their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to determine their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-7 in Appendix C of this report.

Maximum Dry Density and Optimum Moisture Content

Representative bulk samples were tested to determine their maximum dry densities and optimum moisture contents. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557. These tests are generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil type or soil mixes may be necessary at a later date. The results of the testing are plotted on Plates C-8 and C-9 in Appendix C of this report.

Soluble Sulfates

Representative samples of the near-surface soils were submitted to a subcontracted analytical laboratory for determination of soluble sulfate content. Soluble sulfates are naturally present in soils, and if the concentration is high enough, can result in degradation of concrete which comes

into contact with these soils. The results of the soluble sulfate testing are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	Soluble Sulfates (%)	Severity	Class
B-1 @ 0 to 5 feet	0.0016	Not Applicable	S0
B-2 @ 1 to 5 feet	0.0012	Not Applicable	S0
B-5 @ 0 to 5 feet	0.0014	Not Applicable	S0
B-9 @ 0 to 5 feet	0.0014	Not Applicable	S0
B-12 @ 0 to 5 feet	0.0040	Not Applicable	S0

Corrosivity Testing

One representative sample of the near-surface soils was submitted to a subcontracted corrosion engineering laboratory for determination of electrical resistivity, pH, and chloride concentrations. The resistivity of the soils is a measure of their potential to attack buried metal improvements such as utility lines. The results of some of these tests are presented below.

Sample Identification	Saturated Resistivity (ohm-cm)	pH	Chlorides (mg/kg)	Nitrates (mg/kg)	Sulfides (mg/kg)	Redox Potential (mV)
B-2 @ 1 to 5 feet	14,740	8.0	7.9	30.1	0.1	106

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our review, field exploration, laboratory testing and geotechnical analysis, the proposed development is considered feasible from a geotechnical standpoint. The recommendations contained in this report should be taken into the design, construction, and grading considerations.

The recommendations are contingent upon grading and foundation construction activities being monitored by the geotechnical engineer of record. The recommendations are provided with the assumption that an adequate program of client consultation, construction monitoring, and testing will be performed during the final design and construction phases to verify compliance with these recommendations. Maintaining Southern California Geotechnical, Inc., (SCG) as the geotechnical consultant from the beginning to the end of the project will provide continuity of services. The geotechnical engineering firm providing testing and observation services shall assume the responsibility of Geotechnical Engineer of Record.

The Grading Guide Specifications, included as Appendix D, should be considered part of this report, and should be incorporated into the project specifications. The contractor and/or owner of the development should bring to the attention of the geotechnical engineer conditions that differ from those stated in this report, or which may be detrimental for the development.

6.1 Seismic Design Considerations

The subject site is located in an area which is subject to strong ground motions due to earthquakes. The performance of a site-specific seismic hazards analysis was beyond the scope of this investigation. However, numerous faults capable of producing significant ground motions are located near the subject site. Due to economic considerations, it is not generally considered reasonable to design a structure that is not susceptible to earthquake damage. Therefore, significant damage to structures may be unavoidable during large earthquakes. The proposed structure should, however, be designed to resist structural collapse and thereby provide reasonable protection from serious injury, catastrophic property damage and loss of life.

Faulting and Seismicity

Research of available maps indicates that the subject site is not located within an Alquist-Priolo Earthquake Fault Zone. Furthermore, SCG did not identify any evidence of faulting during the geotechnical investigation. Therefore, the possibility of significant fault rupture on the site is considered to be low.

The potential for other geologic hazards such as seismically induced settlement, lateral spreading, tsunamis, inundation, seiches, flooding, and subsidence affecting the site is considered low.

Seismic Design Parameters

The 2022 California Building Code (CBC) provides procedures for earthquake resistant structural design that include considerations for on-site soil conditions, occupancy, and the configuration of

the structure including the structural system and height. The seismic design parameters presented below are based on the soil profile and the proximity of known faults with respect to the subject site. Based on the adoption of the 2022 CBC on January 1, 2023, we expect that the proposed development will be designed in accordance with the 2022 CBC.

The 2022 CBC Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool, a web-based software application available at the website www.seismicmaps.org. This software application calculates seismic design parameters in accordance with several building code reference documents, including ASCE 7-16, upon which the 2022 CBC is based. The application utilizes a database of risk-targeted maximum considered earthquake (MCE_R) site accelerations at 0.01-degree intervals for each of the code documents. The table below was created using data obtained from the application. The output generated from this program is included as Plate E-1 in Appendix E of this report. Based on this output, the following parameters may be utilized for the subject site:

2022 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped Spectral Acceleration at 0.2 sec Period	S_S	2.270
Mapped Spectral Acceleration at 1.0 sec Period	S_1	0.775
Site Class	---	C
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	2.724
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	1.085
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	1.816
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.724

Liquefaction

Liquefaction is the loss of strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors which influence the potential for liquefaction include groundwater table elevation, soil type and grain size characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. The depth within which the occurrence of liquefaction may impact surface improvements is generally identified as the upper 50 feet below the existing ground surface. Liquefaction potential is greater in saturated, loose, poorly graded fine sands with a mean (d_{50}) grain size in the range of 0.075 to 0.2 mm (Seed and Idriss, 1971). Clayey (cohesive) soils or soils which possess clay particles (d<0.005mm) in excess of 20 percent (Seed and Idriss, 1982) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

The California Geological Survey (CGS) has not yet conducted seismic hazard mapping in the area of the subject site. The San Bernardino County Land Use Plan, Geologic Hazard Overlays, Devore Quadrangle, FH21C, indicates that the subject site is not located within a zone of liquefaction susceptibility. In addition, the subsurface conditions at the boring and trench locations are not considered to be conducive to liquefaction. These conditions generally consist of dense to very dense, well-graded, granular soils, and no evidence of a historic high ground water table within

the upper 50± feet of the ground surface. Based on the mapping performed by San Bernardino County and the conditions encountered at the boring and trench locations, liquefaction is not considered to be a design concern for this project.

6.2 Geotechnical Design Considerations

General

Artificial fill soils were encountered at the ground surface at most of the boring and trench locations, extending to depths of 2 to 4½± feet below the existing site grades. Results of laboratory testing indicate that the fill soils are compressible when loaded and may be subject to significant hydrocollapse when inundated with water. Based on a lack of documentation regarding the placement and compaction of the existing fill materials, these soils are considered to be undocumented fill. Therefore, the fill soils are not suitable for the support of the foundation loads of the proposed building. The fill soils and near-surface alluvial soils possess varying strengths. The fill soils are underlain by native alluvium which possesses favorable consolidation/collapse characteristics at a depth of approximately 4 feet from the ground surface. Based on these conditions, the undocumented fill soils and near-surface alluvial soils, in their present condition, are not considered suitable to support the foundation loads of the new building. Based on these conditions, remedial grading is considered warranted within the proposed building area in order to remove all of the undocumented fill soils and a portion of the near-surface native alluvial soils.

The on-site soils contain significant amounts of oversized materials, including cobbles and boulders. Where grading will require excavation into these materials, selective grading techniques will be required to remove the cobbles and/or boulders from these soils prior to reuse as fill.

Settlement

The recommended remedial grading will remove the existing undocumented fill soils and a portion of the near-surface native alluvial soils and replace these materials as compacted structural fill. The native soils that will remain in place below the recommended depth of overexcavation will not be subject to significant stress increases from the foundations of the new structure. Provided that the recommended remedial grading is completed, the post-construction static settlements of the proposed structure are expected to be within tolerable limits.

Expansion

The near-surface soils consist of silty sands and gravelly sands with no appreciable clay content. These materials have been visually classified as non-expansive. Therefore, no design considerations related to expansive soils are considered warranted for this site.

Soluble Sulfates

The results of the soluble sulfate testing, discussed in Section 5.0 of this report, indicate soluble sulfate concentrations of up to 0.0040 percent. These concentrations are considered to be negligible or "not applicable" with respect to the American Concrete Institute (ACI) Publication 318-05 Building Code Requirements for Structural Concrete and Commentary, Section 4.3.

Therefore, specialized concrete mix designs are not considered to be necessary, with regard to sulfate protection purposes. It is, however, recommended that additional soluble sulfate testing be conducted at the completion of rough grading to verify the soluble sulfate concentrations of the soils which are present at pad grade within the building area.

Corrosion Potential

The results of laboratory testing indicate that a representative sample of the on-site soils possesses a saturated resistivity of 14,740 ohm-cm, and a pH value of 8.0. The soils possess a redox potential of 106 mV and a sulfide concentration of 0.1 mg/kg. These test results have been evaluated in accordance with guidelines published by the Ductile Iron Pipe Research Association (DIPRA). The DIPRA guidelines consist of a point system by which characteristics of the soils are used to quantify the corrosivity characteristics of the site. Resistivity, pH, sulfide concentration, redox potential, and moisture content are the five factors that enter into the evaluation procedure. Based on these factors, the on-site soils are not considered to be corrosive to ferrous pipes. Therefore, corrosion protection is not expected to be required for cast iron or ductile iron pipes.

Based on American Concrete Institute (ACI) Publication 318 Building Code Requirements for Structural Concrete and Commentary, reinforced concrete that is exposed to external sources of chlorides requires corrosion protection for the steel reinforcement contained within the concrete. ACI 318 defines concrete exposed to moisture and an external source of chlorides as "severe" or exposure category C2. ACI 318 does not clearly define a specific chloride concentration at which contact with the adjacent soil will constitute a "C2" or severe exposure. However, the Caltrans Memo to Designers 10-5, Protection of Reinforcement Against Corrosion Due to Chlorides, Acids and Sulfates, dated June 2010, indicates that soils possessing chloride concentrations greater than 500 mg/kg are considered to be corrosive to reinforced concrete. The results of the laboratory testing indicate a chloride concentration of 7.9 mg/kg. Although the soils contain some chlorides, we do not expect that the chloride concentrations of the tested soils are high enough to constitute a "severe" or C2 chloride exposure. Therefore, a chloride exposure category of C1 is considered appropriate for this site.

Nitrates present in soil can be corrosive to copper tubing at concentrations greater than 50 mg/kg. The tested sample possesses a nitrate concentration of 30.1 mg/kg. Based on this test result, the on-site soils are not considered to be corrosive to copper pipe.

Since SCG does not practice in the area of corrosion engineering, we recommend that the client contact a corrosion engineer to provide a more thorough evaluation of these test results.

Shrinkage/Subsidence

Removal and recompaction of the near-surface alluvium is estimated to result in an average shrinkage of 4 to 14 percent. However, potential shrinkage for individual samples ranged locally between 2 and 18 percent. The potential shrinkage estimate is based on dry density testing performed on small-diameter samples taken at the boring locations. If a more accurate and precise shrinkage estimate is desired, SCG can perform a shrinkage study involving several excavated test-pits where in-place densities are determined using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.15 feet.

These estimates are based on previous experience and the subsurface conditions encountered at the boring locations. The actual amount of subsidence is expected to be variable and will be dependent on the type of machinery used, repetitions of use, and dynamic effects, all of which are difficult to assess precisely.

Grading and Foundation Plan Review

Grading and foundation plans were unavailable at the time of this report. It is therefore recommended that we be provided with copies of the preliminary grading and foundation plans, when they become available, for review with regard to the conclusions, recommendations, and assumptions contained within this report.

6.3 Site Grading Recommendations

The grading recommendations presented below are based on the subsurface conditions encountered at the boring locations, and our understanding of the proposed development. We recommend that all grading activities be completed in accordance with the Grading Guide Specifications included as Appendix D of this report, unless superseded by site-specific recommendations presented below.

Demolition and Site Stripping

Initial site preparation should include stripping of any surficial vegetation. This includes the removal of native grass and weeds at the site as well as any trees that will not remain with the proposed development. The removal of any trees should also include their associated root masses. Any organic materials should be removed and disposed of off-site, or in non-structural areas of the property. The actual extent of site stripping should be determined in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered.

Demolition of any improvements that will not remain in place for use with the new development will be required at this site. Debris resultant from demolition should be disposed of off-site. All applicable federal, state and local specifications and regulations should be followed in demolition, abandonment, and disposal of the resulting debris.

Treatment of Existing Soils: Building Pad

Remedial grading should be performed within the proposed building area in order to remove the existing undocumented fill soils, and a portion of the near-surface native alluvium. Based on conditions encountered at the boring and trench locations, the existing soils within the proposed building area are recommended to be overexcavated to a depth of at least 4 feet below existing grade, and to a depth of at least 3 feet below proposed building pad subgrade elevations, whichever is greater. The depth of the overexcavation should also extend to a depth sufficient to remove all undocumented fill soils. Within the influence zones of the new foundations, the overexcavation should extend to a depth of at least 3 feet below proposed foundation bearing grade.

The overexcavation areas should extend at least 5 feet beyond the building and foundation perimeters, and to an extent equal to the depth of fill placed below the foundation bearing grade, whichever is greater. If the proposed structure incorporates any exterior columns (such as for a canopy or overhang) the area of overexcavation should also encompass these areas.

Following completion of the overexcavation, the subgrade soils within the overexcavation areas should be evaluated by the geotechnical engineer to verify their suitability to serve as the structural fill subgrade, as well as to support the foundation loads of the new structure. This evaluation should include proofrolling and probing to identify any soft, loose or otherwise unstable soils that must be removed. Some localized areas of deeper excavation may be required if fill materials or loose, porous, or low-density native soils are encountered at the base of the overexcavation.

After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches, and thoroughly flooded to raise the moisture content of the underlying soils to at least 0 to 4 percent above optimum moisture content, extending to a depth of at least 24 inches. The subgrade soils should then be recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The building pad area may then be raised to grade with previously excavated soils or imported structural fill.

Treatment of Existing Soils: Retaining Walls and Site Walls

The existing soils within the areas of proposed retaining and non-retaining site walls should be overexcavated to a depth of at least 3 feet below foundation bearing grade and replaced as compacted structural fill. Any undocumented fill soils within any of these foundation areas should be removed in their entirety. The overexcavation areas should extend at least 3 feet beyond the foundation perimeters, and to an extent equal to the depth of fill below the new foundations. Please note that erection pads are considered to be part of the foundation system. These overexcavation recommendations apply to erection pads also. The overexcavation subgrade soils should be evaluated by the geotechnical engineer prior to scarifying, moisture conditioning to within 0 to 4 percent above the optimum moisture content, and recompacting the upper 12 inches of exposed subgrade soils. The previously excavated soils may then be replaced as compacted structural fill.

If the full lateral extent of overexcavation is not achievable for the proposed walls, foundation elements must be redesigned using a lower bearing pressure. The geotechnical engineer of record should be contacted for recommendations pertaining to this type of condition.

Treatment of Existing Soils: Flatwork, Parking and Drive Areas

Based on economic considerations, overexcavation of the existing near-surface existing soils in the new flatwork, parking and drive areas is not considered warranted, with the exception of areas where lower strength or unstable soils are identified by the geotechnical engineer during grading. Subgrade preparation in the new flatwork, parking and drive areas should initially consist of removal of all soils disturbed during stripping and demolition operations.

The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. Any such materials should be removed to a level of firm and unyielding soil. The exposed subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 0 to 4 percent above the optimum moisture content, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength surficial soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

The grading recommendations presented above for the proposed flatwork, parking and drive areas assume that the owner and/or developer can tolerate minor amounts of settlement within these areas. The grading recommendations presented above do not mitigate the extent of compressible/collapsible native alluvium in the flatwork, parking and drive areas. As such, some settlement and associated pavement distress could occur. Typically, repair of such distressed areas involves significantly lower costs than completely mitigating these soils at the time of construction. If the owner cannot tolerate the risk of such settlements, the flatwork, parking and drive areas should be overexcavated to a depth of 2 feet below proposed pavement subgrade elevation, with the resulting soils replaced as compacted structural fill.

Selective Grading and Oversized Material Placement

The native alluvial soils possess significant cobbles and occasional boulders. It is expected that large scrapers (Caterpillar 657 or equivalent) will be adequate to move the cobble containing soils as well the soils containing smaller boulders. However, some larger boulders (2± feet in size) are expected to be encountered. It will likely be necessary to move such larger boulders individually, and remove them from the site or place them as oversized materials in accordance with the Grading Guide Specifications, in Appendix D of this report.

It is recommended that materials greater than 6-inches in size be excluded from the upper 1 foot of the surface of any compacted fills. Materials greater than 6-inches may also be excluded in planned utility trench locations, if desired, to aid in future trench excavation and backfill. Materials greater than 6-inches in size but smaller than 12-inches in size can be placed within the upper 8 feet of any compacted fills. Larger boulders (24±-inches in size and larger) should be sorted, hauled off-site or stockpiled. A portion of the 24-inch and greater diameter material can be placed at the bottom of the deeper overexcavations (10 feet or greater below the proposed grades). On-site sandy soils should then be thoroughly wetted around the oversize material that was placed at the bottom of the overexcavation.

The placement of oversized materials should be performed in accordance with the Grading Guide Specifications included in Appendix D of this report. If disposal of oversized materials is required, rock blankets or windrows should be used and such areas should be observed during construction and placement by a representative of the geotechnical engineer.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 0 to 4 percent above the optimum moisture content, and compacted.
- On-site soils may be used for fill provided they are cleaned of any debris to the satisfaction of the geotechnical engineer.

- All grading and fill placement activities should be completed in accordance with the requirements of the 2022 CBC and the grading code of the City of Rialto.
- All fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Fill soils should be well mixed.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Imported Structural Fill

Imported structural fill should consist of very low expansive (EI < 20), well graded soils possessing at least 10 percent fines (that portion of the sample passing the No. 200 sieve). Additional specifications for structural fill are presented in the Grading Guide Specifications, included as Appendix D.

Utility Trench Backfill

In general, utility trench backfill should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. As an alternative, a clean sand (minimum Sand Equivalent of 30) may be placed within trenches and compacted in place (jetting or flooding is not recommended). Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the City of Rialto. Utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

Utility trenches which parallel a footing, and extending below a 1h:1v (horizontal to vertical) plane projected from the outside edge of the footing should be backfilled with structural fill soils, compacted to at least 90 percent of the ASTM D-1557 standard. Pea gravel backfill should not be used for these trenches.

Soils used to backfill voids around subsurface utility structures, such as manholes or vaults, should be placed as compacted structural fill. If it is not practical to place compacted fill in these areas, then such void spaces may be backfilled with lean concrete slurry. Uncompacted pea gravel or sand is not recommended for backfilling these voids since these materials have a potential to settle and thereby cause distress of pavements placed around these subterranean structures.

6.4 Construction Considerations

Moisture Sensitive Subgrade Soils

Some of the near-surface soils possess appreciable silt content and may become unstable if exposed to significant moisture infiltration or disturbance by construction traffic. In addition, based on their granular content, some of the on-site soils will also be susceptible to erosion. The site should, therefore, be graded to prevent ponding of surface water and to prevent water from running into excavations.

Excavation Considerations

The near-surface soils generally consist of silty sands and gravelly sands. These materials may will be subject to moderate caving within shallow excavations. Where caving does occur, flattened excavation slopes may be sufficient to provide excavation stability. On a preliminary basis, the inclination of temporary slopes should not exceed 2h:1v. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. All excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Groundwater

The static groundwater table is considered to have existed at a depth in excess of at least 25± feet at the time of the subsurface exploration. Therefore, groundwater is not expected to impact the grading or foundation construction activities.

6.5 Foundation Design and Construction

Based on the preceding grading recommendations, it is assumed that the new building pad will be underlain by structural fill soils used to replace the upper portion of the near-surface alluvial soils. These new structural fill soils are expected to extend to a depth of at least 3 feet below proposed foundation bearing grade, underlain by 1± foot of additional soil that has been densified and moisture conditioned in place. Based on this subsurface profile, the proposed structure may be supported on conventional shallow foundations.

Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure: 3,000 lbs/ft^2.
- Maximum, net allowable soil bearing pressure: 2,000 lbs/ft^2 if the full recommended lateral extent of remedial grading cannot be achieved.
- Minimum wall/column footing width: 14 inches/24 inches.
- Minimum longitudinal steel reinforcement within strip footings: Two (2) No. 5 rebars (1 top and 1 bottom).
- Minimum foundation embedment: 12 inches into suitable structural fill soils, and at least 18 inches below adjacent exterior grade. Interior column footings may be placed immediately beneath the floor slab.
- It is recommended that the perimeter building foundations be continuous across all exterior doorways. Any flatwork adjacent to the exterior doors should be doweled into the perimeter foundations in a manner determined by the structural engineer.

The allowable bearing pressures presented above may be increased by 1/3 when considering short duration wind or seismic loads. The minimum steel reinforcement recommended above is based on geotechnical considerations; additional reinforcement may be necessary for structural considerations. The actual design of the foundations should be determined by the structural engineer.

Foundation Construction

The foundation subgrade soils should be evaluated at the time of overexcavation, as discussed in Section 6.3 of this report. It is further recommended that the foundation subgrade soils be evaluated by the geotechnical engineer immediately prior to steel or concrete placement. Soils suitable for direct foundation support should consist of newly placed structural fill, compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Any unsuitable materials should be removed to a depth of suitable bearing compacted structural fill or suitable native alluvium (where reduced bearing pressures are utilized), with the resulting excavations backfilled with compacted fill soils. As an alternative, lean concrete slurry (500 to 1,500 psi) may be used to backfill such isolated overexcavations.

The foundation subgrade soils should also be properly moisture conditioned to 0 to 4 percent above the Modified Proctor optimum, to a depth of at least 12 inches below bearing grade. Since it is typically not feasible to increase the moisture content of the floor slab and foundation subgrade soils once rough grading has been completed, care should be taken to maintain the moisture content of the building pad subgrade soils throughout the construction process.

Estimated Foundation Settlements

Post-construction total and differential settlements of shallow foundations designed and constructed in accordance with the previously presented recommendations are estimated to be less than 1.0 and 0.5 inches, respectively. Differential movements are expected to occur over a 50-foot span, thereby resulting in an angular distortion of less than 0.002 inches per inch.

Lateral Load Resistance

Lateral load resistance will be developed by a combination of friction acting at the base of foundations and the slab and the passive earth pressure developed by footings below grade. The following friction and passive pressure may be used to resist lateral forces:

- Passive Earth Pressure: 300 lbs/ft^3
- Friction Coefficient: 0.30

These are allowable values, and include a factor of safety. When combining friction and passive resistance, the passive pressure component should be reduced by one-third. These values assume that footings will be poured directly against compacted structural fill soils. The maximum allowable passive pressure is 3,000 lbs/ft^2.

6.6 Floor Slab Design and Construction

Subgrades which will support the new floor slab should be prepared in accordance with the recommendations contained in the ***Site Grading Recommendations*** section of this report. Based on the anticipated grading which will occur at this site, the floor of the proposed structure may be constructed as a conventional slab-on-grade supported on newly placed structural fill, extending to a depth of at least 3 feet below finished pad grades. Based on geotechnical considerations, the floor slab may be designed as follows:

- Minimum slab thickness: 6 inches.

- Modulus of Subgrade Reaction: k = 150 psi/in.

- Minimum slab reinforcement: Reinforcement is not considered necessary from a geotechnical standpoint. The actual floor slab reinforcement should be determined by the structural engineer, based on the imposed slab loading.

- Slab underlayment: If moisture sensitive floor coverings will be used then minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire area of the proposed slab where such moisture sensitive floor coverings are anticipated. The moisture vapor barrier should meet or exceed the Class A rating as defined by ASTM E 1745-97 and have a permeance rating less than 0.01 perms as described in ASTM E 96-95 and ASTM E 154-88. A polyolefin material such as a 15-mil Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with all applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated, the vapor barrier may be eliminated.

- Moisture condition the floor slab subgrade soils to 0 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.

- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.

The actual design of the floor slab should be completed by the structural engineer to verify adequate thickness and reinforcement.

6.7 Retaining Wall Design and Construction

Although not indicated on the site plans, some small (less than 6 feet in height) retaining walls may be required to facilitate the new site grades. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

Based on the soil conditions encountered at the boring locations, the following parameters may be used in the design of new retaining walls for this site. The following parameters assume that only the on-site soils will be utilized for retaining wall backfill. The near-surface soils generally consist of silty sands and gravelly sands. Based on their classification, these materials are expected to possess an internal angle of friction of at least 32 degrees when compacted to at least 90 percent of the ASTM D-1557 maximum dry density.

If desired, SCG could provide design parameters for an alternative select backfill material behind the retaining walls. The use of select backfill material could result in lower lateral earth pressures. In order to use the design parameters for the imported select fill, this material must be placed within the entire active failure wedge. This wedge is defined as extending from the heel of the retaining wall upwards at an angle of approximately 60° from horizontal. If select backfill material behind the retaining wall is desired, SCG should be contacted for supplementary recommendations.

RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type
		On-site Silty Sands
Internal Friction Angle (ϕ)		32°
Unit Weight		140 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	43 lbs/ft^3
	Active Condition (2h:1v backfill)	66 lbs/ft^3
	At-Rest Condition (level backfill)	66 lbs/ft^3

The walls should be designed using a soil-footing coefficient of friction of 0.30 and an equivalent passive pressure of 300 lbs/ft^3. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

The active earth pressure may be used for the design of retaining walls that do not directly support structures or support soils that in turn support structures and which will be allowed to deflect. The at-rest earth pressure should be used for walls that will not be allowed to deflect such as those which will support foundation bearing soils, or which will support foundation loads directly.

Where the soils on the toe side of the retaining wall are not covered by a "hard" surface such as a structure or pavement, the upper 1 foot of soil should be neglected when calculating passive

resistance due to the potential for the material to become disturbed or degraded during the life of the structure.

Seismic Lateral Earth Pressures

In accordance with the 2022 CBC, any retaining walls more than 6 feet in height must be designed for seismic lateral earth pressures. If walls 6 feet or more are required for this site, the geotechnical engineer should be contacted for supplementary seismic lateral earth pressure recommendations.

Retaining Wall Foundation Design

The retaining wall foundations should be underlain by at least 2 feet of newly placed structural fill. Foundations to support new retaining walls should be designed in accordance with the general Foundation Design Parameters presented in a previous section of this report.

Backfill Material

On-site soils may be used to backfill the retaining walls. **However, all backfill material placed within 3 feet of the back wall face should have a particle size no greater than 3 inches.** Some sorting and/or crushing operations may be required. The retaining wall backfill materials should be well graded.

It is recommended that a minimum 1-foot thick layer of free-draining granular material (less than 5 percent passing the No. 200 sieve) be placed against the face of the retaining walls. This material should extend from the top of the retaining wall footing to within 1 foot of the ground surface on the back side of the retaining wall. This material should be approved by the geotechnical engineer. In lieu of the 1-foot thick layer of free-draining material, a properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls, may be used. If the layer of free-draining material is not covered by an impermeable surface, such as a structure or pavement, a 12-inch thick layer of a low permeability soil should be placed over the backfill to reduce surface water migration to the underlying soils. The layer of free draining granular material should be separated from the backfill soils by a suitable geotextile, approved by the geotechnical engineer.

All retaining wall backfill should be placed and compacted under engineering controlled conditions in the necessary layer thicknesses to ensure an in-place density between 90 and 93 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557). Care should be taken to avoid over-compaction of the soils behind the retaining walls, and the use of heavy compaction equipment should be avoided.

Subsurface Drainage

As previously indicated, the retaining wall design parameters are based upon drained backfill conditions. Consequently, some form of permanent drainage system will be necessary in conjunction with the appropriate backfill material. Subsurface drainage may consist of either:

- A weep hole drainage system typically consisting of a series of 2-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 10-foot on-center spacing. Alternatively, 4-inch diameter holes at an approximate 20-foot on-center spacing can be used for this type of drainage system. In addition, the weep holes should include a 2 cubic foot pocket of open graded gravel, surrounded by an approved geotextile fabric, at each weep hole location.

- A 4-inch diameter perforated pipe surrounded by 2 cubic feet of gravel per linear foot of drain placed behind the wall, above the retaining wall footing. The gravel layer should be wrapped in a suitable geotextile fabric to reduce the potential for migration of fines. The footing drain should be extended to daylight or tied into a storm drainage system. The actual design of this type of system should be determined by the civil engineer to verify that the drainage system possesses the adequate capacity and slope for its intended use.

Weep holes or a footing drain will not be required for building stem walls.

6.8 Pavement Design Parameters

Site preparation in the pavement area should be completed as previously recommended in the ***Site Grading Recommendations*** section of this report. The subsequent pavement recommendations assume proper drainage and construction monitoring, and are based on either PCA or CALTRANS design parameters for a twenty (20) year design period. However, these designs also assume a routine pavement maintenance program to obtain the anticipated 20-year pavement service life.

Pavement Subgrades

It is anticipated that the new pavements will be primarily supported on a layer of compacted structural fill, consisting of scarified, thoroughly moisture conditioned and recompacted existing soils. The near-surface soils generally consist of sands, silty sands, and gravelly sands. Based on their classification, these materials are expected to excellent pavement support characteristics, with R-values in the range of 50 to 60. Since R-value testing was not included in the scope of services for this project, the subsequent pavement design is based upon an assumed R-value of 50. Fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering observed and tested conditions. It is recommended that R-value testing be performed after completion of rough grading to verify that the pavement design recommendations presented herein are valid.

Asphaltic Concrete

Presented below are the recommended thicknesses for new flexible pavement structures consisting of asphaltic concrete over a granular base. The pavement designs are based on the traffic indices (TI's) indicated. The client and/or civil engineer should verify that these TI's are representative of the anticipated traffic volumes. If the client and/or civil engineer determine that the expected traffic volume will exceed the applicable traffic index, we should be contacted for supplementary recommendations. The design traffic indices equate to the following approximate daily traffic volumes over a 20-year design life, assuming six operational traffic days per week.

Traffic Index	No. of Heavy Trucks per Day
4.0	0
5.0	1
6.0	3
7.0	11
8.0	35
9.0	93

For the purpose of the traffic volumes indicated above, a truck is defined as a 5-axle tractor trailer unit with one 8-kip axle and two 32-kip tandem axles. All of the traffic indices allow for 1,000 automobiles per day.

ASPHALT PAVEMENTS (R=50)					
Materials	**Thickness (inches)**				
	Auto Parking and Auto Drive Lanes (TI = 4.0 to 5.0)	Truck Traffic			
		TI = 6.0	TI = 7.0	TI = 8.0	TI = 9.0
Asphalt Concrete	3	3½	4	5	5½
Aggregate Base	3	4	5	5	7
Compacted Subgrade	12	12	12	12	12

The aggregate base course should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density. The asphaltic concrete should be compacted to at least 95 percent of the batch plant-reported maximum density. The aggregate base course may consist of crushed aggregate base (CAB) or crushed miscellaneous base (CMB), which is a recycled gravel, asphalt and concrete material. The gradation, R-Value, Sand Equivalent, and Percentage Wear of the CAB or CMB should comply with appropriate specifications contained in the current edition of the "Greenbook" Standard Specifications for Public Works Construction.

Portland Cement Concrete

The preparation of the subgrade soils within Portland cement concrete pavement areas should be performed as previously described in Section 6.3 "Treatment of Existing Soils: Flatwork, Parking, and Drive Areas". The minimum recommended thicknesses for the Portland Cement Concrete pavement sections are as follows:

PORTLAND CEMENT CONCRETE PAVEMENTS (R=50)				
Materials	**Thickness (inches)**			
	Autos and Light Truck Traffic (TI = 6.0)	Truck Traffic		
		TI = 7.0	TI = 8.0	TI = 9.0
PCC	5	5½	6½	8
Compacted Subgrade (95% minimum compaction)	12	12	12	12

The concrete should have a 28-day compressive strength of at least 3,000 psi. Reinforcing within all pavements should be designed by the structural engineer. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness. The actual joint spacing and reinforcing of the Portland cement concrete pavements should be determined by the structural engineer.

7.0 GENERAL COMMENTS

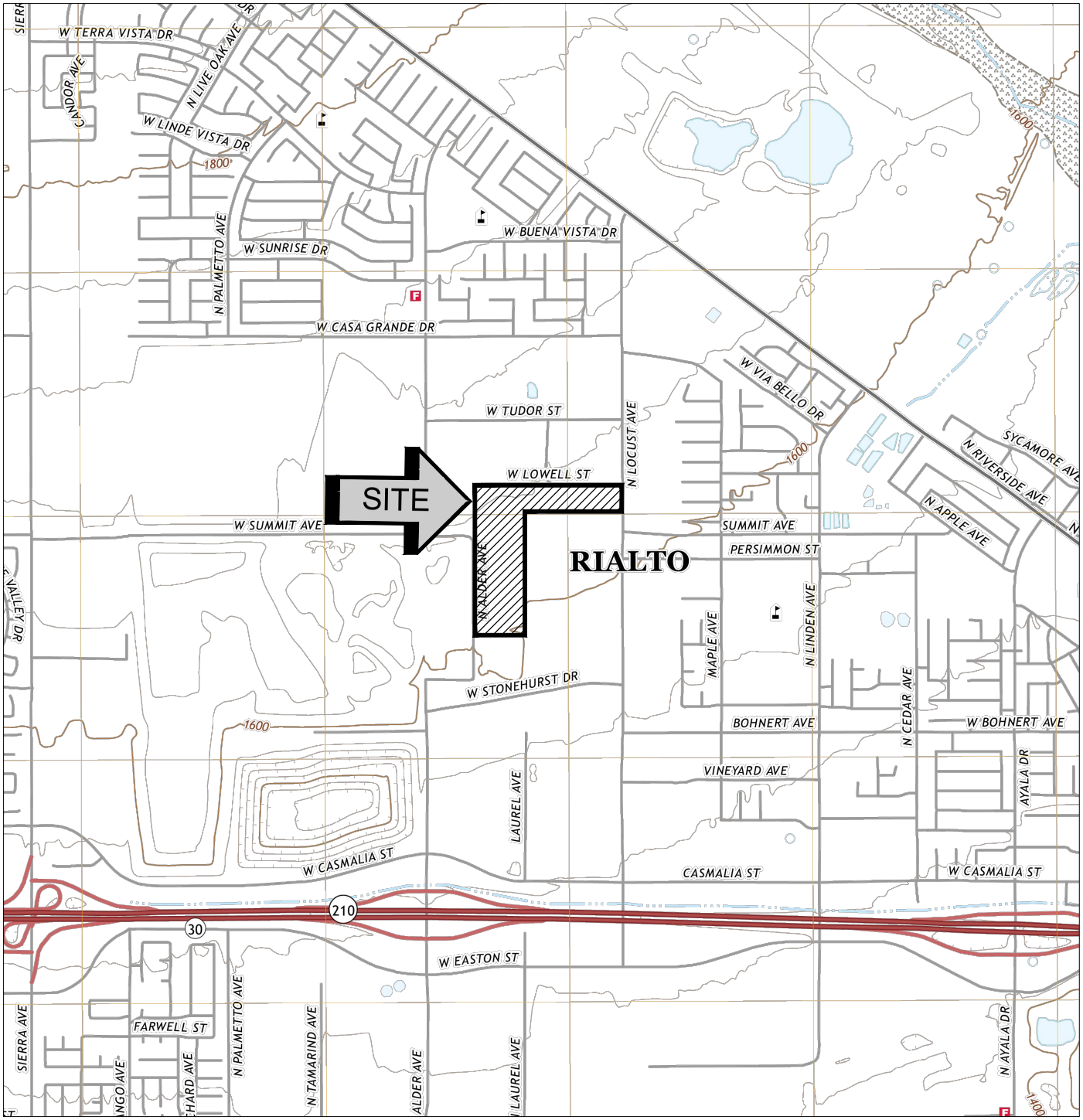
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other 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, civil engineer, and/or structural engineer. 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 client(s)' reliance upon this report is subject to the Engineering Services Agreement, incorporated into our proposal for this project.

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 and trench locations and sample 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.

APPENDIX A



SOURCE: USGS TOPOGRAPHIC MAP OF THE DEVORE QUADRANGLE, SAN BERNARDINO COUNTY, CALIFORNIA, 2021.

SITE LOCATION MAP

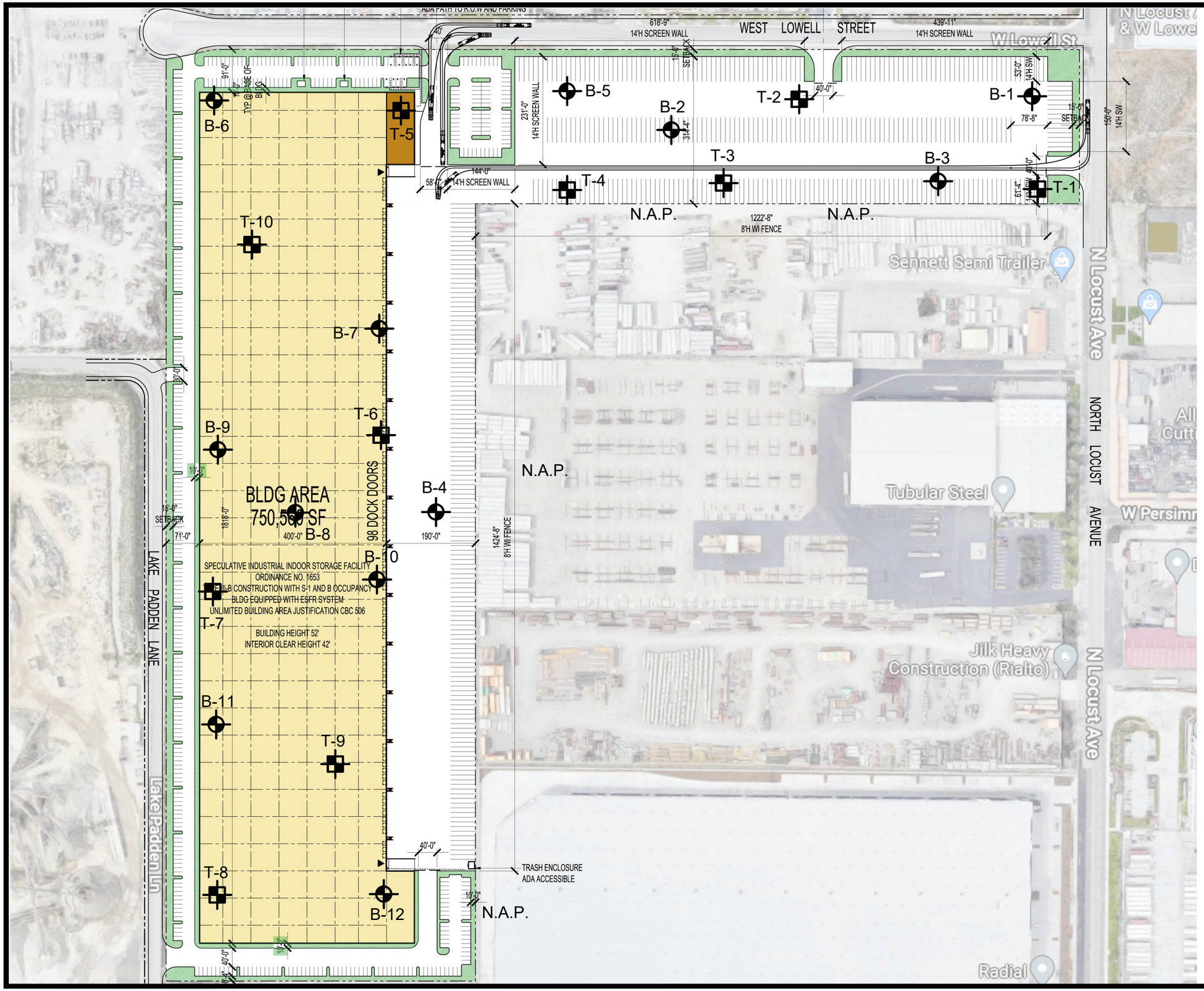
PROPOSED INDUSTRIAL BUILDING

RIALTO, CALIFORNIA

SCALE: 1" = 2000'	
DRAWN: JLL CHKD: RGT	
SCG PROJECT 23G146-1	
PLATE 1	

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



GEOTECHNICAL LEGEND

- APPROXIMATE BORING LOCATION
- APPROXIMATE TRENCH LOCATION

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

BORING AND TRENCH LOCATION PLAN

PROPOSED INDUSTRIAL BUILDING

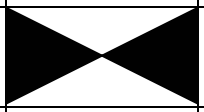
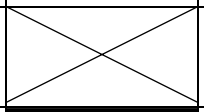
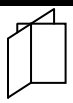
RIALTO, CALIFORNIA

SCALE: 1" = 200'	
DRAWN: JLL CHKD: RGT	
SCG PROJECT 23G146-1	
PLATE 2	

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX B

BORING LOG LEGEND

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

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

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

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

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

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

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

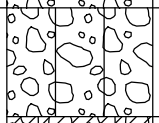
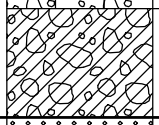
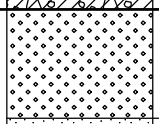
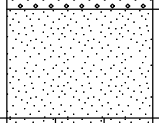
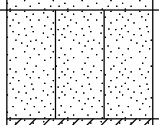
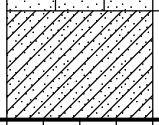
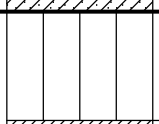
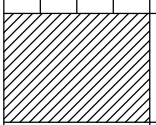
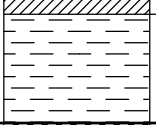
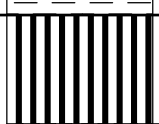
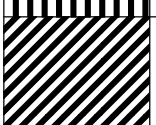
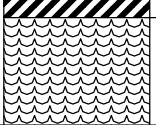
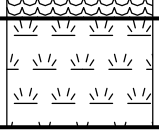
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

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

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

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

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/12/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joseph Lozano Leon

WATER DEPTH: Dry
CAVE DEPTH: 1 foot
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		26			FILL: Brown Gravelly fine to coarse Sand, little Silt, medium dense to very dense-dry to damp		2					@ 1 foot, Disturbed Sample
		50/5"										@ 3 feet, No Sample Recovered
5		34			ALLUVIUM: Light Gray fine to coarse Sandy Gravel, trace Silt, dense-dry		1					
		36			Light Gray Silty fine to coarse Sand, some fine to coarse Gravel, occasional to extensive Cobbles, dense to very dense-dry		2					
10		59					2					
15		50/6"					2					
					Boring Terminated at 16½' due to refusal on extensive Cobbles							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG

PLATE B-1

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-2

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/22/23
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Michelle Krizek

WATER DEPTH: Dry
CAVE DEPTH: 2.5 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		30			FILL: Gray Brown Silty fine to medium Sand, little coarse Sand, little to some fine to coarse Gravel, trace fine root fibers, dense-damp to moist		7					
		50/4"			ALLUVIUM: Light Gray Brown Gravelly fine to medium Sand, trace to little coarse Sand, little Silt, occasional Cobbles, very dense-damp		2					
5		29			@ 6 feet, medium dense		3					
		79/9"					3					
10					Boring Terminated at 10'							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG **PLATE B-2**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-3

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/12/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jason Hiskey

WATER DEPTH: Dry
CAVE DEPTH: 1 foot
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		33			FILL: Brown Silty fine Sand, trace medium Sand, medium dense-damp	103	5					
		54			ALLUVIUM: Light Gray Brown Gravelly fine to coarse Sand, trace Silt, dense-dry	117	1					
					Boring Terminated at 4' due to refusal on extensive Cobbles							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG **PLATE B-3**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-4

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/22/23
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Michelle Krizek

WATER DEPTH: Dry
CAVE DEPTH: 2 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		46			ALLUVIUM: Light Gray Brown Gravelly fine to coarse Sand, little Silt, extensive Cobbles, dense to very dense-dry to damp		2					
		50/5"					2					
5		50/5"					3					
					Boring Terminated at 7½' due to refusal on extensive Cobbles							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG **PLATE B-4**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-5

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/12/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joseph Lozano Leon

WATER DEPTH: Dry
CAVE DEPTH: 2 feet
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		50/4"			FILL: Brown Silty fine Sand, little medium to coarse Sand, trace fine Gravel, dense to very dense-dry to damp		5					@ 1 foot, Disturbed Sample
		61				121	2					
5		50/6"			ALLUVIUM: Light Gray Gravelly fine to coarse Sand, trace Silt, occasional to extensive Cobbles, medium dense to very dense-dry to damp		2					@ 5 feet, Disturbed Sample
		32					1					@ 7 feet, Disturbed Sample
					Boring Terminated at 8' due to refusal on extensive Cobbles							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG **PLATE B-5**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-6

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/12/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jason Hiskey

WATER DEPTH: Dry
CAVE DEPTH: 1 foot
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					ALLUVIUM: Brown Gravelly fine to coarse Sand, little silt, extensive Cobbles, abundant fine to coarse Gravel, very dense-damp							
		50/1"					3					@ 1 foot, Disturbed sample
		50/5"					2					@ 3 feet, Disturbed sample
					Boring Terminated at 4' due to refusal on extensive Cobbles							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG **PLATE B-6**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-7

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/12/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jason Hiskey

WATER DEPTH: Dry
CAVE DEPTH: 4 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		30			FILL: Light Brown Silty fine Sand, some fine to coarse Gravel, dense-dry		2					
5		37			Light Gray Brown Gravelly fine to coarse Sand, trace to little Silt, extensive Cobbles, dense to very dense-dry		1					
		52					1					
					Boring Terminated at 7½' due to refusal on extensive Cobbles							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG

PLATE B-7

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-8

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/22/23
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Michelle Krizek

WATER DEPTH: Dry
CAVE DEPTH: 3 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		70/11"			FILL: Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel, occasional Cobbles, trace fine root fibers, very dense-damp	123	3					
		76/8"			ALLUVIUM: Gray Gravelly fine to coarse Sand, occasional Cobbles, trace to little Silt, very dense-dry	117	2					
5		50/5"			Gray Brown Gravelly fine to medium Sand, trace coarse Sand, some Silt, occasional Cobbles, very dense-dry	114	2					
		50/5"					2					@ 7 feet, Disturbed Sample
		73/9"			Light Gray Gravelly fine to coarse Sand, trace to little Silt, very dense-damp	123	3					
10												
		50/3"					3					
15					Boring Terminated at 15'							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG **PLATE B-8**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-9

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/12/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joseph Lozano Leon

WATER DEPTH: Dry
CAVE DEPTH: 2 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		19			FILL: Gray Brown fine to coarse Sand, some fine to coarse Gravel, trace Silt, medium dense to dense-dry to damp							@ 1 foot, No Sample Recovered
		57				121	2					
					ALLUVIUM: Gray Brown Gravelly fine to coarse Sand, trace Silt, dense-dry to damp							
5		47			Gray Brown fine to coarse Sand, trace Silt, some fine to coarse Gravel, occasional to extensive Cobbles, dense to very dense-dry	119	2					
		65					2					@ 7 feet, Disturbed Sample
		72					2					@ 9 feet, Disturbed Sample
10												
		67					2					
15												
		58					2					
20					Boring Terminated at 20'							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG **PLATE B-9**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-10

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/12/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Joseph Lozano Leon

WATER DEPTH: Dry
CAVE DEPTH: 1 foot
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		55			ALLUVIUM: Gray Brown fine to coarse Sand, trace fine to coarse Gravel, trace Silt, medium dense to dense-dry to damp		1					@ 1 foot, Disturbed Sample
		41					2					@ 3 feet, Disturbed Sample
5		58			Gray Brown Gravelly fine to coarse Sand, trace Silt, occasional to extensive Cobbles, dense to very dense-dry	126	1					
		50/6"										@ 7 feet, No Sample Recovered
		50/6"										@ 8.5 feet, No Sample Recovered
10		50/4"										@ 10 feet, No Sample Recovered
		45			Light Gray Gravelly fine to coarse Sand, little Silt, occasional Cobbles, dense-dry to damp		2					
15												
		67/11"			Light Gray fine to coarse Sand, trace fine to coarse Gravel, little Silt, occasional Cobbles, very dense-dry to damp		1					
20												
		56					3					
25					Boring Terminated at 25'							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG **PLATE B-10**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-11

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/12/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jason Hiskey

WATER DEPTH: Dry
CAVE DEPTH: 5 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		37			ALLUVIUM: Light Gray Brown Gravelly fine to coarse Sand, occasional to extensive Cobbles, trace Silt, dense to very dense-dry to damp		1					
		29			@ 3½ feet, medium dense		2					
5		42					1					
		50					2					
10												
		78					2					
15												
		90					1					
20												
		81/11"					2					
25					Boring Terminated at 25'							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG **PLATE B-11**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-12

JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, California

DRILLING DATE: 5/12/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jason Hiskey

WATER DEPTH: Dry
CAVE DEPTH: 4 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: --- MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
		33			FILL: Brown Silty fine to medium Sand, trace fine Gravel, medium dense-dry	115	2					
		53			ALLUVIUM: Light Brown Silty fine to coarse Sand, extensive Cobbles, trace fine Gravel, dense-dry to damp		3					@ 3 feet, Disturbed Sample
5		58			Light Brown Gravelly fine to coarse Sand, occasional to extensive Cobbles, trace Silt, dense to very-dry to damp		2					@ 5 feet, Disturbed Sample
		56				122	3					
10		75/10"				129	2					
15		82/11"					1					@ 14 feet, Disturbed Sample
		50/5"										@ 17 feet, No Sample Recovered
					Boring Terminated at 18½' due to refusal on extensive Cobbles							

TBL 23G146-1.GPJ SOCALGEO.GDT 6/26/23

TEST BORING LOG

PLATE B-12

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-1

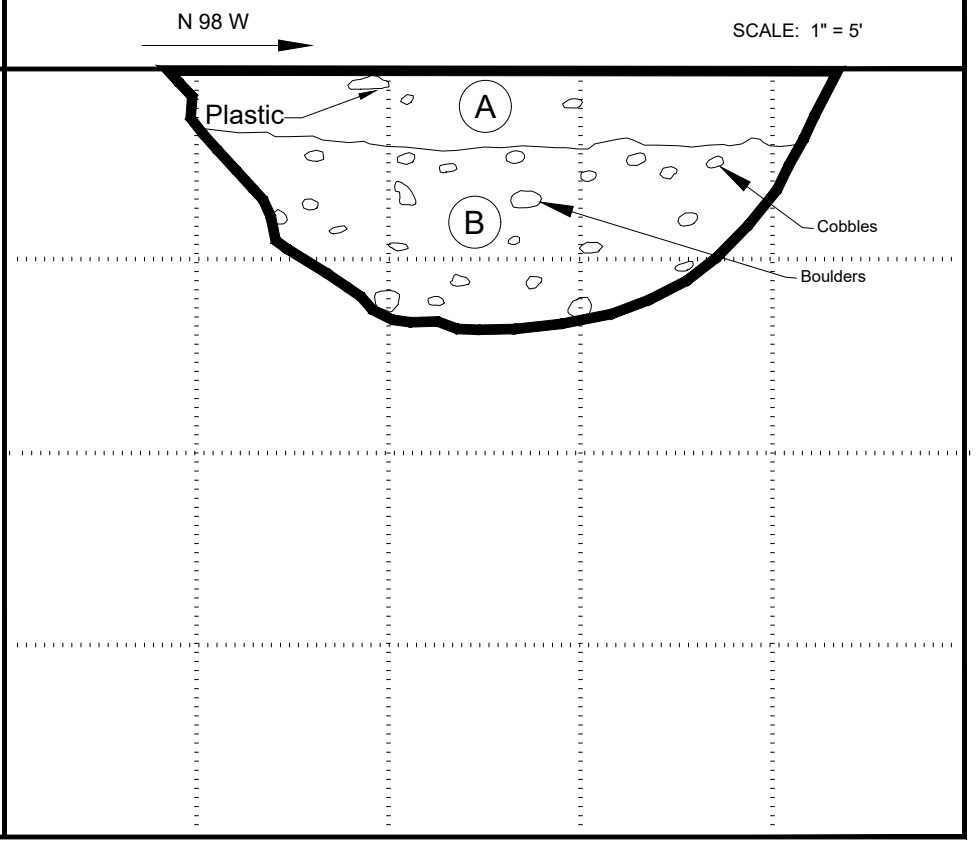
JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-12-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Anthony Luna
ORIENTATION: N 98 W
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		3	A: FILL: Light Gray to Light Brown Silty fine Sand, trace fine Gravel, occasional Cobbles, trace fine root fibers, loose - dry to damp
	b		1	B: ALLUVIUM: Light Brown Gravelly fine to coarse Sand, extensive Cobbles, occasional Boulders, dense - dry
5	b		1	
				Trench Terminated @ 6½ feet
10				
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-13

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-2

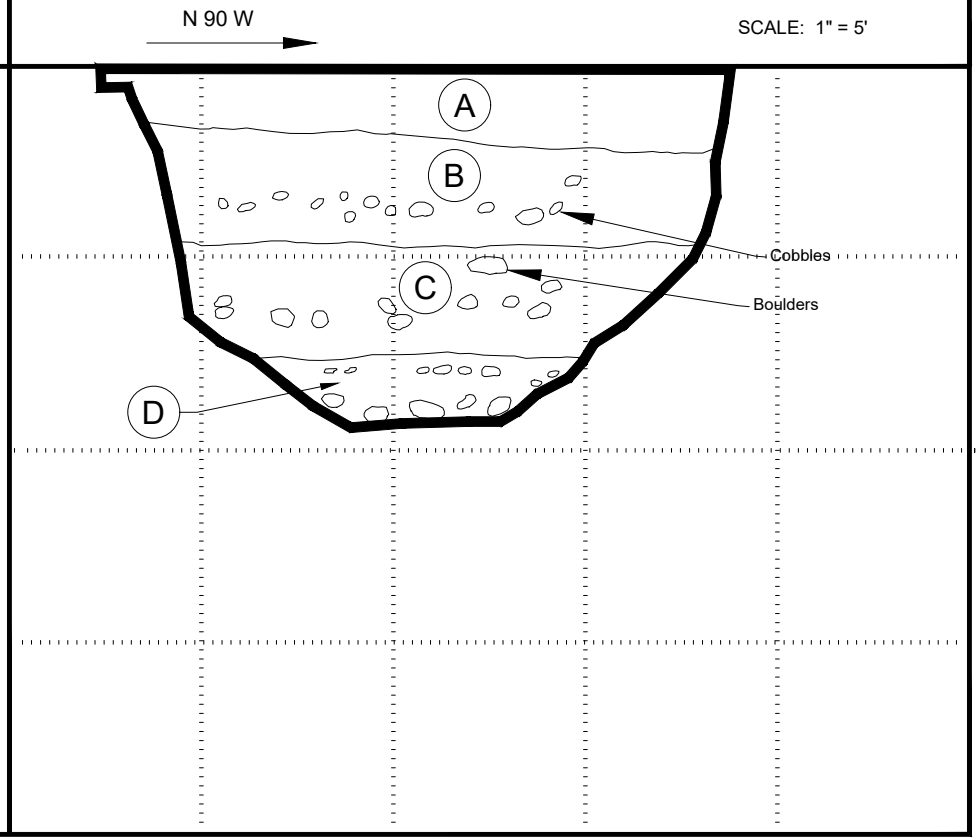
JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-12-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Anthony Luna
ORIENTATION: N 90 W
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		3	A: FILL: Light Gray Brown Silty fine Sand, trace fine root fibers, loose - dry to damp
	b		1	B: ALLUVIUM: Light Gray Brown Gravelly fine to coarse Sand, extensive Cobbles, trace Silt, dense - dry
5	b		1	C: ALLUVIUM: Brown Gravelly fine to coarse Sand, extensive Cobbles, occasional Boulders, trace Silt dense - dry
	b		2	D: ALLUVIUM: Gray to Light Brown Gravelly fine to coarse Sand, extensive Cobbles, occasional Boulders, trace to little Silt, dense - dry to damp
10				Trench Terminated @ 9 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-14

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-3

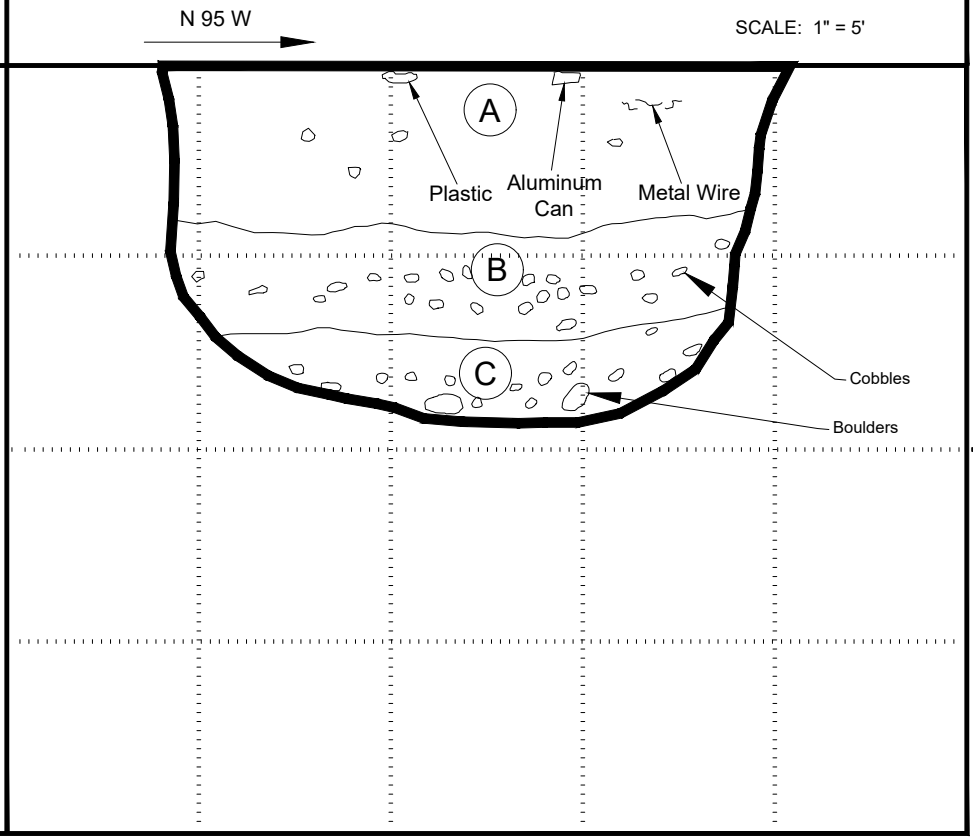
JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-12-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Anthony Luna
ORIENTATION: N 95 W
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		5	A: FILL: Light Gray to Brown Silty fine Sand, some fine to coarse Gravel, occasional Cobbles, abundant fine root fibers, trace Plastic,Metal Wires and Aluminum Cans, loose - damp
5	b		5	B: ALLUVIUM: Light Brown Gravelly fine to coarse Sand, abundant Cobbles, loose to medium dense - damp
	b		4	C: ALLUVIUM: Brown Gravelly fine to coarse Sand, some Boulders, occasional Cobbles, medium dense - damp
10				Trench Terminated @ 9 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-15

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-4

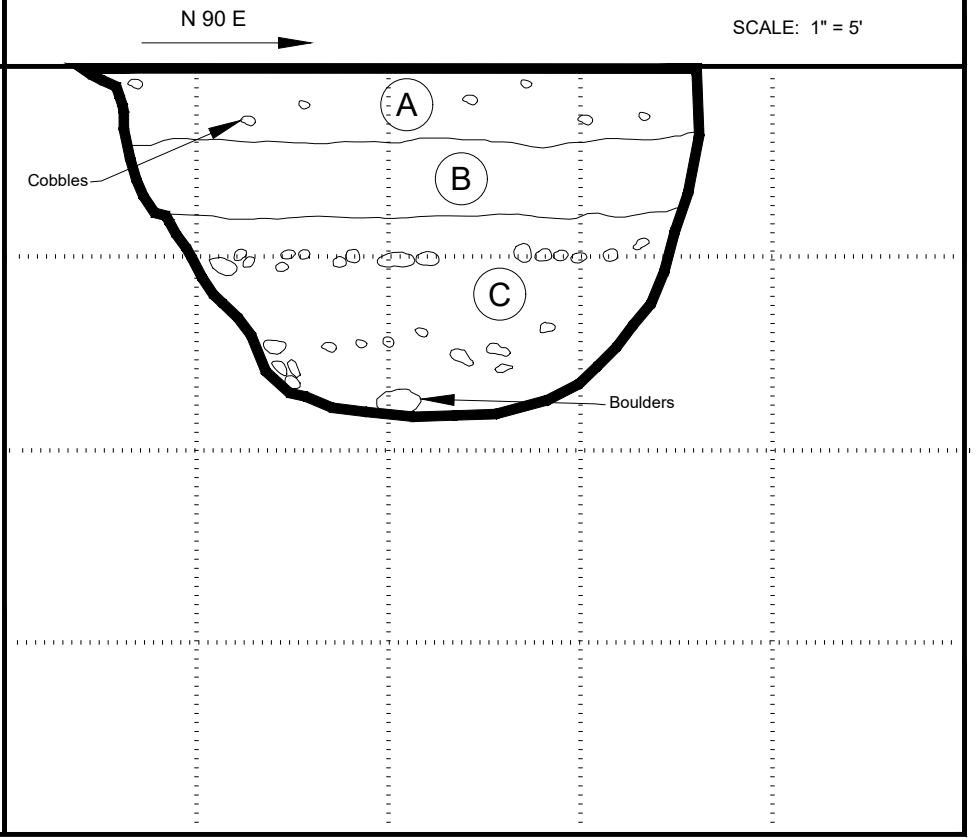
JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-12-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Anthony Luna
ORIENTATION: N 90 E
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		3	A: FILL: Light Gray to Brown Silty fine Sand, some fine Gravel, occasional Cobbles, trace fine root fibers, medium dense - dry to damp
	b		6	B: FILL: Dark Brown Silty fine Sand, trace medium Sand, trace fine Gravel, dense - damp
5				C: ALLUVIUM: Light Gray Brown fine to coarse Sand, some Cobbles, occasional Boulders, dense - dry
	b		2	
	b		2	
10				Trench Terminated @ 9 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-16

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-5

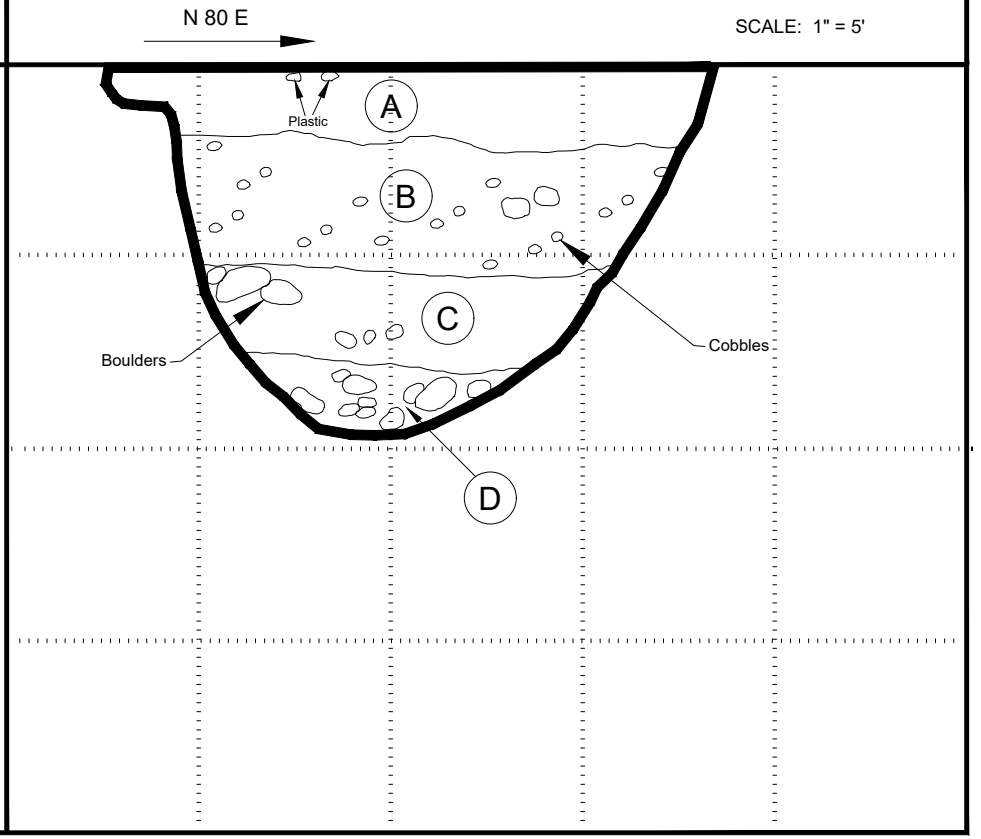
JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-12-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Daryl Kas and Anthony Luna
ORIENTATION: N 80 E
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		5	A: FILL: Gray to Brown Silty fine Sand, some medium to coarse Sand, trace fine Gravel, trace Plastic, loose - damp
	b		2	B: ALLUVIUM: Light Brown Gravelly fine to coarse Sand, extensive Cobbles, occasional Boulders, dense - dry to damp
	b		2	
5				C: ALLUVIUM: Gray Brown fine to coarse Sandy Gravel, extensive Cobbles, occasional Boulders, dense - dry to damp
	b		2	
				D: ALLUVIUM: Gray Brown fine to coarse Sandy Gravel, extensive Cobbles and Boulders, dense - dry to damp
	b		2	
10				Trench Terminated @ 9½ feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-17

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-6

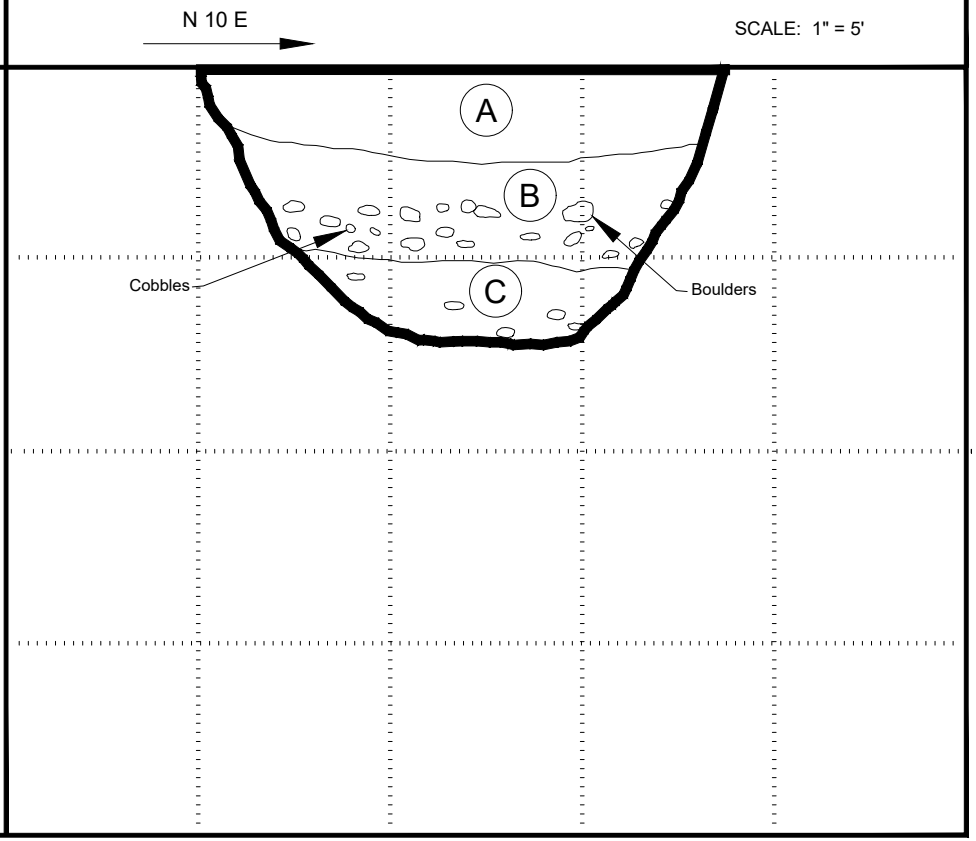
JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-12-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Anthony Luna
ORIENTATION: N 10 E
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
				A: FILL: Light Gray to Light Brown Silty fine Sand, trace medium Sand, trace fine Gravel, trace fine root fibers, loose - dry
	b		2	
				B: ALLUVIUM: Light Gray to Light Brown Gravelly fine to coarse Sand, extensive Cobbles, occasional Boulders, dense - dry
	b		1	
5				C: ALLUVIUM: Light Brown Gravelly fine to coarse Sand, occasional Cobbles, dense - dry
	b		1	
				Trench Terminated @ 7 feet
10				
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-18

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-7

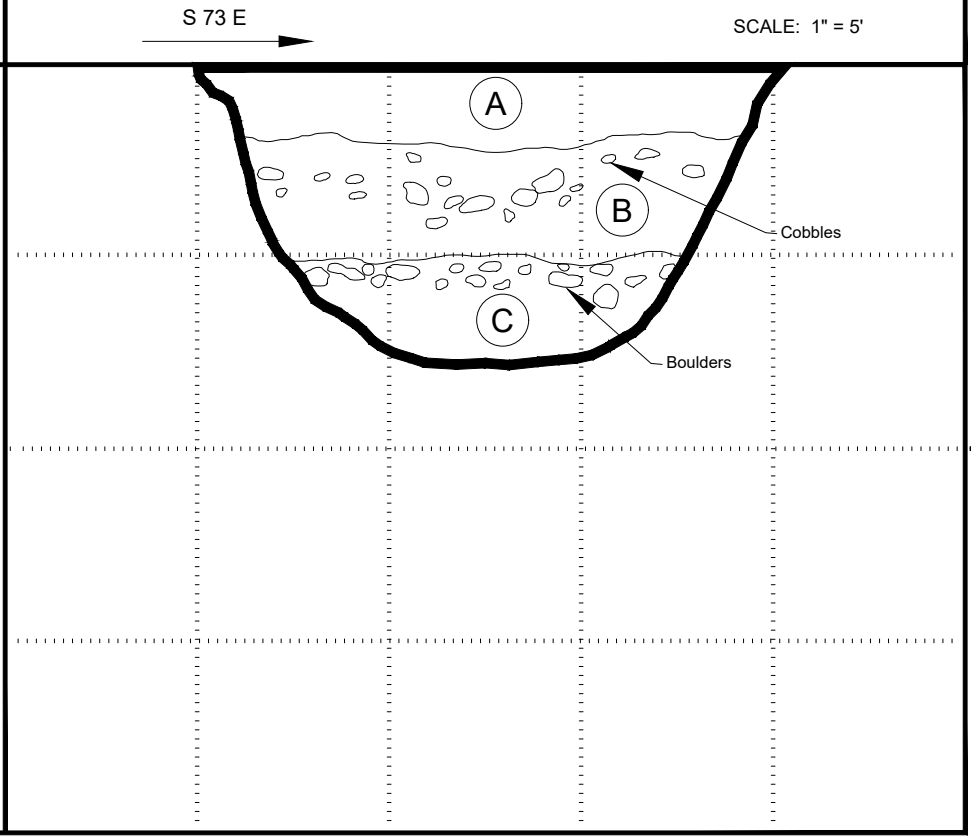
JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-12-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Anthony Luna
ORIENTATION: S 73 E
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
				A: FILL: Brown Silty fine Sand, abundant fine root fibers, trace fine Gravel, loose - dry
	b		2	
	b		1	B: ALLUVIUM: Light Gray to Light Brown Gravelly fine to coarse Sand, extensive Cobbles, occasional Boulders, dense - dry
5				C: ALLUVIUM: Brown Gravelly fine to coarse Sand, occasional Cobbles, occasional Boulders, dense - dry
	b		1	
				Trench Terminated @ 7½ feet
10				
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-19

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-8

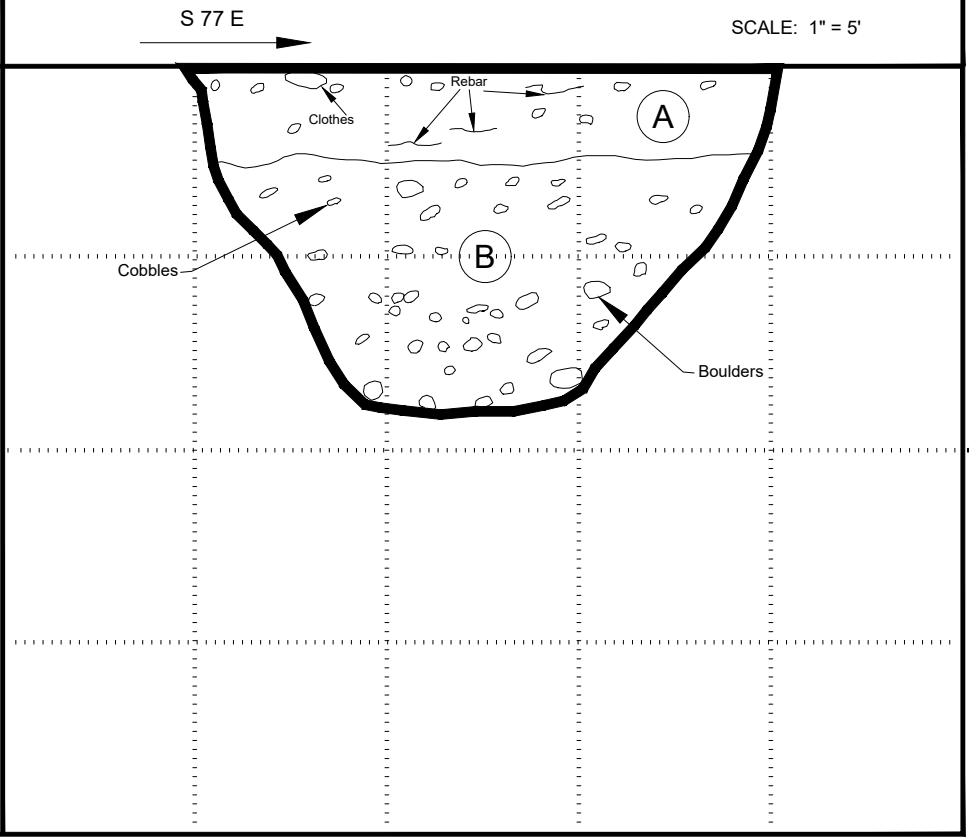
JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-12-2016

EQUIPMENT USED: Backhoe
LOGGED BY: Anthony Luna
ORIENTATION: S 77 E
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
				A: FILL: Brown Silty fine Sand, trace medium to coarse Sand, some fine to coarse Gravel, occasional Cobbles, occasional Boulders, trace Plastic, Rebar and Clothing fragments, loose - damp
	b		6	
				B: ALLUVIUM: Gray to Light Brown Gravelly fine to coarse Sand, extensive Cobbles, occasional Boulders, dense - damp
5	b		3	
	b		3	
	b		4	
10				Trench Terminated @ 9 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-20

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-9

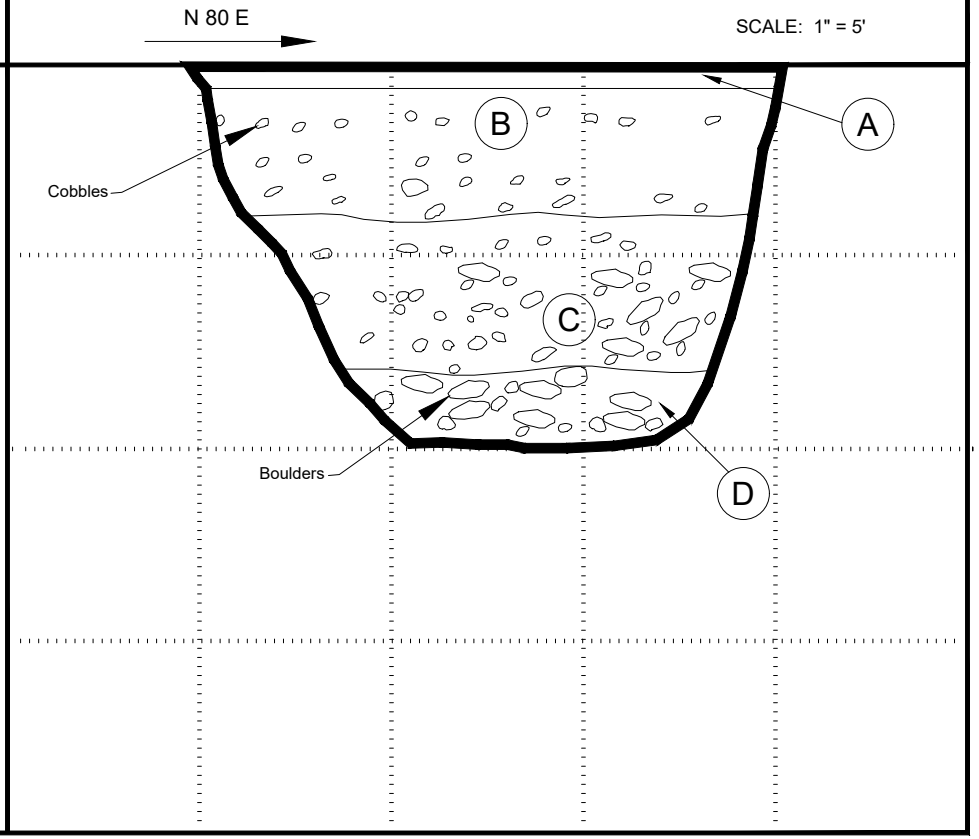
JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-22-2023

EQUIPMENT USED: Backhoe
LOGGED BY: Joseph Hernandez
ORIENTATION: N 80 E
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
	b		2	A: FILL: 6± inches of Crushed Aggregate Base B: FILL: Gray Brown Gravelly fine to coarse Sand, trace Silt, extensive Cobbles, dense - dry
	b		2	
5	b		5	C: ALLUVIUM: Gray Brown Gravelly fine to coarse Sand, extensive Cobbles, occasional Boulders, dense - damp
	b		3	D: ALLUVIUM: Brown Gravelly fine to coarse Sand, trace Silt, extensive Cobbles, extensive Boulders, dense - damp
10				Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-21

SOUTHERN CALIFORNIA GEOTECHNICAL

TRENCH NO. T-10

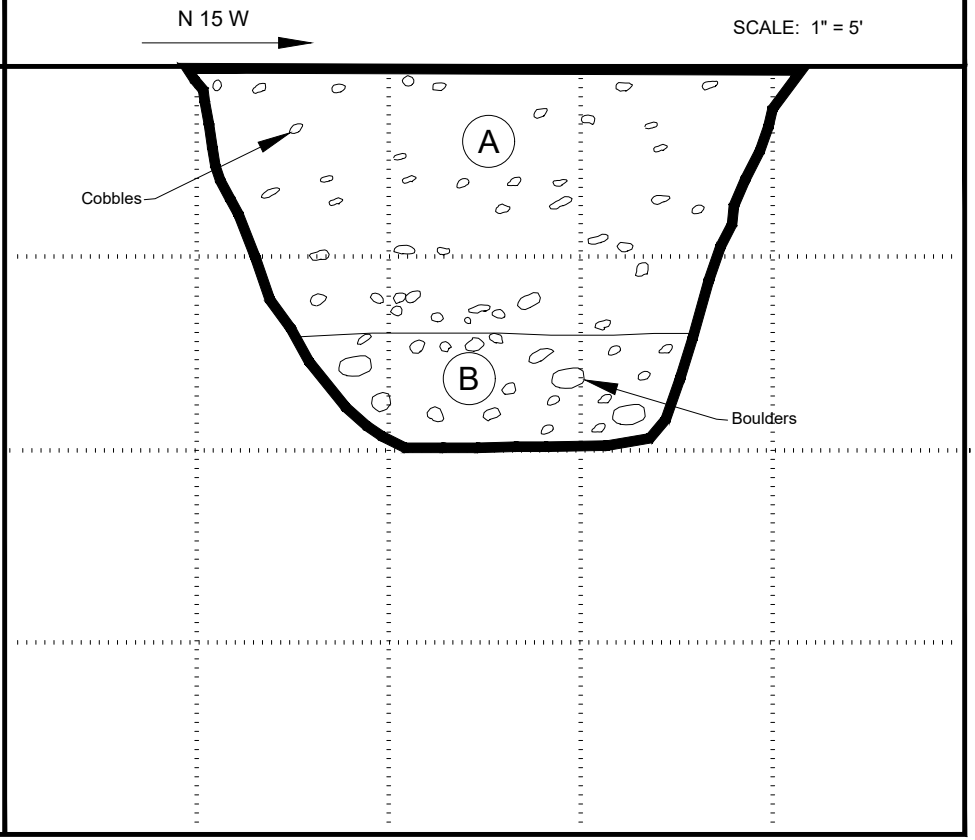
JOB NO.: 23G146-1
PROJECT: Proposed Industrial Building
LOCATION: Rialto, CA
DATE: 5-22-2023

EQUIPMENT USED: Backhoe
LOGGED BY: Joseph Hernandez
ORIENTATION: N 15 W
TOP OF TRENCH ELEVATION: --

WATER DEPTH: Dry
SEEPAGE DEPTH: Dry
READINGS TAKEN: At Completion

DEPTH	SAMPLE	DRY DENSITY (PCF)	MOISTURE (%)	EARTH MATERIALS DESCRIPTION
				A: ALLUVIUM: Gray Brown Gravelly fine to coarse Sand, extensive Cobbles, trace Silt, dense - dry
	b		1	
5				
	b		3	B: ALLUVIUM: Brown Gravelly fine to coarse Sand, trace Silt, extensive Cobbles, occasional Boulders, dense - damp
10				Trench Terminated @ 10 feet
15				

GRAPHIC REPRESENTATION



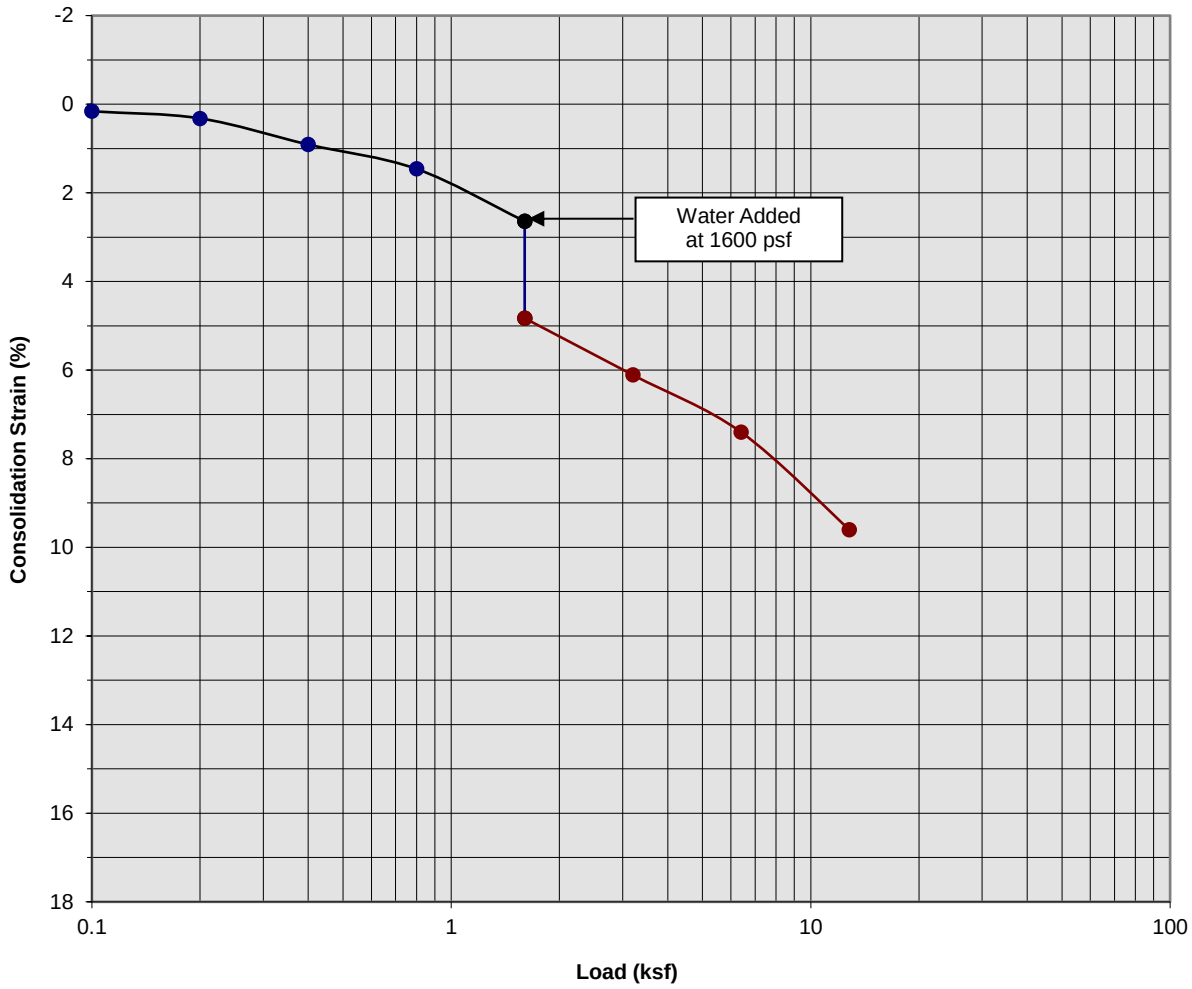
KEY TO SAMPLE TYPES:
B - BULK SAMPLE (DISTURBED)
R - RING SAMPLE 2-1/2" DIAMETER (RELATIVELY UNDISTURBED)

TRENCH LOG

PLATE B-22

APPENDIX C

Consolidation/Collapse Test Results



Classification: FILL: Brown Silty fine Sand, trace medium Sand

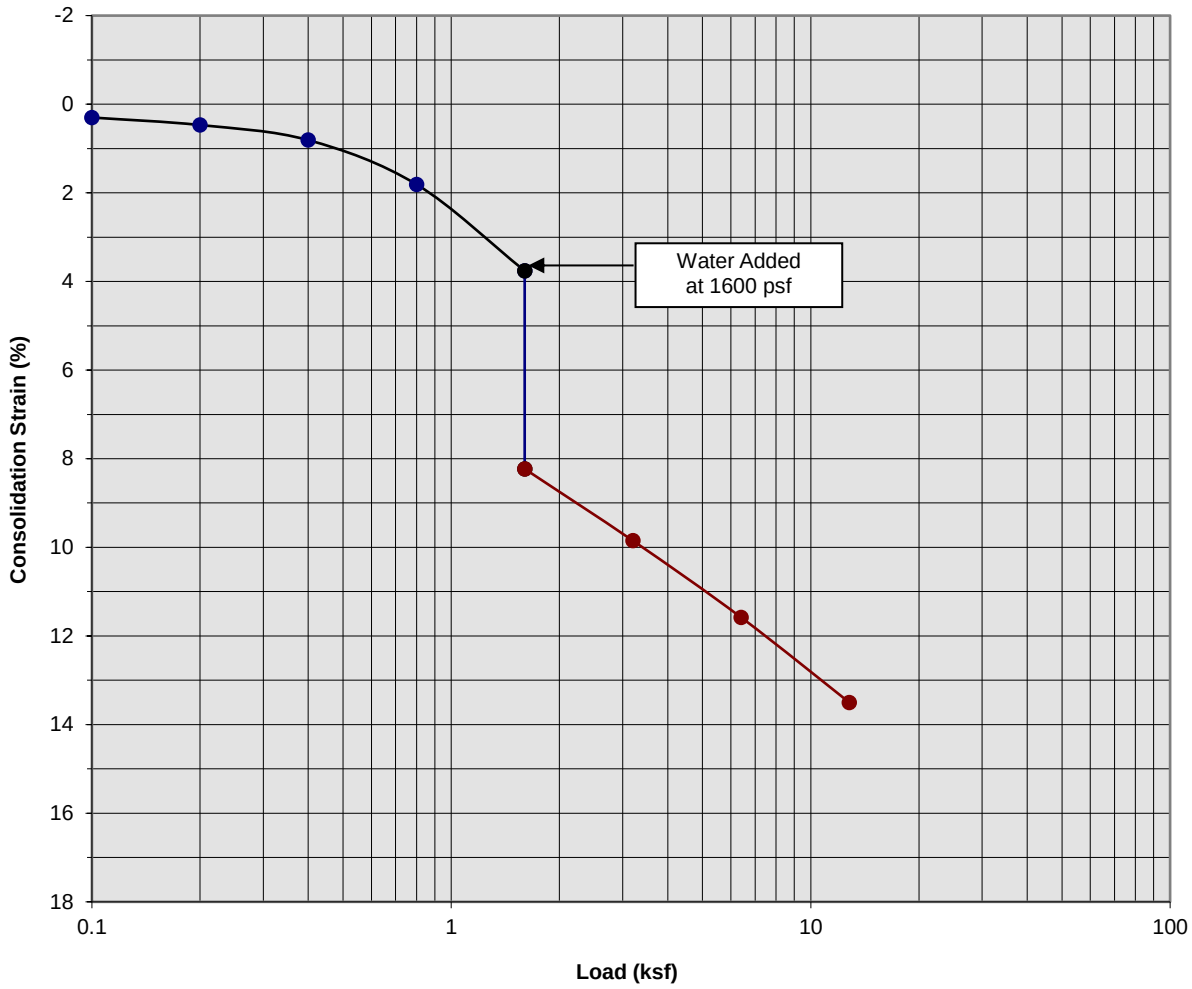
Boring Number:	B-3	Initial Moisture Content (%)	5
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	1 to 2	Initial Dry Density (pcf)	102.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	114.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	2.19

Proposed Industrial Building
Rialto, California
Project No. 23G146-1

PLATE C- 1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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Consolidation/Collapse Test Results



Classification: FILL: Brown Silty fine Sand, trace medium to coarse Sand, trace fine Gravel

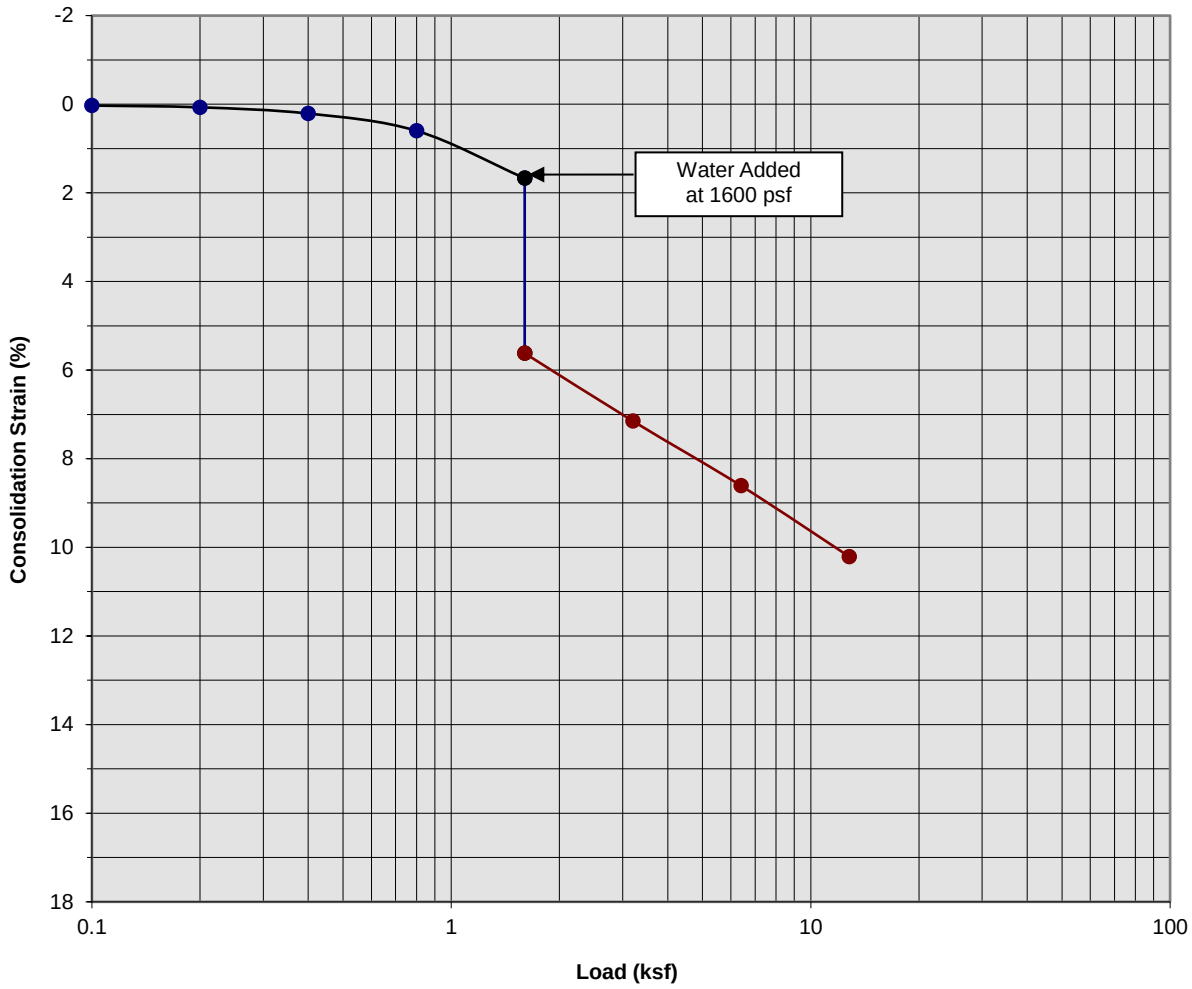
Boring Number:	B-8	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	1 to 2	Initial Dry Density (pcf)	122.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	141.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	4.47

Proposed Industrial Building
Rialto, California
Project No. 23G146-1

PLATE C- 2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Gray Gravelly fine to coarse Sand, trace to little Silt

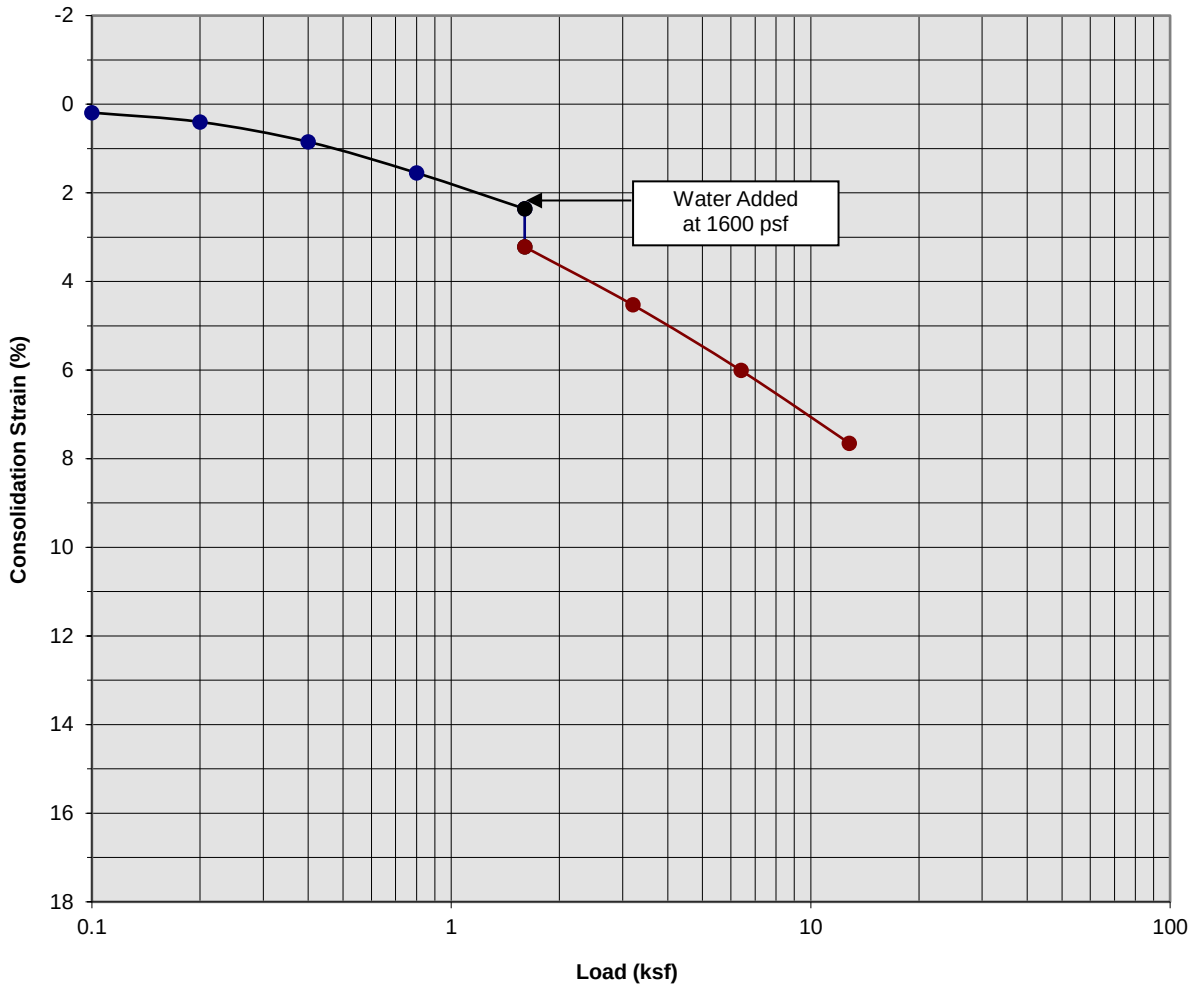
Boring Number:	B-8	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	14
Depth (ft)	3 to 4	Initial Dry Density (pcf)	117.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	129.7
Specimen Thickness (in)	1.0	Percent Collapse (%)	3.95

Proposed Industrial Building
Rialto, California
Project No. 23G146-1

PLATE C- 3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Gray Brown Gravelly fine to medium Sand, trace coarse Sand, some Silt

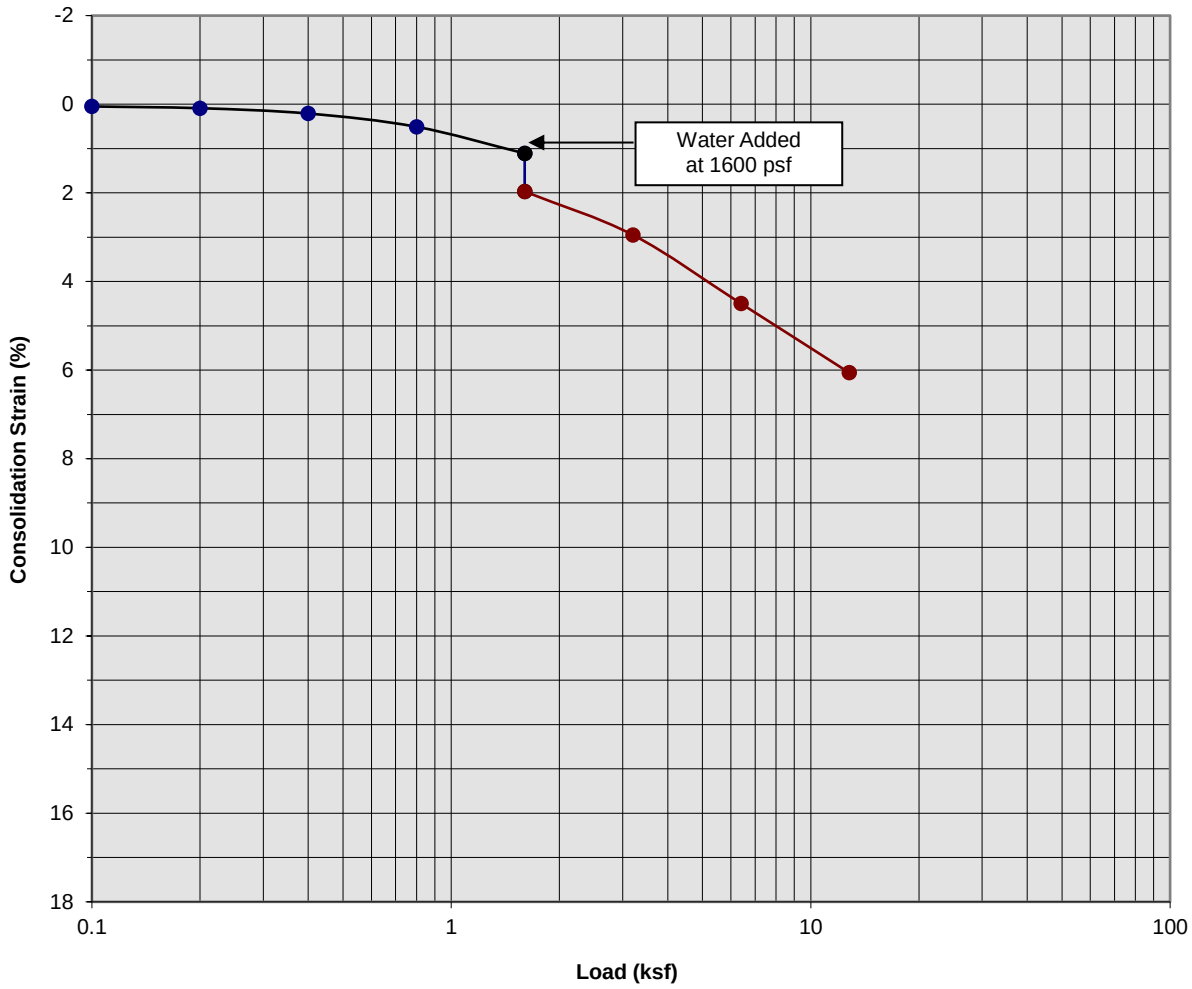
Boring Number:	B-8	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	5 to 6	Initial Dry Density (pcf)	114.1
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	122.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.86

Proposed Industrial Building
Rialto, California
Project No. 23G146-1

PLATE C- 4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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Consolidation/Collapse Test Results



Classification: Light Gray Gravelly fine to coarse Sand, trace to little Silt

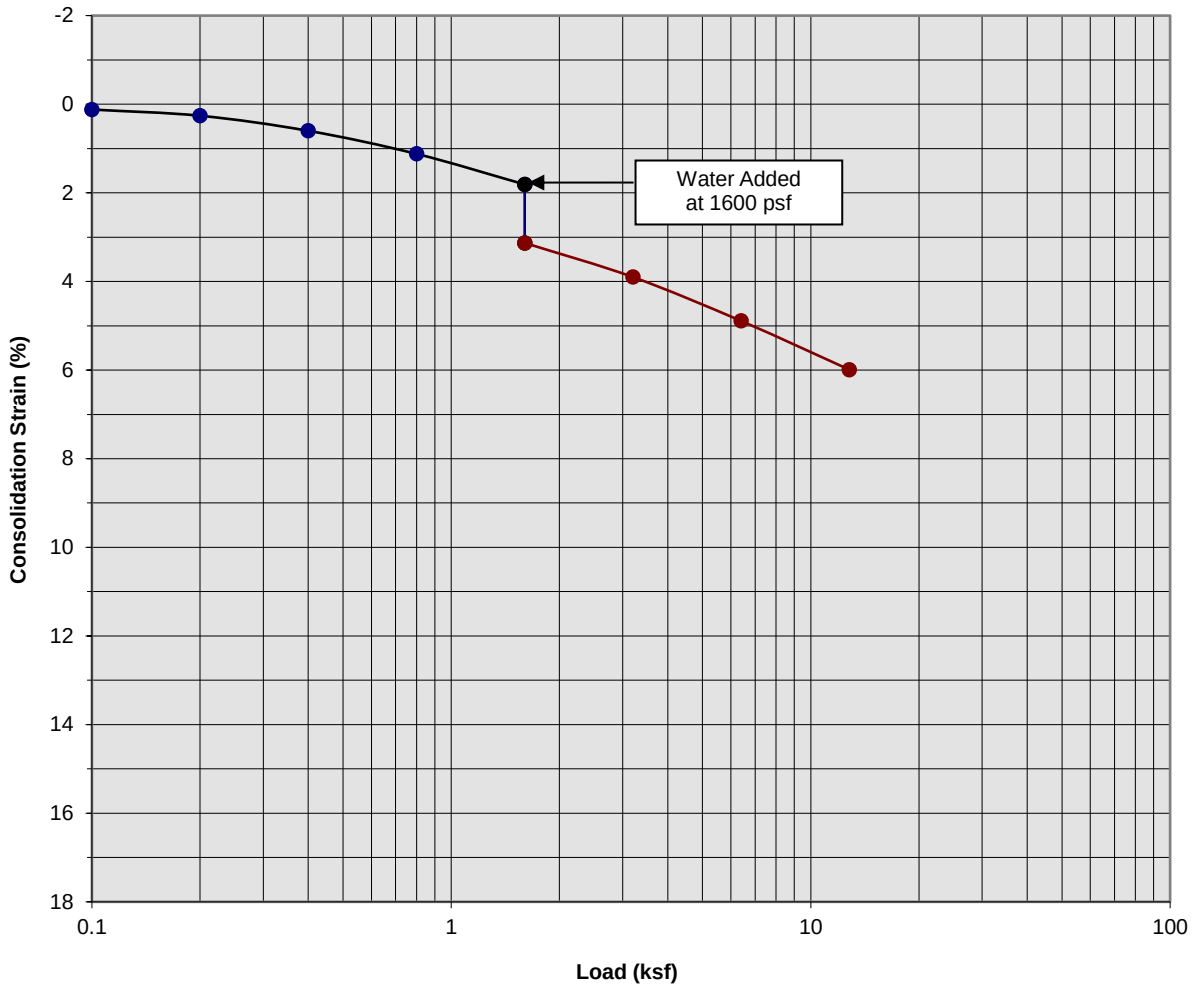
Boring Number:	B-8	Initial Moisture Content (%)	3
Sample Number:	---	Final Moisture Content (%)	11
Depth (ft)	9 to 10	Initial Dry Density (pcf)	123.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	130.9
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.86

Proposed Industrial Building
Rialto, California
Project No. 23G146-1

PLATE C- 5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: FILL: Gray Brown fine to coarse Sand, some fine to coarse Gravel, trace Silt

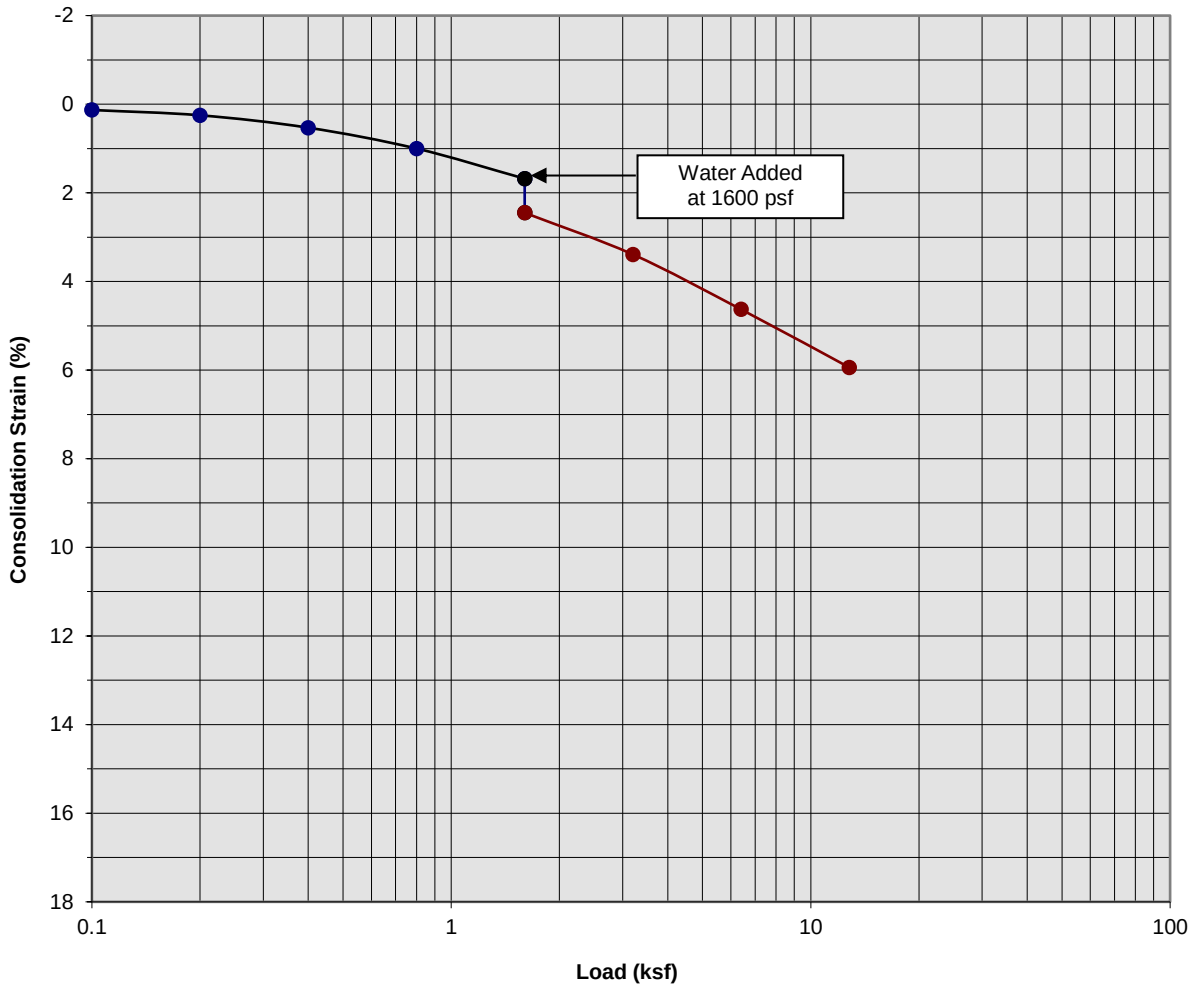
Boring Number:	B-9	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	10
Depth (ft)	3 to 3½	Initial Dry Density (pcf)	121.0
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	128.0
Specimen Thickness (in)	1.0	Percent Collapse (%)	1.32

Proposed Industrial Building
Rialto, California
Project No. 23G146-1

PLATE C- 6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

Consolidation/Collapse Test Results



Classification: Gray Brown fine to coarse Sand, trace Silt, some fine to coarse Gravel

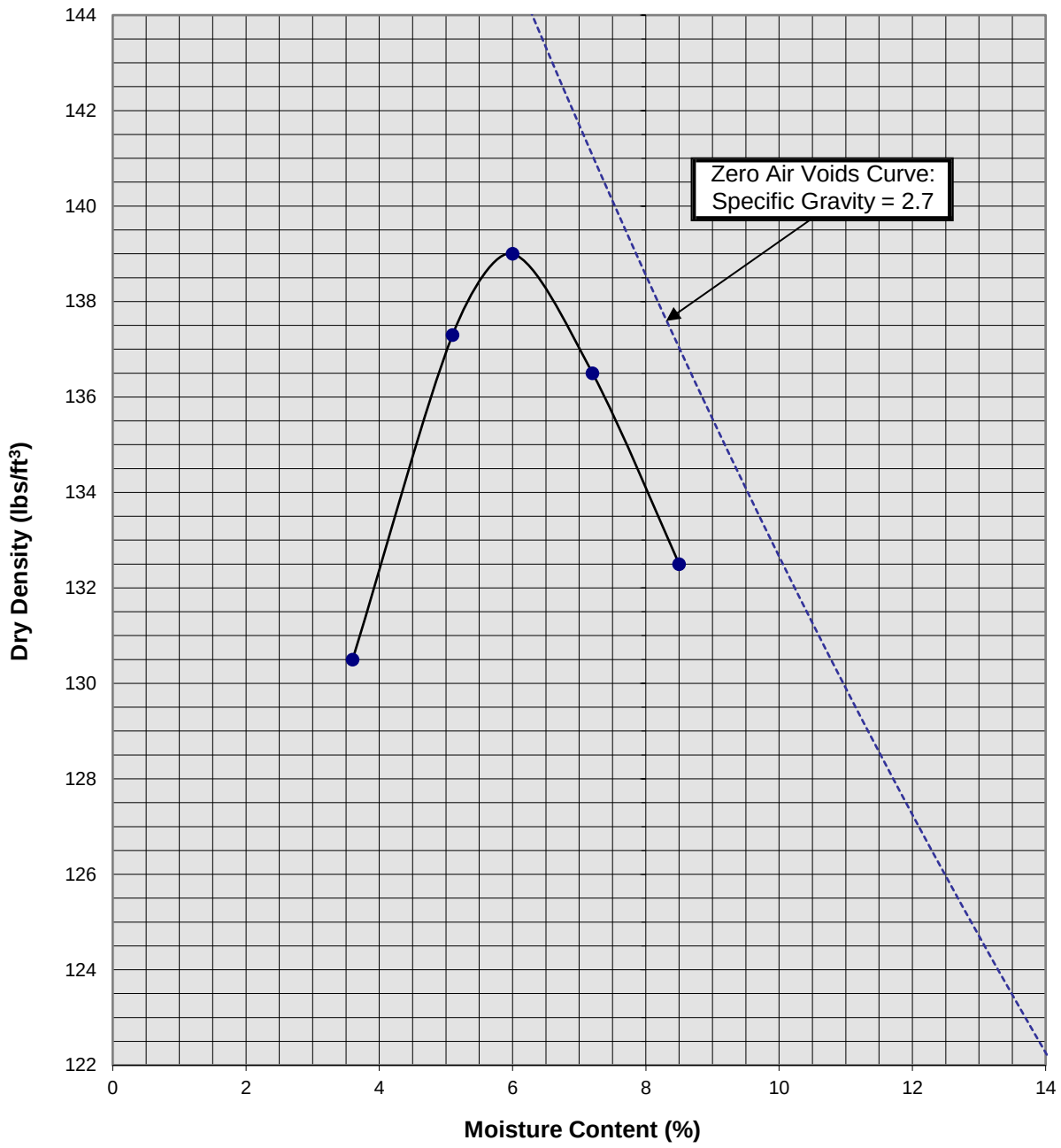
Boring Number:	B-9	Initial Moisture Content (%)	2
Sample Number:	---	Final Moisture Content (%)	13
Depth (ft)	5 to 6	Initial Dry Density (pcf)	119.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	127.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.77

Proposed Industrial Building
Rialto, California
Project No. 23G146-1

PLATE C- 7

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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Moisture/Density Relationship
ASTM D-1557



Soil ID Number	B-1 @ 1-5'
Optimum Moisture (%)	4.5
Maximum Dry Density (pcf)	146
Soil Classification	Brown Gravelly fine to coarse Sand, little Silt

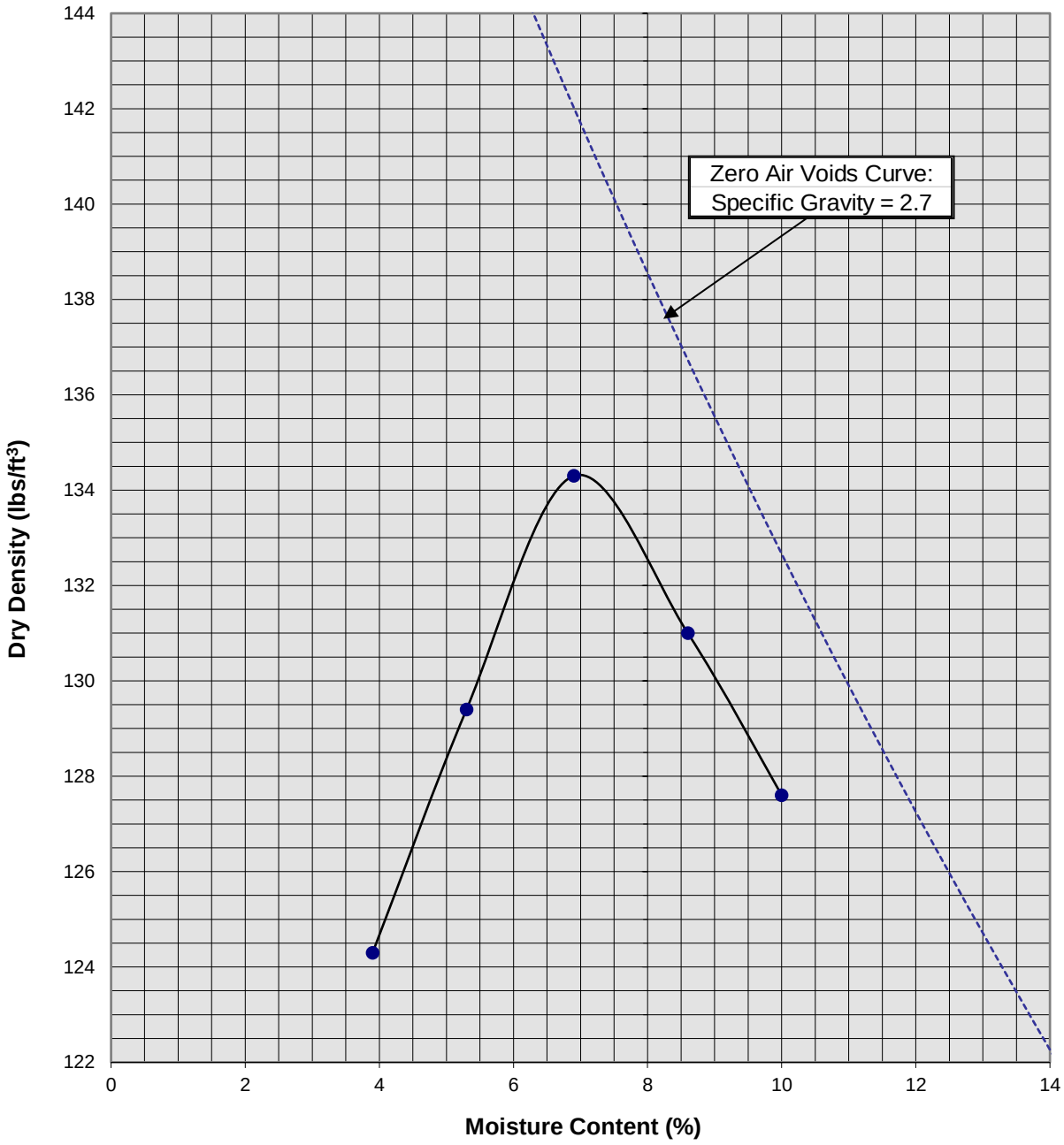
Note: Maximum Density and Optimum Moisture are based on 35% rock correction.

Proposed Industrial Building
Rialto, Califonia
Project No. 23G146-1

PLATE C- 8

SoCalGeo
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Moisture/Density Relationship
ASTM D-1557



Soil ID Number	B-12 @ 1-5'
Optimum Moisture (%)	6.5
Maximum Dry Density (pcf)	138
Soil Classification	Light Gray Brown Silty fine to medium Sand, little coarse Sand, some fine to coarse Gravel

Note: Maximum Density and Optimum Moisture are based on 13% rock correction.

Proposed Industrial Building
Rialto, Califonia
Project No. 23G146-1

PLATE C- 9

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
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APPENDIX D

GRADING GUIDE SPECIFICATIONS

These grading guide specifications are intended to provide typical procedures for grading operations. They are intended to supplement the recommendations contained in the geotechnical investigation report for this project. Should the recommendations in the geotechnical investigation report conflict with the grading guide specifications, the more site specific recommendations in the geotechnical investigation report will govern.

General

- The Earthwork Contractor is responsible for the satisfactory completion of all earthwork in accordance with the plans and geotechnical reports, and in accordance with city, county, and applicable building codes.

- The Geotechnical Engineer is the representative of the Owner/Builder for the purpose of implementing the report recommendations and guidelines. These duties are not intended to relieve the Earthwork Contractor of any responsibility to perform in a workman-like manner, nor is the Geotechnical Engineer to direct the grading equipment or personnel employed by the Contractor.

- The Earthwork Contractor is required to notify the Geotechnical Engineer of the anticipated work and schedule so that testing and inspections can be provided. If necessary, work may be stopped and redone if personnel have not been scheduled in advance.

- The Earthwork Contractor is required to have suitable and sufficient equipment on the job-site to process, moisture condition, mix and compact the amount of fill being placed to the approved compaction. In addition, suitable support equipment should be available to conform with recommendations and guidelines in this report.

- Canyon cleanouts, overexcavation areas, processed ground to receive fill, key excavations, subdrains and benches should be observed by the Geotechnical Engineer prior to placement of any fill. It is the Earthwork Contractor's responsibility to notify the Geotechnical Engineer of areas that are ready for inspection.

- Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide drainage at all times and proper control of erosion. Precipitation, springs, and seepage water encountered shall be pumped or drained to provide a suitable working surface. The Geotechnical Engineer must be informed of springs or water seepage encountered during grading or foundation construction for possible revision to the recommended construction procedures and/or installation of subdrains.

Site Preparation

- The Earthwork Contractor is responsible for all clearing, grubbing, stripping and site preparation for the project in accordance with the recommendations of the Geotechnical Engineer.

- If any materials or areas are encountered by the Earthwork Contractor which are suspected of having toxic or environmentally sensitive contamination, the Geotechnical Engineer and Owner/Builder should be notified immediately.

- Major vegetation should be stripped and disposed of off-site. This includes trees, brush, heavy grasses and any materials considered unsuitable by the Geotechnical Engineer.

- Underground structures such as basements, cesspools or septic disposal systems, mining shafts, tunnels, wells and pipelines should be removed under the inspection of the Geotechnical Engineer and recommendations provided by the Geotechnical Engineer and/or city, county or state agencies. If such structures are known or found, the Geotechnical Engineer should be notified as soon as possible so that recommendations can be formulated.

- Any topsoil, slopewash, colluvium, alluvium and rock materials which are considered unsuitable by the Geotechnical Engineer should be removed prior to fill placement.

- Remaining voids created during site clearing caused by removal of trees, foundations basements, irrigation facilities, etc., should be excavated and filled with compacted fill.

- Subsequent to clearing and removals, areas to receive fill should be scarified to a depth of 10 to 12 inches, moisture conditioned and compacted

- The moisture condition of the processed ground should be at or slightly above the optimum moisture content as determined by the Geotechnical Engineer. Depending upon field conditions, this may require air drying or watering together with mixing and/or discing.

Compacted Fills

- Soil materials imported to or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable in the opinion of the Geotechnical Engineer. Unless otherwise approved by the Geotechnical Engineer, all fill materials shall be free of deleterious, organic, or frozen matter, shall contain no chemicals that may result in the material being classified as “contaminated,” and shall be very low to non-expansive with a maximum expansion index (EI) of 50. The top 12 inches of the compacted fill should have a maximum particle size of 3 inches, and all underlying compacted fill material a maximum 6-inch particle size, except as noted below.

- All soils should be evaluated and tested by the Geotechnical Engineer. Materials with high expansion potential, low strength, poor gradation or containing organic materials may require removal from the site or selective placement and/or mixing to the satisfaction of the Geotechnical Engineer.

- Rock fragments or rocks less than 6 inches in their largest dimensions, or as otherwise determined by the Geotechnical Engineer, may be used in compacted fill, provided the distribution and placement is satisfactory in the opinion of the Geotechnical Engineer.

- Rock fragments or rocks greater than 12 inches should be taken off-site or placed in accordance with recommendations and in areas designated as suitable by the Geotechnical Engineer. These materials should be placed in accordance with Plate D-8 of these Grading Guide Specifications and in accordance with the following recommendations:

    - Rocks 12 inches or more in diameter should be placed in rows at least 15 feet apart, 15 feet from the edge of the fill, and 10 feet or more below subgrade. Spaces should be left between each rock fragment to provide for placement and compaction of soil around the fragments.

    - Fill materials consisting of soil meeting the minimum moisture content requirements and free of oversize material should be placed between and over the rows of rock or

concrete. Ample water and compactive effort should be applied to the fill materials as they are placed in order that all of the voids between each of the fragments are filled and compacted to the specified density.

- Subsequent rows of rocks should be placed such that they are not directly above a row placed in the previous lift of fill. A minimum 5-foot offset between rows is recommended.

- To facilitate future trenching, oversized material should not be placed within the range of foundation excavations, future utilities or other underground construction unless specifically approved by the soil engineer and the developer/owner representative.

- Fill materials approved by the Geotechnical Engineer should be placed in areas previously prepared to receive fill and in evenly placed, near horizontal layers at about 6 to 8 inches in loose thickness, or as otherwise determined by the Geotechnical Engineer for the project.

- Each layer should be moisture conditioned to optimum moisture content, or slightly above, as directed by the Geotechnical Engineer. After proper mixing and/or drying, to evenly distribute the moisture, the layers should be compacted to at least 90 percent of the maximum dry density in compliance with ASTM D-1557-78 unless otherwise indicated.

- Density and moisture content testing should be performed by the Geotechnical Engineer at random intervals and locations as determined by the Geotechnical Engineer. These tests are intended as an aid to the Earthwork Contractor, so he can evaluate his workmanship, equipment effectiveness and site conditions. The Earthwork Contractor is responsible for compaction as required by the Geotechnical Report(s) and governmental agencies.

- Fill areas unused for a period of time may require moisture conditioning, processing and recompaction prior to the start of additional filling. The Earthwork Contractor should notify the Geotechnical Engineer of his intent so that an evaluation can be made.

- Fill placed on ground sloping at a 5-to-1 inclination (horizontal-to-vertical) or steeper should be benched into bedrock or other suitable materials, as directed by the Geotechnical Engineer. Typical details of benching are illustrated on Plates D-2, D-4, and D-5.

- Cut/fill transition lots should have the cut portion overexcavated to a depth of at least 3 feet and rebuilt with fill (see Plate D-1), as determined by the Geotechnical Engineer.

- All cut lots should be inspected by the Geotechnical Engineer for fracturing and other bedrock conditions. If necessary, the pads should be overexcavated to a depth of 3 feet and rebuilt with a uniform, more cohesive soil type to impede moisture penetration.

- Cut portions of pad areas above buttresses or stabilizations should be overexcavated to a depth of 3 feet and rebuilt with uniform, more cohesive compacted fill to impede moisture penetration.

- Non-structural fill adjacent to structural fill should typically be placed in unison to provide lateral support. Backfill along walls must be placed and compacted with care to ensure that excessive unbalanced lateral pressures do not develop. The type of fill material placed adjacent to below grade walls must be properly tested and approved by the Geotechnical Engineer with consideration of the lateral earth pressure used in the design.

Foundations

- The foundation influence zone is defined as extending one foot horizontally from the outside edge of a footing, and proceeding downward at a ½ horizontal to 1 vertical (0.5:1) inclination.

- Where overexcavation beneath a footing subgrade is necessary, it should be conducted so as to encompass the entire foundation influence zone, as described above.

- Compacted fill adjacent to exterior footings should extend at least 12 inches above foundation bearing grade. Compacted fill within the interior of structures should extend to the floor subgrade elevation.

Fill Slopes

- The placement and compaction of fill described above applies to all fill slopes. Slope compaction should be accomplished by overfilling the slope, adequately compacting the fill in even layers, including the overfilled zone and cutting the slope back to expose the compacted core

- Slope compaction may also be achieved by backrolling the slope adequately every 2 to 4 vertical feet during the filling process as well as requiring the earth moving and compaction equipment to work close to the top of the slope. Upon completion of slope construction, the slope face should be compacted with a sheepsfoot connected to a sideboom and then grid rolled. This method of slope compaction should only be used if approved by the Geotechnical Engineer.

- Sandy soils lacking in adequate cohesion may be unstable for a finished slope condition and therefore should not be placed within 15 horizontal feet of the slope face.

- All fill slopes should be keyed into bedrock or other suitable material. Fill keys should be at least 15 feet wide and inclined at 2 percent into the slope. For slopes higher than 30 feet, the fill key width should be equal to one-half the height of the slope (see Plate D-5).

- All fill keys should be cleared of loose slough material prior to geotechnical inspection and should be approved by the Geotechnical Engineer and governmental agencies prior to filling.

- The cut portion of fill over cut slopes should be made first and inspected by the Geotechnical Engineer for possible stabilization requirements. The fill portion should be adequately keyed through all surficial soils and into bedrock or suitable material. Soils should be removed from the transition zone between the cut and fill portions (see Plate D-2).

Cut Slopes

- All cut slopes should be inspected by the Geotechnical Engineer to determine the need for stabilization. The Earthwork Contractor should notify the Geotechnical Engineer when slope cutting is in progress at intervals of 10 vertical feet. Failure to notify may result in a delay in recommendations.

- Cut slopes exposing loose, cohesionless sands should be reported to the Geotechnical Engineer for possible stabilization recommendations.

- All stabilization excavations should be cleared of loose slough material prior to geotechnical inspection. Stakes should be provided by the Civil Engineer to verify the location and dimensions of the key. A typical stabilization fill detail is shown on Plate D-5.

- Stabilization key excavations should be provided with subdrains. Typical subdrain details are shown on Plates D-6.

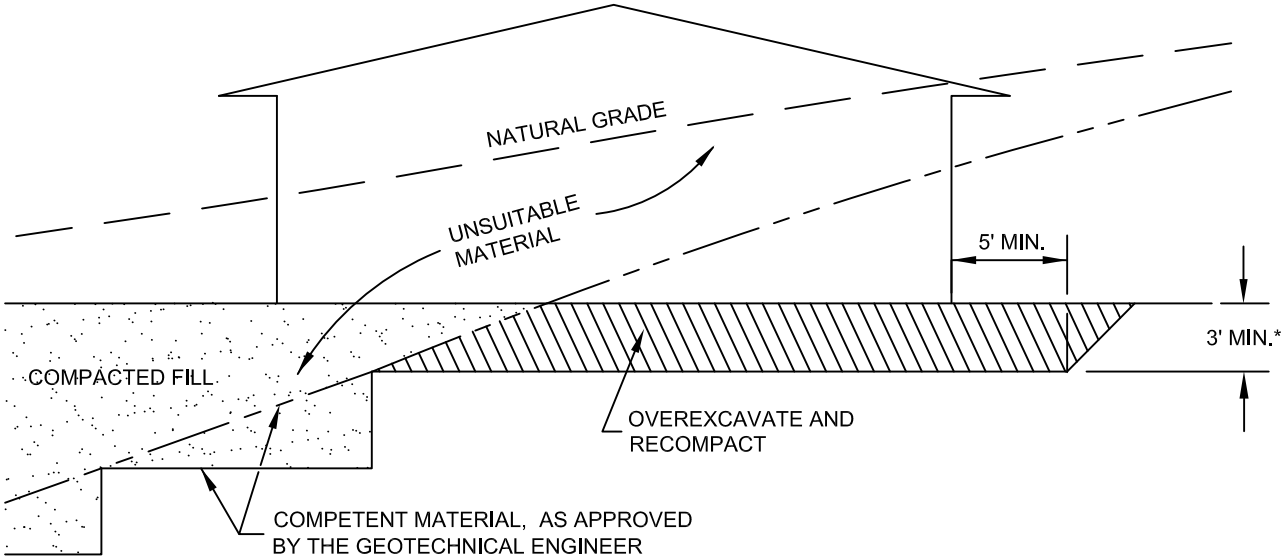
Subdrains

- Subdrains may be required in canyons and swales where fill placement is proposed. Typical subdrain details for canyons are shown on Plate D-3. Subdrains should be installed after approval of removals and before filling, as determined by the Soils Engineer.

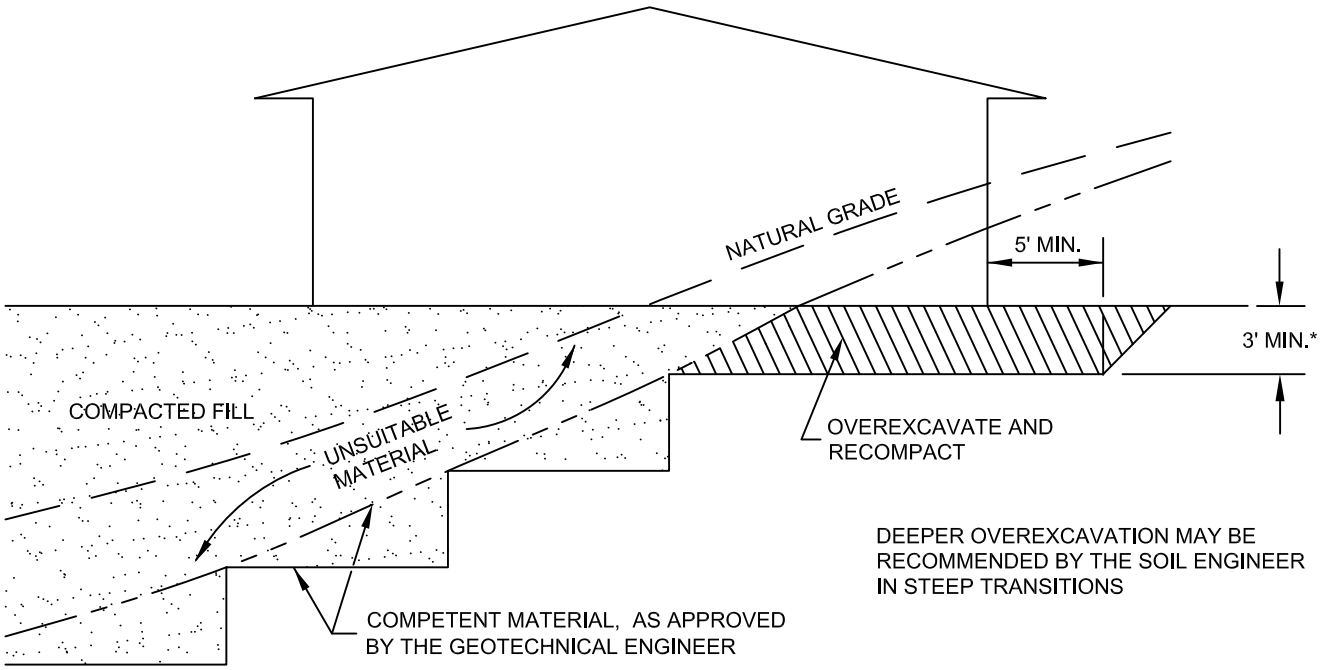
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- Filter material for subdrains should conform to CALTRANS Specification 68-1.025 or as approved by the Geotechnical Engineer for the specific site conditions. Clean ¾-inch crushed rock may be used provided it is wrapped in an acceptable filter cloth and approved by the Geotechnical Engineer. Pipe diameters should be 6 inches for runs up to 500 feet and 8 inches for the downstream continuations of longer runs. Four-inch diameter pipe may be used in buttress and stabilization fills.

CUT LOT



CUT/FILL LOT (TRANSITION)



*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION. ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

TRANSITION LOT DETAIL

GRADING GUIDE SPECIFICATIONS

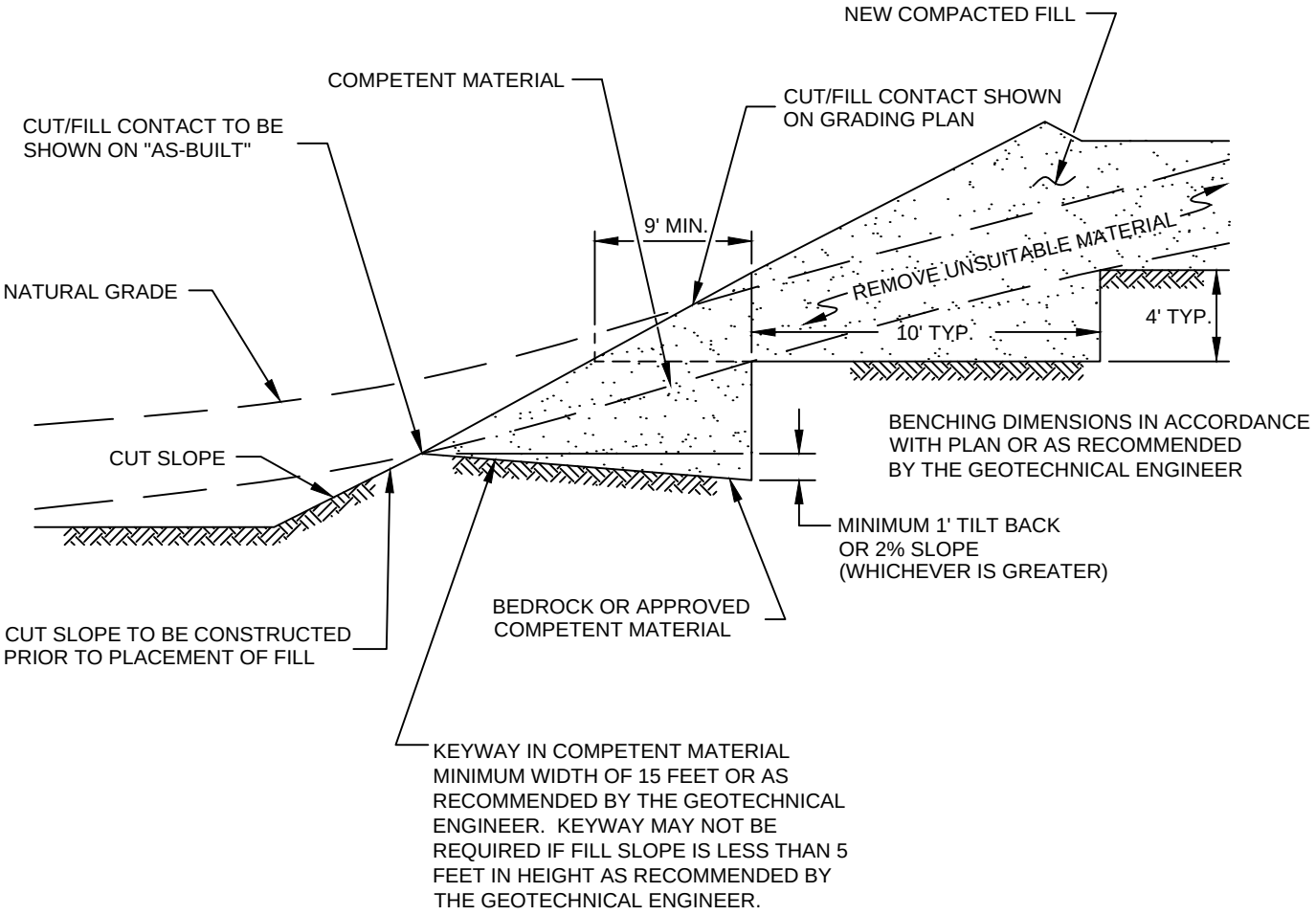
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo

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FILL ABOVE CUT SLOPE DETAIL

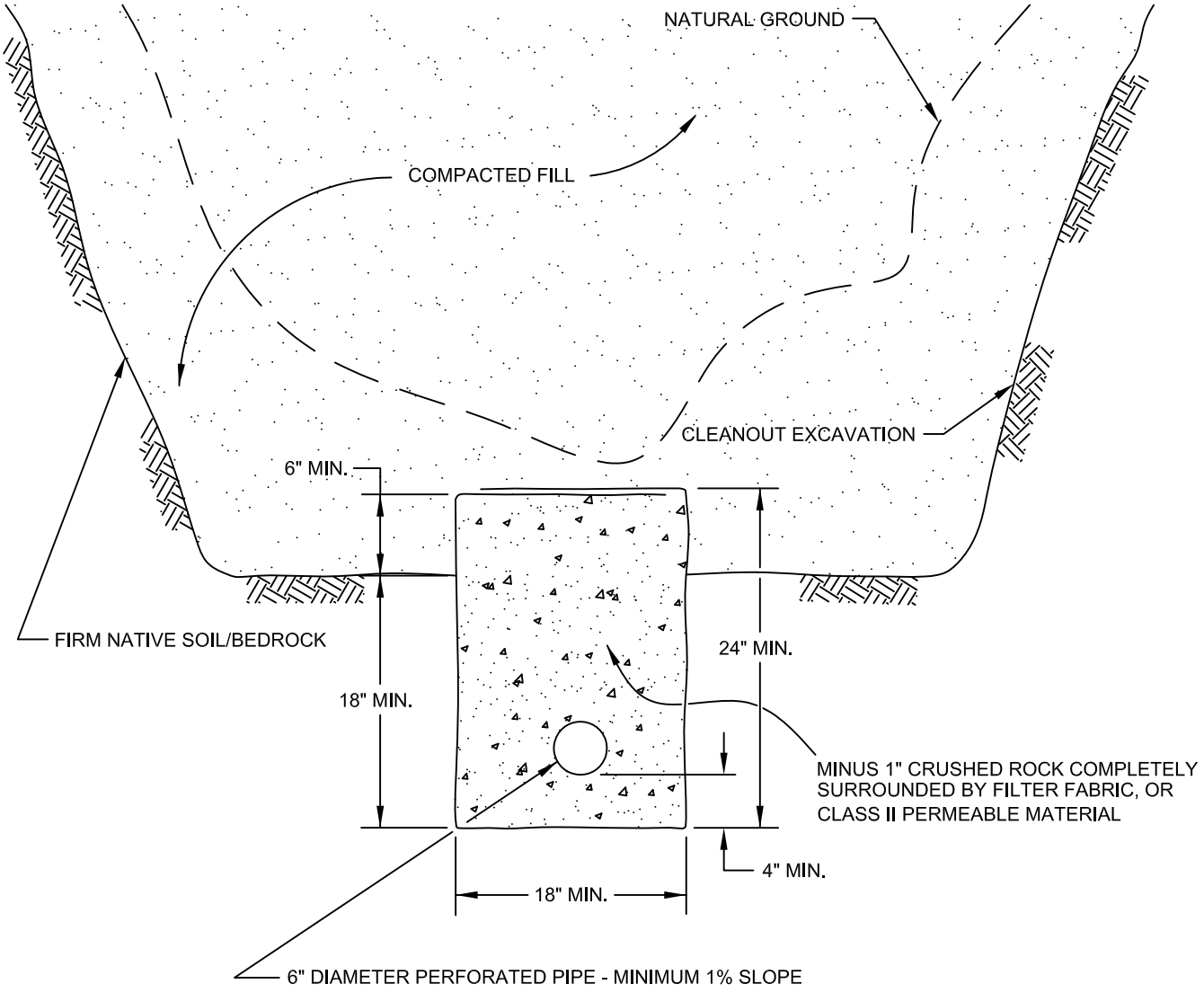
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



PIPE MATERIAL	DEPTH OF FILL OVER SUBDRAIN
ADS (CORRUGATED POLETHYLENE)	8
TRANSITE UNDERDRAIN	20
PVC OR ABS: SDR 35	35
SDR 21	100

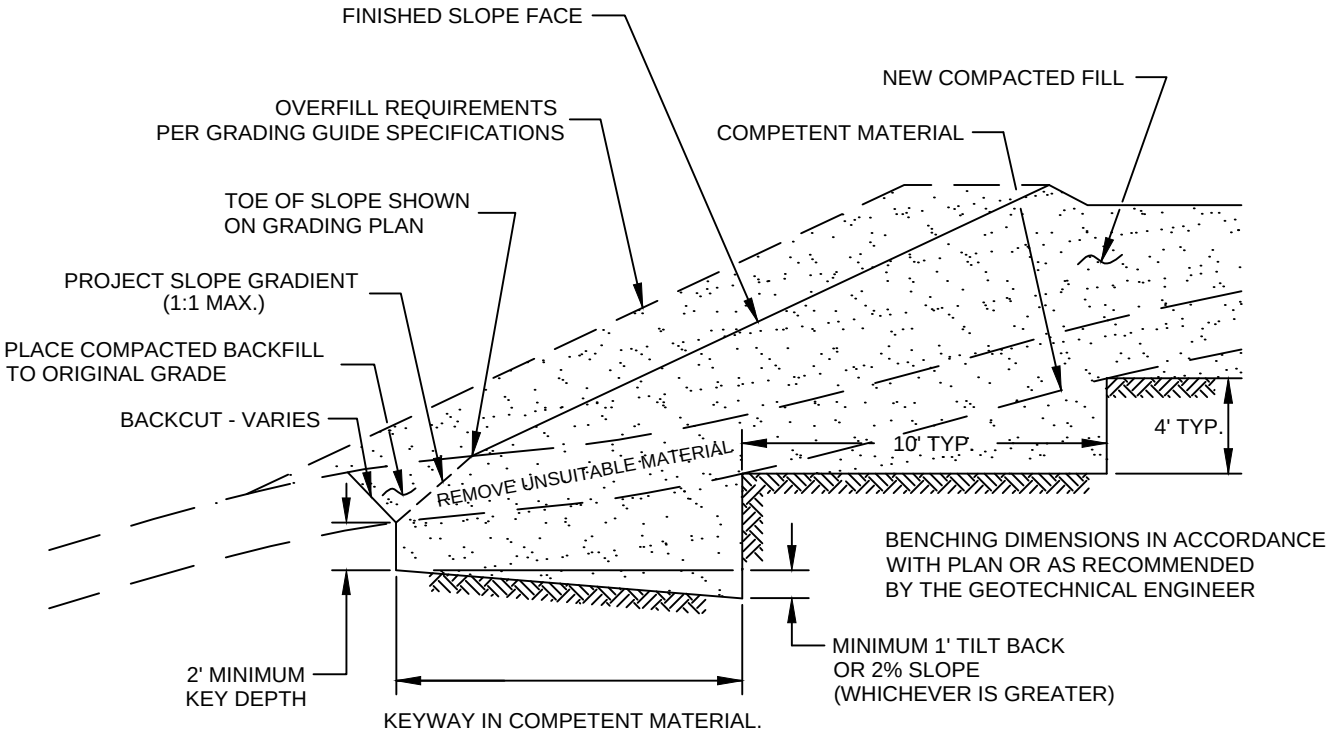
SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE
DRAWN: JAS
CHKD: GKM

PLATE D-3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



NOTE:
BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

FILL ABOVE NATURAL SLOPE DETAIL

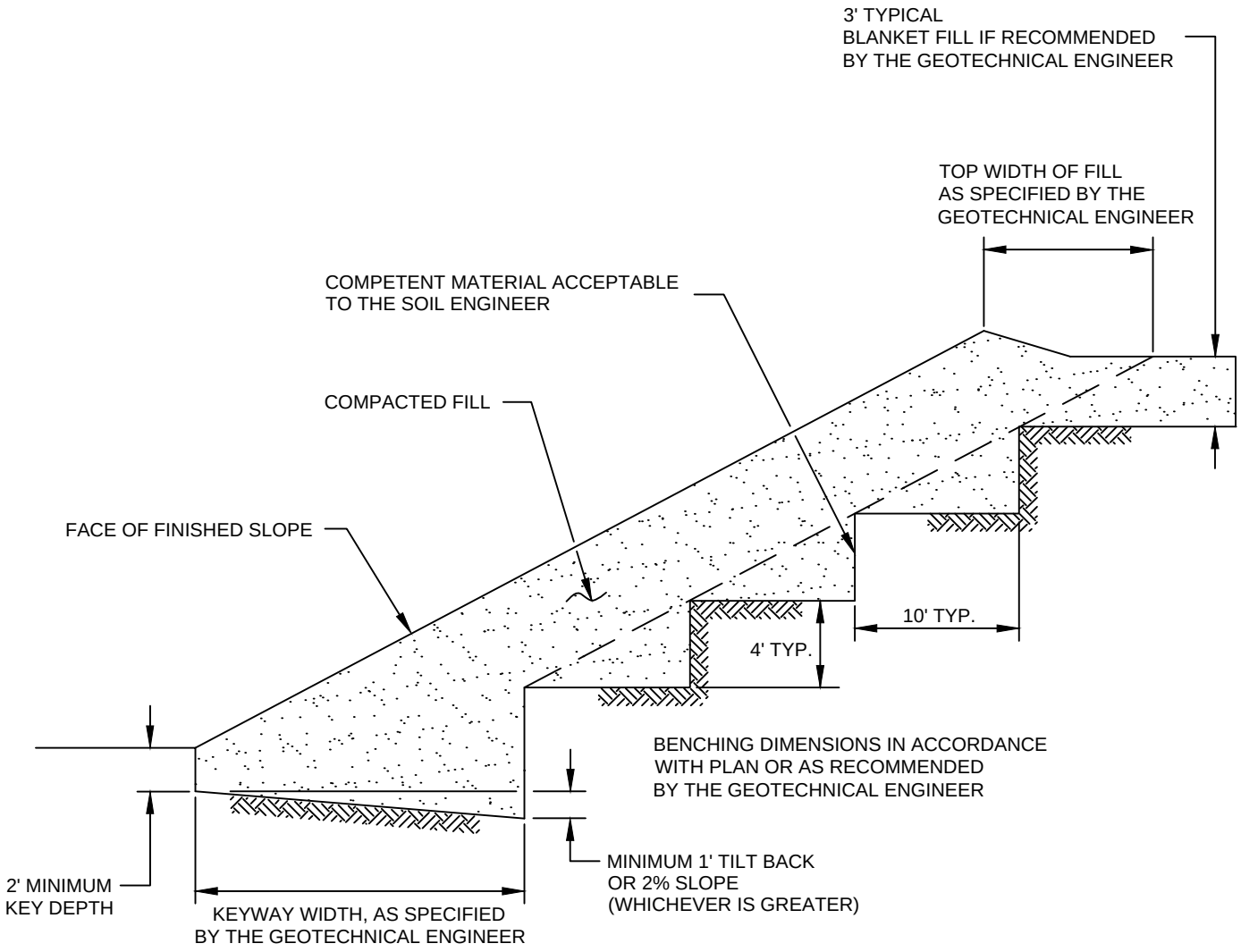
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

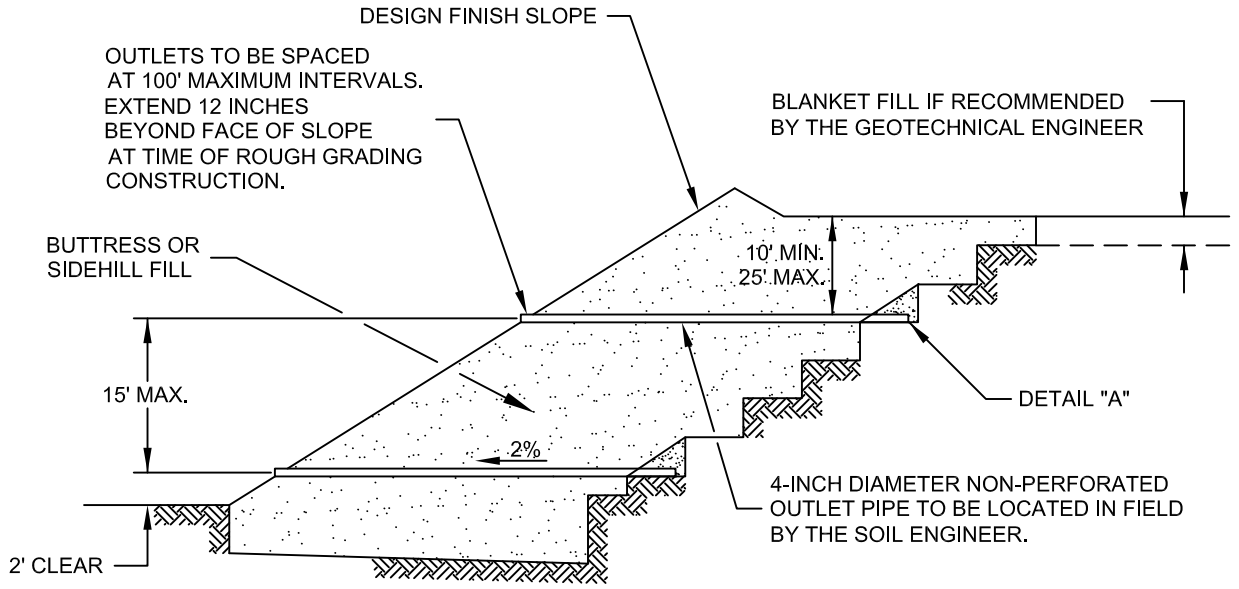
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



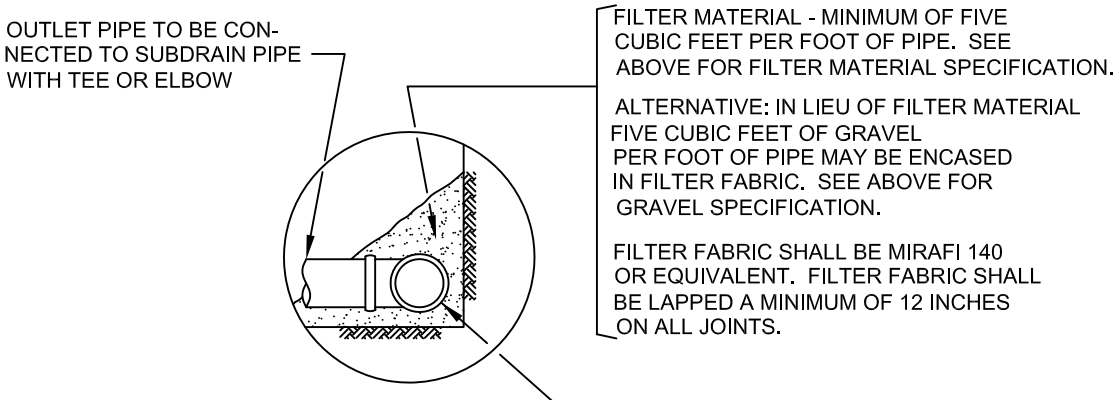
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50



DETAIL "A"

NOTES:
1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

SLOPE FILL SUBDRAINS

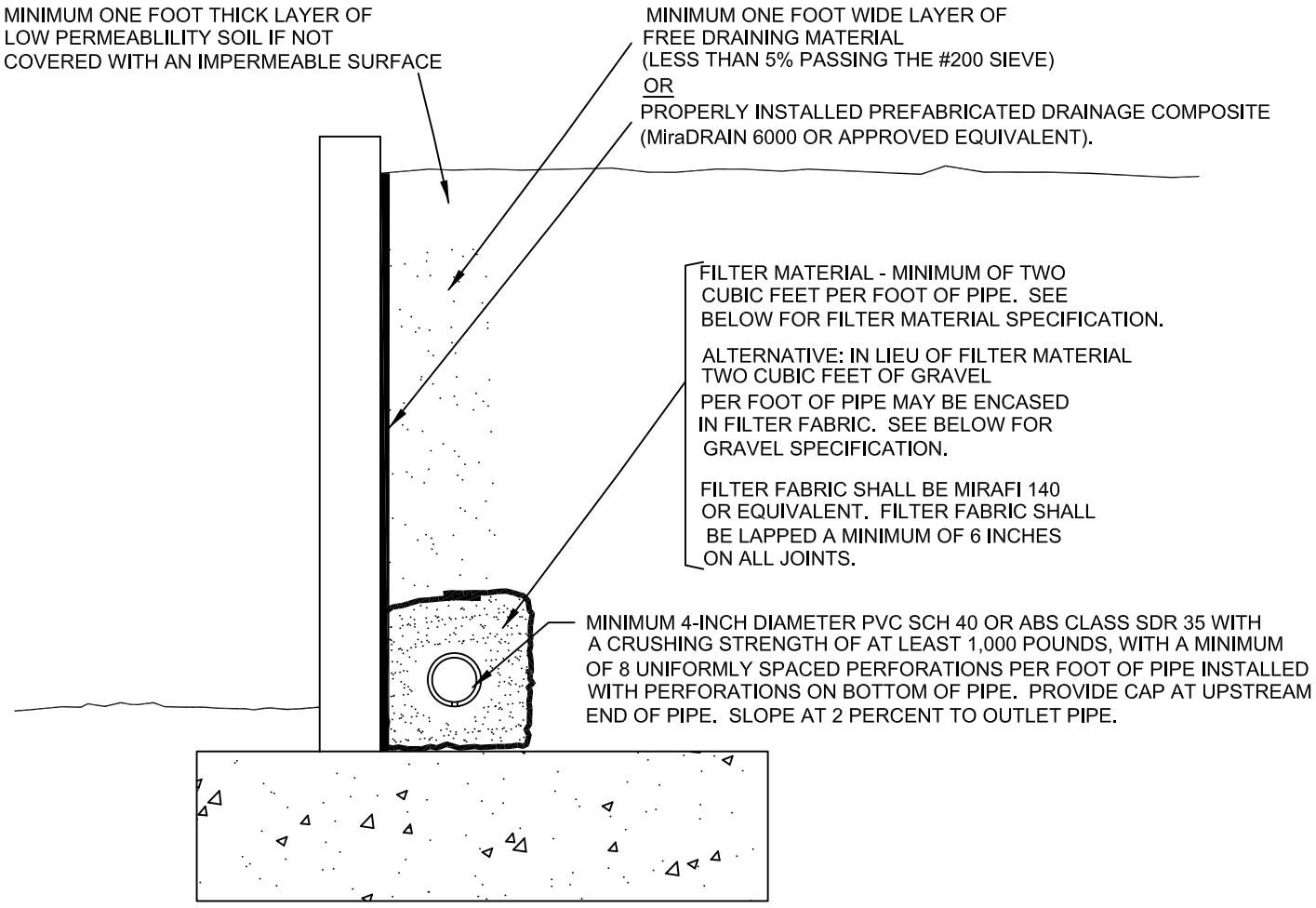
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

GRADING GUIDE SPECIFICATIONS

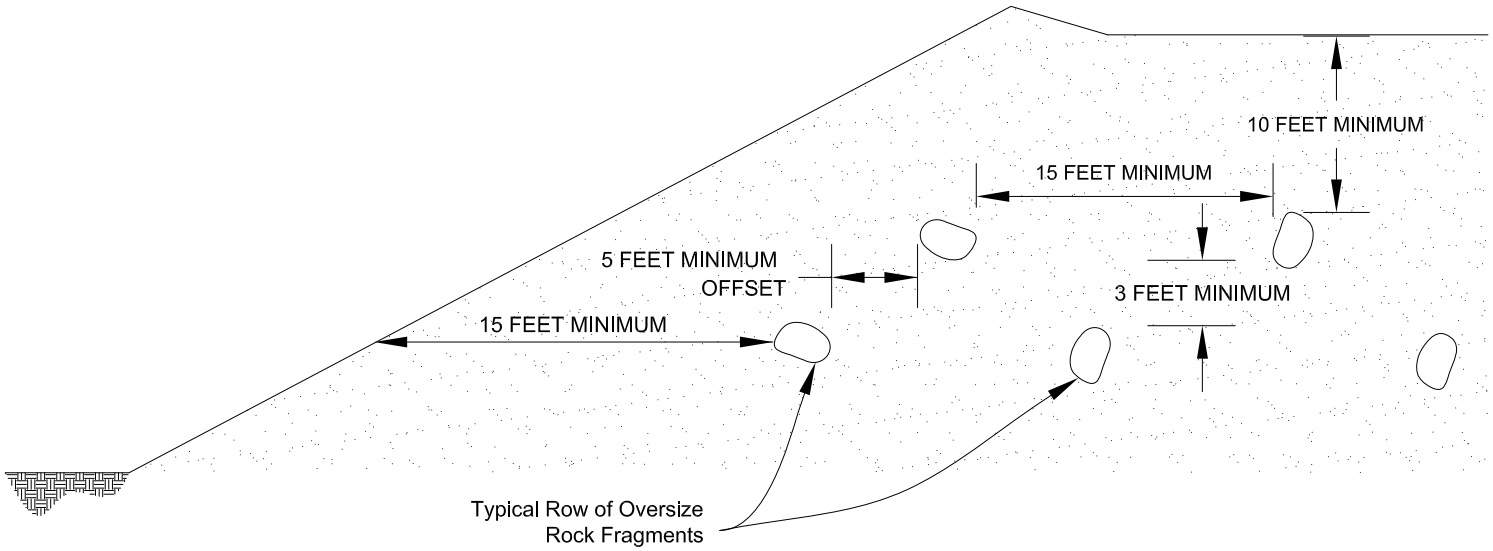
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

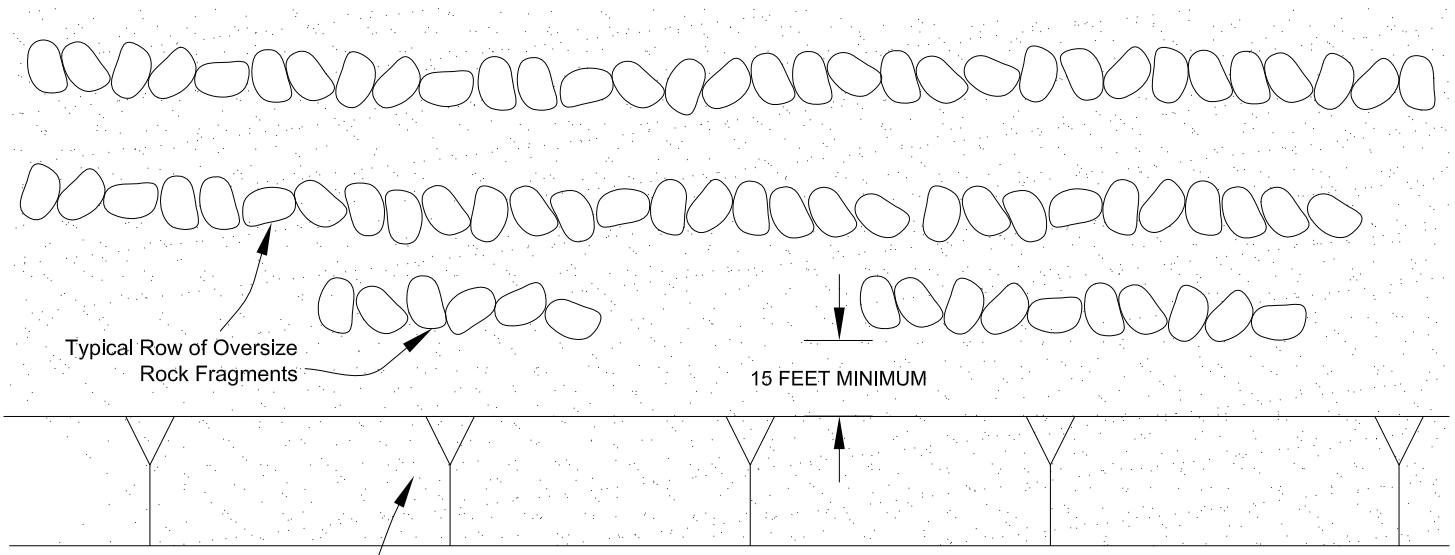
PLATE D-7

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

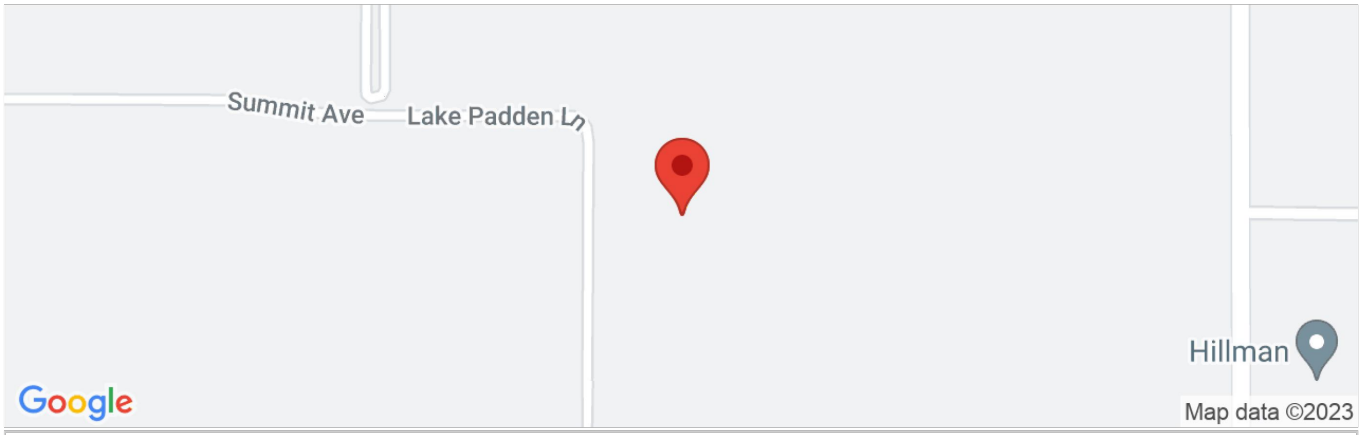
PLATE D-8

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

Latitude, Longitude: 34.149566, -117.415452



Date	6/21/2023, 4:34:11 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	2.27	MCE_R ground motion. (for 0.2 second period)
S_1	0.775	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.724	Site-modified spectral acceleration value
S_{M1}	1.085	Site-modified spectral acceleration value
S_{DS}	1.816	Numeric seismic design value at 0.2 second SA
S_{D1}	0.724	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	E	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.4	Site amplification factor at 1.0 second
PGA	0.931	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	1.117	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	2.495	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.737	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.27	Factored deterministic acceleration value. (0.2 second)
S1RT	1	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	1.125	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.775	Factored deterministic acceleration value. (1.0 second)
PGAd	0.931	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	1.089	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.911	Mapped value of the risk coefficient at short periods
C_{R1}	0.889	Mapped value of the risk coefficient at a period of 1 s
C_V	1.3	Vertical coefficient

SOURCE: SEAOC/OSHPD Seismic Design Maps Tool
<https://seismicmaps.org/>

SEISMIC DESIGN PARAMETERS - 2022 CBC
PROPOSED INDUSTRIAL BUILDING
RIALTO, CALIFORNIA

DRAWN: JLL
CHKD: RGT
SCG PROJECT 23G146-1
PLATE E-1

SOUTHERN CALIFORNIA GEOTECHNICAL