

Appendix D

Updated Geotechnical Investigation, SWC of 7th Street and Cawston
Avenue, San Jacinto, California

Geocon West, Inc

January 2, 2024

UPDATED GEOTECHNICAL INVESTIGATION

**SWC OF 7TH STREET AND
CAWSTON AVENUE
SAN JACINTO, CALIFORNIA**



GEOCON
W E S T, I N C.

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

**RAMONA DAIRY, LLC.
2451 RAMONA EXPRESSWAY
SAN JACINTO, CALIFORNIA 92582**

**JANUARY 2, 2024
PROJECT NO. T2998-22-01**



Project No. T2998-22-01
January 2, 2024

Ramona Dairy, LLC.
2451 Ramona Expressway
San Jacinto, California 92582

Attention: Mr. Richard Michael

Subject: UPDATED GEOTECHNICAL INVESTIGATION
SWC OF 7TH STREET AND CAWSTON AVENUE
SAN JACINTO, CALIFORNIA

Dear Mr. Michael:

In accordance with your authorization of our Work Order Authorization dated December 20, 2023, Geocon West, Inc. (Geocon) herein submits the results of our update to the preliminary geotechnical investigation dated November 4, 2022. The accompanying report presents an update to our preliminary findings, conclusions and recommendations pertaining to the geotechnical aspects of developing the property as presently proposed. Based on the results of this study, it is our opinion that the site is considered suitable for the proposed development provided the recommendations of this report are followed. The conclusions and recommendations provided in the 2022 report remain applicable unless superseded herein.

The primary intent of this report is to address the potential geologic hazards and geotechnical conditions that could impact site development and to provide an update to the preliminary geotechnical recommendations. Five geotechnical borings and four percolation tests were performed within the 76+ acre site for the preliminary geotechnical investigation. The northern portion of the site was occupied with a residence and basin at the time of the field work. Therefore, a supplemental geotechnical investigation should be performed with percolation testing performed at the BMP locations and elevations once grading plans have been developed. Additional analyses will be required in order to provide comprehensive geotechnical recommendations for design and construction when the scope of the proposed development has been established.

Should you have any questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON WEST, INC.


Lisa Battiato
CEG 2316



LAB:ADL:hd
(email) Addressee

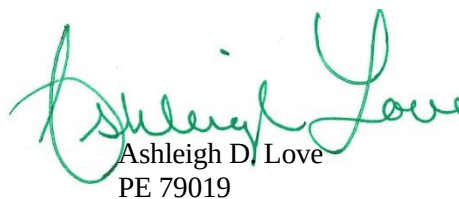

Ashleigh D. Love
PE 79019



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UPDATED GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of our updated geotechnical investigation for the proposed development of approximately 76 acres located southwest of 7th Street and Cawston Avenue in San Jacinto, California, as depicted on the *Vicinity Map*, Figure 1.

The purpose of our investigation in 2022 was to perform a preliminary evaluation of subsurface soil and geologic conditions underlying the site and based on the conditions encountered, provide preliminary recommendations pertaining to the geotechnical aspects of developing the property as proposed. Due to the preliminary nature of the project at this time, the primary intent of this updated report is to address the potential geologic hazards and geotechnical conditions that could impact site development and to provide preliminary recommendations with respect to the 2022 California Building Code. The information provided in the 2022 report remains applicable to the site unless superseded herein. Additional analyses will be required in order to provide comprehensive geotechnical recommendations for design and construction when the scope of the proposed development has been established.

2. SITE AND PROJECT DESCRIPTION

The *Vesting Tentative Tract Map No. 38787* prepared by Psomas indicates site development will include single-family homes, and townhomes with a community park and open space areas for storm water infiltration or retention.

The site grading plans, structural plans, and building loads were not available. Based on the site elevations and surrounding roadway elevations, we expect rough grading will entail cuts and fills of less than 5 feet, exclusive of remedial grading.

We understand that the site will likely be used for the construction of single- or townhouse residential structures, which are expected to have spread footing foundations with slab-on-grade floors. Single-family and townhouse structures will likely be two or three stories. We have assumed that column loads will be up to 300 kips, and wall loads will be up to 4 kips per linear foot for the heaviest loaded structure.

Once the design phase and foundation loading configuration proceeds to a more finalized plan, the recommendations within this report should be reviewed and revised, if necessary. Any changes in the design, location, or elevation of any structure, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

3. GEOLOGIC HAZARDS

3.1 Subsidence

Regional subsidence has occurred in several valley areas in California due to withdrawal of groundwater or oil, and in some cases peat loss. The site is located in the San Jacinto Valley which is a deep northwest trending alluvial valley created along the San Jacinto fault. The valley is bounded on the northeast and southwest by granitic bedrock hills which extend along the valley margins to depths of several hundred feet. The site is not located in an Area of Land Subsidence in California according to the United States Geological Survey (USGS). The San Jacinto Valley is not included in an area currently undergoing a USGS subsidence study. Riverside County does include the site in an area of active subsidence. California Geological Survey does not address subsidence risk on its website. A search of the city of San Jacinto website GIS system did not yield results when the term “subsidence” was searched. Based on this information, ground subsidence could occur. However, the settlement is expected to occur over a relatively large geographic area and is not expected to cause differential settlement over a relatively short horizontal distance which would be addressed as a design concern as part of the site development.

4. SITE INFILTRATION

Percolation testing was performed at four locations within the site to provide preliminary information for project design. Additional percolation testing will be necessary at the proposed BMP locations and planned infiltration elevations once they are known. The testing was performed in general accordance with the procedures outlined in *Riverside County Flood Control and Water Conservation District LID BMP, Appendix A (Handbook)* to determine preliminary infiltration potential. The percolation test locations are depicted on the *Geologic Map*, Figure 2.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 General

- 5.1.1 Additional subsurface exploration and percolation testing will be required before site grading to provide adequate subsurface information for earthwork operations and provide the necessary percolation test data required by Riverside County BMP LID Handbook.

5.2 Soil and Excavation Characteristics

- 5.2.1 The upper 5 feet of existing site soils encountered during the investigation are considered to have a “very low” expansive potential ($EI = 11$) and are classified as “non-expansive” in accordance with the 2022 California Building Code (CBC) Section 1803.5.3. The recommendations presented herein assume that the building foundations and slabs will derive support in these materials.

- 5.2.2 As a minimum, it is recommended that the upper 8 feet of existing earth materials within the proposed building footprint areas be excavated and properly compacted for post-tensioned foundation system support. Deeper excavations should be conducted as necessary to remove deeper artificial fill or soft alluvial soil at the direction of the Geotechnical Engineer (a representative of Geocon). Proposed foundations should be underlain by at least 5 feet of newly placed engineered fill. The excavation should extend laterally a minimum distance of 6 feet beyond the building footprint area, including building appurtenances, or a distance equal to the depth of fill below the foundation, whichever is greater. The limits of existing fill and/or soft alluvial soils removal will be verified by the Geocon representative during site grading activities.

5.3 Soil and Minimum Resistivity, pH, and Water-Soluble Sulfate

- 5.3.1 Laboratory tests were performed on representative samples of the site materials to measure the percentage of water-soluble sulfate content. Results from the laboratory water-soluble sulfate tests are presented in Appendix B (Figure B-4) and indicate that the on-site materials possess a sulfate exposure class of “S0” to concrete structures as defined by 2022 CBC Section 1904 and ACI 318-19 Chapter 19.

5.4 Seismic Design Criteria

- 5.4.1 The following table summarizes the site-specific design criteria obtained from the 2022 California Building Code (CBC; Based on the 2021 International Building Code [IBC] and ASCE 7-16), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The data was calculated using the online application *U.S. Seismic Design Maps*, provided by the Structural Engineers Association of California (SEAOC). The short spectral response uses a period of

0.2 second. We evaluated the Site Class based on the discussion in Section 1613.2.2 of the 2022 CBC and Table 20.3-1 of ASCE 7-16. The values presented below are for the risk-targeted maximum considered earthquake (MCE_R).

- 5.4.2 Although there are soils susceptible to seismic settlement underlying the site, we expect the building possesses a fundamental period of less than 0.5 seconds; therefore, a site response analysis is not anticipated to be required in accordance with ASCE 7-16, Section 20.3.1.

2022 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2022 CBC Reference
Site Class	D	Section 1613.2.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	1.984g	Figure 1613.2.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.785g	Figure 1613.2.1(3)
Site Coefficient, F_A	1.009	Table 1613.2.3(1)
Site Coefficient, F_V	1.7*	Table 1613.2.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.984g	Section 1613.2.3 (Eqn 16-20)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	1.334g*	Section 1613.2.3 (Eqn 16-21)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	1.323g	Section 1613.2.4 (Eqn 16-22)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.889g*	Section 1613.2.4 (Eqn 16-23)
*Per Supplement 3 of ASCE 7-16, a ground motion hazard analysis (GMHA) shall be performed for projects on Site Class “D” sites with 1-second spectral acceleration (S_1) greater than or equal to 0.2g, which is true for this site. However, Supplement 3 of ASCE 7-16 provides an exception stating that that the GMHA may be waived provided that the parameter S_{M1} is increased by 50% for all applications of S_{M1} . The values for parameters S_{M1} and S_{D1} presented above have not been increased in accordance with Supplement 3 of ASCE 7-16.		

- 5.4.3 Conformance to the criteria in the above tables for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

5.5 Post Tensioned Foundation Recommendations

- 5.5.1 The proposed residential structures may be supported on a post-tensioned concrete slab and foundation system deriving support in newly placed engineered fill subsequent to the recommended grading. Proposed foundations should be underlain by at least 5 feet of newly placed engineered fill. Foundation excavations must be observed and approved in writing by the Geotechnical Engineer, prior to placing reinforcing steel or concrete.

- 5.5.2 The post-tensioned system should be designed by a structural engineer experienced in post-tensioned slab design and design criteria of the Post-Tensioning Institute (PTI) DC 10.5-12 *Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils* or *WRI/CRSI Design of Slab-on-Ground Foundations*, as required by the 2022 California Building Code (CBC Section 1808.6.2). Although this procedure was developed for expansive soil conditions, we understand it can also be used to reduce the potential for foundation distress due to differential settlement. The post-tensioned design should incorporate the geotechnical parameters presented in Table 5.5.2 below, which are based on the guidelines presented in the PTI, Third Edition design manual.

TABLE 5.5.2
POST-TENSIONED FOUNDATION SYSTEM DESIGN PARAMETERS

Post-Tensioning Institute (PTI) Third Edition Design Parameters	Value
Thornthwaite Index	-20
Equilibrium Suction	3.9
Edge Lift Moisture Variation Distance, e_M (feet)	4.9
Edge Lift, y_M (inches)	1.58
Center Lift Moisture Variation Distance, e_M (feet)	9.0
Center Lift, y_M (inches)	66

5.6 Foundation Settlement

- 5.6.1 The enclosed seismically induced settlement analysis indicates that the site soils could be susceptible to approximately 0.79 inch of total settlement as a result of the Design Earthquake peak ground acceleration ($\frac{2}{3}PGA_M$). The differential settlement at the foundation level is anticipated to be approximately 0.4 inch over a distance of 50 feet. These settlements are in addition to the static settlements indicated below and must be considered in the structural design.
- 5.6.2 The maximum expected static settlement for the proposed structures supported on a post-tensioned foundation system designed with a maximum bearing pressure of 3,000 psf and deriving support in newly placed engineered fill is estimated to be less than 1.25 inch and occur below the heaviest loaded structural element. A majority of the settlement of the foundation system is expected to occur on initial application of loading; however, minor additional settlements are expected within the first 12 months. Differential settlement is not expected to exceed 5/8 inch over a distance of 20 feet.

5.6.3 Based on seismic considerations, the proposed structures should be designed for a combined static and seismically induced differential settlement of 1 inch over a distance of 20 feet.

5.6.4 Once the design and foundation loading configurations for the proposed structures proceeds to a more finalized plan, the estimated settlements presented in this report should be reviewed and revised, if necessary. If the final foundation loading configurations are greater than the assumed loading conditions, the potential for settlement should be reevaluated by this office.

5.7 Surface Drainage

5.7.1 All site drainage should be collected and controlled in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2022 CBC 1804.4 or other applicable standards. In addition, drainage should not be allowed to flow uncontrolled over any descending slope. Discharge from downspouts, roof drains and scuppers are not recommended onto unprotected soils within 5 feet of the building perimeter. Planters which are located adjacent to foundations should be sealed to prevent moisture intrusion into the soils providing foundation support. Landscape irrigation is not recommended within 5 feet of the building perimeter footings except when enclosed in protected planters.

5.8 Plan Review

5.8.1 Grading, foundation, and, if applicable, shoring plans should be reviewed by the Geotechnical Engineer (a representative of Geocon), prior to finalization to verify that the plans have been prepared in substantial conformance with the recommendations of this report and to provide additional analyses or recommendations. Additional subsurface exploration and percolation are highly recommended to provide adequate coverage of the site prior to earthwork operations and to satisfy Riverside County requirements.

5.9 Testing and Observation Services During Construction

5.9.1 Geocon should provide geotechnical testing and observation services during the grading operations, foundation construction, utility installation, retaining wall backfill and pavement installation. Table 5.9.1 presents the typical geotechnical observations we would expect for the proposed improvements.

**TABLE 5.9.1
EXPECTED GEOTECHNICAL TESTING AND OBSERVATION SERVICES**

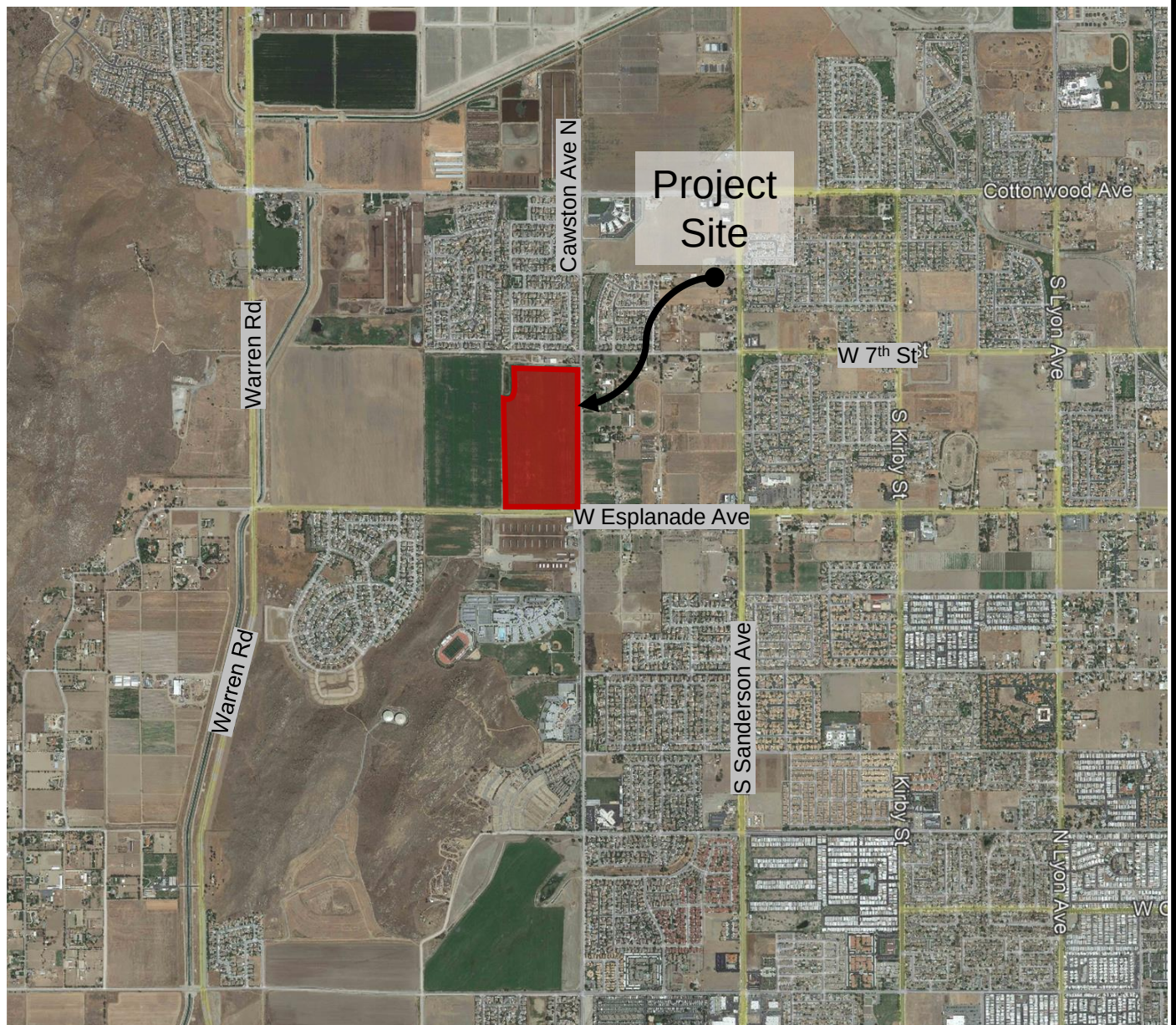
Construction Phase	Observations	Expected Time Frame
Ground Modification	Ground Modification Installation	Full Time
	Confirmation Testing	Part Time to Full Time
Grading	Base of Removal	Part Time During Removals
	Geologic Logging	Part Time to Full Time
	Fill Placement and Soil Compaction	Full Time
Soldier Piles	Solder Pile Drilling Depth	Part Time
Tieback Anchors	Tieback Drilling and Installation	Full Time
	Tieback Testing	Full Time
Soil Nail Walls	Soil Nail Drilling and Installation	Full Time
	Soil Nail Testing	Full Time
Foundations	Foundation Excavation Observations	Full Time
	Drilling Operations for Piles	Part Time
Utility Backfill	Fill Placement and Soil Compaction	Part Time to Full Time
Retaining Wall Backfill	Fill Placement and Soil Compaction	Part Time to Full Time
Subgrade for Sidewalks, Curb/Gutter and Pavement	Soil Compaction	Part Time
Pavement Construction	Base Placement and Compaction	Part Time
	Asphalt Concrete Placement and Compaction	Full Time

LIMITATIONS AND UNIFORMITY OF CONDITIONS

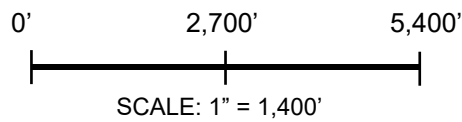
1. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon West, Inc. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon West, Inc.
2. This report is issued with the understanding that it is the responsibility of the owner, or of their representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.
3. The findings of this report are valid as of the date of this report. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.
4. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

LIST OF REFERENCES

1. American Society of Civil Engineers (ASCE), *ASCE 7-16, Minimum Design Loads and Associated Criteria for Buildings and Other Structures*, 2017.
2. California Building Standards Commission, 2022, *California Building Code (CBC)*, California Code of Regulations Title 24, Part 2.
3. California Geological Survey (CGS), *Earthquake Shaking Potential for California*, from USGS/CGS Seismic Hazards Model, CSSC No. 03-02, 2003.
4. California Geological Survey (CGS), *Probabilistic Seismic Hazards Mapping-Ground Motion Page*, 2003, CGS Website: www.conserv.ca.gov/cgs/rghm/pshamap.
5. Geocon West, Inc., 2022, *Preliminary Geotechnical Investigation, SWC of 7th Street and Cawston Avenue, San Jacinto, California*, Project T2998-2-01, dated November 4.
6. OSHPD, *Seismic Design Maps*, seismicdesignmaps.org, accessed December 2023.
7. Riverside County GIS (RC GIS), *Map My County* website, http://mmc.rivcoit.org/MMC_Public/Custom/disclaimer/Default.htm; accessed December 2023.
8. USGS, *Areas of Land Subsidence in California*, ca.water.usgs.gov/land_subsidence/California-subsidence+areas.html, accessed December 2023.
9. USGS, *Unified Hazard Tool*, earthquake.usgs.gov/hazards/interactive, accessed December 2023.



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SOURCE: Google Maps, 2022

VICINITY MAP

GEOCON
WEST, INC.



GEOTECHNICAL ENVIRONMENTAL MATERIALS
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ARK

SWC 7TH STREET & CAWSTON AVENUE
SAN JACINTO, CALIFORNIA

JANUARY 2024

PROJECT NO. T2998-22-01

FIG. 1

VACANT AGRICULTURAL LAND

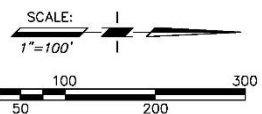


FIG. 2

APPENDIX

A

APPENDIX A

FIELD EXPLORATION

Geocon performed the field investigation on September 26 and 27, 2022, which included the drilling of five geotechnical borings (B-1 through B-5) and four percolation borings (P-1 through P-4) to depths between approximately 2 to 51½ feet, to observe the subsurface geological conditions, perform percolation testing at the site, collect relatively undisturbed in-situ and disturbed bulk samples for laboratory testing, and evaluate the depth to groundwater. Borings were drilled with a truck mounted CME-75 drill rig with 8-inch-diameter hollow stem augers.

We collected relatively undisturbed and bulk samples from the borings. The undisturbed samples were obtained by driving a 3-inch O. D., California Modified Sampler into the “undisturbed” soil mass with blows from a 140-pound hammer falling 30 inches. The California Modified Sampler was equipped with 1-inch high by 2¾-inch inside diameter brass sampler rings to facilitate removal and testing. Relatively undisturbed samples and bulk samples of disturbed soils were transported to our laboratory for testing. The soil conditions encountered in the borings were visually examined, classified and logged in general accordance with the Unified Soil Classification System (USCS).

Logs of the geotechnical borings are presented on Figures A-1 through A-5, percolation borings on A-6 through A-9, and percolation test data sheets on A-10 through A-13. The logs depict the soil and geologic conditions encountered and the depth at which samples were obtained. The logs also include our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the logs were revised based on subsequent laboratory testing. The approximate locations of the borings are depicted on the *Geologic Map*, Figure 2.

T2998-22-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL	 ... STANDARD PENETRATION TEST	 ... DRIVE SAMPLE (UNDISTURBED)
 ... DISTURBED OR BAG SAMPLE	 ... CHUNK SAMPLE	 ... WATER TABLE OR SEEPAGE

GEOCON

T2998-22-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

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NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

T2998-22-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

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GEOCON

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B-3 ELEV. (MSL.) <u>1511</u> DATE COMPLETED <u>9/26/2022</u> EQUIPMENT <u>CME75</u> BY: <u>L. WEIDMAN</u>	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					MATERIAL DESCRIPTION			
				ML	TOPSOIL SILT, soft, slightly moist, olive gray; fine to medium sand			
2	B-3@2.5			SM	ALLUVIUM (Qa) Silty SAND, loose, moist, strong brown; fine to medium sand; little coarse sand; little mica	13		
4	B-3@5				-Little silt; some mica	15	107.8	12.4
6								
8	B-3@7.5				-Few silt; micaceous	15	106.7	9.6
10	B-3@10				-Becomes less silty; moisture increases	16	97.8	19.3
12								
14								
16	B-3@15			SM	Silty SAND, medium dense, moist, strong brown to dark brown; fine to medium sand; some mica; laminated	26		
18								
20	B-3@20				-Becomes dense; inbedded with thin poorly-graded sand layers	44		
22								
24								
26	B-3@25				-Becomes wet, very dark brown; fine to coarse sand	15		
28								

Figure 3,
Log of Boring B-3, Page 1 of 2

T2998-22-01 BORING LOGS.GPJ

SAMPLE SYMBOLS	 ... SAMPLING UNSUCCESSFUL	 ... STANDARD PENETRATION TEST	 ... DRIVE SAMPLE (UNDISTURBED)
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DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B-3		PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					ELEV. (MSL.) <u>1511</u>	DATE COMPLETED <u>9/26/2022</u>			
					EQUIPMENT <u>CME75</u> BY: <u>L. WEIDMAN</u>				
					MATERIAL DESCRIPTION				
30	B-3@30				-Becomes micaceous; massive		30		
32									
34									
36	B-3@35				-Becomes fine to medium sand; slightly oxidized		37		
					Total Depth = 36.5' Groundwater not encountered Penetration resistance for 140-lb hammer falling 30 inches by auto hammer Backfilled with cuttings 9/26/2022				

**Figure 3,
Log of Boring B-3, Page 2 of 2**

T2998-22-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL	 ... STANDARD PENETRATION TEST	 ... DRIVE SAMPLE (UNDISTURBED)
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GEOCON

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 ... DISTURBED OR BAG SAMPLE	 ... CHUNK SAMPLE	 ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

T2998-22-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL	 ... STANDARD PENETRATION TEST	 ... DRIVE SAMPLE (UNDISTURBED)
 ... DISTURBED OR BAG SAMPLE	 ... CHUNK SAMPLE	 ... WATER TABLE OR SEEPAGE

GEOCON

T2998-22-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL	 ... STANDARD PENETRATION TEST	 ... DRIVE SAMPLE (UNDISTURBED)
 ... DISTURBED OR BAG SAMPLE	 ... CHUNK SAMPLE	 ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

T2998-22-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL	 ... STANDARD PENETRATION TEST	 ... DRIVE SAMPLE (UNDISTURBED)
 ... DISTURBED OR BAG SAMPLE	 ... CHUNK SAMPLE	 ... WATER TABLE OR SEEPAGE

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T2998-22-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL	 ... STANDARD PENETRATION TEST	 ... DRIVE SAMPLE (UNDISTURBED)
 ... DISTURBED OR BAG SAMPLE	 ... CHUNK SAMPLE	 ... WATER TABLE OR SEEPAGE

GEOCON

T2998-22-01 BORING LOGS.GPJ

SAMPLE SYMBOLS

 ... SAMPLING UNSUCCESSFUL	 ... STANDARD PENETRATION TEST	 ... DRIVE SAMPLE (UNDISTURBED)
 ... DISTURBED OR BAG SAMPLE	 ... CHUNK SAMPLE	 ... WATER TABLE OR SEEPAGE

GEOCON

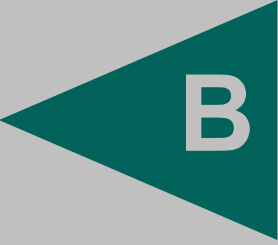
PERCOLATION TEST REPORT							
Project Name:		Ramona San Jacinto		Project No.:		T2998-22-01	
Test Hole No.:		P-1		Date Excavated:		9/26/2022	
Length of Test Pipe:		24.0 inches		Soil Classification:		SM	
Height of Pipe above Ground:		0.0 inches		Presoak Date:		9/26/2022	
Depth of Test Hole:		24.0 inches		Perc Test Date:		9/27/2022	
Check for Sandy Soil Criteria Tested by:				Weidman		Percolation Tested by: Weidman	
Water level measured from BOTTOM of hole							
Sandy Soil Criteria Test							
Trial No.	Time	Time Interval	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	8:30 AM	25	25	24.0	20.3	3.7	6.7
	8:55 AM						
2	8:55 AM	25	50	24.0	22.4	1.6	16.0
	9:20 AM						
Soil Criteria: Normal							
Percolation Test							
Reading No.	Time	Time Interval	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:20 AM	30	30	24.0	22.0	2.0	14.7
	9:50 AM						
2	9:50 AM	30	60	24.0	22.8	1.2	25.0
	10:20 AM						
3	10:20 AM	30	90	24.0	22.7	1.3	22.7
	10:50 AM						
4	10:50 AM	30	120	24.0	22.6	1.4	20.8
	11:20 AM						
5	11:20 AM	30	150	24.0	22.8	1.2	25.0
	11:50 AM						
6	11:50 AM	30	180	24.0	22.6	1.4	20.8
	12:20 PM						
7	12:20 PM	30	210	24.0	22.8	1.2	25.0
	12:50 PM						
8	12:50 PM	30	240	24.0	23.0	1.0	31.3
	1:20 PM						
9	1:20 PM	30	270	24.0	23.3	0.7	41.7
	1:50 PM						
10	1:50 PM	30	300	24.0	23.3	0.7	41.7
	2:20 PM						
11	2:20 PM	30	330	24.0	23.4	0.6	50.0
	2:50 PM						
12	2:50 PM	30	360	24.0	23.4	0.6	50.0
	3:20 PM						
Infiltration Rate (in/hr):		0.1					
Radius of test hole (in):		4				Figure A-10	
Average Head (in):		23.7					

PERCOLATION TEST REPORT							
Project Name:		Ramona San Jacinto		Project No.:		T2998-22-01	
Test Hole No.:		P-2		Date Excavated:		9/26/2022	
Length of Test Pipe:		120.0 inches		Soil Classification:		SM	
Height of Pipe above Ground:		0.0 inches		Presoak Date:		9/26/2022	
Depth of Test Hole:		120.0 inches		Perc Test Date:		9/27/2022	
Check for Sandy Soil Criteria Tested by:		Weidman		Percolation Tested by:		Weidman	
Water level measured from BOTTOM of hole							
Sandy Soil Criteria Test							
Trial No.	Time	Time Interval	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	8:33 AM	25	25	48.0	13.6	34.4	0.7
	8:58 AM						
2	8:58 AM	25	50	48.0	19.2	28.8	0.9
	9:23 AM						
Soil Criteria: Sandy							
Percolation Test							
Reading No.	Time	Time Interval	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:23 AM	10	10	48.0	38.4	9.6	1.0
	9:33 AM						
2	9:33 AM	10	20	48.0	39.6	8.4	1.2
	9:43 AM						
3	9:43 AM	10	30	48.0	40.2	7.8	1.3
	9:53 AM						
4	9:53 AM	10	40	48.0	43.2	4.8	2.1
	10:03 AM						
5	10:03 AM	10	50	48.0	45.0	3.0	3.3
	10:13 AM						
6	10:13 AM	10	60	48.0	45.6	2.4	4.2
	10:23 AM						
Infiltration Rate (in/hr):			0.6				
Radius of test hole (in):			4				Figure A-11
Average Head (in):			46.8				

PERCOLATION TEST REPORT							
Project Name:		Ramona San Jacinto		Project No.:		T2998-22-01	
Test Hole No.:		P-3		Date Excavated:		9/26/2022	
Length of Test Pipe:		24.0 inches		Soil Classification:		SM	
Height of Pipe above Ground:		0.0 inches		Presoak Date:		9/26/2022	
Depth of Test Hole:		24.0 inches		Perc Test Date:		9/27/2022	
Check for Sandy Soil Criteria Tested by:				Weidman		Percolation Tested by: Weidman	
Water level measured from BOTTOM of hole							
Sandy Soil Criteria Test							
Trial No.	Time	Time Interval	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	8:38 AM	25	25	24.0	17.8	6.2	4.0
	9:03 AM						
2	9:03 AM	25	50	24.0	21.6	2.4	10.4
	9:28 AM						
			Soil Criteria: Normal				
			Percolation Test				
Reading No.	Time	Time Interval	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:28 AM	30	30	24.0	21.6	2.4	12.5
	9:58 AM						
2	9:58 AM	30	60	24.0	22.4	1.6	19.2
	10:28 AM						
3	10:28 AM	30	90	24.0	22.6	1.4	20.8
	10:58 AM						
4	10:58 AM	30	120	24.0	22.6	1.4	20.8
	11:28 AM						
5	11:28 AM	30	150	24.0	22.6	1.4	20.8
	11:58 AM						
6	11:58 AM	30	180	24.0	22.2	1.8	16.7
	12:28 PM						
7	12:28 PM	30	210	24.0	22.8	1.2	25.0
	12:58 PM						
8	12:58 PM	30	240	24.0	23.0	1.0	31.3
	1:28 PM						
9	1:28 PM	30	270	24.0	23.3	0.7	41.7
	1:58 PM						
10	1:58 PM	30	300	24.0	23.3	0.7	41.7
	2:28 PM						
11	2:28 PM	30	330	24.0	23.3	0.7	41.7
	2:58 PM						
12	2:58 PM	30	360	24.0	23.3	0.7	41.7
	3:28 PM						
Infiltration Rate (in/hr):		0.1					
Radius of test hole (in):		4				Figure A-12	
Average Head (in):		23.6					

PERCOLATION TEST REPORT							
Project Name:		Ramona San Jacinto		Project No.:		T2998-22-01	
Test Hole No.:		P-4		Date Excavated:		9/26/2022	
Length of Test Pipe:		24.0 inches		Soil Classification:		ML	
Height of Pipe above Ground:		0.0 inches		Presoak Date:		9/26/2022	
Depth of Test Hole:		24.0 inches		Perc Test Date:		9/27/2022	
Check for Sandy Soil Criteria Tested by:				Weidman		Percolation Tested by: Weidman	
Water level measured from BOTTOM of hole							
Sandy Soil Criteria Test							
Trial No.	Time	Time Interval	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	8:30 AM	25	25	24.0	17.9	6.1	4.1
	8:55 AM						
2	8:55 AM	25	50	24.0	20.4	3.6	6.9
	9:20 AM						
Soil Criteria: Normal							
Percolation Test							
Reading No.	Time	Time Interval	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:20 AM	30	30	24.0	20.6	3.4	8.9
	9:50 AM						
2	9:50 AM	30	60	24.0	21.1	2.9	10.4
	10:20 AM						
3	10:20 AM	30	90	24.0	21.6	2.4	12.5
	10:50 AM						
4	10:50 AM	30	120	24.0	21.8	2.2	13.9
	11:20 AM						
5	11:20 AM	30	150	24.0	22.2	1.8	16.7
	11:50 AM						
6	11:50 AM	30	180	24.0	23.0	1.0	31.3
	12:20 PM						
7	12:20 PM	30	210	24.0	22.8	1.2	25.0
	12:50 PM						
8	12:50 PM	30	240	24.0	22.7	1.3	22.7
	1:20 PM						
9	1:20 PM	30	270	24.0	22.8	1.2	25.0
	1:50 PM						
10	1:50 PM	30	300	24.0	22.7	1.3	22.7
	2:20 PM						
11	2:20 PM	30	330	24.0	22.8	1.2	25.0
	2:50 PM						
12	2:50 PM	30	360	24.0	22.8	1.2	25.0
	3:20 PM						
Infiltration Rate (in/hr):			0.2				
Radius of test hole (in):			4	Figure A-13			
Average Head (in):			23.4				

APPENDIX

**B**

APPENDIX B

LABORATORY TESTING

We performed laboratory tests in accordance with current, generally accepted test methods of ASTM International (ASTM) or other suggested procedures. We analyzed selected soil samples for in-situ density and moisture content, maximum dry density and optimum moisture content, corrosivity, grain size distribution, expansion potential, consolidation, and direct shear strength. The results of the laboratory tests are presented on Figures B-1 through B-32. The in-place dry density and moisture content of the samples tested are presented on the boring logs in *Appendix A*.

Sample No:

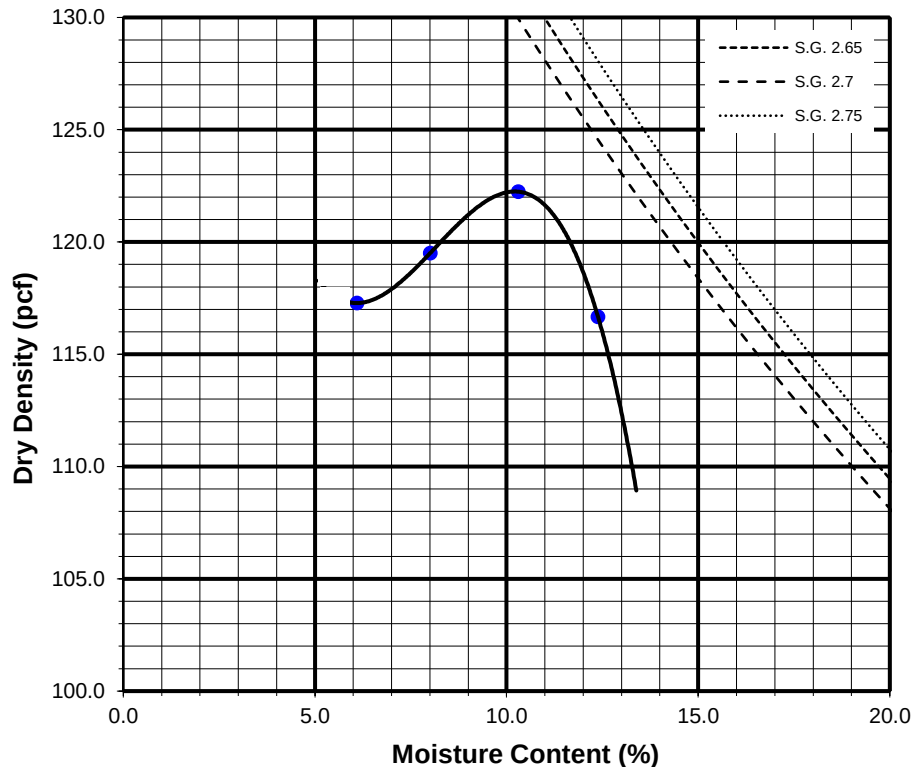
B-2@2-7

Silty SAND (SM), olive gray

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6139	6209	6296	6240		
Weight of Mold	(g)	4259	4259	4259	4259		
Net Weight of Soil	(g)	1880	1950	2037	1981		
Wet Weight of Soil + Cont.	(g)	690.7	655.9	818.6	810.9		
Dry Weight of Soil + Cont.	(g)	665.8	626.0	766.3	750.0		
Weight of Container	(g)	257.3	252.6	259.0	258.3		
Moisture Content	(%)	6.1	8.0	10.3	12.4		
Wet Density	(pcf)	124.4	129.1	134.8	131.1		
Dry Density	(pcf)	117.3	119.5	122.2	116.7		

Maximum Dry Density (pcf) 122.0

Optimum Moisture Content (%) 10.0



Preparation Method: A



**COMPACTION CHARACTERISTICS USING
MODIFIED EFFORT TEST RESULTS**

ASTM D-1557

Checked by:

Project No.: T2998-22-01

RAMONA DAIRY, LLC.
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Nov 22

Figure B-1

Sample No:

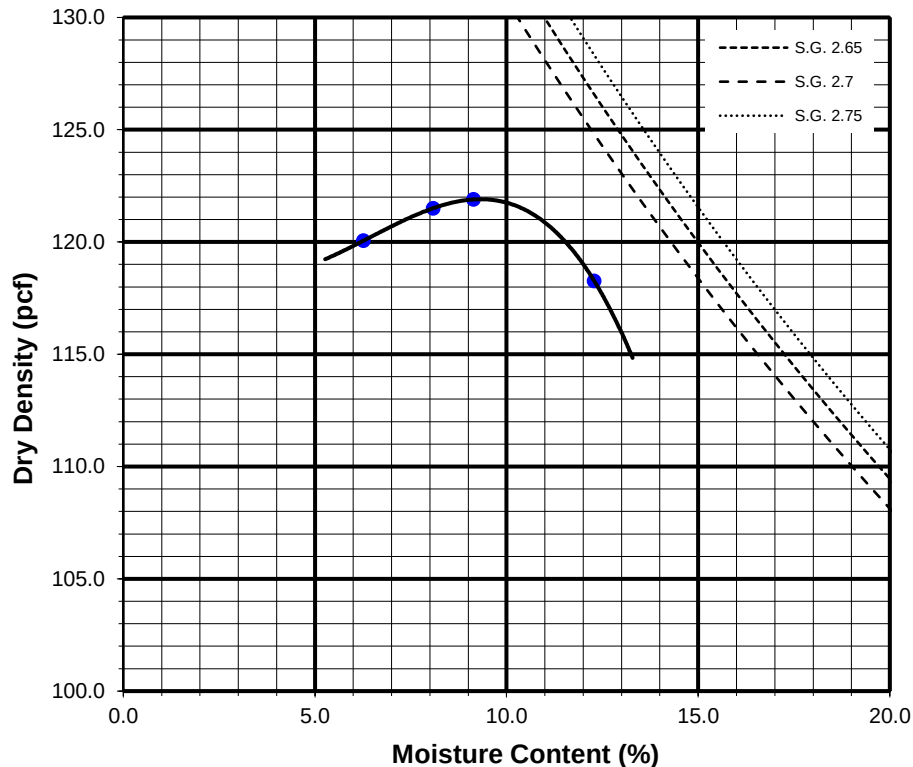
B-4@2-7

Silty SAND (SM), dark brown

TEST NO.		1	2	3	4	5	6
Wt. Compacted Soil + Mold	(g)	6243	6269	6265	6187		
Weight of Mold	(g)	4259	4259	4259	4259		
Net Weight of Soil	(g)	1984	2009	2006	1927		
Wet Weight of Soil + Cont.	(g)	705.9	575.6	679.6	653.9		
Dry Weight of Soil + Cont.	(g)	672.5	548.7	633.4	630.4		
Weight of Container	(g)	259.2	254.2	257.4	255.4		
Moisture Content	(%)	8.1	9.1	12.3	6.3		
Wet Density	(pcf)	131.3	133.0	132.8	127.6		
Dry Density	(pcf)	121.5	121.9	118.3	120.1		

Maximum Dry Density (pcf) 122.0

Optimum Moisture Content (%) 9.0



Preparation Method: A



**COMPACTION CHARACTERISTICS USING
MODIFIED EFFORT TEST RESULTS**

ASTM D-1557

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Figure B-2

B1@0-5

MOLDED SPECIMEN		BEFORE TEST	AFTER TEST
Specimen Diameter	(in.)	4.0	4.0
Specimen Height	(in.)	1.0	1.0
Wt. Comp. Soil + Mold	(gm)	606.5	632.2
Wt. of Mold	(gm)	200.4	200.4
Specific Gravity	(Assumed)	2.7	2.7
Wet Wt. of Soil + Cont.	(gm)	473.2	632.2
Dry Wt. of Soil + Cont.	(gm)	447.9	371.9
Wt. of Container	(gm)	173.2	200.4
Moisture Content	(%)	9.2	16.1
Wet Density	(pcf)	122.5	130.1
Dry Density	(pcf)	112.2	112.0
Void Ratio		0.5	0.5
Total Porosity		0.3	0.3
Pore Volume	(cc)	69.3	71.5
Degree of Saturation	(%) [S_{meas}]	49.8	83.8

Date	Time	Pressure (psi)	Elapsed Time (min)	Dial Readings (in.)
9/30/2022	10:00	1.0	0	0.3267
9/30/2022	10:10	1.0	10	0.3266
Add Distilled Water to the Specimen				
10/1/2022	10:00	1.0	1430	0.3376
10/1/2022	11:00	1.0	1490	0.3376

Expansion Index (EI meas) =	11
Expansion Index (Report) =	11

Expansion Index, EI ₅₀	CBC CLASSIFICATION *	UBC CLASSIFICATION **
0-20	Non-Expansive	Very Low
21-50	Expansive	Low
51-90	Expansive	Medium
91-130	Expansive	High
>130	Expansive	Very High

* Reference: 2019 California Building Code, Section 1803.5.3

** Reference: 1997 Uniform Building Code, Table 18-I-B.



EXPANSION INDEX TEST RESULTS

ASTM D-4829

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Figure B-3

SUMMARY OF LABORATORY
POTENTIAL OF HYDROGEN (pH) AND RESISTIVITY TEST RESULTS
AASHTO T289 ASTM D4972 and AASHTO T288 ASTM G187

Sample No.	pH	Resistivity (ohm centimeters)
B1@0-5	9.3	2300

SUMMARY OF LABORATORY CHLORIDE CONTENT TEST RESULTS
AASHTO T291 ASTM C1218

Sample No.	Chloride Ion Content (%)
B1@0-5	0.015

SUMMARY OF LABORATORY WATER SOLUBLE SULFATE TEST RESULTS
AASHTO T290 ASTM C1580

Sample No.	Water Soluble Sulfate (% SO ₄)	Sulfate Exposure
B1@0-5	0.001	S0



CORROSIVITY TEST RESULTS

Checked by:

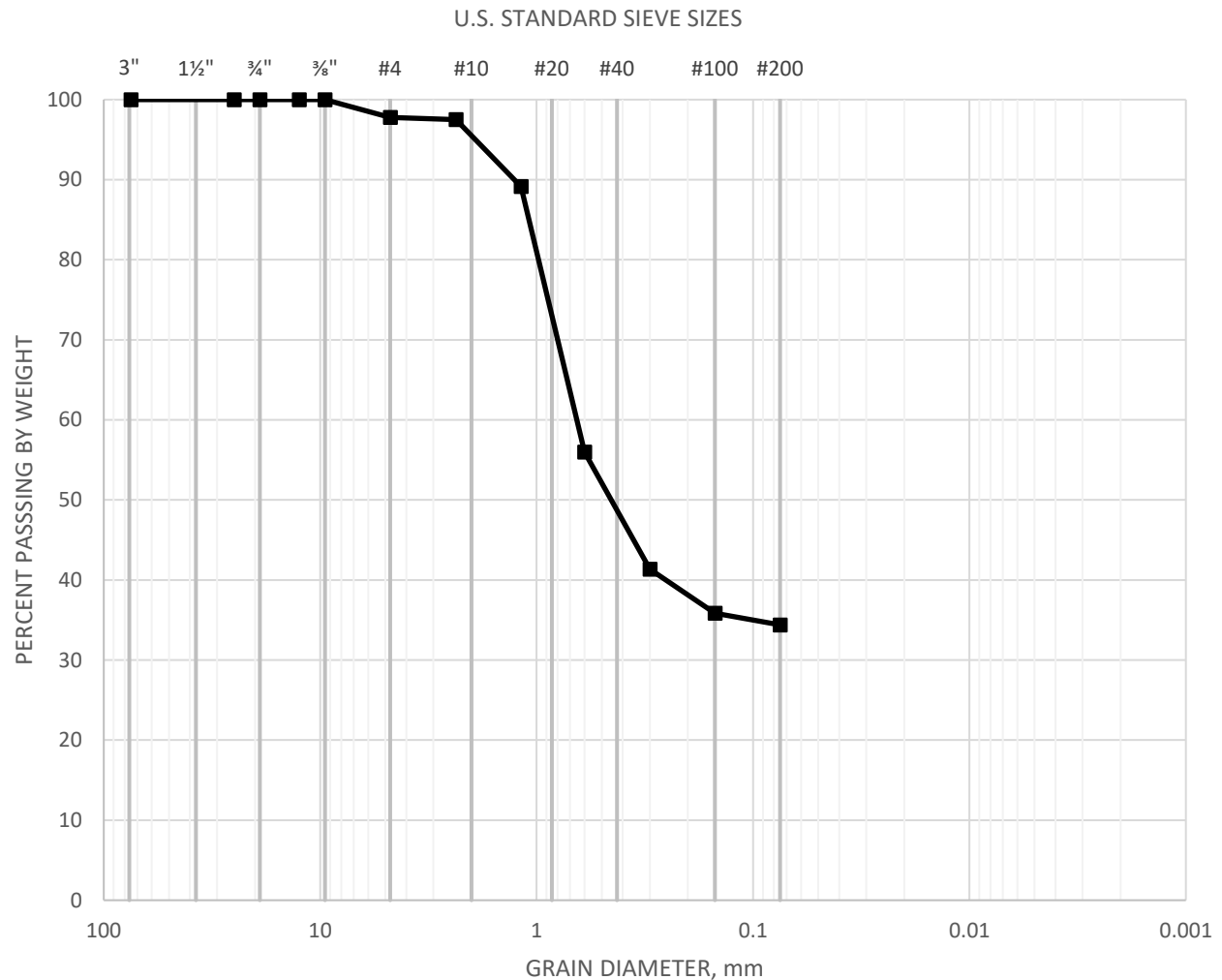
Project No.: T2998-22-01

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Figure B-4

GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P1@1.5-2.0	Silty SAND (SM), dark grayish brown	0.63	0.073	0.073



GRAIN SIZE DISTRIBUTION

ASTM D 6913

Checked by:

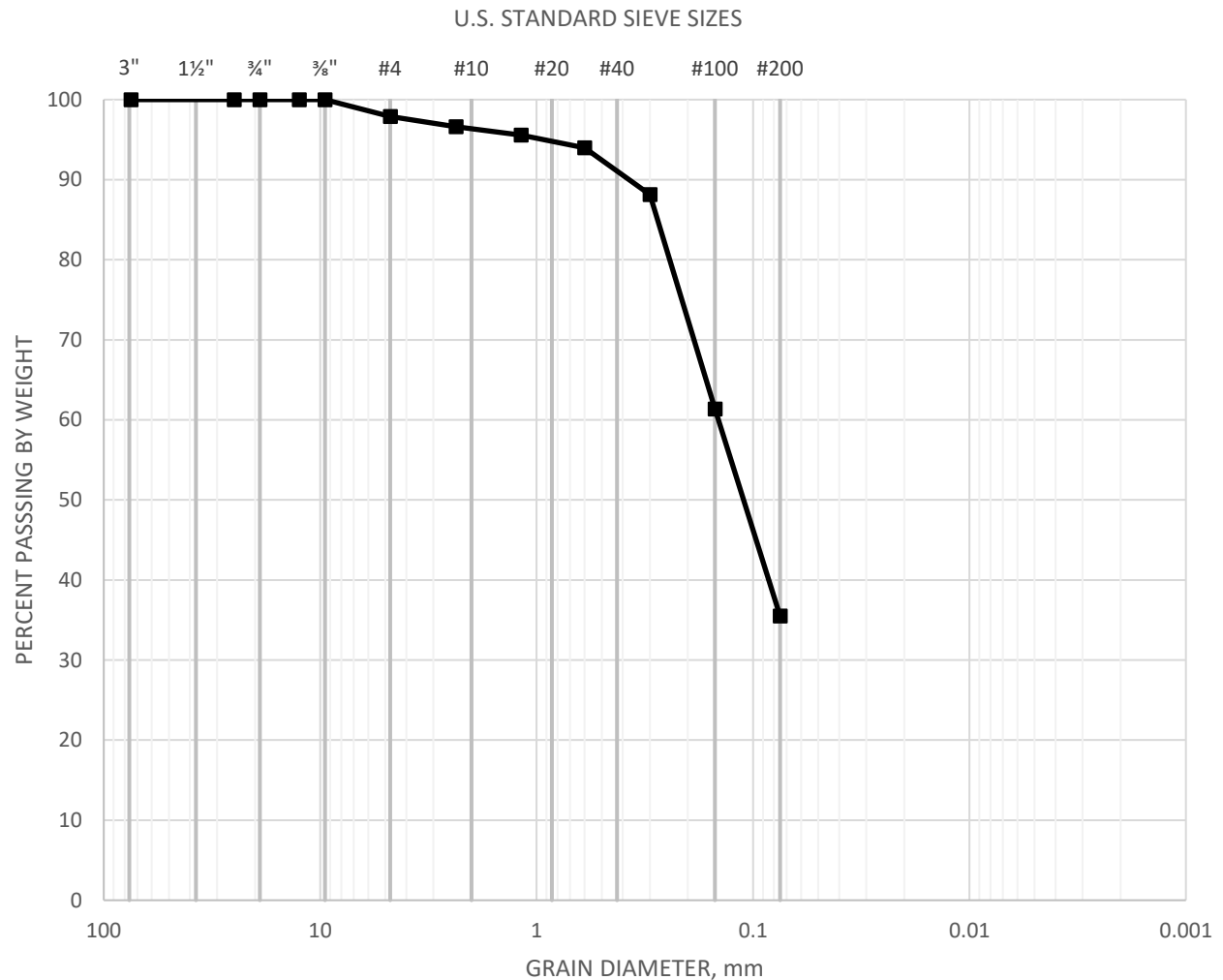
Project No.: T2998-22-01

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Figure B-5

GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P2@9-10	Silty SAND (SM), light grayish brown	0.14	0.073	0.073



GRAIN SIZE DISTRIBUTION

ASTM D 6913

Checked by:

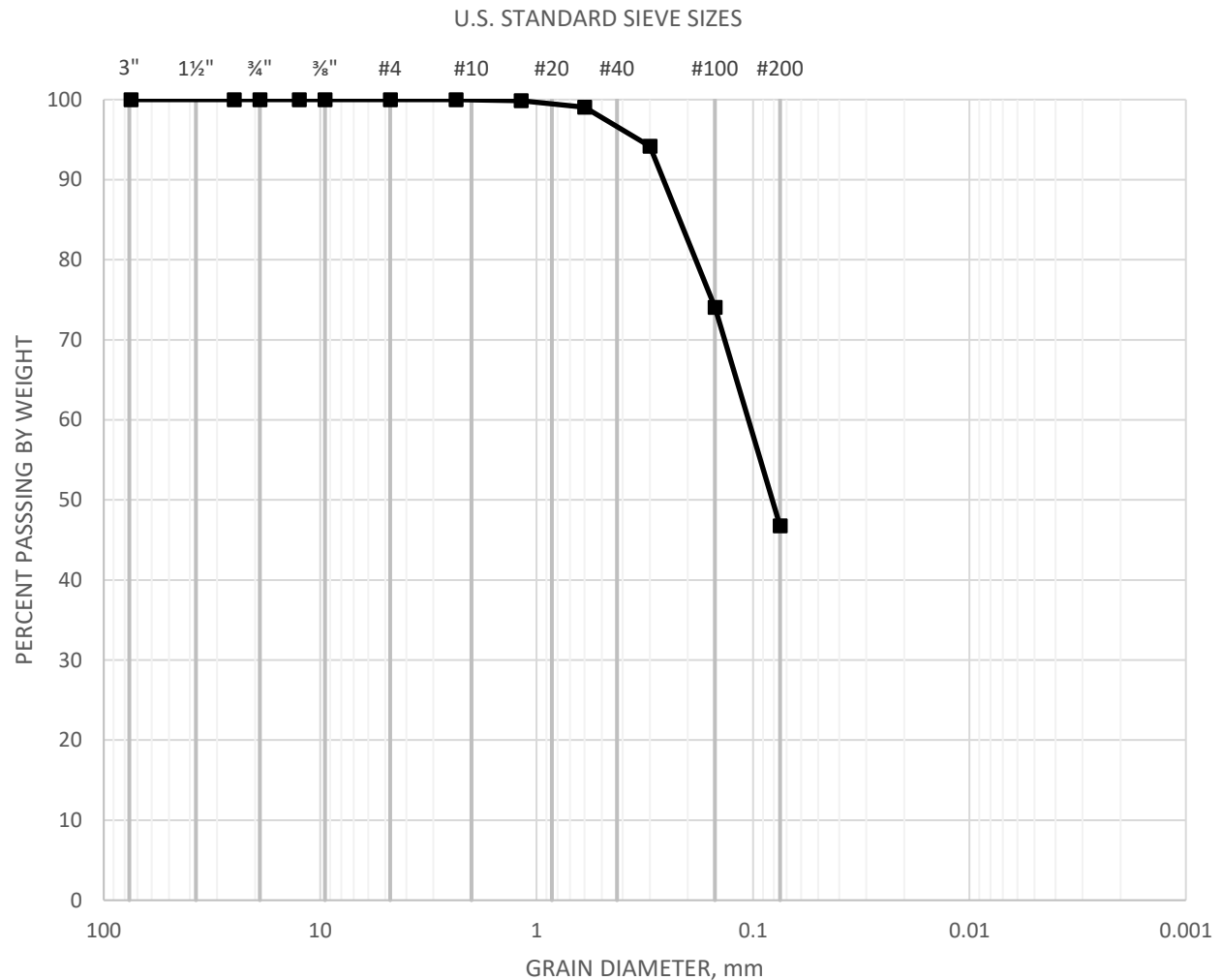
Project No.: T2998-22-01

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Figure B-6

GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P3@1.5-2.0	Silty SAND (SM), dark grayish brown	0.1	0.073	0.073



GRAIN SIZE DISTRIBUTION

ASTM D 6913

Checked by:

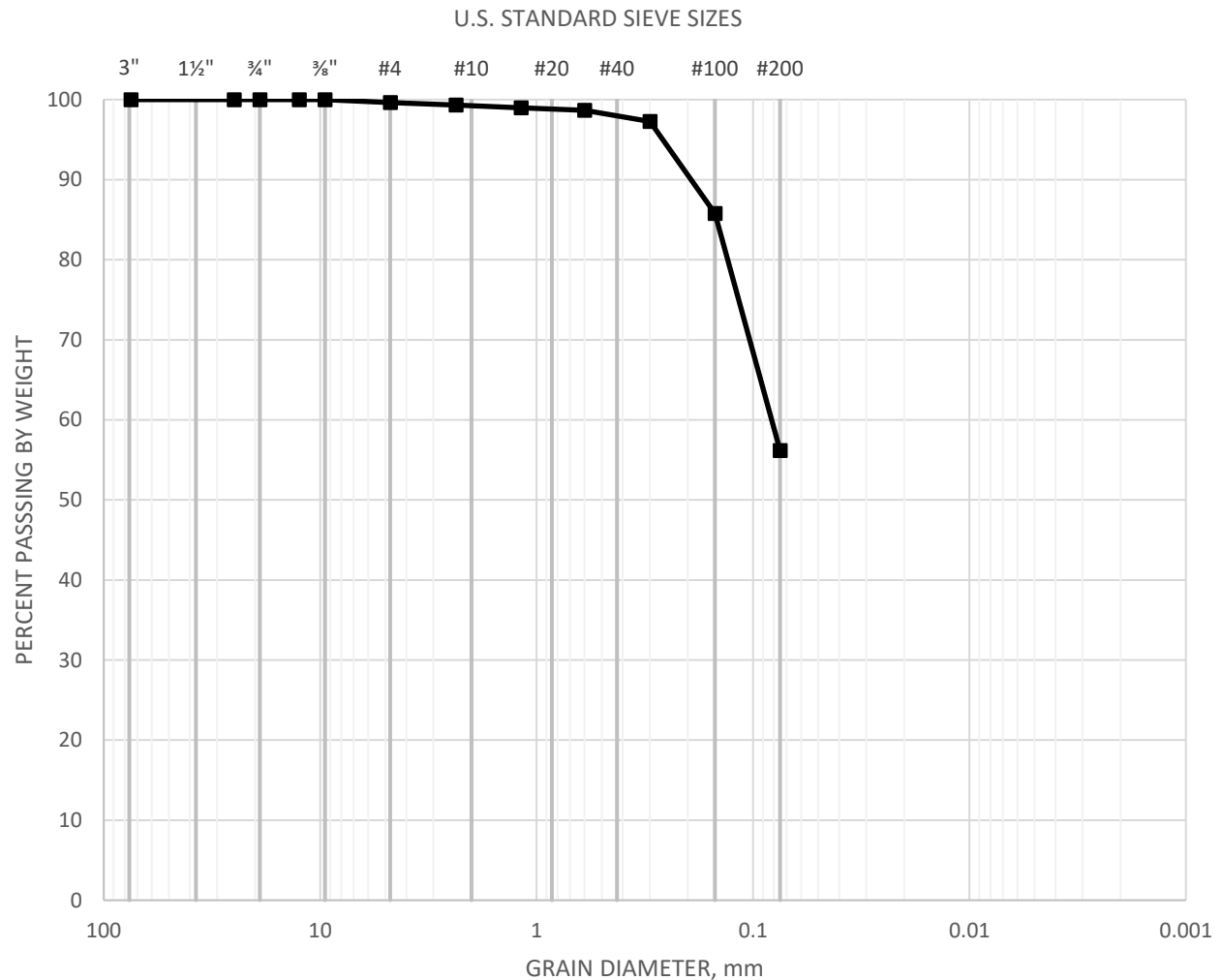
Project No.: T2998-22-01

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Figure B-7

GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P4@1.5-2.0	SILT with Sand (ML), dark grayish brown	0.08	0.073	0.073



GRAIN SIZE DISTRIBUTION

ASTM D 6913

Checked by:

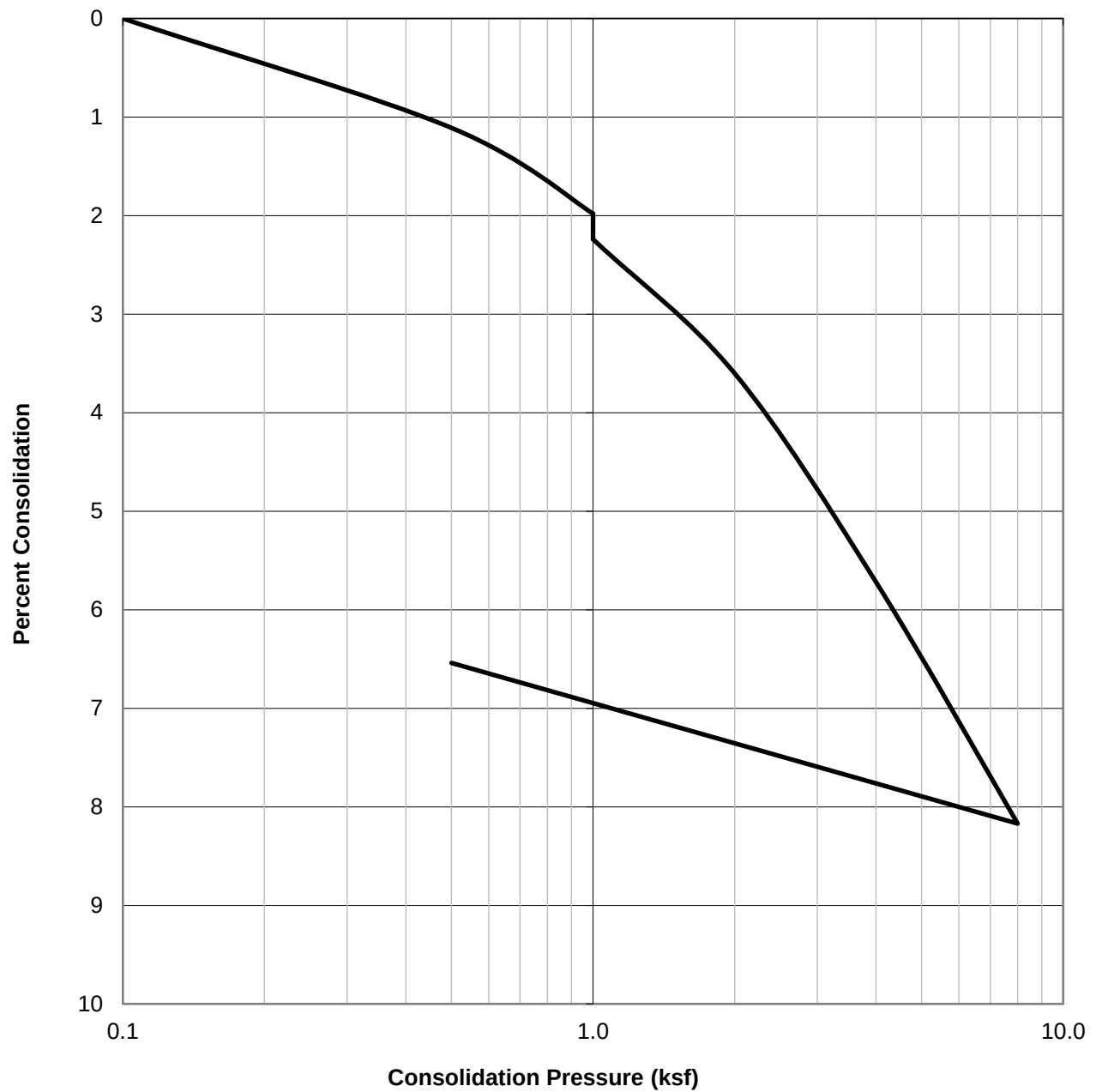
Project No.: T2998-22-01

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Figure B-8

WATER ADDED AT 1.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@5	SILT with Sand (ML), olive brown	95.2	24.2	24.2



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

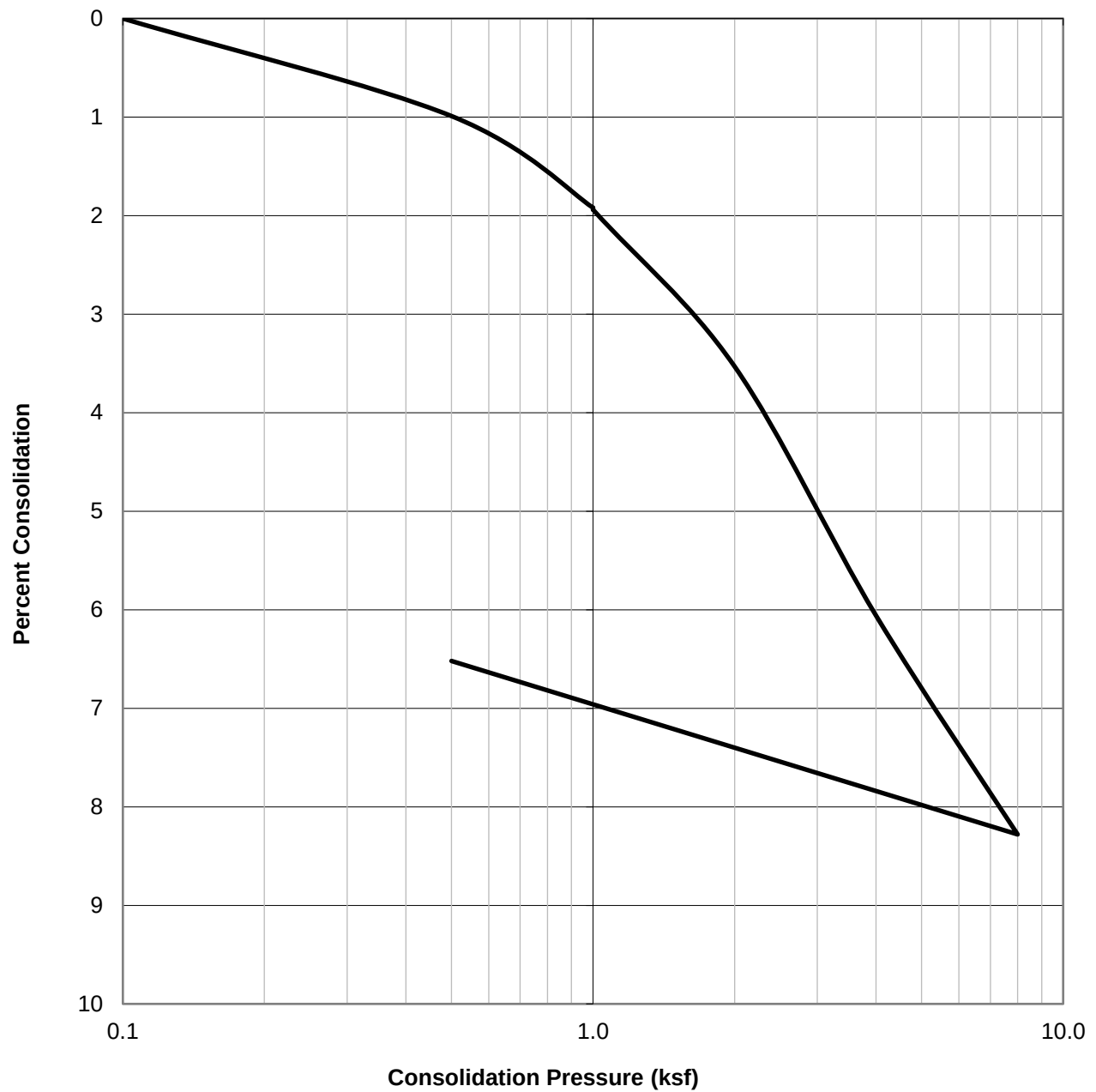
Project No.: T2998-22-01

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Figure B-9

WATER ADDED AT 1.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@7.5	SILT with Sand (ML), olive brown	99.8	23.2	22.5



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

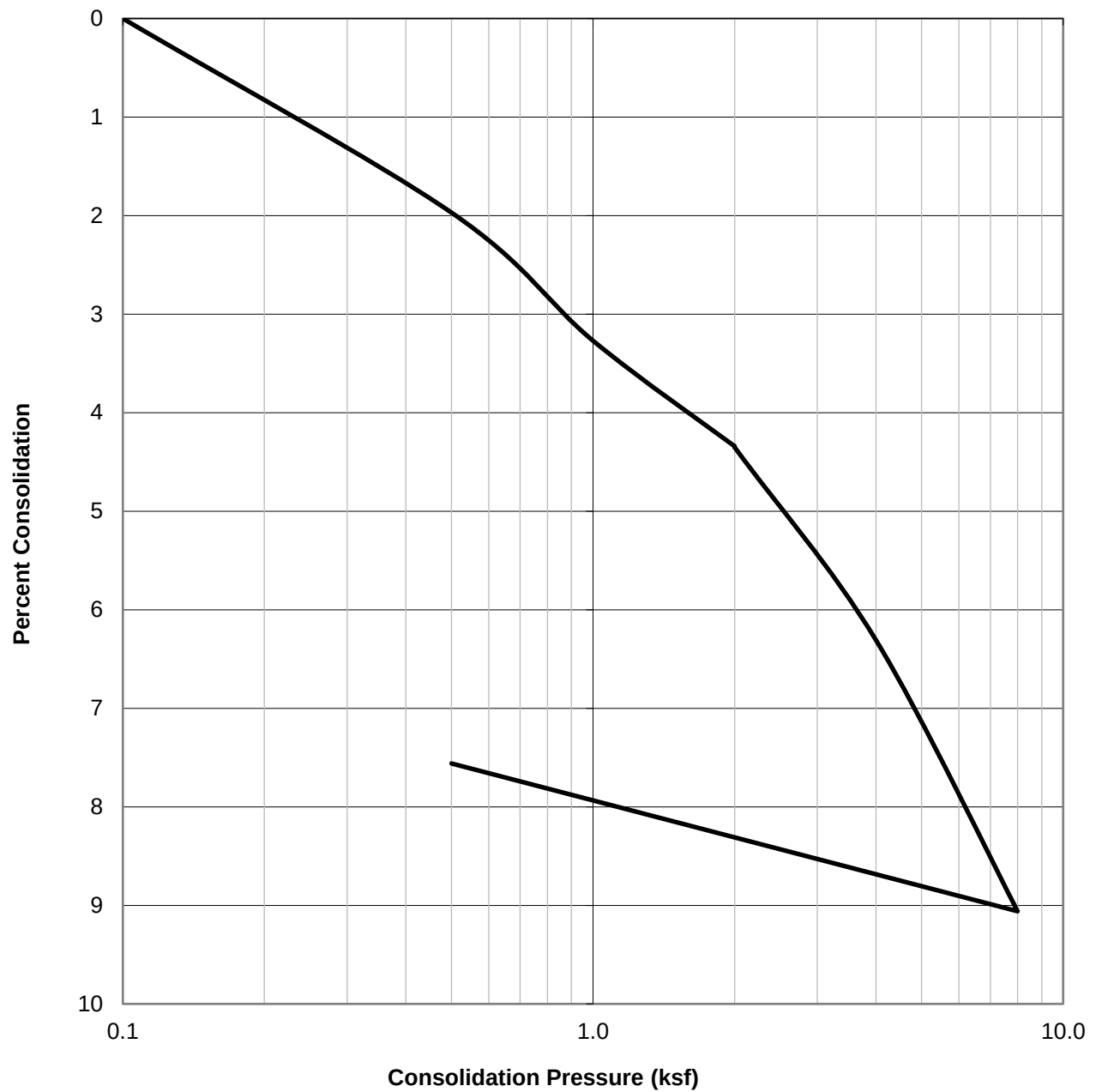
Project No.: T2998-22-01

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Figure B-10

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@10	SILT with Sand (ML), olive brown	91.4	30.0	27.7



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

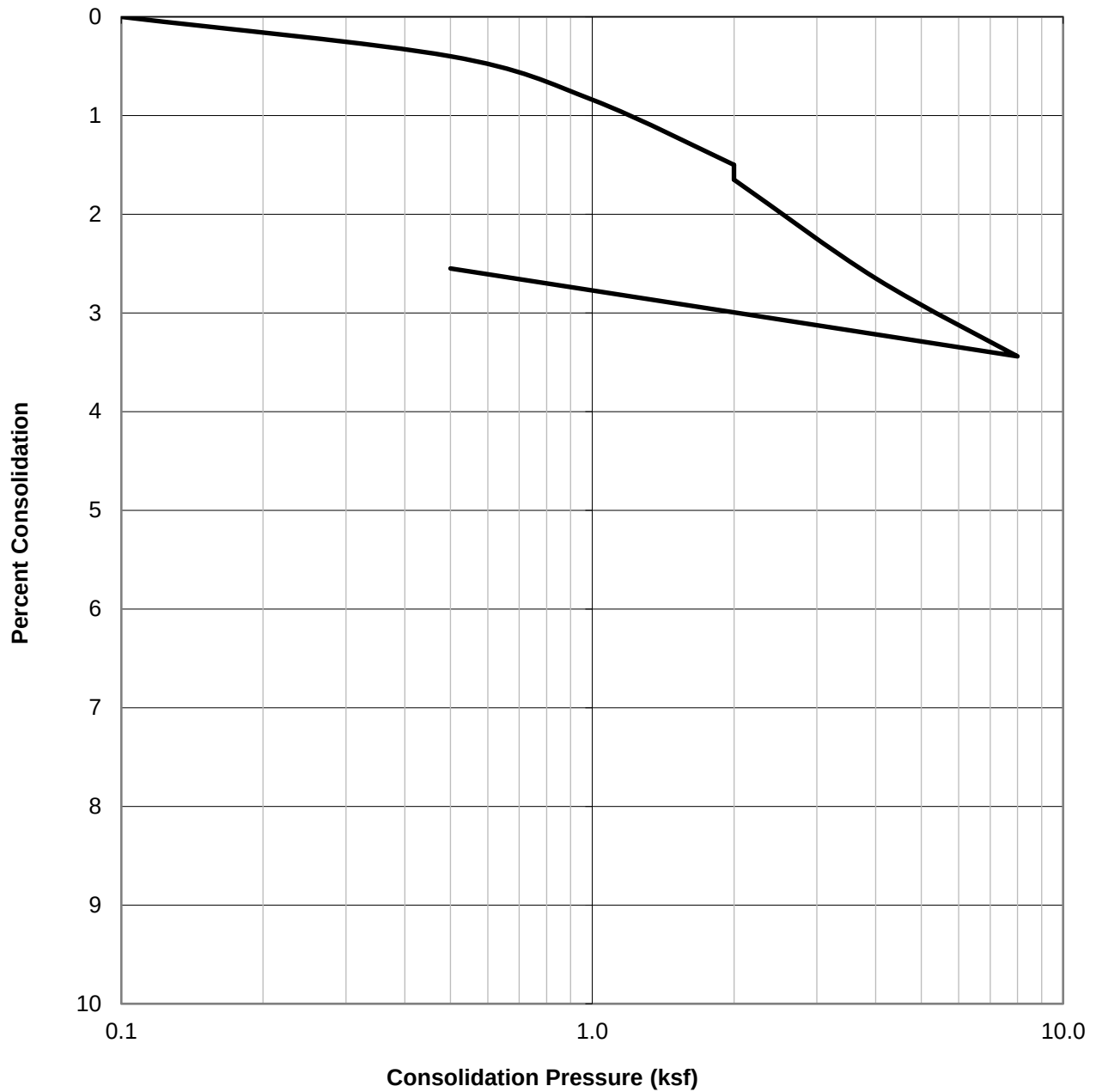
Project No.: T2998-22-01

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Figure B-11

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@15	Poorly Graded SAND with Silt (SP-SM), light olive gray	92.3	21.0	27.1



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

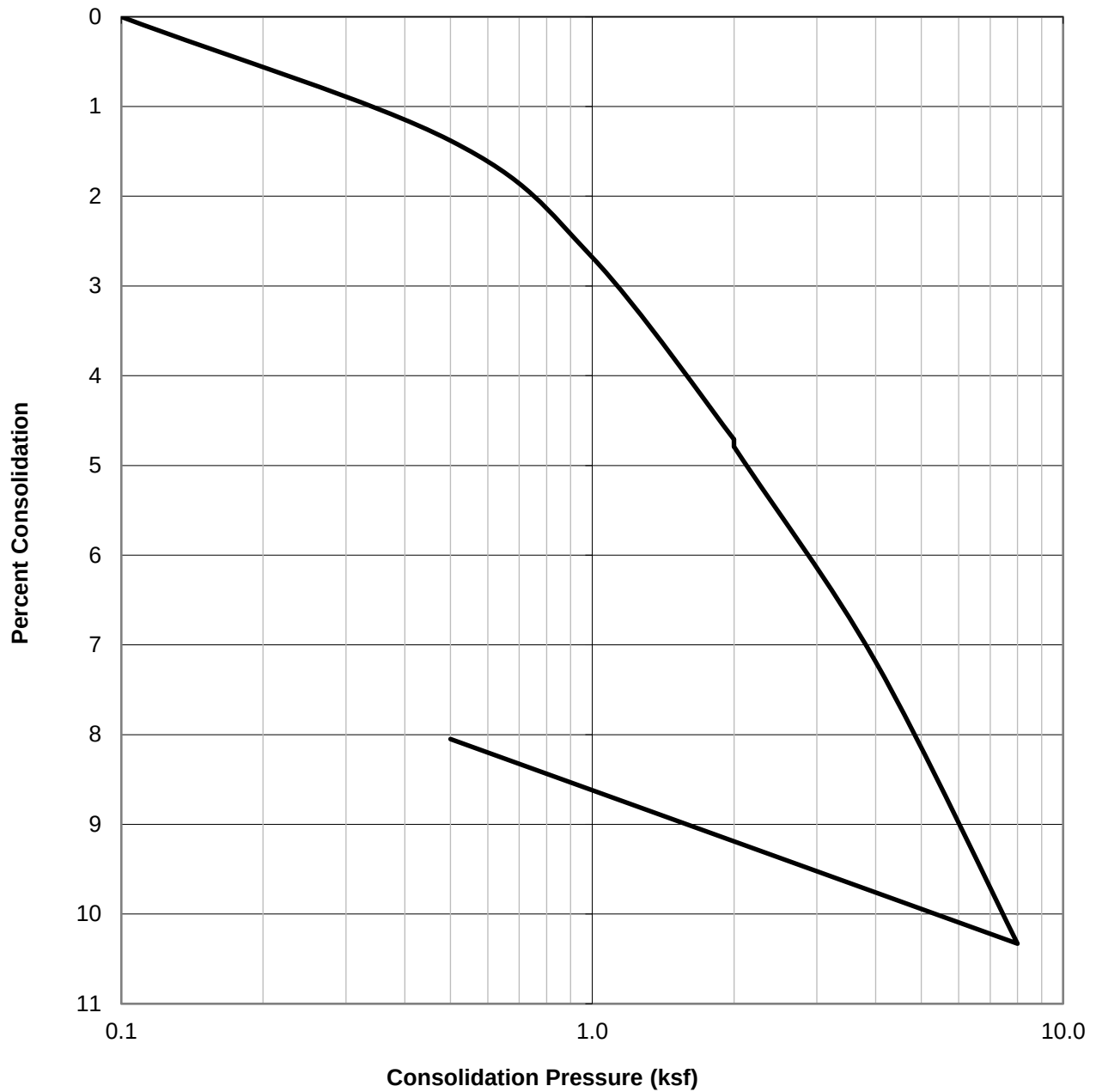
Project No.: T2998-22-01

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Figure B-12

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1@20	CLAY (CL), dark olive gray	90.0	28.7	29.4



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

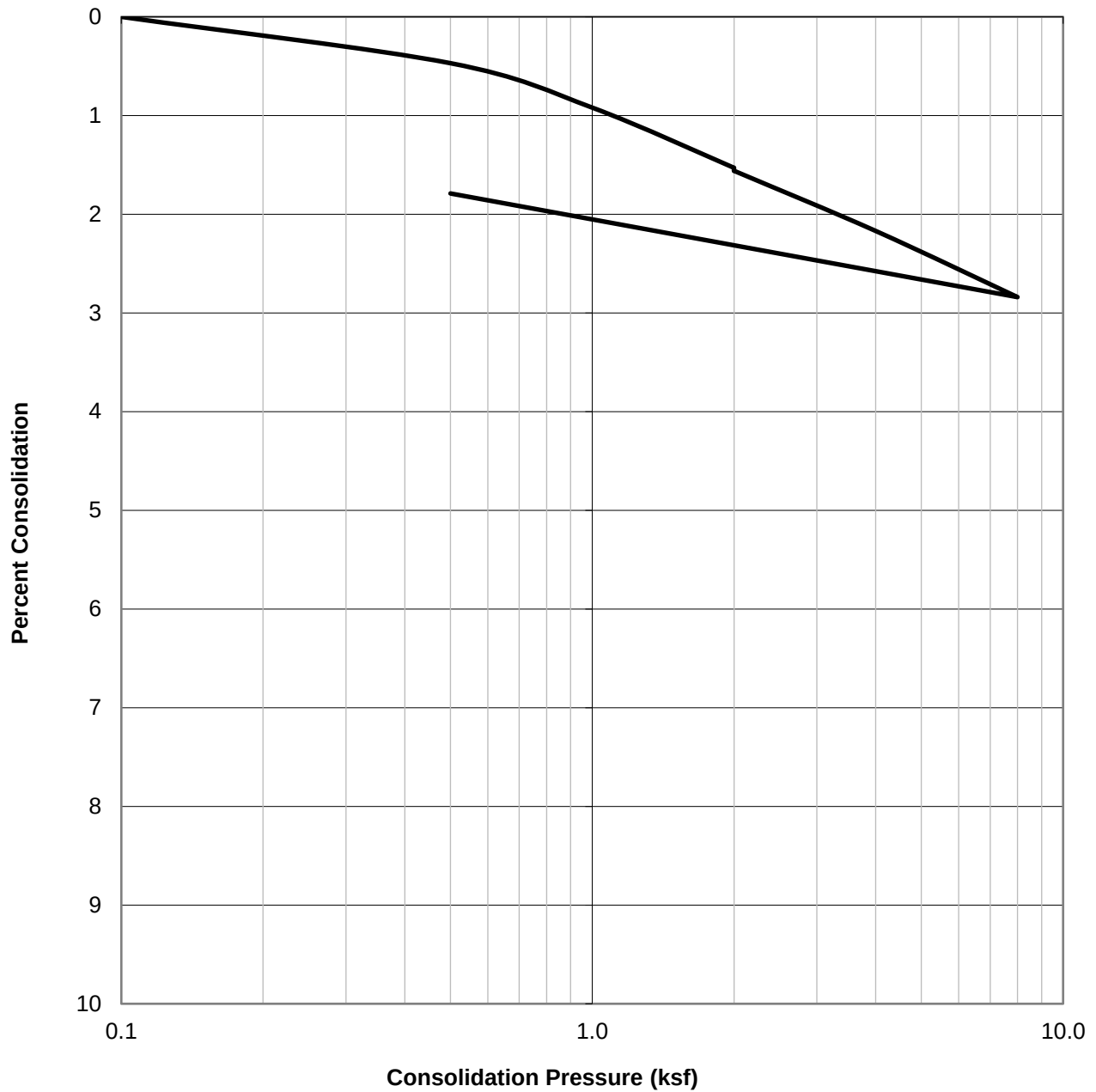
Project No.: T2998-22-01

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Figure B-13

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@2-7	Silty SAND (SM), olive gray	109.3	11.1	19.0



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

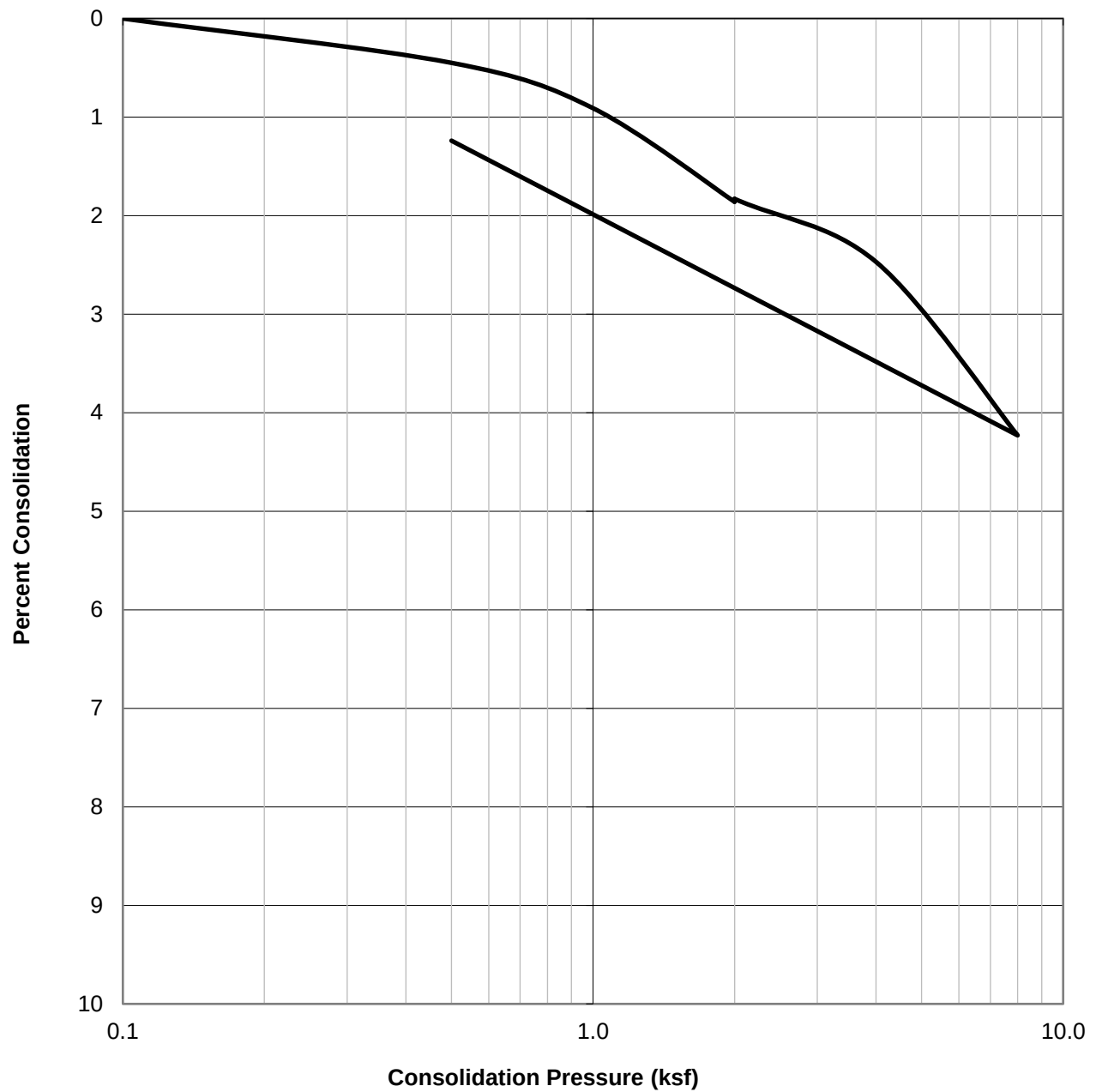
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Figure B-14

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2@10	Silty SAND (SM), olive gray	98.3	22.3	33.0



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

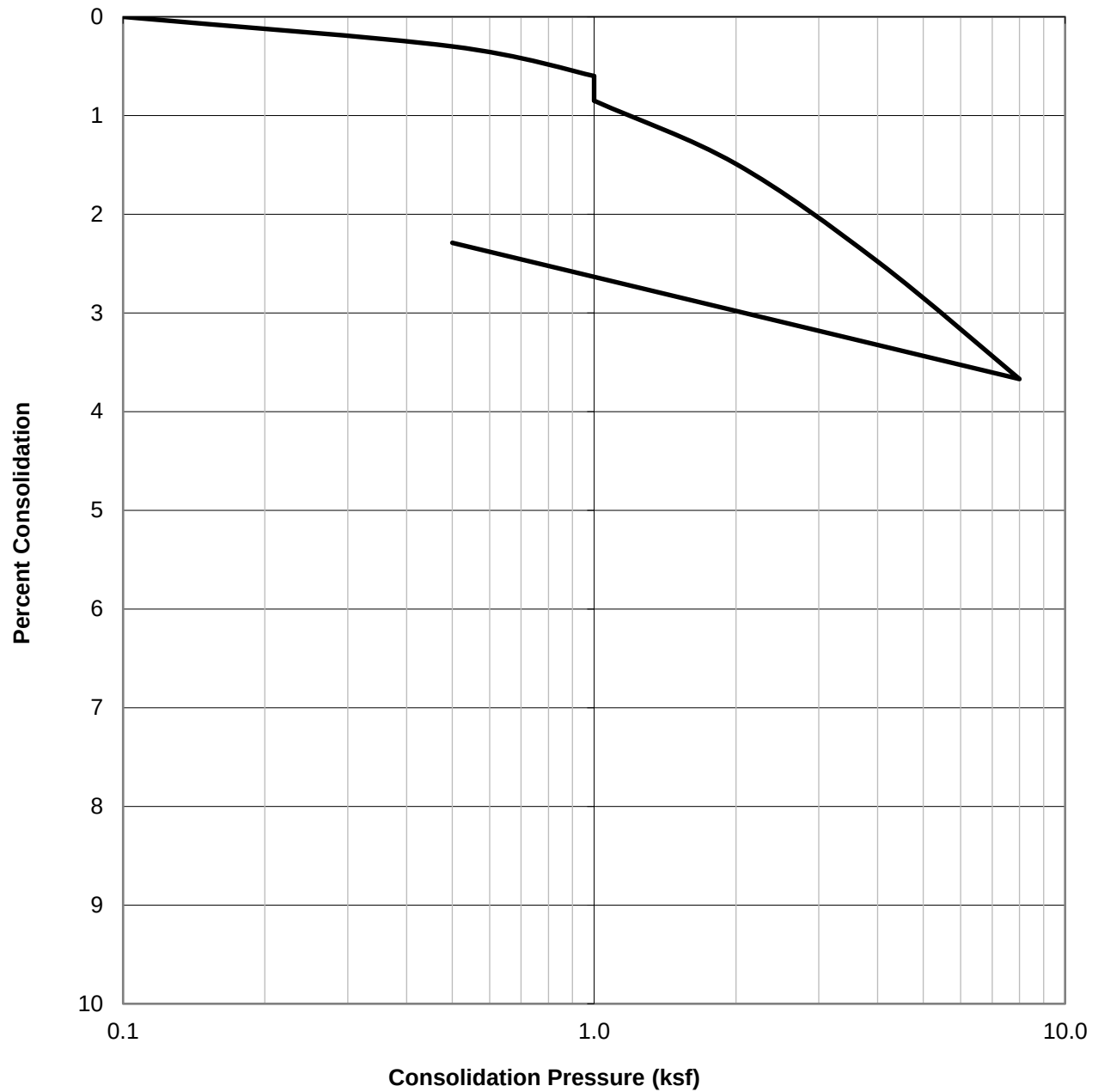
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Figure B-15

WATER ADDED AT 1.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B3@5	Silty SAND (SM), olive gray	105.9	15.1	18.7



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

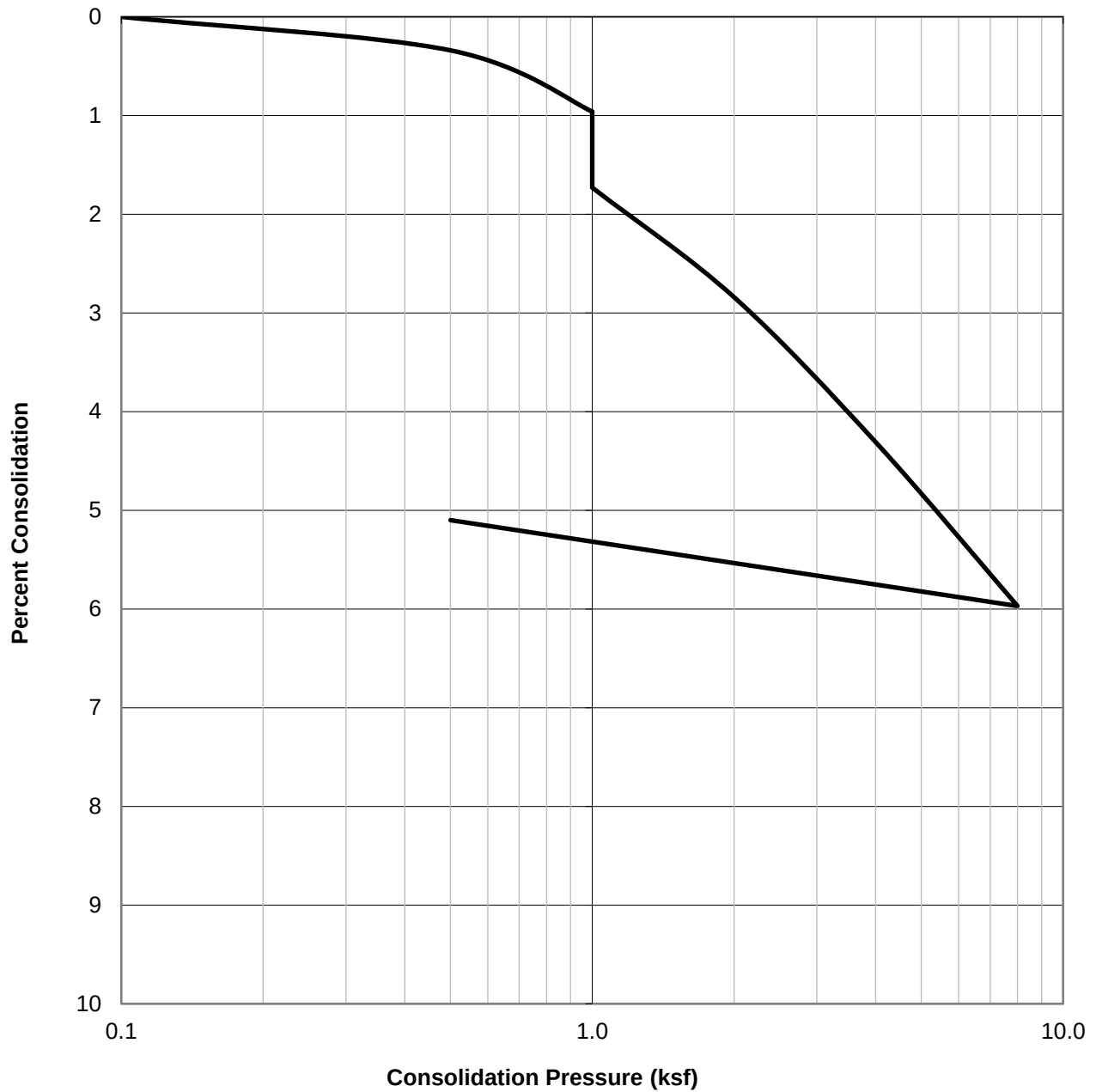
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Figure B-16

WATER ADDED AT 1.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B3@7.5	Silty SAND (SM), olive gray	101.5	9.6	18.9



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

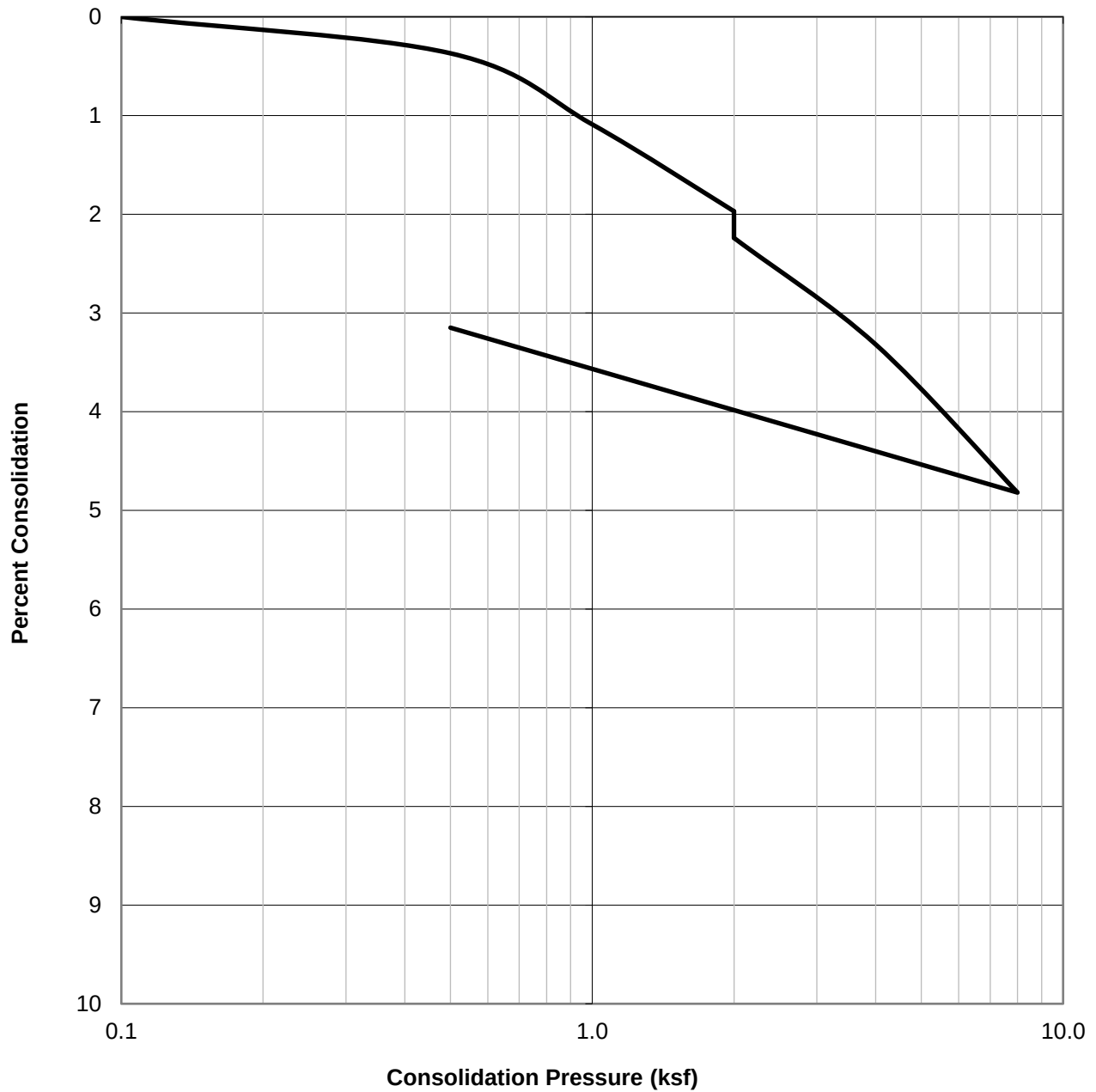
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Figure B-17

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B3@10	Silty SAND (SM), dark olive gray	92.9	19.3	28.3



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

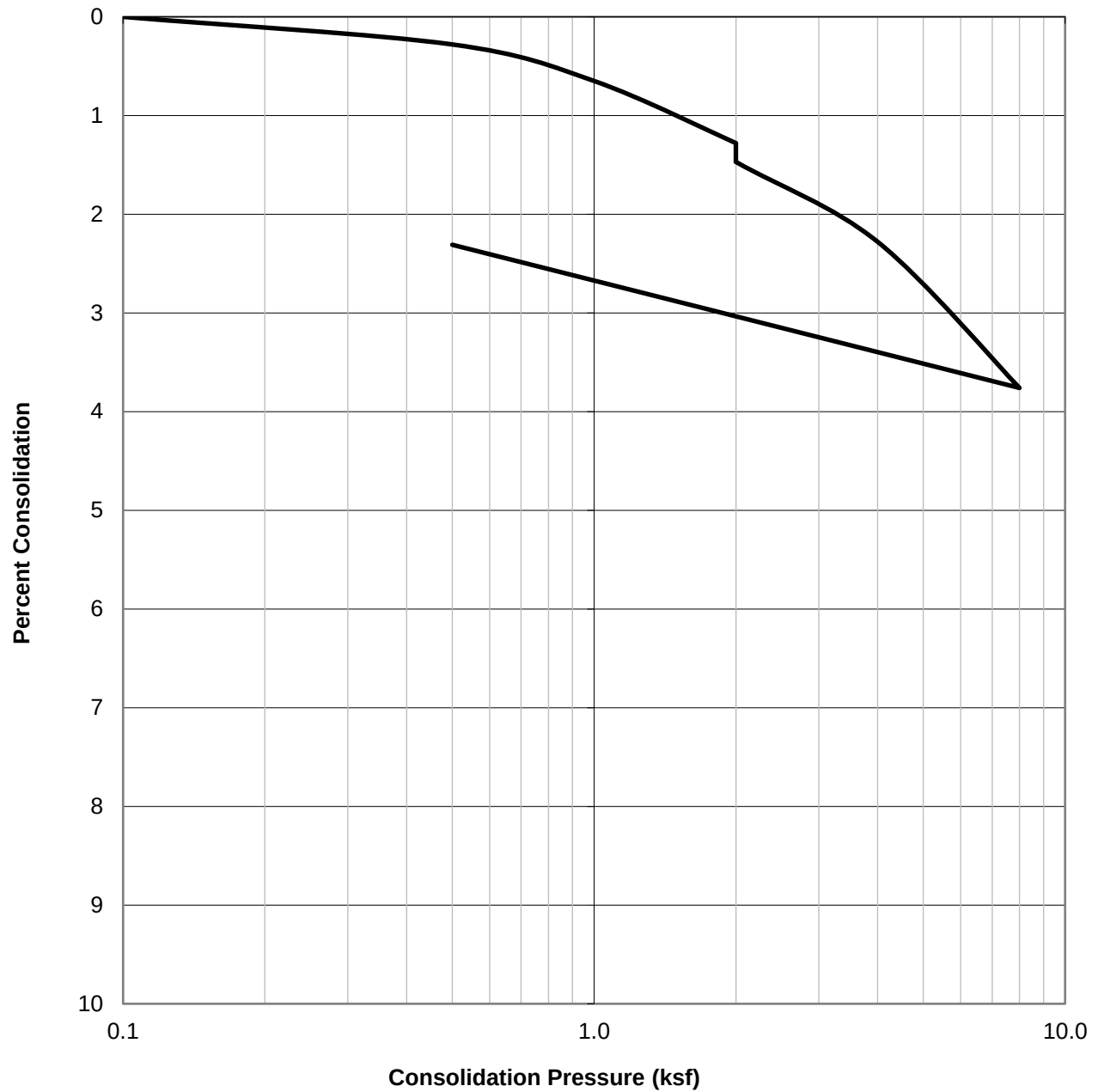
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Figure B-18

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B4@2-7	Silty SAND (SM), dark brown	109.0	9.5	20.9



CONSOLIDATION TEST RESULTS

ASTM D-2435

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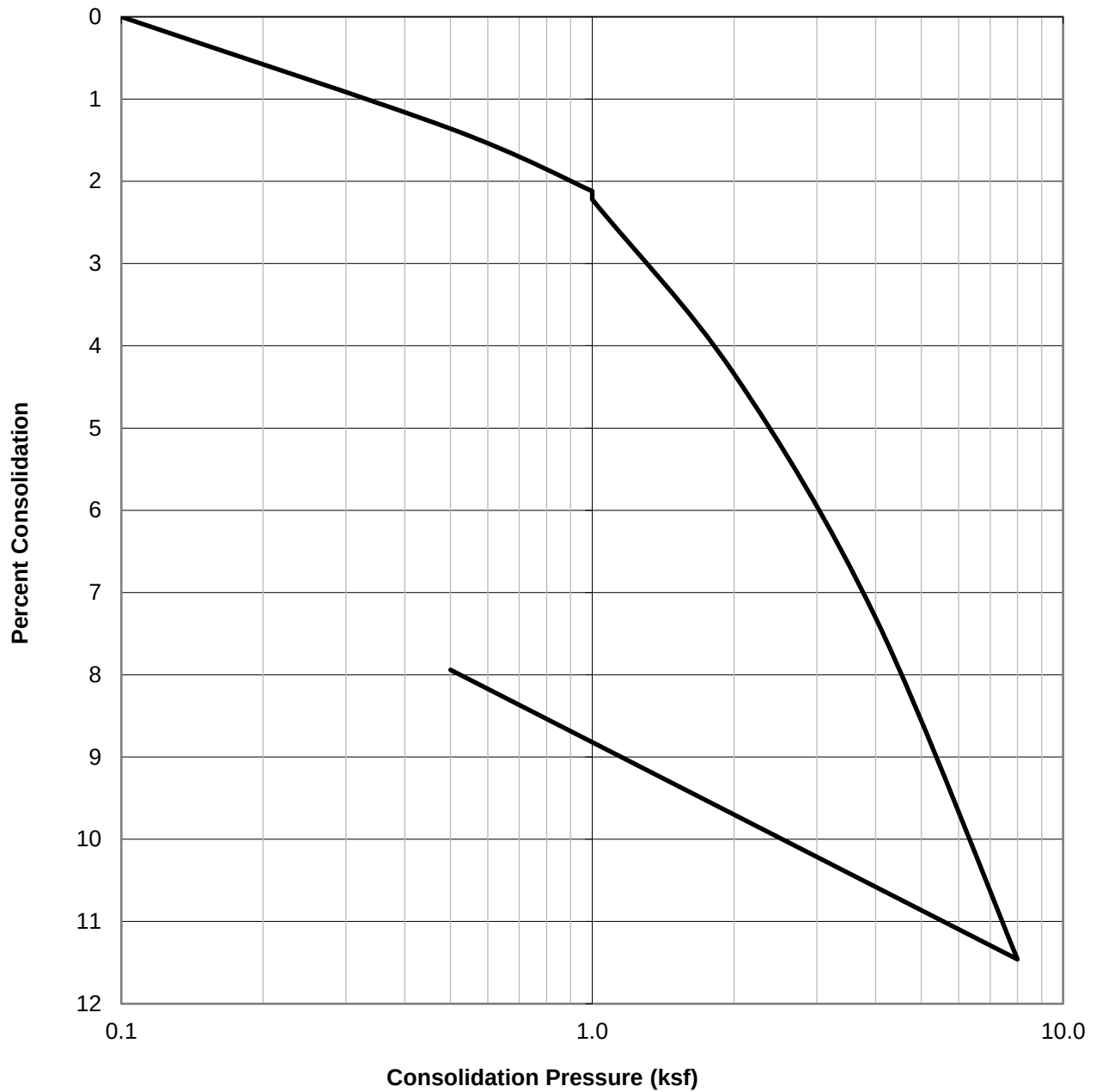
Project No.: T2998-22-01

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Figure B-19

WATER ADDED AT 1.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B4@5	Silty SAND (SM), dark olive gray	81.1	38.3	36.9



CONSOLIDATION TEST RESULTS

ASTM D-2435

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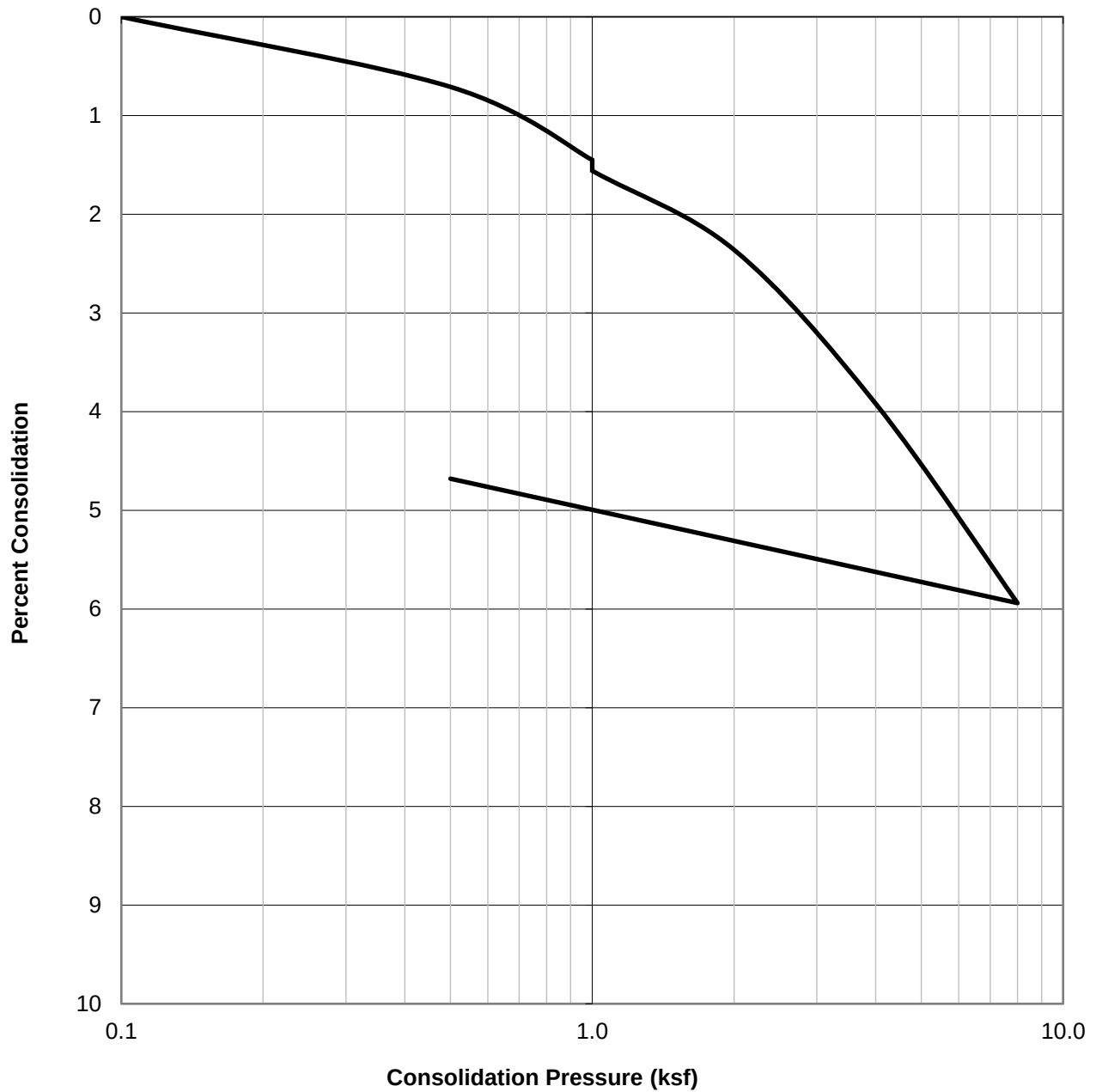
Project No.: T2998-22-01

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Figure B-20

WATER ADDED AT 1.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B4@7.5	Silty SAND (SM), olive brown	102.9	19.1	21.2



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

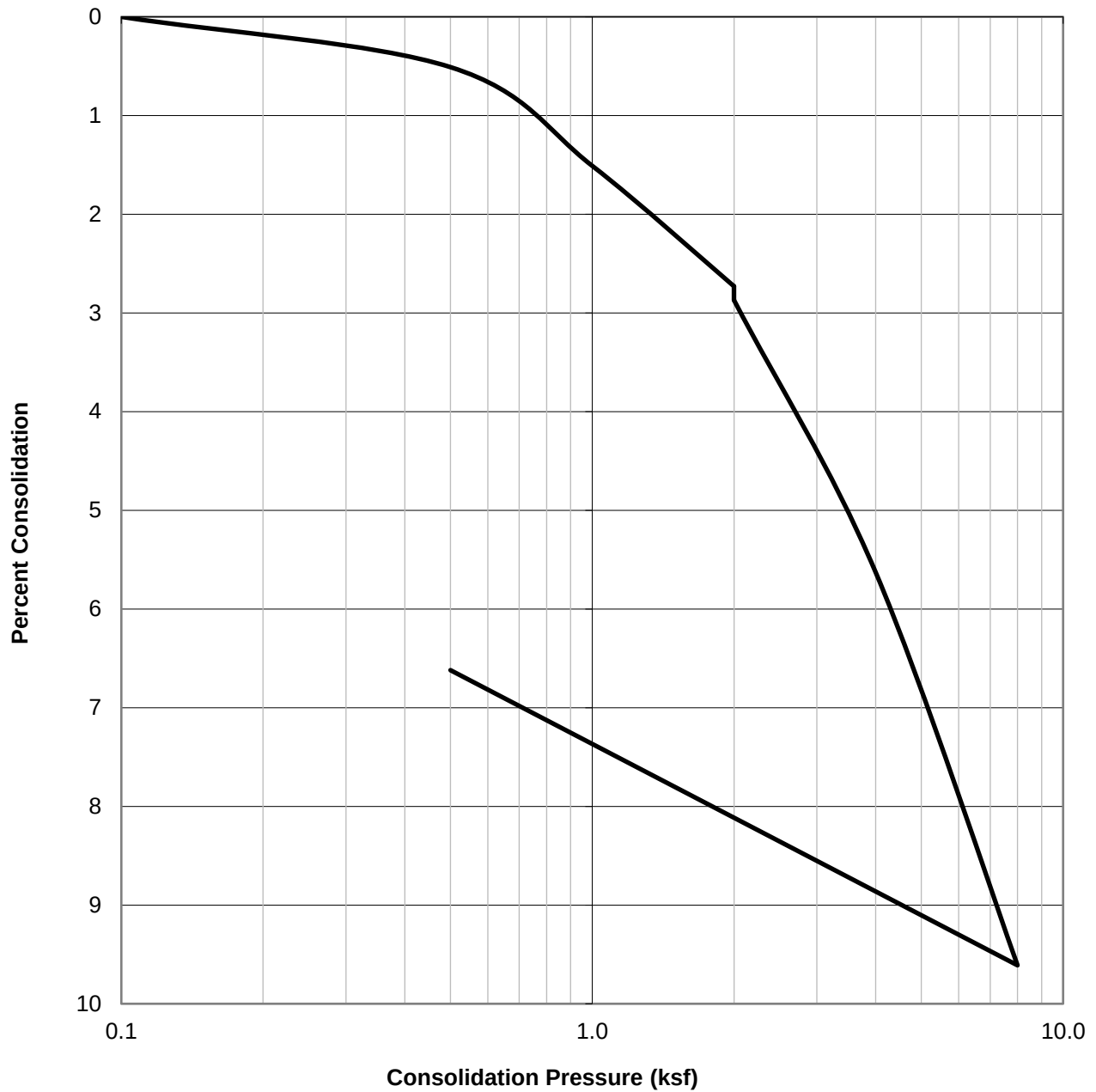
Project No.: T2998-22-01

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Figure B-21

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B4@10	CLAY (CL), olive brown	90.5	31.6	29.9



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

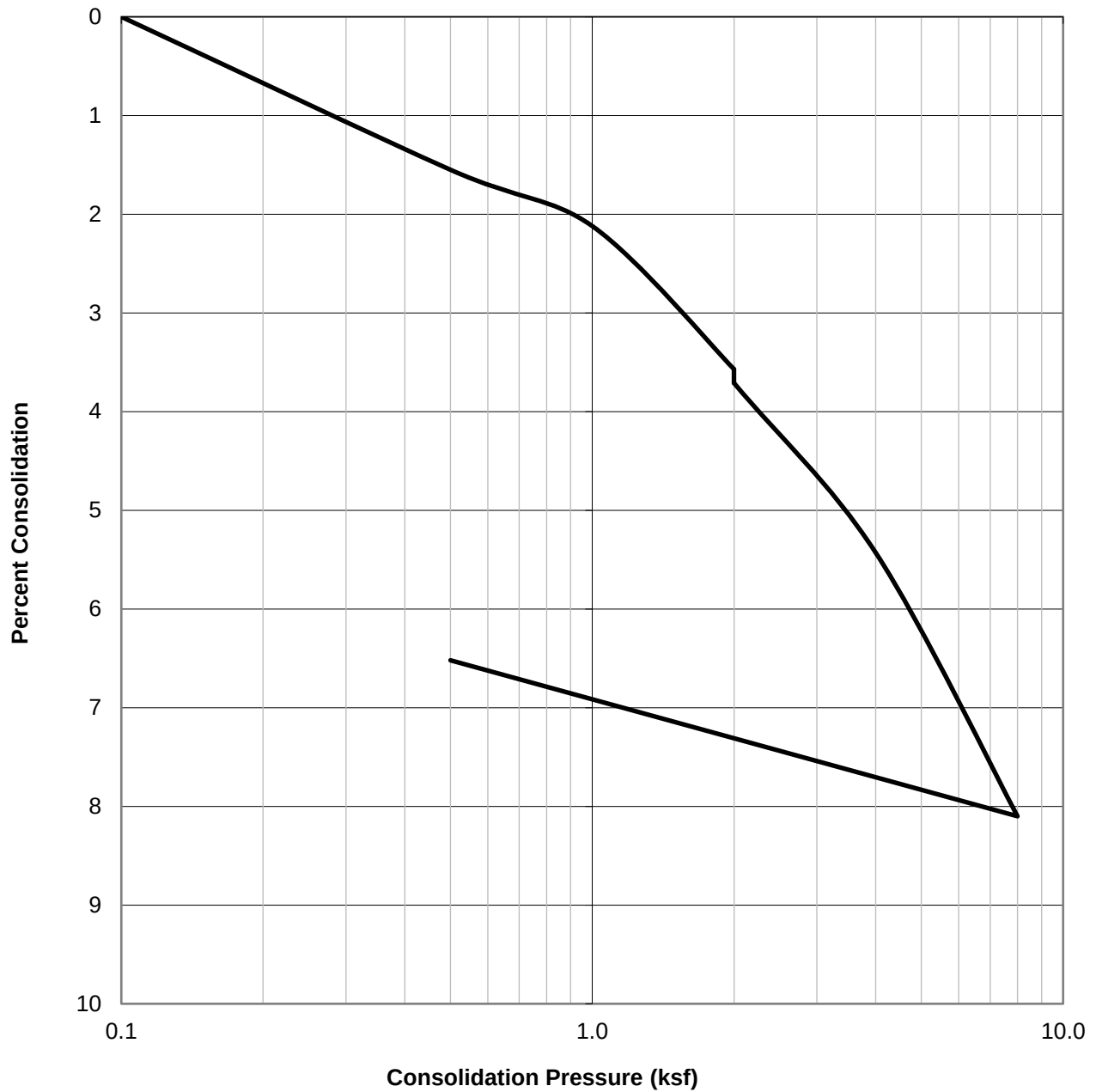
Project No.: T2998-22-01

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Figure B-22

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B4@20	Silty SAND (SM), dark olive gray	103.6	21.5	20.6



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

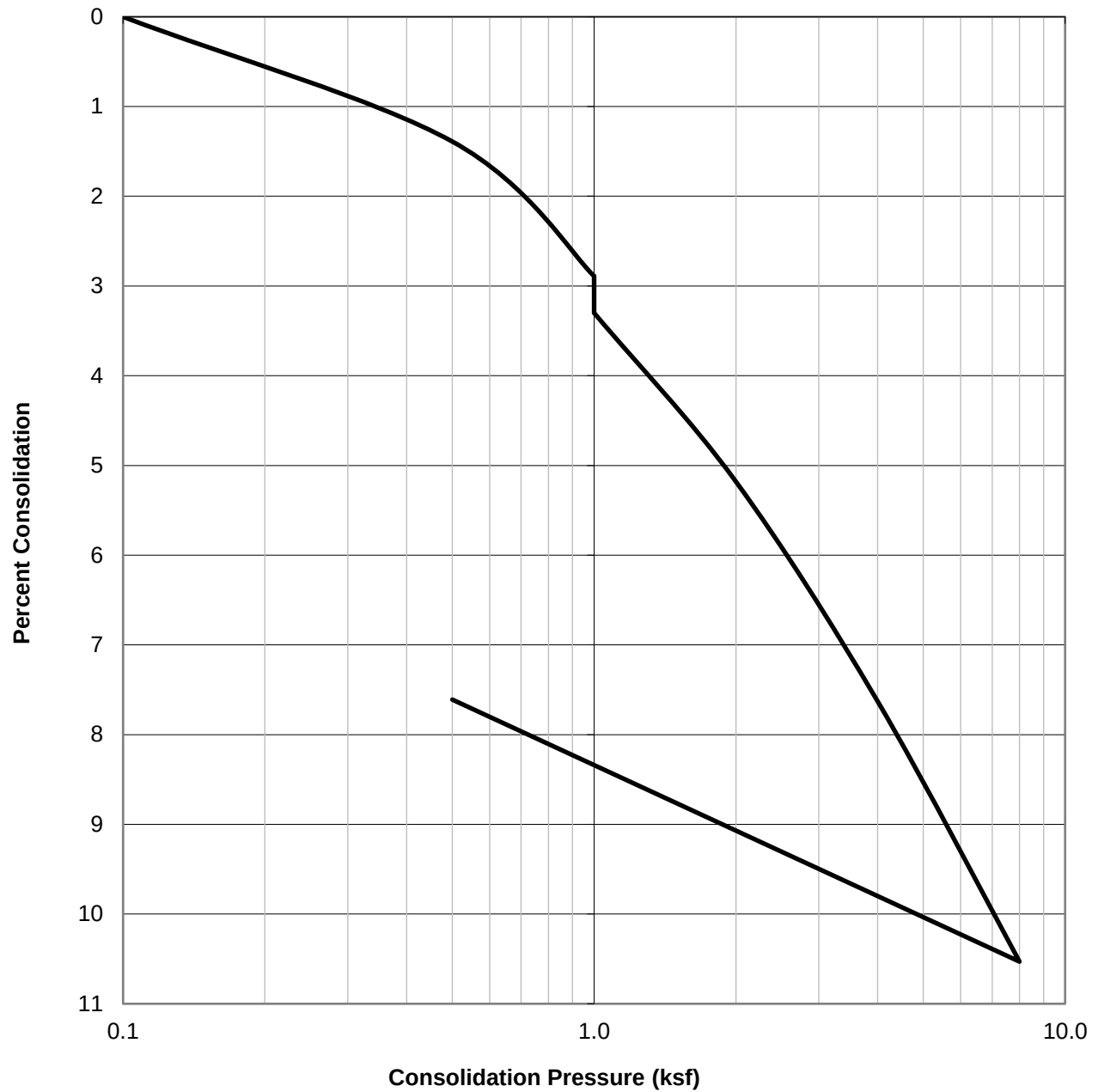
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Figure B-23

WATER ADDED AT 1.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@5	Silty SAND (SM), olive brown	79.9	24.1	37.4



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

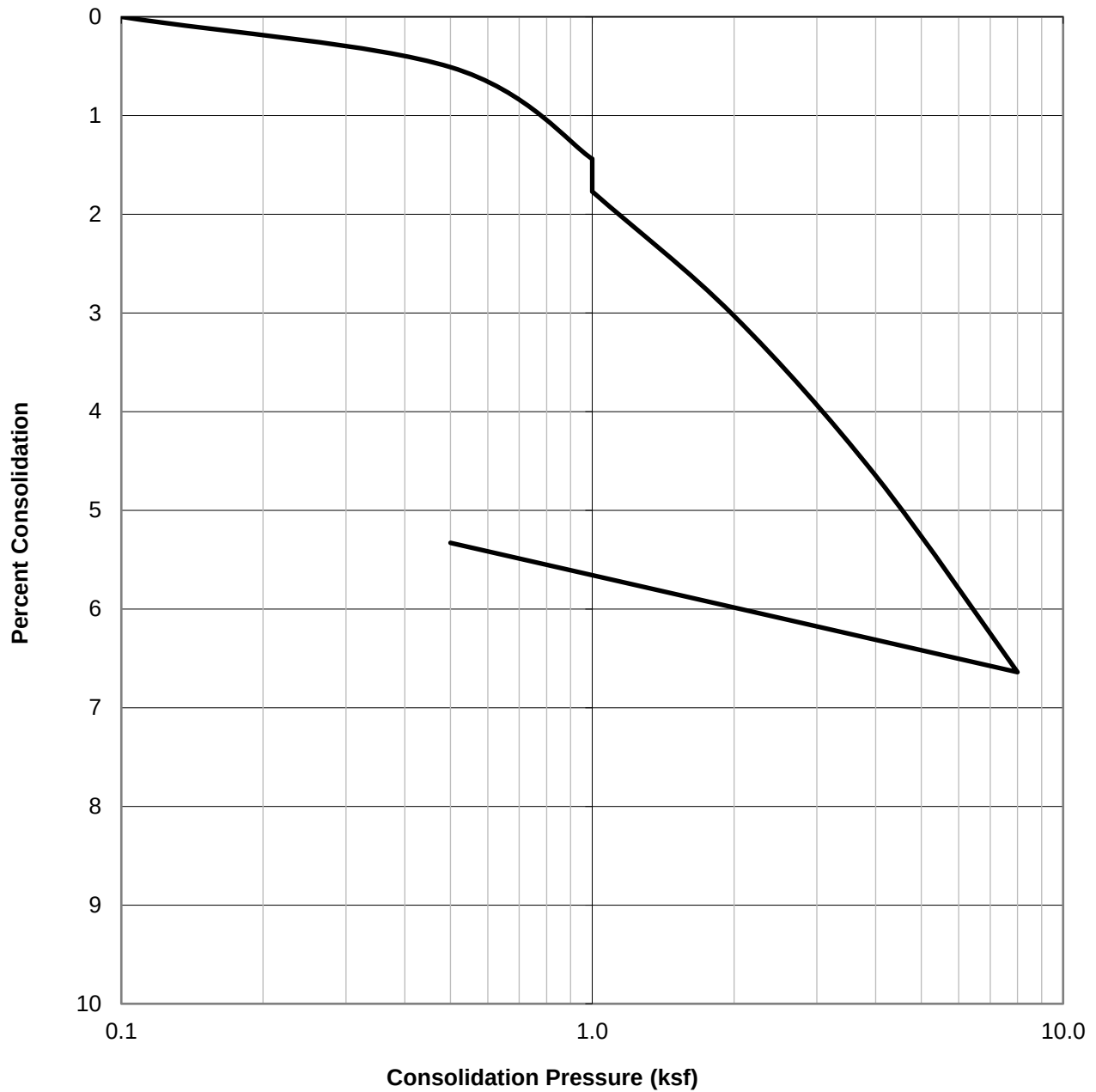
Project No.: T2998-22-01

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Figure B-24

WATER ADDED AT 1.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@7.5	Silty SAND (SM), dark brown	101.4	19.1	20.2



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

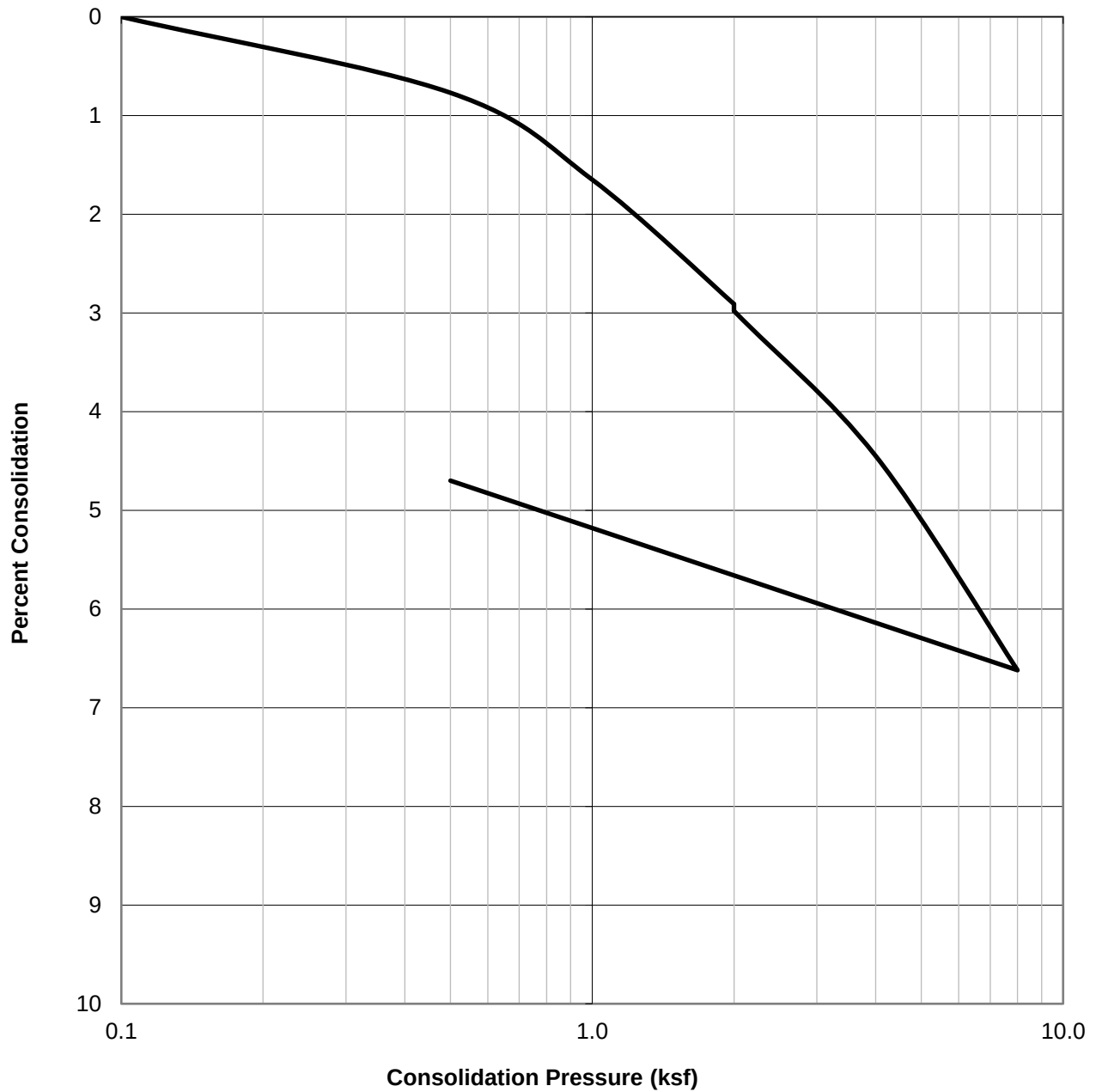
Project No.: T2998-22-01

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Figure B-25

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@10	Clayey SAND (SC), dark olive brown	92.1	22.3	27.5



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

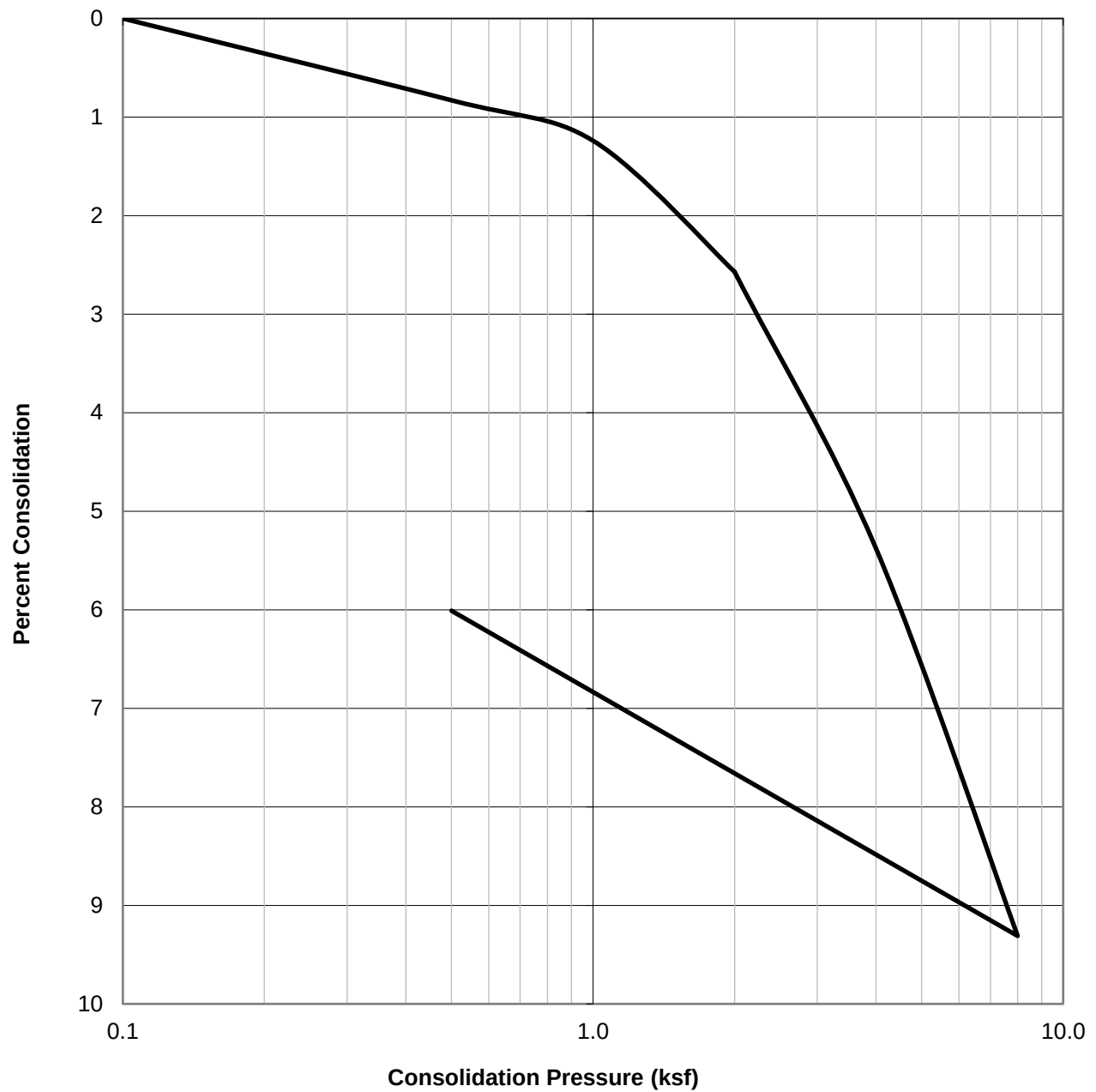
Project No.: T2998-22-01

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Figure B-26

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@15	Lean CLAY (CL), olive gray	83.9	37.1	35.2



CONSOLIDATION TEST RESULTS

ASTM D-2435

Checked by:

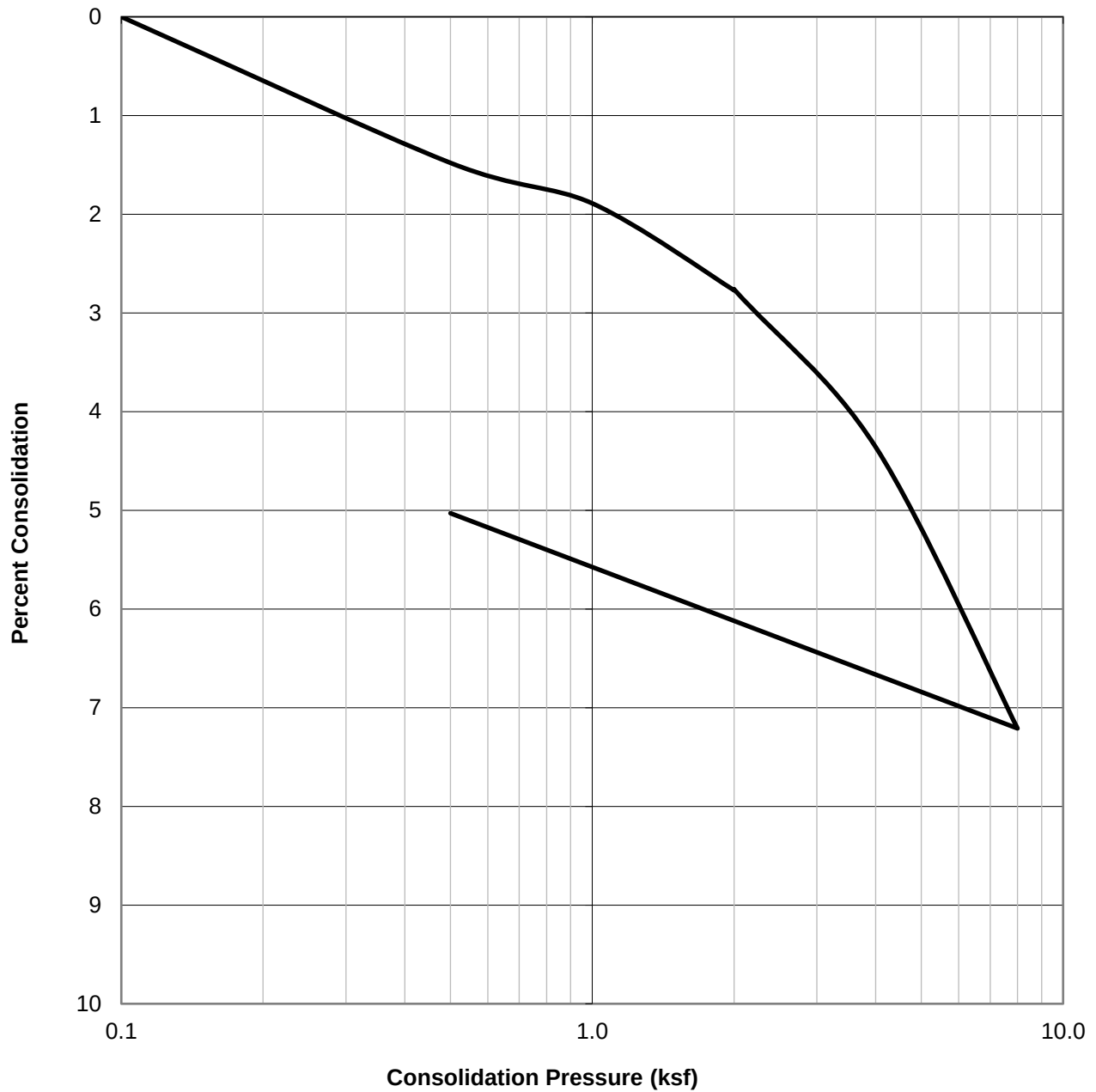
Project No.: T2998-22-01

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Figure B-27

WATER ADDED AT 2.0 KSF



SAMPLE ID.	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B5@20	Lean CLAY (CL), dark brown	99.7	25.3	26.8



CONSOLIDATION TEST RESULTS

ASTM D-2435

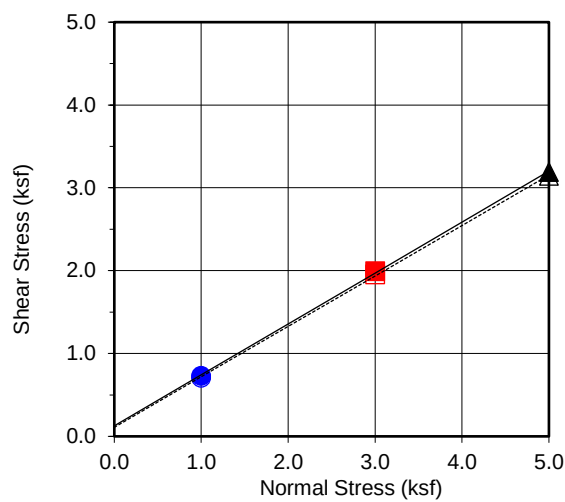
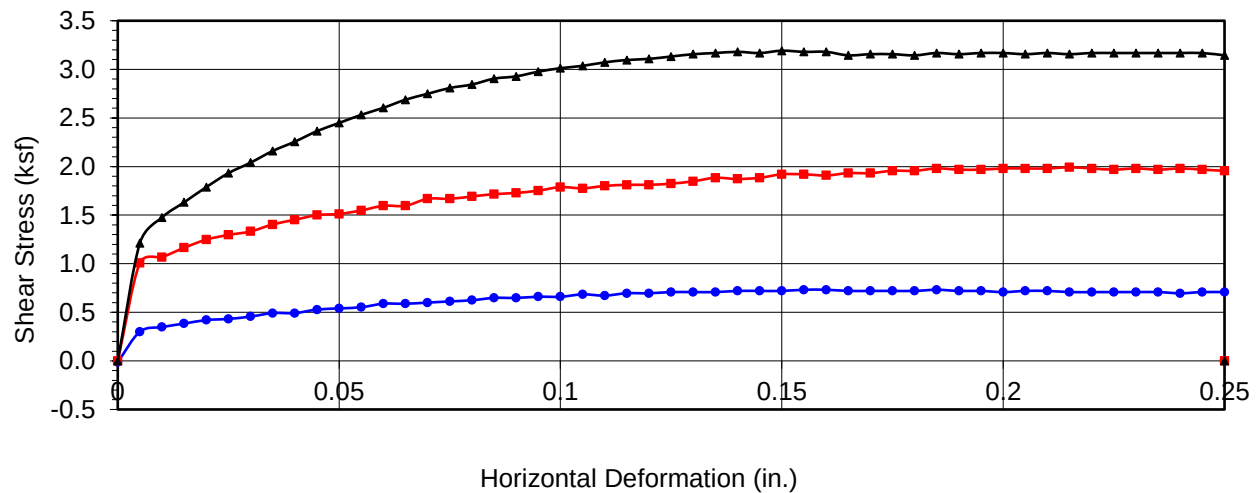
Checked by:

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Figure B-28



Boring No.	B2
Sample No.	B2@2.5
Depth (ft)	2.5
<u>Sample Type:</u>	Ring

<u>Soil Identification:</u>		
Silty SAND (SM), light brown		
<u>Strength Parameters</u>		
	C (psf)	ϕ ($^{\circ}$)
Peak	127	31.6
Ultimate	109	31.3

Normal Stress (kip/ft ²)	1	3	5
Peak Shear Stress (kip/ft ²)	● 0.73	■ 1.99	▲ 3.19
Shear Stress @ End of Test (ksf)	○ 0.71	□ 1.96	△ 3.14
Deformation Rate (in./min.)	0.05	0.05	0.05
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	12.2	17.8	9.8
Initial Dry Density (pcf)	98.9	101.3	105.6
Initial Degree of Saturation (%)	46.8	72.2	44.5
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	24.2	14.2	21.9



DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

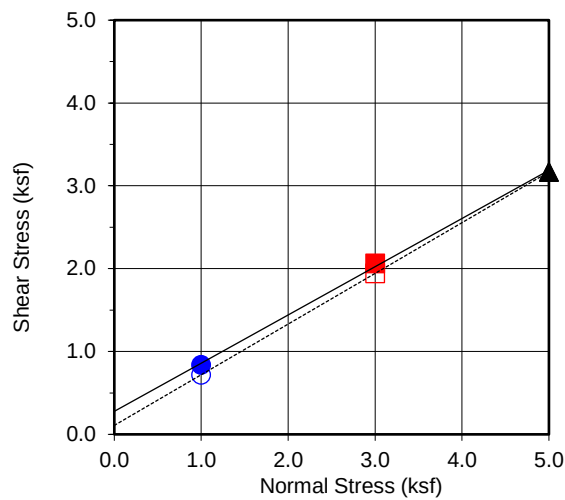
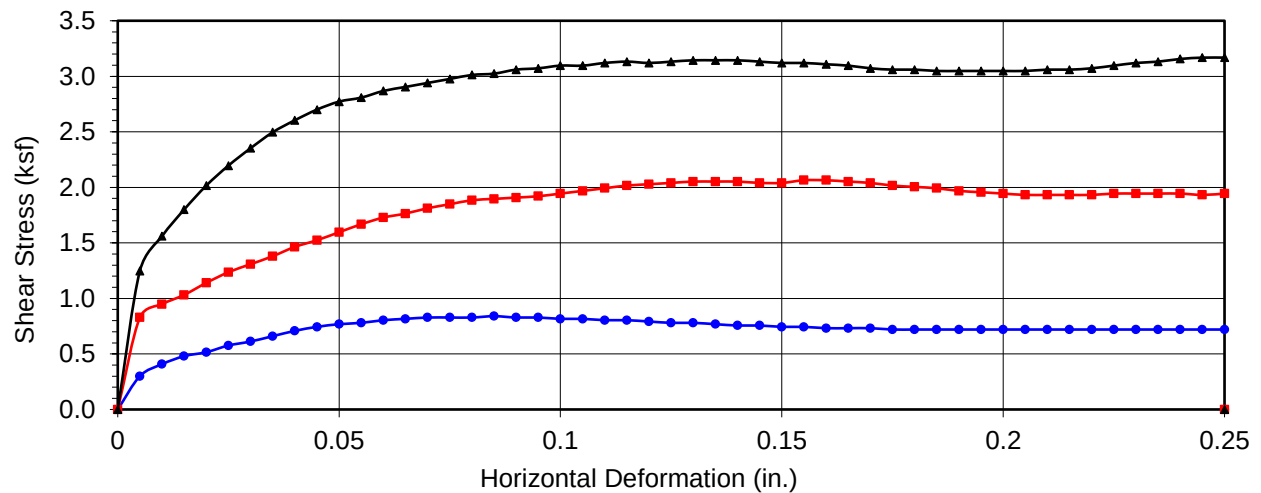
Checked by:

Project No.: T2998-22-01

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Figure B-29



Boring No.	B2
Sample No.	B2@2-7
Depth (ft)	2-7
<u>Sample Type:</u>	Bulk

<u>Soil Identification:</u>		
Silty SAND (SM), olive gray		
<u>Strength Parameters</u>		
	C (psf)	ϕ (°)
Peak	278	30.2
Ultimate	108	31.5

Normal Stress (kip/ft ²)	1	3	5
Peak Shear Stress (kip/ft ²)	● 0.84	■ 2.06	▲ 3.17
Shear Stress @ End of Test (ksf)	○ 0.72	□ 1.94	△ 3.17
Deformation Rate (in./min.)	0.05	0.05	0.05
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	10.1	10.1	10.1
Initial Dry Density (pcf)	110.1	110.1	110.1
Initial Degree of Saturation (%)	51.3	51.6	51.6
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	17.1	15.3	16.0



DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

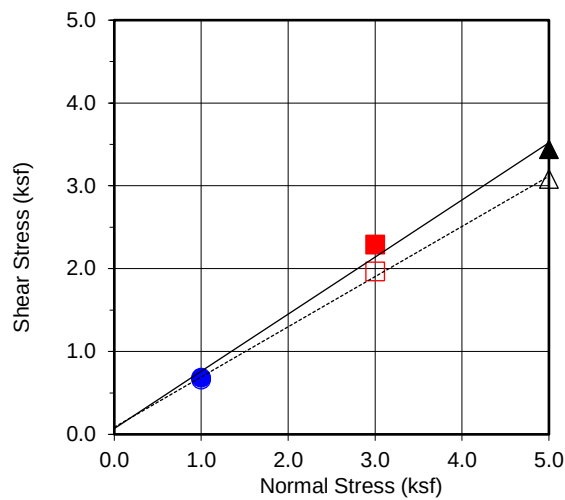
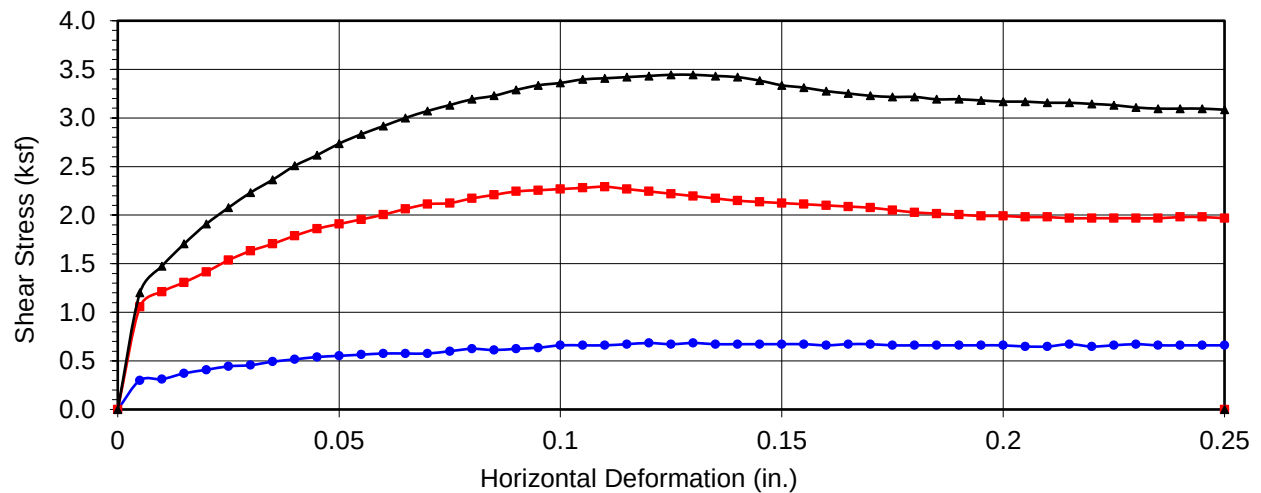
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Figure B-30



Boring No.	B3
Sample No.	B3@2.5
Depth (ft)	2.5
<u>Sample Type:</u>	ring

<u>Soil Identification:</u>		
Silty SAND (SM), brown		
<u>Strength Parameters</u>		
	C (psf)	ϕ (°)
Peak	70	34.6
Ultimate	86	31.2

Normal Stress (kip/ft ²)	1	3	5
Peak Shear Stress (kip/ft ²)	● 0.68	■ 2.29	▲ 3.44
Shear Stress @ End of Test (ksf)	○ 0.66	□ 1.97	△ 3.08
Deformation Rate (in./min.)	0.05	0.05	0.05
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	14.9	17.3	15.0
Initial Dry Density (pcf)	97.8	108.0	104.7
Initial Degree of Saturation (%)	55.8	83.1	66.2
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	21.8	19.6	16.8



DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

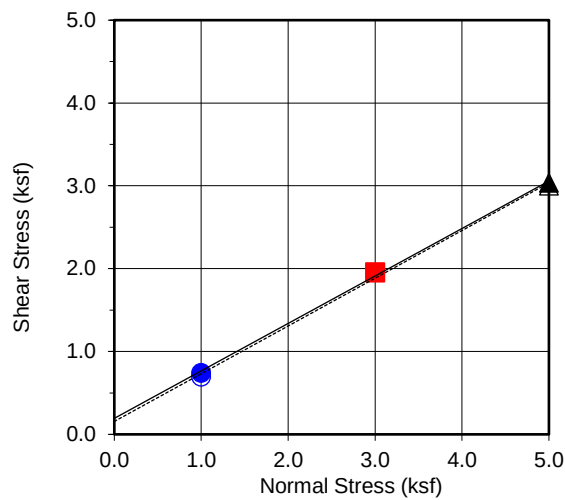
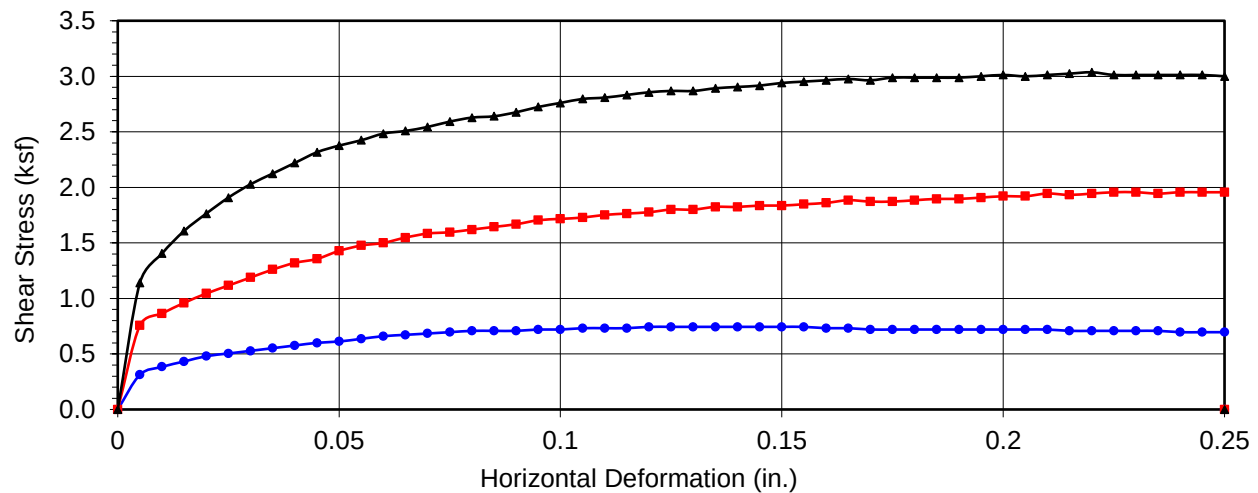
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Figure B-31



Boring No.	B4
Sample No.	B4@2-7
Depth (ft)	2-7
<u>Sample Type:</u>	Bulk

<u>Soil Identification:</u>		
Silty SAND (SM), dark brown		
<u>Strength Parameters</u>		
	C (psf)	ϕ ($^{\circ}$)
Peak	193	29.8
Ultimate	156	29.9

Normal Stress (kip/ft ²)	1	3	5
Peak Shear Stress (kip/ft ²)	● 0.74	■ 1.96	▲ 3.04
Shear Stress @ End of Test (ksf)	○ 0.70	□ 1.96	△ 3.00
Deformation Rate (in./min.)	0.05	0.05	0.05
Initial Sample Height (in.)	1.0	1.0	1.0
Ring Inside Diameter (in.)	2.375	2.375	2.375
Initial Moisture Content (%)	9.1	8.9	8.9
Initial Dry Density (pcf)	109.9	109.9	109.9
Initial Degree of Saturation (%)	45.9	45.1	45.0
Soil Height Before Shearing (in.)	1.2	1.2	1.2
Final Moisture Content (%)	16.4	15.2	14.9



DIRECT SHEAR TEST RESULTS

Consolidated Drained ASTM D-3080

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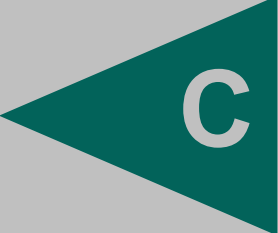
Project No.: T2998-22-01

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Figure B-32

APPENDIX

A teal-colored triangle pointing to the left, containing a white capital letter 'C'.

C

APPENDIX C

RECOMMENDED GRADING SPECIFICATIONS

FOR

SWC 7TH STREET AND CAWSTON AVENUE
SAN JACINTO, CALIFORNIA

PROJECT NO. T2998-22-01

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

- 1.1 These Recommended Grading Specifications shall be used in conjunction with the Geotechnical Report for the project prepared by Geocon. The recommendations contained in the text of the Geotechnical Report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict.
- 1.2 Prior to the commencement of grading, a geotechnical consultant (Consultant) shall be employed for the purpose of observing earthwork procedures and testing the fills for substantial conformance with the recommendations of the Geotechnical Report and these specifications. The Consultant should provide adequate testing and observation services so that they may assess whether, in their opinion, the work was performed in substantial conformance with these specifications. It shall be the responsibility of the Contractor to assist the Consultant and keep them apprised of work schedules and changes so that personnel may be scheduled accordingly.
- 1.3 It shall be the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans. If, in the opinion of the Consultant, unsatisfactory conditions such as questionable soil materials, poor moisture condition, inadequate compaction, and/or adverse weather result in a quality of work not in conformance with these specifications, the Consultant will be empowered to reject the work and recommend to the Owner that grading be stopped until the unacceptable conditions are corrected.

2. DEFINITIONS

- 2.1 **Owner** shall refer to the owner of the property or the entity on whose behalf the grading work is being performed and who has contracted with the Contractor to have grading performed.
- 2.2 **Contractor** shall refer to the Contractor performing the site grading work.
- 2.3 **Civil Engineer** or **Engineer of Work** shall refer to the California licensed Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topography.
- 2.4 **Consultant** shall refer to the soil engineering and engineering geology consulting firm retained to provide geotechnical services for the project.

- 2.5 **Soil Engineer** shall refer to a California licensed Civil Engineer retained by the Owner, who is experienced in the practice of geotechnical engineering. The Soil Engineer shall be responsible for having qualified representatives on-site to observe and test the Contractor's work for conformance with these specifications.
- 2.6 **Engineering Geologist** shall refer to a California licensed Engineering Geologist retained by the Owner to provide geologic observations and recommendations during the site grading.
- 2.7 **Geotechnical Report** shall refer to a soil report (including all addenda) which may include a geologic reconnaissance or geologic investigation that was prepared specifically for the development of the project for which these Recommended Grading Specifications are intended to apply.

3. MATERIALS

- 3.1 Materials for compacted fill shall consist of any soil excavated from the cut areas or imported to the site that, in the opinion of the Consultant, is suitable for use in construction of fills. In general, fill materials can be classified as *soil* fills, *soil-rock* fills or *rock* fills, as defined below.
- 3.1.1 **Soil fills** are defined as fills containing no rocks or hard lumps greater than 12 inches in maximum dimension and containing at least 40 percent by weight of material smaller than $\frac{3}{4}$ inch in size.
- 3.1.2 **Soil-rock fills** are defined as fills containing no rocks or hard lumps larger than 4 feet in maximum dimension and containing a sufficient matrix of soil fill to allow for proper compaction of soil fill around the rock fragments or hard lumps as specified in Paragraph 6.2. **Oversize rock** is defined as material greater than 12 inches.
- 3.1.3 **Rock fills** are defined as fills containing no rocks or hard lumps larger than 3 feet in maximum dimension and containing little or no fines. Fines are defined as material smaller than $\frac{3}{4}$ inch in maximum dimension. The quantity of fines shall be less than approximately 20 percent of the rock fill quantity.
- 3.2 Material of a perishable, spongy, or otherwise unsuitable nature as determined by the Consultant shall not be used in fills.
- 3.3 Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9

and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

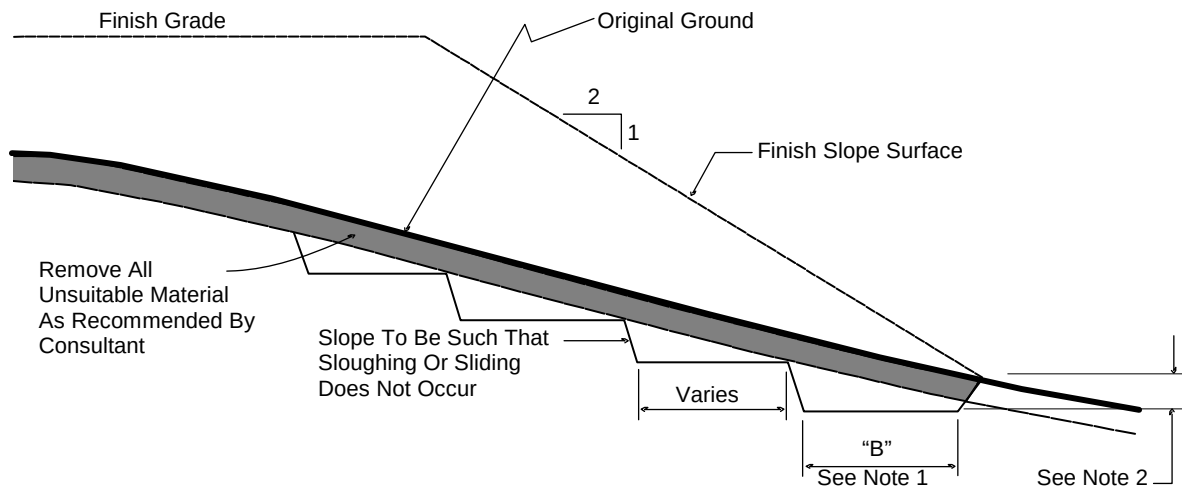
- 3.4 The outer 15 feet of *soil-rock* fill slopes, measured horizontally, should be composed of properly compacted *soil* fill materials approved by the Consultant. *Rock* fill may extend to the slope face, provided that the slope is not steeper than 2:1 (horizontal:vertical) and a soil layer no thicker than 12 inches is track-walked onto the face for landscaping purposes. This procedure may be utilized provided it is acceptable to the governing agency, Owner and Consultant.
- 3.5 Samples of soil materials to be used for fill should be tested in the laboratory by the Consultant to determine the maximum density, optimum moisture content, and, where appropriate, shear strength, expansion, and gradation characteristics of the soil.
- 3.6 During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated condition

4. CLEARING AND PREPARING AREAS TO BE FILLED

- 4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material and shall be performed in areas to be graded. Roots and other projections exceeding 1½ inches in diameter shall be removed to a depth of 3 feet below the surface of the ground. Borrow areas shall be grubbed to the extent necessary to provide suitable fill materials.
- 4.2 Asphalt pavement material removed during clearing operations should be properly disposed at an approved off-site facility or in an acceptable area of the project evaluated by Geocon and the property owner. Concrete fragments that are free of reinforcing steel may be placed in fills, provided they are placed in accordance with Section 6.2 or 6.3 of this document.

- 4.3 After clearing and grubbing of organic matter and other unsuitable material, loose or porous soils shall be removed to the depth recommended in the Geotechnical Report. The depth of removal and compaction should be observed and approved by a representative of the Consultant. The exposed surface shall then be plowed or scarified to a minimum depth of 6 inches and until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.
- 4.4 Where the slope ratio of the original ground is steeper than 5:1 (horizontal:vertical), or where recommended by the Consultant, the original ground should be benched in accordance with the following illustration.

TYPICAL BENCHING DETAIL



- DETAIL NOTES:
- (1) Key width "B" should be a minimum of 10 feet, or sufficiently wide to permit complete coverage with the compaction equipment used. The base of the key should be graded horizontal, or inclined slightly into the natural slope.
 - (2) The outside of the key should be below the topsoil or unsuitable surficial material and at least 2 feet into dense formational material. Where hard rock is exposed in the bottom of the key, the depth and configuration of the key may be modified as approved by the Consultant.

- 4.5 After areas to receive fill have been cleared and scarified, the surface should be moisture conditioned to achieve the proper moisture content, and compacted as recommended in Section 6 of these specifications.

5. COMPACTION EQUIPMENT

- 5.1 Compaction of *soil* or *soil-rock* fill shall be accomplished by sheepsfoot or segmented-steel wheeled rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers, or other types of acceptable compaction equipment. Equipment shall be of such a design that it will be capable of compacting the *soil* or *soil-rock* fill to the specified relative compaction at the specified moisture content.
- 5.2 Compaction of *rock* fills shall be performed in accordance with Section 6.3.

6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

- 6.1 *Soil* fill, as defined in Paragraph 3.1.1, shall be placed by the Contractor in accordance with the following recommendations:
 - 6.1.1 *Soil* fill shall be placed by the Contractor in layers that, when compacted, should generally not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to obtain uniformity of material and moisture in each layer. The entire fill shall be constructed as a unit in nearly level lifts. Rock materials greater than 12 inches in maximum dimension shall be placed in accordance with Section 6.2 or 6.3 of these specifications.
 - 6.1.2 In general, the *soil* fill shall be compacted at a moisture content at or above the optimum moisture content as determined by ASTM D 1557.
 - 6.1.3 When the moisture content of *soil* fill is below that specified by the Consultant, water shall be added by the Contractor until the moisture content is in the range specified.
 - 6.1.4 When the moisture content of the *soil* fill is above the range specified by the Consultant or too wet to achieve proper compaction, the *soil* fill shall be aerated by the Contractor by blading/mixing, or other satisfactory methods until the moisture content is within the range specified.
 - 6.1.5 After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent. Relative compaction is defined as the ratio (expressed in percent) of the in-place dry density of the compacted fill to the maximum laboratory dry density as determined in accordance with ASTM D 1557. Compaction shall be continuous over the entire area, and compaction equipment shall make sufficient passes so that the specified minimum relative compaction has been achieved throughout the entire fill.

- 6.1.6 Where practical, soils having an Expansion Index greater than 50 should be placed at least 3 feet below finish pad grade and should be compacted at a moisture content generally 2 to 4 percent greater than the optimum moisture content for the material.
- 6.1.7 Properly compacted *soil* fill shall extend to the design surface of fill slopes. To achieve proper compaction, it is recommended that fill slopes be over-built by at least 3 feet and then cut to the design grade. This procedure is considered preferable to track-walking of slopes, as described in the following paragraph.
- 6.1.8 As an alternative to over-building of slopes, slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Upon completion, slopes should then be track-walked with a D-8 dozer or similar equipment, such that a dozer track covers all slope surfaces at least twice.
- 6.2 *Soil-rock* fill, as defined in Paragraph 3.1.2, shall be placed by the Contractor in accordance with the following recommendations:
 - 6.2.1 Rocks larger than 12 inches but less than 4 feet in maximum dimension may be incorporated into the compacted *soil* fill, but shall be limited to the area measured 15 feet minimum horizontally from the slope face and 5 feet below finish grade or 3 feet below the deepest utility, whichever is deeper.
 - 6.2.2 Rocks or rock fragments up to 4 feet in maximum dimension may either be individually placed or placed in windrows. Under certain conditions, rocks or rock fragments up to 10 feet in maximum dimension may be placed using similar methods. The acceptability of placing rock materials greater than 4 feet in maximum dimension shall be evaluated during grading as specific cases arise and shall be approved by the Consultant prior to placement.
 - 6.2.3 For individual placement, sufficient space shall be provided between rocks to allow for passage of compaction equipment.
 - 6.2.4 For windrow placement, the rocks should be placed in trenches excavated in properly compacted *soil* fill. Trenches should be approximately 5 feet wide and 4 feet deep in maximum dimension. The voids around and beneath rocks should be filled with approved granular soil having a Sand Equivalent of 30 or greater and should be compacted by flooding. Windrows may also be placed utilizing an "open-face" method in lieu of the trench procedure, however, this method should first be approved by the Consultant.

- 6.2.5 Windrows should generally be parallel to each other and may be placed either parallel to or perpendicular to the face of the slope depending on the site geometry. The minimum horizontal spacing for windrows shall be 12 feet center-to-center with a 5-foot stagger or offset from lower courses to next overlying course. The minimum vertical spacing between windrow courses shall be 2 feet from the top of a lower windrow to the bottom of the next higher windrow.
- 6.2.6 Rock placement, fill placement and flooding of approved granular soil in the windrows should be continuously observed by the Consultant.
- 6.3 *Rock* fills, as defined in Section 3.1.3, shall be placed by the Contractor in accordance with the following recommendations:
- 6.3.1 The base of the *rock* fill shall be placed on a sloping surface (minimum slope of 2 percent). The surface shall slope toward suitable subdrainage outlet facilities. The *rock* fills shall be provided with subdrains during construction so that a hydrostatic pressure buildup does not develop. The subdrains shall be permanently connected to controlled drainage facilities to control post-construction infiltration of water.
- 6.3.2 *Rock* fills shall be placed in lifts not exceeding 3 feet. Placement shall be by rock trucks traversing previously placed lifts and dumping at the edge of the currently placed lift. Spreading of the *rock* fill shall be by dozer to facilitate *seating* of the rock. The *rock* fill shall be watered heavily during placement. Watering shall consist of water trucks traversing in front of the current rock lift face and spraying water continuously during rock placement. Compaction equipment with compactive energy comparable to or greater than that of a 20-ton steel vibratory roller or other compaction equipment providing suitable energy to achieve the required compaction or deflection as recommended in Paragraph 6.3.3 shall be utilized. The number of passes to be made should be determined as described in Paragraph 6.3.3. Once a *rock* fill lift has been covered with *soil* fill, no additional *rock* fill lifts will be permitted over the *soil* fill.
- 6.3.3 Plate bearing tests, in accordance with ASTM D 1196, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the required minimum number of passes of the compaction equipment. If performed, a minimum of three plate bearing tests should be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection

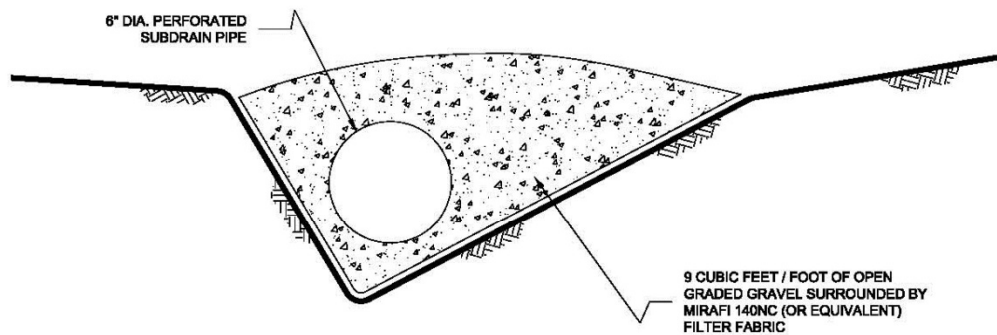
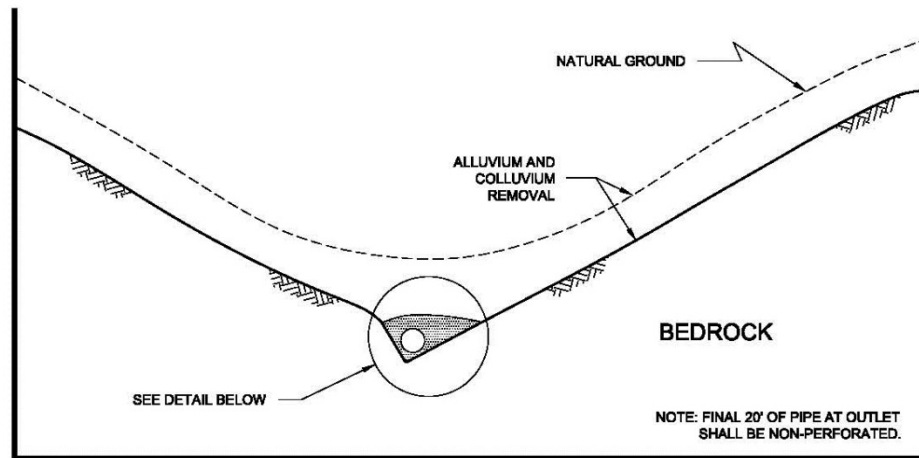
variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

- 6.3.4 A representative of the Consultant should be present during *rock* fill operations to observe that the minimum number of “passes” have been obtained, that water is being properly applied and that specified procedures are being followed. The actual number of plate bearing tests will be determined by the Consultant during grading.
- 6.3.5 Test pits shall be excavated by the Contractor so that the Consultant can state that, in their opinion, sufficient water is present and that voids between large rocks are properly filled with smaller rock material. In-place density testing will not be required in the *rock* fills.
- 6.3.6 To reduce the potential for “piping” of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant prior to commencing grading. The gradation of the graded filter material will be determined at the time the *rock* fill is being excavated. Materials typical of the *rock* fill should be submitted to the Consultant in a timely manner, to allow design of the graded filter prior to the commencement of *rock* fill placement.
- 6.3.7 *Rock* fill placement should be continuously observed during placement by the Consultant.

7. SUBDRAINS

- 7.1 The geologic units on the site may have permeability characteristics and/or fracture systems that could be susceptible under certain conditions to seepage. The use of canyon subdrains may be necessary to mitigate the potential for adverse impacts associated with seepage conditions. Canyon subdrains with lengths in excess of 500 feet or extensions of existing offsite subdrains should use 8-inch-diameter pipes. Canyon subdrains less than 500 feet in length should use 6-inch-diameter pipes.

TYPICAL CANYON DRAIN DETAIL



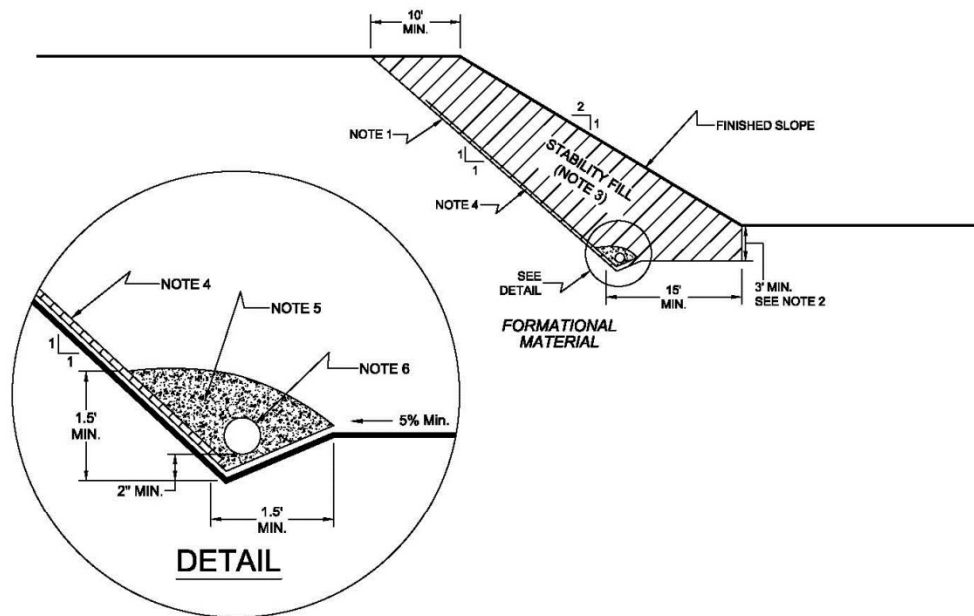
NOTES:

- 1.....8-INCH DIAMETER, SCHEDULE 80 PVC PERFORATED PIPE FOR FILLS IN EXCESS OF 100-FEET IN DEPTH OR A PIPE LENGTH OF LONGER THAN 500 FEET.
- 2.....6-INCH DIAMETER, SCHEDULE 40 PVC PERFORATED PIPE FOR FILLS LESS THAN 100-FEET IN DEPTH OR A PIPE LENGTH SHORTER THAN 500 FEET.

NO SCALE

7.2 Slope drains within stability fill keyways should use 4-inch-diameter (or larger) pipes.

TYPICAL STABILITY FILL DETAIL



NOTES:

- 1.....EXCAVATE BACKCUT AT 1:1 INCLINATION (UNLESS OTHERWISE NOTED).
- 2.....BASE OF STABILITY FILL TO BE 3 FEET INTO FORMATIONAL MATERIAL, SLOPING A MINIMUM 5% INTO SLOPE.
- 3.....STABILITY FILL TO BE COMPOSED OF PROPERLY COMPACTED GRANULAR SOIL.
- 4.....CHIMNEY DRAINS TO BE APPROVED PREFABRICATED CHIMNEY DRAIN PANELS (MIRADRAIN G200N OR EQUIVALENT) SPACED APPROXIMATELY 20 FEET CENTER TO CENTER AND 4 FEET WIDE. CLOSER SPACING MAY BE REQUIRED IF SEEPAGE IS ENCOUNTERED.
- 5.....FILTER MATERIAL TO BE 3/4-INCH, OPEN-GRADED CRUSHED ROCK ENCLOSED IN APPROVED FILTER FABRIC (MIRAFI 140NC).
- 6.....COLLECTOR PIPE TO BE 4-INCH MINIMUM DIAMETER, PERFORATED, THICK-WALLED PVC SCHEDULE 40 OR EQUIVALENT, AND SLOPED TO DRAIN AT 1 PERCENT MINIMUM TO APPROVED OUTLET.

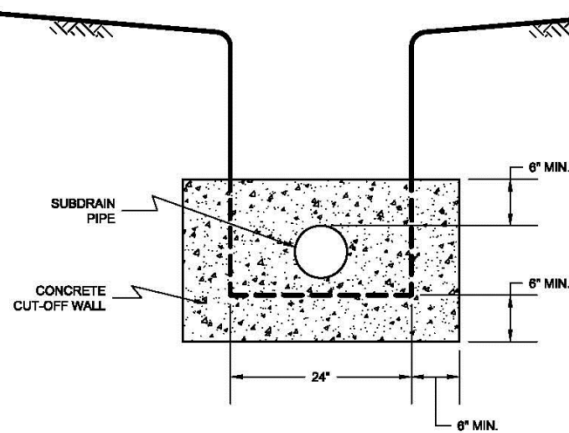
NO SCALE

- 7.3 The actual subdrain locations will be evaluated in the field during the remedial grading operations. Additional drains may be necessary depending on the conditions observed and the requirements of the local regulatory agencies. Appropriate subdrain outlets should be evaluated prior to finalizing 40-scale grading plans.
- 7.4 *Rock fill or soil-rock fill* areas may require subdrains along their down-slope perimeters to mitigate the potential for buildup of water from construction or landscape irrigation. The subdrains should be at least 6-inch-diameter pipes encapsulated in gravel and filter fabric. *Rock fill* drains should be constructed using the same requirements as canyon subdrains.

- 7.5 Prior to outletting, the final 20-foot segment of a subdrain that will not be extended during future development should consist of non-perforated drainpipe. At the non-perforated/perforated interface, a seepage cutoff wall should be constructed on the downslope side of the pipe.

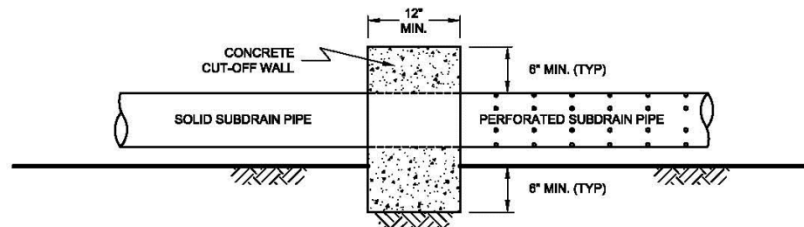
TYPICAL CUT OFF WALL DETAIL

FRONT VIEW



NO SCALE

SIDE VIEW

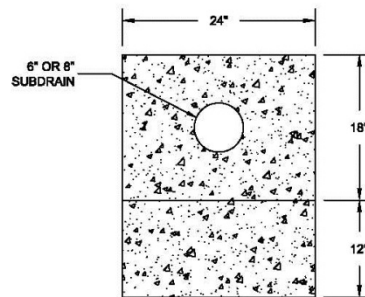


NO SCALE

- 7.6 Subdrains that discharge into a natural drainage course or open space area should be provided with a permanent headwall structure.

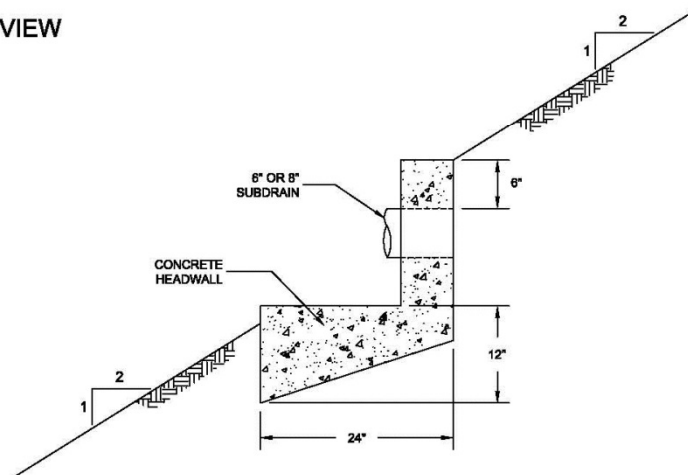
TYPICAL HEADWALL DETAIL

FRONT VIEW



NO SCALE

SIDE VIEW



NOTE: HEADWALL SHOULD OUTLET AT TOE OF FILL SLOPE
OR INTO CONTROLLED SURFACE DRAINAGE

NO SCALE

- 7.7 The final grading plans should show the location of the proposed subdrains. After completion of remedial excavations and subdrain installation, the project civil engineer should survey the drain locations and prepare an “as-built” map showing the drain locations. The final outlet and connection locations should be determined during grading operations. Subdrains that will be extended on adjacent projects after grading can be placed on formational material and a vertical riser should be placed at the end of the subdrain. The grading contractor should consider videoing the subdrains shortly after burial to check proper installation and functionality. The contractor is responsible for the performance of the drains.

8. OBSERVATION AND TESTING

- 8.1 The Consultant shall be the Owner's representative to observe and perform tests during clearing, grubbing, filling, and compaction operations. In general, no more than 2 feet in vertical elevation of *soil* or *soil-rock* fill should be placed without at least one field density test being performed within that interval. In addition, a minimum of one field density test should be performed for every 2,000 cubic yards of *soil* or *soil-rock* fill placed and compacted.
- 8.2 The Consultant should perform a sufficient distribution of field density tests of the compacted *soil* or *soil-rock* fill to provide a basis for expressing an opinion whether the fill material is compacted as specified. Density tests shall be performed in the compacted materials below any disturbed surface. When these tests indicate that the density of any layer of fill or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.
- 8.3 During placement of *rock* fill, the Consultant should observe that the minimum number of passes have been obtained per the criteria discussed in Section 6.3.3. The Consultant should request the excavation of observation pits and may perform plate bearing tests on the placed *rock* fills. The observation pits will be excavated to provide a basis for expressing an opinion as to whether the *rock* fill is properly seated and sufficient moisture has been applied to the material. When observations indicate that a layer of *rock* fill or any portion thereof is below that specified, the affected layer or area shall be reworked until the *rock* fill has been adequately seated and sufficient moisture applied.
- 8.4 A settlement monitoring program designed by the Consultant may be conducted in areas of *rock* fill placement. The specific design of the monitoring program shall be as recommended in the Conclusions and Recommendations section of the project Geotechnical Report or in the final report of testing and observation services performed during grading.
- 8.5 We should observe the placement of subdrains, to check that the drainage devices have been placed and constructed in substantial conformance with project specifications.
- 8.6 Testing procedures shall conform to the following Standards as appropriate:

8.6.1 Soil and Soil-Rock Fills:

- 8.6.1.1 Field Density Test, ASTM D 1556, *Density of Soil In-Place By the Sand-Cone Method*.

- 8.6.1.2 Field Density Test, Nuclear Method, ASTM D 6938, *Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)*.
- 8.6.1.3 Laboratory Compaction Test, ASTM D 1557, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Pound Hammer and 18-Inch Drop*.
- 8.6.1.4 Expansion Index Test, ASTM D 4829, *Expansion Index Test*.

9. PROTECTION OF WORK

- 9.1 During construction, the Contractor shall properly grade all excavated surfaces to provide positive drainage and prevent ponding of water. Drainage of surface water shall be controlled to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control features have been installed. Areas subjected to erosion or sedimentation shall be properly prepared in accordance with the Specifications prior to placing additional fill or structures.
- 9.2 After completion of grading as observed and tested by the Consultant, no further excavation or filling shall be conducted except in conjunction with the services of the Consultant.

10. CERTIFICATIONS AND FINAL REPORTS

- 10.1 Upon completion of the work, Contractor shall furnish Owner a certification by the Civil Engineer stating that the lots and/or building pads are graded to within 0.1 foot vertically of elevations shown on the grading plan and that all tops and toes of slopes are within 0.5 foot horizontally of the positions shown on the grading plans. After installation of a section of subdrain, the project Civil Engineer should survey its location and prepare an *as-built* plan of the subdrain location. The project Civil Engineer should verify the proper outlet for the subdrains and the Contractor should ensure that the drain system is free of obstructions.
- 10.2 The Owner is responsible for furnishing a final as-graded soil and geologic report satisfactory to the appropriate governing or accepting agencies. The as-graded report should be prepared and signed by a California licensed Civil Engineer experienced in geotechnical engineering and by a California Certified Engineering Geologist, indicating that the geotechnical aspects of the grading were performed in substantial conformance with the Specifications or approved changes to the Specifications.