RFP 2024-21-109P
ADDENDUM #1

DESIGN-BUILD SERVICES – PREFABRICATED BUILDINGS FOR JEFFERSON MIDDLE SCHOOL

The following changes, additions, deletions, clarifications, or corrections shall become part of the Request for Proposals for the above-listed project. This Addendum #1 forms part of the RFP document and modifies the original documents. **Addendum #1 MUST be acknowledged in the cover letter.** Failure to do so may subject the response to disqualification.

Oceanside Unified School District	Program Management: CCM/MAAS
RFP 2024-21-109P Design-Build Services – Prefabricated Buildings for Jefferson Middle School	Program Manager: Penny McGrew

Informational Updates
1. UES Geotechnical Report – See Attached
2.

Question	**Response**
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	

END OF ADDENDUM #1

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

February 22, 2024 UES Job No. 4830.2300142

Oceanside Unified School District
2111 Mission Avenue, #E
Oceanside, California 92058

Attention: Mr. Fred Parker
(760) 757-2560
fredparker@maasco.com

Subject: Transfer of Geotechnical Responsibility Letter
OUSD Jefferson Middle School
823 Acacia Avenue, Oceanside, California 92058

Reference: Geotechnical Investigation Final
Proposed Jefferson Middle School Modernization
823 Acacia Avenue, Oceanside, California
CTE/UES Job No. 10-15771, Dated January 13, 2021

Mr. Parker:

Construction Testing & Engineering Inc. (CTE) has been acquired by Universal Engineering Sciences (UES). As a result, our future project submittals will be under the new UES letterhead. Project personnel will remain the same and UES will take full responsibility for all previous work submitted under the CTE letterhead and agreements.

This document is subject to the same limitations as the referenced geotechnical report. The opportunity to be of service is appreciated. If you have any questions, please contact our office.

Respectfully,
Universal Engineering Sciences (UES)

Dan T. Math, GE #3201
Principal Engineer

Jay F. Lynch, CEG #1890
Principal Engineering Geologist

DTM/JL:ach

Attachments:
Attachment A— Addendum 01 to Geotechnical Investigation, Dated January 30, 2024
Attachment B—Geotechnical investigation, Dated January 13, 2021

ATTACHMENT A

Addendum 01 to Geotechnical Investigation, Dated January 30, 2024

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

January 30, 2024 UES Job No. 4830.2300142

Oceanside Unified School District
2111 Mission Avenue, #E
Oceanside, California 92058

Attention: Mr. Fred Parker
(760) 757-2560
fredparker@maasco.com

Subject: Addendum 01 to Geotechnical Investigation
OUSD Jefferson Middle School
823 Acacia Avenue, Oceanside CA 92058

Reference: Geotechnical Investigation Final
Proposed Jefferson Middle School Modernization
823 Acacia Avenue, Oceanside, California
CTE/UES Job No. 10-15771G, Dated January 13, 2021

Mr. Parker:

Universal Engineering Sciences (UES) provides this addendum to the referenced Geotechnical Report performed by UES (formerly CTE) in January 2021. The purpose of this addendum is to present the results based on our recent geotechnical investigation conducted on January 3rd and 4th, 2024 at the subject site. The update investigation was performed in general accordance with the terms of UES proposal 4830.1023.00005, dated October 16, 2023.

1.0 FIELD INVESTIGATION AND LABORATORY TESTING

1.1 Field Investigation

UES conducted a field investigation which included site reconnaissance and the excavation of nine exploratory borings (B-13 through B-21) within the proposed improvement areas. The purpose for the additional borings was to get additional exploration coverage and subsurface information based on the updated proposed improvements. The borings were advanced to a maximum depth of approximately 17.5 feet below ground surface (bgs). Bulk samples were collected from the cuttings, and relatively undisturbed samples were collected by driving Standard Penetration Test (SPT) and Modified California (CAL) samplers. The borings were advanced with a Limited Access Rig (LAR) track-mounted drill rig equipped with eight-inch-diameter, hollow-stem augers.

The soils were logged in the field by a UES Geologist and were visually classified in general accordance with the Unified Soil Classification System. The field descriptions have been modified, where appropriate, to reflect laboratory test results. The boring logs, including descriptions of the soils encountered, are included in Appendix B. The approximate locations of the exploratory soil borings are presented on Figures 2Aa and 2Ab.

1.2 Laboratory Testing

Laboratory tests were conducted on selected soil samples for classification purposes, and to evaluate physical properties and engineering characteristics. Laboratory tests included: Max Density, Expansion Index, Gradation, and Chemical Characteristics. Test descriptions and laboratory results for the selected soils are included in Appendix C. Laboratory results from our recent geotechnical investigation are consistent with the findings presented in our original reference report.

2.0 GEOLOGIC CONDITIONS AND GEOLOGIC HAZARDS

Based on the regional geologic map prepared by Kennedy and Tan (2007), Quaternary Old Paralic Deposits and Tertiary San Onofre Formation are the near surface geologic units that underlie the site (Figure 3). Based on recent explorations, Quaternary Previously Placed Fill was observed over the Old Paralic Deposits with Tertiary San Onofre Breccia encountered at depth at boring locations in the southern portion of the property. Descriptions of the geologic units encountered during the investigation are presented below. Surficial geologic materials are depicted on Figure 2Aa, and 2Ab with generalized geologic cross-sections presented on Figures 2Ac, 2Ad, 2Ae, 2Af, and 2Ag.

2.1 Quaternary Previously Placed Fill

Where observed, the Previously Placed Fill (fill) generally consists of loose to medium dense, dark brown and gray-brown, fine- to medium-grained clayey sand. Recent exploratory excavations encountered fill to a maximum depth of approximately 4.0 feet bgs in the area of boring B-13. Localized areas with deeper fill may be encountered during site grading.

2. 2 Quaternary Old Paralic Deposits

Old Paralic Deposits were observed at all recent boring excavations. Where observed, these materials generally consist of very dense, yellow- to gray-brown and reddish-brown, fine- to medium- grained silty to clayey sand. This geologic unit was observed to be relatively thin in the northern, higher elevations of the site and generally increases in thickness to the south.

2. 3 Tertiary San Onofre Breccia

San Onofre Breccia was observed at depth in borings B-17, B-19, B-20. Where observed, this very dense sandstone breccia unit generally excavates as gray-brown, fine- to medium-grained silty sand with rock fragments. This underlying geologic unit is anticipated at depth through the southwest portion of the site.

2. 4 Geologic Hazards

Based on the recent explorations, the geologic hazards presented in the referenced report are consistent with our findings of this updated geotechnical investigation.

3.0 UPDATE RECOMMENDATIONS

UES concludes that the proposed improvements on the site are feasible from a geotechnical standpoint, provided the preliminary recommendations in the referenced geotechnical report are incorporated into the design and construction of the project.

3.1 Grading Recommendations

Based on the recent explorations for this updated geotechnical investigation, the grading recommendations presented in the referenced report are considered suitable. These recommendations may be adjusted during construction as necessary, based on the encountered conditions during grading.

3.2 Foundation Recommendations

Based on the recent explorations for this updated geotechnical investigation, the foundation recommendations presented in the referenced report are considered suitable. These recommendations may also be adjusted during construction as necessary, based on the encountered conditions.

4.0 SEISMIC DESIGN CRITERIA

The seismic ground motion values listed in the table below were derived in accordance with the ASCE 7-16 Standard that is incorporated into the 2022 California Building Code. This was accomplished by establishing the Site Class based on the soil properties at the site and calculating site coefficients and parameters using the using the SEAOC-OSHPD U.S. Seismic Design Maps application. Seismic ground motion values are based on the approximate site coordinates of 33.2102° latitude and –117.3635° longitude. These values are intended for the design of structures to resist the effects of earthquake ground motions.

TABLE 4.0
SEISMIC GROUND MOTION VALUES (CODE-BASED)
2022 CBC AND ASCE 7-16

PARAMETER	VALUE	2022 CBC/ASCE 7-16 REFERENCE
Site Class	C	ASCE 16, Chapter 20
Mapped Spectral Response Acceleration Parameter, S_S	1.005	Figure 1613.2.1 (1)
Mapped Spectral Response Acceleration Parameter, S_1	0.369	Figure 1613.2.1 (2)
Seismic Coefficient, F_a	1.2	Table 1613.2.3 (1)
Seismic Coefficient, F_v	1.5	Table 1613.2.3 (2)
MCE Spectral Response Acceleration Parameter, S_{MS}	1.206	Section 1613.2.3
MCE Spectral Response Acceleration Parameter, S_{M1}	0.553	Section 1613.2.3
Design Spectral Response Acceleration, Parameter S_{DS}	0.804	Section 1613.2.5(1)
Design Spectral Response Acceleration, Parameter S_{D1}	0.369	Section 1613.2.5 (2)
Peak Ground Acceleration PGA_M	0.526	ASCE 16, Section 11.8.3

The recommendations herein are based on our review of the currently available design information and the recent geotechnical investigation. The anticipated conditions should be verified in the field during construction. This addendum is subject to the same limitations as the previous project geotechnical documents.

UES appreciates this opportunity to be of service on this project. If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Respectfully,
Universal Engineering Sciences (UES)

Dan T. Math, GE #2665
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
DANIEL T. MATH
No.2665
EXP.12/31/24
GEOTECHNICAL
STATE OF CALIFORNIA

Jay Lynch, CEG #1890
Principal Engineering Geologist

PROFESSIONAL GEOLOGIST
JAY F. LYNCH
No.1890
CERTIFIED ENGINEERING GEOLOGIST
EXP.5/31/23
STATE OF CALIFORNIA

Dylan DeJauregui, PG #10119
Project Geologist

PROFESSIONAL GEOLOGIST
DYLAN DEJAUREGUI
No. 10119
STATE OF CALIFORNIA

DD/DTM/JFL:ach

<u>FIGURES</u>

Figure 2Aa	Exploration Location Map
Figure 2Ab	Exploration Location Map Proposed Site Layout
Figure 2Ac	Cross Section A-A
Figure 2Ad	Cross Section B-B
Figure 2Ae	Cross Section C-C
Figure 2Af	Cross Section D-D
Figure 2Ag	Cross Section E-E

<u>APPENDICES</u>

Appendix A	Not Used
Appendix B	Boring Logs
Appendix C	Laboratory Test Results
Appendix D	Standard Specifications for Grading

S:\Projects\4830 (GEO)\4830.2300142.0000 (OUSD Jefferson Middle School (PW 8))\DWG\Figure 2_2024.dwg

LEGEND

B-21 Approximate Boring Location

B-12 Approximate Boring Location (2020)

P-8 Approximate Perc Test Location (2020)

Qls Quaternary Landslide

Qppf Quaternary Previously Placed Fill over

Qop Quaternary Old Paralic Deposits over

Tso Tertiary San Onofre Breccia

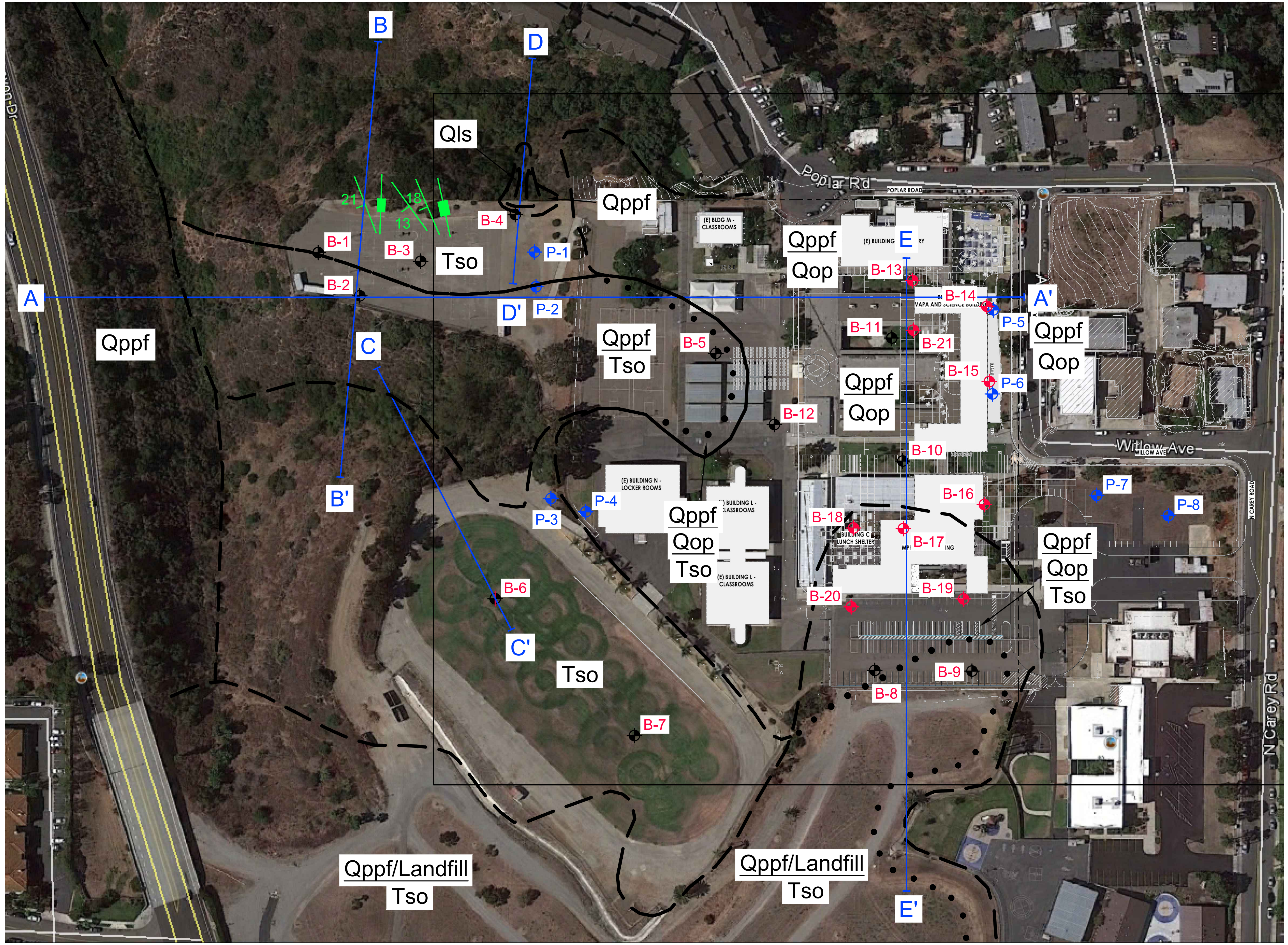
Approximate Geologic Contact

Approximate Buried Geologic Contact

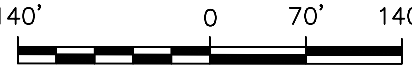
E ⊢⊣ E' Cross Section

18 Bedding Attitude

Joint



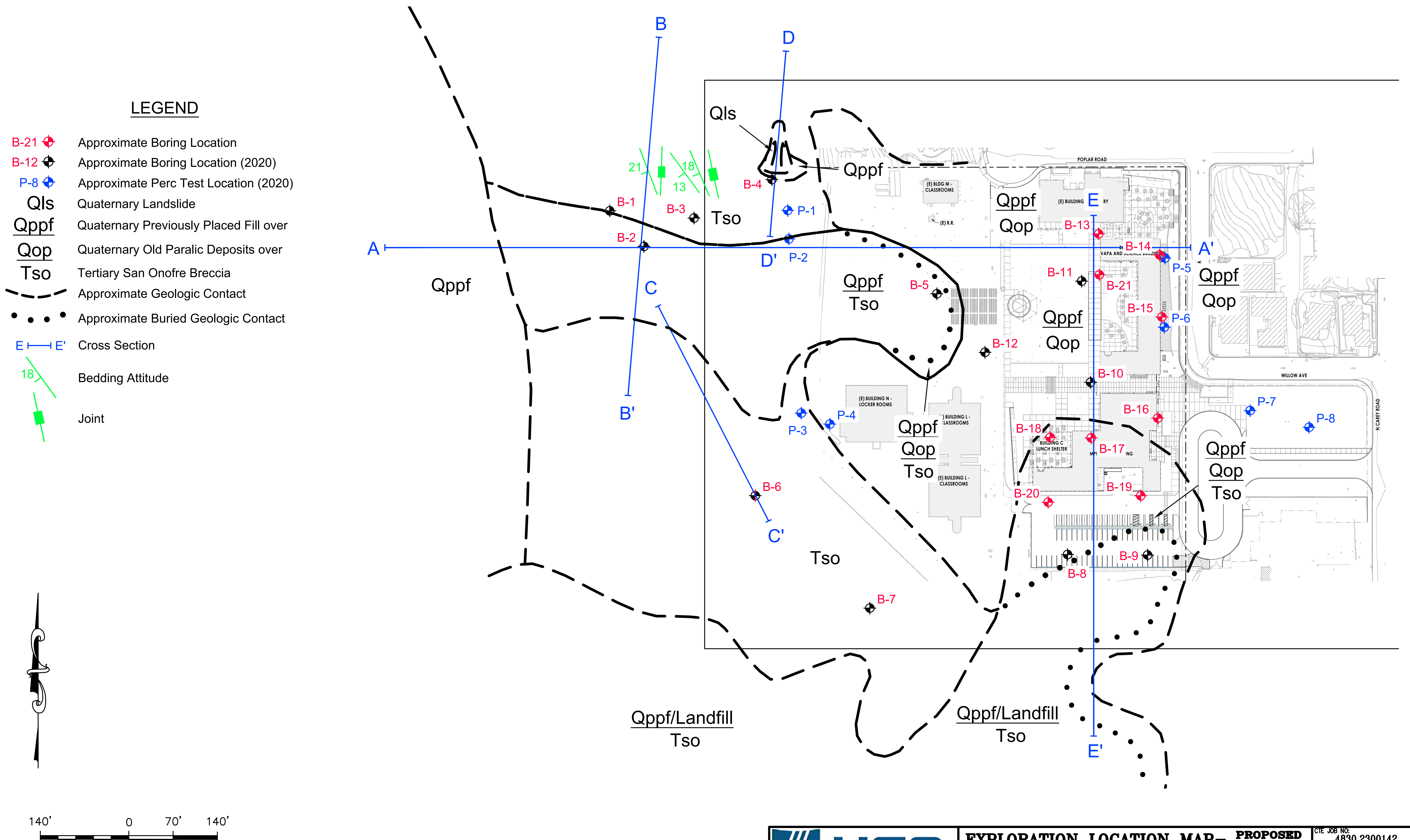
140' 0 70' 140'



EXPLORATION LOCATION MAP

OUSD JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 4830.2300142	
SCALE: 1" ~ 140'	
DATE: 1/24	FIGURE: 2Aa



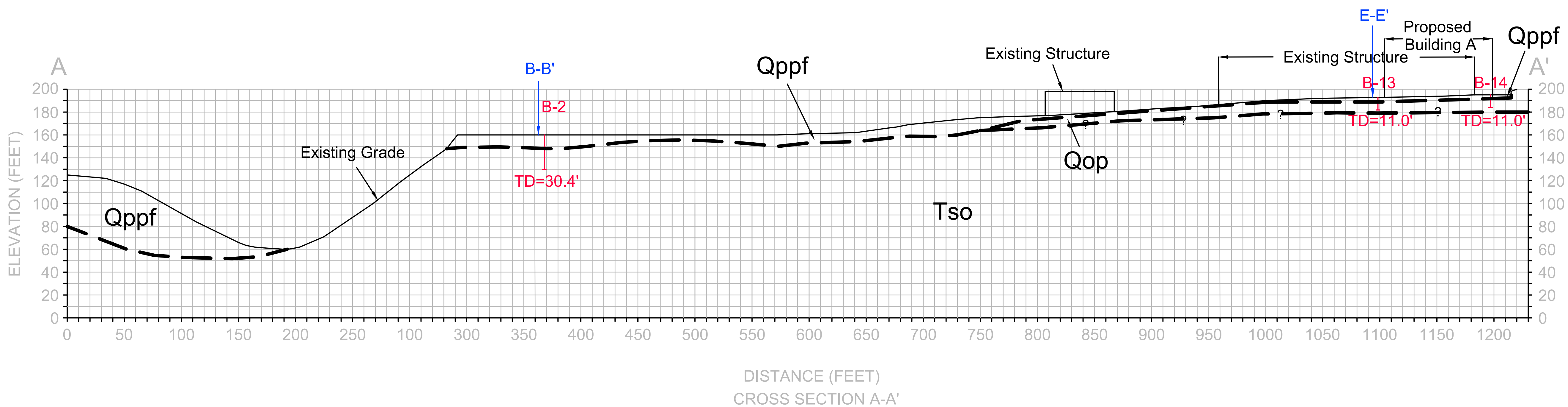
UES

EXPLORATION LOCATION MAP–PROPOSED SITE LAYOUT

OUSD JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 4830.2300142	
SCALE: 1" ~ 140'	
DATE: 1/24	FIGURE: 2Ab

S:\Projects\4830 (GEO)\4830.2300142.0000 (OUSD Jefferson Middle School (PW 8))\DWG\Figure 2_2024.dwg



LEGEND

Qppf QUATERNARY PREVIOUSLY PLACED FILL

Qop QUATERNARY OLD PARALIC DEPOSITS

Tso TERTIARY SAN ONOFRE BRECCIA

APPROXIMATE GEOLOGIC CONTACT

UES

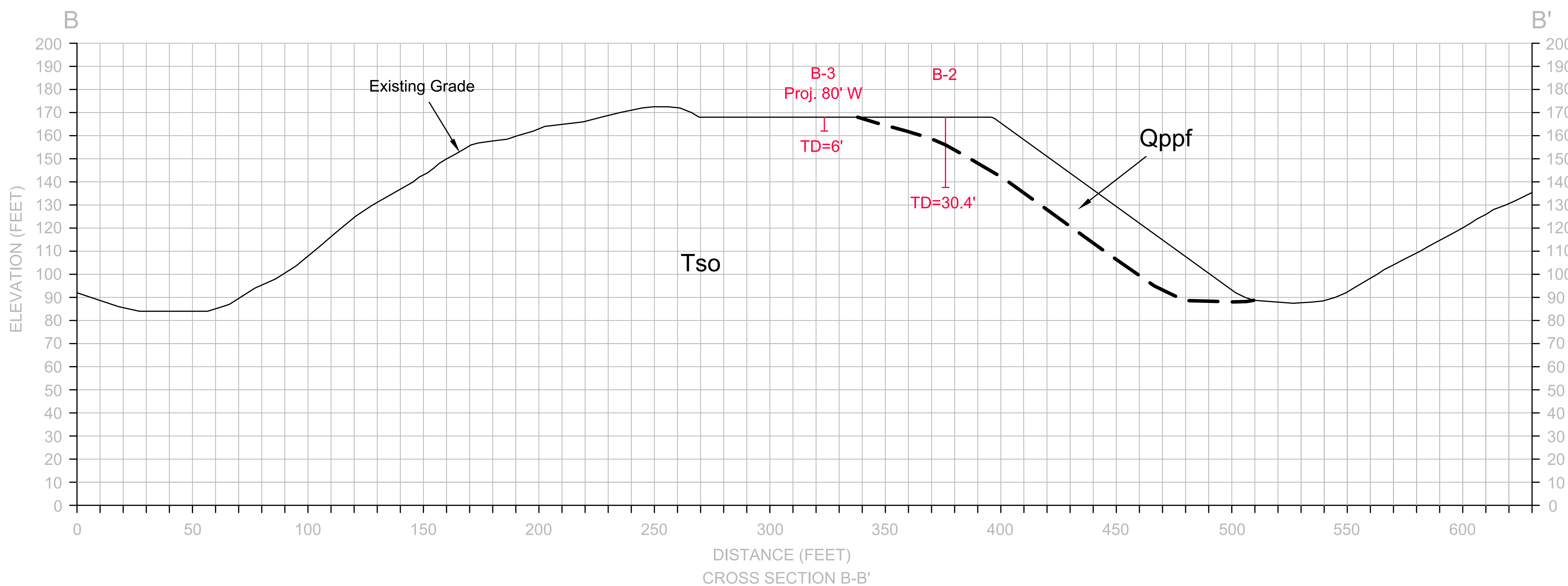
CROSS SECTION A-A'

OUSD JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 4830.2300142
SCALE: 1" = 100'
DATE: 1/24
FIGURE: 2Ac

S:\Projects\4830 (GEO)\4830.2300142.0000 (OUSD Jefferson Middle School (PW 8))\DWG\Figure 2A-2E_2024(Cross Sections).dwg

S:\Projects\4830 (GEO)\4830.2300142.0000 (OUSD Jefferson Middle School (PW 8))\DWG\Figure 2A-2E_2024(Cross Sections).dwg



LEGEND

Qppf QUATERNARY PREVIOUSLY PLACED FILL

Qop QUATERNARY OLD PARALIC DEPOSITS

Tso TERTIARY SAN ONOFRE BRECCIA

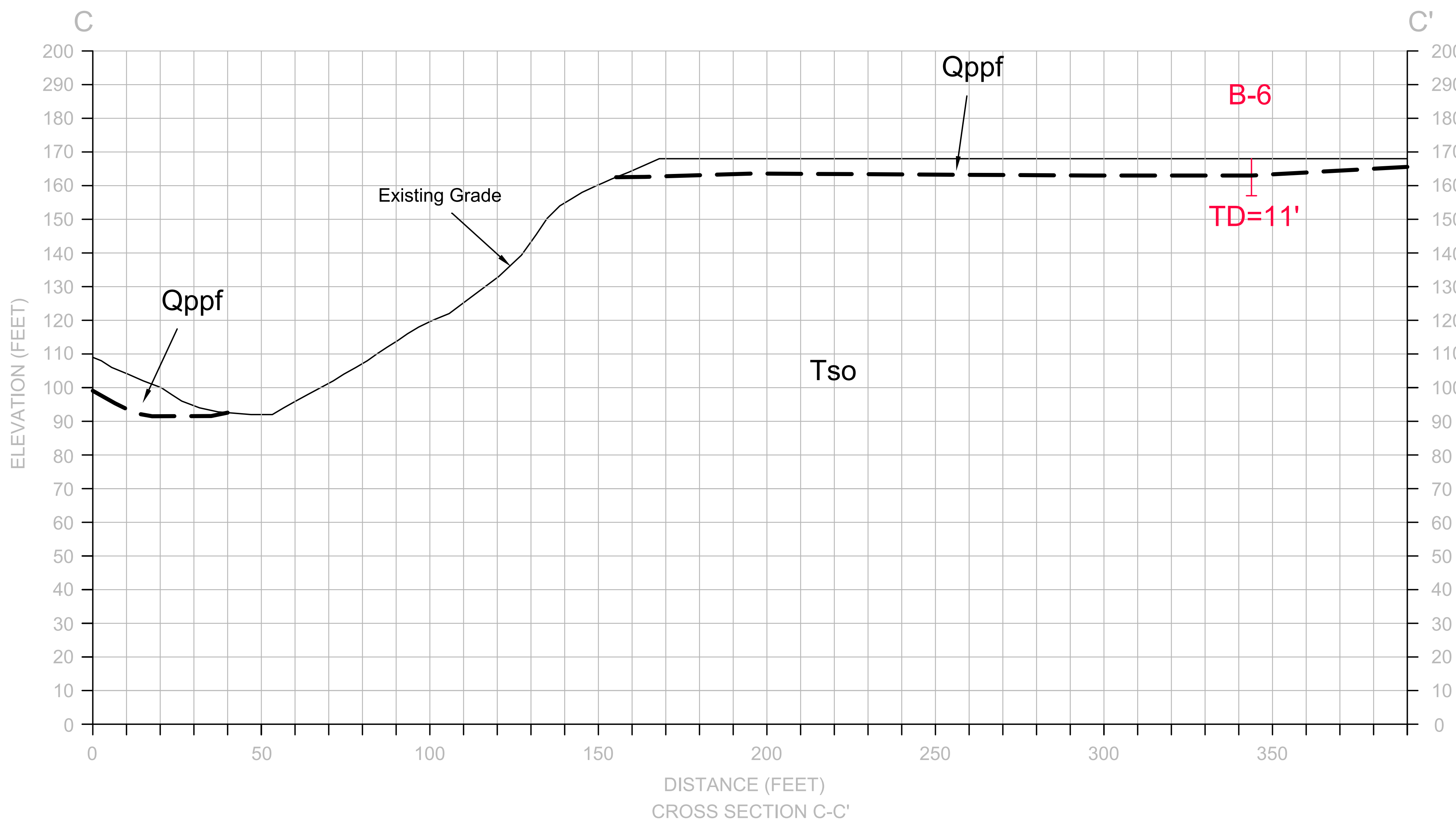
APPROXIMATE GEOLOGIC CONTACT

UES™

CROSS SECTION B–B'

OUSD JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 4830.2300142	
SCALE: 1" = 50'	
DATE: 1/24	FIGURE: 2Ad



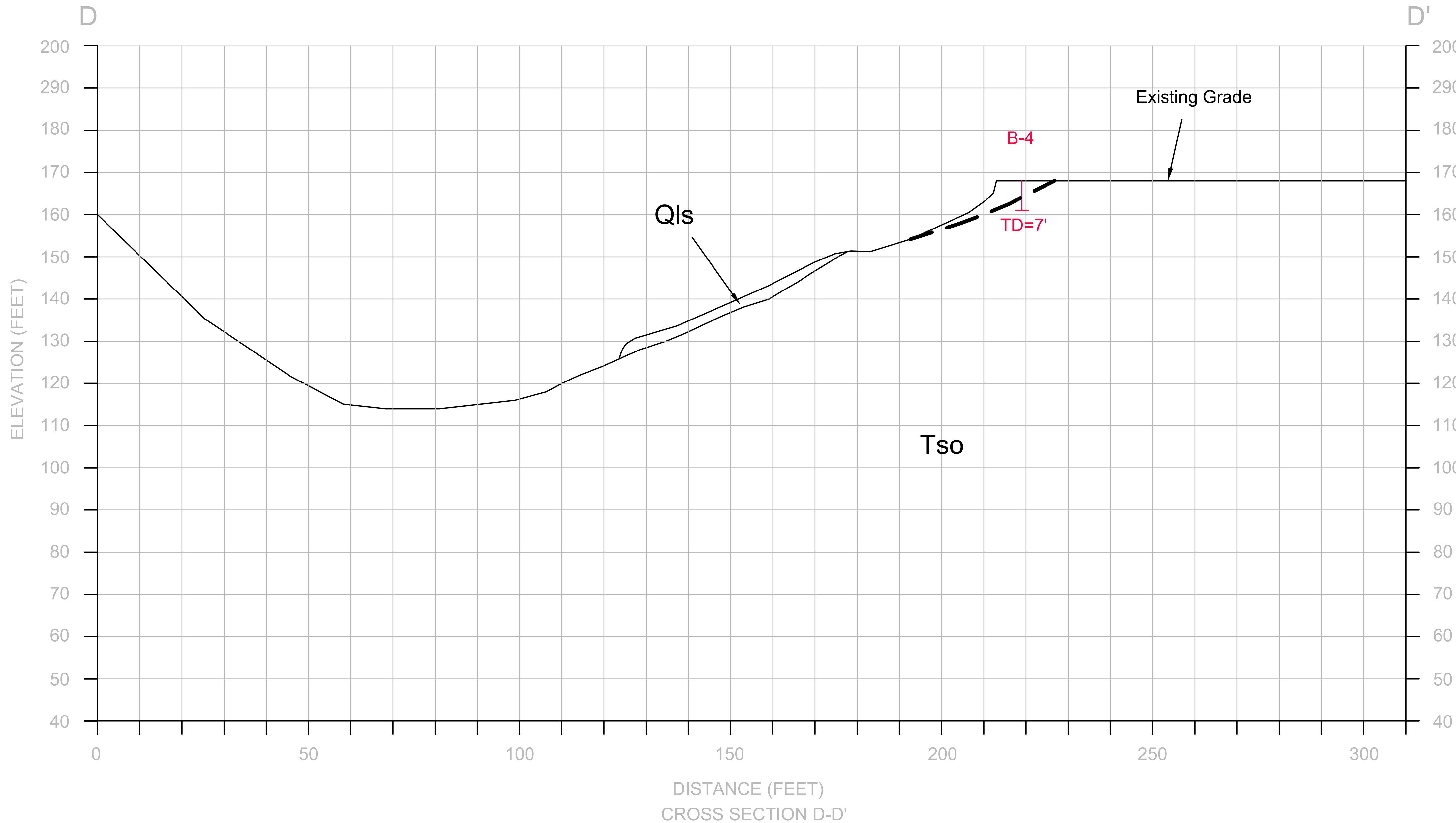
LEGEND

Qppf	QUATERNARY PREVIOUSLY PLACED FILL
Qop	QUATERNARY OLD PARALIC DEPOSITS
Tso	TERTIARY SAN ONOFRE BRECCIA
— — —	APPROXIMATE GEOLOGIC CONTACT

CROSS SECTION C–C'
OUSD JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 4830.2300142
SCALE: 1" = 40'
DATE: 1/24
FIGURE: 2Ae

S:\Projects\4830 (GEO)\4830.2300142.0000 (OUSD Jefferson Middle School (PW 8))\DWG\Figure 2A-2E_2024(Cross Sections).dwg



LEGEND

Qppf QUATERNARY PREVIOUSLY PLACED FILL

Tso TERTIARY SAN ONOFRE BRECCIA

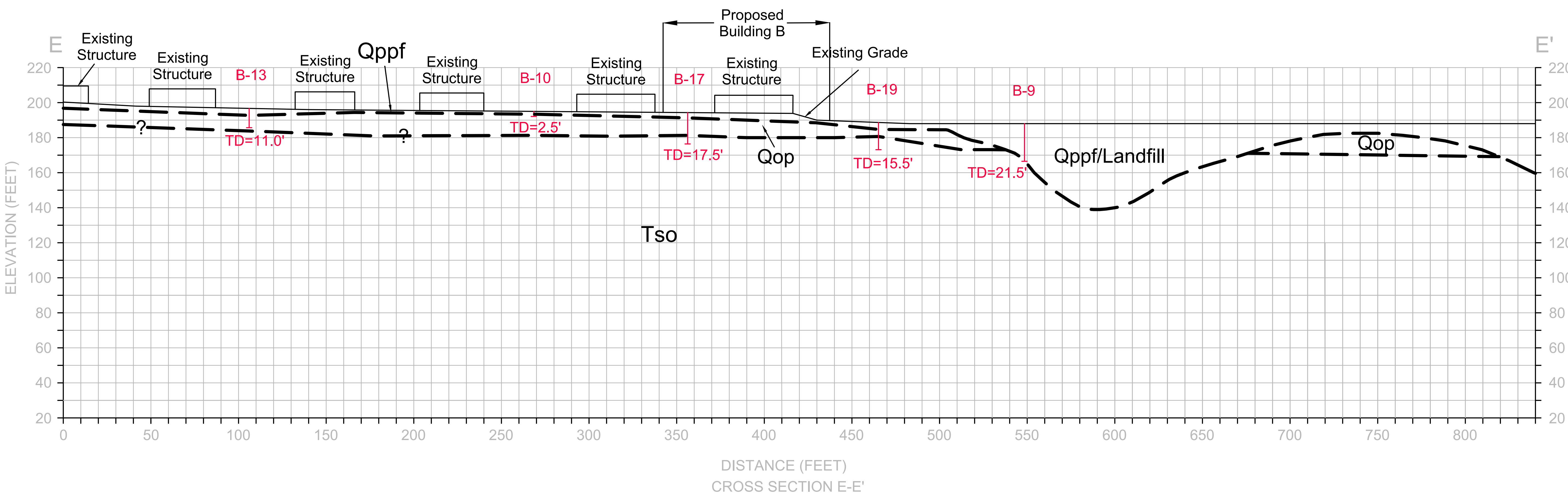
APPROXIMATE GEOLOGIC CONTACT

UES

CROSS SECTION D–D'
OUSD JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 4830.2300142	
SCALE: 1" = 30'	
DATE: 1/24	FIGURE: 2Af

S:\Projects\4830 (GEO)\4830.2300142.0000 (OUSD Jefferson Middle School (PW 8))\DWG\Figure 2A-2E_2024(Cross Sections).dwg



LEGEND

Qppf	QUATERNARY PREVIOUSLY PLACED FILL
Qop	QUATERNARY OLD PARALIC DEPOSITS
Tso	TERTIARY SAN ONOFRE BRECCIA
(dashed line)	APPROXIMATE GEOLOGIC CONTACT

UES™

CROSS SECTION E–E'
OUSD JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 4830.2300142
SCALE: 1" = 60'
DATE: 1/24
FIGURE: 2Ag

S:\Projects\4830 (GEO)\4830.2300142.0000 (OUSD Jefferson Middle School (PW 8))\DWG\Figure 2A-2E_2024(Cross Sections).dwg

APPENDIX A

NOT USED

APPENDIX B

BORING LOGS

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
COARSE GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	**GRAVELS** MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS < 5% FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS OR GRAVEL SAND MIXTURES, LITTLE OF NO FINES
		GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS < 5% FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	**SILTS AND CLAYS** LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, SLIGHTLY PLASTIC CLAYEY SILTS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTS OR LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTY CLAYS
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILTS AND CLAYS
		COARSE	FINE	COARSE	MEDIUM	FINE	

12" 3" 3/4" 4 10 40 200

CLEAR SQUARE SIEVE OPENING — U.S. STANDARD SIEVE SIZE

ADDITIONAL TESTS

(OTHER THAN TEST PIT AND BORING LOG COLUMN HEADINGS)

MAX- Maximum Dry Density
GS- Grain Size Distribution
SE- Sand Equivalent
EI- Expansion Index
CHM- Sulfate and Chloride Content , pH, Resistivity
COR - Corrosivity
SD- Sample Disturbed

PM- Permeability
SG- Specific Gravity
HA- Hydrometer Analysis
AL- Atterberg Limits
RV- R-Value
CN- Consolidation
CP- Collapse Potential
HC- Hydrocollapse
REM- Remolded

PP- Pocket Penetrometer
WA- Wash Analysis
DS- Direct Shear
UC- Unconfined Compression
MD- Moisture/Density
M- Moisture
SC- Swell Compression
OI- Organic Impurities

FIGURE: BL1

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

PROJECT:	DRILLER:	SHEET: of
UES JOB NO:	DRILL METHOD:	DRILLING DATE:
LOGGED BY:	SAMPLE METHOD:	ELEVATION:

Depth (Feet) | Bulk Sample | Driven Type | Blows/Foot | Dry Density (pcf) | Moisture (%) | U.S.C.S. Symbol | Graphic Log

BORING LEGEND

DESCRIPTION

Laboratory Tests

0

Block or Chunk Sample

Bulk Sample

5

Standard Penetration Test

10

Modified Split-Barrel Drive Sampler (Cal Sampler)

Thin Walled Army Corp. of Engineers Sample

15

Groundwater Table

Soil Type or Classification Change

20

? — ? — ? — ? — ? — ? — ? —

Formation Change [(Approximate boundaries queried (?)]

"SM"

Quotes are placed around classifications where the soils exist in situ as bedrock

25

FIGURE: BL2

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

PROJECT:	OUSD Jefferson Middle School	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
UES JOB NO:	4830.2300142	DRILL METHOD:	LAR: 6" Auger	DRILLING DATE:	1/3/2024
LOGGED BY:	DD	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	190ft msl

BORING: B-13

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0–5	X					SC		Topsoil = 0" - 3" **PREVIOUSLY PLACED FILL (Qppf):** Loose to medium dense, moist, dark-brown, fine-grained clayey SAND with gravels and roots.	EI
5		Ring	13 26 45			SM		**QUATERNARY OLD PARALIC DEPOSITS (Qop):** Very dense, slightly moist, yellow-gray-brown, fine-grained sitly SAND.	GS
10		Ring	16 50/5"						
11–25								Total Depth: 11.0' No Groundwater Encountered Backfilled 1/3/23	

UES
Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

PROJECT:	OUSD Jefferson Middle School	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
UES JOB NO:	4830.2300142	DRILL METHOD:	LAR: 6" Auger	DRILLING DATE:	1/3/2024
LOGGED BY:	DD	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	191ft msl

BORING: B-14

Depth (Feet)	Bulk Sample	Driven Sample Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SC		Topsoil = 0" - 4" **PREVIOUSLY PLACED FILL (Qppf):** Loose to medium dense, moist, dark-brown, fine- to medium-grained clayey SAND.	
						SM		**QUATERNARY OLD PARALIC DEPOSITS (Qop):** Very dense, slightly moist, yellow-gray-brown, fine- to medium-grained sitly SAND.	
5		Ring	50/6"						
						SM		Very dense, dry, reddish-brown, fine-grained silty SAND.	
10		SPT	23 50/5"						GS
								Total Depth: 11.0' No Groundwater Encountered Backfilled 1/3/23	
15									
20									
25									

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

PROJECT:	OUSD Jefferson Middle School	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
UES JOB NO:	4830.2300142	DRILL METHOD:	LAR: 6" Auger	DRILLING DATE:	1/3/2024
LOGGED BY:	DD	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	191ft msl

BORING: B-15

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	X					SC		Topsoil = 0" - 4" **PREVIOUSLY PLACED FILL (Qppf):** Loose to medium dense, moist, dark-brown, fine- to medium-grained clayey SAND.	CHM
						SC		**QUATERNARY OLD PARALIC DEPOSITS (Qop):** Very dense, slightly moist, gray-brown, fine- to medium-grained clayey SAND.	
5		X	18 50/6"						MD, DS
						SM		Very dense, dry, reddish-brown, fine- to coarse-grained silty SAND.	
10		X	28 50/2"						
15								Total Depth: 12.5' No Groundwater Encountered Backfilled 1/3/23	
20									
25									

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

PROJECT:	OUSD Jefferson Middle School	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
UES JOB NO:	4830.2300142	DRILL METHOD:	LAR: 6" Auger	DRILLING DATE:	1/3/2024
LOGGED BY:	DD	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	189ft msl

BORING: B-16

Depth (Feet)	Bulk Sample	Driven Sample Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	DESCRIPTION	Laboratory Tests
0						SC	Topsoil = 0" - 5" **PREVIOUSLY PLACED FILL (Qppf):** Loose to medium dense, moist, dark-brown, fine- to medium-grained clayey SAND.	
						SM	**QUATERNARY OLD PARALIC DEPOSITS (Qop):** Very dense, slightly moist, yellow-gray-brown, fine- to medium-grained silty SAND with high gravel content.	
5		Ring	25 50/3"					
10		Ring	22 50/6"					
15							Total Depth: 11.0' No Groundwater Encountered Backfilled 1/3/23	
20								
25								

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

PROJECT:	OUSD Jefferson Middle School	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
UES JOB NO:	4830.2300142	DRILL METHOD:	LAR: 6" Auger	DRILLING DATE:	1/3/2024
LOGGED BY:	DD	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	189ft msl

BORING: B-17

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SM		Topsoil = 0" - 6" with high roots and gravel content. **PREVIOUSLY PLACED FILL (Qppf):** Medium dense to dense, dry, yellow- gray-brown, fine- to medium-grained silty SAND.	
						SM		**QUATERNARY OLD PARALIC DEPOSITS (Qop):** Very dense, dry, yellow-gray-brown, fine- to medium-grained silty SAND.	
5		SPT	50/6"						CN
10		Ring	15 50/5"						
						"SM"		**TERTIARY SAN ONOFRE BRECCIA (Tso):** Very dense sandstone. Excavates as dry, yellow-gray-brown, fine- to medium-grained silty SAND with rock fragments.	
15		Ring	17 50/4"						
								Total Depth: 17.5' (Refusal on bedrock) No Groundwater Encountered Backfilled 1/3/23	
20									
25									

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

PROJECT:	OUSD Jefferson Middle School	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
UES JOB NO:	4830.2300142	DRILL METHOD:	LAR: 6" Auger	DRILLING DATE:	1/3/2024
LOGGED BY:	DD	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	189ft msl

BORING: B-18

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	X (0–5)			134.8	10.3	SC		Topsoil = 0" - 6" **PREVIOUSLY PLACED FILL (Qppf):** Loose to medium dense, moist, dark-brown, fine- to medium-grained clayey SAND.	MAX
						SM		**QUATERNARY OLD PARALIC DEPOSITS (Qop):** Very dense, dry, gray-brown, fine- to medium-grained silty SAND.	
5		X	18 50/6"						
						SM		Very dense, dry, reddish-brown, fine- to coarse-grained silty SAND with trace gravels.	
10		X	28 50/2"						MD, DS
								Total Depth: 12.0' (Drilling Refusal on Bedrock) No Groundwater Encountered Backfilled 1/3/23	
15									
20									
25									

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

PROJECT:	OUSD Jefferson Middle School	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
UES JOB NO:	4830.2300142	DRILL METHOD:	LAR: 6" Auger	DRILLING DATE:	1/4/2024
LOGGED BY:	DD	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	184ft msl

BORING: B-19

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SC		Asphalt = 0" - 3" Base = 3" - 6" **PREVIOUSLY PLACED FILL (Qppf):** Loose to medium dense, dry, yellow-gray-brown, fine- to medium-grained clayey SAND.	
5		Ring	34 50/5"			SM		**QUATERNARY OLD PARALIC DEPOSITS (Qop):** Very dense, dry, gray-brown, fine- to medium-grained silty SAND.	
10		SPT	50/4"			SC		**TERTIARY SAN ONOFRE BRECCIA (Tso):** Very dense sandstone. Excavates as dry, gray-brown, fine- to coarse-grained clayey SAND.	EI
15		Ring	50/5"			SM		Very dense sandstone. Excavates as dry, gray-brown, fine- to coarse-grained sitly SAND with rock fragments.	
20								Total Depth: 15.5' No Groundwater Encountered Backfilled 1/4/23	
25									

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

PROJECT:	OUSD Jefferson Middle School	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
UES JOB NO:	4830.2300142	DRILL METHOD:	LAR: 6" Auger	DRILLING DATE:	1/4/2024
LOGGED BY:	DD	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	181ft msl

BORING: B-20

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	X					SM		Asphalt = 0" - 2" Base = 2" - 5"	
	X					SM		**PREVIOUSLY PLACED FILL (Qppf):** Dense, dry, gray-brown, fine- to medium-grained silty SAND.	
	X							**QUATERNARY OLD PARALIC DEPOSITS (Qop):** Very dense, dry, gray-brown, fine- to medium-grained silty SAND.	
5		X	50/4"						
						"SM"		**TERTIARY SAN ONOFRE BRECCIA (Tso):** Very dense sandstone. Excavates as dry, gray-brown, fine- to coarse-grained silty SAND with rock fragements.	
10		X	40 50/3"						
								Total Depth: 11.0' (Refusal on bedrock) No Groundwater Encountered Backfilled 1/4/23	
15									
20									
25									

Universal Engineering Sciences (UES)
1441 Montiel Road, Suite 115
Escondido, CA 92026
p. 760.746.4955 | TeamUES.com

PROJECT:	OUSD Jefferson Middle School	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
UES JOB NO:	4830.2300142	DRILL METHOD:	Hand Tools and Hand Auger	DRILLING DATE:	1/4/2024
LOGGED BY:	DD	SAMPLE METHOD:	BULK	ELEVATION:	189ft msl

BORING: B-21

Depth (Feet)	Sample: Bulk / Driven Type	Blows/10cm	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	DCP-1	2 6 9 51+			SC		Topsoil: 0" - 3"'	
					SM		**Previously Placed Fill (Qppf):** Loose to Medium dense, slightly moist, dark-brown, fine- to medium-grained clayey SAND with trace gravels.	GS
							QUATERNARY OLD PARALIC DEPOSITS (Qop): Very dense, reddish-gray-brown, fine- to coarse-grained sitly SAND.	
5							Total Depth: 3.0' No Groundwater Encountered Backfilled 1/4/23	
10								
15								
20								
25								

APPENDIX C

LABORATORY TEST RESULTS

LABORATORY TEST METHODS

Classification (ASTM D2487)

Earth materials encountered were visually and texturally classified in accordance with the Unified Soil Classification System (USCS/ASTM D2487) and ASTM D2488. Material classifications are indicated on the logs of the exploratory borings presented in Appendix B.

Particle-size Distribution Tests (ASTM D6913)

Particle-size distribution (gradation) testing was performed on selected samples of the materials encountered in general accordance with the latest version of the ASTM D6913 test method. The test results were utilized in evaluating the soil classifications in accordance with the Unified Soil Classification System and to evaluate the geotechnical engineering characteristics of the tested material. The test results are plotted on grain-size distribution graphs and are presented in the following section of this appendix.

Expansion Index Test (ASTM D4829)

Expansion index testing was performed on selected samples of the earth materials encountered in general accordance with the ASTM D4829 test method. The test determines the expansion potential of the materials encountered. The test results are presented in the following section of this appendix.

Laboratory Compaction Characteristics Test (ASTM D1557)

Laboratory compaction characteristics testing was performed on selected samples of the earth materials encountered in general accordance with the ASTM D1557 test method. The test establishes the laboratory maximum dry density and optimum moisture content of the tested materials and are also used to aid in evaluating the strength characteristics of the materials.

Soil Corrosivity Tests

The water-soluble sulfate and chloride content, the resistivity, and pH of selected samples were performed by a third-party laboratory in general accordance with California Test Methods. The tests results are useful in the assessment of the degree of corrosivity of the earth materials encountered with regard to concrete and normal grade steel.

EXPANSION INDEX
(ASTM D4829)

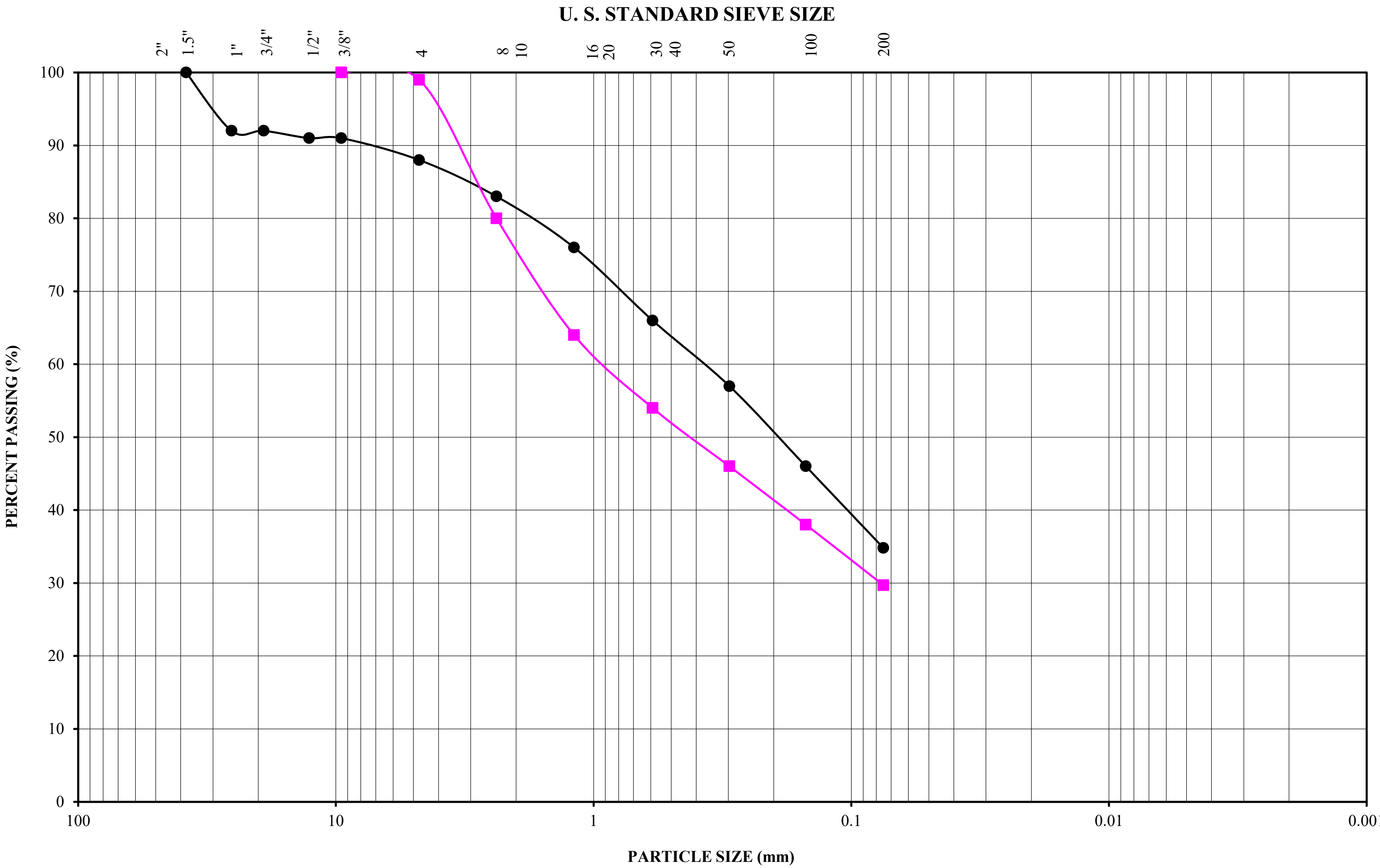
Sample Location / Depth (feet)	Expansion Index	Expansion Potential
B-13 @ 0 – 5	17	VERY LOW
B-19 @ 10	0	VERY LOW

LABORATORY COMPACTION CHARACTERISTICS
(ASTM D1557)

Sample Location / Depth (feet)	Maximum Dry Density (pounds per cubic foot)	Optimum Moisture (percent)
B-18 @ 0 – 5	134.8 (136.1)	10.3 (9.8)

CORROSIVITY
(CTM 417, CTM 422 and CTM 643)

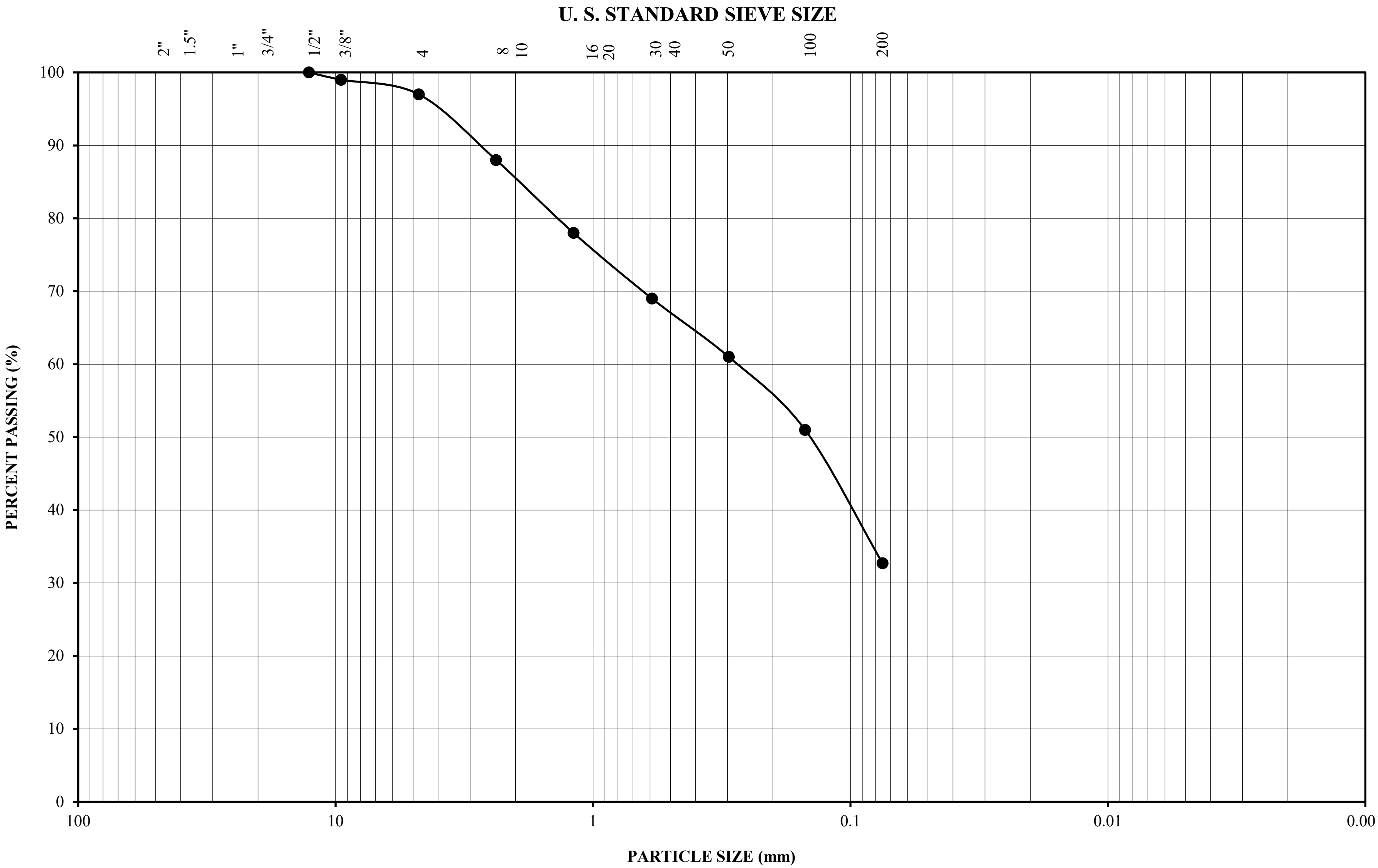
Sample Location / Depth (feet)	Material Type (USCS)	pH	Minimum Resistivity (Ohm-cm)	Water Soluble Sulfates (ppm)	Water Soluble Chlorides (ppm)
B-15 @ 0 – 5	Clayey Sand (SC)	8.32	9090	111.9	21.2



PARTICLE SIZE ANALYSIS

UES™

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-13	5	●	--	--	SC
B-14	10	■	--	--	SC
UES JOB NUMBER:		4830.2300142		FIGURE:	C-1



PARTICLE SIZE ANALYSIS

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-21	2	●	--	--	SC

UES JOB NUMBER:	4830.2300142	FIGURE:	C-2

APPENDIX D

STANDARD SPECIFICATIONS FOR GRADING

Section 1 - General

Construction Testing & Engineering, Inc. presents the following standard recommendations for grading and other associated operations on construction projects. These guidelines should be considered a portion of the project specifications. Recommendations contained in the body of the previously presented soils report shall supersede the recommendations and or requirements as specified herein. The project geotechnical consultant shall interpret disputes arising out of interpretation of the recommendations contained in the soils report or specifications contained herein.

Section 2 - Responsibilities of Project Personnel

The geotechnical consultant should provide observation and testing services sufficient to general conformance with project specifications and standard grading practices. The geotechnical consultant should report any deviations to the client or his authorized representative.

The Client should be chiefly responsible for all aspects of the project. He or his authorized representative has the responsibility of reviewing the findings and recommendations of the geotechnical consultant. He shall authorize or cause to have authorized the Contractor and/or other consultants to perform work and/or provide services. During grading the Client or his authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

The Contractor is responsible for the safety of the project and satisfactory completion of all grading and other associated operations on construction projects, including, but not limited to, earth work in accordance with the project plans, specifications and controlling agency requirements.

Section 3 - Preconstruction Meeting

A preconstruction site meeting should be arranged by the owner and/or client and should include the grading contractor, design engineer, geotechnical consultant, owner's representative and representatives of the appropriate governing authorities.

Section 4 - Site Preparation

The client or contractor should obtain the required approvals from the controlling authorities for the project prior, during and/or after demolition, site preparation and removals, etc. The appropriate approvals should be obtained prior to proceeding with grading operations.

Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, root of trees and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

Demolition should include removal of buildings, structures, foundations, reservoirs, utilities (including underground pipelines, septic tanks, leach fields, seepage pits, cisterns, mining shafts, tunnels, etc.) and other man-made surface and subsurface improvements from the areas to be graded. Demolition of utilities should include proper capping and/or rerouting pipelines at the project perimeter and cutoff and capping of wells in accordance with the requirements of the governing authorities and the recommendations of the geotechnical consultant at the time of demolition.

Trees, plants or man-made improvements not planned to be removed or demolished should be protected by the contractor from damage or injury.

Debris generated during clearing, grubbing and/or demolition operations should be wasted from areas to be graded and disposed off-site. Clearing, grubbing and demolition operations should be performed under the observation of the geotechnical consultant.

Section 5 - Site Protection

Protection of the site during the period of grading should be the responsibility of the contractor. Unless other provisions are made in writing and agreed upon among the concerned parties, completion of a portion of the project should not be considered to preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete as identified by the geotechnical consultant, the client and the regulating agencies.

Precautions should be taken during the performance of site clearing, excavations and grading to protect the work site from flooding, ponding or inundation by poor or improper surface drainage. Temporary provisions should be made during the rainy season to adequately direct surface drainage away from and off the work site. Where low areas cannot be avoided, pumps should be kept on hand to continually remove water during periods of rainfall.

Rain related damage should be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions as determined by the geotechnical consultant. Soil adversely affected should be classified as unsuitable materials and should be subject to overexcavation and replacement with compacted fill or other remedial grading as recommended by the geotechnical consultant.

The contractor should be responsible for the stability of all temporary excavations. Recommendations by the geotechnical consultant pertaining to temporary excavations (e.g., backcuts) are made in consideration of stability of the completed project and, therefore, should not be considered to preclude the responsibilities of the contractor. Recommendations by the geotechnical consultant should not be considered to preclude requirements that are more restrictive by the regulating agencies. The contractor should provide during periods of extensive rainfall plastic sheeting to prevent unprotected slopes from becoming saturated and unstable. When deemed appropriate by the geotechnical consultant or governing agencies the contractor shall install checkdams, desilting basins, sand bags or other drainage control measures.

In relatively level areas and/or slope areas, where saturated soil and/or erosion gullies exist to depths of greater than 1.0 foot; they should be overexcavated and replaced as compacted fill in accordance with the applicable specifications. Where affected materials exist to depths of 1.0 foot or less below proposed finished grade, remedial grading by moisture conditioning in-place, followed by thorough recompaction in accordance with the applicable grading guidelines herein may be attempted. If the desired results are not achieved, all affected materials should be overexcavated and replaced as compacted fill in accordance with the slope repair recommendations herein. If field conditions dictate, the geotechnical consultant may recommend other slope repair procedures.

Section 6 - Excavations

6.1 Unsuitable Materials

Materials that are unsuitable should be excavated under observation and recommendations of the geotechnical consultant. Unsuitable materials include, but may not be limited to, dry, loose, soft, wet, organic compressible natural soils and fractured, weathered, soft bedrock and nonengineered or otherwise deleterious fill materials.

Material identified by the geotechnical consultant as unsatisfactory due to its moisture conditions should be overexcavated; moisture conditioned as needed, to a uniform at or above optimum moisture condition before placement as compacted fill.

If during the course of grading adverse geotechnical conditions are exposed which were not anticipated in the preliminary soil report as determined by the geotechnical consultant additional exploration, analysis, and treatment of these problems may be recommended.

6.2 Cut Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent cut slopes should not be steeper than 2:1 (horizontal: vertical).

The geotechnical consultant should observe cut slope excavation and if these excavations expose loose cohesionless, significantly fractured or otherwise unsuitable material, the materials should be overexcavated and replaced with a compacted stabilization fill. If encountered specific cross section details should be obtained from the Geotechnical Consultant.

When extensive cut slopes are excavated or these cut slopes are made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top of the slope.

6.3 Pad Areas

All lot pad areas, including side yard terrace containing both cut and fill materials, transitions, located less than 3 feet deep should be overexcavated to a depth of 3 feet and replaced with a uniform compacted fill blanket of 3 feet. Actual depth of overexcavation may vary and should be delineated by the geotechnical consultant during grading, especially where deep or drastic transitions are present.

For pad areas created above cut or natural slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm drainage swale and/or an appropriate pad gradient. A gradient in soil areas away from the top-of-slopes of 2 percent or greater is recommended.

Section 7 - Compacted Fill

All fill materials should have fill quality, placement, conditioning and compaction as specified below or as approved by the geotechnical consultant.

7.1 Fill Material Quality

Excavated on-site or import materials which are acceptable to the geotechnical consultant may be utilized as compacted fill, provided trash, vegetation and other deleterious materials are removed prior to placement. All import materials anticipated for use on-site should be sampled tested and approved prior to and placement is in conformance with the requirements outlined.

Rocks 12 inches in maximum and smaller may be utilized within compacted fill provided sufficient fill material is placed and thoroughly compacted over and around all rock to effectively fill rock voids. The amount of rock should not exceed 40 percent by dry weight passing the 3/4-inch sieve. The geotechnical consultant may vary those requirements as field conditions dictate.

Where rocks greater than 12 inches but less than four feet of maximum dimension are generated during grading, or otherwise desired to be placed within an engineered fill, special handling in accordance with the recommendations below. Rocks greater than four feet should be broken down or disposed off-site.

7.2 Placement of Fill

Prior to placement of fill material, the geotechnical consultant should observe and approve the area to receive fill. After observation and approval, the exposed ground surface should be scarified to a depth of 6 to 8 inches. The scarified material should be conditioned (i.e. moisture added or air dried by continued discing) to achieve a moisture content at or slightly above optimum moisture conditions and compacted to a minimum of 90 percent of the maximum density or as otherwise recommended in the soils report or by appropriate government agencies.

Compacted fill should then be placed in thin horizontal lifts not exceeding eight inches in loose thickness prior to compaction. Each lift should be moisture conditioned as needed, thoroughly blended to achieve a consistent moisture content at or slightly above optimum and thoroughly compacted by mechanical methods to a minimum of 90 percent of laboratory maximum dry density. Each lift should be treated in a like manner until the desired finished grades are achieved.

The contractor should have suitable and sufficient mechanical compaction equipment and watering apparatus on the job site to handle the amount of fill being placed in consideration of moisture retention properties of the materials and weather conditions.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal: vertical), horizontal keys and vertical benches should be excavated into the adjacent slope area. Keying and benching should be sufficient to provide at least six-foot wide benches and a minimum of four feet of vertical bench height within the firm natural ground, firm bedrock or engineered compacted fill. No compacted fill should be placed in an area after keying and benching until the geotechnical consultant has reviewed the area. Material generated by the benching operation should be moved sufficiently away from the bench area to allow for the recommended review of the horizontal bench prior to placement of fill.

Within a single fill area where grading procedures dictate two or more separate fills, temporary slopes (false slopes) may be created. When placing fill adjacent to a false slope, benching should be conducted in the same manner as above described. At least a 3-foot vertical bench should be established within the firm core of adjacent approved compacted fill prior to placement of additional fill. Benching should proceed in at least 3-foot vertical increments until the desired finished grades are achieved.

Prior to placement of additional compacted fill following an overnight or other grading delay, the exposed surface or previously compacted fill should be processed by scarification, moisture conditioning as needed to at or slightly above optimum moisture content, thoroughly blended and recompacted to a minimum of 90 percent of laboratory maximum dry density. Where unsuitable materials exist to depths of greater than one foot, the unsuitable materials should be over-excavated.

Following a period of flooding, rainfall or overwatering by other means, no additional fill should be placed until damage assessments have been made and remedial grading performed as described herein.

Rocks 12 inch in maximum dimension and smaller may be utilized in the compacted fill provided the fill is placed and thoroughly compacted over and around all rock. No oversize material should be used within 3 feet of finished pad grade and within 1 foot of other compacted fill areas. Rocks 12 inches up to four feet maximum dimension should be placed below the upper 10 feet of any fill and should not be closer than 15 feet to any slope face. These recommendations could vary as locations of improvements dictate. Where practical, oversized material should not be placed below areas where structures or deep utilities are proposed. Oversized material should be placed in windrows on a clean, overexcavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (S.E. 30 or higher) should be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversized material should be staggered so those successive strata of oversized material are not in the same vertical plane.

It may be possible to dispose of individual larger rock as field conditions dictate and as recommended by the geotechnical consultant at the time of placement.

The contractor should assist the geotechnical consultant and/or his representative by digging test pits for removal determinations and/or for testing compacted fill. The contractor should provide this work at no additional cost to the owner or contractor's client.

Fill should be tested by the geotechnical consultant for compliance with the recommended relative compaction and moisture conditions. Field density testing should conform to ASTM Method of Test D 1556-00, D 2922-04. Tests should be conducted at a minimum of approximately two vertical feet or approximately 1,000 to 2,000 cubic yards of fill placed. Actual test intervals may vary as field conditions dictate. Fill found not to be in conformance with the grading recommendations should be removed or otherwise handled as recommended by the geotechnical consultant.

7.3 Fill Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent fill slopes should not be steeper than 2:1 (horizontal: vertical).

Except as specifically recommended in these grading guidelines compacted fill slopes should be over-built two to five feet and cut back to grade, exposing the firm, compacted fill inner core. The actual amount of overbuilding may vary as field conditions dictate. If the desired results are not achieved, the existing slopes should be overexcavated and reconstructed under the guidelines of the geotechnical consultant. The degree of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by the contractor to provide thorough mechanical compaction to the outer edge of the overbuilt slope surface.

At the discretion of the geotechnical consultant, slope face compaction may be attempted by conventional construction procedures including backrolling. The procedure must create a firmly compacted material throughout the entire depth of the slope face to the surface of the previously compacted firm fill intercore.

During grading operations, care should be taken to extend compactive effort to the outer edge of the slope. Each lift should extend horizontally to the desired finished slope surface or more as needed to ultimately established desired grades. Grade during construction should not be allowed to roll off at the edge of the slope. It may be helpful to elevate slightly the outer edge of the slope. Slough resulting from the placement of individual lifts should not be allowed to drift down over previous lifts. At intervals not exceeding four feet in vertical slope height or the capability of available equipment, whichever is less, fill slopes should be thoroughly dozer trackrolled.

For pad areas above fill slopes, positive drainage should be established away from the top-of-slope. This may be accomplished using a berm and pad gradient of at least two percent.

Section 8 - Trench Backfill

Utility and/or other excavation of trench backfill should, unless otherwise recommended, be compacted by mechanical means. Unless otherwise recommended, the degree of compaction should be a minimum of 90 percent of the laboratory maximum density.

Within slab areas, but outside the influence of foundations, trenches up to one foot wide and two feet deep may be backfilled with sand and consolidated by jetting, flooding or by mechanical means. If on-site materials are utilized, they should be wheel-rolled, tamped or otherwise compacted to a firm condition. For minor interior trenches, density testing may be deleted or spot testing may be elected if deemed necessary, based on review of backfill operations during construction.

If utility contractors indicate that it is undesirable to use compaction equipment in close proximity to a buried conduit, the contractor may elect the utilization of light weight mechanical compaction equipment and/or shading of the conduit with clean, granular material, which should be thoroughly jetted in-place above the conduit, prior to initiating mechanical compaction procedures. Other methods of utility trench compaction may also be appropriate, upon review of the geotechnical consultant at the time of construction.

In cases where clean granular materials are proposed for use in lieu of native materials or where flooding or jetting is proposed, the procedures should be considered subject to review by the geotechnical consultant. Clean granular backfill and/or bedding are not recommended in slope areas.

Section 9 - Drainage

Where deemed appropriate by the geotechnical consultant, canyon subdrain systems should be installed in accordance with CTE's recommendations during grading.

Typical subdrains for compacted fill buttresses, slope stabilization or sidehill masses, should be installed in accordance with the specifications.

Roof, pad and slope drainage should be directed away from slopes and areas of structures to suitable disposal areas via non-erodible devices (i.e., gutters, downspouts, and concrete swales).

For drainage in extensively landscaped areas near structures, (i.e., within four feet) a minimum of 5 percent gradient away from the structure should be maintained. Pad drainage of at least 2 percent should be maintained over the remainder of the site.

Drainage patterns established at the time of fine grading should be maintained throughout the life of the project. Property owners should be made aware that altering drainage patterns could be detrimental to slope stability and foundation performance.

Section 10 - Slope Maintenance

10.1 - Landscape Plants

To enhance surficial slope stability, slope planting should be accomplished at the completion of grading. Slope planting should consist of deep-rooting vegetation requiring little watering. Plants native to the southern California area and plants relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A Landscape Architect should be the best party to consult regarding actual types of plants and planting configuration.

10.2 - Irrigation

Irrigation pipes should be anchored to slope faces, not placed in trenches excavated into slope faces.

Slope irrigation should be minimized. If automatic timing devices are utilized on irrigation systems, provisions should be made for interrupting normal irrigation during periods of rainfall.

10.3 - Repair

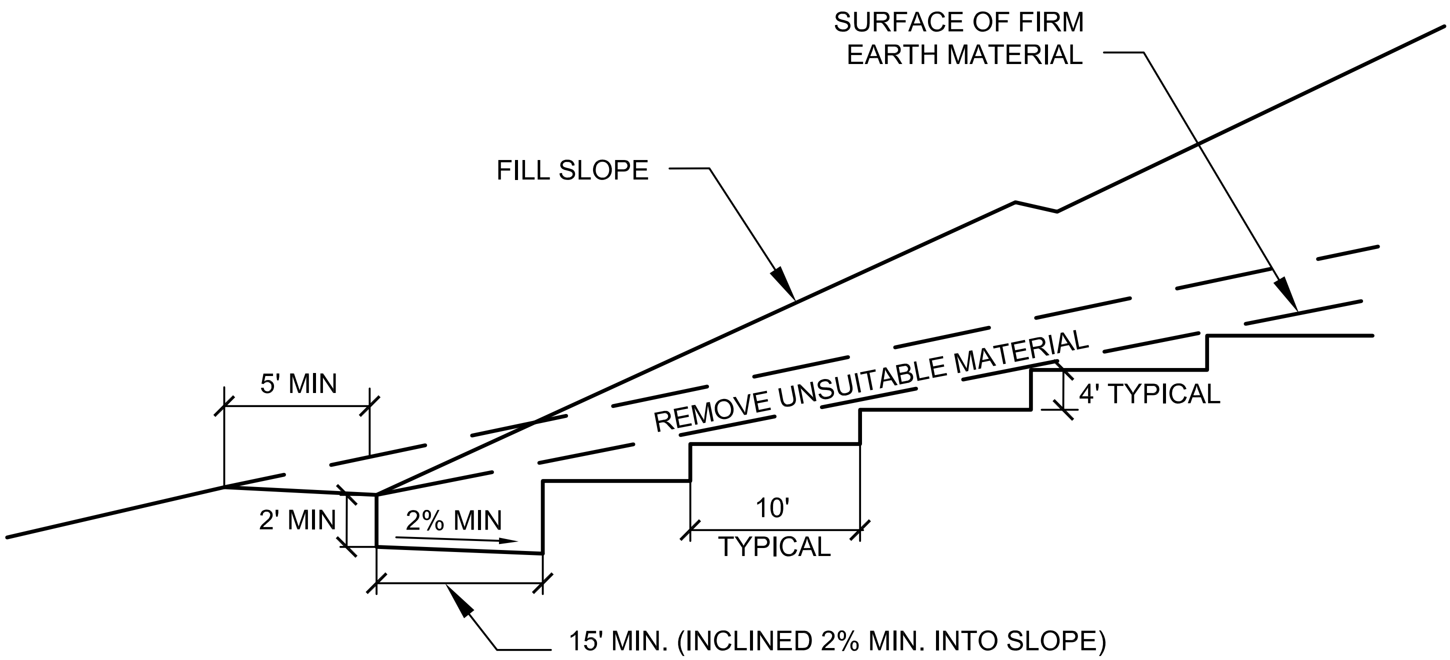
As a precautionary measure, plastic sheeting should be readily available, or kept on hand, to protect all slope areas from saturation by periods of heavy or prolonged rainfall. This measure is strongly recommended, beginning with the period prior to landscape planting.

If slope failures occur, the geotechnical consultant should be contacted for a field review of site conditions and development of recommendations for evaluation and repair.

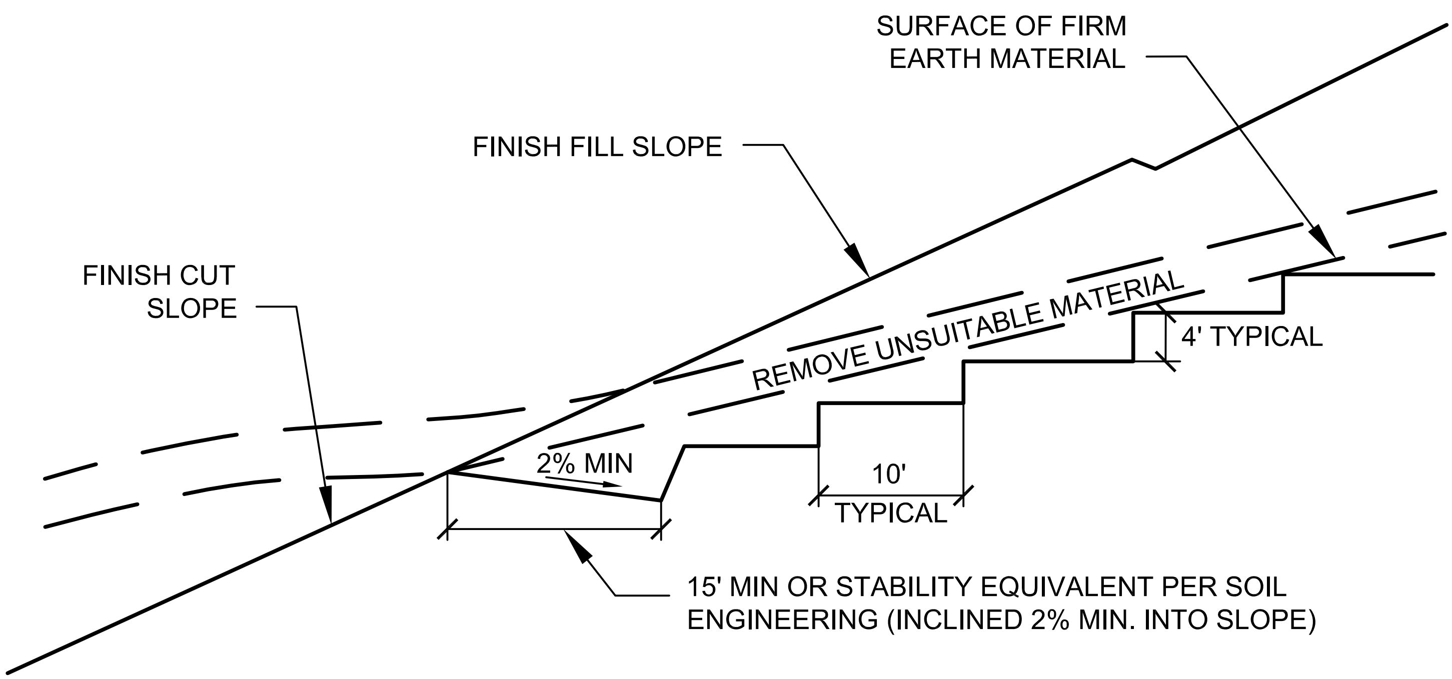
If slope failures occur as a result of exposure to period of heavy rainfall, the failure areas and currently unaffected areas should be covered with plastic sheeting to protect against additional saturation.

In the accompanying Standard Details, appropriate repair procedures are illustrated for superficial slope failures (i.e., occurring typically within the outer one foot to three feet of a slope face).

BENCHING FILL OVER NATURAL

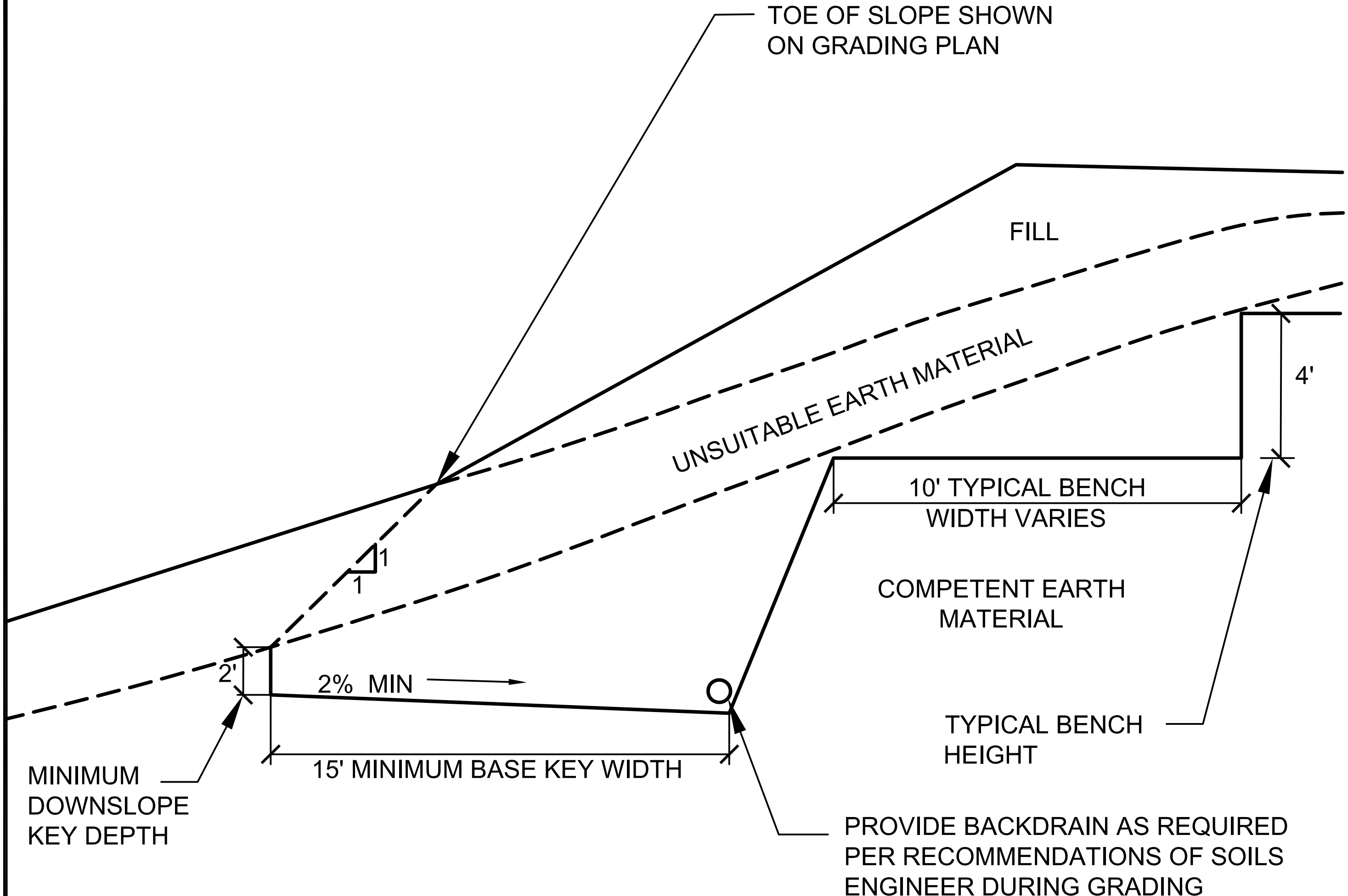


BENCHING FILL OVER CUT



NOT TO SCALE

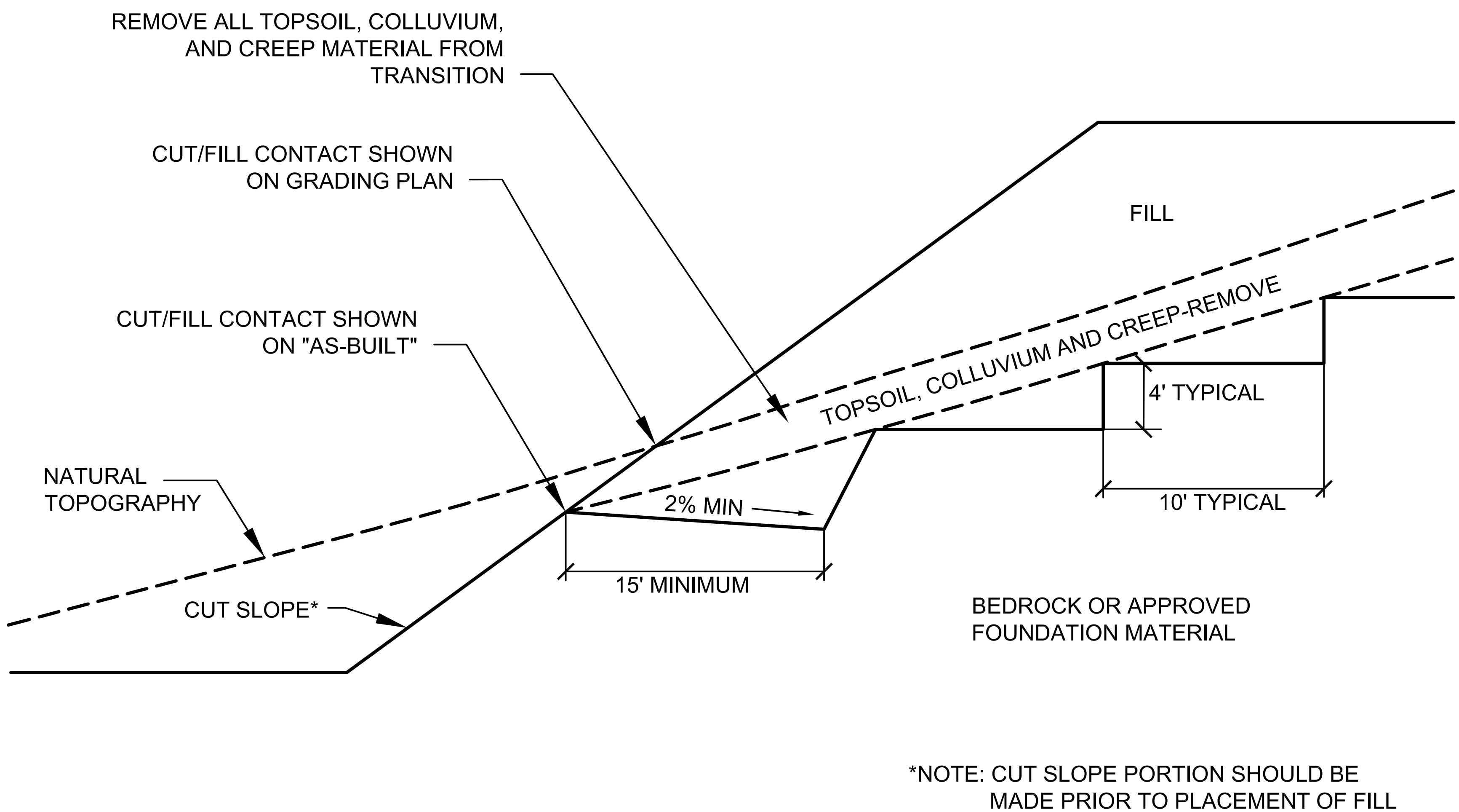
BENCHING FOR COMPACTED FILL DETAIL



WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, BENCHING IS NOT NECESSARY. FILL IS NOT TO BE PLACED ON COMPRESSIBLE OR UNSUITABLE MATERIAL.

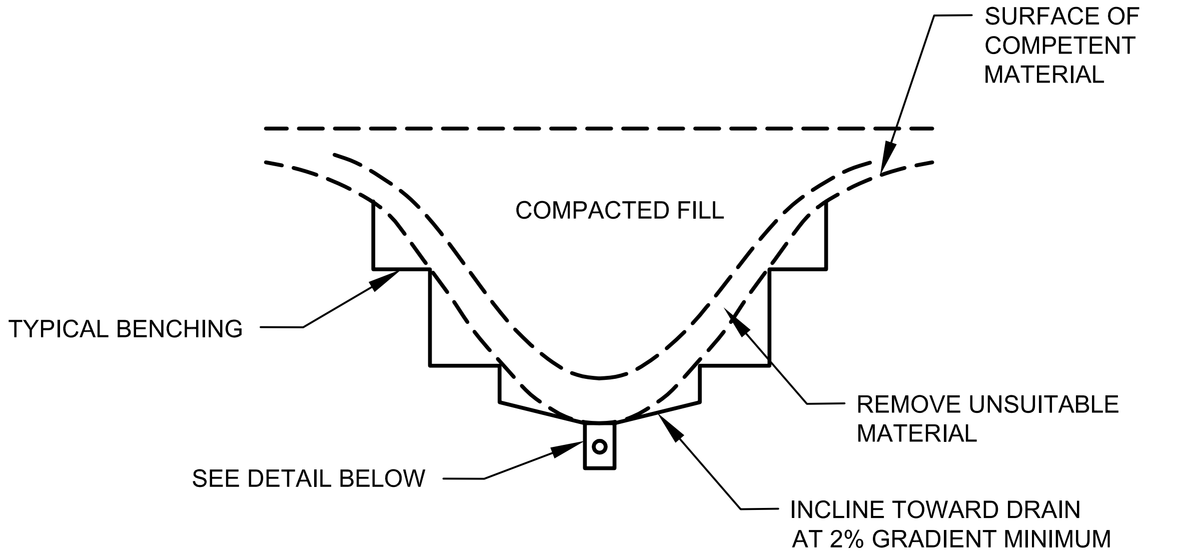
NOT TO SCALE

FILL SLOPE ABOVE NATURAL GROUND DETAIL

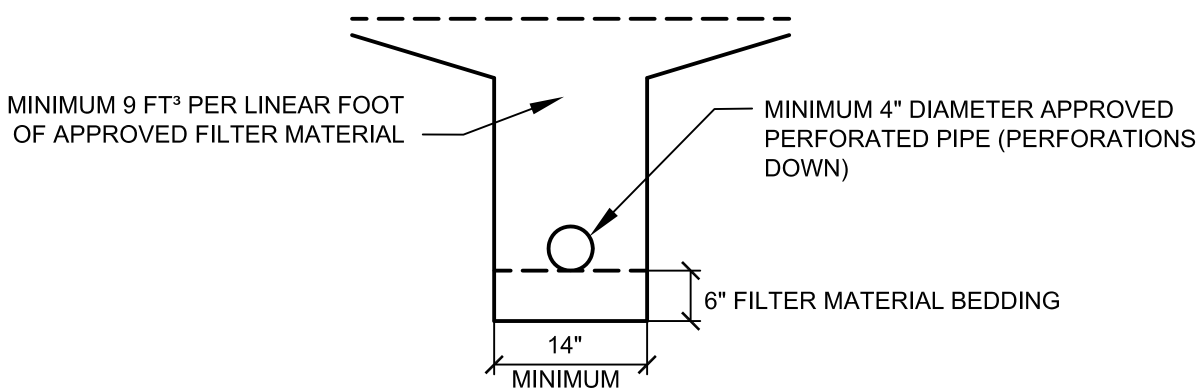


NOT TO SCALE

FILL SLOPE ABOVE CUT SLOPE DETAIL



DETAIL



CALTRANS CLASS 2 PERMEABLE MATERIAL FILTER MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYL-CHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 psi

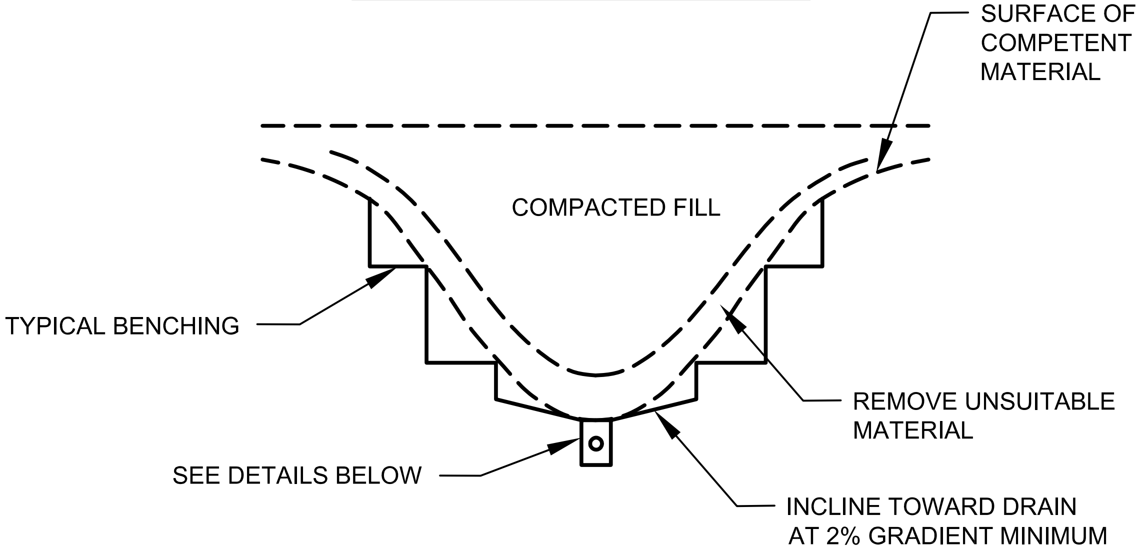
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

NOT TO SCALE

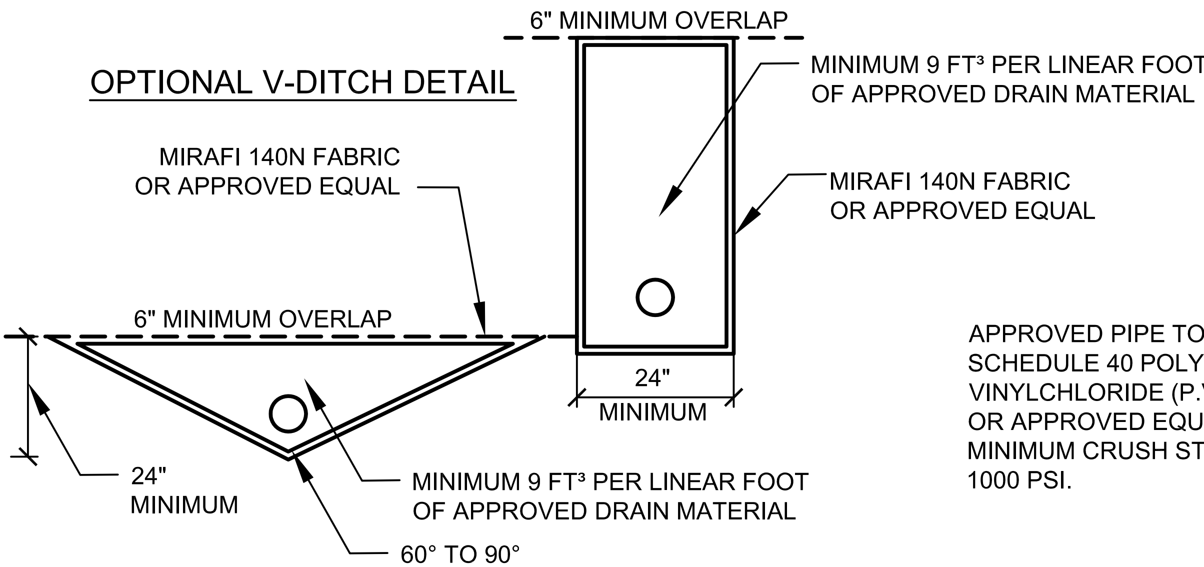
TYPICAL CANYON SUBDRAIN DETAIL

CANYON SUBDRAIN DETAILS



TRENCH DETAILS

OPTIONAL V-DITCH DETAIL



APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYLCHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 PSI.

DRAIN MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1 ½"	88-100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

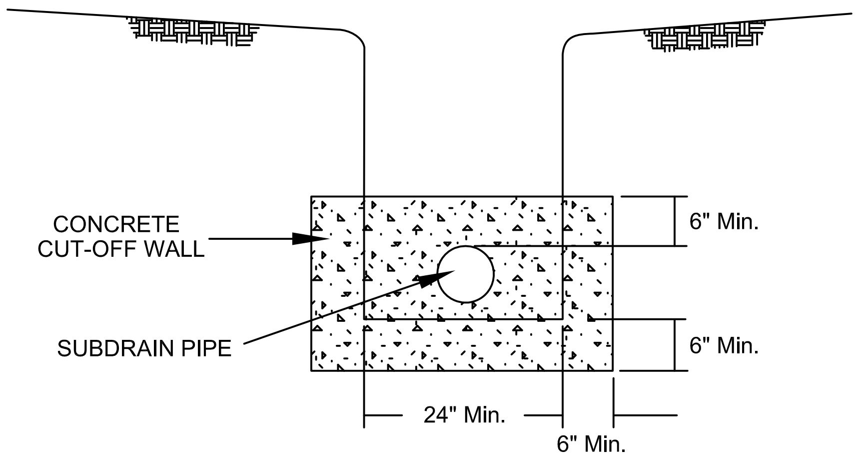
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

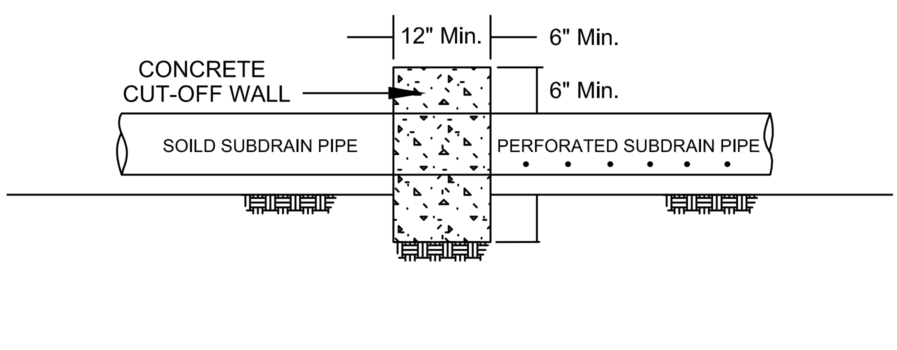
NOT TO SCALE

GEOFABRIC SUBDRAIN

FRONT VIEW



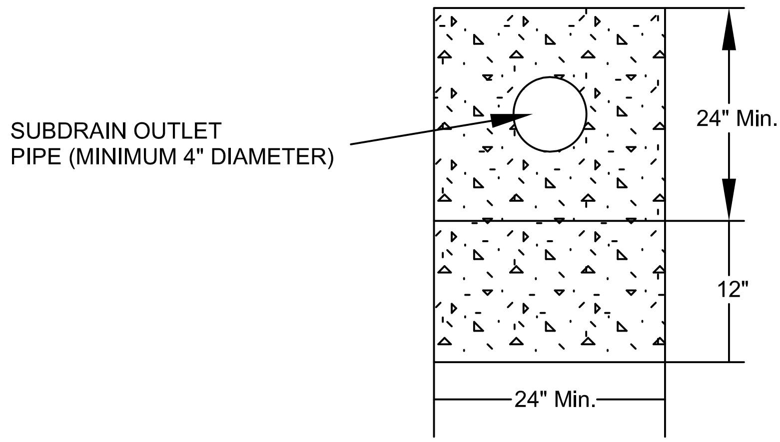
SIDE VIEW



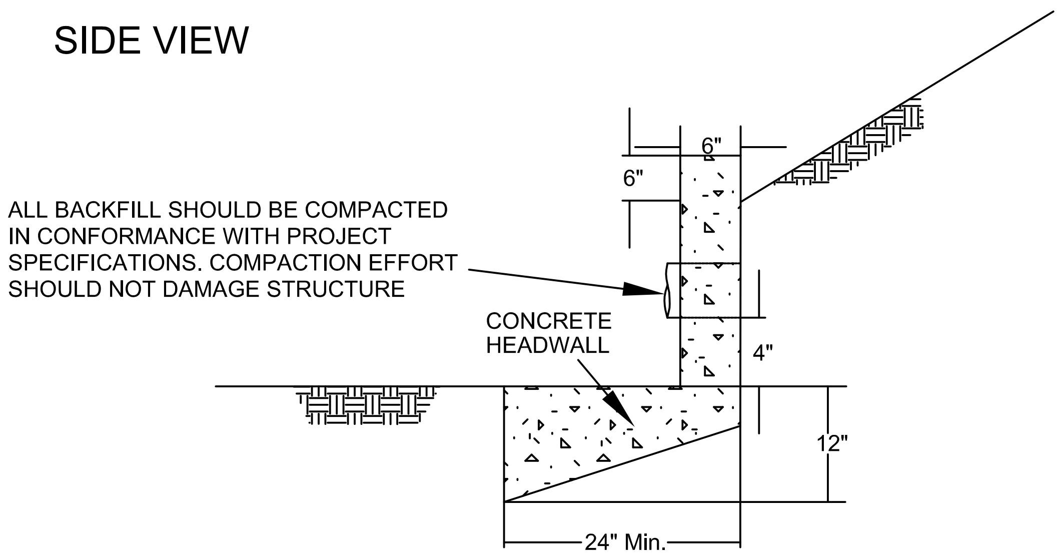
NOT TO SCALE

RECOMMENDED SUBDRAIN CUT-OFF WALL

FRONT VIEW



SIDE VIEW



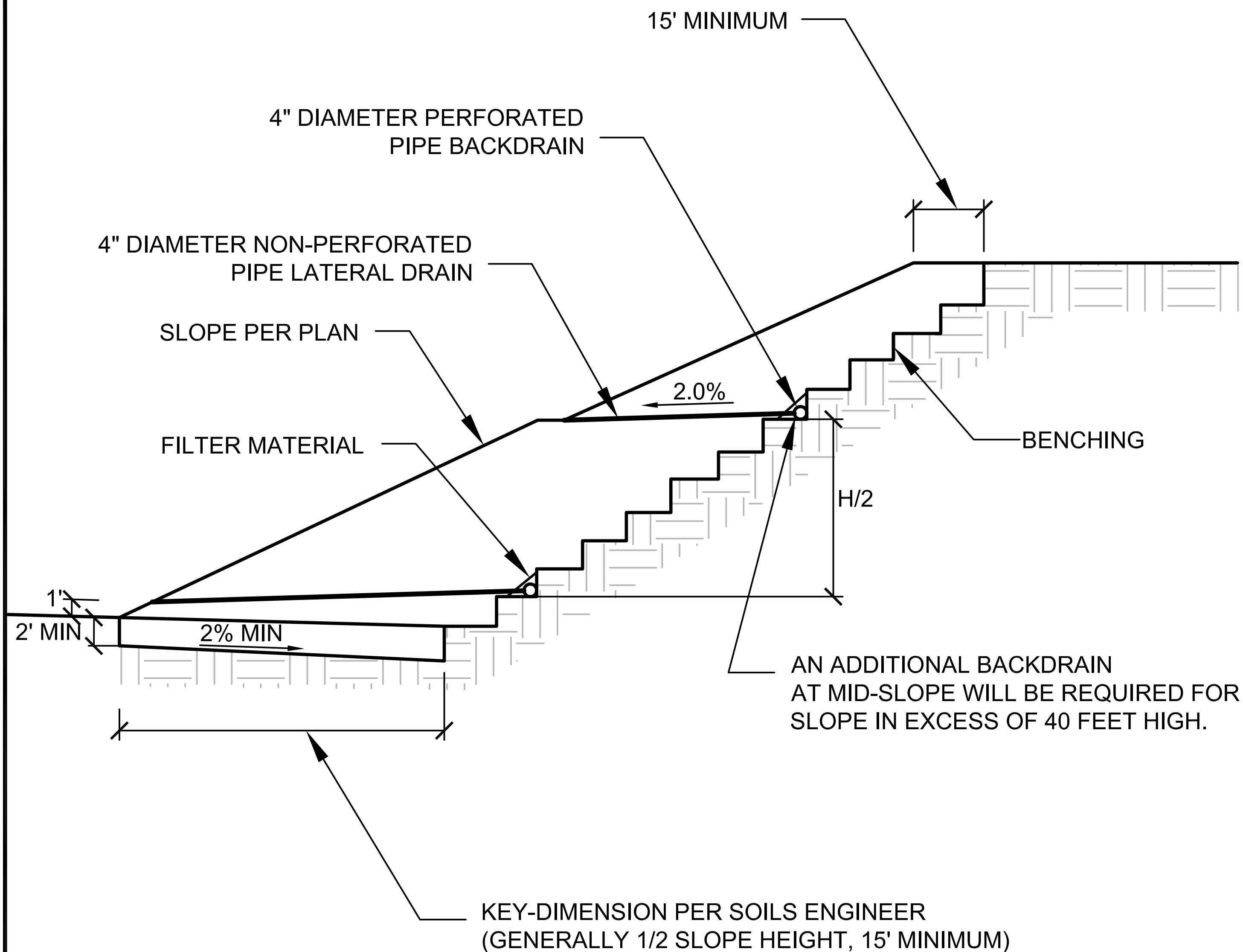
NOTE: HEADWALL SHOULD OUTLET AT TOE OF SLOPE OR INTO CONTROLLED SURFACE DRAINAGE DEVICE

ALL DISCHARGE SHOULD BE CONTROLLED

THIS DETAIL IS A MINIMUM DESIGN AND MAY BE MODIFIED DEPENDING UPON ENCOUNTERED CONDITIONS AND LOCAL REQUIREMENTS

NOT TO SCALE

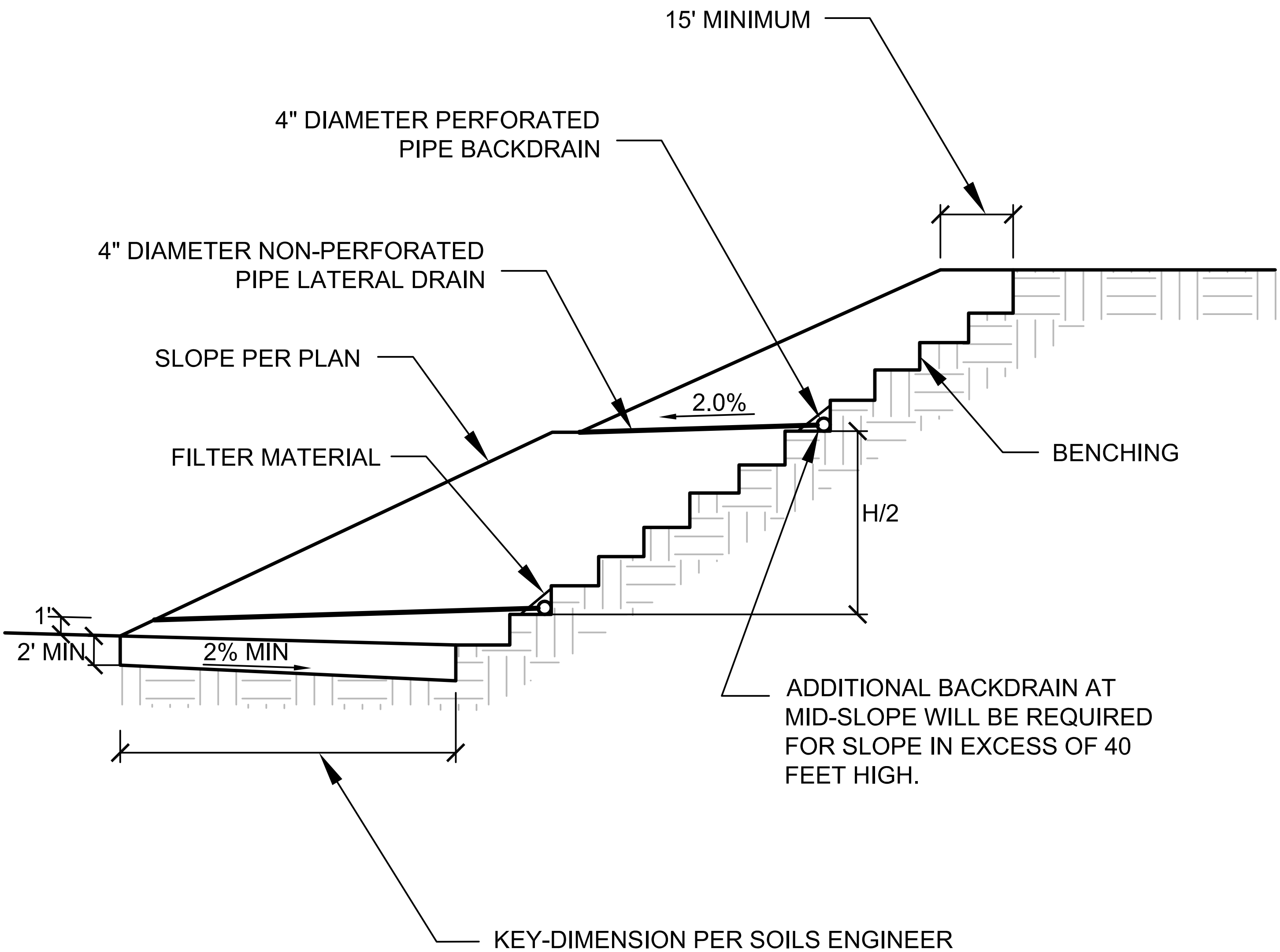
TYPICAL SUBDRAIN OUTLET HEADWALL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

NOT TO SCALE

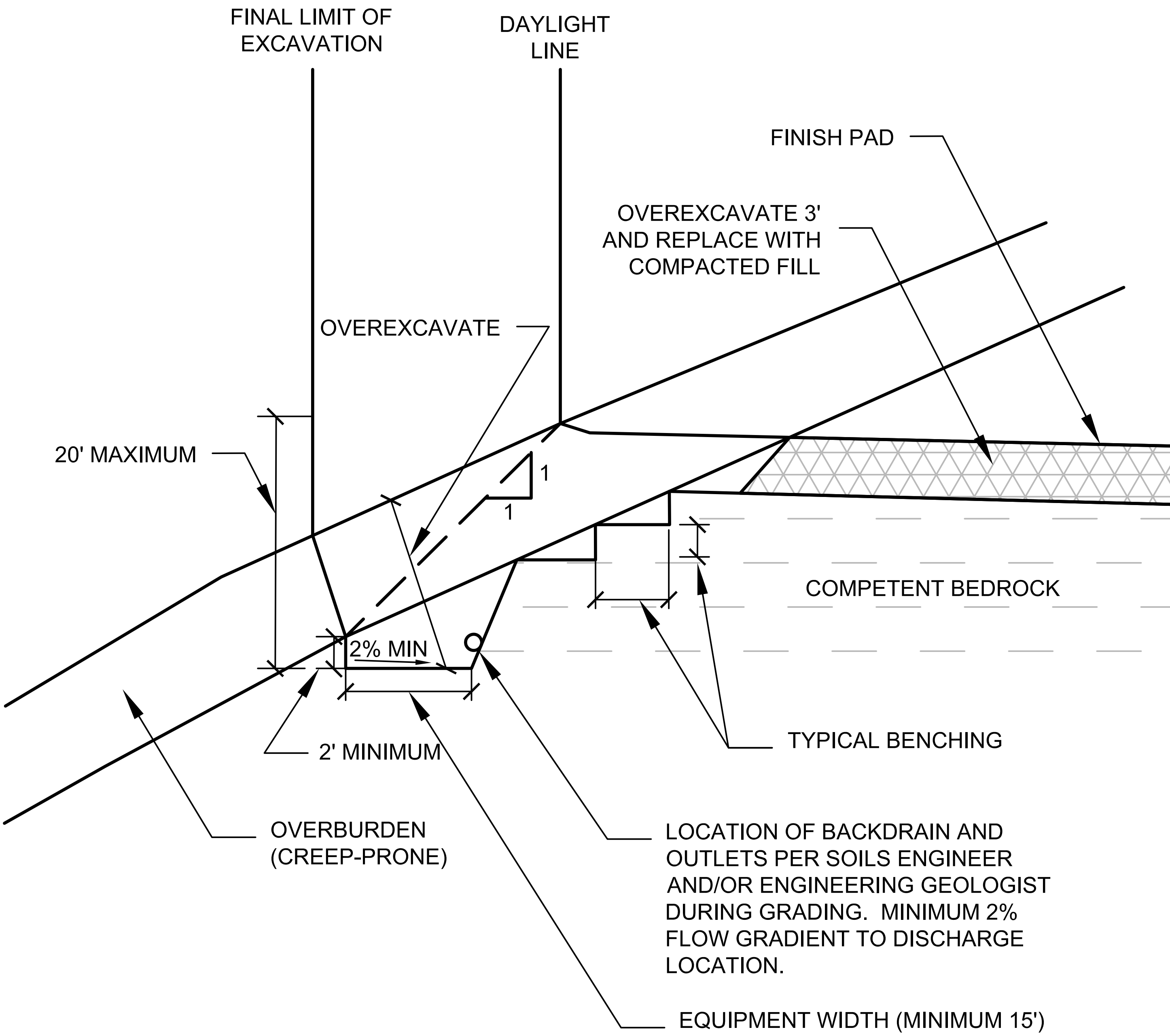
TYPICAL SLOPE STABILIZATION FILL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

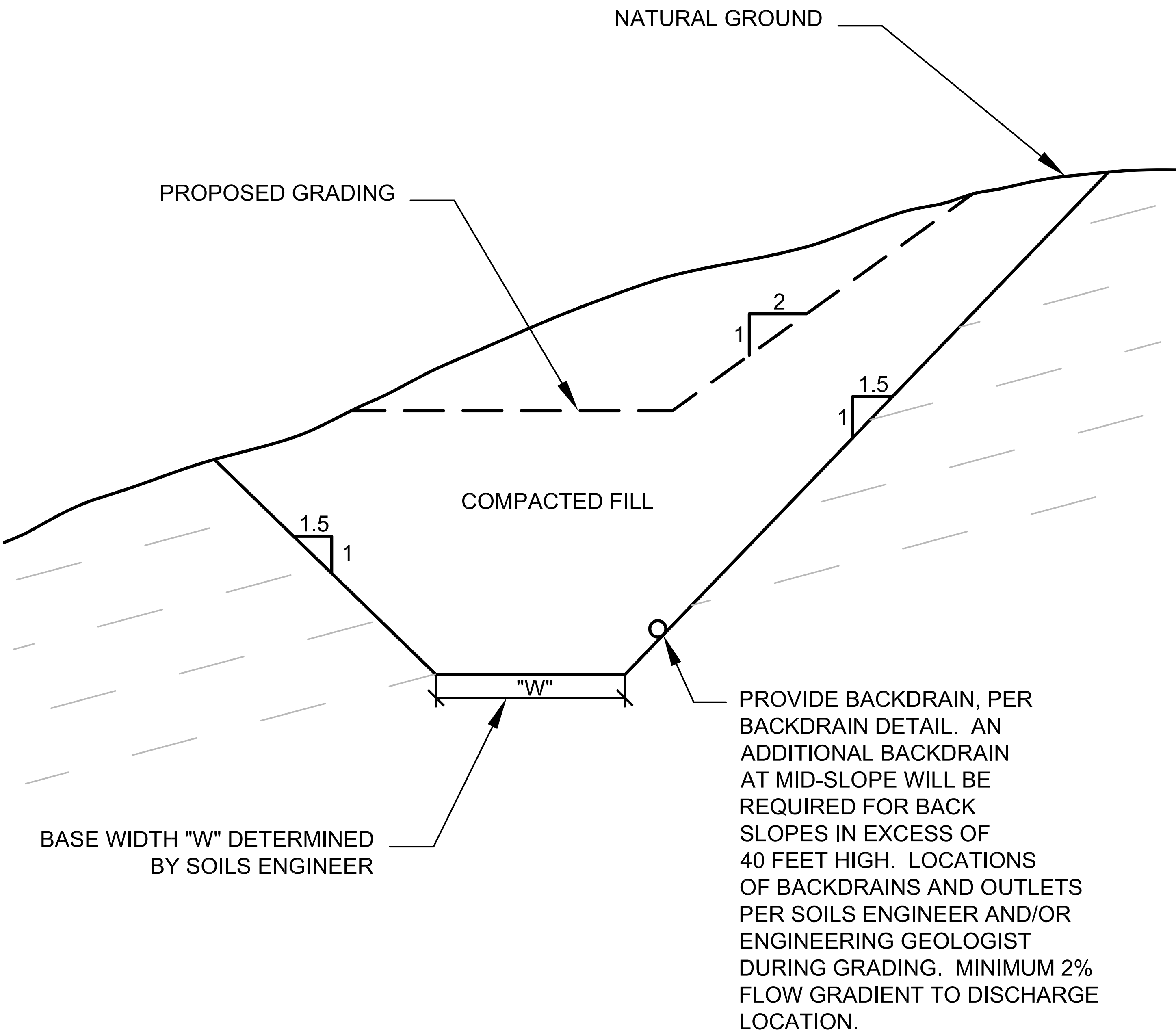
NOT TO SCALE

TYPICAL BUTTRESS FILL DETAIL



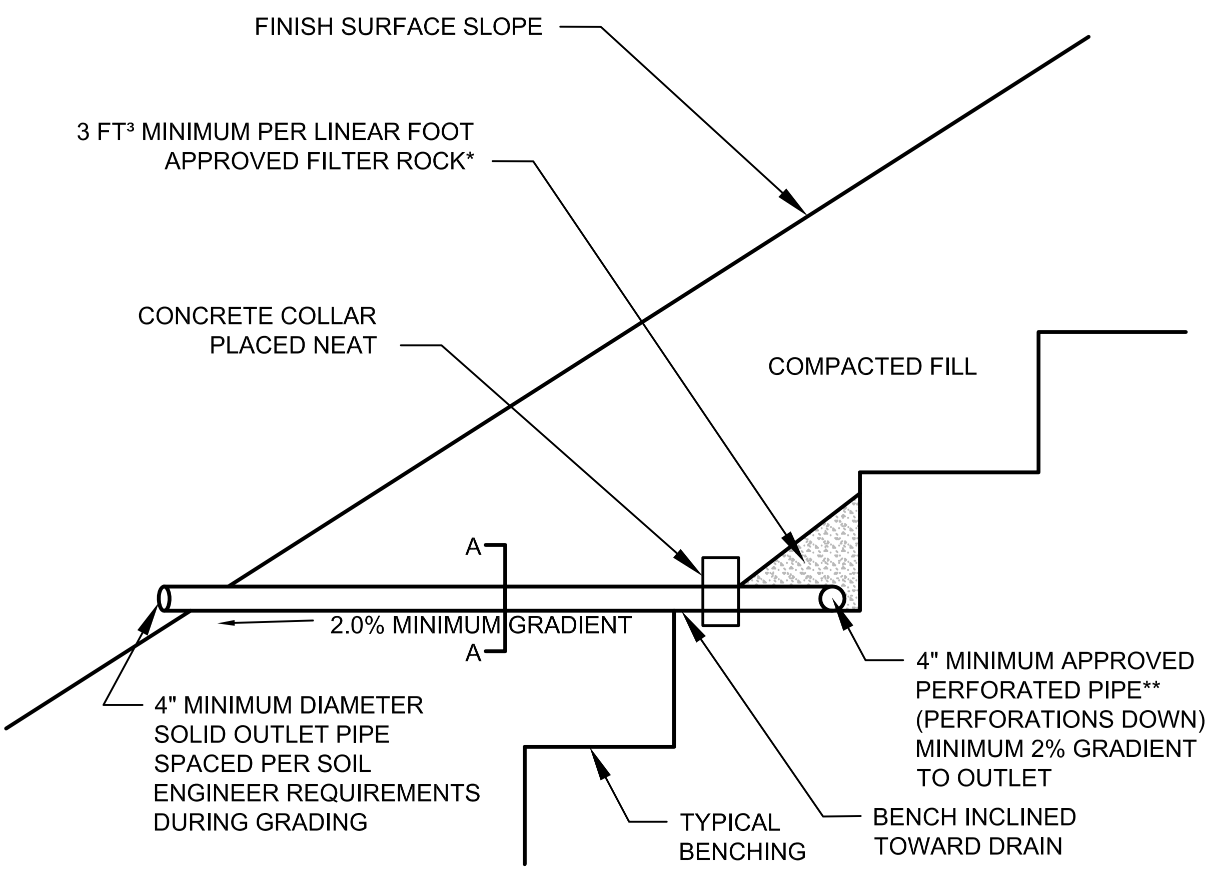
NOT TO SCALE

DAYLIGHT SHEAR KEY DETAIL

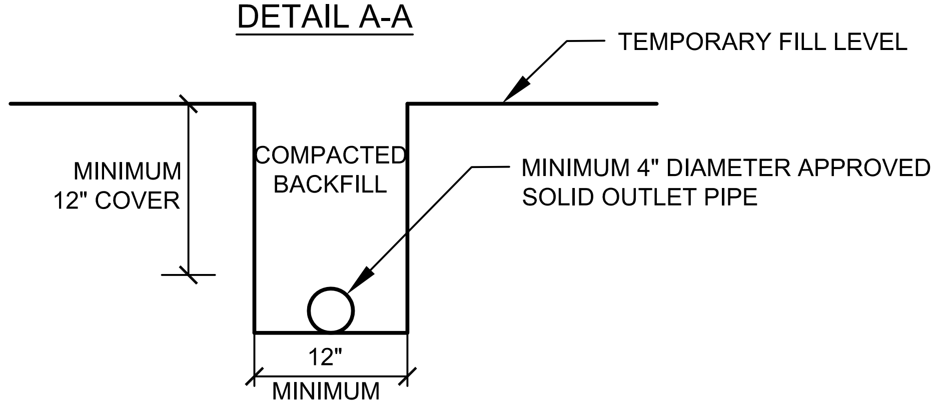


NOT TO SCALE

TYPICAL SHEAR KEY DETAIL



DETAIL A-A



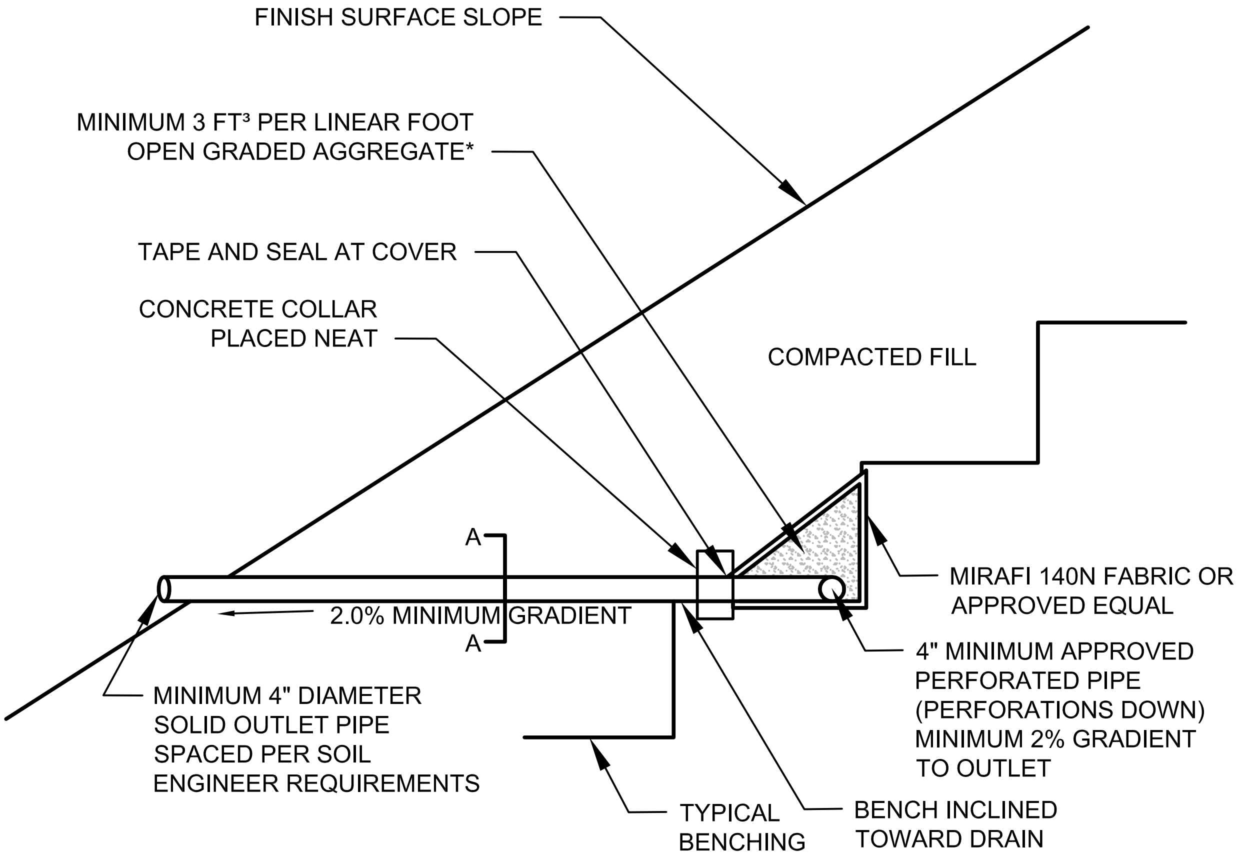
**APPROVED PIPE TYPE:
SCHEDULE 40 POLYVINYL CHLORIDE
(P.V.C.) OR APPROVED EQUAL.
MINIMUM CRUSH STRENGTH 1000 PSI

*FILTER ROCK TO MEET FOLLOWING SPECIFICATIONS OR APPROVED EQUAL:

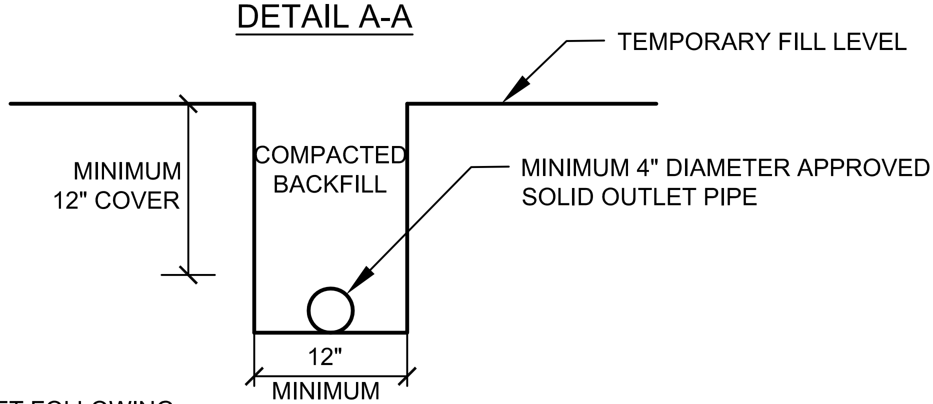
SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

NOT TO SCALE

TYPICAL BACKDRAIN DETAIL



DETAIL A-A

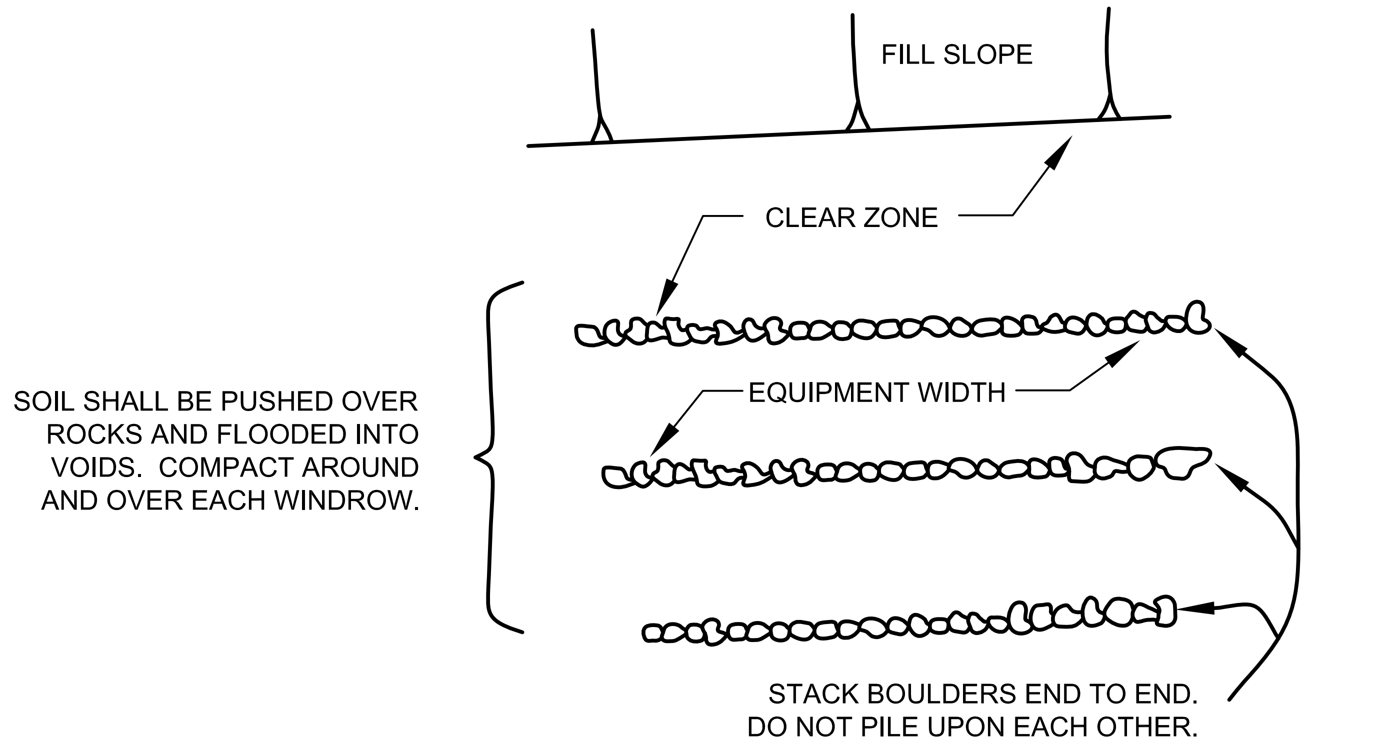


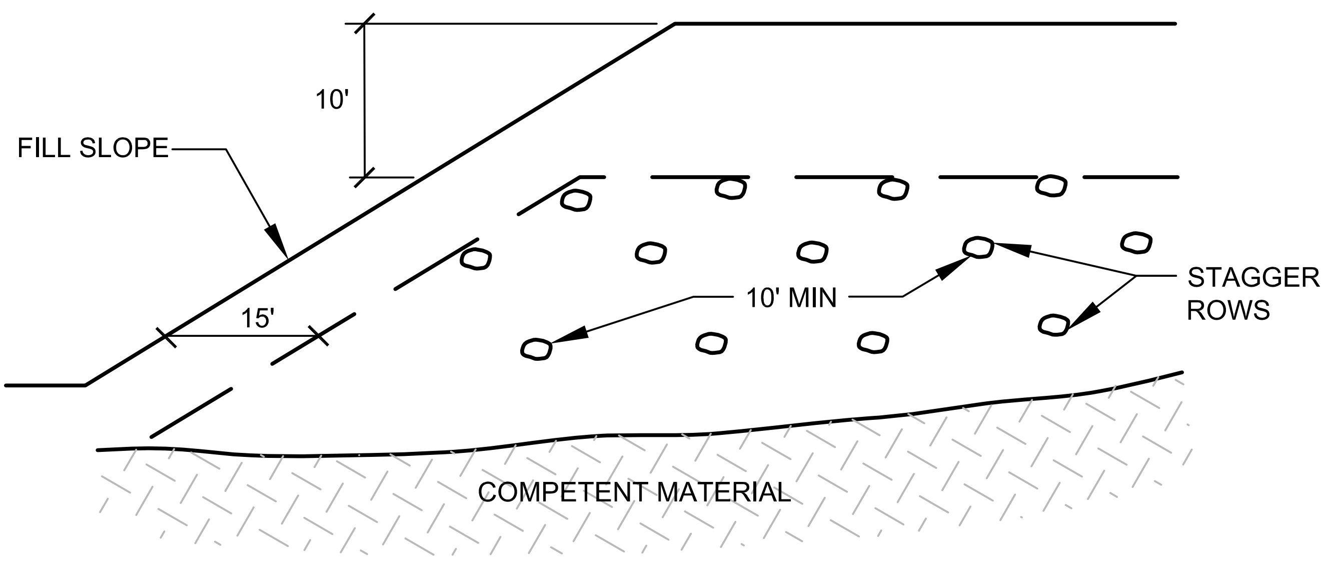
*NOTE: AGGREGATE TO MEET FOLLOWING
SPECIFICATIONS OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1 ½"	100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

NOT TO SCALE

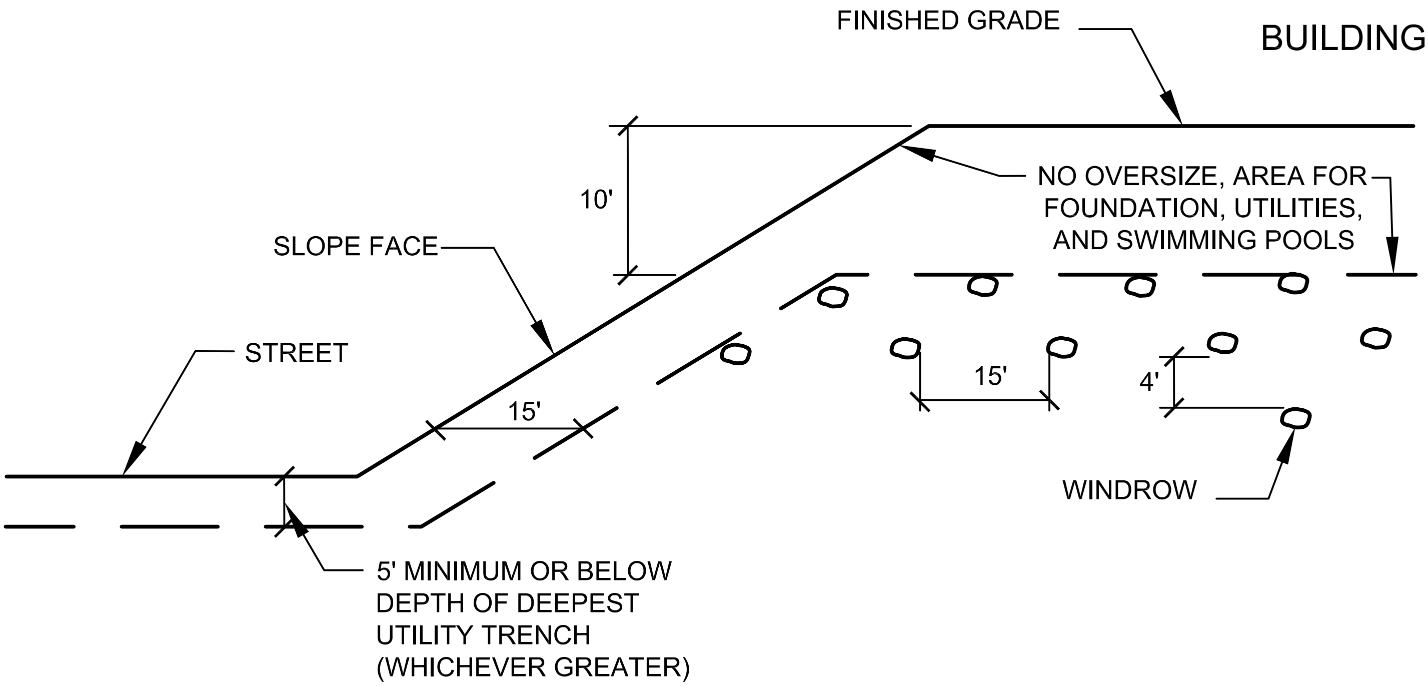
BACKDRAIN DETAIL (GEOFRABIC)



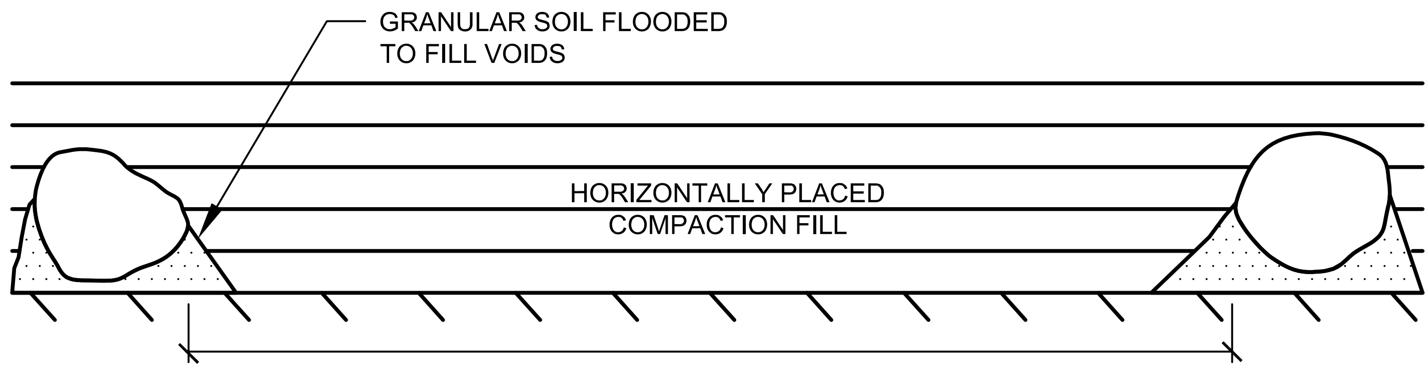


NOT TO SCALE

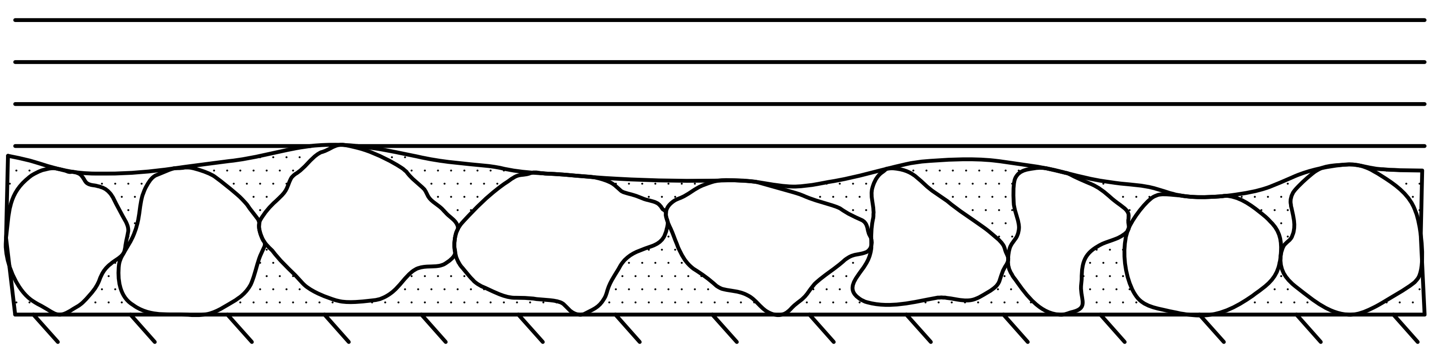
ROCK DISPOSAL DETAIL



TYPICAL WINDROW DETAIL (EDGE VIEW)



PROFILE VIEW

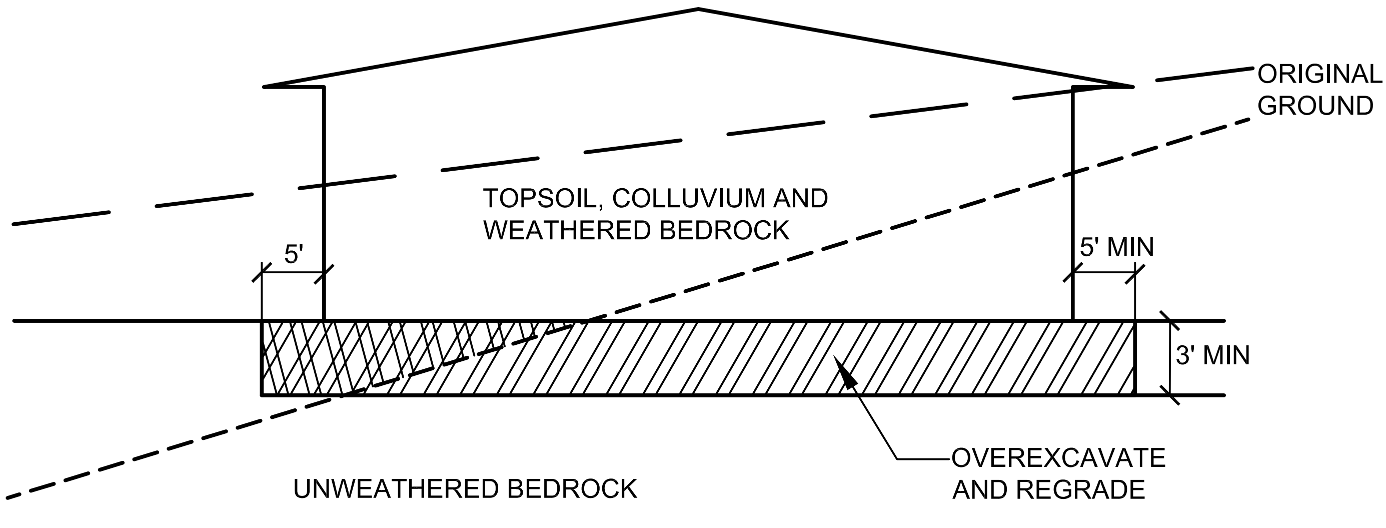


NOT TO SCALE

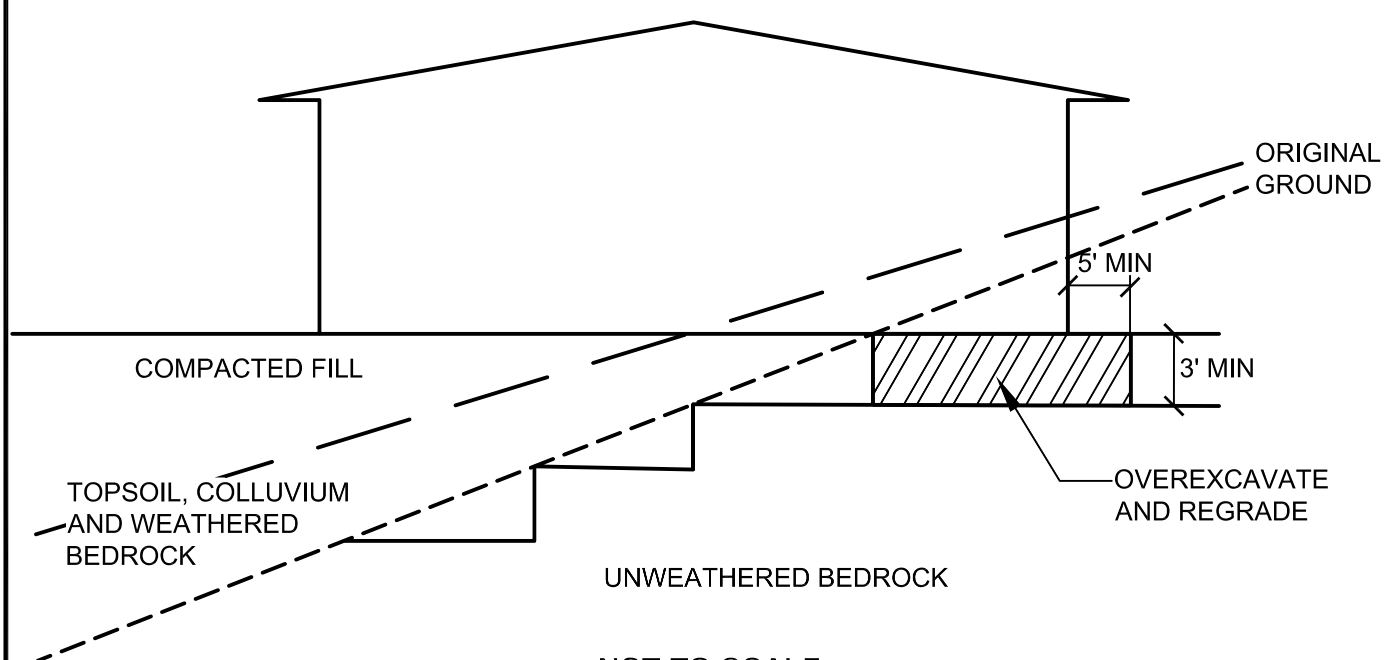
ROCK DISPOSAL DETAIL

GENERAL GRADING RECOMMENDATIONS

CUT LOT



CUT/FILL LOT (TRANSITION)



NOT TO SCALE

TRANSITION LOT DETAIL

ATTACHMENT B

Geotechnical Investigation, Dated January 13, 2021

PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED JEFFERSON MIDDLE SCHOOL MODERNIZATION
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

Prepared for:

OCEANSIDE UNIFIED SCHOOL DISTRICT
ATTENTION: MS. PENNY MCGREW
2111 MISSION AVENUE
SOLANA BEACH, CALIFORNIA 92075

Prepared by:

CONSTRUCTION TESTING & ENGINEERING, INC.
1441 MONTIEL ROAD, SUITE 115
ESCONDIDO, CALIFORNIA 92026

CTE JOB NO.: 10-15771G JANUARY 13, 2021

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION AND SCOPE OF SERVICES

1.1 Introduction

This report presents the results of the geotechnical investigation, performed by Construction Testing and Engineering, Inc. (CTE), and provides preliminary conclusions and geotechnical recommendations for the proposed modernization at the existing Jefferson Middle School campus in Oceanside, California. This geotechnical investigation was performed in general accordance with the terms of CTE proposal E20266, dated September 11, 2020. Preliminary geotechnical recommendations for excavations, fill placement, and foundation design for the proposed improvements are presented herein.

1.2 Scope of Services

The scope of services provided included:

- Review of readily available geologic and soils reports.
- Coordination of utility mark-out and location through USA DigAlert services and an independent utility locater.
- Obtaining appropriate San Diego County Department of Environmental Health (DEH) Boring Permits.
- Excavation of exploratory borings and soil sampling utilizing a truck-mounted drill rig and limited-access manual excavation equipment.
- Laboratory testing of selected soil samples.
- Description of the site geology and evaluation of potential geologic hazards.
- Engineering and geologic analysis.
- Preparation of this preliminary geotechnical report.

2.0 SITE DESCRIPTION

The subject site is located at 823 Acacia Avenue on the campus of Jefferson Middle School in Oceanside, California (Figure 1). The site is bounded by Acacia Avenue and North Carey Road to the east, Poplar Road to the north, Mission Elementary School to the south and descending slopes to the west. The current site area is illustrated on Figure 1. The subject site is currently developed with a middle school campus consisting of multiple structures, pavement and flatwork areas, an athletic field, landscaping, utilities and other associated improvements.

Based on reconnaissance and review of general site topography, the site area generally consists of a terrace that gently descends to the southwest. Adjacent slopes descend from the campus to the west and drainages generally trend in an east-west direction. Campus elevations range from approximately 195 feet above mean sea level (msl) in the northeast to 160 feet msl in the southwest. Descending slopes exist along the western boundary of the campus that range in height from approximately 80 to 100 feet with slope ratios of approximately 1:1 to 2:1 (horizontal: vertical).

At the date of this report, a proposed improvement plan has not been provided for this site. However, we anticipated modernization will consist of several new buildings and associated improvements across the campus area.

3.0 FIELD INVESTIGATION AND LABORATORY TESTING

3.1 Field Investigation

CTE performed the subsurface investigation on December 9 & 10, 2020 to evaluate underlying soil conditions. This fieldwork consisted of site reconnaissance and the excavation of 12 exploratory soil borings and eight percolation test holes. The borings were advanced to a maximum explored depth of approximately 30.4 feet below existing ground surface (bgs) and multiple borings encountered practical refusal in very dense underlying breccia. Borings B-1 to B-9 and B-12 were excavated by a CME-95 truck-mounted drill rig equipped with eight-inch-diameter, hollow-stem augers. Borings B-11 and B-12 were excavated with a manually advanced auger due to limited access. Bulk samples were collected from the cuttings, and relatively undisturbed samples were collected by driving Standard Penetration Test (SPT) and Modified California (CAL) samplers. Approximate locations of the exploratory soil borings and test holes are shown on the attached Figure 2.

Percolation test holes P-1 through P-4 as well as P-7 and P-8 were excavated with the truck-mounted drill rig with eight inch diameter augers. Due to limited access, percolation test holes P-5 and P-6 were excavated with a six inch diameter manually operated auger. The percolation test hole depths ranged from approximately 2.3 to 5.3 feet below ground surface (bgs).

Soils were logged in the field by a CTE Engineering Geologist, and were visually classified in general accordance with the Unified Soil Classification System (USCS). The field descriptions have been modified, where appropriate, to reflect laboratory test results. Boring logs, including descriptions of the soils encountered, are included in Appendix B.

3.2 Laboratory Testing

Laboratory tests were conducted on selected soil samples for classification purposes, and to evaluate physical properties and engineering characteristics. Laboratory tests included: In-place Moisture and Density, Expansion Index, Resistance "R-value", Grain Size Analysis, Atterberg Limits, Direct Shear, Consolidation, and Chemical Characteristics. Test descriptions and laboratory test results are included in Appendix C.

4.0 PERCOLATION TESTING

The percolation test holes were located based on potential stormwater BMP areas designated by the project civil engineer. Eight percolation tests were performed to depths ranging from approximately 2.3 to 5.3 feet below the ground surface (bgs). The attached Figure 2 shows the approximate percolation test locations. The evaluation was performed in accordance with Appendix C of the Model BMP Design Manual for the San Diego Region "Geotechnical and Groundwater Investigation Requirements", dated January 2018.

4.1 Percolation Test Methods

The percolation tests were performed in general accordance with methods approved by the San Diego Region BMP Design Manual with a presoak period of approximately 18 to 19 hours. Percolation test results and calculated infiltration rates are presented below in Table 4.2. Field Data and percolation to infiltration calculations are included in Appendix E.

4.2 Calculated Infiltrated Rate

As per the San Diego Region BMP design documents (2018) infiltration rates are to be evaluated using the Porchet Method. San Diego BMP design documents utilized the Porchet Method through guidance of the County of Riverside (2011). The intent of calculating the infiltration rate is to take into account bias inherent in percolation test borehole sidewall infiltration that would not occur at a basin bottom where such sidewalls are not present.

The infiltration rate (I_t) is derived by the equation:

$$I_t = \frac{\Delta H \, \pi r2 \, 60}{\Delta t(\pi r2 + 2\pi r H_{avg})} = \frac{\Delta H \, 60 \, r}{\Delta t(r + 2H_{avg})}$$

Where:

I_t = tested infiltration rate, inches/hour
ΔH = change in head over the time interval, inches
Δt = time interval, minutes
* r = effective radius of test hole
H_{avg} = average head over the time interval, inches

Given the measured percolation rates, the calculated infiltration rates are presented with and without a Factor of Safety applied in Table 4.2 below. The civil engineer of record should determine an appropriate factor of safety to be applied via completion of Worksheet D.5-1 of Appendix County of San Diego "Best Management Practice Design Manual", Appendix D or other approved methods. CTE does not recommend using a factor of safety of less than 2.0. An I-8 Worksheet is included in Appendix F.

TABLE 4.2

RESULTS OF PERCOLATION TESTING WITH FACTOR OF SAFETY APPLIED

Test Location	Test Depth (inches)	Case	Geologic Unit	Percolation Rate (inches per hour)	Infiltration Rate (inches per hour)	Infiltration Rate with FOS of 2 Applied (inches per hour)
P-1	85	III	Tso	0.500	0.078	0.039
P-2	84	III	Qppf	0.250	0.038	0.019
P-3	72	III	Qppf	1.500	0.273	0.136
P-4	85	I	Tso	0.000	0.000	0.000
P-5	84	III	Tso	0.250	0.044	0.022
P-6	72	III	Tso	0.750	0.137	0.069
P-7	84	III	Tso	0.125	0.020	0.010
P-8	72	III	Tso	0.250	0.041	0.021

NOTES

Water level was measured from a fixed point at the top of the hole.
Weather was sunny during percolation testing.
Qppf = Quaternary Previously Placed Fill
Tso = Tertiary San Onofre Breccia
Test holes were P-1 to P-4 as well as P-7 and P-8 were eight inches in diameter.
Test holes P-5 and P-6 were six inches in diameter.

5.0 GEOLOGY

5.1 General Setting

Oceanside is located with the Peninsular Ranges physiographic province that is characterized by northwest-trending mountain ranges, intervening valleys, and predominantly northwest trending active regional faults. The San Diego Region can be further subdivided into the coastal plain area, a central mountain–valley area, and the eastern mountain valley area. The project site is located within the coastal plain area. The coastal plain sub-province ranges in elevation from approximately sea level to 1200 feet above mean sea level (msl). It is characterized by Cretaceous and Tertiary sedimentary deposits that onlap an eroded basement surface consisting of Jurassic and Cretaceous crystalline rocks that have been repeatedly eroded and infilled and by alluvial processes throughout the Quaternary Period in response to regional uplift. This has resulted in a geomorphic landscape of uplifted alluvial and marine terraces that are dissected by current active alluvial drainages.

5.2 Geologic Conditions

Based on the regional geologic map prepared by Kennedy and Tan (2007), Quaternary Old Paralic Deposits and Tertiary San Onofre Formation are the near surface geologic units that underlie the site (Figure 3). Based on recent explorations, Quaternary Previously Placed Fill was observed over the Old Paralic Deposits with Tertiary San Onofre Breccia at depth. Descriptions of the geologic units encountered during the investigation are presented below. Surficial geologic materials are depicted on Figure 2 and generalized geologic cross-sections are presented on Figures 2A, 2B, 2C, 2D, and 2E.

5.2.1 Quaternary Previously Placed Fill (Landfill Waste)

Where observed, the Previously Placed Fill generally consists of loose to medium, brown to grayish brown, silty to clayey fine to medium grained sand. Exploratory excavations encountered Previously Placed Fill to a maximum depth of approximately 21.0 feet bgs in the area of boring B-9. Landfill waste was observed in infilled drainages in and adjacent to the southern portion of the campus. Landfill waste consisted entirely of unsuitable and detrimental materials and these areas are anticipated to be completely avoided as potential improvement areas. Localized areas with deeper fill may be encountered during site grading.

5.2.2 Quaternary Old Paralic Deposits

Old Paralic Deposits were observed in borings B-8, B-10, B-11 and B-12. Where observed, these materials generally consist of very dense, reddish brown, silty to clayey fine to medium grained sand. This geologic unit was observed to be relatively thin in the northern higher elevations of the site and increased in thickness to the south.

5.2.3 Tertiary San Onofre Breccia

San Onofre Breccia was observed at depth in all the borings. Where observed, this unit generally consisted of very dense, olive brown to gray brown breccia that excavates to silty fine grained sand with angular gravel and cobble. This underlying geologic unit is anticipated at depth throughout the site.

5.3 Groundwater Conditions

Groundwater was not encountered in the recent borings that were advanced to a maximum explored depth of approximately 30.4 feet bgs. While groundwater conditions may vary, especially following periods of sustained precipitation or irrigation, it is generally not anticipated to adversely affect shallow construction activities or the completed improvements, if irrigation is limited and proper site drainage is designed, installed, and maintained per the recommendations of the project civil engineer. However, groundwater could have the potential to perch on the underlying breccia, especially during or following the rainy season, which could impact grading or construction excavations.

5.4 Geologic Hazards

Geologic hazards considered to have potential impacts to site development were evaluated based on field observations, literature review, and laboratory test results. The following paragraphs discuss geologic hazards considered and associated potential risk to the site.

5.4.1 Surface Fault Rupture

In accordance with the Alquist-Priolo Earthquake Fault Zoning Act, (ACT), the State of California established Earthquake Fault Zones around known active faults. The purpose of the ACT is to regulate the development of structures intended for human occupancy near active fault traces in order to mitigate hazards associated with surface fault rupture. According to the California Geological Survey (Special Publication 42, Revised 2018), a fault that has had surface displacement within the last 11,700 years is defined as a Holocene-active fault and is either already zoned or is pending zonation in accordance with the ACT. There are several other definitions of fault activity that are used to regulate dams, power plants, and other critical facilities, and some agencies designate faults that are documented as older than Holocene (last 11,700 years) and younger than late Quaternary (1.6 million years) as potentially active faults that are subject to local jurisdictional regulations.

Based on the site reconnaissance and review of referenced literature, the site is not located within a State-designated Earthquake Fault Zone, no known active fault traces underlie or project toward the site, and no known potentially active fault traces project toward the site.

5.4.2 Local and Regional Faulting

The United States Geological Survey (USGS), with support of State Geological Surveys, and reviewed published work by various researchers, have developed a Quaternary Fault and Fold Database of faults and associated folds that are believed to be sources of earthquakes with magnitudes greater than 6.0 that have occurred during the Quaternary (the past 1.6 million years). The faults and folds within the database have been categorized into four Classes (Class A-D) based on the level of evidence confirming that a Quaternary fault is of tectonic origin and whether the structure is exposed for mapping or inferred from fault related deformational features. Class A faults have been mapped and categorized based on age of documented activity ranging from Historical faults (activity within last 150 years), Latest Quaternary faults (activity within last 15,000 years), Late Quaternary (activity within last 130,000 years), to Middle to late Quaternary (activity within last 1.6 million years). The Class A faults are considered to have the highest potential to generate earthquakes and/or surface rupture, and the earthquakes and surface rupture potential generally increases from oldest to youngest. The evidence for Quaternary deformation and/or tectonic activity progressively decreases for Class B and Class C faults. When geologic evidence indicates that a fault is not of tectonic origin it is considered to be a Class D structure. Such evidence includes joints, fractures, landslides, or erosional and fluvial scarps that resemble fault features, but demonstrate a non-tectonic origin.

The nearest known Class A fault is the Newport-Inglewood-Rose Canyon Fault Zone (<15,000 years), which is approximately 10.0 kilometers west of the site. The attached Figure 4 shows regional faults and seismicity with respect to the site.

5.4.3 Historic Seismicity

The level of seismicity within recent history (last 50 years) of the greater San Diego area is relatively low compared to other areas of southern California and northwestern Baja California. Only a few small to moderate earthquakes have been reported in the greater San Diego area during the period of instrumental recordings, which began in the early 1900s. Most of the high seismic activity in the region is associated with the Elsinore Fault Zone and the San Jacinto Fault Zone, located approximately 29 and 65 kilometers to the northeast of the site respectively. In the western portion of San Diego County a series of small-to-moderate earthquakes in July 1985 were reportedly associated with the Rose Canyon Fault Zone (Reichle, 1985). The largest event in that series was M4.7, which was centered within San Diego Bay. A similar series of earthquakes in coastal San Diego occurred in 1964 (Simons, 1979).

Based on review of the USGS Earthquake Archives (http://earthquake.usgs.gov/earthquakes/search/) significant earthquakes within 100 kilometers of the site with magnitudes greater than M5.5 are provided in Table 5.4.3.

TABLE 5.4.3 Regional Earthquake History				
EARTHQUAKE DATE (yr-mo-day)	EARTHQUAKE TIME (UTC)	MAGNITUDE	ESTIMATED DEPTH (km)	GENERAL LOCATION
1918-04-21	22:32:29	6.7	10.0	Southern California
1933-03-11	01:54:09	6.4	6.0	WNW of Newport Beach
1937-03-25	16:49:02	6.0	6.0	WSW of Oasis
1951-12-26	00:46:54	5.8	6.0	NNE of San Clemente Island

5.4.4 Liquefaction and Seismic Settlement Evaluation

Liquefaction occurs when saturated fine-grained sands or silts lose their physical strengths during earthquake-induced shaking and behave like a liquid. This is due to loss of point-to-point grain contact and transfer of normal stress to the pore water. Liquefaction potential varies with water level, soil type, material gradation, relative density, and probable intensity and duration of ground shaking. Seismic settlement can occur with or without liquefaction; it results from densification of loose soils.

The proposed structural improvement areas at site are underlain at shallow depths by very dense Old Paralic Deposits and San Onofre Breccia. Based on the noted subsurface conditions, the potential for liquefaction or significant seismic settlement at the site is considered to be low.

5.4.5 Tsunamis and Seiche Evaluation

According to McCulloch (1985), the potential in the San Diego County coastal area for "100-year" and "500-year" tsunami waves is approximately five and eight feet, or less. This suggests that there is a negligible probability of a tsunami reaching the site based on elevation of the area and distance from the Pacific Ocean. The site is not located in a zone of potential tsunami inundation based on emergency planning maps prepared by California Emergency Management Agency and CGS. In addition, oscillatory waves (seiches) are considered unlikely due to the absence of nearby confined bodies of water.

5.4.6 Flooding

Based on Federal Emergency Management Agency mapping (FEMA 2012), site improvement areas are located within Zone X, which is defined as: "Areas determined to be outside of the 0.2% annual chance floodplain".

5.4.7 Landsliding

The project site is located near the top of an approximately 100 feet high 1:1 (horizontal: vertical) fill slope that descends to the west from an elevated area with paved basketball courts at the top. An approximately 80 feet high 2:1 fill slope also descends from the athletic field in the southwestern portion of the campus. According to mapping by Tan (1995), the site is located in areas 3-1, which is described as "Generally Susceptible" to landsliding.

Kennedy and Tan (2008) do not indicate the presence of mapped landslides at the subject site. However, a surficial slope failure was observed on one of the northern slopes that appeared to primarily consist of Previously Placed Fill on the upper portion of the slope.

Based on investigation findings, over-steepened slopes (steeper than 2 horizontal to 1 vertical slope ratio) consisting of Previously Placed Fill are considered to be unstable and/or unsuitable in their current condition and are susceptible to slope failures. However, native slopes consisting of San Onofre Breccia were generally found to be stable in their current condition and the potential for deep seated landslides within this unit is considered to be low.

The final input and output data from the slope stability evaluation are presented in Appendix G. For the analysis, the existing slopes were modeled based on topographic and geologic conditions. Based on laboratory direct shear testing, the San Onofre Breccia yielded soil strength values of phi = 46.9^o and 47.2^o and cohesion = 680 psf and 940 psf. Based on remolded shear testing, the Previously Placed Fill yielded a soil strength value of phi = 37.3^o and cohesion = 310 psf. To be conservative, Previously Placed Fill values of phi = 30.0^o and cohesion = 300 psf and San Onofre Breccia values of phi = 40.0^o and cohesion = 600 psf were utilized for the analysis. Based on the findings, existing slope conditions consisting of San Onofre Breccia are anticipated to exhibit global factors of safety in excess of 1.5. However, oversteepened site slopes consisting of Previously Placed Fill exhibited factors of safety below 1.5. It is anticipated that surficial soils within the slopes consisting of

Previously Placed Fill will continue to erode and may develop shallow slumps and failures on slope faces. As such, it is generally recommended that all Previously Placed Fill and fill slopes at site will be removed and properly recompacted where they can impact proposed improvements, and reconstructed fill slopes will be no steeper than 2:1.

5.4.8 Compressible and Expansive Soils

The Previously Placed Fill and desiccated near surface soils are considered to be potentially compressible in their current condition. Therefore, it is recommended that these soils be overexcavated, where necessary, and properly compacted beneath proposed improvement areas as recommended herein and as determined to be necessary during construction. Based on the field data, site observations, and CTE's experience with similar soils in the vicinity of the site, native underlying soils are not considered to be subject to significant compressibility under the anticipated loads.

Based on laboratory testing, near surface soils at the site may exhibit low expansion potential (Expansion Index of 50 or less). Verification of expansion potential should be performed during site excavations and grading.

5.4.9 Corrosive Soils

Testing of representative site soils was performed to evaluate the potential corrosive effects on concrete foundations and buried metallic utilities. Soil environments detrimental to concrete generally have elevated levels of soluble sulfates and/or pH levels less than 5.5.

According to the American Concrete Institute (ACI) Table 318 4.3.1, specific guidelines have been provided for concrete where concentrations of soluble sulfate (SO_4) in soil exceed 0.10 percent by weight. These guidelines include low water:cement ratios, increased compressive strength, and specific cement type requirements. A minimum resistivity value less than approximately 5,000 ohm-cm and/or soluble chloride levels in excess of 200 ppm generally indicate a corrosive environment for buried metallic utilities and untreated conduits.

Sulfate test results indicate that near-surface soils at the site generally present a negligible corrosion potential for Portland cement concrete. Based on resistivity and chloride testing, the site soils have been interpreted to have a low corrosivity potential to buried metallic improvements. However, it would likely be prudent for buried utilities to utilize plastic piping and/or conduits, where feasible. However, CTE does not practice corrosion engineering. Therefore, if corrosion of improvements is of more significant concern, a qualified corrosion engineer could be consulted.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 General

CTE concludes that the proposed improvements on the site are feasible from a geotechnical standpoint, provided the preliminary recommendations in this report are incorporated into the design and construction of the project. Recommendations for the proposed earthwork and improvements are included in the following sections and Appendix D. However, recommendations in the text of this report supersede those presented in Appendix D should conflicts exist. These preliminary recommendations should either be confirmed as appropriate or updated following required excavations, demolition of existing improvements, and observations during site preparation.

An update geotechnical report or addendum should be performed by CTE once actual proposed improvements and location have been more refined by the design team. In general, we recommend that distress sensitive proposed improvements not be located within a 1.25:1 plane of existing Landfill Waste materials. In addition, we recommend that existing deep Previously Placed Fills and fill slopes be overexcavated and properly recompacted where they will be located within a 1.25:1 plane of proposed distress sensitive improvements.

6.2 Site Preparation

Prior to grading, areas to receive distress sensitive improvements should be cleared of existing debris and deleterious materials. Objectionable materials, such as construction or demolition debris and vegetation not suitable for structural backfill should be properly disposed of off-site. Recommendations for grading for structure bearing entirely in engineered fill or entirely in native materials, as well as for slopes, flatwork, pavement, and other non-structural improvement areas are provided below. Structure foundations for a single building or structure improvement should not span cut/fill transitions.

For structures to bear entirely in engineered fill, the remedial excavations should be conducted to a minimum depth of five feet below existing or proposed grade, two feet below the bottom of proposed foundations, or to the depth of competent native materials, whichever is greatest. In order to provide relatively uniform conditions under the proposed structures, the minimum depth of proposed fill should also be one half of the maximum depth of fill beneath a single structure footprint. If loose or otherwise unsuitable materials are encountered at the base of overexcavations, additional excavation to the depth of suitable material may be necessary. Remedial excavations should extend laterally at least five feet beyond the limits of the proposed improvements or the distance resulting from a 1:1 (horizontal: vertical) extended down to suitable material, where feasible. If overexcavations encroach upon property lines or adjacent structures the temporary excavation should generally be sloped at a 1:1 (horizontal to vertical) or flatter, to the prescribed overexcavation depth. Depending upon proximity and condition of exposed soils, overexcavation in slot cuts may be recommended by the geotechnical engineer.

Alternatively, structural foundations may be extended to the depth of suitable formational material provided all foundations for the structure bear entirely on competent formational materials. If this method is utilized, in order to provide uniform slab-on-grade support, it is recommended that overexcavation extends to a depth of one foot below existing or proposed rough building pad grades, or to the depth of suitable material, whichever is greatest.

Overexcavations for proposed surface improvement areas, such as pavement or flatwork should be conducted to a minimum depth of two feet below existing or proposed subgrade, or to the depth of suitable material, whichever is deepest.

If encountered, existing below-ground utilities should be redirected around proposed structures. Existing utilities at an elevation to extend through the proposed footings should generally be sleeved and caulked to minimize the potential for moisture migration below the building slabs. Abandoned pipes exposed by grading should be securely capped or filled with minimum two-sack cement/sand slurry to help prevent moisture from migrating beneath foundation and slab soils.

A geotechnical representative from CTE should observe the exposed ground surface prior to placement of compacted fill or improvements, to verify the competency of exposed subgrade materials. After approval by this office, the exposed subgrades to receive fill should be either proof rolled or scarified a minimum of eight inches, moisture conditioned, and properly compacted prior to fill placement.

As stated, an update geotechnical report or addendum should be performed by CTE once actual proposed improvements and location have been more refined by the design team. In general, we recommend that distress sensitive proposed improvements not be located within a 1.25:1 plane of existing Landfill Waste materials. In addition, we recommend that existing deep Previously Placed Fills and fill slopes be overexcavated and properly recompacted where they will be located within a 1.25:1 plane of proposed distress sensitive improvements.

6.3 Site Excavation

Based on CTE's observations, shallow excavations at the site should generally be feasible using well-maintained heavy-duty construction equipment run by experienced operators. However, excavations within the underlying Old Paralic Deposits and San Onofre Breccia will likely encounter cemented cobble zones resulting in very difficult excavation that may require specialized equipment. Excavations in Landfill Waste materials should be avoided.

6.4 Fill Placement and Compaction

Following the recommended overexcavation and removal of loose or disturbed soils, areas to receive fills should be either proof rolled or scarified approximately eight inches, moisture conditioned, and properly compacted. Fill and backfill should be compacted to a minimum relative compaction of 90 percent at above optimum moisture content (minimum three percent above optimum for clayey soils), as evaluated by ASTM D 1557. The optimum lift thickness for fill soil depends on the type of compaction equipment used. Generally, backfill should be placed in uniform, horizontal lifts not exceeding eight inches in loose thickness. Fill placement and compaction should be conducted in conformance with local ordinances, and should be observed and tested by a CTE geotechnical representative.

6.5 Fill Materials

Properly moisture conditioned, low expansion potential soils derived from the on-site materials are considered suitable for reuse on the site as compacted fill. If used, these materials should be screened of organics and materials generally greater than three inches in maximum dimension. Irreducible materials greater than three inches in maximum dimension should not be used in shallow fills (within three feet of proposed grades). In utility trenches, adequate bedding should surround pipes.

Imported fill beneath structures and flatwork should have an Expansion Index of 20 or less (ASTM D 4829). Imported fill soils for use in structural or slope areas should be evaluated by the soils engineer a minimum of two weeks before being imported to the site.

For retaining walls, backfill located within a 45-degree wedge extending up from the bottom of the heel foundation of the wall should consist of soil having an Expansion Index of 20 or less (ASTM D 4829) with less than 30 percent passing the No. 200 sieve. The upper 12 to 18 inches of wall backfill should consist of lower permeability soils, in order to reduce surface water infiltration behind walls. The project structural engineer and/or architect should detail proper wall backdrains, including gravel drain zones, fills, filter fabric and perforated drain pipes. A conceptual wall drainage detail is provided in Figure 5.

6.6 Temporary Construction Slopes

The following recommended slopes should be relatively stable against deep-seated failure, but may experience localized sloughing. On-site soils are considered Type B and Type C soils with recommended slope ratios as set forth in Table 5.6.

TABLE 6.6 RECOMMENDED TEMPORARY SLOPE RATIOS		
SOIL TYPE	SLOPE RATIO (Horizontal: vertical)	MAXIMUM HEIGHT
B (Old Paralic Deposits and San Onofre Breccia)	1:1 (OR FLATTER)	10 Feet
C (Previously Placed Fill)	1.5:1 (OR FLATTER)	10 Feet

Actual field conditions and soil type designations must be verified by a "competent person" while excavations exist, according to Cal-OSHA regulations. In addition, the above sloping recommendations do not allow for surcharge loading at the top of slopes by vehicular traffic, equipment or materials. Appropriate surcharge setbacks must be maintained from the top of all unshored slopes.

6.7 Foundation and Slab Recommendations

The following recommendations are for preliminary design purposes only. These foundation recommendations should be re-evaluated after review of the project grading and foundation plans, and after completion of rough grading of the building pad areas. Upon completion of rough pad grading, Expansion Index of near surface soils should be verified, and these recommendations should be updated, if necessary.

6.7.1 Foundations

Foundation recommendations presented herein are based on the anticipated very low to low expansion potential of near surface soils after remedial site grading is performed (Expansion Index of 50 or less).

Following the recommended preparatory grading, continuous and isolated spread footings are anticipated to be suitable for use at this site. Foundation dimensions and reinforcement should be based on allowable bearing values of 2,500 pounds per square foot (psf) for minimum 18-inch wide footings embedded a minimum of 24-inches below lowest adjacent subgrade elevation. Isolated footings should be at least 24 inches in minimum dimension. The provided bearing value may be increased by 250 psf for each additional six inches of embedment up to a maximum static value of 3,000 psf. The allowable bearing value may be increased by one-third for short-duration loading, which includes the effects of wind or seismic forces. Based on the recommended preparatory grading, it is anticipated that all footings will be founded entirely in properly recompacted fill materials or entirely within suitable formational material. Footings should not span cut to fill interfaces.

Minimum reinforcement for continuous footings should consist of four No. 5 reinforcing bars; two placed near the top and two placed near the bottom, or as per the project structural engineer. The structural engineer should design isolated footing reinforcement. An uncorrected subgrade modulus of 120 pounds per cubic inch is considered suitable for elastic foundation design.

The structural engineer should provide recommendations for reinforcement of any spread footings and footings with pipe penetrations. Footing excavations should generally be maintained at above optimum moisture content until concrete placement.

6.7.2 Foundation Settlement

The maximum total static settlement is expected to be on the order of 1.0 inch and the maximum differential settlement is expected to be on the order of 0.5 inches over a distance of 40 linear feet. Due to the generally dense nature of underlying native materials, dynamic settlement is not expected to adversely affect the proposed buildings.

6.7.3 Foundation Setback

Footings for structures should be designed such that the horizontal distance from the face of adjacent slopes to the outer edge of the footing is at least 15 feet. In addition, footings should bear beneath a 1:1 plane extended up from the nearest bottom edge of adjacent trenches and/or excavations. Deepening of affected footings may be a suitable means of attaining the prescribed setbacks.

6.7.4 Interior Concrete Slabs

Lightly loaded concrete slabs for non-traffic areas should be a minimum of 5.0 inches thick. Minimum slab reinforcement should consist of #4 reinforcing bars placed on maximum 18-inch centers, each way, at or above mid-slab height, but with proper cover. More stringent recommendations per the project structural engineer supersede these recommendations, as applicable.

In moisture-sensitive floor areas, a suitable vapor retarder of at least 15-mil thickness (with all laps or penetrations sealed or taped) overlying a four-inch layer of consolidated, granular aggregate base or gravel (or sand exhibiting an SE of 30 or more) should be installed. An optional maximum two-inch layer of similar material may be placed above the vapor retarder to help protect the membrane during steel and concrete placement. This recommended protection is generally considered typical in the industry. If proposed floor areas or coverings are considered especially sensitive to moisture emissions, additional recommendations from a specialty consultant could be obtained. CTE is not an expert at preventing moisture penetration through slabs. A qualified architect or other experienced professional should be contacted if moisture penetration is a more significant concern.

Slabs subjected to heavier loads or traffic will require thicker slab sections and/or increased reinforcement. A 110-pci subgrade modulus is considered suitable for elastic design of minimally embedded improvements such as slabs-on-grade.

Subgrade materials should be maintained or brought to a minimum of two percent (three percent for clayey soils) or greater above optimum moisture content until slab underlayment and concrete are placed.

6.8 Seismic Design Criteria

The seismic ground motion values listed in the table below were derived in accordance with the ASCE 7-16 Standard that is incorporated into the 2019 California Building Code. This was accomplished by establishing the Site Class based on the soil properties at the site, and calculating site coefficients and parameters using the using the SEAOC-OSHPD U.S. Seismic Design Maps application. Seismic ground motion values are based on the approximate site coordinates of 33.2102° latitude and –117.3635° longitude. These values are intended for the design of structures to resist the effects of earthquake ground motions.

TABLE 6.8 SEISMIC GROUND MOTION VALUES (CODE-BASED) 2019 CBC AND ASCE 7-16		
PARAMETER	VALUE	2019 CBC/ASCE 7-16 REFERENCE
Site Class	C	ASCE 7-16, Chapter 20
Mapped Spectral Response Acceleration Parameter, S_S	1.005	Figure 1613.2.1 (1)
Mapped Spectral Response Acceleration Parameter, S_1	0.369	Figure 1613.2.1 (2)
Seismic Coefficient, F_a	1.200	Table 1613.2.3 (1)
Seismic Coefficient, F_v	1.500	Table 1613.2.3 (2)
MCE Spectral Response Acceleration Parameter, S_{MS}	1.206	Section 1613.2.3
MCE Spectral Response Acceleration Parameter, S_{M1}	0.553	Section 1613.2.3
Design Spectral Response Acceleration, Parameter S_{DS}	0.804	Section 1613.2.5(1)
Design Spectral Response Acceleration, Parameter S_{D1}	0.369	Section 1613.2.5 (2)
Peak Ground Acceleration PGA_M	0.526	ASCE 16, Section 11.8.3

6.9 Lateral Resistance and Earth Pressures

Lateral loads acting against structures may be resisted by friction between the footings and the supporting soil or passive pressure acting against structures. If frictional resistance is used, allowable coefficients of friction of 0.30 (total frictional resistance equals the coefficient of friction multiplied by the dead load) for concrete cast directly against compacted fill or native material is recommended. A design passive resistance value of 250 pounds per square foot per foot of depth (with a maximum value of 2,000 pounds per square foot) may be used. The allowable lateral resistance can be taken as the sum of the frictional resistance and the passive resistance, provided the passive resistance does not exceed two-thirds of the total allowable resistance.

If proposed, retaining walls backfilled using granular soils may be designed using the equivalent fluid unit weights given in Table 6.9 below.

TABLE 6.9
EQUIVALENT FLUID UNIT WEIGHTS (G_h)
(pounds per cubic foot)

WALL TYPE	LEVEL BACKFILL	SLOPE BACKFILL 2:1 (HORIZONTAL: VERTICAL)
CANTILEVER WALL (YIELDING)	40	60
RESTRAINED WALL	60	85

Late

ral pressures on cantilever retaining walls (yielding walls) over six feet high due to earthquake motions may be calculated based on work by Seed and Whitman (1970). The total lateral earth pressure against a properly drained and backfilled cantilever retaining wall above the groundwater level can be expressed as:

$$P_{AE} = P_A + \Delta P_{AE}$$

For non-yielding (or “restrained”) walls, the total lateral earth pressure may be similarly calculated based on work by Wood (1973):

$$P_{KE} = P_K + \Delta P_{KE}$$

Where P_A/b = Static Active Earth Pressure = $G_hH^2/2$

P_K/b = Static Restrained Wall Earth Pressure = $G_hH^2/2$

$\Delta P_{AE}/b$ = Dynamic Active Earth Pressure Increment = $(3/8)\ k_h\ \gamma H^2$

$\Delta P_{KE}/b$ = Dynamic Restrained Earth Pressure Increment = $k_h\ \gamma H^2$

b = unit length of wall (usually 1 foot)

k_h = 1/2* PGA_m (PGA_m given previously Table 6.8)

G_h = Equivalent Fluid Unit Weight (given previously Table 6.9)

H = Total Height of the retained soil

γ = Total Unit Weight of Soil ≈ 135 pounds per cubic foot

*It is anticipated that the 1/2 reduction factor will be appropriate for proposed walls that are not substantially sensitive to movement during the design seismic event. Proposed walls that are more sensitive to such movement could utilize a 2/3 reduction factor. If any proposed walls require minimal to no movement during the design seismic event, no reduction factor to the peak ground acceleration should be used. The project structural engineer of record should determine the appropriate reduction factor to use (if any) based on the specific proposed wall characteristics.

The static and increment of dynamic earth pressure in both cases may be applied with a line of action located at H/3 above the bottom of the wall (SEAOC, 2013).

These values assume non-expansive backfill and free-draining conditions. Measures should be taken to prevent moisture buildup behind all retaining walls. Drainage measures should include free-draining backfill materials and sloped, perforated drains. These drains should discharge to an appropriate off-site location. Waterproofing should be as specified by the project architect.

6.10 Exterior Flatwork

Flatwork should be installed with crack-control joints at appropriate spacing as designed by the project architect to reduce the potential for cracking in exterior flatwork caused by minor movement of subgrade soils and concrete shrinkage. Additionally, it is recommended that flatwork measure a minimum 4.5 inches in thickness and be installed with at least number 4 reinforcing bars at 18-inch centers, each way, at or above mid-height of slab, but with proper concrete cover, or with other reinforcement per the applicable project designer. Flatwork that should be installed with crack control joints, includes driveways, sidewalks, and architectural features. All subgrades should be prepared according to the earthwork recommendations previously given before placing concrete. Positive drainage should be established and maintained next to all flatwork. Subgrade materials should be maintained at a minimum of two percent above optimum moisture content until the time of concrete placement.

6.11 Vehicular Pavement

The proposed improvements include paved vehicle drive and parking areas. Presented in Table 5.11 are preliminary pavement sections utilizing laboratory determined Resistance "R" Value. Actual traffic area slab sections to be provided by the structural designer. Beneath proposed pavement areas, the upper 12 inches of subgrade and all base materials should be compacted to 95% relative compaction in accordance with ASTM D1557, and at a minimum of two percent above optimum moisture content.

TABLE 6.11
RECOMMENDED PAVEMENT THICKNESS

Traffic Area	Assumed Traffic Index	Preliminary Subgrade "R"-Value	Asphalt Pavements		Portland Cement Concrete Pavements, on Subgrade Soils (inches)
			AC Thickness (inches)	Class II Aggregate Base Thickness (inches)	
Drive Areas & Infrequent Emergency Vehicle Access	6.0	15+	4.0	10.0	7.5
Parking Areas	5.0	15+	3.0	8.0	7.0

* Caltrans Class 2 aggregate base
** Concrete should have a modulus of rupture of at least 600 psi

Following rough site grading, CTE laboratory testing of representative subgrade soils for as-graded "R"-Value should be performed to verify adequacy of pavement sections.

Asphalt paved areas should be designed, constructed, and maintained in accordance with the recommendations of the Asphalt Institute, or other widely recognized authority. Concrete paved areas should be designed and constructed in accordance with the recommendations of the American Concrete Institute or other widely recognized authority, particularly with regard to thickened edges, joints, and drainage. The Standard Specifications for Public Works construction ("Greenbook") or Caltrans Standard Specifications may be referenced for pavement materials specifications.

6.12 Drainage

Surface runoff should be collected and directed away from improvements by means of appropriate erosion-reducing devices and positive drainage should be established around the proposed improvements. Positive drainage should be directed away from improvements at a gradient of at least two percent for a distance of at least five feet. However, the project civil engineers should evaluate the on-site drainage and make necessary provisions to keep surface water from affecting the site.

Generally, CTE recommends against allowing water to infiltrate building pads or adjacent to slopes. This is even more important on sites with ascending and descending adjacent slopes. Furthermore, the site is adjacent to a areas of Landfill Waste where water infiltration could be even more problematic. However, CTE understands that some agencies are encouraging the use of storm-water cleansing devices. Use of such devices tends to increase the possibility of adverse effects associated with high groundwater including slope instability and liquefaction. See Appendix E for further discussion of site infiltration.

6.13 Slopes

Based on anticipated soil strength characteristics, slopes should be constructed at ratios of 2:1 (horizontal: vertical) or flatter. These slope inclinations should exhibit factors of safety greater than 1.5. If improvements are proposed along the northwestern slopes where an existing shallow slope failure has occurred, buttressing with a fill or geogrid reinforced fill slope would likely be necessary, unless the subject slope(s) were cut back as part of the construction.

Although properly constructed slopes on this site should be grossly stable, the soils will be somewhat erodible. Therefore, runoff water should not be permitted to drain over the edges of slopes unless that water is confined to properly designed and constructed drainage facilities. Erosion-resistant vegetation should be maintained on the face of all slopes.

Typically, soils along the top portion of a fill slope face will creep laterally. CTE recommends against building distress-sensitive hardscape improvements within five feet of slope crests, and against using thickened edges in this area.

6.14 Controlled Low Strength Materials (CLSM)

Controlled Low Strength Materials (CLSM) may be used in deepened footing excavation areas, building pads, and/or adjacent to retaining walls or other structures, provided the appropriate following recommendations are also incorporated. Minimum overexcavation depths recommended herein beneath slabs, flatwork, and other areas may be applicable beneath CLSM if/where CLSM is to be used, and excavation bottoms should be observed by CTE prior to placement of CLSM. Prior to CLSM placement, the excavation should be free of debris, loose soil materials, and water. Once specific areas to utilize CLSM have been determined, CTE should review the locations to determine if additional recommendations are appropriate.

CLSM should consist of a minimum three-sack cement/sand slurry with a minimum 28-day compressive strength of 100 psi (or equal to or greater than the maximum allowable short term soil bearing pressure provided herein, whichever is higher) as determined by ASTM D4832. If re-excavation is anticipated, the compressive strength of CLSM should generally be limited to a maximum of 150 psi per ACI 229R-99. Where re-excavation is required, two-sack cement/sand slurry may be used to help limit the compressive strength. The allowable soils bearing pressure and coefficient of friction provided herein should still govern foundation design. CLSM may not be used in lieu of structural concrete where required by the structural engineer.

6.15 Plan Review

CTE should be authorized to review the project grading and foundation plans prior to commencement of earthwork in order to provide additional recommendations, if necessary.

6.16 Construction Observation

The recommendations provided in this report are based on preliminary design information for the proposed construction and the subsurface conditions observed in the soil borings. The interpolated subsurface conditions should be confirmed by CTE during construction with respect to anticipated conditions. Upon completion of precise grading, if necessary, soil samples will be collected to evaluate as-built Expansion Index. Foundation recommendations may be revised upon completion of grading, and as-built laboratory tests results. Additionally, soil samples should be taken in pavement subgrade areas upon rough grading to refine pavement recommendations as necessary.

Recommendations provided in this report are based on the understanding and assumption that CTE will provide the observation and testing services for the project. All earthwork should be observed and tested in accordance with recommendations contained within this report. CTE should evaluate footing excavations before reinforcing steel placement.

7.0 LIMITATIONS OF INVESTIGATION

The field evaluation, laboratory testing and geotechnical analysis presented in this report have been conducted according to current engineering practice and the standard of care exercised by reputable geotechnical consultants performing similar tasks in this area. No other warranty, expressed or implied, is made regarding the conclusions, recommendations and opinions expressed in this report. Variations may exist and conditions not observed or described in this report may be encountered during construction. This report is prepared for the project as described. It is not prepared for any other property or party.

The recommendations provided herein have been developed in order to reduce the post-construction movement of site improvements related to soil settlement and expansion. However, even with the design and construction recommendations presented herein, some post-construction movement and associated distress may occur.

The findings of this report are valid as of the present date. 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 CTE's involvement. Therefore, this report is subject to review and should not be relied upon after a period of three years.

CTE's conclusions and recommendations are based on an analysis of the observed conditions. If conditions different from those described in this report are encountered, CTE should be notified and additional recommendations, if required, will be provided subject to CTE remaining as authorized geotechnical consultant of record. This report is for use of the project as described. It should not be utilized for any other project.

CTE appreciates this opportunity to be of service on this project. If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Respectfully submitted,

CONSTRUCTION TESTING & ENGINEERING, INC.

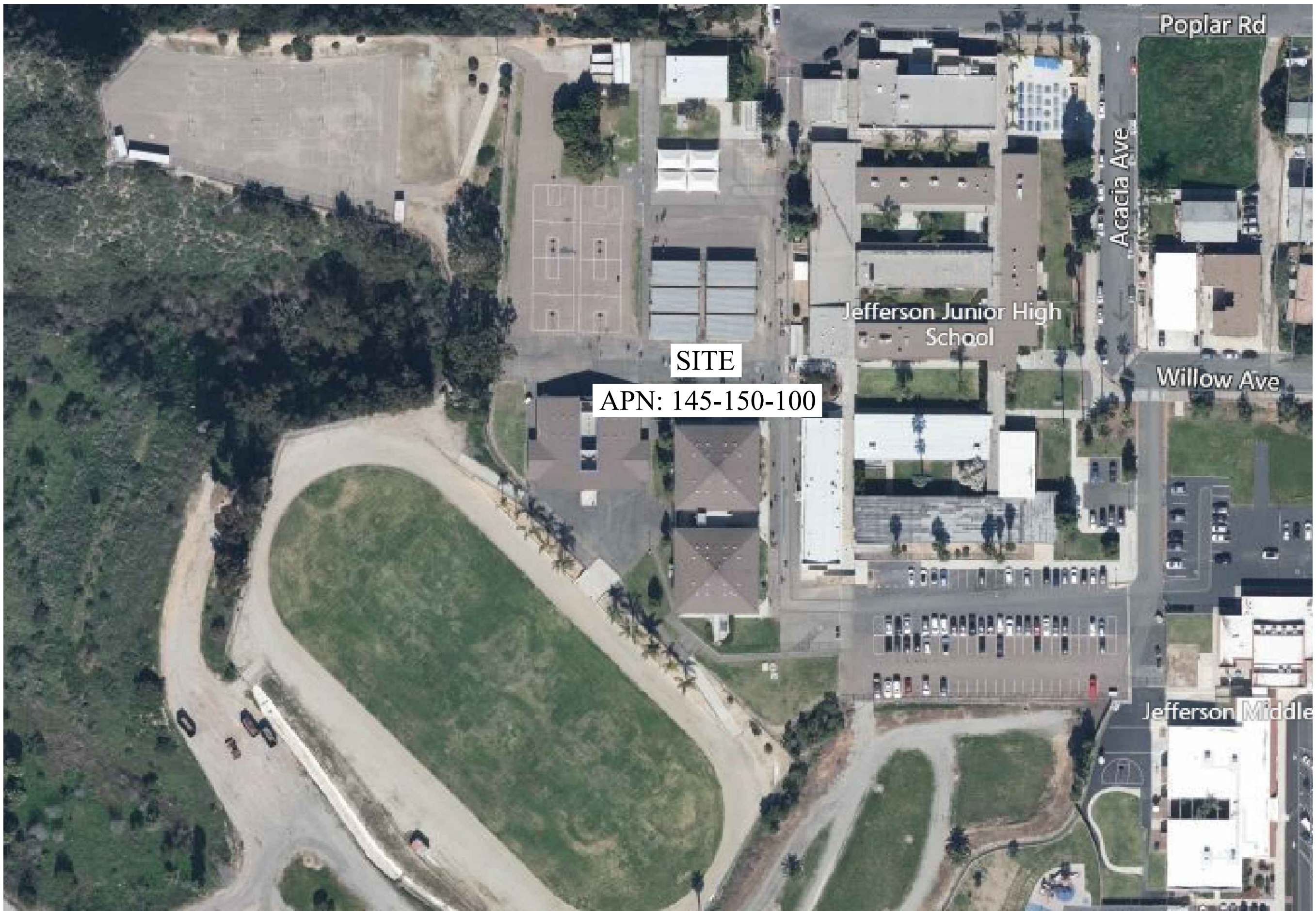
Dan T. Math, GE #2665
Principal Geotechnical Engineer

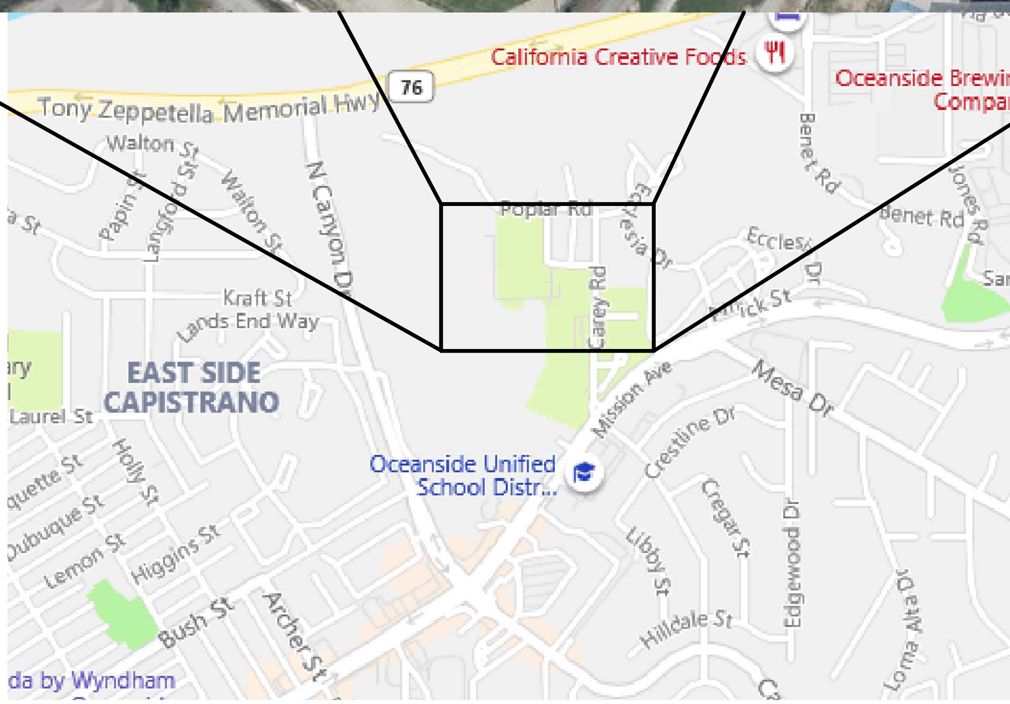
Jay F. Lynch, CEG #1890
Principal Engineering Geologist

Aaron J. Beeby, CEG #2603
Senior Engineering Geologist

Colm J. Kenny, RCE #84406
Senior Engineer

DTM/JFL/AJB/CJK:ach

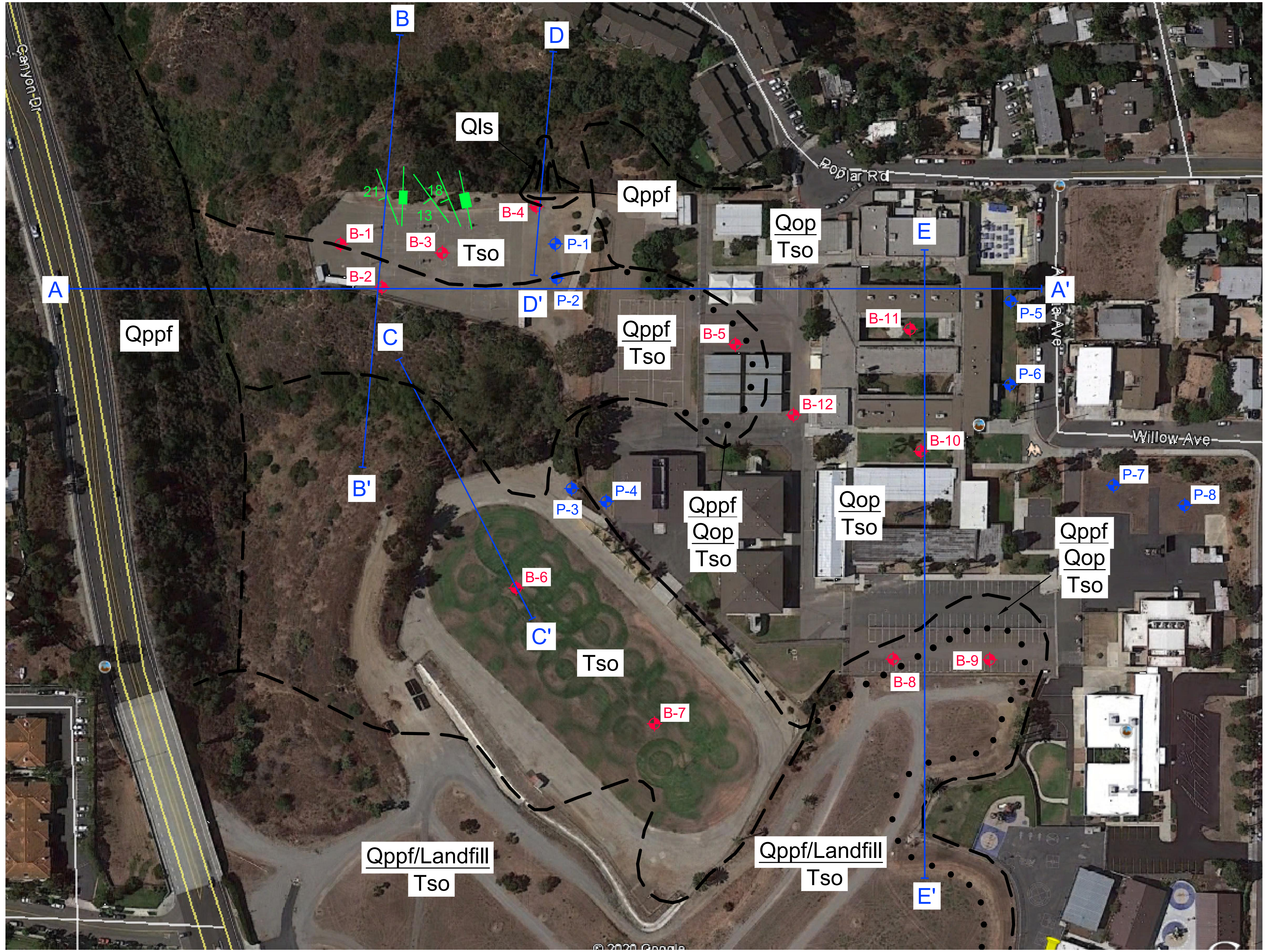




CTE INC. Construction Testing & Engineering, Inc.

1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

SITE INDEX MAP MODERNIZATION AT JEFFERSON MIDDLE SCHOOL 823 ACACIA AVENUE OCEANSIDE, CALIFORNIA	SCALE: AS SHOWN	DATE: 10/20
	CTE JOB NO.: 10-15771G	FIGURE: 1



LEGEND

B-12	Approximate Boring Location
P-8	Approximate Prec Test Location
Qls	Quaternary Landslide
Qppf / Qop / Tso	Quaternary Previously Placed Fill over Quaternary Old Paralic Deposits over Tertiary San Onofre Breccia
	Approximate Geologic Contact
	Approximate Burried Geologic Contact
E — E'	Cross Section
18	Bedding Attitude
	Joint

140' 0 70' 140'

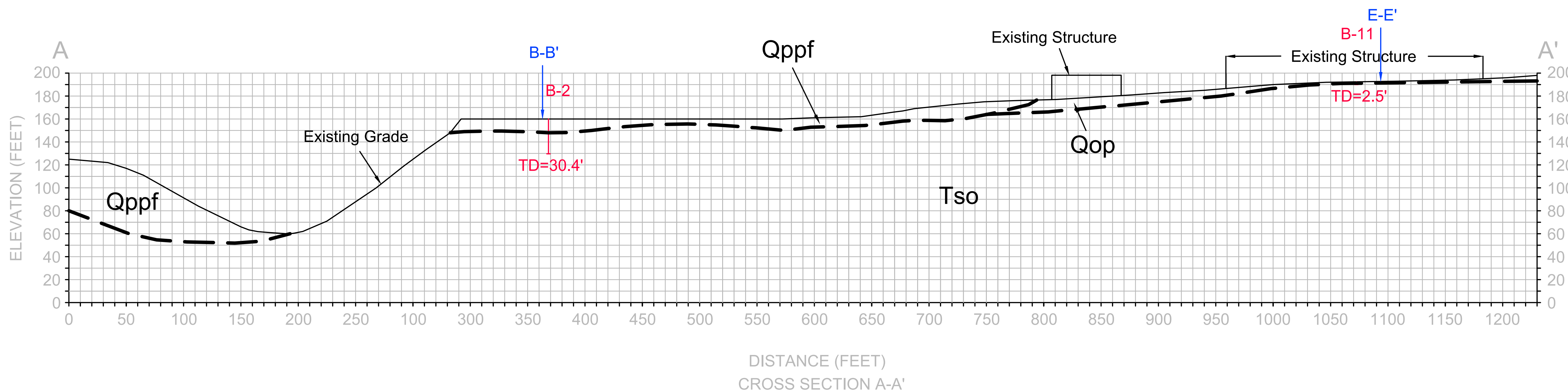
S:\Projects\10-15771G (Jefferson M.S.)\Figure 2.dwg

CTE INC. Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

GEOLOGIC/EXPLORATION LOCATION MAP

MODERNIZATION AT JEFFERSON MIDDLE SCHOOL
823 ACACIA AVEENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 10-15771G	
SCALE: 1" = 140'	
DATE: 12/20	FIGURE: 2



LEGEND

Qppf QUATERNARY PREVIOUSLY PLACED FILL

Qop QUATERNARY OLD PARALIC DEPOSITS

Tso TERTIARY SAN ONOFRE BRECCIA

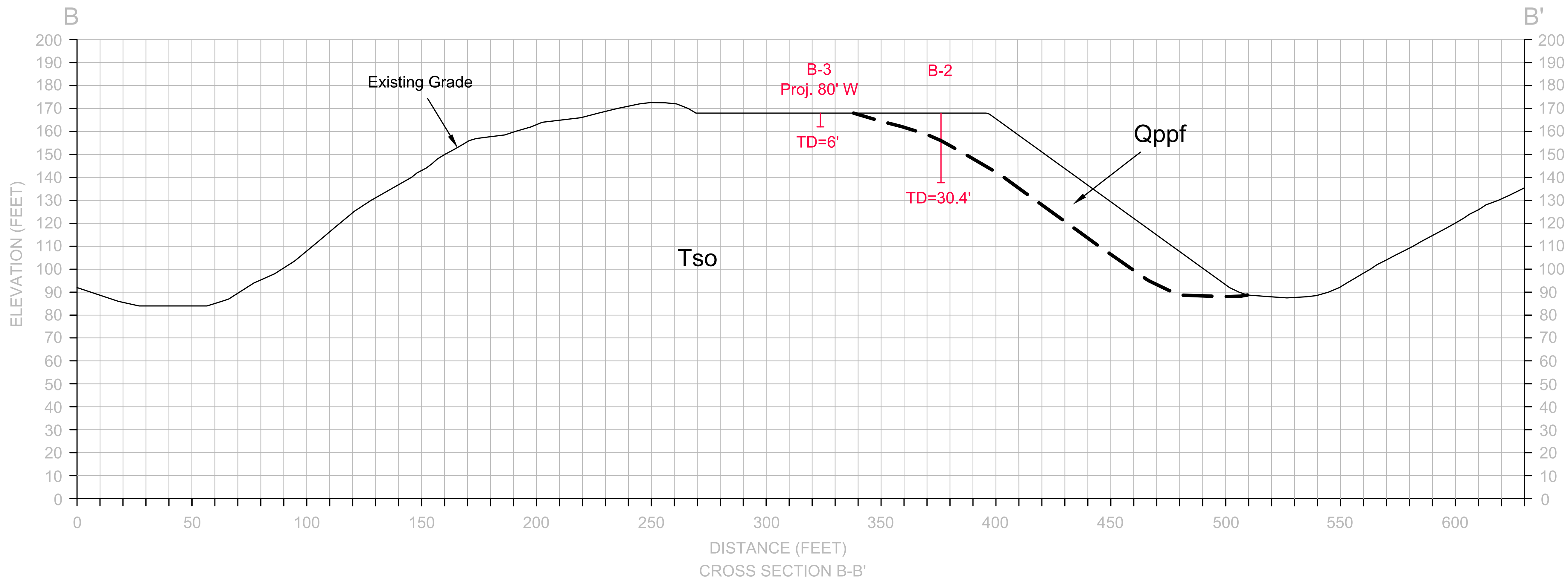
APPROXIMATE GEOLOGIC CONTACT

S:\Projects\10-15771G (Jefferson M.S.)\Figure 2A-2E (Cross Sections).dwg

CTE INC.
Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

CROSS SECTION A–A'
MODERNIZATION AT JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 10-15771G
SCALE: 1" = 100'
DATE: 12/20
FIGURE: 2A



LEGEND

Qppf QUATERNARY PREVIOUSLY PLACED FILL

Qop QUATERNARY OLD PARALIC DEPOSITS

Tso TERTIARY SAN ONOFRE BRECCIA

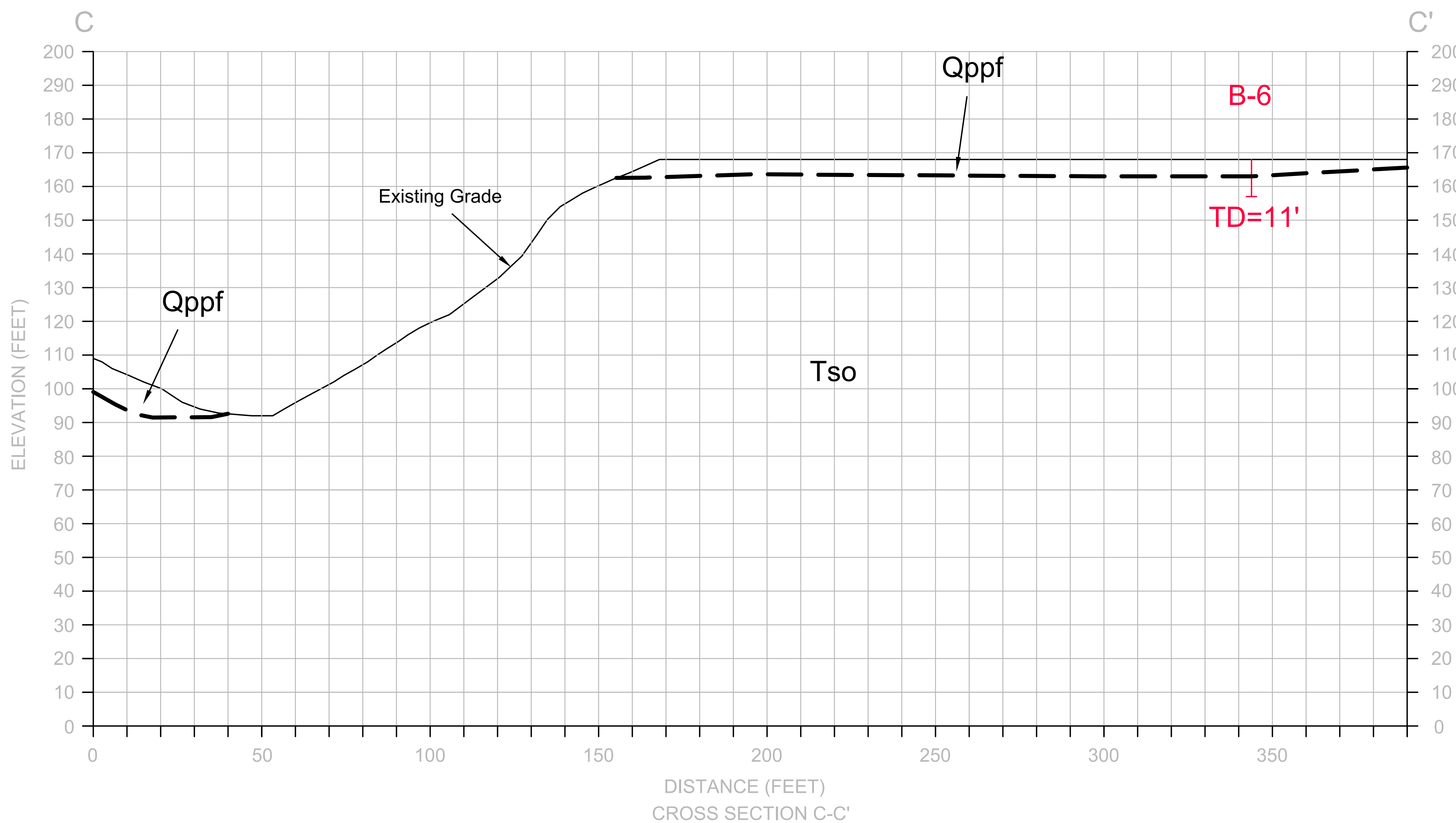
APPROXIMATE GEOLOGIC CONTACT

S:\Projects\10-15771G (Jefferson M.S.)\Figure 2A-2E (Cross Sections).dwg

CTE INC.
Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

CROSS SECTION B–B'
MODERNIZATION AT JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 10-15771G	
SCALE: 1" = 50'	
DATE: 12/20	FIGURE: 2B



CROSS SECTION C-C'

LEGEND

Qppf QUATERNARY PREVIOUSLY PLACED FILL

Qop QUATERNARY OLD PARALIC DEPOSITS

Tso TERTIARY SAN ONOFRE BRECCIA

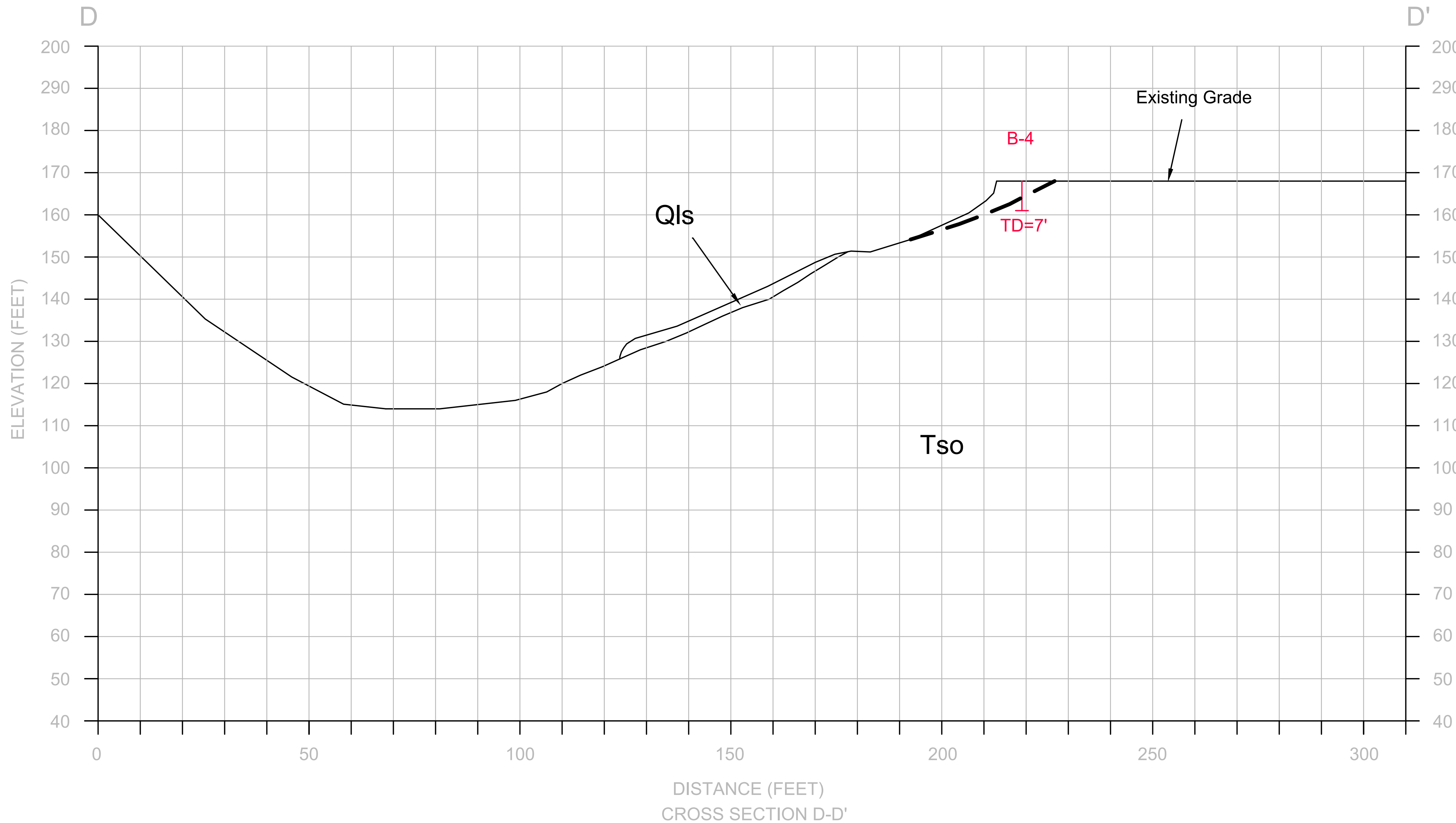
APPROXIMATE GEOLOGIC CONTACT

CTE INC. Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

CROSS SECTION C–C'
MODERNIZATION AT JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 10-15771G
SCALE: 1" = 40'
DATE: 12/20
FIGURE: 2C

S:\Projects\10-15771G (Jefferson M.S.)\Figure 2A-2E (Cross Sections).dwg



LEGEND

Qppf QUATERNARY PREVIOUSLY PLACED FILL

Tso TERTIARY SAN ONOFRE BRECCIA

APPROXIMATE GEOLOGIC CONTACT

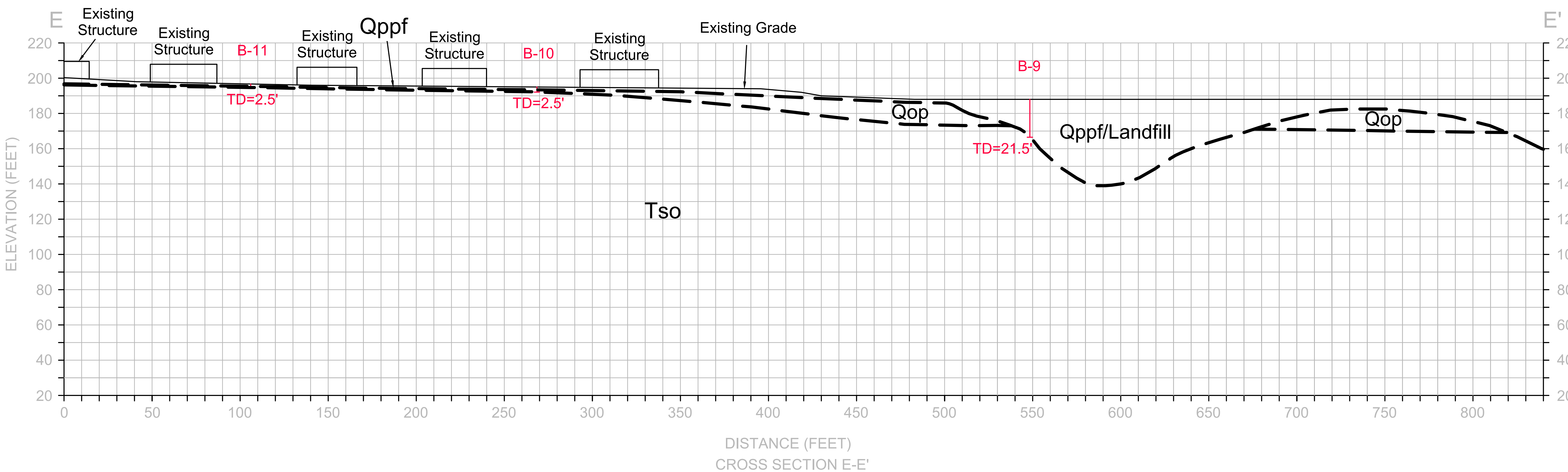
CTE INC.
Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

CROSS SECTION D-D'

MODERNIZATION AT JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO: 10-15771G	
SCALE: 1" = 30'	
DATE: 12/20	FIGURE: 2D

S:\Projects\10-15771G (Jefferson M.S.)\Figure 2A-2E (Cross Sections).dwg



LEGEND

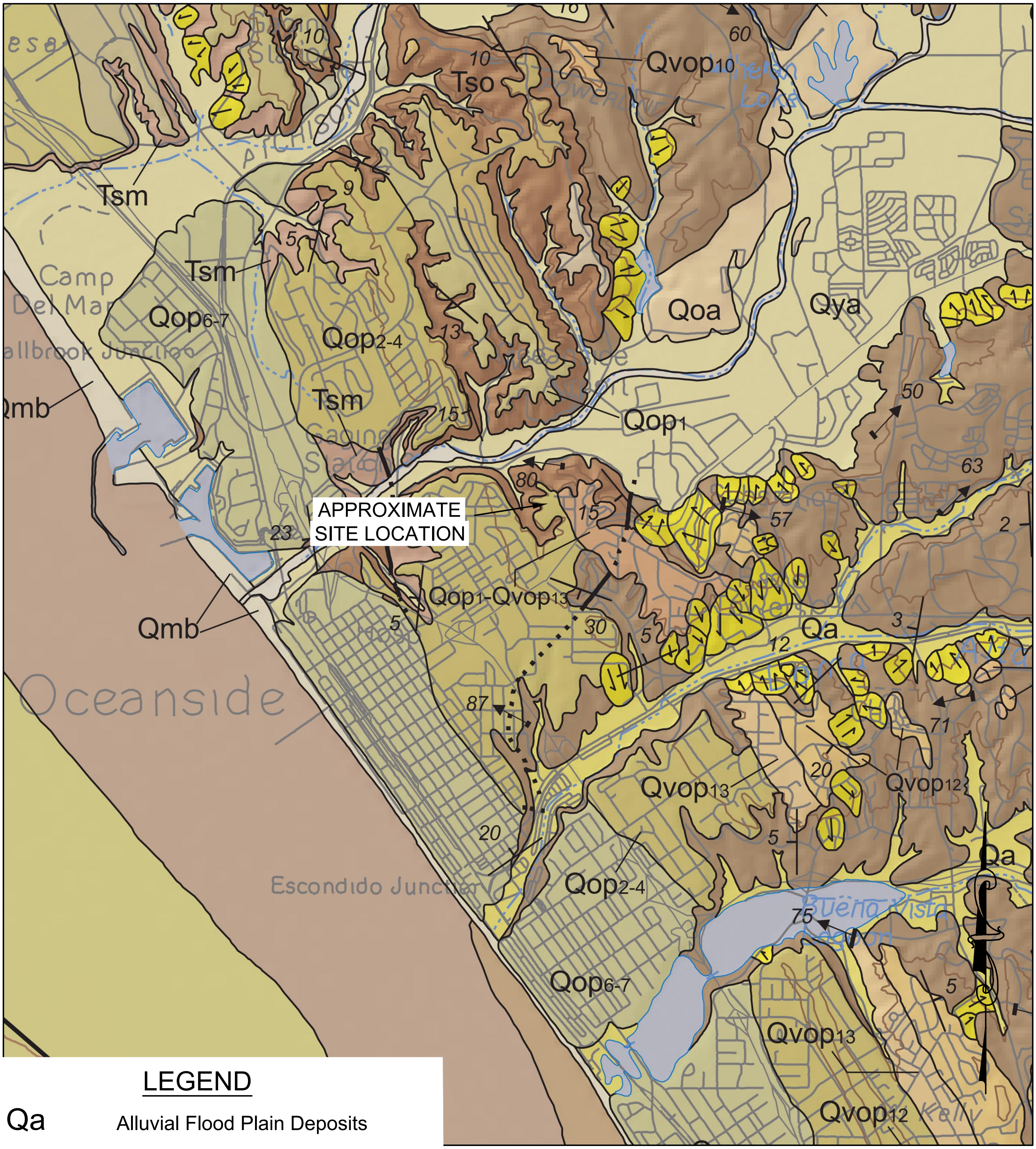
Qppf	QUATERNARY PREVIOUSLY PLACED FILL
Qop	QUATERNARY OLD PARALIC DEPOSITS
Tso	TERTIARY SAN ONOFRE BRECCIA
— — —	APPROXIMATE GEOLOGIC CONTACT

S:\Projects\10-15771G (Jefferson M.S.)\Figure 2A-2E (Cross Sections).dwg

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

CROSS SECTION E–E'
MODERNIZATION AT JEFFERSON MIDDLE SCHOOL
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO:	10-15771G
SCALE:	1" = 60'
DATE:	12/20
FIGURE:	2E



LEGEND

Qa	Alluvial Flood Plain Deposits
Qls	Landslide Deposits
Qop	Old Paralic Deposits
Qvop	Very Old Paralic Deposits
Tsa	Santiago Formation
Kp	Point loma Formation
Kt	Tonalite
Mzu	Metasedimentary and Metavolcanic Rock

NOTE: Base Map by Kennedy and Tan, 2007, Geologic Map of the Oceanside 30' x 60' Quadrangle, California.

CTE INC.

Construction Testing & Engineering, Inc.

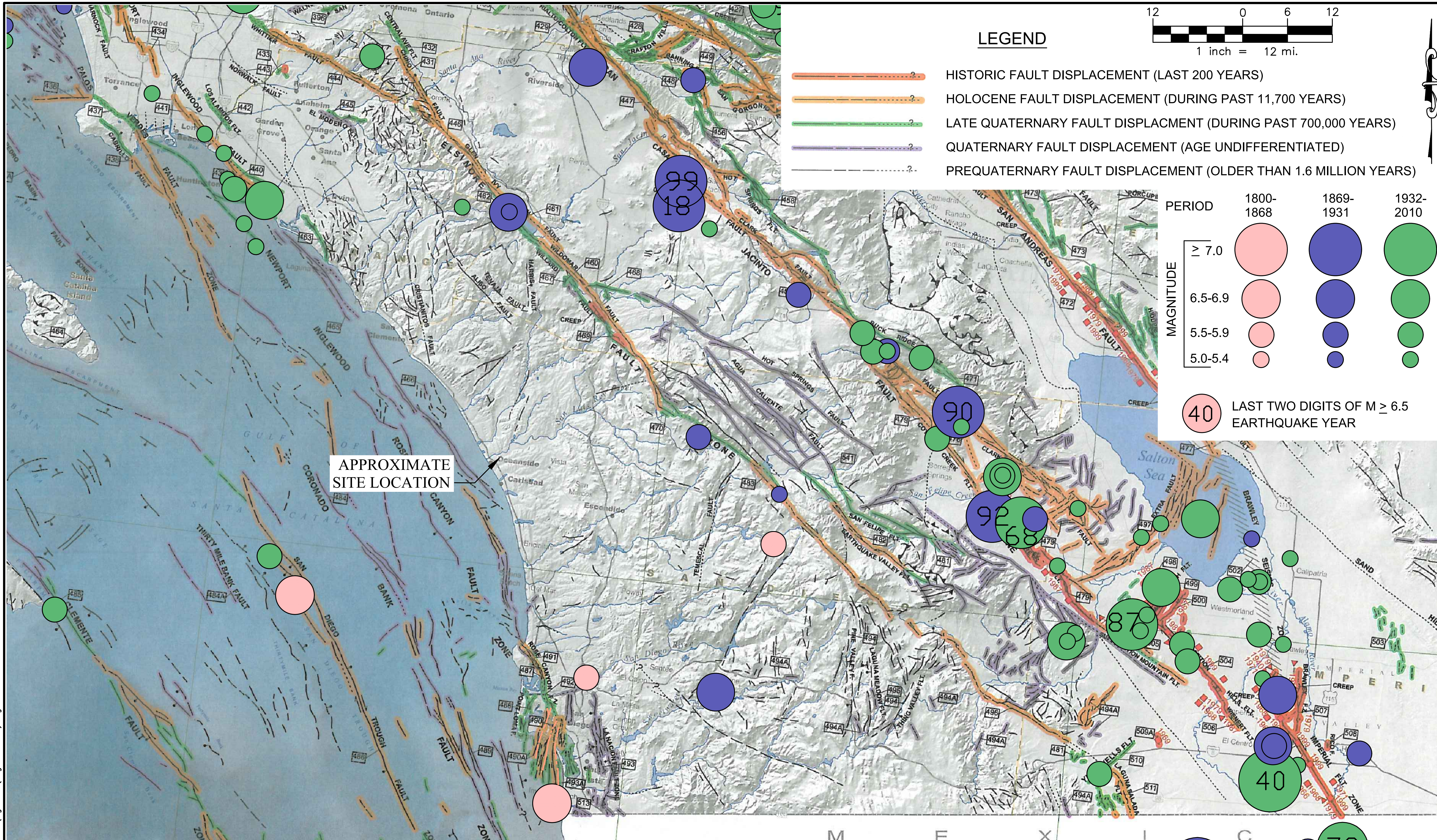
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

REGIONAL GEOLOGIC MAP

PROPOSED JEFFERSON MIDDLE SCHOOL MODERNIZATION
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

SCALE:	DATE:
1"~4,000'	11/20
CTE JOB NO.:	FIGURE:
10-15771G	3

S:\Projects\10-15771G\Figure 3 (Geo Map).dwg



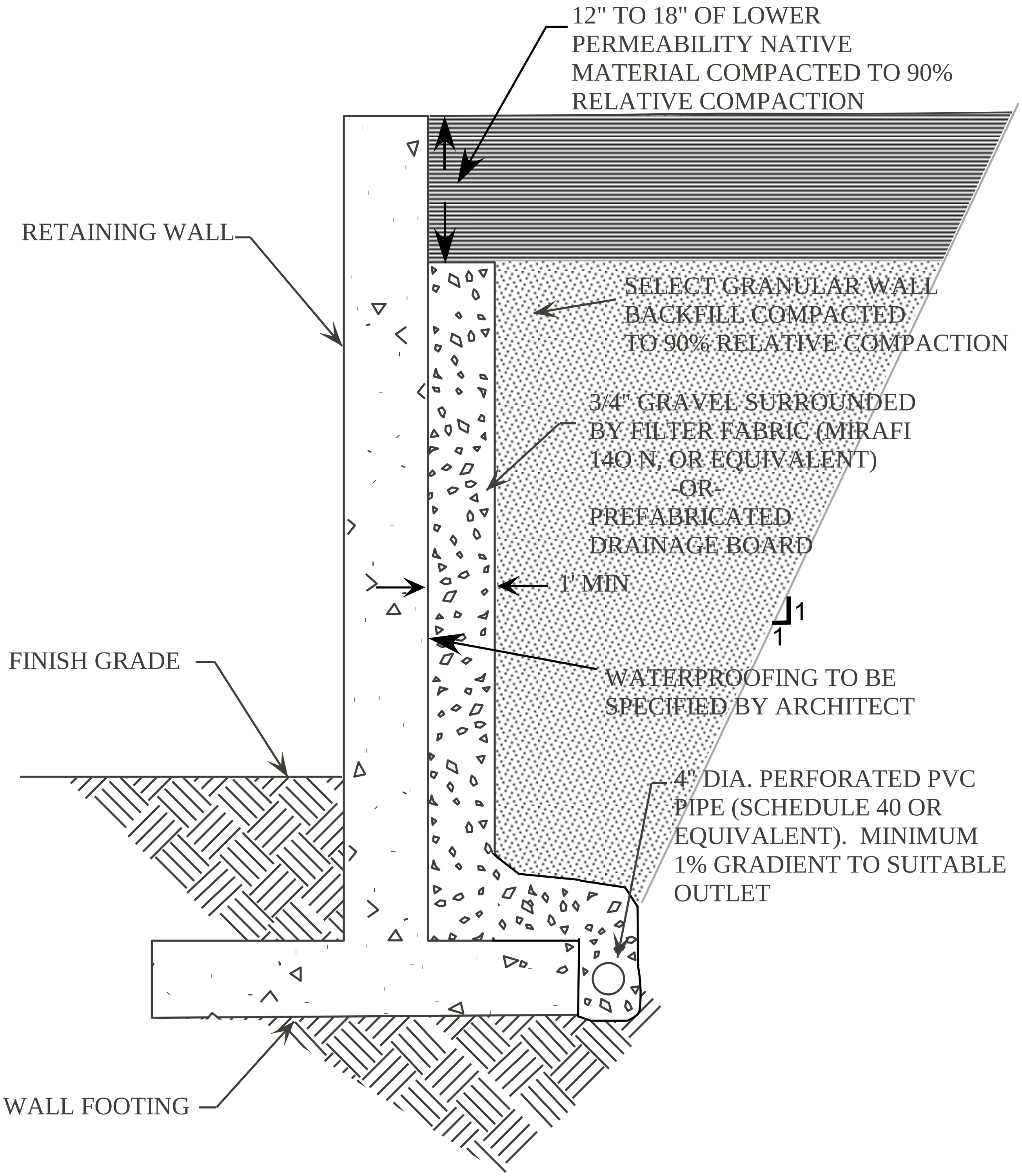
NOTES: FAULT ACTIVITY MAP OF CALIFORNIA, 2010, CALIFORNIA GEOLOGIC DATA MAP SERIES MAP NO. 6;
EPICENTERS OF AND AREAS DAMAGED BY M≥5 CALIFORNIA EARTHQUAKES, 1800-1999 ADAPTED AFTER TOPPOZADA, BRANUM, PETERSEN, HALLSTORM, CRAMER, AND REICHLE, 2000, CDMG MAP SHEET 49
REFERENCE FOR ADDITIONAL EXPLANATION; MODIFIED WITH CISN AND USGS SEISMIC MAPS

CTE INC. Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

REGIONAL FAULT AND SEISMICITY MAP
PROPOSED JEFFERSON MIDDLE SCHOOL MODERNIZATION
823 ACACIA AVENUE
OCEANSIDE, CALIFORNIA

CTE JOB NO:	10-15771G
SCALE:	1 inch = 12 miles
DATE: 11/20	FIGURE: 4

S:\Projects\10-15771G\Figure 4 (Regional Fault).dwg



CTE INC. Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

RETAINING WALL DRAINAGE DETAIL

CTE JOB NO: 10-15771G	
SCALE: NO SCALE	
DATE: 11/20	FIGURE: 5

APPENDIX A

REFERENCES

CITED REFERENCES

1. American Society for Civil Engineers, 2016, "Minimum Design Loads for Buildings and Other Structures," ASCE/SEI 7-16.

2. ASTM, 2002, "Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort," Volume 04.08

3. California Building Code, 2019, "California Code of Regulations, Title 24, Part 2, Volume 2 of 2," California Building Standards Commission, published by ICBO, June.

4. California Division of Mines and Geology, CD 2000-003 "Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, Southern Region," compiled by Martin and Ross.

5. California Emergency Management Agency/California Geological Survey, "Tsunami Inundation Maps for Emergency Planning."

6. FEMA, 2012, Flood Insurance Rate Map, Panel 0753 of 2375 Map Number 06073C0753J, San Diego County, California and Incorporated Areas.

7. Hart, Earl W., Revised 1994, Revised 2018, "Fault-Rupture Hazard Zones in California, Alquist Priolo, Special Studies Zones Act of 1972," California Division of Mines and Geology, Special Publication 42.

8. Jennings, Charles W., 1994, "Fault Activity Map of California and Adjacent Areas" with Locations and Ages of Recent Volcanic Eruptions.

9. Kennedy, M.P. and Tan, S.S., 2007, "Geologic Map of the Oceanside 30' x 60' Quadrangle, California", California Geological Survey, Map No. 2.

10. McCulloch, D.S., 1985, "Evaluating Tsunami Potential" *in* Ziony, J.I., ed., Evaluating Earthquake Hazards in the Los Angeles Region – An Earth-Science Perspective, U.S. Geological Survey Professional Paper 1360.

11. Reichle, M., Bodin, P., and Brune, J., 1985, The June 1985 San Diego Bay Earthquake swarm [abs.]: EOS, v. 66, no. 46, p.952.

12. San Diego, County of, February 2016, "Storm Water Design Manual" Appendix D, Approved Infiltration Rate Assessment Methods for Selection of Storm Water BMPs.

13. Seed, H.B., and R.V. Whitman, 1970, "Design of Earth Retaining Structures for Dynamic Loads," in Proceedings, ASCE Specialty Conference on Lateral Stresses in the Ground and Design of Earth-Retaining Structures, pp. 103-147, Ithaca, New York: Cornell University.

14. Tan, S. S., and Giffen, D. G., 1995, "Landslide Hazards in the Northern Part of the San Diego Metropolitan Area, San Diego County, California: California Department of Conservation, Division of Mines and Geology, Open-File Report 95-04.

15. Wood, J.H. 1973, Earthquake-Induced Soil Pressures on Structures, Report EERL 73-05. Pasadena: California Institute of Technology.

APPENDIX B

EXPLORATION LOGS

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
COARSE GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	**GRAVELS** MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS < 5% FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS OR GRAVEL SAND MIXTURES, LITTLE OF NO FINES
		GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS < 5% FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	**SILTS AND CLAYS** LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, SLIGHTLY PLASTIC CLAYEY SILTS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTS OR LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTY CLAYS
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILTS AND CLAYS
		COARSE	FINE	COARSE	MEDIUM	FINE	

12" 3" 3/4" 4 10 40 200

CLEAR SQUARE SIEVE OPENING U.S. STANDARD SIEVE SIZE

ADDITIONAL TESTS

(OTHER THAN TEST PIT AND BORING LOG COLUMN HEADINGS)

MAX- Maximum Dry Density
GS- Grain Size Distribution
SE- Sand Equivalent
EI- Expansion Index
CHM- Sulfate and Chloride
Content , pH, Resistivity
COR - Corrosivity
SD- Sample Disturbed

PM- Permeability
SG- Specific Gravity
HA- Hydrometer Analysis
AL- Atterberg Limits
RV- R-Value
CN- Consolidation
CP- Collapse Potential
HC- Hydrocollapse
REM- Remolded

PP- Pocket Penetrometer
WA- Wash Analysis
DS- Direct Shear
UC- Unconfined Compression
MD- Moisture/Density
M- Moisture
SC- Swell Compression
OI- Organic Impurities

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	DRILLER:	SHEET: of
CTE JOB NO:	DRILL METHOD:	DRILLING DATE:
LOGGED BY:	SAMPLE METHOD:	ELEVATION:

BORING LEGEND

Depth (Feet)	Bulk Sample	Driven Type	Blows/Foot	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								Block or Chunk Sample	
								Bulk Sample	
5									
								Standard Penetration Test	
10								Modified Split-Barrel Drive Sampler (Cal Sampler)	
								Thin Walled Army Corp. of Engineers Sample	
15								Groundwater Table	
								Soil Type or Classification Change	
20								? — ? — ? — ? — ? — ? — ? — Formation Change [(Approximate boundaries queried (?)]	
25						"SM"		Quotes are placed around classifications where the soils exist in situ as bedrock	

FIGURE: BL2

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/9/2020
LOGGED BY:	AJB	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~161 FEET

BORING: B-1

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	X (0–5)					SC		Asphalt: 0-1" **<u>QUATERNARY PREVIOUSLY PLACED FILL</u>:** Loose to medium dense, slightly moist, grayish brown, clayey fine to medium grained SAND with gravel.	
						"ML"		**<u>TERTIARY SAN ONOFRE BRECCIA</u>:** Hard, slightly moist, olive brown breccia that excavates to fine to coarse grained sandy SILT with angular gravel.	
5		Ring	22 50/6"						GS
						"SM"		Very dense, slightly moist, light brown, silty fine to coarse grained SANDSTONE.	
						"ML"		Hard, slightly moist, olive brown, breccia that excavates to fine to coarse grained sandy SILT with angular gravel.	
10		SPT	25 50/6"						MD, DS
								Total Depth: 11' No Groundwater Encountered	
15									
20									
25									

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/9/2020
LOGGED BY:	AJB	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~160 FEET

BORING: B-2

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	X (0-5)					SC		Asphalt: 0-2.5" Base Material: 2.5-10" **QUATERNARY PREVIOUSLY PLACED FILL:** Loose to medium dense, slightly moist, brown, clayey fine to medium grained SAND with gravel	MAX, EI, DS
5		X	19 19 36						MD, DS
10		X	9 8 14						
12						"SM"		**TERTIARY SAN ONOFRE BRECCIA:** Very dense, slightly moist, light gray, silty fine to coarse grained SANDSTONE	
15		X	50/6"						
20		X	50/6"						
25									

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/9/2020
LOGGED BY:	AJB	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~160 FEET

BORING: B-2

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
25		◫	50/2"			"SM"		Very dense, slightly moist, light gray, silty fine to coarse grained SANDSTONE.	
30		◫	50/4"						
								Total Depth: 30.4' (Refusal in very dense Breccia) No Groundwater Encountered Backfilled with bentonite/ cement mix	
35									
40									
45									
50									

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/9/2020
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~161 FEET

BORING: B-3

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						"ML"		Asphalt: 0-3" **TERTIARY SAN ONOFRE BRECCIA:** Very dense, slightly moist, olive brown to light gray, breccia that excavates to fine to course grained sandy SILT to silty SAND	
5		▯	17 50/3"						
								Total Depth: 6' No Groundwater Encountered	
10									
15									
20									
25									

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/9/2020
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~160 FEET

BORING: B-4

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						"SM"		**QUATERNARY PREVIOUSLY PLACED FILL:** Medium dense, slightly moist, light reddish brown, silty fine grained SAND.	
						"SM"		**TERTIARY SAN ONOFRE BRECCIA:** Very dense, slightly moist, olive brown breccia that excavates to silty fine grained SANDSTONE with gravel.	
5		◪	50/3"						
								Total Depth: 7' (Refusal in very dense breccia) No Groundwater Encountered	
10									
15									
20									
25									

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/10/2020
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~178 FEET

BORING: B-5

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	X					"SM"		Asphalt: 0-3" **QUATERNARY PREVIOUSLY PLACED FILL:** Loose to medium dense or stiff, slightly moist, dark brown, clayey fine to medium grained SAND/sandy CLAY.	EI, CHM
5		X	6 12 21						
10		X	31 50/5"						MD, DS
						"SM"		**TERTIARY SAN ONOFRE BRECCIA:** Very dense, slightly moist, olive brown breccia that excavates to silty fine grained SANDSTONE with gravel.	
15		X	11 50/3"						
		X	17 50/3"						DS
20								Total Depth: 19.5' No Groundwater Encountered	
25									

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/10/2020
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~163 FEET

BORING: B-6

Depth (Feet)	Bulk Sample	Driven Sample Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SC		**QUATERNARY PREVIOUSLY PLACED FILL:** Loose to medium dense, brown, clayey fine to medium grained SAND with trace gravel.	
5		Driven	44 50/2"			"SM"		**TERTIARY SAN ONOFRE BRECCIA:** Very dense, slightly moist, gray breccia that excavates to silty fine to medium grained SAND with gravel.	
10		Driven	50/4"						
		Ring	50/4"						
								Total Depth: 11.5 (Refusal in very dense breccia) No Groundwater Encountered	
15									
20									
25									

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/9/2020
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~163 FEET

BORING: B-7

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SM		**QUATERNARY PREVIOUSLY PLACED FILL:** Loose to medium dense, light brown, silty fine to medium grained SAND with gravel.	
						"SM"		**TERTIARY SAN ONOFRE BRECCIA:** Very dense, slightly moist, light olive brown breccia that excavates to silty fine to medium grained SAND with gravel.	
5		▯	50/3"						
								Total Depth: 5.3 (Refusal in very dense breccia) No Groundwater Encountered	
10									
15									
20									
25									

CTE INC. Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/10/2020
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~176 FEET

BORING: B-8

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SC		Asphalt: 0-6" Base material: 6-12" **QUATERNARY PREVIOUSLY PLACED FILL:** Loose to medium dense, moist, brown, clayey fine to medium grained SAND.	
						CL		Stiff, moist, brown, fine to medium grained sandy CLAY.	
5		X	5 2 3						
								Abundant trash	
10		X	4 5 8						
15		X	16 33 50/2"			"SM"		**QUATERNARY OLD PARALIC DEPOSITS:** Very dense, slightly moist, reddish brown, silty fine to medium grained SANDSTONE, oxidized, massive.	
		X	27 50/3"			"SM"		**TERTIARY SAN ONOFRE BRECCIA:** Very dense, slightly moist, reddish brown breccia that excavates to silty fine to medium grained SAND with gravel.	
20								Total Depth: 19.3' No Groundwater Encountered	
25									

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/10/2020
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~179 FEET

BORING: B-9

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	X					SC		Asphalt: 0-6" Base material: 6-12" **QUATERNARY PREVIOUSLY PLACED FILL:** Loose to medium dense, moist, dark brown, fine to medium grained SAND.	
						CL		Stiff, moist, brown, fine to medium grained sandy CLAY.	RV
5		Driven	8 9 7					Abundant trash	
10		Driven	5 6 11						
15		Ring	10 14 29						
20		Ring	6 15 12 16 17 19			"SM"		**TERTIARY SAN ONOFRE BRECCIA:** Very dense, slightly moist, reddish brown breccia that excavates to silty fine to medium grained SAND with gravel.	
								Total Depth: 21.5' No Groundwater Encountered Backfilled with Bentonite/Concrete Mix	
25									

Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/9/2020
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~186 FEET

BORING: B-10

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	X					SC		**QUATERNARY PREVIOUSLY PLACED FILL:** Loose to medium dense, moist, dark brown, clayey fine to medium grained SAND with roots and gravel.	
	X					CL		Soft to medium stiff, moist, reddish brown, fine to coarse grained sandy CLAY with fine gravel.	
	X					"SC"		**QUATERNARY OLD PARALIC DEPOSITS:** Medium dense, slightly moist, light reddish brown, clayey fine to medium grained SAND.	
								TERTIARY SAN ONOFRE BRECCIA: Very dense, slightly moist, greenish brown breccia that excavates to silty fine to coarse grained SAND with gravel.	
5								Total Depth: 2.9' (Refusal in very dense breccia) No Groundwater Encountered	
10									
15									
20									
25									

CTE INC. Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/9/2020
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~191 FEET

BORING: B-11

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0	X					SC		**QUATERNARY PREVIOUSLY PLACED FILL:** Loose to medium dense, moist, dark brown, clayey fine to medium grained SAND with gravel and roots.	
						"SC"		**QUATERNARY OLD PARALIC DEPOSITS:** Medium dense, moist, reddish brown, fine to medium grained SANDSTONE, oxidized.	
						"SM"		**TERTIARY SAN ONOFRE BRECCIA:** Very dense, slightly moist, greenish brown breccia that excavates to silty fine to coarse grained SAND with gravel.	
5								Total Depth: 2.5' (Refusal in very dense breccia) No Groundwater Encountered	
10									
15									
20									
25									

CTE INC. Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

PROJECT:	JEFFERSON M.S. MODERNIZATION	DRILLER:	BAJA EXPLORATION	SHEET:	1 of 1
CTE JOB NO:	10-15771G	DRILL METHOD:	HOLLOW-STEM AUGER	DRILLING DATE:	12/9/2020
LOGGED BY:	DJT	SAMPLE METHOD:	RING, SPT and BULK	ELEVATION:	~180 FEET

BORING: B-12

Depth (Feet)	Bulk Sample	Driven Type	Blows/6"	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0						SC/CL		Asphalt: 0-2.5" **QUATERNARY PREVIOUSLY PLACED FILL:** Loose to medium dense or stiff, dark brown, clayey fine grained SAND/ sandy CLAY.	
						"SC/SM"		**QUATERNARY OLD PARALIC DEPOSITS:** Very dense, slightly moist, reddish brown, silty to clayey fine to medium grained SANDSTONE, oxidized, massive.	
						"SC"		Very dense, slightly moist, reddish brown, clayey fine grained SANDSTONE, oxidized, massive, manganeze nodules.	
5		Driven	26 50/6"					manganeze nodules	
10		Driven	18 33 50/3"						
15		Driven	36 50/6"			"SM"		**TERTIARY SAN ONOFRE BRECCIA:** Very dense, slightly moist, gray, breccia that excavates to silty fine to medium grained SAND with gravel.	AL
								Total Depth: 17' (Refusal in very dense breccia) No Groundwater Encountered	
20									
25									

APPENDIX C

LABORATORY METHODS AND RESULTS

LABORATORY METHODS AND RESULTS

Laboratory Testing Program

Laboratory tests were performed on representative soil samples to detect their relative engineering properties. Tests were performed following test methods of the American Society for Testing Materials or other accepted standards. The following presents a brief description of the various test methods used.

Classification

Soils were classified visually according to the Unified Soil Classification System. Visual classifications were supplemented by laboratory testing of selected samples according to ASTM D2487. The soil classifications are shown on the Exploration Logs in Appendix B.

In-Place Moisture and Density

To determine the moisture and density of in-place site soils, a representative sample was tested for the moisture and density at time of sampling.

Modified Proctor

Laboratory maximum dry density and optimum moisture content were evaluated according to ASTM D 1557, Method A. A mechanically operated rammer was used during the compaction process.

Expansion Index

Expansion testing was performed on selected samples of the matrix of the on-site soils according to ASTM D 4829.

Particle-Size Analysis

Particle-size analyses were performed on selected representative samples according to ASTM D 422.

Direct Shear

Direct shear tests were performed on either samples direct from the field or on samples recompacted to a specific density. Direct shear testing was performed in accordance with ASTM D 3080. The samples were inundated during shearing to represent adverse field conditions.

Chemical Analysis

Soil materials were collected with sterile sampling equipment and tested for Sulfate and Chloride content, pH, Corrosivity, and Resistivity.

EXPANSION INDEX TEST

ASTM D 4829

LOCATION	DEPTH (feet)	EXPANSION INDEX	EXPANSION POTENTIAL
B-2	0-5	14	VERY LOW
B-5	0-5	15	VERY LOW

IN-PLACE MOISTURE AND DENSITY

LOCATION	DEPTH (feet)	% MOISTURE	DRY DENSITY
B-1	10	10.8	125.2
B-5	10	11.6	128.3
B-5	18.5	19.9	110.7

RESISTANCE "R"-VALUE

LOCATION	DEPTH (feet)	RESULTS
B-9	0-5	15

ATTERBERG LIMITS

LOCATION	DEPTH (feet)	LIQUID LIMIT	PLASTICITY INDEX	CLASSIFICATION
B-12	10	44	20	CL

SULFATE

LOCATION	DEPTH (feet)	RESULTS ppm
B-5	0-5	45.2

CHLORIDE

LOCATION	DEPTH (feet)	RESULTS ppm
B-5	0-5	1.98

p.H.

LOCATION	DEPTH (feet)	RESULTS
B-5	0-5	7.98

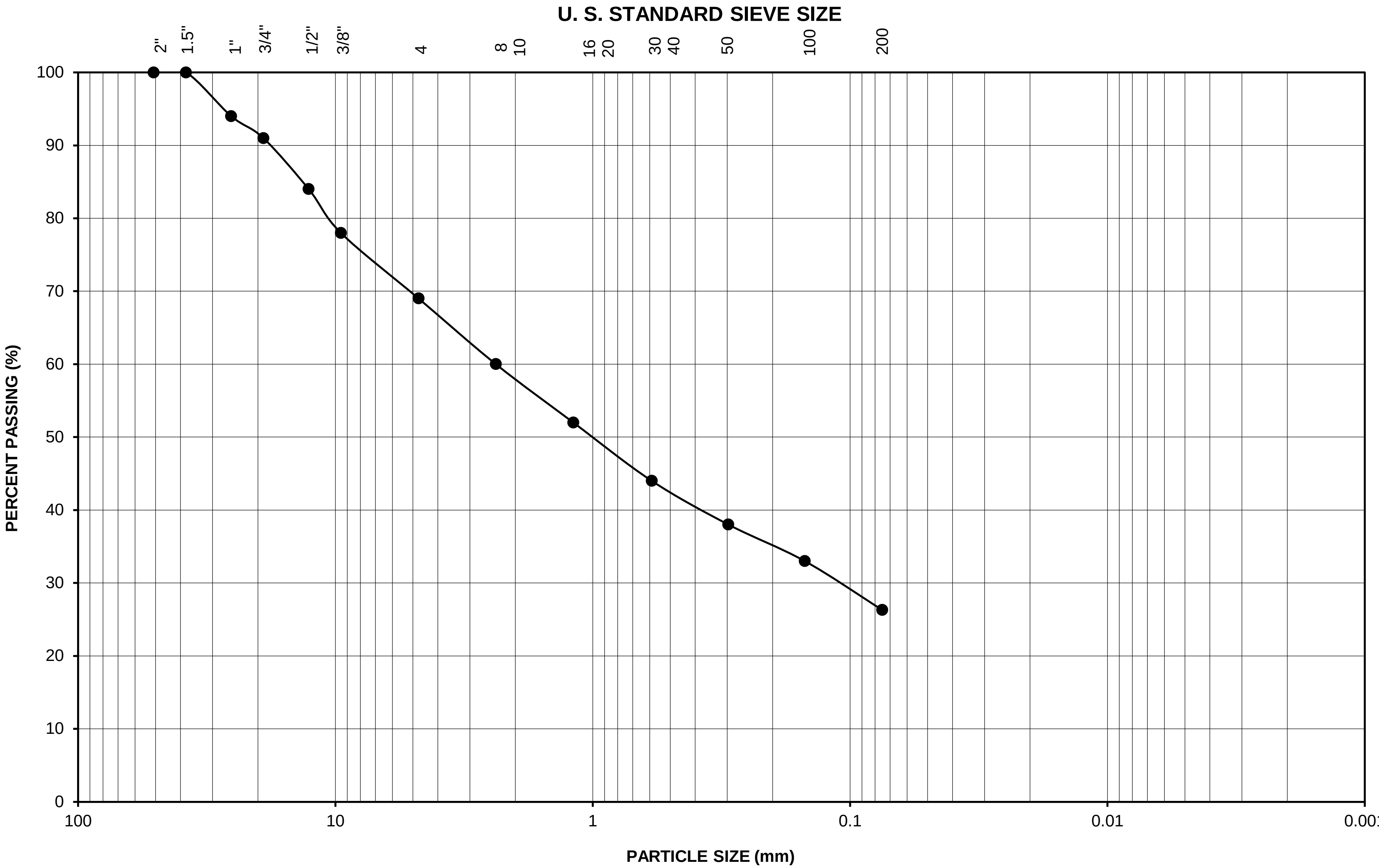
RESISTIVITY

CALIFORNIA TEST 424

LOCATION	DEPTH (feet)	RESULTS ohms-cm
B-5	0-5	14100

MODIFIED PROCTOR

LOCATION	DEPTH (feet)	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE (%)
B-2	0-5	137.2 (RC: 141.9)	9.1 (RC: 7.5)



PARTICLE SIZE ANALYSIS

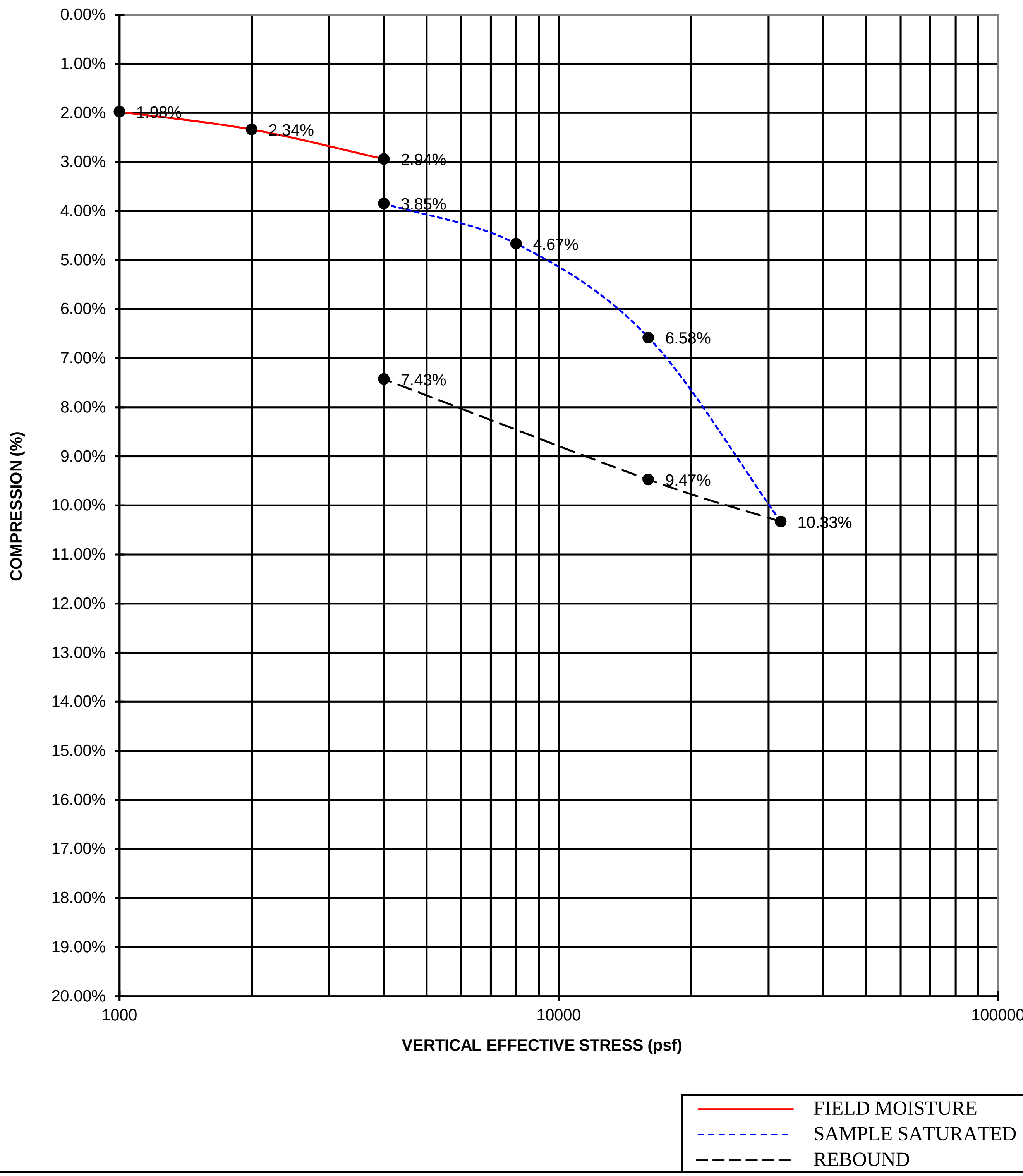
Construction Testing & Engineering, Inc.
1441 Montiel Rd Ste 115, Escondido, CA 92026 Ph (760) 746-4955

Sample Designation	Sample Depth (feet)	Symbol	Liquid Limit (%)	Plasticity Index	Classification
B-1	5	●	--	--	SM
		■			

CTE JOB NUMBER:	10-15771G	FIGURE:	C-1

Construction Testing & Engineering, Inc.

Inspection | Testing | Geotechnical | Environmental & Construction Engineering | Civil Engineering | Surveying



Consolidation Test ASTM D2435

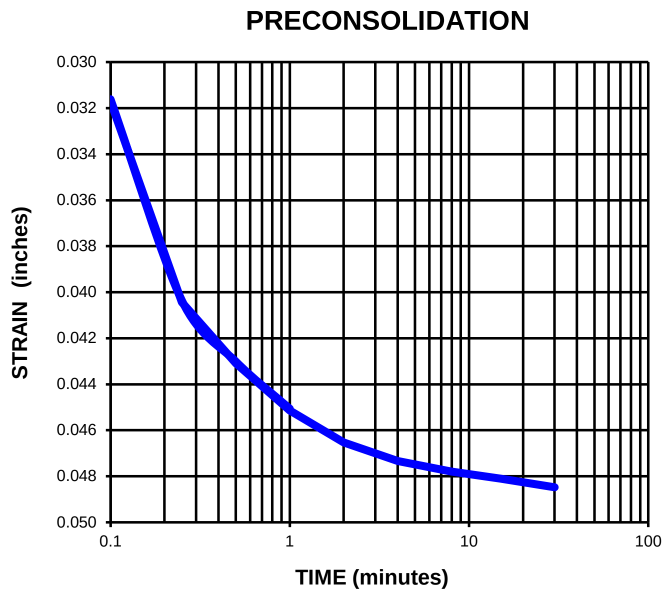
Project Name: Jefferson M.S.

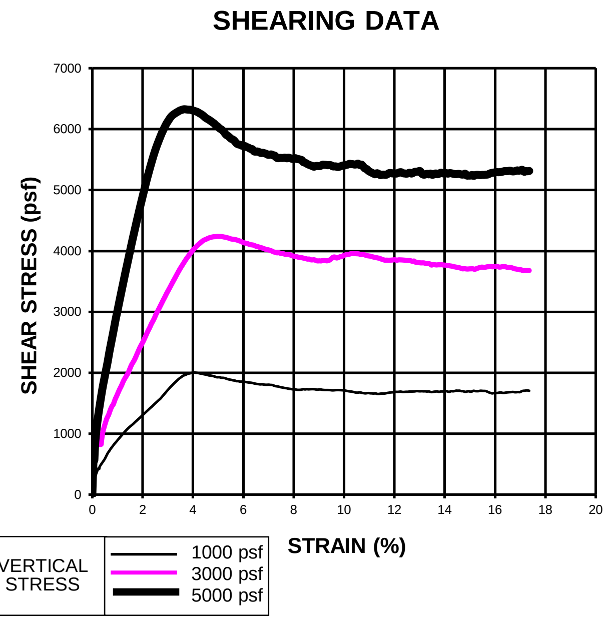
Project Number: 10-15771G | Sample Date: 12/10/2020 | Initial Moisture (%): 11.6

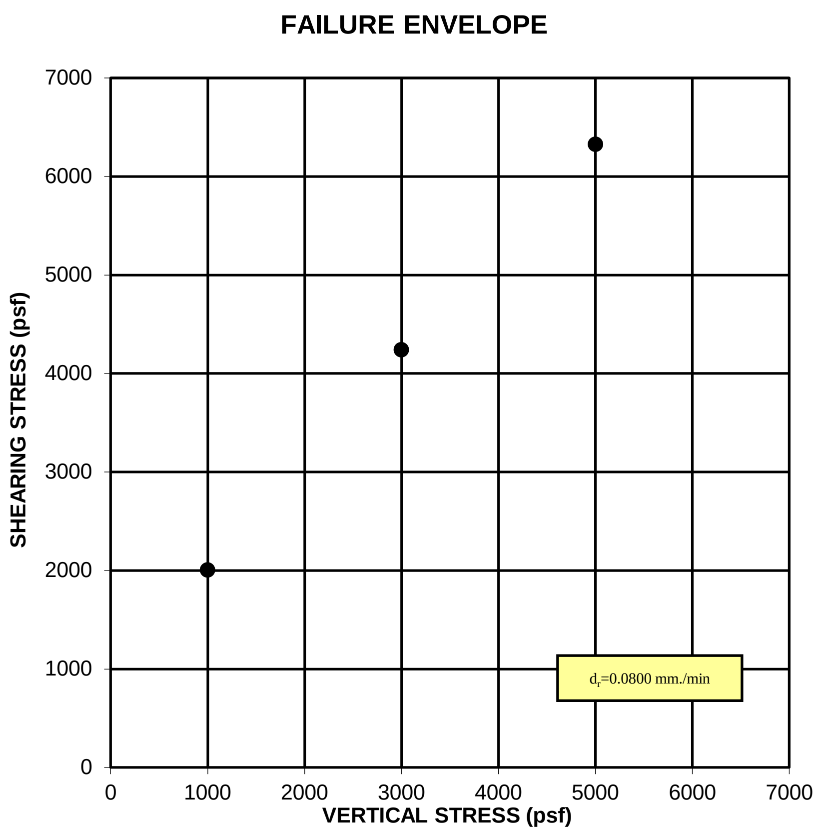
Lab Number: 31587 | Test Date: 12/17/2020 | Final Moisture (%): 12.0

Sample Location: B-5 @ 10' | Tested By: JH | Initial Dry Density (PCF): 128.3

Sample Description: Moderate Brown (CL) | Final Dry Density (PCF): 138.6

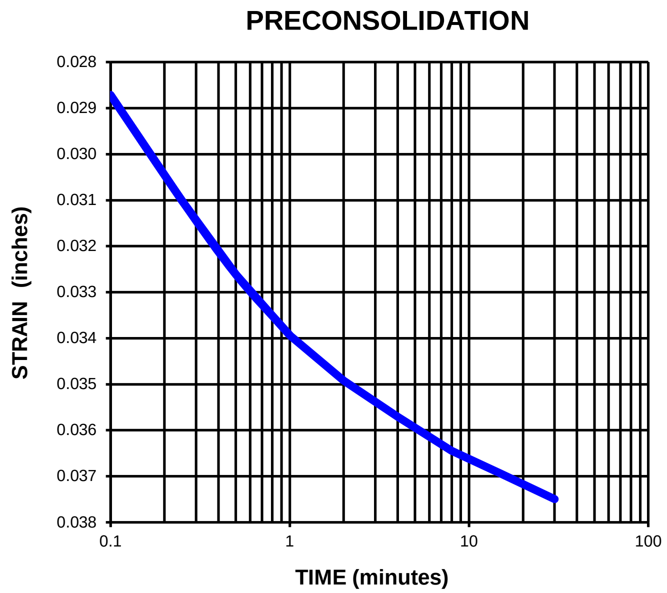


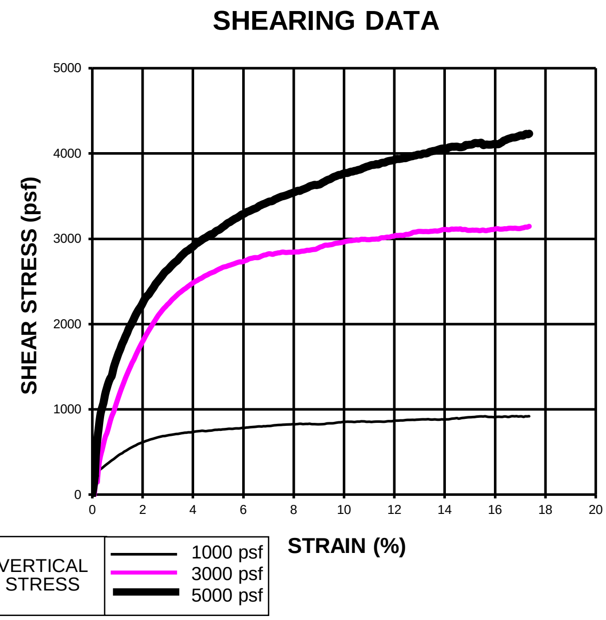


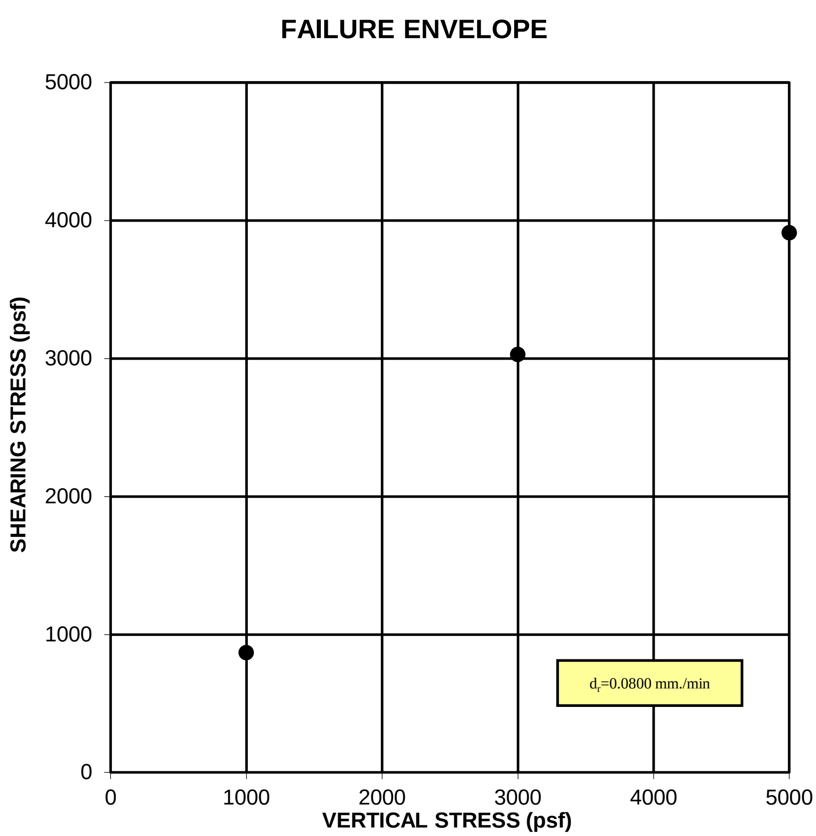


SHEAR STRENGTH TEST - ASTM D3080

Job Name:	Jefferson M.S.			Initial Dry Density (pcf):	125.2
Project Number:	10-15771G	Sample Date:	12/10/2020	Initial Moisture (%):	10.8
Lab Number:	31587	Test Date:	12/21/2020	Final Moisture (%):	17.6
Sample Location:	B-1 @ 10'	Tested by:	JH	Cohesion:	940 psf
Sample Description:	Light Brown (SM-ML)			Angle Of Friction:	47.2



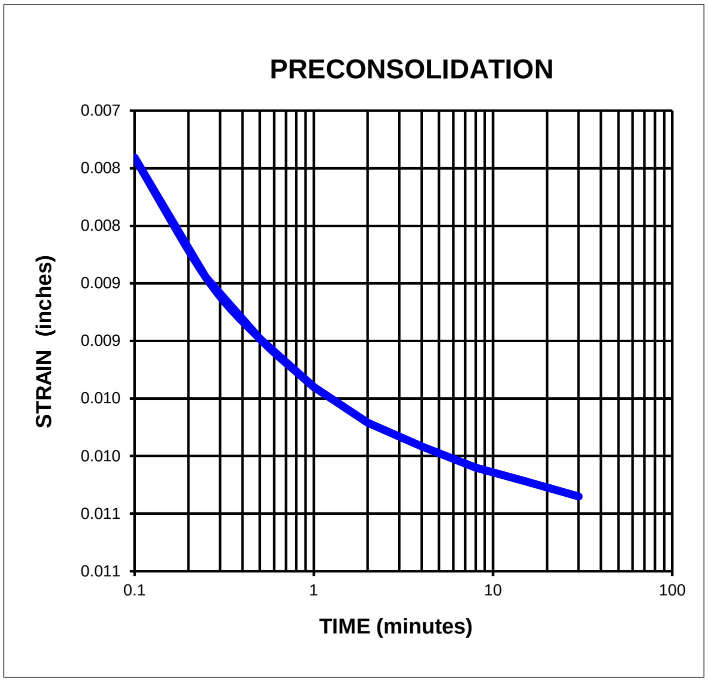


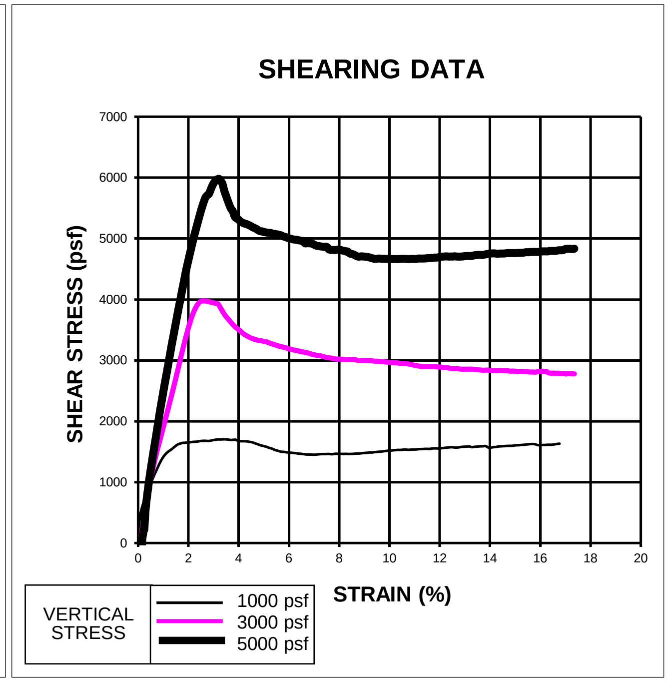


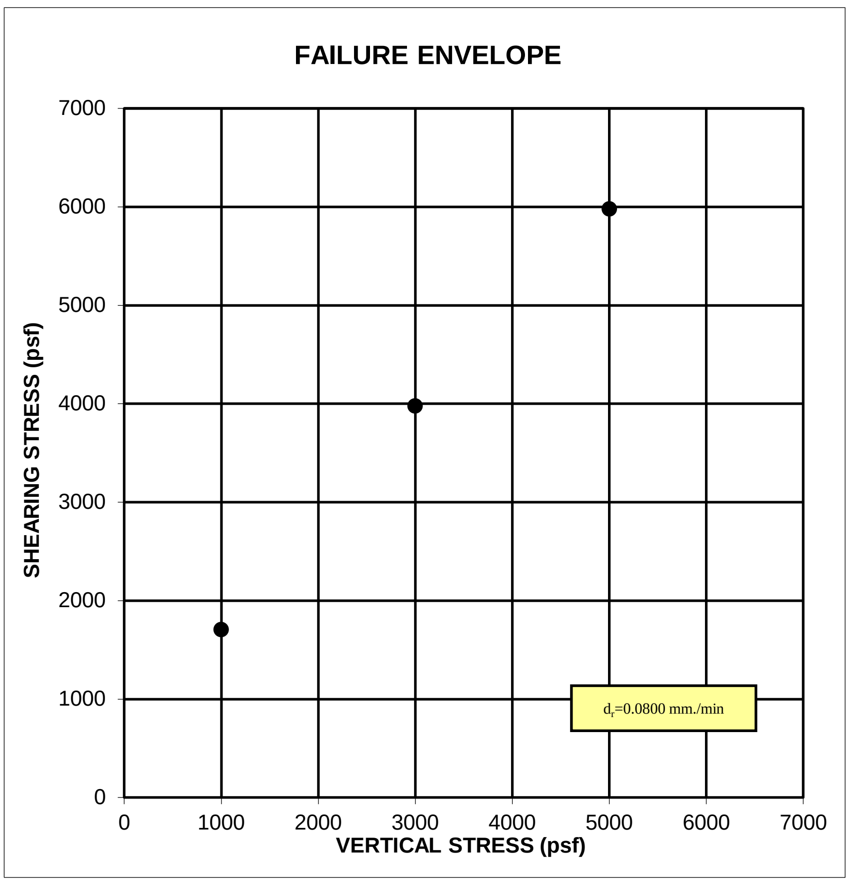
CTE INC.

SHEAR STRENGTH TEST - ASTM D3080

Job Name:	Jefferson M.S.			Initial Dry Density (pcf):	123.5
Project Number:	10-15771G	Sample Date:	12/10/2020	Initial Moisture (%):	9.1
Lab Number:	31587	Test Date:	12/17/2020	Final Moisture (%):	12.9
Sample Location:	B-2 @ 0-5'	Tested by:	JH	Cohesion:	310 psf
Sample Description:	Light Gray (SC) [Remolded to 90%]			Angle Of Friction:	37.3







SHEAR STRENGTH TEST - ASTM D3080

Job Name:	Jefferson M.S.	Initial Dry Density (pcf):	110.7
Project Number:	10-15771G	Sample Date: 12/10/2020	Initial Moisture (%): 19.9
Lab Number:	31587	Test Date: 12/21/2020	Final Moisture (%): 25.7
Sample Location:	B-5 @ 18.5'	Tested by: JH	Cohesion: 680 psf
Sample Description:	Moderate Brown (SM)	Angle Of Friction:	46.9

APPENDIX D

STANDARD SPECIFICATIONS FOR GRADING

Section 1 - General

Construction Testing & Engineering, Inc. presents the following standard recommendations for grading and other associated operations on construction projects. These guidelines should be considered a portion of the project specifications. Recommendations contained in the body of the previously presented soils report shall supersede the recommendations and or requirements as specified herein. The project geotechnical consultant shall interpret disputes arising out of interpretation of the recommendations contained in the soils report or specifications contained herein.

Section 2 - Responsibilities of Project Personnel

The geotechnical consultant should provide observation and testing services sufficient to general conformance with project specifications and standard grading practices. The geotechnical consultant should report any deviations to the client or his authorized representative.

The Client should be chiefly responsible for all aspects of the project. He or his authorized representative has the responsibility of reviewing the findings and recommendations of the geotechnical consultant. He shall authorize or cause to have authorized the Contractor and/or other consultants to perform work and/or provide services. During grading the Client or his authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

The Contractor is responsible for the safety of the project and satisfactory completion of all grading and other associated operations on construction projects, including, but not limited to, earth work in accordance with the project plans, specifications and controlling agency requirements.

Section 3 - Preconstruction Meeting

A preconstruction site meeting should be arranged by the owner and/or client and should include the grading contractor, design engineer, geotechnical consultant, owner's representative and representatives of the appropriate governing authorities.

Section 4 - Site Preparation

The client or contractor should obtain the required approvals from the controlling authorities for the project prior, during and/or after demolition, site preparation and removals, etc. The appropriate approvals should be obtained prior to proceeding with grading operations.

Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, root of trees and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

Demolition should include removal of buildings, structures, foundations, reservoirs, utilities (including underground pipelines, septic tanks, leach fields, seepage pits, cisterns, mining shafts, tunnels, etc.) and other man-made surface and subsurface improvements from the areas to be graded. Demolition of utilities should include proper capping and/or rerouting pipelines at the project perimeter and cutoff and capping of wells in accordance with the requirements of the governing authorities and the recommendations of the geotechnical consultant at the time of demolition.

Trees, plants or man-made improvements not planned to be removed or demolished should be protected by the contractor from damage or injury.

Debris generated during clearing, grubbing and/or demolition operations should be wasted from areas to be graded and disposed off-site. Clearing, grubbing and demolition operations should be performed under the observation of the geotechnical consultant.

Section 5 - Site Protection

Protection of the site during the period of grading should be the responsibility of the contractor. Unless other provisions are made in writing and agreed upon among the concerned parties, completion of a portion of the project should not be considered to preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete as identified by the geotechnical consultant, the client and the regulating agencies.

Precautions should be taken during the performance of site clearing, excavations and grading to protect the work site from flooding, ponding or inundation by poor or improper surface drainage. Temporary provisions should be made during the rainy season to adequately direct surface drainage away from and off the work site. Where low areas cannot be avoided, pumps should be kept on hand to continually remove water during periods of rainfall.

Rain related damage should be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions as determined by the geotechnical consultant. Soil adversely affected should be classified as unsuitable materials and should be subject to overexcavation and replacement with compacted fill or other remedial grading as recommended by the geotechnical consultant.

The contractor should be responsible for the stability of all temporary excavations. Recommendations by the geotechnical consultant pertaining to temporary excavations (e.g., backcuts) are made in consideration of stability of the completed project and, therefore, should not be considered to preclude the responsibilities of the contractor. Recommendations by the geotechnical consultant should not be considered to preclude requirements that are more restrictive by the regulating agencies. The contractor should provide during periods of extensive rainfall plastic sheeting to prevent unprotected slopes from becoming saturated and unstable. When deemed appropriate by the geotechnical consultant or governing agencies the contractor shall install checkdams, desilting basins, sand bags or other drainage control measures.

In relatively level areas and/or slope areas, where saturated soil and/or erosion gullies exist to depths of greater than 1.0 foot; they should be overexcavated and replaced as compacted fill in accordance with the applicable specifications. Where affected materials exist to depths of 1.0 foot or less below proposed finished grade, remedial grading by moisture conditioning in-place, followed by thorough recompaction in accordance with the applicable grading guidelines herein may be attempted. If the desired results are not achieved, all affected materials should be overexcavated and replaced as compacted fill in accordance with the slope repair recommendations herein. If field conditions dictate, the geotechnical consultant may recommend other slope repair procedures.

Section 6 - Excavations

6.1 Unsuitable Materials

Materials that are unsuitable should be excavated under observation and recommendations of the geotechnical consultant. Unsuitable materials include, but may not be limited to, dry, loose, soft, wet, organic compressible natural soils and fractured, weathered, soft bedrock and nonengineered or otherwise deleterious fill materials.

Material identified by the geotechnical consultant as unsatisfactory due to its moisture conditions should be overexcavated; moisture conditioned as needed, to a uniform at or above optimum moisture condition before placement as compacted fill.

If during the course of grading adverse geotechnical conditions are exposed which were not anticipated in the preliminary soil report as determined by the geotechnical consultant additional exploration, analysis, and treatment of these problems may be recommended.

6.2 Cut Slopes
Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent cut slopes should not be steeper than 2:1 (horizontal: vertical).

The geotechnical consultant should observe cut slope excavation and if these excavations expose loose cohesionless, significantly fractured or otherwise unsuitable material, the materials should be overexcavated and replaced with a compacted stabilization fill. If encountered specific cross section details should be obtained from the Geotechnical Consultant.

When extensive cut slopes are excavated or these cut slopes are made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top of the slope.

6.3 Pad Areas
All lot pad areas, including side yard terrace containing both cut and fill materials, transitions, located less than 3 feet deep should be overexcavated to a depth of 3 feet and replaced with a uniform compacted fill blanket of 3 feet. Actual depth of overexcavation may vary and should be delineated by the geotechnical consultant during grading, especially where deep or drastic transitions are present.

For pad areas created above cut or natural slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm drainage swale and/or an appropriate pad gradient. A gradient in soil areas away from the top-of-slopes of 2 percent or greater is recommended.

Section 7 - Compacted Fill

All fill materials should have fill quality, placement, conditioning and compaction as specified below or as approved by the geotechnical consultant.

7.1 Fill Material Quality
Excavated on-site or import materials which are acceptable to the geotechnical consultant may be utilized as compacted fill, provided trash, vegetation and other deleterious materials are removed prior to placement. All import materials anticipated for use on-site should be sampled tested and approved prior to and placement is in conformance with the requirements outlined.

Rocks 12 inches in maximum and smaller may be utilized within compacted fill provided sufficient fill material is placed and thoroughly compacted over and around all rock to effectively fill rock voids. The amount of rock should not exceed 40 percent by dry weight passing the 3/4-inch sieve. The geotechnical consultant may vary those requirements as field conditions dictate.

Where rocks greater than 12 inches but less than four feet of maximum dimension are generated during grading, or otherwise desired to be placed within an engineered fill, special handling in accordance with the recommendations below. Rocks greater than four feet should be broken down or disposed off-site.

7.2 Placement of Fill

Prior to placement of fill material, the geotechnical consultant should observe and approve the area to receive fill. After observation and approval, the exposed ground surface should be scarified to a depth of 6 to 8 inches. The scarified material should be conditioned (i.e. moisture added or air dried by continued discing) to achieve a moisture content at or slightly above optimum moisture conditions and compacted to a minimum of 90 percent of the maximum density or as otherwise recommended in the soils report or by appropriate government agencies.

Compacted fill should then be placed in thin horizontal lifts not exceeding eight inches in loose thickness prior to compaction. Each lift should be moisture conditioned as needed, thoroughly blended to achieve a consistent moisture content at or slightly above optimum and thoroughly compacted by mechanical methods to a minimum of 90 percent of laboratory maximum dry density. Each lift should be treated in a like manner until the desired finished grades are achieved.

The contractor should have suitable and sufficient mechanical compaction equipment and watering apparatus on the job site to handle the amount of fill being placed in consideration of moisture retention properties of the materials and weather conditions.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal: vertical), horizontal keys and vertical benches should be excavated into the adjacent slope area. Keying and benching should be sufficient to provide at least six-foot wide benches and a minimum of four feet of vertical bench height within the firm natural ground, firm bedrock or engineered compacted fill. No compacted fill should be placed in an area after keying and benching until the geotechnical consultant has reviewed the area. Material generated by the benching operation should be moved sufficiently away from the bench area to allow for the recommended review of the horizontal bench prior to placement of fill.

Within a single fill area where grading procedures dictate two or more separate fills, temporary slopes (false slopes) may be created. When placing fill adjacent to a false slope, benching should be conducted in the same manner as above described. At least a 3-foot vertical bench should be established within the firm core of adjacent approved compacted fill prior to placement of additional fill. Benching should proceed in at least 3-foot vertical increments until the desired finished grades are achieved.

Prior to placement of additional compacted fill following an overnight or other grading delay, the exposed surface or previously compacted fill should be processed by scarification, moisture conditioning as needed to at or slightly above optimum moisture content, thoroughly blended and recompacted to a minimum of 90 percent of laboratory maximum dry density. Where unsuitable materials exist to depths of greater than one foot, the unsuitable materials should be over-excavated.

Following a period of flooding, rainfall or overwatering by other means, no additional fill should be placed until damage assessments have been made and remedial grading performed as described herein.

Rocks 12 inch in maximum dimension and smaller may be utilized in the compacted fill provided the fill is placed and thoroughly compacted over and around all rock. No oversize material should be used within 3 feet of finished pad grade and within 1 foot of other compacted fill areas. Rocks 12 inches up to four feet maximum dimension should be placed below the upper 10 feet of any fill and should not be closer than 15 feet to any slope face. These recommendations could vary as locations of improvements dictate. Where practical, oversized material should not be placed below areas where structures or deep utilities are proposed. Oversized material should be placed in windrows on a clean, overexcavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (S.E. 30 or higher) should be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversized material should be staggered so those successive strata of oversized material are not in the same vertical plane.

It may be possible to dispose of individual larger rock as field conditions dictate and as recommended by the geotechnical consultant at the time of placement.

The contractor should assist the geotechnical consultant and/or his representative by digging test pits for removal determinations and/or for testing compacted fill. The contractor should provide this work at no additional cost to the owner or contractor's client.

Fill should be tested by the geotechnical consultant for compliance with the recommended relative compaction and moisture conditions. Field density testing should conform to ASTM Method of Test D 1556-00, D 2922-04. Tests should be conducted at a minimum of approximately two vertical feet or approximately 1,000 to 2,000 cubic yards of fill placed. Actual test intervals may vary as field conditions dictate. Fill found not to be in conformance with the grading recommendations should be removed or otherwise handled as recommended by the geotechnical consultant.

7.3 Fill Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent fill slopes should not be steeper than 2:1 (horizontal: vertical).

Except as specifically recommended in these grading guidelines compacted fill slopes should be over-built two to five feet and cut back to grade, exposing the firm, compacted fill inner core. The actual amount of overbuilding may vary as field conditions dictate. If the desired results are not achieved, the existing slopes should be overexcavated and reconstructed under the guidelines of the geotechnical consultant. The degree of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by the contractor to provide thorough mechanical compaction to the outer edge of the overbuilt slope surface.

At the discretion of the geotechnical consultant, slope face compaction may be attempted by conventional construction procedures including backrolling. The procedure must create a firmly compacted material throughout the entire depth of the slope face to the surface of the previously compacted firm fill intercore.

During grading operations, care should be taken to extend compactive effort to the outer edge of the slope. Each lift should extend horizontally to the desired finished slope surface or more as needed to ultimately established desired grades. Grade during construction should not be allowed to roll off at the edge of the slope. It may be helpful to elevate slightly the outer edge of the slope. Slough resulting from the placement of individual lifts should not be allowed to drift down over previous lifts. At intervals not exceeding four feet in vertical slope height or the capability of available equipment, whichever is less, fill slopes should be thoroughly dozer trackrolled.

For pad areas above fill slopes, positive drainage should be established away from the top-of-slope. This may be accomplished using a berm and pad gradient of at least two percent.

Section 8 - Trench Backfill

Utility and/or other excavation of trench backfill should, unless otherwise recommended, be compacted by mechanical means. Unless otherwise recommended, the degree of compaction should be a minimum of 90 percent of the laboratory maximum density.

Within slab areas, but outside the influence of foundations, trenches up to one foot wide and two feet deep may be backfilled with sand and consolidated by jetting, flooding or by mechanical means. If on-site materials are utilized, they should be wheel-rolled, tamped or otherwise compacted to a firm condition. For minor interior trenches, density testing may be deleted or spot testing may be elected if deemed necessary, based on review of backfill operations during construction.

If utility contractors indicate that it is undesirable to use compaction equipment in close proximity to a buried conduit, the contractor may elect the utilization of light weight mechanical compaction equipment and/or shading of the conduit with clean, granular material, which should be thoroughly jetted in-place above the conduit, prior to initiating mechanical compaction procedures. Other methods of utility trench compaction may also be appropriate, upon review of the geotechnical consultant at the time of construction.

In cases where clean granular materials are proposed for use in lieu of native materials or where flooding or jetting is proposed, the procedures should be considered subject to review by the geotechnical consultant. Clean granular backfill and/or bedding are not recommended in slope areas.

Section 9 - Drainage

Where deemed appropriate by the geotechnical consultant, canyon subdrain systems should be installed in accordance with CTE's recommendations during grading.

Typical subdrains for compacted fill buttresses, slope stabilization or sidehill masses, should be installed in accordance with the specifications.

Roof, pad and slope drainage should be directed away from slopes and areas of structures to suitable disposal areas via non-erodible devices (i.e., gutters, downspouts, and concrete swales).

For drainage in extensively landscaped areas near structures, (i.e., within four feet) a minimum of 5 percent gradient away from the structure should be maintained. Pad drainage of at least 2 percent should be maintained over the remainder of the site.

Drainage patterns established at the time of fine grading should be maintained throughout the life of the project. Property owners should be made aware that altering drainage patterns could be detrimental to slope stability and foundation performance.

Section 10 - Slope Maintenance

10.1 - Landscape Plants

To enhance surficial slope stability, slope planting should be accomplished at the completion of grading. Slope planting should consist of deep-rooting vegetation requiring little watering. Plants native to the southern California area and plants relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A Landscape Architect should be the best party to consult regarding actual types of plants and planting configuration.

10.2 - Irrigation

Irrigation pipes should be anchored to slope faces, not placed in trenches excavated into slope faces.

Slope irrigation should be minimized. If automatic timing devices are utilized on irrigation systems, provisions should be made for interrupting normal irrigation during periods of rainfall.

10.3 - Repair

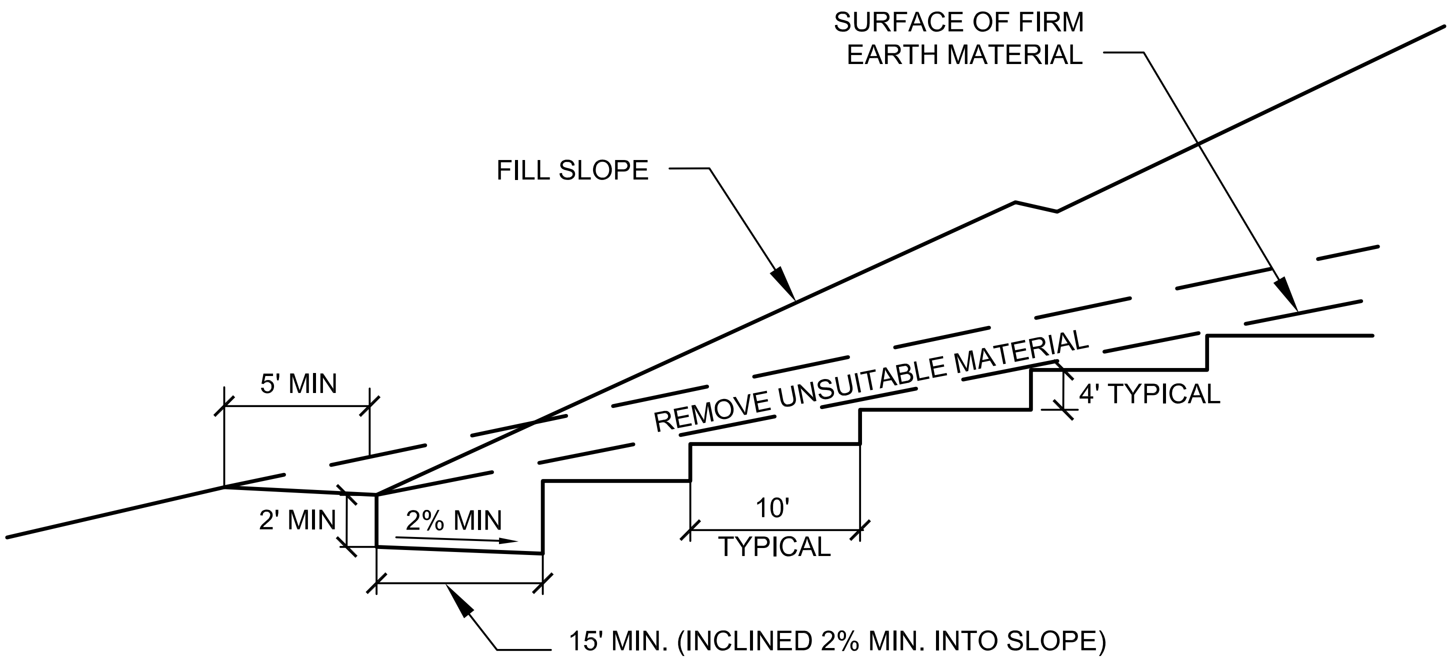
As a precautionary measure, plastic sheeting should be readily available, or kept on hand, to protect all slope areas from saturation by periods of heavy or prolonged rainfall. This measure is strongly recommended, beginning with the period prior to landscape planting.

If slope failures occur, the geotechnical consultant should be contacted for a field review of site conditions and development of recommendations for evaluation and repair.

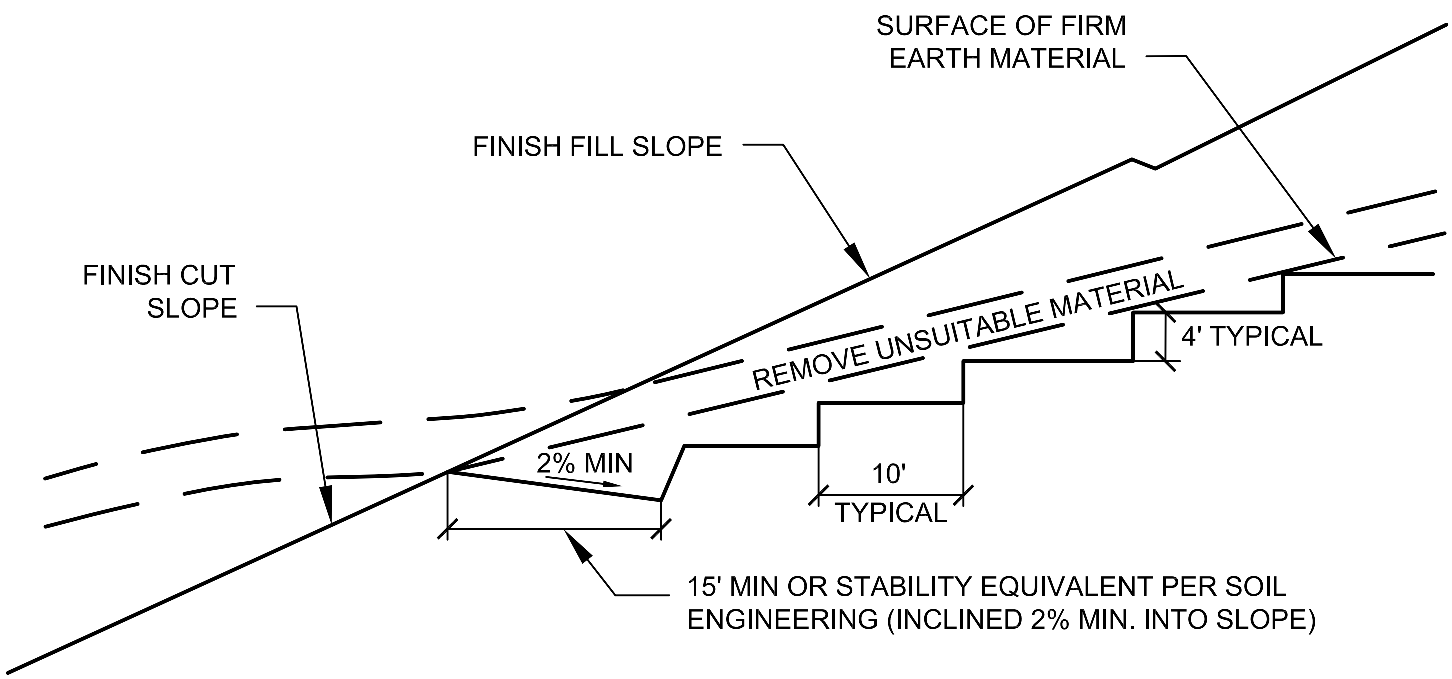
If slope failures occur as a result of exposure to period of heavy rainfall, the failure areas and currently unaffected areas should be covered with plastic sheeting to protect against additional saturation.

In the accompanying Standard Details, appropriate repair procedures are illustrated for superficial slope failures (i.e., occurring typically within the outer one foot to three feet of a slope face).

BENCHING FILL OVER NATURAL

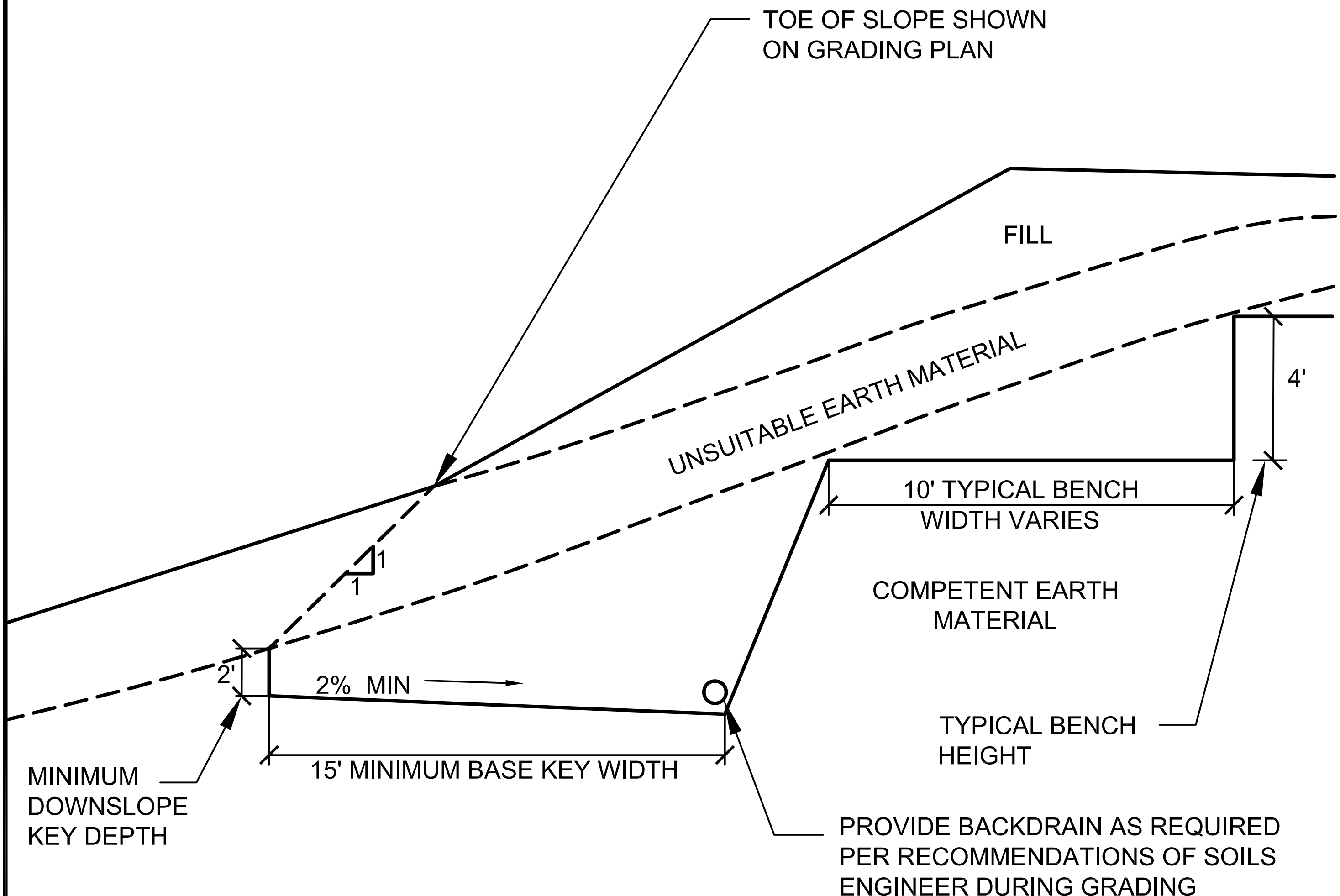


BENCHING FILL OVER CUT



NOT TO SCALE

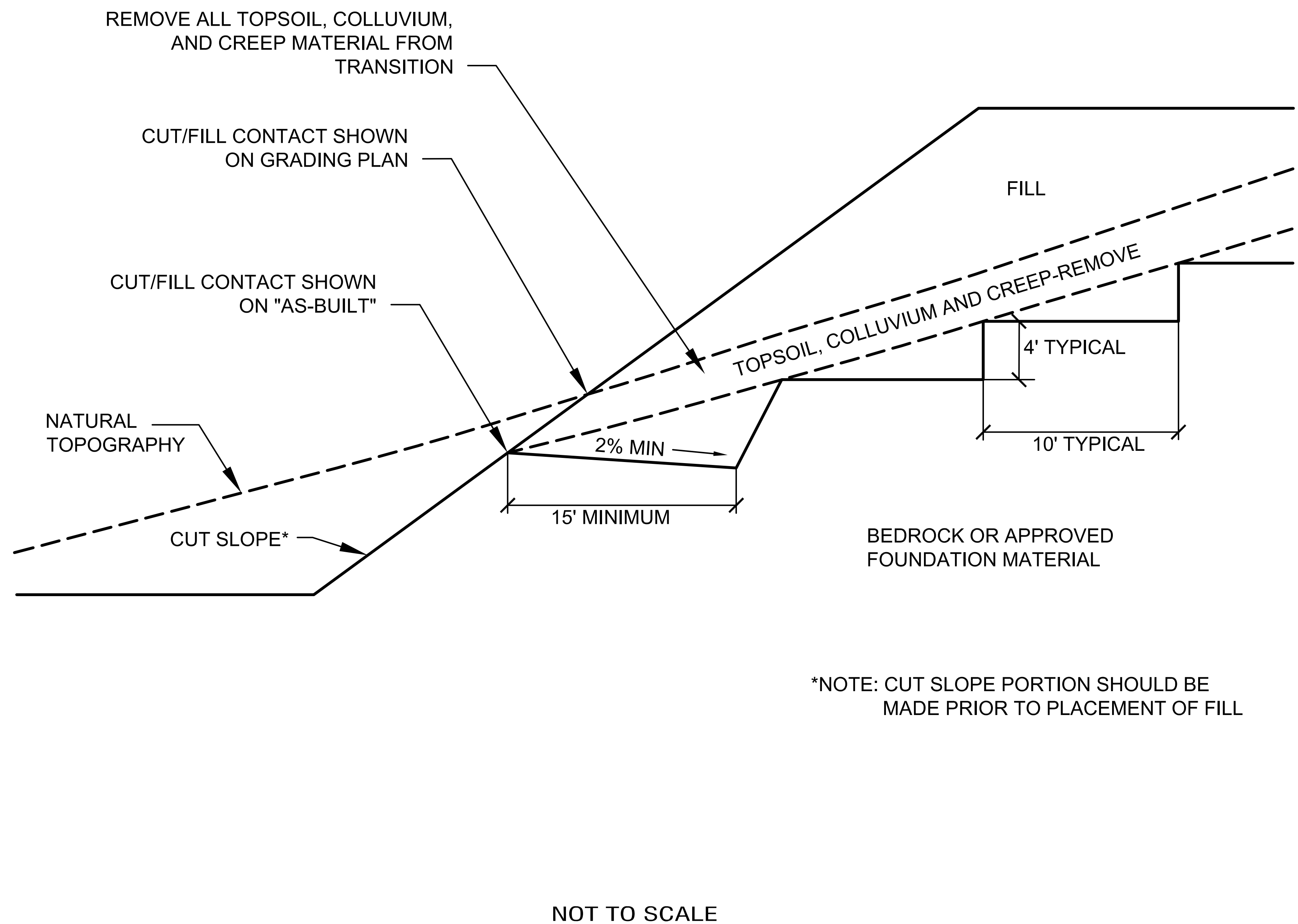
BENCHING FOR COMPACTED FILL DETAIL



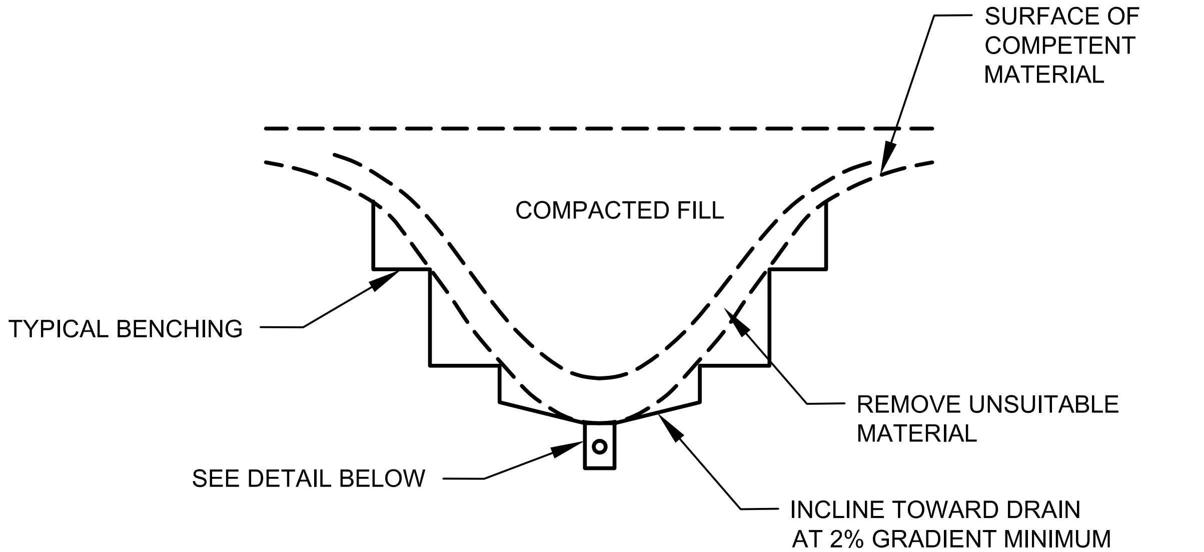
WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, BENCHING IS NOT NECESSARY. FILL IS NOT TO BE PLACED ON COMPRESSIBLE OR UNSUITABLE MATERIAL.

NOT TO SCALE

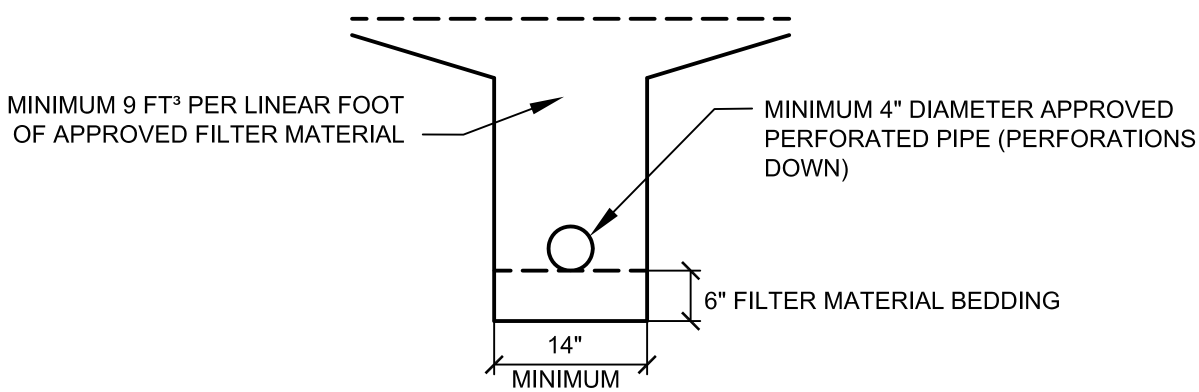
FILL SLOPE ABOVE NATURAL GROUND DETAIL



FILL SLOPE ABOVE CUT SLOPE DETAIL



DETAIL



CALTRANS CLASS 2 PERMEABLE MATERIAL FILTER MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYL-CHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 psi

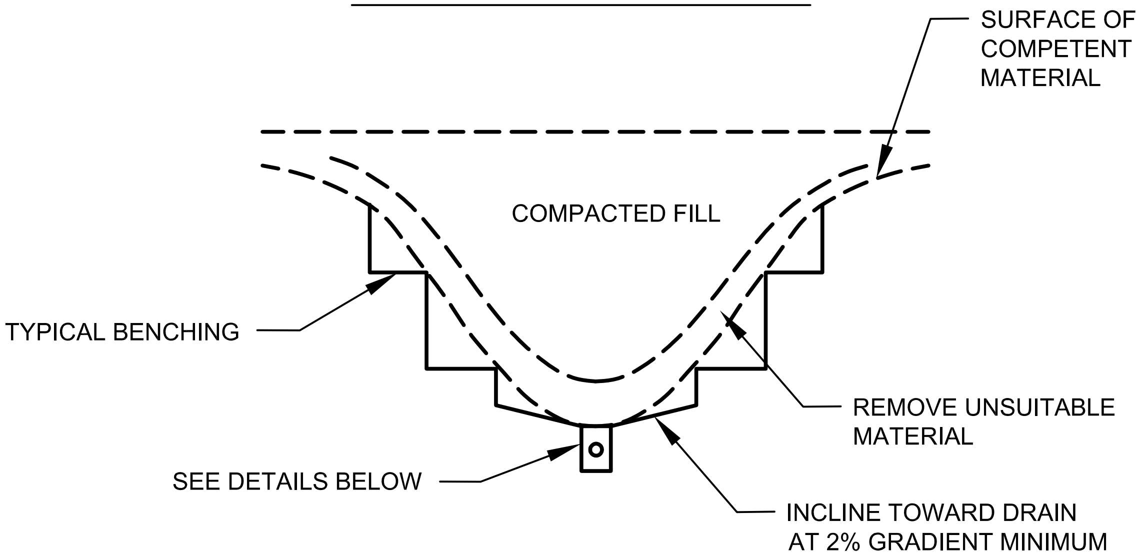
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

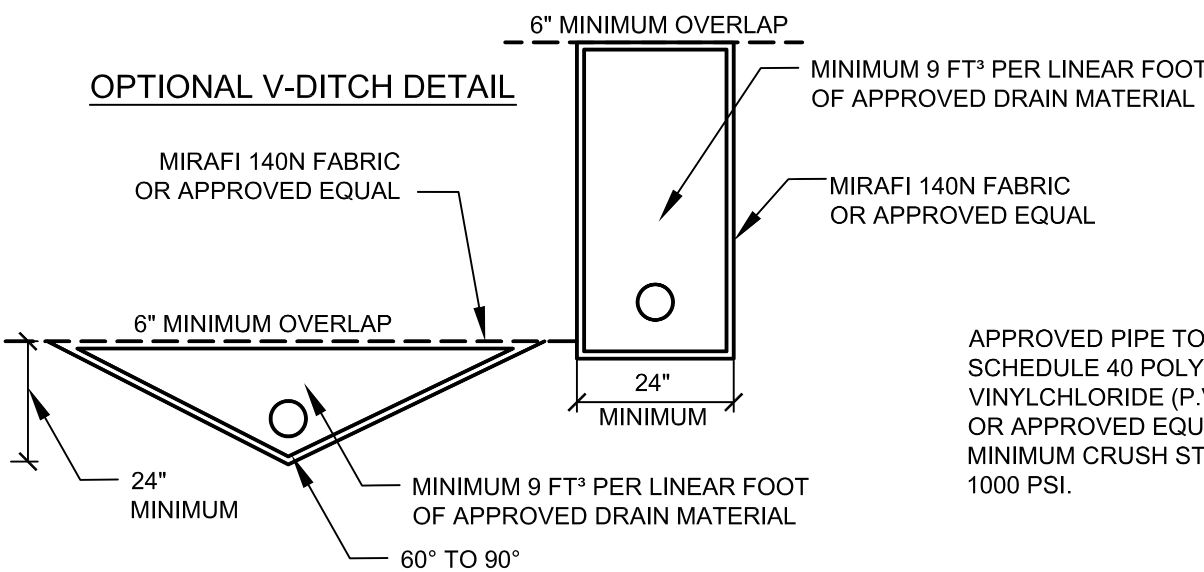
NOT TO SCALE

TYPICAL CANYON SUBDRAIN DETAIL

CANYON SUBDRAIN DETAILS



TRENCH DETAILS



APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYLCHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 PSI.

DRAIN MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1 ½"	88-100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

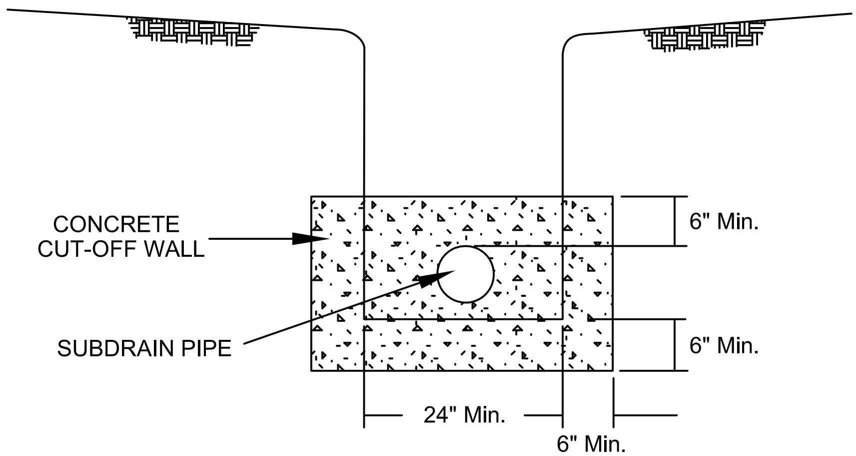
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

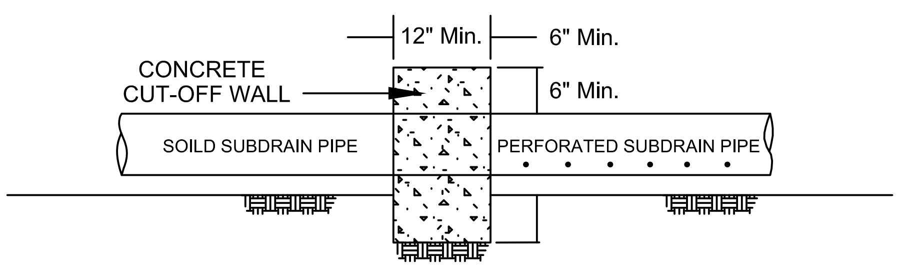
NOT TO SCALE

GEOFABRIC SUBDRAIN

FRONT VIEW



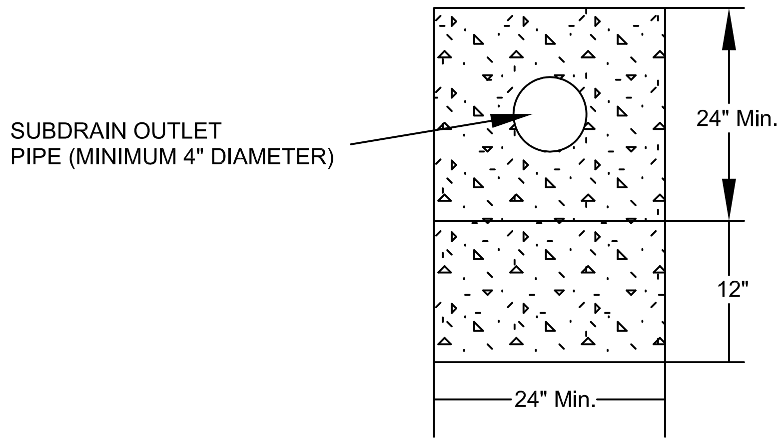
SIDE VIEW



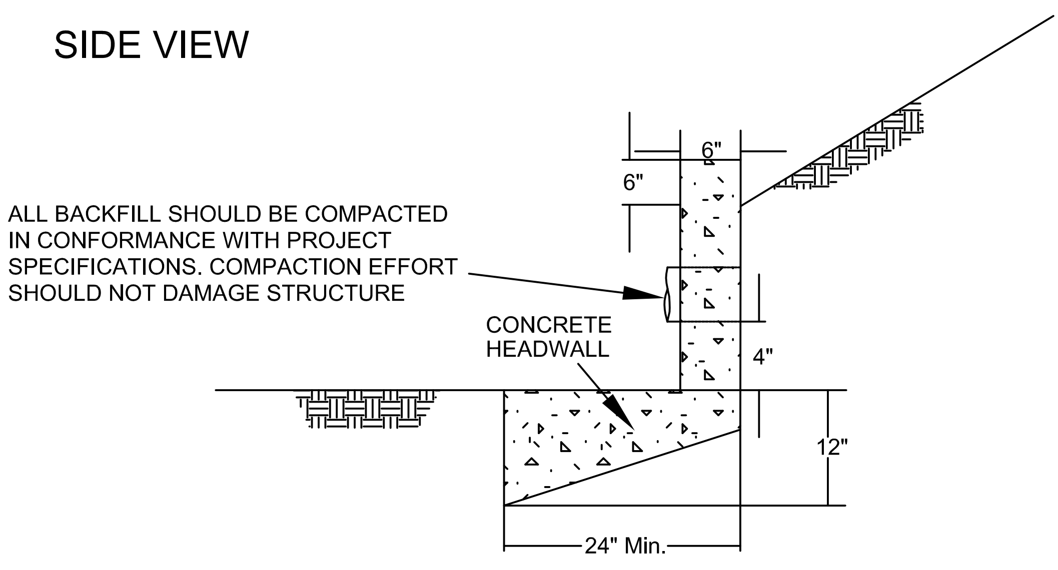
NOT TO SCALE

RECOMMENDED SUBDRAIN CUT-OFF WALL

FRONT VIEW



SIDE VIEW



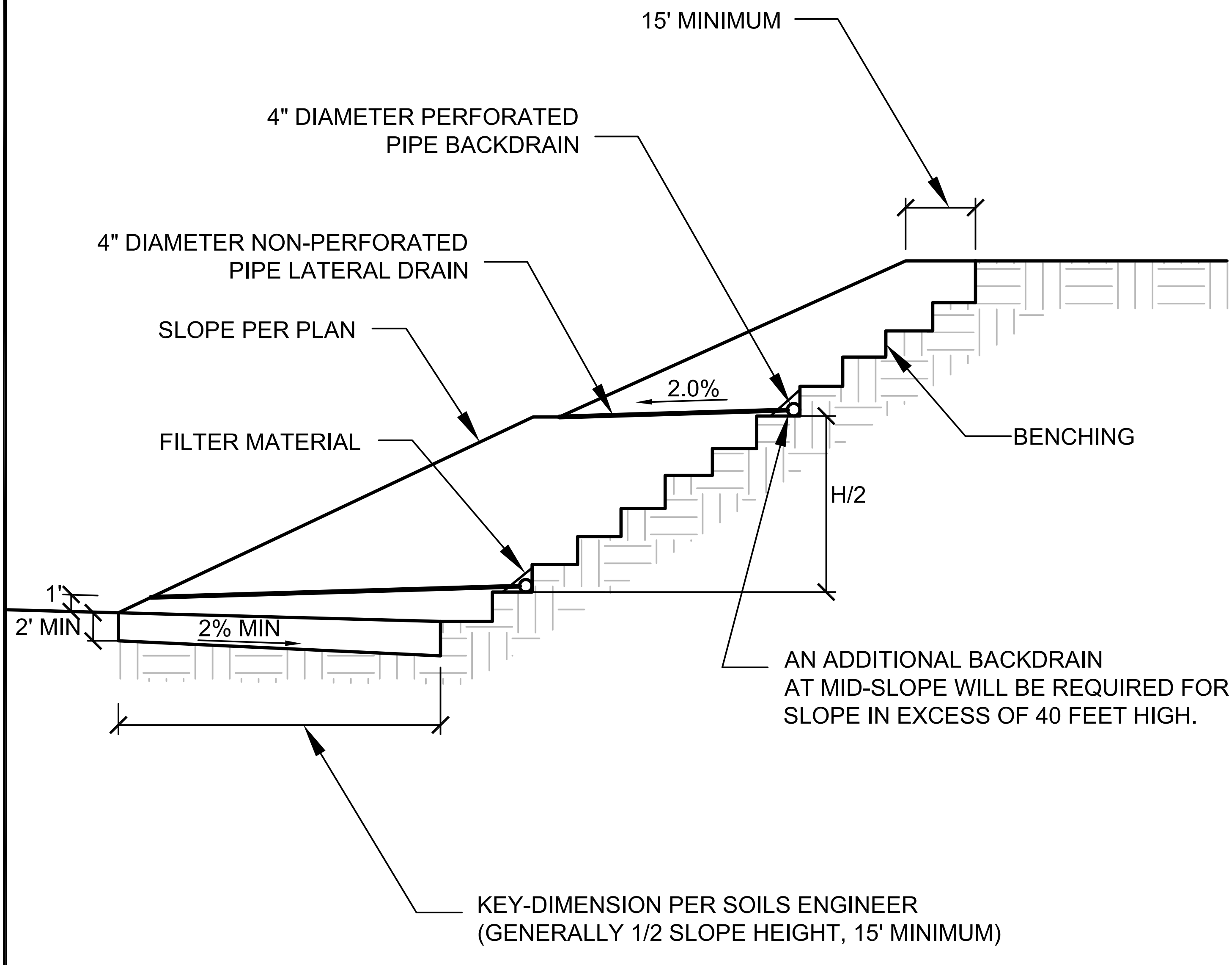
NOTE: HEADWALL SHOULD OUTLET AT TOE OF SLOPE OR INTO CONTROLLED SURFACE DRAINAGE DEVICE

ALL DISCHARGE SHOULD BE CONTROLLED

THIS DETAIL IS A MINIMUM DESIGN AND MAY BE MODIFIED DEPENDING UPON ENCOUNTERED CONDITIONS AND LOCAL REQUIREMENTS

NOT TO SCALE

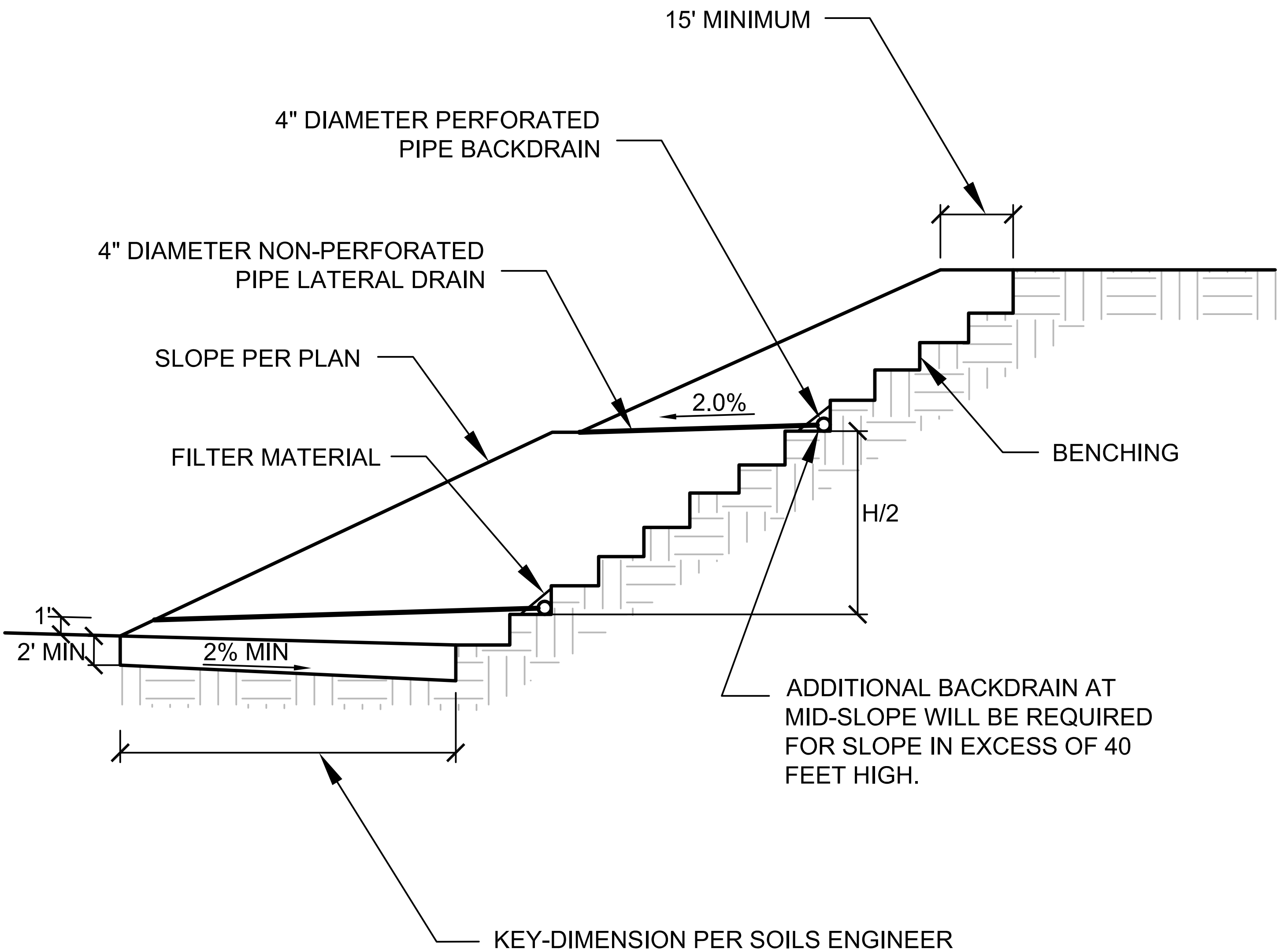
TYPICAL SUBDRAIN OUTLET HEADWALL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

NOT TO SCALE

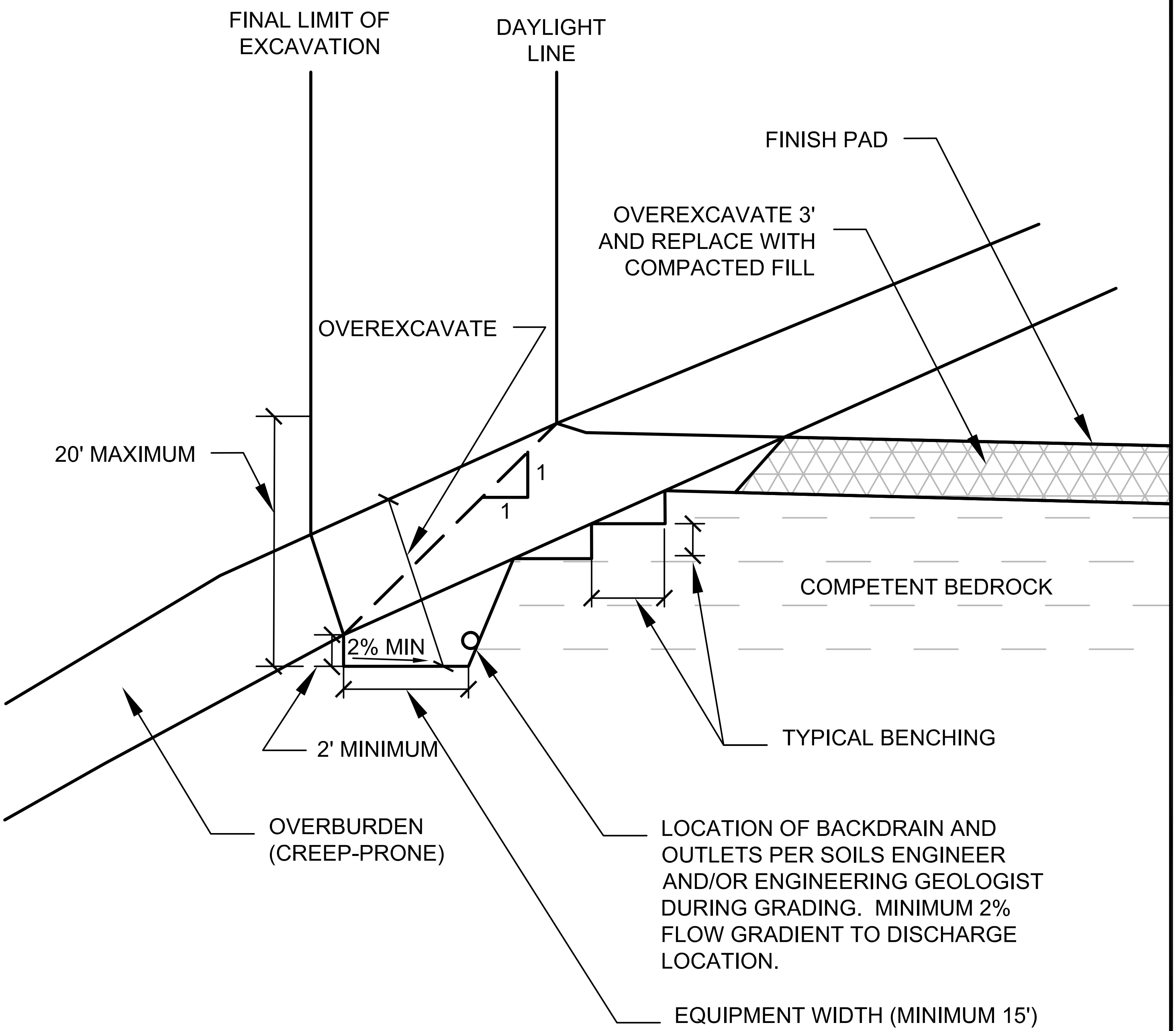
TYPICAL SLOPE STABILIZATION FILL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

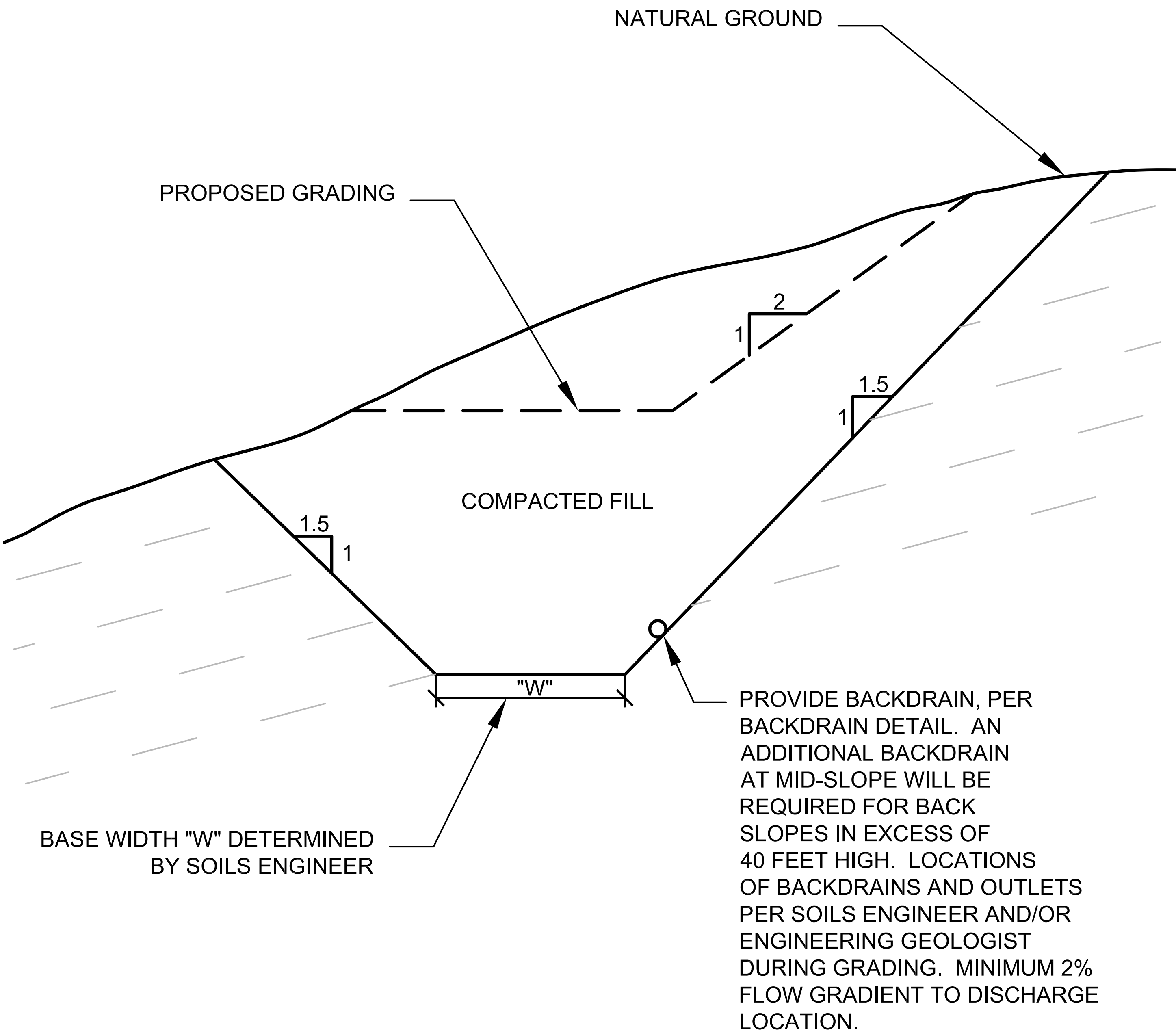
NOT TO SCALE

TYPICAL BUTTRESS FILL DETAIL



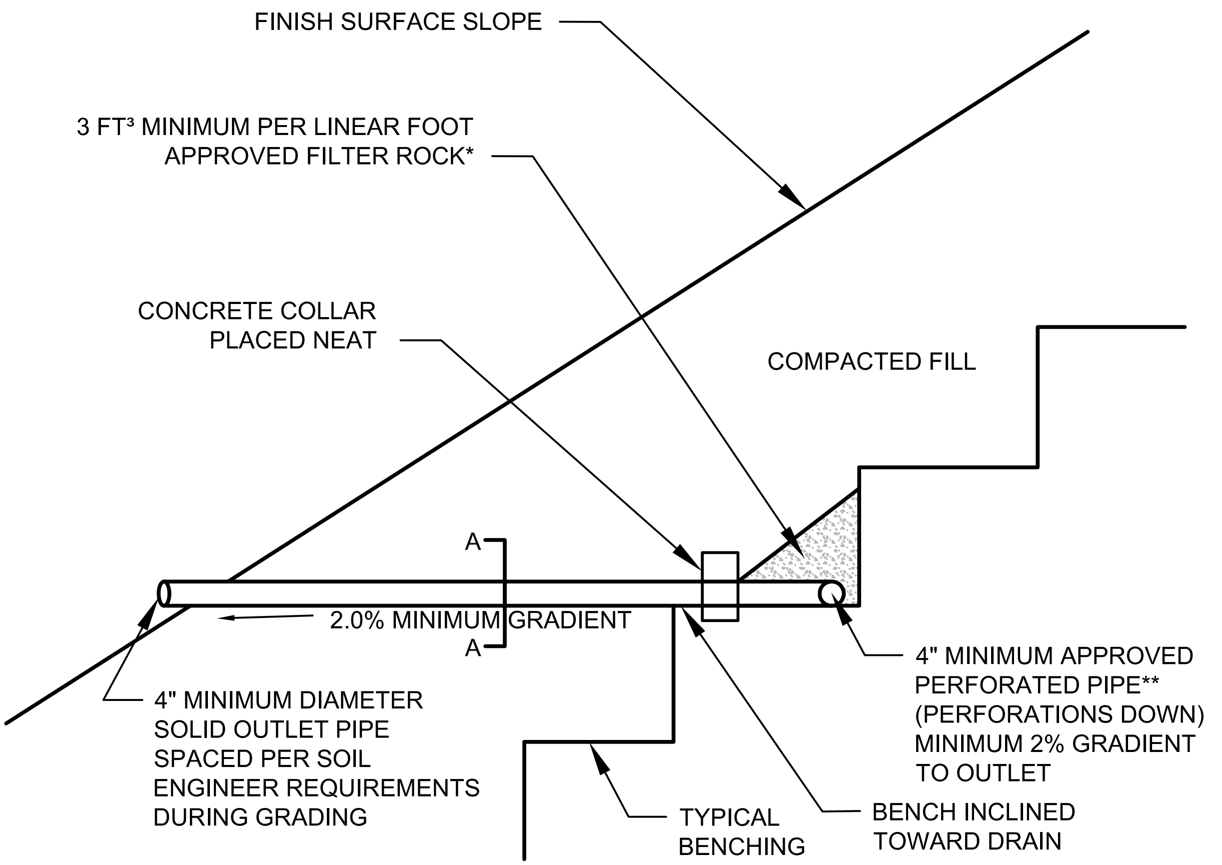
NOT TO SCALE

DAYLIGHT SHEAR KEY DETAIL

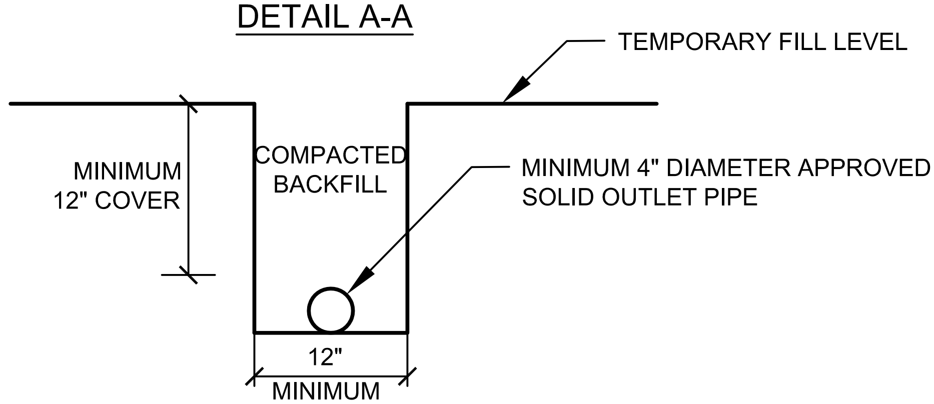


NOT TO SCALE

TYPICAL SHEAR KEY DETAIL



DETAIL A-A



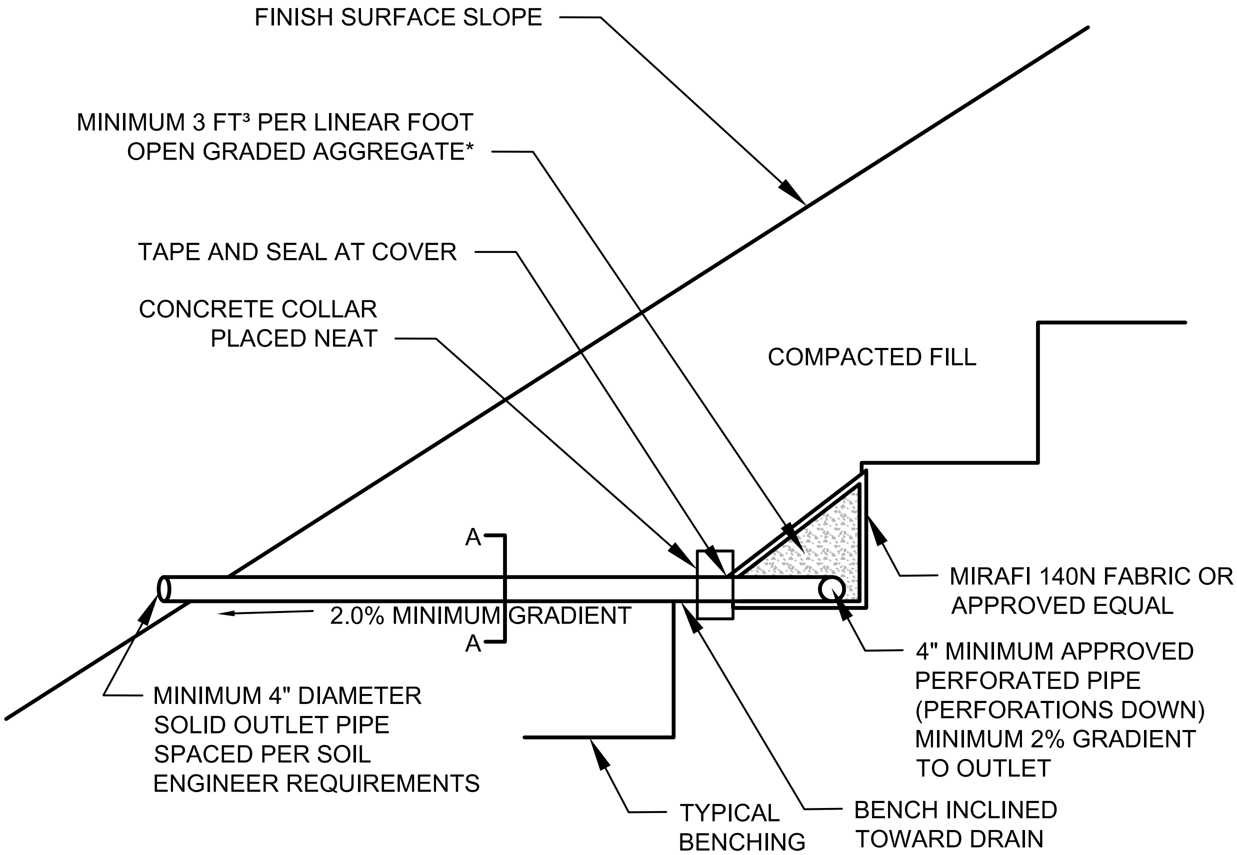
**APPROVED PIPE TYPE:
SCHEDULE 40 POLYVINYL CHLORIDE
(P.V.C.) OR APPROVED EQUAL.
MINIMUM CRUSH STRENGTH 1000 PSI

*FILTER ROCK TO MEET FOLLOWING
SPECIFICATIONS OR APPROVED EQUAL:

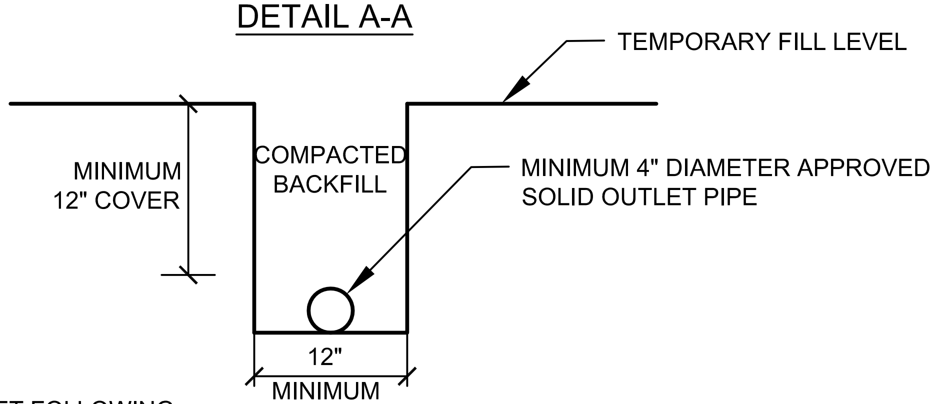
SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

NOT TO SCALE

TYPICAL BACKDRAIN DETAIL



DETAIL A-A

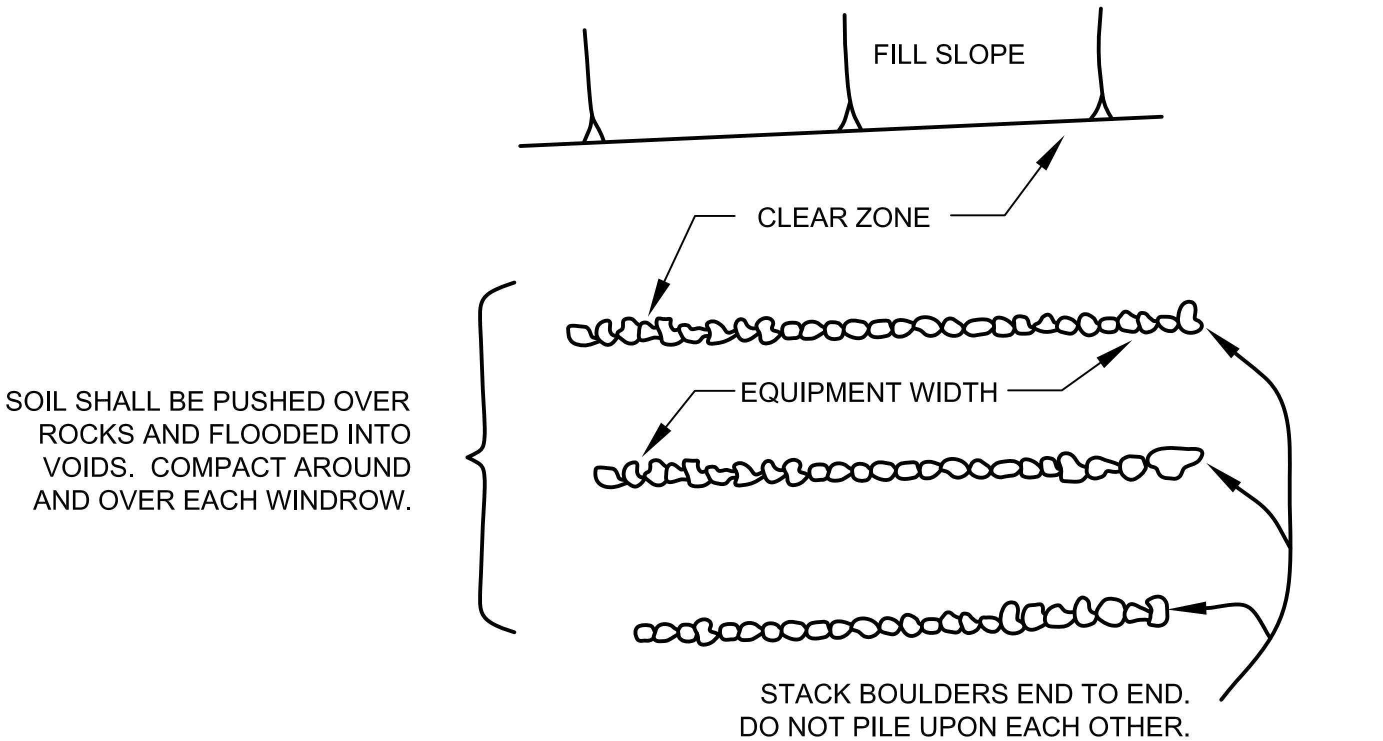


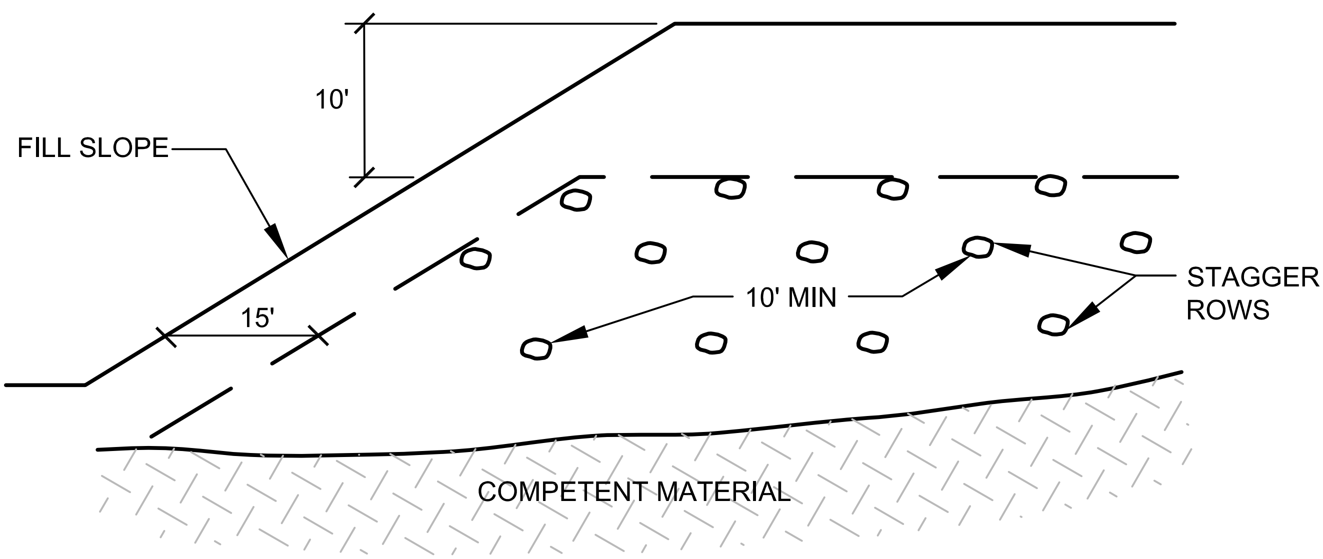
*NOTE: AGGREGATE TO MEET FOLLOWING
SPECIFICATIONS OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1 ½"	100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

NOT TO SCALE

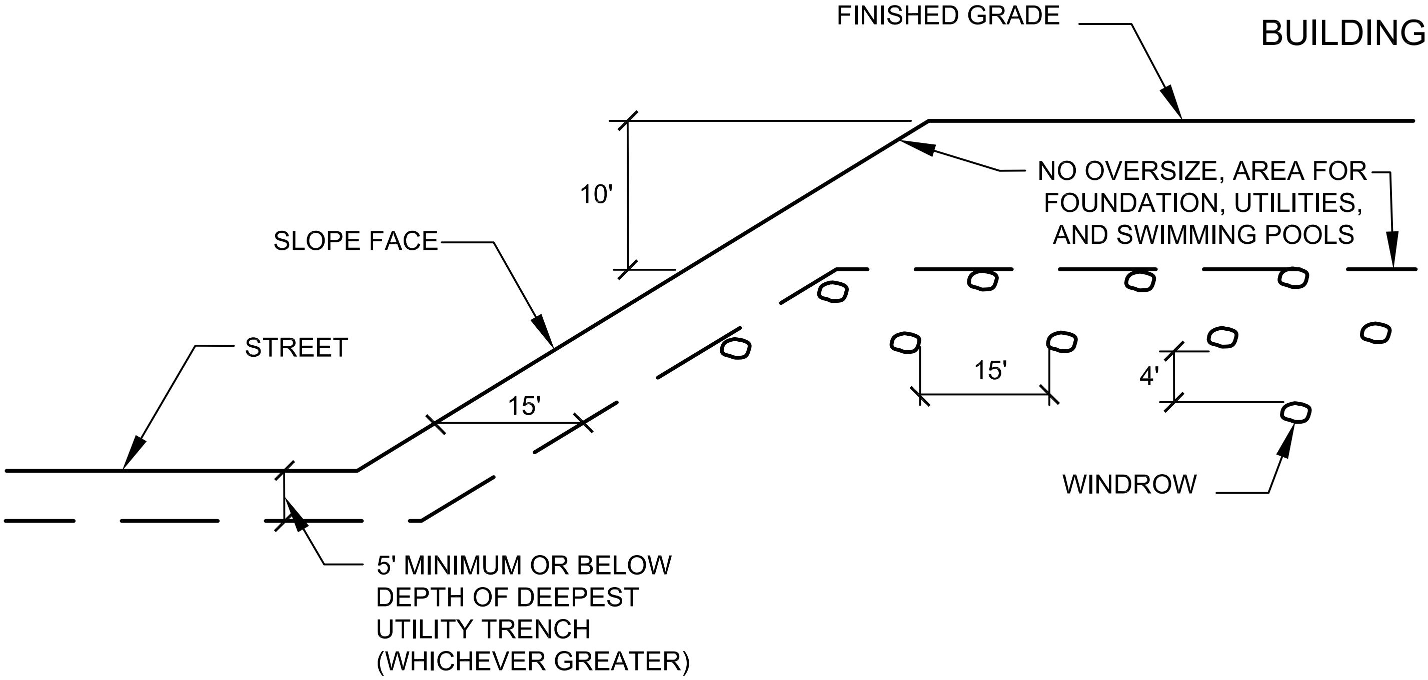
BACKDRAIN DETAIL (GEOFRABIC)



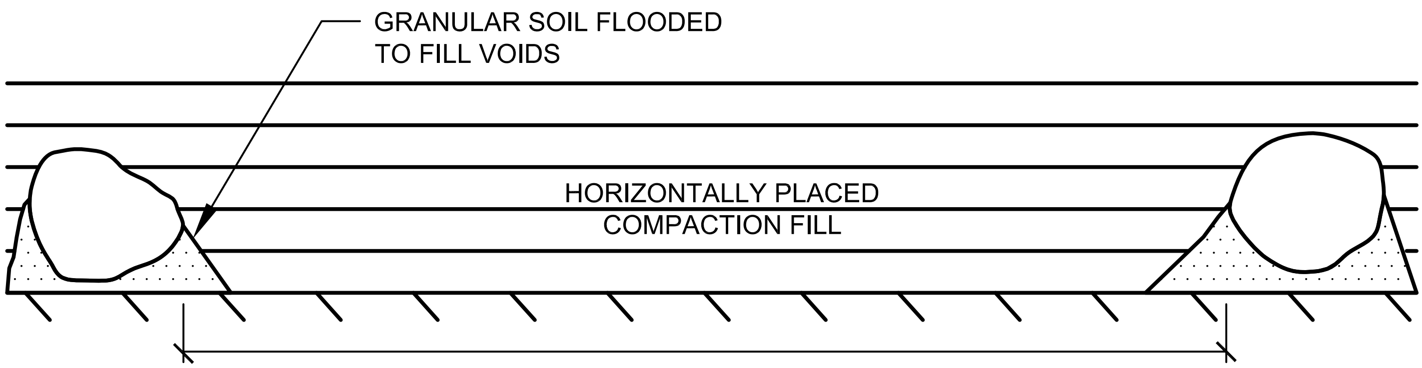


NOT TO SCALE

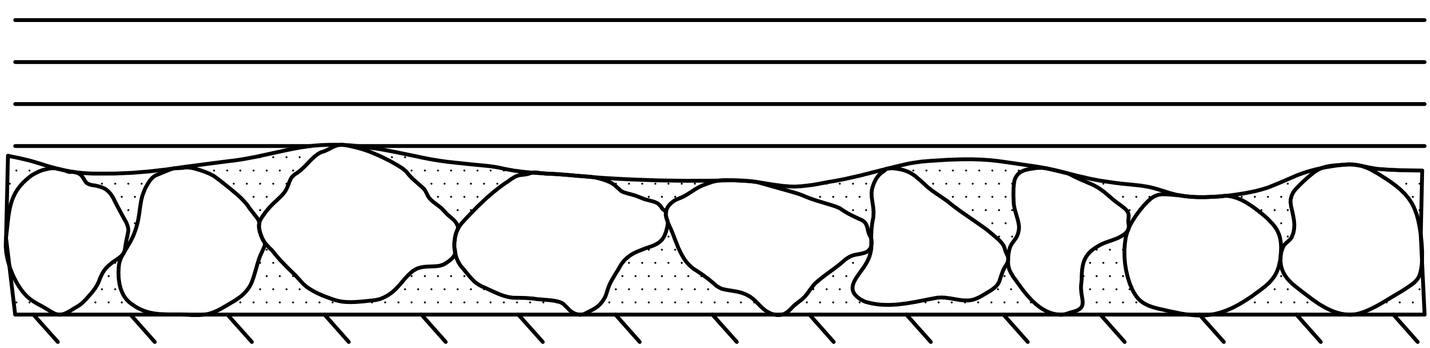
ROCK DISPOSAL DETAIL



TYPICAL WINDROW DETAIL (EDGE VIEW)



PROFILE VIEW

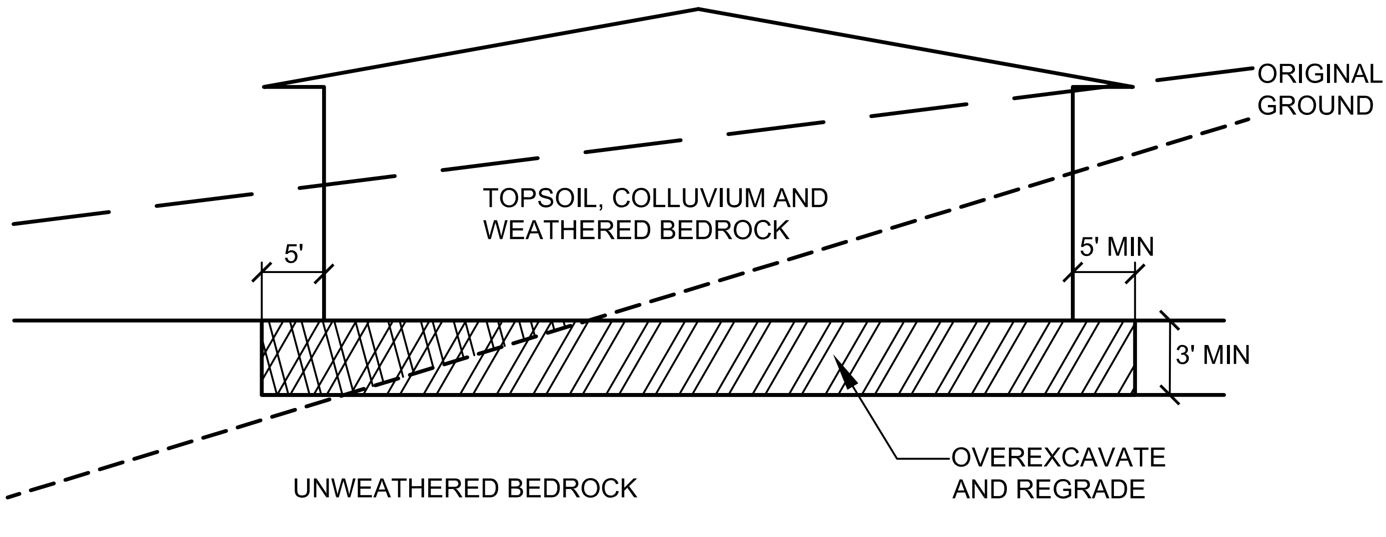


NOT TO SCALE

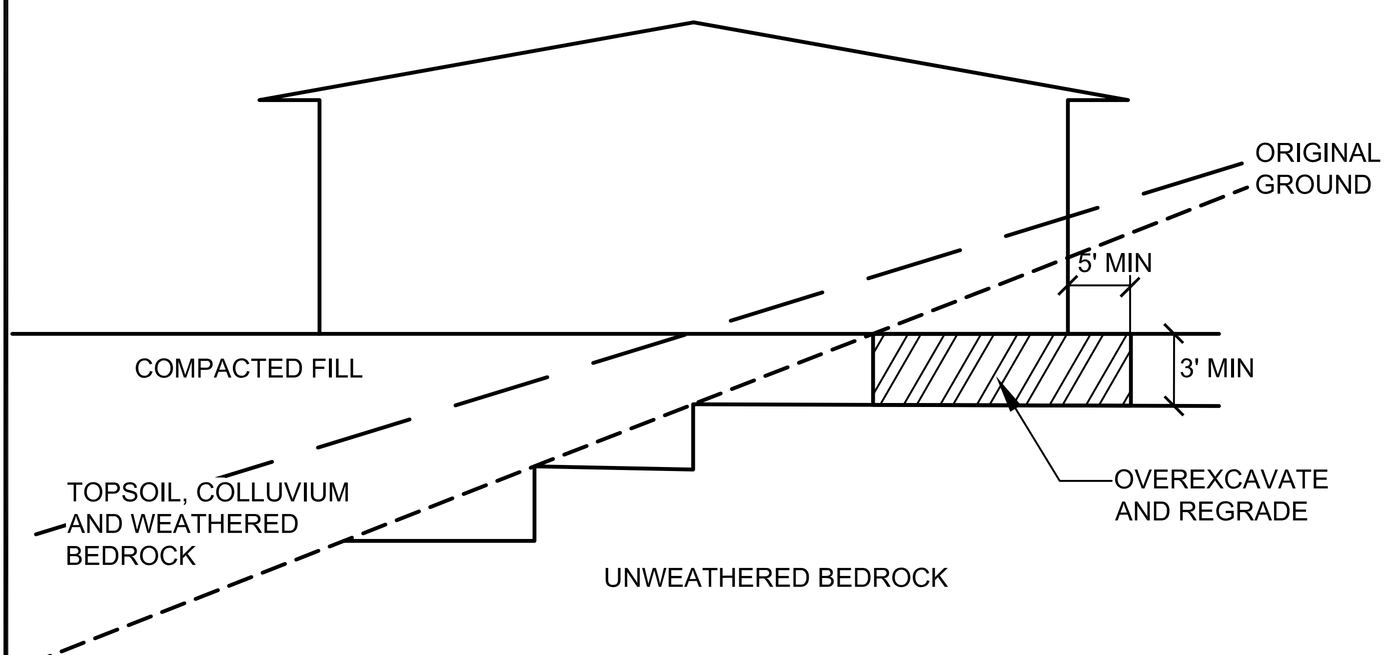
ROCK DISPOSAL DETAIL

GENERAL GRADING RECOMMENDATIONS

CUT LOT



CUT/FILL LOT (TRANSITION)



NOT TO SCALE

TRANSITION LOT DETAIL

APPENDIX E

PERCOLATION TO INFILTRATION CALCULATIONS AND FIELD DATA

Project: Jefferson M. S.

Project No.: 10-15771G — Tables P-1

Percolation Field Data and Calculated Rates

P-1 — **Total Depth: 63.5 inches**

Time	Test Interval Time (minutes)	Test Refill Depth /Inches	Water Level Initial/Start Depth /Inches	Water Level End/Final Depth /Inches	Incremental Water Level Change (inches)	Percolation Rate inches/minute	Percolation Rate inches/hour
9:08:00	Initial	None	55.75	initial	-		
9:38:00	30	NO	55.75	56.25	0.50	0.017	1.000
10:08:00	30	NO	56.25	56.63	0.38	0.013	0.750
10:38:00	30	55	56.63	57.13	0.50	0.017	1.000
11:08:00	30	NO	55.00	55.25	0.25	0.008	0.500
11:38:00	30	NO	55.25	55.50	0.25	0.008	0.500
12:08:00	30	NO	55.50	55.88	0.38	0.013	0.750
12:38:00	30	55.25	55.88	56.13	0.25	0.008	0.500
13:08:00	30	NO	55.25	55.50	0.25	0.008	0.500

P-2 — **Total Depth: 43.5 inches**

Time	Test Interval Time (minutes)	Test Refill Depth /Inches	Water Level Initial/Start Depth /Inches	Water Level End/Final Depth /Inches	Incremental Water Level Change (inches)	Percolation Rate inches/minute	Percolation Rate inches/hour
9:10:00	Initial	None	35.50	initial	-		
9:40:00	30	NO	35.50	35.63	0.125	0.004	0.250
10:10:00	30	NO	35.63	35.88	0.250	0.008	0.500
10:40:00	30	NO	35.88	36.00	0.125	0.004	0.250
11:10:00	30	NO	36.00	36.13	0.125	0.004	0.250
11:40:00	30	NO	36.13	36.38	0.250	0.008	0.500
12:10:00	30	35	36.38	36.50	0.125	0.004	0.250
12:40:00	30	NO	35.00	35.13	0.125	0.004	0.250
13:10:00	30	NO	35.13	35.25	0.125	0.004	0.250

P-3 — **Total Depth: 58 inches**

Time	Test Interval Time (minutes)	Test Refill Depth /Inches	Water Level Initial/Start Depth /Inches	Water Level End/Final Depth /Inches	Incremental Water Level Change (inches)	Percolation Rate inches/minute	Percolation Rate inches/hour
9:28:00	Initial	None	48.50	initial	-		
9:58:00	30	NO	48.50	50.25	1.75	0.058	3.500
10:28:00	30	48.875	50.25	51.63	1.38	0.046	2.750
10:58:00	30	NO	48.88	49.75	0.88	0.029	1.750
11:28:00	30	49.25	49.75	50.75	1.00	0.033	2.000
11:58:00	30	NO	49.25	50.13	0.88	0.029	1.750
12:28:00	30	50.125	50.13	50.88	0.75	0.025	1.500
12:58:00	30	NO	50.13	50.88	0.75	0.025	1.500
13:28:00	30	NO	50.88	51.63	0.75	0.025	1.500

P-4					Total Depth:	54 inches	
Time	Test Interval Time (minutes)	Test Refill Depth /Inches	Water Level Initial/Start Depth /Inches	Water Level End/Final Depth /Inches	Incremental Water Level Change (inches)	Percolation Rate inches/minute	Percolation Rate inches/hour
9:30:00	Initial	None	46.00	initial	-		
10:00:00	30	NO	46.00	46.06	0.06	0.002	0.125
10:30:00	30	NO	46.06	46.06	0.00	0.000	0.000

P-5					Total Depth:	28 inches	
Time	Test Interval Time (minutes)	Test Refill Depth /Inches	Water Level Initial/Start Depth /Inches	Water Level End/Final Depth /Inches	Incremental Water Level Change (inches)	Percolation Rate inches/minute	Percolation Rate inches/hour
8:38:00	Initial	None	20.00	initial	-		
9:08:00	30	20	20.00	21.00	1.00	0.033	2.000
9:38:00	30	NO	20.00	20.63	0.63	0.021	1.250
10:08:00	30	20	20.63	21.00	0.38	0.013	0.750
10:38:00	30	NO	20.00	20.25	0.25	0.008	0.500
11:08:00	30	NO	20.25	20.50	0.25	0.008	0.500
11:38:00	30	NO	20.50	20.63	0.13	0.004	0.250
12:08:00	30	NO	20.63	20.88	0.25	0.008	0.500
12:38:00	30	NO	20.88	21.00	0.13	0.004	0.250

P-6					Total Depth:	28 inches	
Time	Test Interval Time (minutes)	Test Refill Depth /Inches	Water Level Initial/Start Depth /Inches	Water Level End/Final Depth /Inches	Incremental Water Level Change (inches)	Percolation Rate inches/minute	Percolation Rate inches/hour
8:40:00	Initial	None	20.00	initial	-		
9:10:00	30	20	20.00	21.75	1.75	0.058	3.500
9:40:00	30	20	20.00	21.75	1.75	0.058	3.500
10:10:00	30	NO	20.00	20.38	0.38	0.013	0.750
10:40:00	30	20	20.38	21.13	0.75	0.025	1.500
11:10:00	30	NO	20.00	20.50	0.50	0.017	1.000
11:40:00	30	NO	20.50	20.88	0.38	0.013	0.750
12:10:00	30	NO	20.88	21.13	0.25	0.008	0.500
12:40:00	30	NO	21.13	21.50	0.38	0.013	0.750

P-7					Total Depth:	36 inches	
Time	Test Interval Time (minutes)	Test Refill Depth /Inches	Water Level Initial/Start Depth /Inches	Water Level End/Final Depth /Inches	Incremental Water Level Change (inches)	Percolation Rate inches/minute	Percolation Rate inches/hour
8:52:00	Initial	None	28.00	initial	-		
9:22:00	30	NO	28.00	28.25	0.25	0.008	0.500
9:52:00	30	NO	28.25	28.50	0.25	0.008	0.500
10:22:00	30	NO	28.50	28.63	0.13	0.004	0.250
10:52:00	30	NO	28.63	28.75	0.13	0.004	0.250
11:22:00	30	NO	28.75	28.88	0.13	0.004	0.250
11:52:00	30	28	28.88	29.00	0.13	0.004	0.250
12:22:00	30	NO	28.00	28.13	0.13	0.004	0.250
12:52:00	30	NO	28.13	28.19	0.06	0.002	0.125

P-8					Total Depth:	29 inches	
Time	Test Interval Time (minutes)	Test Refill Depth /Inches	Water Level Initial/Start Depth /Inches	Water Level End/Final Depth /Inches	Incremental Water Level Change (inches)	Percolation Rate inches/minute	Percolation Rate inches/hour
8:54:00	Initial	None	21.00	initial	-		
9:24:00	30	NO	21.00	21.38	0.38	0.013	0.750
9:54:00	30	NO	21.38	21.63	0.25	0.008	0.500
10:24:00	30	NO	21.63	21.88	0.25	0.008	0.500
10:54:00	30	21	21.88	22.00	0.13	0.004	0.250
11:24:00	30	NO	21.00	21.13	0.13	0.004	0.250
11:54:00	30	NO	21.13	21.25	0.13	0.004	0.250
12:24:00	30	NO	21.25	21.38	0.13	0.004	0.250
12:54:00	30	NO	21.38	21.50	0.13	0.004	0.250

Percolation Rate Conversion P-1

		Inches
Time Interval,	Δt =	30
Final Depth of Water,	D_f =	55.50
Test Hole Radius,	r =	3
Initial Depth to Water,	D_0 =	55.25
Total Depth of Test Hole,	D_T =	63.5

H_o =	8.25	in
H_f =	8	in
$\Delta H = \Delta D$ =	0.25	in
H_{avg} =	8.125	in
I_t =	0.078	in/hr

Percolation Rate Conversion P-2

		Inches
Time Interval,	Δt =	30
Final Depth of Water,	D_f =	35.25
Test Hole Radius,	r =	3
Initial Depth to Water,	D_0 =	35.13
Total Depth of Test Hole,	D_T =	43.5

H_o =	8.375	in
H_f =	8.25	in
$\Delta H = \Delta D$ =	0.125	in
H_{avg} =	8.3125	in
I_t =	0.038	in/hr

Percolation Rate Conversion P-3

		Inches
Time Interval,	Δt =	30
Final Depth of Water,	D_f =	51.63
Test Hole Radius,	r =	3
Initial Depth to Water,	D_0 =	50.88
Total Depth of Test Hole,	D_T =	58

H_o =	7.125	in
H_f =	6.375	in
$\Delta H = \Delta D$ =	0.75	in
H_{avg} =	6.75	in
I_t =	0.273	in/hr

Percolation Rate Conversion P-4

		Inches
Time Interval,	Δt =	30
Final Depth of Water,	D_f =	46.06
Test Hole Radius,	r =	3
Initial Depth to Water,	D_0 =	46.06
Total Depth of Test Hole,	D_T =	54

H_o =	7.9375	in
H_f =	7.9375	in
$\Delta H = \Delta D$ =	0	in
H_{avg} =	7.9375	in
I_t =	0.000	in/hr

Percolation Rate Conversion P-5

		Inches
Time Interval,	Δt =	30
Final Depth of Water,	D_f =	21.00
Test Hole Radius,	r =	3
Initial Depth to Water,	D_0 =	20.88
Total Depth of Test Hole,	D_T =	28

H_o =	7.125	in
H_f =	7	in
$\Delta H = \Delta D$ =	0.125	in
H_{avg} =	7.0625	in
I_t =	0.044	in/hr

Percolation Rate Conversion P-6

		Inches
Time Interval,	Δt =	30
Final Depth of Water,	D_f =	21.50
Test Hole Radius,	r =	3
Initial Depth to Water,	D_0 =	21.13
Total Depth of Test Hole,	D_T =	28

H_o =	6.875	in
H_f =	6.5	in
$\Delta H = \Delta D$ =	0.375	in
H_{avg} =	6.6875	in
I_t =	0.137	in/hr

Percolation Rate Conversion P-7

		Inches
Time Interval,	Δt =	30
Final Depth of Water,	D_f =	28.19
Test Hole Radius,	r =	3
Initial Depth to Water,	D_0 =	28.13
Total Depth of Test Hole,	D_T =	36

H_o =	7.875	in
H_f =	7.8125	in
$\Delta H = \Delta D$ =	0.0625	in
H_{avg} =	7.84375	in
I_t =	0.020	in/hr

Percolation Rate Conversion P-8

		Inches
Time Interval,	Δt =	30
Final Depth of Water,	D_f =	21.50
Test Hole Radius,	r =	3
Initial Depth to Water,	D_0 =	21.38
Total Depth of Test Hole,	D_T =	29

H_o =	7.625	in
H_f =	7.5	in
$\Delta H = \Delta D$ =	0.125	in
H_{avg} =	7.5625	in
I_t =	0.041	in/hr

TABLE

RESULTS OF PERCOLATION TESTING WITH FACTOR OF SAFETY APPLIED

Test Location	Test Depth (inches)	Case	Soil Type* (USCS Classification)	Percolation Rate (inches per hour)	Infiltration Rate (inches per hour)	Infiltration Rate with FOS of 2 Applied (inches per hour)
P-1	63.5	III	Tso	0.500	0.078	0.039
P-2	43.5	III	Qppf	0.250	0.038	0.019
P-3	58	III	Qppf	1.500	0.273	0.136
P-4	54	I	Tso	0.000	0.000	0.000
P-5	28	III	Tso	0.250	0.044	0.022
P-6	28	III	Tso	0.750	0.137	0.069
P-7	36	III	Tso	0.125	0.020	0.010
P-8	29	III	Tso	0.250	0.041	0.021

APPENDIX F

I-8 WORKSHEET

Worksheet I-8 : Categorization of Infiltration Feasibility Condition

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition</th><th colspan="2">Worksheet I-8</th></tr>
<tr><td colspan="4">Part 1 - Full Infiltration Feasibility Screening Criteria
Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?</td></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>1</td><td>Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis: The NRCS soils across the site are all Type D soils with very high surface runoff. The infiltration rates were generally consistent the NRCS mapped soil types based on percolation testing. Three soil types were present in the area of the proposed development, Quaternary Previously Placed Fill, Old Paralic Deposits, and San Onofre Breccia.

Eight percolation tests were completed with two performed in the Previously Placed Fill and eight within the San Onofre Breccia. The calculated infiltration rates (with an applied factor of safety of 2) ranged from approximately to 0.0 to 0.136 inch per hour.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>2</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis: Provided the basins are constructed in the areas with adequate set back from proposed structural improvements, slopes, and property limits, risk of geotechnical hazards will not be significantly increased.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
</table>

<table>
<tr><th colspan="4">Worksheet I-8 Page 2 of 4</th></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>3</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis: According to Geotracker, the nearest known "Open" LUST cleanup site is over two kilometers away from the site.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>4</td><td>Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis: The nearest down gradient surface waters consist of the San Luis Rey River which is over 2,300 feet from the proposed improvement area. Due to the distance and topography to the pond it is unlikely to be impacted by infiltrating site water.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>Part 1 Result*</td><td colspan="2">If all answers to rows 1 - 4 are “Yes” a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration

If any answer from row 1-4 is “No”, infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a “full infiltration” design. Proceed to Part 2</td><td>No Full</td></tr>
</table>

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

<table>
<tr><th colspan="4">Worksheet I-8 Page 3 of 4</th></tr>
<tr><td colspan="4">Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria
Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?</td></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>5</td><td>Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis: Based on infiltration rates, portions of the site are considered adequate to support partial infiltration. Stormwater BMP's should be designed based on area specific infiltration rates.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
<tr><td>6</td><td>Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis: Provided the basins are constructed in the areas with adequate set back from proposed structural improvements, slopes, and property limits, risk of geotechnical hazards will not be significantly increased.

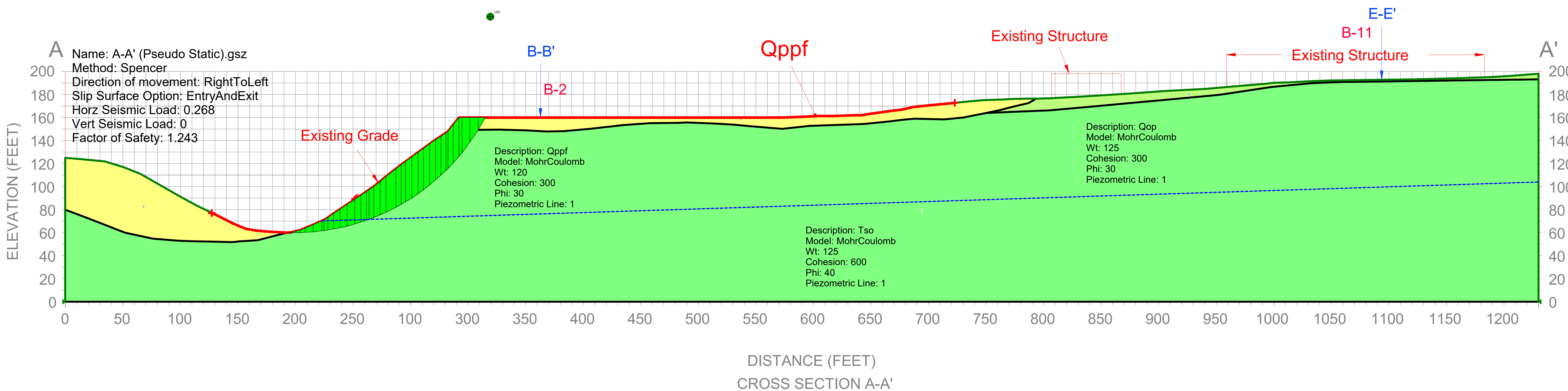
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.</td></tr>
</table>

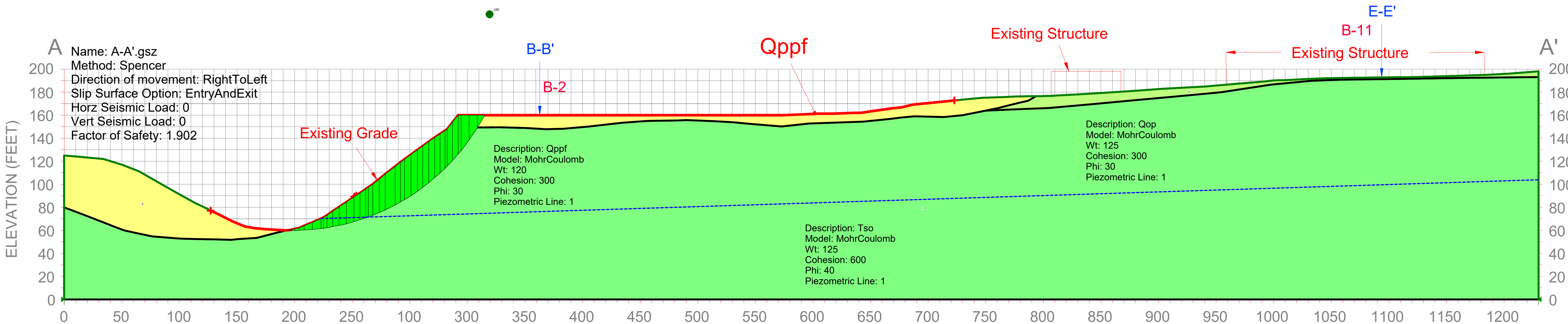
Worksheet I-8 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: According to Geotracker, the nearest known "Open" LUST cleanup site is over two kilometers away from the site. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: The nearest down gradient surface waters consist of the San Luis Rey River which is over 2,300 feet from the proposed improvement area. Due to the distance and topography to the pond it is unlikely to be impacted by infiltrating site water. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.		Partial

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings

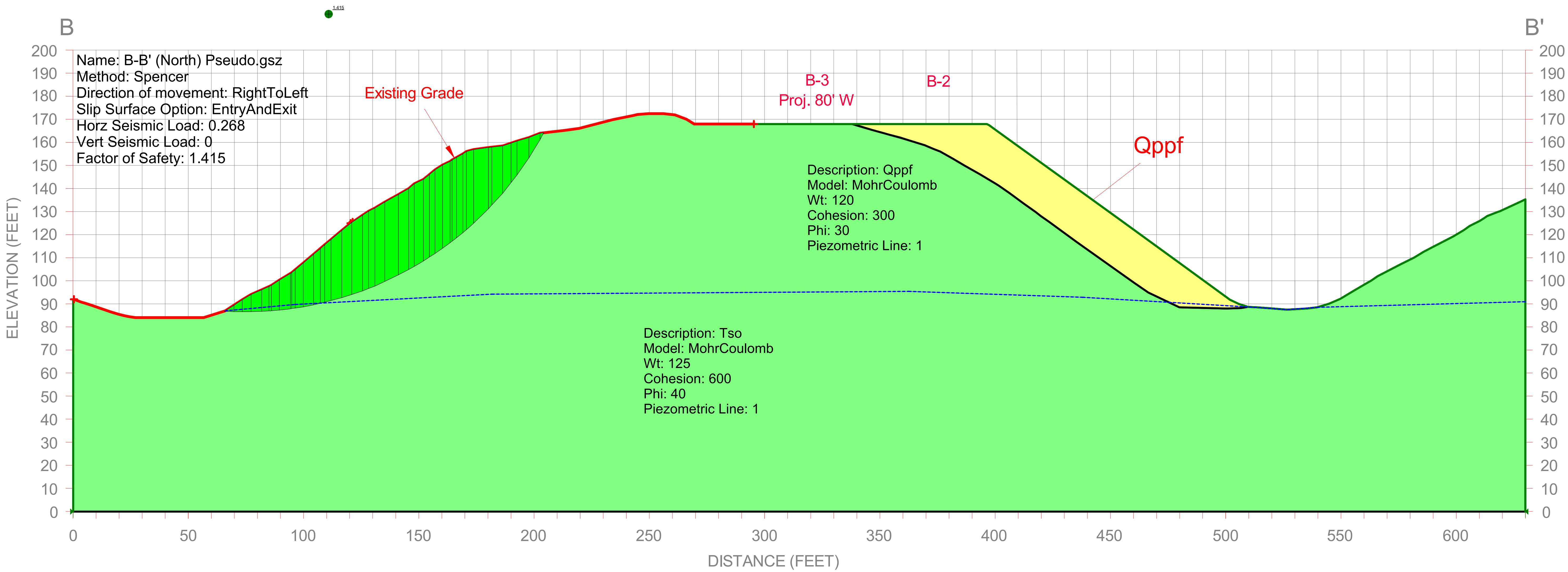
APPENDIX G

SLOPE STABILITY ANALYSIS

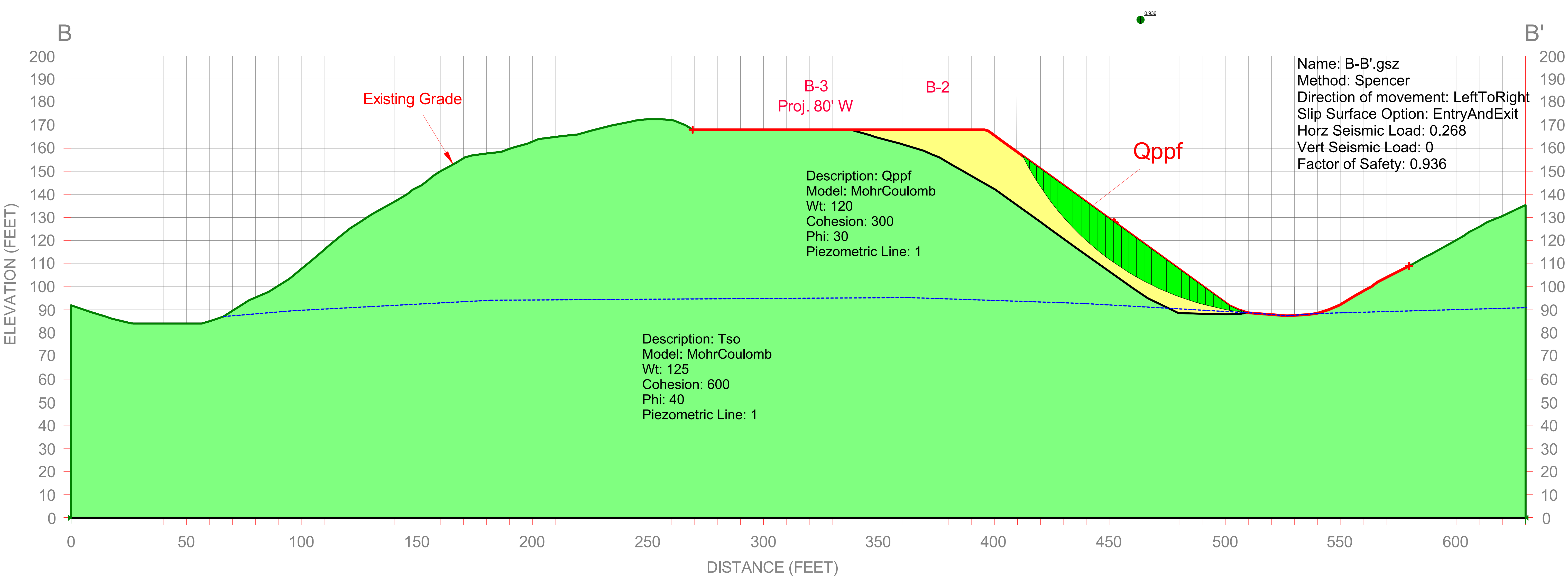

A
A'
Name: A-A' (Pseudo Static).gsz
Method: Spencer
Direction of movement: RightToLeft
Slip Surface Option: EntryAndExit
Horz Seismic Load: 0.268
Vert Seismic Load: 0
Factor of Safety: 1.243
B-B'
B-2
Qppf
Existing Structure
B-11
E-E'
Existing Structure
Existing Grade
Description: Qppf
Model: MohrCoulomb
Wt: 120
Cohesion: 300
Phi: 30
Piezometric Line: 1
Description: Qop
Model: MohrCoulomb
Wt: 125
Cohesion: 300
Phi: 30
Piezometric Line: 1
Description: Tso
Model: MohrCoulomb
Wt: 125
Cohesion: 600
Phi: 40
Piezometric Line: 1
ELEVATION (FEET)
DISTANCE (FEET)
CROSS SECTION A-A'



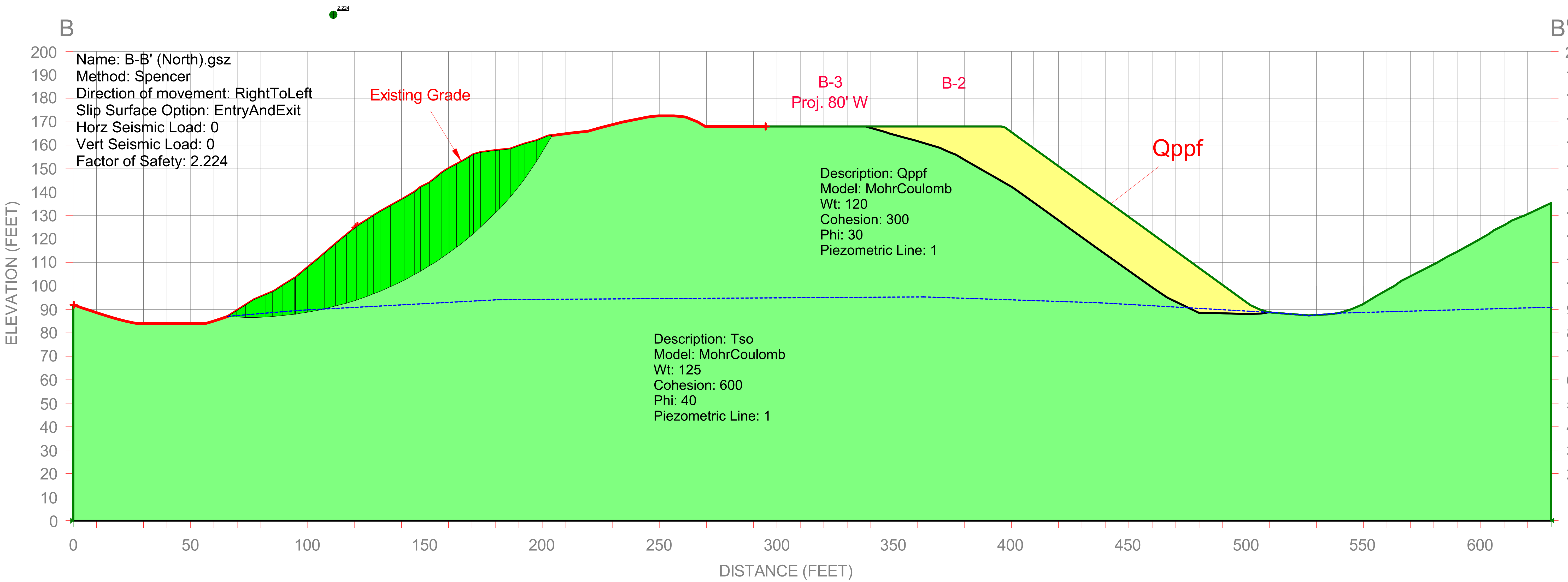
CROSS SECTION A-A'



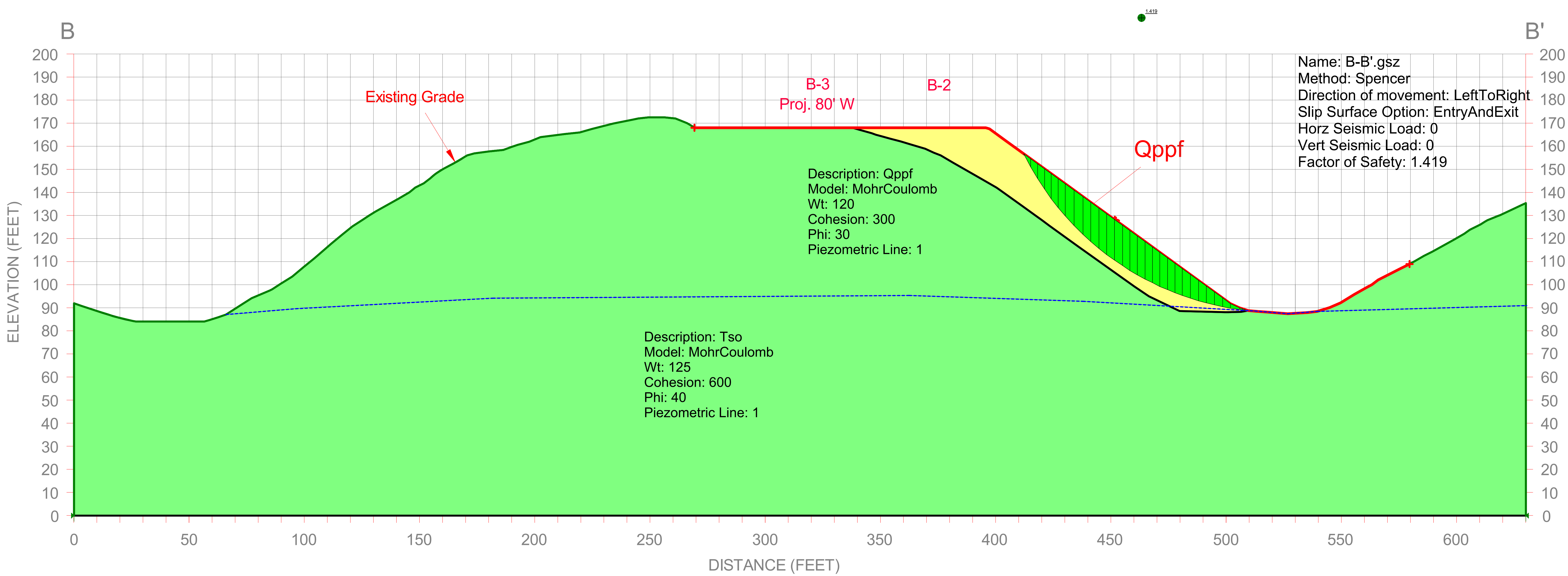
CROSS SECTION B-B'



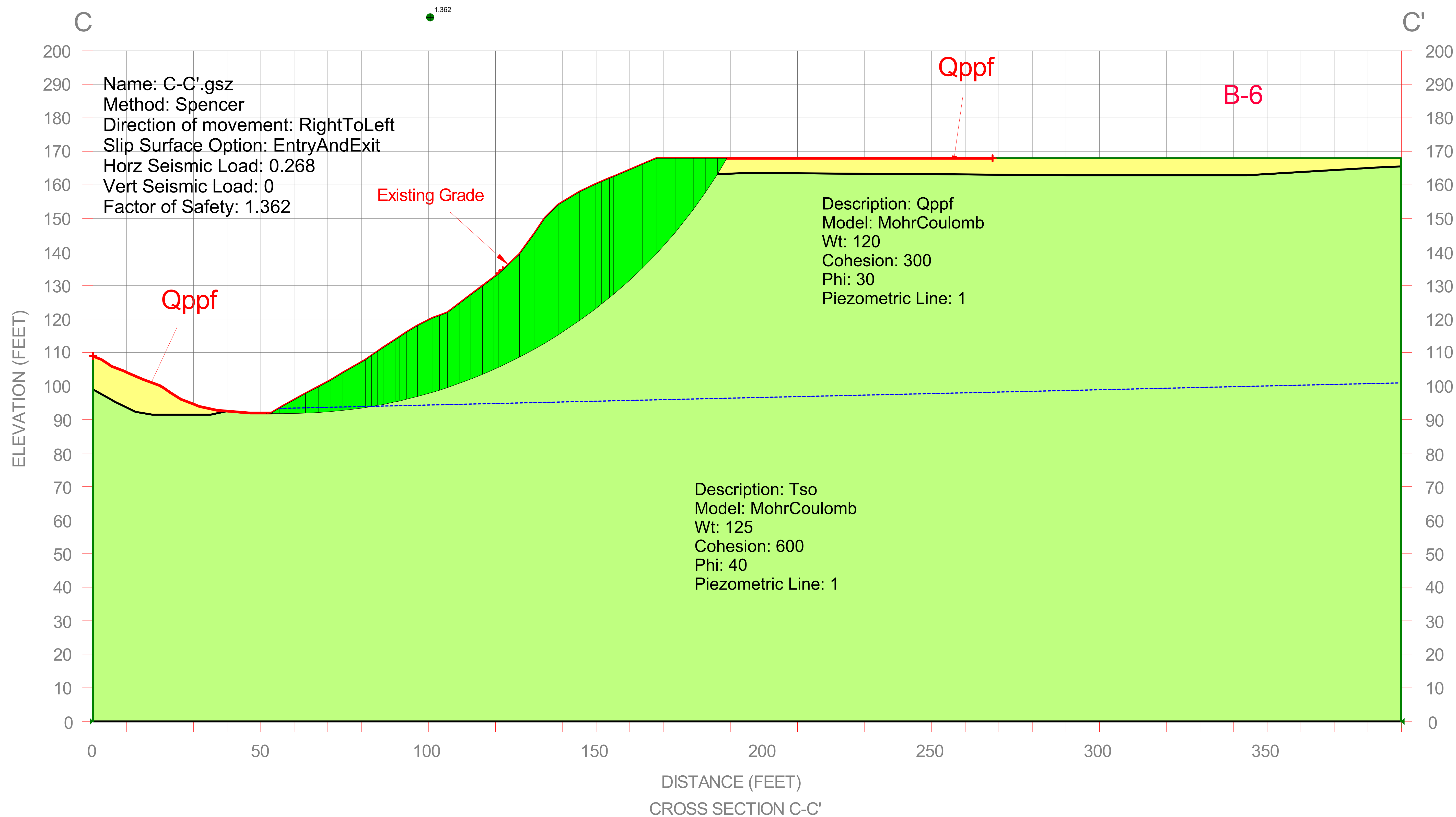
CROSS SECTION B-B'

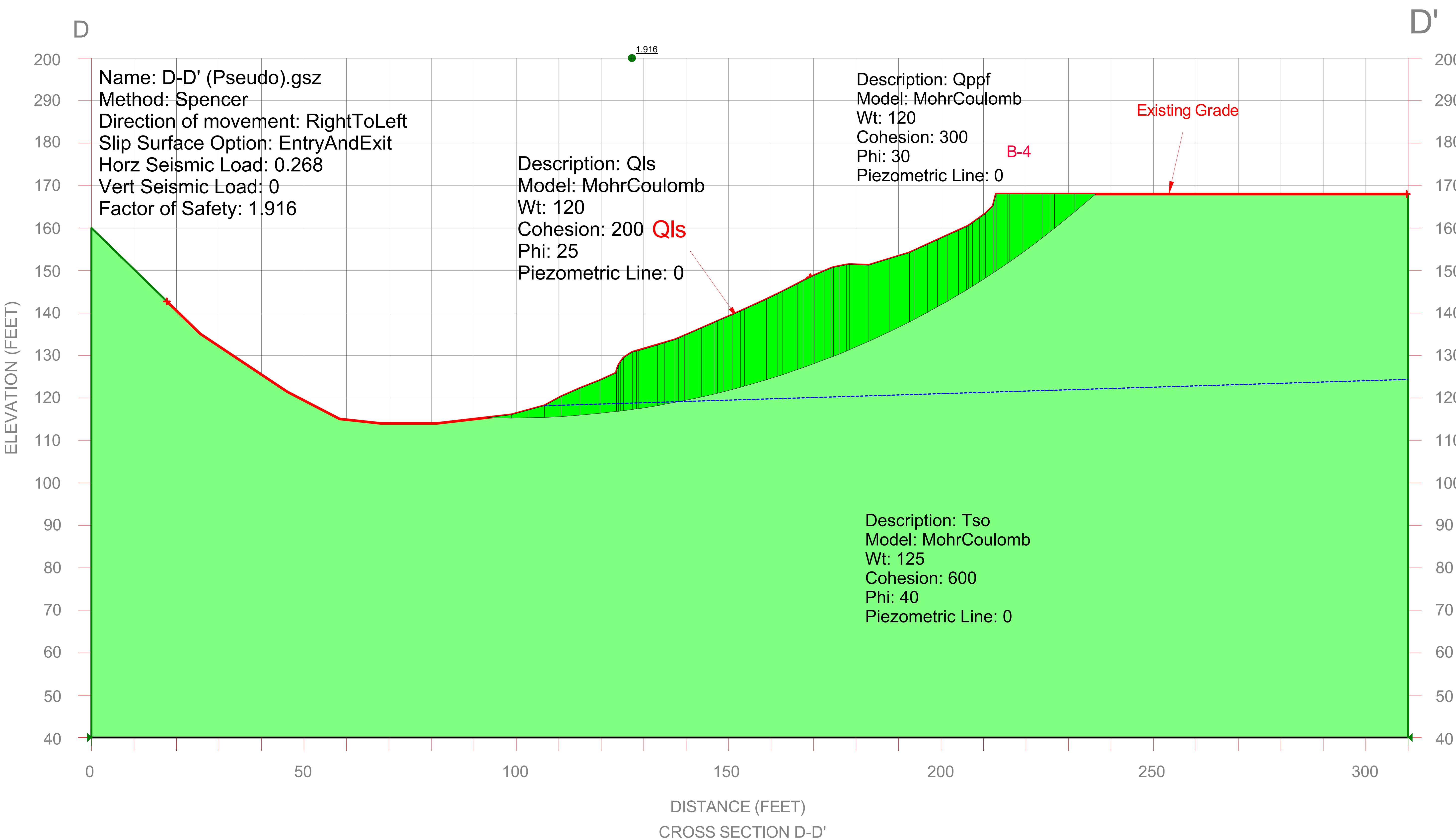


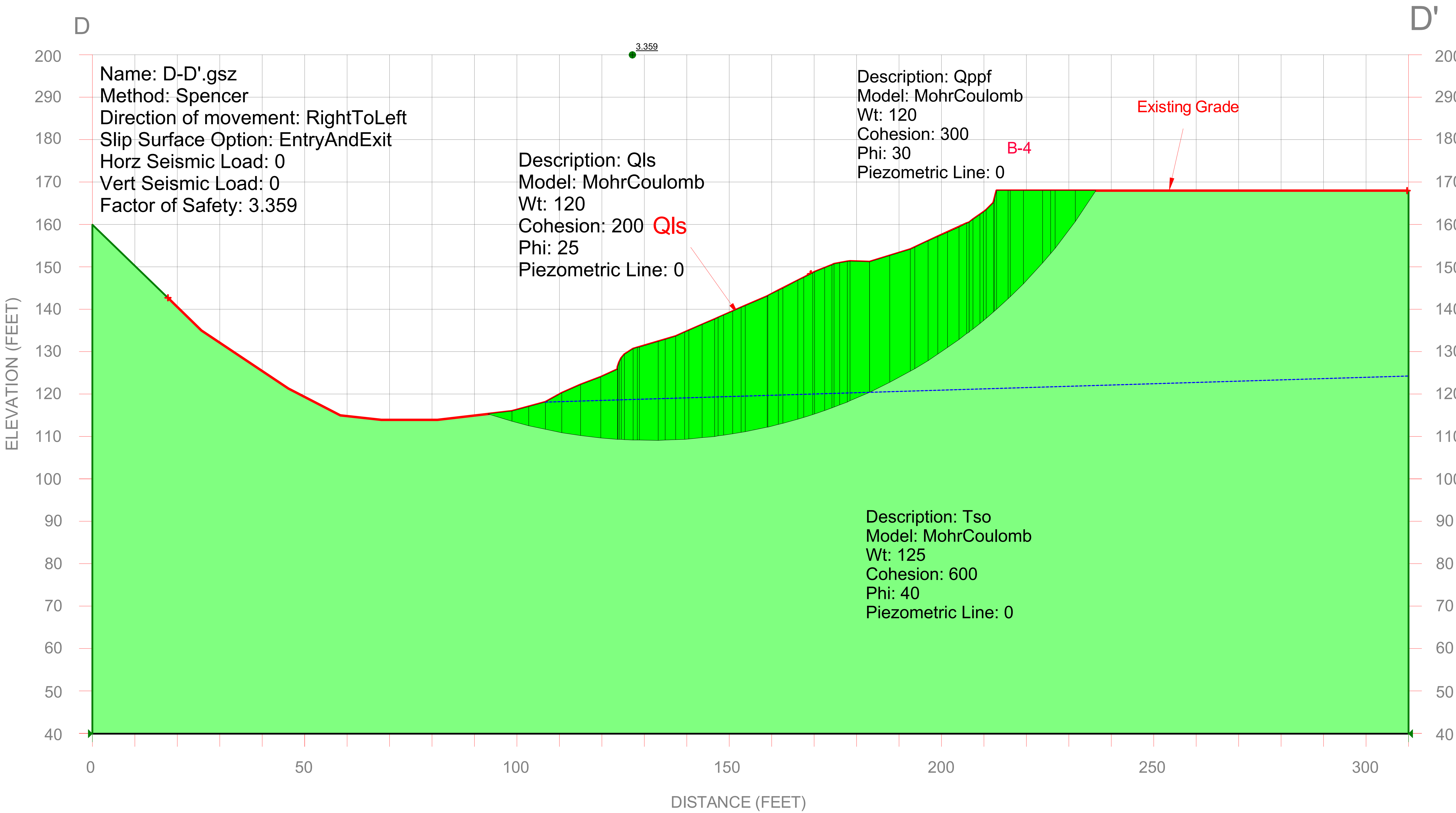
CROSS SECTION B-B'



CROSS SECTION B-B'


C
C'
1.362
Name: C-C'.gsz
Method: Spencer
Direction of movement: RightToLeft
Slip Surface Option: EntryAndExit
Horz Seismic Load: 0.268
Vert Seismic Load: 0
Factor of Safety: 1.362
Existing Grade
Qppf
Qppf
B-6
Description: Qppf
Model: MohrCoulomb
Wt: 120
Cohesion: 300
Phi: 30
Piezometric Line: 1
Description: Tso
Model: MohrCoulomb
Wt: 125
Cohesion: 600
Phi: 40
Piezometric Line: 1
ELEVATION (FEET)
200
290
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0
50
100
150
200
250
300
350
DISTANCE (FEET)
CROSS SECTION C-C'


D
D'
1.916
Name: D-D' (Pseudo).gsz
Method: Spencer
Direction of movement: RightToLeft
Slip Surface Option: EntryAndExit
Horz Seismic Load: 0.268
Vert Seismic Load: 0
Factor of Safety: 1.916
Description: Qls
Model: MohrCoulomb
Wt: 120
Cohesion: 200
Phi: 25
Piezometric Line: 0
Qls
Description: Qppf
Model: MohrCoulomb
Wt: 120
Cohesion: 300
Phi: 30
Piezometric Line: 0
B-4
Existing Grade
Description: Tso
Model: MohrCoulomb
Wt: 125
Cohesion: 600
Phi: 40
Piezometric Line: 0
200
290
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
ELEVATION (FEET)
0
50
100
150
200
250
300
DISTANCE (FEET)
CROSS SECTION D-D'



CROSS SECTION D-D'