

PRE-BID CLARIFICATION FORM

PROJECT NAME:		FILLMORE HIGH SCHOOL NEW ATHLETIC COMPLEX	
PROJECT NUMBER:		Project No. 2024-017 / DSA #03-123950	
TO:		RJ Stump EMAIL: rj.stump@fillmoreusd.org Fillmore Unified School Dist. Roy Frey WestGroup Designs royf@westgroupdesigns.com	
DATE:	January 23, 2025		
FROM:	Icon West, Inc. 520 S. La Fayette Park Pl, Suite 503 Los Angeles, CA 90057	EMAIL:	felix@icon-west.com
DOCUMENT/DIVISION NUMBER:	Section 31 23 00 Athletic Complex	DRAWING NUMBER:	

REQUESTED CLARIFICATION: #05

The project manual spec section 31 23 00 - Excavation, Backfilling, and Compaction, subsection 1.05-B says "A copy of the foundation investigation and soils report is available for examination at the Architect's office during regular office hours of Architect". A soils report was also not included in the bid documents. Can you please provide a PDF copy of the soils report?

See attached geotechnical reports applicable to this project.

[230824_Geotechnical Report](#)
[240112_Geotechnical Response Report](#)
[231122_Infiltration Testing Report](#)
[Geotechnical Letter - Retention Base Preparation](#)

Roy Frey - Westgroup Designs - 01/24/2025

**Stormwater Infiltration Testing
Addenda to
Geotechnical Site Evaluation
Fillmore High School Sports Complex
555 Central Avenue
Fillmore, California**

prepared for

Fillmore Unified School District
627 Sespe Avenue
Fillmore, CA 93015



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Figure 1: Site Vicinity Map

Appendix A: Logs of Subsurface Data

Appendix B: Stormwater Infiltration Testing

Plate 1: Boring Location Map



Applied Earth Sciences
Geotechnical Engineers
Engineering Geologists
DSA Accepted Testing Laboratory
Special Inspection and Materials Testing

3595 Old Conejo Road
Thousand Oaks
California 91320-2122
805 375-9262

November 21, 2023

Fillmore Unified School District
627 Sespe Avenue
Fillmore, CA 93015

Work Order:3242-0-0-101

Attention: Mr. Chris Cline
Bond Facilities Project Manager

Subject: **Stormwater Infiltration Testing, Addenda to Geotechnical Site Evaluation Report for Fillmore High School Sports Complex, 555 Central Avenue, Fillmore, Ventura County, California**

Reference: Gorian and Associates, Inc., August 24, 2023, *Geotechnical Site Evaluation Report for Fillmore High School Sports Complex, 555 Central Avenue, Fillmore, Ventura County, California*. Work Order:3242-0-0-100

Los Angeles County Department of Public Works – *Geotechnical and Materials Engineering Division, 2021, Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration*. Policy Memos GS200.1, dated 6/30/21.

Ventura County Technical Guidance Manual for Stormwater Quality Control Measures, Manual Update 2011, Errata Update 2015.

1. INTRODUCTION

The following report contains the results of our stormwater infiltration testing subsequent to our geotechnical site evaluation (Gorian, August 24, 2023) addressing design and construction of a Sports Complex at Fillmore High School at 555 Central Avenue in Fillmore, California (see the Site Vicinity Map, Figure 1). The Sports Complex will be constructed in the baseball field to the west of the high school with a new parking lot to the north of the planned building. Based on the infiltration testing performed in this area, shallow stormwater infiltration BMPs may be considered for this project. The stormwater infiltration test borings are shown on our Boring Location Map, Plate 1.

2. SITE CONDITIONS

2.1 SITE DESCRIPTION

The Sports Complex and adjacent parking lot are planned within the Fillmore High School property at 555 Central Avenue in Fillmore, California. The complex area is bounded by 2nd Street to the north, a football field and track to the west, school buildings to the east, and swimming pool and tennis courts to the south. The nearly level sod covered area is currently used as a baseball field and gently slopes downward to the pool area (south) and the track (west). Drainage of the site is generally accomplished

by infiltration into the underlying sandy soils and by area storm drain inlet structures adjacent the school buildings.

2.2 OLDER ALLUVIUM

Quaternary-age Older Alluvium underlies the entire site to the maximum depth explored in the borings, 51.5 feet below the existing ground surface (bgs) and to 69 feet bgs in the CPTs (Gorian, August 24, 2023). As encountered, the upper 3 to 6 feet of the site consists of brown very silty fine to coarse sand with fine to coarse gravel in a damp to very moist and loose to medium dense condition. At depth the Older Alluvium generally consists of yellowish brown silty to very silty fine to coarse sand with fine to coarse gravel in a damp to very moist and medium dense to very dense condition locally interstratified with yellowish brown clayey silt and silty clays in a very moist and medium stiff condition. The gravels incorporated into the Older Alluvium appears to generally be derived from Miocene-age Modelo Formation outcroppings to the north and east offsite and uphill of the site. These gravels are typically diatomaceous.

2.3 GROUNDWATER

The site is within the Fillmore groundwater basin, which is unconfined and encompasses an area of approximately 18,600 acres. Water is pumped from the basin for municipal and agricultural uses and by other pumpers. Based on *Water Level Elevation Contour Maps* (2000 and 2002, pages 8 and 9) of the *Aquifer Study of the Fillmore Basin* prepared for the City of Fillmore, groundwater is reportedly below an elevation of 400 feet above sea level. On Table 7 of that report, *Predicted Range of Depth to Water at City of Fillmore Wells* for Well #5, which is approximately 0.7 miles northwest of the Fillmore High School, the water level with the basin full is 415 feet. The current level in the well as of the report date is at elevation 376 feet, 70 feet below the wellhead elevation of 446 feet. In the same report, at the peak of the 1990 drought period, water level elevations at private well 30D1, 0.22 miles northwest from the site, were as low as 369 feet above mean sea level. The approximate locations of wells #5 and 30D1 are shown on Figure 1.

Groundwater levels are indicated to be lower for the high school area in the 2014 and 2015 *Piru and Fillmore Basins, Biennial Groundwater Conditions Report*, prepared by the Groundwater Resources Department, United Water Conservation District, Open File Report 2016-01.

The building will have a finished floor of 490.5 feet, which results in groundwater being more than 75 feet below the ground within the area of the project. In addition, groundwater was not encountered to a depth of 51.5 feet below the existing ground surface, the maximum depth explored in the borings, which supports the depth to groundwater.

CGS Seismic Hazard Zone Report for the Fillmore 7.5-minute Quadrangle, Ventura County, California indicates a historic groundwater depth of approximately 34 feet bgs. However, as discussed above this groundwater depth is not supported by the basin study and lack of groundwater in the exploratory borings. Therefore, a groundwater depth of 75 feet was used in the evaluation of seismic settlement potential.

3. STORMWATER INFILTRATION TESTING

3.1 SUBSURFACE EXPLORATION

Four additional borings (IB-1, IB-2, IB-3, and IB-4) [subsequent to the borings excavated for Gorian, August 24, 2023] were drilled to depths of 10 feet and 15 feet below ground surface in the areas of the proposed stormwater infiltration BMPs. The boring excavation and well development were observed by an engineer from our office.

The borings were converted to infiltration test wells by first placing approximately 1-1½ feet of medium bentonite chips in the bottom of the boring, then placing a 2-inch diameter pipe in the boring with the lower five feet of pipe slotted (0.020"). The annular space between the slotted pipe and wall of the excavation was backfilled using #3 sand. The upper portion of the annular space was then sealed off with bentonite pellets and finally soil backfill. Individual well development details are presented on the boring logs attached in Appendix A. After developing the infiltration test wells, the holes were hydrated (pre-saturation) and tested according to the procedure outlined in the Infiltration Testing section.

3.2 LABORATORY TESTING

In-situ dry density and moisture content were determined from the relatively undisturbed drive samples obtained during exploratory operations. The test results and a detailed description of the earth materials encountered are shown on the attached Logs of Subsurface Data, Appendix A. Grain size distribution analyses were performed on a soil sample at 10' in boring B-2 for Gorian, August 24, 2023. The grain size was evaluated by hydrometer analysis. Hydrometer analyses were performed using a 50-gram sample. The grain size distribution graph is attached hereto in Appendix A.

3.3 INFILTRATION TESTING

Directly after development, water was added into the test wells to the top of each casing for pre-saturation. The water was allowed to pre-soak for a maximum 24-hour period or until the water has completely drained out. Boring IB-1 and IB-3 tested the zone between 9 feet to 15 feet below ground surface, boring IB-2 and IB-4 tested the zone between 4 feet to 10 feet below ground surface.

Before beginning the falling head tests, the wells were pre-saturated by allowing water to freely flow into the well casings, without pressure 24 hours before testing. The following day, additional presoaking was performed and testing was run in general accordance with the Administrative Manual Los Angeles County Public Works Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration (2021). The volume of water infiltrated into the test wells were measured in 10 minutes intervals. Each of the test wells were initially filled to a depth of 3 feet (IB-2, IB-4) and 8 feet (IB-1, IB-3) as shown on the attached test sheets. After ten minutes, the drop in water level was recorded and water added back to the initial water depth for six test cycles as indicated on the Infiltration Testing Log. The infiltration rates were calculated as shown in Appendix B.

At the conclusion of testing, the test wells were demolished and backfilled.

3.4 STORMWATER INFILTRATION

Based on our test results and field exploration observations, each test was found to be suitable for construction of a stormwater infiltration system (greater than 0.3 inches/hour). The measured volume and surface area were utilized to develop infiltration rates. The infiltration tests, with an appropriate reduction factor for the type of test performed, resulted in rates on the order of 1.95 to 2.21 inches per hour. The reduction factor was determined per the Administrative Manual Los Angeles County Public Works Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration (2021), which is 2 for a small diameter borings + 2 for site variability for a reduction factor of 4.

Sizing of the infiltration system or field construction should be specified by the project design civil engineer. Input should be solicited from and data provided to the civil engineer, structural engineer and geotechnical engineer to optimize the design while minimizing the potential detrimental effects the addition of water could have on the site or adjacent sites. Plans and specifications should be provided to our office for review. Depending on actual design depth(s) and location(s) additional infiltration rate testing may be warranted.

4. PLAN REVIEW(S)

As the development process continues and final detailed grading and site/foundation plans and specifications are developed, they should be reviewed by Gorian and Associates, Inc. Additional geotechnical recommendations may be warranted at that time.

oOo

Please contact our office if you have questions regarding the information and recommendations contained in this report, or require additional consultation.

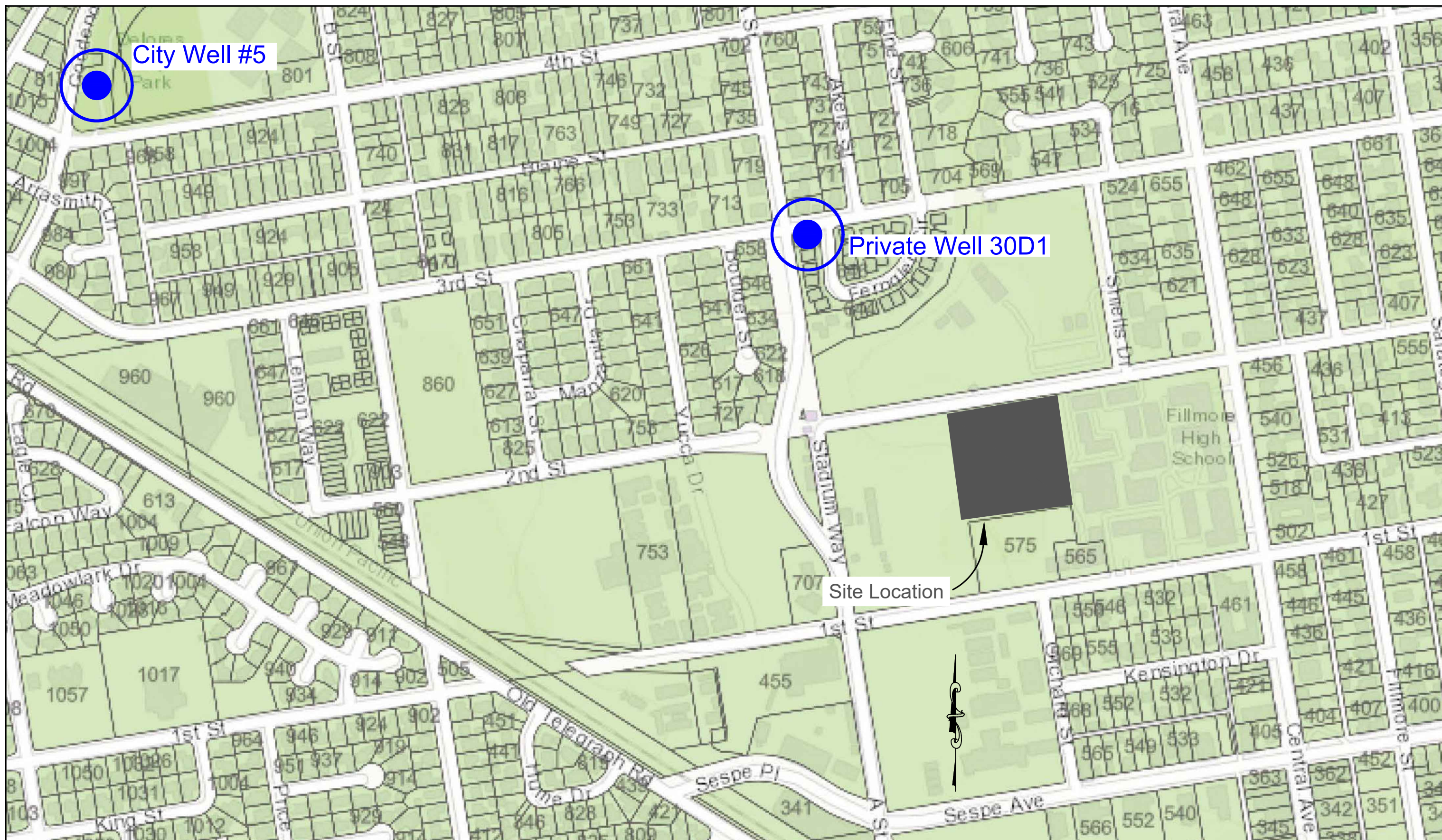
Respectfully submitted,

Gorian and Associates, Inc.


By: Emily Garcia
Staff Engineer


Jerome J. Blunck, GE 151
Principal Geotechnical Engineer





Source
California Geological Survey (CGS) Homepage,
Earthquake Zones of Required Investigation
viewed online

Explanation
Approximate Well Location

SITE VICINITY MAP
Fillmore High School Sports Complex
555 Central Avenue, Fillmore, California

G Gorian & Associates, Inc. <i>Applied Earth Sciences</i>		
Job No: 3242-0-0-101	Date: Nov. 2023	
Scale: NTS	Drawn by:	Figure 1
	Approved by:	

APPENDIX A

LOGS OF SUBSURFACE DATA

The subsurface conditions for stormwater infiltration testing were explored by drilling two hollow stem auger borings, the logs of which are presented in this appendix. Also, included are the boring logs from Gorian and Associates, Inc., May 11, 2021.



Project: FILLMORE HIGH SCHOOL

555 Central Avenue

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: IB-1

Page Number: 1

Date(s) Excavated 10/24/2023	Logged By EG	Excavation Location See Location Map	Approximate Surface Elevation 487±
Excavation Dimension 8" HSA	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data Auto 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		<u>ALLUVIUM:</u> Dark brown very silty fine to coarse SAND with fine to coarse gravel (very moist, medium dense).	
485		8	11.5	95.6				
5		14	9.7	93.0	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (very moist, medium dense).	
480		6	11.9	86.7	SM		Yellowish brown very silty fine SAND with very coarse gravel and 2.5" cobbles (moist, medium dense).	
10		10	9.9	87.8	SM		Yellowish silty SAND, trace clay (moist, medium dense).	
475								
15		20	8.0	103.0	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (moist, medium dense).	
470							TOTAL DEPTH 16' No Caving Observed No Groundwater Encountered	
20							INFILTRATION WELL CONSTRUCTED 16' to 15', Medium bentonite chips 15' to 10', 2" Slotted (.020) Schedule 40 PVC 10' to 0, Blank PVC	
465							ANNULAR SPACE 15' to 9', #3 Sand 9' to 8', Medium bentonite chips 8' to 0, Cuttings	
25								
460								
30								
455								
35								
450								
40								



Project: FILLMORE HIGH SCHOOL
555 Central Avenue
Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: IB-2

Page Number: 1

Date(s) Excavated 10/24/2023	Logged By EG	Excavation Location See Location Map	Approximate Surface Elevation 487±
Excavation Dimension 8" HSA	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data Aut0 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		<u>ALLUVIUM:</u> Brown very silty SAND, with fine to coarse gravel (very moist, medium dense).	
485		6						
5		7	25.6	94.4	SM		Yellowish brown silty fine SAND with fine to coarse gravel (very moist, medium dense).	
480		10	13.0	93.7	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (moist, medium dense).	
10		8	11.9	88.5				
475							TOTAL DEPTH 11' No Caving No Groundwater Encountered	
15							INFILTRATION WELL CONSTRUCTED 11' to 10', Medium bentonite chips 10' to 5', 2" Slotted (.020) Schedule 40 PVC 5' to 0, Blank PVC	
470							ANNULAR SPACE 10' to 4', #3 Sand 4' to 3', Medium bentonite chips 3' to 0, Cuttings	
20								
465								
25								
460								
30								
455								
35								
450								
40								



Project: FILLMORE HIGH SCHOOL
555 Central Avenue
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SUBSURFACE LOG

Excavation
Number: IB-3

Page Number: 1

Date(s) Excavated 10/24/2023	Logged By EG	Excavation Location See Location Map	Approximate Surface Elevation 486±
Excavation Dimension 8" HSA	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data Auto 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0 485		8	13.9	94.5	SM		<u>ALLUVIUM:</u> Yellowish brown very silty SAND with fine to coarse gravel (very moist, medium dense).	
5 480		7	12.1	93.3	SM		Yellowish brown very silty SAND with fine to coarse gravel to sandy SILT with fine gravel (moist, medium dense). Heavy Chatter @7'. Gravel approximately 2" @8'.	
10 475		21	12.3	99.8	SM		Yellowish brown fine to coarse SAND with fine to coarse gravel (moist, medium dense).	
15 470		26	17.6	95.4	SM		Yellowish brown silty SAND with fine to coarse gravel with trace clay (moist, medium dense).	
20 465							TOTAL DEPTH 16' No Caving Observed No Groundwater Encountered INFILTRATION WELL CONSTRUCTED 16' to 15', Medium bentonite chips 15' to 10', 2" Slotted (.020) Schedule 40 PVC 10' to 0, Blank PVC ANNULAR SPACE 15' to 9', #3 Sand 9' to 8', Medium bentonite chips 8' to 0, Cuttings	
25 460								
30 455								
35 450								
40 445								



Project: FILLMORE HIGH SCHOOL

555 Central Avenue

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: IB-4

Page Number: 1

Date(s) Excavated 10/24/2023	Logged By EG	Excavation Location See Location Map	Approximate Surface Elevation 488±
Excavation Dimension 8" HSA	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data Auto 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		<u>ALLUVIUM:</u> Yellowish brown silty SAND (very moist, medium dense).	
485		2	17.4	97.5				
5		4	14.0	100.2				
480		16	15.1	80.7	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (very moist, medium dense).	
10		18	17.4	104.6	SM		Yellowish brown very silty fine to coarse SAND with fine to coarse gravel (moist, medium dense).	
475							TOTAL DEPTH 11' No Caving No Groundwater Encountered	
15							INFILTRATION WELL CONSTRUCTED 11' to 10', Medium bentonite chips 10' to 5', 2" Slotted (.020) Schedule 40 PVC 5' to 0, Blank PVC	
470							ANNULAR SPACE 10' to 4', #3 Sand 4' to 3', Medium bentonite chips 3' to 0, Cuttings	
20								
465								
25								
460								
30								
455								
35								
450								
40								



Project: Fillmore Unified School District
555 Central Avenue, Fillmore

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-1

Page Number: 1

Date(s) Excavated 06/13/2023	Logged By CHD	Excavation Location See Map	Approximate Surface Elevation
Excavation Dimension 8" HSA	Equipment Contractor 2 R Drilling	Equipment Type CME 75	Hammer Data Auto 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		<u>ALLUVIUM:</u> Brown very silty fine to coarse SAND with fine to coarse gravel (damp, loose). @3', becoming medium dense	
		7						
		12			SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, medium dense). Friable, slightly clayey zone. Below 7', chatter.	
5		14	10.2	111.1				
		26	9.6	100.3				
10		3/6/4					@10 very clayey @11.5', becoming moist.	
		25	8.3	105.6				
15		11/ 11/ 14					@15', becoming damp.	
		46	9.3	106.1			@18', becoming dense.	
20		22/ 22/ 28					@20', becoming very dense, heavy chatter.	
		45	10.9	104.5			@23', becoming dense.	
25		6/21/ 18						
		53	9.2	111.1			@28', becoming very dense.	
30		6/7/ 10			SM		Yellowish brown very silty fine SAND, few fine gravels (moist, medium dense).	
		43	11.6	99.4	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, dense).	
35		18/ 19/ 19						
		53	9.0	112.8			@38', becoming very dense.	
40		22/ 32/						



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555 Central Avenue, Fillmore

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-1

Page Number: 2

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
		23						
		51	9.4	106.6				
45	13/ 32/ 31							
		53	11.3	100.6				
50	7/12/ 25				SM		Yellowish brown very silty fine SAND, some fine gravels (moist, dense). @50', becoming dense.	
							TOTAL DEPTH 51.5' No Caving Observed No Groundwater Encountered Backfilled with cuttings and tamped.	
55								
60								
65								
70								
75								
80								
85								



Project: Fillmore Unified School District
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Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-2

Page Number: 1

Date(s) Excavated 06/13/2023	Logged By CHD	Excavation Location See Map	Approximate Surface Elevation
Excavation Dimension 8" HSA	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data Auto 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		<u>ALLUVIUM:</u> Brown very silty fine to coarse SAND with fine to coarse gravel (very moist, medium dense). *Area irrigated, wet at ground surface.	
		21	15.1	101.6				
5		9	9.4	102.4	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (very moist, medium dense).	
		11	16.5	101.8	SM		Yellowish brown very silty fine SAND (very moist, medium dense).	
10	4/3/4				SM		Yellowish brown silty SAND, slightly clayey zone (very moist, medium dense)	
		22	22.1	97.2	SM		Yellowish brown very silty fine to coarse SAND with fine to coarse gravel (very moist, medium dense).	
15	9/10/11				SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, medium dense).	
		22	11.0	104.6				
20	15/22/25						@20', becoming dense, heavy chatter.	
		45	12.4	102.9				
25	13/11/4				SM		Yellowish brown very silty fine SAND (very moist, medium dense).	
		68	11.1	107.6	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, very dense). Heavy chatter	
30	17/11/6				SM		Yellowish brown silty fine SAND (very moist to wet, medium dense).	
		28	18.9	104.9	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (very moist, medium dense).	
35	5/12/15						@35', becoming damp.	
		44	10.9	102.5			@38', becoming dense.	
40	6/9/16						@40', becoming very moist, medium dense.	



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SUBSURFACE LOG

Excavation
Number: B-2

Page Number: 2

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
43		43	13.0	98.0			@43', becoming dense, moist.	
45		15/ 22/ 21					@45', becoming damp.	
50		55	8.8	108.1			@48', becoming very dense.	
		13/9/ 11]			SM		Yellowish brown very silty fine SAND, few fine gravels (very moist, medium dense).	
							TOTAL DEPTH 51.5' No Caving Observed No Groundwater Encountered Backfilled with cuttings and tamped.	
55								
60								
65								
70								
75								
80								
85								



Project: Fillmore Unified School District
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Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-3

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Date(s) Excavated 06/10/2023	Logged By EG	Excavation Location See Map	Approximate Surface Elevation
Excavation Dimension 8" HSA	Equipment Contractor 2 R Drilling	Equipment Type CME 75	Hammer Data Auto 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		<u>ALLUVIUM:</u> Brown silty fine SAND with medium gravel (damp, medium dense).	
		17	15.5	103.3				
		8	15.3	102.0				
5								
		12	16.1	103.2	SM		Yellowish brown very silty SAND with fine to coarse gravel (damp, medium dense).	
		6/7/8						
10								
		12	12.3	98.6				
		8/7/7			SM		Yellowish brown very silty SAND with fine to medium gravel (damp, medium dense).	
15							@15' Larger gravel	
		14	12.4	108.8			@17' Heavy Chatter	
		10/ 15/ 16						
20								
		15	10.3	96.2				
		9/15/ 16			SM		Yellowish brown very silty SAND with coarse gravel (damp, medium dense).	
25								
		18	12.6	106.8				
		11/ 15/ 15			SM/ ML		Silty fine SAND to very sandy SILT, trace clay with fine to medium gravel (damp, medium dense).	
30					SM		Yellowish brown very silty fine SAND with fine to coarse gravel (damp, medium dense).	
		28	9.8	103.0				
		3/6/8						
35								
		33	16.7	106.2				
		4/8/ 12			SM/ ML		Yellowish brown Silty fine SAND to sandy SILT, with fine to medium gravel (moist, medium dense).	
40								
		18	22.3	97.3				



Project: Fillmore Unified School District
555 Central Avenue, Fillmore

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SUBSURFACE LOG

Excavation
Number: B-3

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Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
45	12/9/7	38	17.7	101.4	SM		Yellowish brown very silty fine SAND with fine to coarse gravel (damp, medium dense).	
50	35/33/40	26	11.3	105.3				
55							TOTAL DEPTH 51' No Caving Observed No Groundwater Encountered Backfilled with cuttings.	
60								
65								
70								
75								
80								
85								



Project: Fillmore Unified School District
555 Central Avenue, Fillmore

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-4

Page Number: 1

Date(s) Excavated 06/14/2023	Logged By EG	Excavation Location See Map	Approximate Surface Elevation
Excavation Dimension 8" HSA	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data Auto 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		<u>ALLUVIUM:</u> Brown silty fine SAND with fine to coarse gravel (damp, medium dense).	
		18	17.1	87.9				
		10	14.1	104.7	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, medium dense).	
5		8						
		17	19.8	100.3	SM		Yellowish brown very silty SAND with fine gravel (moist, medium dense).	
		2/2/5						
10		10	11.6	105.1	ML		Yellowish brown clayey SILT and sand with fine to medium gravel (damp, medium dense).	
		3/6/4						
					SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, medium dense).	
15		8	20.8	97.1				
		4/6/11			SM		Yellowish brown very silty fine to coarse SAND with fine to coarse gravel (damp, medium dense). @18' Chatter	
20		30	10.1	101.9				
		4/3/3						
25		18	14.8	106.8	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, medium dense).	
		21/31/33/35			SP		Yellowish brown fine to coarse SAND with medium pebble, fine to coarse gravel (damp, medium dense).	
30			12.9	104.9				
		16/20/20			SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, dense).	
35		42	13.0	107.1			@35' Becoming more coarse.	
		4/3/3			SM		Yellowish brown very silty fine SAND, with fine to coarse gravel (very moist, medium dense).	
40		18	15.6	104.6				



Project: Fillmore Unified School District
555 Central Avenue, Fillmore

Work Order: 3242-0-0-100

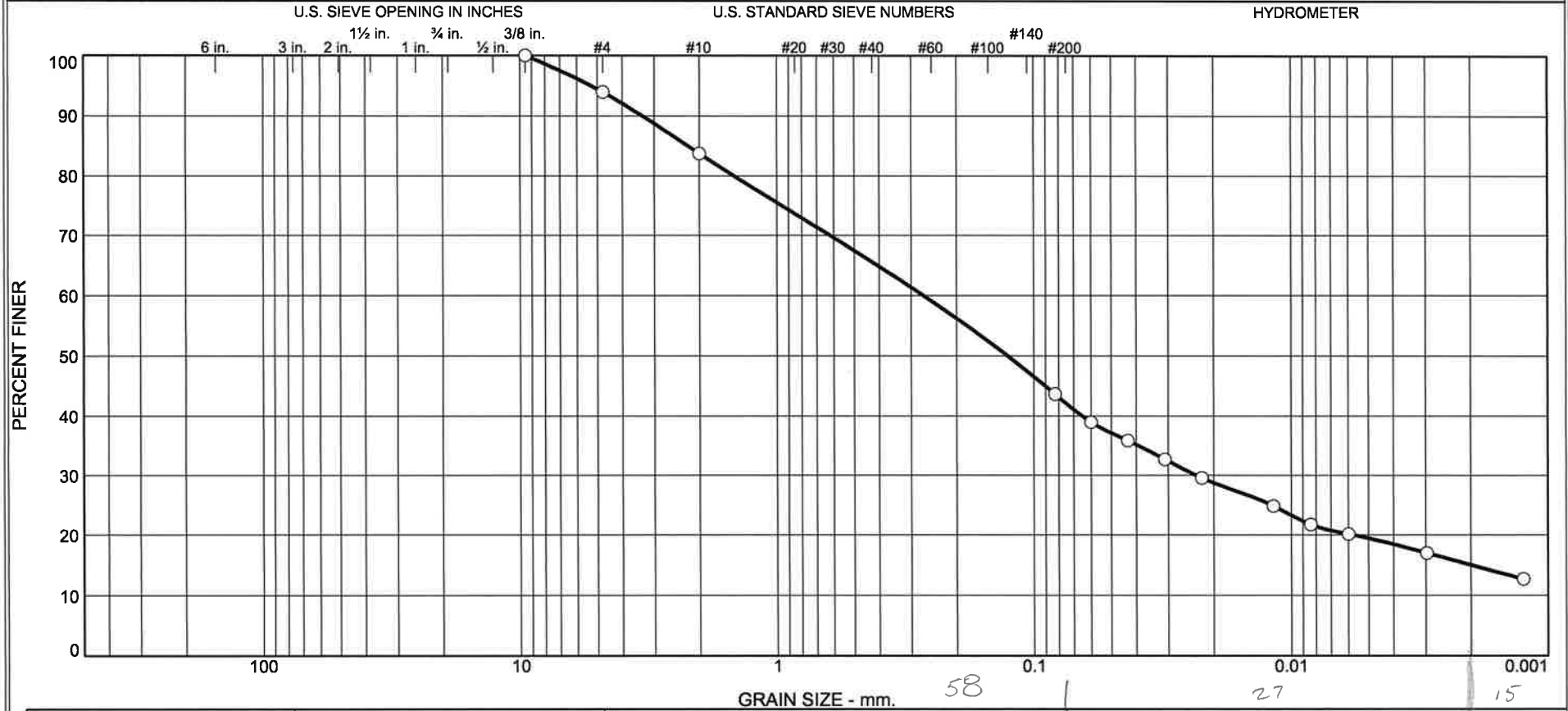
SUBSURFACE LOG

Excavation
Number: B-4

Page Number: 2

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
45	15/ 26/ 23	20	9.5	105.7			@42' Cobbles approximately 2".	
50	12/ 20/ 38	40	13.8	96.8	SM SM		Yellowish brown silty fine SAND with trace silt, with fine to coarse gravel (moist, medium dense). Yellowish brown silty fine to coarse SAND with fine to coarse gravel. some pebbles (damp, medium dense). TOTAL DEPTH 51.5' No Caving Observed No Groundwater Encountered	
55								
60								
65								
70								
75								
80								
85								

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.1	10.2	18.1	23.5	22.7	19.4

Source	Sample #	Depth/Elev.	Date Sampled	USCS	Material Description	NM %	LL	PL
	B-2	10	7/12/23		Y.B Silty Fine Sand			

Client Fillmore USD
Project 555 Central Ave

Project No. 3242-0-0-100

Figure

Gorian & Associates

Thousand Oaks, CA

**APPENDIX B
STORMWATER INFILTRATION TESTING**

Boring Infiltration Testing Field Log

Work Order: 3242-0-0-100
Date: 10/25/2023

Project Location Fillmore High School
Earth Description Silty Sand
Tested By EG
Liquid Description Clear Water
Measurement Method Sounder
Depth to Invert of BMP _____

Boring/Test Number IB-1
Diameter of Boring (DIA) 8 inches
radius (in feet) 0.3333 feet
Depth of Boring 16 feet
Diameter of Casing 2 inches
Depth to Water Table 8 feet

Start Time for Pre-Soak 11:30am 10/24/2023
Start Time for Test 7:30am 10/25/2023

Water Remaining in Boring (Y/N) N
Std Time Interval Between Rdngs 10 minutes

Reading No.	Water Level start	Water Level end	Time start	time end	Δ Time (min)	H for surface area	h for volume	Surface Area (ft ²)	Volume (ft ³)	Raw Rate Volume / Surface Area (in/hr)
presoak	8.0	13.25	7:30	7:40						
1	8.0	13.25	8:00	8:10	10	8	5.25	16.8	1.83	7.88
2	8.0	13.25	8:20	8:30	10	8	5.25	16.8	1.83	7.88
3	8.0	13.25	8:40	8:50	10	8	5.25	16.8	1.83	7.88
4	8.0	13.25	8:50	9:00	10	8	5.25	16.8	1.83	7.88
5	8.0	13.25	9:05	9:15	10	8	5.25	16.8	1.83	7.88
6										
7										
8										

Measured Rate = ave of last 2 readings = 7.88

apply reduction factor: 4 **1.97 in/hr**

Boring Infiltration Testing Field LogWork Order: 3242-0-0-100Date: 10/25/2023

Project Location Fillmore High School
Earth Description Silty Sand
Tested By EG
Liquid Description Clear Water
Measurement Method Sounder
Depth to Invert of BMP _____

Boring/Test Number IB-2
Diameter of Boring (DIA) 8 inches
radius (in feet) 0.3333 feet
Depth of Boring 11 feet
Diameter of Casing 2 inches
Depth to Water Table 3 feet

Start Time for Pre-Soak 11:30am 10/24/2023

Start Time for Test 7:30am 10/25/2023

Water Remaining in Boring (Y/N) N
Std Time Interval Between Rdngs 10 minutes

Reading No.	Water Level start	Water Level end	Time start	time end	Δ Time (min)	H for surface area	h for volume	Surface Area (ft ²)	Volume (ft ³)	Raw Rate Volume / Surface Area (in/hr)
presoak	3.0	8.15	9:35	9:45						
1	3.0	8.15	9:50	10:00	10	8	5.15	16.8	1.80	7.73
2	3.0	8.15	10:10	10:20	10	8	5.15	16.8	1.80	7.73
3	3.0	8.15	10:25	10:30	10	8	5.15	16.8	1.80	7.73
4	3.0	8.15	10:35	10:45	10	8	5.15	16.8	1.80	7.73
5	3.0	8.1	10:55	11:05	10	8	5.1	16.8	1.78	7.65
6										
7										
8										

Measured Rate = ave of last 2 readings = 7.69

apply reduction factor: 4 **1.92 in/hr**

Boring Infiltration Testing Field Log

Work Order: 3242-0-0-100

Date: 10/25/2023

Project Location Fillmore High School
 Earth Description Silty Sand
 Tested By EG
 Liquid Description Clear Water
 Measurement Method Sounder
 Depth to Invert of BMP _____

Boring/Test Number IB-3
 Diameter of Boring (DIA) 8 inches
 radius (in feet) 0.3333 feet
 Depth of Boring 16 feet
 Diameter of Casing 2 inches
 Depth to Water Table 8 feet

Start Time for Pre-Soak 11:30am 10/24/2023

 Start Time for Test 7:30am 10/25/2023

Water Remaining in Boring (Y/N) N
 Std Time Interval Between Rdngs 10 minutes

Reading No.	Water Level start	Water Level end	Time start	time end	Δ Time (min)	H for surface area	h for volume	Surface Area (ft ²)	Volume (ft ³)	Raw Rate Volume / Surface Area (in/hr)
presoak	8.0	13.2	11:20	11:30						
1	8.0	13.2	11:40	11:50	10	8	5.2	16.8	1.82	7.80
2	8.0	13.2	11:55	12:05	10	8	5.2	16.8	1.82	7.80
3	8.0	13.2	12:10	12:20	10	8	5.2	16.8	1.82	7.80
4	8.0	13.2	12:25	12:35	10	8	5.2	16.8	1.82	7.80
5	8.0	13.2	12:40	12:50	10	8	5.2	16.8	1.82	7.80
6										
7										
8										

Measured Rate = ave of last 2 readings = 7.80

apply reduction factor: 4 **1.95 in/hr**

Boring Infiltration Testing Field Log

Work Order: 3242-0-0-100

Date: 10/25/2023

Project Location Fillmore High School
 Earth Description Silty Sand
 Tested By EG
 Liquid Description Clear Water
 Measurement Method Sounder
 Depth to Invert of BMP _____

Boring/Test Number IB-4
 Diameter of Boring (DIA) 8 inches
 radius (in feet) 0.3333 feet
 Depth of Boring 11 feet
 Diameter of Casing 2 inches
 Depth to Water Table 3 feet

Start Time for Pre-Soak 11:30am 10/24/2023

 Start Time for Test 7:30am 10/25/2023

Water Remaining in Boring (Y/N) N
 Std Time Interval Between Rdngs 10 minutes

Reading No.	Water Level start	Water Level end	Time start	time end	Δ Time (min)	H for surface area	h for volume	Surface Area (ft ²)	Volume (ft ³)	Raw Rate Volume / Surface Area (in/hr)
presoak	3.0	8.9	1:00	1:10						
1	3.0	8.9	1:20	1:30	10	8	5.9	16.8	2.06	8.85
2	3.0	8.9	1:35	1:45	10	8	5.9	16.8	2.06	8.85
3	3.0	8.9	1:50	2:00	10	8	5.9	16.8	2.06	8.85
4	3.0	8.9	2:05	2:15	10	8	5.9	16.8	2.06	8.85
5	3.0	8.9	2:20	2:30	10	8	5.9	16.8	2.06	8.85
6										
7										
8										

Measured Rate = ave of last 2 readings = 8.85

apply reduction factor: 4 **2.21 in/hr**

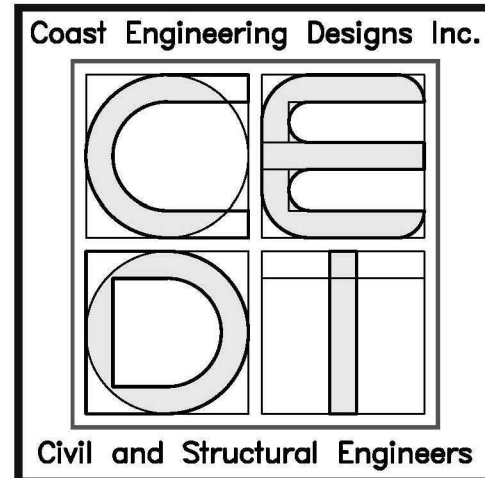
GEOTECHNICAL EXPLANATION

B-4 Approximate Location of Exploratory Boring

IB-4 Approximate Location of Infiltration Wells



19520 Jamboree Road | Suite 100
Irvine | California | 92612
949.250.0880 | FAX 949.250.0882
www.westgroupdesigns.com



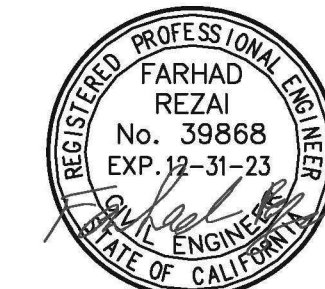
CIVIL ENGINEER:

1500 ADAMS AVE., SUITE 303
COSTA MESA, CA 92626
(714) 593-0337
J.N. 13-2023

ISSUED FOR:

REVISIONS:

REGISTRATION/SIGNATURE:



7/31/2023

SHEET TITLE:

GRADING PLAN

SHEET NUMBER

C-4

WD PROJ. # DRAWN BY: CHECKED: DATE:
CEDI CEDI

© WESTGROUP DESIGNS, INC.

Boring Location Map

Gorlan & Associates, Inc.
Applied Earth Sciences

Job No: 3242-0-0101 Date: Nov. 2023

Scale: 1" = 20' Drawn by: Approved by: PLATE 1



GRADING PLAN

SCALE
1"=20'-0"

1

MATCH LINE 1 SEE SHEET C-4.1

**Geotechnical Site Evaluation
Fillmore High School Sports Complex
555 Central Avenue
Fillmore, California**

prepared for

Fillmore Unified School District
627 Sespe Avenue
Fillmore, CA 93015





Applied Earth Sciences
Geotechnical Engineers
Engineering Geologists
DSA Accepted Testing Laboratory
Special Inspection and Materials Testing

3595 Old Conejo Road
Thousand Oaks
California 91320-2122
805 375-9262

August 26, 2024

Fillmore Unified School District
627 Sespe Avenue
Fillmore, CA 93015

Work Order: 3242-0-0-102

Attention: Mr. Chris Cline
Bond Facilities Project Manager

Subject: Storm Tech Retention and Infiltration Subsurface Chamber, Fillmore High School – New Athletic Complex dated December 21, 2023, 555 Central Avenue, Fillmore, Ventura County, California

Reference: Gorian and Associates, Inc., August 24, 2023, Geotechnical Site Evaluation Report for Fillmore High School Sports Complex, 555 Central Avenue, Fillmore, Ventura County, California, Work Order: 3242-0-0-100

Gorian and Associates, Inc., January 10, 2024, Response to the California Geological Survey (CGS), Engineering Geology and Seismology Review for Fillmore High School – New Athletic Complex dated December 21, 2023, 555 Central Avenue, Fillmore, Ventura County, California. Work Order: 3242-0-0-101

A Storm Tech subsurface chamber system will be used for stormwater retention and infiltration at the, New Athletic Complex at Fillmore High School at 555 Central Avenue in Fillmore, California. The chamber should be placed on 12 inches of aggregate base consisting of minus ¾ inch aggregate either crushed or river run with a 5 percent or less passing the 200 sieve. This will provide an allowable bearing pressure of 3,000 pounds per square foot. The bottom of the chamber excavation should be undisturbed in-place native soils.

oOo

Respectfully,

Gorian and Associates, Inc.


By: Jerome J. Blunck, GE 151
Principal Geotechnical Engineer



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	Figure 2: Regional Geologic Map
	Figure 3: Seismic Hazard Zone Map
	Figure 4: Earthquake Zone Map
	Appendix A: Logs of Subsurface Data
	Appendix B: Laboratory Test Results
	Appendix C: Seismically Induced Settlement Analyses
	Plates 1a and 1b: Boring Location Map
	Plate 2: Geotechnical Cross Sections



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Thousand Oaks
California 91320-2122
805 375-9262
805 375-9263 fax

August 24, 2023

Fillmore Unified School District
627 Sespe Avenue
Fillmore, CA 93015

Work Order:3242-0-0-100

Attention: Mr. Chris Cline
Bond Facilities Project Manager

Subject: **Geotechnical Site Evaluation Report for Fillmore High School Sports Complex, 555 Central Avenue, Fillmore, Ventura County, California**

1. INTRODUCTION

The following report contains the results of our geotechnical site evaluation for design and construction of a Sports Complex at Fillmore High School at 555 Central Avenue in Fillmore, California (see the Site Vicinity Map, Figure 1). The planned 45,000 gross square foot building will be constructed on the baseball field to the west of the high school with a new parking lot to the north of the planned building.

The Sports Complex building will be a one-story structure with an 1,800 square foot court gym space with low volume supporting spaces around the north, east, and south sides of the gym. Foundations and on grade slabs are anticipated to be of conventional design. However, to prepare the site for the planned structure, soil removal and recompaction is recommended to reduce the potential for liquefaction within the site. The potential for liquefaction is address later herein in this report.

Based on our site evaluation, the site is suitable for the proposed construction from a geotechnical standpoint provided recommendations herein are implemented in the project design and construction. Descriptions of the site and geologic units along with our conclusions and recommendations are presented within the text of this report.

2. PROJECT CONSIDERATIONS

Fillmore High School is within a State of California designated Liquefaction Seismic Hazard Zone based on the California Geological Survey (CGS), *Earthquake Zones of Required Investigation Fillmore 7½ Minute Quadrangle* (2002). Therefore, exploratory borings and Cone Penetration Tests (CPT) were used to evaluate the subsurface conditions within the planned building and parking lot area at the approximate locations shown on the Boring Location Map, Plate 1a. Data from the subsurface exploration and laboratory were used in the evaluation of the site for seismic induced settlement. The results indicate the site has a potential for seismic induced differential settlement of 0.7 inches (after soil remediation). To remediate the estimated settlement potential below the building, the upper 12 feet of the site should be

removed and recompact as recommended later in this report. After, the recommended site remediation is complete, the site will be suitable for the planned Sports Complex from a geotechnical standpoint.

3. PROPOSED DEVELOPMENT

A new Sports Complex is planned at Fillmore High School at 555 Central Avenue in Fillmore, California. The location and layout of the building is shown on Plate 1b. The 45,000 gross square foot building will be constructed as a Risk Category Class II structure. It be within the southern portion of the existing baseball field to the west of the high school with a new surface parking lot to the north of the building.

The building will be a one story structure with an 1,800 square foot court gym space with low volume supporting spaces around the north, east, and south sides of the gym. Foundations and on grade slabs are anticipated to be of conventional design after the recommended site remediation. Continuous footings are anticipated to be loaded to 2 to 5± kips per linear foot. Column footings are anticipated to be loaded in the range of 75 to 150 kips per column.

The site is relatively flat, therefore, only minor fill will be necessary to provide a level building pad. In addition, slopes or retaining walls are not planned for the site development.

4. SCOPE OF GEOTECHNICAL SERVICES

Our geotechnical site evaluation in general accordance with the *Scope of Services* presented in our proposal of March 16, 2023 (Proposal Number: 7305-10) was performed to obtain pertinent subsurface data to provide geotechnical recommendations for site development. In addition, an analysis of the potential for seismic induced settlement was performed for this site evaluation. Our scope of services performed under the direction of a state Registered Geotechnical Engineer and Certified Engineering Geologist included the following:

4.1 ARCHIVAL REVIEW

Pertinent site geotechnical and geologic information in our files was reviewed and incorporated into this site evaluation.

4.2 SUBSURFACE EXPLORATION

The required number of exploratory borings per the California Building Code Section 1803A.3.1 is at least one boring for every 5,000 square feet of building area at the foundation level. In addition, based the California Building Code (CBC), borings were required to extend to a total depth of 50 feet below the ground surface for an evaluation of the potential for liquefaction and seismic induced settlement.

Four geotechnical borings (8 inch diameter) were drilled to depths ranging from 51 feet (B-3 and B-4) to 51.5 feet (B-1 and B-2) below the existing ground surface (bgs) utilizing a subcontractor supplied and operated truck-mounted hollow-stem auger drill rig equipped with an automatic hammer weighing 140 pounds with a 30-inch drop. Six CPTs were advanced to 36 to 69 feet below the ground surface (bgs) with a truck-mounted Cone Penetrometer Test (CPT) rig. All CPTs were pushed to resistance. Shear wave testing was performed in the deeper CPT (CPT-2 and -6) to evaluate the Soil Profile Type (or Site Class per ASCE 7-16) of the area, which is used in the evaluation of the potential for liquefaction. The logs of the explorations are presented in Appendix A and the approximate boring and CPT locations are shown on Plates 1a and 1b.

The CPT consists of an instrumented probe hydraulically advanced into the ground to measure tip and sleeve frictional resistance. Data from the probe is monitored to provide a continuous profile of the sub-surface conditions and is correlated with known soil data commonly used in evaluation of the potential for liquefaction.

The field exploration activities described above were observed by an engineer and geologist from this office, who logged the underlying materials and from the borings obtained both bulk and relatively undisturbed drive soil samples for laboratory analyses. Standard Penetration Testing (SPT's) were performed in the borings at maximum 5-foot intervals to evaluate the potential for seismically induced settlement and relative density.

4.3 LABORATORY TESTING

A program of laboratory testing was conducted to evaluate geotechnical properties of selected soil samples obtained during the subsurface exploration as outlined in Appendix B.

4.4 GEOTECHNICAL ENGINEERING ANALYSES

The results of our archival research, field exploration and laboratory testing were used in engineering analyses to provide geotechnical recommendations for design and construction of the Sports Complex building and parking lot. Cross sections A-A' and B-B' have been prepared extending through the complex as required per CGS Note 48. Engineering analyses were performed to evaluate the potential for liquefaction and seismic induced settlements and to provide appropriate foundation system recommendations for support of the structure.

4.5 REPORT PREPARATION

The results of our scope of services are provided in this report and includes:

- a) A description of subsurface conditions as encountered in the exploratory excavations including Logs of Subsurface Data (Appendix A) and a Location Map (Plate 1) showing the approximate excavation locations. Cross Sections A-A' and B-B' (Plate 2) were prepared to illustrate the subsurface conditions under the proposed Sports Complex.
- b) A description of the laboratory testing programs, including tests results (Appendix B).
- c) Discussion and recommendations regarding:
 - i) Geologic hazards including seismic setting of the site and faulting,
 - ii) Seismic design criteria (Seismic Hazards Report);
 - iii) Liquefaction and seismically induced settlement potential;
 - iv) Soil collapse and expansion potential;
 - v) Site preparation and remedial grading;
 - vi) Conventional foundation design recommendations;
 - vii) Estimated settlements, if anticipated loading is provided;
 - viii) Pavement and hardscape design recommendations;
 - ix) Soil chemistry analysis and limited summary report, by subcontract.

5. SITE DESCRIPTION

The Sports Complex and adjacent parking lot are planned within the Fillmore High School property at 555 Central Avenue in Fillmore, California. The complex area is bounded by 2nd Street to the north, a football field and track to the west, school buildings to the east, and swimming pool and tennis courts to the south. The nearly level sod covered area is currently used as a baseball field and gently slopes downward to the pool area (south) and the track (west). Drainage of the site is generally accomplished by infiltration into the underlying sandy soils and by area storm drain inlet structures adjacent the school buildings.

6. REGIONAL GEOLOGIC SETTING

Fillmore, California, where the High School is located, is within the Santa Clara River Valley between Sespe Creek and Santa Clara River. The City sits at the base of the Topatopa Mountains within the eastern central portion of Ventura County. The valley is part of the Transverse Ranges Province, a series of sub parallel east to west trending ridgelines and valleys. This province is tectonically characterized by active compression in a north south direction with associated east to west trending reverse/thrust faulting, folding, and normal faulting.

7. SITE GEOLOGY

Based on a review of the Regional Geologic Map (Dibblee, 1990, see Figure 2), and our subsurface exploration, the site is underlain by Quaternary-age Older Alluvium to the maximum depth explored in the borings to 51.5 feet below the existing ground surface. A general description of the Older Alluvium is presented below with exploration location specific descriptions presented on the attached Logs of Subsurface Data (Appendix A). Cross Sections A-A' and B-B' (Plate 2) illustrate the subsurface conditions.

7.1 OLDER ALLUVIUM

Quaternary-age Older Alluvium underlies the entire site to the maximum depth explored in the borings, 51.5 feet below the existing ground surface (bgs) and to 69 feet bgs in the CPTs. As encountered, the upper 3 to 6 feet of the site consists of brown very silty fine to coarse sand with fine to coarse gravel in a damp to very moist and loose to medium dense condition. At depth the Older Alluvium generally consists of yellowish brown silty to very silty fine to coarse sand with fine to coarse gravel in a damp to very moist and medium dense to very dense condition locally interstratified with yellowish brown clayey silt and silty clays in a very moist and medium stiff condition. The gravels incorporated into the Older Alluvium appears to generally be derived from Miocene-age Modelo Formation outcroppings to the north and east offsite and uphill of the site. These gravels are typically diatomaceous.

7.2 GROUNDWATER

The site is within the Fillmore groundwater basin, which is unconfined and encompasses an area of approximately 18,600 acres. Water is pumped from the basin for municipal and agricultural uses and by other pumpers. Based on *Water Level Elevation Contour Maps* (2000 and 2002, pages 8 and 9) of the *Aquifer Study of the Fillmore Basin* prepared for the City of Fillmore, groundwater is reportedly below an elevation of 400 feet above sea level. On Table 7 of that report, *Predicted Range of Depth to Water at City of Fillmore Wells* for Well #5, which is approximately 0.7 miles northwest of the Fillmore High School, the water level with the basin full is 415 feet. The current level in the well as of the report date is at elevation 376 feet, 70 feet below the wellhead elevation of 446 feet. In the same report, at the peak of the 1990 drought period, water level elevations at private well 30D1, 0.22 miles northwest from the site, were as low as 369 feet above mean sea level. The approximate locations of wells #5 and 30D1 are shown on Figure 1.

Groundwater levels are indicated to be lower for the high school area in the 2014 and 2015 *Piru and Fillmore Basins, Biennial Groundwater Conditions Report*, prepared by the Groundwater Resources Department, United Water Conservation District, Open File Report 2016-01.

The building will have a finished floor of 490.5 feet, which results in groundwater being more than 75 feet below the ground within the area of the project. In addition, groundwater was not encountered to a depth of 51.5 feet below the existing ground surface, the maximum depth explored in the borings, which supports the depth to groundwater.

CGS Seismic Hazard Zone Report for the Fillmore 7.5-minute Quadrangle, Ventura County, California indicates a historic groundwater depth of approximately 34 feet bgs. However, as discussed above this groundwater depth is not supported by the basin study and lack of groundwater in the exploratory borings. Therefore, a groundwater depth of 75 feet was used in the evaluation of seismic settlement potential.

7.3 FLOOD POTENTIAL

The site is not within a flood hazard zone as shown on the FEMA Flood Zone FIRM Panel: 06111C0643E, effective on 1/20/2010 for the City of Fillmore.

7.4 LANDSLIDES

Landslides are not present within or near the site nor are any shown on regional geologic maps (Dibblee, 1990). Furthermore, the site is not prone to earthquake triggered landslides due to the low relief in the alluvial valley and preponderance of development covered land.

7.5 HYDROCONSOLIDATION

Hydroconsolidation occurs when the soil structure collapses due to soil wetting resulting in consolidation of the soil column. Hydroconsolidation was not observed in the consolidation tests performed on samples of the upper soil profile. Therefore, the potential for hydroconsolidation below the completed project should be negligible or nonexistent.

7.6 FAULTING AND SEISMICITY

The school site, like any other development in Southern California, is in a seismically active region prone to occasional damaging earthquakes. The destructive power of earthquakes can be grouped into fault-rupture, ground shaking (strong motion), and secondary effects of ground shaking such as tsunami, liquefaction, settlement, landslides, etc.

The hazard of surface fault-rupture is generally thought to be associated with a relatively narrow zone along well-defined pre-existing active faults. No doubt there is and will be exceptions to this, because it is not possible to predict the precise location of a new fault where none existed before (CDMG, 1975). Holocene-active faults are not known to cross the site nor is the site currently within an Alquist-Priolo (A-P) Earthquake Fault Zone as defined by the State Geologist (CGS 1991) (see Figure 3). However, based on the *Fault Activity Map of California* (Jennings, et.al., 2010), the school site is within ½ mile from the inferred surficial trace of the Holocene-Active (last 11,700 years) San Cayetano fault (see Figures 2 and 4). Other Holocene-active mapped faults are the Oak Ridge fault, approximately 1.8 miles to the southwest of the site and the Simi-Santa Rosa Fault, approximately 10 miles to the southeast. The Historically-active (last 200 years) San Fernando fault (February 9, 1971 earthquake is 24 miles to the southeast and the San Andreas fault is roughly 28 miles to the northeast. Potential for surface ground rupture due to faulting onsite during the project lifetime is considered remote.

Although no active faults are known to cross the site, the area will be subject to strong ground motion from occasional earthquakes in the region. Four significant earthquakes have occurred centered within 50 miles of the site within the last eight decades: the March 11, 1933 Long Beach earthquake (6.4 magnitude), the February 9, 1971 San Fernando earthquake (6.6 magnitude) with its epicenter about 24 miles southeast of the site, the October 1, 1987 Whittier Narrows earthquake (6.0 magnitude), and the January 17, 1994 Northridge earthquake (6.7 magnitude) with an epicentral distance located approximately 25 miles southeast of the site.

During the Northridge event, it is estimated the general area of the school experienced maximum horizontal accelerations on the order of 0.25g on the alluvial soil site condition. This is based upon the ground motion data obtained from ground motion contours presented in Chapter 3 of the *Preliminary Report on the Principal Geotechnical Aspects of the January 17, 1994 Northridge Earthquake* (Chang et al., 1994). Significant earthquakes will likely occur in the area within the life expectancy of the project and the site will experience strong ground shaking from these events.

Probabilistic seismic hazard analyses (PSHA) predict the Design Basis Earthquake having a 2% probability of exceedance in 50 years (2,475-year return period will have a peak ground acceleration estimated to be 0.929g based on a seismic event with a mean magnitude of 7.21 (Mw) at a mean distance of 6.4 km from

the site. This is based on the U.S. Geological Survey (USGS) interactive web application, Unified Hazard Tool <https://earthquake.usgs.gov/hazards/interactive/> for the C/D boundary class site.

Secondary effects of strong ground motion include tsunamis, seiche, liquefaction, settlement, earthquake triggered landslides, and flooding from dam failures. Tsunamis are impulsively generated water waves that can cause damage to shoreline areas. A seiche is an oscillation wave within an enclosed body of water. The site is not near the ocean or adjacent a body of water and, therefore, is not subject to tsunami and seiche hazards. Earthquake induced liquefaction and seismic settlement affecting the proposed site development are discussed below.

8. LIQUEFACTION POTENTIAL

8.1 GENERAL

The school site is within an area shown to have a potential for liquefaction on the Earthquake Zones of Required Investigation Map, Fillmore Quadrangle (CGS, 2002) (see Figure 4). Liquefaction can occur when saturated, loose, sandy to silty soils (non-cohesive) are subjected to excessive ground vibrations during a significant seismic event. During a significant seismic event, pore pressure increases due to earthquake shaking within the saturated soils (generally in the upper 50 feet of a site) causing these soils to lose strength. This may result in mobilization of the soil causing total or differential settlements, lateral spreading, and/or surface manifestations such as loss of bearing capacity, artesian water flow, and sand boils. Dry sand settlement is where seismic shaking causes densification of low-density sands.

Seismic induced lateral movement or spread is where soils that liquefy or loose strength move on a shallow slope or toward a free face. Conditions generally conducive to lateral spread are a gentle surface slope, shallow groundwater table, liquefiable soils.

The analyses of liquefaction potential and seismically induced settlement/movement were conducted in general accordance with State of California Department of Conservation, Division of Mines and Geology (CDMG), Special Publication 117A, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*. Analysis of the potential for liquefaction was performed based on a seismic event having a return period of 2475 years per ASCE 7-16. The assumptions made and the procedures used are discussed below along with the results of the analyses.

8.2 GROUNDWATER

A groundwater level of 75 feet below ground surface was used in the analysis.

8.3 BORING / CPT CORRELATION

Borings and CPT soundings were used to evaluate the site. Both the borings and CPTs indicate the site is predominately underlain by silty fine to coarse sands. However, the CPTs indicate more layering of soils resulting in a higher calculated potential for seismic dry sand settlement than in the borings. However, the estimated settlements in boring B-4 and CPT-3 are relatively close at 1.9 and 2.2, respectively (after site remediation).

8.4 EARTHQUAKE PARAMETERS

A seismic event having a 2% chance of being exceeded in 50 year (2475 return period) was used for the evaluation of liquefaction/seismic settlement potential. Mean magnitude from the probabilistic seismic hazard analysis (PSHA), used to quantify the rate (or probability) of exceeding various ground-motion levels at a site given all possible earthquakes is 7.21 (Mw) with a mean distance of 6.4 km from the property. This is based on the U.S. Geological Survey (USGS) interactive web application, Unified Hazard Tool <https://earthquake.usgs.gov/hazards/interactive/> for the C/D boundary class site. An average shear wave velocity of 1183 feet per second was determined for the site. Peak ground acceleration $PGA_M = 0.929g$ is from ASCE 7 Hazard Tool: <https://asce7hazardtool.online/>.

8.5 SEISMIC SETTLEMENT (DRY SAND SETTLEMENT)

Seismically induced settlement was evaluated using data obtained from both borings. The computer program GeoSuite by GeoAdvanced™ was used for dry sand settlement analyses.

Analysis was conducted using the undisturbed sampler and SPT (standard penetration test) data from the completed borings by this firm. The SPT tests were performed using a 140-pound automatic hammer dropped 30 inches. Field recorded blow counts are shown on the boring logs in Appendix A. The SPT sampler is designed for a liner inside the sampling tube. However, sampling during the field investigation did not include the use of a liner and the blow counts were corrected accordingly. Field N-value blow counts were normalized to 1 ton/square foot and corrected for the rig efficiency, hammer type, sampler type (no liner), rod length, and fines content (where applicable) as described in the Recommended Procedures for Implementation of CDMG Special Publication 117 (SCEC 1999). The GeoSuite program calculates liquefaction based on SPT blow counts following Idriss and Boulanger (2008) and dry sand settlement following Pradel (1998).

Seismic settlement of dry (unsaturated) sands was evaluated using the procedure proposed by Pradel (1998) based on the Tokimatsu and Seed (1987) procedure. This method by Pradel uses a series of equations to determine the volumetric strain induced in a soil layer based on the equivalent corrected N-values and the design earthquake parameters.

For these evaluations, a soils' potential to liquefy is expressed as a factor of safety. The factor of safety against liquefaction potential is calculated, as the ratio of the cyclic stress needed to cause liquefaction over the cyclic stress induced by an earthquake. A factor of safety against liquefaction of 1.3 or greater is generally considered to represent no significant potential for liquefaction. A summary of our results of seismically induced settlement potential is provided in the table below based on the recommended removal and recompaction of the upper 12 feet of the building area. Actual seismic induced settlement would be dependent upon the degree of seismic induced groundshaking at the site and the duration of the shaking. Calculation sheets can be found in Appendix C of this report.

Data Point	Estimated Seismic Settlement at PGAm (inches)	Data Point	Estimated Seismic Settlement at PGAm (inches)
B-1	.12	CPT-1	1.9
B-2	.35	CPT-2	1.7
B-3	.48	CPT-3	2.2
B-4	1.9	CPT-4	1.1
		CPT-5	2.0
		CPT-6	1.2

An average of the potential for seismic induced settlement across the site based on the CPTs is 1.7 inches.

8.6 DIFFERENTIAL SEISMIC SETTLEMENT

"Differential settlement can be calculated directly from the difference in settlement between multiple borings (CGS, 2019) or if using one boring, the recommended differential settlement of one half the total settlement based on CGS Note 48 Item 20." Differential settlement may be calculated as the difference in the potential settlement between the borings. In this case we have considered the difference in the CPT soundings. Therefore, based on California Geological Survey (CGS) requirements, the acceptable differential settlement is 1.1 inches (difference between CPT 3 and 4 and the distance between the two CPTs is 125± feet). In addition, as stated in SCEC 1999 (page 32) "... it can be concluded that differential settlements at level- ground sites with natural soils are expected to be small even if the total settlement is large compared to the total settlement for conditions that typically exist in southern California."

Therefore, based on the above discussion, building differential settlement should be less than 1 inch in 30 feet (settlement difference over boring spacing), which is equivalent to 0.0028L. The upper threshold to allow the use of shallow foundations is 0.007L for single-story structures with concrete or masonry wall systems and 0.015L for other single-story structures per ASCE/SEI 7-16 *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*, Table 12.13-3 (Differential Settlement Threshold Risk Category II). We suggest the conventional foundation system be designed as a minimum per Note 2 in Section 12.13.9.2.1, where individual foundations shall be integral with or connected to a reinforced slab-on-ground, at least 5 inches thick.

8.7 SURFACE MANIFESTATION

Only minor seismic settlement is anticipated within the upper zone of the site. Therefore, minor fissuring of the ground surface consisting of ground fissures and sand boils may occur during a design level seismic event.

8.8 LATERAL SPREADING

The likelihood of lateral spread occurring is considered negligible due to the flat nature of the site, no liquefaction potential (only dry sand settlement potential), and lack of adjacent sloping ground surfaces.

9. GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

9.1 GENERAL

From a geotechnical standpoint, our evaluation of the site and alluvial soil found with the recommended site remediation to reduce the potential for seismic induced settlement, the site is suitable for the planned Sports Complex at Fillmore High School. Therefore, the project may be constructed as described earlier in this report provided recommendations presented herein are followed and incorporated into the project design and construction.

9.2 GEOTECHNICAL SEISMIC DESIGN

As previously discussed, Holocene-active faults are not known to cross the site nor is the site currently within an Alquist-Priolo (A-P) Earthquake Fault Zone as defined by the State Geologist (CGS 2018). Nevertheless, the site is within a seismically active region prone to occasional damaging earthquakes.

Structures within the site may be designed using procedures for seismic design presented in ASCE/SEI 7-16. Mapped acceleration parameters are initially determined for sites having a shear wave velocity of 2,500 feet per second (Section C11.4.4). The S_s and S_1 values are adjusted to obtain the maximum considered earthquake (MCE) spectral acceleration values for the site based on its site class of D. The seismic design parameters for the site's coordinates (latitude 34.4031 N and longitude 118.9160 W) were obtained from the web based ASCE 7 Hazard Tool <https://asce7hazardtool.online/>. The parameters are presented on the following page (the full report is presented in Appendix C) along with the Site-Specific MCE_R and Design Response Spectra per Sect. 21.2, 21.3, 21.4 of ASCE 7-16 (via the SC/EC UGMS MCE_R Tool https://data2.scec.org/ugms-mcerGM-tool_v18.4/).

SEISMIC PARAMETER	VALUE PER CBC
Short Period Mapped Acceleration (S_s)	1.935
Long Period Mapped Acceleration (S_1)	0.734g
Site Class Definition	D
Site Coefficient (F_a)	1.0
Site Coefficient (F_v)	1.7*
$S_{MS} = F_a S_s$	1.935g
$S_{M1} = F_v S_1$	1.248g*
$S_{DS} = 2/3 S_{MS}$	1.29g
$S_{D1} = 2/3 S_{M1}$	0.832g*
PGA_M	0.929g

**Based on proposed development meeting requirements of the exemption for Site Class D sites in Section 11.4.8 of ASCE 7-16. Further analysis may be required once the Response Modification Factor and Period of the proposed development are known.*

The purpose of the building code earthquake provisions is primarily to safeguard against major structural failures and loss of life, not to limit damage nor maintain function. Therefore, values provided in the building code should be considered minimum design values and should be used with the understanding site acceleration could be higher than addressed by code-based parameters. Cracking of walls and possible structural damage should be anticipated in a significant seismic event.

9.3 SITE PREPARATION AND GRADING

9.3.1 General

Geotechnical recommendations are presented in the following sections for preparation of the building pad and parking lot. Site preparation and fill placement should be performed per the CBC / Division of State Architect standards. Undisturbed in-placed alluvial soils below the remediated zone are suitable for foundation support.

9.3.2 Site Clearing

Prior to starting earthwork, trash, debris, and remnants of demolition within areas of construction should be stripped and removed from the site. Utilities (if present) within the area of construction should be identified and removed or protected prior to grading.

9.3.3 Soil Removals

Remedial grading should be performed within the proposed building area. Soil removals, as a minimum, should extend to a minimum depth of 12 feet below the existing ground surface.

The bottom of the soil removal should extend outside the perimeter footings a minimum distance equal to the depth of removal below the footing or a minimum of 12 feet, whichever is greater. However, soil removals should not extend below a 1(horizontal)1(vertical) line extending down from the property lines or as evaluated per this office. After removals are completed, a representative of this office should observe the bottom of the removal area prior to placing fill. Fill soil should not be placed until geotechnical observation of the removal areas is completed.

Outside the building areas, soil removals as a minimum, should extend to 2 feet below the existing ground surface.

The removed soils may be reused as fill material provided, the soils are clean and placed as described herein. The removal area should be observed by this office prior to fill placement to evaluate if deeper removals are necessary.

9.3.4 Soil Compaction

Fill soil or in-place compaction should be completed to a minimum 90 percent relative compaction. Relative compaction is the ratio of the in-place dry soil density to the maximum dry soil density as determined in general accordance with ASTM laboratory standard D-1557.

9.3.5 In-Place Soil Processing

Once the soil removals are complete and prior to placing fill, the bottom of the removal area should be processed. Processing consists of scarifying the exposed surface to a depth of roughly 6 to 8 inches, conditioning the scarified soil to above the optimum moisture content, and compacting the scarified soil. Processed soil should be compacted to 90 percent relative compaction.

9.3.6 Fill Placement

Soils generated from the removal areas should be suitable for reuse as fill. Import fill if required should be similar to on-site materials. This office should observe the source of import fill prior to placement.

Fill soils should be free of significant vegetation, rocks greater than 6 inches in maximum linear dimension, and other deleterious materials. In addition, fill soils should be mixed and blended. Fill soils should be placed in lifts not exceeding 8 inches in maximum loose thickness, moisture conditioned to slightly over optimum moisture content, and compacted to at least 90 percent relative compaction.

9.3.7 Temporary Excavations

Temporary excavations for the soil removal may be made at a 1(horizontal):1(vertical) gradient. However, the lower 5 foot of the 12-foot excavation should be made and backfilled in the same day. The fill should extend out from the toe of the excavation slope a minimum of 10 feet. Therefore, the lower 5 feet of the removal should be performed in segments to allow for the necessary fill placement.

During construction, the contractor is responsible for the excavation and maintenance of safe and stable slope angles considering the subsurface conditions and the methods of operations. Temporary excavations should be made per the applicable requirements of the current Cal/OSHA excavation regulations. Geotechnical evaluation of temporary excavations can be provided when the excavation location is known.

9.4 SOIL EXPANSIVENESS

A soil expansion test was performed on a representative sample of the upper soils within the site. Test results indicate the underlying materials are non-expansive, in the 0-20 expansion index range. Additional expansion tests may be performed at the conclusion of the recommended remedial grading.

Expansive soils contain clay particles that change in volume (shrink or swell) due to a change in the soil moisture content. The amount of volume change depends upon the soil swell potential (amount of expansive clay in the soil), availability of water to the soil, and the soil confining pressure. Swelling occurs when soils containing clay become wet due to excessive water from poor surface drainage, over-irrigation of lawns and planters, and sprinkler or plumbing leaks. Swelling clay soils can cause distress to structures, walks, drains, and patio slabs.

9.5 FOUNDATION DESIGN

9.5.1 Design Data

Structures may be supported on continuous or isolated footings underlain by engineered compacted soil as addressed above and may be designed for an allowable bearing pressure of 2,500 pounds per square foot (psf). The allowable net bearing pressure may be increased by one-third when considering wind or seismic loads. The weight of concrete below grade may be excluded from the footing load.

Continuous and isolated footings should have minimum widths of 18 inches and 24 inches, respectively. The footings should be embedded a minimum of 24 inches for interior and exterior footings. The embedment should be measured from the lowest adjacent grade (lowest grade at the time of excavation or after). Interior footings may be embedded a minimum of 24 inches below the interior slab. Steel reinforcement should be per the structural engineers' recommendations. However, minimum continuous footing reinforcement should consist of two number five bars in the top and bottom (total of 4 bars). In addition, interior slabs should be tied to the footings with number 4 bars at 24-inch centers bent 3-feet into the slab and extended to within 3 inches of the bottom of the footing. Perimeter isolated footings should be tied together with a grade beam extending 24 inches deep below the lowest adjacent grade.

9.5.2 Mat Slab Design Data

Mat slabs may be designed using an allowable soil bearing pressure of 1,500 pounds per square foot (at the ground surface) or a modulus of subgrade reaction "K" of 200 pounds per cubic inch (pci) at the surface of a properly prepared building pad. The project structural engineer should determine the steel reinforcement and concrete compressive strength. Slabs supporting interior walls should be a minimum of 8 inches thick. A mat slab should be underlain by a minimum 6-inch-thick layer of ½ inch or larger clean aggregate or per applicable building codes, whichever is the more restrictive. In addition, interior mat slab design should include a moisture retarder as indicated under *Slabs on Grade* below.

9.5.3 Lateral Earth Pressures

Lateral forces on foundations may be resisted by passive earth pressure and base friction. Lateral passive earth pressure may be considered equal to a fluid weighing 250 pounds per cubic foot (pcf). The lateral passive pressure may be increased to a maximum of 2500 psf. Base friction may be computed at 0.3 times the normal load. Passive earth pressure and base friction may be combined without reduction.

A passive soil pressure of 30 pcf may be used for shallow walls supporting soil loads that are allowed to yield at the top. If the walls are restrained, the active pressure should be increased to 60 pcf.

9.5.4 Estimated Settlements

Static settlement of footings may be evaluated once building footing locations and structural loads are known. However, footing settlement for static loading is anticipated on the order of 1/2 inch or less, with a maximum differential settlement of 1/2± inch over a span of approximately 30 feet or between adjacent individual footings. This is provided building construction is started directly after footing excavation, footings are cast soon after the footing excavation, and construction is completed in a timely manner. Settlements due to static loading are expected to occur rapidly as the loads are applied.

The potential for seismic induced settlement due to seismic induced settlement has been previously discussed in this report.

All structures settle during construction and some minor settlement of structures can occur after construction during the life of the project. Minor wall cracking could occur within the structure associated with expansion and contraction of the structural members. In addition, wall or slab cracking may be associated with settlement or expansive soil movement. Additional settlement/soil movement could occur if the soils dry or become saturated due to excessive water infiltration generally caused by excessive irrigation, poor drainage, etc.

9.5.5 Footing Excavations

This office should observe the footing excavations prior to placing reinforcing steel. Footings should be cut square and level and cleaned of loose soils. Soil excavated from the footing and utility trenches should not be spread over any areas of construction unless properly compacted. Soils silted into the footing excavations should be removed to the required depth prior to casting the concrete. The footings should be cast as soon as possible to avoid deep desiccation of the footing subsoils.

9.5.6 Premoistening

Footings subsoils should be maintained near the optimum moisture content for a depth of 18 inches below the bottom of the footing. Saturated soils or soils silted into the footing excavations should be removed prior to concrete placement.

9.6 SLABS-ON-GRADE

9.6.1 Site Preparation

The subgrade for slabs-on-grade, if disturbed during foundation and utility construction, should be conditioned prior to placement of an aggregate materials. Loose soils should be removed to firm in-place material, the exposed subgrade processed, and the material replaced as engineered compacted fill or aggregate material.

9.6.2 Slab-on-Grade Design Data

Interior concrete slabs on-grade not used for structural support should be 5 inches thick and underlain by 6-inch-thick layer of ½ inch or larger clean aggregate or per applicable building codes, whichever is the more restrictive. The slab should be reinforced with a minimum of number 3 bars at 16-inch centers in each direction. Slab reinforcement should be placed and kept at mid-height. In addition to the above slab recommendations, slabs supporting heavy loads including mat slabs should be designed by the structural engineer for the intended loading, thickness, and reinforcement.

9.6.3 Premoistening

Slab on-grade subsoils should be maintained near the optimum moisture content for a depth of 18 inches.

9.6.4 Concrete Placement and Cracking

Minor cracking of concrete slabs is common and is generally the result of concrete shrinkage continuing after construction. Concrete shrinks as it cures resulting in shrinkage tension within the concrete mass. Since concrete is weak in tension, development of tension results in cracks within the concrete. Therefore, the concrete should be placed using procedures to minimize the cracking within the slab. Shrinkage cracks can become excessive if water is added to the concrete above the allowable limit and proper finishing and curing practices are not followed. Concrete mixing, placement, finishing, and curing should be performed per the American Concrete Institute Guide for Concrete Floor and Slab Construction (ACI 302.1R). Concrete slump during concrete placement should not exceed the design slump specified by the structural engineer or 5 inches, whichever is the lessor. Concrete slabs on grade should be provided with tooled crack control joints at 10-15 foot centers or as specified by the structural engineer.

9.6.5 Moisture Vapor Barrier

Moisture migration occurs when there is a differential potential in the relative moisture below and above the concrete slab on grade. Therefore, concrete slabs on grade within the building interior should be considered sensitive to moisture and an appropriate moisture vapor retarder layer should be installed and maintained below concrete slabs-on-grade. The water vapor retarder should be one specifically designed as a vapor retarder and consist of a minimum 15 mil extruded polyolefin plastic and complying with Class A requirements under ASTM E1745 (*Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs*). The vapor retarder should be installed in accordance with ASTM E1643. The water vapor retarder should be installed in direct contact with the concrete slab along with a concrete mix design to control bleeding, shrinkage, and curling (ACI 302.2R). The vapor retarder shall be installed over a minimum 6-inch-thick layer of ½ inch or larger clean aggregate or per applicable building codes, whichever is the more restrictive. The vapor retarder should be placed per ASTM E1643-98(2005) *Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs*. In addition, various trades and the concrete contractor should be required to protect the moisture retarder during construction.

Joints in the vapor retarder layer should be lapped and sealed. Perforations through the moisture vapor retarder such as at pipes, conduits, columns, grade beams, and wall footing penetrations should be sealed per the manufacture's specifications or ASTM E1643. Proper construction practices should be followed during construction of slabs on-grade. Tears or punctures in the moisture barrier should be repaired and sealed prior to concrete placement.

Minimizing shrinkage cracks in the slab on-grade can further minimize moisture vapor emissions. A properly cured slab utilizing low-slump concrete will reduce the risk of shrinkage cracks in the slab as described herein.

The concrete contractor should make the necessary changes in the concrete placement and curing for concrete placed directly over the retarder. Placing the concrete directly on top of the moisture vapor retarder layer allows the layer to be observed for damage directly prior to concrete placement.

The slabs should be tested for moisture content prior to the selection of the flooring and adhesives. Moisture in the slabs should not exceed the flooring manufacture's specifications. The concrete surface should be sealed per the manufacture's specifications if the moisture readings are excessive. It may be necessary to select floor coverings applicable to high moisture conditions.

9.7 FLAG POLE FOOTING RECOMMENDATIONS

9.7.1 Pile Design

Flagpole footings (piles) may be designed using an allowable lateral bearing pressure of 250 psf per foot of depth for level ground (maximum pressure should not exceed 2,500 psf) and friction between the soil and concrete of 0.30. These values have a factor of safety of 1.5 and may be combined with no reduction. If deflection of pole foundations is a concern, deflection calculations can be provided when loads are known.

9.7.2 Pile Construction

Due to layers of sand, some caving or raveling should be anticipated during the pile construction. The drilling contractor should be prepared to use casing in areas where excessive caving occurs.

To minimize caving potential, piles should be filled with concrete in a timely manner and not left open overnight. Care should be exercised when casting adjacent piles to avoid blowout from one excavation into the other. From an engineering standpoint, the preferred method would be to excavate, cast, and let the concrete achieve initial set prior to excavating the adjacent pile. However, where spacing between adjacent piles is greater than three times the largest pile diameter, satisfactory results have been achieved by casting adjacent piles simultaneously, keeping the differential elevation of the concrete less than five feet between piles.

Pile excavations should be observed by this firm prior to setting reinforcing steel to verify the anticipated geotechnical conditions or to evaluate any unanticipated conditions encountered.

9.8 EXTERIOR SLABS AND WALKWAYS

Exterior concrete slabs-on-grade (non-auto traffic) and walkways should be a minimum of 4 inches thick and underlain by a minimum of 4 inches of sand. In areas of heavy loading for truck traffic (including trash pickup areas and loading docks) the slab thickness should be increased to a minimum of 7 inches thick. Exterior slabs should be reinforced with a minimum of No. 3 bars on 24-inch centers in each direction. The reinforcement should be placed at mid-depth of the slab. Sidewalks may be constructed of non-reinforced concrete provided the sidewalks are cut into square panels (i.e., 4-foot wide walks should be cut into 4 foot by 4 foot squares).

Concrete subgrade soils should be properly placed and compacted for the support of the concrete flatwork. Prior to placing concrete, the subgrade soils should be near the optimum moisture content for a minimum depth of 12 inches.

9.9 SOIL CORROSIVITY

The results of the analytical laboratory testing to evaluate the potential for corrosion of materials in contact with the onsite soils are presented in Appendix B. The testing was performed on a soil sample considered to represent the onsite soils. From ACI Table 19.3.1.1 the evaluated soil is categorized as Class S0. The required concrete design requirements for this exposure class can be obtained from ACI Table 19.3.2.1. The potential for corrosion of metals in contact with the site soils is moderately corrosive as determined from Table 1 in Appendix B. For specific recommendations, a corrosion engineer should be consulted.

9.10 PRELIMINARY PAVING SECTION

9.10.1 Structural Section

Structural sections consisting of asphaltic concrete (AC) placed over a compacted layer of aggregate base are provided in the table below based on an average R value for the subgrade soils of 22. The project civil engineer should determine the appropriate traffic index for the pavement area. For bus drives, a higher traffic index and thicker pavement section should be considered.

PRELIMINARY PAVEMENT SECTIONS	
Traffic Index	"R" Value = 22
4.0 (parking stalls)	3" AC / 5" AB
5.0 (drive aisles)	3" AC / 7" AB
6.0 (light automobile traffic)	3" AC / 11" AB
7.0 (bus traffic)	3" AC / 14" AB
AC = Asphaltic Concrete AB = Aggregate Base	

9.10.2 Subgrade Preparation

Subgrade soils within areas of paving should be moistened to slightly above the optimum moisture content and compacted to at least 90% of the laboratory standard prior to placing aggregate base.

9.10.3 Aggregate Base Preparation

Aggregate base materials should be moistened to slightly above the optimum moisture content and compacted to at least 95% of the laboratory standard prior to placing concrete.

9.10.4 Asphalt Maintenance

Asphalt pavements should be maintained by filling cracks that appear and with periodic application of fog sealers to replace surface oils that are lost due to weathering and wear.

9.11 SITE DRAINAGE

Positive drainage should be continuously provided and maintained away from the structure during and after construction in accordance with applicable building codes and/or the approved grading plan. In addition, drainage should not be changed creating an adverse drainage condition.

Water should not be allowed to gather or pond against foundations or hardscape allowing water migration into the subgrade. Therefore, landscape watering should be held to a minimum and irrigation systems

maintained in good repair. Sprinkler or plumbing leaks should be immediately repaired. Trees should be spaced so that roots will not extend under foundations or slabs. Planters near a structure should be constructed so that irrigation water will not saturate footing and slab subgrade soils.

9.12 GUTTERS AND DOWNSPOUTS

Gutters and downspouts should be installed on the buildings to collect roof water and direct the water away from the structure. Downspouts should drain into PVC collector pipes to carry the water away from the building.

9.13 PLAN REVIEW

This office should review the building location, grading plans, foundation plans and specifications prior to starting construction to review conformance to recommendations in this report. Additional analysis and recommendations may be necessary based on this plan review.

10. CLOSURE

This report was prepared under the direction of a registered geotechnical engineer and certified engineering geologist. No warranty, expressed or implied, is made as to conclusions and professional advice included in this report. Gorian and Associates, Inc. disclaims any and all responsibility and liability for problems that may occur if the recommendations presented in this report are not followed.

This report was prepared for Fillmore School District and design consultants solely for design and construction of the Sports Complex described herein. This report may not contain sufficient information for other uses or the purposes of other parties. Recommendations are based on interpretations of the subsurface conditions concluded from information gained from subsurface explorations and a surficial site reconnaissance. Interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. Due to possible subsurface variations, a representative of this office should observe all aspects of field construction addressed in this report. Anyone using this report for bidding or construction purposes should perform such independent investigations as they deem necessary.


The scope of the services provided by Gorian and Associates, Inc. and its staff, excludes responsibility and/or liability for work conducted by others. Such work includes, but is not limited to, means and methods of work performance, quality control of the work, superintendence, sequencing of construction and safety in, on, or about the jobsite.

-oOo-

Please contact our office if you have questions regarding this report or require additional information.

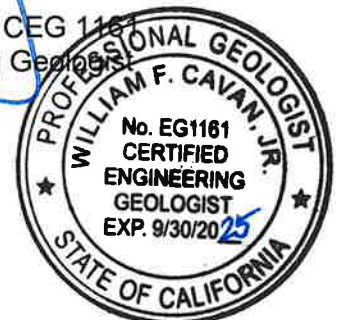
Respectfully,

Gorian and Associates, Inc.


By: Jerome J. Blunck, GE 151
Principal Geotechnical Engineer



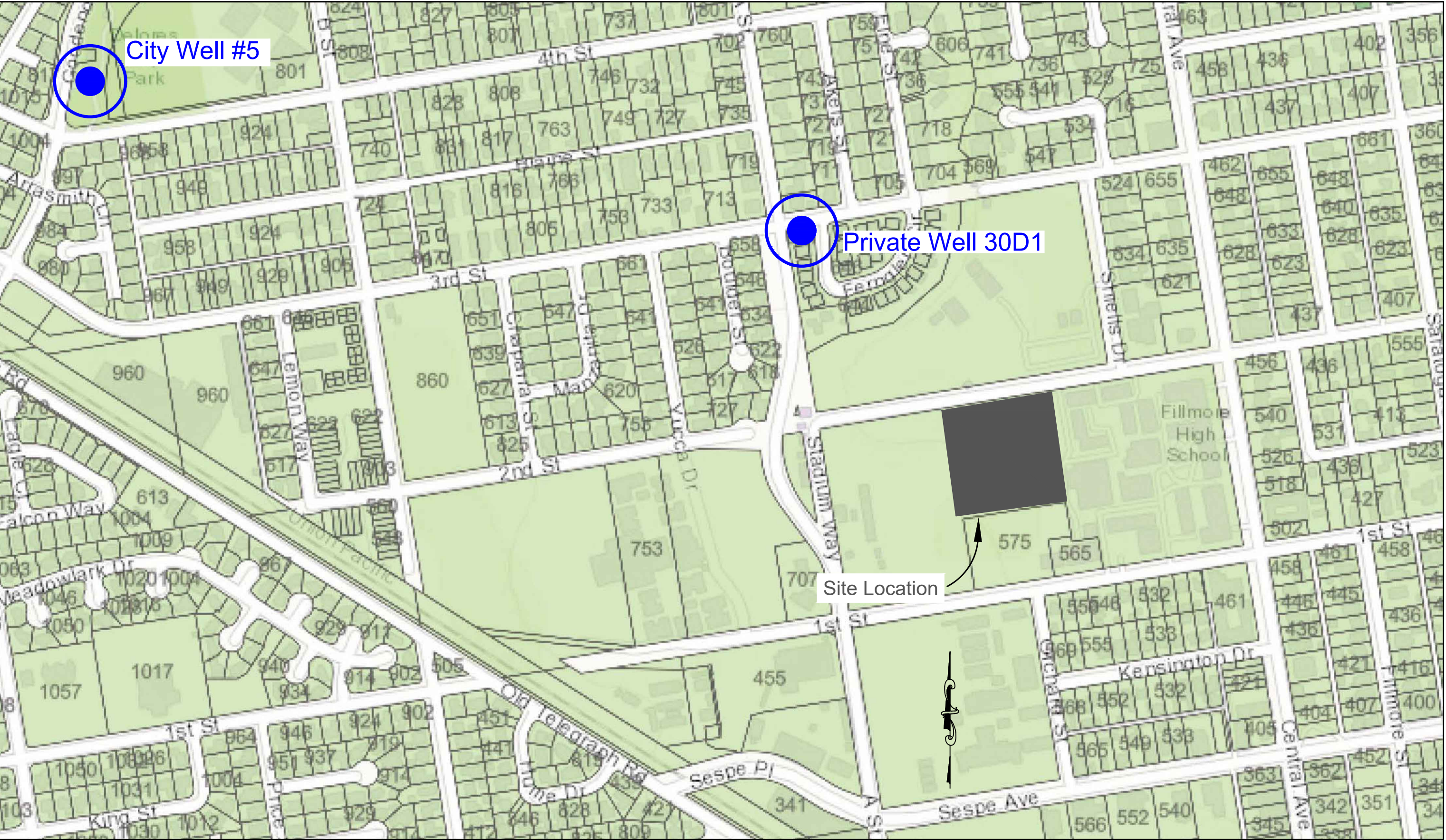

William F. Cavan, Jr. CEG 1161
Principal Engineering Geologist




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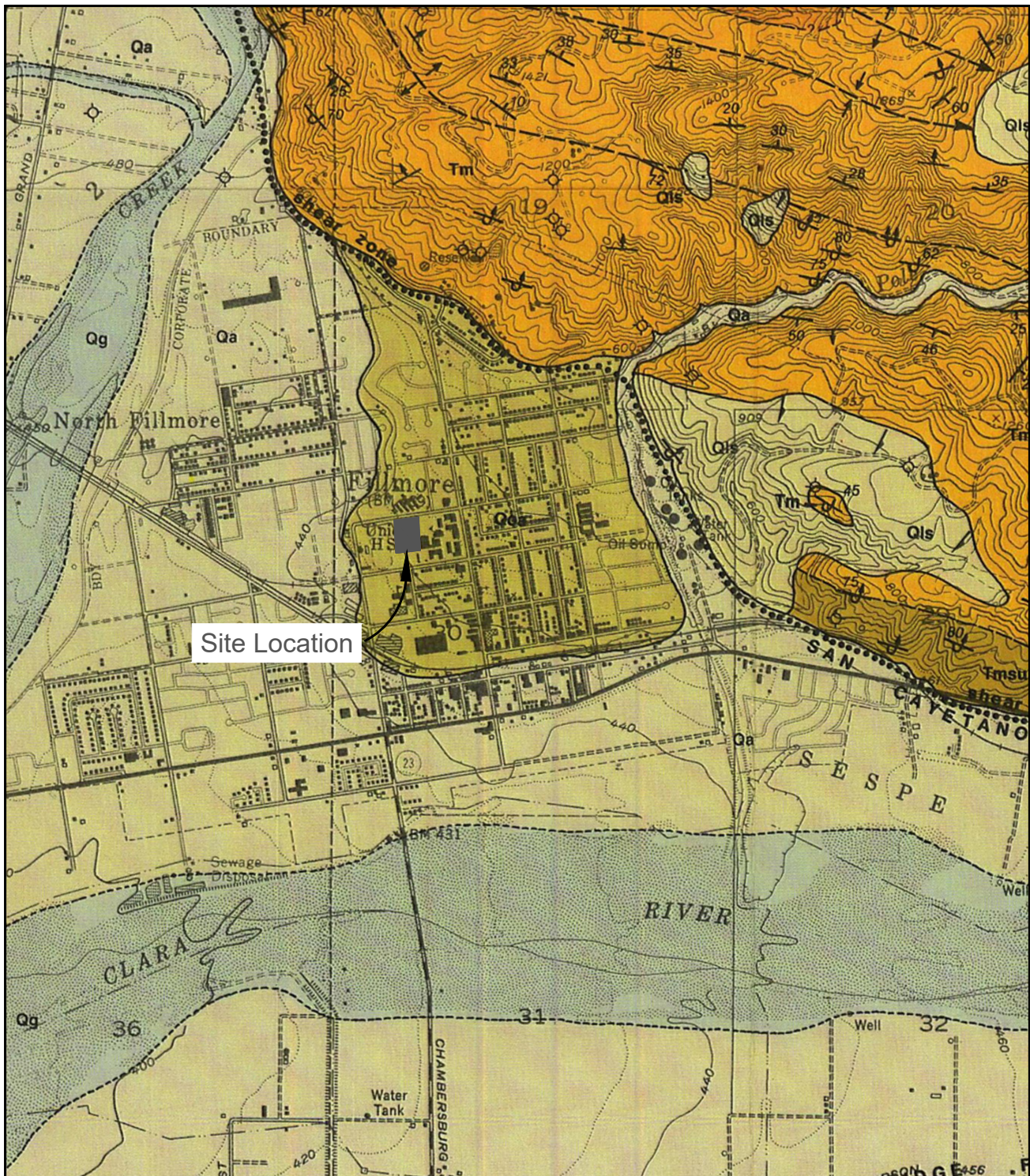


Source
California Geological Survey (CGS) Homepage,
Earthquake Zones of Required Investigation
viewed online

 **Explanation**
Approximate Well Location

SITE VICINITY MAP
Fillmore High School Sports Complex
555 Central Avenue, Fillmore, California

 Gorlan & Associates, Inc. <i>Applied Earth Sciences</i>		
Job No: 3242-0-0-100	Date: Aug. 2023	
Scale: NTS	Drawn by:	Figure 1
	Approved by:	



Source: Dibblee, Thomas W. Jr., ed. Ehrenspeck, Helmut E., 1990, GEOLOGIC MAP OF THE FILLMORE QUADRANGLE, VENTURA COUNTY, CALIFORNIA. Dibblee Geological Foundation Map #DF-27.

Explanation

Qoa - Older Dissected Surficial Sediments; alluvial boulder-cobble gravel, composed sandstone detritus, in sandy to silty matrix

REGIONAL GEOLOGIC MAP

Fillmore High School Sports Complex
555 Central Avenue, Fillmore, California



Gorian & Associates, Inc.
Applied Earth Sciences

Job No: 3242-0-0-100

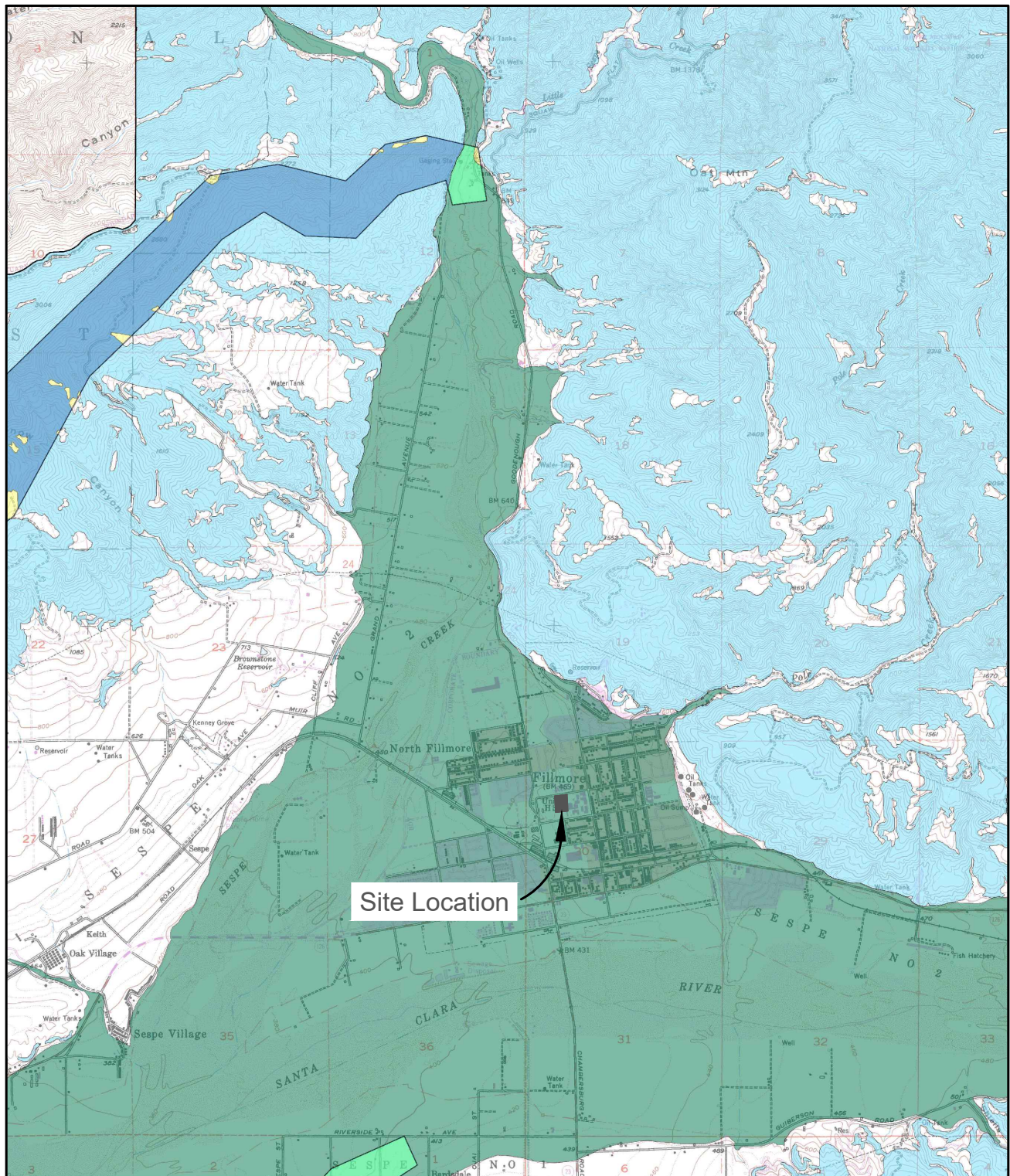
Date: Aug. 2023

Scale: 1" = 2000'




Drawn by:

Approved by:

Figure 2



Explanation

-  Seismic Hazard Zone - Liquefaction
-  Seismic Hazard Zone - Earthquake Induced Landslide
-  Overlap of Earthquake zone and Earthquake-Induced Landslide Zone

Source

California Geological Survey, Earthquake Zones of Required Investigation
Fillmore Quadrangle,
Earthquake Fault Zones Released November 1, 1991
Seismic Hazard Zones Released December 20, 2002

SEISMIC HAZARD ZONE MAP

Fillmore High School Sports Complex
555 Central Avenue, Fillmore, California



Gorian & Associates, Inc.
Applied Earth Sciences

Job No: 3242-0-0-100

Date: Dec. 2022

Scale: 1" = 4000±'

Drawn by:

Approved by:

Figure 3

Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION	
						ON LAND	OFFSHORE
Quaternary	Late Quaternary	Holocene	200			Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
			11,700			Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
	Pleistocene		700,000			Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
	Early Quaternary					Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
Pre-Quaternary			1,600,000*			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.
			4.5 billion (Age of Earth)				


* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.6 Ma criterion.



Source
Jennings, C.W., and Bryant, W.A., 2010,
Fault Activity Map of California, California
Geological Survey Geologic Data Map No.
6.

REGIONAL FAULT MAP

Fillmore High School Sports Complex
555 Central Avenue, Fillmore, California



Gorlan & Associates, Inc.
Applied Earth Sciences

Job No: 3242-0-0-100

Date: Aug. 2023

Scale: 1" = 10 miles

Drawn by:
Approved by:

Figure 4

APPENDIX A
LOGS OF SUBSURFACE DATA



Project: Fillmore Unified School District
555 Central Avenue, Fillmore

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-1

Page Number: 1

Date(s) Excavated 06/13/2023	Logged By CHD	Excavation Location See Map	Approximate Surface Elevation
Excavation Dimension 8" HSA	Equipment Contractor 2 R Drilling	Equipment Type CME 75	Hammer Data Auto 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		<u>ALLUVIUM:</u> Brown very silty fine to coarse SAND with fine to coarse gravel (damp, loose). @3', becoming medium dense	
		7						
		12			SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, medium dense). Friable, slightly clayey zone. Below 7', chatter.	
5		14	10.2	111.1				
		26	9.6	100.3				
10		3/6/4					@10 very clayey @11.5', becoming moist.	
		25	8.3	105.6				
15		11/ 11/ 14					@15', becoming damp.	
		46	9.3	106.1			@18', becoming dense.	
20		22/ 22/ 28					@20', becoming very dense, heavy chatter.	
		45	10.9	104.5			@23', becoming dense.	
25		6/21/ 18						
		53	9.2	111.1			@28', becoming very dense.	
30		6/7/ 10			SM		Yellowish brown very silty fine SAND, few fine gravels (moist, medium dense).	
		43	11.6	99.4	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, dense).	
35		18/ 19/ 19						
		53	9.0	112.8			@38', becoming very dense.	
40		22/ 32/						



Project: Fillmore Unified School District
555 Central Avenue, Fillmore

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-1

Page Number: 2

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
		23						
		51	9.4	106.6				
45		13/ 32/ 31						
		53	11.3	100.6				
50		7/12/ 25			SM		Yellowish brown very silty fine SAND, some fine gravels (moist, dense). @50', becoming dense.	
							TOTAL DEPTH 51.5' No Caving Observed No Groundwater Encountered Backfilled with cuttings and tamped.	
55								
60								
65								
70								
75								
80								
85								



Project: Fillmore Unified School District
555 Central Avenue, Fillmore

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-2

Page Number: 1

Date(s) Excavated 06/13/2023	Logged By CHD	Excavation Location See Map	Approximate Surface Elevation
Excavation Dimension 8" HSA	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data Auto 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		<u>ALLUVIUM:</u> Brown very silty fine to coarse SAND with fine to coarse gravel (very moist, medium dense). *Area irrigated, wet at ground surface.	
		21	15.1	101.6				
5		9	9.4	102.4	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (very moist, medium dense).	
		11	16.5	101.8	SM		Yellowish brown very silty fine SAND (very moist, medium dense).	
10	4/3/4				SM		Yellowish brown silty SAND, slightly clayey zone (very moist, medium dense)	
		22	22.1	97.2	SM		Yellowish brown very silty fine to coarse SAND with fine to coarse gravel (very moist, medium dense).	
15	9/10/11				SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, medium dense).	
		22	11.0	104.6				
20	15/22/25						@20', becoming dense, heavy chatter.	
		45	12.4	102.9				
25	13/11/4				SM		Yellowish brown very silty fine SAND (very moist, medium dense).	
		68	11.1	107.6	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, very dense). Heavy chatter	
30	17/11/6				SM		Yellowish brown silty fine SAND (very moist to wet, medium dense).	
		28	18.9	104.9	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (very moist, medium dense).	
35	5/12/15						@35', becoming damp.	
		44	10.9	102.5			@38', becoming dense.	
40	6/9/16						@40', becoming very moist, medium dense.	



Project: Fillmore Unified School District
555 Central Avenue, Fillmore

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-2

Page Number: 2

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
43		43	13.0	98.0			@43', becoming dense, moist.	
45		15/ 22/ 21					@45', becoming damp.	
50		55	8.8	108.1			@48', becoming very dense.	
		13/9/ 11]			SM		Yellowish brown very silty fine SAND, few fine gravels (very moist, medium dense).	
							TOTAL DEPTH 51.5' No Caving Observed No Groundwater Encountered Backfilled with cuttings and tamped.	
55								
60								
65								
70								
75								
80								
85								



Project: Fillmore Unified School District
555 Central Avenue, Fillmore

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-3

Page Number: 1

Date(s) Excavated 06/10/2023	Logged By EG	Excavation Location See Map	Approximate Surface Elevation
Excavation Dimension 8" HSA	Equipment Contractor 2 R Drilling	Equipment Type CME 75	Hammer Data Auto 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		<u>ALLUVIUM:</u> Brown silty fine SAND with medium gravel (damp, medium dense).	
		17	15.5	103.3				
		8	15.3	102.0				
5								
		12	16.1	103.2	SM		Yellowish brown very silty SAND with fine to coarse gravel (damp, medium dense).	
		6/7/8						
10								
		12	12.3	98.6				
		8/7/7			SM		Yellowish brown very silty SAND with fine to medium gravel (damp, medium dense).	
15							@15' Larger gravel	
		14	12.4	108.8			@17' Heavy Chatter	
		10/ 15/ 16						
20								
		15	10.3	96.2				
		9/15/ 16			SM		Yellowish brown very silty SAND with coarse gravel (damp, medium dense).	
25								
		18	12.6	106.8				
		11/ 15/ 15			SM/ ML		Silty fine SAND to very sandy SILT, trace clay with fine to medium gravel (damp, medium dense).	
30					SM		Yellowish brown very silty fine SAND with fine to coarse gravel (damp, medium dense).	
		28	9.8	103.0				
		3/6/8						
35								
		33	16.7	106.2				
		4/8/ 12			SM/ ML		Yellowish brown Silty fine SAND to sandy SILT, with fine to medium gravel (moist, medium dense).	
40								
		18	22.3	97.3				



Project: Fillmore Unified School District
555 Central Avenue, Fillmore

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-3

Page Number: 2

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
45	12/9/7	38	17.7	101.4	SM		Yellowish brown very silty fine SAND with fine to coarse gravel (damp, medium dense).	
50	35/33/40	26	11.3	105.3				
55							TOTAL DEPTH 51' No Caving Observed No Groundwater Encountered Backfilled with cuttings.	
60								
65								
70								
75								
80								
85								



Project: Fillmore Unified School District
555 Central Avenue, Fillmore

Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
Number: B-4

Page Number: 1

Date(s) Excavated 06/14/2023	Logged By EG	Excavation Location See Map	Approximate Surface Elevation
Excavation Dimension 8" HSA	Equipment Contractor 2R Drilling	Equipment Type CME 75	Hammer Data Auto 140#

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
0					SM		<u>ALLUVIUM:</u> Brown silty fine SAND with fine to coarse gravel (damp, medium dense).	
		18	17.1	87.9				
		10	14.1	104.7	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, medium dense).	
5		8						
		17	19.8	100.3	SM		Yellowish brown very silty SAND with fine gravel (moist, medium dense).	
		2/2/5						
10		10	11.6	105.1	ML		Yellowish brown clayey SILT and sand with fine to medium gravel (damp, medium dense).	
		3/6/4						
					SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, medium dense).	
15		8	20.8	97.1				
		4/6/11			SM		Yellowish brown very silty fine to coarse SAND with fine to coarse gravel (damp, medium dense). @18' Chatter	
20		30	10.1	101.9				
		4/3/3						
25		18	14.8	106.8	SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, medium dense).	
		21/31/33/35			SP		Yellowish brown fine to coarse SAND with medium pebble, fine to coarse gravel (damp, medium dense).	
30			12.9	104.9				
		16/20/20			SM		Yellowish brown silty fine to coarse SAND with fine to coarse gravel (damp, dense).	
35		42	13.0	107.1			@35' Becoming more coarse.	
		4/3/3			SM		Yellowish brown very silty fine SAND, with fine to coarse gravel (very moist, medium dense).	
40		18	15.6	104.6				



Project: Fillmore Unified School District
 555 Central Avenue, Fillmore
 Work Order: 3242-0-0-100

SUBSURFACE LOG

Excavation
 Number: B-4

Page Number: 2

Elevation / Depth (ft.)	Bulk Sample Type	Blow Counts	Moisture Content (% dry weight)	Dry Density (pcf)	USCS	Soil / Lithology	Description	Remarks
45	15/26/23	20	9.5	105.7			@42' Cobbles approximately 2".	
50	12/20/38	40	13.8	96.8	SM SM		Yellowish brown silty fine SAND with trace silt, with fine to coarse gravel (moist, medium dense). Yellowish brown silty fine to coarse SAND with fine to coarse gravel. some pebbles (damp, medium dense). TOTAL DEPTH 51.5' No Caving Observed No Groundwater Encountered	
55								
60								
65								
70								
75								
80								
85								

SUMMARY OF CONE PENETRATION TEST DATA

Project:

**Fillmore High School
555 Central Avenue
Fillmore, CA
June 16, 2023**

Prepared for:

**Mr. Chip DeVault
Gorian & Associates, Inc.
3595 Old Conejo Road
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Office (805) 375-9262 / Fax (805) 375-9263**

Prepared by:



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5415 Industrial Drive
Huntington Beach, CA 92649-1518
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www.kehoetesting.com

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- 1. INTRODUCTION**
- 2. SUMMARY OF FIELD WORK**
- 3. FIELD EQUIPMENT & PROCEDURES**
- 4. CONE PENETRATION TEST DATA & INTERPRETATION**

APPENDIX

- CPT Plots
- CPT Classification/Soil Behavior Chart
- Summary of Shear Wave Velocities
- CPT Data Files (sent via email)

SUMMARY OF CONE PENETRATION TEST DATA

1. INTRODUCTION

This report presents the results of a Cone Penetration Test (CPT) program carried out for the Fillmore High School project located at 555 Central Avenue in Fillmore, California. The work was performed by Kehoe Testing & Engineering (KTE) on June 16, 2023. The scope of work was performed as directed by Gorian & Associates, Inc. personnel.

2. SUMMARY OF FIELD WORK

The fieldwork consisted of performing CPT soundings at six locations to determine the soil lithology. A summary is provided in **TABLE 2.1**.

LOCATION	DEPTH OF CPT (ft)	COMMENTS/NOTES:
CPT-1	62	Refusal
CPT-2	69	Refusal
CPT-3	50	
CPT-4	35	Refusal
CPT-5	52	Refusal
CPT-6	47	Refusal

TABLE 2.1 - Summary of CPT Soundings

3. FIELD EQUIPMENT & PROCEDURES

The CPT soundings were carried out by **KTE** using an integrated electronic cone system manufactured by Vertek. The CPT soundings were performed in accordance with ASTM standards (D5778). The cone penetrometers were pushed using a 30-ton CPT rig. The cone used during the program was a 15 cm² cone with a cone net area ratio of 0.83. The following parameters were recorded at approximately 2.5 cm depth intervals:

- Cone Resistance (qc)
- Sleeve Friction (fs)
- Dynamic Pore Pressure (u)
- Inclination
- Penetration Speed

At locations CPT-2 & CPT-5, shear wave measurements were obtained at various depths. The shear wave is generated using an air-actuated hammer, which is located inside the front jack of the CPT rig. The cone has a triaxial geophone, which recorded the shear wave signal generated by the air hammer.

The above parameters were recorded and viewed in real time using a laptop computer. Data is stored at the KTE office for up to 2 years for future analysis and reference. A complete set of baseline readings was taken prior to each sounding to determine temperature shifts and any zero load offsets. Monitoring base line readings ensures that the cone electronics are operating properly.

4. CONE PENETRATION TEST DATA & INTERPRETATION

The Cone Penetration Test data is presented in graphical form in the attached Appendix. These plots were generated using the CPeT-IT program. Penetration depths are referenced to ground surface. The soil behavior type on the CPT plots is derived from the attached CPT SBT plot (Robertson, "Interpretation of Cone Penetration Test...", 2009) and presents major soil lithologic changes. The stratigraphic interpretation is based on relationships between cone resistance (q_c), sleeve friction (f_s), and penetration pore pressure (u). The friction ratio (R_f), which is sleeve friction divided by cone resistance, is a calculated parameter that is used along with cone resistance to infer soil behavior type. Generally, cohesive soils (clays) have high friction ratios, low cone resistance and generate excess pore water pressures. Cohesionless soils (sands) have lower friction ratios, high cone bearing and generate little (or negative) excess pore water pressures.

The CPT data files have also been provided. These files can be imported in CPeT-IT (software by GeoLogismiki) and other programs to calculate various geotechnical parameters.

It should be noted that it is not always possible to clearly identify a soil type based on q_c , f_s and u . In these situations, experience, judgement and an assessment of the pore pressure data should be used to infer the soil behavior type.

If you have any questions regarding this information, please do not hesitate to call our office at (714) 901-7270.

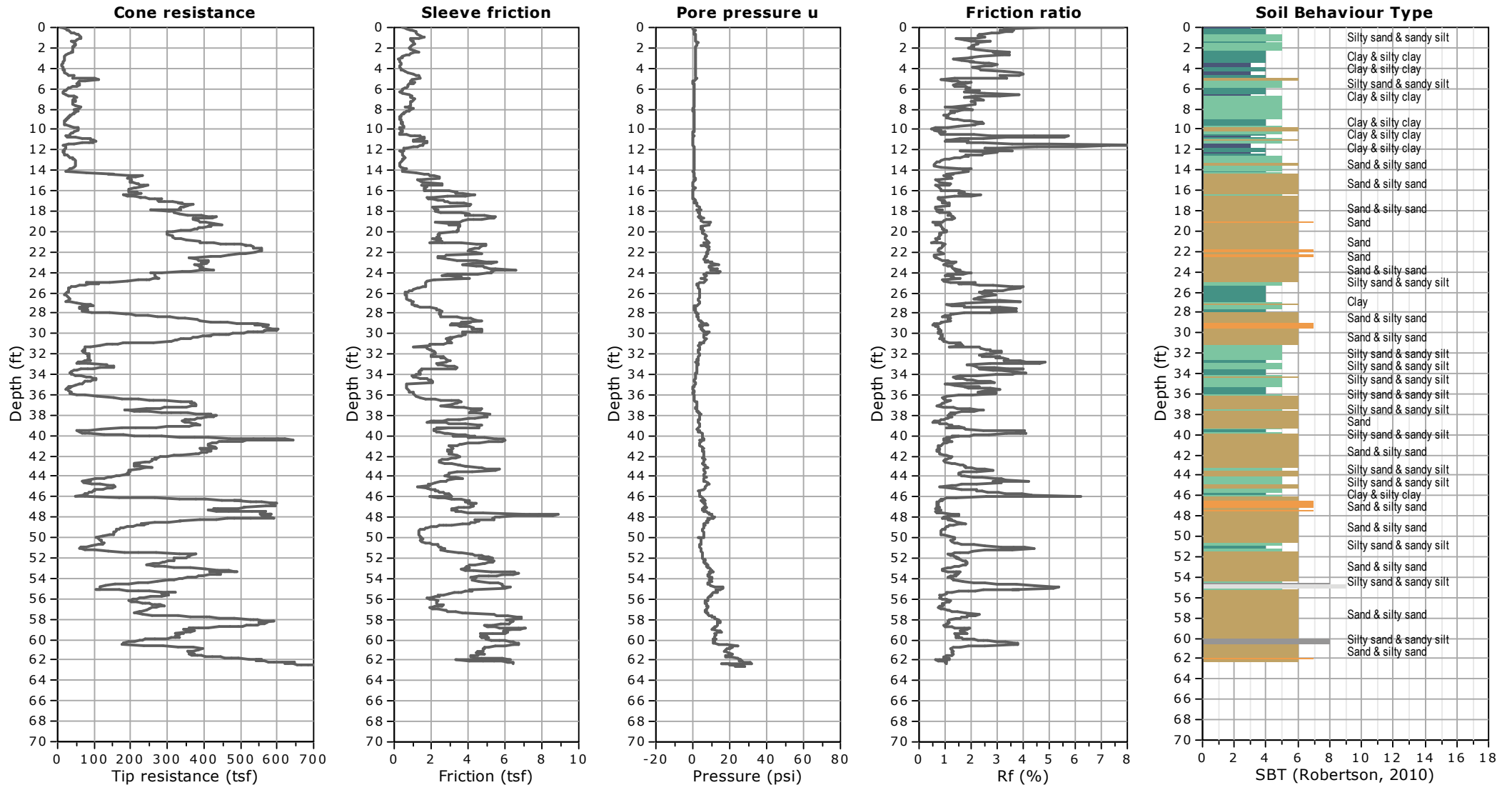
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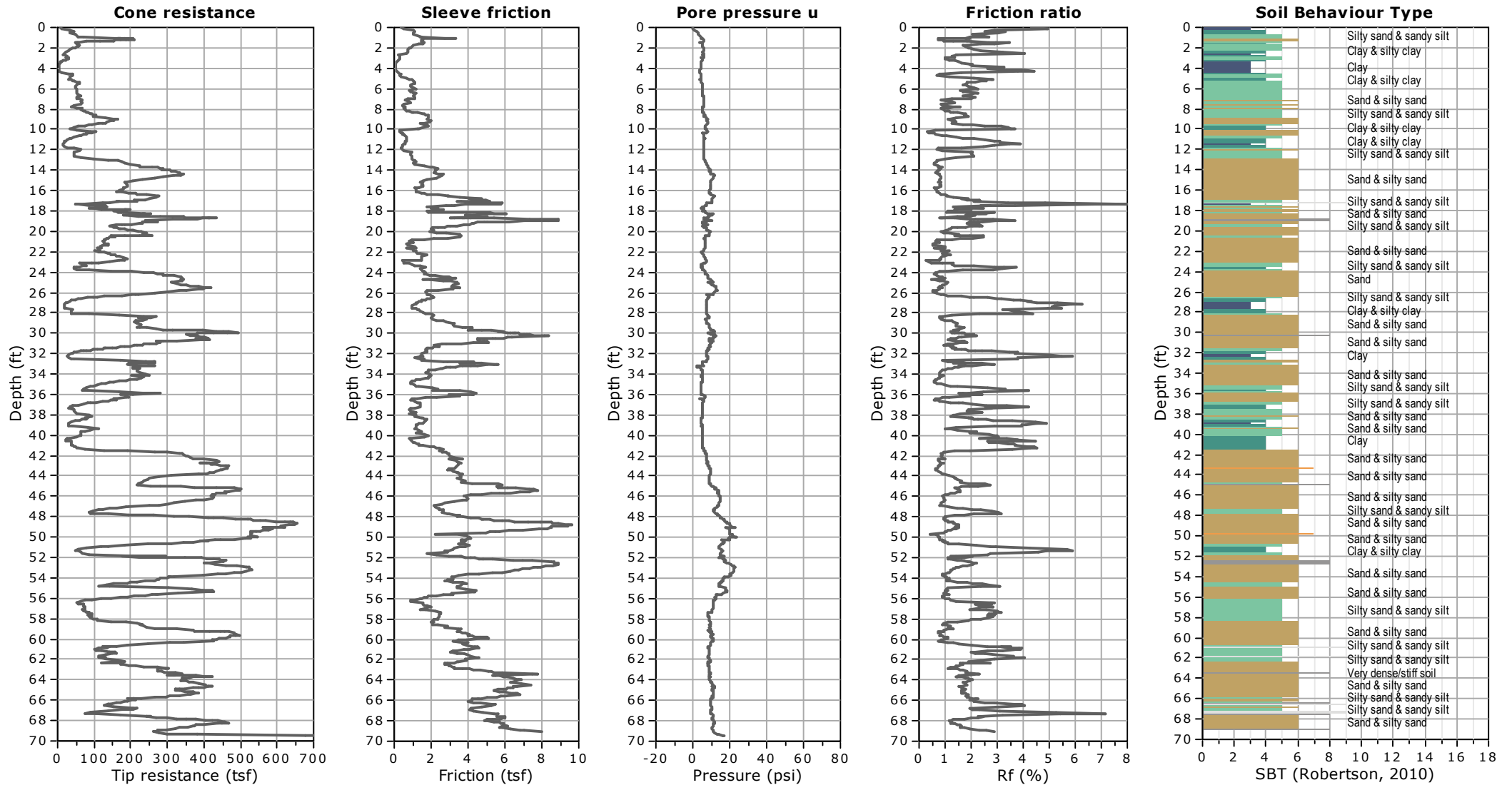
KEHOE TESTING & ENGINEERING

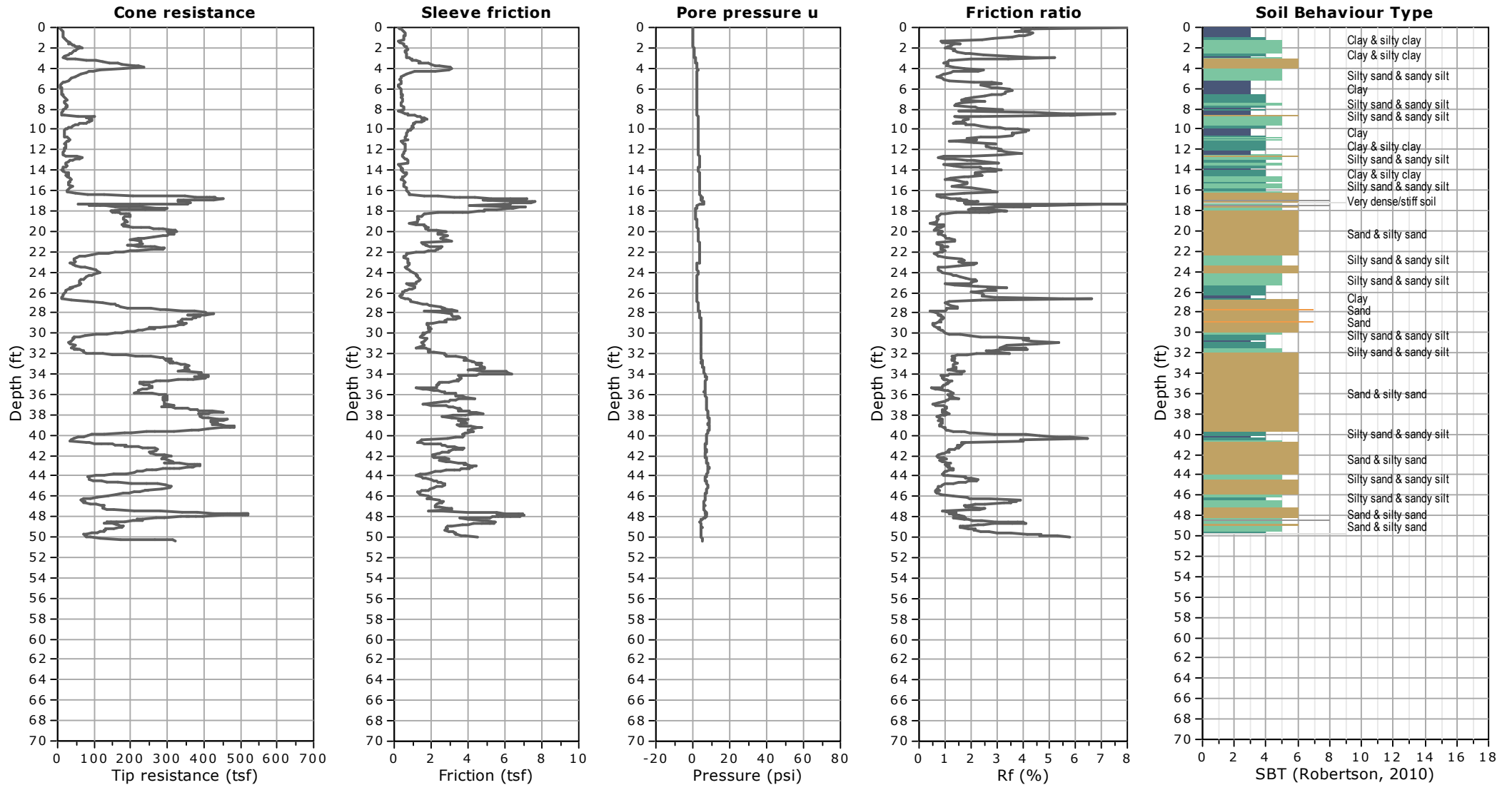


Steven P. Kehoe
President

APPENDIX





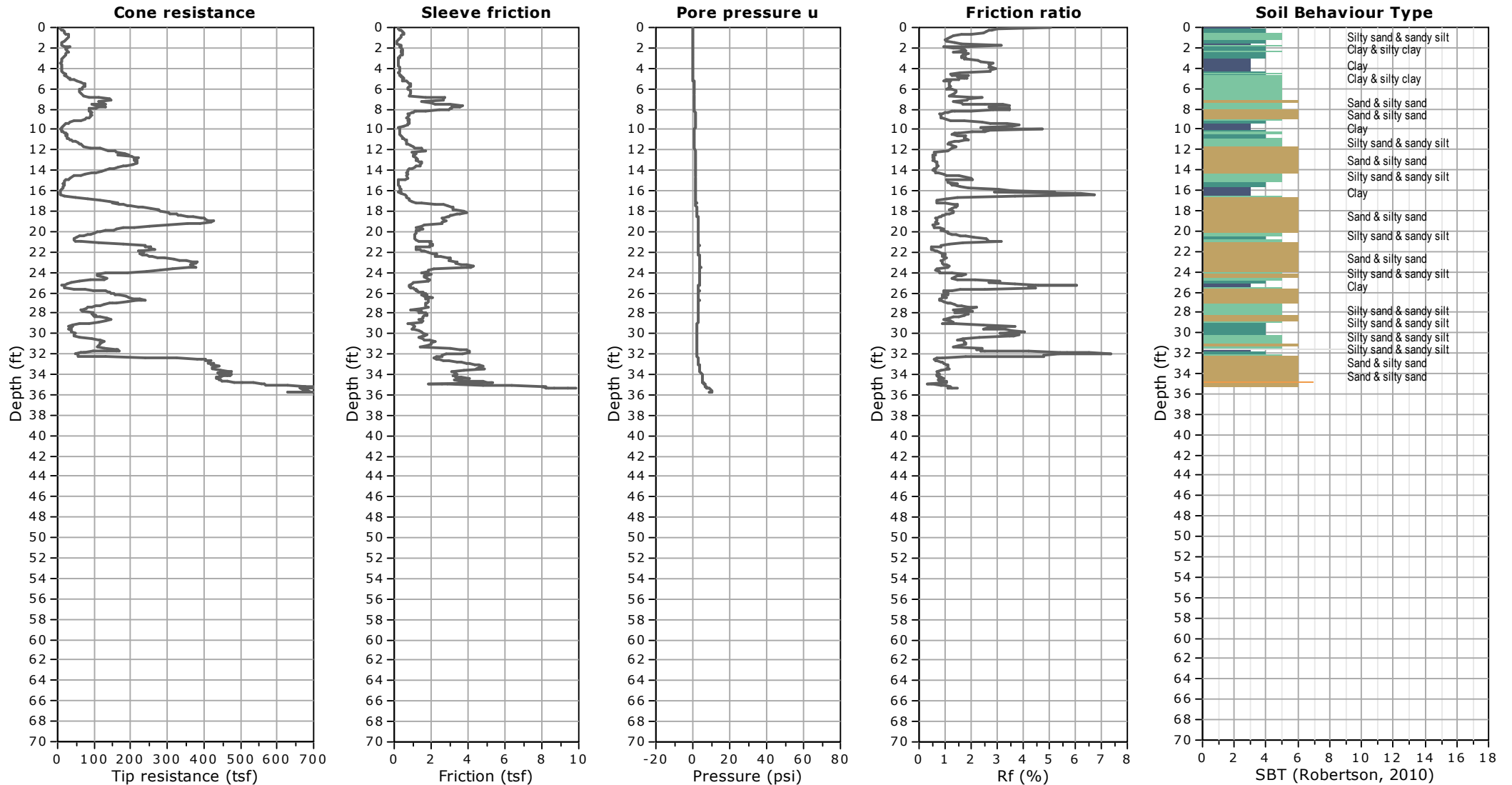




Project: Gorian & Associates / Fillmore High School
Location: 555 Central Ave, Fillmore, CA

CPT-4

Total depth: 35.78 ft, Date: 6/16/2023

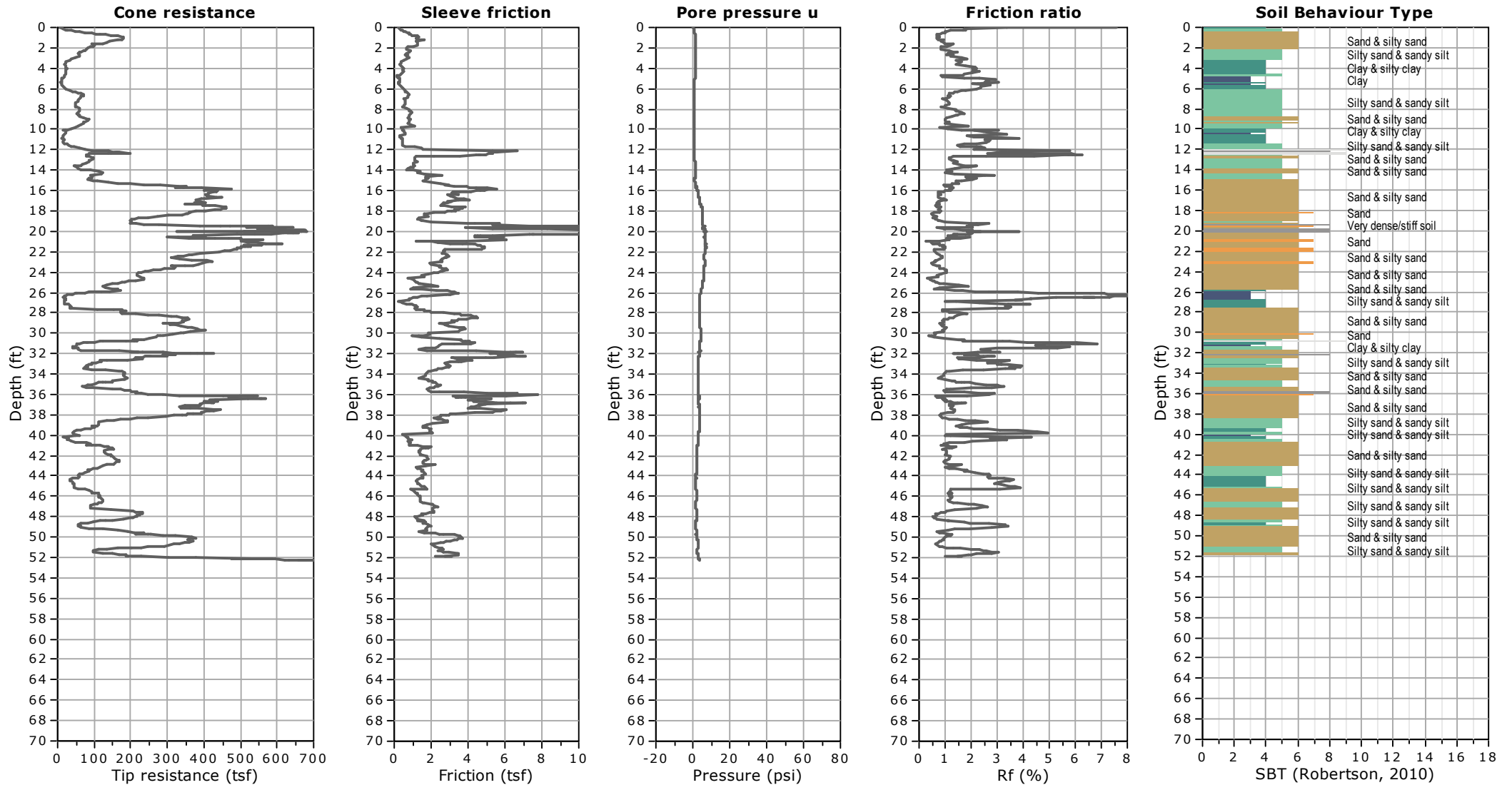




Project: Gorian & Associates / Fillmore High School
Location: 555 Central Ave, Fillmore, CA

CPT-5

Total depth: 52.30 ft, Date: 6/16/2023



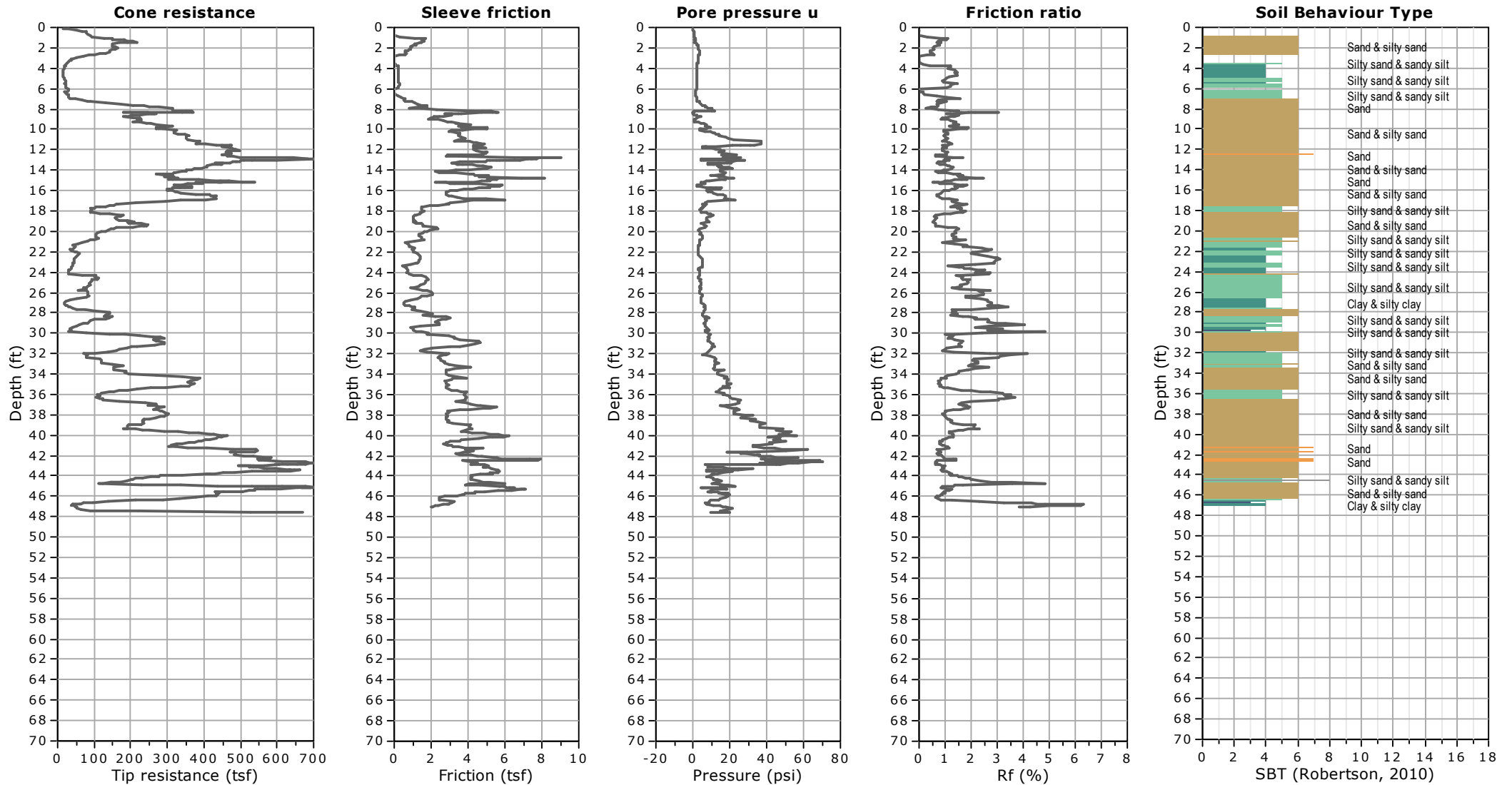


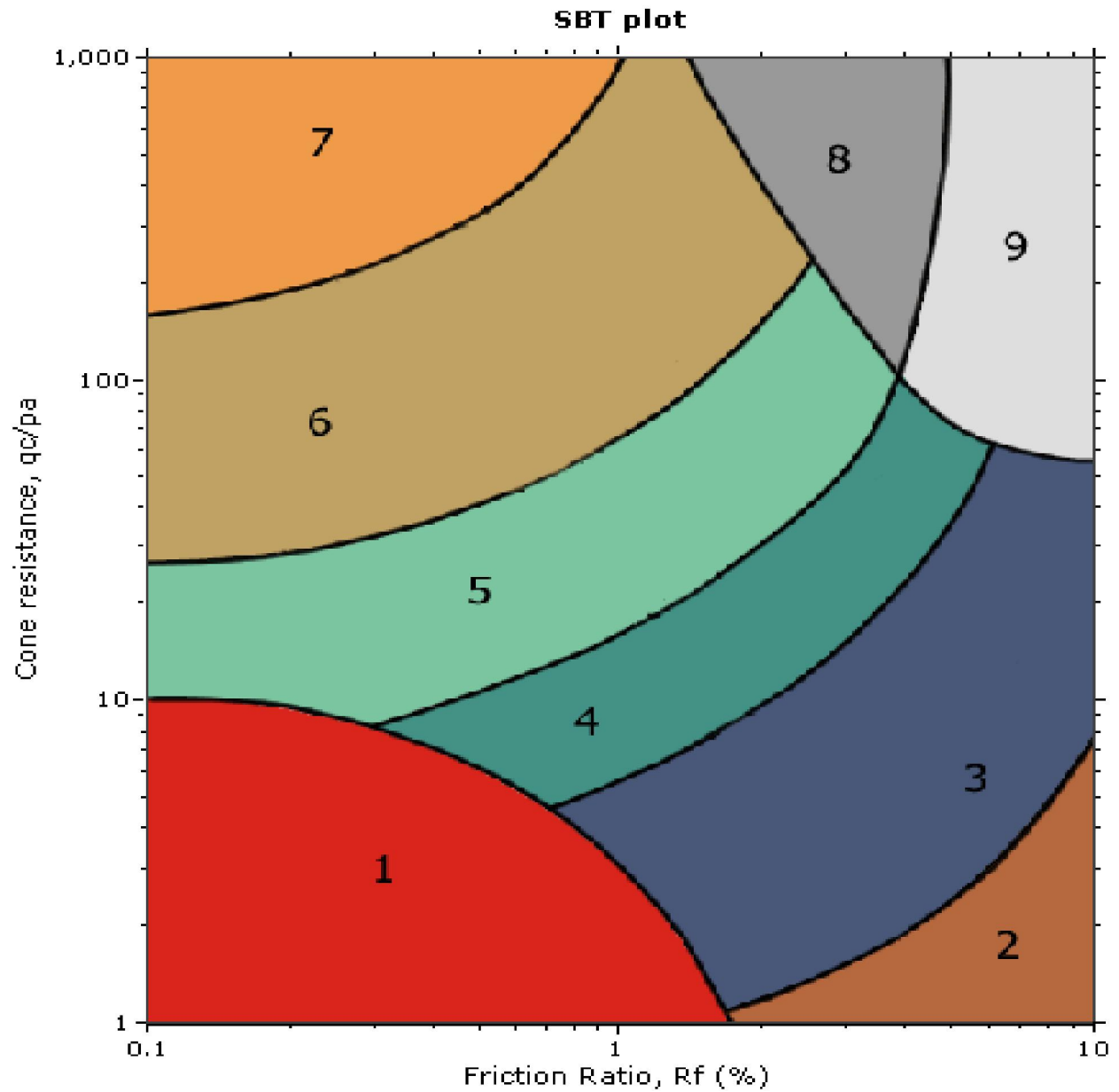
Project: Gorian & Associates / Fillmore High School

Location: 555 Central Ave, Fillmore, CA

CPT-6

Total depth: 47.52 ft, Date: 6/16/2023





SBT legend

- | | | |
|---|---|---|
| ■ 1. Sensitive fine grained | ■ 4. Clayey silt to silty clay | ■ 7. Gravely sand to sand |
| ■ 2. Organic material | ■ 5. Silty sand to sandy silt | ■ 8. Very stiff sand to clayey sand |
| ■ 3. Clay to silty clay | ■ 6. Clean sand to silty sand | ■ 9. Very stiff fine grained |

Gorian & Associates
 Fillmore High School
 Fillmore, CA

CPT Shear Wave Measurements

Location	Tip Depth (ft)	Geophone Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)
CPT-2	69.26	68.26	68.29	67.14	1017	
CPT-5	10.04	9.04	9.26	12.08	766	
	19.98	18.98	19.09	22.98	831	902
	30.12	29.12	29.19	32.66	894	1044
	40.12	39.12	39.17	41.52	943	1127
	50.10	49.10	49.14	51.92	946	959
	52.26	51.26	51.30	53.52	959	1349

Shear Wave Source Offset - 2 ft

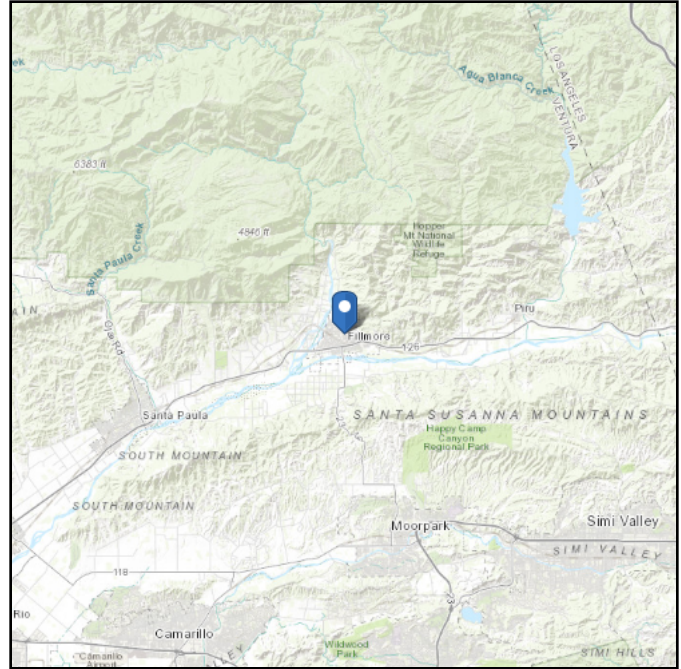
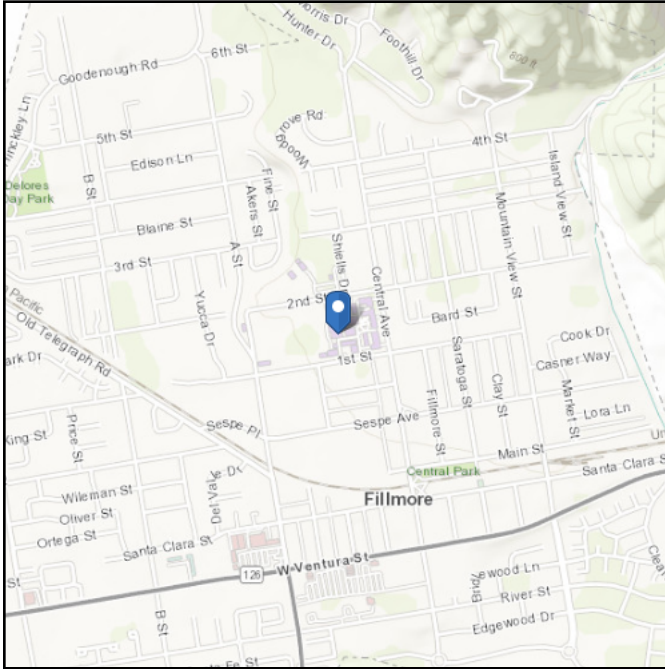
S-Wave Velocity from Surface = Travel Distance/S-Wave Arrival
 Interval S-Wave Velocity = (Travel Dist2-Travel Dist1)/(Time2-Time1)

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 34.4031
Longitude: -118.916
Elevation: 492.8721187640333 ft
(NAVD 88)



Site Soil Class: D - Stiff Soil

Results:

S_S :	1.935	S_{D1} :	N/A
S_1 :	0.734	T_L :	8
F_a :	1	PGA :	0.845
F_v :	N/A	PGA_M :	0.929
S_{MS} :	1.935	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.29	C_v :	1.487

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Thu Sep 07 2023

Date Source: [USGS Seismic Design Maps](#)

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

Fillmore High School (generated 08/19/2023)



Input Parameters

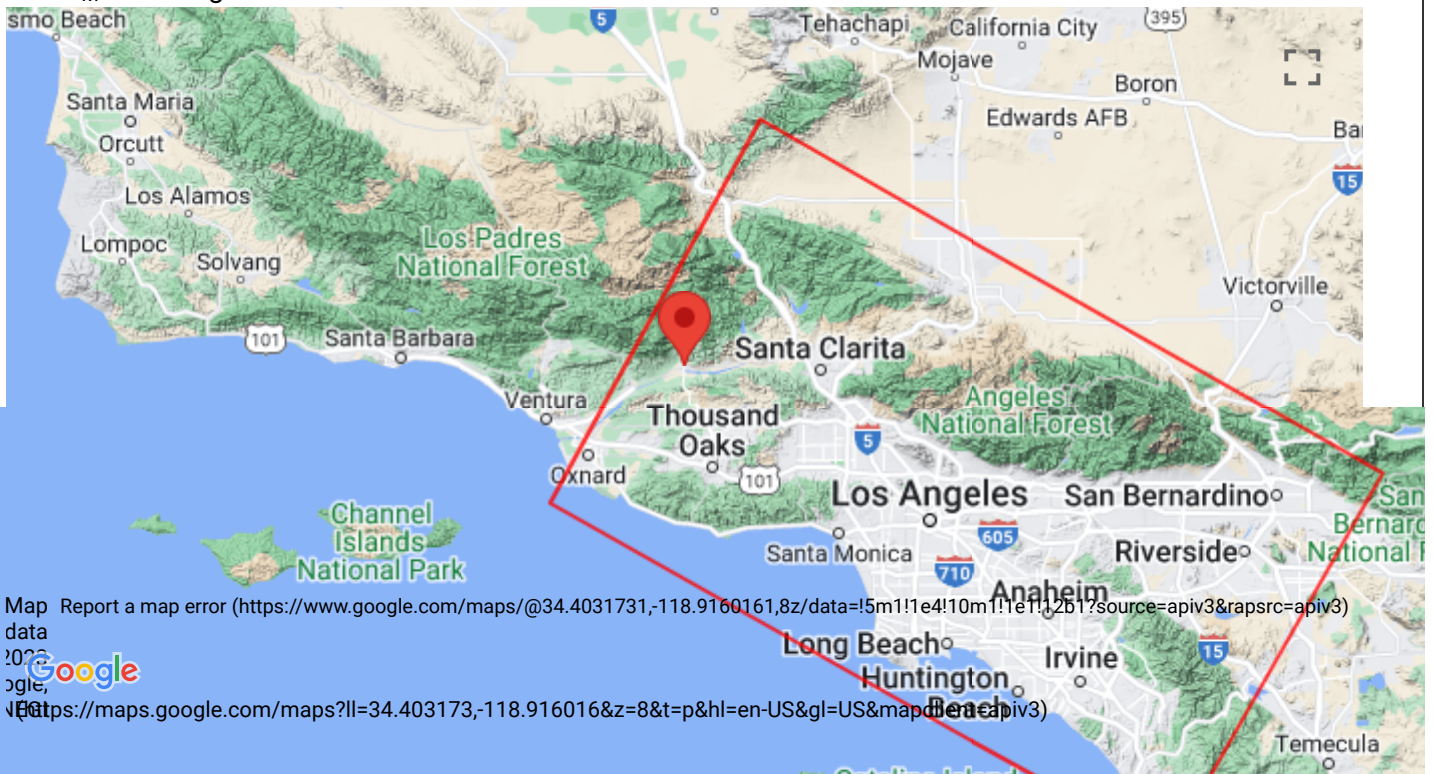
Coordinates	34.4032, -118.916
Site Class	D - Stiff Soil

Vs30 274 m/s

Site-Specific Design Parameters (Sect. 21.4)

$$S_{DS} = 1.626$$
$$S_{MS} = 2.439$$
$$S_{D1} = 1.747$$
$$S_{M1} = 2.621$$

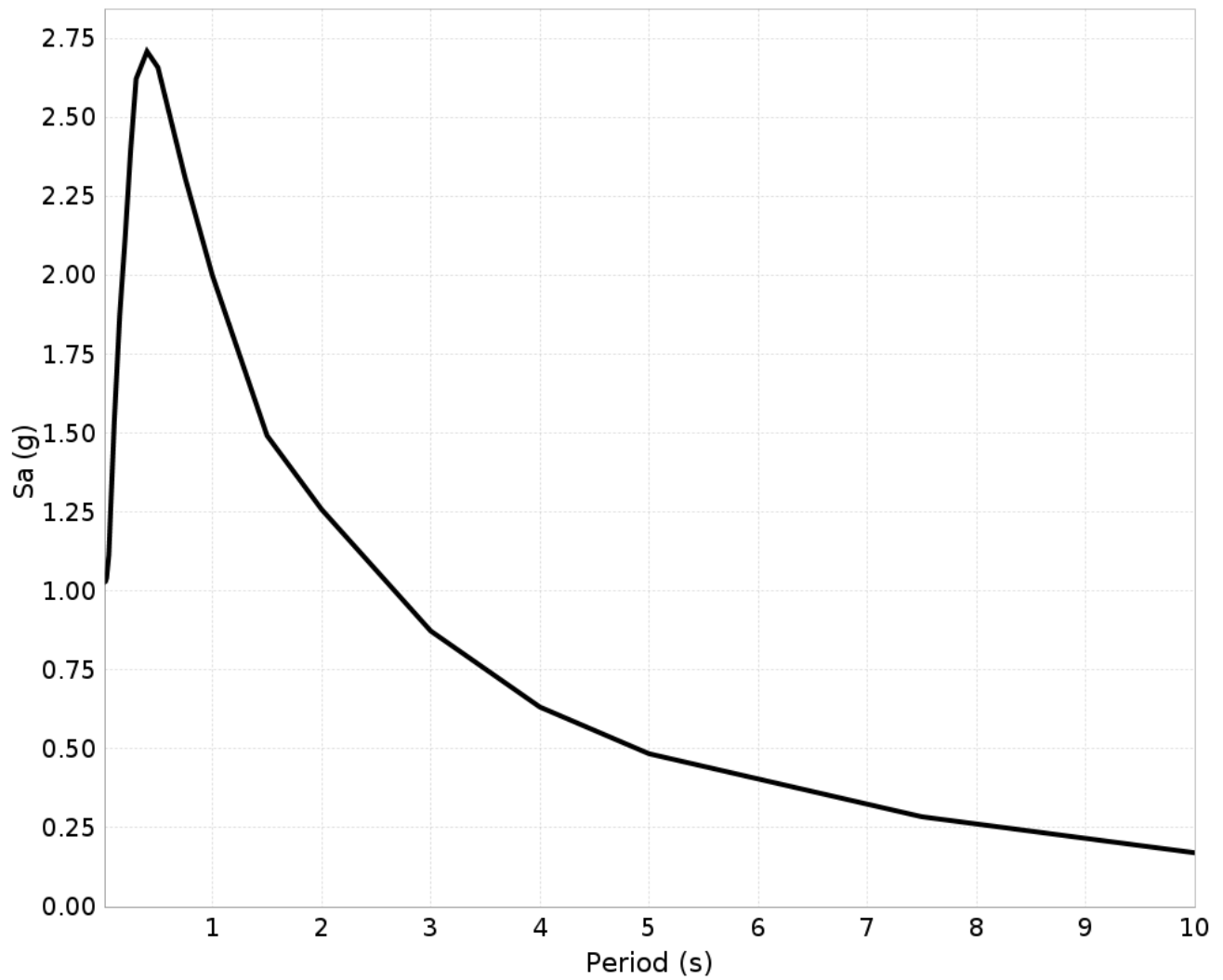
MCE_G Peak Ground Acceleration (Sect. 21.5)

$$\text{PGA}_M = 0.866 \text{ g}$$


MCE_R Response Spectrum

NOTE: The MCE_R response spectrum must be checked against the minimum ASCE 7-16 requirement on the ASCE 7 Hazard Tool (<https://asce7hazardtool.online/>) website; see the User Guide (/ugms-mcerGM-tool_v18.4/guide) for details.

Period (s)	Site-Specific MCE _R S _a [*] (g)
0.01	1.028
0.02	1.031
0.03	1.042
0.05	1.115
0.075	1.325
0.1	1.536
0.15	1.875
0.2	2.121
0.25	2.397
0.3	2.623
0.4	2.710
0.5	2.659
0.75	2.309
1.0	1.999
1.5	1.493
2.0	1.259
3.0	0.874
4.0	0.633
5.0	0.485
7.5	0.285
10.0	0.171



* Site-Specific MCE_R response spectrum obtained using weighted geometric averaging procedure. See User Guide (/ugms-mcerGM-tool_v18.4/guide).

APPENDIX B

LABORATORY TESTING

General

Laboratory test results on selected samples are presented below. Tests were performed to evaluate the physical and engineering properties of the encountered earth materials, including in-situ moisture and dry density, compaction characteristics, expansion potential, consolidation characteristics and shear strength parameters. R-Value and soil corrosivity testing were performed under subcontract by a testing laboratory and corrosion engineer, respectively.

Field Density and Moisture Tests

In-situ dry density and moisture content were determined from the relatively undisturbed drive samples obtained during exploratory operations. The test results and a detailed description of the earth materials encountered are shown on the attached Logs of Subsurface Data, Appendix A.

Optimum Moisture-Maximum Density Curve

Maximum density/optimum moisture tests (compaction characteristics) were performed on a selected bulk sample of the encountered materials. The results are as follows:

Sample	Visual Soil Classification	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
B-1 @ 7'	silty fine to coarse sand	118.6	11.1

Soil Expansion Test

An Expansion Index test was performed on a selected bulk sample of the encountered materials. The results are as follows:

Sample	Expansion Index	Expansion Index Range	Expansion Potential
B-1 @ 5'	6	0 - 20	Non

Direct Shear Tests

Strain controlled direct shear testing was performed on two relatively undisturbed samples. The sample sets were saturated prior to shearing under axial loads ranging from 1,000 to 4,000 psf. The shear strength results are presented as graphic summaries.

Load Consolidation Testing

Load consolidation tests were conducted on three relatively undisturbed drive samples. Test loads were added in increments to a maximum of 8,000 psf. Water was added at the approximate overburden pressure to study the effect of moisture infiltration on potential consolidation behavior. The consolidation results are presented on the attached figures as graphic summaries.

Grain Size Distribution

Grain size distribution analyses were performed on a soil sample at 10' in boring B-2. The grain size was evaluated by hydrometer analysis. Hydrometer analyses were performed using a 50-gram sample. The grain size distribution graph is attached hereto.

R-Value Determination

An R-Value determination was conducted by a subcontractor on the typical soil type encountered in the proposed pavement area. The test was performed in general accordance with the California State Test Method No. 301-F. An R-Value of 22 is indicated. The test results are attached.

Soil Corrosivity

The results of the analytical laboratory testing to evaluate the potential for corrosion of materials in contact with the onsite soils are presented in this appendix. The testing was performed on a soil sample considered to represent the onsite soils. From ACI Table 19.3.1.1 the evaluated soil is categorized as Class S0. The required concrete design requirements for this exposure class can be obtained from ACI Table 19.3.2.1. The potential for corrosion of metals in contact with the site soils is moderately corrosive as determined from Table 1 below. For specific recommendations, a corrosion engineer should be consulted.

ACI Table 19.3.1.1 – Exposure Categories and Classes

Category	Class	Water-soluble sulfate (SO_4^{2-}) in soil, percent by mass	Dissolved sulfate (SO_4^{2-}) in water, ppm ¹
Sulfate (S)	S0	$\text{SO}_4^{2-} < 0.10$	$\text{SO}_4^{2-} < 150$
	S1	$0.10 \leq \text{SO}_4^{2-} < 0.20$	$150 \leq \text{SO}_4^{2-} < 1500$ or seawater
	S2	$0.20 \leq \text{SO}_4^{2-} < 2.00$	$1500 \leq \text{SO}_4^{2-} < 10,000$
	S3	$\text{SO}_4^{2-} > 2.00$	$\text{SO}_4^{2-} > 10,000$

1 ppm (parts per million) = milligrams per kilogram mg/kg of dry soil weight

ACI Table 19.3.2.1 – Requirements for Concrete by Exposure Class

Exposure Class	Maximum w/cm	Minimum f'_c , psi	Cementitious materials - Types			Calcium chloride admixture
			ASTM C150	ASTM C595	ASTM C1157	
S0	N/A	2500	No type restriction	No type restriction	No type restriction	No restriction
S1	0.50	4000	II	Types IP, IS, or IT with (MS) designation	MS	No restriction
S2	0.45	4500	V	Types IP, IS, or IT with (MS) designation	HS	Not permitted
S3	0.45	4500	V plus pozzolan or slag cement	Types IP, IS, or IT with (MS) designation plus pozzolan or slag cement	HS plus pozzolan or slab cement	Not permitted

ACI Tables 19.3.1.1 and 19.3.2.1 - ACI 318-14 Building Code Requirements for Structural Concrete

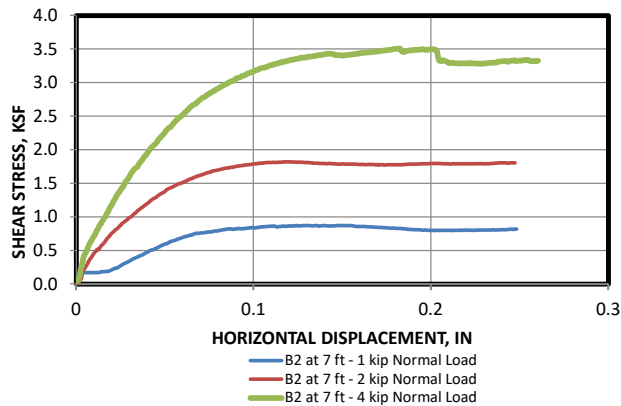
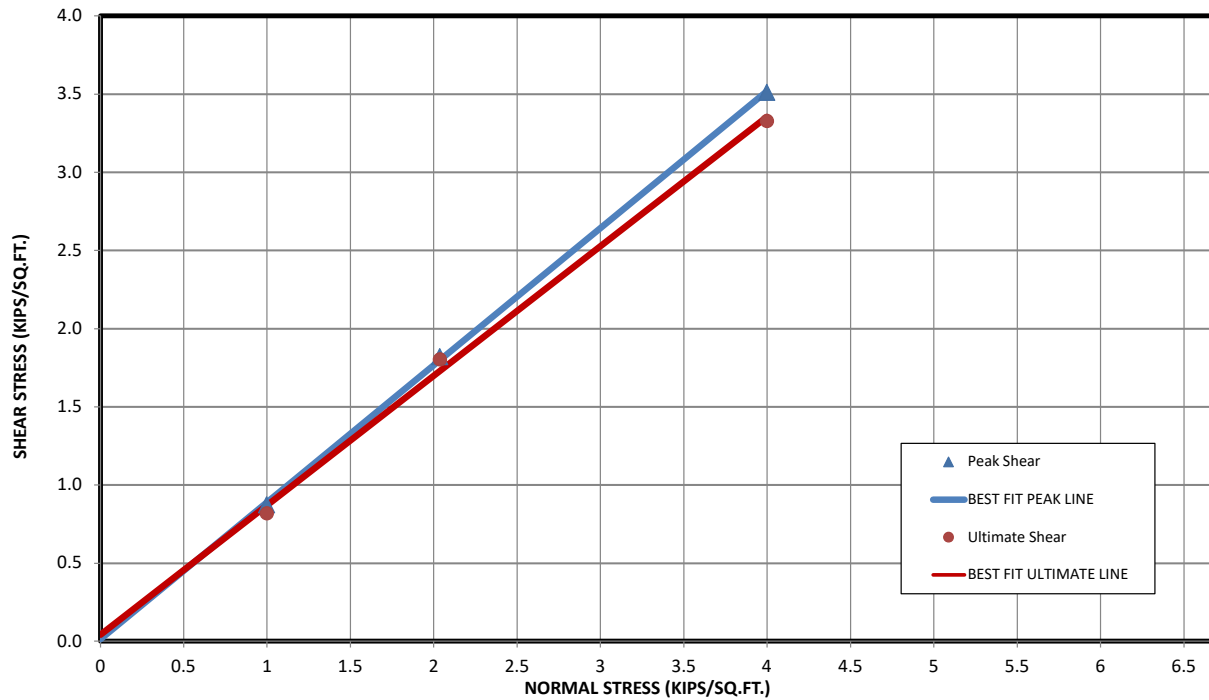
Table 1. Relationship Between Soil Resistivity and Soil Corrosivity

Soil Resistivity, ohm-cm	Classification of Soil Corrosiveness
0 to 900	Very severe corrosion
900 to 2,300	Severely corrosive
2,300 to 5,000	Moderately corrosive
5,000 to 10,000	Mildly corrosive
10,000 to >10,000	Very mildly corrosive

F. O. Waters, Soil Resistivity Measurements for Corrosion Control, Corrosion. 1952, Vol, No. 12, 1952, p. 407.

DIRECT SHEAR TEST RESULTS

Undisturbed Sample



PROJECT: **Fillmore USD**
 W.O: **3242-0-0-100**
 EXCAVATION: **B2**
 DEPTH: **7 ft**

	PEAK	ULT.	RES.
COHESION (KSF):	0.000	0.050	
PHI (DEG):	41	40	

TEST DATA:	#1	#2	#3
NORM. PRES. (KSF)	1.0	2.0	4.0
ULTIMATE			
SHEAR STRESS (KSF):	0.82	1.80	3.33
H.DISPL. (IN)	0.25	0.25	0.26
DISP. RATE (IN/MIN)	0.01	0.01	0.01
PEAK			
SHEAR STRESS (KSF):	0.87	1.82	3.51
H.DISPL. (IN)	0.12	0.12	0.18

PRESHEAR DRY DENSITY (PCF):	101.9	101.9	102.0
PRESHEAR MOISTURE (% OF DD):		22.4	
EST.VOID RATIO, e (preshear):	0.59	0.59	0.59

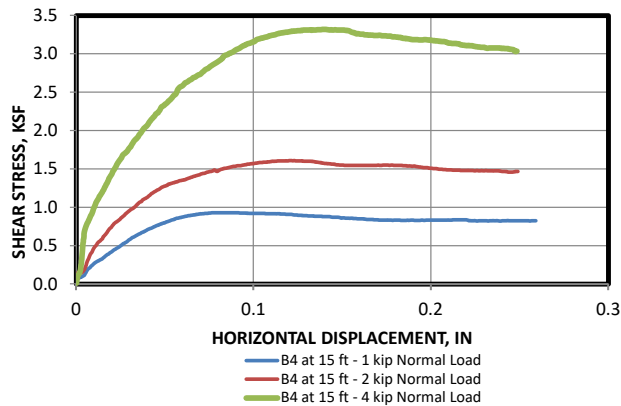
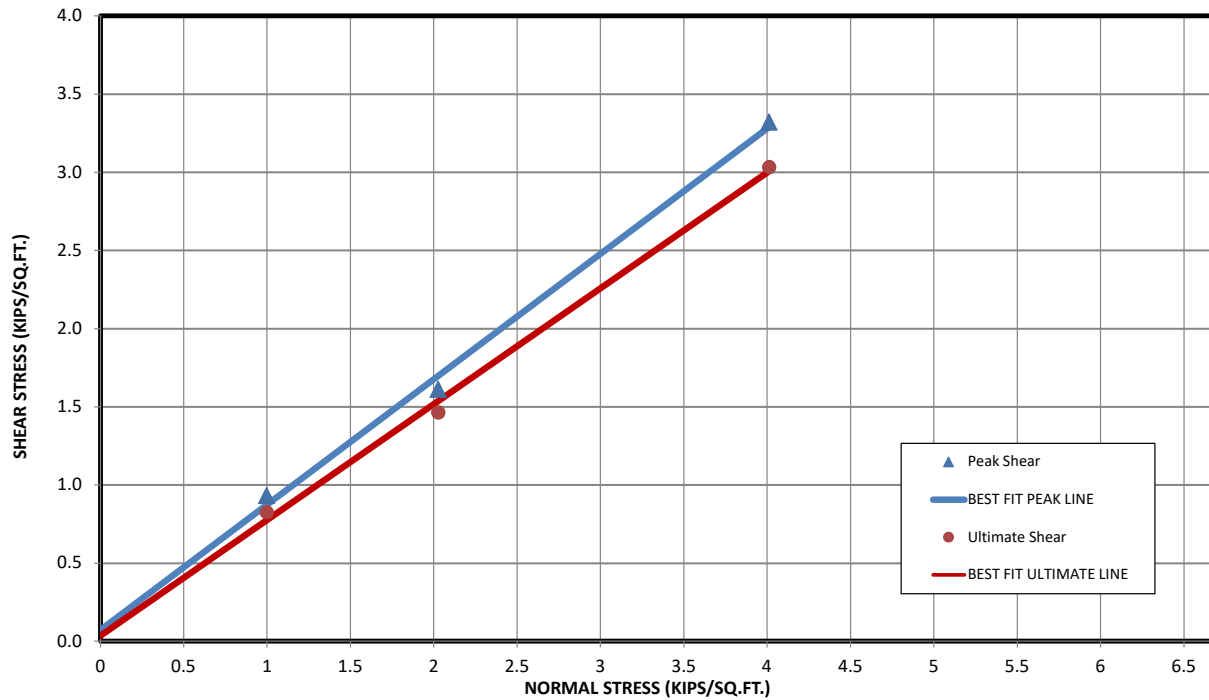
TEST FILES:

S:\GEOTEST\shears\GORIAN\TEST954.DAT
 S:\GEOTEST\shears\GORIAN\TEST955.DAT
 S:\GEOTEST\shears\GORIAN\TEST956.DAT



DIRECT SHEAR TEST RESULTS

Undisturbed Sample



PROJECT: **Fillmore USD**
W.O: **3242-0-0-100**
EXCAVATION: **B4**
DEPTH: **15 ft**

	PEAK	ULT.	RES.
COHESION (KSF):	0.075	0.025	
PHI (DEG):	39	37	

TEST DATA:	#1	#2	#3
NORM. PRES. (KSF)	1.0	2.0	4.0
ULTIMATE			
SHEAR STRESS (KSF):	0.82	1.46	3.03
H.DISPL. (IN)	0.26	0.25	0.25
DISP. RATE (IN/MIN)	0.01	0.01	0.01
PEAK			
SHEAR STRESS (KSF):	0.93	1.61	3.32
H.DISPL. (IN)	0.08	0.12	0.14

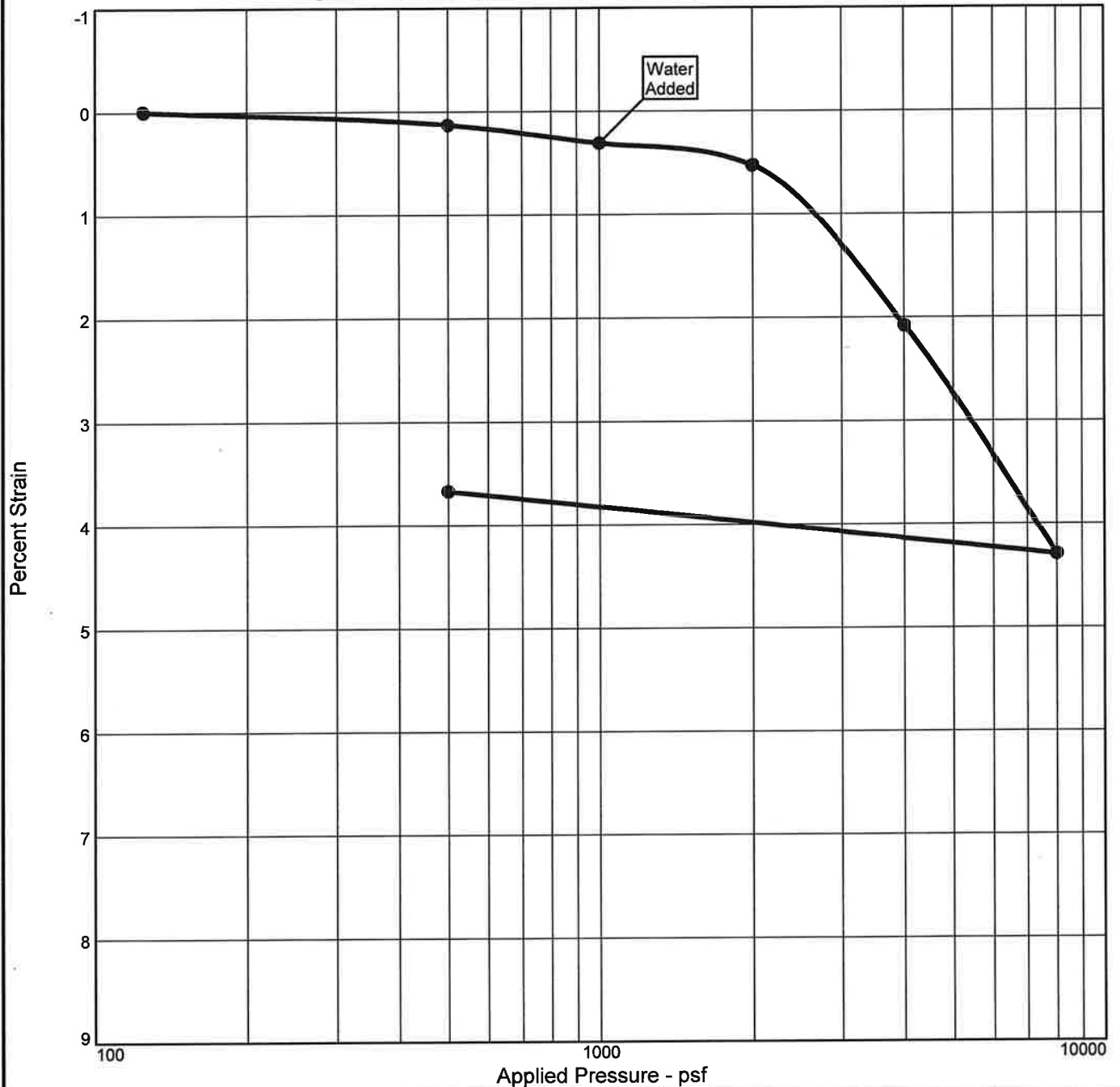
PRESHEAR DRY DENSITY (PCF):	97.8	97.4	110.9
PRESHEAR MOISTURE (% OF DD):		22.0	
EST.VOID RATIO, e (preshear):	0.66	0.67	0.46

TEST FILES:

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S:\GEOTEST\shears\GORIAN\TEST970.DAT
S:\GEOTEST\shears\GORIAN\TEST971.DAT

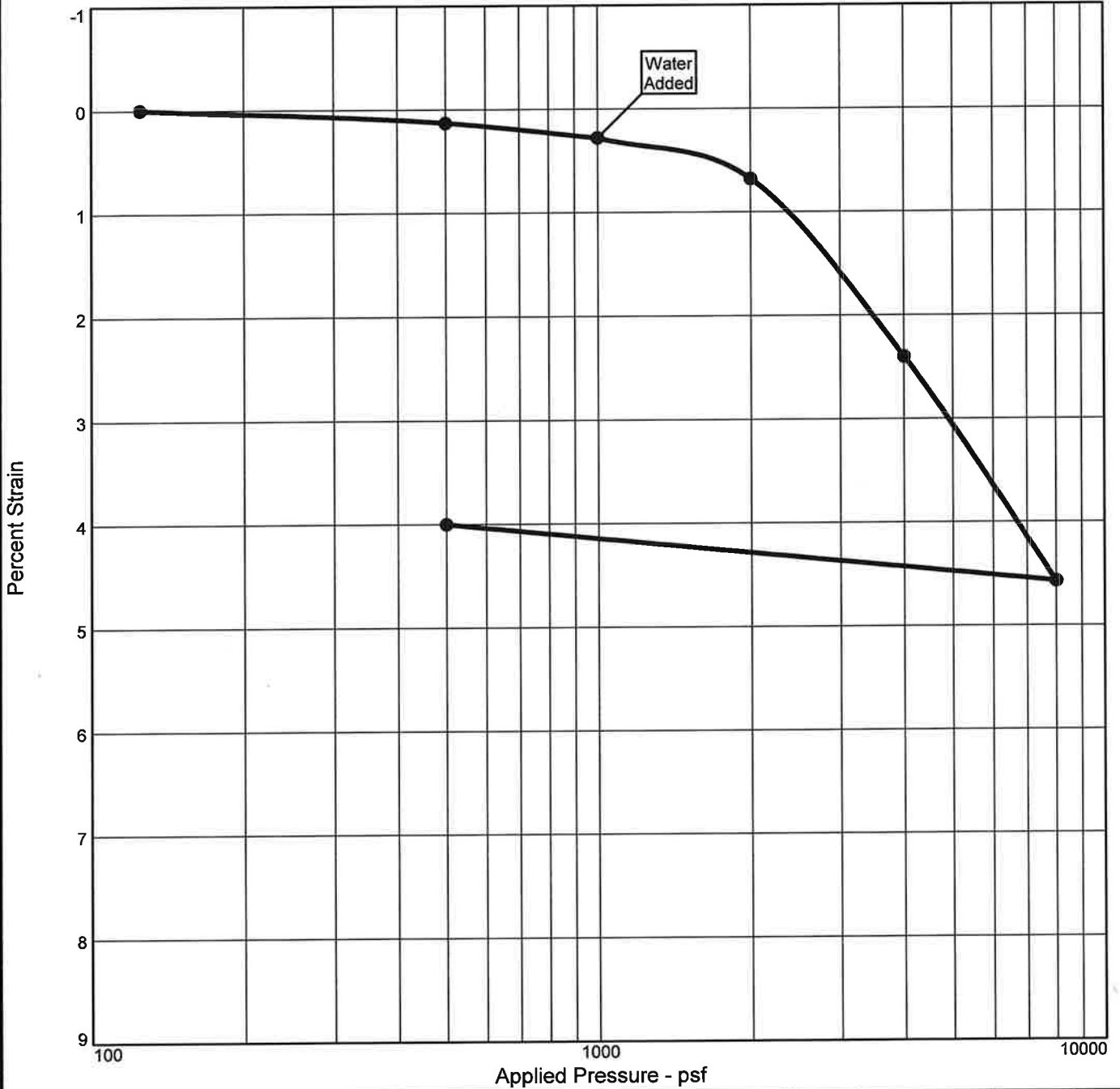


CONSOLIDATION TEST REPORT



Natural	Dry Dens.	LL	PI	Sp. Gr.	Overburden	P _c	C _c	C _r	Swell Press.	Swell %	e _o
Sat.	Moist.	(pcf)			(psf)	(psf)			(psf)		
						2521				0.0	
MATERIAL DESCRIPTION									USCS	AASHTO	
Project No. 3242-0-0- Client: Project: Fillmore Unified School District 555 Central Avenue, Fillmore Source of Sample: B-2 Depth: 18 <div style="text-align: center;">Gorian & Associates</div> <div style="text-align: center;">Thousand Oaks, CA</div>									Remarks: <div style="text-align: right; margin-top: 20px;">Figure</div>		

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P _c (psf)	C _c	C _r	Swell Press. (psf)	Swell %	e _o
Sat.	Moist.											
							2310				0.0	

MATERIAL DESCRIPTION	USCS	AASHTO

Project No. 3242-0-0-	Client:
------------------------------	----------------

Project: Fillmore Unified School District
555 Central Avenue, Fillmore

Source of Sample: B-1 Depth: 7

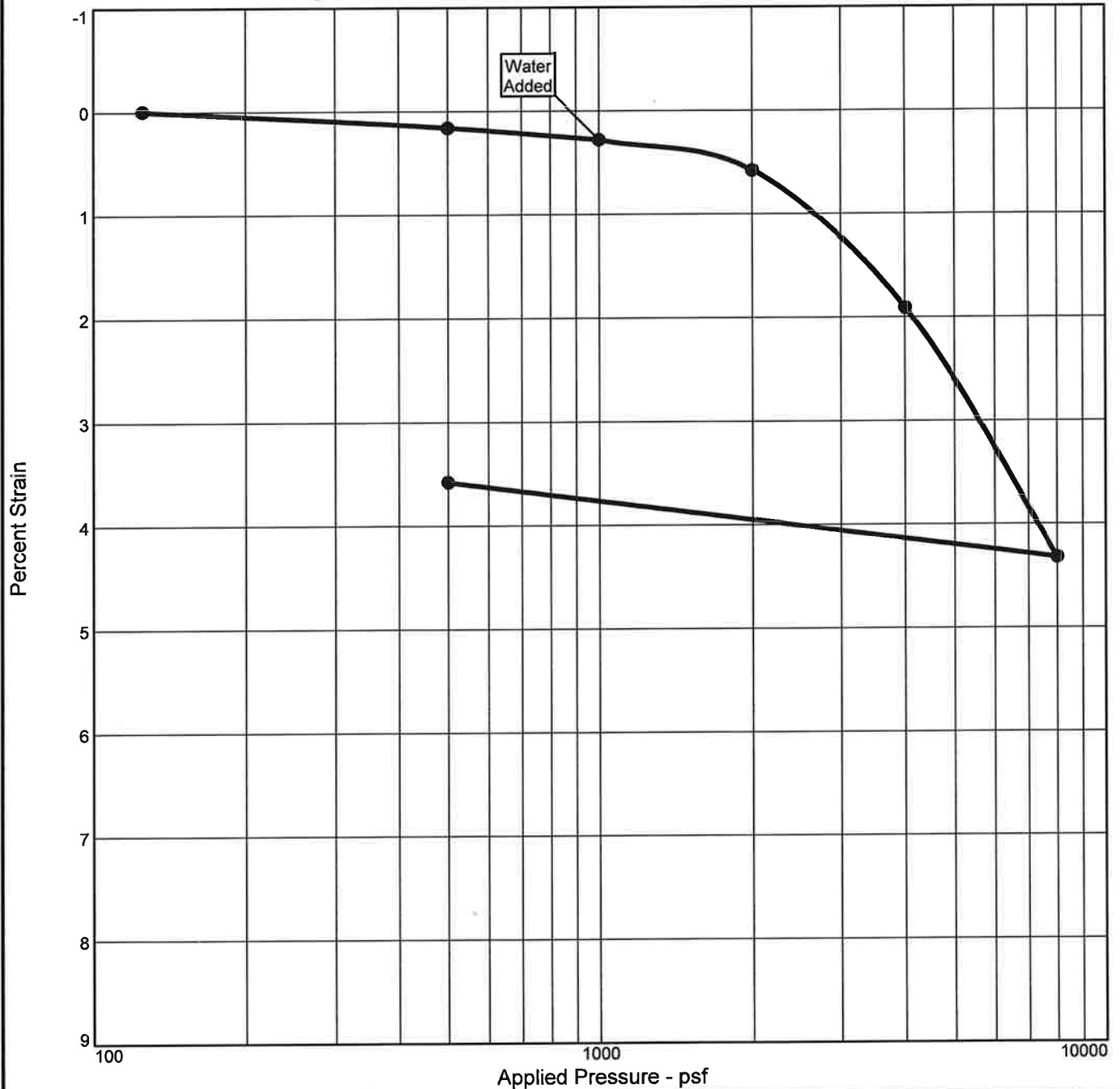
Gorian & Associates

Thousand Oaks, CA

Remarks:

Figure

CONSOLIDATION TEST REPORT



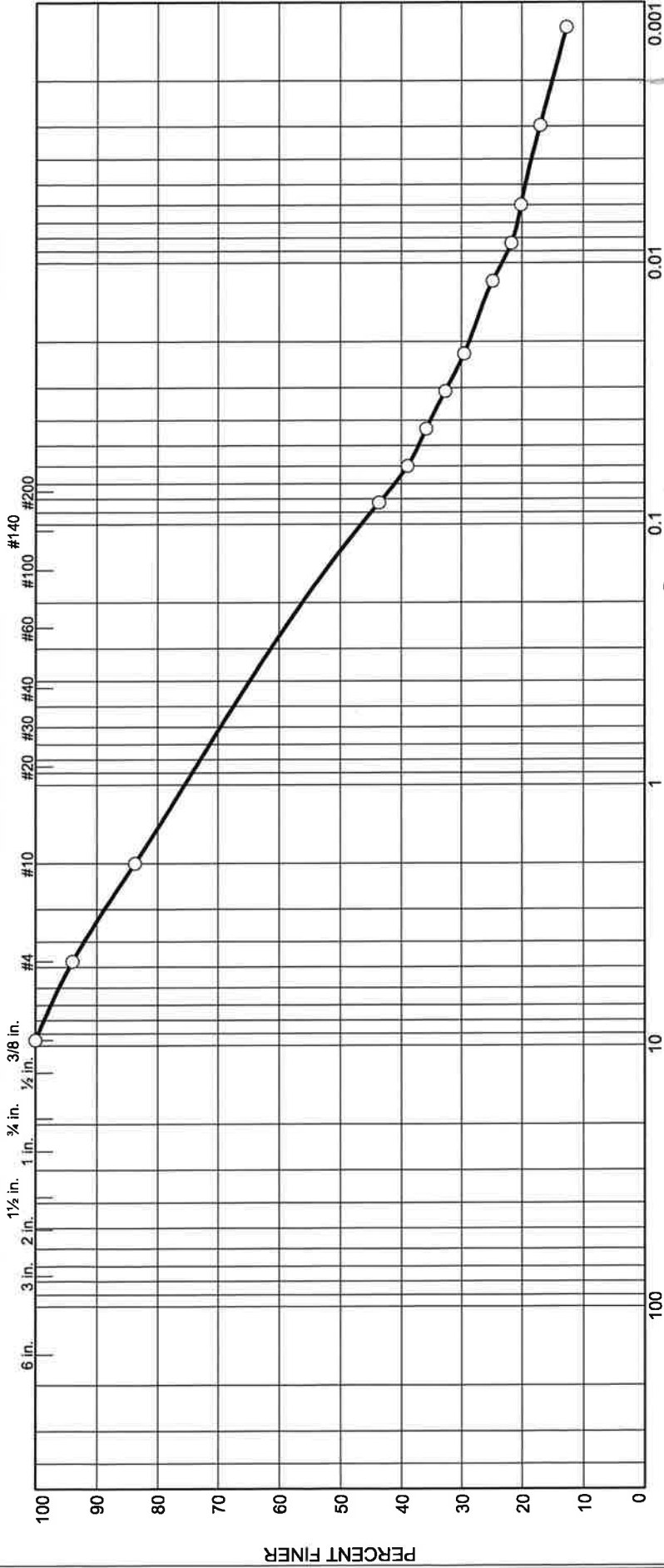
Natural	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P _c (psf)	C _c	C _r	Swell Press. (psf)	Swell %	e ₀
Sat.	Moist.					2961				0.0	
MATERIAL DESCRIPTION									USCS	AASHTO	
Project No. 3242-0-0- Client: Project: Fillmore Unified School District 555 Central Avenue, Fillmore Source of Sample: B-2 Depth: 23 <div style="text-align: center;">Gorian & Associates</div> <div style="text-align: center;">Thousand Oaks, CA</div>									Remarks: <div style="text-align: right; margin-top: 20px;">Figure</div>		

Particle Size Distribution Report

HYDROMETER

U.S. STANDARD SIEVE NUMBERS

U.S. SIEVE OPENING IN INCHES



GRAIN SIZE - mm.		% Sand		% Fines	
		Coarse	Fine	Silt	Clay
58		10.2	23.5	22.7	19.4

Source	Sample #	Depth/Elev.	Date Sampled	USCS	Material Description	NM %	LL	PL
	B-2	10	7/12/23		Y.B Silty Fine Sand			

Client Fillmore USD		Gorian & Associates
Project 555 Central Ave		
Project No. 3242-0-0-100	Figure	Thousand Oaks, CA



NV5 WEST, INC.

1868 Palma Drive, Suite A, Ventura, California 93003
Telephone: (805) 656-6074; Fax: (805) 650-6264

June 29, 2023

NV5 JOB No: **10-000938**

LAB No: 89903

Gorian & Associates, Inc.
3595 Old Conejo Rd.
Thousand Oaks, CA 91360

Attention: Paul Wasserman

Project: Gorian & Associates, Inc. - W.O. 3242-0-0-100
Fillmore HS Sports Complex

The results of the requested laboratory tests are attached for your use.

This report includes the following test reports:

<u>Test Description</u>	<u>Test Method</u>	<u># of Tests</u>
Resistance 'R' Value	ASTM D2844	1

NV5 WEST appreciates the opportunity to be of service. Please contact our office if you have any questions regarding this report.

Copies: 1-Gorian & Asso./Paul Wasserman
1-File

Respectfully submitted,

NV5 WEST

Shaun Simon
Engineering Manager

RESISTANCE "R" VALUE TEST (ASTM D2844/CTM301)

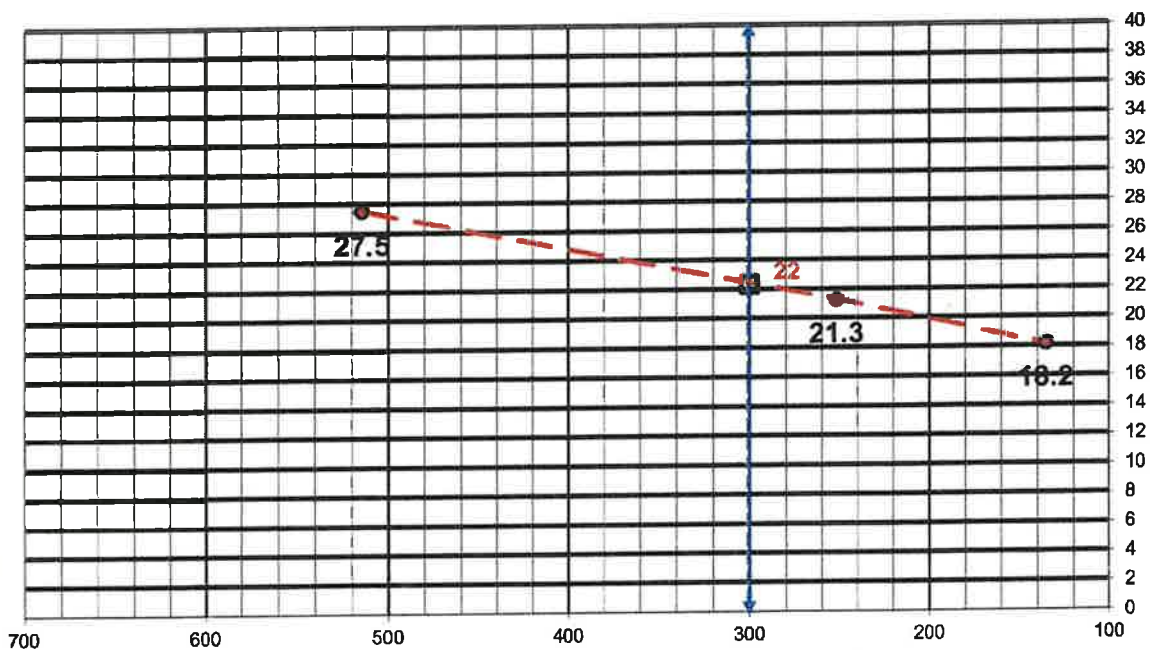
June 29, 2023

Gorian & Associates, Inc.
3595 Old Conejo Rd.
Thousand Oaks, CA 91360

NV5 JOB No: **10-000938**
LAB No: 89903

Project: Gorian & Associates, Inc. - W.O. 3242-0-0-100
Fillmore HS Sports Complex
Material: Dark Brown Clayey SAND with gravel
Location: B-1@1'-3' - Fillmore HS Sports Complex
Sampled By: Client
Date Sampled: N/A
Date Received: 6/16/23

"R" VALUE BY EXUDATION GRAPH



TEST SPECIMEN	A	B	C	D
COMP. FOOT PRESSURE, psi	120	140	200	
INITIAL MOISTURE %	11.8	11.8	11.8	
MOISTURE @ COMPACTION %	16.8	15.8	14.8	
DRY DENSITY, pcf	115.9	116.9	114.6	
EXUDATION PRESSURE, psi	135	252	514	
STABILOMETER VALUE 'R'	18.2	21.3	27.5	
R-Value @ Equilibrium =				22

Reviewed By: 



Soil Analysis Lab Results

Client: Gorian & Associates, Inc.
Job Name: Fillmore, USA 655 Central Avenue
Client Job Number: 3242-0-0-100
Project X Job Number: S230721H
July 24, 2023

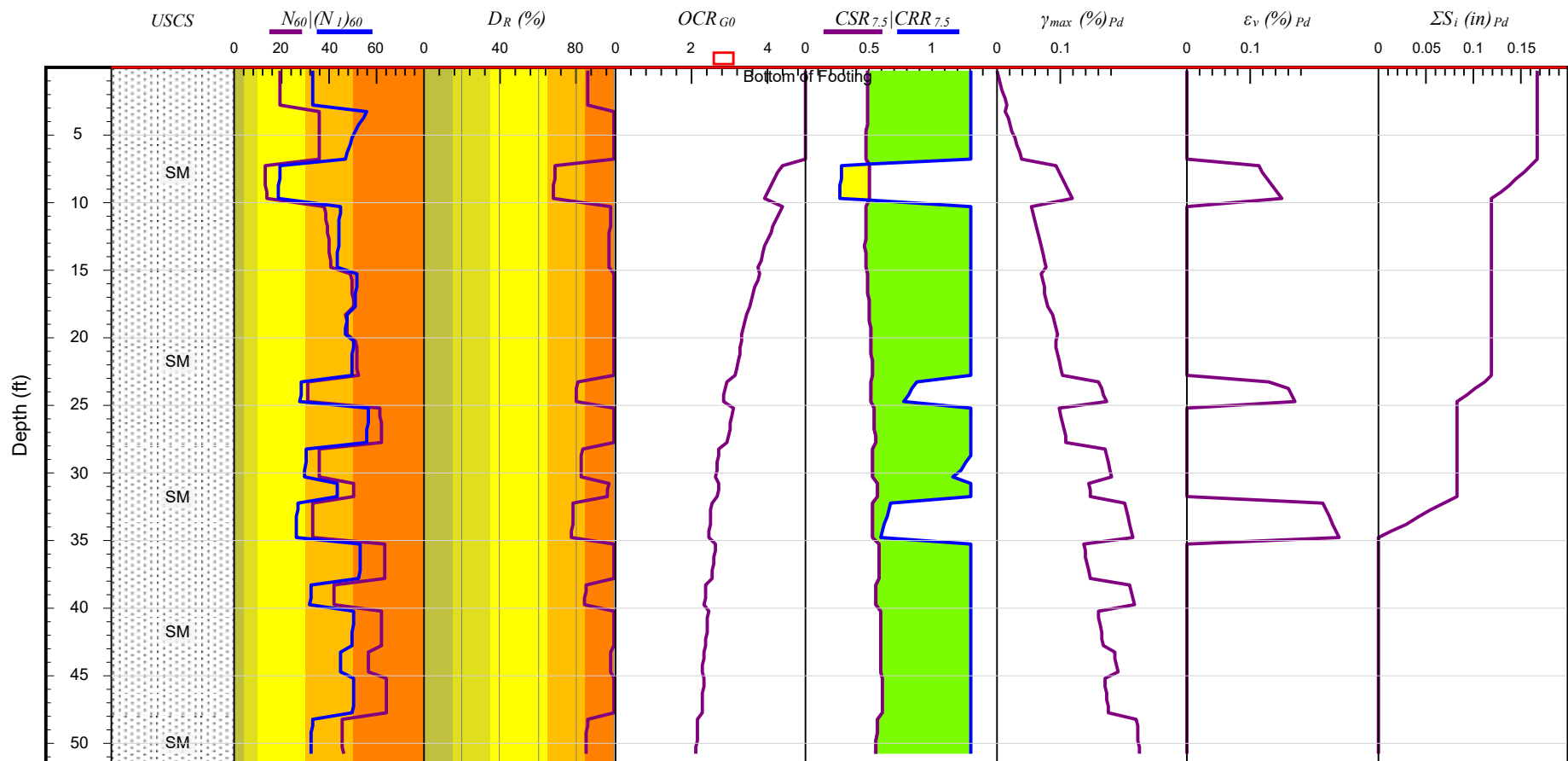
	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51	ASTM G200	SM 4500-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	Depth	Sulfates SO ₄ ²⁻		Chlorides Cl ⁻		Resistivity As Rec'd Minimum		pH	Redox	Sulfide S ²⁻	Nitrate NO ₃ ⁻	Ammonium NH ₄ ⁺	Lithium Li ⁺	Sodium Na ⁺	Potassium K ⁺	Magnesium Mg ²⁺	Calcium Ca ²⁺	Fluoride F ₂ ⁻	Phosphat PO ₄ ³⁻
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ohm-cm)	(Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
B-3	2-4	81.3	0.0081	25.4	0.0025	5,092	2,546	7.9	128	2.9	30.9	4.8	ND	110.1	23.1	48.8	220.4	9.3	134.9

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops which is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.

APPENDIX C
SEISMICALLY INDUCED SETTLEMENT ANALYSES

X:\3242-0-0 Fillmore Unified School District\GeoSuite\Revised_Jerome_Vaues\GeoSuite_3242-0-0-100_B-1.dwg



Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 75 ft
Maximum Settlement = 0.17 in
Settl. at Bottom of Footing = 0.17 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)



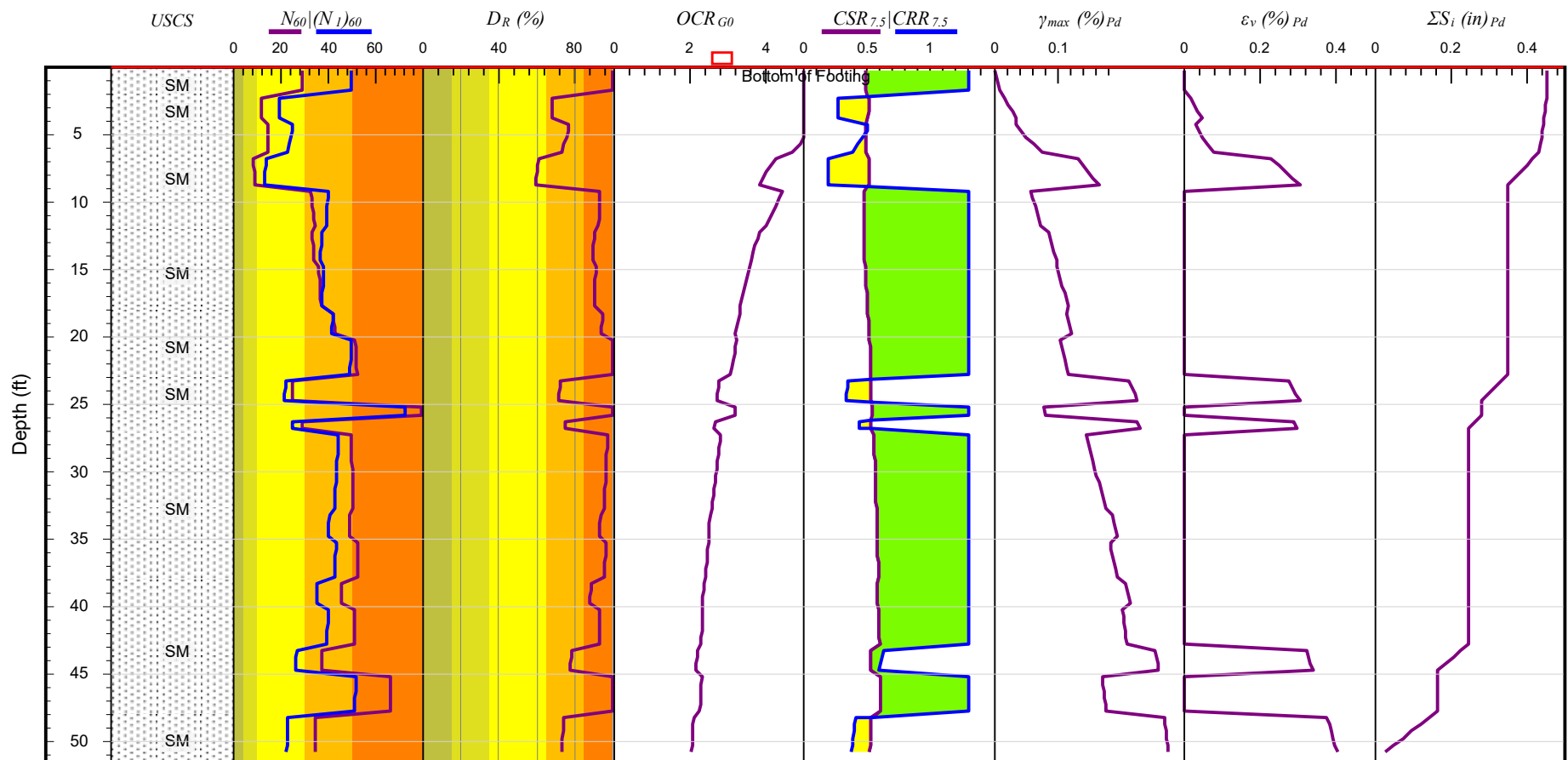
Seismic Settlement Potential - SPT Data

Project:	Fillmore High School				
Location:	555 Central Ave, Fillmore, CA 93015				
Project No.:	3242-0-0-100	Boring No.:	B-1	Figure:	1

Z_b (ft)	Z_m (ft)	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	ϕ (°)	C' (tsf)	σ_{v0} (tsf)	σ_{v0}' (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60cs}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ_p' (tsf)	OCR G_0	S_u/σ_{v0}'	K_0	r_d	MSF	K_σ	K_α	CSR $_{7.5}$	CRR $_{7.5}$	FS	τ_{av} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ε_v (%)	ΔS_i	ΣS_i (in)
0.50	0.25	120.0	19.3	35.0	0.0	12	38.7	0.0	0.02	0.02	1.7	1.3	32.9	38.4	85.9	764.8	1,090.7	0.08	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.01	0.02	0.6165	0.001	0.0000	0.00	0.17
1.00	0.75	120.0	19.3	35.0	0.0	12	38.7	0.0	0.05	0.05	1.7	1.3	32.9	38.4	85.9	760.0	1,077.1	0.23	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.03	0.05	0.3357	0.003	0.0000	0.00	0.17
1.50	1.25	120.0	19.3	35.0	0.0	12	38.7	0.0	0.08	0.08	1.7	1.3	32.9	38.4	85.9	755.4	1,064.3	0.38	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.05	0.08	0.2016	0.006	0.0000	0.00	0.17
2.00	1.75	120.0	19.3	35.0	0.0	12	38.7	0.0	0.11	0.11	1.7	1.3	32.9	38.4	85.9	751.1	1,052.1	0.53	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.06	0.11	0.1293	0.008	0.0000	0.00	0.17
2.50	2.25	120.0	19.3	35.0	0.0	12	38.7	0.0	0.14	0.14	1.7	1.3	32.9	38.4	85.9	747.0	1,040.5	0.68	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.08	0.14	0.0872	0.012	0.0000	0.00	0.17
3.00	2.75	120.0	19.3	35.0	0.0	12	38.7	0.0	0.17	0.17	1.7	1.3	32.9	38.4	85.9	743.0	1,029.6	0.83	5.0		1.0	0.99	1.12	1.10	1.00	0.49	1.30		0.10	0.17	0.0557	0.016	0.0000	0.00	0.17
3.50	3.25	110.0	35.9	35.0	0.0	12	40.5	0.0	0.19	0.19	1.6	1.3	56.1	61.6	100.0	849.4	1,233.2	0.97	5.0		1.0	0.99	1.12	1.10	1.00	0.49	1.30		0.12	0.19	0.0317	0.014	0.0000	0.00	0.17
4.00	3.75	110.0	35.9	35.0	0.0	12	40.5	0.0	0.22	0.22	1.5	1.3	54.2	59.7	100.0	845.3	1,221.5	1.11	5.0		1.0	0.99	1.12	1.10	1.00	0.49	1.30		0.13	0.22	0.0361	0.017	0.0000	0.00	0.17
4.50	4.25	110.0	35.9	35.0	0.0	12	40.5	0.0	0.25	0.25	1.5	1.3	52.6	58.1	100.0	841.4	1,210.3	1.24	5.0		1.0	0.99	1.12	1.10	1.00	0.49	1.30		0.15	0.25	0.0405	0.020	0.0000	0.00	0.17
5.00	4.75	110.0	35.9	35.0	0.0	12	40.5	0.0	0.28	0.28	1.4	1.3	51.1	56.6	100.0	837.7	1,199.6	1.38	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.16	0.28	0.0450	0.024	0.0000	0.00	0.17
5.50	5.25	110.0	35.9	35.0	0.0	12	40.5	0.0	0.30	0.30	1.4	1.3	49.9	55.4	100.0	834.1	1,189.2	1.52	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.18	0.30	0.0470	0.028	0.0000	0.00	0.17
6.00	5.75	110.0	35.9	35.0	0.0	12	40.5	0.0	0.33	0.33	1.4	1.3	48.7	54.3	100.0	830.6	1,179.2	1.66	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.20	0.33	0.0481	0.032	0.0000	0.00	0.17
6.50	6.25	110.0	35.9	35.0	0.0	12	40.5	0.0	0.36	0.36	1.3	1.3	47.7	53.2	100.0	827.2	1,169.6	1.79	5.0		1.0	0.98	1.12	1.10	1.00	0.48	1.30		0.21	0.36	0.0490	0.037	0.0000	0.00	0.17
7.00	6.75	110.0	35.9	35.0	0.0	12	40.5	0.0	0.39	0.39	1.3	1.3	46.8	52.3	100.0	834.6	1,190.8	1.93	5.0		1.0	0.98	1.12	1.10	1.00	0.48	1.30		0.23	0.39	0.0500	0.039	0.0000	0.00	0.17
7.50	7.25	110.0	12.9	35.0	0.0	12	34.6	0.0	0.41	0.41	1.5	1.2	19.5	25.0	69.4	727.4	904.5	1.82	4.4		1.0	0.98	1.07	1.10	1.00	0.50	0.29		0.25	0.41	0.0503	0.094	0.1128	0.01	0.16
8.00	7.75	110.0	13.0	35.0	0.0	12	34.5	0.0	0.44	0.44	1.5	1.2	19.3	24.8	69.0	736.6	927.5	1.89	4.3		1.0	0.98	1.07	1.10	1.00	0.50	0.29		0.26	0.44	0.0511	0.099	0.1200	0.01	0.15
8.50	8.25	110.0	13.2	35.0	0.0	12	34.4	0.0	0.47	0.47	1.4	1.2	19.1	24.6	68.7	745.2	949.3	1.96	4.2		1.0	0.98	1.07	1.10	1.00	0.50	0.28		0.28	0.46	0.0518	0.104	0.1274	0.01	0.15
9.00	8.75	110.0	13.4	35.0	0.0	12	34.4	0.0	0.50	0.50	1.4	1.2	18.8	24.3	68.4	753.3	969.9	2.03	4.1		1.0	0.98	1.07	1.10	1.00	0.50	0.27		0.29	0.48	0.0526	0.109	0.1350	0.01	0.14
9.50	9.25	110.0	13.5	35.0	0.0	12	34.3	0.0	0.52	0.52	1.4	1.2	18.6	24.1	68.1	760.9	989.6	2.09	4.0		1.0	0.98	1.07	1.10	1.00	0.50	0.27		0.31	0.51	0.0533	0.114	0.1430	0.01	0.13
10.00	9.75	110.0	13.7	35.0	0.0	12	34.2	0.0	0.55	0.55	1.3	1.2	18.4	23.9	67.8	768.0	1,008.4	2.16	3.9		0.9	0.97	1.07	1.09	1.00	0.51	0.27		0.32	0.53	0.0539	0.119	0.1513	0.01	0.12
10.50	10.25	115.0	37.9	35.0	0.0	12	40.5	0.1	0.58	0.58	1.2	1.3	44.7	50.2	98.2	876.4	1,372.5	2.55	4.4		0.9	0.97	1.12	1.10	1.00	0.48	1.30		0.34	0.55	0.0530	0.054	0.0000	0.00	0.12
11.00	10.75	115.0	38.3	35.0	0.0	12	40.5	0.1	0.61	0.61	1.2	1.3	44.6	50.1	98.1	883.5	1,395.0	2.63	4.3		0.9	0.97	1.12	1.10	1.00	0.48	1.30		0.36	0.57	0.0537	0.057	0.0000	0.00	0.12
11.50	11.25	115.0	38.7	35.0	0.0	12	40.5	0.1	0.64	0.64	1.1	1.3	44.4	49.9	98.0	890.3	1,416.5	2.70	4.2		0.9	0.97	1.12	1.10	1.00	0.47	1.30		0.37	0.59	0.0543	0.059	0.0000	0.00	0.12
12.00	11.75	115.0	39.0	35.0	0.0	12	40.5	0.1	0.67	0.67	1.1	1.3	44.3	49.8	97.9	896.7	1,437.0	2.77	4.2		0.9	0.97	1.12	1.10	1.00	0.47	1.30		0.39	0.61	0.0549	0.062	0.0000	0.00	0.12
12.50	12.25	115.0	39.4	35.0	0.0	12	40.5	0.1	0.69	0.69	1.1	1.3	44.2	49.7	97.8	902.8	1,456.7	2.83	4.1		0.9	0.96	1.12	1.10	1.00	0.47	1.30		0.40	0.64	0.0555	0.064	0.0000	0.00	0.12
13.00	12.75	115.0	39.7	35.0	0.0	12	40.5	0.1	0.72	0.72	1.1	1.3	44.0	49.6	97.6	908.6	1,475.5	2.90	4.0		0.9	0.96	1.12	1.10	1.00	0.47	1.30		0.42	0.66	0.0561	0.066	0.0000	0.00	0.12
13.50	13.25	115.0	40.0	35.0	0.0	12	40.5	0.1	0.75	0.75	1.1	1.3	43.9	49.4	97.5	914.2	1,493.5	2.97	3.9		0.9	0.96	1.12	1.10	1.00	0.47	1.30		0.44	0.68	0.0566	0.069	0.0000	0.00	0.12
14.00	13.75	115.0	40.2	35.0	0.0	12	40.5	0.1	0.78	0.78	1.1	1.3	43.8	49.3	97.3	919.5	1,510.9	3.03	3.9		0.8	0.96	1.12	1.09	1.00	0.47	1.30		0.45	0.70	0.0571	0.071	0.0000	0.00	0.12
14.50	14.25	115.0	40.5	35.0	0.0	12	40.5	0.1	0.81	0.81	1.1	1.3	43.6	49.1	97.2	924.5	1,527.6	3.09	3.8		0.8	0.96	1.12	1.08	1.00	0.48	1.30		0.47	0.72	0.0576	0.074	0.0000	0.00	0.12
15.00	14.75	115.0	40.7	35.0	0.0	12	40.5	0.1	0.84	0.84	1.1	1.3	43.5	49.0	97.0	929.4	1,543.6	3.15	3.8		0.8	0.96	1.12	1.07	1.00	0.48	1.30		0.48	0.74	0.0581	0.076	0.0000	0.00	0.12
15.50	15.25	115.0	49.2	30.0	0.0	12	40.5	0.1	0.87	0.87	1.1	1.3	51.8	57.2	100.0	956.3	1,634.3	3.29	3.8		0.8	0.95	1.12	1.06	1.00	0.49	1.30		0.50	0.77	0.0586	0.069	0.0000	0.00	0.12
16.00	15.75	115.0	49.4	30.0	0.0	12	40.5	0.1	0.90	0.90	1.0	1.3	51.7	57.0	100.0	960.8	1,649.8	3.35	3.7		0.8	0.95	1.12	1.05	1.00	0.49	1.30		0.51	0.79	0.0591	0.072	0.0000	0.00	0.12
16.50	16.25	115.0	49.7	30.0	0.0	12	40.5	0.1	0.92	0.92	1.0	1.3	51.5	56.9	100.0	965.2	1,664.8	3.41	3.7		0.8	0.95	1.12	1.04	1.00	0.49	1.30		0.53	0.81	0.0604	0.074	0.0000	0.00	0.12
17.00	16.75	115.0	49.9	30.0	0.0	12	40.5	0.1	0.95	0.95	1.0	1.3	51.3	56.7	100.0	969.3	1,679.3	3.46	3.6		0.8	0.95	1.12	1.03	1.00	0.50	1.30		0.55	0.83	0.0629	0.076	0.0000	0.00	0.12
17.50	17.25	115.0	50.2	30.0	0.0	12	40.5	0.1	0.98	0.98	1.0	1.3	51.2	56.5	100.0	973.4	1,693.3	3.52	3.6		0.8	0.95	1.12	1.02	1.00	0.50	1.30		0.56	0.85	0.0653	0.078	0.0000	0.00	0.12
18.00	17.75	115.0	50.4	30.0	0.0	12	40.5	0.1	1.01	1.01	1.0	1.3	51.0	56.4	100.0	977.3	1,706.8	3.58	3.5		0.8	0.94	1.12	1.01	1.00	0.50	1.30		0.58	0.87	0.0678	0.081	0.0000	0.00	0.12
18.50	18.25	115.0	47.2	30.0	0.0	12	40.5	0.1	1.04	1.04	1.0	1.3	47.4	52.8	100.0	969.6	1,680.2	3.59	3.5																

$Z_b(ft)$	$Z_m(ft)$	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	ϕ (°)	C' (tsf)	σ_{v0} (tsf)	σ_{v0}' (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60cs}$	D_R (%)	$V_s(ft/s)$	$G_0(tsf)$	σ_p' (tsf)	OCR_{G0}	S_u/σ_{v0}'	K_0	r_d	MSF	K_σ	K_α	CSR _{7.5}	CRR _{7.5}	FS	$\tau_{av}(tsf)$	p (tsf)	G/G_0	γ_{max} (%)	ϵ_v (%)	ΔS_i	$\Sigma S_i(in)$
31.00	30.75	110.0	50.1	35.0	0.0	12	40.5	0.1	1.77	1.77	0.9	1.3	43.5	49.0	97.0	1,066.6	1,944.8	4.82	2.7		0.7	0.89	1.12	0.85	1.00	0.56	1.30		0.95	1.38	0.1153	0.144	0.0000	0.00	0.08
31.50	31.25	110.0	50.2	35.0	0.0	12	40.5	0.1	1.80	1.80	0.9	1.3	43.3	48.8	96.9	1,068.4	1,951.5	4.86	2.7		0.7	0.88	1.12	0.84	1.00	0.57	1.30		0.96	1.40	0.1177	0.147	0.0000	0.00	0.08
32.00	31.75	110.0	50.3	35.0	0.0	12	40.5	0.1	1.83	1.83	0.9	1.3	43.2	48.7	96.7	1,070.2	1,958.1	4.90	2.7		0.7	0.88	1.12	0.84	1.00	0.57	1.30		0.97	1.42	0.1201	0.149	0.0000	0.00	0.08
32.50	32.25	110.0	33.3	35.0	0.0	12	37.0	0.1	1.85	1.85	0.8	1.3	26.8	32.3	78.8	1,017.3	1,769.1	4.70	2.5		0.7	0.88	1.11	0.89	1.00	0.53	0.68		0.98	1.48	0.1466	0.201	0.2149	0.01	0.07
33.00	32.75	110.0	33.3	35.0	0.0	12	36.9	0.1	1.88	1.88	0.8	1.3	26.6	32.1	78.6	1,019.1	1,775.3	4.73	2.5		0.7	0.88	1.11	0.89	1.00	0.53	0.66		0.99	1.50	0.1498	0.204	0.2199	0.01	0.06
33.50	33.25	110.0	33.3	35.0	0.0	12	36.9	0.1	1.91	1.91	0.8	1.3	26.5	32.0	78.4	1,020.8	1,781.3	4.77	2.5		0.7	0.87	1.11	0.89	1.00	0.53	0.64		1.01	1.52	0.1530	0.206	0.2251	0.01	0.04
34.00	33.75	110.0	33.3	35.0	0.0	12	36.8	0.1	1.94	1.94	0.8	1.3	26.3	31.8	78.2	1,022.5	1,787.2	4.81	2.5		0.7	0.87	1.11	0.89	1.00	0.53	0.62		1.02	1.54	0.1562	0.209	0.2303	0.01	0.03
34.50	34.25	110.0	33.3	35.0	0.0	12	36.7	0.1	1.96	1.96	0.8	1.3	26.1	31.6	78.0	1,024.1	1,793.0	4.84	2.5		0.7	0.87	1.11	0.89	1.00	0.53	0.61		1.03	1.56	0.1594	0.211	0.2355	0.01	0.01
35.00	34.75	110.0	33.3	35.0	0.0	12	36.7	0.1	1.99	1.99	0.8	1.3	25.9	31.4	77.8	1,025.7	1,798.5	4.88	2.5		0.7	0.87	1.11	0.88	1.00	0.53	0.59		1.04	1.58	0.1626	0.214	0.2409	0.01	0.00
35.50	35.25	120.0	63.3	30.0	0.0	12	40.5	0.1	2.02	2.02	0.8	1.3	53.4	58.8	100.0	1,066.4	2,120.9	5.31	2.6		0.7	0.86	1.12	0.81	1.00	0.58	1.30		1.05	1.56	0.1920	0.137	0.0000	0.00	0.00
36.00	35.75	120.0	63.4	30.0	0.0	12	40.5	0.1	2.05	2.05	0.8	1.3	53.2	58.6	100.0	1,068.1	2,127.3	5.35	2.6		0.7	0.86	1.12	0.80	1.00	0.58	1.30		1.07	1.58	0.1951	0.139	0.0000	0.00	0.00
36.50	36.25	120.0	63.4	30.0	0.0	12	40.5	0.1	2.08	2.08	0.8	1.3	53.1	58.4	100.0	1,069.6	2,133.6	5.39	2.6		0.7	0.86	1.12	0.80	1.00	0.58	1.30		1.08	1.60	0.1981	0.141	0.0000	0.00	0.00
37.00	36.75	120.0	63.5	30.0	0.0	12	40.5	0.1	2.11	2.11	0.8	1.3	52.9	58.3	100.0	1,071.2	2,139.8	5.43	2.6		0.6	0.86	1.12	0.79	1.00	0.58	1.30		1.09	1.62	0.2011	0.142	0.0000	0.00	0.00
37.50	37.25	120.0	63.5	30.0	0.0	12	40.5	0.1	2.14	2.14	0.8	1.3	52.8	58.1	100.0	1,072.7	2,145.9	5.47	2.6		0.6	0.85	1.12	0.79	1.00	0.58	1.30		1.10	1.63	0.2041	0.144	0.0000	0.00	0.00
38.00	37.75	120.0	63.6	30.0	0.0	12	40.5	0.1	2.17	2.17	0.8	1.3	52.6	58.0	100.0	1,074.2	2,151.9	5.51	2.5		0.6	0.85	1.12	0.78	1.00	0.59	1.30		1.12	1.65	0.2071	0.146	0.0000	0.00	0.00
38.50	38.25	120.0	41.8	30.0	0.0	12	38.5	0.1	2.20	2.20	0.8	1.3	32.4	37.8	85.2	1,013.0	1,913.7	5.24	2.4		0.6	0.85	1.12	0.82	1.00	0.56	1.30		1.13	1.68	0.2215	0.210	0.0000	0.00	0.00
39.00	38.75	120.0	41.8	30.0	0.0	12	38.5	0.1	2.23	2.23	0.8	1.3	32.3	37.6	85.1	1,014.6	1,919.8	5.28	2.4		0.6	0.85	1.12	0.82	1.00	0.56	1.30		1.14	1.70	0.2251	0.212	0.0000	0.00	0.00
39.50	39.25	120.0	41.9	30.0	0.0	12	38.5	0.1	2.26	2.26	0.8	1.3	32.1	37.5	84.9	1,016.2	1,925.9	5.32	2.4		0.6	0.84	1.12	0.82	1.00	0.55	1.30		1.15	1.72	0.2286	0.215	0.0000	0.00	0.00
40.00	39.75	120.0	41.9	30.0	0.0	12	38.4	0.1	2.29	2.29	0.8	1.3	31.9	37.3	84.7	1,017.8	1,931.9	5.35	2.3		0.6	0.84	1.12	0.82	1.00	0.55	1.30		1.16	1.74	0.2322	0.217	0.0000	0.00	0.00
40.50	40.25	115.0	61.9	30.0	0.0	12	40.5	0.1	2.32	2.32	0.8	1.3	50.4	55.8	100.0	1,099.3	2,159.8	5.68	2.4		0.6	0.84	1.12	0.76	1.00	0.59	1.30		1.17	1.74	0.1920	0.159	0.0000	0.00	0.00
41.00	40.75	115.0	62.0	30.0	0.0	12	40.5	0.1	2.35	2.35	0.8	1.3	50.3	55.6	100.0	1,100.7	2,165.0	5.71	2.4		0.6	0.84	1.12	0.76	1.00	0.59	1.30		1.19	1.76	0.1948	0.161	0.0000	0.00	0.00
41.50	41.25	115.0	62.0	30.0	0.0	12	40.5	0.1	2.38	2.38	0.8	1.3	50.1	55.5	100.0	1,102.0	2,170.2	5.75	2.4		0.6	0.83	1.12	0.76	1.00	0.59	1.30		1.20	1.78	0.1976	0.163	0.0000	0.00	0.00
42.00	41.75	115.0	62.0	30.0	0.0	12	40.5	0.1	2.41	2.41	0.8	1.3	50.0	55.3	100.0	1,103.3	2,175.3	5.78	2.4		0.6	0.83	1.12	0.75	1.00	0.59	1.30		1.21	1.80	0.2004	0.164	0.0000	0.00	0.00
42.50	42.25	115.0	62.1	30.0	0.0	12	40.5	0.1	2.43	2.43	0.8	1.3	49.9	55.2	100.0	1,104.5	2,180.3	5.82	2.4		0.6	0.83	1.12	0.75	1.00	0.60	1.30		1.22	1.81	0.2032	0.166	0.0000	0.00	0.00
43.00	42.75	115.0	62.1	30.0	0.0	12	40.5	0.1	2.46	2.46	0.8	1.3	49.7	55.1	100.0	1,105.8	2,185.2	5.85	2.4		0.6	0.83	1.12	0.75	1.00	0.60	1.30		1.23	1.83	0.2060	0.168	0.0000	0.00	0.00
43.50	43.25	115.0	56.6	30.0	0.0	12	40.5	0.1	2.49	2.49	0.8	1.3	45.0	50.3	98.4	1,090.6	2,125.6	5.81	2.3		0.6	0.82	1.12	0.74	1.00	0.60	1.30		1.24	1.84	0.2063	0.185	0.0000	0.00	0.00
44.00	43.75	115.0	56.7	30.0	0.0	12	40.5	0.1	2.52	2.52	0.8	1.3	44.8	50.2	98.2	1,091.8	2,130.3	5.84	2.3		0.6	0.82	1.12	0.74	1.00	0.60	1.30		1.25	1.86	0.2091	0.187	0.0000	0.00	0.00
44.50	44.25	115.0	56.7	30.0	0.0	12	40.5	0.1	2.55	2.55	0.8	1.3	44.7	50.0	98.1	1,093.0	2,135.0	5.87	2.3		0.6	0.82	1.12	0.74	1.00	0.60	1.30		1.26	1.87	0.2119	0.189	0.0000	0.00	0.00
45.00	44.75	115.0	56.7	30.0	0.0	12	40.5	0.1	2.58	2.58	0.8	1.3	44.5	49.9	97.9	1,094.2	2,139.7	5.91	2.3		0.6	0.82	1.12	0.73	1.00	0.60	1.30		1.27	1.89	0.2147	0.190	0.0000	0.00	0.00
45.50	45.25	110.0	64.1	30.0	0.0	12	40.5	0.1	2.61	2.61	0.8	1.3	50.5	55.9	100.0	1,142.0	2,229.5	6.05	2.3		0.6	0.81	1.12	0.73	1.00	0.60	1.30		1.28	1.92	0.1905	0.170	0.0000	0.00	0.00
46.00	45.75	110.0	64.1	30.0	0.0	12	40.5	0.1	2.63	2.63	0.8	1.3	50.4	55.8	100.0	1,143.2	2,233.9	6.09	2.3		0.6	0.81	1.12	0.73	1.00	0.60	1.30		1.29	1.94	0.1932	0.172	0.0000	0.00	0.00
46.50	46.25	110.0	64.1	30.0	0.0	12	40.5	0.1	2.66	2.66	0.8	1.3	50.3	55.6	100.0	1,144.3	2,238.3	6.12	2.3		0.6	0.81	1.12	0.72	1.00	0.60	1.30		1.30	1.96	0.1958	0.173	0.0000	0.00	0.00
47.00	46.75	110.0	64.1	30.0	0.0	12	40.5	0.1	2.69	2.69	0.8	1.3	50.2	55.5	100.0	1,145.4	2,242.6	6.15	2.3		0.6	0.81	1.12	0.72	1.00	0.60	1.30		1.31	1.97	0.1984	0.174	0.0000	0.00	0.00
47.50	47.25	110.0	64.1	30.0	0.0	12	40.5	0.1	2.72	2.72	0.8	1.3	50.0	55.4	100.0	1,146.5	2,246.8	6.18	2.3		0.6	0.80	1.12	0.72	1.00	0.60	1.30		1.32	1.99	0.2011	0.175	0.0000	0.00	0.00
48.00	47.75	110.0	64.1	30.0	0.0	12	40.5	0.1	2.74	2.74	0.8	1.3	49.9	55.3	100.0	1,147.5	2,251.0	6.21	2.3		0.6	0.80	1.12	0.71	1.00	0.60	1.30		1.33	2.01	0.2037	0.177	0.0000	0.00	0.00
48.50	48.25	110.0	45.8	35.0	0.0	12	38.7	0.1	2.77	2.77	0.7	1.3	32.9	38.4	86.0	1,105.4	2,089.0	6.02	2.2		0.6	0.80	1.12	0.76	1.00	0.57	1.30		1.34	2.05	0.2243	0.220	0.0000	0.00	0.00
49.00	48.75	110.0	45.8	35.0	0.0	12	38.6																												

X:\3242-0-0 Fillmore Unified School District\GeoSuite\Revised_Jerome_Value\GeoSuite_3242-0-0-100_B-2.dwg



SM

Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 75 ft
Maximum Settlement = 0.45 in
Settl. at Bottom of Footing = 0.45 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand] Boulanger & Idriss(2004)
sigma correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)



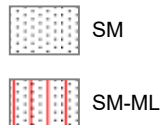
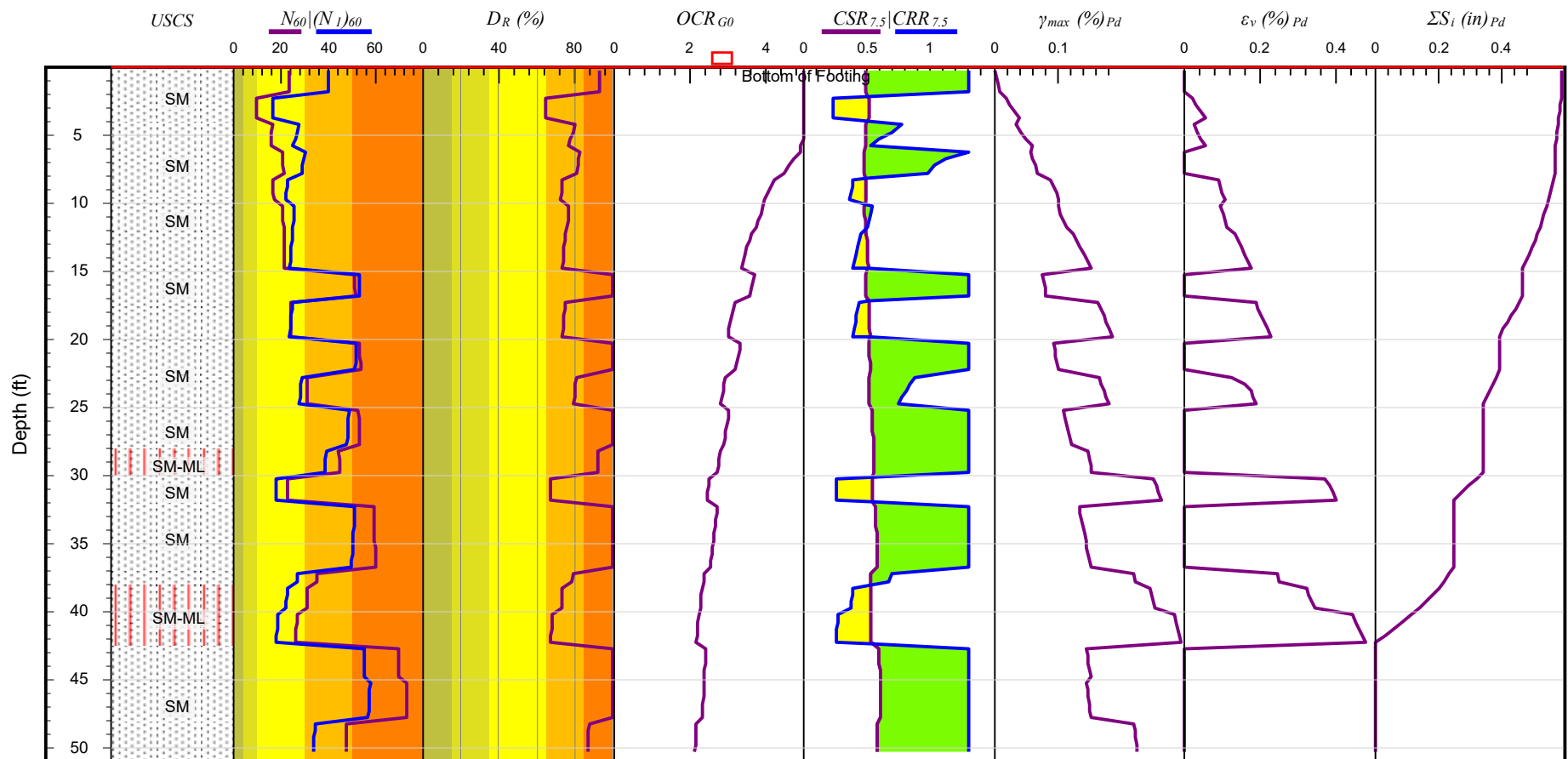
Seismic Settlement Potential - SPT Data

Project:	Fillmore High School				
Location:	555 Central Ave, Fillmore, CA 93015				
Project No.:	3242-0-0-100	Boring No.:	B-2	Figure:	2

Z_s (ft)	Z_w (ft)	γ (pcf)	N_{60}	FC (%)	CC (%)	USCS	ϕ (°)	C' (tsf)	σ_{v0} (tsf)	σ'_{v0} (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{0.025}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ'_v (tsf)	$OCR_{0.01}$	S_{w0}/σ'_{v0}	K_0	r_d	MSF	K_e	K_e	CSR _{1.5}	CRR _{1.5}	FS	τ_{v0} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ε_v (%)	ΔS_v	ΣS_v (in)
0.50	0.25	115.0	29.0	35.0	0.0	12	40.5	0.0	0.01	0.01	1.7	1.3	49.3	54.8	100.0	832.1	1,237.3	0.07	5.0	1.0	1.00	1.12	1.10	1.00	0.49	1.30	0.03	0.01	0.6054	0.001	0.0000	0.00	0.45		
1.00	0.75	115.0	29.0	35.0	0.0	12	40.5	0.0	0.04	0.04	1.7	1.3	49.3	54.8	100.0	826.9	1,222.0	0.22	5.0	1.0	1.00	1.12	1.10	1.00	0.49	1.30	0.03	0.04	0.3215	0.002	0.0000	0.00	0.45		
1.50	1.25	115.0	29.0	35.0	0.0	12	40.5	0.0	0.07	0.07	1.7	1.3	49.3	54.8	100.0	822.0	1,207.6	0.36	5.0	1.0	1.00	1.12	1.10	1.00	0.49	1.30	0.04	0.07	0.1895	0.004	0.0000	0.00	0.45		
2.00	1.75	115.0	29.0	35.0	0.0	12	40.5	0.0	0.10	0.10	1.7	1.3	49.3	54.8	100.0	817.3	1,193.9	0.50	5.0	1.0	1.00	1.12	1.10	1.00	0.49	1.30	0.06	0.10	0.1199	0.007	0.0000	0.00	0.45		
2.50	2.25	110.0	11.4	20.0	0.0	12	34.6	0.0	0.13	0.13	1.7	1.2	19.4	23.9	67.8	706.9	854.3	0.64	5.0	1.1	0.99	1.07	1.10	1.00	0.51	0.27	0.08	0.14	0.0545	0.016	0.0185	0.00	0.45		
3.00	2.75	110.0	11.4	20.0	0.0	12	34.6	0.0	0.16	0.16	1.7	1.2	19.4	23.9	67.8	703.5	846.1	0.78	5.0	1.1	0.99	1.07	1.10	1.00	0.51	0.27	0.09	0.16	0.0331	0.021	0.0258	0.00	0.45		
3.50	3.25	110.0	11.4	20.0	0.0	12	34.6	0.0	0.18	0.18	1.7	1.2	19.4	23.9	67.8	700.3	838.4	0.92	5.0	1.1	0.99	1.07	1.10	1.00	0.51	0.27	0.11	0.19	0.0324	0.027	0.0347	0.00	0.45		
4.00	3.75	110.0	11.4	20.0	0.0	12	34.6	0.0	0.21	0.21	1.7	1.2	19.4	23.9	67.8	697.2	831.0	1.06	5.0	1.1	0.99	1.07	1.10	1.00	0.51	0.27	0.13	0.22	0.0372	0.035	0.0456	0.00	0.44		
4.50	4.25	120.0	14.6	35.0	0.0	12	36.3	0.0	0.24	0.24	1.7	1.2	24.8	30.3	76.3	704.1	924.5	1.20	5.0	1.1	0.99	1.10	1.10	1.00	0.49	0.50	0.14	0.25	0.0371	0.033	0.0296	0.00	0.44		
5.00	4.75	120.0	14.6	35.0	0.0	12	36.3	0.0	0.27	0.27	1.7	1.2	24.8	30.3	76.3	701.0	916.3	1.35	5.0	1.1	0.99	1.10	1.10	1.00	0.49	0.50	0.16	0.28	0.0411	0.041	0.0377	0.00	0.44		
5.50	5.25	120.0	14.5	35.0	0.0	12	36.2	0.0	0.30	0.30	1.7	1.2	24.2	29.7	75.6	697.4	907.1	1.50	5.0	1.1	0.99	1.10	1.10	1.00	0.49	0.47	0.18	0.31	0.0422	0.050	0.0478	0.00	0.44		
6.00	5.75	120.0	14.4	35.0	0.0	12	35.9	0.0	0.33	0.33	1.6	1.2	23.3	28.8	74.5	693.8	897.6	1.63	4.9	1.1	0.99	1.09	1.10	1.00	0.50	0.42	0.20	0.34	0.0431	0.061	0.0604	0.00	0.43		
6.50	6.25	120.0	14.3	35.0	0.0	12	35.6	0.0	0.36	0.36	1.6	1.2	22.5	28.0	73.4	690.8	890.0	1.70	4.7	1.0	0.98	1.09	1.10	1.00	0.50	0.38	0.21	0.37	0.0439	0.074	0.0765	0.00	0.43		
7.00	6.75	120.0	8.5	35.0	0.0	12	32.5	0.0	0.39	0.39	1.6	1.1	13.9	19.4	61.1	652.1	793.1	1.66	4.3	1.0	0.98	1.05	1.10	1.00	0.52	0.20	0.23	0.39	0.0448	0.131	0.2299	0.01	0.42		
7.50	7.25	120.0	8.6	35.0	0.0	12	32.3	0.0	0.42	0.42	1.6	1.1	13.6	19.1	60.6	661.3	815.5	1.74	4.1	1.0	0.98	1.05	1.10	1.00	0.52	0.20	0.25	0.42	0.0456	0.140	0.2495	0.01	0.40		
8.00	7.75	120.0	8.7	35.0	0.0	12	32.2	0.0	0.45	0.45	1.5	1.1	13.3	18.9	60.2	670.3	837.8	1.81	4.0	1.0	0.98	1.04	1.10	1.00	0.51	0.19	0.27	0.44	0.0464	0.148	0.2671	0.02	0.38		
8.50	8.25	120.0	8.8	35.0	0.0	12	32.1	0.0	0.48	0.48	1.5	1.1	13.1	18.6	59.8	678.7	859.0	1.89	3.9	1.0	0.98	1.04	1.09	1.00	0.52	0.19	0.28	0.47	0.0478	0.156	0.2852	0.02	0.37		
9.00	8.75	120.0	8.9	35.0	0.0	12	32.0	0.0	0.51	0.51	1.4	1.1	12.9	18.4	59.5	686.6	879.1	1.96	3.8	1.0	0.98	1.04	1.08	1.00	0.52	0.19	0.30	0.50	0.0522	0.165	0.3040	0.02	0.35		
9.50	9.25	120.0	32.6	35.0	0.0	12	40.4	0.0	0.54	0.54	1.2	1.3	39.9	45.4	93.4	828.4	1,279.6	2.40	4.4	0.9	0.98	1.12	1.10	1.00	0.48	1.30	0.32	0.51	0.0499	0.058	0.0000	0.00	0.35		
10.00	9.75	120.0	33.0	35.0	0.0	12	40.4	0.0	0.57	0.57	1.2	1.3	39.7	45.2	93.3	836.2	1,304.1	2.47	4.3	0.9	0.97	1.12	1.10	1.00	0.48	1.30	0.34	0.54	0.0505	0.061	0.0000	0.00	0.35		
10.50	10.25	120.0	33.4	35.0	0.0	12	40.4	0.1	0.60	0.60	1.2	1.3	39.6	45.1	93.1	843.6	1,327.3	2.55	4.2	0.9	0.97	1.12	1.10	1.00	0.48	1.30	0.35	0.56	0.0512	0.064	0.0000	0.00	0.35		
11.00	10.75	120.0	33.7	35.0	0.0	12	40.3	0.1	0.63	0.63	1.2	1.3	39.4	44.9	93.0	850.7	1,349.4	2.62	4.2	0.9	0.97	1.12	1.10	1.00	0.48	1.30	0.37	0.58	0.0518	0.066	0.0000	0.00	0.35		
11.50	11.25	120.0	34.0	35.0	0.0	12	40.3	0.1	0.66	0.66	1.2	1.3	39.3	44.8	92.8	857.3	1,370.6	2.69	4.1	0.9	0.97	1.12	1.10	1.00	0.47	1.30	0.39	0.61	0.0524	0.069	0.0000	0.00	0.35		
12.00	11.75	120.0	34.3	35.0	0.0	12	40.3	0.1	0.69	0.69	1.1	1.3	39.1	44.6	92.6	863.6	1,390.9	2.76	4.0	0.9	0.97	1.12	1.10	1.00	0.47	1.30	0.40	0.63	0.0530	0.072	0.0000	0.00	0.35		
12.50	12.25	120.0	33.1	25.0	0.0	12	39.8	0.1	0.72	0.72	1.1	1.3	37.3	42.4	90.3	851.3	1,351.3	2.78	3.9	0.9	0.96	1.12	1.10	1.00	0.47	1.30	0.42	0.65	0.0545	0.084	0.0000	0.00	0.35		
13.00	12.75	120.0	33.3	25.0	0.0	12	39.8	0.1	0.75	0.75	1.1	1.3	37.2	42.2	90.1	856.9	1,369.3	2.84	3.8	0.8	0.96	1.12	1.10	1.00	0.47	1.30	0.44	0.67	0.0551	0.088	0.0000	0.00	0.35		
13.50	13.25	120.0	33.6	25.0	0.0	12	39.7	0.1	0.78	0.78	1.1	1.3	37.0	42.0	89.9	862.3	1,386.6	2.91	3.7	0.8	0.96	1.12	1.09	1.00	0.47	1.30	0.45	0.69	0.0575	0.091	0.0000	0.00	0.35		
14.00	13.75	120.0	33.8	25.0	0.0	12	39.7	0.1	0.81	0.81	1.1	1.3	36.8	41.9	89.7	867.4	1,403.2	2.97	3.7	0.8	0.96	1.12	1.08	1.00	0.48	1.30	0.47	0.72	0.0606	0.094	0.0000	0.00	0.35		
14.50	14.25	120.0	34.0	25.0	0.0	12	39.6	0.1	0.84	0.84	1.1	1.3	36.6	41.7	89.5	872.4	1,419.2	3.03	3.6	0.8	0.96	1.12	1.07	1.00	0.48	1.30	0.49	0.74	0.0637	0.098	0.0000	0.00	0.35		
15.00	14.75	115.0	35.8	25.0	0.0	12	40.0	0.1	0.87	0.87	1.1	1.3	38.1	43.2	91.1	901.6	1,452.7	3.11	3.6	0.8	0.96	1.12	1.06	1.00	0.49	1.30	0.50	0.76	0.0600	0.098	0.0000	0.00	0.35		
15.50	15.25	115.0	36.1	25.0	0.0	12	40.0	0.1	0.90	0.90	1.1	1.3	37.9	43.0	91.0	906.1	1,467.3	3.17	3.5	0.8	0.95	1.12	1.05	1.00	0.49	1.30	0.52	0.78	0.0604	0.101	0.0000	0.00	0.35		
16.00	15.75	115.0	36.3	25.0	0.0	12	39.9	0.1	0.93	0.93	1.0	1.3	37.8	42.8	90.7	910.5	1,481.4	3.23	3.5	0.8	0.95	1.12	1.04	1.00	0.49	1.30	0.53	0.80	0.0608	0.104	0.0000	0.00	0.35		
16.50	16.25	115.0	36.4	25.0	0.0	12	39.9	0.1	0.96	0.96	1.0	1.3	37.6	42.7	90.6	914.6	1,495.0	3.28	3.4	0.8	0.95	1.12	1.03	1.00	0.50	1.30	0.55	0.82	0.0612	0.107	0.0000	0.00	0.35		
17.00	16.75	115.0	36.6	25.0	0.0	12	39.8	0.1	0.98	0.98	1.0	1.3	37.5	42.5	90.4	918.7	1,508.3	3.34	3.4	0.8	0.95	1.12	1.02	1.00	0.50	1.30	0.56	0.84	0.0616	0.110	0.0000	0.00	0.35		
17.50	17.25	115.0	36.8	25.0	0.0	12	39.8	0.1	1.01	1.01	1.0	1.3	37.3	42.4	90.3	922.6	1,521.1	3.39	3.3	0.8	0.95	1.12	1.01	1.00	0.50	1.30	0.58	0.86	0.0633	0.113	0.0000	0.00	0.35		
18.00	17.75	115.0	37.0	25.0	0.0	12	39.8	0.1	1.04	1.04	1.0	1.3	37.1	42.2	90.1	926.3	1,533.5	3.44	3.3	0.8	0.94	1.12	1.00	1.00	0.51	1.30	0.59	0.89	0.0660	0.116	0.0000	0.00	0.35		
18.50	18.25	115.0	42.2	20.0	0.0	12	40.5	0.1	1.07	1.07	1.0	1.3	42.0	46.5	94.6	939.9	1,578.8	3.53	3.3	0.8	0.94	1.12	1.00	1.00	0.51	1.30	0.61	0.90	0.0637	0.113	0.0000	0.00	0.35		
19.00	18.75	115.0	42.3	20.0	0.0	12	40.5	0.1	1.10	1.10	1.0	1.3	41.9	46.3	9																				

Z_s (ft)	Z_w (ft)	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	ϕ (°)	C' (tsf)	σ_{v0} (tsf)	σ_{v0}' (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60cs}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ_{p0}' (tsf)	OCR_{cs}	S_w/σ_{v0}'	K_0	r_d	MSF	K_σ	K_σ	$CSR_{2.5}$	$CRR_{2.5}$	FS	τ_{v0} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ε_v (%)	ΔS_1	ΣS_1 (in)
36.00	35.75	115.0	52.5	25.0	0.0	12	40.5	0.1	2.12	2.12	0.8	1.3	43.2	48.3	96.4	1,053.2	1,982.4	5.24	2.5		0.6	0.86	1.12	0.79	1.00	0.59	1.30		1.10	1.60	0.1593	0.185	0.0000	0.00	0.24
36.50	36.25	115.0	52.5	25.0	0.0	12	40.5	0.1	2.15	2.15	0.8	1.3	43.1	48.2	96.2	1,054.7	1,988.0	5.28	2.5		0.6	0.86	1.12	0.79	1.00	0.59	1.30		1.11	1.62	0.1620	0.187	0.0000	0.00	0.24
37.00	36.75	115.0	52.6	25.0	0.0	12	40.5	0.1	2.17	2.17	0.8	1.3	42.9	48.0	96.1	1,056.1	1,993.4	5.32	2.4		0.6	0.86	1.12	0.78	1.00	0.59	1.30		1.12	1.63	0.1647	0.189	0.0000	0.00	0.24
37.50	37.25	115.0	52.6	25.0	0.0	12	40.5	0.1	2.20	2.20	0.8	1.3	42.8	47.8	95.9	1,057.6	1,998.8	5.35	2.4		0.6	0.85	1.12	0.78	1.00	0.59	1.30		1.14	1.65	0.1674	0.191	0.0000	0.00	0.24
38.00	37.75	115.0	52.7	25.0	0.0	12	40.5	0.1	2.23	2.23	0.8	1.3	42.6	47.7	95.8	1,059.0	2,004.1	5.39	2.4		0.6	0.85	1.12	0.78	1.00	0.59	1.30		1.15	1.67	0.1701	0.194	0.0000	0.00	0.24
38.50	38.25	115.0	45.4	30.0	0.0	12	39.3	0.1	2.26	2.26	0.8	1.3	35.4	40.8	88.6	1,048.0	1,963.0	5.37	2.4		0.6	0.85	1.12	0.79	1.00	0.58	1.30		1.16	1.71	0.1882	0.208	0.0000	0.00	0.24
39.00	38.75	115.0	45.5	30.0	0.0	12	39.3	0.1	2.29	2.29	0.8	1.3	35.3	40.6	88.4	1,049.6	1,968.8	5.40	2.4		0.6	0.85	1.12	0.79	1.00	0.58	1.30		1.17	1.73	0.1914	0.210	0.0000	0.00	0.24
39.50	39.25	115.0	45.5	30.0	0.0	12	39.3	0.1	2.32	2.32	0.8	1.3	35.1	40.5	88.2	1,051.1	1,974.5	5.44	2.3		0.6	0.84	1.12	0.78	1.00	0.58	1.30		1.18	1.75	0.1946	0.212	0.0000	0.00	0.24
40.00	39.75	115.0	45.5	30.0	0.0	12	39.2	0.1	2.35	2.35	0.8	1.3	35.0	40.3	88.1	1,052.6	1,980.2	5.47	2.3		0.6	0.84	1.12	0.78	1.00	0.58	1.30		1.19	1.76	0.1979	0.214	0.0000	0.00	0.24
40.50	40.25	110.0	51.0	30.0	0.0	12	40.5	0.1	2.38	2.38	0.8	1.3	40.1	45.4	93.5	1,091.7	2,037.4	5.58	2.3		0.6	0.84	1.12	0.76	1.00	0.60	1.30		1.20	1.76	0.1609	0.202	0.0000	0.00	0.24
41.00	40.75	110.0	51.0	30.0	0.0	12	40.4	0.1	2.40	2.40	0.8	1.3	39.9	45.3	93.3	1,093.1	2,042.5	5.61	2.3		0.6	0.84	1.12	0.75	1.00	0.60	1.30		1.21	1.78	0.1636	0.203	0.0000	0.00	0.24
41.50	41.25	110.0	51.1	30.0	0.0	12	40.4	0.1	2.43	2.43	0.8	1.3	39.8	45.1	93.2	1,094.5	2,047.8	5.64	2.3		0.6	0.83	1.12	0.75	1.00	0.60	1.30		1.22	1.79	0.1666	0.205	0.0000	0.00	0.24
42.00	41.75	110.0	51.1	30.0	0.0	12	40.4	0.1	2.46	2.46	0.8	1.3	39.6	45.0	93.0	1,095.9	2,053.0	5.68	2.3		0.6	0.83	1.12	0.75	1.00	0.60	1.30		1.23	1.81	0.1695	0.206	0.0000	0.00	0.24
42.50	42.25	110.0	51.1	30.0	0.0	12	40.3	0.1	2.49	2.49	0.8	1.3	39.5	44.8	92.9	1,097.3	2,058.2	5.71	2.3		0.6	0.83	1.12	0.74	1.00	0.60	1.30		1.24	1.83	0.1724	0.208	0.0000	0.00	0.24
43.00	42.75	110.0	51.1	30.0	0.0	12	40.3	0.1	2.51	2.51	0.8	1.3	39.3	44.7	92.7	1,098.6	2,063.3	5.74	2.3		0.6	0.83	1.12	0.74	1.00	0.60	1.30		1.25	1.85	0.1754	0.209	0.0000	0.00	0.24
43.50	43.25	110.0	37.3	30.0	0.0	12	36.9	0.1	2.54	2.54	0.7	1.3	26.6	31.9	78.4	1,061.5	1,926.1	5.58	2.2		0.6	0.82	1.11	0.84	1.00	0.54	0.64		1.26	1.93	0.2078	0.254	0.3231	0.02	0.23
44.00	43.75	110.0	37.3	30.0	0.0	12	36.8	0.1	2.57	2.57	0.7	1.3	26.4	31.8	78.1	1,062.6	1,930.3	5.62	2.2		0.6	0.82	1.11	0.84	1.00	0.53	0.62		1.27	1.95	0.2110	0.256	0.3285	0.02	0.21
44.50	44.25	110.0	37.3	30.0	0.0	12	36.8	0.1	2.60	2.60	0.7	1.3	26.2	31.6	78.0	1,063.8	1,934.7	5.65	2.2		0.6	0.82	1.11	0.83	1.00	0.53	0.61		1.28	1.97	0.2142	0.258	0.3337	0.02	0.19
45.00	44.75	110.0	37.2	30.0	0.0	12	36.7	0.1	2.62	2.62	0.7	1.3	26.1	31.4	77.8	1,065.0	1,939.0	5.68	2.2		0.6	0.82	1.11	0.83	1.00	0.53	0.59		1.29	1.99	0.2175	0.260	0.3389	0.02	0.17
45.50	45.25	115.0	65.9	30.0	0.0	12	40.5	0.1	2.65	2.65	0.8	1.3	51.7	57.1	100.0	1,123.7	2,256.8	6.13	2.3		0.6	0.81	1.12	0.72	1.00	0.61	1.30		1.30	1.95	0.2231	0.170	0.0000	0.00	0.17
46.00	45.75	115.0	65.9	30.0	0.0	12	40.5	0.1	2.68	2.68	0.8	1.3	51.6	57.0	100.0	1,124.9	2,261.3	6.17	2.3		0.6	0.81	1.12	0.72	1.00	0.61	1.30		1.31	1.97	0.2259	0.172	0.0000	0.00	0.17
46.50	46.25	115.0	65.9	30.0	0.0	12	40.5	0.1	2.71	2.71	0.8	1.3	51.5	56.8	100.0	1,126.0	2,265.8	6.20	2.3		0.6	0.81	1.12	0.72	1.00	0.61	1.30		1.32	1.99	0.2287	0.173	0.0000	0.00	0.17
47.00	46.75	115.0	65.9	30.0	0.0	12	40.5	0.1	2.74	2.74	0.8	1.3	51.4	56.7	100.0	1,127.1	2,270.2	6.23	2.3		0.6	0.81	1.12	0.71	1.00	0.61	1.30		1.33	2.00	0.2315	0.174	0.0000	0.00	0.17
47.50	47.25	115.0	66.0	30.0	0.0	12	40.5	0.1	2.77	2.77	0.8	1.3	51.2	56.6	100.0	1,128.2	2,274.6	6.27	2.3		0.6	0.80	1.12	0.71	1.00	0.61	1.30		1.34	2.02	0.2342	0.176	0.0000	0.00	0.17
48.00	47.75	115.0	66.0	30.0	0.0	12	40.5	0.1	2.79	2.79	0.8	1.3	51.1	56.5	100.0	1,129.2	2,278.9	6.30	2.3		0.6	0.80	1.12	0.71	1.00	0.61	1.30		1.35	2.04	0.2370	0.177	0.0000	0.00	0.17
48.50	48.25	115.0	34.7	35.0	0.0	12	35.8	0.1	2.82	2.82	0.7	1.2	23.1	28.6	74.1	1,050.3	1,971.4	5.90	2.1		0.6	0.80	1.09	0.84	1.00	0.53	0.41		1.36	2.14	0.2835	0.268	0.3769	0.02	0.14
49.00	48.75	115.0	34.7	35.0	0.0	12	35.8	0.1	2.85	2.85	0.7	1.2	22.9	28.4	73.9	1,051.4	1,975.7	5.93	2.1		0.6	0.80	1.09	0.84	1.00	0.53	0.40		1.37	2.16	0.2868	0.269	0.3823	0.02	0.12
49.50	49.25	115.0	34.6	35.0	0.0	12	35.7	0.1	2.88	2.88	0.7	1.2	22.8	28.3	73.8	1,052.5	1,979.9	5.96	2.1		0.6	0.79	1.09	0.84	1.00	0.53	0.40		1.38	2.18	0.2901	0.271	0.3877	0.02	0.10
50.00	49.75	115.0	34.6	35.0	0.0	12	35.7	0.1	2.91	2.91	0.7	1.2	22.6	28.1	73.6	1,053.7	1,984.1	6.00	2.1		0.6	0.79	1.09	0.84	1.00	0.52	0.39		1.39	2.20	0.2935	0.272	0.3931	0.02	0.07
50.50	50.25	115.0	34.6	35.0	0.0	12	35.6	0.1	2.94	2.94	0.7	1.2	22.5	28.0	73.4	1,054.8	1,988.3	6.03	2.1		0.6	0.79	1.09	0.84	1.00	0.52	0.38		1.40	2.22	0.2968	0.274	0.3985	0.02	0.05
51.00	50.75	115.0	34.5	35.0	0.0	12	35.6	0.1	2.97	2.97	0.6	1.2	22.4	27.9	73.2	1,055.9	1,992.4	6.06	2.0		0.6	0.79	1.09	0.83	1.00	0.52	0.38		1.41	2.24	0.3001	0.275	0.4038	0.02	0.02
51.50	51.25	115.0	34.5	35.0	0.0	12	35.5	0.1	3.00	3.00	0.6	1.2	22.2	27.7	73.0	1,056.9	1,996.5	6.09	2.0		0.6	0.78	1.09	0.83	1.00	0.52	0.37		1.42	2.26	0.3034	0.276	0.4092	0.02	0.00

X:\3242-0-0 Fillmore Unified School District\GeoSuite\Revised_Jerome Values\GeoSuite_3242-0-0-100_B-3.csv



Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 75 ft
Maximum Settlement = 0.59 in
Settl. at Bottom of Footing = 0.59 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)



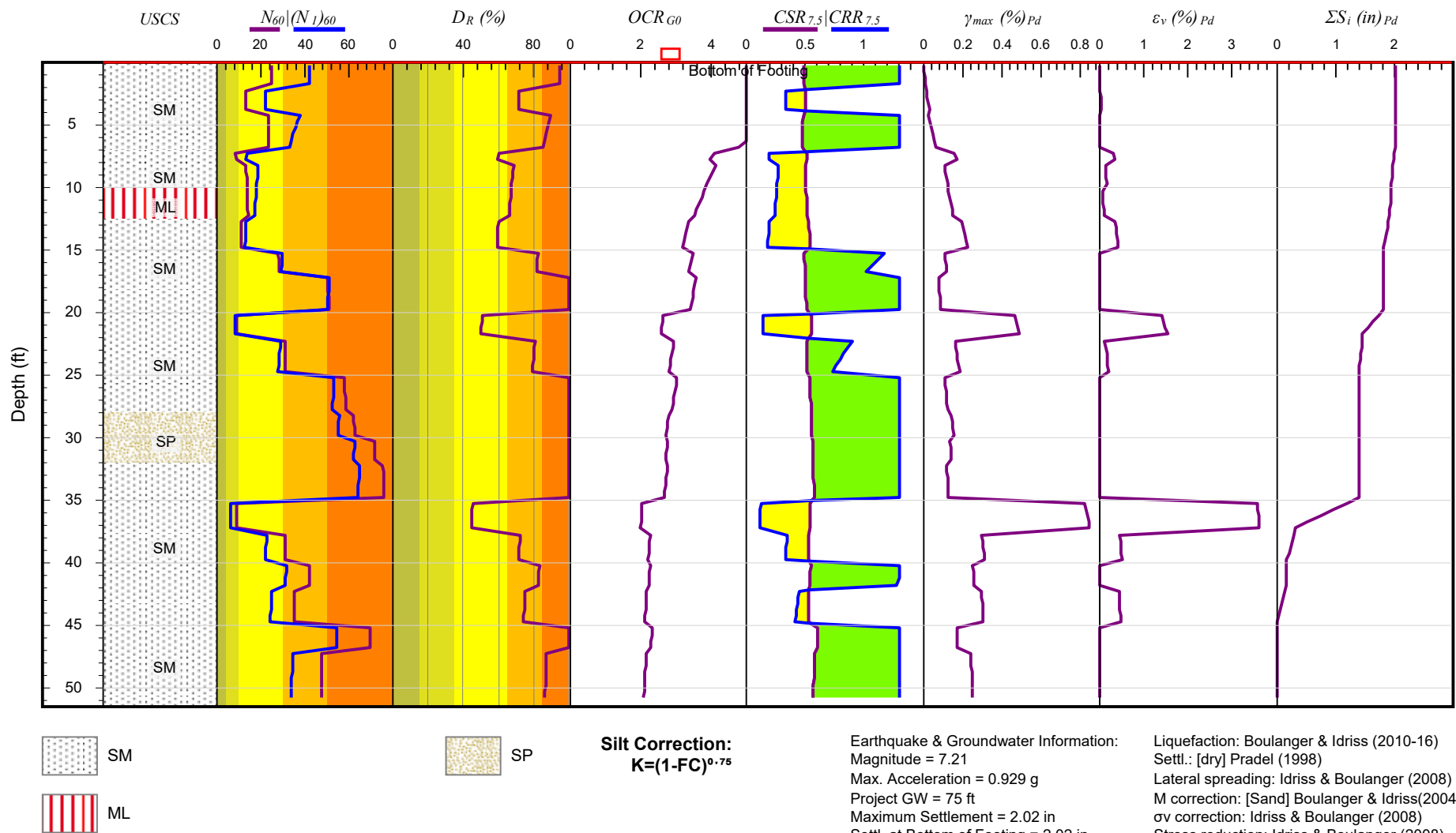
Seismic Settlement Potential - SPT Data

Project:	Fillmore High School				
Location:	555 Central Ave, Fillmore, CA 93015				
Project No.:	3242-0-0-100	Boring No.:	B-3	Figure:	3

Z_s (ft)	Z_w (ft)	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	ϕ (°)	C' (tsf)	σ'_{v0} (tsf)	$\sigma'_{v0'}$ (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{0.025}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ'_p (tsf)	OCR_{60}	$S_w/\sigma'_{v0'}$	K_0	r_d	MSF	K_e	K_e	$CSR_{7.5}$	$CRR_{7.5}$	FS	τ_{v0} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ε_v (%)	ΔS_1	ΣS_1 (in)
0.50	0.25	120.0	23.5	25.0	0.0	12	40.4	0.0	0.02	0.02	1.7	1.3	39.9	45.0	93.0	777.7	1,127.9	0.08	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.01	0.01	0.6049	0.001	0.0000	0.00	0.59
1.00	0.75	120.0	23.5	25.0	0.0	12	40.4	0.0	0.05	0.05	1.7	1.3	39.9	45.0	93.0	772.7	1,113.6	0.23	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.03	0.04	0.3208	0.003	0.0000	0.00	0.59
1.50	1.25	120.0	23.5	25.0	0.0	12	40.4	0.0	0.08	0.08	1.7	1.3	39.9	45.0	93.0	768.0	1,100.0	0.38	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.05	0.07	0.1889	0.005	0.0000	0.00	0.59
2.00	1.75	120.0	23.5	25.0	0.0	12	40.4	0.0	0.11	0.11	1.7	1.3	39.9	45.0	93.0	763.5	1,087.1	0.53	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.06	0.10	0.1194	0.008	0.0000	0.00	0.59
2.50	2.25	115.0	9.9	25.0	0.0	12	33.7	0.0	0.13	0.13	1.7	1.2	16.9	22.0	65.0	683.0	833.7	0.67	5.0		1.1	1.00	1.06	1.10	1.00	0.52	0.23		0.08	0.14	0.0652	0.017	0.0225	0.00	0.59
3.00	2.75	115.0	9.9	25.0	0.0	12	33.7	0.0	0.16	0.16	1.7	1.2	16.9	22.0	65.0	679.7	825.8	0.82	5.0		1.1	0.99	1.06	1.10	1.00	0.52	0.23		0.10	0.17	0.0405	0.024	0.0316	0.00	0.59
3.50	3.25	115.0	9.9	25.0	0.0	12	33.6	0.0	0.19	0.19	1.7	1.2	16.9	22.0	65.0	676.7	818.3	0.96	5.0		1.1	0.99	1.06	1.10	1.00	0.52	0.23		0.12	0.20	0.0321	0.031	0.0428	0.00	0.58
4.00	3.75	115.0	9.9	25.0	0.0	12	33.6	0.0	0.22	0.22	1.7	1.2	16.9	22.0	65.0	673.7	811.1	1.10	5.0		1.1	0.99	1.06	1.10	1.00	0.51	0.23		0.13	0.23	0.0369	0.040	0.0567	0.00	0.58
4.50	4.25	120.0	16.3	35.0	0.0	12	37.2	0.0	0.25	0.25	1.7	1.3	27.6	33.2	79.9	714.2	951.3	1.25	5.0		1.0	0.99	1.12	1.10	1.00	0.49	0.78		0.15	0.26	0.0385	0.033	0.0268	0.00	0.58
5.00	4.75	120.0	16.2	35.0	0.0	12	37.0	0.0	0.28	0.28	1.7	1.3	27.0	32.5	79.1	710.5	941.5	1.40	5.0		1.0	0.99	1.12	1.10	1.00	0.49	0.70		0.17	0.29	0.0416	0.041	0.0341	0.00	0.58
5.50	5.25	120.0	16.1	35.0	0.0	12	36.7	0.0	0.31	0.31	1.6	1.3	26.0	31.5	77.9	706.6	931.1	1.55	5.0		1.1	0.99	1.11	1.10	1.00	0.49	0.60		0.18	0.32	0.0426	0.049	0.0431	0.00	0.57
6.00	5.75	120.0	15.9	35.0	0.0	12	36.4	0.0	0.34	0.34	1.6	1.3	25.1	30.6	76.7	702.9	921.4	1.67	4.9		1.0	0.99	1.10	1.10	1.00	0.49	0.53		0.20	0.35	0.0435	0.060	0.0541	0.00	0.57
6.50	6.25	115.0	20.7	35.0	0.0	12	38.0	0.0	0.37	0.37	1.5	1.3	30.3	35.8	83.0	747.7	999.1	1.82	4.9		1.0	0.98	1.12	1.10	1.00	0.48	1.30		0.22	0.38	0.0468	0.056	0.0000	0.00	0.57
7.00	6.75	115.0	20.6	35.0	0.0	12	37.8	0.0	0.40	0.40	1.4	1.3	29.5	35.0	82.1	756.3	1,022.1	1.89	4.8		1.0	0.98	1.12	1.10	1.00	0.48	1.12		0.24	0.40	0.0477	0.060	0.0000	0.00	0.57
7.50	7.25	115.0	20.8	35.0	0.0	12	37.6	0.0	0.43	0.43	1.4	1.3	29.1	34.6	81.6	765.6	1,047.7	1.97	4.6		1.0	0.98	1.12	1.10	1.00	0.48	1.03		0.25	0.42	0.0486	0.064	0.0000	0.00	0.57
8.00	7.75	115.0	21.1	35.0	0.0	12	37.6	0.0	0.46	0.46	1.4	1.3	28.9	34.4	81.4	775.1	1,073.8	2.05	4.5		1.0	0.98	1.12	1.10	1.00	0.48	0.98		0.27	0.45	0.0494	0.068	0.0000	0.00	0.57
8.50	8.25	110.0	16.3	35.0	0.0	12	35.7	0.0	0.48	0.48	1.4	1.2	22.7	28.2	73.6	771.3	1,016.9	2.05	4.2		1.0	0.98	1.09	1.10	1.00	0.49	0.39		0.29	0.47	0.0524	0.089	0.0895	0.01	0.57
9.00	8.75	110.0	16.6	35.0	0.0	12	35.6	0.0	0.51	0.51	1.4	1.2	22.5	28.0	73.3	779.3	1,038.2	2.12	4.1		1.0	0.98	1.09	1.10	1.00	0.49	0.38		0.30	0.50	0.0532	0.093	0.0947	0.01	0.56
9.50	9.25	110.0	16.7	35.0	0.0	12	35.5	0.0	0.54	0.54	1.3	1.2	22.2	27.8	73.1	786.9	1,058.5	2.19	4.1		0.9	0.98	1.09	1.10	1.00	0.49	0.37		0.32	0.52	0.0538	0.097	0.1001	0.01	0.55
10.00	9.75	110.0	16.9	35.0	0.0	12	35.5	0.0	0.57	0.57	1.3	1.2	22.0	27.5	72.8	794.0	1,077.7	2.25	4.0		0.9	0.97	1.09	1.10	1.00	0.49	0.37		0.33	0.54	0.0545	0.102	0.1058	0.01	0.55
10.50	10.25	110.0	20.6	25.0	0.0	12	36.7	0.0	0.59	0.59	1.3	1.3	25.8	30.9	77.1	809.2	1,119.4	2.34	3.9		0.9	0.97	1.10	1.10	1.00	0.48	0.55		0.35	0.56	0.0565	0.100	0.0964	0.01	0.54
11.00	10.75	110.0	20.7	25.0	0.0	12	36.6	0.0	0.62	0.62	1.2	1.3	25.6	30.7	76.8	815.5	1,136.9	2.40	3.9		0.9	0.97	1.10	1.09	1.00	0.48	0.53		0.36	0.58	0.0571	0.104	0.1019	0.01	0.54
11.50	11.25	110.0	20.9	25.0	0.0	12	36.5	0.0	0.65	0.65	1.2	1.3	25.4	30.4	76.5	821.6	1,153.9	2.46	3.8		0.9	0.97	1.10	1.09	1.00	0.49	0.51		0.38	0.60	0.0577	0.109	0.1074	0.01	0.53
12.00	11.75	110.0	21.0	25.0	0.0	12	36.5	0.1	0.68	0.68	1.2	1.3	25.2	30.2	76.2	827.4	1,170.1	2.52	3.7		0.9	0.97	1.10	1.08	1.00	0.49	0.50		0.39	0.63	0.0583	0.113	0.1132	0.01	0.52
12.50	12.25	120.0	21.2	20.0	0.0	12	36.4	0.1	0.71	0.71	1.2	1.2	24.9	29.4	75.2	790.4	1,165.0	2.56	3.6		0.9	0.96	1.10	1.07	1.00	0.50	0.45		0.41	0.65	0.0577	0.125	0.1350	0.01	0.51
13.00	12.75	120.0	21.3	20.0	0.0	12	36.3	0.1	0.74	0.74	1.2	1.2	24.7	29.1	74.9	795.7	1,180.7	2.63	3.6		0.9	0.96	1.09	1.06	1.00	0.50	0.44		0.43	0.67	0.0613	0.130	0.1431	0.01	0.51
13.50	13.25	120.0	21.4	20.0	0.0	12	36.2	0.1	0.77	0.77	1.1	1.2	24.4	28.9	74.6	800.8	1,196.0	2.69	3.5		0.9	0.96	1.09	1.05	1.00	0.50	0.42		0.44	0.69	0.0648	0.136	0.1511	0.01	0.50
14.00	13.75	120.0	21.5	20.0	0.0	12	36.2	0.1	0.80	0.80	1.1	1.2	24.2	28.7	74.2	805.7	1,210.5	2.75	3.5		0.9	0.96	1.09	1.05	1.00	0.51	0.41		0.46	0.72	0.0684	0.141	0.1597	0.01	0.49
14.50	14.25	120.0	21.6	20.0	0.0	12	36.1	0.1	0.83	0.83	1.1	1.2	23.9	28.4	73.9	810.3	1,224.4	2.80	3.4		0.8	0.96	1.09	1.04	1.00	0.51	0.40		0.48	0.74	0.0720	0.146	0.1686	0.01	0.48
15.00	14.75	120.0	21.7	20.0	0.0	12	36.0	0.1	0.86	0.86	1.1	1.2	23.7	28.2	73.6	814.7	1,237.8	2.86	3.3		0.8	0.96	1.09	1.03	1.00	0.51	0.39		0.49	0.76	0.0756	0.152	0.1778	0.01	0.47
15.50	15.25	110.0	50.8	20.0	0.0	12	40.5	0.1	0.88	0.88	1.0	1.3	53.3	57.7	100.0	971.1	1,612.2	3.29	3.7		0.8	0.95	1.12	1.05	1.00	0.49	1.30		0.51	0.78	0.0636	0.075	0.0000	0.00	0.47
16.00	15.75	110.0	51.1	20.0	0.0	12	40.5	0.1	0.91	0.91	1.0	1.3	53.1	57.6	100.0	975.5	1,626.6	3.35	3.7		0.8	0.95	1.12	1.04	1.00	0.49	1.30		0.52	0.80	0.0641	0.077	0.0000	0.00	0.47
16.50	16.25	110.0	51.3	20.0	0.0	12	40.5	0.1	0.94	0.94	1.0	1.3	53.0	57.5	100.0	979.6	1,640.5	3.40	3.6		0.8	0.95	1.12	1.04	1.00	0.49	1.30		0.54	0.82	0.0645	0.079	0.0000	0.00	0.47
17.00	16.75	110.0	51.6	20.0	0.0	12	40.5	0.1	0.97	0.97	1.0	1.3	52.8	57.3	100.0	983.6	1,654.0	3.46	3.6		0.8	0.95	1.12	1.03	1.00	0.50	1.30		0.55	0.84	0.0649	0.081	0.0000	0.00	0.47
17.50	17.25	105.0	24.1	20.0	0.0	12	36.3	0.1	0.99	0.99	1.0	1.2	24.7	29.2	74.9	901.2	1,325.4	3.15	3.2		0.8	0.95	1.09	1.01	1.00	0.52	0.44		0.57	0.87	0.0679	0.164	0.1882	0.01	0.45
18.00	17.75	105.0	24.1	20.0	0.0	12	36.3	0.1	1.02	1.02	1.0	1.2	24.5	29.0	74.6	904.7	1,335.5	3.19	3.1		0.8	0.94	1.09	1.01	1.00	0.52	0.43		0.58	0.89	0.0682	0.168	0.1958	0.01	0.44
18.50	18.25	105.0	24.2	20.0	0.0	12	36.2	0.1	1.05	1.05	1.0	1.2	24.3	28.8	74.4	908.0</																			

Z_s (ft)	Z_w (ft)	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	ϕ (°)	C' (tsf)	σ'_{v0} (tsf)	$\sigma'_{v0'}$ (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60s}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ'_p (tsf)	OCR_{60}	$S_w/\sigma'_{v0'}$	K_0	r_d	MSF	K_σ	K_σ	CSR _{7.5}	CRR _{7.5}	FS	τ_{v0} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ε_v (%)	ΔS_1	ΣS_1 (in)
36.00	35.75	120.0	59.7	30.0	0.0	12	40.5	0.1	2.06	2.06	0.8	1.3	50.1	55.5	100.0	1,058.2	2,088.3	5.32	2.6		0.6	0.86	1.12	0.80	1.00	0.58	1.30		1.07	1.58	0.1940	0.148	0.0000	0.00	0.25
36.50	36.25	120.0	59.8	30.0	0.0	12	40.5	0.1	2.09	2.09	0.8	1.3	50.0	55.4	100.0	1,059.8	2,094.5	5.36	2.6		0.6	0.86	1.12	0.80	1.00	0.58	1.30		1.08	1.60	0.1970	0.150	0.0000	0.00	0.25
37.00	36.75	120.0	59.8	30.0	0.0	12	40.5	0.1	2.12	2.12	0.8	1.3	49.8	55.2	100.0	1,061.3	2,100.6	5.39	2.5		0.6	0.86	1.12	0.79	1.00	0.58	1.30		1.10	1.62	0.2000	0.152	0.0000	0.00	0.25
37.50	37.25	120.0	35.4	35.0	0.0	12	37.0	0.1	2.15	2.15	0.8	1.3	27.0	32.5	79.0	998.5	1,859.2	5.12	2.4		0.7	0.85	1.11	0.86	1.00	0.53	0.69		1.11	1.68	0.2349	0.219	0.2449	0.01	0.23
38.00	37.75	120.0	35.4	35.0	0.0	12	36.9	0.1	2.18	2.18	0.8	1.3	26.8	32.3	78.8	1,000.0	1,864.8	5.16	2.4		0.7	0.85	1.11	0.86	1.00	0.53	0.67		1.12	1.70	0.2387	0.221	0.2506	0.02	0.22
38.50	38.25	120.0	30.9	35.0	0.0	11	35.7	0.1	2.21	2.21	0.7	1.2	22.7	28.2	73.6	985.5	1,811.1	5.11	2.3		0.7	0.85	1.09	0.88	1.00	0.53	0.39		1.13	1.74	0.2521	0.246	0.3220	0.02	0.20
39.00	38.75	120.0	30.8	35.0	0.0	11	35.6	0.1	2.24	2.24	0.7	1.2	22.5	28.0	73.4	986.9	1,816.5	5.15	2.3		0.7	0.85	1.09	0.88	1.00	0.53	0.38		1.14	1.76	0.2559	0.249	0.3292	0.02	0.18
39.50	39.25	120.0	30.8	35.0	0.0	11	35.6	0.1	2.27	2.27	0.7	1.2	22.3	27.8	73.1	988.4	1,822.0	5.19	2.3		0.7	0.84	1.09	0.88	1.00	0.53	0.38		1.16	1.78	0.2596	0.251	0.3362	0.02	0.16
40.00	39.75	120.0	30.8	35.0	0.0	11	35.5	0.1	2.30	2.30	0.7	1.2	22.2	27.7	72.9	989.9	1,827.4	5.22	2.3		0.7	0.84	1.09	0.88	1.00	0.53	0.37		1.17	1.80	0.2633	0.254	0.3431	0.02	0.14
40.50	40.25	120.0	26.6	35.0	0.0	11	34.3	0.1	2.33	2.33	0.7	1.2	18.6	24.1	68.1	974.8	1,771.9	5.17	2.2		0.7	0.84	1.07	0.89	1.00	0.53	0.27		1.18	1.84	0.2755	0.284	0.4460	0.03	0.11
41.00	40.75	120.0	26.6	35.0	0.0	11	34.2	0.1	2.36	2.36	0.7	1.2	18.5	24.0	67.9	976.2	1,777.2	5.21	2.2		0.7	0.84	1.07	0.89	1.00	0.53	0.27		1.19	1.86	0.2792	0.287	0.4546	0.03	0.08
41.50	41.25	120.0	26.6	35.0	0.0	11	34.2	0.1	2.39	2.39	0.7	1.2	18.3	23.8	67.7	977.7	1,782.5	5.24	2.2		0.7	0.83	1.07	0.89	1.00	0.53	0.26		1.20	1.88	0.2828	0.289	0.4631	0.03	0.06
42.00	41.75	120.0	26.5	35.0	0.0	11	34.1	0.1	2.42	2.42	0.7	1.2	18.2	23.7	67.5	979.1	1,787.7	5.28	2.2		0.7	0.83	1.07	0.89	1.00	0.53	0.26		1.21	1.90	0.2864	0.292	0.4716	0.03	0.03
42.50	42.25	120.0	26.5	35.0	0.0	11	34.1	0.1	2.45	2.45	0.7	1.2	18.1	23.6	67.3	980.5	1,792.9	5.31	2.2		0.7	0.83	1.06	0.88	1.00	0.53	0.26		1.23	1.92	0.2900	0.294	0.4802	0.03	0.00
43.00	42.75	120.0	69.4	35.0	0.0	12	40.5	0.1	2.48	2.48	0.8	1.3	55.5	61.0	100.0	1,111.3	2,303.0	6.02	2.4		0.6	0.83	1.12	0.74	1.00	0.60	1.30		1.24	1.86	0.2458	0.146	0.0000	0.00	0.00
43.50	43.25	120.0	69.4	35.0	0.0	12	40.5	0.1	2.51	2.51	0.8	1.3	55.3	60.8	100.0	1,112.5	2,308.2	6.06	2.4		0.6	0.82	1.12	0.74	1.00	0.60	1.30		1.25	1.88	0.2488	0.147	0.0000	0.00	0.00
44.00	43.75	120.0	69.5	35.0	0.0	12	40.5	0.1	2.54	2.54	0.8	1.3	55.2	60.7	100.0	1,113.8	2,313.4	6.09	2.4		0.6	0.82	1.12	0.74	1.00	0.60	1.30		1.26	1.90	0.2517	0.149	0.0000	0.00	0.00
44.50	44.25	120.0	69.5	35.0	0.0	12	40.5	0.1	2.57	2.57	0.8	1.3	55.0	60.5	100.0	1,115.0	2,318.5	6.13	2.4		0.6	0.82	1.12	0.73	1.00	0.60	1.30		1.27	1.91	0.2547	0.150	0.0000	0.00	0.00
45.00	44.75	120.0	69.5	35.0	0.0	12	40.5	0.1	2.60	2.60	0.8	1.3	54.9	60.4	100.0	1,116.2	2,323.5	6.17	2.4		0.6	0.82	1.12	0.73	1.00	0.60	1.30		1.28	1.93	0.2577	0.151	0.0000	0.00	0.00
45.50	45.25	120.0	73.2	35.0	0.0	12	40.5	0.1	2.63	2.63	0.8	1.3	57.6	63.1	100.0	1,126.8	2,367.8	6.25	2.4		0.6	0.81	1.12	0.73	1.00	0.60	1.30		1.29	1.96	0.2621	0.146	0.0000	0.00	0.00
46.00	45.75	120.0	73.2	35.0	0.0	12	40.5	0.1	2.66	2.66	0.8	1.3	57.5	63.0	100.0	1,128.0	2,372.8	6.29	2.4		0.6	0.81	1.12	0.72	1.00	0.60	1.30		1.30	1.97	0.2650	0.147	0.0000	0.00	0.00
46.50	46.25	120.0	73.2	35.0	0.0	12	40.5	0.1	2.69	2.69	0.8	1.3	57.3	62.8	100.0	1,129.1	2,377.5	6.33	2.4		0.6	0.81	1.12	0.72	1.00	0.61	1.30		1.31	1.99	0.2680	0.148	0.0000	0.00	0.00
47.00	46.75	120.0	73.3	35.0	0.0	12	40.5	0.1	2.72	2.72	0.8	1.3	57.2	62.7	100.0	1,130.2	2,382.3	6.36	2.3		0.6	0.81	1.12	0.72	1.00	0.61	1.30		1.32	2.01	0.2709	0.150	0.0000	0.00	0.00
47.50	47.25	120.0	73.3	35.0	0.0	12	40.5	0.1	2.75	2.75	0.8	1.3	57.0	62.5	100.0	1,131.4	2,387.0	6.40	2.3		0.6	0.80	1.12	0.71	1.00	0.61	1.30		1.33	2.03	0.2738	0.151	0.0000	0.00	0.00
48.00	47.75	120.0	73.3	35.0	0.0	12	40.5	0.1	2.78	2.78	0.8	1.3	56.9	62.4	100.0	1,132.5	2,391.7	6.43	2.3		0.6	0.80	1.12	0.71	1.00	0.61	1.30		1.34	2.05	0.2767	0.152	0.0000	0.00	0.00
48.50	48.25	115.0	47.7	35.0	0.0	12	39.1	0.1	2.81	2.81	0.7	1.3	34.4	39.9	87.6	1,087.4	2,113.4	6.09	2.2		0.6	0.80	1.12	0.74	1.00	0.58	1.30		1.35	2.06	0.2535	0.220	0.0000	0.00	0.00
49.00	48.75	115.0	47.7	35.0	0.0	12	39.0	0.1	2.84	2.84	0.7	1.3	34.3	39.8	87.4	1,088.7	2,118.2	6.12	2.2		0.6	0.80	1.12	0.74	1.00	0.58	1.30		1.36	2.08	0.2568	0.221	0.0000	0.00	0.00
49.50	49.25	115.0	47.7	35.0	0.0	12	39.0	0.1	2.87	2.87	0.7	1.3	34.1	39.6	87.3	1,089.9	2,123.0	6.15	2.1		0.6	0.79	1.12	0.74	1.00	0.58	1.30		1.37	2.10	0.2601	0.223	0.0000	0.00	0.00
50.00	49.75	115.0	47.7	35.0	0.0	12	39.0	0.1	2.90	2.90	0.7	1.3	34.0	39.5	87.1	1,091.1	2,127.7	6.19	2.1		0.6	0.79	1.12	0.74	1.00	0.58	1.30		1.38	2.12	0.2633	0.224	0.0000	0.00	0.00
50.50	50.25	115.0	47.7	35.0	0.0	12	38.9	0.1	2.92	2.92	0.7	1.3	33.8	39.3	87.0	1,092.3	2,132.4	6.22	2.1		0.6	0.79	1.12	0.74	1.00	0.58	1.30		1.39	2.14	0.2665	0.225	0.0000	0.00	0.00
51.00	50.75	115.0	47.7	35.0	0.0	12	38.9	0.1	2.95	2.95	0.7	1.3	33.7	39.2	86.8	1,093.5	2,137.1	6.25	2.1		0.6	0.79	1.12	0.74	1.00	0.58	1.30		1.40	2.16	0.2698	0.226	0.0000	0.00	0.00

X:\3242-0-0 Fillmore Unified School District\GeoSuite\Revised_Jerome_Value\GeoSuite_3242-0-0-100_B-4.gsv



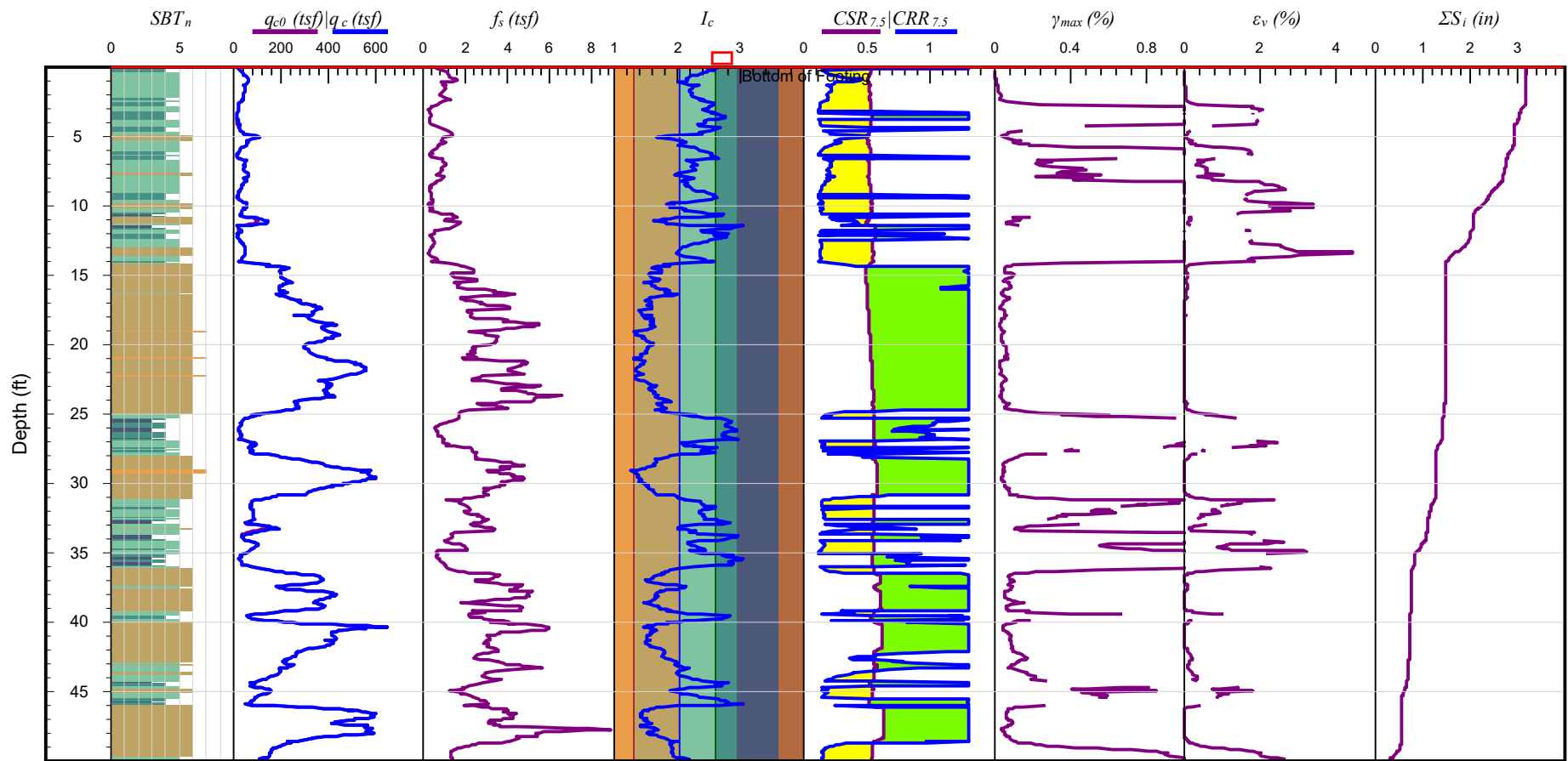
Seismic Settlement Potential - SPT Data

Project:	Fillmore High School				
Location:	555 Central Ave, Fillmore, CA 93015				
Project No.:	3242-0-0-100	Boring No.:	B-4	Figure:	4

Z_s (ft)	Z_{eq} (ft)	γ (pcf)	N_{60}	FC (%)	CC (%)	USCS	ϕ (°)	C' (tsf)	σ_{vm} (tsf)	σ_{vm}' (tsf)	C_{γ}	C_c	$(N_1)_{60}$	$(N_1)_{eq}$	D_R (%)	V_p (ft/s)	G_s (tsf)	σ_p' (tsf)	OCR_{20}	S_v/σ_{vm}'	K_{θ}	r_d	MSF	K_{θ}	K_{θ}	CSR _{7.5}	CRR _{7.5}	FS	τ_{vm} (tsf)	p (tsf)	G/G ₀	T_{max} (%)	ϵ_v (%)	AS_1	ΣS_i (in)	AD_1
0.50	0.25	100.0	24.9	20.0	0.0	12	40.5	0.0	0.01	0.01	1.7	1.3	42.3	46.7	94.8	854.3	1,134.1	0.06	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.01	0.01	0.5364	0.001	0.0000	0.00	2.02	
1.00	0.75	100.0	24.9	20.0	0.0	12	40.5	0.0	0.04	0.04	1.7	1.3	42.3	46.7	94.8	849.7	1,121.9	0.19	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.02	0.04	0.2415	0.002	0.0000	0.00	2.02	
1.50	1.25	100.0	24.9	20.0	0.0	12	40.5	0.0	0.06	0.06	1.7	1.3	42.3	46.7	94.8	845.2	1,110.2	0.31	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.04	0.06	0.1269	0.004	0.0000	0.00	2.02	
2.00	1.75	100.0	24.9	20.0	0.0	12	40.5	0.0	0.09	0.09	1.7	1.3	42.3	46.7	94.8	840.9	1,099.0	0.44	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.05	0.09	0.0737	0.006	0.0000	0.00	2.02	
2.50	2.25	120.0	13.0	20.0	0.0	12	35.5	0.0	0.12	0.12	1.7	1.2	22.1	26.5	71.4	691.3	891.2	0.58	5.0		1.1	1.00	1.08	1.10	1.00	0.51	0.33		0.07	0.12	0.1008	0.012	0.0126	0.00	2.02	
3.00	2.75	120.0	13.0	20.0	0.0	12	35.5	0.0	0.15	0.15	1.7	1.2	22.0	26.5	71.4	687.6	881.6	0.73	5.0		1.1	0.99	1.08	1.10	1.00	0.51	0.33		0.09	0.15	0.0651	0.017	0.0184	0.00	2.02	
3.50	3.25	120.0	13.0	20.0	0.0	12	35.5	0.0	0.18	0.18	1.7	1.2	22.0	26.5	71.4	684.0	872.6	0.88	5.0		1.1	0.99	1.08	1.10	1.00	0.50	0.33		0.10	0.18	0.0409	0.023	0.0256	0.00	2.02	
4.00	3.75	120.0	13.0	20.0	0.0	12	35.5	0.0	0.21	0.21	1.7	1.2	22.0	26.5	71.4	680.7	864.0	1.03	5.0		1.1	0.99	1.08	1.10	1.00	0.50	0.33		0.12	0.21	0.0320	0.030	0.0345	0.00	2.02	
4.50	4.25	120.0	23.5	20.0	0.0	12	39.9	0.0	0.24	0.24	1.6	1.3	37.6	42.1	89.9	740.8	1,023.4	1.18	5.0		1.0	0.99	1.12	1.10	1.00	0.49	1.30		0.14	0.24	0.0368	0.026	0.0000	0.00	2.02	
5.00	4.75	120.0	23.5	20.0	0.0	12	39.6	0.0	0.27	0.27	1.6	1.3	36.5	41.0	88.8	737.2	1,013.4	1.33	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.16	0.27	0.0414	0.032	0.0000	0.00	2.02	
5.50	5.25	120.0	23.5	20.0	0.0	12	39.4	0.0	0.30	0.30	1.5	1.3	35.6	40.1	87.8	733.7	1,003.9	1.48	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.18	0.30	0.0440	0.038	0.0000	0.00	2.02	
6.00	5.75	120.0	23.5	20.0	0.0	12	39.2	0.0	0.33	0.33	1.5	1.3	34.7	39.2	86.8	730.4	994.8	1.63	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.19	0.33	0.0449	0.046	0.0000	0.00	2.02	
6.50	6.25	120.0	23.5	20.0	0.0	12	38.9	0.0	0.36	0.36	1.4	1.3	33.9	38.4	85.9	727.2	986.0	1.77	5.0		1.0	0.98	1.12	1.10	1.00	0.48	1.30		0.21	0.36	0.0459	0.054	0.0000	0.00	2.02	
7.00	6.75	120.0	23.5	20.0	0.0	12	38.7	0.0	0.39	0.39	1.4	1.3	33.2	37.7	85.1	733.1	1,002.2	1.95	4.8		1.0	0.98	1.12	1.10	1.00	0.48	1.30		0.23	0.38	0.0468	0.060	0.0000	0.00	2.02	
7.50	7.25	120.0	8.6	25.0	0.0	12	32.4	0.0	0.42	0.42	1.6	1.1	13.7	18.7	60.0	649.0	785.4	1.70	4.1		1.0	0.98	1.04	1.10	1.00	0.52	0.19		0.25	0.41	0.0465	0.158	0.3143	0.02	2.00	
8.00	7.75	120.0	8.7	25.0	0.0	12	32.3	0.0	0.45	0.45	1.5	1.1	13.4	18.5	59.6	657.9	807.2	1.77	4.0		1.0	0.98	1.04	1.10	1.00	0.52	0.19		0.26	0.44	0.0473	0.168	0.3368	0.02	1.98	
8.50	8.25	115.0	13.2	35.0	0.0	12	34.4	0.0	0.47	0.47	1.4	1.2	18.9	24.5	68.6	730.1	952.6	1.97	4.2		1.0	0.98	1.07	1.10	1.00	0.50	0.28		0.28	0.47	0.0494	0.105	0.1299	0.01	1.97	
9.00	8.75	115.0	13.4	35.0	0.0	12	34.3	0.0	0.50	0.50	1.4	1.2	18.7	24.2	68.2	738.2	973.9	2.04	4.1		1.0	0.98	1.07	1.10	1.00	0.50	0.27		0.30	0.49	0.0501	0.110	0.1382	0.01	1.96	
9.50	9.25	115.0	13.5	35.0	0.0	12	34.2	0.0	0.53	0.53	1.4	1.2	18.5	24.0	67.9	745.8	994.1	2.11	4.0		0.9	0.98	1.07	1.10	1.00	0.50	0.27		0.31	0.51	0.0508	0.116	0.1468	0.01	1.95	
10.00	9.75	115.0	13.6	35.0	0.0	12	34.1	0.0	0.56	0.56	1.3	1.2	18.2	23.7	67.6	753.0	1,013.4	2.18	3.9		0.9	0.97	1.07	1.09	1.00	0.51	0.26		0.33	0.54	0.0515	0.121	0.1558	0.01	1.94	
10.50	10.25	115.0	13.8	65.0	0.0	7	34.1	0.0	0.59	0.59	1.3	1.2	18.0	23.6	67.4	759.8	1,031.8	2.24	3.8		0.9	0.97	1.06	1.08	1.00	0.51	0.26		0.35	0.56	0.0571	0.127	0.0751	0.00	1.94	
11.00	10.75	115.0	13.9	65.0	0.0	7	34.0	0.0	0.62	0.62	1.3	1.2	17.8	23.4	67.0	766.3	1,049.4	2.31	3.7		0.9	0.97	1.06	1.07	1.00	0.51	0.26		0.36	0.59	0.0610	0.132	0.0794	0.00	1.94	
11.50	11.25	115.0	14.0	65.0	0.0	7	33.9	0.0	0.65	0.65	1.3	1.2	17.6	23.2	66.7	772.4	1,066.2	2.37	3.7		0.9	0.97	1.06	1.07	1.00	0.52	0.25		0.38	0.61	0.0649	0.138	0.0839	0.01	1.93	
12.00	11.75	115.0	14.1	65.0	0.0	7	33.8	0.0	0.68	0.68	1.2	1.2	17.4	22.9	66.4	778.2	1,082.4	2.43	3.6		0.9	0.97	1.06	1.06	1.00	0.52	0.25		0.39	0.63	0.0689	0.144	0.0886	0.01	1.93	
12.50	12.25	115.0	14.2	65.0	0.0	7	33.7	0.0	0.70	0.70	1.2	1.2	17.1	22.7	66.1	783.8	1,098.0	2.49	3.5		0.9	0.96	1.06	1.05	1.00	0.52	0.24		0.41	0.66	0.0729	0.149	0.0933	0.01	1.92	
13.00	12.75	115.0	11.1	35.0	0.0	12	32.2	0.0	0.73	0.73	1.2	1.1	13.3	18.8	60.2	763.9	1,042.8	2.47	3.4		0.9	0.96	1.04	1.04	1.00	0.53	0.19		0.43	0.68	0.0670	0.196	0.3464	0.02	1.90	
13.50	13.25	115.0	11.1	35.0	0.0	12	32.1	0.1	0.76	0.76	1.2	1.1	13.1	18.6	59.9	768.9	1,056.7	2.53	3.3		0.9	0.96	1.04	1.04	1.00	0.54	0.19		0.44	0.70	0.0707	0.203	0.3639	0.02	1.88	
14.00	13.75	115.0	11.2	35.0	0.0	12	32.1	0.1	0.79	0.79	1.2	1.1	13.0	18.5	59.6	773.8	1,070.2	2.58	3.3		0.9	0.96	1.04	1.03	1.00	0.54	0.19		0.46	0.73	0.0744	0.210	0.3816	0.02	1.85	
14.50	14.25	115.0	11.2	35.0	0.0	12	32.0	0.1	0.82	0.82	1.1	1.1	12.8	18.3	59.3	778.5	1,083.2	2.64	3.2		0.9	0.96	1.04	1.03	1.00	0.54	0.19		0.47	0.75	0.0781	0.218	0.3996	0.02	1.83	
15.00	14.75	115.0	11.3	35.0	0.0	12	31.9	0.1	0.85	0.85	1.1	1.1	12.6	18.2	59.1	783.1	1,095.9	2.69	3.2		0.9	0.96	1.04	1.03	1.00	0.54	0.19		0.49	0.77	0.0818	0.225	0.4181	0.03	1.81	
15.50	15.25	115.0	27.8	35.0	0.0	12	31.8	0.1	0.88	0.88	1.1	1.3	29.8	35.3	82.4	885.1	1,400.0	3.07	3.5		0.8	0.95	1.12	1.04	1.00	0.49	1.17		0.50	0.78	0.0664	0.108	0.0000	0.00	1.81	
16.00	15.75	115.0	27.9	35.0	0.0	12	31.8	0.1	0.91	0.91	1.1	1.3	29.6	35.1	82.1	889.5	1,414.1	3.12	3.4		0.8	0.95	1.12	1.03	1.00	0.50	1.13		0.52	0.80	0.0695	0.111	0.0000	0.00	1.81	
16.50	16.25	115.0	28.0	35.0	0.0	12	31.7	0.1	0.93	0.93	1.0	1.3	29.3	34.9	81.9	893.7	1,427.2	3.18	3.4		0.8	0.95	1.12	1.03	1.00	0.50	1.08		0.54	0.82	0.0727	0.115	0.0000	0.00	1.81	
17.00	16.75	115.0	28.1	35.0	0.0	12	31.6	0.1	0.96	0.96	1.0	1.3	29.1	34.6	81.6	897.6	1,439.8	3.23	3.4		0.8	0.95	1.12	1.02	1.00	0.50	1.03		0.55	0.84	0.0759	0.118	0.0000	0.00	1.81	
17.50	17.25	110.0	50.2	35.0	0.0	12	40.5	0.1	0.99	0.99	1.0	1.3	51.0	56.5	100.0	1,003.8	1,722.4	3.57	3.6		0.8	0.95	1.12	1.02	1.00	0.50	1.30		0.57	0.86	0.0631	0.076	0.0000	0.00	1.81	
18.00	17.75	110.0	50.4	35.0	0.0	12	40.5	0.1	1.02	1.02	1.0	1.3	50.9	56.4	100.0	1,007.6	1,735.6	3.62	3.6		0.8	0.94	1.12	1.01	1.00	0.50	1.30		0.58	0.88	0.0634	0.078	0.0000	0.00	1.81	
18.50	18.25	110.0	50.6	35.0	0.0	12	40.5	0.1	1.05	1.05	1.0	1.3	50.7	56.3	100.0	1,011.3																				

$Z_s(f)$	$Z_w(f)$	$\gamma(pgf)$	N_{60}	$FC(\%)$	$CC(\%)$	$USCS$	$\phi(^{\circ})$	$C' (tsf)$	$\sigma_{vm} (tsf)$	$\sigma_{vm}' (tsf)$	C_u	C_L	$(N_1)_{60}$	$(N_1)_{60CS}$	$D_R(\%)$	$V_p(f/s)$	$G_s(ts)$	$\sigma_p'(tsf)$	OCR_{20}	$S_v\sigma_{vm}'$	K_0	r_d	MSF	K_{σ}	K_{σ}	$CSR_{7.5}$	$CRR_{7.5}$	FS	$\tau_{av}(tsf)$	$p (tsf)$	G/G_0	$T_{max}(\%)$	$\epsilon_v(\%)$	ΔS_v	$\Sigma S_v (in)$	ΔD_v
38.00	37.75	120.0	30.8	20.0	0.0	12	35.7	0.1	2.20	2.20	0.7	1.2	22.7	27.2	72.3	959.5	1,716.9	4.97	2.3		0.7	0.85	1.08	0.89	1.00	0.54	0.35		1.13	1.72	0.2277	0.298	0.4615	0.03	0.28	
38.50	38.25	120.0	30.8	20.0	0.0	12	35.6	0.1	2.23	2.23	0.7	1.2	22.5	27.0	72.1	960.9	1,722.0	5.01	2.2		0.7	0.85	1.08	0.88	1.00	0.54	0.35		1.14	1.74	0.2314	0.301	0.4720	0.03	0.25	
39.00	38.75	120.0	30.8	20.0	0.0	12	35.6	0.1	2.26	2.26	0.7	1.2	22.4	26.9	71.9	962.3	1,727.0	5.04	2.2		0.7	0.85	1.08	0.88	1.00	0.54	0.34		1.15	1.76	0.2350	0.305	0.4826	0.03	0.22	
39.50	39.25	120.0	30.8	20.0	0.0	12	35.5	0.1	2.29	2.29	0.7	1.2	22.2	26.7	71.6	963.7	1,732.0	5.08	2.2		0.7	0.84	1.08	0.88	1.00	0.53	0.34		1.17	1.78	0.2386	0.308	0.4931	0.03	0.20	
40.00	39.75	120.0	30.7	20.0	0.0	12	35.5	0.1	2.32	2.32	0.7	1.2	22.1	26.5	71.4	965.1	1,736.9	5.11	2.2		0.7	0.84	1.08	0.88	1.00	0.53	0.33		1.18	1.80	0.2422	0.311	0.5037	0.03	0.17	
40.50	40.25	120.0	41.9	20.0	0.0	12	38.3	0.1	2.35	2.35	0.8	1.3	31.6	36.1	83.4	1,003.4	1,877.7	5.34	2.3		0.6	0.84	1.12	0.82	1.00	0.55	1.30		1.19	1.77	0.2216	0.251	0.0000	0.00	0.17	
41.00	40.75	120.0	41.9	20.0	0.0	12	38.3	0.1	2.38	2.38	0.8	1.3	31.5	36.0	83.1	1,004.9	1,883.2	5.37	2.3		0.6	0.84	1.12	0.82	1.00	0.55	1.30		1.20	1.79	0.2251	0.253	0.0000	0.00	0.17	
41.50	41.25	120.0	42.0	20.0	0.0	12	38.2	0.1	2.41	2.41	0.7	1.3	31.3	35.8	83.0	1,006.4	1,888.6	5.41	2.2		0.6	0.83	1.12	0.82	1.00	0.55	1.30		1.21	1.81	0.2286	0.255	0.0000	0.00	0.17	
42.00	41.75	120.0	42.0	20.0	0.0	12	38.2	0.1	2.44	2.44	0.7	1.3	31.2	35.7	82.8	1,007.8	1,894.0	5.44	2.2		0.6	0.83	1.12	0.82	1.00	0.55	1.27		1.22	1.83	0.2320	0.258	0.0000	0.00	0.17	
42.50	42.25	115.0	35.1	20.0	0.0	12	36.4	0.1	2.47	2.47	0.7	1.2	25.0	29.5	75.3	1,008.9	1,819.0	5.37	2.2		0.6	0.83	1.10	0.86	1.00	0.53	0.45		1.23	1.88	0.2205	0.295	0.4385	0.03	0.14	
43.00	42.75	115.0	35.1	20.0	0.0	12	36.4	0.1	2.50	2.50	0.7	1.2	24.8	29.3	75.1	1,010.1	1,823.6	5.40	2.2		0.6	0.83	1.10	0.85	1.00	0.53	0.45		1.24	1.90	0.2238	0.297	0.4464	0.03	0.11	
43.50	43.25	115.0	35.0	20.0	0.0	12	36.3	0.1	2.52	2.52	0.7	1.2	24.7	29.2	74.9	1,011.3	1,827.9	5.43	2.2		0.6	0.82	1.09	0.85	1.00	0.53	0.44		1.26	1.92	0.2272	0.299	0.4545	0.03	0.08	
44.00	43.75	115.0	35.0	20.0	0.0	12	36.3	0.1	2.55	2.55	0.7	1.2	24.5	29.0	74.7	1,012.5	1,832.2	5.46	2.1		0.6	0.82	1.09	0.85	1.00	0.53	0.43		1.27	1.94	0.2305	0.302	0.4627	0.03	0.06	
44.50	44.25	115.0	35.0	20.0	0.0	12	36.2	0.1	2.58	2.58	0.7	1.2	24.4	28.8	74.5	1,013.7	1,836.4	5.50	2.1		0.6	0.82	1.09	0.85	1.00	0.53	0.42		1.28	1.96	0.2339	0.304	0.4709	0.03	0.03	
45.00	44.75	115.0	34.9	20.0	0.0	12	36.2	0.1	2.61	2.61	0.7	1.2	24.2	28.7	74.3	1,014.8	1,840.6	5.53	2.1		0.6	0.82	1.09	0.85	1.00	0.53	0.41		1.29	1.98	0.2373	0.306	0.4790	0.03	0.00	
45.50	45.25	115.0	69.5	25.0	0.0	12	40.5	0.1	2.64	2.64	0.8	1.3	54.7	59.7	100.0	1,124.9	2,261.5	6.13	2.3		0.6	0.81	1.12	0.73	1.00	0.60	1.30		1.30	1.95	0.2173	0.168	0.0000	0.00	0.00	
46.00	45.75	115.0	69.6	25.0	0.0	12	40.5	0.1	2.67	2.67	0.8	1.3	54.5	59.6	100.0	1,126.0	2,266.0	6.16	2.3		0.6	0.81	1.12	0.72	1.00	0.61	1.30		1.31	1.96	0.2200	0.169	0.0000	0.00	0.00	
46.50	46.25	115.0	69.6	25.0	0.0	12	40.5	0.1	2.70	2.70	0.8	1.3	54.4	59.5	100.0	1,127.1	2,270.4	6.19	2.3		0.6	0.81	1.12	0.72	1.00	0.61	1.30		1.32	1.98	0.2228	0.170	0.0000	0.00	0.00	
47.00	46.75	115.0	69.6	25.0	0.0	12	40.5	0.1	2.73	2.73	0.8	1.3	54.3	59.3	100.0	1,128.2	2,274.8	6.23	2.3		0.6	0.81	1.12	0.72	1.00	0.61	1.30		1.33	2.00	0.2256	0.172	0.0000	0.00	0.00	
47.50	47.25	110.0	47.6	25.0	0.0	12	39.1	0.1	2.75	2.75	0.7	1.3	34.6	39.7	87.4	1,092.4	2,040.0	5.94	2.2		0.6	0.80	1.12	0.75	1.00	0.58	1.30		1.34	2.02	0.2035	0.241	0.0000	0.00	0.00	
48.00	47.75	110.0	47.6	25.0	0.0	12	39.1	0.1	2.78	2.78	0.7	1.3	34.5	39.6	87.3	1,093.6	2,044.3	5.97	2.1		0.6	0.80	1.12	0.75	1.00	0.58	1.30		1.35	2.04	0.2064	0.243	0.0000	0.00	0.00	
48.50	48.25	110.0	47.7	25.0	0.0	12	39.1	0.1	2.81	2.81	0.7	1.3	34.4	39.5	87.1	1,094.8	2,048.8	6.00	2.1		0.6	0.80	1.12	0.74	1.00	0.58	1.30		1.35	2.05	0.2095	0.244	0.0000	0.00	0.00	
49.00	48.75	110.0	47.7	25.0	0.0	12	39.0	0.1	2.84	2.84	0.7	1.3	34.3	39.3	87.0	1,096.0	2,053.2	6.03	2.1		0.6	0.80	1.12	0.74	1.00	0.58	1.30		1.36	2.07	0.2125	0.245	0.0000	0.00	0.00	
49.50	49.25	110.0	47.7	25.0	0.0	12	39.0	0.1	2.86	2.86	0.7	1.3	34.1	39.2	86.8	1,097.1	2,057.6	6.06	2.1		0.6	0.79	1.12	0.74	1.00	0.58	1.30		1.37	2.09	0.2155	0.246	0.0000	0.00	0.00	
50.00	49.75	110.0	47.7	25.0	0.0	12	39.0	0.1	2.89	2.89	0.7	1.3	34.0	39.1	86.7	1,098.3	2,062.0	6.09	2.1		0.6	0.79	1.12	0.74	1.00	0.57	1.30		1.38	2.11	0.2186	0.247	0.0000	0.00	0.00	
50.50	50.25	110.0	47.7	25.0	0.0	12	38.9	0.1	2.92	2.92	0.7	1.3	33.9	38.9	86.5	1,099.4	2,066.3	6.12	2.1		0.6	0.79	1.12	0.74	1.00	0.57	1.30		1.39	2.12	0.2216	0.248	0.0000	0.00	0.00	
51.00	50.75	110.0	47.7	25.0	0.0	12	38.9	0.1	2.95	2.95	0.7	1.3	33.7	38.8	86.4	1,100.6	2,070.6	6.15	2.1		0.6	0.79	1.12	0.74	1.00	0.57	1.30		1.40	2.14	0.2247	0.250	0.0000	0.00	0.00	
51.50	51.25	110.0	47.7	25.0	0.0	12	38.9	0.1	2.97	2.97	0.7	1.3	33.6	38.7	86.2	1,101.7	2,074.9	6.18	2.1		0.6	0.78	1.12	0.74	1.00	0.57	1.30		1.41	2.16	0.2277	0.251	0.0000	0.00	0.00	

X:\3242-0-0 Fillmore Unified School District\CPT Data\CPT1 Updated Values\3242-0-0-100 CPT1.csv



- Sensitive fine grained
- Organic soils - peats
- Clay to silty clay
- Silty clay to clayey silt
- Sandy silt to silty sand
- Silty sand to clean sand
- Dense sand to gravelly sand
- Clayey sand to very stiff sand

- Very stiff fine grained *
- * Overconsolidated or cemented

Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 75 ft
Maximum Settlement = 3.18 in
Settl. at Bottom of Footing = 3.18 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand; Clay] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)



Seismic Settlement Potential - CPT Data

Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-1	Figure:	5

Prepared at 8/18/2023 3:14:15 PM

Z_s (ft)	Z_w (ft)	q_c (tsf)	f_c (tsf)	σ_v (tsf)	σ_{vm} (tsf)	Q_{L15}	Q_{max}	F_{max}	$S_{BT,s}$	I_c	K_{cs}	$(SPT)_b$	B_{cs}	$(SPT)_b$	F_c (°)	q_{L15m} (Mpa)	c	R	σ_{vm} (tsf)	V_L (ft/s)	V_s (ft/s)	G_{max}	E' (tsf)	M (tsf)	S_p (tsf)	OCR	S_v	S_u (tsf)	S_u/σ_v	ϕ (°)	c' (tsf)	$C_u/(1+e_0)$	$C_u/(1+e_0)$	K_{cs}	D_R (%)	N_{OLAS}	$(N)_{max}$	C_v	$(N)_{max}$	$(N)_{max}$	$(N)_{max}$	$(N)_{max}$	$(N)_{max}$	r_d	MSF	K_{cs}	K_{cs}	CSR_{L1}	CSR_{L2}	FS	τ_{vm} (tsf)	p (tsf)	γ_{vm} (%)	GG_{cs}	ϵ_v (%)	AS	ES (ms)				
9.00	9.00	24.4	0.32	0.03	24.4	1.30	6	114	0.58	0.54	0.54	36.8	1.50	5	2.38	2.20	5	0.00	1	26.95	0.73	408.5	413	347	334	0.68	1.4							0.32	58.1	9.2	5.6	0.9	1.41	18.8	13.2	5.9	18.3	0.98	1.02	1.00	0.34	0.13	0.32	0.36	1.000	0.08	1.84	0.00	2.45						
9.00	8.99	22.8	0.33	0.03	22.8	1.47	6	113	0.54	0.54	0.54	41.3	34.6	5	2.43	2.43	5	0.00	1	27.79	8.1	0.56	274.0	1.041	148.0	493.4	414	347	0.68	1.3					0.16	0.56	57.1	8.6	5.4	0.7	1.40	18.1	13.2	5.9	18.3	0.98	1.02	1.00	0.34	0.13	0.32	0.36	1.000	0.08	1.84	0.00	2.45				
9.10	9.05	21.9	0.38	0.03	21.9	1.72	6	114	0.54	0.54	0.54	39.5	33.5	1.77	5	2.49	2.69	5	0.00	1	30.11	0.57	240.0	1.116	150.3	430	358	300	0.40	0.49	0.16	0.48	57.4	8.3	5.3	0.5	1.40	18.1	13.2	5.9	19.9	0.98	1.02	1.07	1.00	0.54	0.12	0.32	0.36	1.000	0.07	1.75	0.02	2.45							
9.20	9.12	19.7	0.39	0.03	19.7	1.96	6	114	0.55	0.55	0.55	35.0	30.2	2.02	4	2.56	3.08	5	0.00	1	33.47	2.7	0.58	274.0	1.225	148.8	488.3	421	352	268	0.57	1.0			0.18	0.45	56.3	7.4	4.9	0.5	1.39	17.2	13.0	5.9	21.1	0.98	1.02	1.07	1.00	0.54	0.12	0.32	0.35	1.000	0.08	1.66	0.02	2.41			
9.20	9.18	17.8	0.40	0.03	17.8	2.26	5	114	0.55	0.55	0.55	31.4	27.2	2.33	4	2.58	3.18	5	0.00	1	34.00	2.4	0.58	274.0	1.253	142.8	468.6	388	324	241	0.55	0.9			0.16	0.43	55.1	8.4	4.5	0.4	1.39	18.8	12.4	5.9	23.4	0.98	1.02	1.07	1.00	0.54	0.12	0.32	0.34	1.000	0.08	1.67	0.00	2.41			
9.30	9.34	17.2	0.42	0.03	17.2	2.43	5	114	0.55	0.55	0.55	30.1	26.3	2.51	4	2.61	0.00	4	0.00	1	35.86	2.3	0.59	274.0	1.304	9	470.2	392	233	555	8.8	2.8	1.19	1.88	33.2	1.19	0.62	0.21	3.01			8.1	4.4	0.4	1.38	18.5	12.3	5.9	7.2	0.98	1.01	1.04	1.00	0.56	1.30	0.00	0.00	0.00	2.41		
9.40	9.31	17.7	0.39	0.03	17.7	2.22	5	114	0.56	0.56	0.56	30.8	26.8	2.29	4	2.58	3.18	5	0.00	1	34.30	2.4	0.58	274.0	1.252	142.6	467.8	386	323	240	0.56	0.9			0.16	0.42	54.9	8.4	4.5	0.4	1.38	18.7	12.3	5.9	23.1	0.97	1.02	1.07	1.00	0.54	0.12	0.33	0.34	1.000	0.08	1.68	0.02	2.39			
9.40	9.38	16.9	0.42	0.03	16.9	2.48	5	114	0.56	0.56	0.56	29.2	25.6	2.57	4	2.63	0.00	4	0.00	1	36.63	2.3	0.59	274.0	1.311	143.5	470.7	393		229	5.45	8.5	2.8	1.17	1.83	33.1	1.17	0.64	0.21	2.92			8.0	4.4	0.4	1.37	18.2	12.2	5.9	7.1	0.97	1.01	1.04	1.00	0.56	1.30	0.00	0.00	0.00	2.39	
9.50	9.43	17.7	0.42	0.03	17.7	2.35	5	114	0.56	0.56	0.56	30.4	26.6	2.43	4	2.60	3.29	5	0.00	1	35.22	2.4	0.58	274.0	1.283	141.1	472.9	396	330	240	0.56	0.9			0.16	0.42	54.9	8.4	4.5	0.4	1.37	18.7	12.4	5.9	23.9	0.97	1.02	1.07	1.00	0.54	0.12	0.33	0.34	1.000	0.08	1.63	0.02	2.37			
9.50	9.50	20.3	0.42	0.03	20.3	2.05	6	114	0.57	0.57	0.57	34.8	30.3	2.10	4	2.57	3.11	5	0.00	1	33.76	2.7	0.57	274.0	1.235	151.9	498.3	441	366	277	0.59	1.0			0.18	0.45	56.4	7.7	5.1	0.5	1.37	17.4	13.2	6.0	21.7	0.97	1.02	1.07	1.00	0.54	0.12	0.33	0.36	1.000	0.08	1.63	0.00	2.37			
9.60	9.57	21.2	0.45	0.03	21.2	2.13	6	115	0.57	0.57	0.57	36.0	31.4	2.19	4	2.56	3.10	5	0.00	1	33.66	2.8	0.57	274.0	1.231	154.9	508.1	462	381	288	0.62	1.1			0.17	0.46	56.9	8.0	5.3	0.5	1.36	17.8	13.5	6.0	22.4	0.97	1.02	1.07	1.00	0.54	0.13	0.34	0.37	1.000	0.07	1.60	0.02	2.35			
9.70	9.64	32.6	0.50	0.03	32.6	1.54	6	117	0.58	0.58	0.58	55.7	46.6	1.57	5	2.33	2.03	5	0.00	1	23.61	4.3	0.54	273.9	914.1	166.4	545.8	542	439	449	1.01	1.7			0.35	0.92	61.5	12.3	7.3	2.4	1.36	22.6	15.1	7.3	20.2	0.97	1.03	1.07	1.00	0.53	0.14	0.34	0.41	1.000	0.06	1.69	0.02	2.33			
9.80	9.74	44.5	0.50	0.03	44.5	1.13	7	118	0.58	0.58	0.58	75.6	61.3	1.14	5	2.14	1.52	5	0.00	1	17.01	5.8	0.52	273.8	718.6	172.8	566.8	588	474	947	1.37	2.4			0.31	0.66	64.1	14.0	9.3	5.2	1.35	23.1	16.2	9.0	19.0	0.97	1.03	1.08	1.00	0.53	0.16	0.34	0.45	1.000	0.06	2.22	0.03	2.31			
9.80	9.81	54.6	0.33	0.03	54.6	0.61	8	115	0.59	0.59	0.59	92.3	72.1	0.61	6	1.91	1.20	6	0.00	1	10.75	7.0	0.51	273.8	540.9	166.2	545.4	532	439	877	1.65	2.8			0.38	0.03	0.92	0.31	0.73	58.9	12.9	10.4	7.7	1.34	18.9	15.5	9.2	16.7	0.97	1.02	1.07	1.00	0.54	0.13	0.34	0.48	1.000	0.06	2.59	0.00	2.31
9.80	9.80	57.0	0.26	0.04	57.0	0.46	8	113	0.59	0.59	0.59	95.6	73.9	0.46	6	1.84	1.00	6	0.00	1	5.00	7.3	0.51	273.8	490.6	161.7	530.6	496	415	830	1.71	2.9			0.38	0.03	0.92	0.31	0.74	53.4	13.5	10.6	8.2	1.34	18.0	14.1	9.2	14.1	0.97	1.02	1.06	1.00	0.54	0.12	0.35	0.49	1.000	0.07	3.40	0.04	2.27
10.00	9.98	57.1	0.47	0.04	57.1	0.82	8	118	0.60	0.60	0.60	94.9	75.4	0.83	6	1.98	1.26	6	0.00	1	12.29	7.2	0.51	273.8	583.9	176.6	579.3	615	495	990	1.72	2.9			0.38	0.03	0.85	0.28	0.73	63.5	13.5	11.1	8.2	1.33	20.2	17.0	10.4	18.7	0.97	1.03	1.07	1.00	0.53	0.15	0.35	0.49	1.000	0.06	2.22	0.03	2.24
10.10	10.07	57.7	0.34	0.04	57.7	0.59	8	115	0.60	0.60	0.60	95.0	74.7	0.59	6	1.89	1.17	6	0.00	1	10.19	7.3	0.51	273.8	525.2	168.3	552.2	547	450	899	1.73	2.9			0.38	0.03	0.93	0.31	0.73	58.1	13.6	10.9	8.3	1.33	19.4	15.7	9.5	17.0	0.97	1.02	1.06	1.00	0.54	0.13	0.35	0.49	1.000	0.06	3.40	0.04	2.20
10.20	10.15	44.2	0.34	0.05	44.2	0.77	7	115	0.61	0.61	0.61	72.1	58.4	0.78	6	2.05	1.37	5	0.00	1	14.44	5.6	0.52	273.8	644.7	163.1	535.0	511	422	844	1.35	2.2			0.37	0.03	0.98	0.33	0.64	61.0	13.9	8.9	4.9	1.32	21.6	14.6	7.9	16.1	0.97	1.03	1.07	1.00	0.54	0.14	0.36	0.46	1.000	0.07	2.59	0.03	2.17
10.20	10.17	44.5	0.36	0.01	44.5	0.81	7	115	0.61	0.61	0.61	72.3	58.8	0.82	6	2.07	1.39	5	0.00	1	14.77	5.6	0.52	273.8	654.3	164.7	540.3	523	430	861	1.36	2.2			0.37	0.03	0.97	0.32	0.65	61.5	14.0	9.0	4.9	1.32	21.8	14.8	8.1	16.4	0.97	1.03	1.07	1.00	0.53	0.14	0.36	0.46	1.000	0.07	2.53	0.00	2.17
10.20	10.20	44.7	0.45	0.03	44.7	1.01	7	117	0.61	0.61	0.61	72.5	59.5	1.02	5	2.12	1.48	5	0.00	1	16.34	5.6	0.52	273.8	699.2	170.7	560.1	570	463	925	1.37	2.2			0.37	0.03	0.95	0.32	0.65	63.1	14.1	9.2	5.0	1.32	22.5	15.7	8.6	18.0	0.97	1.03	1.07	1.00	0.53	0.15	0.36	0.46	1.000	0.06	2.34	0.00	2.17
10.30	10.24	45.0	0.44	0.03	45.0	0.97	7	117	0.61	0.61	0.61	72.7	59.6	0.99	5	2.11	1.46	5	0.00	1	16.03	5.7	0.52	273.8	690.3	170.2	558.3	566	460	919	1.37	2.2			0.37	0.03	0.95	0.32	0.65	62.9	14.2	9.2	5.0	1.32	22.4	15.6	8.6	17.7	0.97	1.03	1.07	1.00	0.53	0.15	0.36	0.47	1.000	0.06	2.36	0.03	2.14
10.30	10.29	39.5	0.37	0.03	39.5	0.95	7	115	0.61	0.61	0.61	63.4	52.5	0.96	5	2.15	1.54	5	0.00	1	17.31	5.0	0.53	273.9	727.2	163.5	536.4	516	424	849	1.20	2.0			0.36	0.02	0.98	0.33	0.60	61.3	12.4	8.2	3.7	1.31	20.4	14.5	7.6	16.7	0.97	1.03	1.07	1.00	0.54	0.14	0.36	0.45	1.000	0.07	2.54	0.00	2.14
10.40	10.34	37.1	0.29	0.03	37.1	0.78	7	113	0.																																																				

Z_c (ft)	Z_c (ft)	q_c (tsf)	f_c (tsf)	$a_{2,0}$ (tsf)	q_c (tsf)	R_f	SBT	γ (pcf)	σ_v (tsf)	σ_v (tsf)	Q_c	Q_{max}	$F_{2,0}$	$SBT_{2,0}$	I_c	K_c	$(SBT)_{2,0}$	$B_{2,0}$	$(SBT)_{2,0}$	F_c (%)	$q_{1-2,0}$ (Mpa)	c	R	$\sigma_{v,0}$ (tsf)	$V_{s,0}$ (ft/s)	$V_{s,0}$ (ft/s)	$G_{s,0}$ (tsf)	M (tsf)	σ'_v (tsf)	OCR	S_v	S_v (tsf)	$S_v \sigma_v$	ϕ (°)	c' (tsf)	C_u (1+ σ_v) (%)	C_u (1+ σ_v) (%)	K_c	D_{50} (%)	$N_{60,US}$	$(N_{60})_{US}$	(N) (max)	C_u	(N) (max)	(N) (max)	(N) (max)	(N) (max)	(N) (max)	r_d	MSF	K_c	K_c	CSR _{2,0}	CR _{2,0}	FS	τ_{av} (tsf)	ρ (tsf)	γ_{max} (%)	GVG _{2,0}	ϵ_v (%)	AS	ΣS_v (tsf)
16.40	16.40	178.4	1.27	0.01	178.4	2.38	7	124.7	0.99	0.99	178.5	178.5	2.41	5	2.02	1.32	6	0.00	1	12.47	17.5	0.44	273.6	617.4	321.7	1,055.4	2,378	1,643	3,395	4.51	4.6	42.3	0.89	0.47	0.16	0.01	88.4	56.2	35.3	29.4	1.03	69.3	43.0	32.1	46.3	0.95	1.12	1.01	0.50	1.30	0.57	0.96	0.040	0.62	0.04	0.00	1.47					
16.50	16.45	191.1	1.95	-0.01	191.1	2.91	8	137	1.00	1.00	190.7	186.1	2.02	6	1.94	1.22	6	0.00	1	18.47	18.7	0.44	273.6	559.4	317.1	1,002.2	2,300	1,596	3,191	4.81	4.8	42.3	0.90	0.48	0.16	0.04	97.8	45.2	36.8	31.9	1.03	69.3	40.3	32.1	46.3	0.95	1.12	1.01	0.50	1.30	0.57	0.96	0.040	0.62	0.04	0.00	1.47					
16.50	16.51	208.3	2.90	-0.01	208.3	1.01	8	125	1.00	1.00	207.1	202.0	1.01	6	1.79	1.10	6	0.00	1	8.01	20.3	0.40	273.6	464.6	301.7	989.9	2,054	1,445	2,890	5.14	5.1	42.0	0.90	0.38	0.13	0.07	83.8	49.2	38.0	25.7	1.03	51.5	39.8	35.6	42.8	0.95	1.12	1.01	0.51	1.30	0.57	0.98	0.049	0.57	0.04	0.00	1.47					
16.60	16.58	229.8	2.08	-0.02	229.9	0.90	9	133	1.01	1.01	227.6	221.9	0.91	6	1.63	1.00	6	0.00	1	4.80	22.4	0.43	273.6	375.5	285.0	935.0	1,801	1,289	2,578	5.53	5.5	43.4	0.91	0.36	0.12	1.01	86.8	43.5	39.5	39.3	1.03	44.6	40.6	39.3	40.6	0.95	1.12	1.01	0.50	1.30	0.58	1.01	0.064	0.50	0.06	0.00	1.47					
16.70	16.64	225.2	1.76	0.00	225.2	0.78	9	133	1.01	1.01	222.0	216.9	0.78	6	1.59	1.00	6	0.00	1	4.17	21.9	0.43	273.6	357.7	275.3	903.1	1,664	1,203	2,405	5.45	5.4	43.3	0.91	0.28	0.09	1.00	86.1	42.6	38.2	38.3	1.02	43.6	39.1	38.3	39.1	0.95	1.12	1.01	0.51	1.30	0.58	1.00	0.077	0.45	0.07	0.00	1.47					
16.70	16.69	240.5	1.76	0.00	240.5	0.73	9	131	1.01	1.01	236.4	231.3	0.74	6	1.55	1.00	6	0.00	1	3.56	23.4	0.42	273.6	340.5	277.6	910.7	1,695	1,223	2,446	5.73	5.7	43.6	0.91	0.25	0.08	1.03	88.2	45.5	40.3	41.2	1.02	46.5	41.2	41.2	41.2	0.95	1.12	1.01	0.51	1.30	0.58	1.03	0.074	0.46	0.06	0.00	1.47					
16.80	16.74	249.2	1.87	-0.01	249.2	0.75	9	132	1.02	1.02	244.2	239.3	0.75	6	1.55	1.00	6	0.00	1	3.51	24.2	0.42	273.6	339.1	282.0	925.2	1,756	1,262	2,524	5.88	5.8	43.8	0.92	0.25	0.08	1.04	89.3	47.1	41.7	42.8	1.02	48.1	42.6	42.8	42.6	0.95	1.12	1.01	0.51	1.30	0.58	1.04	0.068	0.49	0.06	0.00	1.47					
16.80	16.79	266.9	2.03	0.01	266.9	0.76	9	133	1.02	1.02	260.8	256.0	0.76	6	1.53	1.00	6	0.00	1	3.25	25.9	0.42	273.3	331.8	288.8	947.4	1,852	1,324	2,647	6.19	6.1	44.1	0.92	0.24	0.08	1.07	91.6	50.5	44.5	46.0	1.02	51.4	45.3	46.0	45.3	0.95	1.12	1.01	0.51	1.30	0.58	1.07	0.060	0.52	0.00	0.00	1.47					
16.90	16.84	285.9	2.04	0.07	285.9	0.71	9	133	1.02	1.02	278.5	273.9	0.72	6	1.49	1.00	6	0.00	1	2.70	27.7	0.41	273.5	315.9	291.6	956.8	1,893	1,350	2,700	6.51	6.4	44.4	0.93	0.23	0.08	1.10	93.9	54.0	47.0	49.3	1.02	55.0	47.8	49.3	47.8	0.95	1.12	1.01	0.51	1.30	0.59	1.09	0.057	0.54	0.00	0.00	1.47					
16.90	16.88	272.2	2.36	0.10	272.2	0.87	9	134	1.03	1.03	264.5	260.4	0.87	6	1.57	1.00	6	0.00	1	3.82	26.3	0.41	273.5	347.7	298.5	979.5	1,997	1,415	2,829	6.29	6.1	44.2	0.93	0.23	0.08	1.07	92.2	51.5	45.9	46.9	1.02	52.3	46.6	46.9	46.6	0.95	1.12	1.01	0.51	1.30	0.59	1.08	0.052	0.57	0.00	0.00	1.47					
17.00	16.93	272.5	2.64	0.10	272.5	0.97	9	135	1.03	1.03	263.9	260.2	0.97	6	1.60	1.00	6	0.00	1	4.39	26.3	0.41	273.5	363.9	305.6	1,002.6	2,106	1,482	2,964	6.29	6.1	44.2	0.93	0.23	0.08	1.07	92.2	51.5	46.5	46.9	1.01	52.2	47.1	46.9	47.1	0.95	1.12	1.01	0.51	1.30	0.59	1.08	0.047	0.59	0.00	0.00	1.47					
17.00	16.98	277.0	2.77	0.08	277.0	1.00	9	135	1.03	1.03	267.3	264.0	1.00	6	1.61	1.00	6	0.00	1	4.51	26.7	0.41	273.5	367.2	309.4	1,015.2	2,166	1,520	3,039	6.37	6.2	44.2	0.93	0.23	0.08	1.08	92.7	52.3	47.4	47.6	1.01	53.0	47.9	47.6	47.9	0.95	1.12	1.01	0.51	1.30	0.59	1.08	0.045	0.61	0.00	0.00	1.47					
17.10	17.03	292.5	2.74	0.08	292.5	0.94	9	135	1.04	1.04	281.4	278.4	0.94	6	1.57	1.00	6	0.00	1	3.92	28.2	0.41	273.5	350.8	310.8	1,019.8	2,187	1,533	3,067	6.63	6.4	44.5	0.93	0.23	0.08	1.10	94.5	55.3	47.4	50.2	1.01	55.9	49.9	50.2	49.9	0.95	1.12	1.01	0.51	1.30	0.59	1.10	0.044	0.62	0.00	0.00	1.47					
17.10	17.08	312.7	2.86	0.07	312.7	0.91	9	136	1.04	1.04	299.9	297.2	0.92	6	1.55	1.00	6	0.00	1	3.50	30.1	0.41	273.5	338.8	315.9	1,036.4	2,266	1,584	3,168	6.96	6.7	44.8	0.94	0.21	0.07	1.13	96.8	59.1	52.4	53.7	1.01	59.6	52.8	53.7	52.8	0.95	1.12	1.01	0.51	1.30	0.59	1.13	0.041	0.64	0.00	0.00	1.47					
17.10	17.12	335.1	3.04	0.08	335.1	0.91	9	136	1.04	1.04	320.7	318.2	0.91	6	1.52	1.00	6	0.00	1	3.18	32.2	0.40	273.5	329.7	322.6	1,058.5	2,375	1,652	3,304	7.31	7.0	45.1	0.95	0.20	0.07	1.16	99.1	63.3	55.7	57.5	1.01	63.8	56.1	57.5	56.1	0.95	1.12	1.00	0.51	1.30	0.59	1.10	0.038	0.66	0.00	0.00	1.47					
17.20	17.17	341.9	3.42	0.07	341.9	1.00	9	137	1.05	1.05	326.1	324.1	1.00	6	1.55	1.00	6	0.00	1	3.61	32.8	0.40	273.5	341.8	331.8	1,088.7	2,530	1,748	3,495	7.42	7.1	45.2	0.95	0.20	0.07	1.17	99.7	64.6	57.4	58.6	1.01	65.0	57.7	58.6	57.7	0.95	1.12	1.00	0.51	1.30	0.60	1.16	0.034	0.69	0.00	0.00	1.47					
17.20	17.22	329.4	3.80	0.16	329.4	1.15	9	138	1.05	1.05	313.2	311.8	1.16	6	1.61	1.00	6	0.00	1	4.55	31.6	0.40	273.5	368.4	338.1	1,109.4	2,640	1,815	3,629	7.23	6.9	45.0	0.94	0.31	0.10	1.15	98.4	62.3	56.4	56.4	1.00	62.5	56.6	56.4	56.6	0.95	1.12	1.00	0.51	1.30	0.60	1.15	0.032	0.70	0.00	0.00	1.47					
17.30	17.27	349.4	4.09	0.16	349.4	1.17	9	139	1.05	1.05	331.1	330.1	1.17	6	1.60	1.00	6	0.00	1	4.39	33.4	0.40	273.5	363.9	346.1	1,135.5	2,780	1,901	3,802	7.54	7.2	45.3	0.95	0.20	0.07	1.17	100.0	66.0	59.6	59.8	1.00	66.2	59.8	59.8	59.8	0.95	1.12	1.00	0.51	1.30	0.60	1.17	0.030	0.72	0.00	0.00	1.47					
17.30	17.32	368.6	4.15	0.15	368.6	1.13	9	139	1.06	1.06	348.2	347.8	1.13	6	1.57	1.00	6	0.00	1	3.95	35.2	0.39	273.5	351.6	349.5	1,146.5	2,839	1,938	3,877	7.83	7.4	45.6	0.96	0.20	0.07	1.20	100.0	69.7	62.3	63.0	1.00	69.7	62.4	63.0	62.4	0.95	1.12	1.00	0.51	1.30	0.60	1.19	0.029	0.73	0.00	0.00	1.47					
17.40	17.37	369.5	4.15	0.15	369.5	1.12	9	139	1.06	1.06	347.9	348.1	1.13	6	1.57	1.00	6	0.00	1	3.94	35.3	0.39	273.5	351.2	349.7	1,147.4	2,844	1,941	3,882	7.85	7.4	45.6	0.96	0.20	0.07	1.20	100.0	69.8	62.5	63.1	1.00	69.8	62.4	63.1	62.4	0.95	1.12	1.00	0.51	1.30	0.60	1.20	0.029	0.73	0.00	0.00	1.47					
17.40	17.41	352.4	4.09	0.16	352.4	1.16	9	139	1.06	1.06	330.9	331.5	1.16	6	1.60	1.00	6	0.00	1	4.32	33.6	0.40	273.5	362.0	346.7	1,137.5	2,790	1,908	3,816	7.60	7.2	45.3	0.95	0.20	0.07	1.17	100.0	66.6	60.0	60.1	1.00	66.5	59.9	60.1	59.9	0.94	1.12	1.00	0.51	1.30	0.61	1.18	0.030	0.72	0.00	0.00	1.47					
17.50	17.47	356.8	4.04	0.18	356.8	1.13	9	139	1.07	1.07	333.8	335.0	1.13	6	1.59	1.00	6	0.00	1	4.14	34.0	0.40	273.5	356.7	346.3	1,136.5	2,783	1,904	3,808	7.67	7.2	45.4																														

$Z_c(f)$	$Z_c(f)$	q_c (tsf)	f_c (tsf)	u_z (tsf)	q_c (tsf)	R_f	S_{BT}	γ (pcf)	σ_v (tsf)	σ_v (tsf)	Q_z	Q_{zs}	F_z	S_{BT_z}	I_z	K_z	$(S_{BT})_z$	B_z	$(S_{BT})_B$	F_c (°)	$q_{1-200}(Mpa)$	c	R	σ_v (msb)	V_c (msb)	V_c (B/s)	G_v (B/s)	G_v (B/s)	M (tsf)	q_c (tsf)	OCR	S_v	S_v (tsf)	$S_v\sigma_v$	ϕ (°)	c' (tsf)	C_u (1+ σ_v) (tsf)	C_u (1+ σ_v) (tsf)	K_u	D_u (°)	N_{OLAS}	$(N)_{OL}$	$(N)_{OLAS}$	C_u	$(N)_{OLAS}$	$(N)_{OLAS}$	$(N)_{OLAS}$	$(N)_{OLAS}$	r_u	MSF	K_z	K_u	CSR _{1.2}	CR _{1.2}	FS	τ_u (tsf)	ρ (tsf)	γ_{ms} (%)	GG _u	ϵ_u (%)	AS	ES	(ms)
22.90	22.90	1411.7	4.97	0.53	411.8	1.21	9	141	1.44	1.44	265.2	332.6	1.29	6	1.61	1.00	6	0.00	1	4.33	34.0	0.40	273.5	367.8	377.7	1,239.2	3,356	2,264	4,329	8.71	6.1	45.3	0.18	0.30	0.10	1.05	100.0	73.8	70.5	334.9	0.86	68.6	68.4	64.9	68.4	0.92	1.12	0.91	1.00	0.55	1.30	0.80	1.50	0.033	0.73	0.00	0.00	1.47					
22.90	22.90	396.2	5.09	0.49	396.2	1.29	9	141	1.44	1.44	274.0	319.7	1.29	6	1.64	0.99	6	0.00	1	5.52	33.4	0.40	273.5	383.3	378.2	1,240.7	3,366	2,270	4,540	8.70	6.1	45.3	0.18	0.30	0.10	1.05	100.0	74.9	68.3	62.4	0.86	69.3	68.8	62.4	68.4	0.92	1.12	0.91	1.00	0.55	1.30	0.80	1.50	0.033	0.73	0.00	0.00	1.47					
23.00	22.96	393.5	5.39	0.69	393.6	1.37	9	141	1.44	1.44	282.1	316.6	1.38	6	1.67	1.01	6	0.00	1	5.58	32.2	0.40	273.5	395.4	328.8	1,256.6	3,460	2,326	4,652	8.71	6.1	45.1	0.17	0.30	0.10	1.04	100.0	74.4	68.6	61.9	0.86	69.9	69.0	61.9	69.4	0.92	1.12	0.91	1.00	0.55	1.30	0.80	1.48	0.033	0.74	0.00	0.00	1.47					
23.00	23.00	355.4	5.58	0.73	395.5	1.41	9	141	1.45	1.45	272.6	317.5	1.42	6	1.68	1.02	6	0.00	1	5.88	33.3	0.40	273.5	400.0	386.0	1,266.3	3,523	2,364	4,729	8.74	6.0	45.1	0.17	0.30	0.10	1.04	100.0	74.7	69.2	62.2	0.86	64.2	59.4	62.2	60.2	0.92	1.12	0.91	1.00	0.55	1.30	0.80	1.49	0.031	0.74	0.00	0.00	1.47					
23.10	23.05	394.6	5.28	0.69	394.7	1.34	9	141	1.45	1.45	271.4	317.0	1.34	6	1.66	1.01	6	0.00	1	5.37	33.2	0.40	273.5	391.2	381.3	1,251.0	3,429	2,308	4,615	8.74	6.0	45.1	0.17	0.30	0.10	1.04	100.0	74.6	68.6	62.0	0.85	63.9	58.8	62.0	60.9	0.92	1.12	0.91	1.00	0.55	1.30	0.81	1.49	0.031	0.73	0.00	0.00	1.47					
23.10	23.10	406.5	4.33	0.77	406.6	1.06	9	140	1.45	1.45	278.9	326.8	1.07	6	1.57	1.00	6	0.00	1	3.91	34.2	0.40	273.5	350.2	366.2	1,201.4	3,131	2,128	4,257	8.93	6.1	45.3	0.18	0.20	0.07	1.05	100.0	76.8	68.7	63.9	0.85	65.6	58.6	63.9	58.6	0.92	1.12	0.90	1.00	0.55	1.30	0.81	1.50	0.037	0.70	0.00	0.00	1.47					
23.20	23.17	390.0	3.70	1.00	390.1	0.95	9	138	1.46	1.46	267.3	313.8	0.95	6	1.54	1.00	6	0.00	1	3.45	32.8	0.40	273.5	357.4	352.5	1,156.4	2,874	1,972	3,944	8.69	6.0	45.1	0.17	0.20	0.07	1.03	100.0	73.9	65.4	61.4	0.85	63.0	55.7	61.4	55.7	0.92	1.12	0.90	1.00	0.55	1.30	0.81	1.49	0.043	0.66	0.00	0.00	1.47					
23.30	23.25	375.9	3.69	0.91	376.1	0.98	9	138	1.46	1.46	256.0	301.1	0.98	6	1.57	1.00	6	0.00	1	3.81	31.5	0.40	273.5	347.6	350.8	1,151.0	2,844	1,953	3,907	8.45	5.8	44.9	0.17	0.20	0.07	1.02	99.9	71.1	63.4	58.9	0.85	60.4	53.9	58.9	53.9	0.92	1.12	0.90	1.00	0.55	1.30	0.81	1.48	0.044	0.66	0.00	0.00	1.47					
23.40	23.32	392.3	4.42	0.71	392.4	1.13	9	140	1.47	1.47	266.3	313.7	1.13	6	1.60	1.00	6	0.00	1	4.39	32.8	0.40	273.5	364.0	366.7	1,203.1	3,141	2,134	4,268	8.72	5.9	45.1	0.17	0.20	0.07	1.03	100.0	74.1	66.9	61.5	0.85	62.9	56.8	61.5	56.8	0.92	1.12	0.90	1.00	0.55	1.30	0.82	1.50	0.034	0.70	0.00	0.00	1.47					
23.40	23.38	385.2	4.84	0.65	385.3	1.26	9	140	1.47	1.47	260.7	307.4	1.26	6	1.64	1.00	6	0.00	1	5.12	32.2	0.40	273.5	384.3	373.4	1,225.0	3,271	2,213	4,425	8.61	5.8	45.0	0.17	0.30	0.10	1.02	100.0	72.8	66.7	60.3	0.85	61.8	56.6	60.3	56.3	0.92	1.12	0.90	1.00	0.55	1.30	0.82	1.49	0.035	0.71	0.00	0.00	1.47					
23.50	23.44	393.6	4.90	0.63	393.7	1.25	9	140	1.48	1.48	265.7	313.8	1.25	6	1.64	1.00	6	0.00	1	4.98	32.9	0.40	273.5	380.3	375.5	1,231.8	3,311	2,237	4,475	8.75	5.9	45.1	0.18	0.30	0.10	1.03	100.0	74.4	67.9	61.6	0.85	63.0	57.5	61.6	57.5	0.92	1.12	0.90	1.00	0.55	1.30	0.82	1.51	0.035	0.72	0.00	0.00	1.47					
23.50	23.48	398.2	4.94	0.66	398.3	1.24	9	140	1.48	1.48	268.3	317.2	1.24	6	1.63	1.00	6	0.00	1	4.90	33.3	0.40	273.5	378.2	376.6	1,235.6	3,334	2,251	4,502	8.83	6.0	45.1	0.18	0.30	0.10	1.03	100.0	75.3	68.6	62.3	0.85	63.7	58.1	62.3	58.1	0.92	1.12	0.90	1.00	0.55	1.30	0.82	1.51	0.034	0.72	0.00	0.00	1.47					
23.60	23.55	388.6	5.17	0.78	388.7	1.33	9	141	1.48	1.48	260.9	308.3	1.33	6	1.66	1.01	6	0.00	1	5.45	32.4	0.40	273.5	393.5	379.5	1,245.0	3,391	2,286	4,571	8.67	5.8	45.0	0.17	0.30	0.10	1.02	100.0	73.4	67.7	60.7	0.84	62.7	57.3	60.7	57.6	0.92	1.12	0.90	1.00	0.55	1.30	0.82	1.51	0.034	0.72	0.00	0.00	1.47					
23.60	23.62	396.4	5.46	0.93	396.6	1.38	9	141	1.49	1.49	265.3	313.8	1.38	6	1.67	1.01	6	0.00	1	5.58	33.0	0.40	273.5	397.3	385.1	1,263.6	3,505	2,354	4,709	8.81	5.9	45.1	0.18	0.30	0.10	1.03	100.0	74.9	69.3	61.9	0.84	63.4	58.6	61.9	59.2	0.92	1.12	0.90	1.00	0.55	1.30	0.83	1.52	0.032	0.73	0.00	0.00	1.47					
23.70	23.69	422.8	6.58	0.79	422.9	1.56	9	143	1.49	1.49	282.1	333.1	1.56	6	1.70	1.03	6	0.00	1	6.10	35.2	0.39	273.5	411.6	404.9	1,328.4	3,916	2,602	5,204	9.22	6.2	45.3	0.18	0.30	0.10	1.05	100.0	79.9	74.6	65.9	0.84	67.6	63.1	66.0	64.8	0.92	1.12	0.90	1.00	0.55	1.30	0.83	1.55	0.027	0.77	0.00	0.00	1.47					
23.80	23.76	425.4	5.98	0.71	425.5	1.41	9	142	1.50	1.50	282.8	335.9	1.41	6	1.66	1.01	6	0.00	1	5.41	35.4	0.39	273.5	392.5	396.6	1,301.1	3,739	2,496	4,992	9.28	6.2	45.4	0.19	0.30	0.10	1.05	100.0	80.4	74.1	66.3	0.84	67.7	62.4	66.3	62.6	0.92	1.12	0.90	1.00	0.55	1.30	0.83	1.55	0.029	0.76	0.00	0.00	1.47					
23.80	23.82	392.4	5.47	0.86	392.5	1.39	9	141	1.50	1.50	260.1	308.7	1.40	6	1.68	1.02	6	0.00	1	5.73	32.5	0.40	273.5	401.4	385.1	1,263.5	3,504	2,376	4,708	8.75	5.8	45.0	0.18	0.30	0.10	1.02	100.0	74.2	68.7	61.1	0.84	62.5	57.9	61.1	58.8	0.92	1.12	0.89	1.00	0.55	1.30	0.83	1.52	0.032	0.73	0.00	0.00	1.47					
23.90	23.87	364.5	5.27	0.99	364.6	1.45	9	141	1.51	1.51	241.0	285.4	1.45	6	1.71	1.04	6	0.00	1	6.33	30.1	0.41	273.5	417.9	378.7	1,242.5	3,377	2,276	4,553	8.29	5.5	44.6	0.17	0.31	0.10	0.99	98.8	68.9	64.6	56.7	0.84	58.1	54.5	56.8	56.3	0.92	1.12	0.89	1.00	0.55	1.30	0.83	1.49	0.035	0.72	0.00	0.00	1.47					
24.00	23.94	339.5	5.31	1.06	339.7	1.56	8	141	1.51	1.51	223.7	264.1	1.57	6	1.76	1.07	6	0.00	1	7.23	28.0	0.41	273.5	443.1	376.3	1,234.7	3,332	2,248	4,495	7.86	5.2	44.2	0.16	0.32	0.11	0.96	96.2	80.2	61.1	52.8	0.84	67.9	54.8	53.0	54.8	0.92	1.12	0.89	1.00	0.55	1.30	0.84	1.47	0.036	0.71	0.00	0.00	1.47					
24.10	24.03	283.3	5.28	1.02	283.5	1.86	8	140	1.52	1.52	185.7	217.1	1.87	6	1.87	1.15	6	0.00	1	9.59	23.2	0.42	273.6	508.6	368.1	1,207.8	3,177	2,151	4,302	6.83	4.5	43.3	0.14	0.41	0.14	0.88	92.8	66.9	53.0	43.2	0.83	57.7	45.9	44.1	51.0	0.92	1.12	0.89	1.00	0.55	1.30	0.84	1.40	0.039	0.68	0.00	0.00	1.47					
24.10	24.09	252.8	5.10	0.61	252.9	2.02	8	140	1.52	1.52	165.1	192.0	2.03	6	1.92	1.21	6	0.00	1	10.98	20.6	0.43	273.6	547.4	360.8	1,183.0	3,036	2,064	4,127	6.43	4.1	42.7	0.12	0.43	0.14	0.84	91.5	59.7	48.3	37.3	0.83	52.3	42.6	38.9	48.6	0.92	1.12	0.89	1.00	0.55	1.30	0.84	1.36	0.043	0.65	0.03	0.00	1.47					
24.10	24.10	261.3	5.01	0.53	261.3	1.92	8	140	1.52	1.52	170.6																																																				

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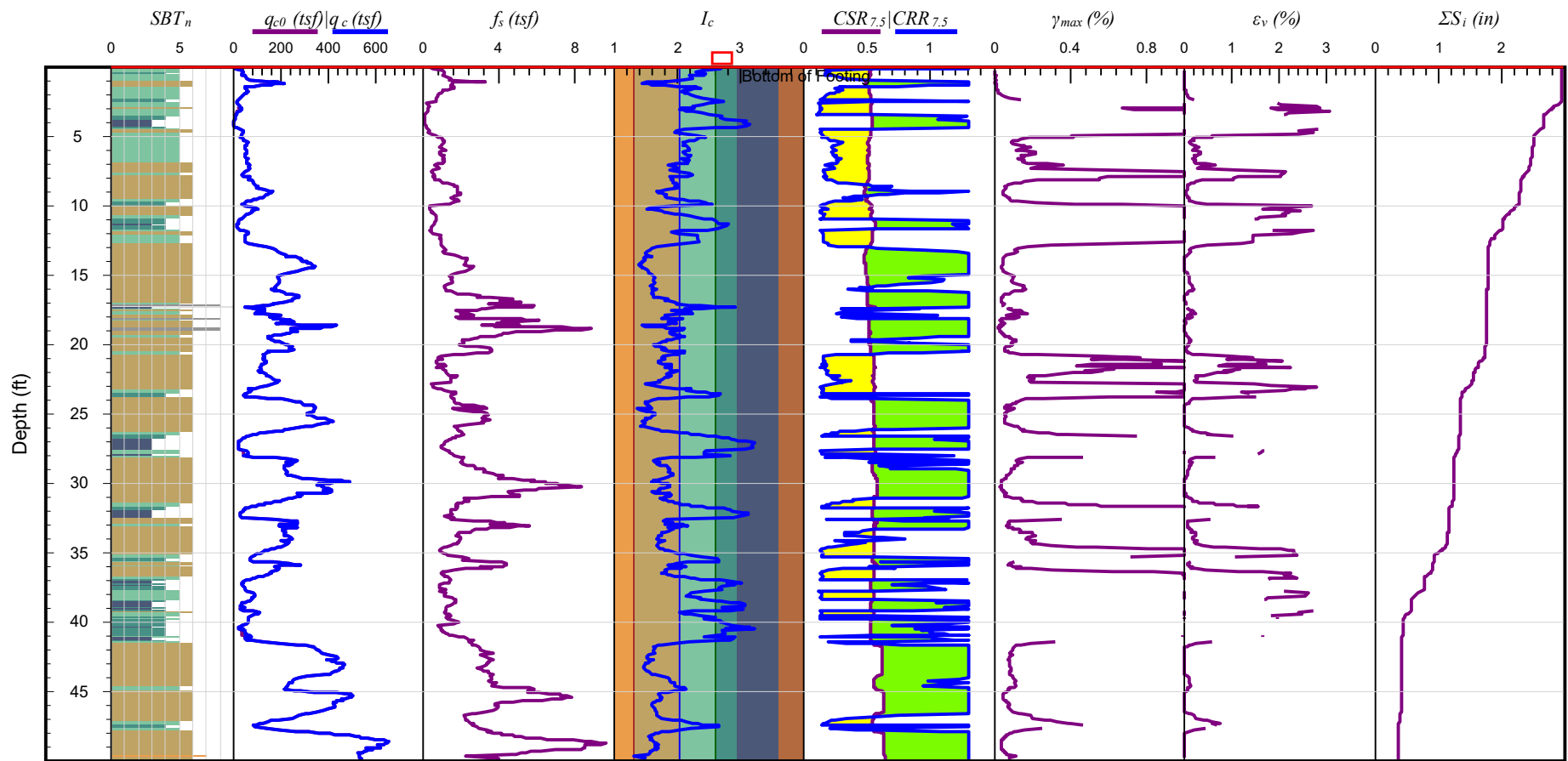
$Z_c(f)$	$Z_c(f)$	q_c (tsf)	f_c (tsf)	u_z (tsf)	q_c (tsf)	R_f	SBT	Y (pcf)	σ_v (tsf)	σ_v (tsf)	Q_z	Q_{zs}	F_{zs}	SBT_{zs}	I_c	K_c	$(SBT)_c$	B_z	$(SBT)_B$	F_c (°)	q_{1-50} (Mpa)	c	R	σ_{vm} (mb)	V_c (mb)	V_c (B)	G (tsf)	T (tsf)	M (tsf)	σ_p (tsf)	OCR	S_v	S_u (tsf)	$S_u \sigma_v$	ϕ (°)	c' (tsf)	$C_{c/1-\sigma_v}$ (%)	$C_{c/1-\sigma_v}$ (%)	K_{cs}	D_{50} (%)	$N_{60,US}$	$(N_{60})_{cs}$	(N) (max)	C_u	(N) (max)	(N) (max)	(N) (max)	(N) (max)	(N) (max)	(N) (max)	r_d	MSF	K_{cs}	K_{cs}	CSR_{z-1}	CSR_{z-2}	FS	τ_{vm} (tsf)	p (tsf)	τ_{vm} (%)	GW_{cs}	ϵ_v (%)	AS	ES (ms)
41.30	41.30	391.5	3.13	0.37	391.5	0.80	10	137	2.66	2.66	146.2	231.8	0.78	6	1.58	1.00	6	0.00	1	3.38	25.3	0.42	273.5	351.8	359.6	1.179	2.963	2.052	4.004	9.53	43.8	0.19	0.27	0.07	0.75	96.1	66.7	66.7	52.0	0.63	38.1	41.8	52.3	41.8	0.83	1.12	0.72	1.00	0.62	1.30	1.34	2.22	0.089	0.51	0.00	0.00	0.72							
41.40	41.34	393.5	3.04	0.38	393.4	0.77	10	137	2.66	2.66	146.2	233.0	0.78	6	1.56	1.00	6	0.00	1	3.37	25.1	0.42	273.5	346.3	357.7	1.173	2.928	2.028	4.051	9.57	43.8	0.19	0.27	0.07	0.75	96.1	62.0	66.3	52.3	0.63	39.1	41.8	52.3	41.8	0.83	1.12	0.72	1.00	0.62	1.30	1.34	2.22	0.089	0.51	0.00	0.00	0.72							
41.40	41.38	418.6	2.92	0.38	418.6	0.70	10	137	2.66	2.66	156.1	273.0	0.76	6	1.51	1.00	6	0.00	1	3.02	27.1	0.41	273.5	325.1	357.5	1.172	2.921	2.029	4.056	10.05	3.8	43.8	0.20	0.21	0.07	0.76	92.7	65.9	69.3	52.9	0.63	41.5	43.7	55.9	43.7	0.83	1.12	0.72	1.00	0.62	1.30	1.34	2.25	0.089	0.52	0.00	0.00	0.72						
41.50	41.43	416.4	3.03	0.38	416.4	0.73	10	137	2.67	2.67	155.1	246.3	0.73	6	1.53	1.00	6	0.00	1	3.23	27.0	0.41	273.5	331.2	359.9	1.180	2.966	2.056	4.111	10.01	3.8	43.9	0.20	0.21	0.07	0.77	98.0	65.6	69.3	55.6	0.63	41.3	43.7	55.6	43.7	0.83	1.12	0.72	1.00	0.62	1.30	1.34	2.25	0.086	0.52	0.00	0.00	0.72						
41.50	41.48	419.2	2.88	0.42	419.3	0.69	10	137	2.67	2.67	156.0	247.8	0.69	6	1.51	1.00	6	0.00	1	2.95	27.2	0.41	273.5	323.3	356.8	1.170	2.908	2.020	4.040	10.07	3.8	43.9	0.20	0.21	0.07	0.77	98.2	66.0	69.4	56.0	0.63	41.6	43.7	56.0	43.7	0.83	1.12	0.72	1.00	0.62	1.30	1.34	2.26	0.090	0.51	0.00	0.00	0.72						
41.60	41.54	413.5	3.08	0.41	413.5	0.75	10	137	2.67	2.67	153.4	244.3	0.75	6	1.54	1.00	6	0.00	1	3.38	26.8	0.41	273.5	335.5	361.0	1.184	2.987	2.068	4.136	9.96	3.7	43.9	0.20	0.21	0.07	0.76	97.8	65.1	69.1	55.1	0.63	41.0	43.4	55.1	43.4	0.83	1.12	0.72	1.00	0.62	1.30	1.34	2.25	0.085	0.53	0.00	0.00	0.72						
41.60	41.61	407.2	3.11	0.41	407.3	0.76	10	137	2.68	2.68	151.0	240.3	0.77	6	1.55	1.00	6	0.00	1	3.57	26.3	0.41	273.5	340.8	361.0	1.184	2.988	2.068	4.137	9.84	3.7	43.8	0.20	0.21	0.07	0.76	97.2	64.1	68.3	54.2	0.63	40.3	42.9	54.2	42.9	0.83	1.12	0.72	1.00	0.62	1.30	1.35	2.25	0.086	0.53	0.00	0.00	0.72						
41.70	41.67	392.7	3.09	0.41	392.7	0.79	10	137	2.68	2.68	145.3	231.5	0.79	6	1.57	1.00	6	0.00	1	3.89	25.3	0.42	273.5	349.9	359.1	1.178	2.954	2.047	4.094	9.56	3.6	43.6	0.19	0.22	0.07	0.75	96.0	61.8	66.3	52.0	0.63	38.8	41.6	52.0	41.6	0.83	1.12	0.72	1.00	0.62	1.30	1.35	2.23	0.088	0.52	0.00	0.00	0.72						
41.70	41.72	384.1	2.99	0.42	384.2	0.78	10	137	2.69	2.69	142.0	226.3	0.78	6	1.57	1.00	6	0.00	1	3.96	24.7	0.42	273.5	351.7	356.1	1.168	2.899	2.043	4.025	9.39	3.5	43.5	0.19	0.22	0.07	0.74	95.2	60.5	65.0	50.7	0.63	38.0	40.8	50.7	40.8	0.83	1.12	0.72	1.00	0.62	1.30	1.35	2.22	0.092	0.50	0.00	0.00	0.72						
41.80	41.79	377.9	3.05	0.42	378.0	0.81	10	137	2.69	2.69	139.4	222.4	0.81	6	1.59	1.00	6	0.00	1	4.22	24.3	0.42	273.5	359.0	356.8	1.170	2.912	2.021	4.042	9.27	3.4	43.4	0.19	0.22	0.07	0.73	94.7	59.5	64.2	49.7	0.63	37.3	40.3	49.7	40.3	0.83	1.12	0.72	1.00	0.62	1.30	1.35	2.21	0.092	0.51	0.00	0.00	0.72						
41.90	41.86	338.1	3.43	0.42	338.2	1.01	9	137	2.70	2.70	124.4	195.5	1.02	6	1.70	1.03	6	0.00	1	6.04	21.5	0.43	273.6	410.0	360.6	1.183	2.987	2.063	4.127	8.42	3.1	42.8	0.17	0.34	0.11	0.69	90.7	63.9	59.6	43.4	0.63	40.3	37.5	43.5	38.4	0.83	1.12	0.72	1.00	0.62	1.30	1.35	2.15	0.089	0.51	0.00	0.00	0.72						
41.90	41.90	319.8	3.38	0.42	319.8	1.06	9	137	2.70	2.70	117.5	183.2	1.07	6	1.73	1.05	6	0.00	1	6.62	20.2	0.43	273.6	426.0	357.3	1.173	2.928	2.026	4.053	8.02	3.0	42.5	0.16	0.35	0.12	0.68	88.1	60.4	56.9	39.9	0.63	38.2	36.0	39.9	37.4	0.83	1.12	0.74	1.00	0.60	1.30	1.35	2.12	0.093	0.50	0.08	0.00	0.72						
42.00	41.98	299.6	3.56	0.42	299.7	1.19	9	137	2.71	2.71	109.8	168.6	1.20	6	1.78	1.09	6	0.00	1	7.76	18.8	0.44	273.6	457.8	358.5	1.176	2.952	2.040	4.079	7.55	2.8	42.1	0.15	0.37	0.12	0.68	85.3	56.4	54.4	36.0	0.63	36.1	34.7	36.1	37.1	0.83	1.12	0.77	1.00	0.60	1.30	1.36	2.08	0.093	0.50	0.08	0.00	0.72						
42.10	42.06	280.3	3.55	0.42	280.3	1.26	9	137	2.71	2.71	102.4	155.7	1.28	6	1.82	1.12	6	0.00	1	8.62	17.5	0.44	273.6	481.7	355.5	1.166	2.899	2.006	4.012	7.10	2.6	41.7	0.14	0.55	0.18	0.63	83.3	53.0	51.6	32.4	0.62	34.1	33.2	33.0	36.1	0.83	1.12	0.79	1.00	0.57	1.30	1.36	2.05	0.098	0.48	0.09	0.00	0.72						
42.20	42.14	272.0	3.31	0.40	272.1	1.22	9	137	2.72	2.72	99.2	151.0	1.23	6	1.82	1.12	6	0.00	1	8.56	16.9	0.45	273.6	479.8	357.5	1.166	2.899	2.006	4.012	7.10	2.6	41.7	0.14	0.55	0.18	0.63	81.8	51.4	50.1	30.9	0.62	33.0	32.2	31.4	34.9	0.83	1.12	0.80	1.00	0.56	1.14	1.36	2.04	0.107	0.46	0.10	0.00	0.72						
42.20	42.20	263.9	3.12	0.40	264.0	1.18	9	136	2.72	2.72	96.0	146.3	1.19	6	1.82	1.12	6	0.00	1	8.56	16.4	0.45	273.6	480.0	344.3	1.129	2.5	2.696	1.881	3.762	6.73	2.5	41.4	0.13	0.59	0.20	0.62	80.5	49.9	48.6	29.4	0.62	32.0	31.2	29.9	33.8	0.83	1.11	0.81	1.00	0.55	0.82	1.36	2.02	0.117	0.43	0.12	0.00	0.72					
42.30	42.28	269.0	2.87	0.45	269.1	1.07	9	135	2.73	2.73	97.7	150.6	1.08	6	1.78	1.09	6	0.00	1	7.77	16.7	0.45	273.6	458.0	339.5	1.114	2.63	1.830	3.660	6.87	2.5	41.6	0.14	0.40	0.13	0.62	80.4	50.8	48.9	30.3	0.62	32.0	31.0	30.6	33.2	0.83	1.11	0.81	1.00	0.55	0.79	1.36	2.04	0.126	0.41	0.13	0.00	0.72						
42.40	42.35	259.2	2.57	0.44	259.3	0.99	9	135	2.73	2.73	94.0	145.3	1.00	6	1.77	1.08	6	0.00	1	7.57	16.0	0.45	273.6	452.4	331.2	1.086	2.468	1.741	3.481	6.65	2.4	41.4	0.13	0.41	0.14	0.61	78.5	49.0	46.9	28.5	0.62	31.0	29.7	28.7	31.6	0.83	1.10	0.82	1.00	0.55	0.56	1.37	2.02	0.147	0.38	0.16	0.00	0.71						
42.50	42.42	260.1	2.47	0.44	260.2	0.95	9	134	2.73	2.73	94.1	146.2	0.96	6	1.76	1.07	6	0.00	1	7.30	16.1	0.45	273.6	444.9	329.0	1.079	2.431	1.718	3.436	6.68	2.4	41.4	0.13	0.41	0.14	0.61	78.7	49.2	46.9	28.6	0.62	31.0	29.6	28.8	31.3	0.83	1.10	0.82	1.00	0.55	0.57	1.37	2.03	0.154	0.37	0.17	0.00	0.71						
42.60	42.51	249.3	2.52	0.41	249.3	1.01	9	134	2.74	2.74	90.0	138.6	1.02	6	1.79	1.10	6	0.00	1	7.96	15.3	0.45	273.6	463.3	328.6	1.078	2.425	1.714	3.428	6.41	2.3	41.2	0.13	0.42	0.14	0.60	77.0	47.1	45.4	26.7	0.62	29.9	28.9	27.6	30.9	0.83	1.09	0.83	1.00	0.55	0.43	1.37	2.01	0.157	0.36	0.17	0.00	0.71						
42.70	42.61	240.4	2.43	0.41	240.4	1.01	9	134	2.75	2.75	86.5	133.0	1.02	6	1.80	1.10	6	0.00	1	8.22	14.7	0.46	273.7	470.4	325.1	1.066	2.367	1.677	3.354	6.20	2.3	41.0	0.12	0.43	0.14	0.59	75.7	45.4	44.0	25.1	0.62	28.9	28.0	25.5	30.1	0.83	1.08	0.84	1.00	0.55	0.36	1.37	1.99	0.169	0.34	0.20	0.00	0.71						
42.70	42.68	210.8	2.71	0.38	210.9	1.29	9	134	2.75	2.75	75.6	112.6	1.30	6	1.92	1.																																																

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$Z_s(f)$	$Z_w(f)$	q_c (tsf)	f_c (tsf)	u_2 (tsf)	q_1 (tsf)	R_f	SBT	γ (pcf)	σ_{av} (tsf)	σ_{av}' (tsf)	Q_v	Q_w	F_s	SBT _s	I_c	K_c	(SBT) _h	B_s	(SBT) _{h1}	F_c (%)	$q_{1,100}$ (Mpa)	c	R	σ_{vm} (mb)	V_c (mb)	V_s (ft/s)	G_s (tsf)	E' (tsf)	M (tsf)	σ_p' (tsf)	OCR	S_v	S_h (tsf)	$S_{av}\sigma_{av}'$	ϕ (°)	c' (tsf)	$C_u/(1+\sigma_{av}')$	$C_u/(1+\sigma_{av}')^2$	K_b	D_R (%)	$N_{60,100}$	(N_{60}) _{av}	(N) _{max}	C_u	(N) _{min,100}	(N) _{min,10}	(N) _{min,100}	(N) _{min,10}	(N) _{min,100}	(N) _{min,10}	r_d	MSF	K_s	K_w	CSR _{1.5}	CRR _{1.5}	FS	τ_{av} (tsf)	p (tsf)	γ_{max} (%)	GG _{av}	ε_v (%)	AS	ES	(ms)
60.30	60.38	179.9	6.61	0.80	180.0	1.67	11	141	3.95	3.95	44.5	44.5	3.75	5	2.36	2.13	5	0.00	1	24.03	8.8	0.49	273.8	945.0	396.5	1,301.0	3,701	2,496	2,465	3.95	0.8				35.7	0.07	0.37	0.04	0.38	74.5	170.0	41.0	10.8	0.52	101.0	27.8	15.8	45.1	0.74	1.07	0.78	1.00	0.53	0.31	1.77	2.31	0.099	0.50	0.09	0.00	0.01				
60.40	60.33	178.3	6.76	0.84	178.4	3.79	11	141	3.96	3.96	44.1	44.1	3.88	5	2.37	2.17	5	0.00	1	25.14	8.7	0.49	273.8	960.9	398.0	1,305.9	3,732	2,514	2,442	3.96	0.8				35.7	0.07	0.37	0.04	0.38	74.2	168.5	40.9	10.6	0.52	101.5	27.9	15.7	46.0	0.74	1.07	0.78	1.00	0.53	0.30	1.77	2.31	0.099	0.50	0.09	0.00	0.01				
60.40	60.38	178.3	6.76	1.02	178.4	3.79	11	141	3.96	3.96	44.0	44.0	3.87	5	2.37	2.17	5	-0.01	1	25.14	8.7	0.49	273.8	960.8	398.0	1,305.9	3,732	2,515	2,443	3.96	0.8				35.7	0.07	0.37	0.04	0.38	74.2	168.5	40.9	10.6	0.52	101.5	27.9	15.6	46.0	0.74	1.07	0.78	1.00	0.53	0.30	1.77	2.31	0.099	0.50	0.09	0.00	0.01				
60.50	60.45	176.7	6.43	1.33	176.9	3.64	11	140	3.97	3.97	43.6	43.6	3.72	5	2.36	2.13	5	-0.01	1	24.71	8.6	0.49	273.8	947.5	393.5	1,291.0	3,638	2,457	2,421	3.97	0.8				35.6	0.07	0.38	0.04	0.37	73.8	167.0	40.3	10.4	0.52	100.2	27.4	15.4	44.5	0.74	1.07	0.78	1.00	0.53	0.29	1.77	2.31	0.099	0.49	0.10	0.00	0.00				
60.60	60.54	236.8	6.01	1.78	237.1	2.54	7	141	3.97	3.97	58.7	58.7	2.58	5	2.15	1.55	5	-0.01	1	17.89	12.0	0.47	273.7	732.4	401.7	1,317.9	3,797	2,561	5,122	4.66	1.2				37.1	0.09	0.67	0.22	0.44	81.8	74.6	49.6	18.4	0.52	44.0	30.3	22.3	39.7	0.74	1.12	0.72	1.00	0.55	1.14	1.77	2.48	0.088	0.53	0.10	0.00	0.00				
60.60	60.61	286.8	5.46	1.52	287.0	1.91	8	140	3.98	3.98	71.2	71.2	1.93	6	2.01	1.30	6	-0.01	1	13.09	14.8	0.46	273.7	606.4	402.8	1,321.5	3,811	2,575	5,150	5.75	1.4				38.0	0.11	0.50	0.17	0.48	86.4	67.8	56.6	26.2	0.52	38.2	32.2	28.7	37.9	0.74	1.12	0.67	1.00	0.60	1.30	1.77	2.61	0.086	0.54	0.08	0.00	0.00				
60.70	60.66	327.7	5.14	1.47	328.0	1.57	8	140	3.98	3.98	81.4	81.4	1.59	6	1.90	1.18	6	0.00	1	10.46	17.2	0.44	273.6	532.8	403.9	1,325.2	3,829	2,589	5,179	6.61	1.7				38.6	0.13	0.47	0.16	0.52	88.5	77.4	62.2	33.4	0.52	41.9	33.8	34.7	38.0	0.74	1.12	0.63	1.00	0.63	1.30	1.78	2.70	0.084	0.55	0.07	0.00	0.00				
60.80	60.73	372.4	4.89	1.52	372.7	1.31	9	140	3.99	3.99	92.5	92.5	1.33	6	1.81	1.11	6	0.00	1	8.29	19.8	0.43	273.6	472.5	405.8	1,331.2	3,863	2,613	5,226	7.51	1.9				39.2	0.15	0.34	0.11	0.55	90.7	70.4	68.3	42.0	0.52	37.1	36.0	42.4	38.9	0.74	1.12	0.60	1.00	0.66	1.30	1.78	2.79	0.082	0.56	0.00	0.00	0.00				
60.80	60.80	393.6	4.87	1.45	393.8	1.24	9	140	3.99	3.99	97.7	97.7	1.25	6	1.77	1.08	6	0.00	1	7.55	21.1	0.43	273.6	451.9	408.0	1,338.7	3,909	2,643	5,285	7.92	2.0				39.5	0.16	0.33	0.11	0.56	92.6	74.4	71.2	45.6	0.51	38.9	37.3	45.8	39.7	0.74	1.12	0.60	1.00	0.66	1.30	1.78	2.83	0.079	0.57	0.00	0.00	0.00				
60.90	60.87	394.9	4.85	1.33	395.1	1.23	9	140	4.00	4.00	97.9	97.9	1.24	6	1.77	1.08	6	0.00	1	7.49	21.1	0.43	273.6	450.2	407.9	1,338.4	3,907	2,641	5,283	7.94	2.0				39.5	0.16	0.33	0.11	0.56	92.7	74.6	71.4	45.7	0.51	39.0	37.3	46.0	39.7	0.74	1.12	0.60	1.00	0.66	1.30	1.78	2.83	0.080	0.57	0.00	0.00	0.00				
61.00	60.95	385.7	4.85	1.30	385.9	1.26	9	140	4.00	4.00	95.4	95.4	1.27	6	1.78	1.09	6	0.00	1	7.80	20.6	0.43	273.6	458.7	406.9	1,334.9	3,885	2,628	5,255	7.76	1.9				39.4	0.16	0.33	0.11	0.56	91.9	72.9	70.1	44.4	0.51	38.2	36.7	44.7	39.3	0.74	1.12	0.60	1.00	0.66	1.30	1.78	2.82	0.081	0.57	0.00	0.00	0.00				
61.10	61.03	370.3	4.84	1.25	370.5	1.31	9	140	4.01	4.01	91.4	91.4	1.32	6	1.81	1.11	6	0.00	1	8.32	19.7	0.44	273.6	473.1	404.8	1,328.1	3,842	2,601	5,202	7.45	1.9				39.2	0.15	0.34	0.11	0.55	90.3	70.0	67.9	41.4	0.51	36.8	35.7	41.9	38.6	0.74	1.12	0.60	1.00	0.66	1.30	1.78	2.79	0.083	0.56	0.00	0.00	0.00				
61.20	61.12	357.3	4.51	1.30	357.5	1.26	9	140	4.01	4.01	88.1	88.1	1.28	6	1.81	1.11	6	0.00	1	8.31	18.9	0.44	273.6	473.1	397.6	1,304.3	3,690	2,509	5,017	7.19	1.8				39.0	0.14	0.35	0.12	0.54	88.4	67.5	65.5	38.8	0.51	35.5	34.5	39.3	37.2	0.74	1.12	0.63	1.00	0.63	1.30	1.78	2.77	0.090	0.54	0.07	0.00	0.00				
61.30	61.22	357.8	4.48	1.41	358.0	1.25	9	140	4.02	4.02	88.0	88.0	1.27	6	1.81	1.11	6	0.00	1	8.26	18.9	0.44	273.6	471.5	397.2	1,303.0	3,681	2,504	5,007	7.20	1.8				39.0	0.14	0.35	0.12	0.53	88.4	67.6	65.5	38.9	0.51	35.5	34.4	39.3	37.2	0.74	1.12	0.63	1.00	0.63	1.30	1.79	2.77	0.091	0.54	0.07	0.00	0.00				
61.40	61.31	375.4	4.87	1.57	375.6	1.30	9	140	4.03	4.03	92.3	92.3	1.31	6	1.80	1.10	6	0.00	1	8.20	19.9	0.43	273.6	469.8	406.2	1,332.7	3,871	2,619	5,237	7.55	1.9				39.2	0.15	0.34	0.11	0.55	90.9	70.9	68.7	42.4	0.51	37.2	36.0	42.8	38.9	0.74	1.12	0.60	1.00	0.66	1.30	1.79	2.81	0.082	0.56	0.00	0.00	0.00				
61.50	61.41	357.7	4.62	1.52	357.9	1.29	9	140	4.03	4.03	87.7	87.7	1.31	6	1.82	1.11	6	0.00	1	8.49	18.9	0.44	273.6	477.8	399.8	1,311.6	3,736	2,537	5,073	7.19	1.8				39.0	0.14	0.47	0.16	0.53	88.6	67.6	65.8	38.8	0.51	35.5	34.6	39.3	37.5	0.73	1.12	0.62	1.00	0.63	1.30	1.79	2.78	0.088	0.54	0.07	0.00	0.00				
61.50	61.47	365.9	4.54	1.32	366.1	1.24	9	140	4.04	4.04	89.7	89.7	1.25	6	1.80	1.10	6	0.00	1	8.07	19.3	0.44	273.6	466.3	399.4	1,310.5	3,728	2,532	5,065	7.35	1.8				39.1	0.15	0.35	0.12	0.54	89.3	69.2	66.8	40.4	0.51	36.2	35.0	40.8	37.6	0.73	1.12	0.61	1.00	0.65	1.30	1.79	2.80	0.089	0.54	0.00	0.00	0.00				
61.50	61.51	382.4	4.16	1.30	382.6	1.09	9	139	4.04	4.04	93.7	93.7	1.10	6	1.74	1.06	6	0.00	1	6.94	20.3	0.43	273.6	434.9	394.4	1,294.0	3,620	2,469	4,938	7.68	1.9				39.3	0.15	0.34	0.11	0.55	91.4	72.3	68.5	43.8	0.51	37.4	35.4	43.9	37.2	0.73	1.12	0.60	1.00	0.66	1.30	1.79	2.83	0.094	0.53	0.00	0.00	0.00				
61.60	61.56	391.3	4.14	1.30	391.6	1.06	9	139	4.04	4.04	95.8	95.8	1.07	6	1.73	1.05	6	0.00	1	6.64	20.8	0.43	273.6	426.5	395.2	1,296.7	3,636	2,479	4,959	7.85	1.9				39.4	0.16	0.33	0.11	0.56	92.2	74.0	69.7	45.0	0.51	38.2	36.0	45.1	37.5	0.73	1.12	0.60	1.00	0.66	1.30	1.79	2.85	0.093	0.53	0.00	0.00	0.00				
61.60	61.60	405.8	4.13	1.29	406.0	1.02	9	139	4.05	4.05	99.3	99.3	1.03	6	1.70	1.04	6	0.00	1	6.20	21.7	0.43	273.6	414.3	396.7	1,301.6	3,665	2,498	4,996	8.13	2.0				39.6	0.16	0.33	0.11	0.57	93.5	76.7	71.7	47.0	0.51	39.5	36.9	47.0	38.0	0.73	1.12	0.60	1.00	0.66	1.30	1.79	2.88	0.091	0.54	0.00	0.00	0.00				
61.60	61.64	421.3	4.13	1.31	421.5	0.98	9	139	4.05	4.05	103.1	103.1	0.99	6	1.68	1.02	6	0.00	1	5.77	22.6	0.43	273.6	402.4	398.5	1,307.3	3,700	2,520	5,040	8.43	2.1				39.7	0.17	0.32	0.11	0.58	94.7	79.6	73.9																							

X:\3242-0-0 Fillmore Unified School District\CPT Data\CPT Updated Values\3242-0-0-100 CPT-2.csv



- Sensitive fine grained
- Organic soils - peats
- Clay to silty clay
- Silty clay to clayey silt
- Sandy silt to silty sand
- Silty sand to clean sand
- Dense sand to gravelly sand
- Clayey sand to very stiff sand

- Very stiff fine grained *
- * Overconsolidated or cemented

Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 75 ft
Maximum Settlement = 2.95 in
Settl. at Bottom of Footing = 2.95 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand; Clay] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)



Seismic Settlement Potential - CPT Data

Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-2	Figure:	6

[illegible]

Z	Y	Z ₀	Y ₀	Z ₁	Y ₁	Z ₂	Y ₂	Z ₃	Y ₃	Z ₄	Y ₄	Z ₅	Y ₅	Z ₆	Y ₆	Z ₇	Y ₇	Z ₈	Y ₈	Z ₉	Y ₉	Z ₁₀	Y ₁₀	Z ₁₁	Y ₁₁	Z ₁₂	Y ₁₂	Z ₁₃	Y ₁₃	Z ₁₄	Y ₁₄	Z ₁₅	Y ₁₅	Z ₁₆	Y ₁₆	Z ₁₇	Y ₁₇	Z ₁₈	Y ₁₈	Z ₁₉	Y ₁₉	Z ₂₀	Y ₂₀	Z ₂₁	Y ₂₁	Z ₂₂	Y ₂₂	Z ₂₃	Y ₂₃	Z ₂₄	Y ₂₄	Z ₂₅	Y ₂₅	Z ₂₆	Y ₂₆	Z ₂₇	Y ₂₇	Z ₂₈	Y ₂₈	Z ₂₉	Y ₂₉	Z ₃₀	Y ₃₀	Z ₃₁	Y ₃₁	Z ₃₂	Y ₃₂	Z ₃₃	Y ₃₃	Z ₃₄	Y ₃₄	Z ₃₅	Y ₃₅	Z ₃₆	Y ₃₆	Z ₃₇	Y ₃₇	Z ₃₈	Y ₃₈	Z ₃₉	Y ₃₉	Z ₄₀	Y ₄₀	Z ₄₁	Y ₄₁	Z ₄₂	Y ₄₂	Z ₄₃	Y ₄₃	Z ₄₄	Y ₄₄	Z ₄₅	Y ₄₅	Z ₄₆	Y ₄₆	Z ₄₇	Y ₄₇	Z ₄₈	Y ₄₈	Z ₄₉	Y ₄₉	Z ₅₀	Y ₅₀	Z ₅₁	Y ₅₁	Z ₅₂	Y ₅₂	Z ₅₃	Y ₅₃	Z ₅₄	Y ₅₄	Z ₅₅	Y ₅₅	Z ₅₆	Y ₅₆	Z ₅₇	Y ₅₇	Z ₅₈	Y ₅₈	Z ₅₉	Y ₅₉	Z ₆₀	Y ₆₀	Z ₆₁	Y ₆₁	Z ₆₂	Y ₆₂	Z ₆₃	Y ₆₃	Z ₆₄	Y ₆₄	Z ₆₅	Y ₆₅	Z ₆₆	Y ₆₆	Z ₆₇	Y ₆₇	Z ₆₈	Y ₆₈	Z ₆₉	Y ₆₉	Z ₇₀	Y ₇₀	Z ₇₁	Y ₇₁	Z ₇₂	Y ₇₂	Z ₇₃	Y ₇₃	Z ₇₄	Y ₇₄	Z ₇₅	Y ₇₅	Z ₇₆	Y ₇₆	Z ₇₇	Y ₇₇	Z ₇₈	Y ₇₈	Z ₇₉	Y ₇₉	Z ₈₀	Y ₈₀	Z ₈₁	Y ₈₁	Z ₈₂	Y ₈₂	Z ₈₃	Y ₈₃	Z ₈₄	Y ₈₄	Z ₈₅	Y ₈₅	Z ₈₆	Y ₈₆	Z ₈₇	Y ₈₇	Z ₈₈	Y ₈₈	Z ₈₉	Y ₈₉	Z ₉₀	Y ₉₀	Z ₉₁	Y ₉₁	Z ₉₂	Y ₉₂	Z ₉₃	Y ₉₃	Z ₉₄	Y ₉₄	Z ₉₅	Y ₉₅	Z ₉₆	Y ₉₆	Z ₉₇	Y ₉₇	Z ₉₈	Y ₉₈	Z ₉₉	Y ₉₉	Z ₁₀₀	Y ₁₀₀	Z ₁₀₁	Y ₁₀₁	Z ₁₀₂	Y ₁₀₂	Z ₁₀₃	Y ₁₀₃	Z ₁₀₄	Y ₁₀₄	Z ₁₀₅	Y ₁₀₅	Z ₁₀₆	Y ₁₀₆	Z ₁₀₇	Y ₁₀₇	Z ₁₀₈	Y ₁₀₈	Z ₁₀₉	Y ₁₀₉	Z ₁₁₀	Y ₁₁₀	Z ₁₁₁	Y ₁₁₁	Z ₁₁₂	Y ₁₁₂	Z ₁₁₃	Y ₁₁₃	Z ₁₁₄	Y ₁₁₄	Z ₁₁₅	Y ₁₁₅	Z ₁₁₆	Y ₁₁₆	Z ₁₁₇	Y ₁₁₇	Z ₁₁₈	Y ₁₁₈	Z ₁₁₉	Y ₁₁₉	Z ₁₂₀	Y ₁₂₀	Z ₁₂₁	Y ₁₂₁	Z ₁₂₂	Y ₁₂₂	Z ₁₂₃	Y ₁₂₃	Z ₁₂₄	Y ₁₂₄	Z ₁₂₅	Y ₁₂₅	Z ₁₂₆	Y ₁₂₆	Z ₁₂₇	Y ₁₂₇	Z ₁₂₈	Y ₁₂₈	Z ₁₂₉	Y ₁₂₉	Z ₁₃₀	Y ₁₃₀	Z ₁₃₁	Y ₁₃₁	Z ₁₃₂	Y ₁₃₂	Z ₁₃₃	Y ₁₃₃	Z ₁₃₄	Y ₁₃₄	Z ₁₃₅	Y ₁₃₅	Z ₁₃₆	Y ₁₃₆	Z ₁₃₇	Y ₁₃₇	Z ₁₃₈	Y ₁₃₈	Z ₁₃₉	Y ₁₃₉	Z ₁₄₀	Y ₁₄₀	Z ₁₄₁	Y ₁₄₁	Z ₁₄₂	Y ₁₄₂	Z ₁₄₃	Y ₁₄₃	Z ₁₄₄	Y ₁₄₄	Z ₁₄₅	Y ₁₄₅	Z ₁₄₆	Y ₁₄₆	Z ₁₄₇	Y ₁₄₇	Z ₁₄₈	Y ₁₄₈	Z ₁₄₉	Y ₁₄₉	Z ₁₅₀	Y ₁₅₀	Z ₁₅₁	Y ₁₅₁	Z ₁₅₂	Y ₁₅₂	Z ₁₅₃	Y ₁₅₃	Z ₁₅₄	Y ₁₅₄	Z ₁₅₅	Y ₁₅₅	Z ₁₅₆	Y ₁₅₆	Z ₁₅₇	Y ₁₅₇	Z ₁₅₈	Y ₁₅₈	Z ₁₅₉	Y ₁₅₉	Z ₁₆₀	Y ₁₆₀	Z ₁₆₁	Y ₁₆₁	Z ₁₆₂	Y ₁₆₂	Z ₁₆₃	Y ₁₆₃	Z ₁₆₄	Y ₁₆₄	Z ₁₆₅	Y ₁₆₅	Z ₁₆₆	Y ₁₆₆	Z ₁₆₇	Y ₁₆₇	Z ₁₆₈	Y ₁₆₈	Z ₁₆₉	Y ₁₆₉	Z ₁₇₀	Y ₁₇₀	Z ₁₇₁	Y ₁₇₁	Z ₁₇₂	Y ₁₇₂	Z ₁₇₃	Y ₁₇₃	Z ₁₇₄	Y ₁₇₄	Z ₁₇₅	Y ₁₇₅	Z ₁₇₆	Y ₁₇₆	Z ₁₇₇	Y ₁₇₇	Z ₁₇₈	Y ₁₇₈	Z ₁₇₉	Y ₁₇₉	Z ₁₈₀	Y ₁₈₀	Z ₁₈₁	Y ₁₈₁	Z ₁₈₂	Y ₁₈₂	Z ₁₈₃	Y ₁₈₃	Z ₁₈₄	Y ₁₈₄	Z ₁₈₅	Y ₁₈₅	Z ₁₈₆	Y ₁₈₆	Z ₁₈₇	Y ₁₈₇	Z ₁₈₈	Y ₁₈₈	Z ₁₈₉	Y ₁₈₉	Z ₁₉₀	Y ₁₉₀	Z ₁₉₁	Y ₁₉₁	Z ₁₉₂	Y ₁₉₂	Z ₁₉₃	Y ₁₉₃	Z ₁₉₄	Y ₁₉₄	Z ₁₉₅	Y ₁₉₅	Z ₁₉₆	Y ₁₉₆	Z ₁₉₇	Y ₁₉₇	Z ₁₉₈	Y ₁₉₈	Z ₁₉₉	Y ₁₉₉	Z ₂₀₀	Y ₂₀₀	Z ₂₀₁	Y ₂₀₁	Z ₂₀₂	Y ₂₀₂	Z ₂₀₃	Y ₂₀₃	Z ₂₀₄	Y ₂₀₄	Z ₂₀₅	Y ₂₀₅	Z ₂₀₆	Y ₂₀₆	Z ₂₀₇	Y ₂₀₇	Z ₂₀₈	Y ₂₀₈	Z ₂₀₉	Y ₂₀₉	Z ₂₁₀	Y ₂₁₀	Z ₂₁₁	Y ₂₁₁	Z ₂₁₂	Y ₂₁₂	Z ₂₁₃	Y ₂₁₃	Z ₂₁₄	Y ₂₁₄	Z ₂₁₅	Y ₂₁₅	Z ₂₁₆	Y ₂₁₆	Z ₂₁₇	Y ₂₁₇	Z ₂₁₈	Y ₂₁₈	Z ₂₁₉	Y ₂₁₉	Z ₂₂₀	Y ₂₂₀	Z ₂₂₁	Y ₂₂₁	Z ₂₂₂	Y ₂₂₂	Z ₂₂₃	Y ₂₂₃	Z ₂₂₄	Y ₂₂₄	Z ₂₂₅	Y ₂₂₅	Z ₂₂₆	Y ₂₂₆	Z ₂₂₇	Y ₂₂₇	Z ₂₂₈	Y ₂₂₈	Z ₂₂₉	Y ₂₂₉	Z ₂₃₀	Y ₂₃₀	Z ₂₃₁	Y ₂₃₁	Z ₂₃₂	Y ₂₃₂	Z ₂₃₃	Y ₂₃₃	Z ₂₃₄	Y ₂₃₄	Z ₂₃₅	Y ₂₃₅	Z ₂₃₆	Y ₂₃₆	Z ₂₃₇	Y ₂₃₇	Z ₂₃₈	Y ₂₃₈	Z ₂₃₉	Y ₂₃₉	Z ₂₄₀	Y ₂₄₀	Z ₂₄₁	Y ₂₄₁	Z ₂₄₂	Y ₂₄₂	Z ₂₄₃	Y ₂₄₃	Z ₂₄₄	Y ₂₄₄	Z ₂₄₅	Y ₂₄₅	Z ₂₄₆	Y ₂₄₆	Z ₂₄₇	Y ₂₄₇	Z ₂₄₈	Y ₂₄₈	Z ₂₄₉	Y ₂₄₉	Z ₂₅₀	Y ₂₅₀	Z ₂₅₁	Y ₂₅₁	Z ₂₅₂	Y ₂₅₂	Z ₂₅₃	Y ₂₅₃	Z ₂₅₄	Y ₂₅₄	Z ₂₅₅	Y ₂₅₅	Z ₂₅₆	Y ₂₅₆	Z ₂₅₇	Y ₂₅₇	Z ₂₅₈	Y ₂₅₈	Z ₂₅₉	Y ₂₅₉	Z ₂₆₀	Y ₂₆₀	Z ₂₆₁	Y ₂₆₁	Z ₂₆₂	Y ₂₆₂	Z ₂₆₃	Y ₂₆₃	Z ₂₆₄	Y ₂₆₄	Z ₂₆₅	Y ₂₆₅	Z ₂₆₆	Y ₂₆₆	Z ₂₆₇	Y ₂₆₇	Z ₂₆₈	Y ₂₆₈	Z ₂₆₉	Y ₂₆₉	Z ₂₇₀	Y ₂₇₀	Z ₂₇₁	Y ₂₇₁	Z ₂₇₂	Y ₂₇₂	Z ₂₇₃	Y ₂₇₃	Z ₂₇₄	Y ₂₇₄	Z ₂₇₅	Y ₂₇₅	Z ₂₇₆	Y ₂₇₆	Z ₂₇₇	Y ₂₇₇	Z ₂₇₈	Y ₂₇₈	Z ₂₇₉	Y ₂₇₉	Z ₂₈₀	Y ₂₈₀	Z ₂₈₁	Y ₂₈₁	Z ₂₈₂	Y ₂₈₂	Z ₂₈₃	Y ₂₈₃	Z ₂₈₄	Y ₂₈₄	Z ₂₈₅	Y ₂₈₅	Z ₂₈₆	Y ₂₈₆	Z ₂₈₇	Y ₂₈₇	Z ₂₈₈	Y ₂₈₈	Z ₂₈₉	Y ₂₈₉	Z ₂₉₀	Y ₂₉₀	Z ₂₉₁	Y ₂₉₁	Z ₂₉₂	Y ₂₉₂	Z ₂₉₃	Y ₂₉₃	Z ₂₉₄	Y ₂₉₄	Z ₂₉₅	Y ₂₉₅	Z ₂₉₆	Y ₂₉₆	Z ₂₉₇	Y ₂₉₇	Z ₂₉₈	Y ₂₉₈	Z ₂₉₉	Y ₂₉₉	Z ₃₀₀	Y ₃₀₀	Z ₃₀₁	Y ₃₀₁	Z ₃₀₂	Y ₃₀₂	Z ₃₀₃	Y ₃₀₃	Z ₃₀₄	Y ₃₀₄	Z ₃₀₅	Y ₃₀₅	Z ₃₀₆	Y ₃₀₆	Z ₃₀₇	Y ₃₀₇	Z ₃₀₈	Y ₃₀₈	Z ₃₀₉	Y ₃₀₉	Z ₃₁₀	Y ₃₁₀	Z ₃₁₁	Y ₃₁₁	Z ₃₁₂	Y ₃₁₂	Z ₃₁₃	Y ₃₁₃	Z ₃₁₄	Y ₃₁₄	Z ₃₁₅	Y ₃₁₅	Z ₃₁₆	Y ₃₁₆	Z ₃₁₇	Y ₃₁₇	Z ₃₁₈	Y ₃₁₈	Z ₃₁₉	Y ₃₁₉	Z ₃₂₀	Y ₃₂₀	Z ₃₂₁	Y ₃₂₁	Z ₃₂₂	Y ₃₂₂	Z ₃₂₃	Y ₃₂₃	Z ₃₂₄	Y ₃₂₄	Z ₃₂₅	Y ₃₂₅	Z ₃₂₆	Y ₃₂₆	Z ₃₂₇	Y ₃₂₇	Z ₃₂₈	Y ₃₂₈	Z ₃₂₉	Y ₃₂₉	Z ₃₃₀	Y ₃₃₀	Z ₃₃₁	Y ₃₃₁	Z ₃₃₂	Y ₃₃₂	Z ₃₃₃	Y ₃₃₃	Z ₃₃₄	Y ₃₃₄	Z ₃₃₅	Y ₃₃₅	Z ₃₃₆	Y ₃₃₆	Z ₃₃₇	Y ₃₃₇	Z ₃₃₈	Y ₃₃₈	Z ₃₃₉	Y ₃₃₉	Z ₃₄₀	Y ₃₄₀	Z ₃₄₁	Y ₃₄₁	Z ₃₄₂	Y ₃₄₂	Z ₃₄₃	Y ₃₄₃	Z ₃₄₄	Y ₃₄₄	Z ₃₄₅	Y ₃₄₅	Z ₃₄₆	Y ₃₄₆	Z ₃₄₇	Y ₃₄₇	Z ₃₄₈	Y ₃₄₈	Z ₃₄₉	Y ₃₄₉	Z ₃₅₀	Y ₃₅₀	Z ₃₅₁	Y ₃₅₁	Z ₃₅₂	Y ₃₅₂	Z ₃₅₃	Y ₃₅₃	Z ₃₅₄	Y ₃₅₄	Z ₃₅₅	Y ₃₅₅	Z ₃₅₆	Y ₃₅₆	Z ₃₅₇	Y ₃₅₇	Z ₃₅₈	Y ₃₅₈	Z ₃₅₉	Y ₃₅₉	Z ₃₆₀	Y ₃₆₀	Z ₃₆₁	Y ₃₆₁	Z ₃₆₂	Y ₃₆₂	Z ₃₆₃	Y ₃₆₃	Z ₃₆₄	Y ₃₆₄	Z ₃₆₅	Y ₃₆₅	Z ₃₆₆	Y ₃₆₆	Z ₃₆₇	Y ₃₆₇	Z ₃₆₈	Y ₃₆₈	Z ₃₆₉	Y ₃₆₉	Z ₃₇₀	Y ₃₇₀	Z ₃₇₁	Y ₃₇₁	Z ₃₇₂	Y ₃₇₂	Z ₃₇₃	Y ₃₇₃	Z ₃₇₄	Y ₃₇₄	Z ₃₇₅	Y ₃₇₅	Z ₃₇₆	Y ₃₇₆	Z ₃₇₇	Y ₃₇₇	Z ₃₇₈	Y ₃₇₈	Z ₃₇₉	Y ₃₇₉	Z ₃₈₀	Y ₃₈₀	Z ₃₈₁	Y ₃₈₁	Z ₃₈₂	Y ₃₈₂	Z ₃₈₃	Y ₃₈₃	Z ₃₈₄	Y ₃₈₄	Z ₃₈₅	Y ₃₈₅	Z ₃₈₆	Y ₃₈₆	Z ₃₈₇	Y ₃₈₇	Z ₃₈₈	Y ₃₈₈	Z ₃₈₉	Y ₃₈₉	Z ₃₉₀	Y ₃₉₀	Z ₃₉₁	Y ₃₉₁	Z ₃₉₂	Y ₃₉₂	Z ₃₉₃	Y ₃₉₃	Z ₃₉₄	Y ₃₉₄	Z ₃₉₅	Y ₃₉₅	Z ₃₉₆	Y ₃₉₆	Z ₃₉₇	Y ₃₉₇	Z ₃₉₈	Y ₃₉₈	Z ₃₉₉	Y ₃₉₉	Z ₄₀₀	Y ₄₀₀	Z ₄₀₁	Y ₄₀₁	Z ₄₀₂	Y ₄₀₂	Z ₄₀₃	Y ₄₀₃	Z ₄₀₄	Y ₄₀₄	Z ₄₀₅	Y ₄₀₅	Z ₄₀₆	Y ₄₀₆	Z ₄₀₇	Y ₄₀₇	Z ₄₀₈	Y ₄₀₈	Z ₄₀₉	Y ₄₀₉	Z ₄₁₀	Y ₄₁₀	Z ₄₁₁	Y ₄₁₁	Z ₄₁₂	Y ₄₁₂	Z ₄₁₃	Y ₄₁₃	Z ₄₁₄	Y ₄₁₄	Z ₄₁₅	Y ₄₁₅	Z ₄₁₆	Y ₄₁₆	Z ₄₁₇	Y ₄₁₇	Z ₄₁₈	Y ₄₁₈	Z ₄₁₉	Y ₄₁₉	Z ₄₂₀	Y ₄₂₀	Z ₄₂₁	Y ₄₂₁	Z ₄₂₂	Y ₄₂₂	Z ₄₂₃	Y ₄₂₃	Z ₄₂₄	Y ₄₂₄	Z ₄₂₅	Y ₄₂₅	Z ₄₂₆	Y ₄₂₆	Z ₄₂₇	Y ₄₂₇	Z ₄₂₈	Y ₄₂₈	Z ₄₂₉	Y ₄₂₉	Z ₄₃₀	Y ₄₃₀	Z ₄₃₁	Y ₄₃₁	Z ₄₃₂	Y ₄₃₂	Z ₄₃₃	Y ₄₃₃	Z ₄₃₄	Y ₄₃₄	Z ₄₃₅	Y ₄₃₅	Z ₄₃₆	Y ₄₃₆	Z ₄₃₇	Y ₄₃₇	Z ₄₃₈	Y ₄₃₈	Z ₄₃₉	Y ₄₃₉	Z ₄₄₀	Y ₄₄₀	Z ₄₄₁	Y ₄₄₁	Z ₄₄₂	Y ₄₄₂	Z ₄₄₃	Y ₄₄₃	Z ₄₄₄	Y ₄₄₄	Z ₄₄₅	Y ₄₄₅	Z ₄₄₆	Y ₄₄₆	Z ₄₄₇	Y ₄₄₇	Z ₄₄₈	Y ₄₄₈	Z ₄₄₉	Y ₄₄₉	Z ₄₅₀	Y ₄₅₀	Z ₄₅₁	Y ₄₅₁	Z ₄₅₂	Y ₄₅₂	Z ₄₅₃	Y ₄₅₃	Z ₄₅₄	Y ₄₅₄	Z ₄₅₅	Y ₄₅₅	Z ₄₅₆	Y ₄₅₆	Z ₄₅₇	Y ₄₅₇	Z ₄₅₈	Y ₄₅₈	Z ₄₅₉	Y ₄₅₉
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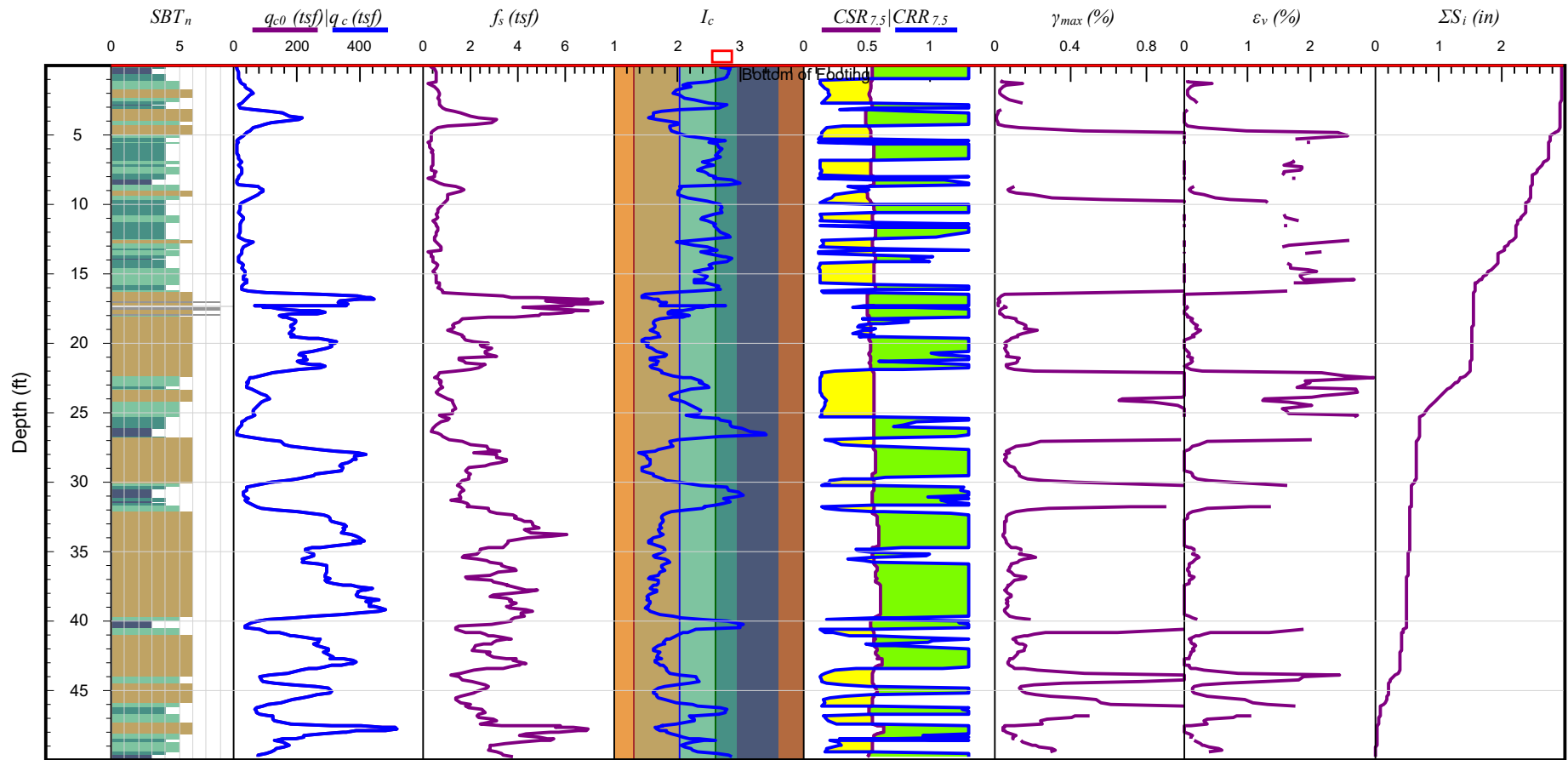
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	F ₀	F ₁	F ₂	F ₃	F ₄	F ₅	F ₆	F ₇	F ₈	F ₉	F ₁₀	F ₁₁	F ₁₂	F ₁₃	F ₁₄	F ₁₅	F ₁₆	F ₁₇	F ₁₈	F ₁₉	F ₂₀	F ₂₁	F ₂₂	F ₂₃	F ₂₄	F ₂₅	F ₂₆	F ₂₇	F ₂₈	F ₂₉	F ₃₀	F ₃₁	F ₃₂	F ₃₃	F ₃₄	F ₃₅	F ₃₆	F ₃₇	F ₃₈	F ₃₉	F ₄₀	F ₄₁	F ₄₂	F ₄₃	F ₄₄	F ₄₅	F ₄₆	F ₄₇	F ₄₈	F ₄₉	F ₅₀	F ₅₁	F ₅₂	F ₅₃	F ₅₄	F ₅₅	F ₅₆	F ₅₇	F ₅₈	F ₅₉	F ₆₀	F ₆₁	F ₆₂	F ₆₃	F ₆₄	F ₆₅	F ₆₆	F ₆₇	F ₆₈	F ₆₉	F ₇₀	F ₇₁	F ₇₂	F ₇₃	F ₇₄	F ₇₅	F ₇₆	F ₇₇	F ₇₈	F ₇₉	F ₈₀	F ₈₁	F ₈₂	F ₈₃	F ₈₄	F ₈₅	F ₈₆	F ₈₇	F ₈₈	F ₈₉	F ₉₀	F ₉₁	F ₉₂	F ₉₃	F ₉₄	F ₉₅	F ₉₆	F ₉₇	F ₉₈	F ₉₉	F ₁₀₀	F ₁₀₁	F ₁₀₂	F ₁₀₃	F ₁₀₄	F ₁₀₅	F ₁₀₆	F ₁₀₇	F ₁₀₈	F ₁₀₉	F ₁₁₀	F ₁₁₁	F ₁₁₂	F ₁₁₃	F ₁₁₄	F ₁₁₅	F ₁₁₆	F ₁₁₇	F ₁₁₈	F ₁₁₉	F ₁₂₀	F ₁₂₁	F ₁₂₂	F ₁₂₃	F ₁₂₄	F ₁₂₅	F ₁₂₆	F ₁₂₇	F ₁₂₈	F ₁₂₉	F ₁₃₀	F ₁₃₁	F ₁₃₂	F ₁₃₃	F ₁₃₄	F ₁₃₅	F ₁₃₆	F ₁₃₇	F ₁₃₈	F ₁₃₉	F ₁₄₀	F ₁₄₁	F ₁₄₂	F ₁₄₃	F ₁₄₄	F ₁₄₅	F ₁₄₆	F ₁₄₇	F ₁₄₈	F ₁₄₉	F ₁₅₀	F ₁₅₁	F ₁₅₂	F ₁₅₃	F ₁₅₄	F ₁₅₅	F ₁₅₆	F ₁₅₇	F ₁₅₈	F ₁₅₉	F ₁₆₀	F ₁₆₁	F ₁₆₂	F ₁₆₃	F ₁₆₄	F ₁₆₅	F ₁₆₆	F ₁₆₇	F ₁₆₈	F ₁₆₉	F ₁₇₀	F ₁₇₁	F ₁₇₂	F ₁₇₃	F ₁₇₄	F ₁₇₅	F ₁₇₆	F ₁₇₇	F ₁₇₈	F ₁₇₉	F ₁₈₀	F ₁₈₁	F ₁₈₂	F ₁₈₃	F ₁₈₄	F ₁₈₅	F ₁₈₆	F ₁₈₇	F ₁₈₈	F ₁₈₉	F ₁₉₀	F ₁₉₁	F ₁₉₂	F ₁₉₃	F ₁₉₄	F ₁₉₅	F ₁₉₆	F ₁₉₇	F ₁₉₈	F ₁₉₉	F ₂₀₀	F ₂₀₁	F ₂₀₂	F ₂₀₃	F ₂₀₄	F ₂₀₅	F ₂₀₆	F ₂₀₇	F ₂₀₈	F ₂₀₉	F ₂₁₀	F ₂₁₁	F ₂₁₂	F ₂₁₃	F ₂₁₄	F ₂₁₅	F ₂₁₆	F ₂₁₇	F ₂₁₈	F ₂₁₉	F ₂₂₀	F ₂₂₁	F ₂₂₂	F ₂₂₃	F ₂₂₄	F ₂₂₅	F ₂₂₆	F ₂₂₇	F ₂₂₈	F ₂₂₉	F ₂₃₀	F ₂₃₁	F ₂₃₂	F ₂₃₃	F ₂₃₄	F ₂₃₅	F ₂₃₆	F ₂₃₇	F ₂₃₈	F ₂₃₉	F ₂₄₀	F ₂₄₁	F ₂₄₂	F ₂₄₃	F ₂₄₄	F ₂₄₅	F ₂₄₆	F ₂₄₇	F ₂₄₈	F ₂₄₉	F ₂₅₀	F ₂₅₁	F ₂₅₂	F ₂₅₃	F ₂₅₄	F ₂₅₅	F ₂₅₆	F ₂₅₇	F ₂₅₈	F ₂₅₉	F ₂₆₀	F ₂₆₁	F ₂₆₂	F ₂₆₃	F ₂₆₄	F ₂₆₅	F ₂₆₆	F ₂₆₇	F ₂₆₈	F ₂₆₉	F ₂₇₀	F ₂₇₁	F ₂₇₂	F ₂₇₃	F ₂₇₄	F ₂₇₅	F ₂₇₆	F ₂₇₇	F ₂₇₈	F ₂₇₉	F ₂₈₀	F ₂₈₁	F ₂₈₂	F ₂₈₃	F ₂₈₄	F ₂₈₅	F ₂₈₆	F ₂₈₇	F ₂₈₈	F ₂₈₉	F ₂₉₀	F ₂₉₁	F ₂₉₂	F ₂₉₃	F ₂₉₄	F ₂₉₅	F ₂₉₆	F ₂₉₇	F ₂₉₈	F ₂₉₉	F ₃₀₀	F ₃₀₁	F ₃₀₂	F ₃₀₃	F ₃₀₄	F ₃₀₅	F ₃₀₆	F ₃₀₇	F ₃₀₈	F ₃₀₉	F ₃₁₀	F ₃₁₁	F ₃₁₂	F ₃₁₃	F ₃₁₄	F ₃₁₅	F ₃₁₆	F ₃₁₇	F ₃₁₈	F ₃₁₉	F ₃₂₀	F ₃₂₁	F ₃₂₂	F ₃₂₃	F ₃₂₄	F ₃₂₅	F ₃₂₆	F ₃₂₇	F ₃₂₈	F ₃₂₉	F ₃₃₀	F ₃₃₁	F ₃₃₂	F ₃₃₃	F ₃₃₄	F ₃₃₅	F ₃₃₆	F ₃₃₇	F ₃₃₈	F ₃₃₉	F ₃₄₀	F ₃₄₁	F ₃₄₂	F ₃₄₃	F ₃₄₄	F ₃₄₅	F ₃₄₆	F ₃₄₇	F ₃₄₈	F ₃₄₉	F ₃₅₀	F ₃₅₁	F ₃₅₂	F ₃₅₃	F ₃₅₄	F ₃₅₅	F ₃₅₆	F ₃₅₇	F ₃₅₈	F ₃₅₉	F ₃₆₀	F ₃₆₁	F ₃₆₂	F ₃₆₃	F ₃₆₄	F ₃₆₅	F ₃₆₆	F ₃₆₇	F ₃₆₈	F ₃₆₉	F ₃₇₀	F ₃₇₁	F ₃₇₂	F ₃₇₃	F ₃₇₄	F ₃₇₅	F ₃₇₆	F ₃₇₇	F ₃₇₈	F ₃₇₉	F ₃₈₀	F ₃₈₁	F ₃₈₂	F ₃₈₃	F ₃₈₄	F ₃₈₅	F ₃₈₆	F ₃₈₇	F ₃₈₈	F ₃₈₉	F ₃₉₀	F ₃₉₁	F ₃₉₂	F ₃₉₃	F ₃₉₄	F ₃₉₅	F ₃₉₆	F ₃₉₇	F ₃₉₈	F ₃₉₉	F ₄₀₀	F ₄₀₁	F ₄₀₂	F ₄₀₃	F ₄₀₄	F ₄₀₅	F ₄₀₆	F ₄₀₇	F ₄₀₈	F ₄₀₉	F ₄₁₀	F ₄₁₁	F ₄₁₂	F ₄₁₃	F ₄₁₄	F ₄₁₅	F ₄₁₆	F ₄₁₇	F ₄₁₈	F ₄₁₉	F ₄₂₀	F ₄₂₁	F ₄₂₂	F ₄₂₃	F ₄₂₄	F ₄₂₅	F ₄₂₆	F ₄₂₇	F ₄₂₈	F ₄₂₉	F ₄₃₀	F ₄₃₁	F ₄₃₂	F ₄₃₃	F ₄₃₄	F ₄₃₅	F ₄₃₆	F ₄₃₇	F ₄₃₈	F ₄₃₉	F ₄₄₀	F ₄₄₁	F ₄₄₂	F ₄₄₃	F ₄₄₄	F ₄₄₅	F ₄₄₆	F ₄₄₇	F ₄₄₈	F ₄₄₉	F ₄₅₀	F ₄₅₁	F ₄₅₂	F ₄₅₃	F ₄₅₄	F ₄₅₅	F ₄₅₆	F ₄₅₇	F ₄₅₈	F ₄₅₉	F ₄₆₀	F ₄₆₁	F ₄₆₂	F ₄₆₃	F ₄₆₄	F ₄₆₅	F ₄₆₆	F ₄₆₇	F ₄₆₈	F ₄₆₉	F ₄₇₀	F ₄₇₁	F ₄₇₂	F ₄₇₃	F ₄₇₄	F ₄₇₅	F ₄₇₆	F ₄₇₇	F ₄₇₈	F ₄₇₉	F ₄₈₀	F ₄₈₁	F ₄₈₂	F ₄₈₃	F ₄₈₄	F ₄₈₅	F ₄₈₆	F ₄₈₇	F ₄₈₈	F ₄₈₉	F ₄₉₀	F ₄₉₁	F ₄₉₂	F ₄₉₃	F ₄₉₄	F ₄₉₅	F ₄₉₆	F ₄₉₇	F ₄₉₈	F ₄₉₉	F ₅₀₀	F ₅₀₁	F ₅₀₂	F ₅₀₃	F ₅₀₄	F ₅₀₅	F ₅₀₆	F ₅₀₇	F ₅₀₈	F ₅₀₉	F ₅₁₀	F ₅₁₁	F ₅₁₂	F ₅₁₃	F ₅₁₄	F ₅₁₅	F ₅₁₆	F ₅₁₇	F ₅₁₈	F ₅₁₉	F ₅₂₀	F ₅₂₁	F ₅₂₂	F ₅₂₃	F ₅₂₄	F ₅₂₅	F ₅₂₆	F ₅₂₇	F ₅₂₈	F ₅₂₉	F ₅₃₀	F ₅₃₁	F ₅₃₂	F ₅₃₃	F ₅₃₄	F ₅₃₅	F ₅₃₆	F ₅₃₇	F ₅₃₈	F ₅₃₉	F ₅₄₀	F ₅₄₁	F ₅₄₂	F ₅₄₃	F ₅₄₄	F ₅₄₅	F ₅₄₆	F ₅₄₇	F ₅₄₈	F ₅₄₉	F ₅₅₀	F ₅₅₁	F ₅₅₂	F ₅₅₃	F ₅₅₄	F ₅₅₅	F ₅₅₆	F ₅₅₇	F ₅₅₈	F ₅₅₉	F ₅₆₀	F ₅₆₁	F ₅₆₂	F ₅₆₃	F ₅₆₄	F ₅₆₅	F ₅₆₆	F ₅₆₇	F ₅₆₈	F ₅₆₉	F ₅₇₀	F ₅₇₁	F ₅₇₂	F ₅₇₃	F ₅₇₄	F ₅₇₅	F ₅₇₆	F ₅₇₇	F ₅₇₈	F ₅₇₉	F ₅₈₀	F ₅₈₁	F ₅₈₂	F ₅₈₃	F ₅₈₄	F ₅₈₅	F ₅₈₆	F ₅₈₇	F ₅₈₈	F ₅₈₉	F ₅₉₀	F ₅₉₁	F ₅₉₂	F ₅₉₃	F ₅₉₄	F ₅₉₅	F ₅₉₆	F ₅₉₇	F ₅₉₈	F ₅₉₉	F ₆₀₀	F ₆₀₁	F ₆₀₂	F ₆₀₃	F ₆₀₄	F ₆₀₅	F ₆₀₆	F ₆₀₇	F ₆₀₈	F ₆₀₉	F ₆₁₀	F ₆₁₁	F ₆₁₂	F ₆₁₃	F ₆₁₄	F ₆₁₅	F ₆₁₆	F ₆₁₇	F ₆₁₈	F ₆₁₉	F ₆₂₀	F ₆₂₁	F ₆₂₂	F ₆₂₃	F ₆₂₄	F ₆₂₅	F ₆₂₆	F ₆₂₇	F ₆₂₈	F ₆₂₉	F ₆₃₀	F ₆₃₁	F ₆₃₂	F ₆₃₃	F ₆₃₄	F ₆₃₅	F ₆₃₆	F ₆₃₇	F ₆₃₈	F ₆₃₉	F ₆₄₀	F ₆₄₁	F ₆₄₂	F ₆₄₃	F ₆₄₄	F ₆₄₅	F ₆₄₆	F ₆₄₇	F ₆₄₈	F ₆₄₉	F ₆₅₀	F ₆₅₁	F ₆₅₂	F ₆₅₃	F ₆₅₄	F ₆₅₅	F ₆₅₆	F ₆₅₇	F ₆₅₈	F ₆₅₉	F ₆₆₀	F ₆₆₁	F ₆₆₂	F ₆₆₃	F ₆₆₄	F ₆₆₅	F ₆₆₆	F ₆₆₇	F ₆₆₈	F ₆₆₉	F ₆₇₀	F ₆₇₁	F ₆₇₂	F ₆₇₃	F ₆₇₄	F ₆₇₅	F ₆₇₆	F ₆₇₇	F ₆₇₈	F ₆₇₉	F ₆₈₀	F ₆₈₁	F ₆₈₂	F ₆₈₃	F ₆₈₄	F ₆₈₅	F ₆₈₆	F ₆₈₇	F ₆₈₈	F ₆₈₉	F ₆₉₀	F ₆₉₁	F ₆₉₂	F ₆₉₃	F ₆₉₄	F ₆₉₅	F ₆₉₆	F ₆₉₇	F ₆₉₈	F ₆₉₉	F ₇₀₀	F ₇₀₁	F ₇₀₂	F ₇₀₃	F ₇₀₄	F ₇₀₅	F ₇₀₆	F ₇₀₇	F ₇₀₈	F ₇₀₉	F ₇₁₀	F ₇₁₁	F ₇₁₂	F ₇₁₃	F ₇₁₄	F ₇₁₅	F ₇₁₆	F ₇₁₇	F ₇₁₈	F ₇₁₉	F ₇₂₀	F ₇₂₁	F ₇₂₂	F ₇₂₃	F ₇₂₄	F ₇₂₅	F ₇₂₆	F ₇₂₇	F ₇₂₈	F ₇₂₉	F ₇₃₀	F ₇₃₁	F ₇₃₂	F ₇₃₃	F ₇₃₄	F ₇₃₅	F ₇₃₆	F ₇₃₇	F ₇₃₈	F ₇₃₉	F ₇₄₀	F ₇₄₁	F ₇₄₂	F ₇₄₃	F ₇₄₄	F ₇₄₅	F ₇₄₆	F ₇₄₇	F ₇₄₈	F ₇₄₉	F ₇₅₀	F ₇₅₁	F ₇₅₂	F ₇₅₃	F ₇₅₄	F ₇₅₅	F ₇₅₆	F ₇₅₇	F ₇₅₈	F ₇₅₉	F ₇₆₀	F ₇₆₁	F ₇₆₂	F ₇₆₃	F ₇₆₄	F ₇₆₅	F ₇₆₆	F ₇₆₇	F ₇₆₈	F ₇₆₉	F ₇₇₀	F ₇₇₁	F ₇₇₂	F ₇₇₃	F ₇₇₄	F ₇₇₅	F ₇₇₆	F ₇₇₇	F ₇₇₈	F ₇₇₉	F ₇₈₀	F ₇₈₁	F ₇₈₂	F ₇₈₃	F ₇₈₄	F ₇₈₅	F ₇₈₆	F ₇₈₇	F ₇₈₈	F ₇₈₉	F ₇₉₀	F ₇₉₁	F ₇₉₂	F ₇₉₃	F ₇₉₄	F ₇₉₅	F ₇₉₆	F ₇₉₇	F ₇₉₈	F ₇₉₉	F ₈₀₀	F ₈₀₁	F ₈₀₂	F ₈₀₃	F ₈₀₄	F ₈₀₅	F ₈₀₆	F ₈₀₇	F ₈₀₈	F ₈₀₉	F ₈₁₀	F ₈₁₁	F ₈₁₂	F ₈₁₃	F ₈₁₄	F ₈₁₅	F ₈₁₆	F ₈₁₇	F ₈₁₈	F ₈₁₉	F ₈₂₀	F ₈₂₁	F ₈₂₂	F ₈₂₃	F ₈₂₄	F ₈₂₅	F ₈₂₆	F ₈₂₇	F ₈₂₈	F ₈₂₉	F ₈₃₀	F ₈₃₁	F ₈₃₂	F ₈₃₃	F ₈₃₄	F ₈₃₅	F ₈₃₆	F ₈₃₇	F ₈₃₈	F ₈₃₉	F ₈₄₀	F ₈₄₁	F ₈₄₂	F ₈₄₃	F ₈₄₄	F ₈₄₅	F ₈₄₆	F ₈₄₇	F 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- Sensitive fine grained
- Organic soils - peats
- Clay to silty clay
- Silty clay to clayey silt
- Sandy silt to silty sand
- Silty sand to clean sand
- Dense sand to gravelly sand
- Clayey sand to very stiff sand

Very stiff fine grained *

* Overconsolidated or cemented

Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 75 ft
Maximum Settlement = 2.96 in
Settl. at Bottom of Footing = 2.96 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand; Clay] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)



Seismic Settlement Potential - CPT Data

Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-3	Figure:	7

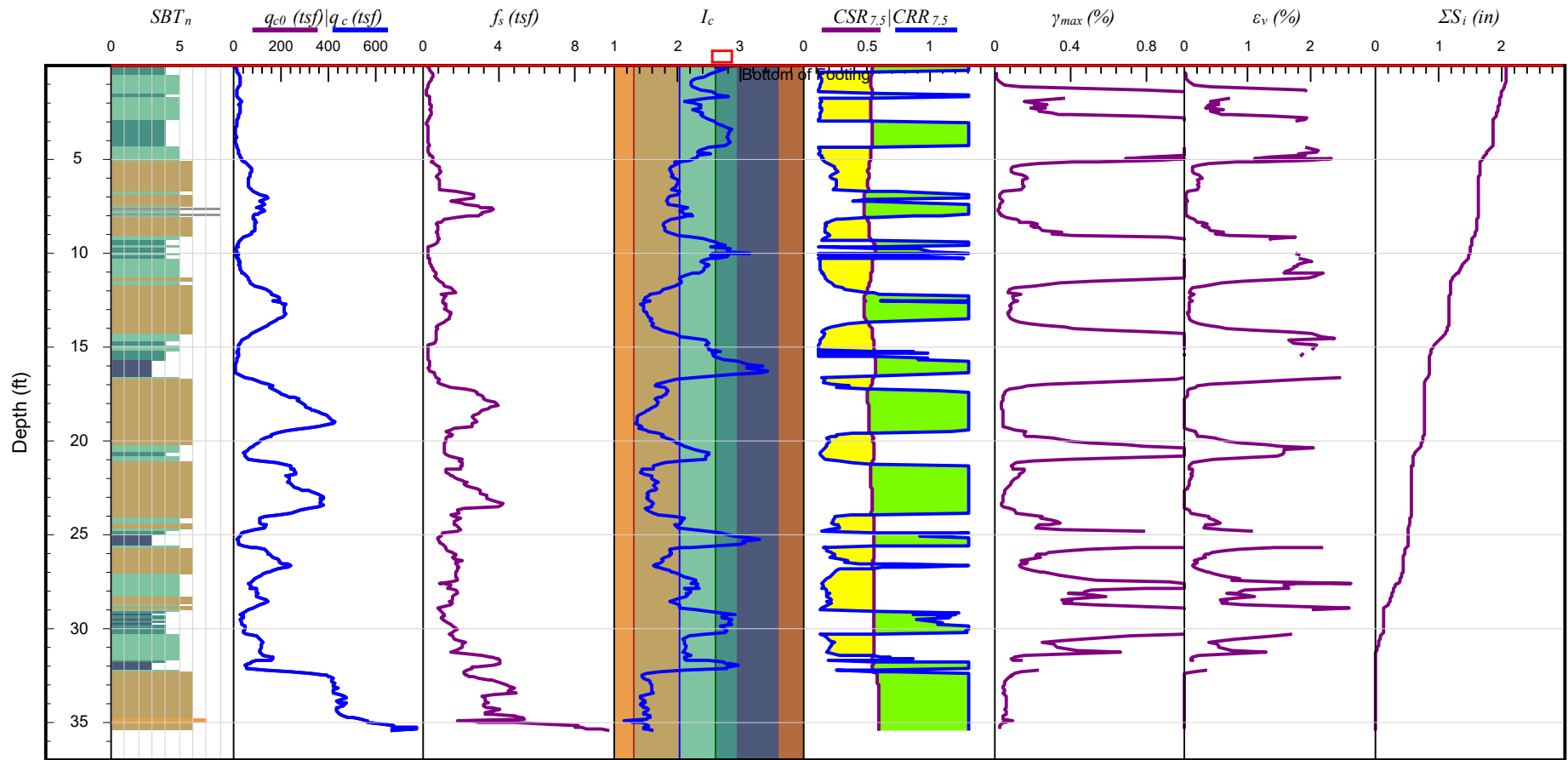
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- Sensitive fine grained
- Organic soils - peats
- Clay to silty clay
- Silty clay to clayey silt
- Sandy silt to silty sand
- Silty sand to clean sand
- Dense sand to gravelly sand
- Clayey sand to very stiff sand

- Very stiff fine grained *
- * Overconsolidated or cemented

Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 75 ft
Maximum Settlement = 2.06 in
Settl. at Bottom of Footing = 2.06 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand; Clay] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)

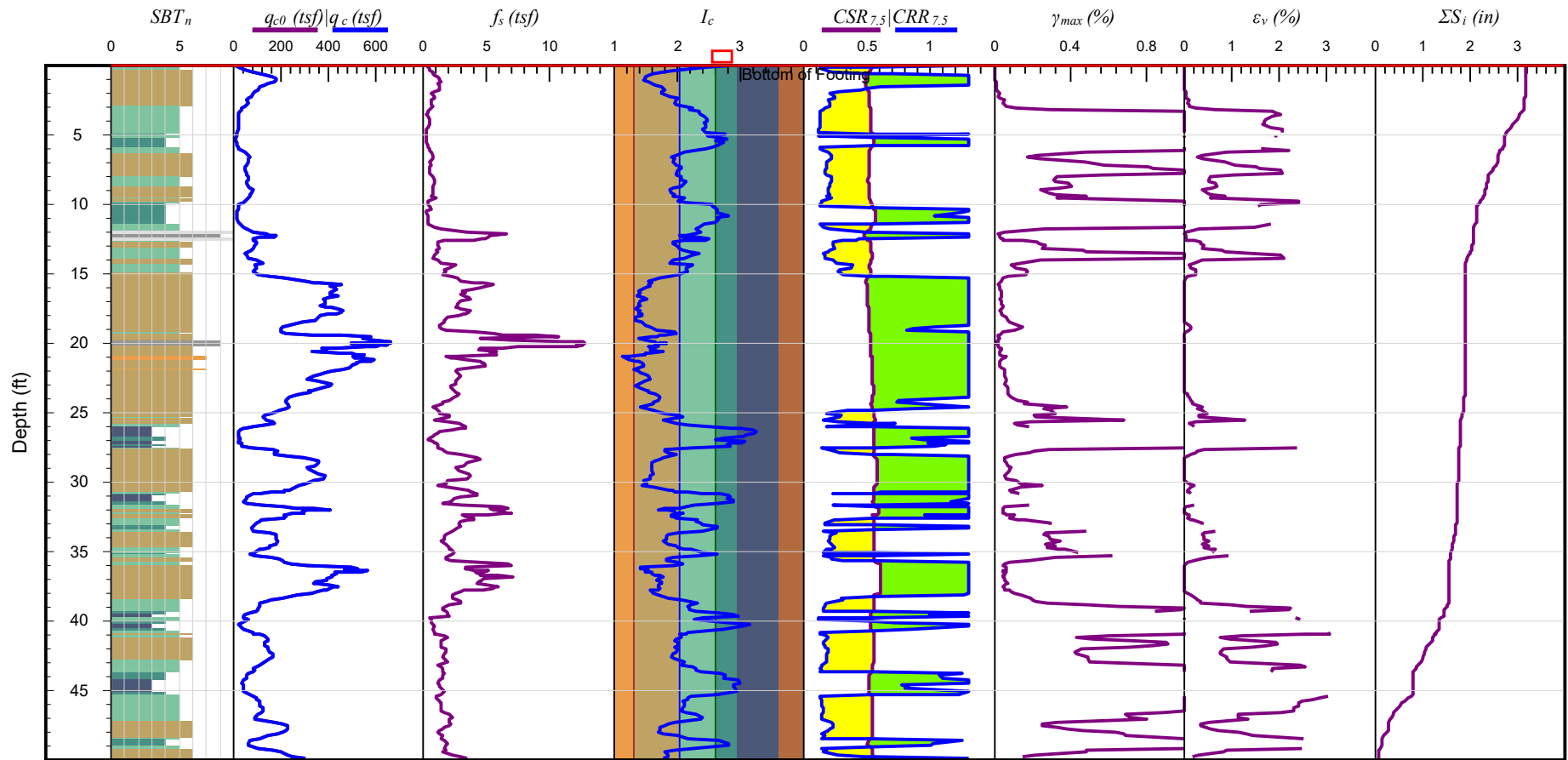


Seismic Settlement Potential - CPT Data

Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-4	Figure:	8

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915	2916	2917	2918	2919	2920	2921	2922	2923	2924	2925	2926	2927	2928	2929	2930	2931	2932	2933	2934	2935	2936	2937	2938	2939	2940	2941	2942	2943	2944	2945	2946	2947	2948	2949	2950	2951	2952	2953	2954	2955	2956	2957	2958	2959	2960	2961	2962	2963	2964	2965	2966	2967	2968	2969	2970	2971	2972	2973	2974	2975	2976	2977	2978	2979	2980	2981	2982	2983	2984	2985	2986	2987	2988	2989	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- Sensitive fine grained
- Organic soils - peats
- Clay to silty clay
- Silty clay to clayey silt
- Sandy silt to silty sand
- Silty sand to clean sand
- Dense sand to gravelly sand
- Clayey sand to very stiff sand

■ Very stiff fine grained *

* Overconsolidated or cemented

Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 75 ft
Maximum Settlement = 3.16 in
Settl. at Bottom of Footing = 3.16 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand; Clay] Boulanger & Idriss(2004)
sigma_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)



Seismic Settlement Potential - CPT Data

Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-5	Figure:	9

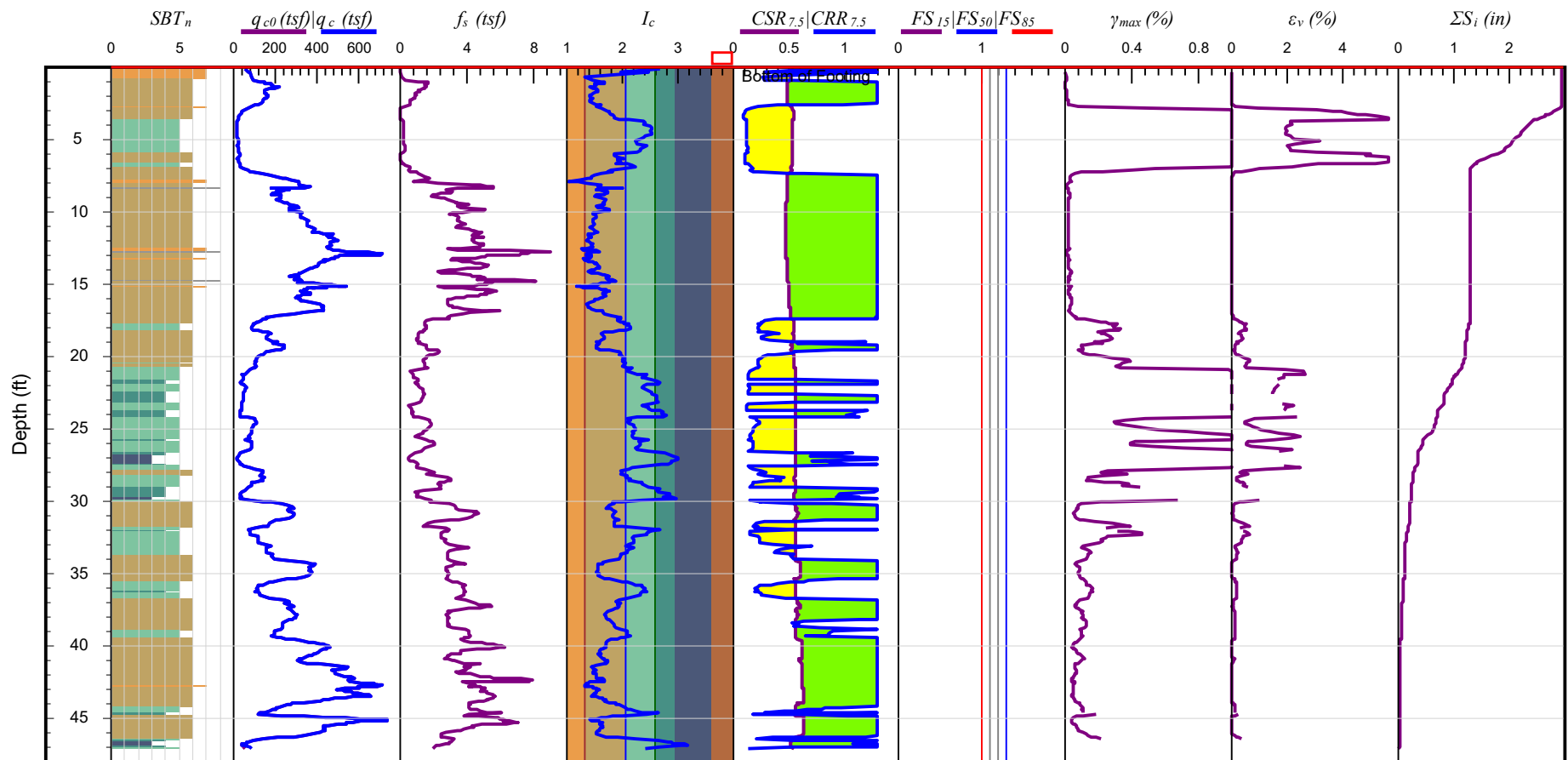
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- Sensitive fine grained
- Organic soils - peats
- Clay to silty clay
- Silty clay to clayey silt
- Sandy silt to silty sand
- Silty sand to clean sand
- Dense sand to gravelly sand
- Clayey sand to very stiff sand

- Very stiff fine grained *
- * Overconsolidated or cemented

Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 75 ft
Maximum Settlement = 2.94 in
Settl. at Bottom of Footing = 2.94 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand; Clay] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)



Seismic Settlement Potential - CPT Data

Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-6	Figure:	10




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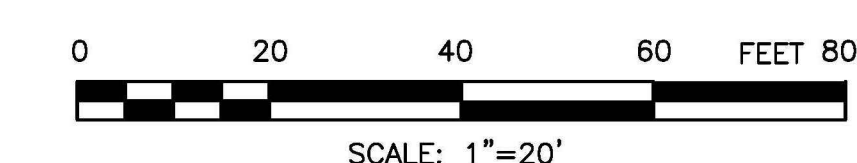
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 CPT-6 Approximate Location of Cone Penetration Test (CPT)
 B-4 Approximate Location of Exploratory Boring
 A-A' Geotechnical Cross Section




 Gorian & Associates, Inc. <i>Applied Earth Sciences</i>	
Job No: 3242-0-0-100	Date: Aug. 2023
Scale: 1" = 20'	Drawn by: _____ Approved by: _____

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 CPT-6 Approximate Location of Cone Penetration Test (CPT)
 B-4 Approximate Location of Exploratory Boring
 A-A' Geotechnical Cross Section



 Gorian & Associates, Inc. <i>Applied Earth Sciences</i>	
Job No: 3242-0-0-100	Date: Aug. 2023
Scale: 1" = 20'	Drawn by: Approved by:
PLATE 1b	

GRADING PLAN

SHEET NUMBER: _____

C-4

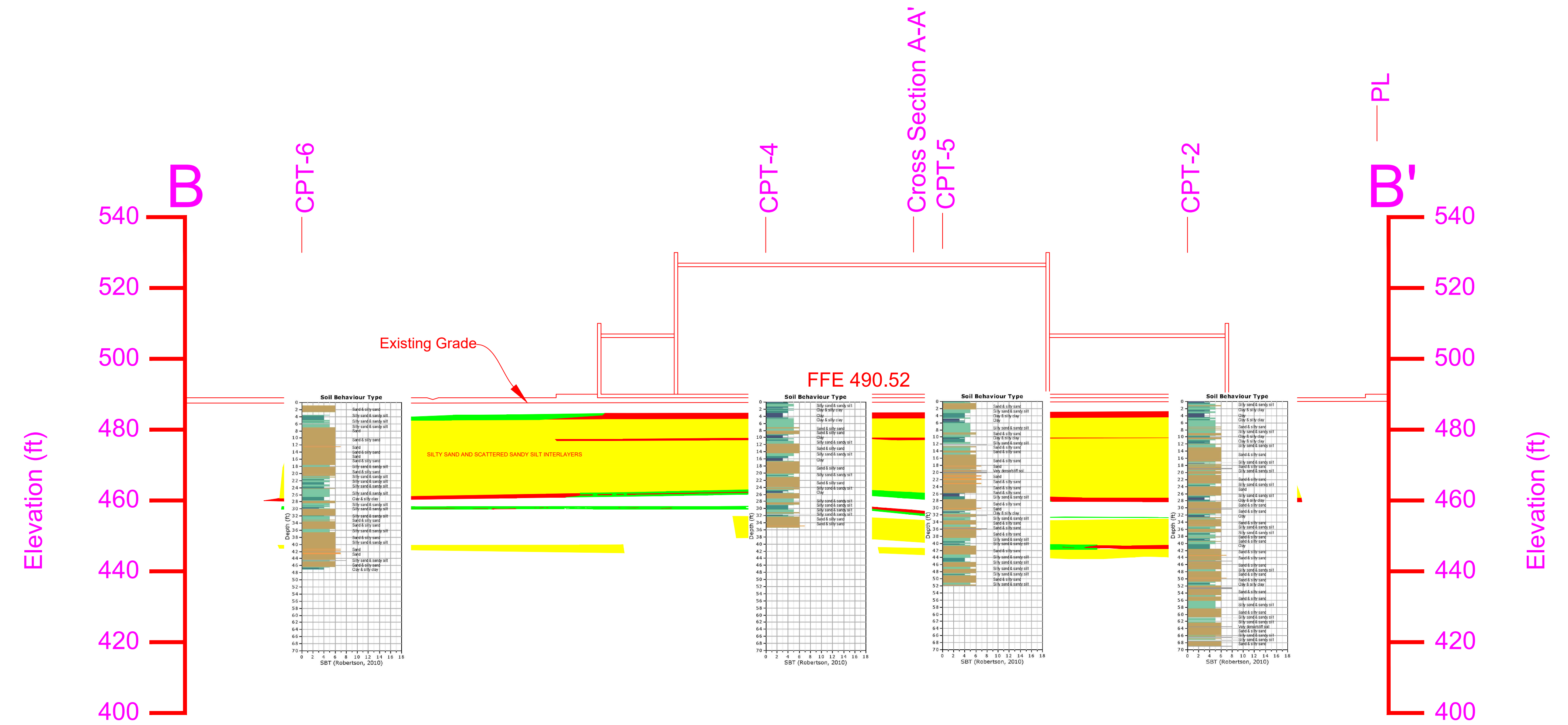
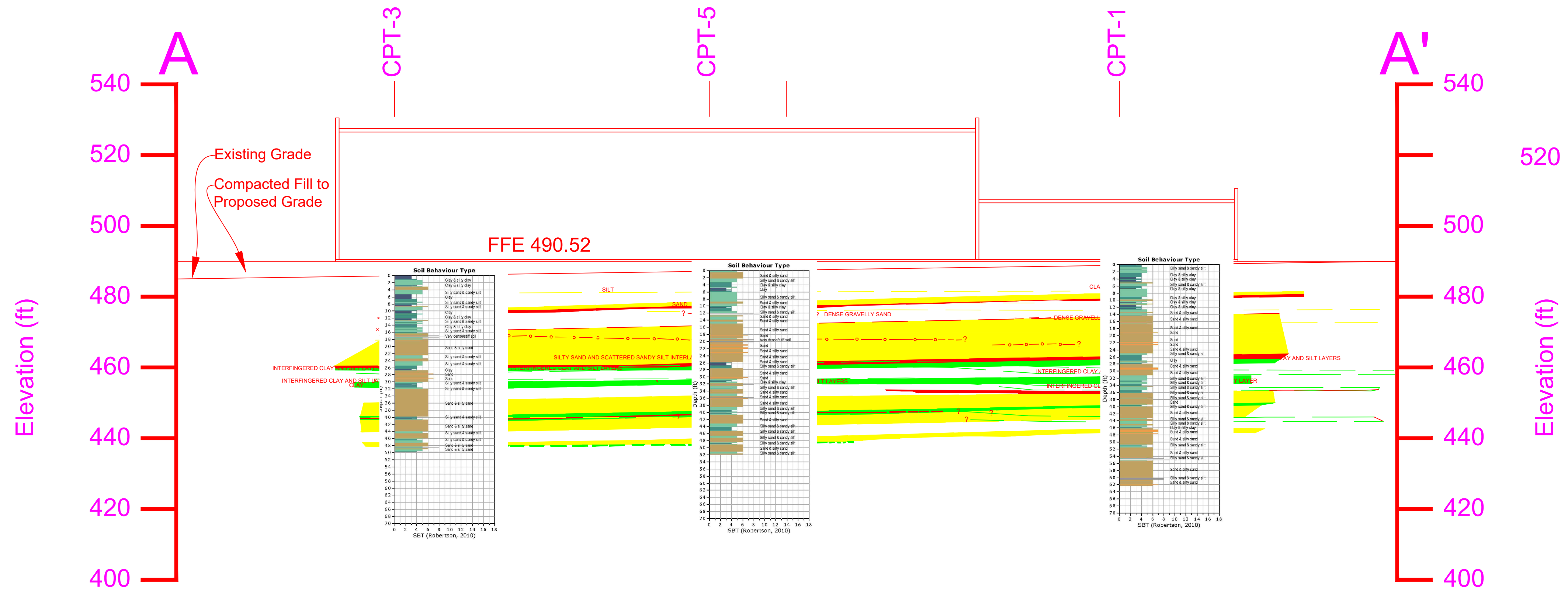
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GRADING PLAN	SCALE	1
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C-4



Geotechnical Cross Sections



Applied Earth Sciences
Geotechnical Engineers
Engineering Geologists
DSA Accepted Testing Laboratory
Special Inspection and Materials Testing

3595 Old Conejo Road
Thousand Oaks
California 91320-2122
805 375-9262

January 10, 2024

Fillmore Unified School District
627 Sespe Avenue
Fillmore, CA 93015

Work Order: 3242-0-0-101

Attention: Mr. Chris Cline
Bond Facilities Project Manager

Subject: Response to the California Geological Survey (CGS), Engineering Geology and Seismology Review for Fillmore High School – New Athletic Complex dated December 21, 2023, 555 Central Avenue, Fillmore, Ventura County, California

Reference: California Geological Survey (CGS), December 21, 2023, *Engineering Geology and Seismology Review for Fillmore High School – New Athletic Complex 555 Central Avenue, Fillmore, CA*, CGS Application No. 03-CGS6144

California Geological Survey (CGS), 2002, *Seismic Hazard Zone Report for the Fillmore 7.5-Minute Quadrangle, Ventura County, California. Revised 2005 & 2006*. CGS Seismic Hazard Zone Report 071.

Gorian and Associates, Inc., August 24, 2023, Geotechnical Site Evaluation Report for Fillmore High School Sports Complex, 555 Central Avenue, Fillmore, Ventura County, California, Work Order:3242-0-0-100

Ishihara, K., 1985, *Stability of natural deposits during earthquakes*, Proceedings of the Eleventh International Conference on Soil Mechanics and Foundation Engineering, A.A. Balkema Publishers, Rotterdam, Netherlands.

INTRODUCTION

Provided herein are our responses to the California Geological Survey (CGS) Engineering Geology and Seismology Review dated December 21, 2023 of the reference geotechnical report for design and construction of the New Athletic Complex at Fillmore High School at 555 Central Avenue in Fillmore, California. The CGS review is attached for reference and our responses are provided in the following sections.

REVIEW

In the California Geological Survey (CGS) review letter dated December 21, 2023 it is indicated that all of the Note 48 Checklist Review Comments have been adequately addressed except for the *Liquefaction/Seismic Settlement Analysis*. CGS is requesting a revision of the liquefaction analysis

presented in the reference geotechnical report based on the historic groundwater presented in Seismic Hazard Zone Report for the Fillmore 7.5-Minute Quadrangle. The following are responses to the comments under the section *Liquefaction/Seismic Settlement Analysis*.

LIQUEFACTION/SEISMIC SETTLEMENT ANALYSIS

Comment 19. Geologic Setting for Occurrence of Liquefaction: **Additional information is requested.** The consultants note the Seismic Hazard Zone (SHZ) Report for the Fillmore Quadrangle (CGS, 2002) indicates a historical high groundwater depth at approximately 34 feet BGS at the project site. However, the consultants characterize the groundwater to be below a depth of 50 feet BGS based on basin-wide reports and well data. CGS notes that **the cited references map groundwater depths at a regional scale when compared to the CGS SHZ Report and/or are indicative of single year data rather than known historical groundwater depths, which can lead to a mischaracterization of groundwater conditions.** CGS notes that there may be potential for liquefaction given the presence of low blow-count granular soils below the historical high depth to groundwater. The consultants are requested to revise their screening analysis of liquefaction using the historical-high depth to groundwater.

Response:

The historical high groundwater depth of approximately 34 feet below the ground surface for the site was estimated from Plate 1.2 of the *Seismic Hazard Zone Report for the Fillmore 7.5-Minute Quadrangle, Ventura County, California*. We have used a groundwater depth of 34 feet in the following liquefaction calculations.

Comment 20: Seismic Settlement Calculations: Additional information is requested. The consultants are requested to revise their settlement calculations of liquefaction using the historical-high depth to groundwater. Additionally, the maximum differential settlement within the site should be defined by the maximum difference found in total settlement between any two of the borings or CPTs over their distance apart.

Response:

The potential for liquefaction to occur at the site was reevaluated as requested using a groundwater depth of 34 feet. The analysis was performed as indicated in the reference geotechnical report. The results are presented in the following table. Calculation sheets can be found in Appendix A of this report.

Data Point	Previous Estimated Seismic Settlement (inches)	Revised Estimated Seismic Settlement (inches)	Data Point	Previous Estimated Seismic Settlement (inches)	Revised Estimated Seismic Settlement (inches)
B-1	.12	0.20	CPT-1	1.9	3.60
B-2	.35	0.44	CPT-2	1.7	3.15
B-3	.48	1.22	CPT-3	2.2	2.57
B-4	1.9	2.38	CPT-4	1.1	2.06
			CPT-5	2.0	3.54
			CPT-6	1.2	2.55

An average of the potential for seismic induced settlement across the site based on the borings is 1.06 inch and CPTs is 2.91 inches.

The maximum differential settlement within the site was determined as the maximum difference found in total settlement between two of the borings or CPTs over their distance apart. For the borings, the

maximum differential settlement is 2.18 between borings B-1 and B-4 over a distance of 200 feet equal to .0009L. For the CPTs, using CPT-4 and CPT-5, the differential settlement is 1.48 inch over a distance of 56 feet equal to 0.002L.

Differential settlement can be calculated directly from the difference in settlement between multiple borings or if using one boring, the recommended differential settlement of one half the total settlement based on CGS Note 48 Item 20. Differential settlement may be calculated as the difference in the potential settlement between the borings. In this case we have considered the difference in the CPT soundings (CPT-4 and CPT-5 the closest CPTs). In addition, as stated in SCEC 1999 (page 32) "... it can be concluded that differential settlements at level- ground sites with natural soils are expected to be small even if the total settlement is large compared to the total settlement for conditions that typically exist in southern California."

The building for a new gymnasium and supporting spaces will be constructed using a combination of CMU, Structural Steel and Metal Stud Framing. The potential for differential settlement onsite falls below the upper threshold of 0.007L for single-story structures with concrete or masonry wall systems for single-story structures with concrete or masonry wall systems per ASCE/SEI 7-16 *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*, Table 12.13-3 (Differential Settlement Threshold Risk Category II).

Therefore, a conventional foundation may be designed as a minimum per Note 2 in Section 12.13.9.2.1, where individual foundations shall be integral with or connected to a reinforced slab-on-ground, at least 5 inches thick. The foundation design recommendations presented in the reference geotechnical report remain applicable without changes.

Comment 21: Other Liquefaction Effects: Additional information is requested. The consultant's report that minor fissuring of the ground surface consisting of ground fissures and sand boils may occur during a design level seismic event. The consultants are requested to clarify the basis for this conclusion and characterize the extent and potential impact to the proposed structures.

Response:

To clarify the potential for sand boils, the potential is considered negligible since layers having a potential for liquefaction are 34 feet below the ground surface. This is based on Section 10 titled *Site Identification for Liquefaction - Induced Damage* of the paper by Ishihara (1985) attached for reference in Appendix B. We use Figure 88 of that section to determine the potential for occurrence of liquefaction induced damage. Based on that figure, a surface layer of non-liquefiable material needs to be at least 9 meters (27 feet) thick with regards to the thickness of the underlying liquefiable sand layers in order to avoid liquefaction induced damage for a ground acceleration of 400-500 gal (.4-.5 g). Within the area of the Athletic Complex, the thickness of the non-liquefiable layer is at least 34 feet. Therefore, ground rupture (fissuring) due to liquefaction at depth should not occur within the area of the Athletic Complex.

With regards to fissuring, the potential for fissuring should be negligible to minor, since, only minimal dry sand settlement is noted in the seismic settlement calculations within the upper 30 feet of the site.

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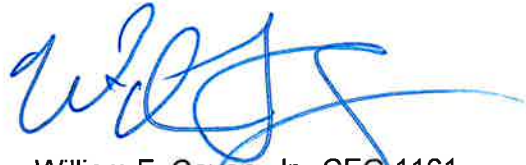
Please contact our office if you have questions concerning this geotechnical report or require additional information.

Respectfully,

Gorian and Associates, Inc.



By: Jerome J. Blunck, GE 151
Principal Geotechnical Engineer



William F. Cavan, Jr., CEG 1161
Principal Engineering Geologist



Attachments: California Geological Survey (CGS) review letter dated December 21, 2023, Engineering Geology and Seismology Review for Fillmore High School – New Athletic Complex 555 Central Avenue, Fillmore, CA, CGS Application No. 03-CGS6144

Appendix A: Liquefaction Analyses

Appendix B: Ishihara (1985) Section 10 titled Site Identification for Liquefaction - Induced Damage



Andrea McNeill
Assistant Superintendent, Business Services
Fillmore Unified School District
627 Sespe Avenue,
Fillmore, CA 93015

December 21, 2023

**Subject: Engineering Geology and Seismology Review for
Fillmore High School – New Athletic Complex
555 Central Avenue, Fillmore, CA
CGS Application No. 03-CGS6144**

Dear Ms. McNeill:

In accordance with your request and transmittal of documents received on October 24, 2023, the California Geological Survey (CGS) has reviewed the engineering geology and seismology aspects of the consulting report prepared for the subject project at Fillmore High School. It is our understanding that this project involves construction of a new one-story 45,000 square foot building with a gymnasium and supporting locker and team spaces. This review was performed in accordance with Title 24, California Code of Regulations, 2022 California Building Code (CBC) and followed CGS Note 48 guidelines. We reviewed the following report:

Geotechnical Site Evaluation, Fillmore High School Sports Complex, 555 Central Avenue, Fillmore, California: Gorian and Associates, Inc., 3595 Old Conejo Road, Thousand Oaks, CA 91320; company Project No. 3242-0-0-100, report dated August 24, 2023, 18 pages, 4 figures, 3 appendices, 3 plates.

Based on our review, the consultants provide an incomplete assessment of engineering geology and seismology issues with respect to the proposed improvements. The principal concerns identified by the consultants are the potential for strong ground shaking and dry seismic settlement. The consultants recommend design spectral acceleration parameters of $S_{DS} = 1.626$ and $S_{D1} = 1.747$. Their evaluation indicates surface fault rupture and deep-seated slope instability are not design concerns for the project. However, **CGS requests the consultants to reassess their characterization of liquefaction and related surface manifestation hazards.** Additional information is provided in the attached checklist comments.

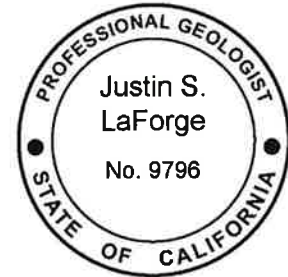
December 21, 2023

In conclusion, ***the engineering geology and seismology issues at this site are not adequately assessed in the referenced reports.*** It is recommended that additional information be provided as requested in the attached Note 48 Checklist Review Comments portion of this letter. The consultants are reminded that one copy of all supplemental documents should be submitted, should include the CGS application number, and should be uploaded directly to CGS at this link: <https://www.conservation.ca.gov/cgs/upload-school>. If you have any further questions about this review letter, please contact the primary reviewer at Justin.LaForge@conservation.ca.gov.

Respectfully submitted,

Justin LaForge

Justin LaForge
Engineering Geologist
PG 9796



Concur:

Jennifer Thornburg

Jennifer Thornburg
Senior Engineering Geologist
PG 5476, CEG 2240



Enclosures:

Note 48 Checklist Review Comments

Keyed to: *Note 48 - Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings*

Copies to:

William F. Cavan, Jr., *Certified Engineering Geologist*, and Jerome J. Blunck, *Registered Geotechnical Engineer*

Gorian and Associates, Inc., 3595 Old Conejo Road, Thousand Oaks, CA 91320

Joshua Smith, *Architect*

Westgroup Designs, 19900 MacArthur Blvd #1000, Irvine, CA 92612

Douglas Humphrey, *Regional Manager*

Division of State Architect, 355 South Grand Avenue, Suite 2100, Los Angeles, CA 90071

Note 48 Checklist Review Comments

In the numbered paragraphs below, this review is keyed to the paragraph numbers of California Geological Survey Note 48 (November 2022 edition), *Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings*.

Project Location

1. Site Location Map, Street Address, County Name: Adequately addressed.
2. Plot Plan with Exploration Data and Building Footprint: Adequately addressed.
3. Site Coordinates: Adequately addressed. Latitude and Longitude provided in report: 34.4031°N, 118.9160°W

Engineering Geology/Site Characterization

4. Regional Geology and Regional Fault Maps: Adequately addressed.
5. Geologic Map of Site: Not addressed by the consultants, and therefore not reviewed.
6. Geologic Hazard Zones: Adequately addressed. The consultants report the school site is within an area shown to have a potential for liquefaction on the Earthquake Zones of Required Investigation Map, Fillmore Quadrangle (CGS, 2002).
7. Subsurface Geology: Adequately addressed. The consultants report the site is underlain by alluvium to the maximum depth explored. The consultants utilized subsurface data from four geotechnical borings drilled to a maximum depth of 51.5 feet below ground surface (BGS) and six Cone Penetrometer Tests (CPTs) advanced to a maximum depth of 69 feet BGS. The consultants report that groundwater was not encountered during their subsurface investigation.
8. Geologic Cross Sections: Adequately addressed.
9. Geotechnical Testing of Representative Samples: Adequately addressed.
10. Consideration of Geology in Geotechnical Engineering Recommendations: **Additional information is requested.** If the consultants' conclusions are updated regarding liquefaction hazards at this site, the engineering recommendations should be updated accordingly (see Checklist Items 19 – 22).
11. Conditional Geotechnical Topics: Not applicable.

Seismology & Calculation of Earthquake Ground Motion

12. Evaluation of Historic Seismicity: Adequately addressed. The consultants provide a summary of historical seismicity in the region.
13. Classify the Geologic Subgrade (Site Class): Adequately addressed. The consultants classify the site soil profile as Site Class D, Stiff Soil, based on shear wave velocities measured by two CPTs.

14. General Procedure Ground Motion Analysis: Adequately addressed. The consultants report the following parameters derived from a map-based analysis:
 $S_S = 1.935$ and $S_1 = 0.734$
 $S_{DS} = 1.29$ and $S_{D1} = 0.832$
 T_s = Not provided by the consultants, but may be taken as S_{D1}/S_{DS} .
These seismic parameters are acceptable **provided that the value of the parameters S_{M1} and S_{D1} are increased by 50% as required in ASCE 7-16 Supplement 3, Section 11.4.8, Item 1 Exception.**
15. Site-Specific Ground Motion Hazard Analysis: Adequately addressed. The consultants report seismic parameters as calculated by the Southern California Earthquake Center (SCEC) online tool in Appendix A. The consultants report site-specific seismic design parameters of $S_{DS} = 1.626$ and $S_{D1} = 1.747$, which appear acceptable. CGS notes the spectrum included in Appendix A represents the MCE_R Response Spectrum and should be translated into the design response spectrum, per ASCE 7, Section 21.3 for use with the equivalent lateral force procedure, per ASCE 7, Section 21.4. The site-specific ground motion analysis presented appears to be reasonable and in accordance with ASCE 7-16.
16. Deaggregated Seismic Source Parameters: Not applicable.
17. Time Histories of Earthquake Ground Motion: Not applicable.

Fault Rupture Hazard Evaluation

18. Active Faulting & Coseismic Deformation Across Site: Adequately addressed. The consultants report that Holocene-active faults are not known to cross the site nor is the site currently within an Alquist-Priolo Earthquake Fault Zone. The consultants note the school site is within ½ mile from the inferred surficial trace of the Holocene-Active San Cayetano fault. The consultants report the potential for surface ground rupture due to faulting onsite during the project lifetime is considered remote, which appears reasonable.

Liquefaction/Seismic Settlement Analysis

19. Geologic Setting for Occurrence of Liquefaction: **Additional information is requested.** The consultants note the Seismic Hazard Zone (SHZ) Report for the Fillmore Quadrangle (CGS, 2002) indicates a historical high groundwater depth at approximately 34 feet BGS at the project site. However, the consultants characterize the groundwater to be below a depth of 50 feet BGS based on basin-wide reports and well data. CGS notes that **the cited references map groundwater depths at a regional scale when compared to the CGS SHZ Report and/or are indicative of single year data rather than known historical groundwater depths, which can lead to a mischaracterization of groundwater conditions.** CGS notes that there may be potential for liquefaction given the presence of low blow-count granular soils below the historical high depth to groundwater. The consultants are requested to revise their screening analysis of liquefaction using the historical-high depth to groundwater.
20. Seismic Settlement Calculations: **Additional information is requested.** The consultants are requested to revise their settlement calculations of liquefaction using the historical-high depth to groundwater. Additionally, the maximum differential settlement within the site should be defined by the maximum difference found in total settlement between any two of the borings or CPTs over their distance apart.
21. Other Liquefaction Effects: **Additional information is requested.** The consultants report that minor fissuring of the ground surface consisting of **ground fissures and sand boils**

may occur during a design level seismic event. The consultants are requested to clarify the basis for this conclusion and characterize the extent and potential impact to the proposed structures.

22. Mitigation Options for Liquefaction/Seismic Settlement: **Additional information is requested.** The consultants are requested to provide appropriate mitigation recommendations for any identified liquefaction hazards at the site.

Slope Stability Analysis

23. Geologic Setting for Occurrence of Landslides: Adequately addressed. The consultants report that landslides are not present within or near the site and the site is not prone to earthquake triggered landslides due to the low relief in the alluvial valley. The data presented appear to support this conclusion.
24. Determination of Static and Dynamic Strength Parameters: Not applicable.
25. Determination of Pseudo-Static Coefficient (K_{eq}): Not applicable.
26. Identify Critical Slip Surfaces for Static and Dynamic Analyses: Not applicable.
27. Dynamic Site Conditions: Not applicable.
28. Mitigation Options for Landsliding/Other Slope Failure: Not applicable.

Other Geologic Hazards or Adverse Site Conditions

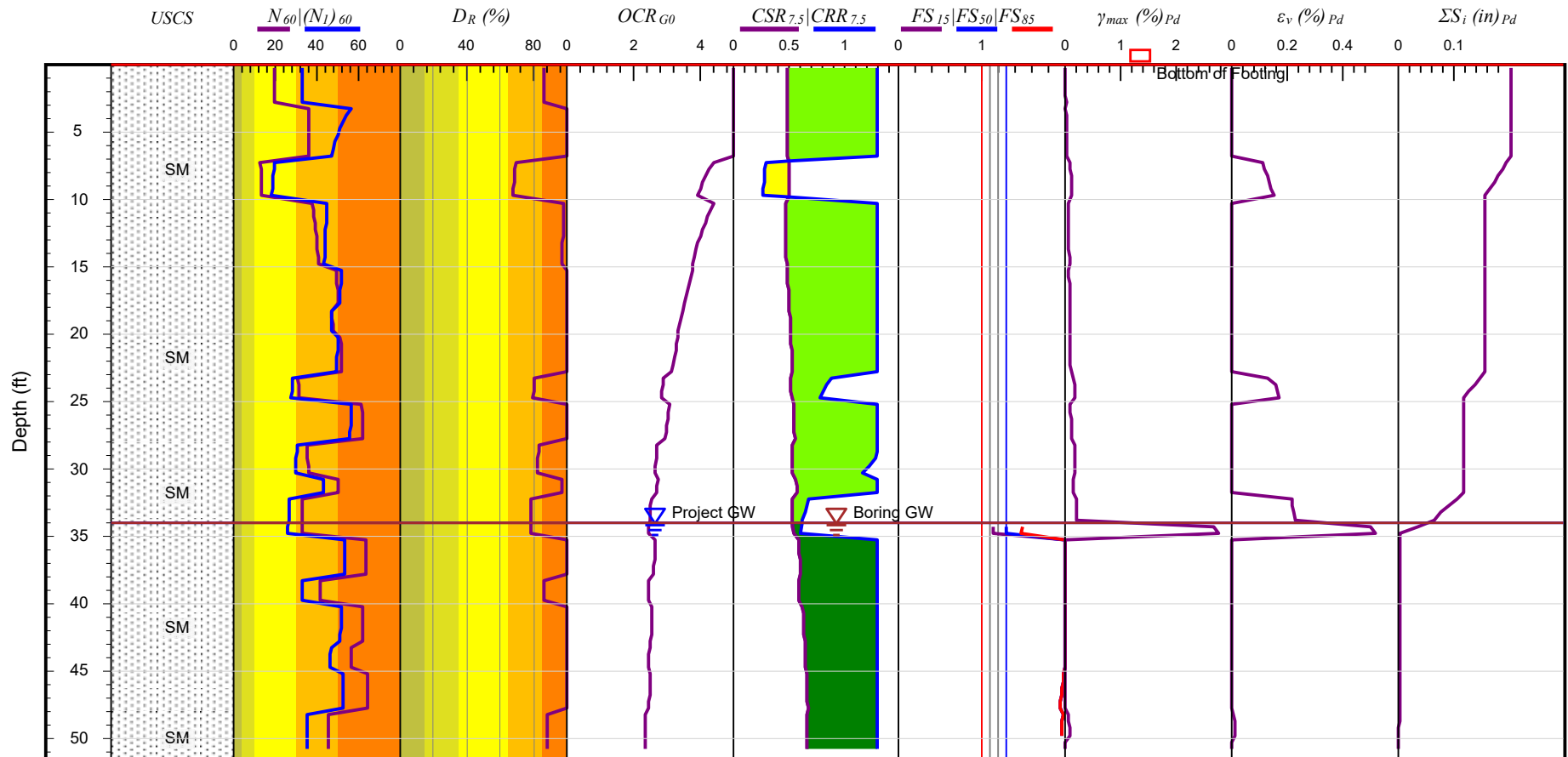
29. Expansive Soils: Adequately addressed. The consultants report that the upper soils within the site are non-expansive.
30. Corrosive/Reactive Geochemistry of the Geologic Subgrade: Adequately addressed. The consultants report that site soils are moderately corrosive to metal. The consultants note that for specific recommendations, a corrosion engineer should be consulted.
31. Conditional Geologic Assessment: Adequately addressed. No significant conditional hazards of potential concern were identified by the consultants.

Report Documentation

32. Geology, Seismology, and Geotechnical References: Adequately addressed.
33. Certified Engineering Geologist: Adequately addressed.
William F. Cavan, Jr., Certified Engineering Geologist #1161
34. Registered Geotechnical Engineer: Adequately addressed.
Jerome J. Blunck, Registered Geotechnical Engineer #151

APPENDIX A
LIQUEFACTION ANALYSES

X:\3242-0-0 Fillmore Unified School District\Geosuite\REVIEW\LETTER VALUES\GeoSuite_3242-0-0-100_B-1.csv



Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 34 ft
Maximum Settlement = 0.20 in
Settl. at Bottom of Footing = 0.20 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998); [sat] Idriss & Boulanger (2008)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)

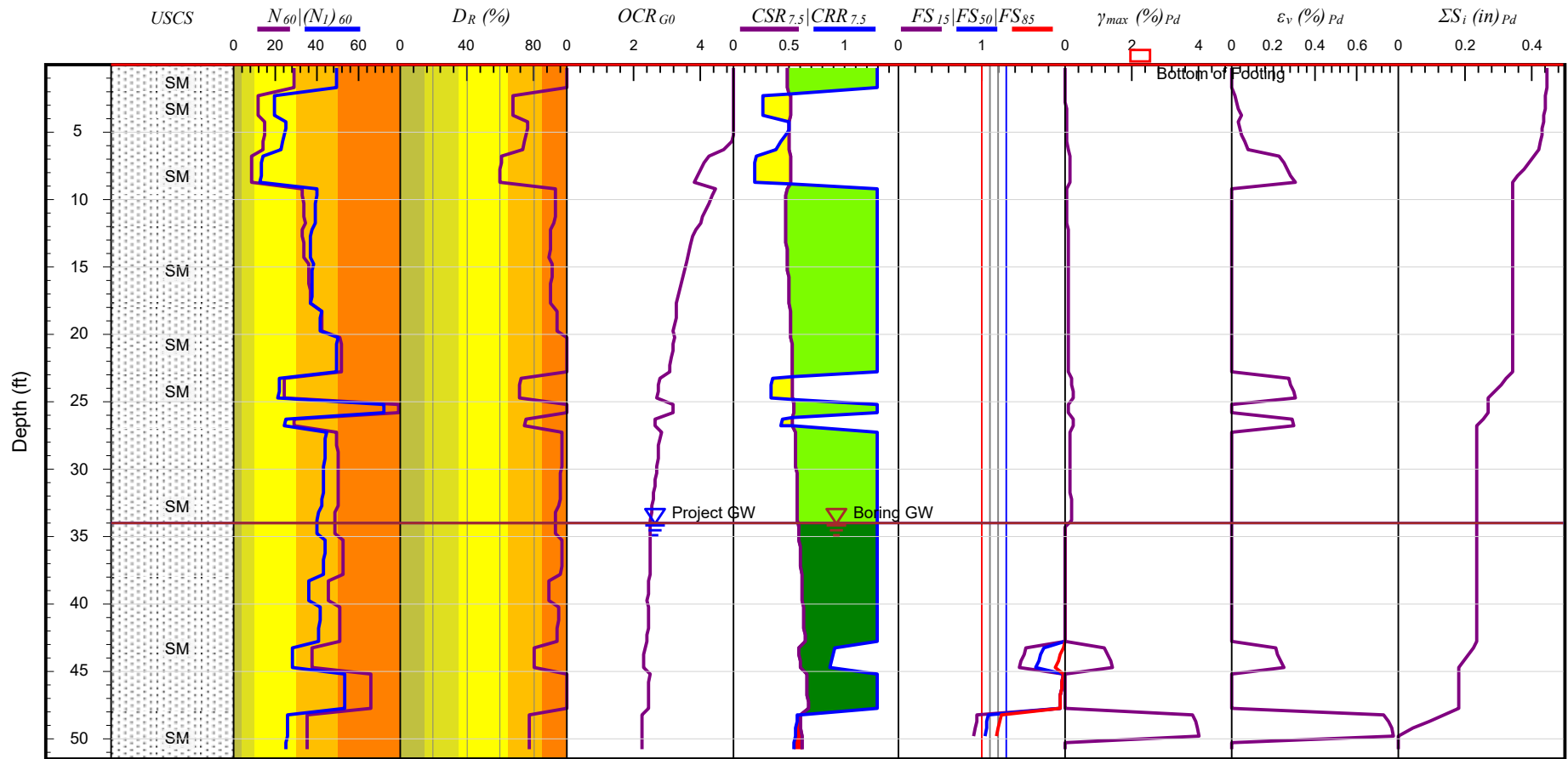


Seismic Settlement Potential - SPT Data

Project:	Fillmore High School				
Location:	555 Central Ave, Fillmore, CA 93015				
Project No.:	3242-0-0-100	Boring No.:	B-1	Figure:	1

Z_b (ft)	Z_m (ft)	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	ϕ (°)	C' (tsf)	σ_{v0} (tsf)	σ_{v0}' (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60cs}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ_p' (tsf)	OCR _{G0}	S_u/σ_{v0}'	K_0	r_d	MSF	K_σ	K_α	CSR _{7.5}	CRR _{7.5}	FS	τ_{av} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ε_v (%)	ΔS_i	ΣS_i (in)
0.50	0.25	120.0	19.3	35.0	0.0	12	38.7	0.0	0.02	0.02	1.7	1.3	32.9	38.4	85.9	764.8	1,090.7	0.08	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.01	0.02	0.6165	0.001	0.0000	0.00	0.20
1.00	0.75	120.0	19.3	35.0	0.0	12	38.7	0.0	0.05	0.05	1.7	1.3	32.9	38.4	85.9	760.0	1,077.1	0.23	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.03	0.05	0.3357	0.003	0.0000	0.00	0.20
1.50	1.25	120.0	19.3	35.0	0.0	12	38.7	0.0	0.08	0.08	1.7	1.3	32.9	38.4	85.9	755.4	1,064.3	0.38	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.05	0.08	0.2016	0.006	0.0000	0.00	0.20
2.00	1.75	120.0	19.3	35.0	0.0	12	38.7	0.0	0.11	0.11	1.7	1.3	32.9	38.4	85.9	751.1	1,052.1	0.53	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.06	0.11	0.1293	0.008	0.0000	0.00	0.20
2.50	2.25	120.0	19.3	35.0	0.0	12	38.7	0.0	0.14	0.14	1.7	1.3	32.9	38.4	85.9	747.0	1,040.5	0.68	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.08	0.14	0.0872	0.012	0.0000	0.00	0.20
3.00	2.75	120.0	19.3	35.0	0.0	12	38.7	0.0	0.17	0.17	1.7	1.3	32.9	38.4	85.9	743.0	1,029.6	0.83	5.0		1.0	0.99	1.12	1.10	1.00	0.49	1.30		0.10	0.17	0.0557	0.016	0.0000	0.00	0.20
3.50	3.25	110.0	35.9	35.0	0.0	12	40.5	0.0	0.19	0.19	1.6	1.3	56.1	61.6	100.0	849.4	1,233.2	0.97	5.0		1.0	0.99	1.12	1.10	1.00	0.49	1.30		0.12	0.19	0.0317	0.014	0.0000	0.00	0.20
4.00	3.75	110.0	35.9	35.0	0.0	12	40.5	0.0	0.22	0.22	1.5	1.3	54.2	59.7	100.0	845.3	1,221.5	1.11	5.0		1.0	0.99	1.12	1.10	1.00	0.49	1.30		0.13	0.22	0.0361	0.017	0.0000	0.00	0.20
4.50	4.25	110.0	35.9	35.0	0.0	12	40.5	0.0	0.25	0.25	1.5	1.3	52.6	58.1	100.0	841.4	1,210.3	1.24	5.0		1.0	0.99	1.12	1.10	1.00	0.49	1.30		0.15	0.25	0.0405	0.020	0.0000	0.00	0.20
5.00	4.75	110.0	35.9	35.0	0.0	12	40.5	0.0	0.28	0.28	1.4	1.3	51.1	56.6	100.0	837.7	1,199.6	1.38	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.16	0.28	0.0450	0.024	0.0000	0.00	0.20
5.50	5.25	110.0	35.9	35.0	0.0	12	40.5	0.0	0.30	0.30	1.4	1.3	49.9	55.4	100.0	834.1	1,189.2	1.52	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.18	0.30	0.0470	0.028	0.0000	0.00	0.20
6.00	5.75	110.0	35.9	35.0	0.0	12	40.5	0.0	0.33	0.33	1.4	1.3	48.7	54.3	100.0	830.6	1,179.2	1.66	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.20	0.33	0.0481	0.032	0.0000	0.00	0.20
6.50	6.25	110.0	35.9	35.0	0.0	12	40.5	0.0	0.36	0.36	1.3	1.3	47.7	53.2	100.0	827.2	1,169.6	1.79	5.0		1.0	0.98	1.12	1.10	1.00	0.48	1.30		0.21	0.36	0.0490	0.037	0.0000	0.00	0.20
7.00	6.75	110.0	35.9	35.0	0.0	12	40.5	0.0	0.39	0.39	1.3	1.3	46.8	52.3	100.0	834.6	1,190.8	1.93	5.0		1.0	0.98	1.12	1.10	1.00	0.48	1.30		0.23	0.39	0.0500	0.039	0.0000	0.00	0.20
7.50	7.25	110.0	12.9	35.0	0.0	12	34.6	0.0	0.41	0.41	1.5	1.2	19.5	25.0	69.4	727.4	904.5	1.82	4.4		1.0	0.98	1.07	1.10	1.00	0.50	0.29		0.25	0.41	0.0503	0.094	0.1128	0.01	0.20
8.00	7.75	110.0	13.0	35.0	0.0	12	34.5	0.0	0.44	0.44	1.5	1.2	19.3	24.8	69.0	736.6	927.5	1.89	4.3		1.0	0.98	1.07	1.10	1.00	0.50	0.29		0.26	0.44	0.0511	0.099	0.1200	0.01	0.19
8.50	8.25	110.0	13.2	35.0	0.0	12	34.4	0.0	0.47	0.47	1.4	1.2	19.1	24.6	68.7	745.2	949.3	1.96	4.2		1.0	0.98	1.07	1.10	1.00	0.50	0.28		0.28	0.46	0.0518	0.104	0.1274	0.01	0.18
9.00	8.75	110.0	13.4	35.0	0.0	12	34.4	0.0	0.50	0.50	1.4	1.2	18.8	24.3	68.4	753.3	969.9	2.03	4.1		1.0	0.98	1.07	1.10	1.00	0.50	0.27		0.29	0.48	0.0526	0.109	0.1350	0.01	0.17
9.50	9.25	110.0	13.5	35.0	0.0	12	34.3	0.0	0.52	0.52	1.4	1.2	18.6	24.1	68.1	760.9	989.6	2.09	4.0		1.0	0.98	1.07	1.10	1.00	0.50	0.27		0.31	0.51	0.0533	0.114	0.1430	0.01	0.16
10.00	9.75	110.0	13.7	35.0	0.0	12	34.2	0.0	0.55	0.55	1.3	1.2	18.4	23.9	67.8	768.0	1,008.4	2.16	3.9		0.9	0.97	1.07	1.09	1.00	0.51	0.27		0.32	0.53	0.0539	0.119	0.1513	0.01	0.15
10.50	10.25	115.0	37.9	35.0	0.0	12	40.5	0.1	0.58	0.58	1.2	1.3	44.7	50.2	98.2	876.4	1,372.5	2.55	4.4		0.9	0.97	1.12	1.10	1.00	0.48	1.30		0.34	0.55	0.0530	0.054	0.0000	0.00	0.15
11.00	10.75	115.0	38.3	35.0	0.0	12	40.5	0.1	0.61	0.61	1.2	1.3	44.6	50.1	98.1	883.5	1,395.0	2.63	4.3		0.9	0.97	1.12	1.10	1.00	0.48	1.30		0.36	0.57	0.0537	0.057	0.0000	0.00	0.15
11.50	11.25	115.0	38.7	35.0	0.0	12	40.5	0.1	0.64	0.64	1.1	1.3	44.4	49.9	98.0	890.3	1,416.5	2.70	4.2		0.9	0.97	1.12	1.10	1.00	0.47	1.30		0.37	0.59	0.0543	0.059	0.0000	0.00	0.15
12.00	11.75	115.0	39.0	35.0	0.0	12	40.5	0.1	0.67	0.67	1.1	1.3	44.3	49.8	97.9	896.7	1,437.0	2.77	4.2		0.9	0.97	1.12	1.10	1.00	0.47	1.30		0.39	0.61	0.0549	0.062	0.0000	0.00	0.15
12.50	12.25	115.0	39.4	35.0	0.0	12	40.5	0.1	0.69	0.69	1.1	1.3	44.2	49.7	97.8	902.8	1,456.7	2.83	4.1		0.9	0.96	1.12	1.10	1.00	0.47	1.30		0.40	0.64	0.0555	0.064	0.0000	0.00	0.15
13.00	12.75	115.0	39.7	35.0	0.0	12	40.5	0.1	0.72	0.72	1.1	1.3	44.0	49.6	97.6	908.6	1,475.5	2.90	4.0		0.9	0.96	1.12	1.10	1.00	0.47	1.30		0.42	0.66	0.0561	0.066	0.0000	0.00	0.15
13.50	13.25	115.0	40.0	35.0	0.0	12	40.5	0.1	0.75	0.75	1.1	1.3	43.9	49.4	97.5	914.2	1,493.5	2.97	3.9		0.9	0.96	1.12	1.10	1.00	0.47	1.30		0.44	0.68	0.0566	0.069	0.0000	0.00	0.15
14.00	13.75	115.0	40.2	35.0	0.0	12	40.5	0.1	0.78	0.78	1.1	1.3	43.8	49.3	97.3	919.5	1,510.9	3.03	3.9		0.8	0.96	1.12	1.09	1.00	0.47	1.30		0.45	0.70	0.0571	0.071	0.0000	0.00	0.15
14.50	14.25	115.0	40.5	35.0	0.0	12	40.5	0.1	0.81	0.81	1.1	1.3	43.6	49.1	97.2	924.5	1,527.6	3.09	3.8		0.8	0.96	1.12	1.08	1.00	0.48	1.30		0.47	0.72	0.0576	0.074	0.0000	0.00	0.15
15.00	14.75	115.0	40.7	35.0	0.0	12	40.5	0.1	0.84	0.84	1.1	1.3	43.5	49.0	97.0	929.4	1,543.6	3.15	3.8		0.8	0.96	1.12	1.07	1.00	0.48	1.30		0.48	0.74	0.0581	0.076	0.0000	0.00	0.15
15.50	15.25	115.0	49.2	30.0	0.0	12	40.5	0.1	0.87	0.87	1.1	1.3	51.8	57.2	100.0	956.3	1,634.3	3.29	3.8		0.8	0.95	1.12	1.06	1.00	0.49	1.30		0.50	0.77	0.0586	0.069	0.0000	0.00	0.15
16.00	15.75	115.0	49.4	30.0	0.0	12	40.5	0.1	0.90	0.90	1.0	1.3	51.7	57.0	100.0	960.8	1,649.8	3.35	3.7		0.8	0.95	1.12	1.05	1.00	0.49	1.30		0.51	0.79	0.0591	0.072	0.0000	0.00	0.15
16.50	16.25	115.0	49.7	30.0	0.0	12	40.5	0.1	0.92	0.92	1.0	1.3	51.5	56.9	100.0	965.2	1,664.8	3.41	3.7		0.8	0.95	1.12	1.04	1.00	0.49	1.30		0.53	0.81	0.0604	0.074	0.0000	0.00	0.15
17.00	16.75	115.0	49.9	30.0	0.0	12	40.5	0.1	0.95	0.95	1.0	1.3	51.3	56.7	100.0	969.3	1,679.3	3.46	3.6		0.8	0.95	1.12	1.03	1.00	0.50	1.30		0.55	0.83	0.0629	0.076	0.0000	0.00	0.15
17.50	17.25	115.0	50.2	30.0	0.0	12	40.5	0.1	0.98	0.98	1.0	1.3	51.2	56.5	100.0	973.4	1,693.3	3.52	3.6		0.8	0.95	1.12	1.02	1.00	0.50	1.30		0.56	0.85	0.0653	0.078	0.0000	0.00	0.15
18.00	17.75	115.0	50.4	30.0	0.0	12	40.5	0.1	1.01	1.01	1.0	1.3	51.0	56.4	100.0	977.3	1,706.8	3.58	3.5		0.8	0.94	1.12	1.01	1.00	0.50	1.30		0.58	0.87	0.0678	0.081	0.0000	0.00	0.15
18.50	18.25	115.0	47.2	30.0	0.0	12	40.5	0.1	1.04	1.04	1.0	1.3	47.4	52.8	100.0	969.6	1,680.2	3.59	3.5																

$Z_b(ft)$	$Z_m(ft)$	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	ϕ (°)	C' (tsf)	σ_{v0} (tsf)	σ_{v0}' (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60cs}$	D_R (%)	$V_s(ft/s)$	G_0 (tsf)	σ_p' (tsf)	OCR_{G0}	S_u/σ_{v0}'	K_0	r_d	MSF	K_σ	K_α	CSR _{7.5}	CRR _{7.5}	FS	τ_{av} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ε_v (%)	ΔS_i	$\Sigma S_i(in)$
31.00	30.75	110.0	50.1	35.0	0.0	12	40.5	0.1	1.77	1.77	0.9	1.3	43.5	49.0	97.0	1,066.6	1,944.8	4.82	2.7		0.7	0.89	1.12	0.85	1.00	0.56	1.30		0.95	1.38	0.1153	0.144	0.0000	0.00	0.12
31.50	31.25	110.0	50.2	35.0	0.0	12	40.5	0.1	1.80	1.80	0.9	1.3	43.3	48.8	96.9	1,068.4	1,951.5	4.86	2.7		0.7	0.88	1.12	0.84	1.00	0.57	1.30		0.96	1.40	0.1177	0.147	0.0000	0.00	0.12
32.00	31.75	110.0	50.3	35.0	0.0	12	40.5	0.1	1.83	1.83	0.9	1.3	43.2	48.7	96.7	1,070.2	1,958.1	4.90	2.7		0.7	0.88	1.12	0.84	1.00	0.57	1.30		0.97	1.42	0.1201	0.149	0.0000	0.00	0.12
32.50	32.25	110.0	33.3	35.0	0.0	12	37.0	0.1	1.85	1.85	0.8	1.3	26.8	32.3	78.8	1,017.3	1,769.1	4.70	2.5		0.7	0.88	1.11	0.89	1.00	0.53	0.68		0.98	1.48	0.1466	0.201	0.2149	0.01	0.10
33.00	32.75	110.0	33.3	35.0	0.0	12	36.9	0.1	1.88	1.88	0.8	1.3	26.6	32.1	78.6	1,019.1	1,775.3	4.73	2.5		0.7	0.88	1.11	0.89	1.00	0.53	0.66		0.99	1.50	0.1498	0.204	0.2199	0.01	0.09
33.50	33.25	110.0	33.3	35.0	0.0	12	36.9	0.1	1.91	1.91	0.8	1.3	26.5	32.0	78.4	1,020.8	1,781.3	4.77	2.5		0.7	0.87	1.11	0.89	1.00	0.53	0.64		1.01	1.52	0.1530	0.206	0.2251	0.01	0.08
34.00	33.75	110.0	33.3	35.0	0.0	12	36.8	0.1	1.94	1.94	0.8	1.3	26.3	31.8	78.2	1,022.5	1,787.2	4.81	2.5		0.7	0.87	1.11	0.89	1.00	0.53	0.62		1.02	1.54	0.1562	0.209	0.2303	0.01	0.06
34.50	34.25	110.0	33.3	35.0	0.0	12	36.8	0.1	1.96	1.96	0.8	1.3	26.2	31.7	78.0	1,023.7	1,791.5	4.83	2.5		0.7	0.87	1.11	0.89	1.00	0.54	0.61	1.14	1.03	1.55		2.672	0.5024	0.03	0.03
35.00	34.75	110.0	33.3	35.0	0.0	12	36.8	0.1	1.99	1.97	0.8	1.3	26.1	31.6	78.0	1,024.5	1,794.3	4.85	2.5		0.7	0.87	1.11	0.89	1.00	0.54	0.61	1.13	1.04	1.56		2.758	0.5194	0.03	0.00
35.50	35.25	120.0	63.3	30.0	0.0	12	40.5	0.1	2.02	1.98	0.8	1.3	53.7	59.0	100.0	1,064.5	2,113.3	5.26	2.7		0.7	0.86	1.12	0.81	1.00	0.58	1.30	2.00	1.05	1.53		0.000	0.0000	0.00	0.00
36.00	35.75	120.0	63.4	30.0	0.0	12	40.5	0.1	2.05	2.00	0.8	1.3	53.6	59.0	100.0	1,065.4	2,116.7	5.28	2.6		0.7	0.86	1.12	0.81	1.00	0.59	1.30	2.00	1.07	1.54		0.000	0.0000	0.00	0.00
36.50	36.25	120.0	63.4	30.0	0.0	12	40.5	0.1	2.08	2.01	0.8	1.3	53.6	58.9	100.0	1,066.3	2,120.2	5.30	2.6		0.7	0.86	1.12	0.81	1.00	0.59	1.30	2.00	1.08	1.55		0.000	0.0000	0.00	0.00
37.00	36.75	120.0	63.5	30.0	0.0	12	40.5	0.1	2.11	2.02	0.8	1.3	53.5	58.9	100.0	1,067.1	2,123.5	5.32	2.6		0.7	0.86	1.12	0.81	1.00	0.60	1.30	2.00	1.09	1.56		0.000	0.0000	0.00	0.00
37.50	37.25	120.0	63.5	30.0	0.0	12	40.5	0.1	2.14	2.04	0.8	1.3	53.4	58.8	100.0	1,067.9	2,126.8	5.34	2.6		0.7	0.85	1.12	0.80	1.00	0.60	1.30	2.00	1.10	1.57		0.000	0.0000	0.00	0.00
38.00	37.75	120.0	63.6	30.0	0.0	12	40.5	0.1	2.17	2.05	0.8	1.3	53.4	58.8	100.0	1,068.8	2,130.1	5.36	2.6		0.7	0.85	1.12	0.80	1.00	0.61	1.30	2.00	1.12	1.58		0.000	0.0000	0.00	0.00
38.50	38.25	120.0	41.8	30.0	0.0	12	38.8	0.1	2.20	2.07	0.8	1.3	33.3	38.6	86.2	1,006.0	1,887.2	5.07	2.5		0.7	0.85	1.12	0.83	1.00	0.59	1.30	2.00	1.13	1.59		0.000	0.0000	0.00	0.00
39.00	38.75	120.0	41.8	30.0	0.0	12	38.7	0.1	2.23	2.08	0.8	1.3	33.2	38.5	86.1	1,006.8	1,890.5	5.09	2.4		0.7	0.85	1.12	0.83	1.00	0.59	1.30	2.00	1.14	1.60		0.000	0.0000	0.00	0.00
39.50	39.25	120.0	41.9	30.0	0.0	12	38.7	0.1	2.26	2.10	0.8	1.3	33.1	38.5	86.0	1,007.7	1,893.7	5.11	2.4		0.7	0.84	1.12	0.83	1.00	0.59	1.30	2.00	1.15	1.61		0.000	0.0000	0.00	0.00
40.00	39.75	120.0	41.9	30.0	0.0	12	38.7	0.1	2.29	2.11	0.8	1.3	33.0	38.4	85.9	1,008.6	1,896.9	5.13	2.4		0.7	0.84	1.12	0.83	1.00	0.59	1.30	2.00	1.16	1.62		0.000	0.0000	0.00	0.00
40.50	40.25	115.0	61.9	30.0	0.0	12	40.5	0.1	2.32	2.12	0.8	1.3	51.6	56.9	100.0	1,090.5	2,125.4	5.43	2.6		0.6	0.84	1.12	0.79	1.00	0.62	1.30	2.00	1.17	1.62		0.000	0.0000	0.00	0.00
41.00	40.75	115.0	62.0	30.0	0.0	12	40.5	0.1	2.35	2.14	0.8	1.3	51.5	56.9	100.0	1,091.3	2,128.2	5.45	2.5		0.6	0.84	1.12	0.79	1.00	0.63	1.30	2.00	1.19	1.63		0.000	0.0000	0.00	0.00
41.50	41.25	115.0	62.0	30.0	0.0	12	40.5	0.1	2.38	2.15	0.8	1.3	51.5	56.8	100.0	1,092.0	2,131.0	5.46	2.5		0.6	0.83	1.12	0.79	1.00	0.63	1.30	2.00	1.20	1.64		0.000	0.0000	0.00	0.00
42.00	41.75	115.0	62.0	30.0	0.0	12	40.5	0.1	2.41	2.16	0.8	1.3	51.4	56.8	100.0	1,092.7	2,133.7	5.48	2.5		0.6	0.83	1.12	0.79	1.00	0.63	1.30	2.00	1.21	1.65		0.000	0.0000	0.00	0.00
42.50	42.25	115.0	62.1	30.0	0.0	12	40.5	0.1	2.43	2.18	0.8	1.3	51.3	56.7	100.0	1,093.4	2,136.4	5.50	2.5		0.6	0.83	1.12	0.78	1.00	0.64	1.30	2.00	1.22	1.66		0.000	0.0000	0.00	0.00
43.00	42.75	115.0	62.1	30.0	0.0	12	40.5	0.1	2.46	2.19	0.8	1.3	51.3	56.6	100.0	1,094.0	2,139.1	5.52	2.5		0.6	0.83	1.12	0.78	1.00	0.64	1.30	2.00	1.23	1.66		0.000	0.0000	0.00	0.00
43.50	43.25	115.0	56.6	30.0	0.0	12	40.5	0.1	2.49	2.20	0.8	1.3	46.7	52.1	100.0	1,078.3	2,078.1	5.45	2.5		0.6	0.82	1.12	0.78	1.00	0.64	1.30	2.00	1.24	1.66		0.000	0.0000	0.00	0.00
44.00	43.75	115.0	56.7	30.0	0.0	12	40.5	0.1	2.52	2.22	0.8	1.3	46.7	52.0	100.0	1,079.0	2,080.6	5.47	2.5		0.6	0.82	1.12	0.78	1.00	0.65	1.30	2.00	1.25	1.67		0.000	0.0000	0.00	0.00
44.50	44.25	115.0	56.7	30.0	0.0	12	40.5	0.1	2.55	2.23	0.8	1.3	46.6	52.0	100.0	1,079.6	2,083.2	5.49	2.5		0.6	0.82	1.12	0.78	1.00	0.65	1.30	2.00	1.26	1.68		0.001	0.0001	0.00	0.00
45.00	44.75	115.0	56.7	30.0	0.0	12	40.5	0.1	2.58	2.24	0.8	1.3	46.5	51.9	99.9	1,080.3	2,085.7	5.50	2.5		0.6	0.82	1.12	0.77	1.00	0.65	1.30	1.99	1.27	1.69		0.010	0.0011	0.00	0.00
45.50	45.25	110.0	64.1	30.0	0.0	12	40.5	0.1	2.61	2.26	0.8	1.3	52.5	57.8	100.0	1,127.3	2,172.5	5.63	2.5		0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.98	1.28	1.71		0.000	0.0000	0.00	0.00
46.00	45.75	110.0	64.1	30.0	0.0	12	40.5	0.1	2.63	2.27	0.8	1.3	52.4	57.8	100.0	1,127.9	2,174.8	5.64	2.5		0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.97	1.29	1.71		0.000	0.0000	0.00	0.00
46.50	46.25	110.0	64.1	30.0	0.0	12	40.5	0.1	2.66	2.28	0.8	1.3	52.4	57.7	100.0	1,128.5	2,177.1	5.66	2.5		0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.97	1.30	1.72		0.000	0.0000	0.00	0.00
47.00	46.75	110.0	64.1	30.0	0.0	12	40.5	0.1	2.69	2.29	0.8	1.3	52.3	57.7	100.0	1,129.1	2,179.3	5.67	2.5		0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.96	1.31	1.73		0.000	0.0000	0.00	0.00
47.50	47.25	110.0	64.1	30.0	0.0	12	40.5	0.1	2.72	2.30	0.8	1.3	52.3	57.6	100.0	1,129.7	2,181.5	5.69	2.5		0.6	0.80	1.12	0.77	1.00	0.67	1.30	1.95	1.32	1.74		0.000	0.0000	0.00	0.00
48.00	47.75	110.0	64.1	30.0	0.0	12	40.5	0.1	2.74	2.31	0.8	1.3	52.2	57.6	100.0	1,130.2	2,183.8	5.70	2.5		0.6	0.80	1.12	0.77	1.00	0.67	1.30	1.94	1.33	1.74		0.000	0.0000	0.00	0.00
48.50	48.25	110.0	45.8	35.0	0.0	12	39.3	0.1	2.77	2.33	0.8	1.3	35.4	40.9	88.7	1,084.3	2,009.8	5.49	2.4		0.6	0.80	1.12	0.78	1.00	0.66	1.30	1.97	1.34	1.75		0.062	0.0088	0.00	0.00
49.00	48.75	110.0	45.8	35.0	0.0	12	39.3	0.1	2.80	2.34	0.8	1.3	35.3	4																					



SM

Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:

Magnitude = 7.21
 Max. Acceleration = 0.929 g
 Project GW = 34 ft
 Maximum Settlement = 0.44 in
 Settl. at Bottom of Footing = 0.44 in

Liquefaction: Boulanger & Idriss (2010-16)

Settl.: [dry] Pradel (1998); [sat] Idriss & Boulanger (2008)
 Lateral spreading: Idriss & Boulanger (2008)
 M correction: [Sand] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
 Stress reduction: Idriss & Boulanger (2008)



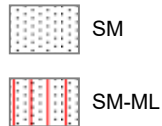
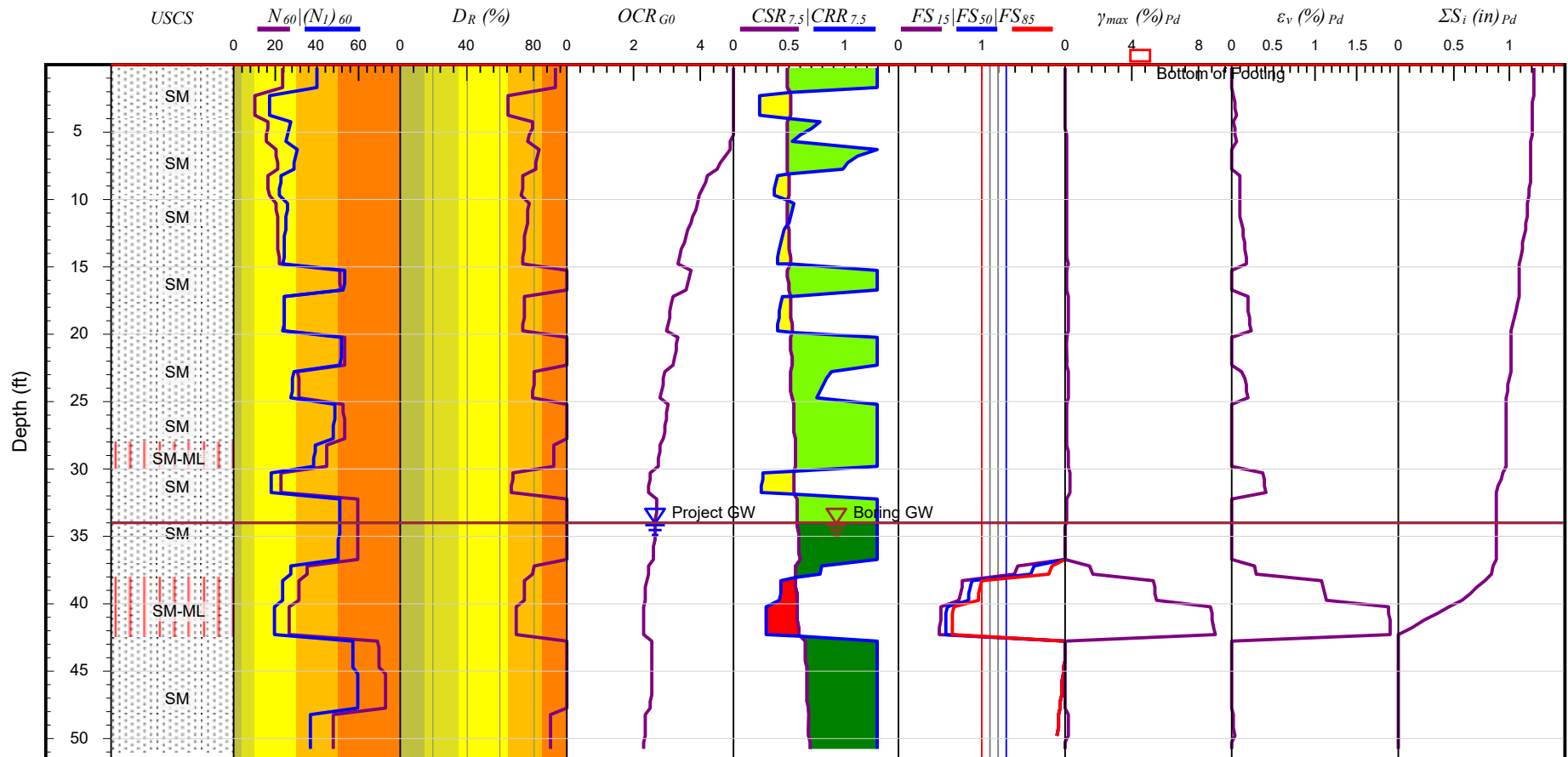
Seismic Settlement Potential - SPT Data

Project:	Fillmore High School				
Location:	555 Central Ave, Fillmore, CA 93015				
Project No.:	3242-0-0-100	Boring No.:	B-2	Figure:	2

Z_b (ft)	Z_m (ft)	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	φ (°)	C' (tsf)	σ_{v0} (tsf)	σ_{v0}' (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60cs}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ_p' (tsf)	OCR_{G0}	S_u/σ_{v0}'	K_0	r_d	MSF	K_a	K_a	CSR _{7.5}	CRR _{7.5}	FS	τ_{av} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ϵ_v (%)	ΔS_i	ΣS_i (in)
0.50	0.25	115.0	29.0	35.0	0.0	12	40.5	0.0	0.01	0.01	1.7	1.3	49.3	54.8	100.0	832.1	1,237.3	0.07	5.0	1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.01	0.01	0.6054	0.001	0.0000	0.00	0.44	
1.00	0.75	115.0	29.0	35.0	0.0	12	40.5	0.0	0.04	0.04	1.7	1.3	49.3	54.8	100.0	826.9	1,222.0	0.22	5.0	1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.03	0.04	0.3215	0.002	0.0000	0.00	0.44	
1.50	1.25	115.0	29.0	35.0	0.0	12	40.5	0.0	0.07	0.07	1.7	1.3	49.3	54.8	100.0	822.0	1,207.6	0.36	5.0	1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.04	0.07	0.1895	0.004	0.0000	0.00	0.44	
2.00	1.75	115.0	29.0	35.0	0.0	12	40.5	0.0	0.10	0.10	1.7	1.3	49.3	54.8	100.0	817.3	1,193.9	0.50	5.0	1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.06	0.10	0.1199	0.007	0.0000	0.00	0.44	
2.50	2.25	110.0	11.4	20.0	0.0	12	34.6	0.0	0.13	0.13	1.7	1.2	19.4	23.9	67.8	706.9	854.3	0.64	5.0	1.1	1.00	1.07	1.10	1.00	0.51	0.27		0.08	0.14	0.0545	0.016	0.0185	0.00	0.44	
3.00	2.75	110.0	11.4	20.0	0.0	12	34.6	0.0	0.16	0.16	1.7	1.2	19.4	23.9	67.8	703.5	846.1	0.78	5.0	1.1	0.99	1.07	1.10	1.00	0.51	0.27		0.09	0.16	0.0331	0.021	0.0258	0.00	0.44	
3.50	3.25	110.0	11.4	20.0	0.0	12	34.6	0.0	0.18	0.18	1.7	1.2	19.4	23.9	67.8	700.3	838.4	0.92	5.0	1.1	0.99	1.07	1.10	1.00	0.51	0.27		0.11	0.19	0.0324	0.027	0.0347	0.00	0.44	
4.00	3.75	110.0	11.4	20.0	0.0	12	34.6	0.0	0.21	0.21	1.7	1.2	19.4	23.9	67.8	697.2	831.0	1.06	5.0	1.1	0.99	1.07	1.10	1.00	0.51	0.27		0.13	0.22	0.0372	0.035	0.0456	0.00	0.44	
4.50	4.25	120.0	14.6	35.0	0.0	12	36.3	0.0	0.24	0.24	1.7	1.2	24.8	30.3	76.3	704.1	924.5	1.20	5.0	1.1	0.99	1.10	1.10	1.00	0.49	0.50		0.14	0.25	0.0371	0.033	0.0296	0.00	0.44	
5.00	4.75	120.0	14.6	35.0	0.0	12	36.3	0.0	0.27	0.27	1.7	1.2	24.8	30.3	76.3	701.0	916.3	1.35	5.0	1.1	0.99	1.10	1.10	1.00	0.49	0.50		0.16	0.28	0.0411	0.041	0.0377	0.00	0.43	
5.50	5.25	120.0	14.5	35.0	0.0	12	36.2	0.0	0.30	0.30	1.7	1.2	24.2	29.7	75.6	697.4	907.1	1.50	5.0	1.1	0.99	1.10	1.10	1.00	0.49	0.47		0.18	0.31	0.0422	0.050	0.0478	0.00	0.43	
6.00	5.75	120.0	14.4	35.0	0.0	12	35.9	0.0	0.33	0.33	1.6	1.2	23.3	28.8	74.5	693.8	897.6	1.63	4.9	1.1	0.99	1.09	1.10	1.00	0.50	0.42		0.20	0.34	0.0431	0.061	0.0604	0.00	0.43	
6.50	6.25	120.0	14.3	35.0	0.0	12	35.6	0.0	0.36	0.36	1.6	1.2	22.5	28.0	73.4	690.8	890.0	1.70	4.7	1.0	0.98	1.09	1.10	1.00	0.50	0.38		0.21	0.37	0.0439	0.074	0.0765	0.00	0.42	
7.00	6.75	120.0	8.5	35.0	0.0	12	32.5	0.0	0.39	0.39	1.6	1.1	13.9	19.4	61.1	652.1	793.1	1.66	4.3	1.0	0.98	1.05	1.10	1.00	0.52	0.20		0.23	0.39	0.0448	0.131	0.2299	0.01	0.41	
7.50	7.25	120.0	8.6	35.0	0.0	12	32.3	0.0	0.42	0.42	1.6	1.1	13.6	19.1	60.6	661.3	815.5	1.74	4.1	1.0	0.98	1.05	1.10	1.00	0.52	0.20		0.25	0.42	0.0456	0.140	0.2495	0.01	0.39	
8.00	7.75	120.0	8.7	35.0	0.0	12	32.2	0.0	0.45	0.45	1.5	1.1	13.3	18.9	60.2	670.3	837.8	1.81	4.0	1.0	0.98	1.04	1.10	1.00	0.51	0.19		0.27	0.44	0.0464	0.148	0.2671	0.02	0.38	
8.50	8.25	120.0	8.8	35.0	0.0	12	32.1	0.0	0.48	0.48	1.5	1.1	13.1	18.6	59.8	678.7	859.0	1.89	3.9	1.0	0.98	1.04	1.09	1.00	0.52	0.19		0.28	0.47	0.0478	0.156	0.2852	0.02	0.36	
9.00	8.75	120.0	8.9	35.0	0.0	12	32.0	0.0	0.51	0.51	1.4	1.1	12.9	18.4	59.5	686.6	879.1	1.96	3.8	1.0	0.98	1.04	1.08	1.00	0.52	0.19		0.30	0.50	0.0522	0.165	0.3040	0.02	0.34	
9.50	9.25	120.0	32.6	35.0	0.0	12	40.4	0.0	0.54	0.54	1.2	1.3	39.9	45.4	93.4	828.4	1,279.6	2.40	4.4	0.9	0.98	1.12	1.10	1.00	0.48	1.30		0.32	0.51	0.0499	0.058	0.0000	0.00	0.34	
10.00	9.75	120.0	33.0	35.0	0.0	12	40.4	0.0	0.57	0.57	1.2	1.3	39.7	45.2	93.3	836.2	1,304.1	2.47	4.3	0.9	0.97	1.12	1.10	1.00	0.48	1.30		0.34	0.54	0.0505	0.061	0.0000	0.00	0.34	
10.50	10.25	120.0	33.4	35.0	0.0	12	40.4	0.1	0.60	0.60	1.2	1.3	39.6	45.1	93.1	843.6	1,327.3	2.55	4.2	0.9	0.97	1.12	1.10	1.00	0.48	1.30		0.35	0.56	0.0512	0.064	0.0000	0.00	0.34	
11.00	10.75	120.0	33.7	35.0	0.0	12	40.3	0.1	0.63	0.63	1.2	1.3	39.4	44.9	93.0	850.7	1,349.4	2.62	4.2	0.9	0.97	1.12	1.10	1.00	0.48	1.30		0.37	0.58	0.0518	0.066	0.0000	0.00	0.34	
11.50	11.25	120.0	34.0	35.0	0.0	12	40.3	0.1	0.66	0.66	1.2	1.3	39.3	44.8	92.8	857.3	1,370.6	2.69	4.1	0.9	0.97	1.12	1.10	1.00	0.47	1.30		0.39	0.61	0.0524	0.069	0.0000	0.00	0.34	
12.00	11.75	120.0	34.3	35.0	0.0	12	40.3	0.1	0.69	0.69	1.1	1.3	39.1	44.6	92.6	863.6	1,390.9	2.76	4.0	0.9	0.97	1.12	1.10	1.00	0.47	1.30		0.40	0.63	0.0530	0.072	0.0000	0.00	0.34	
12.50	12.25	120.0	33.1	25.0	0.0	12	39.8	0.1	0.72	0.72	1.1	1.3	37.3	42.4	90.3	851.3	1,351.3	2.78	3.9	0.9	0.96	1.12	1.10	1.00	0.47	1.30		0.42	0.65	0.0545	0.084	0.0000	0.00	0.34	
13.00	12.75	120.0	33.3	25.0	0.0	12	39.8	0.1	0.75	0.75	1.1	1.3	37.2	42.2	90.1	856.9	1,369.3	2.84	3.8	0.8	0.96	1.12	1.10	1.00	0.47	1.30		0.44	0.67	0.0551	0.088	0.0000	0.00	0.34	
13.50	13.25	120.0	33.6	25.0	0.0	12	39.7	0.1	0.78	0.78	1.1	1.3	37.0	42.0	89.9	862.3	1,386.6	2.91	3.7	0.8	0.96	1.12	1.09	1.00	0.47	1.30		0.45	0.69	0.0575	0.091	0.0000	0.00	0.34	
14.00	13.75	120.0	33.8	25.0	0.0	12	39.7	0.1	0.81	0.81	1.1	1.3	36.8	41.9	89.7	867.4	1,403.2	2.97	3.7	0.8	0.96	1.12	1.08	1.00	0.48	1.30		0.47	0.72	0.0606	0.094	0.0000	0.00	0.34	
14.50	14.25	120.0	34.0	25.0	0.0	12	39.6	0.1	0.84	0.84	1.1	1.3	36.6	41.7	89.5	872.4	1,419.2	3.03	3.6	0.8	0.96	1.12	1.07	1.00	0.48	1.30		0.49	0.74	0.0637	0.098	0.0000	0.00	0.34	
15.00	14.75	115.0	35.8	25.0	0.0	12	40.0	0.1	0.87	0.87	1.1	1.3	38.1	43.2	91.1	901.6	1,452.7	3.11	3.6	0.8	0.96	1.12	1.06	1.00	0.49	1.30		0.50	0.76	0.0600	0.098	0.0000	0.00	0.34	
15.50	15.25	115.0	36.1	25.0	0.0	12	40.0	0.1	0.90	0.90	1.1	1.3	37.9	43.0	91.0	906.1	1,467.3	3.17	3.5	0.8	0.95	1.12	1.05	1.00	0.49	1.30		0.52	0.78	0.0604	0.101	0.0000	0.00	0.34	
16.00	15.75	115.0	36.3	25.0	0.0	12	39.9	0.1	0.93	0.93	1.0	1.3	37.8	42.8	90.7	910.5	1,481.4	3.23	3.5	0.8	0.95	1.12	1.04	1.00	0.49	1.30		0.53	0.80	0.0608	0.104	0.0000	0.00	0.34	
16.50	16.25	115.0	36.4	25.0	0.0	12	39.9	0.1	0.96	0.96	1.0	1.3	37.6	42.7	90.6	914.6	1,495.0	3.28	3.4	0.8	0.95	1.12	1.03	1.00	0.50	1.30		0.55	0.82	0.0612	0.107	0.0000	0.00	0.34	
17.00	16.75	115.0	36.6	25.0	0.0	12	39.8	0.1	0.98	0.98	1.0	1.3	37.5	42.5	90.4	918.7	1,508.3	3.34	3.4	0.8	0.95	1.12	1.02	1.00	0.50	1.30		0.56	0.84	0.0616	0.110	0.0000	0.00	0.34	
17.50	17.25	115.0	36.8	25.0	0.0	12	39.8	0.1	1.01	1.01	1.0	1.3	37.3	42.4	90.3	922.6	1,521.1	3.39	3.3	0.8	0.95	1.12	1.01	1.00	0.50	1.30		0.58	0.86	0.0633	0.113	0.0000	0.00	0.34	
18.00	17.75	115.0	37.0	25.0	0.0	12	39.8	0.1	1.04	1.04	1.0	1.3	37.1	42.2	90.1	926.3	1,533.5	3.44	3.3	0.8	0.94	1.12	1.00	1.00	0.51	1.30		0.59	0.89	0.0660	0.116	0.0000	0.00	0.34	
18.50	18.25	115.0	42.2	20.0	0.0	12	40.5	0.1	1.07	1.07	1.0	1.3	42.0	46.5	94.6	939.9	1,578.8	3.53	3.3	0.8	0.94	1.12	1.00	1.00	0.51	1.30		0.61	0.90	0.0637	0.113	0.0000	0.00	0.34	
19.00	18.75	115.0	42.3	20.0																															

Z_b (ft)	Z_m (ft)	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	φ (°)	C' (tsf)	σ_{v0} (tsf)	σ_{v0}' (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60cs}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ_p' (tsf)	OCR_{G0}	S_u/σ_{v0}'	K_0	r_d	MSF	K_a	K_a	$CSR_{7.5}$	$CRR_{7.5}$	FS	τ_{av} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ε_v (%)	ΔS_i	ΣS_i (in)
29.50	29.25	125.0	49.9	25.0	0.0	12	40.5	0.1	1.72	1.72	0.9	1.3	43.7	48.7	96.8	982.2	1,873.9	4.68	2.7	0.7	0.89	1.12	0.85	1.00	0.56	1.30		0.93	1.34	0.1731	0.156	0.0000	0.00	0.24	
30.00	29.75	125.0	50.0	25.0	0.0	12	40.5	0.1	1.75	1.75	0.9	1.3	43.5	48.6	96.6	984.1	1,881.4	4.72	2.7	0.7	0.89	1.12	0.85	1.00	0.57	1.30		0.94	1.36	0.1763	0.159	0.0000	0.00	0.24	
30.50	30.25	125.0	50.1	25.0	0.0	12	40.5	0.1	1.78	1.78	0.9	1.3	43.3	48.4	96.5	986.1	1,888.8	4.77	2.7	0.7	0.89	1.12	0.84	1.00	0.57	1.30		0.96	1.38	0.1795	0.162	0.0000	0.00	0.24	
31.00	30.75	125.0	50.1	25.0	0.0	12	40.5	0.1	1.81	1.81	0.9	1.3	43.1	48.2	96.3	988.0	1,896.0	4.81	2.7	0.7	0.89	1.12	0.84	1.00	0.57	1.30		0.97	1.40	0.1826	0.165	0.0000	0.00	0.24	
31.50	31.25	125.0	50.2	25.0	0.0	12	40.5	0.1	1.84	1.84	0.9	1.3	43.0	48.0	96.1	989.8	1,903.1	4.85	2.6	0.7	0.88	1.12	0.83	1.00	0.57	1.30		0.98	1.42	0.1858	0.167	0.0000	0.00	0.24	
32.00	31.75	125.0	50.3	25.0	0.0	12	40.5	0.1	1.88	1.88	0.9	1.3	42.8	47.8	95.9	991.6	1,910.1	4.90	2.6	0.7	0.88	1.12	0.83	1.00	0.57	1.30		1.00	1.44	0.1890	0.170	0.0000	0.00	0.24	
32.50	32.25	125.0	50.3	25.0	0.0	12	40.5	0.1	1.91	1.91	0.8	1.3	42.6	47.7	95.7	993.4	1,916.9	4.94	2.6	0.7	0.88	1.12	0.82	1.00	0.58	1.30		1.01	1.46	0.1921	0.173	0.0000	0.00	0.24	
33.00	32.75	125.0	50.4	25.0	0.0	12	40.5	0.1	1.94	1.94	0.8	1.3	42.4	47.5	95.6	995.1	1,923.6	4.98	2.6	0.6	0.88	1.12	0.82	1.00	0.58	1.30		1.02	1.48	0.1953	0.176	0.0000	0.00	0.24	
33.50	33.25	120.0	48.6	25.0	0.0	12	40.5	0.1	1.97	1.97	0.8	1.3	40.5	45.6	93.6	1,011.3	1,907.4	4.99	2.5	0.6	0.87	1.12	0.81	1.00	0.58	1.30		1.04	1.50	0.1703	0.186	0.0000	0.00	0.24	
34.00	33.75	120.0	48.7	25.0	0.0	12	40.5	0.1	2.00	2.00	0.8	1.3	40.3	45.4	93.4	1,013.0	1,913.6	5.03	2.5	0.6	0.87	1.12	0.81	1.00	0.58	1.30		1.05	1.52	0.1732	0.189	0.0000	0.00	0.24	
34.50	34.25	120.0	48.7	25.0	0.0	12	40.5	0.1	2.03	2.02	0.8	1.3	40.2	45.3	93.3	1,014.2	1,918.2	5.06	2.5	0.6	0.87	1.12	0.81	1.00	0.58	1.30	2.00	1.06	1.53		0.000	0.0000	0.00	0.24	
35.00	34.75	120.0	48.8	25.0	0.0	12	40.5	0.1	2.06	2.04	0.8	1.3	40.2	45.2	93.3	1,015.1	1,921.4	5.08	2.5	0.6	0.87	1.12	0.80	1.00	0.59	1.30	2.00	1.08	1.54		0.000	0.0000	0.00	0.24	
35.50	35.25	115.0	52.5	25.0	0.0	12	40.5	0.1	2.09	2.05	0.8	1.3	43.7	48.7	96.8	1,049.8	1,969.7	5.16	2.5	0.6	0.86	1.12	0.80	1.00	0.59	1.30	2.00	1.09	1.56		0.000	0.0000	0.00	0.24	
36.00	35.75	115.0	52.5	25.0	0.0	12	40.5	0.1	2.12	2.06	0.8	1.3	43.6	48.7	96.8	1,050.6	1,972.7	5.17	2.5	0.6	0.86	1.12	0.80	1.00	0.60	1.30	2.00	1.10	1.56		0.000	0.0000	0.00	0.24	
36.50	36.25	115.0	52.5	25.0	0.0	12	40.5	0.1	2.15	2.08	0.8	1.3	43.6	48.6	96.7	1,051.4	1,975.6	5.19	2.5	0.6	0.86	1.12	0.80	1.00	0.60	1.30	2.00	1.11	1.57		0.000	0.0000	0.00	0.24	
37.00	36.75	115.0	52.6	25.0	0.0	12	40.5	0.1	2.17	2.09	0.8	1.3	43.5	48.6	96.7	1,052.2	1,978.4	5.21	2.5	0.6	0.86	1.12	0.80	1.00	0.60	1.30	2.00	1.12	1.58		0.000	0.0000	0.00	0.24	
37.50	37.25	115.0	52.6	25.0	0.0	12	40.5	0.1	2.20	2.10	0.8	1.3	43.5	48.5	96.6	1,052.9	1,981.3	5.23	2.5	0.6	0.85	1.12	0.79	1.00	0.61	1.30	2.00	1.14	1.59		0.000	0.0000	0.00	0.24	
38.00	37.75	115.0	52.7	25.0	0.0	12	40.5	0.1	2.23	2.11	0.8	1.3	43.4	48.5	96.6	1,053.7	1,984.1	5.24	2.5	0.6	0.85	1.12	0.79	1.00	0.61	1.30	2.00	1.15	1.60		0.000	0.0000	0.00	0.24	
38.50	38.25	115.0	45.4	30.0	0.0	12	39.6	0.1	2.26	2.13	0.8	1.3	36.3	41.6	89.5	1,041.1	1,937.0	5.20	2.4	0.6	0.85	1.12	0.80	1.00	0.61	1.30	2.00	1.16	1.62		0.000	0.0000	0.00	0.24	
39.00	38.75	115.0	45.5	30.0	0.0	12	39.5	0.1	2.29	2.14	0.8	1.3	36.2	41.6	89.4	1,041.9	1,940.0	5.22	2.4	0.6	0.85	1.12	0.79	1.00	0.61	1.30	2.00	1.17	1.63		0.000	0.0000	0.00	0.24	
39.50	39.25	115.0	45.5	30.0	0.0	12	39.5	0.1	2.32	2.15	0.8	1.3	36.2	41.5	89.4	1,042.7	1,942.9	5.23	2.4	0.6	0.84	1.12	0.79	1.00	0.62	1.30	2.00	1.18	1.64		0.000	0.0000	0.00	0.24	
40.00	39.75	115.0	45.5	30.0	0.0	12	39.5	0.1	2.35	2.17	0.8	1.3	36.1	41.5	89.3	1,043.4	1,945.8	5.25	2.4	0.6	0.84	1.12	0.79	1.00	0.62	1.30	2.00	1.19	1.65		0.000	0.0000	0.00	0.24	
40.50	40.25	110.0	51.0	30.0	0.0	12	40.5	0.1	2.38	2.18	0.8	1.3	41.3	46.7	94.8	1,083.0	2,004.9	5.34	2.4	0.6	0.84	1.12	0.78	1.00	0.63	1.30	2.00	1.20	1.64		0.000	0.0000	0.00	0.24	
41.00	40.75	110.0	51.0	30.0	0.0	12	40.5	0.1	2.40	2.19	0.8	1.3	41.3	46.6	94.7	1,083.6	2,007.3	5.35	2.4	0.6	0.84	1.12	0.78	1.00	0.63	1.30	2.00	1.21	1.65		0.000	0.0000	0.00	0.24	
41.50	41.25	110.0	51.1	30.0	0.0	12	40.5	0.1	2.43	2.20	0.8	1.3	41.2	46.6	94.7	1,084.3	2,009.7	5.37	2.4	0.6	0.83	1.12	0.78	1.00	0.64	1.30	2.00	1.22	1.65		0.000	0.0000	0.00	0.24	
42.00	41.75	110.0	51.1	30.0	0.0	12	40.5	0.1	2.46	2.22	0.8	1.3	41.2	46.5	94.6	1,084.9	2,012.1	5.38	2.4	0.6	0.83	1.12	0.78	1.00	0.64	1.30	2.00	1.23	1.66		0.000	0.0000	0.00	0.24	
42.50	42.25	110.0	51.1	30.0	0.0	12	40.5	0.1	2.49	2.23	0.8	1.3	41.1	46.5	94.5	1,085.6	2,014.5	5.40	2.4	0.6	0.83	1.12	0.78	1.00	0.64	1.30	2.00	1.24	1.67		0.000	0.0000	0.00	0.24	
43.00	42.75	110.0	51.1	30.0	0.0	12	40.5	0.1	2.51	2.24	0.8	1.3	41.1	46.4	94.5	1,086.2	2,016.8	5.41	2.4	0.6	0.83	1.12	0.78	1.00	0.64	1.30	2.00	1.25	1.68		0.000	0.0000	0.00	0.24	
43.50	43.25	110.0	37.9	30.0	0.0	12	37.5	0.1	2.54	2.25	0.8	1.3	28.6	34.0	80.8	1,048.8	1,880.5	5.25	2.3	0.7	0.82	1.12	0.85	1.00	0.59	0.90	1.53	1.26	1.73		1.191	0.2080	0.01	0.22	
44.00	43.75	110.0	37.9	30.0	0.0	12	37.5	0.1	2.57	2.26	0.8	1.3	28.5	33.9	80.7	1,049.4	1,882.7	5.26	2.3	0.7	0.82	1.12	0.85	1.00	0.59	0.89	1.50	1.27	1.74		1.276	0.2233	0.01	0.21	
44.50	44.25	110.0	37.9	30.0	0.0	12	37.4	0.1	2.60	2.28	0.8	1.3	28.5	33.8	80.7	1,050.0	1,884.8	5.28	2.3	0.7	0.82	1.12	0.85	1.00	0.60	0.88	1.48	1.28	1.75		1.356	0.2378	0.01	0.20	
45.00	44.75	110.0	37.9	30.0	0.0	12	37.4	0.1	2.62	2.29	0.7	1.3	28.4	33.8	80.6	1,050.6	1,887.0	5.29	2.3	0.7	0.82	1.12	0.84	1.00	0.60	0.87	1.45	1.29	1.76		1.436	0.2525	0.02	0.18	
45.50	45.25	115.0	65.9	30.0	0.0	12	40.5	0.1	2.65	2.30	0.8	1.3	53.7	59.1	100.0	1,109.6	2,200.4	5.71	2.5	0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.97	1.30	1.74		0.000	0.0000	0.00	0.18	
46.00	45.75	115.0	65.9	30.0	0.0	12	40.5	0.1	2.68	2.31	0.8	1.3	53.6	59.0	100.0	1,110.2	2,202.9	5.72	2.5	0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.96	1.31	1.75		0.000	0.0000	0.00	0.18	
46.50	46.25	115.0	65.9	30.0	0.0	12	40.5	0.1	2.71	2.33	0.8	1.3	53.6	58.9	100.0	1,110.9	2,205.4	5.74	2.5	0.6	0.81	1.12	0.76	1.00	0.66	1.30	1.96	1.32	1.75		0.000	0.0000	0.00	0.18	
47.00	46.75	115.0	65.9	30.0	0.0	12	40.5	0.1	2.74	2.34	0.8	1.3	53.5	58.9	100.0	1,111.5	2,207.8	5.76	2.5	0.6	0.81	1.12	0.76	1.00	0.67	1.30	1.95	1.33	1.76		0.000	0.0000	0.00	0.18	
47.50	47.25	115.0	66.0	30.0	0.0	12	40.5	0.1	2.77	2.35	0.8	1.3	53.5	58.8	100.0	1,112.1	2,210.2	5.77	2.5	0.6	0.80	1.12	0.76	1.00	0.67	1.30	1.94	1.34	1.77		0.000				

X:\3242-0-0 Fillmore Unified School District\GeoSuite\REVIEW LETTER VALUES\GeoSuite_3242-0-0-100_B-3.csv



Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 34 ft
Maximum Settlement = 1.22 in
Settl. at Bottom of Footing = 1.22 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998); [sat] Idriss & Boulanger (2008)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)



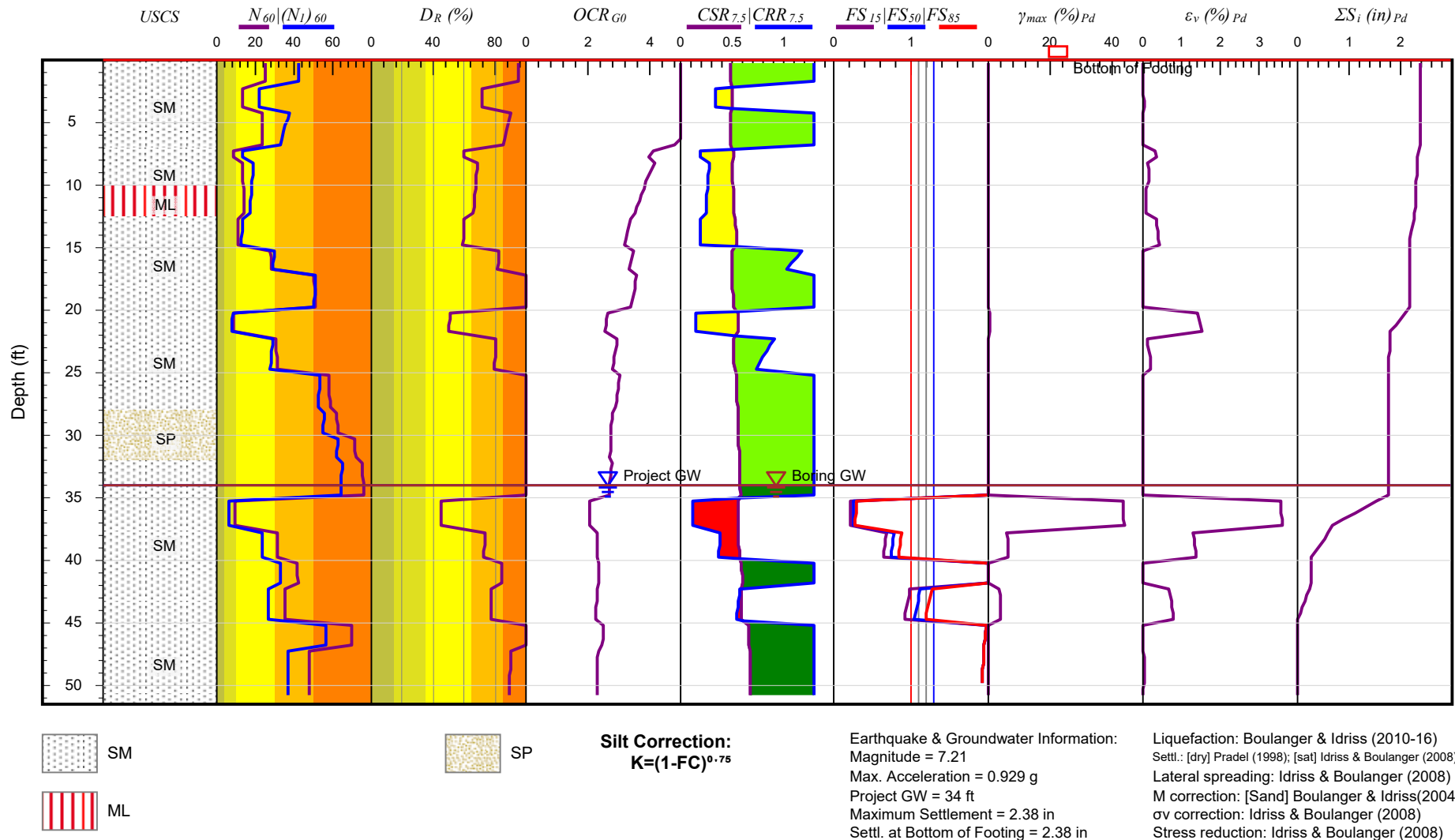
Seismic Settlement Potential - SPT Data

Project:	Fillmore High School				
Location:	555 Central Ave, Fillmore, CA 93015				
Project No.:	3242-0-0-100	Boring No.:	B-3	Figure:	3

Z_b (ft)	Z_m (ft)	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	φ (°)	C' (tsf)	σ_{v0} (tsf)	σ_{v0}' (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60cs}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ_p' (tsf)	OCR_{G0}	S_u/σ_{v0}'	K_0	r_d	MSF	K_a	K_a	CSR _{7.5}	CRR _{7.5}	FS	τ_{av} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ϵ_v (%)	ΔS_i	ΣS_i (in)
0.50	0.25	120.0	23.5	25.0	0.0	12	40.4	0.0	0.02	0.02	1.7	1.3	39.9	45.0	93.0	777.7	1,127.9	0.08	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.01	0.01	0.6049	0.001	0.0000	0.00	1.22
1.00	0.75	120.0	23.5	25.0	0.0	12	40.4	0.0	0.05	0.05	1.7	1.3	39.9	45.0	93.0	772.7	1,113.6	0.23	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.03	0.04	0.3208	0.003	0.0000	0.00	1.22
1.50	1.25	120.0	23.5	25.0	0.0	12	40.4	0.0	0.08	0.08	1.7	1.3	39.9	45.0	93.0	768.0	1,100.0	0.38	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.05	0.07	0.1889	0.005	0.0000	0.00	1.22
2.00	1.75	120.0	23.5	25.0	0.0	12	40.4	0.0	0.11	0.11	1.7	1.3	39.9	45.0	93.0	763.5	1,087.1	0.53	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.06	0.10	0.1194	0.008	0.0000	0.00	1.22
2.50	2.25	115.0	9.9	25.0	0.0	12	33.7	0.0	0.13	0.13	1.7	1.2	16.9	22.0	65.0	683.0	833.7	0.67	5.0		1.1	1.00	1.06	1.10	1.00	0.52	0.23		0.08	0.14	0.0652	0.017	0.0225	0.00	1.21
3.00	2.75	115.0	9.9	25.0	0.0	12	33.7	0.0	0.16	0.16	1.7	1.2	16.9	22.0	65.0	679.7	825.8	0.82	5.0		1.1	0.99	1.06	1.10	1.00	0.52	0.23		0.10	0.17	0.0405	0.024	0.0316	0.00	1.21
3.50	3.25	115.0	9.9	25.0	0.0	12	33.6	0.0	0.19	0.19	1.7	1.2	16.9	22.0	65.0	676.7	818.3	0.96	5.0		1.1	0.99	1.06	1.10	1.00	0.52	0.23		0.12	0.20	0.0321	0.031	0.0428	0.00	1.21
4.00	3.75	115.0	9.9	25.0	0.0	12	33.6	0.0	0.22	0.22	1.7	1.2	16.9	22.0	65.0	673.7	811.1	1.10	5.0		1.1	0.99	1.06	1.10	1.00	0.51	0.23		0.13	0.23	0.0369	0.040	0.0567	0.00	1.21
4.50	4.25	120.0	16.3	35.0	0.0	12	37.2	0.0	0.25	0.25	1.7	1.3	27.6	33.2	79.9	714.2	951.3	1.25	5.0		1.0	0.99	1.12	1.10	1.00	0.49	0.78		0.15	0.26	0.0385	0.033	0.0268	0.00	1.21
5.00	4.75	120.0	16.2	35.0	0.0	12	37.0	0.0	0.28	0.28	1.7	1.3	27.0	32.5	79.1	710.5	941.5	1.40	5.0		1.0	0.99	1.12	1.10	1.00	0.49	0.70		0.17	0.29	0.0416	0.041	0.0341	0.00	1.20
5.50	5.25	120.0	16.1	35.0	0.0	12	36.7	0.0	0.31	0.31	1.6	1.3	26.0	31.5	77.9	706.6	931.1	1.55	5.0		1.1	0.99	1.11	1.10	1.00	0.49	0.60		0.18	0.32	0.0426	0.049	0.0431	0.00	1.20
6.00	5.75	120.0	15.9	35.0	0.0	12	36.4	0.0	0.34	0.34	1.6	1.3	25.1	30.6	76.7	702.9	921.4	1.67	4.9		1.0	0.99	1.10	1.10	1.00	0.49	0.53		0.20	0.35	0.0435	0.060	0.0541	0.00	1.20
6.50	6.25	115.0	20.7	35.0	0.0	12	38.0	0.0	0.37	0.37	1.5	1.3	30.3	35.8	83.0	747.7	999.1	1.82	4.9		1.0	0.98	1.12	1.10	1.00	0.48	1.30		0.22	0.38	0.0468	0.056	0.0000	0.00	1.20
7.00	6.75	115.0	20.6	35.0	0.0	12	37.8	0.0	0.40	0.40	1.4	1.3	29.5	35.0	82.1	756.3	1,022.1	1.89	4.8		1.0	0.98	1.12	1.10	1.00	0.48	1.12		0.24	0.40	0.0477	0.060	0.0000	0.00	1.20
7.50	7.25	115.0	20.8	35.0	0.0	12	37.6	0.0	0.43	0.43	1.4	1.3	29.1	34.6	81.6	765.6	1,047.7	1.97	4.6		1.0	0.98	1.12	1.10	1.00	0.48	1.03		0.25	0.42	0.0486	0.064	0.0000	0.00	1.20
8.00	7.75	115.0	21.1	35.0	0.0	12	37.6	0.0	0.46	0.46	1.4	1.3	28.9	34.4	81.4	775.1	1,073.8	2.05	4.5		1.0	0.98	1.12	1.10	1.00	0.48	0.98		0.27	0.45	0.0494	0.068	0.0000	0.00	1.20
8.50	8.25	110.0	16.3	35.0	0.0	12	35.7	0.0	0.48	0.48	1.4	1.2	22.7	28.2	73.6	771.3	1,016.9	2.05	4.2		1.0	0.98	1.09	1.10	1.00	0.49	0.39		0.29	0.47	0.0524	0.089	0.0895	0.01	1.19
9.00	8.75	110.0	16.6	35.0	0.0	12	35.6	0.0	0.51	0.51	1.4	1.2	22.5	28.0	73.3	779.3	1,038.2	2.12	4.1		1.0	0.98	1.09	1.10	1.00	0.49	0.38		0.30	0.50	0.0532	0.093	0.0947	0.01	1.19
9.50	9.25	110.0	16.7	35.0	0.0	12	35.5	0.0	0.54	0.54	1.3	1.2	22.2	27.8	73.1	786.9	1,058.5	2.19	4.1		0.9	0.98	1.09	1.10	1.00	0.49	0.37		0.32	0.52	0.0538	0.097	0.1001	0.01	1.18
10.00	9.75	110.0	16.9	35.0	0.0	12	35.5	0.0	0.57	0.57	1.3	1.2	22.0	27.5	72.8	794.0	1,077.7	2.25	4.0		0.9	0.97	1.09	1.10	1.00	0.49	0.37		0.33	0.54	0.0545	0.102	0.1058	0.01	1.17
10.50	10.25	110.0	20.6	25.0	0.0	12	36.7	0.0	0.59	0.59	1.3	1.3	25.8	30.9	77.1	809.2	1,119.4	2.34	3.9		0.9	0.97	1.10	1.10	1.00	0.48	0.55		0.35	0.56	0.0565	0.100	0.0964	0.01	1.17
11.00	10.75	110.0	20.7	25.0	0.0	12	36.6	0.0	0.62	0.62	1.2	1.3	25.6	30.7	76.8	815.5	1,136.9	2.40	3.9		0.9	0.97	1.10	1.09	1.00	0.48	0.53		0.36	0.58	0.0571	0.104	0.1019	0.01	1.16
11.50	11.25	110.0	20.9	25.0	0.0	12	36.5	0.0	0.65	0.65	1.2	1.3	25.4	30.4	76.5	821.6	1,153.9	2.46	3.8		0.9	0.97	1.10	1.09	1.00	0.49	0.51		0.38	0.60	0.0577	0.109	0.1074	0.01	1.16
12.00	11.75	110.0	21.0	25.0	0.0	12	36.5	0.1	0.68	0.68	1.2	1.3	25.2	30.2	76.2	827.4	1,170.1	2.52	3.7		0.9	0.97	1.10	1.08	1.00	0.49	0.50		0.39	0.63	0.0583	0.113	0.1132	0.01	1.15
12.50	12.25	120.0	21.2	20.0	0.0	12	36.4	0.1	0.71	0.71	1.2	1.2	24.9	29.4	75.2	790.4	1,165.0	2.56	3.6		0.9	0.96	1.10	1.07	1.00	0.50	0.45		0.41	0.65	0.0577	0.125	0.1350	0.01	1.14
13.00	12.75	120.0	21.3	20.0	0.0	12	36.3	0.1	0.74	0.74	1.2	1.2	24.7	29.1	74.9	795.7	1,180.7	2.63	3.6		0.9	0.96	1.09	1.06	1.00	0.50	0.44		0.43	0.67	0.0613	0.130	0.1431	0.01	1.13
13.50	13.25	120.0	21.4	20.0	0.0	12	36.2	0.1	0.77	0.77	1.1	1.2	24.4	28.9	74.6	800.8	1,196.0	2.69	3.5		0.9	0.96	1.09	1.05	1.00	0.50	0.42		0.44	0.69	0.0648	0.136	0.1511	0.01	1.12
14.00	13.75	120.0	21.5	20.0	0.0	12	36.2	0.1	0.80	0.80	1.1	1.2	24.2	28.7	74.2	805.7	1,210.5	2.75	3.5		0.9	0.96	1.09	1.05	1.00	0.51	0.41		0.46	0.72	0.0684	0.141	0.1597	0.01	1.11
14.50	14.25	120.0	21.6	20.0	0.0	12	36.1	0.1	0.83	0.83	1.1	1.2	23.9	28.4	73.9	810.3	1,224.4	2.80	3.4		0.8	0.96	1.09	1.04	1.00	0.51	0.40		0.48	0.74	0.0720	0.146	0.1686	0.01	1.10
15.00	14.75	120.0	21.7	20.0	0.0	12	36.0	0.1	0.86	0.86	1.1	1.2	23.7	28.2	73.6	814.7	1,237.8	2.86	3.3		0.8	0.96	1.09	1.03	1.00	0.51	0.39		0.49	0.76	0.0756	0.152	0.1778	0.01	1.09
15.50	15.25	110.0	50.8	20.0	0.0	12	40.5	0.1	0.88	0.88	1.0	1.3	53.3	57.7	100.0	971.1	1,612.2	3.29	3.7		0.8	0.95	1.12	1.05	1.00	0.49	1.30		0.51	0.78	0.0636	0.075	0.0000	0.00	1.09
16.00	15.75	110.0	51.1	20.0	0.0	12	40.5	0.1	0.91	0.91	1.0	1.3	53.1	57.6	100.0	975.5	1,626.6	3.35	3.7		0.8	0.95	1.12	1.04	1.00	0.49	1.30		0.52	0.80	0.0641	0.077	0.0000	0.00	1.09
16.50	16.25	110.0	51.3	20.0	0.0	12	40.5	0.1	0.94	0.94	1.0	1.3	53.0	57.5	100.0	979.6	1,640.5	3.40	3.6		0.8	0.95	1.12	1.04	1.00	0.49	1.30		0.54	0.82	0.0645	0.079	0.0000	0.00	1.09
17.00	16.75	110.0	51.6	20.0	0.0	12	40.5	0.1	0.97	0.97	1.0	1.3	52.8	57.3	100.0	983.6	1,654.0	3.46	3.6		0.8	0.95	1.12	1.03	1.00	0.50	1.30		0.55	0.84	0.0649	0.081	0.0000	0.00	1.09
17.50	17.25	105.0	24.1	20.0	0.0	12	36.3	0.1	0.99	0.99	1.0	1.2	24.7	29.2	74.9	901.2	1,325.4	3.15	3.2		0.8	0.95	1.09	1.01	1.00	0.52	0.44		0.57	0.87	0.0679	0.164	0.1882	0.01	1.08
18.00	17.75	105.0	24.1	20.0	0.0	12	36.3	0.1	1.02	1.02	1.0	1.2	24.5	29.0	74.6	904.7	1,335.5	3.19	3.1		0.8	0.94	1.09	1.01	1.00	0.52	0.43		0.58	0.89	0.0682	0.168	0.1958	0.01	1.07
18.50	18.25	105.0	24.2	20.0	0.0	12	36.2	0.1	1.05	1.05	1.0	1.2	24.3	28.8	74.4	908.0	1,345.5	3.24	3.1		0.8	0.94	1.09												

Z_b (ft)	Z_m (ft)	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	φ (°)	C' (tsf)	σ_{v0} (tsf)	σ_{v0}' (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60cs}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ_p' (tsf)	OCR_{G0}	S_u/σ_{v0}'	K_0	r_d	MSF	K_a	K_a	$CSR_{7.5}$	$CRR_{7.5}$	FS	τ_{av} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ε_v (%)	ΔS_i	ΣS_i (in)
29.50	29.25	115.0	44.6	35.0	0.0	11	40.2	0.1	1.68	1.68	0.9	1.3	38.7	44.2	92.2	1,019.1	1,856.1	4.61	2.7	0.7	0.89	1.12	0.86	1.00	0.56	1.30		0.90	1.32	0.1318	0.151	0.0000	0.00	0.97	
30.00	29.75	115.0	44.7	35.0	0.0	11	40.1	0.1	1.71	1.71	0.9	1.3	38.5	44.0	92.0	1,021.3	1,863.9	4.65	2.7	0.7	0.89	1.12	0.86	1.00	0.56	1.30		0.92	1.34	0.1349	0.154	0.0000	0.00	0.97	
30.50	30.25	115.0	22.8	35.0	0.0	12	34.1	0.1	1.73	1.73	0.8	1.2	18.2	23.7	67.5	942.3	1,586.7	4.34	2.5	0.7	0.89	1.07	0.93	1.00	0.54	0.26		0.93	1.43	0.1795	0.252	0.3724	0.02	0.95	
31.00	30.75	115.0	22.7	35.0	0.0	12	34.1	0.1	1.76	1.76	0.8	1.2	18.0	23.5	67.2	944.1	1,593.0	4.37	2.5	0.7	0.89	1.06	0.93	1.00	0.54	0.26		0.94	1.45	0.1832	0.256	0.3828	0.02	0.92	
31.50	31.25	115.0	22.7	35.0	0.0	12	34.0	0.1	1.79	1.79	0.8	1.2	17.9	23.4	67.0	946.1	1,599.6	4.41	2.5	0.7	0.88	1.06	0.93	1.00	0.54	0.26		0.96	1.47	0.1868	0.260	0.3924	0.02	0.90	
32.00	31.75	115.0	22.7	35.0	0.0	12	34.0	0.1	1.82	1.82	0.8	1.2	17.7	23.2	66.8	948.0	1,606.1	4.45	2.4	0.7	0.88	1.06	0.93	1.00	0.54	0.25		0.97	1.49	0.1905	0.263	0.4021	0.02	0.88	
32.50	32.25	120.0	59.3	30.0	0.0	12	40.5	0.1	1.85	1.85	0.9	1.3	51.2	56.6	100.0	1,046.4	2,041.8	5.03	2.7	0.7	0.88	1.12	0.83	1.00	0.57	1.30		0.98	1.44	0.1729	0.134	0.0000	0.00	0.88	
33.00	32.75	120.0	59.4	30.0	0.0	12	40.5	0.1	1.88	1.88	0.9	1.3	51.1	56.4	100.0	1,048.2	2,048.8	5.07	2.7	0.7	0.88	1.12	0.83	1.00	0.57	1.30		0.99	1.46	0.1759	0.136	0.0000	0.00	0.88	
33.50	33.25	120.0	59.5	30.0	0.0	12	40.5	0.1	1.91	1.91	0.9	1.3	50.9	56.3	100.0	1,049.9	2,055.7	5.11	2.7	0.7	0.87	1.12	0.82	1.00	0.57	1.30		1.01	1.48	0.1789	0.138	0.0000	0.00	0.88	
34.00	33.75	120.0	59.5	30.0	0.0	12	40.5	0.1	1.94	1.94	0.9	1.3	50.7	56.1	100.0	1,051.6	2,062.4	5.15	2.7	0.7	0.87	1.12	0.82	1.00	0.57	1.30		1.02	1.50	0.1819	0.140	0.0000	0.00	0.88	
34.50	34.25	120.0	59.6	30.0	0.0	12	40.5	0.1	1.97	1.96	0.9	1.3	50.6	56.0	100.0	1,052.9	2,067.5	5.18	2.6	0.7	0.87	1.12	0.81	1.00	0.58	1.30	2.00	1.03	1.52		0.000	0.0000	0.00	0.88	
35.00	34.75	120.0	59.6	30.0	0.0	12	40.5	0.1	2.00	1.98	0.8	1.3	50.6	56.0	100.0	1,053.8	2,071.0	5.20	2.6	0.7	0.87	1.12	0.81	1.00	0.58	1.30	2.00	1.05	1.53		0.000	0.0000	0.00	0.88	
35.50	35.25	120.0	59.7	30.0	0.0	12	40.5	0.1	2.03	1.99	0.8	1.3	50.5	55.9	100.0	1,054.7	2,074.5	5.22	2.6	0.7	0.86	1.12	0.81	1.00	0.59	1.30	2.00	1.06	1.53		0.000	0.0000	0.00	0.88	
36.00	35.75	120.0	59.7	30.0	0.0	12	40.5	0.1	2.06	2.01	0.8	1.3	50.5	55.9	100.0	1,055.6	2,077.9	5.24	2.6	0.7	0.86	1.12	0.81	1.00	0.59	1.30	2.00	1.07	1.54		0.000	0.0000	0.00	0.88	
36.50	36.25	120.0	59.8	30.0	0.0	12	40.5	0.1	2.09	2.02	0.8	1.3	50.4	55.8	100.0	1,056.4	2,081.2	5.26	2.6	0.7	0.86	1.12	0.81	1.00	0.59	1.30	2.00	1.08	1.55		0.000	0.0000	0.00	0.88	
37.00	36.75	120.0	59.8	30.0	0.0	12	40.5	0.1	2.12	2.03	0.8	1.3	50.4	55.8	100.0	1,057.3	2,084.5	5.28	2.6	0.7	0.86	1.12	0.80	1.00	0.60	1.30	2.00	1.10	1.56		0.000	0.0000	0.00	0.88	
37.50	37.25	120.0	35.7	35.0	0.0	12	37.2	0.1	2.15	2.05	0.8	1.3	27.7	33.2	80.0	993.6	1,841.2	4.99	2.4	0.7	0.85	1.12	0.87	1.00	0.56	0.79	1.43	1.11	1.61		1.517	0.2711	0.02	0.86	
38.00	37.75	120.0	35.6	35.0	0.0	12	37.2	0.1	2.18	2.06	0.8	1.3	27.6	33.2	79.9	994.4	1,844.0	5.01	2.4	0.7	0.85	1.12	0.87	1.00	0.56	0.78	1.40	1.12	1.62		1.621	0.2904	0.02	0.84	
38.50	38.25	120.0	31.1	35.0	0.0	11	36.0	0.1	2.21	2.08	0.8	1.2	23.5	29.0	74.7	979.1	1,787.6	4.95	2.4	0.7	0.85	1.09	0.89	1.00	0.56	0.43	0.77	1.13	1.64		5.293	1.0868	0.07	0.78	
39.00	38.75	120.0	31.1	35.0	0.0	11	35.9	0.1	2.24	2.09	0.8	1.2	23.4	28.9	74.6	979.8	1,790.3	4.97	2.4	0.7	0.85	1.09	0.89	1.00	0.56	0.43	0.76	1.14	1.65		5.363	1.1049	0.07	0.71	
39.50	39.25	120.0	31.1	35.0	0.0	11	35.9	0.1	2.27	2.11	0.8	1.2	23.4	28.9	74.5	980.6	1,793.3	4.99	2.4	0.7	0.84	1.09	0.89	1.00	0.57	0.42	0.74	1.16	1.66		5.418	1.1190	0.07	0.64	
40.00	39.75	120.0	31.1	35.0	0.0	11	35.9	0.1	2.30	2.12	0.8	1.2	23.3	28.8	74.4	981.4	1,796.2	5.01	2.4	0.7	0.84	1.09	0.88	1.00	0.57	0.42	0.73	1.17	1.67		5.473	1.1333	0.07	0.58	
40.50	40.25	120.0	26.8	35.0	0.0	11	34.7	0.1	2.33	2.14	0.7	1.2	19.6	25.1	69.5	965.3	1,737.7	4.94	2.3	0.7	0.84	1.07	0.90	1.00	0.57	0.29	0.51	1.18	1.70		8.722	1.8863	0.11	0.46	
41.00	40.75	120.0	26.8	35.0	0.0	11	34.6	0.1	2.36	2.15	0.7	1.2	19.6	25.1	69.4	966.1	1,740.6	4.96	2.3	0.7	0.84	1.07	0.90	1.00	0.58	0.29	0.51	1.19	1.71		8.796	1.8911	0.11	0.35	
41.50	41.25	120.0	26.8	35.0	0.0	11	34.6	0.1	2.39	2.16	0.7	1.2	19.5	25.0	69.3	966.9	1,743.4	4.98	2.3	0.7	0.83	1.07	0.90	1.00	0.58	0.29	0.50	1.20	1.72		8.867	1.8957	0.11	0.23	
42.00	41.75	120.0	26.8	35.0	0.0	11	34.6	0.1	2.42	2.18	0.7	1.2	19.4	24.9	69.3	967.7	1,746.2	5.00	2.3	0.7	0.83	1.07	0.90	1.00	0.58	0.29	0.50	1.21	1.73		8.940	1.9004	0.11	0.12	
42.50	42.25	120.0	26.8	35.0	0.0	11	34.6	0.1	2.45	2.19	0.7	1.2	19.4	24.9	69.2	968.4	1,749.0	5.01	2.3	0.7	0.83	1.07	0.89	1.00	0.58	0.29	0.49	1.23	1.74		9.013	1.9051	0.11	0.01	
43.00	42.75	120.0	69.4	35.0	0.0	12	40.5	0.1	2.48	2.21	0.8	1.3	57.2	62.7	100.0	1,099.8	2,255.6	5.68	2.6	0.6	0.83	1.12	0.78	1.00	0.64	1.30	2.00	1.24	1.69		0.000	0.0000	0.00	0.01	
43.50	43.25	120.0	69.4	35.0	0.0	12	40.5	0.1	2.51	2.22	0.8	1.3	57.1	62.6	100.0	1,100.5	2,258.5	5.70	2.6	0.6	0.82	1.12	0.78	1.00	0.65	1.30	2.00	1.25	1.70		0.000	0.0000	0.00	0.01	
44.00	43.75	120.0	69.5	35.0	0.0	12	40.5	0.1	2.54	2.24	0.8	1.3	57.1	62.6	100.0	1,101.2	2,261.5	5.71	2.6	0.6	0.82	1.12	0.78	1.00	0.65	1.30	2.00	1.26	1.71		0.000	0.0000	0.00	0.01	
44.50	44.25	120.0	69.5	35.0	0.0	12	40.5	0.1	2.57	2.25	0.8	1.3	57.0	62.5	100.0	1,101.9	2,264.4	5.73	2.5	0.6	0.82	1.12	0.77	1.00	0.65	1.30	1.99	1.27	1.72		0.000	0.0000	0.00	0.01	
45.00	44.75	120.0	69.5	35.0	0.0	12	40.5	0.1	2.60	2.26	0.8	1.3	56.9	62.4	100.0	1,102.6	2,267.2	5.75	2.5	0.6	0.82	1.12	0.77	1.00	0.65	1.30	1.99	1.28	1.73		0.000	0.0000	0.00	0.01	
45.50	45.25	120.0	73.2	35.0	0.0	12	40.5	0.1	2.63	2.28	0.8	1.3	59.8	65.3	100.0	1,112.7	2,309.0	5.82	2.6	0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.98	1.29	1.74		0.000	0.0000	0.00	0.01	
46.00	45.75	120.0	73.2	35.0	0.0	12	40.5	0.1	2.66	2.29	0.8	1.3	59.7	65.2	100.0	1,113.4	2,311.8	5.84	2.5	0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.97	1.30	1.75		0.000	0.0000	0.00	0.01	
46.50	46.25	120.0	73.2	35.0	0.0	12	40.5	0.1	2.69	2.31	0.8	1.3	59.7	65.2	100.0	1,114.1	2,314.6	5.86	2.5	0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.96	1.31	1.76		0.000	0.0000	0.00	0.01	
47.00	46.75	120.0	73.3	35.0	0.0	12	40.5	0.1	2.72	2.32	0.8	1.3	59.6	65.1	100.0	1,114.7	2,317.4	5.87	2.5	0.6	0.81	1.12	0.76	1.00	0.67	1.30	1.95	1.32	1.77		0.000	0.0000	0.00	0.01	
47.50	47.25	120.0	73.3	35.0	0.0	12	40.5	0.1	2.75	2.34	0.8	1.3	59.5	65.0	100.0	1,115.4	2,320.1	5.89	2.5	0.6	0.80	1.12	0.76	1.00	0.67	1.30	1.94	1.33	1.78		0.000				

X:\3242-0-0 Fillmore Unified School District\GeoSuite\REVIEW LETTER VALUES\GeoSuite_3242-0-0-100_B-4.csv



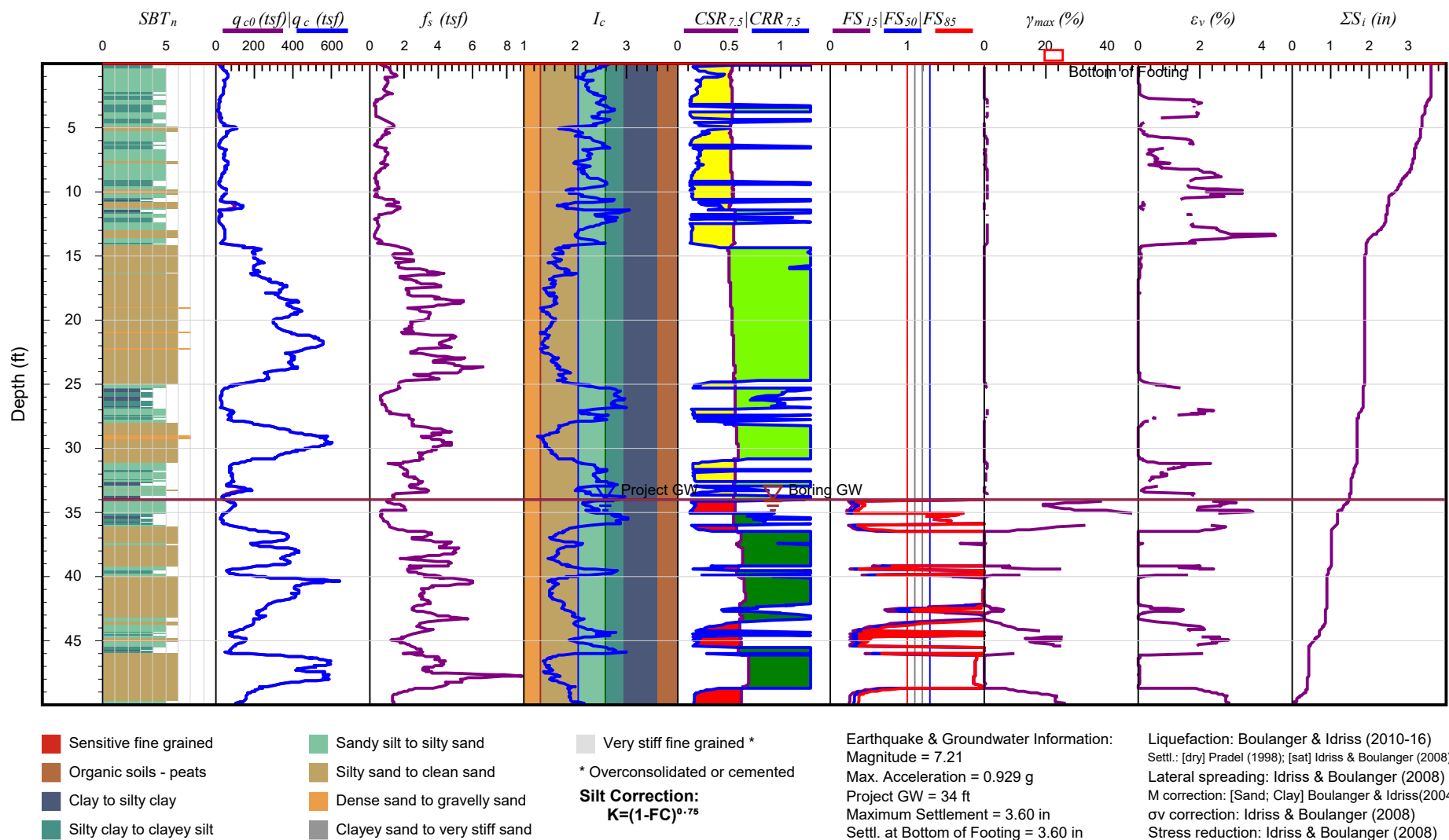
Seismic Settlement Potential - SPT Data

Project:	Fillmore High School				
Location:	555 Central Ave, Fillmore, CA 93015				
Project No.:	3242-0-0-100	Boring No.:	B-4	Figure:	4

Z_b (ft)	Z_m (ft)	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	φ (°)	C' (tsf)	σ_{v0} (tsf)	σ_{v0}' (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60cs}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ_p' (tsf)	OCR_{G0}	S_u/σ_{v0}'	K_0	r_d	MSF	K_a	K_a	$CSR_{7.5}$	$CRR_{7.5}$	FS	τ_{av} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ε_v (%)	ΔS_i	ΣS_i (in)
0.50	0.25	100.0	24.9	20.0	0.0	12	40.5	0.0	0.01	0.01	1.7	1.3	42.3	46.7	94.8	854.3	1,134.1	0.06	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.01	0.01	0.5364	0.001	0.0000	0.00	2.38
1.00	0.75	100.0	24.9	20.0	0.0	12	40.5	0.0	0.04	0.04	1.7	1.3	42.3	46.7	94.8	849.7	1,121.9	0.19	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.02	0.04	0.2415	0.002	0.0000	0.00	2.38
1.50	1.25	100.0	24.9	20.0	0.0	12	40.5	0.0	0.06	0.06	1.7	1.3	42.3	46.7	94.8	845.2	1,110.2	0.31	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.04	0.06	0.1269	0.004	0.0000	0.00	2.38
2.00	1.75	100.0	24.9	20.0	0.0	12	40.5	0.0	0.09	0.09	1.7	1.3	42.3	46.7	94.8	840.9	1,099.0	0.44	5.0		1.0	1.00	1.12	1.10	1.00	0.49	1.30		0.05	0.09	0.0737	0.006	0.0000	0.00	2.38
2.50	2.25	120.0	13.0	20.0	0.0	12	35.5	0.0	0.12	0.12	1.7	1.2	22.1	26.5	71.4	691.3	891.2	0.58	5.0		1.1	1.00	1.08	1.10	1.00	0.51	0.33		0.07	0.12	0.1008	0.012	0.0126	0.00	2.38
3.00	2.75	120.0	13.0	20.0	0.0	12	35.5	0.0	0.15	0.15	1.7	1.2	22.0	26.5	71.4	687.6	881.6	0.73	5.0		1.1	0.99	1.08	1.10	1.00	0.51	0.33		0.09	0.15	0.0651	0.017	0.0184	0.00	2.38
3.50	3.25	120.0	13.0	20.0	0.0	12	35.5	0.0	0.18	0.18	1.7	1.2	22.0	26.5	71.4	684.0	872.6	0.88	5.0		1.1	0.99	1.08	1.10	1.00	0.50	0.33		0.10	0.18	0.0409	0.023	0.0256	0.00	2.38
4.00	3.75	120.0	13.0	20.0	0.0	12	35.5	0.0	0.21	0.21	1.7	1.2	22.0	26.5	71.4	680.7	864.0	1.03	5.0		1.1	0.99	1.08	1.10	1.00	0.50	0.33		0.12	0.21	0.0329	0.030	0.0345	0.00	2.38
4.50	4.25	120.0	23.5	20.0	0.0	12	39.9	0.0	0.24	0.24	1.6	1.3	37.6	42.1	89.9	740.8	1,023.4	1.18	5.0		1.0	0.99	1.12	1.10	1.00	0.49	1.30		0.14	0.24	0.0368	0.026	0.0000	0.00	2.38
5.00	4.75	120.0	23.5	20.0	0.0	12	39.6	0.0	0.27	0.27	1.6	1.3	36.5	41.0	88.8	737.2	1,013.4	1.33	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.16	0.27	0.0414	0.032	0.0000	0.00	2.38
5.50	5.25	120.0	23.5	20.0	0.0	12	39.4	0.0	0.30	0.30	1.5	1.3	35.6	40.1	87.8	733.7	1,003.9	1.48	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.18	0.30	0.0440	0.038	0.0000	0.00	2.38
6.00	5.75	120.0	23.5	20.0	0.0	12	39.2	0.0	0.33	0.33	1.5	1.3	34.7	39.2	86.8	730.4	994.8	1.63	5.0		1.0	0.99	1.12	1.10	1.00	0.48	1.30		0.19	0.33	0.0449	0.046	0.0000	0.00	2.38
6.50	6.25	120.0	23.5	20.0	0.0	12	38.9	0.0	0.36	0.36	1.4	1.3	33.9	38.4	85.9	727.2	986.0	1.77	5.0		1.0	0.98	1.12	1.10	1.00	0.48	1.30		0.21	0.36	0.0459	0.054	0.0000	0.00	2.38
7.00	6.75	120.0	23.5	20.0	0.0	12	38.7	0.0	0.39	0.39	1.4	1.3	33.2	37.7	85.1	733.1	1,002.2	1.85	4.8		1.0	0.98	1.12	1.10	1.00	0.48	1.30		0.23	0.38	0.0468	0.060	0.0000	0.00	2.38
7.50	7.25	120.0	8.6	25.0	0.0	12	32.4	0.0	0.42	0.42	1.6	1.1	13.7	18.7	60.0	649.0	785.4	1.70	4.1		1.0	0.98	1.04	1.10	1.00	0.52	0.19		0.25	0.41	0.0465	0.158	0.3143	0.02	2.36
8.00	7.75	120.0	8.7	25.0	0.0	12	32.3	0.0	0.45	0.45	1.5	1.1	13.4	18.5	59.6	657.9	807.2	1.77	4.0		1.0	0.98	1.04	1.10	1.00	0.52	0.19		0.26	0.44	0.0473	0.168	0.3368	0.02	2.34
8.50	8.25	115.0	13.2	35.0	0.0	12	34.4	0.0	0.47	0.47	1.4	1.2	18.9	24.5	68.6	730.1	952.6	1.97	4.2		1.0	0.98	1.07	1.10	1.00	0.50	0.28		0.28	0.47	0.0494	0.105	0.1299	0.01	2.33
9.00	8.75	115.0	13.4	35.0	0.0	12	34.3	0.0	0.50	0.50	1.4	1.2	18.7	24.2	68.2	738.2	973.9	2.04	4.1		1.0	0.98	1.07	1.10	1.00	0.50	0.27		0.30	0.49	0.0501	0.110	0.1382	0.01	2.32
9.50	9.25	115.0	13.5	35.0	0.0	12	34.2	0.0	0.53	0.53	1.4	1.2	18.5	24.0	67.9	745.8	994.1	2.11	4.0		0.9	0.98	1.07	1.10	1.00	0.50	0.27		0.31	0.51	0.0508	0.116	0.1468	0.01	2.31
10.00	9.75	115.0	13.6	35.0	0.0	12	34.1	0.0	0.56	0.56	1.3	1.2	18.2	23.7	67.6	753.0	1,013.4	2.18	3.9		0.9	0.97	1.07	1.09	1.00	0.51	0.26		0.33	0.54	0.0515	0.121	0.1558	0.01	2.30
10.50	10.25	115.0	13.8	65.0	0.0	7	34.1	0.0	0.59	0.59	1.3	1.2	18.0	23.6	67.4	759.8	1,031.8	2.24	3.8		0.9	0.97	1.06	1.08	1.00	0.51	0.26		0.35	0.56	0.0571	0.127	0.0751	0.00	2.30
11.00	10.75	115.0	13.9	65.0	0.0	7	34.0	0.0	0.62	0.62	1.3	1.2	17.8	23.4	67.0	766.3	1,049.4	2.31	3.7		0.9	0.97	1.06	1.07	1.00	0.51	0.26		0.36	0.59	0.0610	0.132	0.0794	0.00	2.29
11.50	11.25	115.0	14.0	65.0	0.0	7	33.9	0.0	0.65	0.65	1.3	1.2	17.6	23.2	66.7	772.4	1,066.2	2.37	3.7		0.9	0.97	1.06	1.07	1.00	0.52	0.25		0.38	0.61	0.0649	0.138	0.0839	0.01	2.29
12.00	11.75	115.0	14.1	65.0	0.0	7	33.8	0.0	0.68	0.68	1.2	1.2	17.4	22.9	66.4	778.2	1,082.4	2.43	3.6		0.9	0.97	1.06	1.06	1.00	0.52	0.25		0.39	0.63	0.0689	0.144	0.0886	0.01	2.28
12.50	12.25	115.0	14.2	65.0	0.0	7	33.7	0.0	0.70	0.70	1.2	1.2	17.1	22.7	66.1	783.8	1,098.0	2.49	3.5		0.9	0.96	1.06	1.05	1.00	0.52	0.24		0.41	0.66	0.0729	0.149	0.0933	0.01	2.28
13.00	12.75	115.0	11.1	35.0	0.0	12	32.2	0.0	0.73	0.73	1.2	1.1	13.3	18.8	60.2	763.9	1,042.8	2.47	3.4		0.9	0.96	1.04	1.04	1.00	0.53	0.19		0.43	0.68	0.0670	0.196	0.3464	0.02	2.26
13.50	13.25	115.0	11.1	35.0	0.0	12	32.1	0.1	0.76	0.76	1.2	1.1	13.1	18.6	59.9	768.9	1,056.7	2.53	3.3		0.9	0.96	1.04	1.04	1.00	0.54	0.19		0.44	0.70	0.0707	0.203	0.3639	0.02	2.23
14.00	13.75	115.0	11.2	35.0	0.0	12	32.1	0.1	0.79	0.79	1.2	1.1	13.0	18.5	59.6	773.8	1,070.2	2.58	3.3		0.9	0.96	1.04	1.03	1.00	0.54	0.19		0.46	0.73	0.0744	0.210	0.3816	0.02	2.21
14.50	14.25	115.0	11.2	35.0	0.0	12	32.0	0.1	0.82	0.82	1.1	1.1	12.8	18.3	59.3	778.5	1,083.2	2.64	3.2		0.9	0.96	1.04	1.03	1.00	0.54	0.19		0.47	0.75	0.0781	0.218	0.3996	0.02	2.19
15.00	14.75	115.0	11.3	35.0	0.0	12	31.9	0.1	0.85	0.85	1.1	1.1	12.6	18.2	59.1	783.1	1,095.9	2.69	3.2		0.9	0.96	1.04	1.03	1.00	0.54	0.19		0.49	0.77	0.0818	0.225	0.4181	0.03	2.16
15.50	15.25	115.0	27.8	35.0	0.0	12	37.8	0.1	0.88	0.88	1.1	1.3	29.8	35.3	82.4	885.1	1,400.0	3.07	3.5		0.8	0.95	1.12	1.04	1.00	0.49	1.17		0.50	0.78	0.0664	0.108	0.0000	0.00	2.16
16.00	15.75	115.0	27.9	35.0	0.0	12	37.8	0.1	0.91	0.91	1.1	1.3	29.6	35.1	82.1	889.5	1,414.1	3.12	3.4		0.8	0.95	1.12	1.03	1.00	0.50	1.13		0.52	0.80	0.0695	0.111	0.0000	0.00	2.16
16.50	16.25	115.0	28.0	35.0	0.0	12	37.7	0.1	0.93	0.93	1.0	1.3	29.3	34.9	81.9	893.7	1,427.2	3.18	3.4		0.8	0.95	1.12	1.03	1.00	0.50	1.08		0.54	0.82	0.0727	0.115	0.0000	0.00	2.16
17.00	16.75	115.0	28.1	35.0	0.0	12	37.6	0.1	0.96	0.96	1.0	1.3	29.1	34.6	81.6	897.6	1,439.8	3.23	3.4		0.8	0.95	1.12	1.02	1.00	0.50	1.03		0.55	0.84	0.0759	0.118	0.0000	0.00	2.16
17.50	17.25	110.0	50.2	35.0	0.0	12	40.5	0.1	0.99	0.99	1.0	1.3	51.0	56.5	100.0	1,003.8	1,722.4	3.57	3.6		0.8	0.95	1.12	1.02	1.00	0.50	1.30		0.57	0.86	0.0631	0.076	0.0000	0.00	2.16
18.00	17.75	110.0	50.4	35.0	0.0	12	40.5	0.1	1.02	1.02	1.0	1.3	50.9	56.4	100.0	1,007.6	1,735.6	3.62	3.6		0.8	0.94	1.12	1.01	1.00	0.50	1.30		0.58	0.88	0.0634	0.078	0.0000	0.00	2.16
18.50	18.25	110.0	50.6	35.0	0.0	12	40.5	0.1	1.05	1.05	1.0	1.3	50.7	56.3	100.0	1,011.3	1,748.4	3.67	3.5		0.8	0.94	1.12												

Z_b (ft)	Z_m (ft)	γ (pcf)	N_{60}	FC(%)	CC(%)	USCS	φ (°)	C' (tsf)	σ_{v0} (tsf)	σ_{v0}' (tsf)	C_N	C_s	$(N_1)_{60}$	$(N_1)_{60cs}$	D_R (%)	V_s (ft/s)	G_0 (tsf)	σ_p' (tsf)	OCR_{G0}	S_u/σ_{v0}'	K_0	r_d	MSF	K_a	K_a	$CSR_{7.5}$	$CRR_{7.5}$	FS	τ_{av} (tsf)	p (tsf)	G/G_0	γ_{max} (%)	ε_v (%)	ΔS_i	ΣS_i (in)
29.50	29.25	120.0	62.4	5.0	0.0	17	40.5	0.1	1.69	1.69	0.9	1.3	55.2	55.2	100.0	1,002.7	1,874.9	4.64	2.8		0.7	0.89	1.12	0.86	1.00	0.56	1.30		0.91	1.32	0.1030	0.149	0.0000	0.00	1.75
30.00	29.75	120.0	62.5	5.0	0.0	17	40.5	0.1	1.72	1.72	0.9	1.3	55.0	55.0	100.0	1,004.5	1,881.6	4.68	2.7		0.7	0.89	1.12	0.85	1.00	0.56	1.30		0.92	1.34	0.1055	0.152	0.0000	0.00	1.75
30.50	30.25	120.0	71.5	5.0	0.0	17	40.5	0.1	1.75	1.75	0.9	1.3	62.7	62.7	100.0	1,031.1	1,982.7	4.84	2.8		0.7	0.89	1.12	0.85	1.00	0.56	1.30		0.94	1.37	0.1105	0.133	0.0000	0.00	1.75
31.00	30.75	120.0	71.6	5.0	0.0	17	40.5	0.1	1.78	1.78	0.9	1.3	62.5	62.5	100.0	1,032.8	1,989.3	4.88	2.7		0.7	0.89	1.12	0.84	1.00	0.57	1.30		0.95	1.39	0.1130	0.136	0.0000	0.00	1.75
31.50	31.25	120.0	71.7	5.0	0.0	17	40.5	0.1	1.81	1.81	0.9	1.3	62.3	62.3	100.0	1,034.5	1,995.9	4.92	2.7		0.7	0.88	1.12	0.84	1.00	0.57	1.30		0.96	1.41	0.1155	0.138	0.0000	0.00	1.75
32.00	31.75	120.0	71.8	5.0	0.0	17	40.5	0.1	1.84	1.84	0.9	1.3	62.1	62.1	100.0	1,036.2	2,002.2	4.97	2.7		0.7	0.88	1.12	0.83	1.00	0.57	1.30		0.98	1.43	0.1180	0.141	0.0000	0.00	1.75
32.50	32.25	120.0	75.5	20.0	0.0	12	40.5	0.1	1.87	1.87	0.9	1.3	65.0	69.5	100.0	1,074.5	2,153.1	5.18	2.8		0.7	0.88	1.12	0.83	1.00	0.57	1.30		0.99	1.47	0.1657	0.117	0.0000	0.00	1.75
33.00	32.75	120.0	75.6	20.0	0.0	12	40.5	0.1	1.90	1.90	0.9	1.3	64.8	69.3	100.0	1,076.3	2,160.1	5.22	2.8		0.7	0.88	1.12	0.82	1.00	0.57	1.30		1.00	1.49	0.1686	0.119	0.0000	0.00	1.75
33.50	33.25	120.0	75.7	20.0	0.0	12	40.5	0.1	1.93	1.93	0.9	1.3	64.6	69.1	100.0	1,078.0	2,167.0	5.26	2.7		0.7	0.87	1.12	0.82	1.00	0.57	1.30		1.02	1.51	0.1716	0.121	0.0000	0.00	1.75
34.00	33.75	120.0	75.8	20.0	0.0	12	40.5	0.1	1.96	1.96	0.9	1.3	64.4	68.9	100.0	1,079.7	2,173.8	5.30	2.7		0.7	0.87	1.12	0.82	1.00	0.58	1.30		1.03	1.53	0.1745	0.122	0.0000	0.00	1.75
34.50	34.25	120.0	75.8	20.0	0.0	12	40.5	0.1	1.99	1.98	0.8	1.3	64.3	68.8	100.0	1,080.9	2,178.9	5.33	2.7		0.7	0.87	1.12	0.81	1.00	0.58	1.30	2.00	1.04	1.54		0.000	0.0000	0.00	1.75
35.00	34.75	120.0	75.9	20.0	0.0	12	40.5	0.1	2.02	1.99	0.8	1.3	64.2	68.7	100.0	1,081.8	2,182.5	5.35	2.7		0.7	0.87	1.12	0.81	1.00	0.58	1.30	2.00	1.05	1.55		0.000	0.0000	0.00	1.75
35.50	35.25	120.0	9.2	20.0	0.0	12	28.6	0.1	2.05	2.01	0.7	1.1	6.3	10.8	45.5	824.8	1,268.8	4.14	2.1		0.7	0.86	1.02	0.94	1.00	0.55	0.12	0.22	1.07	1.66		43.482	3.5750	0.21	1.54
36.00	35.75	120.0	9.2	20.0	0.0	12	28.6	0.1	2.08	2.02	0.7	1.1	6.3	10.7	45.5	825.8	1,271.7	4.16	2.1		0.7	0.86	1.02	0.94	1.00	0.56	0.12	0.22	1.08	1.67		43.609	3.5803	0.21	1.32
36.50	36.25	120.0	9.2	20.0	0.0	12	28.5	0.1	2.11	2.04	0.7	1.1	6.2	10.7	45.4	826.7	1,274.6	4.18	2.1		0.7	0.86	1.02	0.94	1.00	0.56	0.12	0.22	1.09	1.68		43.716	3.5848	0.22	1.11
37.00	36.75	120.0	9.2	20.0	0.0	12	28.5	0.1	2.14	2.05	0.7	1.1	6.2	10.7	45.4	827.6	1,277.4	4.20	2.0		0.7	0.86	1.02	0.94	1.00	0.56	0.12	0.22	1.10	1.69		43.823	3.5894	0.22	0.89
37.50	37.25	120.0	9.2	20.0	0.0	12	28.5	0.1	2.17	2.07	0.7	1.1	6.2	10.7	45.3	828.6	1,280.3	4.21	2.0		0.7	0.85	1.02	0.94	1.00	0.56	0.12	0.22	1.12	1.70		43.931	3.5939	0.22	0.67
38.00	37.75	120.0	31.0	20.0	0.0	12	35.9	0.1	2.20	2.08	0.8	1.2	23.5	28.0	73.3	954.2	1,697.9	4.83	2.3		0.7	0.85	1.09	0.89	1.00	0.56	0.38	0.68	1.13	1.63		6.117	1.3041	0.08	0.60
38.50	38.25	120.0	31.0	20.0	0.0	12	35.9	0.1	2.23	2.09	0.8	1.2	23.4	27.9	73.2	955.0	1,700.6	4.85	2.3		0.7	0.85	1.09	0.89	1.00	0.56	0.38	0.67	1.14	1.64		6.180	1.3212	0.08	0.52
39.00	38.75	120.0	31.0	20.0	0.0	12	35.9	0.1	2.26	2.11	0.8	1.2	23.3	27.8	73.1	955.7	1,703.3	4.87	2.3		0.7	0.85	1.09	0.89	1.00	0.57	0.38	0.66	1.15	1.65		6.240	1.3375	0.08	0.44
39.50	39.25	120.0	31.0	20.0	0.0	12	35.9	0.1	2.29	2.12	0.7	1.2	23.2	27.7	73.0	956.5	1,706.0	4.89	2.3		0.7	0.84	1.09	0.89	1.00	0.57	0.37	0.66	1.17	1.66		6.301	1.3540	0.08	0.36
40.00	39.75	120.0	31.0	20.0	0.0	12	35.8	0.1	2.32	2.14	0.7	1.2	23.2	27.7	72.9	957.2	1,708.7	4.91	2.3		0.7	0.84	1.09	0.89	1.00	0.57	0.37	0.65	1.18	1.67		6.362	1.3708	0.08	0.27
40.50	40.25	120.0	41.9	20.0	0.0	12	38.6	0.1	2.35	2.15	0.8	1.3	32.8	37.3	84.7	994.0	1,842.4	5.10	2.4		0.6	0.84	1.12	0.83	1.00	0.59	1.30	2.00	1.19	1.64		0.000	0.0000	0.00	0.27
41.00	40.75	120.0	41.9	20.0	0.0	12	38.6	0.1	2.38	2.17	0.8	1.3	32.7	37.2	84.6	994.7	1,845.3	5.12	2.4		0.6	0.84	1.12	0.83	1.00	0.59	1.30	2.00	1.20	1.65		0.000	0.0000	0.00	0.27
41.50	41.25	120.0	42.0	20.0	0.0	12	38.6	0.1	2.41	2.18	0.8	1.3	32.7	37.1	84.5	995.5	1,848.2	5.14	2.4		0.6	0.83	1.12	0.83	1.00	0.60	1.30	2.00	1.21	1.66		0.000	0.0000	0.00	0.27
42.00	41.75	120.0	42.0	20.0	0.0	12	38.6	0.1	2.44	2.20	0.8	1.3	32.6	37.1	84.4	996.3	1,851.1	5.15	2.3		0.6	0.83	1.12	0.83	1.00	0.60	1.30	2.00	1.22	1.67		0.000	0.0000	0.00	0.27
42.50	42.25	115.0	35.6	20.0	0.0	12	36.9	0.1	2.47	2.21	0.8	1.3	26.8	31.2	77.5	998.2	1,780.7	5.07	2.3		0.7	0.83	1.11	0.87	1.00	0.58	0.58	0.99	1.23	1.70		3.585	0.6836	0.04	0.23
43.00	42.75	115.0	35.6	20.0	0.0	12	36.9	0.1	2.50	2.22	0.8	1.3	26.7	31.2	77.4	998.8	1,782.9	5.09	2.3		0.7	0.83	1.11	0.87	1.00	0.58	0.57	0.97	1.24	1.71		3.694	0.7063	0.04	0.19
43.50	43.25	115.0	35.6	20.0	0.0	12	36.9	0.1	2.52	2.24	0.7	1.3	26.6	31.1	77.3	999.5	1,785.2	5.10	2.3		0.7	0.82	1.11	0.86	1.00	0.59	0.56	0.96	1.26	1.72		3.793	0.7272	0.04	0.15
44.00	43.75	115.0	35.6	20.0	0.0	12	36.9	0.1	2.55	2.25	0.7	1.3	26.5	31.0	77.2	1,000.1	1,787.5	5.12	2.3		0.7	0.82	1.11	0.86	1.00	0.59	0.56	0.94	1.27	1.73		3.893	0.7483	0.04	0.10
44.50	44.25	115.0	35.6	20.0	0.0	12	36.9	0.1	2.58	2.26	0.7	1.3	26.4	30.9	77.1	1,000.7	1,789.7	5.14	2.3		0.7	0.82	1.10	0.86	1.00	0.59	0.55	0.93	1.28	1.74		3.994	0.7696	0.05	0.06
45.00	44.75	115.0	35.5	20.0	0.0	12	36.8	0.1	2.61	2.28	0.7	1.3	26.4	30.8	77.0	1,001.3	1,792.0	5.15	2.3		0.7	0.82	1.10	0.86	1.00	0.59	0.54	0.92	1.29	1.75		4.095	0.7912	0.05	0.01
45.50	45.25	115.0	69.5	25.0	0.0	12	40.5	0.1	2.64	2.29	0.8	1.3	56.8	61.8	100.0	1,110.9	2,205.7	5.70	2.5		0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.97	1.30	1.73		0.000	0.0000	0.00	0.01
46.00	45.75	115.0	69.6	25.0	0.0	12	40.5	0.1	2.67	2.30	0.8	1.3	56.7	61.8	100.0	1,111.6	2,208.2	5.72	2.5		0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.97	1.31	1.74		0.000	0.0000	0.00	0.01
46.50	46.25	115.0	69.6	25.0	0.0	12	40.5	0.1	2.70	2.31	0.8	1.3	56.6	61.7	100.0	1,112.2	2,210.6	5.74	2.5		0.6	0.81	1.12	0.77	1.00	0.66	1.30	1.96	1.32	1.75		0.000	0.0000	0.00	0.01
47.00	46.75	115.0	69.6	25.0	0.0	12	40.5	0.1	2.73	2.33	0.8	1.3	56.6	61.6	100.0	1,112.8	2,213.0	5.75	2.5		0.6	0.81	1.12	0.76	1.00	0.67	1.30	1.95	1.33	1.76		0.000	0.0000	0.00	0.01
47.50	47.25	110.0	47.6	25.0	0.0	12	39.7	0.1	2.75	2.34	0.8	1.3	37.0	42.1	90.0	1,073.3	1,969.																		

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Seismic Settlement Potential - CPT Data

Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-1	Figure:	5

$Z_{\text{eff}}(0)$	$Z_{\text{eff}}(0.01)$	$f_{\text{eff}}(0)$	$f_{\text{eff}}(0.01)$	$u_1(0)$	$u_1(0.01)$	$q(0)$	$q(0.01)$	R_p	S_{BT}	$\gamma(\text{eff})$	$\sigma_{\text{eff}}(0)$	$\sigma_{\text{eff}}(0.01)$	Q_1	Q_{max}	F_2	$S_{\text{BT}}(r)$	I_c	K_c	(S_{BT})	B_2	(S_{BT})	$F_c(r)$	$S_{\text{eff}}(r)$	$q(1-\omega)(0)$	$q(1-\omega)(0.01)$	c	R_2	$u_{\text{eff}}(0)$	$f_{\text{eff}}(0.01)$	$V_{\text{eff}}(0)$	$G_2(R_p)$	$G_2(\text{eff})$	$E(\text{eff})$	$M(\text{eff})$	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}	S_{16}	S_{17}	S_{18}	S_{19}	S_{20}	S_{21}	S_{22}	S_{23}	S_{24}	S_{25}	S_{26}	S_{27}	S_{28}	S_{29}	S_{30}	S_{31}	S_{32}	S_{33}	S_{34}	S_{35}	S_{36}	S_{37}	S_{38}	S_{39}	S_{40}	S_{41}	S_{42}	S_{43}	S_{44}	S_{45}	S_{46}	S_{47}	S_{48}	S_{49}	S_{50}	S_{51}	S_{52}	S_{53}	S_{54}	S_{55}	S_{56}	S_{57}	S_{58}	S_{59}	S_{60}	S_{61}	S_{62}	S_{63}	S_{64}	S_{65}	S_{66}	S_{67}	S_{68}	S_{69}	S_{70}	S_{71}	S_{72}	S_{73}	S_{74}	S_{75}	S_{76}	S_{77}	S_{78}	S_{79}	S_{80}	S_{81}	S_{82}	S_{83}	S_{84}	S_{85}	S_{86}	S_{87}	S_{88}	S_{89}	S_{90}	S_{91}	S_{92}	S_{93}	S_{94}	S_{95}	S_{96}	S_{97}	S_{98}	S_{99}	S_{100}	S_{101}	S_{102}	S_{103}	S_{104}	S_{105}	S_{106}	S_{107}	S_{108}	S_{109}	S_{110}	S_{111}	S_{112}	S_{113}	S_{114}	S_{115}	S_{116}	S_{117}	S_{118}	S_{119}	S_{120}	S_{121}	S_{122}	S_{123}	S_{124}	S_{125}	S_{126}	S_{127}	S_{128}	S_{129}	S_{130}	S_{131}	S_{132}	S_{133}	S_{134}	S_{135}	S_{136}	S_{137}	S_{138}	S_{139}	S_{140}	S_{141}	S_{142}	S_{143}	S_{144}	S_{145}	S_{146}	S_{147}	S_{148}	S_{149}	S_{150}	S_{151}	S_{152}	S_{153}	S_{154}	S_{155}	S_{156}	S_{157}	S_{158}	S_{159}	S_{160}	S_{161}	S_{162}	S_{163}	S_{164}	S_{165}	S_{166}	S_{167}	S_{168}	S_{169}	S_{170}	S_{171}	S_{172}	S_{173}	S_{174}	S_{175}	S_{176}	S_{177}	S_{178}	S_{179}	S_{180}	S_{181}	S_{182}	S_{183}	S_{184}	S_{185}	S_{186}	S_{187}	S_{188}	S_{189}	S_{190}	S_{191}	S_{192}	S_{193}	S_{194}	S_{195}	S_{196}	S_{197}	S_{198}	S_{199}	S_{200}	S_{201}	S_{202}	S_{203}	S_{204}	S_{205}	S_{206}	S_{207}	S_{208}	S_{209}	S_{210}	S_{211}	S_{212}	S_{213}	S_{214}	S_{215}	S_{216}	S_{217}	S_{218}	S_{219}	S_{220}	S_{221}	S_{222}	S_{223}	S_{224}	S_{225}	S_{226}	S_{227}	S_{228}	S_{229}	S_{230}	S_{231}	S_{232}	S_{233}	S_{234}	S_{235}	S_{236}	S_{237}	S_{238}	S_{239}	S_{240}	S_{241}	S_{242}	S_{243}	S_{244}	S_{245}	S_{246}	S_{247}	S_{248}	S_{249}	S_{250}	S_{251}	S_{252}	S_{253}	S_{254}	S_{255}	S_{256}	S_{257}	S_{258}	S_{259}	S_{260}	S_{261}	S_{262}	S_{263}	S_{264}	S_{265}	S_{266}	S_{267}	S_{268}	S_{269}	S_{270}	S_{271}	S_{272}	S_{273}	S_{274}	S_{275}	S_{276}	S_{277}	S_{278}	S_{279}	S_{280}	S_{281}	S_{282}	S_{283}	S_{284}	S_{285}	S_{286}	S_{287}	S_{288}	S_{289}	S_{290}	S_{291}	S_{292}	S_{293}	S_{294}	S_{295}	S_{296}	S_{297}	S_{298}	S_{299}	S_{300}	S_{301}	S_{302}	S_{303}	S_{304}	S_{305}	S_{306}	S_{307}	S_{308}	S_{309}	S_{310}	S_{311}	S_{312}	S_{313}	S_{314}	S_{315}	S_{316}	S_{317}	S_{318}	S_{319}	S_{320}	S_{321}	S_{322}	S_{323}	S_{324}	S_{325}	S_{326}	S_{327}	S_{328}	S_{329}	S_{330}	S_{331}	S_{332}	S_{333}	S_{334}	S_{335}	S_{336}	S_{337}	S_{338}	S_{339}	S_{340}	S_{341}	S_{342}	S_{343}	S_{344}	S_{345}	S_{346}	S_{347}	S_{348}	S_{349}	S_{350}	S_{351}	S_{352}	S_{353}	S_{354}	S_{355}	S_{356}	S_{357}	S_{358}	S_{359}	S_{360}	S_{361}	S_{362}	S_{363}	S_{364}	S_{365}	S_{366}	S_{367}	S_{368}	S_{369}	S_{370}	S_{371}	S_{372}	S_{373}	S_{374}	S_{375}	S_{376}	S_{377}	S_{378}	S_{379}	S_{380}	S_{381}	S_{382}	S_{383}	S_{384}	S_{385}	S_{386}	S_{387}	S_{388}	S_{389}	S_{390}	S_{391}	S_{392}	S_{393}	S_{394}	S_{395}	S_{396}	S_{397}	S_{398}	S_{399}	S_{400}	S_{401}	S_{402}	S_{403}	S_{404}	S_{405}	S_{406}	S_{407}	S_{408}	S_{409}	S_{410}	S_{411}	S_{412}	S_{413}	S_{414}	S_{415}	S_{416}	S_{417}	S_{418}	S_{419}	S_{420}	S_{421}	S_{422}	S_{423}	S_{424}	S_{425}	S_{426}	S_{427}	S_{428}	S_{429}	S_{430}	S_{431}	S_{432}	S_{433}	S_{434}	S_{435}	S_{436}	S_{437}	S_{438}	S_{439}	S_{440}	S_{441}	S_{442}	S_{443}	S_{444}	S_{445}	S_{446}	S_{447}	S_{448}	S_{449}	S_{450}	S_{451}	S_{452}	S_{453}	S_{454}	S_{455}	S_{456}	S_{457}	S_{458}	S_{459}	S_{460}	S_{461}	S_{462}	S_{463}	S_{464}	S_{465}	S_{466}	S_{467}	S_{468}	S_{469}	S_{470}	S_{471}	S_{472}	S_{473}	S_{474}	S_{475}	S_{476}	S_{477}	S_{478}	S_{479}	S_{480}	S_{481}	S_{482}	S_{483}	S_{484}	S_{485}	S_{486}	S_{487}	S_{488}	S_{489}	S_{490}	S_{491}	S_{492}	S_{493}	S_{494}	S_{495}	S_{496}	S_{497}	S_{498}	S_{499}	S_{500}	S_{501}	S_{502}	S_{503}	S_{504}	S_{505}	S_{506}	S_{507}	S_{508}	S_{509}	S_{510}	S_{511}	S_{512}	S_{513}	S_{514}	S_{515}	S_{516}	S_{517}	S_{518}	S_{519}	S_{520}	S_{521}	S_{522}	S_{523}	S_{524}	S_{525}	S_{526}	S_{527}	S_{528}	S_{529}	S_{530}	S_{531}	S_{532}	S_{533}	S_{534}	S_{535}	S_{536}	S_{537}	S_{538}	S_{539}	S_{540}	S_{541}	S_{542}	S_{543}	S_{544}	S_{545}	S_{546}	S_{547}	S_{548}	S_{549}	S_{550}	S_{551}	S_{552}	S_{553}	S_{554}	S_{555}	S_{556}	S_{557}	S_{558}	S_{559}	S_{560}	S_{561}	S_{562}	S_{563}	S_{564}	S_{565}	S_{566}	S_{567}	S_{568}	S_{569}	S_{570}	S_{571}	S_{572}	S_{573}	S_{574}	S_{575}	S_{576}	S_{577}	S_{578}	S_{579}	S_{580}	S_{581}	S_{582}	S_{583}	S_{584}	S_{585}	S_{586}	S_{587}	S_{588}	S_{589}	S_{590}	S_{591}	S_{592}	S_{593}	S_{594}	S_{595}	S_{596}	S_{597}	S_{598}	S_{599}	S_{600}	S_{601}	S_{602}	S_{603}	S_{604}	S_{605}	S_{606}	S_{607}	S_{608}	S_{609}	S_{610}	S_{611}	S_{612}	S_{613}	S_{614}	S_{615}	S_{616}	S_{617}	S_{618}	S_{619}	S_{620}	S_{621}	S_{622}	S_{623}	S_{624}	S_{625}	S_{626}	S_{627}	S_{628}	S_{629}	S_{630}	S_{631}	S_{632}	S_{633}	S_{634}	S_{635}	S_{636}	S_{637}	S_{638}	S_{639}	S_{640}	S_{641}	S_{642}	S_{643}	S_{644}	S_{645}	S_{646}	S_{647}	S_{648}	S_{649}	S_{650}	S_{651}	S_{652}	S_{653}	S_{654}	S_{655}	S_{656}	S_{657}	S_{658}	S_{659}	S_{660}	S_{661}	S_{662}	S_{663}	S_{664}	S_{665}	S_{666}	S_{667}	S_{668}	S_{669}	S_{670}	S_{671}	S_{672}	S_{673}	S_{674}	S_{675}	S_{676}	S_{677}	S_{678}	S_{679}	S_{680}	S_{681}	S_{682}	S_{683}	S_{684}	S_{685}	S_{686}	S_{687}	S_{688}	S_{689}	S_{690}	S_{691}	S_{692}	S_{693}	S_{694}	S_{695}	S_{696}	S_{697}	S_{698}	S_{699}	S_{700}	S_{701}	S_{702}	S_{703}	S_{704}	S_{705}	S_{706}	S_{707}	S_{708}	S_{709}	S_{710}	S_{711}	S_{712}	S_{713}	S_{714}	S_{715}	S_{716}	S_{717}	S_{718}	S_{719}	S_{720}	S_{721}	S_{722}	S_{723}	S_{724}	S_{725}	S_{726}	S_{727}	S_{728}	S_{729}	S_{730}	S_{731}	S_{732}	S_{733}	S_{734}	S_{735}	S_{736}	S_{737}	S_{738}	S_{739}	S_{740}	S_{741}	S_{742}	S_{743}	S_{744}	S_{745}	S_{746}	S_{747}	S_{748}	S_{749}	S_{750}	S_{751}	S_{752}	S_{753}	S_{754}	S_{755}	S_{756}	S_{757}	S_{758}	S_{759}	S_{760}	S_{761}	S_{762}	S_{763}	S_{764}	S_{765}	S_{766}	S_{767}	S_{768}	S_{769}	S_{770}	S_{771}	S_{772}	S_{773}	S_{774}	S_{775}	S_{776}	S_{777}	S_{778}	S_{779}	S_{780}	S_{781}	S_{782}	S_{783}	S_{784}	S_{785}	S_{786}	S_{787}	S_{788}	S_{789}	S_{790}	S_{791}	S_{792}	S_{793}	S_{794}	S_{795}	S_{796}	S_{797}	S_{798}	S_{799}	S_{800}	S_{801}	S_{802}	S_{803}	S_{804}	S_{805}	S_{806}	S_{807}	S_{808}	S_{809}	S_{810}	S_{811}	S_{812}	S_{813}	S_{814}	S_{815}	S_{816}	S_{817}	S_{818}	S_{819}	S_{820}	S_{821}	S_{822}	S_{823}	S_{824}	S_{825}	S_{826}	S_{827}	S_{828}	S_{829}	S_{830}	S_{831}	S_{832}	S_{833}	S_{834}	S_{835}	S_{836}	S_{837}	S_{838}	S_{839}	S_{840}	S_{841}	S_{842}	S_{843}	S_{844}	S_{845}	S_{846}	S_{847}	S_{848}	S_{849}	S_{850}	S_{851}	S_{852}	S_{853}	S_{854}	S_{855}	S_{856}	S_{857}	S_{858}	S_{859}	S_{860}	S_{861}	S_{862}	S_{863}	S_{864}	S_{865}	S_{866}	S_{867}	S_{868}	S_{869}	S_{870}	S_{871}	S_{872}	S_{873}	S_{874}	S_{875}	S_{876}	S_{877}	S_{878}	S_{879}	S_{880}	S_{881}	S_{882}	S_{883}	S_{884}	S_{885}	S_{886}	S_{887}	S_{888}	S_{889}	S_{890}	S_{891}	S_{892}	S_{893}	S_{894}	S_{895}	S_{896}	S_{897}	S_{898}	S_{899}	S_{900}	S_{901}	S_{902}	S_{903}	S_{904}	S_{905}	S_{906}	S_{907}	S_{908}	S_{909}	S_{910}	S_{911}	S_{912}	S_{913}	S_{914}	S_{915}	S_{916}	S_{917}	S_{918}	S_{919}	S_{920}	$S_{$
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Z_s (ft)	Z_u (ft)	q_c (tsf)	f_1 (tsf)	w_z (tsf)	q_u (tsf)	R_f	S_{BT}	γ (pcf)	σ_{vm} (tsf)	σ'_{vm} (tsf)	Q_u	Q_{um}	F_R	$S_{BT_{cr}}$	I_c	K_u	(S_{BT}) L_c	B_u	(S_{BT}) B_u	F_c (kPa)	$q_{1.5m}$ (Mpa)	c	R	σ_v (m/s)	V_s (m/s)	V_s (ft/s)	G_s (kPa)	G_s (tsf)	E' (tsf)	M (tsf)	σ'_p (tsf)	OCR	S_r	S_r (tsf)	S_u/σ'_{vm}	ϕ (°)	ζ' (tsf)	$C_u/(1+e_0)/\rho_w$	$C_u/(1+e_0)/\rho_w$	K_B	D_R (ft)	$N_{60,1AR}$	(N_{60}) L_c	(N_f) $_{60,1AR}$	C_{γ}	(N_f) $_{60,1AR}$	(N_f) $_{60,1AR}$	(N_f) $_{60,1AR}$	(N_f) $_{60,1AR}$	r_d	MSF	K_{γ}	K_{γ}	CSR $_{z-1}$	CSR $_{z-1.5}$	FS	τ_{vm} (tsf)	p (tsf)	γ_{max} (%)	G/G $_s$	ε_v (%)	ΔS_v	ΔS_v (in)
9.00	8.94	24.4	0.32	0.03	24.4	1.30	6	113	0.54	0.54	44.5	36.8	1.33	5	2.38	2.20	5	0.00	1	25.45	3.3	0.56	273.9	970.4	147.9	485.3	39.552	413	347	334	0.74	1.4	34.8	0.01	0.45	0.15	0.52	58.1	9.2	5.6	0.9	1.41	18.8	13.2	6.1	17.4	0.98	1.02	1.08	1.00	0.53	0.13	0.32	0.36	1.000	0.08	1.90	0.02	2.88				
9.00	8.99	22.8	0.33	0.03	22.8	1.47	6	113	0.54	0.54	41.3	34.6	1.50	5	2.43	2.43	5	0.00	1	27.73	3.1	0.56	274.0	1,041.1	148.0	485.4	39.643	414	347	331	0.68	1.3	34.5	0.01	0.47	0.16	0.50	57.6	8.6	5.4	0.7	1.40	18.3	13.1	5.9	18.3	0.98	1.02	1.08	1.00	0.54	0.13	0.32	0.36	1.000	0.08	1.84	0.02	2.88				
9.10	9.05	21.9	0.38	0.03	21.9	1.72	6	114	0.54	0.54	39.5	33.5	1.77	5	2.49	2.69	5	0.00	1	30.11	3.0	0.57	274.0	1,116.6	150.3	493.0	41.183	430	358	330	0.65	1.2	34.4	0.01	0.49	0.16	0.48	57.4	8.3	5.3	0.5	1.40	18.1	13.3	5.9	19.9	0.98	1.02	1.07	1.00	0.54	0.13	0.32	0.36	1.000	0.07	1.75	0.02	2.86				
9.20	9.12	18.7	0.39	0.01	18.7	1.96	6	114	0.55	0.55	35.0	30.2	2.02	4	2.56	3.08	5	0.00	1	33.47	2.7	0.58	274.0	1,225.9	148.8	488.3	40.363	421	352	288	0.57	1.0	33.9	0.01	0.54	0.18	0.45	56.3	7.4	4.9	0.5	1.39	17.2	13.0	5.9	21.1	0.98	1.02	1.07	1.00	0.54	0.12	0.32	0.35	1.000	0.08	1.66	0.02	2.84				
9.20	9.18	17.8	0.40	0.01	17.8	2.26	5	114	0.55	0.55	31.4	27.2	2.33	4	2.68	3.18	5	0.00	1	34.38	2.4	0.58	274.0	1,253.0	142.8	468.6	37.190	388	324	241	0.51	0.8	33.4	0.01	0.60	0.06	0.44	56.1	8.4	4.5	0.4	1.39	18.8	12.4	5.9	23.4	0.98	1.02	1.07	1.00	0.54	0.12	0.32	0.34	1.000	0.08	1.67	0.02	2.84				
9.30	9.24	17.3	0.42	0.03	17.3	2.43	5	114	0.55	0.55	30.1	26.3	2.51	4	2.63	0.00	4	0.00	1	35.86	2.3	0.59	274.0	1,304.9	143.3	470.2	37.508	392	4	231	0.55	0.8	33.2	0.01	0.62	0.21	0.01	8.1	8.1	4.4	0.4	1.38	18.5	12.3	5.9	7.2	0.98	1.01	1.04	1.00	0.56	0.10	0.33	0.37	1.29	0.00	0.00	0.00	2.84				
9.40	9.31	17.7	0.39	0.03	17.7	2.22	5	114	0.56	0.56	30.8	26.8	2.29	4	2.58	3.18	5	0.00	1	34.30	2.4	0.58	274.0	1,252.9	142.6	467.8	37.011	386	323	240	0.56	0.9	33.3	0.01	0.61	0.06	0.42	54.9	8.4	4.5	0.4	1.38	18.7	12.3	5.9	23.1	0.97	1.02	1.07	1.00	0.54	0.12	0.33	0.34	1.000	0.08	1.68	0.02	2.82				
9.40	9.38	16.9	0.42	0.03	16.9	2.48	5	114	0.56	0.56	29.2	25.6	2.57	4	2.63	0.00	4	0.00	1	36.63	2.3	0.59	274.0	1,331.0	143.5	470.7	37.597	393	229	5.45	8.5	2.8	1.17	1.83	33.1	1.17	0.64	0.21	2.92	8.0	4.4	0.4	1.37	18.2	12.2	5.9	7.1	0.97	1.01	1.04	1.00	0.56	0.10	0.33	0.36	1.000	0.07	1.60	0.02	2.82			
9.50	9.43	17.7	0.42	0.03	17.7	2.35	5	114	0.56	0.56	30.4	26.6	2.43	4	2.60	3.29	5	0.00	1	35.22	2.4	0.58	274.0	1,253.9	144.1	472.9	37.955	396	330	240	0.56	0.9	33.3	0.01	0.62	0.06	0.42	54.9	8.4	4.5	0.4	1.37	18.7	12.4	5.9	23.9	0.97	1.02	1.07	1.00	0.54	0.12	0.33	0.34	1.000	0.08	1.63	0.02	2.80				
9.50	9.50	20.3	0.42	0.03	20.3	2.05	6	114	0.57	0.57	34.8	30.3	2.10	4	2.57	3.11	5	0.00	1	33.76	2.7	0.57	274.0	1,235.3	151.9	498.3	42.270	441	366	277	0.59	1.0	33.9	0.01	0.54	0.18	0.45	56.4	7.7	5.1	0.5	1.37	17.4	13.2	6.0	21.7	0.97	1.02	1.07	1.00	0.54	0.12	0.33	0.36	1.000	0.08	1.63	0.02	2.80				
9.60	9.57	21.2	0.45	0.03	21.2	2.13	6	115	0.57	0.57	36.0	31.4	2.19	4	2.56	3.10	5	0.00	1	33.66	2.8	0.57	274.0	1,231.9	154.9	508.1	42.240	462	381	288	0.62	1.1	34.1	0.01	0.52	0.17	0.46	56.9	8.0	5.3	0.5	1.36	17.8	13.5	6.0	22.4	0.97	1.02	1.07	1.00	0.54	0.13	0.34	0.37	1.000	0.07	1.60	0.02	2.78				
9.70	9.64	32.6	0.50	0.03	32.6	1.54	6	117	0.58	0.58	55.7	46.6	1.57	5	2.33	2.03	5	0.00	1	23.61	4.3	0.54	273.9	914.1	166.4	545.8	51.889	542	439	449	1.01	1.7	35.9	0.02	0.35	0.12	0.57	61.5	12.3	7.3	2.4	1.36	22.6	15.1	7.3	20.2	0.97	1.03	1.07	1.00	0.53	0.14	0.34	0.41	1.000	0.06	1.69	0.02	2.76				
9.80	9.74	44.5	0.50	0.03	44.5	1.13	7	118	0.58	0.58	75.6	61.3	1.14	5	2.14	1.52	5	0.00	1	17.01	5.8	0.52	273.8	718.6	172.8	566.8	56.304	588	474	947	1.37	2.4	37.3	0.03	0.33	0.03	0.66	64.1	14.0	9.3	5.2	1.35	23.1	16.2	9.0	39.0	0.97	1.03	1.08	1.00	0.53	0.16	0.34	0.45	1.000	0.06	2.22	0.03	2.73				
9.80	9.81	54.6	0.33	0.03	54.6	0.61	8	115	0.59	0.59	92.3	72.1	0.61	6	1.91	1.20	6	0.00	1	10.75	7.0	0.51	273.8	540.9	166.2	545.4	50.977	532	439	877	1.65	2.8	38.0	0.03	0.52	0.31	0.73	58.9	12.9	10.4	7.7	1.34	18.9	15.5	9.2	16.7	0.97	1.02	1.07	1.00	0.54	0.13	0.34	0.48	1.000	0.06	2.59	0.00	2.73				
9.90	9.89	57.0	0.26	0.04	57.0	0.46	8	113	0.59	0.59	95.6	73.9	0.46	6	1.84	1.00	6	0.00	1	5.00	7.3	0.51	273.8	490.6	161.7	530.6	47.531	496	415	830	1.71	2.9	38.2	0.03	1.00	0.33	0.74	53.4	13.5	10.6	8.2	1.34	18.0	14.1	8.2	14.1	0.97	1.02	1.06	1.00	0.54	0.12	0.35	0.49	1.000	0.07	3.40	0.04	2.69				
10.00	9.98	57.1	0.47	0.04	57.1	0.82	8	118	0.60	0.60	94.9	75.4	0.83	6	1.98	1.26	6	0.00	1	12.29	7.2	0.51	273.8	583.9	176.6	579.3	58.889	615	495	990	1.72	2.9	38.3	0.03	0.85	0.28	0.73	63.5	13.5	11.1	8.2	1.33	20.2	17.0	10.4	18.7	0.97	1.03	1.07	1.00	0.53	0.15	0.35	0.49	1.000	0.06	2.22	0.03	2.66				
10.10	10.07	57.7	0.34	0.04	57.7	0.59	8	115	0.60	0.60	95.0	74.7	0.59	6	1.89	1.17	6	0.00	1	10.19	7.3	0.51	273.8	525.2	168.3	552.2	53.284	547	450	899	1.73	2.9	38.2	0.03	0.93	0.31	0.73	58.1	13.6	10.9	9.5	1.37	19.4	15.7	9.5	17.0	0.97	1.02	1.06	1.00	0.54	0.13	0.35	0.49	1.000	0.06	3.40	0.04	2.62				
10.20	10.15	44.2	0.34	0.05	44.2	0.77	7	115	0.61	0.61	72.1	58.4	0.78	6	2.05	1.37	5	0.00	1	14.44	5.6	0.52	273.8	644.7	163.1	535.0	48.910	511	422	844	1.35	2.2	37.1	0.03	0.98	0.33	0.64	61.0	13.9	8.9	4.9	1.32	21.6	14.6	7.9	16.1	0.97	1.03	1.07	1.00	0.54	0.14	0.36	0.46	1.000	0.07	2.59	0.03	2.59				
10.20	10.17	44.5	0.36	0.01	44.5	0.81	7	115	0.61	0.61	72.3	58.8	0.82	6	2.07	1.39	5	0.00	1	14.77	5.6	0.52	273.8	654.3	164.7	540.3	50.090	523	430	861	1.36	2.2	37.0	0.03	0.97	0.32	0.65	61.5	14.0	9.0	4.9	1.32	21.8	14.8	8.1	16.4	0.97	1.03	1.07	1.00	0.53	0.14	0.36	0.46	1.000	0.07	2.53	0.00	2.59				
10.20	10.20	44.7	0.45	0.03	44.7	1.01	7	117	0.61	0.61	72.5	59.5	1.02	5	2.12	1.48	5	0.00	1	16.34	5.6	0.52	273.8	699.2	170.7	560.1	54.618	570	463	925	1.37	2.2	37.1	0.03	0.95	0.32	0.65	63.1	14.1	9.2	5.0	1.32	22.5	15.7	8.6	18.0	0.97	1.03	1.07	1.00	0.53	0.15	0.36	0.46	1.000	0.06	2.34	0.00	2.59				
10.30	10.24	45.0	0.44	0.03	45.0	0.97	7	117	0.61	0.61	72.7	59.6	0.99	5	2.11	1.46	5	0.00	1	16.03	5.7	0.52	273.8	690.3	170.2	558.3	54.177	566	460	919	1.37	2.3	37.1	0.03	0.95	0.32	0.65	62.9	14.2	9.2	5.0	1.32	22.4	15.6	8.6	17.7	0.97	1.03	1.07	1.00	0.53	0.15	0.36	0.47	1.000	0.06	2.36	0.03	2.56				
10.30	10.29	39.5	0.37	0.03	39.5	0.95	7	115	0.61	0.61	63.4	52.5	0.96	5																																																	

Z_s (ft)	Z_u (ft)	q_c (tsf)	f_s (tsf)	u_2 (tsf)	q_u (tsf)	R_f	S_{BT}	γ (pcf)	σ_{vm} (tsf)	σ'_{vm} (tsf)	Q_u	Q_{um}	F_R	$S_{BT_{cs}}$	I_c	K_u	(S_{BT}) $_L$	B_u	(S_{BT}) $_B$	F_c (tsf)	$q_{1.5m}$ (Mpa)	c	R	σ_v (m/s)	V_s (m/s)	V_s (ft/s)	G_s (kPa)	G_s (tsf)	E' (tsf)	M (tsf)	σ'_p (tsf)	OCR	S_v	S_v (tsf)	S_u (tsf)	ϕ (°)	ζ' (tsf)	$C_u(1+e_0)/\rho_w$	$C_u(1+e_0)/\rho_w$	K_B	D_R (ft)	N_{60BLAS}	(N_6) $_L$	(N_1) $_{60BLAS}$	C_u	(N_1) $_{60BLAS}$	(N_1) $_{60BLAS}$	(N_1) $_{60BLAS}$	(N_1) $_{60BLAS}$	r_d	MSF	K_{cs}	K_{cs}	CSR $_{z,1}$	CR $_{R,z,1}$	FS	τ_{vm} (tsf)	p (tsf)	γ_{vm} (tsf)	G/G $_s$	ε_v (%)	ΔS_v	ΔS_v (in)
16.40	16.40	178.4	4.27	-0.01	178.4	2.39	7	137	0.99	0.99	178.5	174.2	2.41	5	2.02	1.32	6	0.00	1	13.47	17.5	0.44	273.6	617.4	321.7	1,055.4	227.760	2,378	1,643	3,285	4.56	4.6			0.47	0.16	0.91	88.4	56.2	35.3	29.4	1.03	62.3	40.0	33.1	48.1	0.95	1.12	1.02	1.00	0.50	1.30	0.57	0.94	0.038	0.63	0.03	0.00	1.89				
16.50	16.45	191.1	3.85	-0.01	191.1	2.01	8	137	1.00	1.00	190.7	186.1	2.02	6	1.94	1.22	6	0.00	1	11.41	18.7	0.44	273.6	599.4	317.1	1,040.2	220.241	2,300	1,596	3,191	4.81	4.8			0.48	0.16	0.94	87.8	45.2	36.8	31.9	1.03	49.2	40.0	32.7	46.3	0.95	1.12	1.02	1.00	0.50	1.30	0.57	0.96	0.040	0.62	0.04	0.00	1.89				
16.50	16.51	208.5	2.90	-0.01	208.3	1.99	8	135	1.00	1.00	207.1	202.0	1.40	6	1.79	1.10	6	0.00	1	8.01	20.3	0.43	273.6	464.6	301.7	989.9	196.663	2,054	1,445	2,890	5.14	5.1			0.49	0.13	0.97	83.8	49.2	38.0	35.2	1.03	51.5	39.8	35.6	42.8	0.95	1.12	1.01	1.00	0.51	1.30	0.57	0.98	0.049	0.57	0.04	0.00	1.89				
16.60	16.58	229.9	2.08	-0.01	229.9	0.99	9	133	1.01	1.01	227.6	223.9	0.91	6	1.63	1.00	6	0.00	1	4.80	22.4	0.43	273.6	375.5	265.0	935.0	172.507	1,801	1,289	2,578	5.53	5.5			0.38	0.13	1.01	86.8	43.5	39.3	40.6	1.00	44.6	40.6	39.3	40.6	0.95	1.12	1.01	1.00	0.50	1.30	0.58	1.01	0.064	0.50	0.07	0.00	1.89				
16.70	16.64	225.2	1.76	0.00	225.2	0.78	9	131	1.01	1.01	222.0	216.9	0.78	6	1.59	1.00	6	0.00	1	4.17	21.9	0.43	273.6	357.7	275.3	909.1	159.361	1,664	1,240	2,405	5.45	5.4			0.26	0.09	1.00	86.1	42.6	38.2	38.3	1.02	43.6	39.1	38.3	39.1	0.95	1.12	1.01	1.00	0.51	1.30	0.58	1.01	0.077	0.45	0.07	0.00	1.89				
16.70	16.69	240.5	1.76	0.00	240.5	0.73	9	131	1.01	1.01	236.4	231.3	0.74	6	1.55	1.00	6	0.00	1	3.56	23.4	0.42	273.6	340.5	277.6	915.2	162.280	1,695	1,223	2,446	5.73	5.7			0.26	0.08	1.03	88.2	45.5	40.3	41.2	1.02	46.5	41.2	41.2	41.2	0.95	1.12	1.01	1.00	0.51	1.30	0.59	1.03	0.074	0.46	0.06	0.00	1.89				
16.80	16.74	249.2	1.87	-0.01	249.2	0.75	9	132	1.02	1.02	244.2	239.3	0.75	6	1.55	1.00	6	0.00	1	3.51	24.2	0.42	273.6	339.1	282.0	925.2	168.159	1,756	1,262	2,534	5.88	5.8			0.28	0.08	1.04	89.3	47.1	41.7	42.8	1.02	48.5	42.6	42.8	42.6	0.95	1.12	1.01	1.00	0.51	1.30	0.58	1.04	0.068	0.49	0.06	0.00	1.89				
16.80	16.79	266.9	2.03	-0.01	266.9	0.76	9	133	1.02	1.02	260.8	256.0	0.76	6	1.53	1.00	6	0.00	1	3.25	25.9	0.42	273.5	331.8	288.8	947.4	177.372	1,852	1,324	2,647	6.19	6.1			0.41	0.12	0.24	0.08	1.07	91.6	50.5	44.5	46.0	1.02	51.4	45.3	46.0	45.3	0.95	1.12	1.01	1.00	0.51	1.30	0.58	1.07	0.060	0.52	0.00	0.00	1.89		
16.90	16.84	285.9	2.04	0.07	285.9	0.71	9	133	1.02	1.02	278.5	273.9	0.72	6	1.49	1.00	6	0.00	1	2.70	27.7	0.41	273.5	315.9	291.6	956.8	181.237	1,893	1,350	2,700	6.51	6.4			0.44	0.13	0.23	0.08	1.10	93.9	54.0	47.0	49.3	1.02	55.0	47.8	49.3	47.8	0.95	1.12	1.01	1.00	0.51	1.30	0.59	1.09	0.057	0.54	0.00	0.00	1.89		
16.90	16.88	272.2	2.36	0.10	272.2	0.87	9	134	1.03	1.03	264.5	260.4	0.87	6	1.57	1.00	6	0.00	1	3.82	26.3	0.41	273.5	347.7	298.5	979.5	191.281	1,997	1,415	2,829	6.29	6.1			0.42	0.13	0.23	0.08	1.07	92.2	51.5	45.9	46.9	1.02	52.3	46.6	46.9	46.6	0.95	1.12	1.01	1.00	0.51	1.30	0.59	1.08	0.052	0.57	0.00	0.00	1.89		
16.90	16.93	272.5	2.64	0.10	272.5	0.97	9	135	1.03	1.03	263.9	260.2	0.97	6	1.60	1.00	6	0.00	1	4.39	26.3	0.41	273.5	363.9	305.6	1,002.6	201.658	2,106	1,482	2,964	6.29	6.1			0.44	0.13	0.23	0.08	1.07	92.2	51.5	46.5	46.9	1.01	52.2	47.1	46.9	47.1	0.95	1.12	1.01	1.00	0.51	1.30	0.59	1.08	0.047	0.59	0.00	0.00	1.89		
16.90	16.98	277.0	2.77	0.08	277.0	1.00	9	135	1.03	1.03	267.3	264.0	1.00	6	1.61	1.00	6	0.00	1	4.51	26.7	0.41	273.5	367.2	309.4	1,015.2	207.417	2,166	1,520	3,039	6.37	6.2			0.42	0.13	0.23	0.08	1.08	92.7	52.3	47.4	47.6	1.01	53.0	47.9	47.6	47.9	0.95	1.12	1.01	1.00	0.51	1.30	0.59	1.08	0.045	0.61	0.00	0.00	1.89		
17.00	17.03	292.5	2.74	0.08	292.5	0.94	9	135	1.04	1.04	281.4	278.4	0.94	6	1.57	1.00	6	0.00	1	3.92	28.2	0.41	273.5	350.8	310.8	1,019.8	209.390	2,187	1,533	3,067	6.63	6.4			0.44	0.13	0.22	0.07	1.10	94.5	55.3	49.4	50.2	1.01	55.9	49.9	50.2	49.9	0.95	1.12	1.01	1.00	0.51	1.30	0.59	1.10	0.044	0.62	0.00	0.00	1.89		
17.10	17.08	312.7	2.86	0.07	312.7	0.91	9	136	1.04	1.04	299.9	297.2	0.92	6	1.55	1.00	6	0.00	1	3.50	30.1	0.41	273.5	338.8	315.9	1,036.4	217.038	2,266	1,584	3,168	6.96	6.7			0.44	0.14	0.21	0.07	1.13	96.8	59.1	52.4	53.7	1.01	59.6	52.8	53.7	52.8	0.95	1.12	1.01	1.00	0.51	1.30	0.59	1.13	0.041	0.64	0.00	0.00	1.89		
17.10	17.12	335.1	3.04	0.08	335.1	0.91	9	136	1.04	1.04	320.7	318.2	0.91	6	1.52	1.00	6	0.00	1	3.18	32.2	0.40	273.5	329.7	322.6	1,058.5	227.417	2,375	1,652	3,304	7.31	7.0			0.45	0.15	0.20	0.07	1.16	99.1	63.3	55.7	57.5	1.01	63.8	56.1	57.5	56.1	0.95	1.12	1.00	1.00	0.51	1.30	0.60	1.15	0.038	0.66	0.00	0.00	1.89		
17.20	17.17	341.9	3.42	0.07	341.9	1.00	9	137	1.05	1.05	326.1	324.1	1.00	6	1.55	1.00	6	0.00	1	3.61	32.8	0.40	273.5	341.8	331.8	1,088.7	242.268	2,530	1,748	3,495	7.42	7.1			0.45	0.15	0.20	0.07	1.17	99.7	64.6	57.4	58.6	1.01	65.0	57.7	58.6	57.7	0.95	1.12	1.00	1.00	0.51	1.30	0.60	1.16	0.034	0.69	0.00	0.00	1.89		
17.20	17.22	329.8	3.80	0.16	329.8	1.15	9	138	1.05	1.05	313.2	311.8	1.16	6	1.61	1.00	6	0.00	1	4.55	31.6	0.40	273.5	368.4	338.1	1,109.4	252.840	2,640	1,815	3,629	7.23	6.9			0.50	0.14	0.31	0.10	1.15	98.8	62.3	56.4	56.4	1.00	62.5	56.6	56.4	56.6	0.95	1.12	1.00	1.00	0.51	1.30	0.60	1.15	0.032	0.70	0.00	0.00	1.89		
17.30	17.27	349.4	4.09	0.16	349.4	1.17	9	139	1.05	1.05	331.1	330.1	1.17	6	1.60	1.00	6	0.00	1	4.39	33.4	0.40	273.5	363.9	346.1	1,135.5	266.229	2,780	1,901	3,802	7.54	7.2			0.45	0.15	0.20	0.07	1.17	100.0	66.0	59.6	59.8	1.00	66.2	59.8	59.8	59.8	0.95	1.12	1.00	1.00	0.51	1.30	0.60	1.17	0.030	0.72	0.00	0.00	1.89		
17.30	17.32	368.6	4.15	0.15	368.6	1.13	9	139	1.06	1.06	348.2	347.8	1.13	6	1.57	1.00	6	0.00	1	3.95	35.2	0.39	273.5	351.6	349.5	1,146.5	271.901	2,839	1,938	3,877	7.83	7.4			0.46	0.16	0.20	0.07	1.20	100.0	69.7	62.3	63.0	1.00	69.2	62.4	63.0	62.4	0.95	1.12	1.00	1.00	0.51	1.30	0.60	1.19	0.029	0.73	0.00	0.00	1.89		
17.40	17.37	369.5	4.15	0.15	369.5	1.12	9	139	1.06	1.06	347.9	348.1	1.13	6	1.57	1.00	6	0.00	1	3.94	35.3	0.39	273.5	351.2	349.7	1,147.4	272.317	2,844	1,941	3,882	7.85	7.4			0.46	0.16	0.20	0.07	1.20	100.0	69.8	62.5	63.1	1.00	69.8	62.4	63.1	62.4	0.95	1.12	1.00	1.00	0.51	1.30	0.60	1.20	0.029	0.73	0.00	0.00	1.89		
17.40	17.41	352.4	4.09	0.16	352.4	1.16	9	139	1.06	1.06	330.9	331.5	1.16	6	1.60	1.00	6	0.00	1	4.32	33.6	0.40	273.5	362.0	346.7	1,137.5	267.198	2,790	1,908	3,816																																	

Z_s (ft)	Z_{s0} (ft)	q_c (tsf)	f_s (tsf)	u_2 (tsf)	q_u (tsf)	R_f	S_{BT}	γ (pcf)	σ_{vm} (tsf)	σ'_{vm} (tsf)	Q_u	Q_{vm}	F_R	$S_{BT_{cs}}$	I_c	K_u	(S_{BT}) I_c	B_u	(S_{BT}) B_u	F_c (kPa)	$q_{1.5m}$ (Mpa)	c	R	σ_v (m/s)	V (m/s)	V_r (ft/s)	G_s (kPa)	G_s (tsf)	E' (tsf)	M (tsf)	σ'_p (tsf)	OCR	S_v	S_v (tsf)	S_v/σ'_p	ϕ (°)	ζ' (tsf)	$C_u(1+e_0)/\rho_w$	$C_u(1+e_0)/\rho_w$	K_B	D_R (ft)	$N_{60,USL}$	(N_{60}) $I_{p,c}$	(N_{60}) a_{USL}	C_{γ}	(N_{60}) a_{USL}/R_f	(N_{60}) a_{USL}	(N_{60}) a_{USL}/R_f	(N_{60}) a_{USL}/R_f	r_d	MSF	K_{cs}	K_{cs}	CSR $_{z,z}$	CR $_{R,z,z}$	FS	τ_{vm} (tsf)	p (tsf)	γ_{vm} (pcf)	G/G $_s$	ε_v (%)	ΔS_v	ΔS_v (in)
22.90	22.90	411.7	4.97	0.53	411.8	1.21	9	141	1.44	1.44	285.2	332.6	1.21	6	1.61	1.00	6	0.00	1	4.53	34.8	0.40	273.5	367.8	377.7	1,239.2	321.377	3,356	2,264	4,529	9.00	6.3	45.3	0.18	0.30	0.10	1.06	100.0	77.8	70.5	64.9	0.86	66.7	60.4	64.9	60.4	0.92	1.12	0.91	1.00	0.55	1.30	0.80	1.50	0.033	0.73	0.00	0.00	1.89				
22.90	22.93	396.2	5.09	0.49	396.2	1.29	9	141	1.44	1.44	274.0	319.7	1.29	6	1.64	0.99	6	0.00	1	5.08	33.4	0.40	273.5	383.3	378.2	1,240.7	322.367	3,366	2,270	4,540	8.75	6.1	45.3	0.17	0.30	0.10	1.04	100.0	74.9	68.5	62.4	0.86	64.3	58.8	62.4	58.8	0.92	1.12	0.91	1.00	0.55	1.30	0.80	1.48	0.033	0.73	0.00	0.00	1.89				
23.00	22.96	393.5	5.39	0.69	393.6	1.37	9	141	1.44	1.44	271.8	316.6	1.38	6	1.67	1.01	6	0.00	1	5.52	33.2	0.40	273.5	395.4	382.8	1,256.0	331.315	3,460	2,326	4,652	8.71	6.0	45.1	0.17	0.30	0.10	1.04	100.0	74.4	68.6	61.9	0.86	63.9	59.0	61.9	59.4	0.92	1.12	0.91	1.00	0.55	1.30	0.80	1.48	0.032	0.74	0.00	0.00	1.89				
23.00	23.00	395.4	5.58	0.71	395.5	1.41	9	141	1.45	1.45	272.6	317.5	1.42	6	1.68	1.02	6	0.00	1	5.68	33.3	0.40	273.5	400.0	386.0	1,266.3	337.411	3,523	2,364	4,729	8.74	6.0	45.1	0.17	0.30	0.10	1.04	100.0	74.7	69.2	62.2	0.86	64.2	59.4	62.2	60.2	0.92	1.12	0.91	1.00	0.55	1.30	0.80	1.49	0.031	0.74	0.00	0.00	1.89				
23.10	23.05	394.6	5.38	0.69	394.7	1.34	9	141	1.45	1.45	271.4	317.0	1.34	6	1.66	1.01	6	0.00	1	5.37	33.2	0.40	273.5	391.2	381.3	1,251.0	328.365	3,429	2,308	4,631	8.74	6.0	45.1	0.17	0.30	0.10	1.04	100.0	74.6	68.6	62.0	0.86	63.9	58.8	62.0	58.8	0.92	1.12	0.91	1.00	0.55	1.30	0.81	1.49	0.032	0.73	0.00	0.00	1.89				
23.10	23.10	406.5	3.33	0.77	406.6	1.06	9	140	1.45	1.45	278.9	326.8	1.07	6	1.57	1.00	6	0.00	1	3.91	34.2	0.40	273.5	350.2	366.2	1,201.4	299.787	3,311	2,128	4,257	8.93	6.1	45.3	0.18	0.20	0.07	1.05	100.0	76.8	68.7	61.9	0.85	65.6	58.6	61.9	58.6	0.92	1.12	0.90	1.00	0.55	1.30	0.81	1.50	0.037	0.70	0.00	0.00	1.89				
23.20	23.17	391.0	3.70	1.00	391.1	0.95	9	138	1.46	1.46	267.3	313.8	0.95	6	1.54	1.00	6	0.00	1	3.45	32.8	0.40	273.5	337.4	352.5	1,156.4	275.208	2,874	1,977	3,944	8.69	6.0	45.1	0.17	0.20	0.07	1.03	100.0	73.9	65.4	61.4	0.85	63.0	55.7	61.4	55.7	0.92	1.12	0.90	1.00	0.55	1.30	0.81	1.49	0.043	0.66	0.00	0.00	1.89				
23.30	23.25	375.9	3.69	0.91	376.1	0.98	9	138	1.46	1.46	256.0	301.1	0.98	6	1.57	1.00	6	0.00	1	3.83	31.5	0.40	273.5	347.6	350.8	1,151.0	272.362	2,844	1,953	3,907	8.45	5.8	44.9	0.17	0.20	0.07	1.02	99.9	71.1	63.4	58.9	0.85	60.4	53.9	58.9	53.9	0.92	1.12	0.90	1.00	0.55	1.30	0.81	1.48	0.044	0.66	0.00	0.00	1.89				
23.40	23.32	392.3	4.62	0.71	392.4	1.13	9	140	1.47	1.47	266.3	313.7	1.13	6	1.60	1.00	6	0.00	1	4.39	32.8	0.40	273.5	364.0	366.7	1,203.1	300.757	3,411	2,134	4,268	8.72	5.9	45.1	0.17	0.20	0.07	1.03	100.0	74.1	66.9	61.9	0.85	62.9	56.8	61.9	56.8	0.92	1.12	0.90	1.00	0.55	1.30	0.82	1.50	0.037	0.70	0.00	0.00	1.89				
23.40	23.38	385.2	4.84	0.65	385.3	1.26	9	140	1.47	1.47	260.7	307.4	1.26	6	1.64	1.00	6	0.00	1	5.12	32.2	0.40	273.5	384.3	373.4	1,225.0	313.214	3,271	2,213	4,425	8.61	5.8	45.0	0.17	0.30	0.10	1.02	100.0	72.8	66.7	60.3	0.85	61.8	56.6	60.3	56.3	0.92	1.12	0.90	1.00	0.55	1.30	0.82	1.49	0.035	0.71	0.00	0.00	1.89				
23.50	23.44	393.6	4.90	0.63	393.7	1.25	9	140	1.48	1.48	265.7	313.8	1.25	6	1.64	1.00	6	0.00	1	4.98	32.9	0.40	273.5	380.3	375.5	1,231.8	317.063	3,311	2,237	4,475	8.75	5.9	45.1	0.18	0.30	0.10	1.03	100.0	74.4	67.9	61.6	0.85	63.0	57.5	61.6	57.5	0.92	1.12	0.90	1.00	0.55	1.30	0.82	1.51	0.035	0.72	0.00	0.00	1.89				
23.50	23.48	398.2	4.94	0.66	398.3	1.24	9	140	1.48	1.48	268.3	317.2	1.24	6	1.63	1.00	6	0.00	1	4.90	33.3	0.40	273.5	378.2	376.6	1,235.6	319.223	3,334	2,251	4,502	8.83	6.0	45.1	0.18	0.30	0.10	1.03	100.0	75.3	68.6	62.3	0.85	63.7	58.1	62.3	58.1	0.92	1.12	0.90	1.00	0.55	1.30	0.82	1.51	0.034	0.72	0.00	0.00	1.89				
23.60	23.55	388.6	5.17	0.78	388.7	1.33	9	141	1.48	1.48	260.9	308.3	1.33	6	1.66	1.01	6	0.00	1	5.45	32.4	0.40	273.5	393.5	379.5	1,245.0	324.755	3,391	2,285	4,571	8.67	5.8	45.0	0.17	0.30	0.10	1.02	100.0	73.4	67.7	60.7	0.84	62.2	57.3	60.7	57.6	0.92	1.12	0.90	1.00	0.55	1.30	0.82	1.51	0.034	0.72	0.00	0.00	1.89				
23.60	23.62	396.4	5.46	0.93	396.6	1.38	9	141	1.49	1.49	265.3	313.8	1.38	6	1.67	1.01	6	0.00	1	5.58	33.0	0.40	273.5	397.3	385.1	1,263.6	335.624	3,505	2,354	4,709	8.81	5.9	45.1	0.18	0.30	0.10	1.03	100.0	74.9	69.3	61.9	0.84	63.4	58.6	61.9	59.2	0.92	1.12	0.90	1.00	0.55	1.30	0.83	1.52	0.032	0.73	0.00	0.00	1.89				
23.70	23.69	422.8	5.58	0.79	422.9	1.56	9	143	1.49	1.49	282.1	333.1	1.56	6	1.70	1.03	6	0.00	1	6.10	35.2	0.39	273.5	411.6	404.9	1,328.4	375.009	3,916	2,602	5,204	9.22	6.2	45.3	0.18	0.30	0.10	1.05	100.0	79.9	74.6	65.9	0.84	67.6	63.1	66.0	64.8	0.92	1.12	0.90	1.00	0.55	1.30	0.83	1.55	0.027	0.77	0.00	0.00	1.89				
23.80	23.76	425.4	5.98	0.71	425.5	1.41	9	142	1.50	1.50	282.8	335.9	1.41	6	1.66	1.01	6	0.00	1	5.41	35.4	0.39	273.5	392.5	396.6	1,301.1	358.006	3,739	2,496	4,992	9.28	6.2	45.4	0.19	0.30	0.10	1.05	100.0	80.4	74.1	66.3	0.84	67.7	62.4	66.3	62.6	0.92	1.12	0.90	1.00	0.55	1.30	0.83	1.55	0.029	0.76	0.00	0.00	1.89				
23.80	23.82	392.4	5.47	0.86	392.5	1.39	9	141	1.50	1.50	260.1	308.7	1.40	6	1.68	1.02	6	0.00	1	5.73	32.5	0.40	273.5	401.4	385.1	1,263.5	335.557	3,504	2,354	4,708	8.75	5.8	45.0	0.18	0.30	0.10	1.02	100.0	74.2	68.7	61.1	0.84	62.5	57.9	61.1	58.8	0.92	1.12	0.89	1.00	0.55	1.30	0.83	1.52	0.032	0.73	0.00	0.00	1.89				
23.90	23.87	364.5	5.27	0.99	364.6	1.45	9	141	1.51	1.51	241.0	285.4	1.45	6	1.71	1.04	6	0.00	1	6.33	30.1	0.41	273.5	417.9	378.7	1,242.5	323.406	3,377	2,276	4,553	8.29	5.5	44.6	0.17	0.31	0.10	0.99	98.6	68.9	64.6	56.7	0.84	58.1	54.5	56.8	56.3	0.92	1.12	0.89	1.00	0.55	1.30	0.83	1.49	0.035	0.72	0.00	0.00	1.89				
24.00	23.94	339.5	5.31	1.06	339.7	1.56	8	141	1.51	1.51	233.7	264.1	1.57	6	1.76	1.07	6	0.00	1	7.23	28.0	0.41	273.5	443.1	376.3	1,234.7	310.660	3,332	2,248	4,495	7.86	5.2	44.2	0.16	0.32	0.11	0.96	96.2	80.2	61.1	52.8	0.84	67.9	51.8	53.0	54.8	0.92	1.12	0.89	1.00	0.55	1.30	0.84	1.47	0.036	0.71	0.00	0.00	1.89				
24.10	24.03	283.3	5.28	1.02	283.5	1.86	8	140	1.52	1.52	185.7	217.1	1.87	6	1.87	1.15	6	0.00	1	9.59	23.2	0.42	273.6	508.6	368.1	1,207.8	304.259	3,177	2,151	4,302	6.83	4.5	43.3	0.14	0.41	0.14	0.88	92.8	66.9	53.0	43.2	0.83	57.7	45.9	44.1	51.0	0.92	1.12	0.89	1.00	0.55	1.30	0.84	1.40	0.039	0.68	0.00	0.00	1.89				
24.10	24.09	252.8	5.10	0.61	252.9	2.02	8	140	1.52	1.52	165.1	192.0	2.03	6	1.92	1.21	6	0.00	1	10.98	20.6	0.43	273.6	547.4	360.6	1,183.0	290.737	3,036	2,064	4,12																																	

Z_s (ft)	Z_u (ft)	q_c (tsf)	f_s (tsf)	u_2 (tsf)	q_u (tsf)	R_f	SBT	γ (pcf)	σ_{vm} (tsf)	σ'_{vm} (tsf)	Q_u	Q_m	F_R	$SBT_{x\%}$	I_c	K_u	(SBT) $_{I_c}$	B_u	(SBT) $_{B_u}$	F_c (kPa)	$q_{(1-u)}(Mpa)$	c	R	σ_v (m/s)	V_s (m/s)	V_s (ft/s)	G_s (kPa)	G_s (tsf)	E' (tsf)	M (tsf)	σ'_p (tsf)	OCR	S_v	S_v (tsf)	S_v/σ'_{vm}	ϕ (°)	ζ' (tsf)	$C_u/(1+e_u)/\rho$	$C_u/(1+e_u)/\rho_u$	K_B	D_R (ft)	$N_{60,BSL}$	(N_{60}) $_{I_c}$	(N_f) $_{60BSL}$	C_u	(N_f) $_{60BSL}$	(N_f) $_{60SL}$	(N_f) $_{60BSL}$	(N_f) $_{60BSL}$	r_d	MSF	K_{cs}	K_{cs}	CSR $_{z,z}$	CR $_{R,z,z}$	FS	τ_{vm} (tsf)	p (tsf)	γ_{vm} (pcf)	G/G $_s$	ε_v (%)	ΔS_v	ΔS_v (in)
29.50	29.52	591.7	4.50	0.36	591.8	0.76	10	141	1.87	1.87	314.7	418.8	0.76	6	1.39	1.00	6	0.00	1	1.40	45.5	0.38	273.4	278.2	393.8	1,292.0	349.753	3,652	2,461	4,902.3	12.27	6.5		46.4	0.25	0.20	0.07	1.07	100.0	93.2	94.3	86.9	0.75	70.0	70.8	86.9	70.8	0.89	1.12	0.83	1.00	0.58	1.30	1.01	1.97	0.038	0.72	0.00	0.00	1.69			
29.60	29.54	593.3	4.56	0.36	593.4	0.79	10	141	1.88	1.88	315.3	419.8	0.79	6	1.40	1.00	6	0.00	1	1.53	45.7	0.38	273.4	282.0	397.1	1,302.7	356.260	3,720	2,502	5,005	12.29	6.6		46.5	0.25	0.20	0.07	1.07	100.0	93.5	94.9	87.1	0.75	70.2	71.2	87.1	71.2	0.89	1.12	0.83	1.00	0.58	1.30	1.01	1.97	0.037	0.73	0.00	0.00	1.69			
29.60	29.58	601.7	4.76	0.36	601.8	0.79	10	141	1.88	1.88	319.3	425.5	0.79	6	1.40	1.00	6	0.00	1	1.52	46.3	0.38	273.4	281.6	399.6	1,311.0	361.276	3,773	2,534	5,088	12.42	6.6		46.5	0.25	0.20	0.07	1.08	100.0	94.8	96.2	88.3	0.75	71.1	72.2	88.3	72.2	0.89	1.12	0.83	1.00	0.58	1.30	1.01	1.98	0.037	0.73	0.00	0.00	1.69			
29.60	29.61	599.7	4.77	0.40	599.7	0.90	10	141	1.88	1.88	317.8	423.8	0.80	6	1.40	1.00	6	0.00	1	1.56	46.1	0.38	273.4	282.8	399.7	1,311.5	361.608	3,776	2,536	5,072	12.39	6.6		46.5	0.25	0.20	0.07	1.08	100.0	94.5	95.9	88.0	0.75	70.8	72.0	88.0	72.0	0.89	1.12	0.83	1.00	0.58	1.30	1.01	1.98	0.037	0.73	0.00	0.00	1.69			
29.70	29.65	567.0	4.49	0.40	567.0	0.83	10	141	1.88	1.88	300.0	400.3	0.83	6	1.43	1.00	6	0.00	1	1.80	43.5	0.38	273.4	293.0	395.6	1,297.9	353.430	3,691	2,484	4,988	11.91	6.3		46.2	0.24	0.20	0.07	1.05	100.0	89.3	91.5	83.2	0.75	66.9	68.6	83.2	68.6	0.89	1.12	0.83	1.00	0.58	1.30	1.01	1.95	0.038	0.72	0.00	0.00	1.69			
29.70	29.70	568.7	7.74	0.41	568.7	0.83	10	141	1.89	1.89	300.3	401.1	0.84	6	1.43	1.00	6	0.00	1	1.93	43.6	0.38	273.4	293.9	396.6	1,301.8	355.785	3,715	2,499	4,981	11.94	6.3		46.2	0.24	0.20	0.07	1.05	100.0	89.6	91.8	83.4	0.75	67.1	68.8	83.4	68.8	0.89	1.12	0.83	1.00	0.58	1.30	1.01	1.95	0.038	0.72	0.00	0.00	1.69			
29.80	29.74	561.9	4.73	0.43	562.0	0.84	10	141	1.89	1.89	296.3	396.1	0.85	6	1.44	1.00	6	0.00	1	2.02	43.0	0.38	273.4	296.5	396.2	1,299.8	354.613	3,703	2,491	4,982	11.85	6.3		46.2	0.24	0.20	0.07	1.05	100.0	88.5	91.0	82.4	0.75	66.2	68.1	82.4	68.1	0.89	1.12	0.83	1.00	0.58	1.30	1.02	1.95	0.038	0.72	0.00	0.00	1.69			
29.80	29.78	556.1	4.42	0.58	556.2	0.79	10	141	1.89	1.89	292.8	391.6	0.80	6	1.42	1.00	6	0.00	1	1.81	42.5	0.38	273.4	290.1	389.8	1,279.0	342.051	3,572	2,412	4,824	11.76	6.2		46.1	0.24	0.20	0.07	1.04	100.0	87.6	89.5	81.5	0.75	65.5	66.9	81.5	66.9	0.89	1.12	0.83	1.00	0.58	1.30	1.02	1.95	0.040	0.71	0.00	0.00	1.69			
29.80	29.80	545.7	4.25	0.65	545.8	0.78	10	140	1.89	1.89	287.1	384.2	0.78	6	1.42	1.00	6	0.00	1	1.79	41.7	0.38	273.5	289.7	385.9	1,266.0	334.310	3,491	2,363	4,726	11.61	6.1		46.0	0.23	0.20	0.07	1.03	100.0	86.0	87.8	79.9	0.75	64.2	65.6	79.9	65.6	0.89	1.12	0.83	1.00	0.58	1.30	1.02	1.94	0.042	0.70	0.00	0.00	1.69			
29.90	29.84	533.5	3.91	0.64	533.6	0.73	10	139	1.90	1.90	280.3	375.3	0.74	6	1.41	1.00	6	0.00	1	1.61	40.7	0.38	273.5	284.5	378.1	1,240.5	319.409	3,335	2,269	4,538	11.42	6.0		45.9	0.23	0.20	0.07	1.02	100.0	84.0	85.5	78.1	0.75	62.8	63.8	78.1	63.8	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.93	0.045	0.68	0.00	0.00	1.69			
29.90	29.87	520.0	3.72	0.62	520.1	0.72	10	139	1.90	1.90	272.8	365.5	0.72	6	1.41	1.00	6	0.00	1	1.61	39.6	0.39	273.5	284.3	373.1	1,224.1	310.052	3,238	2,209	4,431	11.22	5.9		45.8	0.22	0.20	0.07	1.01	100.0	81.9	83.3	76.1	0.75	61.1	62.2	76.1	62.2	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.93	0.047	0.66	0.00	0.00	1.69			
29.90	29.90	507.9	3.71	0.58	508.0	0.73	10	139	1.90	1.90	266.2	356.8	0.73	6	1.42	1.00	6	0.00	1	1.77	38.6	0.39	273.5	289.0	371.7	1,219.7	307.594	3,212	2,193	4,387	11.03	5.7		45.7	0.22	0.20	0.07	1.00	100.0	80.0	81.7	74.3	0.75	59.7	60.9	74.3	60.9	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.90	0.048	0.66	0.00	0.00	1.69			
30.00	29.94	501.5	3.79	0.58	501.6	0.75	10	139	1.90	1.90	262.4	352.1	0.76	6	1.43	1.00	6	0.00	1	1.96	38.1	0.39	273.5	294.5	373.0	1,223.6	309.886	3,236	2,208	4,415	10.93	5.7		45.6	0.22	0.20	0.07	0.99	100.0	79.0	81.1	73.4	0.75	58.9	60.4	73.4	60.4	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.90	0.048	0.66	0.00	0.00	1.69			
30.00	29.99	480.7	3.85	0.53	480.7	0.80	10	139	1.91	1.91	251.0	337.0	0.80	6	1.47	1.00	6	0.00	1	2.37	36.4	0.39	273.5	306.6	372.5	1,222.1	309.132	3,228	2,202	4,404	10.60	5.6		45.4	0.21	0.20	0.07	0.98	100.0	75.7	78.5	70.3	0.74	56.4	58.4	70.3	58.4	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.88	0.048	0.66	0.00	0.00	1.69			
30.00	30.02	468.1	3.86	0.53	468.2	0.82	10	139	1.91	1.91	244.1	328.0	0.83	6	1.48	1.00	6	0.00	1	2.61	35.4	0.39	273.5	313.3	371.6	1,219.0	307.473	3,211	2,191	4,382	10.40	5.4		45.3	0.21	0.20	0.07	0.97	100.0	73.7	76.8	68.4	0.74	54.9	57.2	68.4	57.2	0.89	1.12	0.82	1.00	0.58	1.30	1.03	1.87	0.049	0.65	0.00	0.00	1.69			
30.10	30.04	461.1	3.87	0.51	461.2	0.84	10	139	1.91	1.91	240.3	323.0	0.84	6	1.49	1.00	6	0.00	1	2.76	34.8	0.40	273.5	317.7	371.3	1,218.2	307.090	3,207	2,188	4,377	10.29	5.4		45.2	0.21	0.20	0.07	0.96	100.0	72.6	76.0	67.4	0.74	54.0	56.5	67.4	56.5	0.89	1.12	0.82	1.00	0.58	1.30	1.03	1.86	0.049	0.65	0.00	0.00	1.69			
30.10	30.08	459.6	3.87	0.47	459.6	0.84	10	139	1.91	1.91	239.2	321.7	0.85	6	1.50	1.00	6	0.00	1	2.79	34.7	0.40	273.5	318.5	371.2	1,217.9	306.881	3,205	2,187	4,374	10.26	5.4		45.2	0.21	0.20	0.07	0.96	100.0	72.4	75.8	67.1	0.74	53.8	56.5	67.1	56.3	0.89	1.12	0.82	1.00	0.58	1.30	1.03	1.86	0.049	0.65	0.00	0.00	1.69			
30.10	30.12	440.2	3.82	0.47	440.3	0.87	10	139	1.92	1.92	228.7	307.8	0.87	6	1.52	1.00	6	0.00	1	3.11	33.1	0.40	273.5	327.7	368.5	1,208.8	301.896	3,153	2,155	4,309	9.94	5.2		45.0	0.20	0.20	0.07	0.94	100.0	69.3	73.1	64.3	0.74	51.5	54.3	64.3	54.3	0.89	1.12	0.82	1.00	0.58	1.30	1.03	1.84	0.051	0.64	0.00	0.00	1.69			
30.10	30.13	426.9	3.81	0.42	427.0	0.89	10	139	1.92	1.92	221.7	298.4	0.90	6	1.54	1.00	6	0.00	1	3.36	32.1	0.40	273.5	334.9	366.8	1,203.4	298.926	3,122	2,133	4,271	9.72	5.1		44.8	0.19	0.20	0.07	0.93	100.0	67.2	71.3	62.3	0.74	50.0	52.9	62.3	52.9	0.89	1.12	0.82	1.00	0.58	1.30	1.03	1.82	0.052	0.64	0.00	0.00	1.69			
30.20	30.16	413.6	3.62	0.42	413.7	0.87	10	138	1.92	1.92	214.5	289.9	0.88	6	1.54	1.00	6	0.00	1	3.41	31.0	0.40	273.5	336.1	361.7	1,186.5	289.659	3,025	2,076	4,152	9.50	4.9		44.7	0.19	0.20	0.07	0.91	100.0	65.2	69.1	60.4	0.74	48.4	51.3	60.4	51.3	0.89	1.12	0.82	1.00	0.58	1.30	1.03	1.81	0.055	0.62	0.00	0.00	1.69			
30.20	30.21	420.5	3.61	0.42	420.6	0.86	10	138	1.92	1.92	217.7	293.5	0.86	6	1.53	1.00	6	0.00																																													

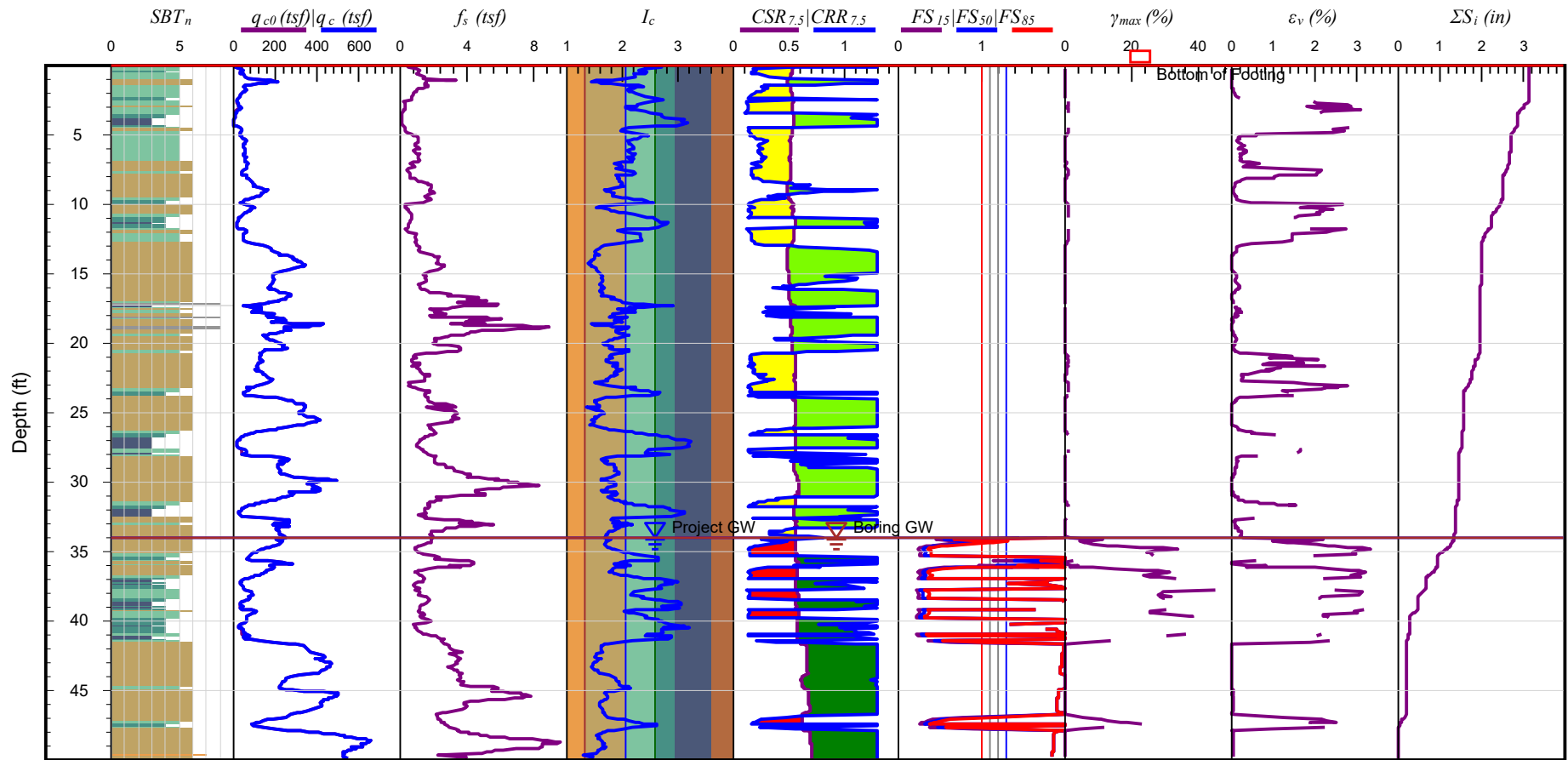
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Zs(ft)	Zs(m)	qc (tsf)	fs (tsf)	u2 (tsf)	qs (tsf)	Rf	SPT	γ (pcf)	σvm (tsf)	σ'vm (tsf)	Qv	Qvm	Fs	SPT _{xs}	I _c	K _{cs}	(SPT) _{cs}	B _{cs}	(SPT) _{cs}	F _c (tsf)	q _{1.5m} (Mpa)	c	R	σ _v (ms)	V _s (m/s)	V _s (ft/s)	G _s (kPa)	G _s (tsf)	E'(tsf)	M (tsf)	σ' _v (tsf)	OCR	S _i	S _i (tsf)	S _i σ' _v	φ (°)	z'(tsf)	C _u (1+e ₀)P ₀	C _u (1+e ₀)P ₀	K _s	D _r (%)	N ₆₀ BSL	(N ₆₀) _{cs}	(N ₆₀) _{BSL}	C _{ys}	(N ₆₀) _{BSL}	(N ₆₀) _{BSL}	(N ₆₀) _{BSL}	(N ₆₀) _{BSL}	r _d	MSF	K _{cs}	K _{cs}	CSR _{z1}	CSR _{z2}	FS	τ _{vm} (tsf)	p'(tsf)	γ _{vm} (%)	G/G _s	ε _v (%)	ΔS _v	ΔS _v (in)
41.30	41.32	391.5	3.13	0.37	391.5	0.80	10	137	2.66	2.43	159.9	242.4	0.80	6	1.56	1.00	6	0.00	1	3.75	26.4	0.41	273.5	345.8	356.5	1,169.6	276,912	2,913	2,017	4,034	9.42	3.9	43.8	0.19	0.21	0.07	0.79	96.8	61.7	65.9	53.5	0.66	40.7	43.5	53.5	43.5	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.34	2.08	0.001	0.00	0.00	0.92				
41.40	41.34	391.5	3.13	0.37	391.5	0.77	10	137	2.66	2.43	160.7	243.7	0.78	6	1.55	1.00	6	0.00	1	3.56	26.5	0.41	273.5	350.4	354.6	1,163.4	275,552	2,878	1,996	3,991	9.46	3.9	43.8	0.19	0.21	0.07	0.79	96.9	62.0	66.0	53.8	0.66	40.9	43.5	53.8	43.5	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.34	2.09	0.000	0.00	0.00	0.92				
41.40	41.38	416.5	2.92	0.38	416.6	0.70	10	137	2.66	2.43	170.9	259.2	0.70	6	1.50	1.00	6	0.00	1	2.82	28.3	0.41	273.5	334.4	354.3	1,162.5	274,867	2,870	1,993	3,986	9.93	4.1	44.2	0.20	0.20	0.07	0.81	99.0	65.9	69.0	57.4	0.66	43.5	45.5	57.4	45.5	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.34	2.12	0.000	0.00	0.00	0.92				
41.50	41.43	416.5	2.92	0.38	416.4	0.73	10	137	2.67	2.44	169.9	257.7	0.73	6	1.51	1.00	6	0.00	1	3.03	28.1	0.41	273.5	335.4	356.7	1,170.4	279,125	2,935	2,020	4,040	9.89	4.1	44.1	0.20	0.20	0.07	0.81	98.8	65.5	69.0	57.1	0.66	43.2	45.5	57.1	45.5	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.34	2.12	0.000	0.00	0.00	0.92				
41.50	41.48	419.2	2.88	0.42	419.3	0.69	10	137	2.67	2.44	170.9	259.4	0.69	6	1.49	1.00	6	0.00	1	2.76	28.3	0.41	273.5	317.6	333.6	1,180.1	273,539	2,856	1,985	3,969	9.94	4.1	44.2	0.20	0.20	0.07	0.81	99.0	66.0	69.0	57.5	0.66	43.5	45.5	57.5	45.5	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.34	2.13	0.000	0.01	0.00	0.92				
41.60	41.54	413.5	3.08	0.41	413.6	0.75	10	137	2.67	2.44	168.4	255.8	0.75	6	1.52	1.00	6	0.00	1	3.18	27.9	0.41	273.5	329.6	337.8	1,173.9	281,038	2,935	2,032	4,064	9.84	4.0	44.1	0.20	0.21	0.07	0.80	96.4	65.1	68.8	56.7	0.66	42.9	45.3	56.7	45.3	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.34	2.12	0.000	0.01	0.00	0.92				
41.60	41.61	407.2	3.11	0.41	407.3	0.76	10	137	2.68	2.44	165.7	251.7	0.77	6	1.54	1.00	6	0.00	1	3.36	27.4	0.41	273.5	334.8	337.8	1,173.8	281,073	2,935	2,032	4,064	9.71	4.0	44.0	0.19	0.21	0.07	0.80	96.0	64.1	68.0	55.7	0.66	42.2	44.7	55.7	44.7	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.35	2.11	0.000	0.01	0.00	0.92				
41.70	41.67	392.7	3.09	0.41	392.7	0.79	10	137	2.68	2.44	159.6	242.5	0.79	6	1.56	1.00	6	0.00	1	3.67	26.4	0.41	273.5	343.6	355.5	1,167.7	277,838	2,901	2,020	4,021	9.45	3.9	43.7	0.19	0.21	0.07	0.78	96.8	61.8	66.0	53.6	0.66	40.7	43.4	53.6	43.4	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.35	2.09	0.000	0.01	0.00	0.92				
41.70	41.72	384.1	2.99	0.42	384.2	0.78	10	137	2.69	2.45	156.0	237.1	0.78	6	1.56	1.00	6	0.00	1	3.73	25.8	0.42	273.5	345.4	352.9	1,157.8	272,581	2,846	1,977	3,953	9.25	3.8	43.8	0.19	0.22	0.07	0.78	96.1	60.5	64.7	52.3	0.66	39.8	42.5	52.3	42.5	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.35	2.08	0.003	0.01	0.00	0.92				
41.80	41.79	377.9	3.05	0.42	378.0	0.81	10	137	2.69	2.45	153.2	233.1	0.81	6	1.58	1.00	6	0.00	1	3.99	25.3	0.42	273.5	352.5	353.6	1,160.1	273,855	2,860	1,948	3,969	9.17	3.7	43.6	0.18	0.22	0.07	0.77	95.5	59.5	63.9	51.3	0.66	39.1	42.0	51.3	42.0	0.83	1.12	0.75	1.00	0.66	1.30	1.97	1.35	2.07	0.008	0.01	0.00	0.92				
41.90	41.86	338.1	3.43	0.42	338.2	1.01	9	137	2.70	2.45	136.8	206.1	1.02	6	1.68	1.02	6	0.00	1	5.78	22.5	0.43	273.6	402.7	373.7	1,172.4	280,922	2,934	2,027	4,053	8.35	3.4	43.4	0.17	0.34	0.11	0.73	91.8	63.9	59.3	45.2	0.66	42.2	39.1	45.2	39.7	0.83	1.12	0.75	1.00	0.66	1.30	1.97	1.35	2.01	0.067	0.01	0.00	0.92				
41.90	41.90	319.8	3.38	0.42	319.8	1.06	9	137	2.70	2.45	129.3	193.3	1.07	6	1.71	1.04	6	0.00	1	6.34	21.1	0.43	273.6	418.3	354.1	1,161.7	275,343	2,875	1,990	3,980	7.96	3.2	42.7	0.16	0.35	0.12	0.71	89.4	60.4	56.6	41.7	0.66	40.0	37.5	41.8	38.7	0.83	1.12	0.76	1.00	0.65	1.30	1.99	1.35	1.99	0.018	0.00	0.00	0.92				
42.00	41.98	299.6	3.56	0.42	299.7	1.19	9	137	2.71	2.46	120.9	178.3	1.20	6	1.77	1.08	6	0.00	1	7.47	19.7	0.44	273.6	449.6	355.2	1,165.5	277,614	2,899	2,003	4,006	7.51	3.1	42.4	0.15	0.36	0.12	0.69	86.5	56.6	54.1	37.9	0.66	37.8	36.1	38.1	38.3	0.83	1.12	0.79	1.00	0.63	1.30	2.00	1.36	1.95	0.000	0.00	0.00	0.92				
42.10	42.06	280.3	3.55	0.42	280.3	1.26	9	137	2.71	2.46	112.9	164.9	1.28	6	1.81	1.11	6	0.00	1	8.31	18.3	0.44	273.6	473.0	352.3	1,155.7	272,566	2,846	1,970	3,939	7.07	2.9	42.0	0.14	0.37	0.12	0.67	84.2	53.0	51.4	34.2	0.66	35.6	34.5	34.7	37.3	0.83	1.12	0.81	1.00	0.61	1.30	2.00	1.36	1.92	0.000	0.00	0.00	0.92				
42.20	42.14	272.0	3.31	0.40	272.1	1.22	9	137	2.72	2.46	109.4	160.1	1.23	6	1.81	1.10	6	0.00	1	8.24	17.8	0.44	273.6	470.9	346.3	1,136.0	262,200	2,738	1,903	3,806	6.89	2.8	41.8	0.14	0.38	0.13	0.66	82.8	51.4	49.8	32.7	0.66	34.5	33.4	33.1	36.1	0.83	1.12	0.82	1.00	0.60	1.30	2.00	1.36	1.91	0.000	0.00	0.00	0.92				
42.20	42.20	263.9	3.12	0.40	264.0	1.18	9	136	2.72	2.46	106.0	155.1	1.19	6	1.81	1.10	6	0.00	1	8.24	17.2	0.44	273.6	471.0	341.0	1,118.8	253,357	2,646	1,846	3,692	6.71	2.7	41.7	0.14	0.39	0.13	0.65	81.5	49.5	48.3	31.2	0.66	33.5	32.4	31.6	35.0	0.83	1.12	0.82	1.00	0.60	1.05	1.75	1.36	1.89	0.571	0.11	0.00	0.92				
42.30	42.28	269.0	2.87	0.45	269.1	1.07	9	135	2.73	2.47	108.0	159.6	1.08	6	1.77	1.08	6	0.00	1	7.45	17.5	0.44	273.6	449.2	336.3	1,103.2	245,276	2,561	1,795	3,589	6.85	2.8	41.8	0.13	0.39	0.13	0.66	81.8	50.8	48.6	32.1	0.65	33.8	32.3	32.3	34.3	0.83	1.12	0.82	1.00	0.60	1.14	1.89	1.36	1.90	0.231	0.05	0.00	0.92				
42.40	42.35	259.2	2.57	0.44	259.3	0.99	9	135	2.73	2.47	103.9	154.0	1.00	6	1.76	1.07	6	0.00	1	7.25	16.8	0.45	273.6	443.5	327.9	1,075.8	231,644	2,419	1,706	3,413	6.64	2.7	41.7	0.13	0.40	0.13	0.65	80.2	49.0	46.7	30.3	0.65	32.5	31.0	30.5	32.7	0.83	1.11	0.83	1.00	0.60	0.76	1.27	1.37	1.89	2.081	0.43	0.01	0.91				
42.50	42.42	260.1	2.47	0.42	260.2	0.95	9	134	2.73	2.47	104.1	155.0	0.96	6	1.74	1.06	6	0.00	1	6.98	16.9	0.45	273.6	436.0	325.7	1,068.6	228,103	2,382	1,684	3,367	6.66	2.7	41.7	0.13	0.40	0.13	0.65	80.3	49.2	46.6	30.4	0.65	32.6	30.9	30.6	32.4	0.83	1.11	0.83	1.00	0.60	0.79	1.31	1.37	1.89	1.920	0.40	0.00	0.91				
42.60	42.51	249.3	2.52	0.41	249.3	1.01	9	134	2.74	2.48	99.6	147.2	1.02	6	1.78	1.08	6	0.00	1	7.63	16.1	0.45	273.6	454.0	325.3	1,067.2	227,551	2,376	1,679	3,359	6.40	2.6	41.4	0.13	0.41	0.14	0.63	78.5	47.1	45.2	28.5	0.65	31.4	30.1	28.7	32.0	0.83	1.10	0.84	1.00	0.60	0.55	0.91	1.37	1.87	4.150	0.92	0.01	0.90				
42.70	42.61	240.4	2.43	0.41	240.4	1.01	9	134	2.75	2.48	95.9	141.3	1.02	6	1.79	1.09	6	0.00	1	7.87	15.5	0.45	273.6	460.8	321.7	1,055.6	222,010	2,318	1,643	3,286	6.19	2.5	41.3	0.12	0.42	0.14	0.62	77.0	45.4	43.7	26.8	0.65	30.3	29.2	27.2	31.2																	

Zs(ft)	Zs(m)	qc (tsf)	fs (tsf)	u2 (tsf)	qs (tsf)	Rf	SPT	γ (pcf)	σvm (tsf)	σ'vm (tsf)	Qv	Qm	Fd	SPT _{cs}	Ic	Kc	(SPT) _{cs}	B _{cs}	(SPT) _{cs}	F _c (tsf)	q ₁₋₁₀ (Mpa)	c	R	σ _v (m/s)	V _s (m/s)	V _s (ft/s)	G _s (kPa)	G _s (tsf)	E'(tsf)	M (tsf)	σ' _v (tsf)	OCR	S _i	S _i (tsf)	S _i σ _v (m)	φ (°)	z'(ft)	C _u (1+e ₀)P _u	C _u (1+e ₀)P _u	K _s	D _r (%)	N ₆₀ BS	(N ₆₀) _{cs}	C _u	(N ₆₀) _{BS}	(N ₆₀) _{BS}	(N ₆₀) _{BS}	(N ₆₀) _{BS}	r _d	MSF	K _{cs}	K _{cs}	CSR _{1.5}	CSR _{2.5}	FS	τ _{av} (tsf)	p'(tsf)	γ _{av} (m)	G/G _s	ε _v (%)	ΔS _v	ΔS _v (in)
47.70	47.64	579.3	7.36	0.72	579.5	1.27	9	144	3.09	2.66	216.6	343.4	1.28	6	1.62	1.00	6	0.00	1	4.71	38.6	0.39	273.5	372.7	450.6	1,478.3	469.70	4,906	3,222	6,445	12.91	4.9	45.5	0.26	0.30	0.10	0.88	100.0	109.5	99.5	77.6	0.63	69.0	62.7	77.6	62.7	0.80	1.12	0.72	1.00	0.69	1.30	1.87	1.49	2.46	0.000	0.02	0.00	0.41			
47.70	47.67	585.4	7.84	0.77	585.4	1.34	9	145	3.09	2.66	216.6	346.9	1.35	6	1.64	1.00	6	0.00	1	4.99	39.0	0.39	273.5	380.5	457.7	1,501.5	486.33	5,079	3,335	6,499	13.01	4.9	45.5	0.26	0.30	0.10	0.88	100.0	110.6	101.1	78.4	0.63	69.7	63.7	78.4	63.7	0.80	1.12	0.72	1.00	0.69	1.30	1.87	1.50	2.46	0.000	0.02	0.00	0.41			
47.70	47.71	578.4	8.92	0.72	578.5	1.54	9	146	3.09	2.67	215.9	337.8	1.55	6	1.69	1.03	6	0.00	1	5.95	38.5	0.39	273.5	407.6	470.7	1,544.3	517.789	5,407	3,517	7,032	12.85	4.8	45.4	0.26	0.30	0.10	0.88	100.0	109.3	101.7	77.4	0.63	69.2	64.4	77.4	65.8	0.80	1.12	0.72	1.00	0.69	1.30	1.87	1.50	2.45	0.000	0.02	0.00	0.41			
47.80	47.76	564.1	8.61	0.73	564.2	1.53	9	146	3.10	2.67	210.4	329.1	1.53	6	1.69	1.03	6	0.00	1	5.99	37.5	0.39	273.5	407.6	465.5	1,527.1	505.168	5,375	3,439	6,878	12.61	4.7	45.3	0.25	0.30	0.10	0.87	100.0	106.5	99.3	75.5	0.63	67.5	63.8	75.5	64.3	0.80	1.12	0.72	1.00	0.69	1.30	1.87	1.50	2.44	0.000	0.03	0.00	0.41			
47.80	47.80	579.2	7.80	0.75	579.4	1.35	9	146	3.10	2.67	215.9	342.8	1.35	6	1.64	0.99	6	0.00	1	5.07	38.2	0.39	273.5	382.8	456.6	1,498.0	483.801	5,052	3,309	6,648	12.92	4.7	45.3	0.26	0.30	0.10	0.88	100.0	109.5	100.2	77.3	0.63	69.0	63.2	77.3	62.6	0.80	1.12	0.72	1.00	0.69	1.30	1.87	1.50	2.46	0.000	0.03	0.00	0.41			
47.90	47.86	557.6	6.51	0.73	557.7	1.17	9	143	3.10	2.67	207.6	329.9	1.18	6	1.60	1.00	6	0.00	1	4.39	37.0	0.39	273.5	363.9	436.7	1,432.8	438.27	4,576	3,077	6,095	12.55	4.7	45.3	0.25	0.20	0.07	0.87	100.0	105.4	95.1	74.6	0.63	66.3	59.9	74.6	59.9	0.80	1.12	0.72	1.00	0.69	1.30	1.87	1.50	2.44	0.000	0.03	0.00	0.41			
48.00	47.92	580.1	5.73	0.79	580.2	0.99	30	143	3.11	2.67	215.8	343.1	0.99	6	1.53	1.00	6	0.00	1	3.31	38.6	0.39	273.5	333.5	435.5	1,399.2	415.337	4,337	2,887	5,773	12.94	4.8	45.5	0.26	0.20	0.07	0.88	100.0	91.4	96.8	77.6	0.63	57.5	60.9	77.6	60.9	0.80	1.12	0.72	1.00	0.69	1.30	1.87	1.50	2.47	0.000	0.03	0.00	0.41			
48.00	47.97	579.8	5.88	0.87	579.9	0.95	30	142	3.11	2.68	215.6	342.8	0.95	6	1.52	1.00	6	0.00	1	3.10	38.5	0.39	273.5	327.3	422.4	1,385.9	406.548	4,245	2,832	5,664	12.93	4.8	45.5	0.26	0.20	0.07	0.88	100.0	91.3	96.2	77.5	0.63	57.4	60.5	77.5	60.5	0.80	1.12	0.72	1.00	0.70	1.30	1.87	1.50	2.47	0.000	0.03	0.00	0.41			
48.10	48.02	591.0	5.32	0.78	591.0	0.90	30	142	3.12	2.68	219.6	349.3	0.90	6	1.50	1.00	6	0.00	1	2.78	39.3	0.39	273.5	318.3	420.6	1,379.8	402.480	4,203	2,807	5,615	13.12	4.9	45.6	0.26	0.20	0.07	0.89	100.0	91.1	97.4	79.0	0.63	58.5	61.2	79.0	61.2	0.80	1.12	0.72	1.00	0.70	1.30	1.87	1.50	2.48	0.000	0.03	0.00	0.41			
48.10	48.08	526.7	5.35	0.66	526.8	1.01	9	142	3.12	2.68	195.4	311.0	1.02	6	1.57	1.00	6	0.00	1	3.86	34.7	0.40	273.5	348.9	415.5	1,363.3	392.220	4,096	2,741	5,481	12.03	4.5	45.0	0.24	0.20	0.07	0.85	100.0	99.6	88.9	70.4	0.63	62.6	55.8	70.4	55.8	0.80	1.12	0.72	1.00	0.70	1.30	1.87	1.51	2.41	0.000	0.03	0.00	0.41			
48.10	48.10	484.1	5.36	0.62	484.2	1.01	9	142	3.12	2.68	179.4	285.6	1.11	6	1.52	1.00	6	0.00	1	4.72	31.7	0.40	273.5	373.0	411.8	1,351.0	384.667	4,017	2,691	5,383	11.27	4.2	44.6	0.23	0.30	0.10	0.82	100.0	91.5	83.1	64.7	0.63	57.5	52.2	64.7	52.2	0.80	1.12	0.72	1.00	0.70	1.30	1.87	1.51	2.35	0.000	0.03	0.00	0.41			
48.20	48.14	464.4	5.39	0.60	464.5	1.16	9	142	3.12	2.68	172.0	273.2	1.17	6	1.65	1.00	6	0.00	1	5.19	30.3	0.40	273.5	386.2	410.4	1,346.4	381.860	3,988	2,673	5,346	10.91	4.1	44.4	0.22	0.30	0.10	0.80	100.0	87.8	80.5	62.1	0.63	55.2	50.7	62.1	50.5	0.80	1.12	0.72	1.00	0.70	1.30	1.87	1.51	2.33	0.000	0.03	0.00	0.41			
48.20	48.19	434.4	5.39	0.59	434.5	1.24	9	141	3.13	2.68	160.7	252.4	1.25	6	1.69	1.03	6	0.00	1	5.93	28.2	0.41	273.5	406.8	407.3	1,336.1	375.616	3,922	2,632	5,265	10.32	3.8	44.0	0.21	0.30	0.10	0.78	99.4	82.1	76.4	58.0	0.63	51.8	48.2	58.1	49.2	0.80	1.12	0.72	1.00	0.70	1.30	1.87	1.51	2.29	0.000	0.04	0.00	0.41			
48.30	48.24	389.3	4.39	0.63	389.4	1.13	9	140	3.13	2.69	143.8	226.0	1.14	6	1.69	1.03	6	0.00	1	5.91	25.0	0.42	273.6	406.2	385.1	1,263.3	331.470	3,461	2,353	4,707	9.46	3.5	43.5	0.19	0.32	0.11	0.74	95.7	73.6	68.4	51.5	0.63	46.4	43.1	51.5	44.0	0.80	1.12	0.72	1.00	0.70	1.30	1.87	1.51	2.22	0.006	0.04	0.00	0.41			
48.40	48.31	333.5	4.56	0.54	333.6	1.37	9	139	3.14	2.69	122.9	187.5	1.38	6	1.80	1.10	6	0.00	1	8.05	21.2	0.43	273.6	465.7	381.4	1,251.2	324.892	3,393	2,308	4,617	8.25	3.1	42.6	0.17	0.34	0.11	0.69	90.4	63.0	60.9	42.6	0.63	40.4	39.0	43.0	41.9	0.80	1.12	0.72	1.00	0.70	1.30	1.86	1.51	2.13	0.318	0.05	0.00	0.41			
48.40	48.38	338.6	4.56	0.54	338.7	1.35	9	139	3.14	2.69	124.6	190.8	1.36	6	1.79	1.09	6	0.00	1	7.84	21.5	0.43	273.6	460.0	381.9	1,253.1	325.949	3,404	2,315	4,631	8.36	3.1	42.7	0.17	0.34	0.11	0.69	90.9	64.0	61.6	43.6	0.63	40.9	39.3	43.9	42.1	0.80	1.12	0.72	1.00	0.70	1.30	1.86	1.51	2.14	0.254	0.05	0.00	0.41			
48.50	48.45	302.3	4.38	0.56	302.4	1.45	9	139	3.15	2.69	111.1	167.4	1.46	6	1.84	1.13	6	0.00	1	9.09	19.0	0.44	273.6	494.7	374.0	1,227.1	311.280	3,251	2,220	4,441	7.56	2.8	42.1	0.15	0.49	0.16	0.66	87.6	57.1	56.1	36.6	0.63	37.0	36.4	37.3	39.9	0.80	1.12	0.75	1.00	0.67	1.30	1.94	1.51	2.08	0.136	0.02	0.00	0.41			
48.60	48.53	267.4	4.13	0.54	267.5	1.54	8	138	3.15	2.70	98.0	145.4	1.56	6	1.90	1.18	6	0.00	1	10.40	16.7	0.45	273.6	531.2	364.3	1,195.2	293.698	3,067	2,106	4,213	6.75	2.5	41.4	0.14	0.52	0.17	0.62	85.3	63.2	50.7	30.2	0.63	41.5	33.5	31.5	37.5	0.80	1.12	0.77	1.00	0.65	1.30	2.00	1.52	2.02	0.000	0.00	0.00	0.41			
48.60	48.58	227.1	4.09	0.42	227.2	1.80	8	138	3.15	2.70	83.0	119.9	1.82	6	2.00	1.29	6	0.00	1	12.90	14.0	0.46	273.7	601.1	356.8	1,170.5	280.704	2,931	2,020	4,041	5.77	2.1	40.5	0.12	0.56	0.19	0.57	83.0	53.7	44.7	23.1	0.63	36.7	30.8	25.6	36.1	0.80	1.12	0.79	1.00	0.63	1.30	2.00	1.52	1.93	0.000	0.00	0.00	0.41			
48.60	48.62	246.4	4.03	0.40	246.5	1.64	8	138	3.16	2.70	90.1	132.2	1.66	6	1.94	1.23	6	0.00	1	11.47	15.2	0.45	273.6	560.9	359.2	1,178.4	284.670	2,973	2,047	4,095	6.25	2.3	40.9	0.12	0.54	0.18	0.60	84.0	58.2	47.5	26.4	0.63	38.9	31.9	28.3	36.4	0.80	1.12	0.79	1.00	0.64	1.30	2.00	1.52	1.98	0.000	0.00	0.00	0.41			
48.70	48.66	243.2	3.70	0.43	243.3	1.52	8	137	3.16	2.70	88.9	131.1	1.54	6	1.92	1.21	6	0.00	1	11.00	15.0	0.45	273.6	547.8	352.6	1,156.7	272.986	2,851	1,973	3,946	6.19	2.3	40.9	0.12	0.56	0.19	0.59	82.6	57.5	46.5	25.9	0.63	38.1	31.1	27.5	35.1	0.															

[illegible]

X:\3242-0-0-Fillmore Unified School District\GeoSuite\REVIEW LETTER VALUES\3242-0-0-100 CPT-2.csv



- Sensitive fine grained
- Organic soils - peats
- Clay to silty clay
- Silty clay to clayey silt
- Sandy silt to silty sand
- Silty sand to clean sand
- Dense sand to gravelly sand
- Clayey sand to very stiff sand

- Very stiff fine grained *
- * Overconsolidated or cemented

Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 34 ft
Maximum Settlement = 3.15 in
Settl. at Bottom of Footing = 3.15 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998); [sat] Idriss & Boulanger (2008)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand; Clay] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)



Seismic Settlement Potential - CPT Data

Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-2	Figure:	6

Zs(ft)	Zs(m)	q _v (tsf)	f _c (tsf)	u ₂ (tsf)	q _u (tsf)	R _u	S _{BT}	γ (pcf)	σ _{vo} (tsf)	σ _{v'} (tsf)	Q _u	Q _{av}	F _{sk}	S _{BT} z	I _p	K _c	(S _{BT}) _z	B _z	(S _{BT}) _h	F _u (tsf)	q _{u150(MPa)}	c	R	σ _v (ms)	V _u (ms)	V _u (ft/s)	G _u (kPa)	G _u (tsf)	E' (tsf)	M (tsf)	σ _p ' (tsf)	OCR	S _u	S _u (tsf)	S _u /σ _{v'}	φ (°)	c' (tsf)	C _u /(1+σ _{v'})	C _u /σ _{v'} (%)	K _u	D _u (ft)	S _{max}	(N _u) _z	(N _u) _{max}	C _u	(N _u) _{max} z	(N _u) _{max} z	(N _u) _{max} z	(N _u) _{max} z	r _u	MSF	K _u	K _u	CSR ₁₅	CSR ₁₅	FS	τ _u (tsf)	p(tsf)	τ _u (°)	G/G _u	c _u (°)	ΔS _u	ΔS _u (in)
8.40	8.36	84.1	1.25	0.42	84.2	1.46	7	126	0.50	0.50	169.0	124.9	1.49	6	1.96	1.27	6	-0.01	1	12.39	11.5	0.47	27.37	586.7	215.4	706.9	93.866	980	727	1,473	2.40	4.4	40.7	0.05	0.02	0.22	0.97	75.1	26.5	36.4	17.0	1.46	43.7	26.5	19.2	30.4	0.98	1.07	1.10	1.00	0.50	0.33	0.29	0.49	0.10	0.29	0.14	0.00	2.50				
8.50	8.44	90.8	1.58	0.44	90.9	1.74	7	128	0.50	0.50	189.9	134.9	1.74	6	2.01	1.30	6	0.00	1	13.10	12.1	0.47	27.37	606.9	227.6	763.3	106.984	1,111	822	1,643	2.51	5.1	41.0	0.05	0.02	0.21	1.00	77.1	28.6	37.9	18.6	1.46	45.1	29.1	21.1	33.9	0.98	1.09	1.10	1.00	0.49	0.48	0.30	0.50	0.01	0.38	0.09	0.00	2.50				
8.55	8.50	92.3	1.65	0.44	92.4	1.78	7	129	0.50	0.50	182.7	136.6	1.79	6	2.01	1.31	6	0.00	1	13.10	12.4	0.47	27.37	610.7	230.3	755.4	109.186	1,140	841	1,683	2.59	5.1	41.1	0.05	0.03	0.21	1.00	78.3	29.1	38.5	18.9	1.45	45.7	29.1	21.1	34.5	0.98	1.09	1.10	1.00	0.49	0.51	0.30	0.50	0.00	0.39	0.00	0.00	2.50				
8.60	8.55	96.0	1.67	0.45	96.1	1.74	7	129	0.51	0.51	188.3	141.0	1.78	6	1.99	1.29	6	0.00	1	12.75	12.9	0.46	27.27	597.1	232.2	761.8	111.237	1,163	856	1,712	2.67	5.1	41.1	0.05	0.03	0.21	1.03	78.5	30.2	38.8	19.7	1.44	47.0	30.0	21.2	34.9	0.98	1.10	1.10	1.00	0.49	0.51	0.30	0.51	0.04	0.40	0.08	0.00	2.50				
8.70	8.65	104.2	1.85	0.46	104.3	1.78	7	130	0.51	0.51	202.8	151.7	1.78	6	1.98	1.26	6	0.00	1	12.39	13.9	0.46	27.37	584.1	239.4	759.3	119.092	1,144	909	1,819	2.84	5.1	41.6	0.06	0.06	0.20	1.05	79.8	32.8	20.3	21.7	1.44	59.4	31.8	23.9	36.9	0.98	1.11	1.10	1.00	0.48	0.70	0.40	0.53	0.05	0.06	0.00	0.00	2.50				
8.70	8.69	97.7	1.85	0.44	97.8	1.89	7	130	0.52	0.52	188.5	142.9	1.89	6	2.02	1.31	6	0.00	1	13.30	13.0	0.46	27.37	615.1	237.9	780.1	117.350	1,235	807	1,795	2.71	5.1	41.1	0.05	0.05	0.20	1.03	79.3	30.8	19.4	20.0	1.43	47.8	30.8	22.6	36.4	0.98	1.11	1.10	1.00	0.49	0.67	0.30	0.52	0.05	0.43	0.07	0.00	2.50				
8.80	8.74	98.8	1.85	0.48	98.9	1.87	7	130	0.52	0.52	189.3	143.6	1.88	6	2.01	1.31	6	0.00	1	13.23	13.1	0.46	27.37	610.4	238.2	781.6	119.147	1,231	901	1,803	2.74	5.1	41.3	0.05	0.05	0.21	1.02	79.6	31.1	19.5	20.2	1.43	48.1	30.9	22.8	36.4	0.98	1.11	1.10	1.00	0.49	0.67	0.31	0.53	0.05	0.44	0.07	0.00	2.50				
8.90	8.82	129.6	1.82	0.51	129.7	1.40	8	130	0.52	0.52	246.1	180.1	1.41	6	1.84	1.11	6	0.00	1	9.00	16.9	0.45	27.36	492.1	245.1	804.1	125.274	1,308	954	1,907	3.33	6.1	42.4	0.07	0.05	0.21	1.13	78.2	30.6	24.0	27.4	1.42	44.8	35.3	28.1	38.6	0.98	1.09	1.10	1.00	0.49	0.51	0.31	0.57	0.049	0.50	0.05	0.00	2.50				
9.00	8.91	152.6	1.81	0.53	152.7	1.11	8	131	0.53	0.53	286.8	207.7	1.19	6	1.74	1.06	6	0.00	1	6.86	19.7	0.44	27.36	432.7	249.5	818.5	130.131	1,359	988	1,976	3.74	7.0	42.4	0.07	0.04	0.21	1.13	78.2	30.7	36.1	27.3	1.42	44.8	35.3	28.1	38.6	0.98	1.10	1.10	1.00	0.49	0.40	0.33	0.60	0.043	0.53	0.04	0.00	2.50				
9.00	8.98	165.8	1.80	0.56	165.9	1.08	9	131	0.54	0.54	308.9	221.9	1.09	6	1.69	1.02	6	0.00	1	5.88	21.2	0.43	27.36	405.5	251.7	825.9	132.667	1,385	1006	2,012	3.96	7.4	43.4	0.08	0.38	0.13	1.24	82.9	31.3	29.1	35.0	1.41	44.3	41.2	35.0	42.0	0.98	1.12	1.10	1.00	0.48	1.30	0.32	0.62	0.042	0.55	0.04	0.00	2.50				
9.10	9.04	158.5	1.78	0.57	158.6	1.13	8	131	0.54	0.54	293.2	212.4	1.13	6	1.71	1.04	6	0.00	1	6.38	20.3	0.43	27.36	419.4	250.3	821.2	131.006	1,368	994	1,989	3.85	7.1	43.2	0.08	0.39	0.13	1.21	81.6	31.5	28.1	33.4	1.46	42.8	39.7	33.4	41.0	0.98	1.12	1.10	1.00	0.48	1.07	0.32	0.62	0.044	0.53	0.04	0.00	2.49				
9.20	9.11	152.6	1.95	0.54	152.7	1.28	8	131	0.54	0.54	279.9	205.8	1.28	6	1.77	1.08	6	0.00	1	7.44	19.5	0.44	27.36	448.7	254.0	833.5	135.537	1,415	1,024	2,049	3.78	6.9	43.4	0.08	0.40	0.13	1.19	80.4	36.1	27.6	32.0	1.39	51.0	39.0	32.2	41.5	0.98	1.11	1.10	1.00	0.48	0.80	0.32	0.61	0.041	0.55	0.04	0.00	2.49				
9.20	9.18	145.0	2.01	0.55	145.1	1.39	8	131	0.55	0.55	263.5	196.2	1.39	6	1.81	1.11	6	0.00	1	8.34	18.5	0.44	27.36	473.9	254.4	834.7	136.051	1,421	1,027	2,055	3.63	6.6	42.8	0.07	0.41	0.20	1.16	79.5	34.3	26.6	30.2	1.39	48.6	37.8	30.7	40.9	0.98	1.11	1.10	1.00	0.48	0.66	0.32	0.61	0.042	0.54	0.04	0.00	2.49				
9.20	9.22	136.3	1.95	0.59	136.3	1.43	8	131	0.55	0.55	246.5	184.9	1.44	6	1.84	1.13	6	0.00	1	8.98	17.4	0.44	27.36	491.7	251.2	834.1	132.247	1,381	1,002	2,003	3.48	6.3	42.5	0.07	0.62	0.21	1.13	79.0	32.2	25.3	28.3	1.39	45.9	36.2	29.0	39.6	0.98	1.10	1.10	1.00	0.49	0.60	0.32	0.60	0.045	0.52	0.05	0.00	2.49				
9.30	9.30	130.0	1.66	0.58	130.1	1.27	8	129	0.56	0.56	232.9	174.7	1.28	6	1.82	1.11	6	0.00	1	8.47	16.5	0.45	27.36	477.5	241.8	793.3	121.244	1,266	928	1,856	3.36	6.0	42.3	0.07	0.65	0.22	1.10	76.5	30.7	23.9	26.8	1.38	43.4	33.9	27.3	36.7	0.97	1.08	1.10	1.00	0.49	0.40	0.33	0.59	0.057	0.45	0.06	0.00	2.49				
9.40	9.37	124.2	1.54	0.57	124.3	1.24	8	129	0.56	0.56	220.7	166.4	1.27	6	1.82	1.12	6	0.00	1	8.63	15.8	0.45	27.36	481.9	237.4	778.9	116.304	1,215	894	1,789	3.25	5.8	42.0	0.07	0.67	0.22	1.07	75.4	29.3	22.9	25.3	1.37	41.4	32.4	25.9	35.2	0.97	1.08	1.10	1.00	0.50	0.34	0.33	0.59	0.065	0.42	0.08	0.00	2.49				
9.40	9.42	112.7	1.42	0.57	112.8	1.26	8	128	0.56	0.56	199.0	151.4	1.25	6	1.86	1.15	6	-0.01	1	9.43	14.3	0.46	27.37	504.1	232.2	758.5	109.583	1,144	848	1,697	3.03	5.4	41.6	0.06	0.68	0.21	1.03	74.4	29.6	21.0	22.6	1.37	37.8	30.1	23.5	33.0	0.97	1.07	1.10	1.00	0.50	0.31	0.33	0.57	0.079	0.37	0.10	0.00	2.49				
9.50	9.49	94.9	1.62	0.53	94.9	1.70	7	128	0.57	0.57	166.0	130.3	1.71	6	2.01	1.30	6	-0.01	1	13.10	12.1	0.47	27.37	606.9	232.7	763.3	111.414	1,163	859	1,718	2.66	4.7	40.9	0.05	0.64	0.21	0.95	77.4	29.9	18.7	18.2	1.36	44.2	28.4	20.8	33.2	0.97	1.09	1.10	1.00	0.49	0.46	0.33	0.55	0.080	0.36	0.10	0.00	2.49				
9.60	9.56	86.1	1.77	0.51	86.2	2.06	7	129	0.57	0.57	149.5	119.6	2.07	5	2.10	1.44	5	-0.01	1	15.67	11.0	0.48	27.37	680.0	234.6	769.7	113.686	1,187	874	1,747	2.48	4.3	40.5	0.05	0.74	0.24	0.91	77.5	27.1	17.6	16.6	1.36	41.5	27.9	19.4	34.4	0.97	1.09	1.10	1.00	0.49	0.46	0.34	0.54	0.079	0.36	0.10	0.00	2.49				
9.60	9.62	74.4	1.87	0.48	74.5	2.52	6	129	0.58	0.58	128.1	104.8	2.53	5	2.20	1.67	5	-0.01	1	19.14	9.5	0.49	27.37	780.7	233.5	766.0	112.640	1,176	865	1,034	2.20	3.8	39.8	0.04	0.14	0.05	0.85	76.0	28.1	15.9	12.9	1.35	44.4	26.6	17.2	35.9	0.97	1.08	1.10	1.00	0.50	0.37	0.34	0.52	0.087	0.33	0.12	0.00	2.49				
9.70	9.69	57.2	1.82	0.48	57.3	3.19	6	128	0.58	0.58	97.6	82.3	3.22	5	2.36	2.14	5	-0.01	1	24.76	7.4	0.50	27.38	949.0	225.6	794.1	104.449	1,091	808	794	1.76	3.0	38.9	0.04	0.20	0.07	0.75	72.1	21.6	13.1	8.4	1.35	36.8	23.9	13.5	37.7	0.97	1.06	1.09	1.00	0.51	0.24	0.34	0.48	0.123	0.							

Zs(ft)	Zs(m)	q _s (tsf)	f _c (tsf)	u ₂ (tsf)	q _s (tsf)	R _s	SPT	γ [pcf]	σ _{vo} (tsf)	σ _{v'} (tsf)	Q _s	Q _{un}	F _h	SPT _h	I _p	K _c	(SPT) _h	B _h	(SPT) _h	F _c (tsf)	q _{1-100(MPa)}	c	R	σ _v (ms)	V _s (m/s)	V _s (ft/s)	G ₀ (kPa)	G ₀ (tsf)	E' (tsf)	M (tsf)	σ _p ' (tsf)	OCR	S _v	S _u (tsf)	S _u σ _{v'}	φ (°)	c' (tsf)	C _u (1+σ _v σ _{v'})	C _u (1+σ _v σ _{v'})	K _u	D _u (tsf)	S _{max}	(N) _u z	(N) _u max	C _u	(N) _u max	(N) _u max	(N) _u max	(N) _u max	r _u	MSF	K _u	K _u	CSR ₁₅	CSR ₁₅	FS	τ _u (tsf)	p (tsf)	τ _u σ _v (°)	G/G _u	z _u (°)	ΔS _u	2S _u (m)
17.30	17.29	47.4	5.14	0.53	47.5	10.85	3	135	1.06	1.06	43.7	43.7	11.07	3	2.91	0.00	4	<0.01	1	52.70	4.4	0.54	273.9	1.9107	289.5	949.7	181.855	1.899		650	15.47	14.6	0.6	3.31	3.12	35.6	3.31	0.38	0.13	4.27		53.5	44.8	14.4	2.5	1.00	58.6	22.2	8.2	14.0	0.95	1.01	1.00	0.57	1.30	0.61	0.45	0.00	0.00	1.97			
17.40	17.39	56.7	5.86	0.63	56.7	6.82	3	134	1.07	1.07	150.2	52.3	6.94	3	2.71	0.00	4	<0.01	1	40.74	5.3	0.53	273.9	1.4712	279.3	939.2	166.905	1.734		790	18.55	14.7	1.0	3.98	3.74	35.6	3.98	0.40	0.13	4.27		53.5	53.1	41.1	0.99	69.0	23.1	9.7	14.9	0.94	1.01	1.00	0.54	1.30	0.61	0.40	0.00	0.00	1.97				
17.45	17.38	87.6	5.24	0.53	87.6	3.70	6	134	1.07	1.07	81.0	81.2	3.74	6	2.37	2.19	5	<0.01	1	25.11	8.2	0.50	273.9	965.6	281.1	922.4	169.058	1.765		1254	12.12	24.7	2.3			35.6	0.65	0.20	0.07	0.63	74.1	33.1	20.1	10.1	0.99	41.1	26.1	15.3	43.9	0.94	1.07	1.00	0.54	1.30	0.61	0.40	0.00	0.00	1.97				
17.45	17.43	103.1	3.26	0.50	103.1	3.17	6	134	1.07	1.07	95.3	85.7	3.20	6	2.28	1.86	5	0.00	1	21.61	9.7	0.49	273.7	853.7	287.0	941.7	176.828	1.847		1308	14.29	28.8	2.1			39.4	0.66	0.17	0.06	0.68	77.2	39.0	22.7	13.2	0.99	46.1	28.5	17.9	43.9	0.94	1.09	1.00	0.53	0.44	0.61	0.85	0.070	0.42	0.10	0.00	1.97		
17.50	17.45	130.3	3.11	0.48	130.4	2.39	7	134	1.07	1.07	120.4	121.1	2.41	7	2.12	1.47	5	0.00	1	16.39	12.3	0.47	273.7	697.9	292.0	998.0	183.337	1.915		1353	2.70	3.4			40.5	0.67	0.66	0.23	0.76	81.0	41.0	26.8	18.7	0.99	45.9	31.0	22.1	39.3	0.94	1.12	1.00	0.51	0.91	0.60	0.90	0.46	0.08	0.00	1.97				
17.50	17.49	103.8	3.85	0.49	103.9	2.76	6	133	1.08	1.08	95.5	96.0	2.77	6	2.23	1.73	5	0.00	1	19.90	9.8	0.48	273.7	803.0	279.3	916.4	166.210	1.736		1238	14.49	2.9	2.7			39.4	0.66	0.17	0.06	0.68	76.7	39.2	22.4	13.3	0.99	45.6	27.5	17.8	38.1	0.94	1.08	1.00	0.53	0.41	0.61	0.85	0.094	0.38	0.12	0.00	1.97		
17.60	17.54	132.2	1.74	0.44	132.3	1.33	8	130	1.08	1.08	121.5	122.5	1.33	8	1.92	1.21	6	0.00	1	10.99	12.4	0.47	273.7	547.6	290.5	854.8	141.250	1.475		1077	2.155	3.9	3.3			39.4	0.67	0.58	0.23	0.76	75.0	31.2	25.3	19.0	0.99	32.9	26.9	20.6	30.2	0.94	1.07	1.00	0.53	0.35	0.62	0.91	0.142	0.26	0.19	0.00	1.97		
17.60	17.60	104.5	2.93	0.38	104.6	1.94	7	130	1.08	1.08	95.5	96.3	1.96	7	2.12	1.48	5	0.00	1	16.31	9.8	0.48	273.7	698.4	261.4	895.2	142.744	1.491		1094	2.188	2.9	2.7			39.4	0.66	0.76	0.26	0.68	75.1	32.9	21.5	13.4	0.99	37.2	25.3	17.0	31.4	0.94	1.07	1.00	0.53	0.35	0.62	0.86	0.150	0.28	0.21	0.00	1.97		
17.60	17.64	134.1	2.23	0.35	134.1	1.67	8	132	1.09	1.09	122.5	123.8	1.68	8	1.99	1.28	6	0.00	1	12.76	12.6	0.47	273.7	597.4	274.1	899.2	158.576	1.656		1192	2.384	3.6	3.3			39.4	0.67	0.62	0.21	0.77	78.4	31.7	26.3	19.3	0.99	34.2	28.7	21.7	33.3	0.94	1.10	1.00	0.52	0.53	0.62	0.92	0.302	0.37	0.12	0.00	1.97		
17.70	17.67	95.9	2.37	0.32	95.9	2.47	7	131	1.09	1.09	87.2	88.0	2.50	7	2.22	1.70	5	0.00	1	19.63	9.0	0.49	273.8	795.0	267.0	875.9	150.014	1.567		1131	1.338	2.6	2.5			39.0	0.65	0.19	0.06	0.65	74.5	30.2	20.6	11.6	0.99	35.6	25.4	16.0	34.6	0.94	1.07	1.00	0.53	0.31	0.62	0.84	0.132	0.30	0.19	0.00	1.97		
17.70	17.72	87.8	2.17	0.39	87.9	2.47	7	131	1.09	1.09	79.5	80.3	2.50	7	2.25	1.77	5	0.00	1	20.55	8.2	0.50	273.8	822.3	259.7	852.1	141.033	1.473		1071	1.215	2.47	2.3			38.6	0.65	0.20	0.07	0.63	72.7	27.7	19.1	10.0	0.98	33.2	24.1	14.5	33.4	0.94	1.06	1.00	0.54	0.26	0.62	0.82	0.168	0.25	0.25	0.00	1.97		
17.80	17.76	107.7	2.08	0.44	107.8	1.93	7	131	1.09	1.09	95.5	98.7	1.95	7	2.11	1.46	5	0.00	1	16.02	10.1	0.48	273.7	690.0	263.8	865.5	145.720	1.522		1104	2.209	2.9	2.7			39.5	0.66	0.77	0.26	0.69	75.5	33.9	22.1	13.9	0.98	38.0	25.7	17.5	31.7	0.94	1.08	0.99	0.53	0.35	0.62	0.87	0.141	0.29	0.19	0.00	1.98		
17.80	17.78	102.8	2.02	0.41	102.9	1.96	7	130	1.10	1.10	92.9	94.1	1.98	7	2.13	1.49	5	0.00	1	16.60	9.6	0.49	273.7	706.8	260.7	855.4	141.951	1.482		1079	2.158	2.87	2.6			39.3	0.66	0.78	0.26	0.67	74.7	32.4	21.3	12.9	0.98	36.6	25.0	16.7	31.2	0.94	1.07	0.99	0.53	0.32	0.62	0.86	0.157	0.27	0.22	0.00	1.98		
17.80	17.82	119.5	2.40	0.42	119.6	2.01	7	132	1.10	1.10	107.9	109.4	2.03	7	2.09	1.43	5	0.00	1	15.47	11.1	0.48	273.7	674.2	274.7	901.3	159.646	1.667		1198	2.396	3.8	3.0			40.0	0.67	0.74	0.25	0.72	77.8	37.6	24.3	16.2	0.98	41.5	27.7	19.4	34.1	0.94	1.09	0.99	0.53	0.48	0.63	0.89	0.105	0.36	0.13	0.00	1.98		
17.90	17.86	198.7	2.67	0.42	198.8	1.34	8	134	1.10	1.10	179.6	182.8	1.35	8	1.81	1.11	6	0.00	1	8.34	18.6	0.44	273.6	473.7	297.5	976.0	150.134	1.986		1405	2.899	5.0	4.6			42.5	0.10	0.58	0.19	0.90	81.6	46.9	36.4	32.0	0.98	47.1	36.6	32.4	39.6	0.94	1.12	0.99	0.51	1.06	0.63	1.03	0.061	0.51	0.06	0.00	1.98		
17.90	17.89	183.3	2.70	0.42	183.3	1.47	8	134	1.10	1.10	165.3	168.2	1.48	8	1.86	1.15	6	0.00	1	9.52	17.1	0.44	273.6	506.7	295.4	969.1	187.295	1.956		1385	2.770	4.7	4.0			42.1	0.09	0.58	0.19	0.87	81.4	44.3	34.3	28.9	0.98	44.0	34.9	29.8	38.6	0.94	1.12	0.99	0.51	1.02	0.63	1.01	0.065	0.50	0.07	0.00	1.98		
17.90	17.92	186.1	2.70	0.42	186.2	1.45	8	134	1.10	1.10	167.5	170.7	1.46	8	1.85	1.14	6	0.00	1	9.32	17.4	0.44	273.6	501.1	296.0	971.3	188.189	1.965		1391	2.782	4.7	4.3			42.2	0.10	0.58	0.19	0.88	81.4	44.0	34.7	29.4	0.98	44.5	35.2	30.3	38.8	0.94	1.12	0.99	0.51	1.02	0.63	1.01	0.064	0.50	0.06	0.00	1.98		
18.00	17.95	185.5	2.59	0.37	185.4	1.30	8	134	1.11	1.11	166.7	170.0	1.40	8	1.84	1.13	6	0.00	1	9.07	17.3	0.44	273.6	494.0	293.5	962.9	184.510	1.927		1362	2.734	4.5	4.3			42.1	0.09	0.59	0.20	0.87	80.7	43.8	34.4	29.3	0.98	44.2	34.8	30.0	38.2	0.94	1.12	0.99	0.52	0.85	0.63	1.01	0.067	0.49	0.07	0.00	1.98		
18.00	17.97	175.5	2.32	0.44	175.6	1.32	8	133	1.11	1.11	157.5	160.7	1.33	8	1.84	1.13	6	0.00	1	9.06	16.4	0.45	273.6	493.7	285.3	936.0	173.091	1.908		1297	2.584	4.5	4.1			41.9	0.09	0.62	0.21	0.85	78.8	41.5	32.6	27.3	0.98	41.8	32.9	28.0	36.0	0.94	1.10	0.99	0.52	0.57	0.63	1.00	0.079	0.44	0.08	0.00	1.98		
18.00	18.01	154.8	1.74	0.49	154.9	1.12	8	130	1.11	1.11	138.5	141.5	1.13	8	1.89	1.12	6	0.00	1	8.79	14.4	0.46	273.7	486.4	265.9	872.3	147.538	1.541		1122	2.244	4.1	3.7			41.3	0.08	0.69	0.23	0.81	74.0	36.6	28.6	23.2	0.98	36.8	28.9	23.8	31.4	0.94	1.07	0.99	0.54	0.29	0.63	0.97	0.126	0.33	0.16	0.00	1.98		
18.10	18.06	177.2	1.86	0.47	177.3	1.10	9	131	1.11	1.11	158.2	162.0	1.06	9	1.73	1.08	6	0.00	1	7.45	16.5	0.45	273.6	469.2	273.5	897.3	157.118	1.641		1187	2.375	4.5	4.1			41.9	0.09	0.62	0.24	0.85	76.9	33.5	32.0	27.6	0.97	33.2	31.7	27.8	33.7	0.94	1.08	0.99	0.53	0.42	0.63								

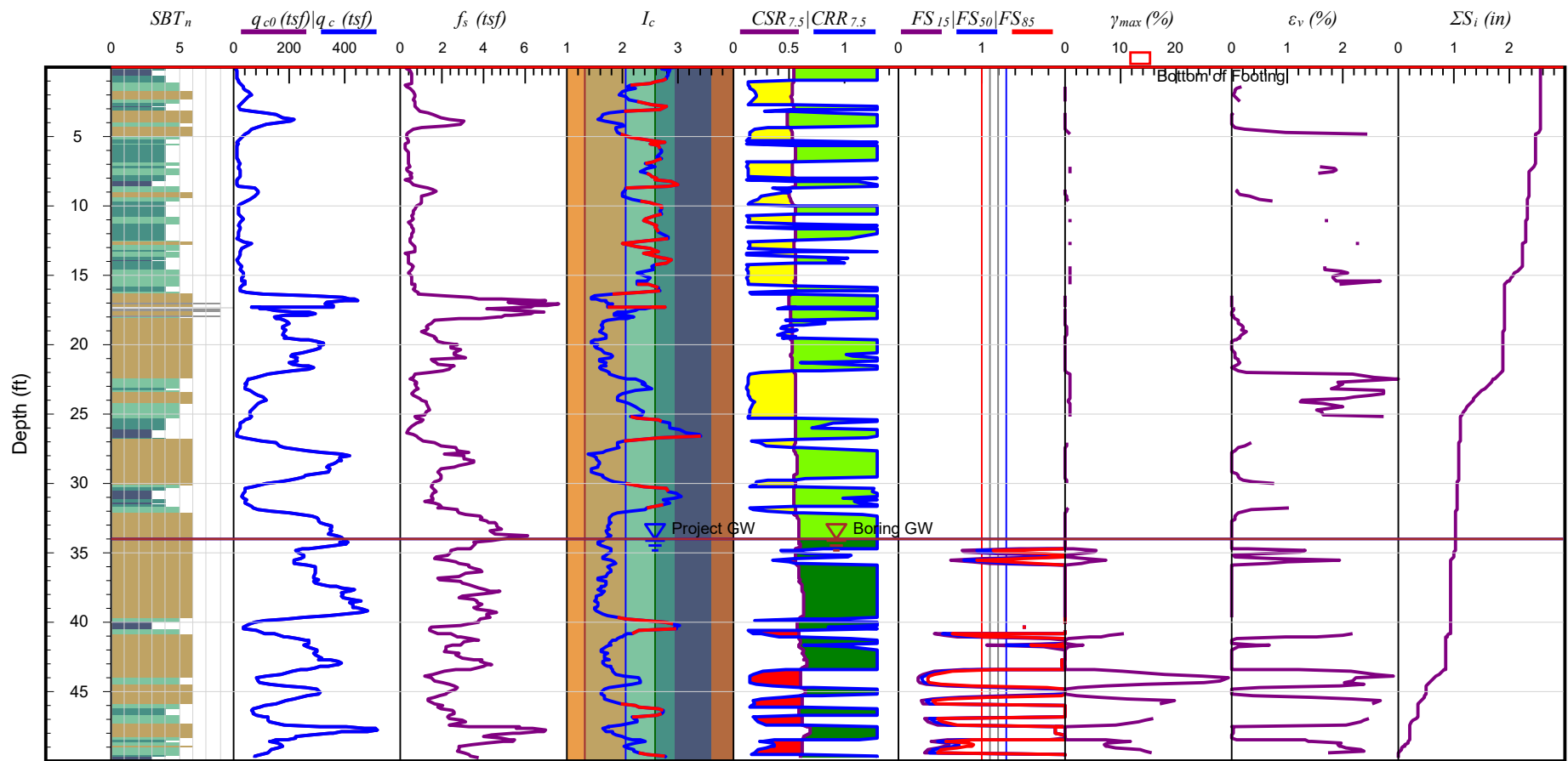
Zs(ft)	Zs(ft)	q _v (tsf)	f _c (tsf)	u ₂ (tsf)	q _v (tsf)	R _z	S _{BT}	γ (pcf)	σ _{vo} (tsf)	σ _{v'} (tsf)	Q _v	Q _u	F _z	S _{BT} z	I _p	K _c	(S _{BT}) _z	B _z	(S _{BT}) _u	F _z (psi)	q _{1-100(MPa)}	c	R	σ _v (ms)	V _z (ms)	V _z (ft/s)	G _z (kPa)	G _z (tsf)	E' (tsf)	M (tsf)	σ _p ' (tsf)	OCR	S _v	S _u (tsf)	S _u σ _{v'}	φ (°)	c' (tsf)	C _u (1+σ _v σ _p)	C _u (1+σ _v σ _p)	K _u	D _u (psi)	S _u σ _{v'}	(N)σ _v	(N)σ _v	C _u	(N)σ _v σ _p	(N)σ _v σ _p	(N)σ _v σ _p	(N)σ _v σ _p	r _z	MSF	K _u	K _u	CSR ₁₅	CSR ₁₅	FS	τ _u (tsf)	p(tsf)	τ _u σ _v (psi)	G/G _u	c _v (psi)	ΔS _v	ΔS _v (in)
22.30	22.32	158.2	1.75	0.42	158.3	1.11	8	130	1.40	1.40	112.4	126.8	1.12	6	1.86	1.14	6	0.00	1	9.36	1.12	0.46	27.37	502.0	272.8	895.2	155.477	1.624	1.122	2.363	4.22	3.0				40.7	0.08	0.71	0.28	0.71	72.9	37.4	29.5	20.7	0.87	33.8	26.8	21.6	29.4	0.92	1.06	0.96	1.00	0.55	0.26	0.78	1.13	0.172	0.28	0.23	0.00	1.76	
22.40	22.32	160.5	1.51	0.44	160.7	0.94	9	129	1.40	1.40	113.7	127.0	0.95	6	1.80	1.10	6	0.00	1	9.39	1.14	0.46	27.37	499.9	265.9	872.4	146.426	1.624	1.122	2.363	4.22	3.0				40.8	0.08	0.71	0.28	0.71	72.9	37.4	29.5	20.7	0.87	33.8	26.8	21.6	29.4	0.92	1.06	0.96	1.00	0.55	0.22	0.78	1.14	0.171	0.28	0.23	0.00	1.75	
22.50	22.36	167.5	1.49	0.44	167.5	0.89	9	128	1.41	1.41	118.2	133.7	0.90	6	1.77	1.08	6	0.00	1	9.39	1.14	0.46	27.37	452.3	265.6	884.4	147.236	1.538	1.128	2.257	4.44	3.2				41.0	0.09	0.71	0.28	0.71	71.7	31.7	30.3	22.4	0.87	28.1	26.5	0.92	1.06	0.96	1.00	0.55	0.24	0.78	1.15	0.205	0.25	0.20	0.00	1.73			
22.60	22.42	175.7	1.50	0.45	175.8	0.84	9	128	1.41	1.41	125.7	144.0	0.84	6	1.74	1.06	6	0.00	1	9.42	1.14	0.45	27.37	431.6	269.0	872.4	150.062	1.567	1.148	2.296	4.49	3.3				41.3	0.09	0.71	0.28	0.71	71.9	33.8	31.9	24.5	0.87	29.6	28.0	0.94	1.00	0.95	1.00	0.55	0.20	0.78	1.18	0.190	0.26	0.24	0.00	1.73			
22.70	22.63	189.9	1.48	0.49	190.0	0.78	9	130	1.40	1.40	133.1	153.2	0.79	6	1.70	1.03	6	0.00	1	9.08	1.58	0.45	27.36	470.6	270.6	887.8	152.016	1.587	1.162	2.324	4.95	3.5				41.6	0.10	0.43	0.14	0.77	76.1	35.9	33.5	26.3	0.86	31.2	29.1	36.4	29.4	0.92	1.08	0.96	1.00	0.54	0.37	0.79	1.20	0.180	0.26	0.23	0.00	1.74	
22.70	22.71	180.7	1.47	0.48	180.9	0.83	9	129	1.40	1.40	126.1	145.1	0.82	6	1.73	1.05	6	0.00	1	9.63	1.50	0.45	27.37	426.4	269.3	892.0	149.877	1.565	1.147	2.294	4.74	3.3				41.4	0.09	0.45	0.13	0.75	74.2	34.2	32.1	24.7	0.86	29.7	28.0	34.8	29.3	0.92	1.07	0.95	1.00	0.55	0.30	0.79	1.19	0.193	0.26	0.25	0.00	1.74	
22.80	22.76	183.0	1.47	0.53	183.0	0.81	9	129	1.43	1.43	127.5	146.9	0.81	6	1.72	1.05	6	0.00	1	9.49	1.52	0.45	27.36	422.5	269.3	885.5	150.373	1.570	1.151	2.302	4.79	3.4				41.4	0.10	0.44	0.13	0.75	74.5	34.6	32.5	25.1	0.86	30.1	28.3	35.2	29.3	0.92	1.07	0.95	1.00	0.55	0.31	0.79	1.19	0.191	0.26	0.24	0.00	1.74	
22.90	22.83	167.3	0.45	0.51	167.2	0.27	9	120	1.43	1.43	116.0	134.8	0.27	6	1.49	1.00	6	0.00	1	2.66	1.38	0.46	27.37	314.5	222.1	728.7	95.052	993	793	1.556	4.45	3.1				41.0	0.09	0.38	0.13	0.72	71.3	31.6	27.5	22.1	0.86	27.2	23.6	22.1	23.6	0.92	1.05	0.95	1.00	0.55	0.23	0.80	1.17	1.000	0.8	1.47	0.02	1.72	
23.00	22.92	143.5	0.55	0.51	143.3	0.39	9	121	1.43	1.43	99.0	115.3	0.39	6	1.62	1.00	6	0.00	1	4.71	1.18	0.47	27.37	372.9	223.8	734.2	97.437	1.018	798	1.590	3.89	2.7				40.3	0.08	0.54	0.18	0.67	65.7	27.1	24.6	17.6	0.86	23.3	21.2	17.6	21.2	0.92	1.04	0.96	1.00	0.56	0.17	0.80	1.12	1.000	0.8	1.84	0.02	1.70	
23.10	23.02	111.4	0.53	0.49	111.3	0.47	9	120	1.44	1.44	76.4	88.2	0.48	6	1.76	1.00	6	0.00	1	5.00	9.11	0.49	27.38	445.1	215.2	705.9	89.318	933	793	1.470	3.05	2.1				39.0	0.06	0.63	0.21	0.60	56.6	21.1	20.1	11.7	0.86	18.0	17.2	11.7	17.2	0.92	1.02	0.97	1.00	0.56	0.13	0.80	1.05	1.000	0.9	2.80	0.03	1.63	
23.20	23.12	91.7	0.82	0.46	91.8	0.89	8	123	1.45	1.45	62.4	70.7	0.90	6	1.99	1.27	6	-0.01	1	12.56	7.4	0.50	27.38	591.5	224.7	737.4	99.743	1.042	803	1.603	2.50	1.7				37.9	0.05	0.85	0.28	0.54	63.3	21.7	18.0	8.2	0.86	20.9	17.6	10.5	19.6	0.92	1.03	0.96	1.00	0.56	0.15	0.80	1.00	1.000	0.8	2.25	0.03	1.64	
23.20	23.17	61.6	0.82	0.44	61.7	1.34	7	122	1.45	1.45	41.5	46.0	1.37	5	2.23	1.74	5	-0.01	1	20.09	4.9	0.53	27.39	808.4	214.5	703.7	90.152	941	730	843	1.59	1.1				35.9	0.03	0.36	0.12	0.44	60.8	19.4	13.3	3.4	0.85	21.5	15.9	7.9	19.8	0.92	1.03	0.96	1.00	0.56	0.14	0.81	0.91	1.000	0.9	2.56	0.00	1.64	
23.20	23.20	75.0	0.93	0.34	75.1	1.24	8	124	1.45	1.45	50.7	56.6	1.26	5	2.14	1.53	5	0.00	1	17.14	6.0	0.52	27.38	722.3	224.2	735.6	99.648	1.041	798	1.596	2.00	1.4				36.9	0.04	0.94	0.31	0.48	63.5	17.7	15.6	5.4	0.85	19.1	17.2	9.3	20.4	0.92	1.03	0.96	1.00	0.56	0.15	0.81	0.95	1.000	0.8	2.29	0.00	1.64	
23.30	23.27	78.6	1.08	0.34	78.7	1.38	7	125	1.46	1.46	53.0	59.2	1.40	5	2.16	1.56	5	0.00	1	17.56	6.3	0.52	27.38	734.5	231.6	759.7	107.378	1.121	851	1.702	2.11	1.4				37.1	0.04	0.92	0.31	0.50	64.8	24.8	16.5	6.0	0.85	25.6	18.1	10.0	21.9	0.92	1.03	0.96	1.00	0.56	0.16	0.81	0.97	1.000	0.7	2.14	0.03	1.62	
23.40	23.36	68.4	1.44	0.35	68.5	2.11	7	127	1.46	1.46	45.8	50.4	2.15	5	2.32	2.02	5	-0.01	1	23.42	5.4	0.53	27.39	908.2	239.8	788.8	116.830	1.220	913	938	1.79	1.2				36.3	0.04	0.33	0.11	0.46	64.1	21.6	15.4	4.4	0.85	24.3	18.6	9.3	24.6	0.92	1.03	0.96	1.00	0.56	0.16	0.81	0.93	0.953	0.7	1.43	0.02	1.60	
23.50	23.43	59.1	1.72	0.31	59.2	2.91	6	128	1.47	1.47	39.4	42.7	2.98	5	2.47	2.59	5	-0.01	1	29.23	4.6	0.54	27.39	1.088.4	243.6	799.3	121.496	1.269	942	808	1.49	1.0				35.5	0.03	0.38	0.13	0.42	62.3	22.3	14.2	3.0	0.85	26.4	18.5	8.3	31.2	0.92	1.03	0.96	1.00	0.56	0.15	0.81	0.90	0.857	0.7	1.20	0.01	1.58	
23.50	23.49	53.5	1.74	0.35	53.4	3.25	6	128	1.47	1.47	35.5	38.3	3.34	4	2.53	2.92	5	-0.01	1	32.16	4.2	0.54	27.39	1.182.9	241.4	799.3	119.112	1.244	925	730	1.47	0.9				35.0	0.03	0.43	0.14	0.40	64.0	20.2	14.3	3.2	0.85	25.0	18.0	7.7	32.9	0.92	1.03	0.96	1.00	0.56	0.14	0.82	0.88	1.000	0.7	1.38	0.00	1.58	
23.60	23.54	45.7	1.70	0.33	45.7	3.73	5	127	1.47	1.47	30.0	31.9	3.85	4	2.69	0.00	4	-0.01	1	39.84	3.5	0.56	27.39	1.440.9	245.5	805.4	122.643	1.281		620	14.75	10.6	1.8	3.16	2.28	34.1	3.16	0.51	0.17	3.00	21.6	12.2	0.6	0.85	26.9	17.4	6.2	8.5	0.92	1.01	0.98	1.00	0.56	0.13	0.82	0.84	1.000	0.0	0.00	0.00	1.58		
23.70	23.61	44.6	1.44	0.35	44.7	3.23	5	126	1.48	1.48	29.2	31.2	3.34	4	2.66	0.00	4	-0.01	1	38.19	3.4	0.56	27.39	1.383.9	237.7	807.0	113.851	1.189		605	14.40	10.4	2.1	3.09	2.23	34.0	3.09	0.53	0.18	2.92		21.1	11.8	0.5	0.85	26.4	16.9	6.1	8.1	0.92	1.01	0.98	1.00	0.56	0.13	0.82	0.83	1.000	0.0	0.00	0.00	1.58	
23.80	23.71	51.2	1.45	0.38	51.1	2.83	6	126	1.48	1.48	33.5	36.4	2.91	4	2.51	2.79	5	-0.01	1	31.62	4.0	0.55	27.39	1.145.9	232.1	781.5	108.844	1.137	855	696	1.48	0.8				34.8	0.02	0.45	0.05	0.39	59.8	19.3	12.5	1.9	0.84	23.8	17.1	7.3	29.5	0.92	1.03	0.96	1.00	0.56	0.14	0.82	0.88	1.000	0.0	0.00	0.00	1.57	
23.80	23.78	87.1	1.47	0.42	87.2	1.68	7	128	1.49	1.49	57.5	64.6	1.71	5	2.18	1.61	5	0.00	1	18.41	6.9	0.51	27.38	759.3	247.9	814.3	125.591	1.312	796	1.951	2.34	1.6																															

Zs (m)	Zr (m)	q _v (tsf)	f _c (tsf)	u ₂ (tsf)	q _u (tsf)	R _z	S _{BT}	γ (pcf)	σ _{va} (tsf)	σ _{va'} (tsf)	Q _v	Q _u	F _z	S _{BT,z}	I _p	K _c	(S _{BT}) _z	B _z	(S _{BT}) _u	F _c (tsf)	q _{1-100(MPa)}	c	R	σ _{va} (ms)	V _{ms} (m)	V _d (ft/s)	G ₀ (kPa)	G ₀ (tsf)	E' (tsf)	M (tsf)	σ _{p'} (tsf)	OCR	S _v	S _v (tsf)	S _u σ _{va'}	q (°)	c' (tsf)	C _u (1+σ _{va'})	C _u (1+σ _{va})	K _u	D _u (tsf)	S _u σ _{va}	(N _u) _z	(N _u) _{max}	C _u	(N _u) _{max,z}	(N _u) _{max,u}	(N _u) _{max,z}	(N _u) _{max,u}	r _z	MSF	K _u	K _u	CSR ₁₅	CSR ₂₅	FS	τ _u (tsf)	p(tsf)	τ _{max} (°)	G/G _u	ε _u (°)	ΔS _u	ΔS _u (in)
29.90	29.97	492.6	6.15	0.81	492.7	1.24	9	143	1.89	1.89	259.6	347.0	1.25		6	1.61	1.00	6	0.00	1	4.54	37.5	0.39	273.5	368.0	413.2	1,355.5	990.986	4,074	2,708	5,439	10.78	5.7			45.5	0.22	0.30	0.10	0.99	100.0	93.1	84.3	72.2	0.75	69.7	63.1	72.2	63.1	0.89	1.12	0.83	1.00	0.58	1.30	1.02	1.88	0.035	0.75	0.00	0.00	1.44	
29.90	29.97	463.3	6.31	0.77	463.5	1.36	9	143	1.89	1.89	243.7	325.0	1.27		6	1.66	1.00	6	0.00	1	4.35	35.1	0.39	273.5	398.0	415.9	1,354.7	989.773	4,070	2,708	5,432	10.80	5.7			45.2	0.20	0.30	0.10	0.97	100.0	97.6	80.6	67.9	0.75	65.6	60.1	67.9	60.6	0.89	1.12	0.83	1.00	0.58	1.30	1.02	1.83	0.034	0.74	0.00	0.00	1.44	
29.90	29.93	475.3	6.42	0.74	475.5	1.51	8	143	1.90	1.90	235.5	295.1	1.52		6	1.71	1.04	6	0.00	1	6.01	32.1	0.40	273.5	420.0	410.4	1,346.6	984.943	4,020	2,674	5,348	9.65	5.1			44.8	0.19	0.30	0.10	0.93	100.0	95.4	75.5	62.3	0.75	60.5	56.8	62.3	59.9	0.89	1.12	0.83	1.00	0.58	1.30	1.02	1.81	0.034	0.74	0.00	0.00	1.44	
30.00	29.95	409.8	4.49	0.61	409.9	1.61	8	143	1.90	1.90	212.0	278.3	1.61		6	1.75	1.07	6	0.00	1	7.13	30.4	0.40	273.5	460.0	409.0	1,341.7	982.023	3,989	2,655	5,309	8.26	4.3			44.6	0.19	0.30	0.10	0.91	100.0	95.4	72.5	59.1	0.75	72.0	54.6	59.1	57.8	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.78	0.035	0.73	0.00	0.00	1.44	
30.00	29.97	382.7	6.53	0.62	382.8	1.71	8	143	1.90	1.90	200.7	262.0	1.71		6	1.79	1.09	6	0.00	1	7.84	28.7	0.41	273.5	460.0	406.9	1,335.1	978.001	3,947	2,628	5,296	8.88	4.1			44.3	0.18	0.31	0.10	0.89	98.3	90.4	69.6	56.0	0.75	69.6	52.9	56.0	54.7	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.76	0.036	0.73	0.00	0.00	1.44	
30.00	29.98	381.9	6.58	0.64	382.0	1.71	8	143	1.90	1.90	200.2	261.2	1.73		6	1.79	1.09	6	0.00	1	7.80	28.7	0.41	273.5	462.3	407.6	1,337.1	979.294	3,961	2,636	5,271	8.87	4.1			44.3	0.18	0.31	0.10	0.89	98.3	90.2	69.6	55.9	0.75	69.3	52.9	56.3	54.8	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.76	0.035	0.73	0.00	0.00	1.44	
30.00	30.01	381.9	6.73	0.64	382.0	1.76	8	143	1.90	1.90	200.0	260.7	1.77		6	1.80	1.10	6	0.00	1	8.10	28.6	0.41	273.5	467.0	409.7	1,344.1	983.733	4,002	2,664	5,328	8.87	4.1			44.3	0.18	0.31	0.10	0.89	98.4	90.2	69.8	55.9	0.75	69.5	53.1	56.3	52.9	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.76	0.035	0.73	0.00	0.00	1.44	
30.00	30.03	381.2	6.81	0.68	381.3	1.75	8	143	1.90	1.90	199.4	259.8	1.79		6	1.80	1.10	6	0.00	1	8.21	28.6	0.41	273.5	470.0	410.6	1,347.2	985.699	4,028	2,676	5,352	8.85	4.1			44.2	0.18	0.31	0.10	0.88	98.4	90.1	69.8	55.8	0.75	69.4	53.1	56.2	52.7	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.76	0.035	0.73	0.00	0.00	1.44	
30.10	30.05	359.8	7.04	0.69	359.9	1.96	8	143	1.90	1.90	188.0	243.0	1.97		6	1.85	1.14	6	0.00	1	9.25	26.9	0.41	273.5	499.0	410.9	1,348.1	986.497	4,036	2,680	5,359	8.45	4.4			44.3	0.17	0.33	0.11	0.88	98.1	85.0	67.0	52.6	0.75	65.2	51.5	53.4	56.9	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.73	0.035	0.73	0.00	0.00	1.44	
30.10	30.07	353.0	7.20	0.73	353.2	2.04	8	143	1.91	1.91	184.4	237.5	2.05		6	1.87	1.16	6	0.00	1	9.70	26.4	0.41	273.5	511.7	412.1	1,352.2	989.202	4,064	2,696	5,392	8.22	4.4			43.7	0.17	0.32	0.11	0.88	98.4	83.4	66.2	53.5	0.75	64.2	51.1	52.5	57.0	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.72	0.034	0.73	0.00	0.00	1.44	
30.10	30.10	351.4	7.32	0.84	351.6	2.08	8	143	1.91	1.91	183.3	235.9	2.09		6	1.88	1.16	6	0.00	1	9.90	26.2	0.42	273.5	517.2	413.4	1,356.4	991.908	4,093	2,713	5,425	8.29	4.3			43.7	0.17	0.32	0.11	0.85	98.6	83.0	66.1	51.3	0.74	64.0	51.1	52.4	57.9	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.72	0.034	0.73	0.00	0.00	1.44	
30.20	30.14	363.0	7.54	0.82	363.1	2.08	8	143	1.91	1.91	189.1	243.9	2.09		6	1.87	1.16	6	0.00	1	9.70	27.1	0.41	273.5	511.6	417.9	1,371.2	410.370	4,191	2,772	5,544	8.51	4.5			43.9	0.17	0.31	0.10	0.86	99.3	85.8	68.1	53.1	0.74	65.9	52.4	54.1	58.6	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.74	0.033	0.74	0.00	0.00	1.44	
30.20	30.17	373.3	7.59	0.79	373.3	2.03	8	144	1.91	1.91	194.3	251.4	2.04		6	1.86	1.14	6	0.00	1	9.37	27.9	0.41	273.5	502.3	420.0	1,377.9	405.682	4,336	2,800	5,599	8.70	4.5			44.0	0.17	0.31	0.10	0.87	99.6	88.2	69.6	54.5	0.74	67.5	53.4	55.4	59.2	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.73	0.032	0.75	0.00	0.00	1.44	
30.20	30.21	375.3	8.11	0.80	375.4	2.16	8	144	1.92	1.92	195.0	251.6	2.17		6	1.88	1.16	6	0.00	1	9.85	28.0	0.41	273.5	515.7	426.7	1,399.9	420.219	4,388	2,890	5,779	8.73	4.6			44.0	0.17	0.30	0.10	0.88	100.0	88.7	70.5	54.8	0.74	68.1	54.3	55.9	60.9	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.76	0.031	0.76	0.00	0.00	1.44	
30.30	30.25	381.9	8.36	0.88	382.1	2.19	8	144	1.92	1.92	198.2	255.8	2.20		6	1.88	1.16	6	0.00	1	9.86	28.5	0.41	273.5	516.0	430.6	1,412.6	428.690	4,477	2,942	5,885	8.85	4.6			44.1	0.18	0.30	0.10	0.88	100.0	90.2	71.8	55.8	0.74	69.3	55.3	56.8	61.9	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.77	0.030	0.76	0.00	0.00	1.44	
30.40	30.32	388.5	6.41	0.85	388.6	1.65	8	142	1.92	1.92	201.1	264.7	1.66		6	1.77	1.08	6	0.00	1	7.55	29.0	0.41	273.5	451.8	406.3	1,333.1	976.595	3,933	2,620	5,241	9.01	4.7			44.3	0.18	0.31	0.10	0.89	98.4	91.8	70.3	56.7	0.74	69.0	52.9	56.9	56.4	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.78	0.036	0.72	0.00	0.00	1.44	
30.40	30.38	398.8	6.14	0.81	398.9	1.54	9	142	1.93	1.93	206.0	273.0	1.55		6	1.74	1.06	6	0.00	1	6.93	29.8	0.41	273.5	434.6	403.8	1,324.9	971.332	3,878	2,588	5,177	9.20	4.8			44.4	0.18	0.30	0.10	0.90	99.4	75.4	71.4	58.1	0.74	56.4	53.4	58.3	56.1	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.79	0.037	0.72	0.00	0.00	1.44	
30.50	30.43	413.3	5.96	0.79	413.4	1.44	9	142	1.93	1.93	213.1	284.3	1.45		6	1.71	1.04	6	0.00	1	6.30	30.9	0.40	273.5	417.3	402.8	1,321.7	969.144	3,855	2,576	5,151	9.47	4.9			44.6	0.19	0.30	0.10	0.91	100.0	78.1	73.2	60.2	0.74	58.2	54.5	60.3	56.3	0.89	1.12	0.82	1.00	0.58	1.30	1.02	1.81	0.037	0.72	0.00	0.00	1.44	
30.50	30.48	377.3	5.46	0.77	377.4	1.45	9	141	1.93	1.93	194.1	258.0	1.45		6	1.74	1.06	6	0.00	1	6.79	28.1	0.41	273.5	430.9	391.0	1,282.9	945.655	3,610	2,427	4,854	8.83	4.6			44.6	0.19	0.31	0.10	0.87	97.5	71.3	67.4	55.0	0.74	53.2	50.3	55.1	52.6	0.89	1.12	0.82	1.00	0.58	1.30	1.04	1.77	0.042	0.69	0.00	0.00	1.44	
30.50	30.50	376.9	5.30	0.64	377.0	1.41	9	141	1.94	1.94	193.8	258.0	1.41		6	1.73	1.05	6	0.00	1	6.61	28.0	0.41	273.5	425.9	388.5	1,274.8	940.735	3,558	2,396	4,792	8.83	4.6			44.1	0.18	0.31	0.10	0.87	97.5	71.2	67.1	54.9	0.74	53.1	50.0	55.0	52.1	0.89	1.12	0.82	1.00	0.58	1.30	1.04	1.77	0.043	0.68	0.00	0.00	1.44	
30.60	30.53	376.5	4.52	0.66	377.7	1.20	9	140	1.94	1.94	193.4	26																																																			

Zs(ft)	Zs(m)	q _v (tsf)	f _v (tsf)	u ₂ (tsf)	q _u (tsf)	R _u	S _{BT}	γ [pcf]	σ _{vo} (tsf)	σ _{vo'} (tsf)	Q _v	Q _u	F _h	S _{BT} z	I _p	K _c	(S _{BT}) _z	B _z	(S _{BT}) _h	F _u (psi)	q _{u,100(MPa)}	c	R	σ _u (ms)	V _u (ms)	V _u (ft/s)	G _u (kPa)	G _u (tsf)	E' (tsf)	M (tsf)	σ _{p'} (tsf)	OCR	S _u	S _u (tsf)	S _u /σ _{vo'}	φ (°)	c' (tsf)	C _u (1+σ _{vo'})	C _u (1+σ _{vo'})	K _u	D _u (psi)	S _{max}	(N _u) _z	(N _u) _{max}	C _u	(N _u) _{max} z	(N _u) _{max}	(N _u) _{max} z	(N _u) _{max}	r _u	MSF	K _u	K _u	CSR ₁₅	CSR ₂₅	FS	τ _u (tsf)	p(tsf)	τ _u max (°)	G/G _u	σ _u /σ _{vo'}	ΔS _u	2S _u (m)
34.90	34.87	152.2	0.90	0.34	152.2	0.68	9	125	2.22	2.20	99.2	81.2	0.69	6	1.86	1.15	6	0.00	1	9.51	8.7	0.49	273.8	506.5	249.4	818.3	124.475	1.300	987	1,975	3.49	1.4	38.6	0.07	0.91	0.30	0.30	59.3	25.0	24.7	10.8	0.69	18.4	18.2	11.7	19.7	0.87	1.02	0.92	1.00	0.56	0.13	0.24	1.14	1.47	32.956	3.30	0.04	1.13				
35.00	34.94	120.7	0.96	0.31	120.8	0.82	9	125	2.22	2.20	99.9	72.7	0.86	6	1.94	1.22	6	0.00	1	11.43	7.9	0.54	273.8	559.8	290.5	821.7	125.995	1.316	986	1,961	3.15	1.4	38.1	0.06	0.87	0.29	0.48	62.1	22.9	23.1	9.0	0.67	17.6	17.5	10.8	19.7	0.86	1.01	0.91	1.00	0.59	0.14	0.24	1.14	1.43	27.138	3.40	0.04	1.09				
35.10	35.01	110.5	1.09	0.33	110.3	0.99	8	126	2.23	2.20	99.1	65.1	1.01	6	2.02	1.32	6	0.00	1	13.59	7.0	0.51	273.8	630.5	251.7	835.8	127.167	1.334	1,005	2,001	2.83	1.1	37.3	0.05	0.85	0.28	0.45	63.1	26.0	21.9	7.5	0.67	16.0	16.0	10.8	20.1	0.85	1.03	0.91	1.00	0.57	0.15	0.27	1.17	1.40	24.601	2.91	0.03	1.05				
35.20	35.11	97.2	1.17	0.33	97.3	1.21	8	126	2.24	2.20	43.1	56.0	1.23	5	2.12	1.48	5	0.00	1	16.43	6.2	0.52	273.8	701.5	251.0	833.6	127.319	1.330	1,020	2,000	2.43	1.1	36.3	0.05	0.85	0.33	0.42	63.1	23.0	20.1	8.8	0.69	19.7	17.6	9.5	20.6	0.86	1.03	0.91	1.00	0.57	0.15	0.27	1.17	1.36	25.204	2.94	0.04	1.03				
35.30	35.21	89.1	1.33	0.33	89.1	1.59	7	127	2.25	2.21	99.4	50.1	1.53	5	2.21	1.68	5	0.00	1	19.30	5.7	0.53	273.8	785.3	253.9	823.0	131.694	1.368	1,024	1,216	2.21	1.0	36.1	0.04	0.83	0.39	0.40	62.7	26.1	19.1	4.7	0.69	24.4	17.7	9.1	22.1	0.86	1.00	0.91	1.00	0.57	0.15	0.26	1.17	1.33	26.021	2.98	0.04	0.98				
35.40	35.30	78.9	2.09	0.33	78.9	2.65	6	130	2.25	2.21	94.7	42.2	2.72	4	2.41	2.36	4	0.00	1	27.00	5.0	0.53	273.9	1,018.2	271.6	890.9	135.516	1.403	1,170	1,071	2.21	0.8	34.9	0.04	0.79	0.40	0.37	62.3	29.8	18.5	3.3	0.69	27.9	18.9	8.7	30.1	0.86	1.00	0.91	1.00	0.57	0.15	0.26	1.17	1.29	26.715	1.95	0.03	0.96				
35.40	35.40	71.8	2.40	0.33	71.9	3.34	6	131	2.26	2.21	93.4	36.4	3.44	4	2.64	0.00	4	0.00	1	37.42	4.5	0.54	273.9	1,357.7	298.9	986.6	187.111	1.954	975	23.21	12.1	2.1	4.97	2.60	34.8	4.97	0.45	0.15	3.14	27.2	18.8	0.9	0.69	27.5	20.6	6.5	8.7	0.86	1.00	0.95	1.00	0.56	1.30	2.00	1.18	5.8	0.00	0.96					
35.50	35.49	65.8	2.96	0.33	65.8	3.13	6	129	2.26	2.22	98.7	33.1	3.24	4	2.65	0.00	4	0.00	1	38.05	4.1	0.55	273.9	1,379.3	287.8	944.3	171.704	1.793	890	21.18	11.0	2.2	4.54	2.37	34.3	4.54	0.50	0.17	2.87	24.9	17.3	0.6	0.69	25.6	19.3	6.1	8.0	0.86	1.00	0.95	1.00	0.56	1.30	2.00	1.18	4.98	0.00	0.96					
35.60	35.59	83.9	3.55	0.33	83.9	4.23	5	134	2.27	2.22	96.8	42.4	4.35	4	2.66	0.00	4	0.00	1	38.62	5.3	0.53	273.9	1,391.4	327.7	1,075.1	230.674	2.409	1,143	27.21	14.1	1.6	5.83	3.03	35.5	5.83	0.39	0.13	3.68	39.4	22.1	1.9	0.69	37.8	23.3	7.4	10.3	0.86	1.00	0.94	1.00	0.56	1.30	2.00	1.18	6.18	0.00	0.96					
35.70	35.69	168.3	4.15	0.33	168.3	2.47	7	137	2.28	2.23	94.7	96.4	2.50	5	2.16	1.56	5	0.00	1	17.66	11.2	0.47	273.7	737.2	340.1	1,115.9	253.963	2.652	1,836	3.673	4.33	1.9	39.4	0.09	0.71	0.24	0.56	79.3	53.0	35.3	16.3	0.69	42.1	29.1	20.3	38.0	0.86	1.00	0.86	1.00	0.56	0.64	1.14	1.18	1.57	2.696	0.58	0.01	0.95				
35.80	35.78	231.6	4.42	0.34	231.6	1.91	8	138	2.28	2.23	103.0	138.4	1.93	6	1.86	1.27	6	0.00	1	12.50	15.7	0.45	273.6	589.9	357.6	1,173.1	283.270	2.958	2,029	4.059	5.89	2.6	42.2	0.12	0.51	0.25	0.65	86.0	54.7	45.3	27.1	0.69	40.7	34.0	29.4	39.7	0.86	1.12	0.81	1.00	0.58	1.30	2.00	1.19	1.71	0.00	0.00	0.95					
35.80	35.84	264.7	4.39	0.34	264.8	1.66	8	139	2.29	2.23	117.7	161.3	1.67	6	1.90	1.18	6	0.00	1	10.36	18.1	0.44	273.6	530.0	362.6	1,189.6	291.883	3.048	2,087	4.174	6.66	3.0	41.9	0.13	0.49	0.16	0.69	87.4	62.5	50.1	33.1	0.69	45.1	36.3	34.4	40.8	0.86	1.12	0.80	1.00	0.59	1.30	2.00	1.19	1.77	0.00	0.00	0.95					
35.90	35.87	279.3	4.34	0.33	279.4	1.55	8	139	2.29	2.23	124.2	171.6	1.56	6	1.86	1.15	6	0.00	1	9.49	19.1	0.44	273.6	505.7	363.9	1,193.9	294.064	3.071	2,102	4.204	6.99	3.1	42.2	0.14	0.48	0.16	0.77	87.7	66.0	52.2	35.8	0.69	47.0	37.3	36.7	41.3	0.86	1.12	0.80	1.00	0.60	1.30	2.00	1.19	1.80	0.00	0.00	0.95					
36.00	35.99	206.8	4.33	0.34	206.8	2.09	8	138	2.29	2.23	91.6	121.5	2.12	5	2.05	1.36	6	0.00	1	14.24	13.9	0.46	273.7	639.1	351.5	1,153.1	272.804	2.849	1,961	3.921	5.30	2.4	40.5	0.11	0.54	0.18	0.61	83.8	48.8	41.4	22.7	0.69	37.4	32.0	25.7	38.7	0.86	1.12	0.83	1.00	0.57	1.30	2.00	1.19	1.66	0.00	0.00	0.95					
36.00	35.99	172.2	4.24	0.36	173.3	2.45	7	137	2.30	2.24	76.5	99.2	2.48	5	2.15	1.54	5	0.00	1	17.32	11.5	0.47	273.7	727.6	342.9	1,124.9	258.476	2.699	1,866	3.732	4.45	2.0	39.6	0.09	0.70	0.23	0.56	80.0	54.6	36.2	17.0	0.69	43.0	29.5	20.9	38.3	0.86	1.11	0.85	1.00	0.56	0.74	1.30	1.19	1.58	1.949	0.41	0.00	0.95				
36.10	36.04	186.1	2.98	0.39	186.2	1.60	8	135	2.30	2.24	82.2	110.4	1.62	6	1.99	1.28	6	0.00	1	12.74	12.4	0.47	273.7	596.5	327.0	1,056.3	223.797	2.337	1,645	3.290	4.82	2.2	40.1	0.10	0.62	0.21	0.58	78.5	44.8	34.9	19.1	0.69	33.1	27.8	21.1	32.2	0.86	1.10	0.86	1.00	0.57	0.55	0.97	1.19	1.62	3.740	0.83	0.01	0.94				
36.10	36.10	185.4	3.59	0.46	185.5	1.94	8	136	2.31	2.24	81.8	108.4	1.96	5	2.05	1.37	5	0.00	1	14.44	12.4	0.47	273.7	644.8	334.1	1,096.2	243.538	2.543	1,772	3.544	4.79	2.1	40.0	0.10	0.60	0.21	0.58	80.3	43.8	37.3	19.0	0.69	33.8	29.1	22.1	35.0	0.86	1.11	0.85	1.00	0.57	0.78	1.38	1.20	1.62	1.676	0.35	0.00	0.94				
36.20	36.17	193.0	2.28	0.46	193.1	1.18	9	133	2.31	2.24	85.1	117.1	1.19	6	1.89	1.17	6	0.00	1	10.10	12.9	0.46	273.7	522.8	307.0	1,007.3	200.593	2.095	1,496	2.992	5.03	2.2	40.4	0.10	0.68	0.23	0.59	74.7	36.5	36.4	20.3	0.69	26.5	26.5	21.5	29.3	0.86	1.07	0.87	1.00	0.57	0.32	0.55	1.20	1.64	8.427	2.02	0.02	0.92				
36.30	36.25	188.4	1.68	0.45	188.4	0.89	9	130	2.32	2.24	89.1	116.1	0.90	6	1.81	1.11	6	0.00	1	8.43	12.5	0.47	273.7	476.2	289.4	949.6	175.106	1.829	1,330	2.659	4.95	2.2	40.3	0.10	0.76	0.25	0.59	69.4	35.6	34.6	19.5	0.69	25.2	24.5	20.0	26.4	0.86	1.05	0.89	1.00	0.57	0.20	0.35	1.20	1.63	14.845	2.41	0.03	0.89				
36.40	36.33	159.9	1.24	0.43	159.8	0.78	9	128	2.32	2.25	70.1	97.8	0.79	6	1.83	1.13	6	0.00	1	8.84	10.5	0.48	273.7	487.7	269.4	884.0	148.623	1.552	1,152	2.305	4.22	1.9	39.5	0.08	0.84	0.28	0.54	63.8	30.2	29.5	14.8	0.69	21.6	21.1	15.4	22.8	0.86	1.03	0.90	1.00	0.57	0.15	0.27	1.20	1.56	21.852	2.87	0.03	0.86				
36.40	36.37	156.8	1.10	0.28	156.9	0.70	9	127	2.32	2.25	68.7	96.3	0.71	6	1.81	1.11	6	0.00	1	8.43	10.3	0.48	273.7	476.3	263.8	863.5	141.385	1.476	1,104	2,208	4.15	1.8	39.4	0.08	0.87	0.29	0.54	62.0	29.6	28.8	14.3	0.69	21.0	20.4	14.8	22.0	0.86	1.00	0.91	1.00	0.57	0.14	0.25	1.20									

Zs(ft)	Zs(ft)	q _v (tsf)	f _c (tsf)	u ₂ (tsf)	q _v (tsf)	R _z	S _{BT}	γ [pcf]	σ _{vo} (tsf)	σ _{v'} (tsf)	Q _v	Q _{un}	F _{sk}	S _{BT} z	I _p	K _c	(S _{BT}) _z	B _z	(S _{BT}) _h	F _c (psi)	q _{1-100(MPa)}	c	R	σ _v (ms)	V _{sm} (m)	V _d (ft/s)	G ₀ (kPa)	G ₀ (tsf)	E' (tsf)	M (tsf)	σ _p ' (tsf)	OCR	S _z	S _u (tsf)	S _u /σ _{v'}	φ (°)	c' (tsf)	C _u (1+σ _v %)	C _u (1+σ _v %)	K _u	D ₅₀ (%)	N _{max}	(N ₆₀) _s	(N ₁) _{max}	C _u	(N ₁) _{max}	(N ₁) _{max}	(N ₁) _{max}	(N ₁) _{max}	r _z	MSF	K _u	K _u	CSR _{7.5}	CSR ₁₅	FS	τ _u (tsf)	p(tsf)	τ _u (°)	G/G ₀	ε _v (°)	ΔS _v	ΔS _v (in)
43.00	42.98	459.4	3.38	0.59	459.4	0.74	10	138	2.75	2.41	185.1	282.6	0.74	6	149	1.00	6	0.00	1	2.69	31.1	0.40	273.5	315.7	369.1	1,211.1	301,232	3,146	2,175	4,326	10.69	4.3			44.6	0.21	0.20	0.07	0.83	100.0	72.4	75.5	62.7	0.65	47.4	49.5	62.7	49.5	0.82	1.12	0.75	1.00	0.66	1.30	1.96	1.37	2.20	0.000	0.03	0.00	0.19		
43.10	42.98	469.1	3.40	0.62	469.2	0.73	10	138	2.75	2.41	185.1	286.6	0.73	6	148	1.00	6	0.00	1	2.54	28.8	0.40	273.5	311.4	370.5	1,215.7	303,793	3,173	2,178	4,328	10.67	4.4			44.7	0.22	0.20	0.07	0.84	100.0	73.9	76.9	64.1	0.65	48.4	50.1	64.1	50.1	0.82	1.12	0.75	1.00	0.66	1.30	1.96	1.37	2.21	0.000	0.03	0.00	0.19		
43.10	43.10	463.7	3.35	0.66	463.8	0.72	10	138	2.75	2.41	185.5	285.1	0.72	6	148	1.00	6	0.00	1	2.57	31.4	0.40	273.5	312.2	369.9	1,210.2	300,660	3,140	2,160	4,319	10.70	4.4			44.6	0.22	0.20	0.07	0.84	100.0	73.0	76.1	63.3	0.65	47.9	49.6	63.3	49.6	0.82	1.12	0.75	1.00	0.66	1.30	1.95	1.37	2.20	0.000	0.03	0.00	0.19		
43.20	43.17	463.5	3.23	0.65	463.4	0.70	10	138	2.76	2.47	186.1	284.7	0.70	6	147	1.00	6	0.00	1	2.45	31.3	0.40	273.5	308.1	365.2	1,201.6	295,823	3,089	2,129	4,298	10.77	4.3			44.6	0.22	0.20	0.07	0.84	100.0	72.0	75.7	63.2	0.65	47.7	49.5	63.2	49.5	0.82	1.12	0.75	1.00	0.67	1.30	1.95	1.37	2.21	0.000	0.03	0.00	0.19		
43.30	43.25	459.8	3.97	0.86	459.9	0.65	10	137	2.77	2.48	184.5	282.3	0.65	6	145	1.00	6	0.00	1	2.14	31.1	0.40	273.5	299.9	360.0	1,181.1	284,472	2,971	2,079	4,134	10.71	4.3			44.7	0.21	0.20	0.07	0.83	100.0	72.4	74.7	62.7	0.65	47.3	48.8	62.7	48.8	0.82	1.12	0.74	1.00	0.67	1.30	1.95	1.36	2.20	0.000	0.03	0.00	0.19		
43.40	43.31	450.9	3.85	0.70	451.0	0.63	10	137	2.77	2.48	180.7	276.7	0.64	6	145	1.00	6	0.00	1	2.14	30.4	0.40	273.5	299.9	356.5	1,169.5	278,195	2,905	2,071	4,093	10.55	4.3			44.5	0.21	0.20	0.07	0.83	100.0	71.0	73.2	61.5	0.65	46.4	47.8	61.5	47.8	0.82	1.12	0.74	1.00	0.67	1.30	1.95	1.36	2.19	0.000	0.03	0.00	0.19		
43.40	43.40	447.0	3.11	0.68	447.1	0.70	10	137	2.78	2.49	178.9	274.1	0.70	6	148	1.00	6	0.00	1	2.58	30.1	0.41	273.5	312.4	362.7	1,188.5	288,626	3,014	2,083	4,105	10.48	4.2			44.4	0.21	0.20	0.07	0.82	100.0	70.4	73.3	61.0	0.65	46.0	47.9	61.0	47.9	0.82	1.12	0.74	1.00	0.67	1.30	1.95	1.38	2.19	0.000	0.03	0.00	0.19		
43.50	43.49	433.7	3.20	0.69	433.8	0.74	10	137	2.78	2.49	173.3	265.7	0.74	6	151	1.00	6	0.00	1	2.96	29.1	0.41	273.5	323.4	363.0	1,190.8	290,047	3,029	2,091	4,130	10.24	4.1			44.3	0.20	0.20	0.07	0.81	100.0	68.3	71.8	59.1	0.65	44.6	46.8	59.1	46.8	0.82	1.12	0.74	1.00	0.67	1.30	1.95	1.38	2.17	0.000	0.03	0.00	0.19		
43.60	43.58	425.5	3.47	0.70	425.6	0.82	10	138	2.79	2.49	169.8	260.5	0.82	6	153	1.00	6	0.00	1	3.52	28.5	0.41	273.5	339.5	368.3	1,208.4	299,934	3,132	2,193	4,306	10.29	4.1			44.2	0.20	0.20	0.07	0.80	99.3	67.0	71.3	58.0	0.65	43.7	46.6	58.0	46.5	0.82	1.12	0.74	1.00	0.67	1.30	1.95	1.38	2.16	0.000	0.03	0.00	0.19		
43.70	43.68	414.6	3.44	0.69	414.7	0.83	10	138	2.80	2.49	165.2	253.6	0.83	6	156	1.00	6	0.00	1	3.72	27.7	0.41	273.5	344.9	366.4	1,202.3	296,558	3,097	2,171	4,283	9.89	4.0			44.0	0.20	0.21	0.07	0.79	98.5	65.3	69.8	56.5	0.65	42.5	45.4	56.5	45.4	0.82	1.12	0.74	1.00	0.67	1.30	1.94	1.39	2.15	0.000	0.03	0.00	0.19		
43.80	43.76	408.5	3.62	0.69	408.6	0.89	9	138	2.80	2.50	162.5	249.6	0.89	6	159	1.00	6	0.00	1	4.13	27.3	0.41	273.5	356.5	369.7	1,213.1	302,697	3,161	2,130	4,340	9.78	3.9			44.0	0.20	0.21	0.07	0.79	98.0	77.2	69.3	55.6	0.65	50.3	45.1	55.6	45.1	0.82	1.12	0.74	1.00	0.67	1.30	1.94	1.39	2.15	0.000	0.02	0.00	0.18		
43.90	43.82	384.5	3.71	0.68	384.6	0.96	9	138	2.81	2.50	152.8	234.8	0.97	6	163	1.00	6	0.00	1	4.87	25.5	0.42	273.5	377.4	369.0	1,210.8	301,614	3,150	2,122	4,333	9.32	3.7			43.7	0.19	0.32	0.11	0.77	95.9	72.7	66.2	52.0	0.65	47.3	43.1	52.0	43.1	0.82	1.12	0.74	1.00	0.67	1.30	1.94	1.39	2.11	0.004	0.02	0.00	0.18		
44.00	43.92	310.1	3.57	0.66	310.2	1.15	9	137	2.81	2.50	122.8	183.5	1.16	6	175	1.07	6	0.00	1	7.11	20.3	0.43	273.6	459.7	357.4	1,172.6	381,231	2,937	2,028	4,055	7.75	3.1			42.5	0.15	0.36	0.12	0.70	87.8	58.6	55.7	39.5	0.65	38.6	36.7	39.6	38.6	0.82	1.12	0.77	1.00	0.65	1.30	2.00	1.39	2.00	0.000	0.00	0.00	0.18		
44.10	44.02	275.4	3.66	0.63	275.5	1.33	9	137	2.82	2.51	108.8	159.3	1.34	6	183	1.13	6	0.00	1	8.83	17.8	0.44	273.6	487.5	354.4	1,162.8	376,285	2,885	1,994	3,987	6.96	2.8			41.8	0.14	0.54	0.18	0.66	84.1	52.0	50.9	32.9	0.65	34.9	34.1	33.6	37.2	0.82	1.12	0.80	1.00	0.62	1.30	2.00	1.40	1.94	0.000	0.00	0.00	0.18		
44.20	44.12	251.9	3.59	0.63	252.0	1.43	8	137	2.83	2.51	99.2	143.6	1.44	6	188	1.17	6	0.00	1	9.96	16.2	0.45	273.6	518.9	349.5	1,146.8	368,040	2,799	1,939	3,878	6.41	2.6			41.3	0.13	0.56	0.19	0.63	82.9	59.5	47.4	28.7	0.65	40.3	32.3	29.8	35.9	0.82	1.12	0.81	1.00	0.61	1.30	2.00	1.40	1.89	0.000	0.00	0.00	0.18		
44.30	44.22	250.2	3.43	0.62	250.3	1.37	9	137	2.83	2.51	98.4	142.9	1.39	6	187	1.16	6	0.00	1	9.73	16.1	0.45	273.6	512.3	346.2	1,135.8	362,235	2,738	1,902	3,804	6.38	2.5			41.3	0.13	0.57	0.19	0.63	82.1	47.3	46.9	28.4	0.65	32.1	31.8	29.4	35.2	0.82	1.12	0.82	1.00	0.61	1.23	2.00	1.40	1.89	0.000	0.00	0.00	0.18		
44.30	44.30	245.7	3.66	0.64	245.8	1.49	8	137	2.84	2.52	96.5	139.0	1.51	6	180	1.19	6	0.00	1	10.48	15.7	0.45	273.6	533.2	349.9	1,148.0	368,759	2,807	1,943	3,887	6.26	2.5			41.2	0.13	0.55	0.18	0.62	83.1	48.0	46.6	27.5	0.65	39.6	32.0	28.9	35.8	0.82	1.12	0.81	1.00	0.62	1.30	2.00	1.40	1.88	0.000	0.00	0.00	0.18		
44.50	44.40	235.1	3.87	0.65	235.2	1.65	8	137	2.85	2.52	92.2	131.3	1.67	6	195	1.23	6	0.00	1	11.61	15.0	0.45	273.7	564.9	352.2	1,155.5	372,894	2,850	1,969	3,937	5.99	2.4			40.9	0.12	0.55	0.18	0.61	83.5	55.5	45.4	25.6	0.65	38.5	31.7	27.5	36.2	0.82	1.12	0.81	1.00	0.62	1.30	2.00	1.41	1.86	0.000	0.00	0.00	0.18		
44.60	44.54	230.8	3.60	0.64	230.9	1.56	8	137	2.86	2.53	90.3	129.1	1.58	6	194	1.22	6	0.00	1	11.32	14.7	0.46	273.7	556.8	346.4	1,136.6	362,928	2,746	1,965	3,810	5.90	2.3			40.8	0.12	0.57	0.18	0.60	82.2	54.5	44.4	24.9	0.65	37.6	30.8	26.8	35.0	0.82	1.12	0.81	1.00	0.61	1.28	2.00	1.41	1.86	0.000	0.00	0.00	0.18		
44.70	44.65	221.6	4.22	0.64	221.7	1.90	8	138	2.86	2.53	86.5	121.3	1.93	6	201	1.31	6	0.00	1	13.32	14.0	0.46	273.7	613.1	356.1	1,168.3	380,016	2,924	2,013	4,006	5.64	2.2			40.5	0.11	0.55	0.18	0.59	83.5	52.4	43.8	23.3	0.65	37.2	31.4	25.9	37.1	0.82	1.12	0.80	1.00	0.62	1.30	2.00	1.41	1.84	0.000	0.00	0.00	0.18		
44.80	44.75	221.8	5.62	0.68	221.9	2.53	7	140	2.87	2.53	86.4	118.3	2.56	5	211	1.46	5	0.00	1	16.05	14.0	0.46	273.7	690.																																							

[illegible]



- Sensitive fine grained
- Organic soils - peats
- Clay to silty clay
- Silty clay to clayey silt
- Sandy silt to silty sand
- Silty sand to clean sand
- Dense sand to gravelly sand
- Clayey sand to very stiff sand
- Very stiff fine grained *

* Overconsolidated or cemented

Silt Correction:

$$K = (1 - FC)^{0.75}$$

Earthquake & Groundwater Information:

Magnitude = 7.21
 Max. Acceleration = 0.929 g
 Project GW = 34 ft
 Maximum Settlement = 2.57 in
 Settl. at Bottom of Footing = 2.57 in

Liquefaction: Boulanger & Idriss (2010-16)

Settl.: [dry] Pradel (1998); [sat] Idriss & Boulanger (2008)
 Lateral spreading: Idriss & Boulanger (2008)
 M correction: [Sand; Clay] Boulanger & Idriss (2004)
 σ_v correction: Idriss & Boulanger (2008)
 Stress reduction: Idriss & Boulanger (2008)



Seismic Settlement Potential - CPT Data

Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-3	Figure:	7

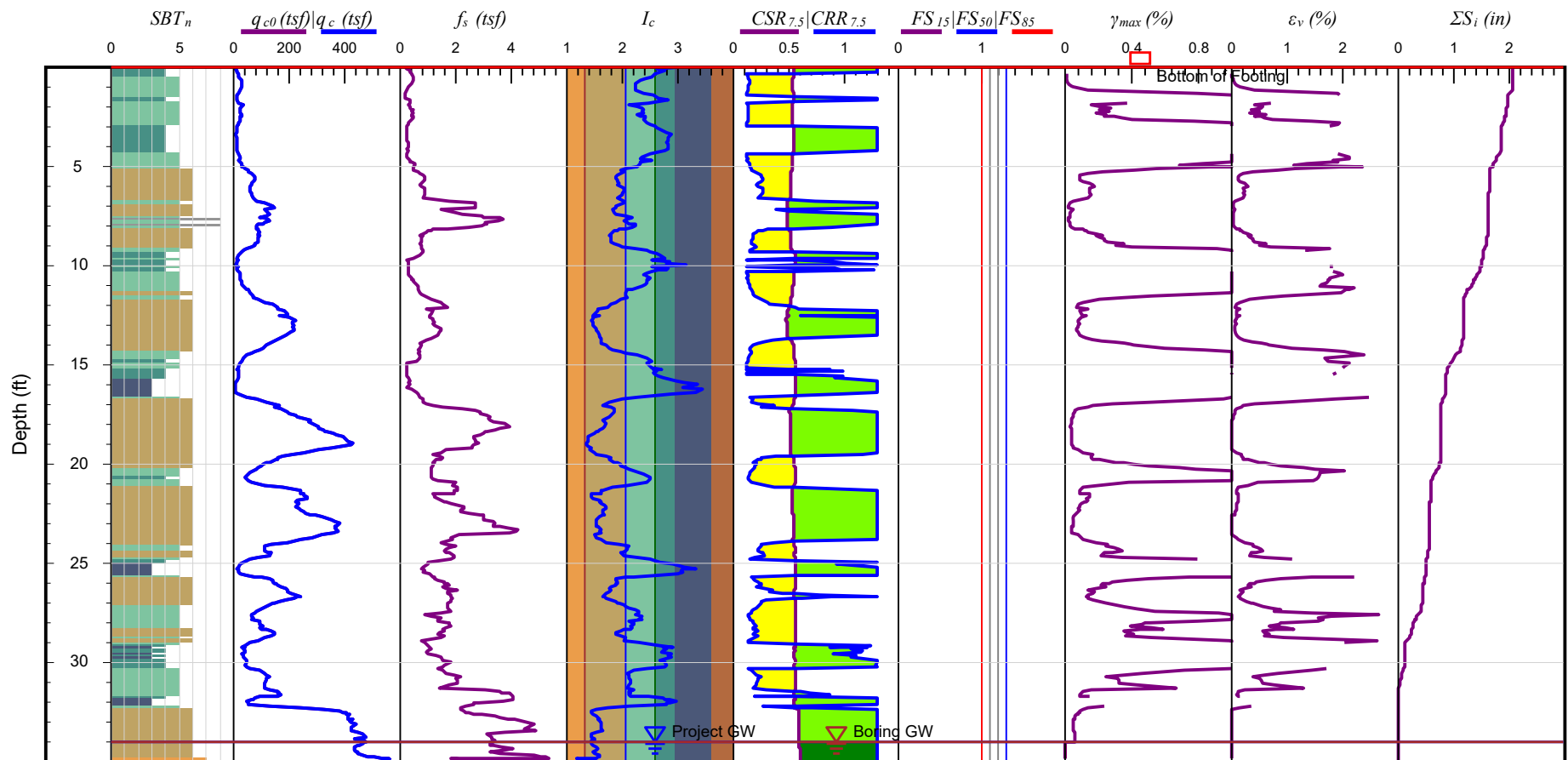
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$Z_s(f)$	$Z_u(f)$	$q_c(fsf)$	$f_s(fsf)$	$w_z(fsf)$	$q_u(fsf)$	R_f	SBT	$\gamma(pcf)$	$\sigma_{vm}(tsf)$	$\sigma'_{vm}(tsf)$	Q_v	Q_m	F_R	SBT_{x2}	I_c	K_c	$(SBT)_c$	B_c	$(SBT)_{Bc}$	$F_c(\rho Pa)$	$q_{1.5m}(Mpa)$	c	R	$\sigma_v(m/s)$	$V_r(m/s)$	$V_r(R/s)$	$G_s(RPa)$	$G_s(RPa)$	$E'(tsf)$	$M(tsf)$	$\sigma'_p(tsf)$	OCR	S_v	$S_v(ts)$	$S_v(\sigma'_{vm})$	$\phi(^{\circ})$	$\zeta'(tsf)$	$C_v(1+e_{vm}/\rho)$	$C_v(1+e_{vm}/\rho)$	K_B	$D_B(\rho/s)$	$N_{0.6dB}$	$(N_{0.6})_{Bc}$	$(N_f)_{0.6dB}$	C_{v2}	$(N_f)_{0.6dB,AR}$	$(N_f)_{0.6dB,c}$	$(N_f)_{0.6dB,AR}$	$(N_f)_{0.6dB,cms}$	r_d	MSF	K_{σ}	K_{σ}	$CSR_{z,1}$	$CR_{R,z,1}$	FS	$\tau_{vm}(tsf)$	$p'(tsf)$	$\gamma_{vm}(tsf)$	G/G_s	$\varepsilon_v(\%)$	ΔS_v	$\Delta S_v(m)$		
16.40	16.34	104.8	0.83	0.28	104.8	0.83	9	124	0.96	0.96	107.7	103.4	0.80	6	1.84	1.13	6	0.00	1	8.96	10.4	0.48	273.7	390.9	219.5	720.1	95,780	1,000	765	1,529	2.92	3.0	39.8	0.06	0.84	0.28	0.73	63.9	24.7	19.4	14.7	1.05	26.9	21.2	15.4	23.0	0.95	1.03	1.01	1.00	0.55	0.15	0.35	0.79	0.00	0.00	1.92								
16.60	16.49	276.3	2.01	0.32	276.3	2.04	9	133	0.97	0.97	282.7	271.2	0.73	6	1.50	1.00	6	0.00	1	2.81	27.3	0.41	273.5	319.0	288.1	949.3	176,809	1,846	1,318	2,635	6.30	6.5	44.0	0.13	0.23	0.08	1.11	93.2	52.7	45.6	48.2	1.04	54.4	47.5	48.2	1.12	1.02	1.00	0.50	1.30	0.36	1.04	0.956	0.54	0.00	0.00	1.92								
16.70	16.61	393.4	3.29	0.35	393.4	3.38	9	138	0.98	0.98	399.6	385.0	0.87	6	1.46	1.00	6	0.00	1	2.23	38.7	0.39	273.5	302.5	334.9	1,098.9	247,346	2,583	1,780	3,561	8.94	8.2	46.0	0.16	0.20	0.07	1.28	100.0	74.4	64.0	68.5	1.04	77.2	68.4	68.5	66.4	0.95	1.12	1.02	1.00	0.50	1.30	0.36	1.16	0.930	0.72	0.00	0.00	1.92						
16.70	16.68	420.1	3.76	0.37	420.1	3.89	9	139	0.99	0.99	424.7	410.2	0.90	6	1.45	1.00	6	0.00	1	2.16	41.2	0.38	273.5	300.9	345.1	1,132.7	264,580	2,763	1,892	3,784	8.44	8.6	46.3	0.17	0.20	0.07	1.31	100.0	79.4	68.3	73.1	1.04	82.2	70.7	70.1	70.7	0.95	1.12	1.02	1.00	0.50	1.30	0.36	1.19	0.927	0.74	0.00	0.00	1.92						
16.80	16.73	433.7	4.48	0.37	433.8	1.12	9	141	0.99	0.99	437.0	423.8	1.12	6	1.52	1.00	6	0.00	1	3.17	42.2	0.38	273.4	329.3	367.0	1,204.1	303,272	3,487	2,138	4,278	8.63	8.7	46.5	0.17	0.20	0.07	1.32	100.0	82.0	73.1	75.4	1.03	84.7	74.5	74.4	74.5	0.95	1.12	1.02	1.00	0.50	1.30	0.37	1.20	0.923	0.79	0.00	0.00	1.92						
16.80	16.80	445.1	6.77	0.35	445.2	1.53	9	143	1.00	1.00	446.3	432.9	1.51	6	1.63	1.00	6	0.00	1	4.85	43.5	0.38	273.4	376.6	397.6	1,304.6	362,425	3,785	2,510	5,091	8.79	8.8	46.6	0.18	0.30	0.10	1.33	100.0	84.1	76.6	77.3	1.03	86.8	79.0	77.3	79.0	0.95	1.12	1.02	1.00	0.50	1.30	0.37	1.23	0.918	0.83	0.00	0.00	1.92						
16.90	16.87	400.7	6.98	0.30	400.8	1.75	8	143	1.00	1.00	399.7	389.0	1.75	6	1.71	1.04	6	0.00	1	6.23	39.1	0.39	273.5	415.3	396.1	1,299.6	359,767	3,757	2,490	4,981	8.30	8.2	46.1	0.16	0.30	0.10	1.27	100.0	94.7	70.8	69.5	1.03	98.0	73.3	69.5	75.5	0.95	1.12	1.02	1.00	0.50	1.30	0.57	1.18	0.918	0.82	0.00	0.00	1.92						
17.00	16.93	337.4	5.15	0.32	337.5	1.53	8	140	1.00	1.00	334.9	326.7	1.53	6	1.70	1.03	6	0.00	1	6.09	32.9	0.40	273.5	411.3	361.7	1,186.5	294,160	3,072	2,076	4,152	7.30	7.3	45.3	0.15	0.30	0.10	1.18	99.6	79.7	59.5	58.4	1.03	82.3	61.4	58.5	63.0	0.95	1.12	1.02	1.00	0.50	1.30	0.57	1.13	0.924	0.76	0.00	0.00	1.92						
17.00	17.00	330.1	5.81	0.36	330.2	1.76	8	141	1.01	1.01	326.1	319.0	1.76	6	1.76	1.07	6	0.00	1	7.20	32.1	0.40	273.5	442.3	370.9	1,217.0	311,316	3,251	2,184	4,368	7.19	7.1	45.3	0.14	0.30	0.10	1.17	98.8	78.0	59.4	57.1	1.02	80.7	61.5	57.3	65.1	0.95	1.12	1.01	1.00	0.50	1.30	0.58	1.12	0.923	0.78	0.00	0.00	1.92						
17.10	17.06	339.1	7.58	0.39	339.1	2.24	8	143	1.01	1.01	333.5	327.3	2.24	8	1.84	1.13	6	0.00	1	8.95	32.9	0.40	273.5	490.7	396.0	1,299.2	360,011	3,759	2,489	4,978	7.34	7.2	45.3	0.15	0.30	0.10	1.18	100.0	80.1	62.8	58.6	1.02	83.8	65.8	59.3	72.4	0.95	1.12	1.01	1.00	0.50	1.30	0.58	1.14	0.919	0.82	0.00	0.00	1.92						
17.20	17.13	360.1	7.04	0.43	360.2	1.96	8	143	1.02	1.02	352.5	346.5	1.96	6	1.84	1.08	6	0.00	1	7.60	34.9	0.39	273.5	453.3	392.3	1,286.9	352,255	3,679	2,442	4,884	7.65	7.5	45.5	0.15	0.30	0.10	1.21	100.0	85.1	65.2	62.1	1.02	87.9	67.4	62.4	72.0	0.95	1.12	1.01	1.00	0.50	1.30	0.58	1.16	0.919	0.81	0.00	0.00	1.92						
17.20	17.18	357.1	6.31	0.43	357.2	1.80	8	142	1.02	1.02	348.4	342.8	1.81	6	1.75	1.06	6	0.00	1	7.03	34.6	0.40	273.5	437.6	383.8	1,259.1	335,538	3,504	2,338	4,675	7.62	7.4	45.5	0.15	0.30	0.10	1.20	100.0	84.4	64.0	61.6	1.02	86.7	65.8	61.7	69.4	0.95	1.12	1.01	1.00	0.50	1.30	0.58	1.16	0.921	0.80	0.00	0.00	1.92						
17.30	17.24	357.4	6.43	0.43	357.5	1.76	8	142	1.03	1.03	347.2	342.3	1.77	6	1.74	1.06	6	0.00	1	6.89	34.5	0.40	273.5	433.6	382.2	1,253.8	332,384	3,471	2,318	4,636	7.63	7.4	45.5	0.15	0.30	0.10	1.20	100.0	84.4	63.9	61.5	1.02	86.5	65.5	61.7	68.8	0.95	1.12	1.01	1.00	0.51	1.30	0.59	1.16	0.921	0.80	0.00	0.00	1.92						
17.30	17.28	289.5	6.29	0.38	289.5	2.29	7	142	1.03	1.03	280.2	276.9	2.18	6	1.87	1.15	6	0.00	1	9.60	27.9	0.41	273.5	508.8	372.5	1,222.0	331,402	3,294	2,202	4,404	6.58	6.4	44.5	0.13	0.34	0.11	1.10	97.0	91.2	54.2	49.8	1.01	95.0	56.7	50.8	63.3	0.95	1.12	1.01	1.00	0.51	1.30	0.59	1.10	0.00	0.00	0.00	0.00	1.92						
17.30	17.30	65.1	6.25	0.33	65.1	9.74	12	138	1.03	1.03	62.2	61.9	9.75	9	2.77	0.00	4	-0.01	1	44.45	6.2	0.52	273.8	1,603.6	311.7	1,022.7	214,551	2,240							898	213.7	20.6	0.7	4.58	4.42	37.3	4.58	0.27	6.22	30.8	18.2	6.0	1.01	42.4	27.2	11.6	18.4	0.95	1.01	1.00	1.00	0.56	1.30	0.59	4.62	0.00	0.00	0.00	0.00	1.92
17.40	17.34	96.4	6.08	0.32	96.5	6.39	12	139	1.03	1.03	92.3	91.8	6.37	9	2.52	0.28	5	0.00	1	31.70	9.2	0.49	273.7	1,167.9	324.5	1,064.8	233,861	2,442	1,672	1,336	2.71	2.6	39.2	0.05	0.18	0.06	0.67	77.7	45.6	23.7	12.2	1.01	58.7	32.9	17.6	68.9	0.95	1.09	1.00	1.00	0.52	0.48	0.59	0.81	0.00	0.00	0.00	0.00	1.92						
17.40	17.39	93.9	4.18	0.14	93.9	4.48	12	136	1.04	1.04	89.6	89.1	4.50	9	2.41	2.34	5	0.00	1	26.85	9.0	0.49	273.8	1,013.5	298.3	798	193.57	2,019	1,412	1,300	2.65	2.6	39.0	0.05	0.18	0.06	0.67	76.4	44.4	21.9	11.7	1.01	55.1	29.5	16.9	51.9	0.94	1.08	1.00	1.00	0.53	0.39	0.59	0.81	0.061	0.48	0.05	0.00	0.00	1.92					
17.50	17.46	116.5	4.35	0.14	116.5	3.73	6	136	1.04	1.04	110.8	110.3	3.76	8	2.29	1.91	5	0.00	1	22.23	11.1	0.48	273.7	872.4	308.6	1,012.3	208,115	2,173	1,511	1,617	3.21	3.1	40.1	0.06	0.15	0.05	0.74	80.7	44.0	25.8	16.2	1.01	52.5	32.4	21.0	49.8	0.94	1.12	1.00	1.00	0.51	0.86	0.59	0.86	0.050	0.54	0.04	0.00	0.00	1.92					
17.60	17.53	144.7	5.46	0.15	144.7	3.73	11	139	1.05	1.05	137.3	136.8	3.86	8	2.24	1.76	5	0.00	1	20.33	13.8	0.46	273.7	815.5	332.8	1,091.7	245,874	2,568	1,757	2,011	3.87	3.7	41.1	0.08	0.12	0.04	0.81	85.8	136.7	31.3	21.9	1.01	152.4	37.8	26.4	55.4	0.94	1.12	1.00	1.00	0.51	1.30	0.60	0.91	0.036	0.64	0.03	0.00	0.00	1.92					
17.60	17.60	213.4	6.94	0.17	213.4	3.28	11	142	1.05	1.05	202.0	201.5	3.27	8	2.09	1.43	5	0.00	1	15.46	20.4	0.43	273.6	674.0	367.8	1,206.6	306,738	3,203	2,147	4,294	5.27	5.0	42.9	0.11	0.42	0.14	0.96	94.6	201.7	43.5	35.5	1.00	215.2	48.4	38.9	62.1	0.94	1.12	1.00	1.00	0.51	1.30	0.60	1.02	0.025	0.75	0.00	0.00	0.00	1.92					
17.70	17.69	270.5	6.41	0.15	270.5	2.37	7	141	1.06	1.06	254.7	254.7	2.38	6	1.92	1.20	6	0.00	1	10.81	25.8	0.42	273.5	542.6	371.7	1,219.6	313,202	3,271	2,193	4,387	6.29	5.9	44.1	0.13	0.35	0.12	1.05	96.9	80.2	51.6</																									

$Z_s(f)$	$Z_u(f)$	$q_c(fsf)$	$f_s(fsf)$	$w_z(fsf)$	$q_u(fsf)$	R_f	SBT	$\gamma(pcf)$	$\sigma_{vm}(fsf)$	$\sigma'_{vm}(fsf)$	Q_v	Q_{vm}	F_R	SBT_{xv}	I_c	K_v	$(SBT)_L$	B_v	$(SBT)_{Bv}$	$F_c(RPa)$	$q_{(1.5m)}(Mpa)$	c	R	$\sigma_v(m/s)$	$V_s(m/s)$	$V_s(fsf)$	$G_s(RPa)$	$G_s(fsf)$	$E'(fsf)$	$M(fsf)$	$\sigma'_p(fs)$	OCR	S_v	$S_v(fs)$	S_v/σ'_{vm}	$\phi(^{\circ})$	$\zeta'(fsf)$	$C_v(1+e_{vm}/p)$	$C_v(1+e_{vm}/p)$	K_B	$D_B(p)$	N_{60BLR}	$(N_{60})_B$	$(N_f)_{60BLR}$	C_{γ}	$(N_f)_{60BLR}$	$(N_f)_{60BLR}$	$(N_f)_{60BLR}$	$(N_f)_{60BLR}$	r_d	MSF	K_{σ}	K_{σ}	CSR_{z1}	CSR_{Rz1}	FS	$\tau_{vm}(fsf)$	$p(fs)$	$\gamma_{vm}(fsf)$	G/G_s	$\varepsilon_v(\%)$	ΔS_v	$\Delta S_v(m)$				
28.90	28.82	334.8	2.62	0.31	334.8	0.78	9	135	1.77	1.77	188.1	243.3	0.79	6	1.55	1.00	6	0.00	1	3.64	25.7	0.42	273.5	342.7	328.4	1,077.6	233.788	2,441	1,712	3,424	7.98	4.5			43.8	0.16	0.22	0.07	0.87	94.3	63.3	56.2	49.7	0.77	48.9	43.5	49.7	43.5	0.89	1.12	0.85	1.00	0.57	1.30	0.96	1.62	0.075	0.52	0.00	0.00	1.09						
29.10	28.99	347.0	1.94	0.32	347.0	0.56	10	133	1.78	1.78	193.8	251.5	0.56	6	1.44	1.00	6	0.00	1	2.05	26.8	0.41	273.5	297.2	311.4	1,021.7	206.821	2,160	1,539	3,079	8.22	4.6			44.0	0.16	0.22	0.07	0.88	95.5	54.7	56.2	51.6	0.77	42.1	43.3	51.6	43.3	0.89	1.12	0.84	1.00	0.57	1.30	0.96	1.64	0.099	0.45	0.00	0.00	1.09						
29.20	29.14	339.3	1.81	0.33	339.4	0.52	10	133	1.79	1.79	188.4	245.2	0.54	6	1.44	1.00	6	0.00	1	1.99	26.0	0.42	273.5	295.5	307.0	1,007.3	200.150	2,090	1,496	2,992	8.08	4.5			43.9	0.16	0.22	0.07	0.87	94.7	53.4	54.9	50.3	0.77	41.1	42.2	50.3	42.2	0.89	1.12	0.84	1.00	0.57	1.30	0.97	1.64	0.109	0.42	0.00	0.00	1.09						
29.40	29.30	302.3	1.87	0.33	302.4	0.52	10	133	1.80	1.80	165.8	217.7	0.62	6	1.52	1.00	6	0.00	1	3.13	23.0	0.42	273.5	327.5	305.0	1,000.7	197.514	2,063	1,476	2,953	7.38	4.1			43.3	0.15	0.24	0.08	0.87	90.6	47.6	50.2	43.9	0.77	36.5	38.5	43.9	36.5	0.89	1.12	0.84	1.00	0.57	1.30	0.97	1.59	0.117	0.40	0.00	0.00	1.09						
29.50	29.45	257.1	1.98	0.33	257.1	0.77	9	133	1.81	1.81	140.3	184.4	0.78	6	1.64	1.00	6	0.00	1	4.96	19.3	0.44	273.6	379.7	302.7	999.1	194.503	2,031	1,454	2,988	6.49	3.6			42.5	0.13	0.37	0.12	0.77	84.2	48.6	44.4	35.3	0.76	37.1	33.9	35.3	33.9	0.89	1.12	0.88	1.00	0.55	1.30	0.98	1.53	0.127	0.38	0.12	0.00	1.09						
29.60	29.56	254.0	1.94	0.34	254.0	0.76	9	132	1.82	1.82	138.6	181.8	0.77	6	1.64	1.00	6	0.00	1	4.99	19.1	0.44	273.6	380.6	301.2	988.2	192.297	2,008	1,440	2,980	6.43	3.5			42.5	0.13	0.38	0.13	0.76	83.6	48.0	43.9	34.6	0.76	36.6	33.4	34.6	33.4	0.89	1.12	0.88	1.00	0.55	1.30	0.98	1.53	0.132	0.37	0.10	0.00	1.08						
29.70	29.68	228.0	1.95	0.34	228.1	0.85	9	132	1.83	1.83	123.8	161.0	0.86	6	1.71	1.04	6	0.00	1	6.22	17.0	0.45	273.6	414.9	297.8	977.2	187.700	1,960	1,408	2,816	5.87	3.2			41.9	0.12	0.40	0.13	0.72	79.4	43.1	40.3	29.7	0.76	33.0	30.9	29.8	31.8	0.89	1.10	0.89	1.00	0.54	0.64	0.98	1.49	0.146	0.34	0.16	0.00	1.08						
29.80	29.79	201.0	1.91	0.34	201.1	0.95	9	132	1.83	1.83	108.6	139.8	0.96	6	1.78	1.09	6	0.00	1	7.66	14.9	0.45	273.7	455.0	292.7	960.5	180.636	1,886	1,380	2,719	5.25	2.9			41.2	0.10	0.45	0.15	0.68	74.4	38.0	36.4	24.7	0.76	29.4	28.2	25.0	30.0	0.89	1.07	0.91	1.00	0.55	0.31	0.99	1.45	0.171	0.31	0.21	0.00	1.08						
30.00	29.91	167.6	1.65	0.34	167.6	0.98	9	130	1.84	1.84	90.0	114.7	0.99	6	1.85	1.14	6	0.00	1	9.18	12.2	0.47	273.7	497.0	279.0	915.2	162.232	1,694	1,236	2,472	4.44	2.4			40.3	0.09	0.75	0.25	0.62	70.1	31.7	31.2	18.7	0.76	25.0	24.6	19.5	26.8	0.89	1.05	0.92	1.00	0.56	0.21	0.99	1.38	0.260	0.22	0.38	0.01	1.07						
30.10	30.05	119.4	1.60	0.32	119.4	1.37	8	129	1.85	1.85	63.5	78.4	1.36	6	2.05	1.36	5	0.00	1	14.35	8.5	0.49	273.8	642.3	267.2	876.5	147.700	1,542	1,133	2,266	3.16	1.7			38.4	0.06	0.86	0.29	0.53	69.4	28.2	24.0	10.5	0.76	24.6	21.2	13.5	24.7	0.89	1.05	0.92	1.00	0.56	0.00	0.99	1.27	0.435	0.15	0.76	0.01	1.06						
30.30	30.22	68.4	1.46	0.32	68.5	1.15	7	127	1.86	1.86	35.8	41.9	2.19	5	2.37	1.27	5	0.00	1	25.13	4.7	0.54	273.9	960.3	245.9	806.6	122.951	1,284	959	332	1.86	0.9			35.4	0.03	0.39	0.04	0.39	61.3	21.6	15.7	3.1	0.75	22.4	17.5	8.2	25.7	0.89	1.03	0.93	1.00	0.56	0.14	1.00	1.10			0.00	0.00	1.06						
30.50	30.39	43.3	1.56	0.32	43.4	3.64	5	126	1.87	1.87	22.1	24.2	3.75	4	2.78	0.00	4	-0.01	1	44.91	2.9	0.57	274.0	1,620.2	252.0	826.9	128.554	1,342							58.1	13.83	8.1	1.9	2.96	1.73	32.8	2.96	0.68	0.23	0.21	20.5	12.2	0.4	0.75	23.5	16.0	6.0	6.6	0.89	1.01	0.96	1.00	0.55	1.27	1.00	3.39			0.00	0.00	1.06	
30.70	30.56	43.0	1.73	0.32	43.0	4.02	5	127	1.88	1.88	21.8	23.8	4.20	3	2.82	0.00	4	-0.01	1	46.99	2.8	0.57	274.0	1,695.9	256.8	842.4	134.138	1,401							57.6	13.71	7.9	1.7	2.94	1.70	32.7	2.94	0.69	0.23	21.8	20.3	12.3	0.4	0.75	23.3	16.1	6.0	6.6	0.89	1.01	0.96	1.00	0.55	1.25	1.01	3.39			0.00	0.00	1.06	
30.80	30.75	32.6	1.56	0.32	32.7	4.84	4	126	1.90	1.90	16.0	16.2	17.2	5.05	3	2.97	0.00	3	-0.01	1	56.30	2.1	0.59	274.0	2,050.8	244.3	801.6	120.167	1,255							43.1	10.27	5.7	1.4	2.20	1.23	31.2	2.20	0.95	0.32	1.62	20.6	10.2	0.3	0.75	23.4	14.2	5.9	5.4	0.89	1.01	0.97	1.00	0.55	1.30	1.01	2.69			0.00	0.00	1.06
30.90	30.90	28.5	1.53	0.33	28.6	5.36	3	125	1.91	1.91	14.0	14.6	5.73	3	3.05	0.00	3	-0.01	1	62.04	1.8	0.60	274.1	2,282.7	239.9	787.0	115.272	1,204							37.3	8.89	4.9	1.2	1.91	1.05	31.0	1.91	1.12	0.37	1.40	27.0	8.4	5.9	4.9	0.88	1.01	0.97	1.00	0.55	1.30	1.02	2.41			0.00	0.00	1.06					
31.10	31.02	35.0	1.58	0.33	35.0	4.52	4	126	1.91	1.91	17.3	18.5	4.77	4	2.93	0.00	4	-0.01	1	53.90	2.2	0.59	274.0	1,957.0	247.4	811.8	123.403	1,289							46.3	11.03	6.2	1.5	2.36	1.32	31.5	2.36	0.89	0.30	1.73	22.0	10.7	0.3	0.74	24.7	14.6	5.9	5.6	0.88	1.01	0.97	1.00	0.55	0.99	1.02	2.84			0.00	0.00	1.06	
31.20	31.16	47.8	1.60	0.33	47.8	3.35	5	127	1.92	1.92	19.2	23.9	26.5	4.48	4	2.74	0.00	4	-0.01	1	42.35	3.1	0.56	274.0	1,528.8	257.5	844.7	134.542	1,405							64.2	15.29	8.8	2.0	3.28	1.89	33.2	3.28	0.62	0.21	2.39	22.6	13.1	0.5	0.74	25.1	16.7	6.1	6.9	0.88	1.01	0.96	1.00	0.55	1.30	1.03	3.70			0.00	0.00	1.06
31.40	31.30	38.6	1.20	0.33	38.6	3.11	5	124	1.93	1.93	19.0	20.8	3.27	4	2.79	0.00	4	-0.01	1	45.68	2.5	0.58	274.0	1,648.2	239.0	784.3	113.501	1,185							514	12.23	6.9	2.2	2.62	1.49	32.1	2.62	0.79	0.26	1.90	18.2	10.9	0.4	0.74	21.2	14.7	6.0	5.7	0.88	1.01	0.96	1.00	0.55	1.09	1.03	3.09			0.00	0.00	1.06	
31.50	31.42	40.5	1.67	0.33	40.5	4.13	5	127	1.94	1.94	19.9	21.6	3.33	3	2.86	0.00	4	-0.01	1	49.32	2.6	0.58	274.0	1,782.5	254.9	836.4	131.804	1,376							540	12.86	7.2	1.6	2.76	1.54	32.3	2.76	0.76	0.25	1.99	19.1	11.9	0.4	0.74	22.0	15.5	6.0	6.2	0.88	1.01	0.96	1.00	0.55	1.14	1.03	3.22			0.00	0.00	1.06	
31.60	31.54	50.7	1.87	0.33	50.8	3.73	5	128	1.95	1.95	25.1	27.8	3.83	4	2.75	0.00	4	-0.01	1	42.92	3.3	0.56	273.9	1,548.8	267.4	877.3	146.731	1,532							684	16.28	9.3	1.9	3.49	1.99	33.5	3.49	0.59	0.20	2.51	24.0	14.0	0.5	0.74	26.2	17.4	6.1	7.3	0.88	1.01	0.96	1.00	0.55	1.30	1.04	3.90			0.00	0.00	1.06	
31.70	31.64	64.4	1.92	0.31	64.5	2.99	6	129	1.95	1.95	32.0	36.5	3.07	4	2.60	0.00	4	0.00	1	35.50	4.3	0.54	273.9	1,293.0	276.4	803.9	157.730	1,647							875																																

$Z_s(f)$	$Z_{ss}(f)$	q_c (tsf)	f_s (tsf)	w_z (tsf)	q_s (tsf)	R_f	SBT	γ (pcf)	σ_{vm} (tsf)	σ_{vm}' (tsf)	Q_v	Q_{vm}	F_R	SBT_x	I_c	K_c	(SBT) $_x$	B_x	(SBT) $_{ss}$	F_c (%)	$q_{1.1,vm}(Mpa)$	c	R	$\sigma_{vm}(m/s)$	$V_s(m/s)$	$V_p(f/s)$	$G_s(RPa)$	$G_s(tsf)$	E' (tsf)	M (tsf)	σ_p' (tsf)	OCR	S_v	S_v (tsf)	S_v/σ_{vm}'	ϕ (°)	ϕ' (tsf)	$C_u/(1+e_{vm})\sigma_{vm}'$	$C_u/(1+e_{vm})\sigma_{vm}'$	K_B	D_R (tsf)	$N_{0.01AR}$	($N_{0.01}$) $_L$	(N_{11}) $_{0.01AR}$	C_{11}	(N_{11}) $_{0.01AR}$	(N_{11}) $_{0.01L}$	(N_{11}) $_{0.01AR}$	(N_{11}) $_{0.01ms}$	r_d	MSF	K_x	K_v	CSR $_{1.5}$	CRR $_{1.5}$	FS	τ_{vm} (tsf)	p (tsf)	γ_{vm} (%)	G/G $_s$	ε_v (%)	AS $_v$	2S $_v$ (in)
41.60	41.59	252.5	2.90	0.50	252.6	1.15	9	135	2.63	2.39	104.5	150.9	1.16	6	1.81	1.11	6	0.00	1	8.25	16.6	0.45	273.6	471.3	333.7	1,094.8	241,411	2,521	1,767	3,534	6.45	2.7			41.6	0.13	0.40	0.13	0.65	80.1	47.7	46.2	29.6	0.67	32.5	31.5	30.1	34.0	0.83	1.11	0.84	1.00	0.59	0.75	1.26	1.32	1.83	2.143	0.45	0.01	0.86		
41.70	41.69	251.1	2.52	0.50	251.2	1.00	9	134	2.64	2.40	103.8	151.4	1.01	6	1.77	1.08	6	0.00	1	7.42	16.5	0.45	273.6	488.4	324.6	1,064.8	226,585	2,366	1,672	3,344	6.44	2.7			41.6	0.13	0.41	0.14	0.65	79.3	47.5	45.3	29.3	0.66	32.5	0.83	1.10	0.84	1.00	0.59	0.63	1.06	1.32	1.83	3.113	0.67	0.01	0.85					
41.90	41.82	264.6	2.22	0.49	264.5	0.84	9	133	2.64	2.40	109.1	162.0	0.85	6	1.70	1.03	6	0.00	1	6.06	17.4	0.44	273.6	440.4	318.7	1,045.5	217,099	2,267	1,612	3,224	6.77	2.8			41.9	0.14	0.39	0.13	0.66	81.5	50.0	46.6	31.7	0.66	33.4	31.1	31.8	31.9	0.83	1.12	0.83	1.00	0.59	1.04	1.74	1.33	1.86	0.583	0.12	0.00	0.85		
42.00	41.96	300.0	2.17	0.50	300.1	0.72	9	134	2.65	2.41	123.7	186.5	0.73	6	1.61	1.00	6	0.00	1	4.58	18.9	0.43	273.6	369.2	322.2	1,057.0	222,164	2,320	1,647	3,295	7.58	3.1			42.6	0.15	0.36	0.12	0.70	86.9	56.7	51.4	38.3	0.66	37.6	34.1	38.3	34.1	0.83	1.12	0.79	1.00	0.63	1.30	2.00	1.33	1.93	0.000	0.00	0.00	0.85		
42.10	42.09	299.3	2.10	0.50	299.4	0.70	9	133	2.66	2.41	123.1	185.8	0.71	6	1.61	1.00	6	0.00	1	4.46	19.9	0.43	273.6	365.6	320.2	1,050.5	219,019	2,287	1,627	3,245	7.56	3.1			42.6	0.15	0.36	0.09	0.70	86.7	56.6	51.1	38.1	0.66	37.5	33.9	38.1	33.9	0.83	1.12	0.79	1.00	0.63	1.30	2.00	1.33	1.93	0.000	0.00	0.00	0.85		
42.30	42.23	286.6	2.84	0.51	286.7	0.99	9	136	2.67	2.42	117.6	174.1	1.00	6	1.72	1.05	6	0.00	1	6.55	18.9	0.44	273.6	424.1	337.4	1,107.0	247,116	2,581	1,807	3,634	7.25	3.0			42.2	0.14	0.37	0.12	0.69	84.8	54.2	51.0	35.7	0.66	36.2	34.0	35.8	35.4	0.83	1.12	0.80	1.00	0.61	1.30	2.00	1.34	1.93	0.000	0.00	0.00	0.85		
42.50	42.40	296.8	2.67	0.51	296.9	0.90	9	135	2.68	2.42	121.5	181.9	0.91	6	1.68	1.02	6	0.00	1	5.80	19.6	0.44	273.6	403.3	334.9	1,098.7	242,782	2,535	1,780	3,580	7.49	3.1			42.5	0.15	0.36	0.12	0.70	86.3	56.1	52.1	37.6	0.66	37.3	34.6	37.6	35.2	0.83	1.12	0.79	1.00	0.63	1.30	2.00	1.34	1.93	0.000	0.00	0.00	0.85		
42.60	42.54	315.7	2.95	0.51	315.8	0.94	9	136	2.69	2.43	129.0	193.6	0.94	6	1.68	1.02	6	0.00	1	5.67	21.0	0.43	273.6	399.8	343.9	1,128.3	257,756	2,692	1,877	3,754	7.89	3.3			42.8	0.16	0.35	0.12	0.71	89.0	59.7	55.2	41.1	0.66	39.6	36.6	41.1	37.1	0.83	1.12	0.76	1.00	0.65	1.30	2.00	1.34	1.97	0.000	0.00	0.00	0.85		
42.70	42.66	305.2	3.52	0.54	305.3	1.16	9	137	2.70	2.43	124.5	183.5	1.16	6	1.75	1.07	6	0.00	1	7.13	20.2	0.43	273.6	440.2	354.8	1,164.0	276,856	2,891	1,998	3,996	7.63	3.1			42.5	0.15	0.36	0.12	0.70	87.5	57.7	54.8	39.1	0.66	38.6	36.6	39.3	38.6	0.83	1.12	0.78	1.00	0.64	1.30	2.00	1.35	1.95	0.000	0.00	0.00	0.85		
42.80	42.76	344.8	3.90	0.59	344.9	1.13	9	138	2.71	2.43	140.5	209.5	1.14	6	1.71	1.04	6	0.00	1	6.31	23.0	0.42	273.6	417.5	367.5	1,205.6	299,272	3,125	2,143	4,286	8.47	3.5			43.1	0.17	0.33	0.11	0.74	92.5	65.2	61.0	46.3	0.66	43.3	40.5	46.4	41.8	0.83	1.12	0.75	1.00	0.66	1.30	1.97	1.35	2.02	0.081	0.01	0.00	0.85		
42.90	42.84	378.0	3.82	0.59	378.1	1.01	9	138	2.71	2.44	154.0	233.3	1.02	6	1.65	1.00	6	0.00	1	5.15	25.4	0.42	273.5	385.3	369.7	1,212.9	303,071	3,165	2,169	4,338	9.16	3.8			43.6	0.18	0.32	0.11	0.77	95.6	71.4	65.5	51.4	0.66	47.2	43.2	51.4	43.0	0.83	1.12	0.75	1.00	0.66	1.30	1.97	1.35	2.07	0.007	0.01	0.00	0.85		
43.00	42.91	388.2	4.05	0.60	388.3	1.04	9	139	2.72	2.44	158.0	239.4	1.05	6	1.65	1.00	6	0.00	1	5.20	26.1	0.42	273.5	386.5	375.3	1,231.4	313,520	3,274	2,236	4,472	9.36	3.8			43.8	0.19	0.31	0.10	0.78	96.5	73.4	67.3	52.9	0.66	48.4	44.4	52.9	44.3	0.83	1.12	0.75	1.00	0.66	1.30	1.96	1.35	2.08	0.001	0.01	0.00	0.85		
43.10	43.01	378.2	4.36	0.60	378.3	1.15	9	139	2.73	2.44	153.6	230.6	1.16	6	1.69	1.03	6	0.00	1	5.94	25.3	0.42	273.6	407.1	380.1	1,247.0	323,682	3,370	2,293	4,586	9.14	3.7			43.6	0.18	0.32	0.11	0.77	95.6	71.5	66.5	51.4	0.66	47.3	44.0	51.4	44.9	0.82	1.12	0.75	1.00	0.66	1.30	1.96	1.36	2.07	0.008	0.01	0.00	0.85		
43.10	43.08	369.7	4.12	0.62	369.8	1.11	9	139	2.73	2.45	150.0	225.5	1.12	6	1.69	1.02	6	0.00	1	5.86	24.7	0.42	273.6	404.8	374.7	1,229.4	312,543	3,264	2,229	4,457	8.98	3.7			43.5	0.18	0.32	0.11	0.76	94.8	69.9	64.9	50.1	0.66	46.2	42.9	50.1	43.7	0.82	1.12	0.75	1.00	0.66	1.30	1.96	1.36	2.06	0.020	0.01	0.00	0.85		
43.20	43.15	343.6	4.03	0.62	343.7	1.18	9	139	2.74	2.45	139.2	204.4	1.18	6	1.72	1.05	6	0.00	1	6.58	22.9	0.42	273.6	424.9	370.1	1,214.1	304,071	3,175	2,173	4,347	8.48	3.4			43.1	0.17	0.33	0.11	0.74	92.3	64.9	61.1	46.1	0.66	43.1	40.5	46.1	42.1	0.82	1.12	0.75	1.00	0.66	1.30	1.96	1.36	2.02	0.101	0.01	0.00	0.85		
43.30	43.23	312.3	4.00	0.60	312.4	1.28	9	138	2.74	2.45	126.3	185.6	1.29	6	1.78	1.09	6	0.00	1	7.70	20.6	0.43	273.6	456.1	365.4	1,198.8	295,775	3,089	2,119	4,238	7.77	3.2			42.6	0.16	0.35	0.12	0.71	88.4	59.0	56.7	40.3	0.66	39.5	37.9	40.6	40.5	0.82	1.12	0.77	1.00	0.65	1.30	2.00	1.36	1.97	0.000	0.00	0.00	0.85		
43.30	43.28	291.3	3.68	0.59	291.4	1.27	9	138	2.74	2.45	117.6	172.1	1.28	6	1.80	1.10	6	0.00	1	8.06	19.1	0.44	273.6	466.0	356.5	1,169.7	279,985	2,924	2,017	4,035	7.31	3.0			42.2	0.15	0.37	0.12	0.68	85.6	55.1	53.2	36.3	0.66	36.9	35.7	36.7	38.4	0.82	1.12	0.79	1.00	0.62	1.30	2.00	1.36	1.94	0.000	0.00	0.00	0.85		
43.40	43.36	264.4	3.39	0.58	264.5	1.28	9	137	2.75	2.46	106.5	154.7	1.30	6	1.83	1.12	6	0.00	1	8.79	17.2	0.44	273.6	486.4	346.8	1,137.9	263,301	2,750	1,909	3,818	6.71	2.7			41.7	0.13	0.56	0.19	0.65	82.6	50.0	48.8	31.3	0.66	33.8	33.1	31.9	36.0	0.82	1.12	0.82	1.00	0.61	1.30	2.00	1.37	1.89	0.000	0.00	0.00	0.85		
43.50	43.46	238.3	2.67	0.58	238.4	1.12	9	135	2.76	2.46	95.7	139.5	1.13	6	1.82	1.12	6	0.00	1	8.56	15.4	0.45	273.6	479.9	326.9	1,072.5	230,338	2,405	1,696	3,392	6.13	2.5			41.2	0.12	0.63	0.21	0.62	77.7	45.0	43.9	26.6	0.66	30.4	29.6	27.1	32.1	0.82	1.09	0.85	1.00	0.60	0.47	0.79	1.37	1.84	5.338	1.21	0.01	0.83		
43.60	43.58	213.6	2.11	0.57	213.7	0.99	9	133	2.76	2.47	85.5	124.8	1.00	6	1.82	1.11	6	0.00	1	8.52	13.7	0.46	273.7	478.8	308.9	1,013.6	202,617	2,116	1,515	3,030	5.55	2.3			40.7	0.10	0.70	0.23	0.59	73.0	40.4	39.3	22.3	0.66	27.3	26.5	22.8	28.7	0.82	1.06	0.87	1.00	0.61	0.27	0.44	1.37	1.79	10.206	2.13	0.03	0.81		
43.80	43.72	170.1	1.55	0.56	170.2	0.91	9	130	2.77	2.47	67.8	97.6	0.93	6	1.87	1.16	6	0.00	1																																												

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| ■ Sensitive fine grained | ■ Sandy silt to silty sand |
| ■ Organic soils - peats | ■ Silty sand to clean sand |
| ■ Clay to silty clay | ■ Dense sand to gravelly sand |
| ■ Silty clay to clayey silt | ■ Clayey sand to very stiff sand |

■ Very stiff fine grained *

* Overconsolidated or cemented

Silt Correction:
 $K=(1-FC)^{0.75}$

Earthquake & Groundwater Information:
Magnitude = 7.21
Max. Acceleration = 0.929 g
Project GW = 34 ft
Maximum Settlement = 2.06 in
Settl. at Bottom of Footing = 2.06 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Pradel (1998); [sat] Idriss & Boulanger (2008)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand; Clay] Boulanger & Idriss(2004)
 σ_v correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)



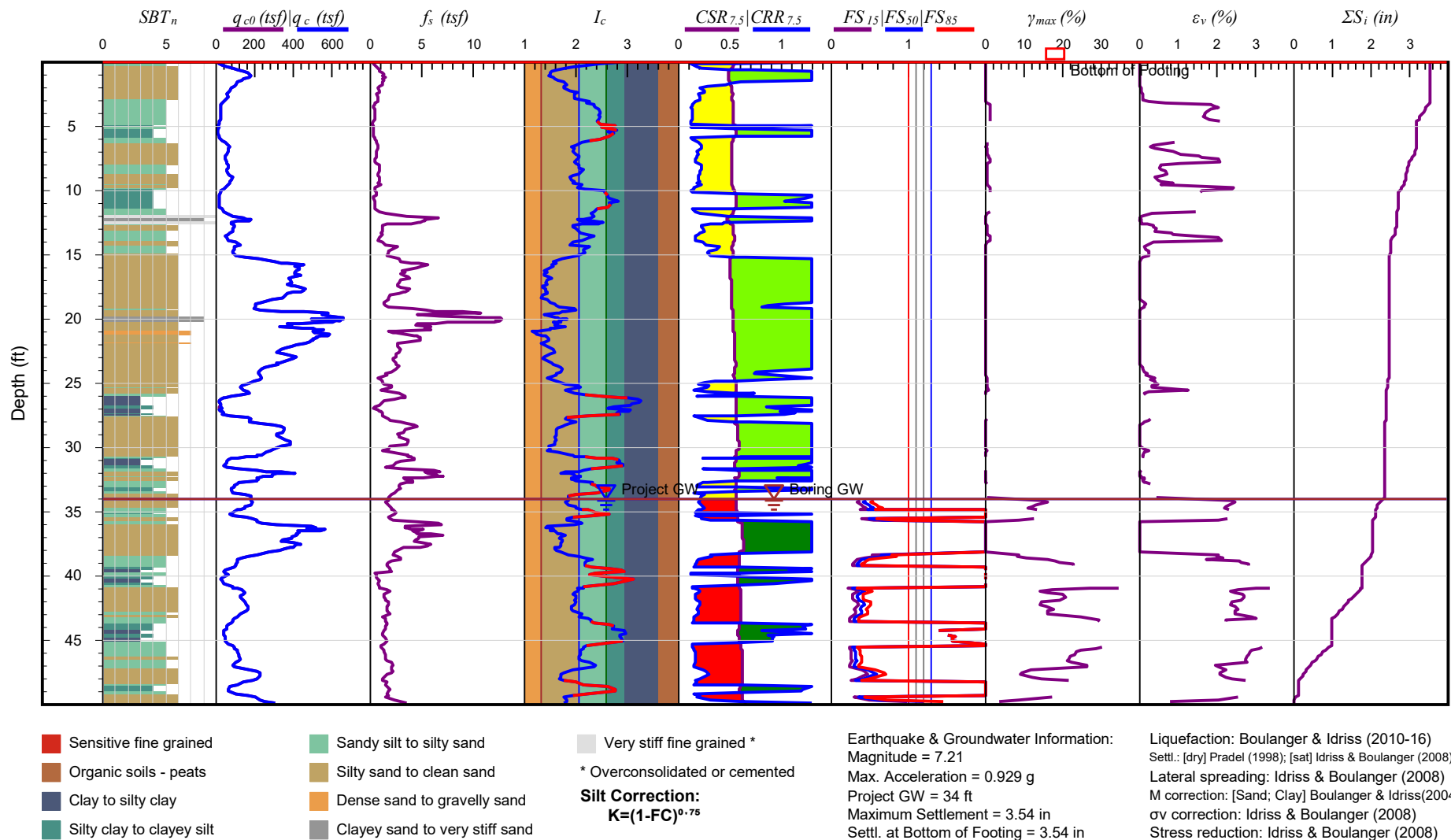
Seismic Settlement Potential - CPT Data

Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-4	Figure:	8

GeoSuite® Version 3.1.0.0. Developed by Fred Yi, PhD, PE, GE, F. ASCE

Zs(ft)	Zs(m)	q _v (tsf)	f _c (tsf)	u ₂ (tsf)	q _u (tsf)	R _z	S _{BT}	γ [pcf]	σ _{vo} (tsf)	σ _{v'} (tsf)	Q _v	Q _{un}	F _{sk}	S _{BT} z	I _p	K _c	(S _{BT}) _z	B _z	(S _{BT}) _h	F _c (tsf)	q _{1-100(MPa)}	c	R	σ _v (ms)	V _{ms} (m)	V _d (ft/s)	G ₀ (kPa)	G ₀ (tsf)	E' (tsf)	M (tsf)	σ _p ' (tsf)	OCR	S ₁	S _u (tsf)	S _u /σ _{v'}	φ (°)	c' (tsf)	C _u (1+σ _v σ _{v'})	C _u (1+σ _v σ _{v'})	K _u	D _u (ft)	S _{max}	(N _u) _z	(N _u) _{max}	C _u	(N _u) _{max} z	(N _u) _{max}	(N _u) _{max} z	(N _u) _{max}	r _u	MSF	K _u	K _u	CSR ₁₅	CSR ₁₅	FS	τ _u (tsf)	p(tsf)	τ _u σ _v (°)	G/G _u	ε _v (°)	ΔS _u	2S _u (m)	
19.60	19.50	209.3	1.18	0.20	209.3	0.56	9	128	1.18	1.18	176.8	186.5	0.57	6	1.54	1.00	6	0.00	1	3.45	19.0	0.44	273.6	337.5	257.7	845.3	136.223	1.423	1.054	2.107	5.26	4.5					41.6	0.11	0.29	0.10	0.89	81.9	39.6	35.0	33.0	0.95	37.5	33.2	33.0	33.2	0.94	1.12	0.98	1.00	0.52	1.16	0.67	1.00	0.95	0.28	0.17	0.00	0.71	
19.60	19.50	178.1	1.19	0.20	178.1	0.80	9	128	1.19	1.19	133.8	157.8	0.80	6	1.99	1.03	6	0.00	1	6.02	16.1	0.45	273.6	408.4	261.6	808.1	141.518	1.478	1.058	2.172	5.61	4.5					41.6	0.09	0.43	0.10	0.83	76.1	33.7	31.4	26.9	0.93	33.0	30.4	29.4	26.8	0.93	1.00	0.98	1.00	0.51	1.38	0.67	1.00	0.95	0.28	0.17	0.00	0.70	
19.70	19.67	160.2	1.53	0.20	160.2	0.96	9	128	1.19	1.19	110.4	141.1	0.96	6	1.70	1.00	6	0.00	1	7.76	14.4	0.46	273.7	457.7	252.3	860.4	142.566	1.489	1.059	2.180	5.69	4.5					41.3	0.08	0.46	0.11	0.79	72.1	30.3	29.1	26.0	0.94	30.4	28.0	27.0	25.9	0.94	1.06	0.98	1.00	0.54	0.76	0.67	1.00	0.95	0.28	0.17	0.00	0.70	
19.80	19.74	160.2	1.48	0.21	160.2	0.93	9	128	1.19	1.19	110.4	140.9	0.93	6	1.77	1.00	6	0.00	1	7.55	14.4	0.46	273.7	451.9	250.7	855.2	140.550	1.468	1.078	2.182	5.67	4.5					41.3	0.08	0.47	0.11	0.78	72.1	30.3	29.0	27.8	0.93	29.5	27.4	26.8	25.5	0.94	1.06	0.98	1.00	0.54	0.76	0.67	1.00	0.95	0.28	0.17	0.00	0.70	
19.80	19.80	153.9	1.30	0.21	153.9	0.86	9	128	1.20	1.20	127.6	135.1	0.87	6	1.77	1.00	6	0.00	1	7.41	13.8	0.46	273.7	448.0	254.3	834.3	132.792	1.387	1.026	2.053	4.10	3.4					41.0	0.08	0.46	0.11	0.78	72.1	29.1	27.8	27.0	0.94	27.8	26.6	22.7	24.0	0.94	1.05	0.98	1.00	0.55	0.76	0.68	1.00	0.95	0.28	0.17	0.00	0.70	
19.90	19.89	130.3	1.19	0.21	130.3	0.93	8	127	1.20	1.20	107.5	113.8	0.92	6	1.84	1.13	6	0.00	1	8.99	11.7	0.47	273.7	491.8	245.2	799.7	122.297	1.277	89.4	1.908	3.55	3.0					40.7	0.07	0.76	0.26	0.71	67.7	30.8	24.2	17.3	0.94	30.0	23.6	18.0	25.6	0.93	1.04	0.98	1.00	0.55	0.18	0.68	0.97	0.308	0.17	0.40	0.01	0.70	
20.00	19.97	116.8	1.22	0.21	116.8	1.05	8	127	1.21	1.21	95.7	101.2	1.06	5	1.92	1.20	5	0.00	1	10.76	10.4	0.48	273.7	541.1	243.1	797.7	120.171	1.355	99.8	1.876	3.21	2.7					40.3	0.07	0.76	0.25	0.68	69.1	27.6	22.3	16.6	0.94	27.6	22.5	16.1	24.9	0.93	1.05	0.98	1.00	0.55	0.20	0.68	0.95	0.353	0.15	0.58	0.01	0.70	
20.10	20.04	106.6	1.21	0.21	106.7	1.11	8	127	1.21	1.21	88.7	93.7	1.12	6	1.96	1.24	6	0.00	1	11.79	9.6	0.49	273.7	570.0	240.6	789.3	117.409	1.326	99.1	1.837	3.00	2.5					39.3	0.06	0.76	0.25	0.65	69.3	25.7	21.0	13.0	0.93	25.2	21.7	15.0	24.3	0.93	1.05	0.98	1.00	0.55	0.20	0.68	0.93	0.406	0.14	0.69	0.01	0.70	
20.20	20.11	102.0	1.15	0.21	102.0	1.13	8	126	1.22	1.22	82.9	87.6	1.14	6	1.98	1.27	6	0.00	1	12.49	9.0	0.49	273.8	589.3	237.1	777.7	113.538	1.186	89.2	1.784	2.83	2.3					39.0	0.06	0.77	0.25	0.63	68.8	24.1	19.9	11.7	0.93	23.0	21.0	14.0	23.6	0.93	1.05	0.98	1.00	0.55	0.19	0.69	0.92	0.450	0.12	0.87	0.01	0.70	
20.20	20.19	88.6	1.11	0.21	88.7	1.26	8	126	1.22	1.22	71.6	75.5	1.27	5	2.06	1.38	5	0.00	1	14.64	7.8	0.50	273.8	650.4	231.9	760.7	108.088	1.129	86.3	1.706	2.46	2.0					38.3	0.05	0.88	0.29	0.59	67.8	20.9	17.9	9.1	0.93	22.8	19.8	12.2	22.9	0.93	1.04	0.98	1.00	0.55	0.18	0.69	0.89	0.689	0.09	1.29	0.00	0.70	
20.30	20.26	81.2	1.14	0.21	81.2	1.40	7	125	1.23	1.23	65.2	68.7	1.43	5	2.12	1.49	5	0.00	1	16.48	7.1	0.51	273.8	703.1	230.5	756.3	108.798	1.115	84.3	1.687	2.25	1.8					37.8	0.05	0.89	0.30	0.56	67.2	25.6	16.8	7.7	0.93	28.0	19.3	11.4	22.1	0.93	1.04	0.98	1.00	0.55	0.18	0.69	0.87	0.781	0.08	1.51	0.02	0.71	
20.40	20.34	71.8	1.14	0.20	71.8	1.59	7	125	1.23	1.23	57.3	60.3	1.61	5	2.20	1.65	5	0.00	1	18.93	6.3	0.52	273.8	774.5	227.3	745.8	103.599	1.082	82.0	1.640	1.97	1.6					37.2	0.04	0.91	0.30	0.53	65.8	22.6	15.3	6.0	0.93	25.9	18.6	10.3	23.4	0.93	1.04	0.98	1.00	0.55	0.17	0.69	0.84	1.000	0.06	2.03	0.02	0.69	
20.50	20.42	61.8	1.11	0.20	61.8	1.79	7	125	1.24	1.24	49.0	51.4	1.83	5	2.28	1.88	5	0.00	1	21.91	5.3	0.53	273.9	862.6	222.2	728.9	98.493	1.029	78.3	848	1.67	1.3					36.4	0.03	0.92	0.31	0.49	63.7	19.5	13.6	4.3	0.93	23.6	17.7	9.0	23.8	0.93	1.03	0.98	1.00	0.56	0.15	0.70	0.81	1.000	0.07	1.59	0.02	0.69	
20.60	20.52	53.9	1.13	0.20	53.9	2.10	6	124	1.24	1.24	42.4	44.4	2.15	5	2.38	2.20	5	0.00	1	25.40	4.6	0.54	273.9	968.9	219.6	720.6	96.125	1.004	76.6	738	1.42	1.1					35.7	0.03	0.97	0.12	0.45	61.9	20.4	12.4	3.0	0.92	25.4	17.1	8.1	25.2	0.93	1.03	0.98	1.00	0.56	0.14	0.70	0.79	1.000	0.07	1.58	0.02	0.65	
20.70	20.64	43.4	1.12	0.20	43.4	2.58	6	124	1.25	1.25	33.7	35.1	2.66	4	2.51	2.79	5	0.00	1	31.01	3.7	0.55	273.9	1.145.7	213.7	701.0	90.514	945	725	590	1.25	0.9					34.6	0.02	0.47	0.05	0.40	59.0	16.4	10.6	1.5	0.92	22.3	16.1	6.9	27.2	0.93	1.02	0.98	1.00	0.56	0.13	0.70	0.75	1.000	0.07	1.57	0.02	0.63	
20.80	20.75	44.9	1.19	0.20	44.9	2.65	6	124	1.26	1.26	34.8	36.2	2.72	4	2.50	2.77	5	0.00	1	30.87	3.8	0.53	273.9	1.141.2	217.0	712.0	93.782	979	747	611	1.26	0.9					34.7	0.02	0.45	0.05	0.40	59.5	17.0	11.0	1.7	0.92	22.9	16.4	7.1	27.9	0.93	1.02	0.98	1.00	0.56	0.13	0.71	0.76	1.000	0.07	1.54	0.02	0.61	
20.90	20.85	30.3	1.34	0.20	30.3	2.67	6	124	1.26	1.26	38.9	40.6	2.74	5	2.47	2.60	5	0.00	1	29.34	4.3	0.54	273.9	1.092.1	225.0	738.3	101.801	1.063	804	687	1.29	1.0					35.3	0.03	0.40	0.15	0.11	64.3	61.2	19.0	12.1	2.4	0.92	24.7	17.4	7.7	28.8	0.93	1.03	0.98	1.00	0.56	0.14	0.71	0.78	1.000	0.07	1.47	0.02	0.59
21.00	20.95	63.9	2.03	0.20	64.0	3.17	6	129	1.27	1.27	49.4	51.8	3.24	5	2.45	2.49	5	0.00	1	28.30	5.5	0.53	273.9	1.059.0	250.5	821.8	129.879	1.356	99.6	878	1.17	1.4					36.5	0.03	0.32	0.11	0.49	65.6	24.2	15.2	4.5	0.91	29.8	20.4	9.7	34.5	0.93	1.04	0.98	1.00	0.56	0.17	0.71	0.83	0.387	0.14	0.48	0.01	0.59	
21.10	21.06	112.1	1.89	0.21	112.2	1.69	7	130	1.28	1.28	86.9	93.1	1.71	5	2.08	1.41	5	0.00	1	15.14	9.7	0.48	273.7	664.7	263.9	865.9	145.175	1.516	1.106	2.211	3.08	2.4					39.3	0.06	0.80	0.27	0.64	73.9	35.3	22.7	13.1	0.91	36.3	24.3	16.4	29.1	0.93	1.07	0.97	1.00	0.54	0.29	0.72	0.97	0.198	0.24	0.29	0.00	0.58	
21.20	21.18	178.3	2.04	0.22	178.4	1.14	9	132	1.28	1.28	137.9	150.4	1.15	6	1.81	1.11	6	0.00	1	8.44	15.5	0.45	273.6	476.4	282.4	926.4	168.370	1.758	1.266	2.531	4.65	3.6					41.5	0.09	0.64	0.22	0.79	76.1	33.7	32.8	25.8	0.91	31.4	30.6	26.3	33.0	0.93	1.08	0.97	1.00	0.54	0.37	0.72	1.10	1.10	0.37	0.13	0.00	0.58	
21.30	21.29	239.3	2.04	0.24	239.4	0.85	9	133	1.29	1.29	184.4	203.7	0.86	6	1.63	1.00	6</																																															

Zs(ft)	Zs(m)	q _v (tsf)	f _c (tsf)	u ₂ (tsf)	q _u (tsf)	R _z	S _{BT}	γ (pcf)	σ _{vo} (tsf)	σ _{vo'} (tsf)	Q _v	Q _{un}	F _z	S _{BTz}	I _p	K _c	(S _{BT}) _z	B _z	(S _{BT}) _u	F _c (tsf)	q ₁₋₁₀₀ (Mpa)	c	R	σ _v (ms)	V _s (m/s)	V _s (ft/s)	G ₀ (kPa)	G ₀ (tsf)	E' (tsf)	M (tsf)	σ _{p'} (tsf)	OCR	S _v	S _u (tsf)	S _u σ _{vo'}	γ (°)	c' (tsf)	C _u (1+σ _{vo'})%	C _u (1+σ _{vo'})%	K _u	D _u (ft)	S _{max}	(N _u) _z	(N _u) _{max}	C _u	(N _u) _{max}	(N _u) _{max}	(N _u) _{max}	(N _u) _{max}	r _z	MSF	K _u	K _u	CSR ₁₅	CSR _{7.5}	FS	τ _u (tsf)	p(tsf)	τ _u σ _{vo'}	G/G _u	c _u (tsf)	ΔS _u	2S _u (m)
28.10	28.08	95.3	1.76	0.19	95.3	1.86	7	129	1.73	1.73	94.0	63.5	1.90	5	2.21	1.68	5	0.00	1	19.29	7.0	0.51	273.8	784.8	263.4	864.3	143.650	1.500	1.102	1.310	2.49	1.4	37.4	0.05	0.26	0.09	0.49	67.9	30.0	30.4	7.3	0.78	28.7	20.6	11.7	26.7	0.90	1.04	0.93	1.00	0.56	0.18	0.94	1.14	0.464	0.13	0.86	0.01	0.27				
28.30	28.15	104.7	1.61	0.19	104.8	1.73	7	130	1.73	1.74	99.1	70.4	1.76	5	2.16	1.58	5	0.00	1	17.15	7.1	0.50	273.8	784.8	267.4	877.3	148.421	1.500	1.135	1.289	3.77	1.4	37.4	0.05	0.26	0.09	0.49	67.9	31.0	31.8	8.8	0.78	30.5	21.3	12.8	26.6	0.90	1.04	0.93	1.00	0.56	0.18	0.94	1.14	0.464	0.13	0.86	0.01	0.27				
28.50	28.32	96.9	1.66	0.19	96.9	1.72	7	128	1.74	1.74	94.6	64.7	1.75	5	2.18	1.63	5	0.00	1	18.32	7.1	0.51	273.8	756.5	260.9	855.6	140.367	1.466	1.090	2.160	2.54	1.5	37.5	0.05	0.26	0.09	0.49	67.9	30.5	30.5	20.7	0.78	28.7	20.4	11.7	25.7	0.90	1.04	0.93	1.00	0.56	0.18	0.94	1.14	0.464	0.13	0.86	0.01	0.27				
28.70	28.29	99.5	1.53	0.19	99.5	1.53	8	128	1.75	1.75	96.0	66.8	1.56	5	2.14	1.52	5	0.00	1	17.00	7.3	0.51	273.8	718.1	257.7	845.5	136.310	1.423	1.054	2.107	2.62	1.5	37.7	0.05	0.26	0.09	0.49	67.9	31.0	31.0	20.7	0.78	27.9	22.4	20.1	25.7	0.90	1.04	0.93	1.00	0.56	0.18	0.94	1.14	0.464	0.13	0.86	0.01	0.27				
28.80	28.36	116.3	1.53	0.19	116.3	1.31	8	129	1.75	1.75	65.4	79.3	1.33	5	2.04	1.35	6	0.00	1	14.15	8.6	0.49	273.8	636.6	262.6	861.4	141.995	1.483	1.094	2.188	3.00	1.8	38.5	0.06	0.76	0.23	0.54	69.3	27.5	23.3	10.6	0.78	24.5	21.1	13.5	24.5	0.90	1.05	0.93	1.00	0.56	0.20	0.95	1.21	0.456	0.14	0.80	0.01	0.24				
28.90	28.43	134.9	1.57	0.20	134.9	1.16	8	129	1.76	1.76	75.8	93.0	1.18	6	1.96	1.24	6	0.00	1	11.89	10.0	0.49	273.7	572.9	269.5	880.9	149.127	1.507	1.144	2.288	3.61	2.1	39.3	0.07	0.74	0.23	0.58	70.4	31.9	26.1	13.6	0.78	27.0	22.4	15.7	25.1	0.90	1.05	0.93	1.00	0.56	0.21	0.95	1.26	0.350	0.17	0.57	0.01	0.23				
28.95	28.52	146.1	1.42	0.20	146.2	0.97	9	129	1.76	1.76	82.0	101.9	0.99	6	1.88	1.17	6	0.00	1	10.00	10.8	0.48	273.7	519.5	256.4	873.9	146.175	1.526	1.126	2.252	3.91	2.2	39.7	0.08	0.77	0.26	0.60	68.4	27.6	27.6	15.5	0.78	27.0	22.7	16.7	24.6	0.90	1.04	0.93	1.00	0.56	0.19	0.95	1.29	0.370	0.17	0.50	0.01	0.23				
28.95	28.59	145.0	1.36	0.19	145.0	0.93	9	128	1.77	1.77	81.1	101.1	0.95	6	1.88	1.16	6	0.00	1	9.80	10.7	0.49	273.7	514.4	263.9	865.9	143.065	1.494	1.105	2.211	3.88	2.2	39.7	0.08	0.76	0.26	0.60	67.5	27.4	27.4	15.3	0.77	27.5	22.5	16.4	24.4	0.90	1.04	0.93	1.00	0.56	0.18	0.96	1.29	0.407	0.16	0.58	0.01	0.22				
28.70	28.68	132.5	1.57	0.19	132.5	1.18	8	129	1.77	1.77	73.8	90.7	1.20	6	1.97	1.26	6	0.00	1	12.22	9.8	0.48	273.7	582.0	268.2	879.9	148.752	1.553	1.142	2.283	3.54	2.0	39.1	0.07	0.75	0.25	0.57	70.3	31.3	25.8	13.1	0.77	26.6	22.2	15.5	25.1	0.90	1.05	0.92	1.00	0.56	0.21	0.96	1.26	0.364	0.17	0.60	0.01	0.22				
28.80	28.77	113.1	1.48	0.19	113.1	1.31	8	128	1.78	1.78	62.6	76.1	1.33	5	2.05	1.37	5	0.00	1	14.48	8.2	0.50	273.8	645.8	260.7	855.3	139.651	1.458	1.079	2.157	3.00	1.7	38.3	0.06	0.87	0.29	0.53	68.7	26.7	22.7	9.9	0.77	23.9	20.7	13.0	24.0	0.89	1.05	0.93	1.00	0.56	0.19	0.96	1.22	0.516	0.13	0.93	0.01	0.20				
29.00	28.89	85.6	0.75	0.18	85.6	0.87	8	122	1.78	1.78	47.0	57.3	0.89	6	2.04	1.35	6	0.00	1	14.14	6.1	0.52	273.8	636.1	224.5	736.7	108.856	1.032	800	1.600	2.22	1.2	36.9	0.04	0.89	0.88	0.30	0.46	60.7	20.2	22.7	11.7	5.6	0.77	18.5	16.0	8.6	17.8	0.89	1.03	0.94	1.00	0.56	0.14	0.96	1.14	1.000	0.09	2.62	0.06	0.14		
29.10	29.01	60.9	0.87	0.18	60.9	1.43	7	123	1.79	1.79	33.0	38.7	1.47	5	2.29	1.91	5	0.00	1	22.22	4.3	0.54	273.9	871.9	220.8	724.3	95.792	1.000	773	828	1.79	0.8	35.1	0.03	0.42	0.04	0.37	58.6	19.2	13.5	2.4	0.77	20.1	15.3	7.1	19.8	0.89	1.02	0.94	1.00	0.56	0.13	0.97	1.05	1.000	0.10	2.02	0.02	0.12				
29.20	29.13	40.6	1.01	0.18	40.7	2.48	6	123	1.80	1.80	21.6	23.8	2.59	4	2.69	0.00	4	0.00	1	39.86	2.7	0.57	274.0	1,441.6	230.1	754.9	104.153	1.088	544	12.95	7.9	2.7	2.78	1.70	32.7	2.78	0.69	0.23	2.16	15.4	10.9	6.4	0.77	19.1	15.0	6.0	6.1	0.89	1.01	0.97	1.00	0.55	1.23	0.97	3.19	0.00	0.00	0.00	0.12				
29.30	29.23	29.3	1.08	0.17	29.3	3.70	5	123	1.81	1.81	15.2	16.2	3.94	3	2.92	0.00	4	-0.01	1	53.27	1.9	0.60	274.1	1,932.6	224.0	735.1	98.519	1.029	385	9.16	5.4	1.8	1.96	1.16	30.9	1.96	1.01	0.34	1.52	13.8	8.9	0.3	0.77	17.7	13.2	5.9	4.9	0.89	1.01	0.97	1.00	0.55	0.87	0.97	2.43	0.00	0.00	0.00	0.12				
29.30	29.26	39.7	1.08	0.15	39.8	2.73	6	123	1.81	1.81	21.0	23.1	2.85	4	2.72	0.00	4	0.00	1	41.75	2.7	0.58	274.0	1,507.5	232.5	762.9	106.783	1.115	531	12.65	7.7	2.5	2.71	1.65	32.6	2.71	0.71	0.24	2.10	15.0	10.8	0.4	0.77	18.8	15.0	6.0	6.1	0.89	1.01	0.97	1.00	0.55	1.20	0.97	3.13	0.00	0.00	0.00	0.12				
29.40	29.31	35.3	1.10	0.16	35.3	3.09	5	123	1.81	1.81	18.6	20.2	3.26	4	2.80	0.00	4	0.00	1	46.02	2.4	0.58	274.0	1,660.4	230.1	754.8	104.380	1.090	472	11.24	6.7	2.2	2.41	1.44	32.0	2.41	0.81	0.27	1.86	16.8	10.1	0.4	0.76	20.4	14.3	6.0	5.6	0.89	1.01	0.97	1.00	0.55	1.06	0.98	2.85	0.00	0.00	0.00	0.12				
29.40	29.38	38.8	1.02	0.16	38.9	2.63	6	123	1.82	1.82	20.4	22.4	2.75	4	2.72	0.00	4	0.00	1	41.76	2.6	0.58	274.0	1,507.9	229.8	733.8	103.833	1.084	519	12.35	7.5	2.6	2.65	1.60	32.5	2.65	0.73	0.24	2.04	14.7	10.6	0.4	0.76	18.4	14.7	6.0	5.9	0.89	1.01	0.97	1.00	0.55	1.17	0.98	3.07	0.00	0.00	0.00	0.12				
29.50	29.46	38.3	0.94	0.16	38.3	2.45	6	122	1.82	1.82	20.0	22.1	2.57	4	2.71	0.00	4	0.00	1	41.12	2.6	0.58	274.0	1,485.4	226.3	742.3	100.140	1.046	511	12.16	7.4	2.8	2.60	1.58	32.4	2.60	0.74	0.25	2.00	14.5	10.4	0.4	0.76	18.2	14.5	6.0	5.7	0.89	1.01	0.97	1.00	0.55	1.15	0.98	3.04	0.00	0.00	0.00	0.12				
29.60	29.55	30.4	1.01	0.16	30.4	3.32	5	122	1.83	1.83	15.7	16.8	3.53	3	2.88	0.00	4	-0.01	1	50.83	2.0	0.60	274.1	1,839.1	223.0	731.5	97.228	1.015	400	9.53	5.6	2.0	2.04	1.20	31.1	2.04	0.88	0.33	1.57	14.4	9.1	0.3	0.76	18.1	13.3	5.9	4.9	0.89	1.01	0.97	1.00	0.55	0.90	0.98	2.52	0.00	0.00	0.00	0.12				
29.70	29.65	37.1	1.30	0.16	37.1	3.51	5	125	1.83	1.83	19.3	20.9	3.69	4	2.82	0.00	4	0.00	1	47.30	2.5	0.58	274.0	1,707.4	238.7	783.2	113.662	1.187	494	11.77	7.0	1.9	2.52	1.49	32.1	2.52	0.79	0.26	1.93	17.5	10.7	0.4	0.76	21.0	14.7	6.0	5.9	0.89	1.01	0.97	1.00	0.55	1.10	0.99	2.96	0.00	0.00	0.00	0.12				
29.80	29.77	36.0	1.46	0.16	36.0	4.04	5	125	1.84	1.84	18.6	20.0	4.26	3	2.87	0.00	4	0.00	1	50.43	2.4	0.58	274.0	1,824.0	242.7	796.4	118.235	1.235	478	11.39	6.7	1.7	2.44	1.43	31.9	2.44	0.82	0.27	1.86	17.0	10.7	0.4	0.76	20.5	14.7	6.0	5.8	0.89	1.01	0.97	1.00	0.55	1.06	0.99	2.89	0.00	0.0						



Seismic Settlement Potential - CPT Data

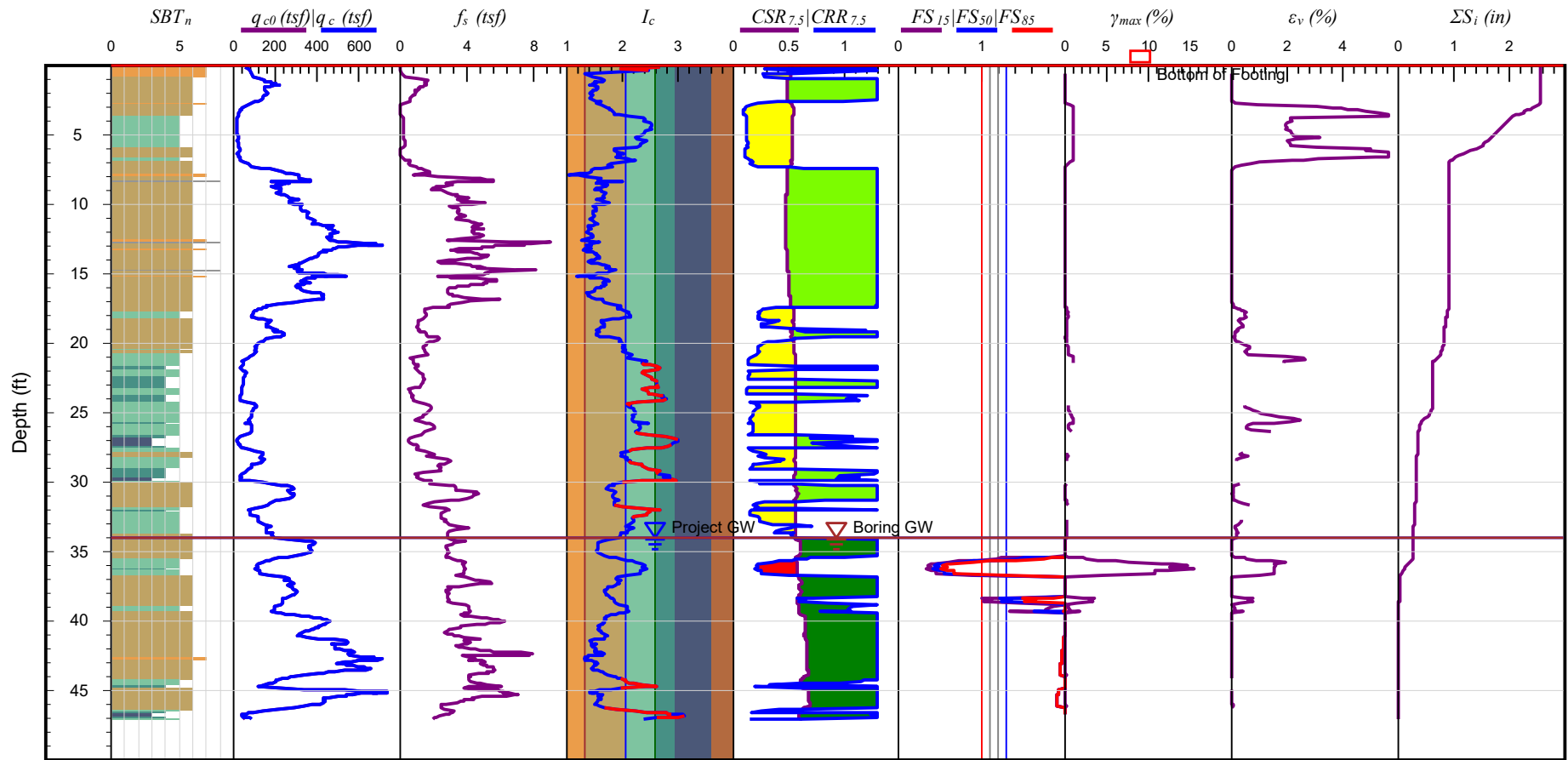
Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-5	Figure:	9

[illegible]

Zs(ft)	Zs(m)	qc (tsf)	fs (tsf)	u2 (tsf)	qs (tsf)	Rf	SPT	γ (pcf)	σvm (tsf)	σ'vm (tsf)	Qv	Qm	Fs	SPT _{cs}	Ic	Kc	(SPT) _{cs}	B _{cs}	(SPT) _{cs}	F _c (tsf)	q _{1-3m} (Mpa)	c	R	σ _v (m/s)	V _s (m/s)	V _s (ft/s)	G _s (kPa)	G _s (tsf)	E'(tsf)	M (tsf)	σ _p '(tsf)	OCR	S _i	S _i (tsf)	S _i σ _v '	φ (°)	z'(ft)	C _u (1+e ₀)P ₀	C _v (1+e ₀)P ₀	K _s	D ₅₀ (%)	N ₆₀ AS	(N ₆₀) _{cs}	(N ₆₀) _{AS}	C _{yc}	(N ₆₀) _{AS} AS	(N ₆₀) _{AS} cs	(N ₆₀) _{AS} AS	(N ₆₀) _{AS} cs	r _d	MSF	K _{cs}	K _{cs}	CSR _{1.5}	CSR _{2.5}	FS	τ _{vm} (tsf)	p'(tsf)	γ _{vm}	G/G _s	ε _v (%)	ΔS _v	ΔS _v (in)
15.80	15.70	368.4	4.76	0.14	368.5	1.29	9	140	0.95	0.95	385.7	366.0	1.30	6	1.61	1.00	6	0.00	1	4.55	36.7	0.39	273.5	368.3	357.6	1,173.4	286,920	2,996	2,200	4,060	7.67	8.0	45.8	0.15	0.30	0.10	1.26	100.0	69.6	63.1	64.7	1.05	73.4	66.4	64.7	66.4	0.95	1.12	1.03	1.00	0.50	1.30	0.55	1.12	0.024	0.77	0.00	0.00	2.48				
15.80	15.80	452.4	5.35	0.17	452.4	1.22	9	142	0.96	0.96	470.3	447.9	1.22	6	1.54	1.00	6	0.00	1	3.46	48.8	0.38	273.4	371.6	379.5	1,245.1	326,886	3,414	2,280	4,572	8.81	9.2	45.8	0.18	0.20	0.07	1.37	100.0	85.5	75.7	79.3	1.05	79.8	79.5	79.3	79.5	0.95	1.12	1.03	1.00	0.50	1.30	0.55	1.19	0.020	0.81	0.00	0.00	2.48				
15.90	15.90	404.4	4.98	0.18	404.4	1.23	9	141	0.97	0.97	427.2	398.8	1.23	6	1.57	1.00	6	0.00	1	3.93	40.0	0.39	273.5	390.9	385.7	1,199.9	301,274	3,146	2,123	4,246	8.19	8.5	46.2	0.16	0.20	0.07	1.30	100.0	76.4	68.3	70.7	1.05	80.0	71.5	70.7	71.5	0.95	1.12	1.03	1.00	0.50	1.30	0.56	1.16	0.022	0.79	0.00	0.00	2.48				
16.00	15.99	429.9	4.54	0.19	430.0	1.06	9	140	0.97	0.97	440.8	422.8	1.06	6	1.50	1.00	6	0.00	1	2.88	42.4	0.38	273.4	391.1	390.8	1,183.8	292,095	3,050	2,066	4,133	8.55	8.8	46.5	0.17	0.20	0.07	1.33	100.0	81.3	71.0	75.1	1.04	84.7	74.0	75.1	74.0	0.95	1.12	1.03	1.00	0.50	1.30	0.56	1.19	0.024	0.78	0.00	0.00	2.48				
16.10	16.09	432.9	3.87	0.19	432.9	0.89	10	139	0.98	0.98	440.7	424.1	0.89	6	1.44	1.00	6	0.00	1	1.06	42.6	0.38	273.4	397.5	348.5	1,141.3	270,119	3,821	1,937	3,885	8.60	8.8	46.5	0.17	0.20	0.07	1.33	100.0	68.2	70.1	75.1	1.04	70.8	72.9	75.1	72.9	0.95	1.12	1.02	1.00	0.50	1.30	0.56	1.19	0.026	0.75	0.00	0.00	2.48				
16.30	16.20	418.4	3.13	0.20	418.4	0.75	10	137	0.99	0.99	423.6	408.3	0.75	6	1.39	1.00	6	0.00	1	1.41	41.0	0.38	273.5	378.5	331.5	1,087.5	241,449	2,521	1,744	3,488	8.42	8.5	46.3	0.17	0.20	0.07	1.30	100.0	65.9	66.7	73.8	1.04	68.2	69.0	72.8	69.0	0.95	1.12	1.02	1.00	0.50	1.30	0.57	1.19	0.032	0.71	0.00	0.00	2.48				
16.40	16.32	408.6	3.35	0.21	408.7	0.82	10	138	1.00	1.00	409.3	397.1	0.82	6	1.43	1.00	6	0.00	1	1.89	40.0	0.39	273.5	292.6	335.8	1,101.6	248,566	2,596	1,789	3,579	8.30	8.3	46.2	0.17	0.20	0.07	1.29	100.0	64.4	65.9	70.9	1.03	66.3	68.0	70.9	68.0	0.95	1.12	1.02	1.00	0.50	1.30	0.57	1.19	0.031	0.72	0.00	0.00	2.48				
16.50	16.45	405.2	2.97	0.22	405.2	0.73	10	137	1.00	1.00	402.2	392.0	0.73	6	1.39	1.00	6	0.00	1	1.46	39.5	0.39	273.5	280.0	327.1	1,073.0	234,250	2,446	1,698	3,396	8.27	8.2	46.1	0.17	0.20	0.07	1.28	100.0	63.8	64.7	70.2	1.03	65.5	66.3	70.2	66.3	0.95	1.12	1.02	1.00	0.50	1.30	0.58	1.19	0.034	0.69	0.00	0.00	2.48				
16.70	16.60	441.5	3.25	0.24	441.6	0.74	10	138	1.02	1.02	434.0	425.1	0.74	6	1.37	1.00	6	0.00	1	1.22	42.9	0.38	273.4	272.8	337.0	1,057.3	250,358	2,614	1,803	3,606	8.78	8.7	46.5	0.18	0.20	0.07	1.31	100.0	69.5	70.0	76.3	1.02	71.0	71.5	76.3	71.5	0.95	1.12	1.01	1.00	0.51	1.30	0.58	1.23	0.031	0.72	0.00	0.00	2.48				
16.80	16.74	396.6	3.61	0.25	396.6	0.91	9	138	1.02	1.02	386.0	379.9	0.91	6	1.48	1.00	6	0.00	1	2.53	38.4	0.39	273.5	311.0	341.0	1,118.7	257,270	2,687	1,845	3,691	8.19	8.0	46.0	0.16	0.20	0.07	1.25	100.0	75.0	65.0	68.3	1.02	76.2	66.0	68.3	66.0	0.95	1.12	1.01	1.00	0.51	1.30	0.59	1.20	0.030	0.72	0.00	0.00	2.48				
16.90	16.86	377.9	3.79	0.26	377.9	1.00	9	138	1.03	1.03	364.8	360.5	1.00	6	1.52	1.00	6	0.00	1	3.20	36.4	0.39	273.5	330.1	342.9	1,125.0	260,616	2,722	1,866	3,732	7.93	7.7	45.7	0.16	0.20	0.07	1.22	100.0	71.4	62.9	65.0	1.01	72.3	63.6	65.0	63.6	0.95	1.12	1.01	1.00	0.51	1.30	0.59	1.19	0.030	0.72	0.00	0.00	2.48				
17.10	16.99	385.4	3.00	0.26	385.5	0.78	10	137	1.04	1.04	368.9	366.1	0.78	6	1.43	1.00	6	0.00	1	1.94	37.0	0.39	273.5	294.1	326.9	1,072.5	233,945	2,443	1,696	3,392	8.06	7.7	45.8	0.16	0.20	0.07	1.23	100.0	60.7	62.3	66.1	1.01	61.2	62.7	66.1	62.7	0.95	1.12	1.00	1.00	0.51	1.30	0.60	1.20	0.036	0.68	0.00	0.00	2.48				
17.20	17.16	389.0	2.76	0.26	389.0	0.71	10	136	1.05	1.05	368.2	367.4	0.71	6	1.40	1.00	6	0.00	1	1.55	37.2	0.39	273.5	282.5	321.8	1,055.8	225,706	2,357	1,644	3,288	8.13	7.7	45.8	0.16	0.20	0.07	1.22	100.0	61.3	62.2	66.5	1.00	61.4	62.3	66.5	62.3	0.95	1.12	1.00	1.00	0.51	1.30	0.60	1.21	0.038	0.66	0.00	0.00	2.48				
17.30	17.28	364.9	2.65	0.27	364.9	0.73	10	136	1.06	1.06	342.7	343.3	0.73	6	1.43	1.00	6	0.00	1	1.89	34.8	0.40	273.5	292.6	317.2	1,040.7	218,589	2,283	1,597	3,194	7.79	7.3	45.0	0.16	0.20	0.07	1.19	100.0	57.5	58.9	62.3	1.00	57.4	58.8	62.3	58.8	0.95	1.12	1.00	1.00	0.51	1.30	0.61	1.19	0.041	0.64	0.00	0.00	2.48				
17.40	17.36	395.6	2.58	0.30	395.7	0.65	10	136	1.07	1.07	369.8	371.4	0.65	6	1.37	1.00	6	0.00	1	1.18	37.7	0.39	273.5	271.8	318.4	1,044.6	220,198	2,299	1,609	3,218	8.24	7.7	45.9	0.16	0.20	0.07	1.22	100.0	62.3	62.7	67.4	1.00	62.1	62.4	67.4	62.4	0.95	1.12	1.00	1.00	0.51	1.30	0.61	1.23	0.041	0.65	0.00	0.00	2.48				
17.50	17.43	410.4	2.65	0.31	410.4	0.65	10	136	1.07	1.07	381.9	384.4	0.65	6	1.36	1.00	6	0.00	1	1.04	39.0	0.39	273.5	267.5	321.7	1,055.5	225,313	2,353	1,643	3,285	8.46	7.9	46.0	0.17	0.20	0.07	1.24	100.0	64.6	64.8	69.9	0.99	64.2	64.3	69.9	64.3	0.94	1.12	1.00	1.00	0.51	1.30	0.61	1.24	0.039	0.66	0.00	0.00	2.48				
17.60	17.50	441.1	2.93	0.33	441.2	0.66	10	137	1.08	1.08	408.7	412.3	0.67	6	1.35	1.00	6	0.00	1	0.92	41.9	0.38	273.5	263.9	311.3	1,086.9	240,525	2,512	1,742	3,484	8.89	8.3	46.4	0.18	0.20	0.07	1.27	100.0	69.5	69.4	75.0	0.99	68.9	68.8	75.0	68.8	0.94	1.12	0.99	1.00	0.51	1.30	0.61	1.27	0.035	0.69	0.00	0.00	2.48				
17.60	17.60	458.9	3.81	0.36	459.0	0.83	10	139	1.08	1.08	422.6	427.7	0.83	6	1.41	1.00	6	0.00	1	1.70	43.5	0.38	273.4	287.1	352.5	1,156.5	276,441	2,887	1,972	3,944	9.15	8.4	46.5	0.18	0.20	0.07	1.29	100.0	72.3	73.7	77.9	0.99	71.4	72.8	77.9	72.8	0.94	1.12	0.99	1.00	0.51	1.30	0.62	1.29	0.029	0.74	0.00	0.00	2.48				
17.70	17.67	456.6	3.68	0.37	456.7	0.81	10	139	1.09	1.09	418.6	424.5	0.81	6	1.41	1.00	6	0.00	1	1.61	43.2	0.38	273.4	284.2	349.8	1,147.7	271,768	2,948	1,942	3,885	9.13	8.4	46.5	0.18	0.20	0.07	1.28	100.0	71.9	73.1	77.4	0.99	70.9	72.1	77.4	72.1	0.94	1.12	0.99	1.00	0.51	1.30	0.62	1.29	0.030	0.74	0.00	0.00	2.48				
17.80	17.75	456.6	3.62	0.37	456.9	0.77	10	139	1.09	1.09	416.6	423.6	0.80	6	1.40	1.00	6	0.00	1	1.54	43.1	0.38	273.4	282.4	348.8	1,144.3	269,901	2,818	1,931	3,861	9.14	8.4	46.5	0.18	0.20	0.07	1.28	100.0	72.0	73.1	77.3	0.98	70.8	71.9	77.3	71.9	0.94	1.12	0.99	1.00	0.51	1.30	0.62	1.30	0.030	0.73	0.00	0.00	2.48				
17.90	17.84	436.6	3.34	0.37	436.7	0.77	10	138	1.10	1.10	395.9	400.7	0.77	6	1.40	1.00	6	0.00	1	1.55	41.1	0.38	273.5	282.5	341.0	1,118.9	268,741	2,861	1,846	3,692	8.87	8.1	46.3	0.18	0.20	0.07	1.25	100.0	68.8	69.8	73.8	0.98	70.4	68.5																			

$Z_s(f)$	$Z_{ss}(f)$	$q_c(fsf)$	$f_s(fsf)$	$u_2(fsf)$	$q_{cs}(fsf)$	R_f	SBT	$\gamma(pcf)$	$\sigma_{vm}(fsf)$	$\sigma'_{vm}(fsf)$	Q_v	Q_{vm}	F_{Rv}	SBT_{Rv}	I_c	K_v	$(SBT)_L$	B_v	$(SBT)_{Bv}$	$F_{Cv}(fsf)$	$q_{(1+u)}(Mpa)$	c	R	$u_v(m/s)$	$V_v(m/s)$	$V_v(fsf)$	$G_v(RPa)$	$G_v(fsf)$	$E'(fsf)$	$M(fsf)$	$\sigma'_p(fs)$	OCR	S_v	$S_v(fs)$	$S_v(\sigma'_{vm})$	$\phi(^{\circ})$	$\zeta'(fsf)$	$C_v(1+u)/\rho$	$C_v(1+u)/\rho u$	K_B	$D_B(fsf)$	$N_{0B(L)}$	$(N_{0B})_L$	$(N_f)_{0B(L)}$	C_{γ}	$(N_f)_{0B(L)AR}$	$(N_f)_{0B(L)SC}$	$(N_f)_{0B(L)AR}$	$(N_f)_{0B(L)SC}$	r_d	MSF	K_{γ}	K_{γ}	CSR_{z-1}	CRR_{z-1}	FS	$\tau_{vm}(fsf)$	$p(fs)$	γ_{vm}	G/G_s	$\varepsilon_v(\%)$	ΔS_v	$\Delta S_v(m)$
27.10	27.08	19.5	0.74	0.28	18.95	3.79	4	119	1.72	1.72	10.3	10.7	4.15	3	3.07	0.00	3	-0.02	1	63.12	1.3	0.63	274.1	2,327.6	197.8	648.9	74,341	776	190	5.93	3.6	1.7	1.27	0.76	28.9	1.27	2.01	0.67	10.3	12.3	6.5	0.2	0.78	16.5	11.1	5.8	3.7	0.90	1.01	0.97	1.00	0.56	1.30	0.94	1.78	0.00	0.00	0.00	2.38				
27.20	27.16	22.2	0.84	0.26	22.2	3.85	4	120	1.72	1.72	11.9	12.4	4.11	3	3.02	0.00	3	-0.01	1	59.62	1.5	0.62	274.1	2,183.8	205.7	674.8	81,347	849	254	6.85	4.1	1.7	1.46	0.89	29.6	1.46	1.50	0.50	11.9	14.0	7.2	0.2	0.78	18.1	11.7	5.8	4.1	0.90	1.01	0.97	1.00	0.56	1.30	0.94	1.94	0.00	0.00	0.00	2.38				
27.30	27.21	31.4	1.05	0.27	31.4	3.36	5	123	1.73	1.73	17.2	18.4	3.55	3	2.85	0.00	4	-0.01	1	48.99	2.1	0.59	274.0	1,769.9	222.8	731.1	97,457	1,018	436	9.90	6.1	2.0	2.12	1.31	31.5	2.12	0.88	0.90	1.72	14.8	9.2	0.3	0.78	18.9	13.6	5.9	5.3	0.90	1.01	0.97	1.00	0.56	0.98	0.94	2.95	0.00	0.00	0.00	2.38				
27.40	27.30	35.9	1.22	0.26	36.0	3.40	5	124	1.73	1.73	19.8	21.3	3.56	4	2.80	0.00	4	-0.01	1	46.28	2.5	0.58	274.0	1,669.9	232.4	762.6	107,266	1,120	479	11.41	7.1	2.0	2.45	1.52	32.2	2.45	0.77	0.26	1.98	17.0	10.2	0.4	0.78	20.9	14.6	6.0	6.0	0.90	1.01	0.97	1.00	0.56	1.13	0.94	2.85	0.00	0.00	0.00	2.38				
27.50	27.42	33.2	1.16	0.26	33.2	3.48	5	123	1.74	1.74	18.1	19.4	3.68	3	2.84	0.00	4	-0.01	1	48.52	2.2	0.59	274.0	1,752.8	238.8	749.1	103,009	1,076	441	10.49	6.5	1.9	2.25	1.38	31.8	2.25	0.85	0.28	1.81	15.7	8.7	0.3	0.78	19.7	14.0	6.0	5.9	0.90	1.01	0.97	1.00	0.56	1.03	0.95	2.68	0.00	0.00	0.00	2.38				
27.60	27.56	73.9	1.15	0.26	73.9	2.92	7	127	1.75	1.75	41.3	48.4	1.59	5	2.34	1.77	5	0.00	1	20.47	5.3	0.53	273.9	819.9	236.5	775.3	113,997	1,190	888	1,074	1.86	1.1	36.1	0.04	0.34	0.11	0.42	62.3	23.3	16.0	4.1	0.78	23.9	17.2	8.7	22.1	0.90	1.03	0.94	1.00	0.56	0.15	0.95	1.08	0.00	0.00	0.00	2.38					
27.70	27.69	165.7	1.51	0.27	165.7	0.91	9	129	1.76	1.76	93.3	116.9	0.92	6	1.82	1.12	6	0.00	1	8.50	12.4	0.47	273.7	489.9	273.0	895.6	154,431	1,613	1,183	2,366	4.40	2.5	40.3	0.09	0.77	0.26	0.64	90.0	31.3	30.5	19.0	0.78	25.1	24.5	19.6	26.4	0.90	1.05	0.93	1.00	0.56	0.20	0.96	1.33	0.00	0.00	0.00	2.38					
27.80	27.78	183.2	1.72	0.27	183.2	0.94	9	131	1.76	1.76	102.9	129.6	0.95	6	1.80	1.10	6	0.00	1	8.09	13.7	0.46	273.7	466.8	282.9	928.2	167,451	1,749	1,270	2,541	4.82	2.7	40.8	0.10	0.47	0.16	0.67	71.8	34.6	33.4	22.1	0.77	27.5	26.6	22.5	28.5	0.90	1.06	0.92	1.00	0.56	0.24	0.96	1.37	0.210	0.26	0.28	0.00	2.38				
27.90	27.88	174.4	1.97	0.26	174.4	1.13	9	132	1.77	1.77	97.5	121.8	1.14	6	1.87	1.15	6	0.00	1	9.67	13.0	0.46	273.7	510.6	288.7	947.0	175,534	1,833	1,322	2,645	4.60	2.6	40.5	0.09	0.70	0.23	0.65	73.6	33.0	32.7	20.4	0.77	26.8	26.5	21.4	29.2	0.90	1.07	0.92	1.00	0.56	0.28	0.96	1.36	0.184	0.28	0.24	0.00	2.37				
28.10	28.00	174.1	2.94	0.26	174.2	1.69	8	135	1.78	1.78	97.0	119.0	1.71	6	1.99	1.28	6	0.00	1	12.77	13.0	0.46	273.7	597.6	312.1	1,023.8	209,821	2,191	1,546	3,091	4.57	2.6	40.4	0.09	0.60	0.20	0.65	79.7	41.1	34.2	20.3	0.77	34.7	29.1	22.7	33.8	0.90	1.11	0.90	1.00	0.55	0.69	0.96	1.36	0.111	0.40	0.13	0.00	2.37				
28.20	28.13	229.0	3.58	0.26	229.1	1.57	8	137	1.79	1.79	127.2	159.0	1.58	6	1.89	1.17	6	0.00	1	10.12	17.2	0.44	273.6	523.3	355.3	1,000.0	246,205	2,571	1,784	3,568	5.83	3.3	41.8	0.12	0.53	0.28	0.73	84.4	54.1	43.2	30.3	0.77	43.5	34.9	31.5	39.0	0.90	1.12	0.88	1.00	0.55	1.00	0.97	1.47	0.073	0.51	0.07	0.00	2.37				
28.30	28.25	294.1	4.21	0.28	294.2	1.43	9	139	1.80	1.80	162.9	207.2	1.44	6	1.79	1.09	6	0.00	1	7.89	22.3	0.43	273.6	461.4	357.1	1,171.5	282,981	2,955	2,044	4,047	7.19	4.0	43.1	0.14	0.35	0.12	0.82	89.7	55.6	53.5	42.4	0.77	43.5	41.9	42.8	44.9	0.90	1.12	0.84	1.00	0.57	1.30	0.97	1.58	0.054	0.60	0.00	0.00	2.37				
28.40	28.37	333.4	4.50	0.28	333.4	1.35	9	139	1.80	1.80	183.9	236.4	1.36	6	1.74	1.06	6	0.00	1	6.80	25.4	0.42	273.5	431.1	367.6	1,205.9	301,586	3,149	2,144	4,289	7.95	4.4	43.7	0.16	0.33	0.11	0.86	94.0	63.0	59.5	49.2	0.77	48.7	46.0	49.3	48.2	0.90	1.12	0.84	1.00	0.58	1.30	0.98	1.64	0.048	0.64	0.00	0.00	2.37				
28.60	28.48	356.0	4.03	0.28	356.1	1.13	9	139	1.81	1.81	195.6	255.1	1.14	6	1.66	1.01	6	0.00	1	5.37	27.2	0.41	273.5	391.2	361.9	1,187.3	290,954	3,038	2,079	4,137	8.39	4.6	44.1	0.17	0.32	0.11	0.88	96.2	67.3	61.9	52.8	0.76	51.6	47.5	52.8	47.6	0.90	1.12	0.84	1.00	0.58	1.30	0.98	1.67	0.051	0.63	0.00	0.00	2.37				
28.70	28.62	355.4	3.44	0.28	355.4	0.97	9	137	1.82	1.82	194.2	254.8	0.97	6	1.61	1.00	6	0.00	1	4.49	27.1	0.41	273.5	366.7	350.1	1,148.5	269,888	2,818	1,945	3,890	8.39	4.6	44.1	0.17	0.32	0.11	0.88	96.1	67.2	60.8	52.6	0.76	51.2	46.3	52.6	46.3	0.90	1.12	0.84	1.00	0.58	1.30	0.98	1.68	0.059	0.59	0.00	0.00	2.37				
28.80	28.77	342.8	3.17	0.27	342.9	0.93	9	137	1.83	1.83	186.3	245.0	0.93	6	1.61	1.00	6	0.00	1	4.45	26.0	0.42	273.5	365.4	343.2	1,126.0	258,097	2,695	1,869	3,739	8.17	4.5	43.9	0.16	0.22	0.07	0.87	94.8	64.8	58.6	50.5	0.76	49.3	44.5	50.5	44.5	0.89	1.12	0.84	1.00	0.58	1.30	0.99	1.67	0.065	0.56	0.00	0.00	2.37				
29.00	28.94	310.1	2.60	0.27	310.2	0.84	9	135	1.84	1.84	167.3	220.8	0.84	6	1.60	1.00	6	0.00	1	4.44	23.3	0.42	273.6	365.3	326.3	1,070.4	230,267	2,405	1,689	3,379	7.56	4.1	43.4	0.15	0.24	0.08	0.83	91.4	58.6	53.0	45.0	0.76	44.4	40.1	45.0	40.1	0.89	1.12	0.83	1.00	0.58	1.30	0.99	1.63	0.085	0.49	0.00	0.00	2.37				
29.10	29.08	314.2	2.73	0.27	314.2	0.87	9	135	1.85	1.85	168.7	223.1	0.87	6	1.61	1.00	6	0.00	1	4.57	23.6	0.42	273.6	368.9	330.0	1,082.7	236,273	2,467	1,728	3,457	7.65	4.1	43.4	0.15	0.34	0.11	0.83	91.8	59.4	53.8	45.7	0.76	44.9	40.7	45.7	40.7	0.89	1.12	0.83	1.00	0.58	1.30	1.00	1.64	0.080	0.50	0.00	0.00	2.37				
29.20	29.22	329.7	2.85	0.28	329.7	0.86	9	136	1.86	1.86	176.1	233.6	0.87	6	1.60	1.00	6	0.00	1	4.32	24.8	0.42	273.6	361.9	334.9	1,098.7	244,090	2,549	1,780	3,560	7.95	4.3	43.7	0.16	0.23	0.08	0.84	93.4	62.3	56.2	48.1	0.75	47.0	42.3	48.1	42.3	0.89	1.12	0.83	1.00	0.58	1.30	1.00	1.67	0.075	0.52	0.00	0.00	2.37				
29.30	29.39	361.1	3.65	0.29	361.1	1.01	9	138	1.87	1.87	191.8	255.2	1.02	6	1.62	1.00	6	0.00	1	4.73	27.2	0.41	273.5	373.3	356.0	1,168.0	280,125	2,925	2,012	4,023	8.53	4.6	44.1	0.17	0.32	0.11	0.87	96.4	68.3	62.0	53.0	0.75	51.3	46.6	53.0	46.6	0.89	1.12	0.83	1.00	0.58	1.30	1.01	1.72	0.057	0.60	0.00	0.00	2.37				
29.50	29.55	384.9	3.71	0.30	384.9	0.96	9	138	1.88	1.88	203.3	271.3	0.97	6	1.59	1.00	6	0.00	1	4.18	29.0	0.41	273.5	357.9	360.0	1,181.0	286,963	2,997	2,057	4,113	8.97	4.8	44.4	0.18	0.37	0.10	0.90	98.5	72.7	65.4	56.5	0.75	54.5	49.0	56.5	49.0	0.89	1.12	0.83	1.00	0.58	1.30	1.01										

$Z_s(f)$	$Z_u(f)$	q_c (tsf)	f_1 (tsf)	w_z (tsf)	q_c (tsf)	R_f	SBT	γ (pcf)	σ_{vm} (tsf)	σ_{vm}' (tsf)	Q_v	Q_m	F_R	SBT_{x_0}	I_c	K_c	(SBT) $_L$	B_c	(SBT) $_{B_0}$	F_c c' (psi)	$q_{1.1m}$ (Mpa)	c	R	σ_{vm} (m/s)	V_s (m/s)	V_s (ft/s)	G_s (kPa)	G_s (tsf)	E' (tsf)	M (tsf)	σ_{vm}' (tsf)	OCR	S_v	S_v (tsf)	S_u c' (psi)	ϕ (°)	c' (tsf)	$C_u/(1+e_{vm})\rho$	$C_u/(1+e_{vm})\rho$	K_B	D_R (psi)	$N_{0.01AB}$	($N_{0.01}$) $_L$	(N_f) $_{0.01AB}$	C_v	(N_f) $_{0.01AB}$	(N_f) $_{0.01c}$	(N_f) $_{0.01AB}$	(N_f) $_{0.01c_{ms}}$	r_d	MSF	K_c	K_{ϕ}	CSR $_{z-1.5}$	CRR $_{z-1.5}$	FS	τ_{vm} (tsf)	p (tsf)	γ_{vm} (tsf)	G/G $_s$	ε_v (%)	ΔS_v	ΔS_v (in)			
38.10	38.02	329.2	2.65	0.29	329.2	0.80	9	135	2.46	2.33	140.2	208.1	0.81	6	1.61	1.00	6	0.00	1	4.53	22.3	0.43	273.6	367.9	337.1	1,105.9	246.321	2,572	1,803	3,607	8.15	3.5					43.1	0.16	0.34	0.11	0.75	91.3	62.2	56.3	44.5	0.67	41.9	38.0	44.5	38.0	0.85	1.12	0.76	1.00	0.63	1.30	2.00	1.26	1.93	0.000	0.00	0.00	2.06			
38.20	38.16	271.5	2.39	0.28	271.6	0.80	9	134	2.47	2.34	115.2	168.8	0.89	6	1.70	1.03	6	0.00	1	6.08	18.2	0.44	273.6	411.1	323.3	1,060.8	224.543	2,345	1,659	3,319	6.92	3.0					42.1	0.14	0.38	0.13	0.68	83.0	51.3	47.9	33.5	0.67	34.8	32.4	33.6	31.2	0.83	1.10	0.59	1.30	2.00	1.26	1.84	0.000	0.00	0.00	2.06					
38.40	38.40	227	2.27	0.27	208.8	1.09	9	133	2.47	2.34	88.2	124.8	1.10	6	1.85	1.14	6	0.00	1	9.13	13.7	0.46	273.7	495.7	310.9	1,020.0	206.004	2,151	1,534	3,088	5.42	2.3					40.7	0.11	0.48	0.23	0.60	74.4	39.5	38.8	22.3	0.67	27.6	27.1	23.1	29.6	0.85	1.07	0.67	1.00	0.58	0.31	0.53	1.27	1.72	8.702	2.03	0.05	2.01			
38.50	38.44	162.0	2.67	0.27	162.0	1.05	8	134	2.48	2.35	69.0	91.8	1.67	5	2.05	1.36	5	0.00	1	14.37	10.4	0.48	273.7	642.9	313.3	1,021.5	207.512	2,167	1,539	3,077	4.18	1.8					39.2	0.08	0.78	0.26	0.53	75.0	38.3	32.5	14.5	0.67	29.2	25.1	17.6	29.8	0.85	1.07	0.67	1.00	0.58	0.33	0.55	1.27	1.61	8.669	1.99	0.02	1.96			
38.60	38.56	136.2	2.92	0.27	136.2	2.13	7	134	2.49	2.36	56.9	74.4	2.10	5	2.19	1.63	5	0.00	1	18.37	8.6	0.49	273.8	763.9	310.7	1,019.3	207.690	2,163	1,533	3,086	3.45	1.5					0.81	0.27	0.48	0.27	0.48	72.4	42.9	28.9	10.7	0.67	34.2	24.1	14.9	31.5	0.85	1.06	0.67	1.00	0.59	0.26	0.44	1.27	1.54	10.689	2.16	0.03	1.96			
38.70	38.67	110.9	2.91	0.27	110.9	2.63	7	133	2.50	2.35	46.1	58.5	2.69	5	2.31	1.98	5	0.00	1	23.05	6.9	0.51	273.8	896.9	303.2	994.6	196.283	2,050	1,459	1,538	2.75	1.2					0.70	0.25	0.28	0.09	0.43	68.5	34.9	24.8	7.1	0.67	29.8	23.4	12.0	31.0	0.85	1.04	0.69	1.00	0.59	0.19	0.33	1.26	1.46	16.046	1.74	0.03	1.94			
38.90	38.79	111.1	2.09	0.27	111.1	1.88	7	131	2.51	2.36	46.1	59.9	1.92	5	2.21	1.69	5	0.00	1	19.42	6.9	0.51	273.8	788.6	284.5	934.4	169.625	1,771	1,285	1,521	2.75	1.2					37.2	0.06	0.27	0.09	0.43	67.3	35.0	23.8	7.1	0.67	28.7	20.7	11.5	26.9	0.85	1.04	0.69	1.00	0.59	0.18	0.31	1.26	1.47	17.953	2.58	0.06	1.88			
39.00	38.93	111.3	1.79	0.27	111.3	1.61	8	120	2.52	2.36	46.0	60.6	1.64	5	2.17	1.58	5	0.00	1	17.89	6.9	0.51	273.8	744.1	276.6	875.5	158.897	1,659	1,214	2,429	2.27	1.2					37.2	0.06	0.90	0.30	0.44	66.5	26.3	23.4	7.1	0.67	22.0	19.9	11.2	24.7	0.85	1.04	0.69	1.00	0.59	0.17	0.29	1.28	1.47	19.178	2.64	0.03	1.85			
39.10	39.07	101.3	1.55	0.27	101.4	1.54	8	128	2.53	2.37	41.8	54.7	1.57	5	2.18	1.62	5	0.00	1	18.49	6.2	0.52	273.8	761.6	266.7	870.1	146.330	1,528	1,129	2,258	2.48	1.0					36.7	0.05	0.93	0.31	0.41	64.4	26.9	23.5	5.8	0.67	20.5	18.7	10.0	23.3	0.84	1.03	0.90	1.00	0.59	0.16	0.27	1.29	1.44	22.848	2.83	0.03	1.81			
39.20	39.17	102.1	1.56	0.26	102.2	1.53	8	128	2.53	2.37	42.0	55.2	1.57	5	2.18	1.61	5	0.00	1	18.40	6.3	0.52	273.8	758.9	267.3	877.0	147.005	1,535	1,134	2,288	2.50	1.1					36.8	0.05	0.93	0.31	0.41	64.5	24.1	21.6	5.9	0.67	20.5	18.7	10.0	23.3	0.84	1.03	0.90	1.00	0.59	0.16	0.27	1.29	1.45	22.618	2.81	0.03	1.78			
39.30	39.26	93.3	1.83	0.25	93.3	1.97	7	129	2.54	2.37	38.2	49.0	2.02	5	2.28	1.89	5	0.00	1	21.93	5.7	0.52	273.8	863.2	272.1	892.7	153.486	1,603	1,175	1,271	2.37	0.9					36.2	0.04	0.34	0.03	0.39	63.8	29.4	20.6	4.8	0.67	25.3	18.9	9.5	25.9	0.84	1.03	0.90	1.00	0.59	0.15	0.20	1.29	1.41		0.00	1.78				
39.50	39.41	68.5	1.96	0.24	68.6	2.88	6	129	2.55	2.38	27.8	32.6	2.97	4	2.64	0.00	4	0.00	1	37.37	4.1	0.55	273.9	1,356.2	290.9	954.4	175.118	1,829							924	22.01	10.9	2.4	4.72	2.33	34.3	4.72	0.50	0.17	2.78	25.9	17.9	0.6	0.67	25.7	19.3	6.1	7.7	0.84	1.01	0.94	1.00	0.57	1.30	2.00	1.30	5.19		0.00	1.78	
39.60	39.55	47.2	1.93	0.24	47.3	4.11	5	128	2.56	2.38	18.8	20.8	4.32	3	2.88	0.00	4	0.00	1	50.46	2.7	0.58	274.0	1,825.3	277.8	911.3	158.371	1,654							626	14.01	6.9	1.6	3.19	1.49	32.1	3.19	0.79	0.26	1.88	22.3	14.0	0.4	0.67	22.9	16.2	6.0	5.9	0.84	1.01	0.95	1.00	0.57	1.07	2.00	1.30	3.78		0.00	1.78	
39.70	39.67	42.9	2.04	0.23	42.9	4.75	4	128	2.56	2.39	16.9	18.4	5.04	3	2.95	0.00	3	0.00	1	55.40	2.4	0.58	274.0	2,015.5	277.3	909.7	157.944	1,649							585	13.45	6.1	1.4	2.88	1.32	31.5	2.88	0.89	0.30	1.69		27.0	13.3	0.3	0.67	26.6	15.7	6.0	5.6	0.84	1.01	0.95	1.00	0.57	1.30		0.00	1.78			
39.90	39.80	44.4	2.08	0.23	44.4	1.08	7	117	2.57	2.39	17.5	21.9	1.14	5	2.39	2.27	5	0.00	1	26.14	2.5	0.58	274.0	991.7	198.0	649.5	73.703	770	622	585	2.39	0.3					32.3	0.01	0.75	0.08	0.25	50.9	14.0	10.3	0.4	0.67	14.8	12.1	5.5	15.6	0.84	1.02	0.92	1.00	0.58	0.11	2.00	1.31	1.19		0.00	1.78				
40.00	39.92	59.1	0.60	0.23	59.2	1.01	7	120	2.58	2.39	23.6	30.5	1.06	5	2.27	1.85	5	0.00	1	21.45	3.4	0.56	273.9	848.8	213.1	699.1	87.148	910	721	792	2.39	0.5					33.9	0.02	0.54	0.05	0.30	53.9	18.6	13.0	1.2	0.66	17.3	13.3	5.9	15.9	0.84	1.02	0.91	1.00	0.59	0.12	2.00	1.31	1.28		0.00	1.78				
40.20	40.06	35.2	0.64	0.22	35.2	2.27	6	121	2.59	2.40	13.6	15.5	1.96	4	2.78	0.00	4	0.00	1	44.97	1.9	0.60	274.1	1,623.3	223.8	734.2	96.818	1,011							45.7	10.89	5.2	3.6	2.33	1.11	30.7	2.33	1.06	0.35	1.36		13.3	9.9	0.3	0.66	15.6	12.9	5.9	4.1	0.84	1.01	0.95	1.00	0.57	0.78	2.00	1.31	2.98		0.00	1.78
40.30	40.22	22.4	0.75	0.19	22.4	3.55	5	120	2.60	2.40	8.3	8.6	3.77	3	3.12	0.00	3	0.00	1	67.07	1.1	0.64	274.2	2,494.5	216.3	709.7	89.618	936							172	6.62	2.9	1.9	1.42	0.62	27.9	1.42	3.08	1.03	0.83		10.6	7.8	0.2	0.66	13.4	11.2	5.8	3.0	0.84	1.01	0.95	1.00	0.57	1.30	2.00	1.32	2.12		0.00	1.78
40.50	40.38	28.8	0.95	0.20	28.8	3.31	5	122	2.61	2.41	10.9	11.7	3.63	3	3.01	0.00	3	0.00	1	59.47	1.5	0.62	274.1	2,177.7	232.2	761.7	104.922	1,096							306	8.73	3.9	2.0	1.87	0.84	29.3	1.87	1.68	0.56	1.09		13.6	9.3	0.2	0.66	15.8	12.4	5.8	3.7	0.84	1.01	0.95	1.00	0.57	1.30		1.32	2.55		0.00	1.78
40.70	40.58	41.9	0.79	0.20	42.0	1.90	6	121	2.62	2.41	16.3	18.8	2.00	4	2.72	0.00	4	0.00	1	41.67	2.3	0.59	274.0	1,504.8	236.6	776.1	108.576	1,134							551	13.12	6.3	3.5	2.81	1.35	31.6	2.81	0.87	0.29	1.63		15.9	11.4	0.3	0.66	17.6	14.1	5.9	4.7	0.84	1.01	0.95	1.00	0.57	0.93	2.00	1.32	3.43		0.00	1.78
40.90	40.78	83.0	0.88	0.20	83.0	1.96	6	124	2.63	2.42	33.2	44.2	1.09	5	2.16	1.56	5	0.00	1	17.65	5.0	0.53	273.9	1,371.1	236.6	776.1	110.865																																							



- Sensitive fine grained
- Organic soils - peats
- Clay to silty clay
- Silty clay to clayey silt
- Sandy silt to silty sand
- Silty sand to clean sand
- Dense sand to gravelly sand
- Clayey sand to very stiff sand
- Very stiff fine grained *

* Overconsolidated or cemented

Silt Correction:
 $K = (1 - FC)^{0.75}$

Earthquake & Groundwater Information:
 Magnitude = 7.21
 Max. Acceleration = 0.929 g
 Project GW = 34 ft
 Maximum Settlement = 2.55 in
 Settl. at Bottom of Footing = 2.55 in

Liquefaction: Boulanger & Idriss (2010-16)
 Settl.: [dry] Pradel (1998); [sat] Idriss & Boulanger (2008)
 Lateral spreading: Idriss & Boulanger (2008)
 M correction: [Sand; Clay] Boulanger & Idriss (2004)
 σ_v correction: Idriss & Boulanger (2008)
 Stress reduction: Idriss & Boulanger (2008)



Seismic Settlement Potential - CPT Data

Project:	Fillmore High School				
Location:	555 Central Avenue, Fillmore, California				
Project No.:	3242-0-0-100	CPT No.:	CPT-6	Figure:	10

Z_s (ft)	Z_u (ft)	q_c (tsf)	f_1 (tsf)	u_2 (tsf)	q_c (tsf)	R_f	S_{BT}	γ (pcf)	σ_{vm} (tsf)	σ'_{vm} (tsf)	Q_v	Q_{un}	F_R	$S_{BT_{un}}$	I_c	K_c	(S_{BT}) I_c	B_{eq}	(S_{BT}) B_{eq}	F_c (kPa)	$q_{1.5m}$ (Mpa)	c	R	σ_{vm} (m/s)	V_s (m/s)	V_s (ft/s)	G_s (kPa)	G_s (tsf)	E' (tsf)	M (tsf)	σ'_p (tsf)	OCR	S_v	S_v (tsf)	$S_{u,0.01}$	ϕ (°)	ζ' (tsf)	$C_u(1+e_{v0})/w$	$C_u(1+e_{v0})/w$	K_B	D_R (ft)	$N_{0.001AS}$	($N_{0.001}$) I_c	(N) $I_{0.001AS}$	C_{γ}	(N) $I_{0.001AS}$	(N) $I_{0.001c}$	(N) $I_{0.001AS}$	(N) $I_{0.001c}$	r_d	MSF	K_{γ}	K_{γ}	CSR $_{z,z}$	CR $_{RR,z}$	FS	τ_{vm} (tsf)	p (tsf)	γ_{max} (%)	G/G $_s$	ε_v (%)	ΔS_v	ΔS_v (in)
0.20	0.12	51.0	0.00	0.01	51.0	0.00	8	59	0.00	0.00	192.9	82.0	0.00	7	2.68	0.00	4	0.00	1	39.61	42.7	0.38	273.4	1.4329	282.9	862.4	65.531	684	734	17.01	27.3	18,115.2	3.64	5.86	38.7	3.64	0.20	0.07	19.29	12.1	13.6	10.0	1.70	29.6	32.8	15.6	23.2	1.00	1.02	1.10	1.00	0.54	1.30	0.00	0.05	0.00	0.00	0.00	2.55				
0.30	0.29	68.6	0.00	0.01	68.6	0.00	8	77	0.01	0.01	259.5	110.3	0.00	7	1.96	1.00	4	0.00	1	5.00	40.5	0.38	273.5	570.2	192.3	631.0	45.556	476	587	1174	1.05	5.4	40.5	0.38	0.13	0.04	1.11	85.0	14.7	18.8	19.2	1.70	33.5	41.5	24.6	85.2	1.00	1.12	1.10	1.00	0.49	1.30	0.01	0.01	0.00	0.00	0.00	2.55					
0.40	0.39	77.7	0.00	0.03	77.7	0.00	9	65	0.01	0.01	293.8	124.9	0.00	7	2.48	2.67	5	0.00	1	29.93	40.7	0.38	273.5	1.1109	285.6	937.1	85.576	894	1,295	1,088	0.08	5.9	40.7	0.38	0.13	0.04	1.11	85.0	14.7	18.8	19.2	1.70	33.5	41.5	24.6	85.2	1.00	1.12	1.10	1.00	0.49	1.30	0.01	0.01	0.00	0.00	0.00	2.55					
0.80	0.63	90.1	0.02	0.01	90.1	0.06	9	102	0.02	0.02	340.7	144.8	0.06	7	1.31	1.00	7	0.00	1	0.51	37.3	0.39	273.5	251.4	146.3	480.1	35.043	366	340	680	0.16	6.6	41.4	0.00	0.27	0.09	1.18	72.7	17.0	14.0	23.5	1.70	29.0	23.8	23.5	23.8	1.00	1.06	1.10	1.00	0.52	0.26	0.01	0.03	0.008	0.49	0.01	0.00	2.55				
0.90	0.87	93.2	0.28	0.06	93.2	0.30	9	115	0.04	0.04	352.1	149.6	0.30	6	1.47	1.00	6	0.00	1	2.42	33.7	0.40	273.5	308.0	164.7	540.2	36.041	323	430	881	0.25	6.6	41.5	0.01	0.35	0.11	1.20	73.8	17.6	15.2	24.3	1.70	29.9	25.9	23.9	25.9	1.00	1.07	1.10	1.00	0.51	0.29	0.02	0.04	0.007	0.61	0.01	0.00	2.55				
1.00	0.96	128.8	1.07	0.12	128.8	0.83	9	126	0.04	0.04	486.7	206.9	0.83	6	1.62	1.00	6	0.00	1	4.75	42.0	0.38	273.4	373.9	213.3	699.8	91.957	960	722	1,444	0.37	8.5	43.1	0.01	0.37	0.11	1.37	84.6	24.3	22.1	26.5	1.70	41.4	37.6	36.5	37.6	1.00	1.12	1.10	1.00	0.49	1.30	0.03	0.05	0.003	0.83	0.00	0.00	2.55				
1.10	1.06	149.9	1.68	0.12	149.9	1.12	8	130	0.05	0.05	566.5	240.8	1.12	6	1.67	1.01	6	0.00	1	5.60	45.5	0.38	273.4	397.8	237.4	777.7	117.254	1,234	894	1,788	0.47	9.4	43.8	0.01	0.35	0.12	1.45	89.7	35.4	26.2	43.3	1.70	60.4	44.7	43.3	45.1	1.00	1.12	1.10	1.00	0.49	1.30	0.03	0.06	0.003	0.87	0.00	0.00	2.55				
1.10	1.11	149.3	1.69	0.12	149.3	1.13	8	130	0.05	0.05	564.2	239.8	1.13	6	1.68	1.02	6	0.00	1	5.68	44.4	0.38	273.4	400.0	237.5	779.3	117.441	1,236	895	1,791	0.49	9.4	43.8	0.01	0.35	0.12	1.45	89.6	35.3	26.1	43.1	1.70	60.2	44.6	43.1	45.2	1.00	1.12	1.10	1.00	0.49	1.30	0.03	0.07	0.003	0.87	0.00	0.00	2.55				
1.20	1.13	148.7	1.55	0.06	148.7	1.04	8	129	0.05	0.05	561.8	238.8	1.05	6	1.65	1.00	6	0.00	1	5.24	44.0	0.38	273.4	387.6	233.3	765.5	112.764	1,178	864	1,728	0.51	9.4	43.8	0.01	0.35	0.12	1.45	89.4	35.1	25.8	42.9	1.70	59.8	43.9	42.9	43.8	1.00	1.12	1.10	1.00	0.49	1.30	0.03	0.07	0.003	0.86	0.00	0.00	2.55				
1.20	1.15	173.7	1.50	0.08	173.8	0.86	9	129	0.06	0.06	656.6	279.1	0.86	6	1.54	1.00	6	0.00	1	3.48	49.7	0.37	273.4	338.3	235.7	773.2	115.145	1,202	881	1,763	0.57	10.7	44.5	0.01	0.22	0.07	1.54	94.7	32.8	29.1	50.5	1.70	55.8	49.4	50.5	49.4	1.00	1.12	1.10	1.00	0.49	1.30	0.03	0.08	0.003	0.87	0.00	0.00	2.55				
1.20	1.18	181.6	1.47	0.08	181.6	0.81	9	129	0.06	0.06	686.3	291.7	0.81	6	1.51	1.00	6	0.00	1	2.99	51.0	0.37	273.4	324.4	235.9	774.1	115.932	1,205	884	1,767	0.57	10.4	44.5	0.01	0.22	0.07	1.54	96.2	34.3	30.1	52.7	1.70	58.4	51.1	52.7	51.1	1.00	1.12	1.10	1.00	0.49	1.30	0.03	0.08	0.003	0.86	0.00	0.00	2.55				
1.20	1.22	180.5	1.50	0.08	180.5	0.83	9	130	0.06	0.06	682.0	289.9	0.83	6	1.52	1.00	6	0.00	1	3.13	50.0	0.37	273.4	328.3	236.6	776.2	116.145	1,213	880	1,777	0.64	10.6	44.7	0.01	0.22	0.07	1.56	96.0	34.1	30.0	52.4	1.70	58.0	51.0	52.4	51.0	1.00	1.12	1.10	1.00	0.49	1.30	0.04	0.08	0.003	0.86	0.00	0.00	2.55				
1.30	1.25	180.8	1.50	0.10	180.8	0.83	9	130	0.06	0.06	683.1	290.3	0.83	6	1.52	1.00	6	0.00	1	3.13	49.6	0.37	273.4	328.3	236.8	776.8	116.332	1,215	880	1,780	0.64	10.6	44.7	0.01	0.22	0.07	1.57	96.0	34.2	30.0	52.5	1.70	58.1	51.0	52.5	51.0	1.00	1.12	1.10	1.00	0.49	1.30	0.04	0.09	0.004	0.86	0.00	0.00	2.55				
1.30	1.28	190.2	1.56	0.10	190.2	0.82	9	130	0.06	0.06	718.9	305.0	0.82	6	1.50	1.00	6	0.00	1	2.86	51.3	0.37	273.4	320.5	240.0	787.4	119.913	1,252	914	1,838	0.57	11.0	44.9	0.01	0.21	0.07	1.60	97.7	36.0	31.4	55.2	1.70	61.1	53.4	55.2	53.4	1.00	1.12	1.10	1.00	0.49	1.30	0.04	0.09	0.004	0.87	0.00	0.00	2.55				
1.30	1.31	191.2	1.60	0.10	191.2	0.84	9	130	0.07	0.07	722.5	307.5	0.84	6	1.51	1.00	6	0.00	1	2.95	51.0	0.37	273.4	323.1	241.6	792.6	121.706	1,271	926	1,853	0.72	11.0	45.0	0.01	0.21	0.07	1.60	97.9	36.1	31.6	55.5	1.70	61.4	53.8	55.5	53.8	1.00	1.12	1.10	1.00	0.49	1.30	0.04	0.09	0.004	0.87	0.00	0.00	2.55				
1.30	1.33	201.0	1.61	0.10	201.0	0.80	9	130	0.07	0.07	759.7	322.9	0.80	6	1.48	1.00	6	0.00	1	2.55	52.9	0.37	273.4	311.5	243.2	798.1	123.556	1,290	939	1,878	0.76	11.4	45.2	0.02	0.20	0.07	1.63	99.6	38.0	32.9	58.4	1.70	64.6	56.0	58.4	56.0	1.00	1.12	1.10	1.00	0.49	1.30	0.04	0.10	0.004	0.87	0.00	0.00	2.55				
1.40	1.36	206.6	1.56	0.10	206.6	0.75	9	130	0.07	0.07	780.8	331.8	0.75	6	1.45	1.00	6	0.00	1	2.16	53.6	0.36	273.4	300.4	242.2	794.5	122.263	1,277	931	1,861	0.80	11.6	45.3	0.02	0.20	0.07	1.65	100.0	39.1	33.6	60.0	1.70	66.4	57.0	60.0	57.0	1.00	1.12	1.10	1.00	0.49	1.30	0.04	0.10	0.004	0.87	0.00	0.00	2.55				
1.40	1.41	217.9	1.50	0.08	217.9	0.69	9	130	0.07	0.07	823.4	349.9	0.69	6	1.41	1.00	6	0.00	1	1.61	55.3	0.36	273.4	284.4	241.9	793.7	121.922	1,273	929	1,858	0.86	12.0	45.6	0.02	0.20	0.07	1.68	100.0	41.2	34.9	63.3	1.70	70.0	59.3	63.3	59.3	1.00	1.12	1.10	1.00	0.49	1.30	0.04	0.11	0.004	0.86	0.00	0.00	2.55				
1.50	1.46	192.5	1.45	0.08	192.5	0.76	9	129	0.08	0.08	727.4	309.2	0.76	6	1.47	1.00	6	0.00	1	2.44	49.1	0.37	273.4	308.6	236.9	777.2	116.391	1,215	891	1,781	0.84	11.1	45.0	0.02	0.21	0.07	1.60	98.1	36.4	31.5	55.9	1.70	61.9	53.5	53.5	53.5	1.00	1.12	1.10	1.00	0.49	1.30	0.05	0.11	0.004	0.85	0.00	0.00	2.55				
1.50	1.50	169.9	1.40	0.12	169.9	0.82	9	129	0.08	0.08	641.9	272.8	0.82	6	1.54	1.00	6	0.00	1	3.36	43.7	0.38	273.4	334.9	231.8	760.6	110.938	1,158	853	1,706	0.80	10.2	44.4	0.02	0.23	0.08	1.53	93.9	32.1	28.4	49.3	1.70	54.6	48.2	49.3	48.2	1.00	1.12	1.10	1.00	0.49	1.30	0.05	0.11	0.005	0.83	0.00	0.00	2.55				
1.60	1.55	151.5	1.20	0.15	151.5	0.79	9	127	0.08	0.08	572.5	243.3	0.79	6	1.56	1.00	6	0.00	1	3.68	39.2	0.39	273.5	344.0	221.9	727.9	100.474	1,049	781	1,563	0.77	9.5	43.8	0.01	0.24	0.08	1.46	90.1	28.6	25.5	43.8	1.70	48.7	43.3	43.8	43.3	1.00	1.12	1.10	1.00	0.49	1.30											

Z_s (ft)	Z_u (ft)	q_c (tsf)	f_1 (tsf)	u_2 (tsf)	q_c (tsf)	R_f	S_{BT}	γ (pcf)	σ_{vm} (tsf)	σ'_{vm} (tsf)	Q_v	Q_{un}	F_R	$S_{BT_{un}}$	I_c	K_u	(S_{BT}) L_c	B_u	(S_{BT}) B_u	F_c (tsf)	$q_{1.5m}$ (Mpa)	c	R	σ_v (m/s)	V (m/s)	V_r (ft/s)	G_s (kPa)	G_s (tsf)	E' (tsf)	M (tsf)	σ'_p (tsf)	OCR	S_v	S_v (tsf)	S_u/σ'_m	ϕ (°)	ζ' (tsf)	$C_u/(1+e_0)/\rho_u$	$C_u/(1+e_0)/\rho_u$	K_B	D_R (ft)	N_{60BLAS}	(N_6) L_c	(N_6) B_{60BL}	C_{γ}	(N_6) B_{60BLAS}	(N_6) B_{60BL}	(N_6) B_{60BLAS}	(N_6) B_{60BL}	τ_d	MSF	K_{σ}	K_{σ}	CSR $_{z1}$	CSR $_{z2}$	FS	τ_{vm} (tsf)	p (tsf)	γ_{vm} (tsf)	G/G $_s$	ε_v (%)	ΔS_v	ΔS_v (in)
8.70	8.64	202.1	3.08	0.15	202.1	1.52	8	135	0.48	0.48	421.1	289.6	1.53	6	1.73	1.06	6	0.00	1	6.75	26.8	0.41	273.5	429.8	286.2	938.8	177.389	1.852	1.200	2,599	4.45	9.3	44.7	0.09	0.35	0.12	142	89.4	47.1	36.1	43.1	1.49	71.6	54.1	43.2	56.5	0.98	1.12	1.10	1.00	0.48	1.30	0.28	0.61	0.021	0.73	0.02	0.00	0.91				
8.70	8.69	195.2	2.69	0.16	195.3	1.38	8	134	0.48	0.48	404.0	277.1	1.38	6	1.71	1.04	6	0.00	1	6.27	25.9	0.42	273.5	429.8	276.9	908.4	164.727	1.720	1,217	2,434	4.35	9.0	44.5	0.09	0.35	0.12	140	88.4	46.1	34.5	41.9	1.48	68.8	51.5	41.9	53.1	0.98	1.12	1.10	1.00	0.48	1.30	0.28	0.61	0.024	0.70	0.02	0.00	0.91				
8.70	8.73	186.1	2.46	0.31	188.2	1.31	8	133	0.48	0.48	387.2	265.8	1.31	6	1.70	1.03	6	0.00	1	6.12	24.9	0.42	273.6	421.1	270.4	887.1	156.159	1.631	1,180	2,320	4.25	8.8	44.3	0.08	0.36	0.12	137	87.4	44.4	33.2	40.6	1.48	66.0	49.3	40.6	50.6	0.98	1.12	1.10	1.00	0.48	1.30	0.29	0.61	0.026	0.67	0.02	0.00	0.91				
8.80	8.76	181.0	2.15	0.25	181.1	1.19	8	132	0.49	0.49	371.0	254.0	1.19	6	1.68	1.02	6	0.00	1	5.74	24.0	0.42	273.6	401.1	261.8	858.8	145.182	1.516	1,098	2,175	4.14	8.5	44.1	0.08	0.36	0.12	135	86.3	42.8	31.7	39.2	1.47	63.3	46.9	39.3	47.6	0.98	1.12	1.10	1.00	0.48	1.30	0.29	0.60	0.030	0.64	0.03	0.00	0.91				
8.80	8.81	205.2	2.06	0.16	205.2	1.01	8	132	0.49	0.49	417.7	284.3	1.01	6	1.59	1.00	6	0.00	1	4.19	26.9	0.41	273.5	358.4	263.3	861.9	146.897	1.534	1,201	2,291	4.30	9.1	44.6	0.09	0.25	0.08	141	89.6	38.8	34.9	43.4	1.47	67.0	51.2	43.4	51.2	0.98	1.12	1.10	1.00	0.48	1.30	0.29	0.63	0.020	0.65	0.02	0.00	0.91				
8.90	8.86	224.0	1.98	0.17	224.0	0.88	9	132	0.49	0.49	453.1	309.4	0.88	6	1.52	1.00	6	0.00	1	3.17	29.2	0.41	273.5	329.3	263.8	851.4	147.298	1.538	1,104	2,298	4.78	9.7	45.0	0.10	0.23	0.08	146	92.1	42.3	37.2	46.8	1.46	62.0	54.5	46.8	54.5	0.98	1.12	1.10	1.00	0.48	1.30	0.29	0.64	0.020	0.65	0.00	0.00	0.91				
8.90	8.91	227.4	1.89	0.12	227.5	0.83	9	132	0.50	0.50	457.0	313.1	0.83	6	1.50	1.00	6	0.00	1	2.82	29.6	0.41	273.5	319.4	261.7	865.8	144.701	1.511	1,087	2,175	4.83	9.7	45.1	0.10	0.23	0.08	146	92.6	43.0	37.5	47.4	1.46	62.7	54.8	47.4	54.8	0.98	1.12	1.10	1.00	0.48	1.30	0.29	0.65	0.030	0.64	0.00	0.00	0.91				
9.00	8.99	217.8	2.00	0.07	217.8	1.10	9	134	0.50	0.50	432.8	298.1	1.11	6	1.61	1.00	6	0.00	1	4.50	28.2	0.41	273.5	366.9	274.5	900.5	161.190	1.683	1,196	2,392	4.71	9.4	44.8	0.09	0.24	0.08	143	91.1	41.2	37.2	45.4	1.45	59.8	54.1	45.4	54.1	0.98	1.12	1.10	1.00	0.48	1.30	0.30	0.65	0.026	0.69	0.00	0.00	0.91				
9.10	9.08	226.5	2.68	0.04	226.5	1.19	9	134	0.51	0.51	444.8	308.2	1.19	6	1.62	1.00	6	0.00	1	4.76	29.2	0.41	273.5	374.2	282.7	927.5	172.183	1.798	1,269	2,537	4.84	9.5	45.0	0.10	0.24	0.08	145	92.3	42.8	38.9	47.0	1.44	61.8	56.2	47.0	56.2	0.98	1.12	1.10	1.00	0.48	1.30	0.30	0.66	0.023	0.71	0.00	0.00	0.91				
9.20	9.17	205.9	2.88	0.08	205.9	1.40	8	135	0.51	0.51	399.6	282.6	1.40	6	1.71	1.04	6	0.00	1	6.26	26.5	0.41	273.5	416.0	284.2	932.4	174.350	1.821	1,282	2,564	4.57	8.9	44.6	0.09	0.35	0.12	138	89.4	48.7	36.4	43.1	1.43	70.2	52.6	43.1	54.2	0.98	1.12	1.10	1.00	0.48	1.30	0.30	0.64	0.023	0.71	0.02	0.00	0.91				
9.30	9.27	225.5	3.14	0.19	225.6	1.39	8	136	0.52	0.52	432.0	306.0	1.40	6	1.68	1.02	6	0.00	1	5.83	28.8	0.41	273.5	404.2	293.2	969.1	186.813	1.951	1,364	2,729	4.86	9.3	44.9	0.10	0.33	0.11	142	91.9	53.3	39.6	46.5	1.43	76.3	56.7	46.5	57.7	0.97	1.12	1.10	1.00	0.48	1.30	0.31	0.67	0.021	0.74	0.00	0.00	0.91				
9.40	9.35	242.0	3.47	0.34	242.1	1.44	8	137	0.53	0.53	458.9	326.3	1.44	6	1.68	1.02	6	0.00	1	5.72	30.7	0.40	273.5	401.1	302.6	992.0	200.354	2.092	1,453	2,907	5.10	9.7	45.2	0.10	0.32	0.11	145	94.2	57.2	42.4	49.7	1.42	81.4	60.3	49.7	61.2	0.97	1.12	1.10	1.00	0.48	1.30	0.31	0.69	0.019	0.76	0.00	0.00	0.91				
9.50	9.43	256.2	3.36	0.44	256.3	1.31	9	137	0.53	0.53	480.9	340.9	1.32	6	1.63	1.00	6	0.00	1	4.93	32.3	0.40	273.5	379.0	302.7	993.0	200.307	2.092	1,454	2,908	5.30	10.0	45.5	0.11	0.32	0.11	148	96.0	48.4	44.2	52.5	1.41	68.3	62.3	52.5	62.3	0.97	1.12	1.10	1.00	0.48	1.30	0.31	0.70	0.020	0.76	0.00	0.00	0.91				
9.60	9.51	269.3	4.12	0.53	269.4	1.53	8	138	0.54	0.54	500.4	359.3	1.53	6	1.68	1.02	6	0.00	1	5.71	33.7	0.40	273.5	400.7	319.1	1,046.8	225.305	2.353	1,616	3,232	5.50	10.2	45.7	0.11	0.31	0.10	150	97.6	63.6	47.1	55.0	1.40	89.6	66.4	55.0	67.4	0.97	1.12	1.10	1.00	0.48	1.30	0.32	0.72	0.017	0.80	0.00	0.00	0.91				
9.70	9.61	305.8	3.47	0.51	305.9	1.13	9	137	0.54	0.54	561.1	402.4	1.14	6	1.54	1.00	6	0.00	1	3.43	37.9	0.39	273.5	336.9	311.8	1,022.9	231.620	2.331	1,543	3,086	5.98	11.0	46.3	0.12	0.30	0.07	157	100.0	57.8	51.1	62.3	1.39	80.6	71.3	62.3	71.3	0.97	1.12	1.10	1.00	0.48	1.30	0.32	0.75	0.018	0.78	0.00	0.00	0.91				
9.70	9.68	315.3	3.68	0.55	315.4	1.17	9	138	0.55	0.55	573.5	413.1	1.17	6	1.54	1.00	6	0.00	1	3.49	38.9	0.39	273.5	338.4	317.3	1,041.0	222.059	2.319	1,598	3,196	6.11	11.1	46.4	0.12	0.30	0.07	158	100.0	59.6	52.8	64.0	1.39	82.7	73.3	64.0	73.3	0.97	1.12	1.10	1.00	0.48	1.30	0.32	0.76	0.018	0.79	0.00	0.00	0.91				
9.80	9.75	268.7	3.66	0.71	268.8	1.36	9	137	0.55	0.55	484.4	350.5	1.36	6	1.64	0.99	6	0.00	1	5.04	33.3	0.40	273.5	382.0	311.2	1,021.1	212.972	2.224	1,537	3,075	5.52	10.0	45.6	0.11	0.31	0.10	148	97.2	50.8	46.5	54.5	1.38	70.3	64.3	54.5	63.7	0.97	1.12	1.10	1.00	0.48	1.30	0.33	0.73	0.019	0.77	0.00	0.00	0.91				
9.90	9.83	270.0	5.07	0.57	270.1	1.88	8	140	0.56	0.56	482.0	358.4	1.88	6	1.76	1.07	6	0.00	1	7.23	33.3	0.40	273.5	443.1	336.0	1,102.3	252.670	2.639	1,792	3,583	5.57	10.0	45.7	0.11	0.31	0.10	147	97.3	63.8	48.6	54.6	1.38	88.7	67.6	54.8	71.6	0.97	1.12	1.10	1.00	0.48	1.30	0.33	0.74	0.015	0.82	0.00	0.00	0.91				
9.90	9.89	270.6	5.02	0.56	270.7	1.85	8	140	0.56	0.56	479.4	357.4	1.86	6	1.75	1.07	6	0.00	1	7.15	33.3	0.40	273.5	440.7	335.4	1,100.5	251.687	2.628	1,786	3,571	5.59	9.9	45.7	0.11	0.31	0.10	147	97.3	63.9	48.6	54.6	1.37	88.5	67.4	54.8	71.2	0.97	1.12	1.10	1.00	0.48	1.30	0.33	0.74	0.015	0.82	0.00	0.00	0.91				
9.90	9.94	269.3	4.98	0.25	269.3	1.85	8	140	0.57	0.57	474.0	354.5	1.85	6	1.75	1.07	6	0.00	1	7.16	33.0	0.40	273.5	441.2	334.7	1,098.2	250.531	2.616	1,778	3,557	5.57	9.8	45.6	0.11	0.31	0.10	146	97.1	63.6	48.4	54.2	1.37	87.9	66.9	54.4	70.7	0.97	1.12	1.10	1.00	0.48	1.30	0.33	0.74	0.016	0.81	0.00	0.00	0.91				
10.00	9.97	287.2	4.32	0.34	287.2	1.51	8	139	0.57	0.57	503.8	371.1	1.51	6	1.66	1.01	6	0.00	1	5.46	35.1	0.39	273.5	393.7	326.3	1,071.4	236.920	2.474	1,693	3,386	5.80	10.2	45.9	0.12	0.30	0.10	149	99.2	67.8	50.8	57.8	1.36	92.8	68.8	57.8	68.8	0.97	1.1															

$Z_s(f)$	$Z_u(f)$	$q_c(f)$	$f_c(fsf)$	$f_r(fsf)$	$u_2(fsf)$	$q_c(fsf)$	R_f	S_{BT}	$\gamma(pcf)$	$\sigma_{vm}(tsf)$	$\sigma'_{vm}(tsf)$	Q_v	Q_{un}	F_R	$S_{BT_{cs}}$	I_c	K_u	$(S_{BT})_L$	B_u	$(S_{BT})_{B_u}$	$F_c(fsf)$	$q_{1.5m}(Mpa)$	c	R	$\sigma_v(m/s)$	$V_r(m/s)$	$V_r(fsf)$	$G_s(RPa)$	$G_s(fsf)$	$E'(tsf)$	$M(tsf)$	$\sigma'_p(tsf)$	OCR	S_v	$S_v(tsf)$	S_v/σ'_{vm}	$\phi(^{\circ})$	$\zeta'(tsf)$	$C_u(1+\sigma'_{vm}/\sigma'_p)$	$C_u(1+\sigma'_{vm}/\sigma'_p)$	K_B	$D_B(fsf)$	$N_{0.60L}$	$(N_{60})_{L_c}$	$(N_f)_{0.60L}$	C_{γ}	$(N_f)_{0.60L-R}$	$(N_f)_{0.60L_c}$	$(N_f)_{0.60L-R}$	$(N_f)_{0.60L-R}$	$(N_f)_{0.60L-R}$	r_d	MSF	K_{cs}	K_{cs}	$CSR_{z1.5}$	$CRR_{z1.5}$	FS	$\tau_{vm}(tsf)$	$p'(tsf)$	$\gamma_{vm}(tsf)$	G/G_s	$\varepsilon_v(\%)$	ΔS_v	$\Delta S_v(m)$
14.20	14.18	322.4	3.44	1.29	322.6	0.76	9	135	0.86	0.86	373.1	336.8	0.76	6	1.45	1.00	6	0.00	1	2.12	33.4	0.40	273.5	299.2	301.6	989.6	196.243	2.049	1.444	2.888	6.86	8.0	45.4	0.14	0.20	0.07	1.26	99.4	60.9	52.3	58.1	1.11	67.5	58.0	58.1	58.0	0.96	1.12	1.06	1.00	0.49	1.30	0.50	1.01	0.038	0.65	0.00	0.00	0.91						
14.30	14.24	316.7	2.36	1.21	316.9	1.06	9	137	0.87	0.87	364.8	330.1	1.06	6	1.57	1.00	6	0.00	1	3.84	32.8	0.40	273.5	348.3	322.5	1.058.2	228.322	2.384	1.651	3.302	6.78	7.8	45.3	0.14	0.21	0.07	1.25	98.8	59.9	53.4	57.0	1.11	66.2	59.1	57.0	59.1	0.96	1.12	1.06	1.00	0.49	1.30	0.50	1.01	0.030	0.71	0.00	0.00	0.91						
14.30	14.31	313.0	4.08	1.22	313.2	1.30	9	138	0.87	0.87	358.5	325.4	1.31	6	1.64	0.99	6	0.00	1	5.09	32.3	0.40	273.5	383.5	336.5	1.103.9	251.120	2.622	1.797	3.594	6.73	7.7	45.2	0.13	0.31	0.10	1.24	98.3	59.2	54.2	56.3	1.10	65.3	59.8	56.3	59.4	0.96	1.12	1.06	1.00	0.49	1.30	0.50	1.01	0.026	0.74	0.00	0.00	0.91						
14.40	14.37	294.7	4.39	1.23	294.9	1.42	9	139	0.88	0.88	335.8	306.3	1.43	6	1.69	1.03	6	0.00	1	5.93	30.4	0.40	273.5	407.0	336.3	1.103.3	250.914	2.620	1.795	3.590	6.47	7.4	44.9	0.13	0.32	0.11	1.21	96.3	55.7	51.8	52.9	1.10	61.5	57.3	52.9	58.5	0.96	1.12	1.06	1.00	0.49	1.30	0.51	1.00	0.026	0.73	0.00	0.00	0.91						
14.40	14.42	268.1	4.31	1.23	268.3	1.61	8	138	0.88	0.88	304.3	279.2	1.61	6	1.76	1.07	6	0.00	1	7.23	27.6	0.41	273.5	443.1	334.7	1.098.0	248.459	2.595	1.778	3.595	6.06	6.8	44.5	0.12	0.33	0.11	1.16	93.1	63.4	48.3	48.3	1.10	60.3	56.7	48.3	56.7	0.96	1.12	1.06	1.00	0.49	1.30	0.51	0.97	0.027	0.73	0.00	0.00	0.91						
14.40	14.44	299.3	3.56	0.84	298.4	1.46	9	139	0.88	0.88	338.0	309.3	1.47	6	1.70	1.03	6	0.00	1	6.07	30.7	0.40	273.5	410.8	339.9	1.115.0	256.896	2.683	1.833	3.687	6.53	7.4	45.0	0.13	0.31	0.10	1.21	96.6	56.4	53.6	53.5	1.10	62.1	58.0	53.5	59.5	0.96	1.12	1.06	1.00	0.49	1.30	0.51	1.00	0.026	0.74	0.00	0.00	0.91						
14.50	14.47	301.9	4.52	0.77	302.0	1.53	8	139	0.88	0.88	341.2	312.8	1.53	6	1.71	1.04	6	0.00	1	6.33	31.0	0.40	273.5	417.9	344.9	1.131.4	265.372	2.771	1.887	3.775	6.59	7.5	45.0	0.13	0.31	0.10	1.21	97.0	71.3	53.5	54.1	1.10	78.6	59.9	54.1	60.9	0.96	1.12	1.06	1.00	0.49	1.30	0.51	1.01	0.024	0.75	0.00	0.00	0.91						
14.50	14.50	314.3	4.81	0.71	314.5	1.53	8	140	0.88	0.88	354.5	325.2	1.53	6	1.70	1.03	6	0.00	1	6.14	32.3	0.40	273.5	412.8	349.8	1.147.5	273.800	2.859	1.942	3.884	6.78	7.7	45.2	0.14	0.31	0.10	1.23	98.4	74.3	55.5	56.3	1.09	81.7	61.0	56.3	62.7	0.96	1.12	1.06	1.00	0.49	1.30	0.51	1.02	0.023	0.76	0.00	0.00	0.91						
14.60	14.54	301.2	5.08	0.90	301.3	1.69	8	140	0.89	0.89	338.6	311.8	1.69	6	1.75	1.06	6	0.00	1	7.03	30.9	0.40	273.5	437.5	352.5	1.156.4	278.644	2.910	1.972	3.944	6.59	7.4	45.2	0.13	0.31	0.10	1.21	96.9	71.2	54.0	53.9	1.09	78.5	59.6	54.0	62.8	0.96	1.12	1.06	1.00	0.49	1.30	0.51	1.01	0.023	0.77	0.00	0.00	0.91						
14.60	14.59	317.1	4.88	1.03	317.3	1.54	8	140	0.89	0.89	355.2	326.9	1.54	6	1.70	1.03	6	0.00	1	6.16	32.5	0.40	273.5	413.2	351.5	1.153.3	276.797	2.891	1.961	3.922	6.83	7.7	45.3	0.14	0.31	0.10	1.23	98.6	74.9	56.0	56.7	1.09	82.1	61.4	56.7	63.1	0.96	1.12	1.06	1.00	0.49	1.30	0.51	1.03	0.023	0.77	0.00	0.00	0.91						
14.70	14.64	293.1	4.60	1.21	293.3	1.57	8	139	0.89	0.89	327.0	302.0	1.57	6	1.73	1.05	6	0.00	1	6.67	30.0	0.41	273.5	427.3	343.7	1.127.6	263.372	2.750	1.875	3.749	6.47	7.2	44.9	0.13	0.32	0.11	1.19	95.9	69.3	52.3	52.3	1.09	76.0	57.3	52.4	59.8	0.96	1.12	1.06	1.00	0.49	1.30	0.52	1.01	0.025	0.75	0.00	0.00	0.91						
14.70	14.69	319.8	6.86	1.40	320.1	2.14	8	142	0.90	0.90	355.6	330.4	2.15	8	1.82	1.12	6	0.00	1	8.59	32.6	0.40	273.5	480.8	380.8	1.249.5	330.893	3.455	2.302	4.604	6.89	7.7	45.3	0.14	0.31	0.10	1.23	99.7	75.6	58.9	57.1	1.09	83.7	65.4	57.6	71.4	0.96	1.12	1.06	1.00	0.49	1.30	0.52	1.04	0.018	0.81	0.00	0.00	0.91						
14.80	14.75	327.8	8.12	1.62	328.1	2.48	7	144	0.90	0.90	362.7	338.6	2.48	8	1.87	1.16	6	0.00	1	9.70	33.4	0.40	273.5	511.5	397.7	1.304.7	364.214	3.803	2.510	5.020	7.01	7.8	45.4	0.14	0.30	0.10	1.24	100.0	103.3	61.5	58.4	1.08	114.9	68.7	59.4	77.0	0.96	1.12	1.06	1.00	0.49	1.30	0.52	1.05	0.016	0.83	0.00	0.00	0.91						
14.80	14.81	312.9	6.83	1.25	313.1	1.80	8	141	0.91	0.91	344.5	320.7	1.80	6	1.76	1.08	6	0.00	1	7.36	31.8	0.40	273.5	446.5	363.0	1.190.9	297.315	3.105	2.091	4.182	6.77	7.5	45.2	0.14	0.31	0.10	1.21	98.0	73.9	56.5	55.7	1.08	80.9	61.8	55.9	65.6	0.96	1.12	1.06	1.00	0.49	1.30	0.52	1.04	0.021	0.78	0.00	0.00	0.91						
14.80	14.86	303.8	5.53	1.25	303.8	1.82	8	141	0.91	0.91	332.9	310.6	1.83	6	1.78	1.08	6	0.00	1	7.62	30.8	0.40	273.5	453.7	360.4	1.182.3	292.643	3.056	2.061	4.122	6.66	7.3	45.0	0.13	0.31	0.10	1.20	97.0	71.7	55.0	54.0	1.08	78.4	60.2	54.9	64.3	0.95	1.12	1.06	1.00	0.49	1.30	0.52	1.03	0.022	0.78	0.00	0.00	0.91						
14.90	14.91	315.1	5.07	1.20	315.3	1.61	8	140	0.91	0.91	344.2	321.0	1.61	6	1.72	1.05	6	0.00	1	6.54	31.9	0.40	273.5	423.8	354.9	1.164.3	282.626	2.951	1.999	3.997	6.83	7.5	45.2	0.14	0.31	0.10	1.21	98.2	74.4	56.0	56.0	1.08	80.7	60.8	56.0	63.2	0.95	1.12	1.06	1.00	0.49	1.30	0.53	1.04	0.023	0.77	0.00	0.00	0.91						
15.00	14.95	385.5	5.26	1.09	385.6	1.36	9	141	0.92	0.92	419.9	390.7	1.37	6	1.61	1.00	6	0.00	1	4.60	39.0	0.39	273.5	369.8	366.7	1.203.1	303.484	3.169	2.134	4.269	7.84	8.6	46.1	0.16	0.30	0.10	1.31	100.0	72.9	66.1	68.4	1.07	78.3	71.0	68.4	71.0	0.95	1.12	1.06	1.00	0.49	1.30	0.53	1.11	0.021	0.79	0.00	0.00	0.91						
15.00	14.98	428.3	5.19	0.62	428.4	1.21	9	141	0.92	0.92	465.5	433.6	1.21	6	1.55	1.00	6	0.00	1	3.52	43.2	0.38	273.4	339.4	370.3	1.214.9	309.797	3.235	2.176	4.352	8.41	9.2	46.6	0.17	0.20	0.07	1.37	100.0	80.9	71.8	75.9	1.07	86.9	77.0	75.9	77.0	0.95	1.12	1.06	1.00	0.49	1.30	0.53	1.14	0.020	0.80	0.00	0.00	0.91						
15.00	15.01	445.3	5.01	0.53	445.4	1.13	9	141	0.92	0.92	482.9	450.4	1.13	6	1.51	1.00	6	0.00	1	2.99	44.9	0.38	273.4	324.4	369.1	1.211.1	307.523	3.211	2.163	4.325	8.64	9.4	46.8	0.17	0.20	0.07	1.39	100.0	84.2	73.7	78.9	1.07	90.2	79.1	78.9	79.1	0.95	1.12	1.06	1.00	0.49	1.30	0.53	1.16	0.021	0.80	0.00	0.00	0.91						
15.10	15.05	467.0	4.74	0.56	467.1	1.01	9	141	0.92	0.92	504.9	471.6	1.02	6	1.46	1.00	6	0.00	1	2.32	47.0	0.37	273.4	305.0	366.5	1.202.6	302.564	3.160	2.132	4.265	8.92	9.7	47.0	0.18	0.20	0.07	1.41	100.0	88.3	76.1	82.7	1.07	94.5	81.5	82.7	81.5	0.95	1.12	1.06	1.00	0.49	1.30	0.53	1.18	0.021	0.80	0.00	0.00	0.91						
15.10	15.10	503.7	4.41	0.44	503.8	0.87	10	140	0.93	0.93	542.6	507.8	0.88	6	1.39	1.00	6	0.00	1	1.41	50.6	0.37	273.4	278.6	363.9	1.193.8	297.431	3.106	2.102	4.203	9.38	10.1	47.4	0.18	0.20	0.07	1.45																												

Zs(ft)	Zs(m)	q _c (tsf)	f ₁ (tsf)	u ₂ (tsf)	q _s (tsf)	R _f	S _{BT}	γ(ppcf)	σ _{vm} (tsf)	σ _{vm'} (tsf)	Q _v	Q _{un}	F _h	S _{BT} x _h	I _c	K _{cs}	(S _{BT}) _{cs}	B _{cs}	(S _{BT}) _h	F _c (kPa)	q _{1.5m} (Mpa)	c	R	σ _v (m/s)	V _h (m/s)	V _v (m/s)	G ₁ (kPa)	G ₂ (kPa)	E'(tsf)	M(tsf)	σ _{p'} (tsf)	OCR	S _i	S _i (tsf)	S _i σ _{vm'}	φ(°)	z'(ft)	C _u (1+e _{cs}) ₀	C _u (1+e _{cs}) ₁₀	K _s	D ₅₀ (%)	N ₆₀ AS	(N ₆₀) _{cs}	(N ₆₀) _{AS}	C _{yc}	(N ₆₀) _{AS} AS	(N ₆₀) _{AS} cs	(N ₆₀) _{AS} AS	(N ₆₀) _{AS} AS	r _d	MSF	K _{cs}	K _{cs}	CSR _{z:1}	CSR _{z:1.5}	FS	τ _{vm} (tsf)	p'(tsf)	γ _{max} (%)	G/G _s	ε _v (%)	ΔS _v	ΔS _h (in)
20.20	20.20	106.4	1.34	0.29	106.5	1.26	8	127	1.27	1.27	83.1	89.1	1.28	6	2.01	1.30	6	0.00	1	13.14	9.2	0.49	273.7	607.9	245.9	806.6	123.349	1.288	959	1.919	2.94	2.3	39.1	0.06	0.74	0.25	0.63	70.4	25.1	21.0	12.1	0.91	25.8	21.9	14.7	25.0	0.99	1.05	0.97	1.00	0.55	0.22	0.71	0.95	0.379	0.15	0.63	0.01	0.80				
20.30	20.28	104.3	1.35	0.31	104.4	1.29	8	127	1.27	1.27	81.2	87.1	1.31	6	2.02	1.32	6	0.00	1	13.52	9.0	0.49	273.8	618.7	245.5	806.6	123.020	1.285	957	1.914	2.88	2.3	38.9	0.06	0.75	0.25	0.62	70.3	24.7	20.7	11.7	0.91	25.4	21.7	14.4	24.9	0.99	1.05	0.97	1.00	0.55	0.21	0.72	0.95	0.392	0.14	0.66	0.01	0.80				
20.40	20.36	106.1	1.35	0.35	106.2	1.27	8	127	1.28	1.28	82.2	88.4	1.29	6	2.01	1.31	6	0.00	1	13.27	9.2	0.49	273.7	611.6	246.3	808.0	123.805	1.293	963	1.925	2.93	2.2	39.0	0.06	0.74	0.25	0.62	70.3	25.1	21.0	12.0	0.91	25.7	21.8	14.6	25.0	0.99	1.05	0.97	1.00	0.55	0.22	0.72	0.96	0.382	0.15	0.64	0.01	0.79				
20.50	20.45	103.1	1.49	0.39	103.4	1.44	8	128	1.28	1.28	79.7	85.6	1.46	5	2.06	1.37	5	0.00	1	14.54	8.9	0.49	273.6	647.5	249.9	820.0	128.179	1.339	992	1.983	2.85	2.2	38.9	0.06	0.84	0.28	0.62	71.0	24.4	20.8	11.4	0.91	25.5	22.1	14.5	25.9	0.99	1.05	0.97	1.00	0.55	0.23	0.72	0.95	0.338	0.16	0.55	0.01	0.78				
20.60	20.54	105.9	1.48	0.38	105.9	1.39	8	128	1.29	1.29	81.3	87.3	1.41	6	2.04	1.35	6	0.00	1	14.06	9.1	0.49	273.8	639.9	250.4	821.4	128.615	1.343	995	1.990	2.90	2.2	39.0	0.06	0.73	0.24	0.62	71.1	25.0	21.2	11.8	0.91	25.9	22.2	14.8	25.9	0.99	1.05	0.97	1.00	0.55	0.23	0.72	0.96	0.334	0.16	0.54	0.01	0.78				
20.70	20.63	111.6	1.49	0.36	111.7	1.34	8	128	1.29	1.29	85.4	92.3	1.35	6	2.01	1.31	6	0.00	1	13.25	9.6	0.49	273.7	611.1	251.5	820.4	131.034	1.368	1002	2.024	3.07	2.4	39.2	0.06	0.73	0.24	0.64	71.5	26.4	21.1	12.9	0.90	26.7	22.7	15.5	26.1	0.99	1.06	0.97	1.00	0.55	0.23	0.73	0.98	0.305	0.17	0.49	0.01	0.77				
20.80	20.73	99.9	1.57	0.34	99.9	1.57	7	128	1.30	1.30	75.9	81.8	1.59	5	2.09	1.44	5	0.00	1	15.65	8.5	0.49	273.8	679.3	251.7	825.6	130.240	1.360	1005	2.030	2.75	2.1	38.6	0.06	0.84	0.28	0.60	71.0	31.5	20.4	10.6	0.90	32.5	22.0	14.1	26.4	0.95	1.05	0.97	1.00	0.55	0.22	0.73	0.95	0.333	0.16	0.55	0.01	0.76				
20.90	20.82	91.3	1.65	0.26	91.3	1.81	7	129	1.31	1.31	69.0	74.1	1.84	5	2.17	1.58	5	0.00	1	17.92	7.8	0.50	273.8	744.9	251.7	825.9	130.500	1.363	1006	2.011	2.51	1.9	38.2	0.05	0.85	0.28	0.57	70.1	28.8	19.2	9.0	0.90	30.8	21.6	13.1	27.3	0.93	1.05	0.97	1.00	0.55	0.21	0.73	0.93	0.349	0.15	0.59	0.01	0.76				
21.00	20.92	81.8	1.10	0.25	81.8	1.34	8	125	1.31	1.31	61.4	66.3	1.36	5	2.12	1.48	5	0.00	1	16.35	6.9	0.51	273.8	699.4	230.7	757.0	106.780	1.115	845	1.690	2.25	1.7	37.6	0.04	0.90	0.30	0.54	66.4	19.3	16.9	7.3	0.90	21.2	18.9	11.0	22.4	0.93	1.04	0.97	1.00	0.56	0.17	0.74	0.91	0.380	0.07	1.96	0.02	0.73				
21.10	21.05	69.1	0.63	0.27	69.2	0.91	8	121	1.32	1.32	51.4	55.8	0.92	5	2.07	1.40	5	0.00	1	15.05	5.8	0.52	273.8	662.1	206.0	676.0	81.984	856	674	1.348	1.87	1.4	36.8	0.04	0.98	0.33	0.49	61.1	16.3	14.0	5.1	0.90	17.8	15.7	8.4	17.6	0.93	1.03	0.97	1.00	0.56	0.14	0.74	0.87	1.000	0.59	2.59	0.03	0.70				
21.20	21.18	55.5	0.75	0.27	55.5	1.36	7	121	1.33	1.33	40.8	43.8	1.39	5	2.26	1.81	5	-0.01	1	20.98	4.6	0.54	273.9	834.9	206.8	678.5	81.73	869	679	1.59	1.44	1.1	35.7	0.03	0.37	0.13	0.44	60.3	17.5	12.1	2.9	0.89	20.7	15.5	7.6	19.6	0.93	1.03	0.97	1.00	0.56	0.14	0.74	0.83	1.000	0.59	2.62	0.03	0.67				
21.30	21.28	41.9	0.78	0.25	42.0	1.86	6	121	1.33	1.33	30.5	32.4	1.92	5	2.44	2.47	5	-0.01	1	28.07	3.4	0.56	273.9	1,051.9	201.0	659.5	78.310	818	641	569	1.33	0.7	34.2	0.02	0.51	0.05	0.37	57.2	15.9	9.9	1.2	0.89	20.6	14.7	6.4	21.9	0.93	1.02	0.97	1.00	0.56	0.13	0.75	0.77	1.000	0.59	1.86	0.02	0.65				
21.30	21.32	43.7	0.79	0.19	43.7	1.80	7	121	1.34	1.34	31.7	33.8	1.86	5	2.42	2.37	5	0.00	1	27.12	3.6	0.56	273.9	1,022.2	202.4	660.6	79.472	830	650	594	1.34	0.8	34.4	0.02	0.49	0.05	0.38	57.6	13.8	10.2	1.3	0.89	18.3	14.8	6.6	21.6	0.93	1.02	0.97	1.00	0.56	0.13	0.75	0.78	1.000	0.59	1.87	0.00	0.65				
21.40	21.35	45.5	0.80	0.21	45.5	1.76	7	121	1.34	1.34	33.0	35.2	1.81	5	2.40	2.29	5	0.00	1	26.29	3.7	0.55	273.9	996.3	203.9	668.9	80.795	844	660	618	1.34	0.8	34.6	0.02	0.47	0.05	0.39	58.1	14.3	10.6	1.5	0.89	18.7	15.0	6.7	21.5	0.93	1.02	0.97	1.00	0.56	0.13	0.75	0.79	1.000	0.59	1.86	0.02	0.63				
21.40	21.41	48.4	0.81	0.22	48.4	1.67	7	122	1.34	1.34	35.1	37.5	1.71	5	2.36	2.15	5	0.00	1	24.88	4.0	0.55	273.9	952.6	205.9	674.6	82.541	862	673	659	1.34	0.9	34.9	0.02	0.44	0.04	0.40	58.8	15.2	11.1	1.9	0.89	19.4	15.2	7.0	21.1	0.93	1.02	0.97	1.00	0.56	0.13	0.75	0.81	1.000	0.59	1.86	0.00	0.63				
21.50	21.48	47.6	0.88	0.22	47.7	1.84	7	122	1.35	1.35	34.4	36.8	1.89	5	2.39	2.28	5	0.00	1	26.18	3.9	0.55	273.9	992.9	208.5	683.9	85.041	888	680	648	1.35	0.9	34.8	0.02	0.45	0.04	0.40	58.8	15.0	11.1	1.8	0.89	19.4	15.4	7.0	22.3	0.93	1.02	0.97	1.00	0.56	0.13	0.75	0.80	1.000	0.59	1.86	0.00	0.63				
21.60	21.57	45.1	0.99	0.23	45.1	2.42	6	124	1.35	1.35	32.4	34.4	2.49	5	2.49	2.70	5	-0.01	1	30.21	3.7	0.55	273.9	1,119.9	215.2	706.0	91.737	958	735	613	1.35	0.8	34.5	0.02	0.48	0.05	0.38	58.6	17.0	10.9	1.5	0.88	22.1	15.9	6.8	26.1	0.93	1.02	0.97	1.00	0.56	0.13	0.76	0.80	1.000	0.59	1.86	0.00	0.63				
21.70	21.66	40.2	1.06	0.23	40.2	2.65	6	123	1.36	1.36	28.6	30.2	2.74	4	2.61	2.00	4	-0.01	1	35.74	3.2	0.56	274.0	1,301.2	218.5	716.9	94.230	984	744	524	1.29	0.1	2.6	2.77	2.15	33.9	2.77	0.54	0.18	2.86	15.2	10.3	0.5	0.88	21.1	15.9	6.0	7.8	0.93	1.01	0.98	1.00	0.56	0.10	0.76	3.04	0.00	0.63					
21.80	21.76	33.3	0.93	0.23	33.4	2.78	6	122	1.36	1.36	23.5	24.6	2.89	4	2.69	2.00	4	-0.01	1	39.91	2.6	0.58	274.0	1,443.2	208.9	685.5	85.095	889	748	10.67	8.2	2.5	2.29	1.76	32.9	2.29	0.67	0.22	2.35	12.6	8.9	0.4	0.88	18.3	14.4	6.0	6.7	0.93	1.01	0.98	1.00	0.56	0.10	0.76	2.59	0.00	0.63						
21.90	21.86	37.9	1.01	0.22	37.9	2.66	6	123	1.37	1.37	26.7	28.1	2.75	4	2.63	2.00	4	-0.01	1	36.98	3.0	0.57	274.0	1,342.8	215.3	706.5	91.087	951	752	512	1.28	9.4	2.6	2.61	2.01	33.5	2.61	0.58	0.19	2.67	14.3	9.9	0.5	0.88	20.1	15.4	6.0	7.3	0.93	1.01	0.98	1.00	0.56	0.10	0.77	2.89	0.00	0.63					
22.00	21.96	48.0	1.04	0.22	48.0	2.17	6	123	1.38	1.38	33.9	36.3	2.23	5	2.44	2.47	5	0.00	1	28.10	3.9	0.55	273.9	1,052.7	215.5	706.9	91.825	959	737	653	1.38	0.9	34.8	0.02	0.45	0.05	0.39	59.1	18.1	11.4	1.8	0.88	22.7	15.9	7.0	24.7	0.93	1.02	0.97	1.00	0.56	0.13	0.77	0.82	1.000	0.59	1.86	0.00	0.63				
22.10	22.05	54.0	1.11	0.22	54.0	2.05	7</																																																								

Z_s (ft)	Z_u (ft)	q_c (tsf)	f_s (tsf)	w_z (tsf)	q_u (tsf)	R_f	S_{BT}	γ (pcf)	σ_{vm} (tsf)	σ'_{vm} (tsf)	Q_u	Q_m	F_R	$S_{BT_{cs}}$	I_c	K_u	(S_{BT}) L_c	B_u	(S_{BT}) B_u	F_c (kPa)	$q_{1.5m}$ (Mpa)	c	R	σ_v (m/s)	V_s (m/s)	V_s (ft/s)	G_s (kPa)	G_s (tsf)	E' (tsf)	M (tsf)	σ'_p (tsf)	OCR	S_v	S_v (tsf)	S_v σ'_p	ϕ (°)	ζ' (tsf)	$C_u(1+e_0)/P_0$	$C_u(1+e_0)/P_0$	K_B	D_R (Pa)	$N_{60,BSL}$	(N_6) L_c	(N_6) $B_{60,BSL}$	C_{γ}	(N_6) $B_{60,BSL}$	(N_6) $B_{60,BSL}$	(N_6) $B_{60,BSL}$	(N_6) $B_{60,BSL}$	r_d	MSF	K_{cs}	K_{cs}	CSR $_{z=1}$	CR $_{R=1}$	FS	τ_{vm} (tsf)	p (tsf)	γ_{vm} (tsf)	G/G $_s$	ε_v (%)	ΔS_v	ΔS_v (in)		
31.00	30.95	290.4	4.37	0.77	290.5	1.50	8	139	1.94	1.94	148.4	194.7	1.51	6	1.82	1.12	6	0.00	1	8.56	21.3	0.43	273.6	479.9	361.8	1,186.9	290.934	3.038	2,077	4,154	7.16	3.7					42.8	0.14	0.46	0.15	0.78	89.0	68.6	53.5	40.3	0.74	51.8	40.5	40.9	44.0	0.88	1.12	0.83	1.00	0.58	1.30	1.04	1.66	0.057	0.60	0.05	0.00	0.32		
31.10	31.04	282.6	4.36	0.79	282.8	1.50	8	139	1.95	1.95	149.3	188.5	1.55	6	1.84	1.13	6	0.00	1	8.95	20.8	0.43	273.6	490.2	360.7	1,183.4	289.064	3.019	2,065	4,130	7.00	3.6					42.8	0.14	0.47	0.16	0.77	88.6	68.8	52.3	38.8	0.74	50.5	39.7	39.5	43.5	0.88	1.12	0.83	1.00	0.58	1.30	1.04	1.65	0.058	0.59	0.05	0.00	0.32		
31.20	31.14	266.3	4.04	0.82	266.4	1.52	8	138	1.96	1.96	135.1	176.8	1.53	6	1.85	1.14	6	0.00	1	9.19	19.4	0.44	273.6	492.7	352.5	1,156.7	274.704	2.869	1,973	3,945	6.66	3.4					42.3	0.13	0.50	0.17	0.75	88.8	62.9	49.5	35.7	0.74	47.7	37.7	36.5	41.4	0.88	1.12	0.84	1.00	0.57	1.30	1.04	1.63	0.065	0.56	0.06	0.00	0.32		
31.30	31.24	215.7	3.52	0.83	215.9	1.63	8	136	1.96	1.96	108.8	140.5	1.65	6	1.93	1.23	6	0.00	1	11.22	15.5	0.45	273.6	554.3	334.7	1,097.9	244.721	2,556	1,777	3,555	5.55	2.8					41.2	0.11	0.55	0.18	0.68	83.2	51.0	41.4	26.3	0.73	39.7	32.5	28.0	36.9	0.88	1.12	0.86	1.00	0.55	1.30	1.05	1.54	0.086	0.48	0.09	0.00	0.31		
31.30	31.32	203.5	3.03	0.76	203.6	1.49	8	135	1.97	1.97	102.3	132.5	1.50	6	1.92	1.20	6	0.00	1	10.95	14.5	0.46	273.7	546.4	322.7	1,058.6	238.387	2,334	1,653	3,395	5.27	2.7					40.9	0.11	0.59	0.20	0.65	80.3	48.1	38.9	24.1	0.73	37.3	30.4	25.8	34.3	0.88	1.11	0.87	1.00	0.56	0.83	1.06	1.52	0.106	0.42	0.12	0.00	0.31		
31.50	31.41	193.5	2.96	0.75	193.6	1.08	9	132	1.98	1.98	95.9	126.2	1.09	6	1.84	1.13	6	0.00	1	9.06	13.6	0.46	273.7	493.7	297.4	975.8	187.173	1,955	1,404	2,898	5.02	2.5					40.7	0.10	0.70	0.23	0.64	73.6	36.2	35.5	21.9	0.73	27.5	27.0	22.6	29.5	0.88	1.07	0.90	1.00	0.56	0.28	1.05	1.50	0.180	0.30	0.23	0.01	0.31		
31.60	31.55	169.2	2.66	0.70	169.3	0.98	9	130	1.99	1.99	84.3	110.8	0.99	6	1.86	1.14	6	0.00	1	9.39	11.9	0.47	273.7	502.9	282.0	925.2	165.831	1,732	1,262	2,535	4.48	2.3					40.1	0.09	0.75	0.25	0.60	69.9	32.0	31.6	18.0	0.73	24.5	24.2	18.8	26.4	0.88	1.05	0.91	1.00	0.56	0.21	1.06	1.46	0.283	0.22	0.42	0.01	0.30		
31.70	31.68	161.1	1.42	0.63	161.2	0.88	9	129	1.99	1.99	79.8	105.4	0.89	6	1.84	1.13	6	0.00	1	9.08	11.3	0.47	273.7	494.4	272.7	894.7	153.499	1,603	1,180	2,361	4.28	2.1					39.9	0.09	0.79	0.26	0.59	67.0	30.4	29.9	16.5	0.73	23.1	22.7	17.3	24.7	0.88	1.04	0.91	1.00	0.56	0.18	1.06	1.44	0.391	0.17	0.64	0.01	0.30		
31.80	31.78	137.9	1.81	0.60	138.0	1.31	8	120	2.00	2.00	68.0	87.1	1.33	6	2.01	1.30	6	0.00	1	13.19	9.6	0.49	273.7	609.5	279.8	918.1	163.442	1,707	1,243	2,486	3.63	1.8					38.9	0.09	0.73	0.24	0.54	71.1	32.6	27.2	12.7	0.73	26.5	22.7	15.2	25.8	0.88	1.05	0.90	1.00	0.56	0.23	1.06	1.39	0.00	0.00	0.00	0.30			
32.00	31.89	102.0	2.79	0.51	102.1	2.73	6	133	2.01	2.01	49.8	60.2	2.79	5	2.33	2.02	5	-0.01	1	23.51	6.9	0.51	273.8	911.1	295.5	962.9	183.232	1,913	1,367	1,401	2.58	1.3					37.2	0.05	0.27	0.09	0.46	68.9	38.5	23.0	7.1	0.73	35.0	22.5	12.1	33.7	0.88	1.05	0.91	1.00	0.56	0.20	1.07	1.28	0.00	0.00	0.00	0.30			
32.00	31.99	70.5	2.93	0.51	70.6	4.16	5	132	2.01	2.01	49.8	60.2	2.79	4	2.68	2.00	4	-0.01	1	39.37	4.7	0.54	273.9	1,424.7	304.0	997.2	195.702	2,044							961	22.87	12.8	1.7	4.90	2.75	35.0	0.40	0.43	0.14	3.41	33.3	18.8	1.3	0.72	34.0	21.4	6.9	9.6	0.88	1.01	0.95	1.00	0.55	1.30	1.07	5.25	0.00	0.00	0.00	0.30
32.10	32.03	82.0	2.85	0.36	82.1	3.47	6	132	2.02	2.02	39.7	46.7	3.56	4	2.47	2.60	5	0.00	1	29.33	5.5	0.53	273.9	1,091.6	287.3	946.7	175.109	1,829	1,313	1,120	2.02	1.0					36.0	0.04	0.35	0.04	0.41	64.9	31.0	19.7	4.4	0.72	30.5	21.0	9.7	37.1	0.88	1.03	0.92	1.00	0.56	0.16	1.07	1.22	0.00	0.00	0.00	0.30			
32.10	32.09	77.3	2.69	0.47	77.3	3.49	6	132	2.02	2.02	37.3	43.7	3.58	4	2.49	2.70	5	0.00	1	30.20	5.1	0.53	273.9	1,119.4	282.3	926.1	168.266	1,757	1,265	1,054	2.02	0.9					35.6	0.04	0.38	0.04	0.39	63.7	29.2	18.2	3.8	0.72	29.1	20.4	9.1	36.6	0.88	1.03	0.92	1.00	0.56	0.15	1.07	1.20	0.00	0.00	0.00	0.30			
32.30	32.19	78.1	2.42	0.67	78.2	3.10	6	131	2.03	2.03	37.6	44.4	3.18	5	2.45	2.51	5	-0.01	1	28.50	5.2	0.53	273.9	1,065.3	277.0	908.7	161.062	1,682	1,218	1,067	2.03	0.9					35.7	0.04	0.37	0.04	0.39	63.6	29.5	18.6	3.8	0.72	29.0	20.0	9.1	33.8	0.88	1.03	0.92	1.00	0.56	0.15	1.08	1.21	0.00	0.00	0.00	0.30			
32.40	32.31	79.0	2.41	0.85	79.1	3.05	6	131	2.04	2.04	37.9	44.9	3.12	5	2.44	2.48	5	-0.01	1	28.14	5.2	0.53	273.9	1,054.0	277.1	909.0	161.141	1,683	1,218	1,079	2.04	0.9					35.8	0.04	0.37	0.04	0.40	63.7	29.8	18.7	3.9	0.72	29.1	20.0	9.2	33.5	0.88	1.03	0.92	1.00	0.56	0.15	1.08	1.22	0.00	0.00	0.00	0.30			
32.50	32.43	117.3	2.49	0.90	117.5	2.12	7	132	2.04	2.04	56.5	70.2	2.16	5	2.21	1.67	5	-0.01	1	19.23	8.0	0.50	273.8	783.1	292.3	958.9	180.999	1,890	1,356	1,616	3.02	1.5					37.9	0.06	0.23	0.08	0.49	70.8	37.0	25.1	9.2	0.72	32.0	22.9	13.6	30.2	0.88	1.05	0.90	1.00	0.56	0.22	1.08	1.35	0.00	0.00	0.00	0.30			
32.60	32.54	121.3	2.48	0.86	121.4	2.05	7	132	2.05	2.05	58.2	72.7	2.08	5	2.19	1.62	5	-0.01	1	18.54	8.2	0.50	273.8	763.0	293.4	967.3	182.529	1,906	1,366	2,733	3.13	1.5					38.1	0.06	0.23	0.08	0.50	71.4	38.2	25.7	9.8	0.72	32.7	23.1	14.0	30.0	0.88	1.06	0.90	1.00	0.56	0.23	1.09	1.36	0.00	0.00	0.00	0.30			
32.70	32.66	121.4	2.72	0.89	121.5	2.24	7	133	2.06	2.06	58.0	72.2	2.28	5	2.21	1.69	5	-0.01	1	19.48	8.2	0.50	273.8	790.5	298.8	980.2	190.206	1,986	1,417	1,673	3.13	1.5					38.0	0.06	0.23	0.08	0.50	71.8	38.2	26.1	9.8	0.72	33.0	23.6	14.2	31.6	0.88	1.06	0.90	1.00	0.56	0.24	1.09	1.37	0.212	0.26	0.33	0.00	0.29		
32.80	32.78	121.4	2.64	0.87	121.5	2.17	7	133	2.07	2.07	57.8	72.1	2.21	5	2.21	1.67	5	-0.01	1	19.17	8.2	0.50	273.8	781.5	297.0	974.6	187.707	1,960	1,400	1,672	3.13	1.5					38.0	0.06	0.23	0.08	0.50	71.6	38.2	26.0	9.7	0.72	32.9	23.4	14.1	31.0	0.88	1.06	0.90	1.00	0.56	0.24	1.09	1.37	0.223	0.25	0.35	0.00	0.29		
32.90	32.88	121.5	2.76	1.03	121.7	2.28	7	133	2.07	2.07	57.7	71.8	2.31	5	2.22	1.71	5	-0.01	1	19.67	8.2	0.50	273.8	796.1	300.0	984.1	191.927	2,004	1,428	1,674	3.13	1.5					38.0	0.06	0.23	0.08	0.49	71.8	38.3	26.1	9.7	0.71	33.0	23.7	14.2	31.9	0.88	1.06	0.90	1.00	0.56	0.24	1.10	1.37	0.208	0.26	0.33	0.00	0.28		
33.00	33.00	148.0	2.93	0.86	148.1	1.98	7	134	2.08	2.08	70.2	89.4	2.01	5	2.12	1.48	5	-0.01	1	16.32</																																													

Zs(ft)	Zs(m)	q _c (tsf)	f _s (tsf)	u ₂ (tsf)	q _s (tsf)	R _f	S _{BT}	γ(pcf)	σ _{vm} (tsf)	σ _{av} (tsf)	Q _v	Q _{un}	F _g	S _{BT} x _z	I _c	K _{cs}	(S _{BT}) _L	B _{cs}	(S _{BT}) _{us}	F _c (tsf)	q _{1.5m} (Mpa)	c	R	σ _v (m/s)	V _r (m/s)	V _r (ft/s)	G ₁ (kPa)	G ₂ (tsf)	E'(tsf)	M(tsf)	σ _p '(tsf)	OCR	S _i	S _i (tsf)	S _i σ _{av} '	φ(°)	z'(ft)	C _u (1+e ₀) ^{0.95}	C _u (1+e ₀) ^{0.70}	K _g	D _g (P _u)	N ₆₀ ESL	(N ₁) _{ESL}	C _{ys}	(N ₁) _{ESL} ESL	(N ₁) _{ESL} ESL	(N ₁) _{ESL} ESL	(N ₁) _{ESL} ESL	r _d	MSF	K _{cs}	K _{cs}	CSR _z	CSR _z	FS	τ _{av} (tsf)	p'(tsf)	γ _{ms}	G/G _s	ε _v (%)	ΔS _v	ΔS _v (in)
40.60	40.57	387.1	3.05	3.65	387.7	0.79	10	137	2.60	2.39	160.9	242.0	0.79	6	1.56	1.00	6	-0.01	1	3.69	26.3	0.41	273.5	344.1	353.9	1,161.0	274.476	2,866	1,988	3,975	9.33	3.9	43.8	0.19	0.21	0.07	0.79	96.5	61.0	65.2	53.1	0.66	40.5	43.3	53.1	43.3	0.84	1.12	0.76	1.00	0.65	1.30	2.00	1.31	2.06	0.000	0.00	0.00	0.01			
40.70	40.64	373.4	2.92	3.10	374.0	0.78	10	136	2.60	2.40	155.0	233.2	0.79	6	1.57	1.00	6	-0.01	1	3.82	25.3	0.42	273.5	347.9	349.5	1,146.5	266.816	2,786	1,938	3,876	9.06	3.8	43.8	0.18	0.22	0.07	0.78	93.5	58.8	63.0	51.0	0.66	39.1	41.9	51.0	41.9	0.84	1.12	0.75	1.00	0.65	1.30	2.00	1.32	2.04	0.000	0.00	0.00	0.01			
40.80	40.59	360.5	2.82	2.97	361.1	0.78	10	136	2.61	2.40	149.5	225.0	0.79	6	1.58	1.00	6	-0.01	1	4.00	24.3	0.42	273.6	352.8	345.7	1,134.2	260.433	2,720	1,897	3,793	8.81	3.7	43.5	0.18	0.22	0.07	0.76	94.1	56.8	61.1	49.0	0.66	37.7	40.6	49.0	40.6	0.84	1.12	0.75	1.00	0.65	1.30	2.00	1.32	2.02	0.000	0.00	0.00	0.01			
40.90	40.76	342.3	2.80	3.07	342.8	0.82	9	136	2.61	2.40	141.7	213.5	0.82	6	1.61	1.00	6	-0.01	1	4.49	23.0	0.42	273.6	366.4	343.3	1,126.3	256.525	2,679	1,871	3,741	8.45	3.5	43.2	0.17	0.23	0.08	0.75	92.4	54.7	58.6	46.2	0.66	43.0	38.9	46.2	38.9	0.84	1.12	0.75	1.00	0.65	1.30	2.00	1.32	1.99	0.000	0.00	0.00	0.01			
40.90	40.84	326.0	2.46	3.03	326.6	0.82	9	135	2.62	2.40	134.8	203.1	0.82	6	1.62	1.00	6	-0.01	1	4.72	21.1	0.43	273.6	373.0	337.9	1,108.7	247.565	2,585	1,812	3,625	8.12	3.4	43.0	0.16	0.24	0.11	0.73	92.4	54.7	58.6	43.3	0.66	40.9	37.2	43.3	37.2	0.84	1.12	0.75	1.00	0.65	1.30	2.00	1.32	1.97	0.000	0.00	0.00	0.01			
40.90	40.89	311.9	2.85	2.55	312.3	0.91	9	136	2.62	2.41	138.8	192.7	0.92	6	1.67	1.01	6	-0.01	1	5.58	20.8	0.43	273.6	397.0	340.9	1,118.4	252.706	2,639	1,844	3,589	7.81	3.3	42.7	0.16	0.35	0.12	0.72	88.5	59.0	54.5	40.8	0.66	39.2	36.3	39.2	36.3	0.84	1.12	0.77	1.00	0.64	1.30	2.00	1.32	1.95	0.000	0.00	0.00	0.01			
41.00	40.96	324.3	3.09	3.26	324.7	0.95	9	136	2.62	2.41	133.8	200.2	0.96	6	1.67	1.01	6	-0.01	1	5.60	21.7	0.43	273.6	397.6	347.9	1,141.3	264.535	2,762	1,921	3,841	8.07	3.4	43.0	0.16	0.34	0.11	0.73	90.2	61.3	56.7	43.0	0.66	40.8	37.7	43.0	37.7	0.84	1.12	0.75	1.00	0.65	1.30	1.99	1.32	1.97	0.013	0.00	0.00	0.01			
41.10	41.03	303.1	3.21	2.33	303.5	1.06	9	137	2.63	2.41	124.8	184.4	1.07	6	1.73	1.05	6	-0.01	1	6.63	20.2	0.43	273.6	425.7	347.9	1,141.4	264.821	2,765	1,921	3,842	7.60	3.2	42.5	0.15	0.36	0.12	0.70	87.3	57.3	54.0	38.9	0.66	38.3	36.1	38.9	37.6	0.83	1.12	0.78	1.00	0.63	1.30	2.00	1.33	1.94	0.000	0.00	0.00	0.01			
41.10	41.10	322.6	3.49	2.47	323.0	1.08	9	137	2.63	2.41	132.8	196.9	1.09	6	1.71	1.04	6	-0.01	1	6.38	21.5	0.43	273.6	419.4	356.3	1,169.1	273.416	2,918	2,015	4,031	8.01	3.3	42.8	0.16	0.34	0.11	0.72	90.0	61.0	57.2	42.6	0.66	40.7	38.2	42.6	39.5	0.83	1.12	0.75	1.00	0.63	1.30	1.99	1.33	1.97	0.019	0.00	0.00	0.01			
41.20	41.17	355.3	3.83	2.77	355.7	1.08	9	138	2.64	2.42	146.2	218.4	1.09	6	1.68	1.02	6	-0.01	1	5.83	23.9	0.42	273.6	404.0	367.2	1,204.7	298.728	3,120	2,140	4,280	8.69	3.6	43.3	0.17	0.33	0.11	0.76	93.6	67.1	62.4	48.1	0.66	44.6	41.5	48.1	42.2	0.83	1.12	0.75	1.00	0.65	1.30	1.99	1.33	2.02	0.025	0.00	0.00	0.01			
41.30	41.25	407.7	4.78	3.21	408.2	1.17	9	140	2.64	2.42	167.7	251.5	1.18	6	1.67	1.01	6	-0.01	1	5.62	27.6	0.41	273.5	398.2	390.7	1,281.8	343.106	3,583	2,432	4,845	9.71	4.0	44.0	0.19	0.31	0.10	0.80	98.2	77.1	71.3	56.0	0.66	51.2	47.4	56.0	47.9	0.83	1.12	0.75	1.00	0.65	1.30	1.99	1.33	2.10	0.000	0.00	0.00	0.01			
41.40	41.33	478.5	3.94	3.46	479.1	0.82	10	139	2.65	2.42	196.7	297.6	0.83	6	1.51	1.00	6	-0.01	1	2.99	32.8	0.40	273.5	324.3	382.1	1,253.7	325.782	3,402	2,318	4,635	11.01	4.5	44.8	0.22	0.07	0.86	100.0	75.4	79.3	65.7	0.66	49.8	52.4	65.7	52.4	0.83	1.12	0.75	1.00	0.65	1.30	1.99	1.33	2.19	0.000	0.00	0.00	0.01				
41.40	41.40	544.6	3.84	4.46	545.4	0.70	10	139	2.66	2.42	223.8	338.8	0.71	6	1.42	1.00	6	-0.01	1	1.80	37.6	0.39	273.5	289.9	385.6	1,265.1	332.007	3,467	2,360	4,720	12.14	5.0	45.4	0.24	0.20	0.07	0.91	100.0	85.8	78.8	74.7	0.66	56.7	58.0	74.7	58.0	0.83	1.12	0.75	1.00	0.65	1.30	1.99	1.34	2.27	0.000	0.00	0.00	0.01			
41.50	41.49	547.7	4.26	3.62	548.4	0.78	10	140	2.66	2.43	224.7	340.5	0.78	6	1.45	1.00	6	-0.01	1	2.21	37.8	0.39	273.5	301.8	394.5	1,294.3	349.495	3,650	2,470	4,940	12.20	5.0	45.5	0.24	0.20	0.07	0.91	100.0	86.3	89.1	75.1	0.66	57.0	58.8	75.1	58.8	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.34	2.28	0.000	0.00	0.00	0.01			
41.60	41.59	538.7	4.02	2.14	539.0	0.75	10	140	2.67	2.43	220.5	334.4	0.75	6	1.45	1.00	6	0.00	1	2.09	37.1	0.39	273.5	298.4	388.9	1,276.0	338.496	3,535	2,401	4,880	12.04	5.0	45.4	0.24	0.20	0.07	0.90	100.0	84.8	87.4	73.9	0.66	56.0	57.6	73.9	57.6	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.34	2.27	0.000	0.00	0.00	0.01			
41.70	41.65	472.4	3.90	1.34	472.6	0.82	10	139	2.67	2.43	193.0	292.8	0.83	6	1.52	1.00	6	0.00	1	3.07	32.2	0.40	273.5	326.4	380.8	1,249.2	323.143	3,374	2,301	4,602	10.91	4.5	44.7	0.22	0.20	0.07	0.85	100.0	74.4	78.4	64.8	0.66	49.1	51.7	64.8	51.7	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.34	2.19	0.000	0.00	0.00	0.01			
41.70	41.69	486.0	3.79	2.12	486.4	0.78	10	139	2.68	2.44	198.6	301.3	0.78	6	1.49	1.00	6	0.00	1	2.69	33.2	0.40	273.5	315.7	379.9	1,246.4	321.379	3,356	2,291	4,581	11.15	4.6	44.9	0.22	0.20	0.07	0.86	100.0	76.6	80.0	66.6	0.66	50.5	52.7	66.6	52.7	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.34	2.21	0.000	0.00	0.00	0.01			
41.80	41.74	487.5	3.52	1.88	487.8	0.72	10	138	2.68	2.44	199.0	302.1	0.72	6	1.46	1.00	6	0.00	1	2.33	33.3	0.40	273.5	305.4	374.2	1,227.7	310.577	3,243	2,223	4,445	11.18	4.6	44.9	0.22	0.20	0.07	0.86	100.0	76.8	79.5	66.8	0.66	50.6	52.4	66.8	52.4	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.34	2.21	0.000	0.01	0.00	0.01			
41.80	41.81	485.3	3.32	2.10	485.3	0.68	10	138	2.68	2.44	197.8	300.4	0.69	6	1.45	1.00	6	0.00	1	2.13	33.1	0.40	273.5	299.6	369.7	1,212.8	302.065	3,154	2,169	4,338	11.13	4.6	44.9	0.22	0.20	0.07	0.86	100.0	76.4	78.8	66.4	0.66	50.3	51.9	66.4	51.9	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.35	2.21	0.000	0.01	0.00	0.01			
41.90	41.86	484.8	3.53	2.40	485.2	0.73	10	138	2.69	2.44	197.6	300.2	0.73	6	1.47	1.00	6	0.00	1	2.40	33.1	0.40	273.5	307.3	374.4	1,228.3	310.891	3,247	2,225	4,449	11.13	4.6	44.9	0.22	0.20	0.07	0.86	100.0	76.4	79.2	66.4	0.66	50.3	52.2	66.4	52.2	0.83	1.12	0.75	1.00	0.66	1.30	1.98	1.35	2.21	0.000	0.01	0.00	0.01			
41.90	41.90	484.8	3.73	2.63	485.3	0.77	10	139	2.69	2.44	197.5	300.1	0.77	6	1.49	1.00	6	0.00	1	2.65	33.1	0.40	273.5	314.4	378.7	1,242.4	319.077	3,332	2,276	4,552	11.14	4.6	44.9	0.22	0.20	0.07																										

$Z_s(f)$	$Z_{av}(f)$	q_c (tsf)	f_v (tsf)	u_z (tsf)	q_s (tsf)	R_f	SBT	γ (pcf)	σ_{vm} (tsf)	σ_{vm}' (tsf)	Q_v	Q_m	F_R	SBT_x	I_c	K_v	$(SBT)_L$	B_v	$(SBT)_{80}$	F_c (%)	$q_{1.17ms}$ (Mpa)	c	R	σ_{vm} (m/s)	V_s (m/s)	V_s (ft/s)	G_0 (kPa)	G_0 (tsf)	E' (tsf)	M (tsf)	σ_p' (tsf)	OCR	S_v	S_v (tsf)	S_v/σ_{vm}'	ϕ (°)	ϕ' (tsf)	$C_v/(1+e_{vs})/\sigma_v$	$C_v/(1+e_{vs})/\sigma_v'$	K_B	D_R (%)	$N_{0.01AB}$	$(N_{0.01})_L$	$(N_1)_{0.01AB}$	C_N	$(N_1)_{0.01AB}$	$(N_1)_{0.01L}$	$(N_1)_{0.01AB}$	$(N_1)_{0.01ms}$	r_d	MSF	K_x	K_v	CSR _{1.5}	CRR _{1.5}	FS	τ_{vm} (tsf)	p' (tsf)	γ_{ms} (%)	G/G_0	ε_v (%)	ΔS_v	ΔS_v (in)	
45.60	45.62	433.8	4.37	1.14	434.0	1.01	9	140	2.95	2.59	166.5	260.4	1.01	6	1.62	1.00	6	0.00	1	4.61	28.6	0.41	273.5	370.1	388.3	1,273.9	337,622	3,526	2,393	4,786	10.30	4.0					44.2	0.21	0.30	0.10	0.79	99.7	82.0	74.4	58.5	0.64	52.4	47.5	58.5	47.5	0.81	1.12	0.73	1.00	0.68	1.30	1.91	1.45	2.23	0.000		0.03	0.00	0.00
45.60	45.63	432.6	4.38	1.17	432.8	1.01	9	140	2.95	2.59	166.0	259.7	1.02	6	1.62	1.00	6	0.00	1	4.65	28.5	0.41	273.5	371.1	388.3	1,273.9	337,622	3,526	2,393	4,786	10.28	4.0					44.2	0.21	0.30	0.10	0.79	99.6	81.8	74.2	58.3	0.64	52.3	47.4	58.3	47.4	0.81	1.12	0.73	1.00	0.68	1.30	1.91	1.45	2.23	0.000		0.03	0.00	0.00
45.70	45.66	437.0	4.22	1.03	438.1	0.96	9	140	2.95	2.59	167.9	262.8	0.97	6	1.60	1.00	6	0.00	1	4.32	28.9	0.41	273.5	362.0	385.8	1,265.8	332,753	3,475	2,363	4,725	10.38	4.0					44.2	0.21	0.20	0.07	0.80	100.0	82.8	74.6	59.1	0.64	52.9	47.7	59.1	47.7	0.81	1.12	0.73	1.00	0.68	1.30	1.90	1.45	2.24	0.000		0.03	0.00	0.00
45.70	45.70	441.0	3.83	1.33	441.3	0.97	10	139	2.96	2.59	169.1	264.6	0.87	6	1.56	1.00	6	0.00	1	3.76	29.1	0.41	273.5	346.2	378.7	1,242.4	318,949	3,331	2,276	4,552	10.44	4.0					44.2	0.21	0.20	0.07	0.80	100.0	69.5	74.3	59.5	0.64	44.4	47.5	59.5	47.5	0.81	1.12	0.73	1.00	0.68	1.30	1.90	1.45	2.24	0.000		0.03	0.00	0.00
45.70	45.73	435.7	3.83	1.09	435.9	0.88	10	139	2.96	2.59	166.0	261.3	0.88	6	1.57	1.00	6	0.00	1	3.87	28.7	0.41	273.5	349.4	378.1	1,240.4	317,863	3,319	2,269	4,538	10.34	4.0					44.2	0.21	0.20	0.07	0.79	99.8	68.6	73.6	58.7	0.64	43.8	47.0	58.7	47.0	0.81	1.12	0.73	1.00	0.68	1.30	1.90	1.45	2.24	0.000		0.03	0.00	0.00
45.80	45.76	434.8	3.80	1.30	435.0	0.87	10	139	2.96	2.59	166.5	260.7	0.88	6	1.57	1.00	6	0.00	1	3.85	28.7	0.41	273.5	348.8	377.4	1,238.1	316,499	3,305	2,260	4,530	10.33	4.0					44.2	0.21	0.20	0.07	0.79	99.7	68.5	73.4	58.6	0.64	43.7	46.9	58.6	46.9	0.81	1.12	0.73	1.00	0.68	1.30	1.90	1.45	2.24	0.000		0.03	0.00	0.00
45.90	45.82	436.7	3.67	1.44	436.9	0.84	10	139	2.97	2.60	167.1	261.8	0.85	6	1.55	1.00	6	0.00	1	3.64	28.8	0.41	273.5	342.9	375.0	1,230.3	311,984	3,258	2,232	4,464	10.36	4.0					44.2	0.21	0.20	0.07	0.79	99.8	68.8	73.4	58.8	0.64	43.9	46.8	58.8	46.8	0.81	1.12	0.73	1.00	0.68	1.30	1.90	1.45	2.24	0.000		0.03	0.00	0.00
45.90	45.89	433.2	3.43	1.35	433.4	0.79	10	138	2.97	2.60	165.6	259.5	0.80	6	1.54	1.00	6	0.00	1	3.39	28.5	0.41	273.5	335.7	369.5	1,212.4	301,801	3,152	2,167	4,335	10.30	4.0					44.2	0.21	0.20	0.07	0.79	99.6	68.2	72.4	58.4	0.64	43.5	46.2	58.4	46.2	0.81	1.12	0.73	1.00	0.68	1.30	1.90	1.45	2.24	0.000		0.03	0.00	0.00
46.00	45.96	412.1	2.78	1.37	412.3	0.67	10	136	2.98	2.60	157.3	246.7	0.68	6	1.50	1.00	6	0.00	1	2.89	27.0	0.41	273.5	321.3	352.6	1,156.7	271,320	2,833	1,973	3,846	9.90	3.8					43.9	0.20	0.21	0.07	0.77	97.9	64.9	68.1	55.4	0.64	41.4	43.4	55.4	43.4	0.81	1.12	0.73	1.00	0.68	1.30	1.90	1.46	2.21	0.000		0.03	0.00	0.00
46.10	46.04	376.6	2.45	1.26	376.8	0.65	10	135	2.98	2.61	143.5	225.1	0.66	6	1.52	1.00	6	0.00	1	3.16	24.5	0.42	273.6	329.1	340.9	1,118.6	251,558	2,627	1,845	3,690	9.21	3.5					43.5	0.18	0.22	0.07	0.74	94.8	59.3	62.6	50.1	0.64	37.8	39.9	50.1	39.9	0.81	1.12	0.73	1.00	0.68	1.30	1.90	1.46	2.16	0.018		0.03	0.00	0.00
46.20	46.14	333.9	2.46	1.08	334.1	0.74	10	135	2.99	2.61	126.9	199.3	0.74	6	1.60	1.00	6	0.00	1	4.31	21.5	0.43	273.6	361.5	336.4	1,103.6	244,313	2,551	1,796	3,592	8.35	3.2					42.9	0.17	0.24	0.08	0.70	90.5	52.6	56.9	43.3	0.64	33.5	36.2	43.3	36.2	0.81	1.12	0.73	1.00	0.69	1.30	1.90	1.46	2.10	0.257		0.04	0.00	0.00
46.30	46.25	288.7	2.44	1.01	288.9	0.84	9	134	3.00	2.61	109.4	169.8	0.85	6	1.68	1.02	6	0.00	1	5.83	18.4	0.44	273.6	404.2	330.4	1,084.1	235,061	2,455	1,733	3,466	7.35	2.8					42.1	0.15	0.38	0.13	0.66	84.0	54.6	50.7	34.6	0.64	34.9	32.4	34.7	33.0	0.81	1.12	0.79	1.00	0.63	1.30	2.00	1.46	2.02	0.000		0.00	0.00	0.00
46.40	46.35	215.0	2.68	0.68	215.1	1.24	9	134	3.00	2.62	81.1	119.0	1.26	6	1.89	1.18	6	0.00	1	10.27	13.4	0.46	273.7	527.4	325.2	1,066.8	227,535	2,376	1,678	3,356	5.54	2.1					40.4	0.11	0.65	0.22	0.57	76.7	40.6	40.7	21.6	0.64	27.4	27.4	22.9	30.4	0.81	1.08	0.84	1.00	0.62	0.41	2.00	1.46	1.87				0.00	0.00
46.50	46.45	139.3	3.26	0.62	139.4	2.34	7	135	3.01	2.62	52.0	69.9	2.39	5	2.22	1.72	5	0.00	1	19.82	8.3	0.50	273.8	800.6	321.2	1,053.9	222,712	2,326	1,638	1,809	3.45	1.3					37.9	0.07	0.24	0.08	0.46	72.1	43.9	30.0	10.0	0.64	33.6	24.1	14.4	32.8	0.81	1.06	0.86	1.00	0.62	0.24	2.00	1.47	1.67				0.00	0.00
46.60	46.54	95.5	3.12	0.63	95.6	3.27	6	133	3.01	2.62	35.3	44.6	3.37	4	2.45	2.49	5	0.00	1	28.32	5.5	0.52	273.8	1,059.7	304.6	999.2	198,324	2,071	1,472	1,297	2.62	0.8					35.7	0.04	0.37	0.04	0.37	64.4	36.1	22.7	4.4	0.64	30.7	21.0	9.7	36.0	0.81	1.03	0.88	1.00	0.61	0.16	2.00	1.47	1.52				0.00	0.00
46.60	46.62	69.7	3.01	0.49	69.8	4.32	5	132	3.02	2.63	25.4	29.3	4.51	3	2.79	0.00	4	0.00	1	45.32	3.9	0.55	273.9	1,635.3	321.2	1,053.8	218,800	2,285		935	22.25	9.8	1.6	4.77	2.09	33.7	4.77	0.56	0.19	2.54		32.9	19.7	0.6	0.63	30.1	20.0	6.2	7.6	0.81	1.01	0.94	1.00	0.59	1.30	2.00	1.47	5.33				0.00	0.00	
46.70	46.67	65.2	2.96	0.52	65.3	4.54	4	132	3.02	2.63	23.7	27.0	4.75	3	2.83	0.00	4	0.00	1	47.53	3.6	0.55	273.9	1,716.0	317.9	1,042.9	213,859	2,233		872	20.77	9.0	1.5	4.45	1.93	33.3	4.45	0.61	0.20	2.37		41.1	18.8	0.5	0.63	36.3	19.3	6.1	7.2	0.81	1.01	0.94	1.00	0.59	1.30	2.00	1.47	5.03				0.00	0.00	
46.70	46.71	59.7	2.90	0.52	59.7	4.86	4	132	3.03	2.63	21.6	24.2	5.11	3	2.88	0.00	4	0.00	1	50.63	3.3	0.56	274.0	1,831.5	313.3	1,027.9	207,148	2,163		794	18.90	8.1	1.4	4.05	1.73	32.8	4.05	0.68	0.23	2.16		37.6	17.7	0.5	0.63	33.6	18.5	6.1	6.8	0.81	1.01	0.94	1.00	0.59	1.23	2.00	1.47	4.66				0.00	0.00	
46.80	46.76	42.8	2.70	0.55	42.9	6.31	3	130	3.03	2.63	15.2	16.1	6.77	3	3.07	0.00	3	0.00	1	63.59	2.2	0.59	274.0	2,347.2	297.4	975.6	184,683	1,929		558	13.29	5.4	1.0	2.85	1.15	30.9	2.85	1.02	0.34	1.52		40.4	14.4	0.3	0.63	35.8	15.9	5.9	5.4	0.81	1.01	0.95	1.00	0.59	1.30			1.47	3.53				0.00	0.00
46.90	46.83	37.3	2.33	0.81	37.4	6.26	3	129	3.03	2.63	13.1	13.7	6.78	3	3.12	0.00	3	-0.01	1	67.11	1.9	0.60	274.1	2,496.4	284.9	934.7	167,659	1,751		473	11.47	4.6	1.0	2.46	0.98	30.1	2.46	1.22	0.41	1.31		35.3	13.0	0.3	0.63	31.8	14.9	5.9	4.8	0.81	1.01	0.95	1.00	0.58	1.30			1.48	3.17				0.00	0.00
46.90	46.90	43.7	2.19	1.08	43.9	5.01																																																										

APPENDIX B

Section 10 titled Site Identification for Liquefaction - Induced Damage

from

STABILITY OF NATURAL DEPOSITS DURING EARTHQUAKES

Ishihara (1985)

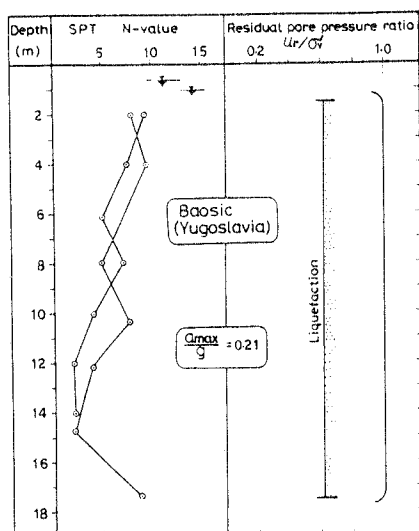


Fig. 81 Result of liquefaction analysis of Bijela

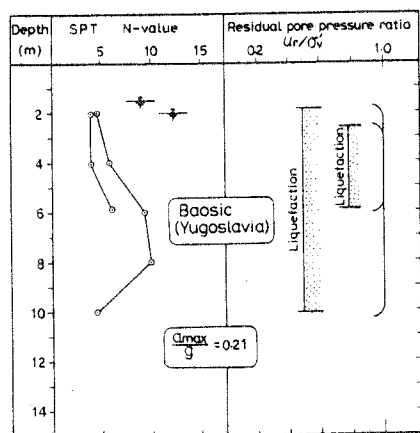


Fig. 82 Result of liquefaction analysis at Baosic

located above the depth of 3 m and the thickness of the liquefied sand layer was greater than about 3 m. The conditions as above in which the effects of liquefaction were manifested on the ground surface are the same as the conditions for the cases of liquefaction encountered in Niigata.

X SITE IDENTIFICATION FOR LIQUEFACTION-INDUCED DAMAGE

10.1 General

Studies of the cases described in the preceding section indicate that the occurrence of liquefaction itself in some layer in the deposit is not necessarily associated with the damage of structures and other installations founded on or near the ground surface. Only when the development of liquefaction is sufficiently extensive through the depth of a deposit and shallow enough in proximity

to the ground surface, do the effects of liquefaction become disastrous, leading to sand boiling and ground fissuring with various types of associated damage to structures and underground installations. Therefore, it will be of interest to study conditions under which the effects of liquefaction will or will not appear on the ground surface.

This aspect of the problem has an important bearing in developing microzoning maps with respect to liquefaction-induced damage in area of high seismicity. In executing the microzoning work, it is necessary to have a proper guideline to distinguish whether a given site is to be identified as being prone or immune to liquefaction-induced ground damage for a given intensity of shaking anticipated to occur during an earthquake in the future.

10.2 Factors Influencing the Liquefaction-Induced Ground Damage

One of the factors influencing the surface manifestation of liquefaction would be the thickness of a mantle of unliquefied soils overlying the deposit of sand which is prone to liquefaction. Should the mantle near the ground surface be thin, the pore water pressure from the underlying liquefied sand deposit will be able to easily break through the surface soil layer, thereby bringing about the ground rupture such as sand boiling and fissuring. On the other hand, if the mantle of the subsurface soil is sufficiently thick, the uplift force due to the excess pore water pressure will not be strong enough to cause a breach in the surface layer, and hence, there will be no surface manifestation of liquefaction even if it occurs deep in the deposit. In view of these considerations, the first step for establishing a guideline for site identification of liquefaction-induced damage would be to specify a threshold value on the thickness of the surface soil layer.

The thickness of the liquefiable sand layer itself will also exert a profound influence on the development of the breach in the mantle of surface layer. If the liquefied sand layer is thin, the resulting uplift pressure will not be powerful enough to bring about the collapse in the surface layer. Therefore, the site may need to be identified as being free from the damage due to liquefaction. The opposite effects will be expected to occur if the sand layer is thick enough. Accordingly, the second step for setting up a criterion is to stipulate a threshold on the thickness of the sand layer which is potentially liquefiable.

A guideline in the above context was adopted by Ishihara and Ogawa (1978) in establishing a microzonation map for the area of downtown Tokyo. In that area, the general subsurface stratification is characterized by the presence of a sand deposit of alluvial origin underlying surface fills consisting of a potpourri of clays, loams, sands and cobbles, which are considered immune to liquefaction. The potentially liquefiable sand layer is underlain in many cases by an alluvium of silt and clay, but sometimes by dense sand deposits of diluvial origin.

To establish the guideline, literature surveys were made on boring data at sites with known field performances during past earthquake in Japan. Over a wide area generally affected by liquefaction, some sites are known to have suffered damage, but

others are known to have shown no evidence of damage. For several sites within such an area, available boring data were examined to seek for the minimum thickness of surface layer required to avoid the ground damage due to liquefaction. The result of this study indicated that the damaging effect of liquefaction is brought about on the ground surface when the thickness of the surface layer is smaller than approximately 3 m. It was also pointed out that, with the thickness of surface layer less than 3 m, the damaging effect of is certainly reinforced, if the thickness of underlying liquefiable layer is larger than about 3 m. It is to be noted that the rule of thumb as above was established for the motions of earthquakes having an intensity of shaking of the order of 200 to 250 gal in terms of maximum horizontal ground acceleration.

10.3 Case Study in the 1977 Vrancea Earthquake

A set of data in support of the above guideline was presented by Perlea (1983) who compiled a number of boring logs obtained on various occasions in a small patch of landfill area along the Dimbovitza river course in the city of Bucharest, Romania. This area suffered extensive ground damage due to liquefaction at the time of the Vrancea earthquake of March 4, 1977, as evidenced by sand spurring and differential settlements of farmhouses (Ishihara-Perlea, 1984). The locations where dozens of sand boils were observed following the earthquake are indicated in Fig. 83. Also

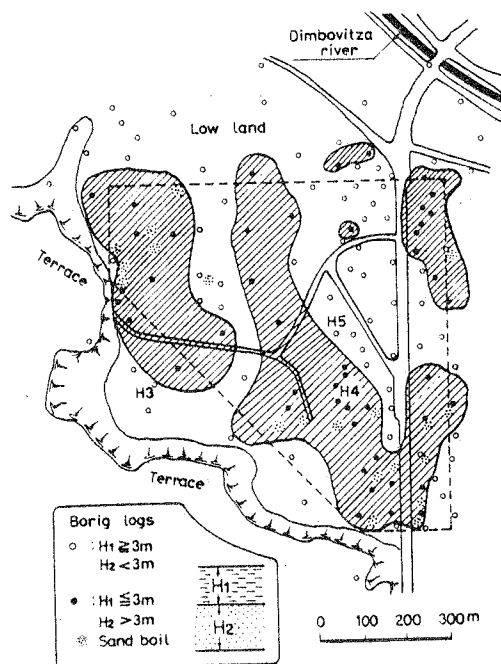


Fig. 83 Sites of liquefaction near the river course in Bucharest during the 1977 Vrancea earthquake, (Perlea, 1983)

indicated are individual locations where borings were performed. The general soil profile in this area is characterized by the presence of an alluvial sand deposit overlaid by a mantle of clayey silt which is not vulnerable to liquefaction.

All the available boring logs in this area were classified into two groups in accordance with the guideline discussed above. When the surface layer is thinner than 3.0 m and if the underlying sand layer is thicker than 3.0 m, the site was labelled with a black circle and indicated accordingly in Fig. 83. Otherwise, the site of a boring is indicated with a white circle. The area predominantly studded with black circles is indicated with hatched lines. The outcome of such zoning as shown in Fig. 83 indicates that the area with the soil profile identified as prone to liquefaction-induced damage according to the above rule is approximately coincident with the area where surface evidences of liquefaction were actually observed during the Vrancea earthquake of 1977.

10.4 Cases in the 1983 Nihonkai-chube Earthquake

The earthquake of magnitude 7.7 which occurred in the northern part of Japan on May 26, 1983, furnished an additional body of field performance data which are useful to examine the conditions of occurrence or non-occurrence of ground damage due to liquefaction. Various types of liquefaction-induced damage was incurred to many structures and installations in a widespread area within an epicentral distance of about 120 Km. The boring data collected from many liquefaction-inflicted areas disclosed that the soil profile could be classified into three groups according to the location of the ground water table, as illustrated in Fig. 84.

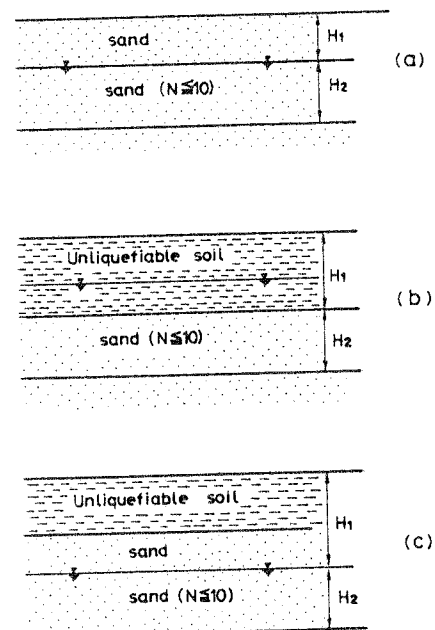


Fig. 84 Definitions of the surface unliquefiable layer and the underlying liquefiable sand layer

The thickness of the surface unliquefiable layer, H_1 , was then defined as being equal to the depth of the ground water table if it is located within the sand deposit. Should an unliquefiable cohesive soil exist to a depth below the ground water table the value of H_1 was chosen as the thickness of the surface layer itself as illustrated in Fig. 84(b)

The areas inflicted by this earthquake are believed to have undergone a shaking with a horizontal ground acceleration of the order of 200 gal as indicated in Table 4. The simple analysis for liquefaction was made using this acceleration on the basis of the procedure described in Section 8.2. The analysis results indicated that a sand layer with a blow count value less than about 10 would probably have developed liquefaction during the 1983 earthquake. Consequently, the thickness of liquefied sand deposit, H_2 , was chosen equal to that of the sand layer satisfying this condition, as accordingly indicated in Fig. 84.

Acting upon the above rule, the thickness of the surface layer, H_1 , and the underlying supposedly liquefied layer, H_2 , were read off from many boring logs collected from sites within the inflicted area. The collected boring data indicated that the majority of sites inflicted by this earthquake consist predominantly of sand from the ground surface and, therefore, the type of soil profile indicated by Fig. 84(a) is encountered in most cases. The data thus assembled are presented in Fig. 85 by plotting these two layer thicknesses as the ordinate and abscissa. The data from sites of known liquefaction damage are indicated by black circles and those from sites without damage are marked by white circles. It may be seen in Fig. 85 that the data points with known liquefaction damage fall mostly in the zone on the left

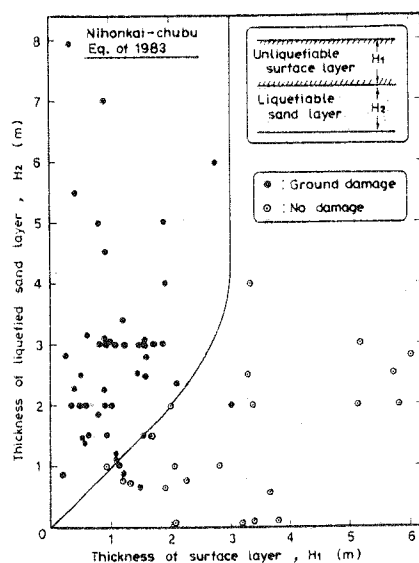


Fig. 85 Conditions of subsurface soil stratification discriminating between occurrence and non-occurrence of ground rupturing due to liquefaction

bounded by $H = 3.0\text{m}$. For the deposits with liquefied sand layer thinner than 3.0 m, the thickness of surface layer required to prevent liquefaction-induced damage appears to decrease, as indicated by a straight line directed to the zero point in Fig. 85. Thus it would appear that, for deposits subjected to an earthquake shaking with an acceleration of the order of 200 gal, the conditions for avoiding liquefaction-induced damage would be to have a mantle of unliquefiable soils thicker than about 3.0 m when the thickness of the underlying liquefiable sand layer is larger than

3.0 m. If the thickness of the liquefiable sand layer is smaller than 3.0 m, the thickness of the surface layer required to prevent damage would be correspondingly reduced. The conditions as above are indicated by a smoothed boundary line in Fig. 85.

10.5 Case Study in the 1976 Tangshan Earthquake

The Tangshan earthquake of July 26, 1976, in China is probably the most catastrophic event to have occurred in recent years. The ground damage due to liquefaction was brought about in a widespread area near the epicenter of the earthquake. The unparalleled degree of destructiveness of this earthquake due to liquefaction is described vividly in several papers by Wang (1981), Wang et al. (1983) and Finn (1982). Among the many areas devastated by the liquefaction, a detailed study was made by Gao et al. (1983) for a limited area north of Tangshan city along the Dou river regarding the soil profile conditions leading to ground damage due to liquefaction. In this area a mantle of sandy clay exists generally near the ground surface underlain by a loose deposit of fine sand with varying thickness. The SPT N-value of this sand layer ranges between 5 and 24, but mostly below 20 indicating a loose state of deposition susceptible to liquefaction. This area is a flat land and the ground water table is located at an elevation shallower than about 4 m. A total of 226 boring logs was assembled within this area and the soil profile conditions were examined in the light of the ground damage identified by air photographs taken following the earthquake. The results of this investigation are presented in Fig. 86 in which the depth of the surface layer, H_1 , is plotted versus the depth to the bottom of

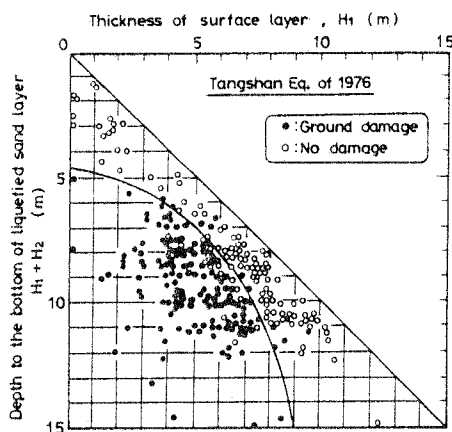


Fig. 86 Conditions of subsurface soil stratification discriminating between occurrence and non-occurrence of ground rupturing due to liquefaction (Gao et al. 1983)

the liquefied sand layer, $H_1 + H_2$. If a site in question is known to have suffered liquefaction-induced damage, it is indicated by a black circle in Fig. 86 and otherwise the data were plotted with white circles. A boundary line was then drawn in Fig. 86 differentiating between the zones of damage and no damage due to liquefaction. It may be seen that the thickness of surface layer

required to avoid damage due to liquefaction is surprisingly large. This fact may need to be interpreted in the light of the extremely strong shaking occurring in this area during the Tangshan earthquake. Since this area is located within 30 Km from the epicenter of the magnitude 7.8 earthquake, the intensity of shaking is believed to have been of the order of 8 to 9 on the Chinese intensity scale. The corresponding ground acceleration is supposed to have been as great as 400 to 500 gal.

In order to compare the results of the two independent studies described above, the boundary curve obtained by Gao et al. (1983) was re-plotted using the same type of presentation as for the diagram in Fig. 85. The two boundary curves thus superimposed are shown in Fig. 87. One of the peculiar features of the curve by Gao et al. (1983) is that, for increasing thickness of liquefiable sand layer, the thickness of surface layer

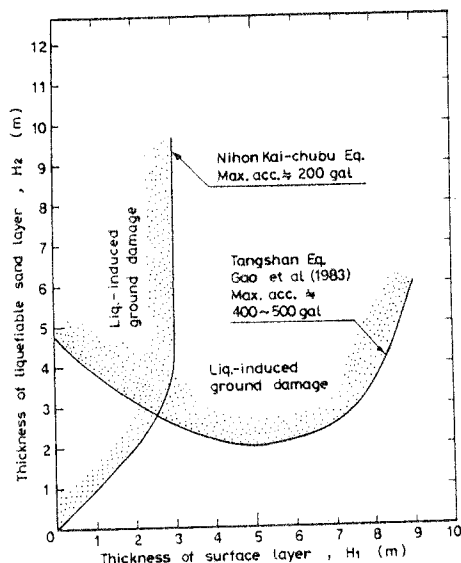


Fig. 87 Comparison of two boundary curves differentiating between conditions of damage and no damage due to liquefaction

required to prevent liquefaction damage tends to decrease when it is smaller than about 5 m. This contradiction appears to result from Gao's definition of surface layer thickness being different from that illustrated in Fig. 84. In their data arrangements, the surface layer thickness appears to be taken simply as the thickness of the sandy clay deposit near the ground surface. However, in cases where the ground water table is located below the bottom of the surface layer as illustrated in Fig. 84(c), the thickness of the unliquefiable surface layer should have been taken as being equal to the depth of the elevation of the ground water table. If such a modification is incorporated in Gao's data interpretation, the boundary curve would probably be corrected as indicated in Fig. 88. Also plotted in Fig. 88 is the boundary curve established in Fig. 85. Comparison of these two curves appears to indicate that the difference emerges mainly from the difference in the intensity of shaking incurred in the investigated areas

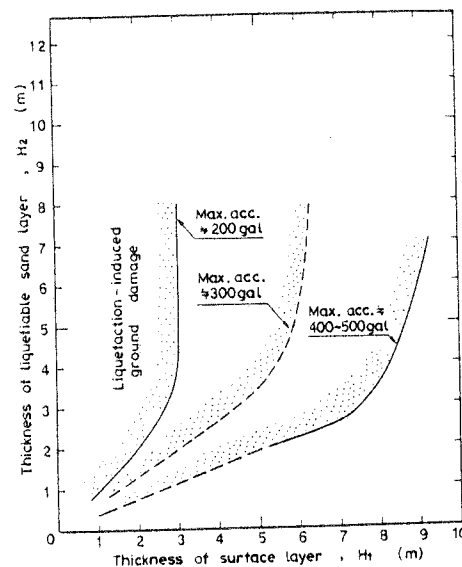


Fig. 88 Proposed boundary curves for site identification of liquefaction-induced damage

during these two earthquakes. Considering the great difference in the intensity of shaking and hence the large gap between the two proposed curves, it might well be possible to draw another boundary curve between them as shown in Fig. 88 for an intermediate level of shaking intensity with a ground acceleration on the order of 300 gal. The three boundary curves thus established and shown in Fig. 88 may be useful for identifying sites from the viewpoint of whether or not the ground sustains damage due to liquefaction during a given intensity of earthquake shaking.

SEISMIC STABILITY OF NATURAL SLOPES

XI EVALUATION OF SOIL PROPERTIES IN SEISMIC LOADING

11.1 General

Failure of natural slopes during earthquakes is governed in many cases by details of geological and hydrological conditions. However, careful scrutiny of the site conditions in many slide areas during past earthquakes has indicated that there always seems to exist a well-defined slip plane in the slide area and that this plane runs through a zone of weakness near the surface of the slope-forming soil deposits. The weak zone is often created by water infiltration into surface layers of residual or weathered soils but there are also many cases where planes of weakness coincide with tectonically disturbed zones such as fault surfaces and contact surfaces between beds or sequences of rock.

Evaluation of seismic stability of natural slope should, therefore, be made by identifying the potential slip plane and by investigating the properties of the soils constituting the zone of weakness. Since the mode of stress application