



February 23, 2018
File: 867.185bltr.docx

Tamalpais Union High School District
333 Doherty Drive
Larkspur, CA 94977

Attn: Mr. David O'Connor

Re: Geotechnical Engineering Recommendations
Redwood High School Portable Restrooms
Larkspur, California

Introduction

This report presents supplemental geotechnical recommendations for the two planned modular restroom structures at Redwood High School. In 2017 we explored subsurface conditions at the site and issued a design level geotechnical report¹ for three portable classrooms constructed in 2017 and for one of the restrooms (Restroom #1). As shown on the Site Location Map, Figure 1, the campus is located at 395 Doherty Drive in Larkspur, California.

Our scope of work includes review of the architectural drawings for the restrooms and our 2017 geotechnical report, performing a site visit to review current site conditions, consultation with the design team, and providing a letter report with updated geotechnical design criteria for the new restroom building foundations.

Project Description

The planned project includes constructing two new 12 foot by 40-foot restroom buildings at the locations shown on the Site Plans, Figures 2 and 3. Restroom #1 is located at the north end of the campus close to Doherty Drive and Restroom #2 is located south of the new portable classroom buildings and north of a baseball field. The planned buildings would consist of modular structures supported on shallow spread footing foundations. Project plans are being developed by the Project Architect, PHD Architects. Structural load information was not available at the time we prepared this report but loading is anticipated to be relatively light. Site elevations in the immediate vicinity of the buildings is about +10.5 feet for Restroom #1 and +8 feet for Restroom 2. Minor grading will include placing up to about a foot of fill beneath the Restroom #2 to fill low areas where surface water is currently directed.

Subsurface Exploration

In 2017 we explored subsurface conditions in the vicinity of Restroom #1 by excavating two test borings, Borings 3 and 4, at the locations shown on Figure 2. In Boring 3 we encountered about 1.5- feet of medium dense to dense silty sand with gravel over 1- foot of rocky fill underlain by

¹ Miller Pacific Engineering Group, "Geotechnical Investigation, Redwood High School Modular Classrooms, Tamalpais Union High School District, Larkspur, California", June 23, 2017.

less than a foot of dense, sandy residual soil over sandstone bedrock. Boring 3 was terminated at 10.1- feet in hard Sandstone bedrock. In Boring 4 we encountered about 1.5- feet of very stiff gravelly clay fill over 2- foot of stiff, sandy residual soil over Sandstone bedrock. Boring 4 was terminated at 10.5- feet in hard sandstone bedrock.

In 2017 we explored subsurface conditions in the vicinity of Restroom #2 by excavating two test borings, Borings 1 and 2, and we also pushed two CPTs, CPT-1 and CPT-2, at the locations shown on Figure 3. Boring 1 encountered a pavement section of 4- inches of asphalt concrete over 20- inches of aggregate base rock underlain by fill consisting of medium dense, clayey gravel with sand to a depth of 5- feet. Below that we encountered 3.5- feet of soft clay underlain by about 10- feet of stiff, sandy clay over 12.5- feet of stiff, gravelly clay. Boring 1 was terminated at 31.0- feet. In Boring 2 we encountered a pavement section of 4- inches of asphalt concrete over 18- inches of aggregate base rock underlain by fill consisting of medium dense, clayey gravel with sand to a depth of 5- feet. Below that we encountered 3.5- feet of stiff, gravelly clay underlain by about 12- feet of stiff to very stiff, sandy clay over 1.5- feet of stiff, gravelly clay. Boring 2 was terminated at 21.5- feet.

CPT-1 encountered about 4- feet of medium dense to dense gravelly fill over 3.5- feet of soft clay over 20- feet of stiff, clayey alluvium. CPT-1 encountered equipment refusal at 28.2- feet on stiff to very stiff clay. CPT-2 encountered about 5.5- feet of medium dense to dense gravelly fill over 2- feet of soft clay over 14- feet of stiff, clayey alluvium. CPT-2 was terminated at 22.3- feet on similar stiff/very stiff alluvium.

Groundwater was encountered in Boring 1 at a depth of 9- feet and in Boring 2 at a depth of 13- feet. Groundwater was not encountered in Borings 3 and 4. Because the borings were not left open for an extended period of time, a stabilized depth to groundwater was not observed. Boring Logs and CPT logs are attached in Appendix A. Simplified geologic cross-sections are presented in our 2017 report.

CONCLUSIONS AND RECOMMENDATIONS

General

Based on our experience with similar projects at Redwood High School, we conclude that, from a geotechnical standpoint, the site is suitable for the planned improvements. The primary geotechnical issues to address in design of the project are designing structures to withstand strong seismic shaking and flooding. Geologic hazards and mitigation measures for the classrooms project and for Restroom #1 were addressed in our 2017 report and are not repeated in this letter. Since Restroom #2 is adjacent to the classrooms project, Geologic hazards and mitigation measures for Restroom #2 are the same as those for the classrooms project.

Seismic Design

The project site is located in a seismically active area. Therefore, the structures should be designed in conformance with the seismic provisions of the California Building Code (CBC) to mitigate the potential effects of strong seismic ground shaking to the proposed structures. As previously discussed, Restroom #1 is underlain by shallow bedrock whereas Restroom #2 is underlain by moderately deep alluvium. Therefore, it is our opinion Site Class "C" is appropriate for Restroom #1 and Site Class "D" is appropriate for Restroom #2. At a minimum, we recommend the project Structural Engineer utilize the 2016 CBC coefficients shown in Table A below to determine the base shear values.

TABLE A
2016 CBC FACTORS
Redwood High School
Modular Restrooms
Larkspur, California

Restroom #1

<u>Factor Name</u>	<u>Coefficient</u>	<u>2016 CBC Site Specific Value</u>
Site Class ¹	S _{A,B,C,D,E, or F}	S _C
Site Coefficient	F _a	1.00
Site Coefficient	F _v	1.30
Spectral Acc. (short)	S _s	1.5 g
Spectral Acc. (1-sec)	S ₁	0.6 g
Spectral Response (short)	SM _s	1.5 g
Spectral Response (1-sec)	SM ₁	0.78 g
Design Spectral Response (short)	SD _s	1.00 g
Design Spectral Response (1-sec)	SD ₁	0.52 g
Seismic Design Category	A,B,C,D, or E	C

Restroom #2

<u>Factor Name</u>	<u>Coefficient</u>	<u>2016 CBC Site Specific Value</u>
Site Class ¹	S _{A,B,C,D,E, or F}	S _D
Site Coefficient	F _a	1.00
Site Coefficient	F _v	1.50
Spectral Acc. (short)	S _s	1.5 g
Spectral Acc. (1-sec)	S ₁	0.6 g
Spectral Response (short)	SM _s	1.5 g
Spectral Response (1-sec)	SM ₁	0.9 g
Design Spectral Response (short)	SD _s	1.00 g
Design Spectral Response (1-sec)	SD ₁	0.60 g
Seismic Design Category	A,B,C,D, or E	D

1. Site Class C, Description: very dense soil / soft rock profile with shear wave velocities between 1,200 and 2,500 ft/sec, standard penetration blow counts greater than 50 blows per foot, and undrained shear strength greater than 2,000 psf.
2. Site Class D, Description: stiff soil profile with shear wave velocities between 600 and 1,200 ft/sec, standard penetration blow counts between 15 and 50, and undrained shear strength between 1,000 and 2,000 psf.

Site Preparation and Grading

The general grading recommendations presented below are appropriate for construction in the late spring through fall months. From winter through the early spring months, on-site soils may be saturated due to rainfall and may be difficult to compact without drying by aeration or the

addition of lime and/or cement (or a similar product) to dry the soils. Site preparation and grading should conform to the recommendations and criteria outlined below.

Surface Preparation

Clear all trees, brush, roots, over-sized debris, and organic material from areas to be graded. Trees that will be removed (in structural areas) must also include removal of stumps and roots larger than two inches in diameter. Excavated areas (i.e., excavations for stump removal) should be restored with properly moisture conditioned and compacted fill as described in the following sections. Any loose soil or rock at subgrade will need to be excavated to expose firm natural soils or bedrock. Debris, rocks larger than six inches and vegetation are not suitable for structural fill and should be removed from the site.

Where fills or other structural improvements are planned on level ground, the subgrade surface should be scarified to a depth of about eight inches, moisture conditioned to at least 3% above the optimum moisture content, and compacted to a minimum of 90% relative compaction (ASTM D-1557). Relative compaction should be increased to a minimum of 95% where new asphalt pavements are planned. Relative compaction, maximum dry density, and optimum moisture content of fill materials should be determined in accordance with ASTM Test Method D 1557, "Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 10-lb. Rammer and 18-in. Drop." If soft, wet or otherwise unsuitable materials are encountered at the subgrade elevation during construction, we will provide supplemental recommendations/field directives to address the specific condition.

Materials

If imported fill is required, the material shall consist of soil and rock mixtures that: (1) are free of organic material, (2) have a Liquid Limit less than 40 and a Plasticity Index of less than 20, and (3) have a maximum particle size of 6 inches. Any imported fill material needs to be tested to determine its suitability for use as fill material.

Foundation Recommendations

Provided site preparation and grading are performed in accordance with the recommendations above, new building loads can be supported on shallow interconnected spread footings bearing on the existing fill. Because the fill is variable localized deepening of foundation excavations or over-excavation and re-compaction may be required. Shallow foundation design criteria are presented in Table B below.

TABLE B
FOUNDATION DESIGN CRITERIA
Redwood High School
Modular Restrooms
Larkspur, California

Shallow Footings

Minimum footing width ¹ :	12 inches
Minimum Embedment:	18 inches
Allowable bearing pressure (dead + live loads) ² :	1500 psf
Base friction coefficient:	0.35
Lateral Passive Resistance ³ :	300 pcf

1. Load all shallow foundations to similar bearing pressures, i.e. size footing widths to design loads instead of uniform foundation widths.
2. May increase design values by 1/3 for total loads including seismic.
3. Equivalent fluid pressure. Ignore upper 6 inches, unless confined by asphalt concrete or concrete.

Plan Review and Construction Observation

When the plans are nearing completion, we must review the geotechnical aspects of the design to verify that the intent of our recommendations has been incorporated. During construction, we should observe the excavation of the footings to confirm that the materials encountered are consistent with the geotechnical design parameters and to adjust the foundation depths, if necessary. We should also observe and test site grading.

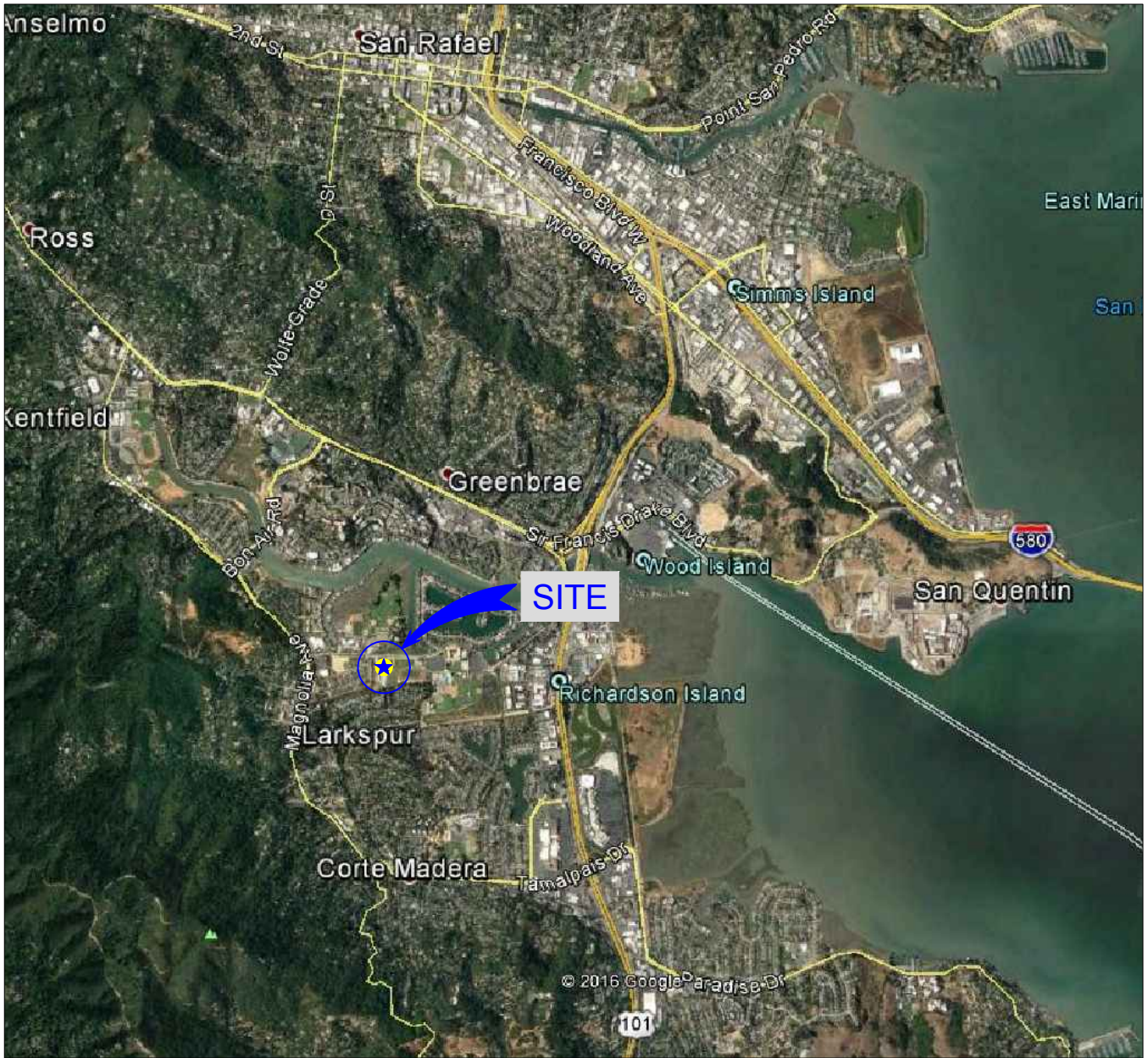
If there are any questions regarding our recommendations please call.

Very truly yours,
MILLER PACIFIC ENGINEERING GROUP



Eric A. Dabanian
Geotechnical Engineer No. 2526
(Expires 6/30/19)

Attachments: Figures 1-3
Appendix A



SITE: LATITUDE, 37.9378°
 LONGITUDE, -122.5293°

SITE LOCATION
 N.T.S.



REFERENCE: Google Earth, 2017



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SITE LOCATION MAP

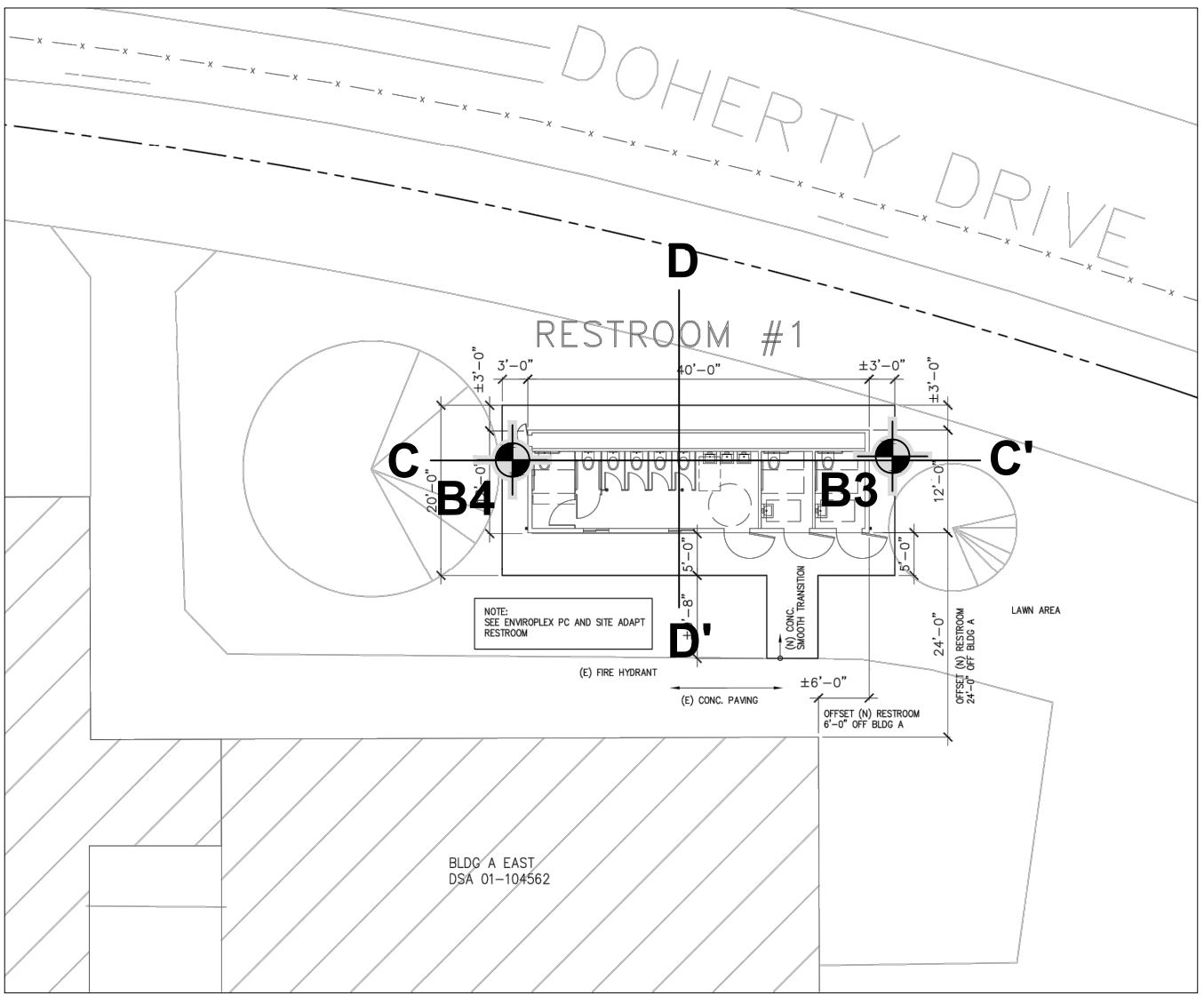
Redwood High School
 Modular Bathrooms
 Larkspur, California

Project No. 867.185

Date: 1/23/2018

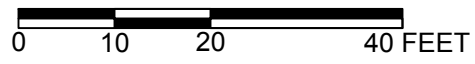
Drawn _____
 ENE
 Checked _____


1
 FIGURE



SITE PLAN RESTROOM #1

SCALE



 Approximate boring location completed by MPEG, 2017

MPEG
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SITE PLAN

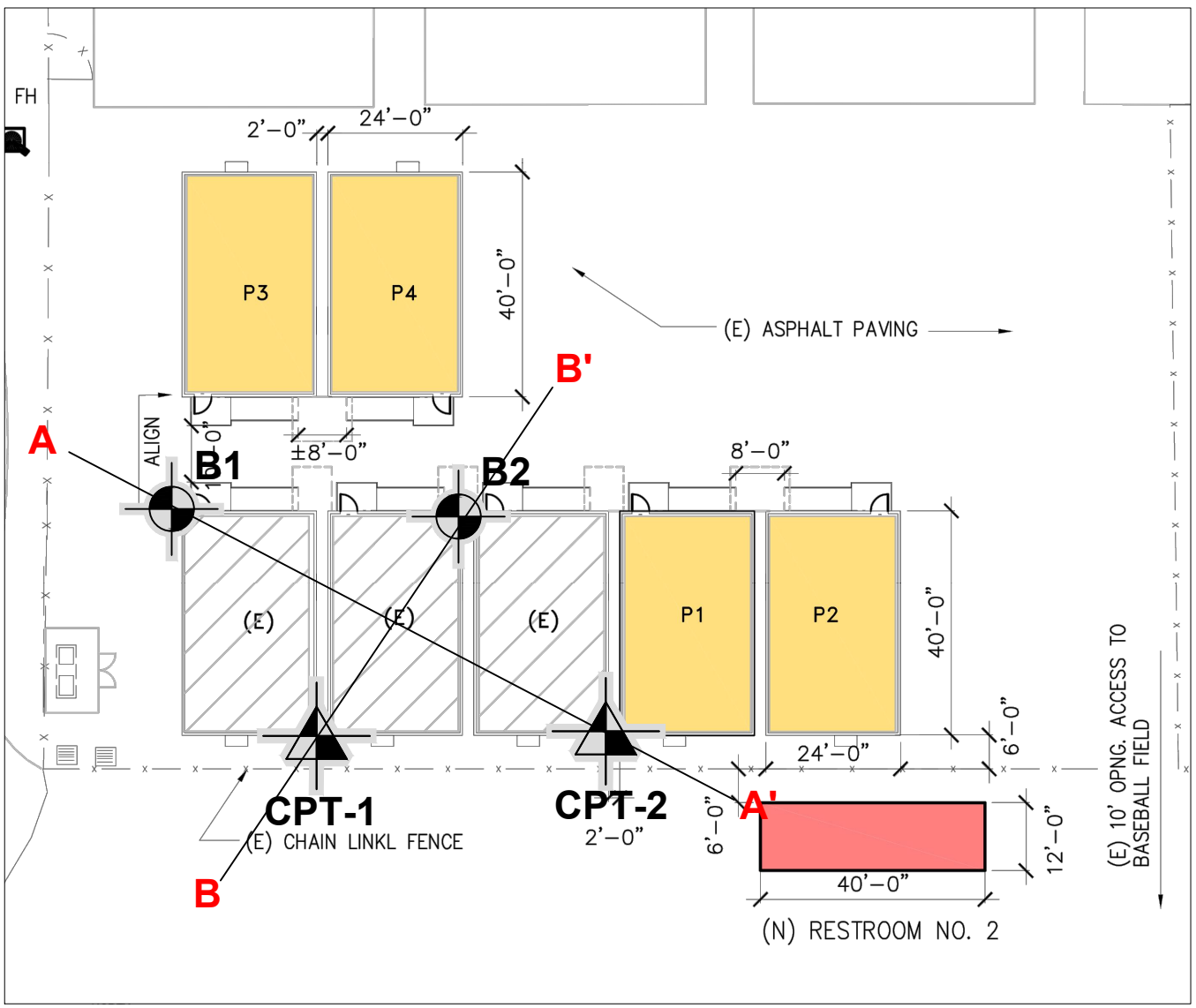
Redwood High School
 Restrooms
 Larkspur, California

Project No. 867.185 Date: 1/23/2018

Drawn _____
 ENE
 Checked _____



2

FIGURE




SITE PLAN RESTROOM #2



-  Approximate CPT location completed by MPEG, 2017
-  Approximate boring location completed by MPEG, 2017

Note: Building '4' is not a part of this project.

 <p>MILLER PACIFIC ENGINEERING GROUP</p> <p><small>A CALIFORNIA CORPORATION, © 2018. ALL RIGHTS RESERVED FILENAME: 867.185 STD FIGS.dwg</small></p>	<p>504 Redwood Blvd. Suite 220 Novato, CA 94947 T 415 / 382-3444 F 415 / 382-3450 www.millerpac.com</p>	<p>SITE PLAN</p>		<p>Redwood High School Restrooms Larkspur, California</p>	<p>Drawn _____ Checked <u>ZMS</u></p>	<p style="font-size: 2em; font-weight: bold;">3</p> <p>FIGURE</p>
	<p>Project No. 867.185 Date: 1/23/2018</p>					

APPENDIX A

MAJOR DIVISIONS		SYMBOL	DESCRIPTION
COARSE GRAINED SOILS over 50% sand and gravel	CLEAN GRAVEL	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
	GRAVEL with fines	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	CLEAN SAND	SW	Well-graded sands or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
	SAND with fines	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS over 50% silt and clay	SILT AND CLAY liquid limit <50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	SILT AND CLAY liquid limit >50%	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS	PT	Peat, muck, and other highly organic soils	
ROCK		Undifferentiated as to type or composition	

KEY TO BORING AND TEST PIT SYMBOLS







CLASSIFICATION TESTS

PI	PLASTICITY INDEX
LL	LIQUID LIMIT
SA	SIEVE ANALYSIS
HYD	HYDROMETER ANALYSIS
P200	PERCENT PASSING NO. 200 SIEVE
P4	PERCENT PASSING NO. 4 SIEVE

STRENGTH TESTS

TV	FIELD TORVANE (UNDRAINED SHEAR)
UC	LABORATORY UNCONFINED COMPRESSION
TXCU	CONSOLIDATED UNDRAINED TRIAXIAL
TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL
	UC, CU, UJU = 1/2 Deviator Stress

SAMPLER TYPE

	MODIFIED CALIFORNIA		HAND SAMPLER
	STANDARD PENETRATION TEST		ROCK CORE
	THIN-WALLED / FIXED PISTON		DISTURBED OR BULK SAMPLE

SAMPLER DRIVING RESISTANCE

Modified California and Standard Penetration Test samplers are driven 18 inches with a 140-pound hammer falling 30 inches per blow. Blows for the initial 6-inch drive seat the sampler. Blows for the final 12-inch drive are recorded onto the logs. Sampler refusal is defined as 50 blows during a 6-inch drive. Examples of blow records are as follows:

25 sampler driven 12 inches with 25 blows after initial 6-inch drive

85/7" sampler driven 7 inches with 85 blows after initial 6-inch drive

50/3" sampler driven 3 inches with 50 blows during initial 6-inch drive or beginning of final 12-inch drive

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the excavation location during the time of exploration. Subsurface rock, soil or water conditions may vary in different locations within the project site and with the passage of time. Boundaries between differing soil or rock descriptions are approximate and may indicate a gradual transition.



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SOIL CLASSIFICATION CHART

Redwood High School
Modular Classrooms
Larkspur, California

Project No. 867.185

Date: 5/24/2017

Drawn _____
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ENE

A-1
FIGURE

FRACTURING AND BEDDING

Fracture Classification

Crushed
Intensely fractured
Closely fractured
Moderately fractured
Widely fractured
Very widely fractured

Spacing

less than 3/4 inch
3/4 to 2-1/2 inches
2-1/2 to 8 inches
8 to 24 inches
2 to 6 feet
greater than 6 feet

Bedding Classification

Laminated
Very thinly bedded
Thinly bedded
Medium bedded
Thickly bedded
Very thickly bedded

HARDNESS

Low
Moderate
Hard
Very hard

Carved or gouged with a knife
Easily scratched with a knife, friable
Difficult to scratch, knife scratch leaves dust trace
Rock scratches metal

STRENGTH

Friable
Weak
Moderate
Strong
Very strong

Crumbles by rubbing with fingers
Crumbles under light hammer blows
Indentations <1/8 inch with moderate blow with pick end of rock hammer
Withstands few heavy hammer blows, yields large fragments
Withstands many heavy hammer blows, yields dust, small fragments

WEATHERING

Complete	Minerals decomposed to soil, but fabric and structure preserved
High	Rock decomposition, thorough discoloration, all fractures are extensively coated with clay, oxides or carbonates
Moderate	Fracture surfaces coated with weathering minerals, moderate or localized discoloration
Slight	A few stained fractures, slight discoloration, no mineral decomposition, no affect on cementation
Fresh	Rock unaffected by weathering, no change with depth, rings under hammer impact

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the location and time of exploration. Subsurface rock, soil and water conditions may differ in other locations and with the passage of time.



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ROCK CLASSIFICATION CHART

Redwood High School
Modular Classrooms
Larkspur, California

Project No. 867.185

Date: 5/24/2017

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A-2
FIGURE

DEPTH		BORING 1				BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
meters	feet	SAMPLE SYMBOL (4)	EQUIPMENT: Truck Mounted B-53 Mobile Drill Rig with 6.0-inch Hollow Stem Auger	DATE: 5/10/2017	ELEVATION: 8 - feet*						
			*REFERENCE: Google Earth, 2017								
0	0		4 inches Asphaltic Concrete								
			20 inches Aggregate Base Rock								
1			Clayey GRAVEL with Sand (GC) Gray, black, Medium dense to dense, angular gravels up to 3 inches, with ~25% medium plasticity clay, with ~10% fine to medium grained sand. [Fill]			19	129	8.0			
2			Silty CLAY (CH) Dark gray, soft to medium stiff, moist to wet, high plasticity clay, with ~5-10% pebble sized, highly to completely weathered gravels. [Alluvium]			6	81	23.6			
3	10		Sandy CLAY (CL) Orange, tan, mottled yellow, red, stiff to very stiff, moist, medium plasticity clay, with ~25% fine to medium grained sand. [Alluvium]			38	113	17.9	UC 3200		
5			Gravelly CLAY (CL) Orange, tan, mottled black, medium stiff to stiff, moist, medium plasticity clay, with ~40% rounded to angular gravels up to 1 1/2 inches. [Alluvium]			23	104	22.6			
6	20					17	108	20.7			

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT $kN/m^3 = 0.1571 \times$ DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = $0.0479 \times$ STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY



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BORING LOG		Drawn _____ ENE Checked _____	A-3 FIGURE
Redwood High School Modular Classrooms Larkspur, California			
Project No. 867.185 Date: 5/24/2017			

DEPTH		BORING 1 (CONTINUED)		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
meters	feet	SAMPLE	SYMBOL (4)						
20									
7									
25									
8									
9									
30									
9									
10									
35									
11									
12									
40									

Gravelly CLAY (CL)
Orange, tan, mottled black, medium stiff to stiff, moist, medium plasticity clay, with ~40% rounded to angular gravels up to 1 1/2 inches. [Alluvium]

No sample recovered.
Boring terminated at 31 feet.
Groundwater encountered at 9 feet.

43/6"

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT $kN/m^3 = 0.1571 \times$ DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY



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BORING LOG


Redwood High School
Modular Classrooms
Larkspur, California
Project No. 867.185 Date: 5/24/2017

Drawn ENE
Checked

A-4
FIGURE

DEPTH		BORING 2		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
meters	feet	SAMPLE	SYMBOL (4)						
		EQUIPMENT: Truck Mounted B-53 Mobile Drill Rig with 6.0-inch Hollow Stem Auger							
		DATE: 5/10/2017							
		ELEVATION: 9 - feet*							
		*REFERENCE: Google Earth, 2017							
0	0		4 inches Asphaltic Concrete						
			18 inches Aggregate Base Rock						
1			Clayey GRAVEL with Sand (GC) Gray, black, Medium dense to dense, angular gravels up to 3 inches, with ~20% medium plasticity clay, with ~10% fine to medium grained sand. [Fill]	40	132	6.0			
2			Gravelly CLAY (CL) Orange, tan, mottled black, medium stiff to stiff, moist, medium plasticity clay, with ~40% rounded to angular gravels up to 1 1/2 inches. [Alluvium]	9	92	13.7			
3	10		Sandy CLAY (CL) Medium brown, orange, mottled tan, black, stiff to very stiff, moist, medium plasticity clay, with ~5-10% fine to medium grained sand. [Alluvium]	26					
4									
5	15		Grades to contain ~25% sand.	36	110	20.4	UC 3700		
6	20		Gravelly CLAY (CL) Orange, tan, mottled black, medium stiff, moist, medium plasticity clay, with ~40% rounded to angular gravels up to 1 1/2 inches. [Alluvium]						
			Boring terminated at 21 feet 6 inches. Groundwater encountered at 13 feet.	20	107	20.5			

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS (3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT $\text{kN/m}^3 = 0.1571 \times \text{DRY UNIT WEIGHT (pcf)}$ (4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

	504 Redwood Blvd.	BORING LOG		Drawn <u>ENE</u> Checked _____	<h1 style="margin: 0;">A-5</h1> <p style="margin: 0;">FIGURE</p>
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		BORING 3								
DEPTH meters feet	SAMPLE SYMBOL (4)	EQUIPMENT: Portable Hydraulic Drill Rig with 4.0-inch Solid Flight Auger			BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
		DATE: 5/26/2017 ELEVATION: 8 - feet* *REFERENCE: Google Earth, 2017								
0		Silty SAND with Gravel (SC) Light brown, moist, medium dense to dense, low plasticity silty sand, with ~10-15% sub rounded to sub angular gravels up to 1 inch. [Top Soil]			50	131	11.3	UC 4250		
		Mixed Rock and Concrete (GW) [Fill]								
1		Clayey SAND with Gravel (SC) [Residual Soil] SANDSTONE Yellow, brown, low hardness, weak, highly weathered, fine to coarse grained Sandstone. [Bedrock]			50/6"	110	10.6			
5		Grades moderately hard, strong.			36					
2					50/4"					
3		Boring terminated at 10 feet 1 inches. No groundwater encountered during drilling.			50/1"					
10										
4										
15										
5										
6										
20										

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT $kN/m^3 = 0.1571 \times$ DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = $0.0479 \times$ STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY



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BORING LOG

Redwood High School
Modular Classrooms
Larkspur, California
Project No. 867.185 Date: 6/5/2017

Drawn ENE
Checked _____

A-6
FIGURE

		BORING 4							
DEPTH meters feet	SAMPLE	SYMBOL (4)	EQUIPMENT: Portable Hydraulic Drill Rig with 4.0-inch Solid Flight Auger	BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
			DATE: 5/26/2017						
0			Gravelly CLAY (CL) Dark brown, moist, medium dense, medium plasticity clay, with ~50% angular gravels up to 1 inch. [Fill]	53	131	12.0	UC 1700		
1			Clayey SAND with Gravel (SC) Yellow, brown, moist, dense, fine to medium grained sand, with ~25% clay, with ~20% weathered sandstone gravels. [Residual Soil]						
5			SANDSTONE Yellow, brown, low to moderately hard, strong, moderately to highly weathered, fine to coarse grained Sandstone. [Bedrock]	50/4"	120	11.9			
2				50/6"					
3				50/5"					
10			Boring terminated at 10 feet 5 inches. No groundwater encountered during drilling.						
4									
15									
5									
6									
20									

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT $kN/m^3 = 0.1571 \times$ DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY



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504 Redwood Blvd.
Suite 220
Novato, CA 94947
T 415 / 382-3444
F 415 / 382-3450
www.millerpac.com

BORING LOG

Redwood High School
Modular Classrooms
Larkspur, California
Project No. 867.185 Date: 6/5/2017

Drawn ENE
Checked

A-7
FIGURE

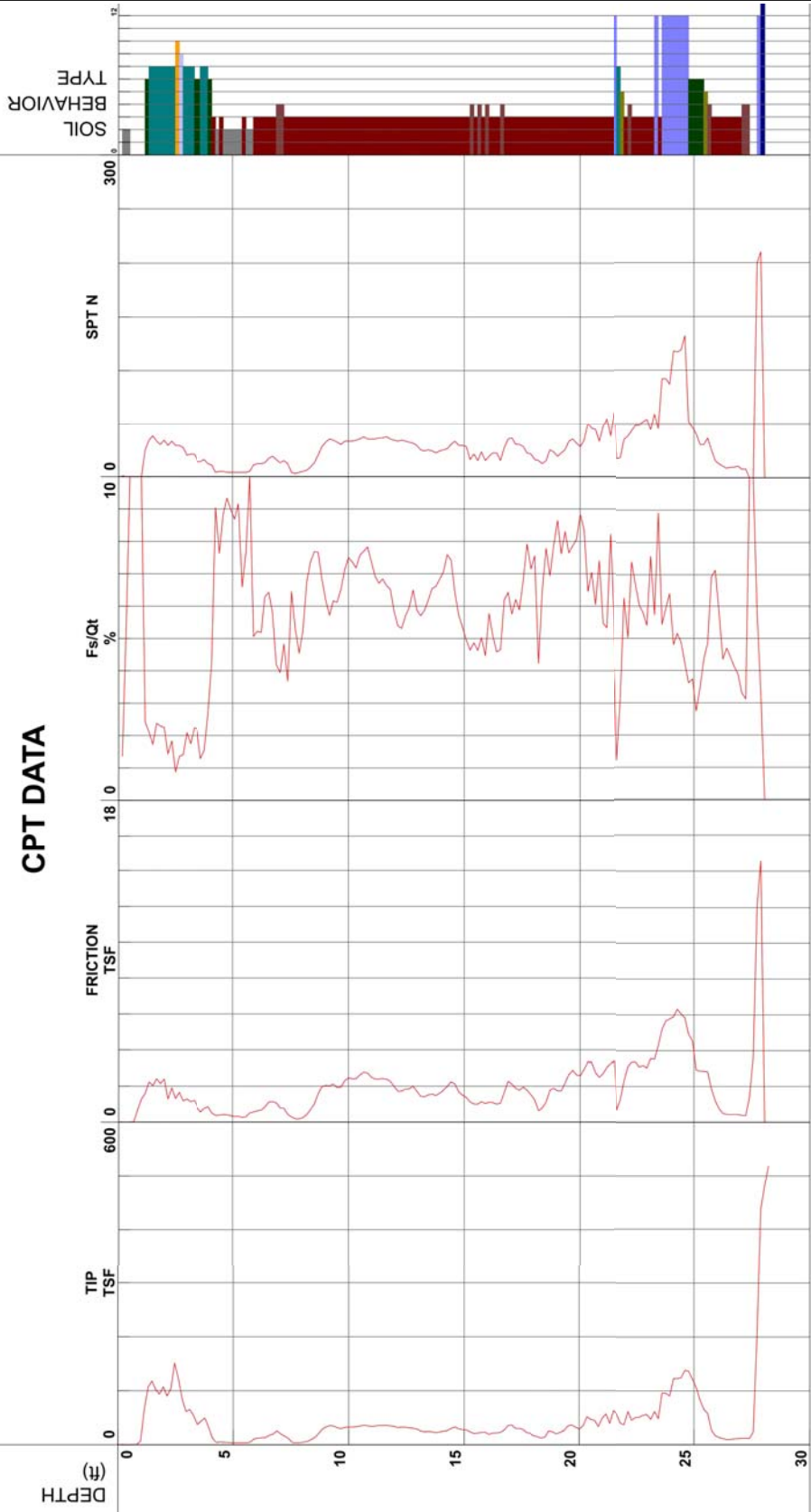
Miller Pacific Engineers



Project Redwood High School Modular Classroom Operator
 Job Number 867-185 RB KK
 Hole Number CPT-01 Cone Number DDG1379
 EST GW Depth During Test 5.00 ft Date and Time 4/26/2017 12:12:58 PM

Filename SDF(034).cpt
 GPS Maximum Depth 28.21 ft

Net Area Ratio .8



*Soil behavior type and SPT based on data from UBC-1983

Cone Size 10cm squared



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CONE PENETRATION TEST LOG

Redwood High School
 Modular Classrooms
 Larkspur, California

Project No. 867.185

Date: 6/1/2017

Drawn ENE
 Checked

A-8
 FIGURE

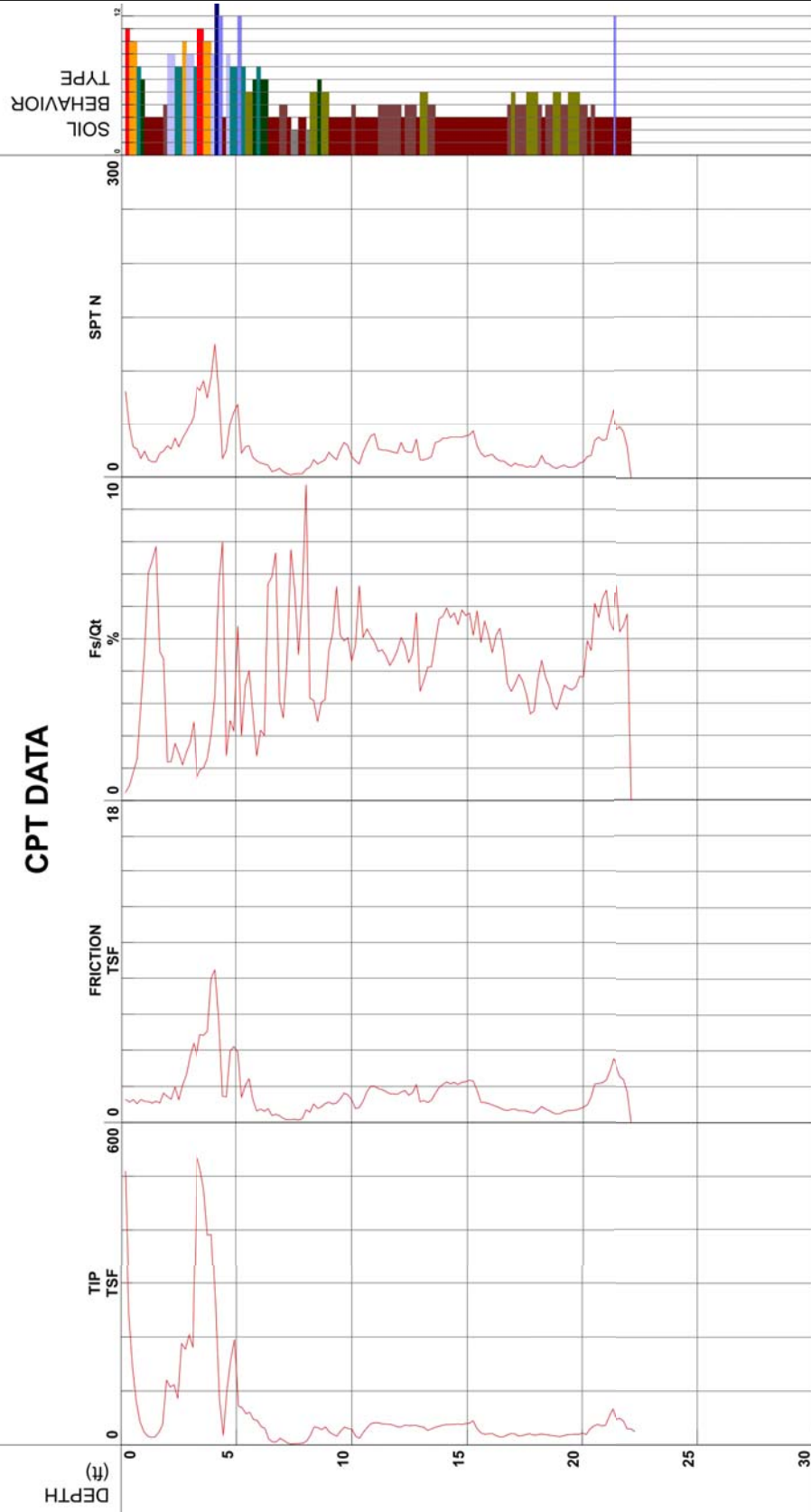
Miller Pacific Engineers



Project Redwood High School Modular Classroom Operator
Job Number 867-185 **Cone Number** DDG1333
Hole Number CPT-02 **Date and Time** 4/26/2017 11:15:09 AM
EST GW Depth During Test 5.00 ft

Filename SDF(033).cpt
GPS
Maximum Depth 22.31 ft

Net Area Ratio .8



- 1 - sensitive fine grained
 - 2 - organic material
 - 3 - clay
 - 4 - silty clay to clay
 - 5 - clayey silt to silty clay
 - 6 - sandy silt to clayey silt
 - 7 - silty sand to sandy silt
 - 8 - sand to silty sand
 - 9 - sand
 - 10 - gravelly sand to sand
 - 11 - very stiff fine grained (*)
 - 12 - sand to clayey sand (*)
- Cone Size 10cm squared
- S*Soil behavior type and SPT based on data from UBC-1983



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CONE PENETRATION TEST LOG

Redwood High School
 Modular Classrooms
 Larkspur, California

Project No. 867.185

Date: 6/1/2017

Drawn _____
 Checked ENE

A-9
 FIGURE