COUNTY OF SAN MATEO - PLANNING AND BUILDING DEPARTMENT

ATTACHMENT I

Pln 2018-00458

Sigma Prime Geosciences, Inc.
Effective Solutions

GEOTECHNICAL STUDY

LI PROPERTY
1855 SUNSHINE VALLEY ROAD
MOSS BEACH, CALIFORNIA
APN 037-156-130

RECEIVED
NOV 2 X 2018
San Mateo County
Planning and Building Department

PREPARED FOR:
FULI LI
1855 SUNSHINE VALLEY ROAD
MOSS BEACH, CA 94038

PREPARED BY:
SIGMA PRIME GEOSCIENCES, INC.
332 PRINCETON AVENUE
HALF MOON BAY, CALIFORNIA 94019

AUGUST, 2018

Sigma Prime Geosciences, Inc.
Effective Solutions

August 18, 2018

Fuli Li
1855 Sunshine Valley Road
Moss Beach, CA 94038

Re: Geotechnical Report for Proposed Residence: Sunshine Valley Road, Moss Beach, California. APN 037-156-130
Sigma Prime Geosciences Job No. 18-159

Dear Ms. Li:

As per our proposal dated June 18, 2018 we have performed a geotechnical study for your proposed residence located at 1855 Sunshine Valley Road in Moss Beach, California. The accompanying report summarizes the results of our field study, laboratory testing, and engineering analyses, and presents geotechnical recommendations for the planned structure.

Thank you for the opportunity to work with you on this project. If you have any questions concerning our study, please call.

Yours,

Sigma Prime Geosciences, Inc.

Charles M. Kissick, P.E.

REGISTERED PROFESSIONAL ENGINEER
CHARLES M. KISSICK
No. 62264
9/30/19
EXPIRES
CIVIL
STATE OF CALIFORNIA

GEOTECHNICAL STUDY
LI PROPERTY
SUNSHINE VALLEY ROAD
MOSS BEACH, CALIFORNIA
APN 037-156-130

PREPARED FOR:

FULI LI
1855 SUNSHINE VALLEY ROAD
MOSS BEACH, CA 94038

PREPARED BY:

SIGMA PRIME GEOSCIENCES, INC.
332 PRINCETON AVENUE
HALF MOON BAY, CALIFORNIA 94019

August 18, 2018

TABLE OF CONTENTS

1. INTRODUCTION

We are pleased to present this geotechnical study report for the proposed residence located on 1855 Sunshine Valley Road in Moss Beach, California, at the location shown in Figure 1. The purpose of this study was to evaluate the subsurface conditions at the site, and to provide geotechnical design recommendations for the proposed construction.

1.1 PROJECT DESCRIPTION

We understand that you plan to construct a single family home on the lot adjoining 1855 Sunshine Valley Road, in Moss Beach. The new house will get a new address later on. The lot is located on the east side of Highway 1. Structural loads are expected to be relatively light as is typical for this type of construction.

1.2 SCOPE OF WORK

The scope of work for this study was presented in our proposal dated June 18, 2018. In order to complete this project we have performed the following tasks:

- Reviewed published information on the geologic and seismic conditions in the site vicinity;
- Subsurface study, including 2 soil borings at the site;
- Laboratory testing of selected soil samples, to establish their engineering properties, and for soil classification purposes;
- Engineering analysis and evaluation of the subsurface data to develop geotechnical design criteria; and
- Preparation of this report presenting our recommendations for the proposed structure.

2. FINDINGS

2.1 GENERAL

The site reconnaissance and subsurface study were performed on July 17, 2018. The subsurface study consisted of drilling 2 soil borings. The borings were advanced to depths 12 and 18 feet. The approximate locations of the borings, numbered B-1 and B-2, are shown in Figure 2. The boring logs and the results of the laboratory tests on soil samples are attached in Appendices A and B, respectively.

2.2 SITE CONDITIONS

At the time of our study, the site was an undeveloped lot on the south side of Sunshine Valley Road. The project site is vegetated with lawn grass and shrubs, and a small number of trees. The lot is very flat.

2.3 REGIONAL AND LOCAL GEOLOGY

Based on Brabb and Pampeyan (1983), the site vicinity is underlain by the Montara granodiorite.

2.4 SITE SUBSURFACE CONDITIONS

Based on the soil borings, the subsurface conditions at the site consist of medium stiff to stiff sandy clay to a depth of 11.5 feet. The sandy clay is underlain by a loose to medium dense clayey sand with about 20 percent fines. The upper clays have low expansive potential, with a low plasticity of 14.

2.5 GROUNDWATER

No groundwater was encountered in Boring B-1, but it was encountered in Boring B-2 at a depth of 2 feet, then lowered to a depth of 4 feet after drilling. The clayey sand below 11.5 feet did not appear to be saturated and had a moisture content of 17.6 percent. We suspect that a perched water table in a shallow lenticular deposit was intercepted. The permanent water table is likely deeper, as there was no groundwater encountered in the sands at the base of Boring B-1. Groundwater is not expected to have a substantial impact on the project.

2.6 FAULTS AND SEISMICITY

The site is in an area of high seismicity, with active faults associated with the San Andreas fault system. The closest active fault to the site is the San Gregorio-Seal Cove fault, located offshore, about 0.8 km to the west. The San Andreas fault is located about 11 km to the northeast. Other faults most likely to produce significant seismic ground motions include the Hayward, Rodgers Creek, and Calaveras faults. Selected historical earthquakes in the area with an estimated magnitude greater than 6-1/4, are presented in Table 1 below.

TABLE 1
HISTORICAL EARTHQUAKES

Date	Magnitude	Fault	Locale
June 10, 1836	6.5[1]	San Andreas	San Juan Bautista
June 1838	7.0[2]	San Andreas	Peninsula
October 8, 1865	6.3[2]	San Andreas	Santa Cruz Mountains
October 21, 1868	7.0[2]	Hayward	Berkeley Hills, San Leandro
April 18, 1906	7.9[3]	San Andreas	Golden Gate
July 1, 1911	6.6[4]	Calaveras	Diablo Range, East of San Jose
October 17, 1989	7.1[5]	San Andreas	Loma Prieta, Santa Cruz Mountains

(1) Borchardt & Toppozada (1996)
(2) Toppozada et al (1981)
(3) Petersen (1996)
(4) Toppozada (1984)
(5) USGS (1989)

2.7 2016 CBC EARTHQUAKE DESIGN PARAMETERS

Based on the 2016 California Building Code (CBC) and our site evaluation, we recommend using Site Class Definition D (stiff soil) for the site. The other pertinent CBC seismic parameters are given in Table 2 below.

Table 2
CBC SEISMIC DESIGN PARAMETERS

S_S	S_1	S_{MS}	S_{M1}	S_{DS}	S_{D1}
2.182	0.893	2.182	null	1.455	null

Because the S_1 value is greater than 0.75, Seismic Design Category E is recommended, per CBC Section 1613.5.6. The values in the table above were obtained from a USGS software program which provides the values based on the latitude and longitude of the site, and the Site Class Definition. The latitude and longitude were 37.5285 and –122.5079, respectively, and were accurately obtained from Google Earth™. These same values can be obtained directly from maps in the CBC, however the scale of the map makes it impractical to achieve satisfactory accuracy. The map in the CBC was derived from the same work that led to the USGS software. The remaining parameters were also obtained by the same USGS program.

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 GENERAL

It is our opinion that, from a geotechnical viewpoint, the site is suitable for the proposed construction, provided the recommendations presented in this report are followed during design and construction. Detailed recommendations are presented in the following sections of this report.

Because subsurface conditions may vary from those encountered at the location of our borings, and to observe that our recommendations are properly implemented, we recommend that we be retained to 1) Review the project plans and structural calculations for conformance with our report recommendations and 2) Observe and test the earthwork and foundation installation phases of construction.

3.2 GEOLOGIC HAZARDS

We reviewed the potential for geologic hazards to impact the site, considering the geologic setting, and the soils encountered during our investigation. The results of our review are presented below:

- Fault Rupture - The site is not located in an Alquist-Priolo Earthquake Fault Zone where fault rupture is considered likely (California Division of Mines and Geology, 1976). Therefore, active faults are not believed to exist beneath the site, and the potential for fault rupture to occur at the site is considered low, in our opinion.

- Ground Shaking - The site is located in an active seismic area. Moderate to large earthquakes are probable along several active faults in the greater Bay Area over a 30 to 50 year design life. Strong ground shaking should therefore be expected several times during the design life of the structure, as is typical for sites throughout the Bay Area. The improvements should be designed and constructed in accordance with current earthquake resistance standards.

- Differential Compaction - Differential compaction occurs during moderate and large earthquakes when soft or loose, natural or fill soils are densified and settle, often unevenly across a site. In our opinion, due to the medium stiff to stiff nature of the underlying clays, the likelihood of significant damage to the structure from differential compaction is low, provided the proper foundation is built.

- Liquefaction - Liquefaction occurs when loose, saturated sandy soils lose strength and flow like a liquid during earthquake shaking. Ground settlement often accompanies liquefaction. Soils most susceptible to liquefaction are saturated, loose, silty sands, and uniformly graded sands. Loose silty sands were not encountered at the site. A loose to medium dense clayey sand was encountered below 11.5 feet. The fines content is 20 percent and appeared to be mostly clay. In our experience, this material has a low potential for liquefaction due to the relatively high clay content. We anticipate less than 1 inch of settlement due to liquefaction.

- Static Settlement – Static settlement, both total and differential, are due to increased loads from the structure on soft clay. The project site is underlain by medium stiff to very stiff clay in the upper 11.5 feet. With the proposed foundation type, we expect very little static settlement. Total settlement should be less than ½-inch, and differential settlement should be less that ¼-inch.

3.3 EARTHWORK

3.3.1 Clearing & Subgrade Preparation

All deleterious materials, including trees, topsoil, roots, vegetation, designated utility lines, etc., should be cleared from building and driveway areas. The actual stripping depth required will depend on site usage prior to construction, and should be established by the Contractor during construction. Topsoil may be stockpiled separately for later use in landscaping areas.

After the site has been properly cleared, stripped, and excavated to the required grades, the exposed surface soil in areas to receive a slab-on-grade should be scarified to the depth recommended in Section 3.5.2, moisture conditioned to at least 3-5 percent over optimum moisture content, and compacted to the specifications listed below under the section captioned "compaction."

3.3.2 Compaction

The scarified surface soils should be moisture conditioned to 3-5 percent above the optimum moisture content and compacted to at least 90 percent of the maximum dry density, as determined by ASTM D1557-78. All trench backfill should also be moisture conditioned to 3-5 percent above the optimum moisture content and compacted to at least 90 percent of the maximum dry density. The upper 3 feet of trench backfill below foundations or paved areas should be compacted to 95 percent of the maximum dry density in 6-inch loose lifts.

3.3.3 Surface Drainage

The finish grades should be designed to drain surface water away from foundations and slab areas, to suitable discharge points. On pervious surfaces, such as soil, slopes of at least 5 percent within 10 feet of the structures is required by the building code. The slope can be reduced to 2 percent for impervious surfaces. Ponding of water should not be allowed adjacent to the structure.

3.4 FOUNDATIONS

Because the variable and fairly poor nature of the site soils, the potential for differential movement is high during an earthquake. To mitigate this, a mat slab foundation is recommended. Because the site is on level ground in a narrow valley, the potential for excessive moisture in a crawl space would be high. A mat slab will eliminate this potential.

A reinforced slab or mat foundation may be designed for allowable bearing pressures of 1500 pounds per square foot for dead plus live loads, with a one-third increase allowed for total loads including wind or seismic forces.

We recommend that the slabs be underlain by at least 12 inches of non-expansive granular fill. Where floor wetness would be detrimental, a vapor barrier, such Stego wrap or equivalent may be used.

All slabs should be reinforced to provide structural continuity and to permit spanning of local irregularities. The slabs should be capable of spanning 15 feet, point to point, and should cantilever a minimum of 6 feet.

3.5.1 Lateral Loads

A passive pressure equivalent to that provided by a fluid weighing 300 pcf and a friction factor of 0.3 may be used to resist lateral forces and sliding against mat or spread footing foundations. These values include a safety factor of 1.5 and may be used in combination without reduction. Passive pressures should be disregarded for the uppermost 12 inches of foundation depth, measured below the lowest adjacent finished grade, unless confined by concrete slabs or pavements. However, the pressure distribution may be computed from the ground surface.

3.5.2 Slabs-on-Grade

Slabs-on-grade should be constructed as free-standing slabs, structurally isolated from surrounding grade beams. We recommend that the slab-on-grade be underlain by at least 12 inches of non-expansive fill. Where floor wetness would be detrimental, a vapor barrier, such as Stego wrap or equivalent may be used.

3.6 CONSTRUCTION OBSERVATIONS AND TESTING

The earthwork and foundation phases of construction should be observed and tested by us to 1) Establish that subsurface conditions are compatible with those used in the analysis and design; 2) Observe compliance with the design concepts, specifications and recommendations; and 3) Allow design changes in the event that subsurface conditions differ from those anticipated. The recommendations in this report are based on a limited number of borings. The nature and extent of variation across the site may not become evident until construction. If variations are then exposed, it will be necessary to reevaluate our recommendations.

4. LIMITATIONS

This report has been prepared for the exclusive use of the owner for specific application in developing geotechnical design criteria for the currently planned residence on Sunshine Valley Road in Moss Beach, California (APN 037-156-130). We make no warranty, expressed or implied, except that our services were performed in accordance with geotechnical engineering principles generally accepted at this time and location. The report was prepared to provide engineering opinions and recommendations only. In the event that there are any changes in the nature, design or location of the project, or if any future improvements are planned, the conclusions and recommendations contained in this report should not be considered valid unless 1) The project changes are reviewed by us, and 2) The conclusions and recommendations presented in this report are modified or verified in writing.

The analyses, conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our study; the currently planned improvements; review of previous reports relevant to the site conditions; and laboratory results. In addition, it should be recognized that certain limitations are inherent in the evaluation of subsurface conditions, and that certain conditions may not be detected during a study of this type. Changes in the information or data gained from any of these sources could result in changes in our conclusions or recommendations. If such changes do occur, we should be advised so that we can review our report in light of those changes.

5. REFERENCES

Borchardt, G. and Toppozada, T.R., 1996, Relocation of the "1836 Hayward Fault Earthquake" to the San Andreas Fault, Abstracts, American Geophysical Union Fall Meeting, December, San Francisco.

Brabb, Earl E. and Pampeyan, Earl H., 1983, Geologic Map of San Mateo County, California, USGS Miscellaneous Investigations Series Map I-1257-A, Scale 1:62,500.

California Building Code, 2016. California Code of Regulations. Title 24, Part 2 Volume 2, Effective January 1, 2017.

California Division of Mines and Geology, 1976, Earthquake Fault Zones, Alquist-Priolo Earthquake Fault Zoning Act, Half Moon Bay Quadrangle, Scale 1: 24,000.

Jennings, C.W., 1996, Preliminary Fault and Geologic Map, State of California, California Division of Mines and Geology, Scale 1:750,000.

Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic Seismic Hazard Assessment for the State of California, USGS Open File Report 96-706, CDMG Open File Report 96-08, 33p.

Toppozada, T.R., Real, C.R., and Park, D.L., 1981, Preparation of Isoseismal Maps and Summaries of Reported Effects for pre-1900 California Earthquakes, CDMG Open File Report 81-11 SAC.

Toppozada, T.R., 1984, History of Earthquake Damage in Santa Clara County and Comparison of 1911 and 1984 Earthquakes.

United States Geological Survey, 1989, Lessons Learned from the Loma Prieta, California Earthquake of October 17, 1989, Circular 1045.

United States Geologic Survey, 11/20/2007, Earthquake Ground Motion Parameters, Version 5.0.8.

Working Group on California Earthquake Probabilities, 1999, Earthquake Probabilities in the San Francisco Bay Region: 2000 to 2030 – A Summary of Findings, U.S. Geological Survey Open File Report 99-517, version 1.

Sigma Prime Geosciences, Inc.	Figure	1
	Date:	8/18/18
	Job No.:	18-159

Location Map

Li Property, 1855 Sunshine Valley Rd., Moss Beach

EXPLANATION

B-1 Soil Boring, Drilled, 7/17/18

Sigma Prime Geosciences, Inc.	Figure 2
	Date: 8/18/18
	Job No.: 18-159

Site Plan

Li Property, 1855 Sunshine Valley Rd., Moss Beach

APPENDIX A

SUBSURFACE STUDY

The soils encountered during drilling were logged by our representative, and samples were obtained at depths appropriate to the study. The samples were taken to the laboratory where they were carefully observed and classified in accordance with the Unified Soil Classification System. The logs of our borings, as well as a summary of the soil classification system, are attached.

Several tests were performed in the field during drilling. The standard penetration resistance was determined by dropping a 140-pound hammer through a 30-inch free fall, and recording the blows required to drive the 2-inch (outside diameter) sampler 24 inches. The standard penetration resistance is the number of blows required to drive a standard split spoon sampler the last 12 inches. The blow counts are recorded on the boring logs at the appropriate depth. Use of the standard split spoon sampler defines a Standard Penetration Test (SPT), and yields an SPT-equivalent blow count. A modified California (Mod-Cal) sampler was also used, which results in blow counts that are higher than an SPT-equivalent blow count, due to the Mod-Cal sampler's larger diameter. For analyses, it is normal practice to reduce the Mod-Cal blow counts to correspond to an SPT-equivalent blow count. The blow counts from the Mod-Cal sampler are uncorrected on the logs. The results of these field tests are also presented on the boring logs.

The boring logs and related information depict our interpretation of subsurface conditions only at the specific location and time indicated. Subsurface conditions and groundwater levels at other locations may differ from conditions at the locations where sampling was conducted. The passage of time may also result in changes in the subsurface conditions.

Project Name	Project Number	
Li	18-159	Sigma Prime Geosciences, Inc.

Location: Back of Lot

Drilling Method	Hole Size	Total Depth	Soil Footage	Rock Footage	Elevation	Datum
Cont. Sampling	4"	12'	12'	0	~111'	NGVD88

Drilling Company: Access Soil Drilling, Inc.	Logged By: C. Kissick
Type of Drill Rig: N/A	Type of Sampler(s): MC, SPT, 2.5" ID
Hammer Weight and Fall: 140 lb, 30"	

Boring No.	B-1
Page	1 of 1
Date(s)	8/18/18

Depth (feet)	Description	Graphic Log	Class	Blow Count	Sample No.	Sample Type	Comments
0	0'-11.5': Sandy Clay: dark brown; stiff; moist.		CL	6 11 15 24	1	MC	
				18 15 13 10	2	MC	
5	Becomes medium stiff.			3 4 5 5	3	2½"	
				5 6 6 6	4	2½"	
	Color change to olive-gray.			3 3 5 4	5	SPT	
10	11.5'-12': Clayey Sand: blue-gray; medium dense; moist.		SC	3 3 3 6	6	SPT	
12	Bottom at 12': No Groundwater.						
15							
20							

Project Name	Li	Project Number	18-159
Location	Front of Lot		

Sigma Prime Geosciences, Inc.

Drilling Method	Hole Size	Total Depth	Soil Footage	Rock Footage	Elevation	Datum
Cont. Sampling	4"	18'	18'	0	~111'	NGVD88

Boring No.	B-2
Page	1 of 1
Date(s)	8/18/18

Drilling Company	Access Soil Drilling, Inc.
Logged By:	C. Kissick
Type of Drill Rig	N/A
Type of Sampler(s)	MC, SPT, 2.5" ID
Hammer Weight and Fall	140 lb, 30"

Depth (feet)	Description	Graphic Log	Class	Blow Count	Sample No.	Sample Type	Comments
0–2	0'-11.5': Sandy Clay: dark brown; stiff; moist.		CL	6 7 13 12	1	MC	
2–4	Becomes medium stiff.		CL	5 6 5 3	2	MC	Lab, Sample #2: Moisture %=21.0% Dry Density=103.9 pcf LL=31, PL=16, PI=14
4–6 (5)			CL	5 9 11 12	3	MC	
6–8			CL	9 9 9 9	4	2½"	
8–10			CL	5 5 5 4	5	2½"	
10–12 (10)			CL	3 3 4 5	6	2½"	
12–14	11.5'-18': Clayey Sand: blue-gray; loose to medium dense; moist.		SC	2 3 5 4	7	SPT	
14–16 (15)			SC	3 3 6 9	8	SPT	Lab, Sample #8: 20% Fines Moisture %: 17.6%
16–18			SC	5 4 6 3	9	SPT	
18–20 (20)	Bottom at 18': 1st Groundwater @ 2'; Groundwater @ 4' after drilling.						

UNIFIED SOIL CLASSIFICATION (ASTM D-2487-85)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND
COARSE-GRAINED SOILS > 50% RETAINED ON NO. 4 SIEVE	GRAVELS > 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS < 5% FINES	Cu > 4 AND 1 < Cc < 3	GW	WELL-GRADED GRAVEL
			Cu < 4 AND/OR 1 > Cc > 3	GP	POORLY-GRADED GRAVEL
		GRAVELS WITH FINES > 12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL
	SANDS > 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN SANDS < 5% FINES	Cu > 6 AND 1 < Cc < 3	SW	WELL-GRADED SAND
			Cu < 6 AND/OR 1 > Cc > 3	SP	POORLY-GRADED SAND
		SANDS WITH FINES > 12% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND
FINE-GRAINED SOILS > 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT < 50	INORGANIC	PI > 7 AND PLOTS > "A" LINE	CL	LOW-PLASTICITY CLAY
			PI > 4 AND PLOTS < "A" LINE	ML	LOW-PLASTICITY SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL	ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT > 50	INORGANIC	PI PLOTS > "A" LINE	CH	HIGH-PLASTICITY CLAY
			PI PLOTS < "A" LINE	MH	HIGH-PLASTICITY SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH	ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK COLOR, ORGANIC ODOR		PT	PEAT

NOTE: $Cu = D_{60}/D_{10}$

$Cc = (D_{30})^2/(D_{10}+D_{60})$

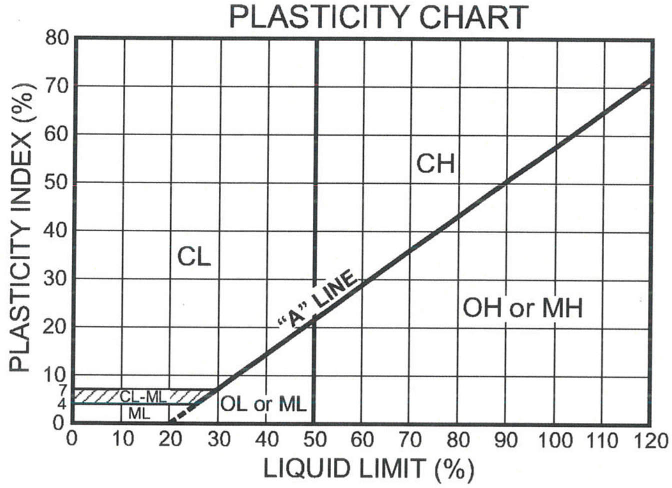
SAMPLE TYPES

B	BULK SAMPLE
ST	PUSHED SHELBY TUBE
SPT	STANDARD PENETRATION
MC	MODIFIED CALIFORNIA
P	PITCHER SAMPLE
C	ROCK CORE

BLOW COUNT

THE NUMBER OF BLOWS OF THE HAMMER REQUIRED TO DRIVE THE SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE. THE NOTATION 50/4 INDICATES 4 INCHES OF PENETRATION ACHIEVED IN 50 BLOWS.

PLASTICITY CHART



ADDITIONAL TESTS

CA - CHEMICAL ANALYSIS
CN - CONSOLIDATION
CP - COMPACTION
DS - DIRECT SHEAR
PM - PERMEABILITY
PP - POCKET PENETROMETER
Cor. - CORROSIVITY
SA - GRAIN SIZE ANALYSIS
(20%) - (PERCENT PASSING #200 SIEVE
SW - SWELL TEST
TC - CYCLIC TRIAXIAL
TU - CONSOLIDATED UNDRAINED TRIAXIAL
TV - TORVANE SHEAR
UC - UNCONFINED COMPRESSION
WA - WASH ANALYSIS
▽ - WATER LEVEL AT TIME OF DRILLING AND DATE MEASURED
▼ - LATER WATER LEVEL AND DATE MEASURED

LEGEND TO SOIL DESCRIPTIONS

Sigma Prime Geosciences, Inc.

FIGURE A-1

APPENDIX B

LABORATORY TESTS

Samples from the subsurface study were selected for tests to establish some of the physical and engineering properties of the soils. The tests performed are briefly described below.

The natural moisture content and dry density were determined in accordance with ASTM D 2216 on selected samples recovered from the borings. This test determines the moisture content and density, representative of field conditions, at the time the samples were collected. The results are presented on the boring logs, at the appropriate sample depth.

The plasticity of selected clayey soil samples was determined on two soil samples in accordance with ASTM D 422. These results are presented on the boring logs, at the appropriate sample depth.

One soil sample was tested to measure the fines content, as per ASTM D-422. The test helped in our liquefaction potential evaluation. The results are presented on the boring log, at the appropriate sample depth.