Exhibit Z. Sinclair Site Preliminary Geotechnical Engineering Report

CSRS
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Sinclair Site Preliminary Geotechnical Engineering Report

October 12, 2016

St. Bernard Economic Development Foundation
100 Port Boulevard, Suite 10
Chalmette, Louisiana 70043

Attention : Mr. Andrew Jacques
Email: ajacques@sbedf.org
Phone: (504) 227-4009

Re: Preliminary Geotechnical Engineering Parameters and Guidance
Sinclair Site
St. Bernard Parish, Louisiana
PSI Project No.: 0254826-1

Dear Mr. Jacques:

Professional Service Industries, Inc. (PSI) is pleased to submit this report that presents the results of the requested preliminary geotechnical engineering parameters and guidance relative to the Sinclair Site located in Meraux, Louisiana. This study was performed in general accordance with PSI Proposal No. 0254-177747-R1; dated April 11, 2016, which was authorized by Mr. Andrew Jacques with the St. Bernard Economic Development Foundation dated May 25, 2016

We appreciate the opportunity to perform these geotechnical engineering services and look forward to continuing participation during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, INC.

William Barker
Project Manager
Geotechnical Services

Reda M. Bakeer, Ph.D., P.E.
Senior Vice-President

GENERAL GEOTECHNICAL SITE CHARACTERIZATION REPORT

SINCLAIR SITE
LA HWY 45 AND LA HWY 39
MERAUX, LOUISIANA

PSI PROJECT NO. 0254826-1

PREPARED FOR

ST. BERNARD ECONOMIC DEVELOPMENT FOUNDATION
100 PORT BOULEVARD, SUITE 10
CHALMETTE, LOUISIANA 70043

OCTOBER 12, 2016

BY

PROFESSIONAL SERVICE INDUSTRIES, INC.
724 CENTRAL AVENUE
JEFFERSON, LOUISIANA 70121
PHONE: 504-733-9411
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Name: Reda M. Bakeer, Ph.D., P.E.
Date: October 12, 2016
License No.: 27123
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PROJECT INFORMATION

Project Description

Project information was provided to PSI by Mr. Joseph Yarbrough with CSRS, Inc. via an email and it included a Request for Proposal (RFP) dated April 4, 2016. Based on the information provided, it is understood that the purpose of this study is to perform a preliminary geotechnical investigation to develop a "General Geotechnical Site Characterization" for the subject site. The approximately 260-acre site is located near the intersection of Maureen Lane and LA Highway 39 in Chalmette, Louisiana. The property extends approximately 3,200 west of Highway 39 (towards the Mississippi River) and approximately 3,200 feet north of Maureen Lane.

It is understood that this report will not be used for the construction of structures or foundations, but will be limited to providing general characterization of the subsoil types and stratification at the subject sit as indicated by the borings. It is understood that the general geotechnical characterization of the site will be utilized to support the Louisiana Economic Development (LED) site certification process. It is understood that consideration is being given to shallow and deep foundation support of a "typical" petrochemical plant. PSI has been requested to provide preliminary recommendations for the size of spread footings (if feasible) and deep foundations. It should be noted that only a small number of borings were made and some variations should be expected to exist away from the boring locations considering the site size and its proximity to the Mississippi River.

The opinions and information to be presented in this report are estimates for preliminary consideration only, are based on limited geotechnical exploration, and are not to be used for final design and construction. A detailed geotechnical exploration and analyses should be performed once design and function of the proposed development have been finalized.

Purpose and Scope of Services

The purposes of PSI's geotechnical services are to:

- Perform five (5) soil borings at the site as per the request of the Client;
- Evaluate general subsurface soil conditions and groundwater depth at the boring locations;
- Perform limited laboratory testing on selected soil samples recovered from the borings; and,
- Provide a general discussion regarding the compatibility of this site with industrial development and the suitability of soils encountered.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, surface water, groundwater, or air on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes. Prior to development of this site, an environmental assessment is advisable. Additionally, PSI did not provide any service to investigate or detect the presence of moisture, mold or other biological contaminants in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence or the amplification of the same. Client acknowledges that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. Client further acknowledges that site conditions are outside of PSI's control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, PSI cannot and shall not be held responsible for the occurrence or recurrence

of mold amplification.

FIELD EXPLORATION AND LABORATORY TESTING PROCEDURES

As requested by the Client, PSI performed five (5) soil borings, to the depths described in Table 1, to explore the subsurface conditions at these randomly selected locations within the 260-acre site.

Table 1: Soil Borings

Boring(s)	Depth (feet)*
B-1	80
B-2	25
B-3	100
B-4	80
B-5	25

**Approximate depth below the existing ground surface.*

The approximate locations of the borings are indicated on the Boring Location Plan included in the Appendix.

The soil borings were performed with a ATV track-mounted drilling rig using solid stem auger and wet rotary drilling techniques. Samples were generally obtained at two (2) foot intervals from the ground surface to a depth of ten (10) feet and at maximum five (5) foot intervals thereafter to the boring termination depths. Drilling and sampling were accomplished in general accordance with ASTM Standard Procedures.

Undisturbed samples of cohesive soils were generally obtained using thin-walled tubes in general accordance with the procedures for “Thin-Walled Tube Geotechnical Sampling of Soils” (ASTM D1587). These samples were extruded in the field with a hydraulic ram.

For cohesionless soils and semi-cohesive soils, Standard Penetration Test (SPT) was performed to obtain standard penetration values of the soil. The standard penetration value (N) is defined as the number of blows of a 140 pound hammer falling 30 inches that is required to advance the split-barrel sampler one (1) foot into the soil. To perform the test and obtain a sample, the sampler is lowered to the bottom of the previously cleaned drill hole and advanced by blows from the hammer. The number of blows is recorded for each of three (3) successive increments of six (6) inches penetration. The “N” value is obtained by adding the second and third incremental numbers. The results of the standard penetration test indicate the relative density of cohesionless soils and thereby provide a basis for estimating the relative strength of the soil profile components. Samples of granular soils were obtained utilizing a two (2) inch O.D. split-barrel sampler in general accordance with procedures for “Penetration Test and Split-Barrel Sampling of Soils” (ASTM D-1586).

The samples were identified according to the project number, boring number and depth, and placed in polyethylene plastic wrapping to protect against moisture loss. In addition, undisturbed samples were wrapped in aluminum foil prior to placing in the plastic wrapping and were transported to the laboratory in containers to minimize further disturbance.

In addition to the field exploration, a laboratory testing program was conducted on the samples obtained from the soil borings to evaluate additional pertinent engineering characteristics of the

subsurface materials. The laboratory testing program included supplementary visual classification and water content tests on the soil samples. In addition, selected samples were tested for unconsolidated undrained triaxial strength, Atterberg limits, and percent passing No. 200 sieve. Additional estimates of undrained shear-strength and unconfined compressive strength were also determined through the use of a torvane and a hand penetrometer, respectively.

The results of the laboratory tests are presented on the accompanying boring logs given in the Appendix. The samples which were not altered by laboratory testing will be retained for 60 days from the date of this report and then will be discarded.

Laboratory Testing

Selected soil samples were tested in the laboratory to determine material properties for our evaluation. Visual classifications were performed in the laboratory. Physical testing included determination of moisture contents, Atterberg limits classification testing and unconfined compressive strength or unconsolidated-undrained triaxial shear tests to supplement the field pocket penetrometer and torvane testing. The laboratory testing was performed in general accordance with ASTM standard procedures. Samples not altered by laboratory testing will be retained for sixty days from the date of this report and then be discarded.

SITE AND SUBSURFACE CONDITIONS

Site Description

The approximately 260-acre site is located near the intersection of Maureen Lane and LA Highway 39 in Chalmette, Louisiana. The property extends approximately 3,200 southwest of Highway 39 (towards the Mississippi River) and approximately 3,200 feet northwest of Maureen Lane. At the time of the field exploration, the project site was an undeveloped grass covered field and was generally level in most areas with some relatively localized low areas. The areas to the northwest and southeast of the site are presently developed with residences. The most recent Site Vicinity Map dated April 6, 2016 available on Google Earth is presented in the Appendix.

Subsurface Conditions

Based on the field observations and the results of the laboratory testing, the soils were classified and the boring logs were developed. The boring logs are presented in the Appendix along with a key to the terms and symbols used on the boring logs. In view of the site size and the limited number of borings made at this time, a generalized subsurface profile at each specific boring location is presented in Tables 2 thru 6.

Table 2: Generalized Soil Profile – B-1

Approximate Depth Range (feet)[1]	Consistency/Relative Density	Material Description
0 – 2	Firm	Lean Clay (CL) TOPSOIL
2 – 38	Very soft to Soft	Lean Clay (CL) or Fat Clay (CH)
38 – 45	Medium dense	Silty Sand (SM)
45 – 57	Soft	Lean Clay (CL)
57 – 73	Firm to Stiff	Sandy Lean Clay (CL)
73 – 75	Loose	Silt (ML)
75 – 80	Soft to Firm	Fat Clay (CH)

[1]Referenced from the existing grade at the boring locations

Table 3: Generalized Soil Profile – B-2

Approximate Depth Range (feet)[1]	Consistency/Relative Density	Material Description
0 – 2	Stiff	Lean Clay (CL) TOPSOIL
2 – 25	Soft to Firm	Fat Clay (CH)

[1]Referenced from existing ground surface

Table 4: Generalized Soil Profile – B-3

Approximate Depth Range (feet)[1]	Consistency/Relative Density	Material Description
0 – 2	Firm	Lean Clay (CL) TOPSOIL
2 – 37	Very soft to Soft	Fat Clay (CH)
37 – 57	Very soft to Soft	Sandy Lean Clay (CL)
57 – 73	Firm	Fat Clay (CH)
73 – 80	Dense	Poorly Graded Sand (SP-SM)
80 – 85	Dense	Silty Sand (SM)
85 – 100	Soft to Firm	Lean Clay (CL)

[1]Referenced from existing ground surface

Table 5: Generalized Soil Profile – B-4

Approximate Depth Range (feet)[1]	Consistency/Relative Density	Material Description
0 – 2	Stiff	Lean Clay (CL) TOPSOIL
2 – 38	Soft to Firm	Fat Clay (CH)
38 – 50	Medium Dense	Silty Sand (SM)
50 – 63	Firm	Fat Clay (CH)
63 – 80	Medium Dense	Silty Sand (SM)

[1]Referenced from existing ground surface

Table 6: Generalized Soil Profile – B-5

Approximate Depth Range (feet)[(1)]	Consistency/Relative Density	Material Description
0 – 25	Soft to Firm	Fat Clay (CH)

[(1)] *Referenced from existing ground surface*

The above subsurface descriptions are of a generalized nature to highlight the major subsurface stratification features and material characteristics in each exploration area of the 260-acre site. The boring logs included in the Appendix should be reviewed for specific information at the boring locations. These boring logs also include soil descriptions, stratification, penetration resistances, and locations of the samples and laboratory test data. The stratification shown on the logs represents the conditions only at the actual exploration locations and within that particular area. Therefore, variation may occur, and should be expected across the site considering its size and proximity to the Mississippi River. The stratification represents the approximate boundary between subsurface materials, but the actual transition may be gradual. Groundwater level information obtained during field operations is also shown on the boring logs. As previously discussed, this report is intended for general site characterization and not for use in any formal designs.

Groundwater Conditions

Table 7 presents groundwater levels observed during the time of drilling.

Table 7: Groundwater Levels at the time of Field Exploration Activities

Boring	Groundwater Depth During Drilling (feet)*
B-1, B-2, and B-3	8
B-4 and B-5	6

**Referenced from the existing ground surface.*

It is possible that seasonal variations (temperature, rainfall, etc) as well as the water level or stage in the nearby water bodies (i.e., Mississippi River, etc.) will cause fluctuations in the groundwater level. Additionally, perched water may be encountered in discontinuous zones within the overburden. This condition develops as rainwater in entrapped in the more pervious surface lean clays underlain by less pervious cohesive fat clay soils. The groundwater levels presented in this report are the levels that were measured at the time of our field activities. It is recommended that the Contractor determine the actual groundwater levels at the site at the time of the construction activities to determine the impact, if any, on the construction procedures. This is particularly important considering the size of the site and the limited number of borings drilled at this time.

EVALUATION AND DISCUSSIONS

The type and depth of foundation suitable for a given structure primarily depends on several factors including the subsurface conditions, the function of the structure, the loads it may carry, the cost of the foundation and the criteria set by the Design Engineer with respect to vertical and differential movements which the structure can withstand without damage. Detailed column loads for specific structures and grading plans were not provided at the time of this study. All future design plans should also consider the requirements of the U.S. Army Corps of Engineers (USACE) with regard to any construction to be made within 1,500 feet from any existing flood

protection structure (levee, etc.) along the adjacent Mississippi River. This includes performing analyses with regard to local stability, global stability, seepage, etc. as well as construction considerations (vibrations, excavations, etc.)

Grade supported foundations or surface coverings will likely be governed by the anticipated load and settlement tolerances, particularly where a significant amount of new fill is placed. Driven piles should be viable foundation types considering the subsurface and groundwater conditions encountered and should be anticipated to carry the structural loads anticipating that settlement will occur as a result of new fill. Prior to new fill placement, site preparation should include removal of surficial vegetation, trees, topsoil, organic matter, and soft soil or demucking of wet areas or drainage conveyances and proofrolling in the presence of the Geotechnical Engineer to assess general stability and firmness prior to fill placement.

Based on the limited number of soil borings, field data and laboratory test results, the proposed site is generally suitable for industrial development. The results of the exploration indicate that the near surface soils present at this site are highly compressible in nature, and poor in bearing quality. In consideration of the existing soil conditions and the impact of any additional fill being planned to raise the site grades, a shallow foundation is expected to undergo excessive settlements and, therefore, will not be suitable for support of “typical” industrial construction. However, spread footing type foundations (square, continuous, mats, etc.) could be used for support of lightly loaded auxiliary structures that can tolerate settlements including some differential with time.

Areas within 1,500 feet of the existing levee to the southwest of the site should anticipate USACE interaction per the Hurricane and Storm Damage Risk Reduction System (HSDRRS) Design Guidelines and will likely be subject to the requirements of the Lower Mississippi Valley (MVN) and New Orleans District (NOD) requirements. Special permitting should also be anticipated for any geotechnical borings, new fill or excavations, and any loading or changes in loading configurations within the referenced area of the site. Supplemental exploration and sampling methods, laboratory testing and engineering analysis (including, but not limited to, slope stability, seepage analysis, and settlement analysis) following the HSDRRS Design Guidelines may be required for the project. Additionally, the USACE permits typically prohibit excavation or deep foundation installation during periods of high water (typically late April through late July but may vary dependent on the weather conditions in the region) as detailed by the permit requirements. Strict monitoring of pile driving is also mandated by the USACE in terms of vibration and potential impact on the adjacent flood protection system.

As stated previously, PSI’s opinions and information presented in this site evaluation report are provided for planning purposes and preliminary considerations only; they are based on a very limited geotechnical exploration, and are not to be used for final design and construction.

Axial Capacity of Piles

Using the static method of analyses and results of the soil borings allowable axial capacities have been computed for the following pile types: 7” tip -12” butt diameter large Class “B” treated timber piles and a 14-inch square precast, pre-stressed concrete (PPC) piles. It is recommended that only one pile type and length be used to support a given structure. The estimated pile capacities provided include a design factors of safety of 2.0 in compression and 3.0 in tension. The piles at this site will generally derive their support in compression and tension, or uplift, through “skin friction” along their embedded lengths since no stratum was encountered that would offer “good” additional “point support.”

The recommended driven lengths and the estimated corresponding allowable compression and tension capacities for the piles are presented in Tables 8 and 9. Due to the central location and depth of soil boring B-3 and the dissimilarities encountered in all three (3) deep soil borings with regard to soil type, strength and stratification, the soil profile of soil boring B-3 was employed in the pile capacity analysis provided below. The recommended pile lengths are referenced from the existing ground surface and any length of pile needed above, or below, this reference should be added to, or subtracted from, the pile lengths given in Tables 8 and 9.

TABLE 8. Timber Pile Allowable Capacities

ESTIMATED ALLOWABLE SINGLE PILE CAPACITY (tons)[1]		
Pile Length (feet)[2]	Class "B" Timber (7" tip – 12" butt)	
	Comp.	Tens.
55	23	9
±60	+25	12

[1] Capacities are soil-pile related capacities and consideration should be given to the structural integrity of the pile member.
[2] Pile lengths are referenced from existing ground surface at the time of drilling.

TABLE 9. 14-inch square PPC Allowable Capacities

ESTIMATED ALLOWABLE SINGLE PILE CAPACITY (tons)[1]		
Pile Length (feet)[2]	Sq. Precast Concrete (14-inch)	
	Comp.	Tens.
60	26	17
65	29	19
70	32	21
75[3]	60	25
80[3]	72	31
85	75	38
90	63	41
95	65	42

[1] Capacities are soil-pile related capacities and consideration should be given to the structural integrity of the pile member.
[2] Pile lengths are referenced from existing ground surface at the time of drilling.
[3] Piles installed to firm embedment into sand stratum and should be confirmed with a probe pile and load test program.

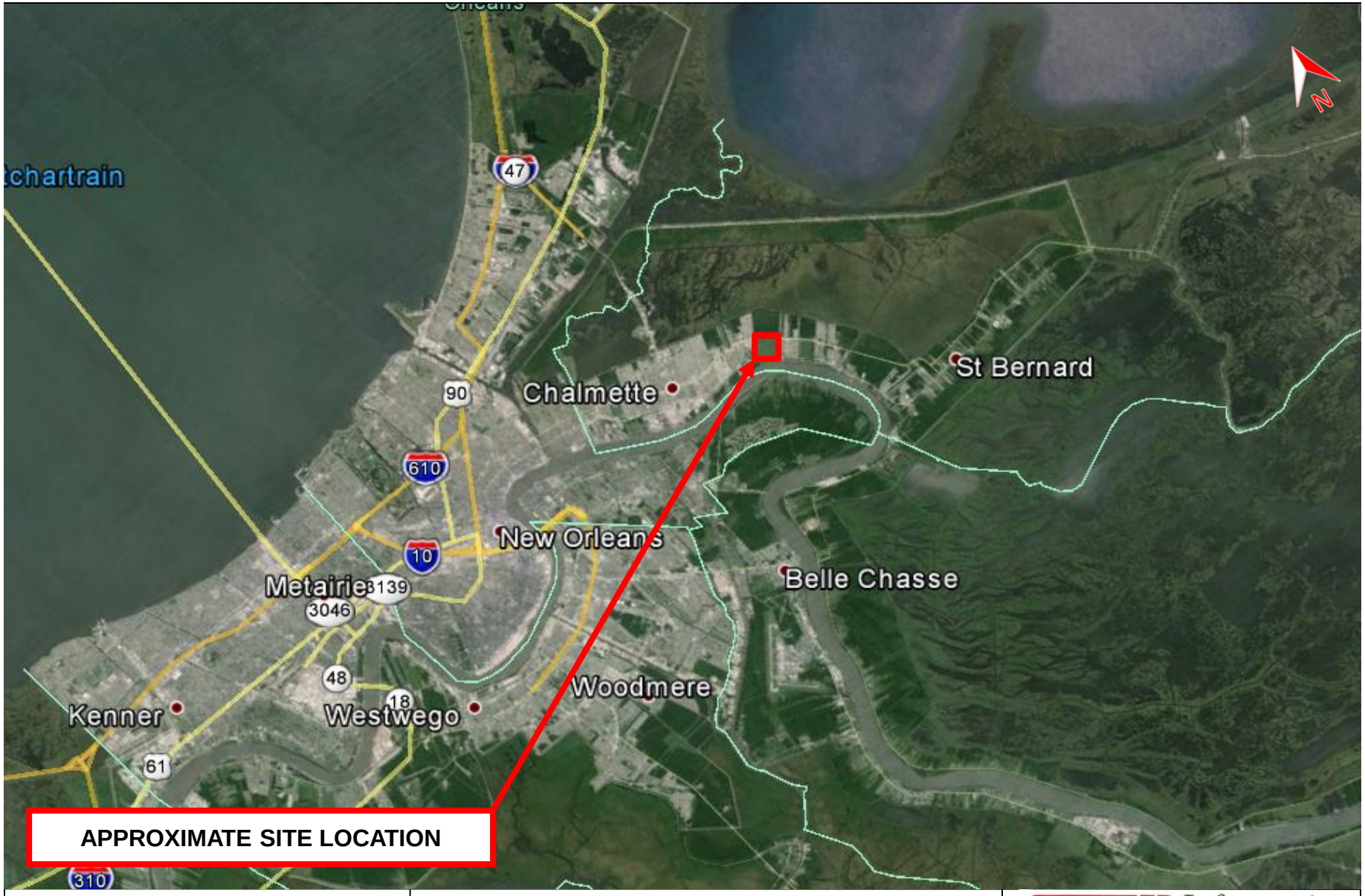
The estimated pile capacities include a factor of safety of two (2) in compression and three (3) in tension. In both cases, pile lengths are measured from the existing ground surface at the boring locations. Any pile lengths needed above, or below, this reference grade should be added to or subtracted from, the tabulated lengths, respectively. Also, a pile cutoff of 2 and 4 feet for timber and PPC, respectively, piles should be of no consequence. It should be noted that if more than three (3) feet of fill is planned, the above pile capacities should be re-evaluated to account for drag loads on the piles. Additional analyses will need to be performed with regard to lateral loads, group effect and settlement based on the specific project loads and layout.

REPORT LIMITATIONS

The preliminary information submitted in this report is based on the available subsurface data obtained by PSI at the time of our field exploration. PSI warrants that the preliminary findings contained herein have been made in accordance with generally accepted drilling procedures and visual soil classification methods in the local area. No other warranties are implied or expressed. This report has been prepared for the exclusive use of the St. Bernard Economic Development Foundation for the specific purpose of determining general subsurface information at the subject site to develop a general geotechnical site characterization.

APPENDIX

Site Vicinity Map
Boring Location Plan
Boring Logs
Key to Terms and Symbols Used on Boring Logs



SINCLAIR SITE
MERAUX, LOUISIANA

SITE VICINITY MAP

PSI PROJECT NO. 0254826-1
(Google Earth Image dated April 6, 2016)

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SINCLAIR SITE
MERAUX, LOUISIANA

BORING LOCATION PLAN

PSI PROJECT NO. 0254826-1
(Google Earth Image dated April 6, 2016)

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LOG OF BORING B-1

SINCLAIR PROJECT SITE
MERAUX, LOUISIANA
ST. BERNARD PARISH

TYPE OF BORING: SOLID STEM AUGER / WET ROTARY LOCATION: SINCLAIR PSI Project No.: 0254826

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf) ○ HP ● UC △ TV ▲ UU 0.0 0.5 1.0 1.5	SHEAR STRENGTH (tsf) HP (tsf)	SHEAR STRENGTH (tsf) UC (tsf)	SHEAR STRENGTH (tsf) TV (tsf)	SHEAR STRENGTH (tsf) UU (tsf)	DRY UNIT WEIGHT (pcf)
		CL		Firm brown and gray **LEAN CLAY**		27					○	0.42				
2.5		CL		Very soft brown and gray **LEAN CLAY**		32	45	20	25		●		0.08	0.10		85
5.0		CH		Soft gray **FAT CLAY**		43	61	23	38		△			0.20		
				▼		37					△			0.20		
7.5				▽												
						53					▲△			0.40	0.20	69
10.0																
12.5		CH		Soft gray **FAT CLAY**, with organic		91					△			0.15		
15.0																
17.5		OH		Soft black **ORGANIC CLAY**		178	255	73	182		△			0.20		
20.0																
22.5		CL		Very soft gray **SANDY LEAN CLAY**		39					△			0.10		
25.0																
27.5																
						32					△			0.10		
30.0																
32.5																
						29				70						
35.0																
37.5		SM		Medium dense gray **SILTY SAND**	14	31										
40.0																
42.5																
					13	27				33						
45.0		CL		Soft gray **LEAN CLAY**, with sand pockets												
47.5																
					3	39										
50.0																

DEPTH OF BORING: 80 FEET
DATE DRILLED: 9/6/16
NOTE:

▽ GROUNDWATER DURING DRILLING: 8 FEET
▼ GROUNDWATER UPON COMPLETION: 6 FEET
▼ DELAYED GROUNDWATER: N / A

BORINGLOG_JEFFERSON - PSIHOUSTON.GDT - 10/12/16 16:01 - 0254

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LOG OF BORING B-1

SINCLAIR PROJECT SITE
MERAUX, LOUISIANA
ST. BERNARD PARISH

TYPE OF BORING: SOLID STEM AUGER / WET ROTARY LOCATION: SINCLAIR PSI Project No.: 0254826

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf) ○ HP ● UC △ TV ▲ UU 0.0 0.5 1.0 1.5	SHEAR STRENGTH (tsf) HP (tsf)	UC (tsf)	TV (tsf)	UU (tsf)	DRY UNIT WEIGHT (pcf)
52.5		CL		Soft gray **LEAN CLAY**, with sand pockets												
55.0						36	40	20	20		△			0.15		
57.5		CL		Firm to stiff **SANDY LEAN CLAY**												
60.0					7	32				58						
62.5																
65.0					12	32										
67.5																
70.0					15	31										
72.5																
75.0		ML		Loose gray **SILT**, with sand (NONPLASTIC)	5	33				91						
77.5		CH		Soft gray **FAT CLAY**		44	62	19	43		▲			0.25	0.25	76
80.0				Boring terminated at 80 feet												
82.5																
85.0																
87.5																
90.0																
92.5																
95.0																
97.5																
100.0																

DEPTH OF BORING: 80 FEET
DATE DRILLED: 9/6/16
NOTE:

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LOG OF BORING B-2

SINCLAIR PROJECT SITE
MERAUX, LOUISIANA
ST. BERNARD PARISH

TYPE OF BORING: SOLID STEM AUGER / WET ROTARY LOCATION: SINCLAIR PSI Project No.: 0254826

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf) ○ HP ● UC △ TV ▲ UU 0.0 0.5 1.0 1.5	SHEAR STRENGTH (tsf) HP (tsf)	SHEAR STRENGTH (tsf) UC (tsf)	SHEAR STRENGTH (tsf) TV (tsf)	SHEAR STRENGTH (tsf) UU (tsf)	DRY UNIT WEIGHT (pcf)
		CL		Stiff brown **LEAN CLAY**		26						0.58				
2.5		CH		Soft to firm brown and gray **FAT CLAY**		34	71	22	49					0.45		
5.0						35						0.50	0.38			78
7.5				▽		35								0.35		
		CH		Soft to firm gray **FAT CLAY**, with trace organic		43								0.30	0.18	70
10.0																
12.5																
15.0						47	91	26	65			0.25				
17.5																
20.0						42								0.15		
22.5																
25.0						46								0.20	0.15	73
				Boring terminated at 25 feet												
27.5																
30.0																
32.5																
35.0																
37.5																
40.0																
42.5																
45.0																
47.5																
50.0																

DEPTH OF BORING: 25 FEET
DATE DRILLED: 9/7/16
NOTE:

▽ GROUNDWATER DURING DRILLING: 8 FEET
▼ GROUNDWATER UPON COMPLETION: N / A
▼ DELAYED GROUNDWATER: N / A

BORINGLOG_JEFFERSON - PSIHOUSTON.GDT - 10/12/16 16:01 - 0254

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LOG OF BORING B-3

SINCLAIR PROJECT SITE
MERAUX, LOUISIANA
ST. BERNARD PARISH

TYPE OF BORING: SOLID STEM AUGER / WET ROTARY LOCATION: SINCLAIR PSI Project No.: 0254826

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf) ○ HP ● UC △ TV ▲ UU 0.0 0.5 1.0 1.5	SHEAR STRENGTH (tsf) HP (tsf)	UC (tsf)	TV (tsf)	UU (tsf)	DRY UNIT WEIGHT (pcf)
		CL		Soft brown **LEAN CLAY**		27					○	0.25				
2.5		CH		Very soft to soft gray **FAT CLAY**		43	60	20	40		△			0.30		
5.0						53					△			0.30		
					▼											
7.5				-with trace organic, 6 to 10 feet	▽	61					●		0.17	0.15		65
						58					△			0.35		
10.0																
12.5																
						36					△			0.20		
15.0																
17.5																
						47	77	22	55		▲△			0.25	0.16	73
20.0																
22.5																
						39					△			0.15		
25.0																
27.5																
				-with trace organic, 28 to 30 feet		64					△			0.35		
30.0																
32.5																
						47					▲			0.10	0.10	69
35.0																
37.5		CL		Very soft to soft gray **SANDY LEAN CLAY**												
						29				70	△			0.10		
40.0																
42.5																
						26				78	△			0.15		
45.0																
47.5																
						38					△			0.15		
50.0																

DEPTH OF BORING: 100 FEET
DATE DRILLED: 9/2/16
NOTE:

▽ GROUNDWATER DURING DRILLING: 8 FEET
▼ GROUNDWATER UPON COMPLETION: 6 FEET
▼ DELAYED GROUNDWATER: N / A

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psi Information To Build On
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724 Central Avenue
Jefferson Louisiana 70121
(504) 733-9411

LOG OF BORING B-3

SINCLAIR PROJECT SITE
MERAUX, LOUISIANA
ST. BERNARD PARISH

TYPE OF BORING: SOLID STEM AUGER / WET ROTARY LOCATION: SINCLAIR PSI Project No.: 0254826

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf) ○ HP ● UC △ TV ▲ UU 0.0 0.5 1.0 1.5	SHEAR STRENGTH (tsf) HP (tsf)	SHEAR STRENGTH (tsf) UC (tsf)	SHEAR STRENGTH (tsf) TV (tsf)	SHEAR STRENGTH (tsf) UU (tsf)	DRY UNIT WEIGHT (pcf)
52.5		CL		Very soft to soft gray **SANDY LEAN CLAY**												
						34					△			0.10		
55.0																
57.5		CH		Firm gray **FAT CLAY**												
						52	80	24	56		△			0.30		
60.0																
62.5																
						53					▲			0.40	0.39	
65.0																
67.5																
						54					△			0.45		71
70.0																
72.5		SP-SM		Dense gray **SAND WITH SILT**	31	26				6						
75.0																
77.5																
					32	27										
80.0		SM		Dense gray **SILTY SAND**												
82.5																
					38	33				40						
85.0		CL		Soft to firm gray **LEAN CLAY**												
87.5																
						39					○	0.25				
90.0																
92.5																
						34					○	0.25				
95.0																
97.5																
						37					▲			0.20	0.14	87
100.0				Boring terminated at 100 feet												

DEPTH OF BORING: 100 FEET
DATE DRILLED: 9/2/16
NOTE:

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Jefferson Louisiana 70121
(504) 733-9411

LOG OF BORING B-4

SINCLAIR PROJECT SITE
MERAUX, LOUISIANA
ST. BERNARD PARISH

TYPE OF BORING: SOLID STEM AUGER / WET ROTARY LOCATION: SINCLAIR PSI Project No.: 0254826

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf) ○ HP ● UC △ TV ▲ UU 0.0 0.5 1.0 1.5	SHEAR STRENGTH (tsf) HP (tsf)	SHEAR STRENGTH (tsf) UC (tsf)	SHEAR STRENGTH (tsf) TV (tsf)	SHEAR STRENGTH (tsf) UU (tsf)	DRY UNIT WEIGHT (pcf)
		CL		Stiff brown **LEAN CLAY**, with trace sand and silt		27						0.67				
2.5		CH		Soft to firm brown and gray **FAT CLAY**		35						0.33				
5.0				-trace organic, 4 to 10 feet ▽		50	105	27	78					0.30		
7.5						51								0.10		
						62								0.15		
10.0																
12.5																
						46								0.15	0.14	71
15.0																
17.5																
						60								0.15		
20.0																
22.5																
						49								0.10		
25.0																
27.5																
						49								0.15		
30.0																
32.5																
						46								0.25	0.11	75
35.0																
37.5		SM		Medium dense gray **SILTY SAND**	18	26				26						
40.0																
42.5																
					11	27										
45.0																
47.5																
					12	26										
50.0																

DEPTH OF BORING: 80 FEET
DATE DRILLED: 9/7/16
NOTE:

▽ GROUNDWATER DURING DRILLING: 6 FEET
▼ GROUNDWATER UPON COMPLETION: N / A
▼ DELAYED GROUNDWATER: N / A

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LOG OF BORING B-4

SINCLAIR PROJECT SITE
MERAUX, LOUISIANA
ST. BERNARD PARISH

TYPE OF BORING: SOLID STEM AUGER / WET ROTARY LOCATION: SINCLAIR PSI Project No.: 0254826

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTICITY INDEX (PI)	% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf) ○ HP ● UC △ TV ▲ UU 0.0 0.5 1.0 1.5	SHEAR STRENGTH (tsf) HP (tsf)	UC (tsf)	TV (tsf)	UU (tsf)	DRY UNIT WEIGHT (pcf)
52.5		CH		Firm gray **FAT CLAY**												
						49								0.30	0.28	69
55.0																
57.5																
				-with trace sand at 58 feet	5	34				82						
60.0																
62.5																
		SM		Medium dense gray **SILTY SAND**	16	29										
65.0																
67.5																
					15	30										
70.0																
72.5																
					16	28										
75.0																
77.5																
					14	30				33						
80.0				Boring terminated at 80 feet												
82.5																
85.0																
87.5																
90.0																
92.5																
95.0																
97.5																
100.0																

DEPTH OF BORING: 80 FEET
DATE DRILLED: 9/7/16
NOTE:

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LOG OF BORING B-5

SINCLAIR PROJECT SITE
MERAUX, LOUISIANA
ST. BERNARD PARISH

TYPE OF BORING: SOLID STEM AUGER / WET ROTARY LOCATION: SINCLAIR PSI Project No.: 0254826

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf) ○ HP ● UC △ TV ▲ UU 0.0 0.5 1.0 1.5	SHEAR STRENGTH (tsf) HP (tsf)	SHEAR STRENGTH (tsf) UC (tsf)	SHEAR STRENGTH (tsf) TV (tsf)	SHEAR STRENGTH (tsf) UU (tsf)	DRY UNIT WEIGHT (pcf)
		CH		Soft to firm brown and gray **FAT CLAY**		38					○	0.42				
2.5						40					●	0.50	0.45			78
5.0				▽		44	87	25	62		△			0.30		
7.5						37					▲△			0.40	0.17	77
10.0						35					△			0.35		
12.5																
15.0						47					△			0.20		
17.5																
20.0						37	83	22	61		▲△			0.30	0.17	72
22.5																
25.0						39					△			0.20		
				Boring terminated at 25 feet												
27.5																
30.0																
32.5																
35.0																
37.5																
40.0																
42.5																
45.0																
47.5																
50.0																

DEPTH OF BORING: 25 FEET
DATE DRILLED: 9/7/16
NOTE:

▽ GROUNDWATER DURING DRILLING: 6 FEET
▼ GROUNDWATER UPON COMPLETION: N / A
▼ DELAYED GROUNDWATER: N / A

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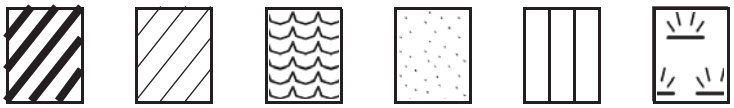
KEY TO TERMS AND SYMBOLS USED ON LOGS

SOIL TYPE

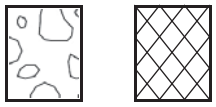


FAT CLAY | LEAN CLAY | ORGANIC CLAY | SAND | SILT | PEAT

SAMPLER TYPE

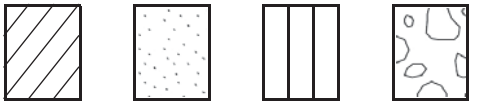
NO RECOVERY | AUGER SAMPLE | SHELBY TUBE | SPLIT SPOON

SOIL TYPE



GRAVEL | FILL

MODIFIERS



CLAYEY | SANDY | SILTY | GRAVELY

GROUNDWATER DURING DRILLING

GROUNDWATER UPON COMPLETION

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

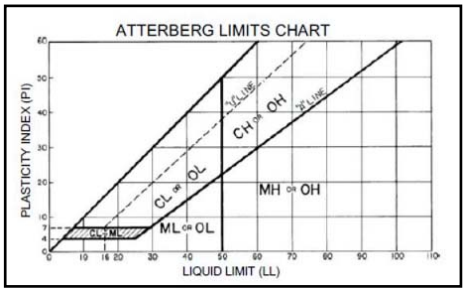
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		W/ APPRECIA BLE FINES	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN 50% PASSING NO. 4 SIEVE	CLEAN SANDS LITTLE FINES	SW	WELL GRADED SAND, GRAVELY SAND (LITTLE FINES)
			SP	POORLY GRADED SANDS, GRAVELY SAND (L.FINES)
		SANDS WITH APPREA. FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS,SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS & VERY FINE SANDS,ROCK FLOUR SILTY OR CLAYEY FINE SANDS OR CLAYEY SILT W/ LOW PI
			CL	INORGANIC CLAY OF LOW TO MEDIUM PI LEAN CLAY GRAVELY CLAYS, SANDY CLAYS, SILTY CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PI
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY FAT CLAYS
			OH	ORGANIC CLAYS OF MED TO HIGH PI, ORGANIC SILT
HIGHLY ORGANIC SOIL			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS
UNCLASSIFIED FILL MATERIALS			ARTIFICIALLY DEPOSITED AND OTHER UNCLASSIFIED SOILS AND MAN MADE SOIL MIXTURES	

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	SHEAR STRENGTH IN TONS/FT^2
VERY SOFT	0 TO 0.125
SOFT	0.125 TO 0.25
FIRM	0.25 TO .50
STIFF	0.50 TO 1.00
VERY STIFF	1.00 TO 2.00
HARD	> 2.00 OR 2.00+

RELATIVE DENSITY - GRANULAR SOILS

CONSISTENCY	N-VALUE (BLOWS/FOOT)
VERY LOOSE	0-4
LOOSE	4-9
MEDIUM DENSE	10-29
DENSE	30-49
VERY DENSE	> 50 OR 50+



ABBREVIATIONS

HP - HAND PENETROMETER
TV - TORVANE
MV - MINIATURE VANE
UC - UNCONFINED COMPRESSION TEST
UU - UNCONSOLIDATED UNDRAINED TRAIXIAL
CU - CONSOLIDATED UNDRAINED

NOTE: PLOT INDICATES SHEAR STRENGTH AS OBTAINED BY ABOVE TESTS

CLASSIFICATION OF GRANULAR SOILS

U.S. STANDARD SIEVE SIZE(S)

6"	3"	3/4"	4	10	40	200

BOUL--DERS	COBBLES	GRAVEL		SAND			SILT OR CLAY	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		

152	76.2	19.1	4.76	2.0	0.42	0.074	0.002

GRAIN SIZE IN MM