

Exhibit W. Woodley Site  
Preliminary Geotechnical Engineering  
Report



February 25, 2016

Baton Rouge Area Chamber  
564 Laurel Street  
Baton Rouge, LA 70801

## Woodley Site Preliminary Geotechnical Engineering Report

Attention : Mr. Jim A. Cavanaugh  
Site Development Director  
Email: jim@brac.org  
Phone: (225) 339-1163

Re: **General Geotechnical Site Characterization Report**  
**Woodley Plantation**  
**Pointe Coupee Parish, Louisiana**  
**PSI Project No. 0259900**

Dear Mr. Cavanaugh:

Professional Service Industries, Inc. is pleased to submit this General Geotechnical Site Characterization Report for the Woodley Plantation Site Study. This report includes the results of field and laboratory testing, and information regarding the compatibility of this site with industrial development, suitability of soils for building foundations and on-site roadways, requirements of soil augmentation for construction of a typical 100,000 square feet (sf) industrial manufacturing building and depth of groundwater.

We appreciate the opportunity to perform this Preliminary Geotechnical Site Evaluation Report. 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.**



Nicholas K. Miller, P.E.  
Project Engineer  
Geotechnical Services



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

Name: Nicholas K. Miller, P.E.

Date: February 25, 2016

License No.: 40111

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**GENERAL GEOTECHNICAL SITE CHARACTERIZATION REPORT**

**WOODLEY PLANTATION SITE  
POINTE COUPEE PARISH, LOUISIANA  
PSI PROJECT NO.: 0259900**

**PREPARED FOR**

**BATON ROUGE AREA CHAMBER  
564 LAUREL STREET  
BATON ROUGE, LA 70801**

**FEBRUARY 25, 2016**

**BY  
PROFESSIONAL SERVICE INDUSTRIES, INC.  
11950 INDUSTRIPLEX BLVD.  
BATON ROUGE, LOUISIANA 70809**

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## PROJECT INFORMATION

### **Project Authorization**

Professional Service Industries, Inc. (PSI) has completed a General Geotechnical Site Characterization study at the Woodley Plantation site, located in Pointe Coupee Parish, Louisiana. Our services were provided in general accordance with PSI Proposal No. 259-169945, dated January 12, 2016. Authorization to provide our services was provided by Mr. Kyle Zeringue, Senior Vice President - Business Development for Baton Rouge Area Chamber (BRAC) who signed our Proposal on January 20, 2016.

### **Project Description**

The primary objectives for this preliminary report are to provide general information regarding the compatibility of this site with industrial development, suitability of soils for structure foundations and on-site roadways, requirements of soil augmentation for construction of a typical 100,000 square feet (sf) industrial manufacturing building, and the depth of free groundwater table at the time of drilling. This general geotechnical site characterization report will provide an initial baseline of the site subsurface conditions that will likely be encountered during future site development. However, as with any geotechnical investigation, particularly given the size of this subject site and the relatively limited number of borings and soundings performed, variations between exploration locations may and should be expected to exist, and there remains a distinct possibility that other conditions may exist on site that were not encountered within the scope of this exploration. Groundwater level at the time of construction should also vary considering the proximity of the site to several water bodies as well as due to seasonal changes.

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 3 soil borings and 1 Cone Penetration Test (CPTu) sounding at the site per the request of the Client;
- Evaluate general subsurface soil conditions and groundwater depth at the subject site;
- 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, suitability of soils for structure foundations and on-site pavement improvement, and requirements of soil augmentation for construction of a typical 100,000 square foot industrial manufacturing building.

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.

## **SITE AND SUBSURFACE CONDITIONS**

### **Site Location and Description**

The subject site is approximately 355 acres in size and is located on the west side of LA Highway 77 (Maringouin Road W.) approximately ½ mile south of its intersection with US Highway 190 in Livonia, Pointe Coupee Parish, Louisiana. The site continues southward approximately 4,800 feet along LA Highway 77 and extends westward approximately 4,200 feet. It is bound by LA Highway 77 to the east, a railway spur to the west, residential properties to the north, and by mostly undeveloped, rural/agricultural land to the south. The site is currently used primarily for agricultural purposes and contains several dirt and gravel access farm roads. The site also contains a few residential structures and farm equipment storage barns on the southeast corner. Several ditches and other runoff conveyances were observed during our field reconnaissance including an unnamed branch of Bayou Maringouin.

PSI's track-mounted Geoprobe 7822DT drill rig was used to perform this field exploration. The borings and CPT sounding were generally located just off of existing field roads or paths.

### **Site Geology**

Based on the Geological Map of Louisiana (1984), the site is located within the Natural Levees Formation (Qnl) geologic unit. The Natural Levees geologic unit is characterized by gray and brown silt and silty clay with some very fine sand. Per the U.S. Geological Society (USGS), these deposits are encountered on past and present courses of major streams. Natural Levee deposits in the site vicinity are relatively weak and compressible in nature.

### **Field Exploration**

The field exploration included mobilization to the site by a PSI drilling crew, drilling of the soil borings, and recovering soil samples from the soil borings. Borings B-1, B-2, and B-3 were extended to a depth of approximately 25 feet below the existing ground surface. The CPT sounding, CPT-1, was extended to a depth of approximately 75 feet below existing grade. Refer to the Boring and CPT Location Plan given in the Appendix for the approximate exploration locations.

Drilling and sampling activities were performed in general accordance with referenced ASTM procedures or other accepted methods. The boreholes were backfilled per LADOTD and LDEQ requirements.

Undisturbed samples of cohesive soils were generally obtained using three-inch-diameter, thin-wall tube samplers (Shelby tube) 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 and were identified according to boring number and depth, wrapped in aluminum foil, placed in polyethylene plastic wrapping to protect against moisture loss and transported to the laboratory in containers to minimize disturbance.

CPT with pore pressure readings (CPTu) was performed in general accordance with ASTM D5778. The CPTu method involves hydraulically pushing an instrumented piezocone probe through the subsurface strata and continuously recording the cone tip resistance, skin friction and pore water pressure within the soil with depth at approximate one-inch depth intervals.

### **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, determining the percent passing the No. 200 sieve, and 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.

### **Subsurface Conditions**

Boring B-1 encountered firm silt to a depth of about 4 feet below the existing ground surface (bgs). Very soft to soft lean clay was encountered beneath that layer to a depth of about 12 feet bgs and was followed by soft silt with sand to a depth of about 17 feet bgs. Loose to medium dense, semi-cohesive clayey sand with silt was encountered beneath the silt stratum and extended to a depth of about 22 feet bgs. The boring was terminated in a firm clay stratum at a depth of about 25 feet bgs.

Borings B-2 encountered firm fat clay to a depth of about 4 feet bgs. Soft sandy lean clay was encountered beneath that layer to a depth of about 8 feet bgs and was followed by very soft to soft silt to a depth of about 17 feet bgs. Very soft lean clay with sand and silt was encountered beneath the silt stratum and extended to a depth of about 22 feet bgs. The boring was terminated in a soft clay stratum at a depth of about 25 feet bgs.

Boring B-3 encountered soft to firm lean clay to a depth of about 12 feet bgs and was followed by soft silt to a depth of about 17 feet bgs. Loose silty sand was encountered beneath the clay stratum and extended to a depth of about 22 feet bgs. The boring was terminated in a very soft sandy clay stratum at a depth of about 25 feet bgs.

The CPT sounding, CPT-1, generally encountered very soft to soft (or very loose to loose) silt and fine grained sands to a depth of 10 feet bgs which was underlain by a stratum of loose silty sand to approximately 20 ft bgs. This stratum is followed by firm clay with varying percentages of silt and sand to a depth of about 48 ft bgs, where a stratum of firm silty sand was encountered and extended to about 58 feet bgs. Firm clay and silty clay was encountered below the sand stratum to the terminal depth of the sounding at approximately 75 feet bgs.

The CPT sounding did not encounter a stratum of dense sand or stiff clay prior to the terminal depth of about 75 feet bgs.

The above subsurface description is generalized in nature to highlight the major subsurface stratification features and material characteristics. The boring and CPT logs included in the Appendix should be reviewed for specific information at the individual exploration locations. These records include soil descriptions, stratifications, penetration resistances, locations of the samples, and laboratory test data. The stratifications shown on the logs represent the conditions only at the actual exploration locations. Variations may occur and should be expected between the exploration locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. This is particularly important considering the site size and the limited number of borings and soundings performed.

### **Groundwater Information**

Groundwater was encountered in all three borings during the exploration. The groundwater depth measured in the borings during our drilling activities are shown in the following table.

**Table 1: Groundwater Depth Measured During Drilling**

<b>Boring</b>	<b>Groundwater Depth During Drilling (feet below the existing ground surface)</b>
B-1	6
B-2	8
B-3	13

It should be noted that groundwater level fluctuations at this site may occur due to seasonal and climatic variations, alteration of drainage patterns, land usage and ground cover. Additionally, perched water may be encountered in discontinuous zones within the overburden. This condition develops as rainwater is entrapped in the more pervious surface cultivated soils underlain by less pervious cohesive soils. We recommend the Contractor determine the actual groundwater levels at the time any future construction activities begin. The water level in the adjacent water bodies as well as seasonal changes should impact groundwater level at the subject site.

### **Seismic Design Considerations**

The design of structures must consider dynamic forces resulting from seismic events. These forces are dependent upon the magnitude of the earthquake event as well as the properties of the soils that underlie the site. As part of the procedure to evaluate seismic forces, the evaluation of the Seismic Site Class, which categorizes the site based upon the characteristics of the subsurface profile within the upper 100 feet of the ground surface, is required. To define the Site Class for this site, we have interpreted the results of soil test borings drilled within the subject site and estimated appropriate soil properties below the base of the borings to a depth of 100 feet as permitted by the International Building Code, 2012 edition. The estimated soil properties were based upon our experience with subsurface conditions in the general site area. Based upon our evaluation, the subsurface conditions within the site are consistent with the characteristics of a Site Class "E" as defined in Table 20.3-1 of the ASCE Standard 7-10. This assessment can and should be better defined by performing additional deep borings and associated geotechnical laboratory testing.



## 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 a typical 100,000 sf industrial manufacturing building were not provided at the time of this study; however, the structural column loads are anticipated to be on the order of 100 kips, with wall loads on the order of about 5 kips per lineal foot. Further, grading plans are not available at this time. Settlement due to the addition of fill material should be evaluated if plans call for more than 2 feet of fill material to be placed at the site.

A typical 100,000 sf industrial facility, with assumed loads as described herein, should be supported by a deep foundation system. The choice of type of deep foundation should be based on the tolerance criteria for the performance of the structures and economics of construction. 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, building and slab loads.

Grade supported foundations or surface coverings will likely be governed by the anticipated load and settlement tolerances, particularly if a significant amount of new fill is placed. Lightly-loaded equipment pads may be able to be supported on shallow spread footings, or mat foundations, as long as the settlement potential is considered. Prior to new fill placement, site preparation should include removal of surficial topsoil, organic materials, 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.

The upper silty soils encountered at this site can be sensitive to disturbances caused by construction traffic when wet. This is demonstrated by the heterogeneous character encountered in the soil borings and their sensitive nature to disturbance as demonstrated on the CPT log. Proper maintenance of surface drainage will be an important factor in the preparation of this site. Depending on weather-related ground conditions, the maintenance of drainage during construction, and other factors, some difficulty may be encountered in achieving compaction on initial lifts of fill placed on loose or soft subgrade. This will be exacerbated by wet weather, particularly if surface drainage is allowed to enter and pond in the excavations.

During wet weather periods, increases in the moisture content of the soil can cause reduction in the soil strength and support characteristics. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather. Earthwork activities performed during cooler, wetter months may certainly offer more difficulties than if performed during warmer, drier periods. If construction is performed during wet conditions, work platforms may be necessary; these can be created for earthwork by mixing soil and hydrated lime, cement, or combinations of these additives. In view of the high silt content, Portland cement treatment will be more applicable.

The suitability of reuse of excavated soils (from ponds, etc.) as structural fill may require the use of lime treatment or soil mixing and should be further evaluated as design plans are developed. The heterogeneous and sensitive character of the near surface soils may limit their potential for reuse.

Site pavements should be underlain by at least 12 inches of properly compacted low plasticity engineered fill material or otherwise or chemically treated with hydrated lime, cement, or a combination of the two.

It should be noted that the exploration locations were generally performed on or near the shoulder of existing farm roads or paths. It should be assumed that the upper soils encountered in cultivated areas typically used for planting crops will require significantly more effort to achieve proper compaction and may contain far more organic material and other additives (fertilizers, etc.) in the upper soils than the areas explored during this preliminary exploration.

Based on the limited number of soil borings and CPT soundings, field data and laboratory test results, the proposed site is generally feasible for industrial development. The subsurface soils explored are suitable for supporting buildings using deep foundations and for site roadways after proper preparation. This type of foundation support will be required considering the magnitude of anticipated loads associated with industrial developments as well as the heterogeneous and sensitive character of the near surface soils encountered at the soil boring and CPT sounding locations. A detailed geotechnical investigation is highly recommended prior to commencing with design of any proposed construction.

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.

### **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 Baton Rouge Area Chamber for the specific purpose of determining general subsurface information at the subject site to develop a general geotechnical site characterization.

## APPENDIX







# LOG OF BORING B-1

Woodley Plantation Site  
Highway 77  
Pointe Coupee Parish, LA

TYPE OF BORING: Hollow Stem Auger

LOCATION: Northeastern portion of site

PSI Project No.: 0259900

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf)				HAND PEN (tsf)	UC (tsf)	TORVANE (tsf)	UU (tsf)	UNIT DRY WEIGHT (pcf)
											SHEAR STRENGTH (tsf)								
											0.0	0.5	1.0	1.5					
							LL	PL	PI		○ HP	● UC	△ TV	▲ UU					
		MH		Firm brown <b>SILT</b>		30	57	42	15								0.35	0.45	91
2.5				-Ferrous stains, 0-2'		28											0.50		
5.0		CL		Very soft to soft brown <b>LEAN CLAY</b>		34	40	21	19								0.25		
7.5						35											0.25		
10.0						32											0.20	0.08	90
12.5		ML		Soft gray <b>SILT</b> with sand		33				88							0.15		
15.0																			
17.5		SM		Loose to medium dense gray <b>CLAYEY SAND</b> with silt		26				38					0.50				
20.0																			
22.5		CL		Firm gray <b>LEAN CLAY</b> with ferrous stains		33	40	19	21								0.30		
25.0				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: 2/8/16

NOTE:

▽ GROUNDWATER DURING DRILLING: 6 feet

▼ GROUNDWATER UPON COMPLETION: N/ A

⚡ DELAYED GROUNDWATER: N / A

BORING LOG BATON ROUGE - PSIHOUSTON.GDT - 2/25/16 16:26 - 0254

# LOG OF BORING B-2

Woodley Plantation Site  
Highway 77  
Pointe Coupee Parish, LA

TYPE OF BORING: Hollow Stem Auger

LOCATION: Western portion of site

PSI Project No.: 0259900

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf)				SHEAR STRENGTH (tsf)				UNIT DRY WEIGHT (pcf)
											○ HP    ● UC △ TV    ▲ UU				HAND PEN (tsf)	UC (tsf)	TORVANE (tsf)	UU (tsf)	
											0.0	0.5	1.0	1.5					
		CH		Firm brown <b>FAT CLAY</b>		28									0.67				
2.5						23	51	20	31						0.50				
5.0		CL		Soft brown <b>SANDY LEAN CLAY</b>		33											0.30	0.17	87
7.5						29				78							0.25		
10.0		ML		Very soft to soft gray <b>SILT</b> with trace sand		31	30	25	5						0.41				
12.5																			
15.0						37				95							0.15		
17.5		CL		Very soft gray <b>LEAN CLAY</b> with sand and silt		42	45	20	25								0.20	0.09	78
20.0																			
22.5		CL		Soft gray <b>LEAN CLAY</b> with ferrous stains		36											0.15		
25.0				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: 2/8/16

NOTE:

▽ GROUNDWATER DURING DRILLING: 8 feet

▼ GROUNDWATER UPON COMPLETION: N/ A

▽ DELAYED GROUNDWATER: N / A

BORING LOG BATON ROUGE - PSIHOUSTON.GDT - 2/25/16 16:26 - 0254

# LOG OF BORING B-3

Woodley Plantation Site  
Highway 77  
Pointe Coupee Parish, LA

TYPE OF BORING: Hollow Stem Auger

LOCATION: Southern portion of site

PSI Project No.: 0259900

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf)				SHEAR STRENGTH (tsf)				UNIT DRY WEIGHT (pcf)
											0.0 0.5 1.0 1.5				HAND PEN (tsf)	UC (tsf)	TORVANE (tsf)	UU (tsf)	
							○ HP	● UC	△ TV		▲ UU								
		CL		Soft to firm brown <b>LEAN CLAY</b> with silt and trace sand		22						△				0.25			
2.5						23	44	21	23			△				0.30			
5.0						35						△				0.35			
7.5						34	41	21	20			▲				0.25	0.22	85	
10.0						33				96		△				0.15			
12.5		ML		Soft gray <b>SILT</b> <span style="float:right">▽</span>		30	29	26	3			▲ ⊕		0.50			0.22	92	
15.0																			
17.5		SM		Loose gray <b>SILTY SAND</b>		24						⊖		0.67					
20.0																			
22.5		CL		Very soft brown <b>SANDY LEAN CLAY</b>		37				80		△				0.10			
25.0				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

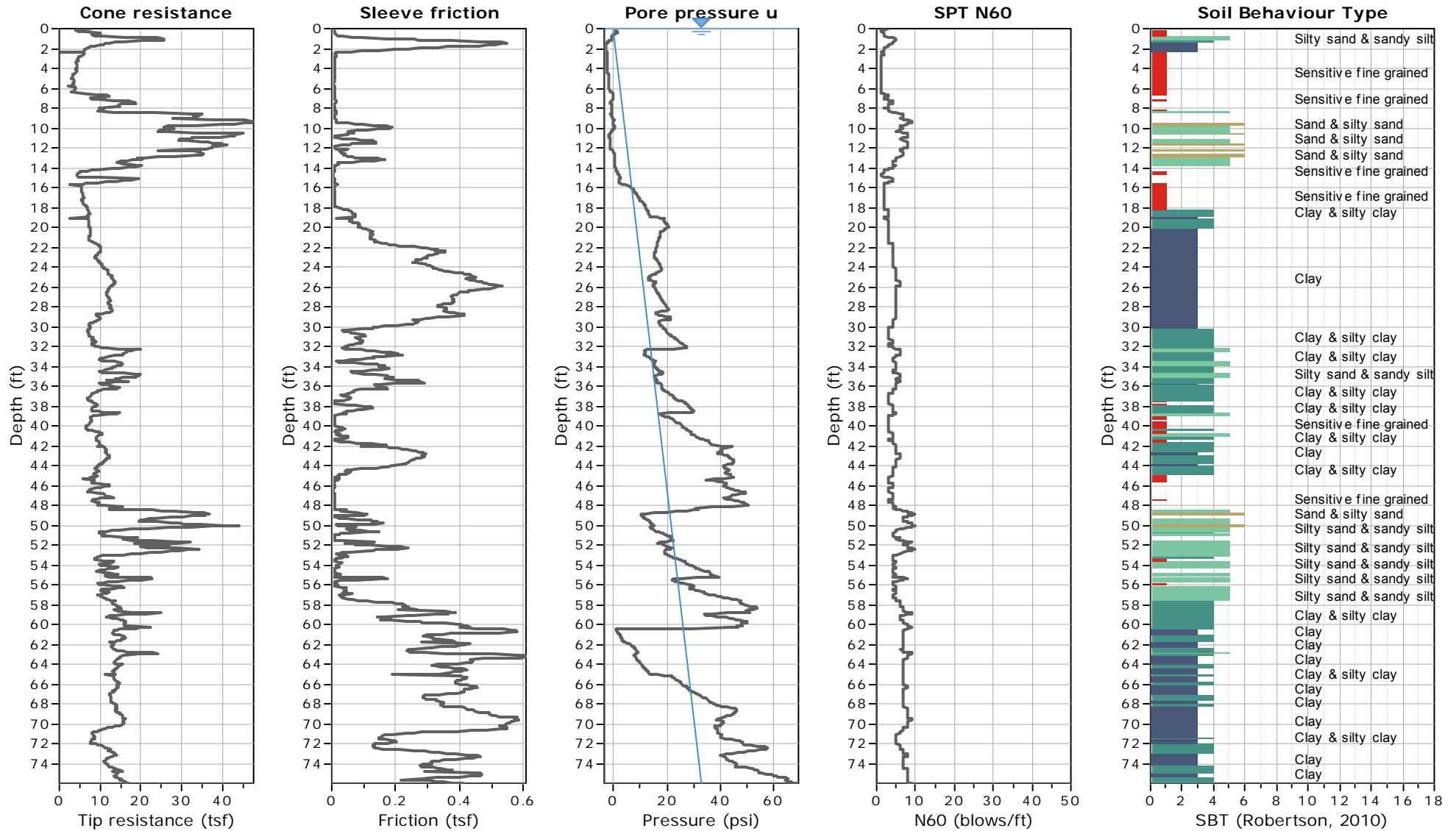
DATE DRILLED: 2/8/16

NOTE:

- ▽ GROUNDWATER DURING DRILLING: 13 feet
- ▼ GROUNDWATER UPON COMPLETION: N/ A
- ▽ DELAYED GROUNDWATER: N / A

BORING LOG BATON ROUGE - PSIHOUSTON.GDT - 2/25/16 16:26 - 0254





## KEY TO TERMS AND SYMBOLS USED ON LOGS

SOIL TYPE					
FAT CLAY	LEAN CLAY	ORGANIC CLAY	SAND	SILT	PEAT
SOIL TYPE		MODIFIERS			
GRAVEL	FILL	CLAYEY	SANDY	SILTY	GRAVELLY

SAMPLER TYPE			
NO RECOVERY	AUGER SAMPLE	SHELBY TUBE	SPLIT SPOON
GROUNDWATER DURING DRILLING GROUNDWATER UPON COMPLETION			

### UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

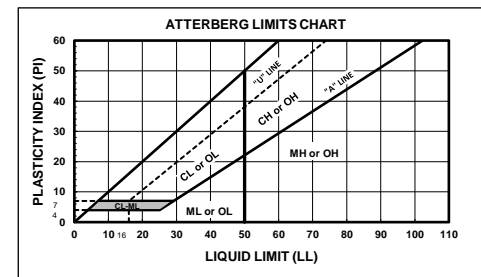
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELLY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		WITH APPRECIABLE 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 OR NO FINES)	SW	WELL-GRADED SAND
			SP	POORLY-GRADED SANDS
		WITH APPRECIABLE FINES	SM	SILTY SANDS
			SC	CLAYEY SANDS
FINE-GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT < 50		ML	INORGANIC SILTS & VERY FINE SANDS, CLAYEY SILT W/ LOW PLASTICITY INDEX
			CL	INORGANIC LEAN CLAYS GRAVELLY, SANDY, OR SILTY LEAN CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS W/LOW PLASTICITY INDEX
	SILTS AND CLAYS LIQUID LIMIT ≥ 50		MH	INORGANIC SILTS W/ HIGH PLASTICITY INDEX, ELASTIC SILTS
			CH	INORGANIC FAT CLAYS GRAVELLY, SANDY, OR SILTY FAT CLAYS
			OH	ORGANIC CLAYS OF MED TO HIGH PLASTICITY, ORGANIC SILTS
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 <sup>2</sup>
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	UC - UNCONFINED COMPRESSION TEST
TV - MINIATURE TORVANE	UU - UNCONSOLIDATED UNDRAINED TRIAXIAL
FV - FIELD TORVANE	CU - CONSOLIDATED UNDRAINED

NOTE: BORING LOGS INDICATE 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	
BOULDERS	COBBLES	GRAVEL		SAND			SILT OR 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							



**Geotechnical Consulting Services**  
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