

Exhibit Z. Port Barre Industrial Park - Central Site Preliminary Geotechnical Engineering Report





Professional Service Industries, Inc.
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Phone: (225) 293-8378

December 7, 2018

One Acadiana
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Port Barre Industrial Park - Central Site Preliminary Geotechnical Engineering Report

Attn: Mr. Zach Hager
Phone: 337.233.2705
Email: zach@oneacadiana.org

Re: **General Geotechnical Site Characterization Report**
LED Port Barre Industrial Park – Central Site
Port Barre, Louisiana
PSI Project No. 02591709

Dear Mr. Hager:

Professional Service Industries, Inc. (PSI) is pleased to submit our General Geotechnical Site Characterization Report for the above-referenced project. This report presents the results of our field exploration 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 an industrial manufacturing facility, and depth of groundwater.

If you have any questions pertaining to this report, please contact our office at (225) 293-8378. PSI would be pleased to continue providing geotechnical and construction material testing services throughout the construction of the project, and we look forward to working with you and your organization on this and future projects.

Respectfully submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC.

Sarah F. Berman, E.I.
Geotechnical Project Manager

John O. Gordon, P.E.
Chief Engineer





Project No: 02591709
LED Port Barre Industrial Park – Central Site
St. Landry Parish, Louisiana
December 7, 2018

GENERAL GEOTECHNICAL SITE CHARACTERIZATION REPORT

**LED Port Barre Industrial Park – Central Site
Port Barre, St. Landry Parish, Louisiana
PSI Project No. 02591709**

PREPARED FOR

**ONE ACADIANA
804 EAST ST. MARY STREET
LAFAYETTE, LOUISIANA 70503**

December 7, 2018

**BY
PROFESSIONAL SERVICE INDUSTRIES, INC.
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Name: John O. Gordon

Date: December 7, 2018

License No.: 32993

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PROJECT INFORMATION

PROJECT AUTHORIZATION

Professional Service Industries, Inc. (PSI) has completed a General Geotechnical Site Characterization Study at the Port Barre Industrial Park LED – Central Site located in St. Landry Parish, Louisiana. Our services were performed in general accordance with PSI Proposal No. 243663, dated May 3, 2018. Authorization was provided by Mr. Jim Bourgeois of One Acadiana, by signing PSI's proposal on October 17, 2018.

PROJECT DESCRIPTION

The primary objective of this preliminary investigation is to provide general information regarding the compatibility of this site with industrial development:

- Sustainability of the naturally occurring soils for building foundations;
- Requirements of soil augmentation, if any, for construction of a petrochemical plant or other industrial manufacturing facility; and
- Depth of free groundwater table at the exploration locations during our field operations.

This general geotechnical site characterization report will provide an initial baseline of the site's 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 exploration locations, variations between exploration locations may and should be expected to exist, and there remains a distinct possibility that other conditions may exist at the site that were not encountered within the scope of this preliminary investigation.

The opinions and information to be presented in this preliminary report are general estimates for use by others in feasibility studies and cost-estimating purposes. Thus, the estimates are based on a 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 purpose of this site characterization was to explore the subsurface conditions at the site and present preliminary geotechnical related observations for the proposed construction. PSI's contracted scope of services is:

- Perform one (1) Cone Penetrometer Test (CPTu) sounding and one (1) conventional soil boring at the subject site as outlined by the Client;
- Evaluate the general subsurface soil conditions and groundwater depth at the subject site at the exploration locations during our field activities;
- Perform limited geotechnical laboratory testing on selected soil samples recovered from the boring; and,
- Provide a general discussion regarding compatibility of this site for industrial development, suitability of the subgrade soils for building and other industrial structure foundations, and requirements of soil augmentation, if needed, for construction of the proposed industrial manufacturing facility.



The scope of services did not include an environmental assessment for determining the presence or absence of wetland, or hazardous or toxic materials in the soil, surface water, groundwater, or air on, 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. Additionally, PSI's scope of services did not include environmental sampling or performing analytical testing of soil or groundwater samples.

PSI did not provide any service to investigate or detect the presence of moisture, mold, or other biological contaminants within the project area, or any service that was designed or intended to prevent or lower the risk of the occurrence or amplification of the same. The Client should be aware that mold is ubiquitous to the environment, with mold amplification occurring when building materials are impacted by moisture. The Client should also be aware 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 AND LABORATORY PROCEDURES

In accordance to the LED standard SOW, the subsurface conditions at the subject site were explored by drilling and recovering soil samples from one (1) soil boring and through performing one (1) Cone Penetrometer Test (CPTu) sounding. Soil boring 'B-1' extended to a depth of approximately 30 feet below the existing ground surface. CPTu sounding 'CPT-1' extended to a depth of approximately 50 feet below the existing ground surface. The number and depths of the boring and sounding were selected in accordance with the exploration guidelines provided by the Client. Refer to the Boring Location Plan in the Appendix for the approximate exploration locations based on the most recent Google Earth aerial imagery, dated April 14, 2018.

The exploration locations were selected and located in the field by PSI personnel using a furnished site plan and a handheld GPS unit. The soil boring was performed using the Geoprobe 7822DT track-mounted drilling rig using hollow-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 then at five (5) foot intervals thereafter to the boring termination depth. Drilling and sampling were both performed in general accordance with ASTM Standard Procedures.

The boring was sampled using the Shelby Tube (ASTM D1587) samplers. The samples were identified according to boring number and depth, placed in polyethylene plastic wrapping to reduce moisture loss, and transported to PSI's laboratory in Baton Rouge, Louisiana. The CPT soundings were performed in general accordance with ASTM D5778. The CPTu sounding was performed using the same Geoprobe 7822DT track-mounted drilling rig and was performed in general accordance with ASTM D5778.

All samples obtained during the field exploration were visually classified and evaluated by experienced geotechnical personnel upon arrival at the laboratory. Selected samples were tested in the laboratory to determine material properties for our evaluation. The geotechnical laboratory testing program included moisture content, Atterberg limits, percent passing the US Standard No. 200 sieve, and unconfined compressive and unconsolidated undrained strength testing. Additional estimates of unconfined compressive strength were obtained through the use of a hand penetrometer.

The geotechnical laboratory testing was conducted in general accordance with applicable ASTM procedures. The results of the laboratory tests are presented in the Boring Logs 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 will then be discarded.

SITE AND SUBSURFACE CONDITIONS

SITE LOCATION AND DESCRIPTION

The Port Barre Industrial Park LED – Central site is located off LA Highway 741 at the intersection of US Highway 190 in St. Landry Parish outside of Port Barre, Louisiana. The Latitude and Longitude near the center of the approximately 39-acre site are approximately N 30.5445° and W 91.9512°, respectively. At the time of PSI's field exploration, the subject site area was an undeveloped tract of land with grass groundcover. Based on limited information obtained from Google Earth, across the site, the elevation ranges from approximately 22 feet to 26 feet.

Based on a review of historical Google Earth aerial imagery, a gravel road was placed on the northeast most tip of the site between April 2013 and April 2014. The remainder of the land has been undeveloped since the oldest available aerial imagery, dated March 1, 1998. It should be noted that the available Google Earth aerial imagery for the subject site is of low quality and includes some gaps in coverage; therefore, it may not necessarily be sufficient to reach a conclusion regarding former uses, if any, of the site.

SUBSURFACE CONDITIONS

Based on the field observations and results of the laboratory testing, the soils were classified, and the boring and CPTu logs were developed. The boring and CPTu logs are presented in the Appendix along with a key to the terms and symbols used on the logs. The soil boring generally encountered stiff to very stiff fat clay stratum from the ground surface to 15 feet below the existing ground surface (bgs) underlain by loose sandy silt strata from 11 to 25 feet bgs. From 25 feet bgs to the maximum explored depth of approximately 30 feet, soft silt stratum was identified.

The CPTu sounding was relatively consistent with the boring stratification. The CPTu generally encountered clay extending from the ground surface to about 10 feet below the existing ground surface. These soils were underlain with a sensitive fine-grained stratum to 12 feet bgs. From 12 to 25 feet bgs, the CPT sounding generally showed silty sand and sandy silt strata. This was underlain a layer of sand and silty sand stratum to a depth of approximately 27 feet bgs. From 27 to 30 feet below the existing ground surface, the CPTu encountered alternating layers of clay, silty clay, sandy silt and silty sand materials. This was underlain with another layer of sensitive fine-grained material to the depth of approximately 32 feet bgs. These soils were underlain by silty sand and sandy silt material to about 34 feet bgs. From 34 to the maximum depth explored of 50 feet bgs, the CPTu encountered mostly sand and silty sand material with some small silty and sand sandy silt layers throughout the layer.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring and CPTu logs included in the Appendix should be reviewed for specific information at the individual exploration locations. These records include soil descriptions, stratifications, penetration resistances, and 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 and away from the sample locations. The stratifications represent the approximate boundary between subsurface materials, but the actual



transition may be more gradual. This is particularly important considering the site size and the limited number of explorations made at random and accessible locations.

WATER LEVEL MEASUREMENTS

Free groundwater was not encountered at the time of our field exploration. However, it should be noted that the groundwater information presented in this report is based on observations made at the time of our field exploration and may not have become fully static at the time of measurement. Groundwater levels at the site can fluctuate based on variations in rainfall, evaporation, surface runoff, and other hydro-geologic factors. Therefore, it is recommended that the Contractor determine the groundwater depth at the time of construction.

EVALUATION AND DISCUSSION

The foundations suitable for a given structure primarily depend 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 structural loading information for industrial manufacturing facility were not provided at the time of this study. Grading plans are also not available at this time.

The choice of the type of a foundation system should be based on the tolerance criteria for the performance of the structures and economics of the construction. 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 considered to carry the structural loads anticipating that settlement will occur as a result of the self-weight of new fill, and building, and floor loads. Lightly loaded equipment pads may be able to be supported on shallow spread footings, or mat foundations, as long as potential for movement is considered in the design. Prior to new fill placement, site preparation should include stripping and removal of surficial topsoil, organic materials, and soft soil or de-mucking of wet areas or drainage conveyances. Proof-rolling should be performed in the presence of the Geotechnical Engineer to assess general stability and firmness prior to fill placement. It should also be noted that the presence of silty material encountered in the upper two feet of the CPT sounding can be very susceptible to disturbance created during construction and can lead to a significant loss of strength in the material. Therefore, precautions should be taken to limit the amount of disturbance induced to these soils.

Notwithstanding the limited number of soil borings and CPTu soundings with associated field data and laboratory test results, the proposed site is generally feasible for industrial development. The subsurface soils explored are suitable for building foundations and site roadways following proper preparation. The requested estimated allowable bearing capacities for both deep and shallow foundations systems are presented below.

Provided that the site is properly prepared, the proposed industrial structures (tanks, pipe racks, etc.) could be supported on shallow foundation systems using spread footings bearing at least 24 inches below final grade in properly compacted structural fill. For preliminary analyses purposes only, spread footings bearing in these materials can be designed for a net allowable soil bearing capacities between 1,000 and 1,800 psf for a footing size up to five (5) feet by five (5) feet based on the assumed settlement tolerances of one (1) inch.



This allowable bearing capacity value is in consideration of dead loads plus sustained live loads and may be increased by one third (1/3) when accounting for transient live loads, such as wind. To minimize the potential for localized bearing failure, minimum dimensions of 24 inches for spread footings are recommended.

Based on the CPT soundings and the laboratory testing, the static method of analysis was used to compute the estimated allowable pile capacities for a precast concrete pile and a Class B (13" butt & 7" tip) timber pile for possible use in support of the proposed industrial facility. In Table 1 below, allowable axial capacities are shown for both 14-inch precast concrete piles and Class B timber piles with an applied design factor of safety of 2.0 in compression and 3.0 in tension.

Table 1: Preliminary Estimated Allowable Pile Capacities

Estimated Allowable Single Pile Capacity (tons)* FS=2.0 in compression; FS= 3.0 in tension					
Pile Length (ft)**	Precast Concrete Pile (PCC)		Pile Length (ft)**	Class B Timber Pile	
	14-inch Square			13" Butt & 7" Tip	
	Compression	Tension		Compression	Tension
30	35	16	20	10	4.5
35	53	21	25	14	7
40	70	29	30	18	10
45	100	55	35	24	12

(*) These are soil-pile related capacities and consideration should be given to the structural integrity of the pile member.

(**) Pile lengths are referenced from the existing ground surface in borings B-1 and CPT-1 at the time of drilling, and additional length should be added to account for fill thickness or a raised floor.

As previously stated, PSI’s opinions and information presented in this preliminary site characterization report are provided for planning purposes and are strictly 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 recommendations provided in this site characterization report are based on the available subsurface information obtained by PSI and design details furnished by the Client for the proposed project. If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in our recommendations are required. If PSI is not notified of such changes, we will not be responsible for the impact of those changes on the project.

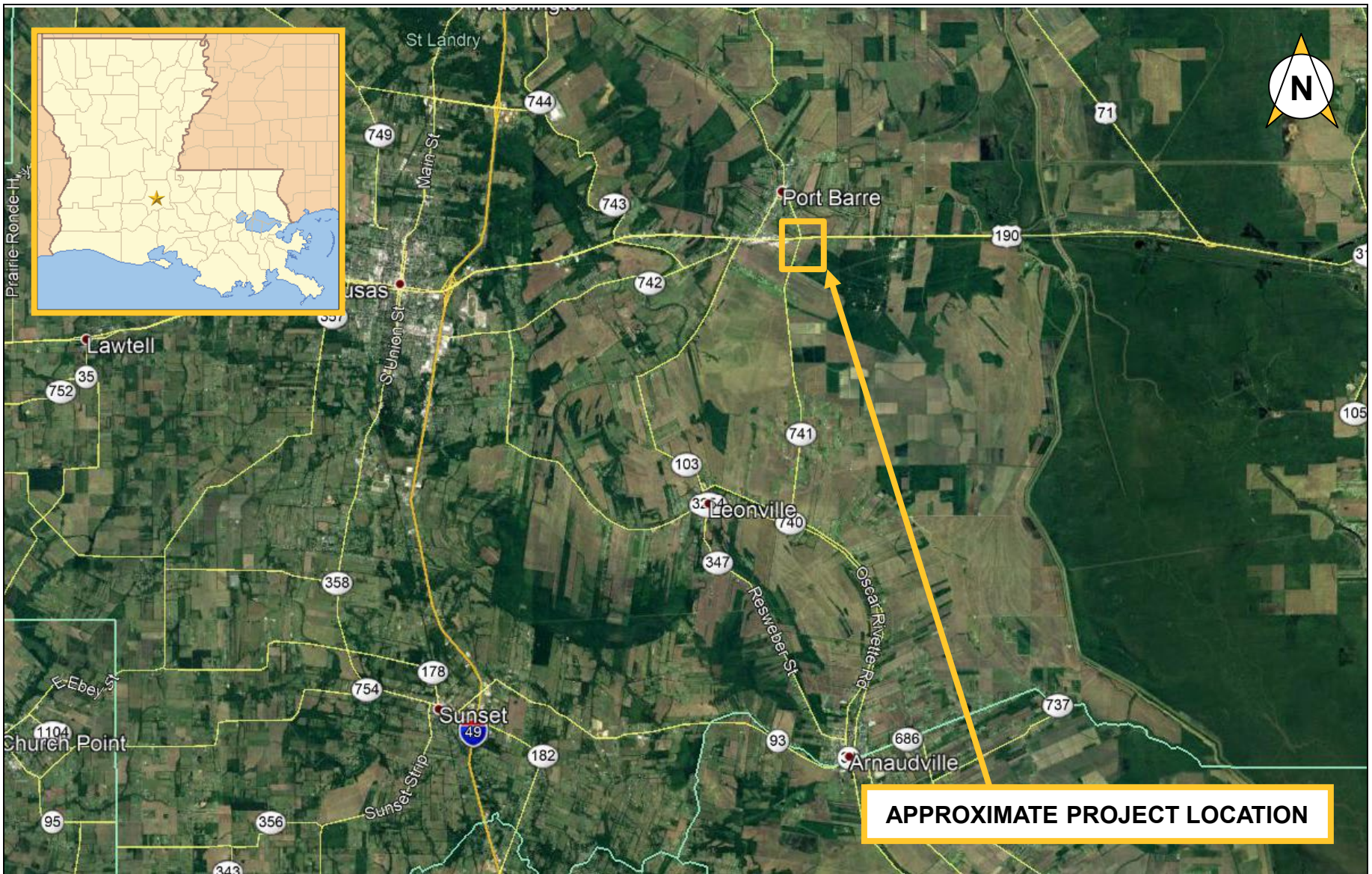
PSI warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

This report has been prepared for the exclusive use One Acadiana for the specific purpose of determining general site characterization information at the LED Port Barre Industrial Park – Central site located in St. Landry Parish, Louisiana.



Project No: 02591709
LED Port Barre Industrial Park – Central Site
St. Landry Parish, Louisiana
December 7, 2018

APPENDIX



GEOTECHNICAL ENGINEERING SERVICES
LED PORT BARRE INDUSTRIAL PARK
 CENTRAL SITE
 PORT BARRE, LOUISIANA

SITE VICINITY MAP
 PSI PROJECT NO.: 02591709
 GOOGLE EARTH IMAGERY DATE: 4/14/2018



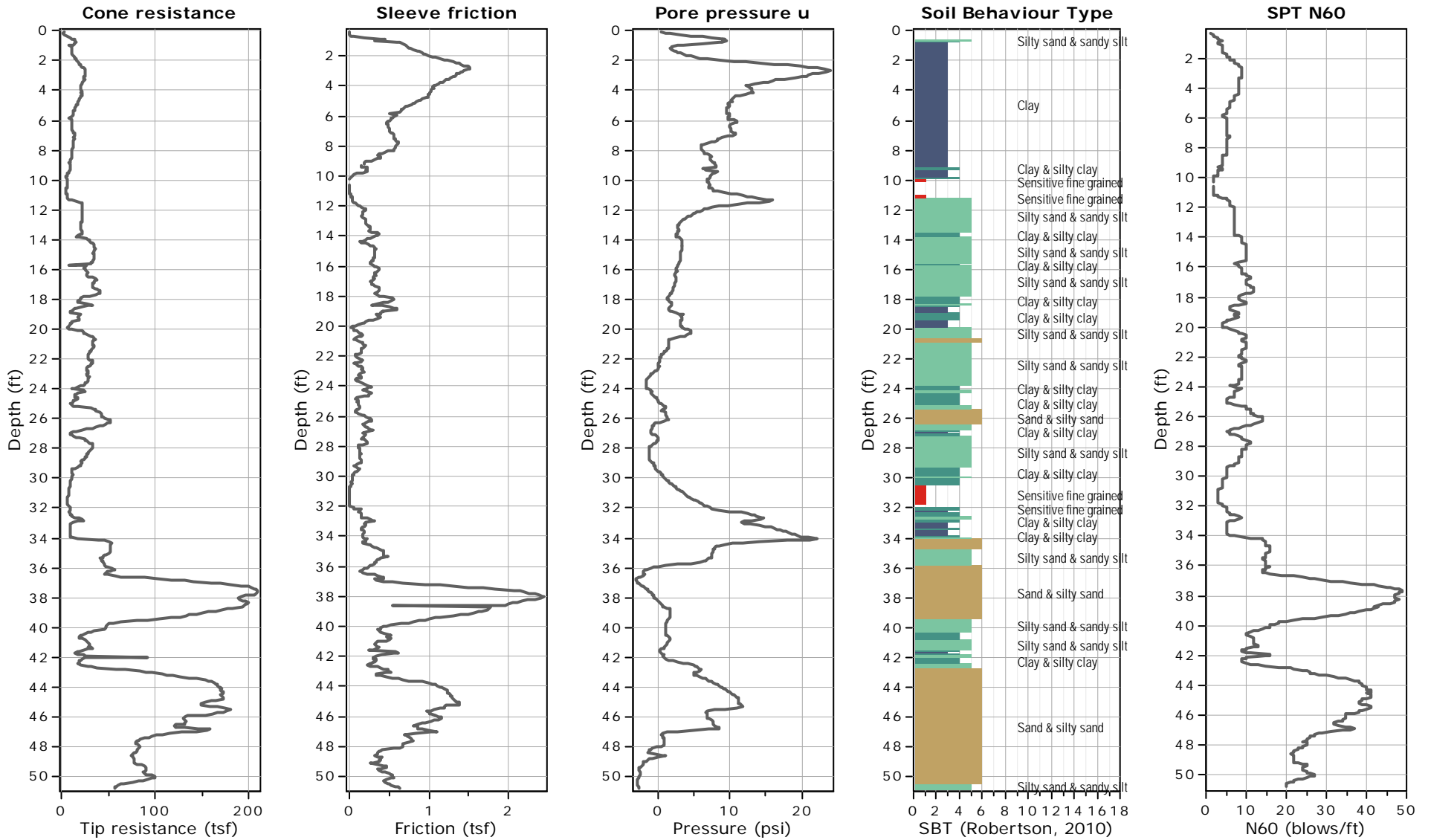


GEOTECHNICAL ENGINEERING SERVICES
LED PORT BARRE INDUSTRIAL PARK
CENTRAL SITE
PORT BARRE, LOUISIANA

BORING LOCATION PLAN

PSI PROJECT NO.: 02591709
GOOGLE EARTH IMAGERY DATE: 4/14/2018





LOG OF BORING B-1

PORT BARRE INDUSTRIAL SITE - CENTRAL SITE

PORT BARRE, LOUISIANA

TYPE OF BORING: Hollow Stem Auger

LOCATION:

PSI Project No.: 02591709

DEPTH, FT.	SOIL TYPE	USCS SYMBOL	SAMPLES	SOIL DESCRIPTION	N-BLOWS/FT.	MOISTURE CONTENT (%)	LIQUID LIMIT			% PASSING No. 200 SIEVE	SHEAR STRENGTH (tsf)				DRY UNIT WEIGHT (pcf)						
							LL	PL	PI		SHEAR STRENGTH (tsf)										
											SHEAR STRENGTH (tsf)										
											HAND PEN (tsf)	UC (tsf)	TORVANE (tsf)	UU (tsf)							
0.0 - 2.5	CH			Stiff to very stiff tan, gray, and brown FAT CLAY with ferrous stains		28	62	26	36		○				0.83						
2.5 - 5.0					28				○							0.75					
5.0 - 7.5					25	58	23	35		○						1.33					
7.5 - 10.0					28					○				●			1.17	1.53			96
10.0 - 12.5					28	59	22	37		○							0.63				
12.5 - 15.0	ML			Loose brown and gray SANDY SILT with trace clay		29					●			0.54	0.51			86			
15.0 - 20.0					4	29				57											
20.0 - 25.0					3	33															
25.0 - 30.0	ML			Soft dark gray SILT with sand																	
30.0 - 32.5						32				80	○					0.17					
32.5 - 35.0																					
35.0 - 37.5																					
37.5 - 40.0																					
40.0 - 42.5																					
42.5 - 45.0																					
45.0 - 47.5																					
47.5 - 50.0																					

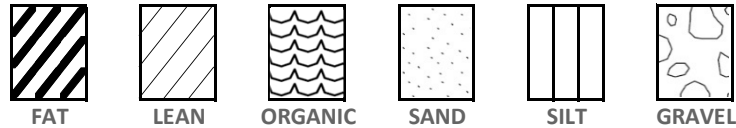
DEPTH OF BORING: 30 FEET
 DATE DRILLED: 11/13/18
 NOTE:

- ▽ GROUNDWATER DURING DRILLING:
- ▼ GROUNDWATER UPON COMPLETION:
- ⚡ DELAYED GROUNDWATER:

BORING LOG BATONROUGE - PSIHOUSTON.GDT - 12/4/18 11:59 - 0254

KEY TO TERMS AND SYMBOLS USED ON LOGS

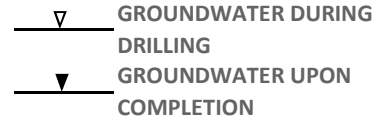
SOIL TYPE



SOIL TYPE MODIFIERS



SAMPLER TYPE



UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

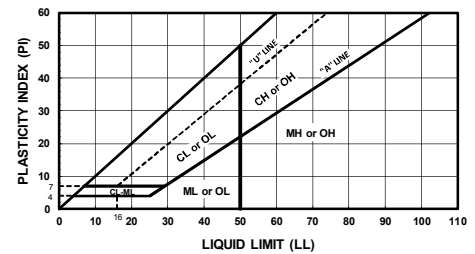
MAJOR DIVISIONS		LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELLY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	GW	WELL-GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
	SANDS MORE THAN 50% PASSING NO. 4 SIEVE	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
		SW	WELL-GRADED SAND
		SP	POORLY-GRADED SANDS
FINE-GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT < 50	SM	SILTY SANDS
		SC	CLAYEY SANDS
		ML	INORGANIC SILTS & VERY FINE SANDS, CLAYEY SILT W/ LOW PLASTICITY INDEX
	SILTS AND CLAYS LIQUID LIMIT ≥ 50	CL	INORGANIC LEAN CLAYS GRAVELLY, SANDY, OR SILTY LEAN CLAYS
		OL	ORGANIC SILTS & ORGANIC SILTY CLAYS W/LOW PLASTICITY INDEX
		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 - 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

DENSITY	N-VALUE (BLOWS/FT)
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

NOTE: BORING LOGS INDICATE SHEAR STRENGTH AS OBTAINED BY ABOVE TESTS

CLASSIFICATION OF GRANULAR SOILS

U.S. STANDARD SIEVE SIZE(S)										
12"	3"	3/4"	4	10	40	200				
BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY	CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE				
300	75	19	4.75	2.0	0.42	0.075	0.005			
GRAIN SIZE IN MM										