



Exhibit AA. West Calcasieu Port Site  
Preliminary Geotechnical Engineering Report



Professional Service Industries, Inc.  
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# West Calcasieu Port Site Preliminary Geotechnical Engineering Report

August 27, 2019

**Southwest Louisiana Economic Development Alliance**  
4310 Ryan Street  
Lake Charles, Louisiana 70605

Attn: Mr. Gus Fontenot  
Phone: 337.433.3632  
Email: [gfontenot@allianceswla.org](mailto:gfontenot@allianceswla.org)

Re: Preliminary Geotechnical Site Characterization Services  
Proposed LED West Calcasieu Port Site  
Calcasieu Parish, Louisiana  
PSI Project No. 02541140

Dear Mr. Fontenot,

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 Louisiana Economic Development (LED) West Calcasieu Port Site located in Calcasieu Parish, Louisiana. This exploration was performed in general accordance with PSI Proposal No. 0254-276109; dated April 25, 2019, which was authorized by Mr. Gus Fontenot with the Southwest Louisiana Economic Development Alliance on July 11, 2019.

We appreciate the opportunity to perform these geotechnical services and look forward to continued 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 us.

Respectfully submitted,

**PROFESSIONAL SERVICE INDUSTRIES, INC.**

William B. Barker  
Geotechnical Project Manager



Name: Reda M. Bakeer, Ph.D., P.E.

Date: August 27, 2019

License No.: 27123

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SALES, OR AS THE BASIS FOR THE ISSUANCE OF A PERMIT.



## GEOTECHNICAL SITE CHARACTERIZATION

PSI Project No. 02541140  
Proposed LED West Calcasieu Port Site  
Calcasieu, Louisiana

A handwritten signature in black ink that reads "William Barker".

William Barker  
Project Manager

Prepared for

Southwest Louisiana Economic Development Alliance  
4310 Ryan Street  
Lake Charles, Louisiana 70605

Prepared by

Professional Service Industries, Inc.  
724 Central Avenue  
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LA Registered Engineering Firm: EF0001219

Reda M. Bakeer, Ph.D., P.E.  
Chief Engineer

August 27, 2019

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## 1 PROJECT INFORMATION

Professional Service Industries, Inc. (PSI), an Intertek company, has completed a geotechnical exploration for the LED West Calcasieu Port Site, located about 12 miles south of Sulphur, Louisiana. Our scope of services were outlined in PSI Proposal 0254-276109, dated April 25, 2019. Our geotechnical services were authorized by Mr. Gus Fontenot with the Southwest Louisiana Economic Development Alliance on July 11, 2019.

### 1.1 PROJECT DESCRIPTION

Initial project information was provided by Mr. Elliott Boudreaux of CSRS, Inc. through a Request for Proposal (RFP), dated April 23, 2019. The RFP indicated that the proposed project consists of conducting a Preliminary Geotechnical Characterization Investigation of a site located in Calcasieu Parish, Louisiana. These services are required to support the Louisiana Economic Development (LED) Site Certification process. The LED Certified Site Application requires a preliminary geotechnical investigation that would generally characterize the site's soil, rock, and groundwater conditions to substantiate that unfavorable geotechnical conditions do not exist on the site.

The subject site is located within the northwest quadrant where LA Highway 27 and the Intracoastal Waterway intersect in Calcasieu Parish, Louisiana. PSI was provided with multiple maps depicting the site location and boundaries.

It is understood that the site could be utilized for a plant or other large industrial manufacturing facility, and that it may accommodate structures such as tanks, pipe racks, manufacturing buildings, etc. It is further understood that the required geotechnical information includes the approximate load bearing capacity of a 14-inch square concrete or steel pipe pile or other similar, commonly used for support of structures associated with this type development.

The report containing the results of the requested geotechnical characterization investigation should be considered to be "preliminary" and could be used for general evaluation of the suitability of the site for development. However, it should not be used for the preliminary or final design and construction of any structures or foundations. It is understood that a subsequent detailed geotechnical exploration and analysis will be performed at a later stage once design and function of the proposed development have been finalized. Information needed would be the depth to groundwater, depth to a stiff clay material or a dense sand stratum, and the suitability of the soils for development. The explored depth is limited to 100 feet, so it should be noted that the report may state that the stiff clay strata or dense sand strata is "deeper than 100 feet below the existing grade," if it is not encountered within this investigation depth. This is particularly important if the anticipated construction on the subject site could include relatively high loads, requires adding significant amounts of fill to reach design grades, or structures that cannot tolerate settlement. Please note that our scope of services does not include environmental drilling or sampling of soil or groundwater.

The preliminary geotechnical recommendations presented in this report are based on the available project information, site location, laboratory testing, and the subsurface materials, as well as the assumptions stated in this report. If any of the noted information is incorrect, PSI should be informed in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the Client. PSI will not be responsible for the implementation of its recommendations when it is not notified in advance and in writing of changes in the project.

## 1.2 PURPOSE AND SCOPE OF SERVICES

The purposes of PSI's geotechnical services were to:

- Perform two (2) soil borings at the site;
- Evaluate general subsurface soil conditions and groundwater depth at the boring locations at the time of drilling;
- 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/commercial 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.

## 2 GEOTECHNICAL EXPLORATION PROGRAM

### 2.1 FIELD EXPLORATION

PSI performed five (5) soil borings, to the depths described in Table 1, to explore the subsurface conditions at these randomly selected and accessible locations within the 25-50 acre site considering its present use.

**Table 1: Soil Borings Information.**

Boring(s)	Depth (feet)*
B-1	100
B-2	50

*\*Approximate depth below the existing ground surface at the boring locations*

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

The soil borings were performed with a truck-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.

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.



## 2.2 GEOTECHNICAL LABORATORY TESTING

Geotechnical Laboratory testing of selected soil samples was performed in general accordance with ASTM procedures and included the following:

- Visual Classification (ASTM D2487 / D2488)
- Moisture Content (ASTM D2216)
- Atterberg Limits (ASTM D4318)
- Percent Soil Particles Finer than No. 200 Sieve (ASTM D1140)
- Unconfined Compression Tests (ASTM D2166)
- Unconsolidated Undrained Triaxial Tests (ASTM D2850)

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.

### 3 SUBSURFACE CONDITIONS

#### 3.1 SOIL PROFILE

Based on the field observations and the results of the geotechnical 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 and 3.

**Table 2: Generalized Soil Profile – B-1.**

Approximate Depth Range (feet) <sup>(1)</sup>	Consistency/Relative Density	Material Description
0 – 4	Firm	Lean Clay (CL) or Fill
4 – 8	Stiff to Very Stiff	Fat Clay (CH)
8 – 12	Firm	Lean Clay (CL)
12 – 23	Stiff to Very Stiff	Lean Clay (CL)
23 – 33	Firm to Stiff	Lean Clay (CL)
33 – 58	Soft to Firm	Lean Clay (CL)
58 – 63	Very Stiff	Lean Clay (CL)
63 – 88	Firm to Stiff	Lean Clay (CL)
88 – 93	Very Stiff	Lean Clay (CL)
93 – 100	Dense	Silty Sand (SM)

<sup>(1)</sup>Referenced from the existing grade at the boring location.

**Table 3: Generalized Soil Profile – B-2.**

Approximate Depth Range (feet) <sup>(1)</sup>	Consistency/Relative Density	Material Description
0 – 13	Firm to Stiff	Fat Clay (CH)
13 – 28	Firm to Stiff	Lean Clay (CL)
28 – 43	Soft to Firm	Lean Clay (CL)
43 – 50	Firm to Stiff	Lean Clay (CL)

<sup>(1)</sup>Referenced from the existing grade at the boring location.

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 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 at the time of our field exploration. Therefore, variation may occur, and should be expected across the site considering its size. The stratification represents the approximate boundary between subsurface materials, but the actual transition may be gradual. This is particularly important considering the limited number of borings made at

readily accessible areas within the relatively large property where subsurface conditions could vary significantly than those outlined in Table 2 and 3. 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.

### 3.2 GROUNDWATER INFORMATION

Table 4 presents groundwater levels observed during the time of drilling.

**Table 4: Groundwater Levels Detected during the Field Exploration.**

Boring No.	Groundwater Depth (feet) <sup>(1)</sup>
B-1	12
B-2	15

<sup>(1)</sup>Referenced from the existing grade at the boring locations.

It is possible that seasonal variations (temperature, rainfall, adjacent waterways and drainage canals, etc.) as well as the water level or stage in the nearby water bodies will cause fluctuations in the groundwater level. Additionally, perched water may be encountered in discontinuous zones within the overburden. This condition develops as rainwater is 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 readily accessible locations.



## 4 PRELIMINARY GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

### 4.1 GEOTECHNICAL DISCUSSION

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.

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. Prior to new fill placement, site preparation should include removal of surficial vegetation, topsoil, organic matter, and soft soil or demucking of wet areas or drainage conveyances and proof rolling in the presence of the Geotechnical Engineer of Record to assess general stability and firmness prior to fill placement.

Based on the limited number of soil borings made at readily accessible locations, field data and laboratory test results, the proposed site is generally suitable for industrial development. The results of the exploration indicate that aside from the the near surface desiccated crust, the underlying soils encountered at the boring locations -4 are moderately to highly compressible in nature, and poor to fair 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 heavy construction. However, spread footing type foundations (square, continuous, mats, etc.) could be used for support of lightly loaded auxiliary structures that can tolerate long-term settlements including some differential with time.

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 shall not to be used for final design and construction.

## 4.2 PRELIMINARY SHALLOW FOUNDATION DESIGN

Provided the preliminary findings gleaned from the limited number of borings made at readily accessible locations are confirmed with a comprehensive subsurface investigation, lightly loaded structures can be supported on conventional spread footings bearing on naturally occurring firm clay or properly compacted structural fill. In this case, additional geotechnical recommendations will have to be provided with regard to site preparation, design parameters and anticipated long-term settlement based on the specific structural loads and configuration.

Foundations should be placed at least 2 feet below the finished grade on firm clay or controlled-compacted structural fill and can be designed for a preliminary net allowable bearing pressure of 1,700 psf for dead load plus transient live loads (i.e. wind loads) or 1,500 psf for dead plus sustained live loads (i.e. equipment inside a structure), whichever results in a larger bearing area. Minimum footing dimension for continuous wall footings should be at least 18 inches. It should be noted that poor quality and/or soft materials may exist at parts of the site considering the limited number of explorations location. Therefore, the footing excavation should be thoroughly inspected to assure that all poor-quality and/or soft materials are removed and replaced with structural fill. The location, depth and lateral extent of unsuitable or poor quality materials shall be delineated through the comprehensive subsurface investigation to be conducted as part of the design phase for the proposed development.

No detailed settlement analyses were made since the anticipated loads, footing configuration, etc. are not known at this time. However, spread footings with a width no larger than five (5) feet, designed as described above and seated in firm clay or controlled-compacted structural fill, should experience a total settlement on the order of less than one inch. If a cluster of closely spaced footings (i.e., if the center to center spacing of the footings is less than two times the width of the footing) are planned, PSI should be contacted to calculate the amount of settlement. However, the near surface firm to stiff clays are underlain by firm and more compressible clays which could experience larger and differential settlement partially under large footings and if significant fill thickness is needed to raise the site grade.

The foundation excavations shall be observed by a representative of the Geotechnical Engineer of Record or a designated representative prior to steel or concrete placement to assess that the foundation materials can support the design loads and are consistent with the materials discussed in the report. Soft or loose soil zones, if encountered at the bottom of the shallow footing excavations, shall be removed and replaced with properly compacted structural fill as directed by the Geotechnical Engineer of Record.

After opening, isolated spread footing excavations should be observed, and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond. If possible, the foundation concrete should be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture. While no detailed analyses were made, structures placed on existing soils will be subject up to two (2) to three (3) inches of movement.

### 4.3 PRELIMINARY DEEP FOUNDATION DESIGN

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 and potentially “good” additional “point support” if the piles are embedded in the medium dense to dense sand encountered in soil boring B-1 at about 58 feet and 93 feet from the existing ground surface. The location, thickness, depth and lateral extent of the competent sand stratum shall be delineated through the comprehensive subsurface investigation to be conducted as part of the design phase for the proposed development.

The recommended driven lengths and the estimated corresponding allowable compression and tension capacities for the piles are presented in Tables 5 and 6. 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.

**TABLE 5. Preliminary Timber Pile Allowable Capacities**

ESTIMATED ALLOWABLE SINGLE PILE CAPACITY (tons) <sup>(1)</sup>		
Pile Length (feet) <sup>(2)</sup>	Class "B" Timber (7" tip – 12" butt)	
	Comp.	Tens.
35	10	7
40	12	8
45	13	9
50	15	10
55	17	11
60 <sup>(3)</sup>	19	13

<sup>(1)</sup> Capacities are soil-pile related capacities and consideration should be given to the structural integrity of the pile member.

<sup>(2)</sup> Pile lengths are referenced from existing ground surface at the time of drilling.

<sup>(3)</sup> Piles driven to firm embedment into medium dense sand.



**TABLE 6. Preliminary 14-inch square PPC Allowable Capacities.**

ESTIMATED ALLOWABLE SINGLE PILE CAPACITY (tons) <sup>(1)</sup>		
Pile Length (feet) <sup>(2)</sup>	Sq. Precast Concrete (14-inch)	
	Comp.	Tens.
60	36	24
65	39	26
70	43	28
75	46	31
80	50	33
85	53	35
90	55	37
95 <sup>(3)</sup>	58	39

<sup>(1)</sup> Capacities are soil-pile related capacities and consideration should be given to the structural integrity of the pile member.

<sup>(2)</sup> Pile lengths are referenced from existing ground surface at the time of drilling.

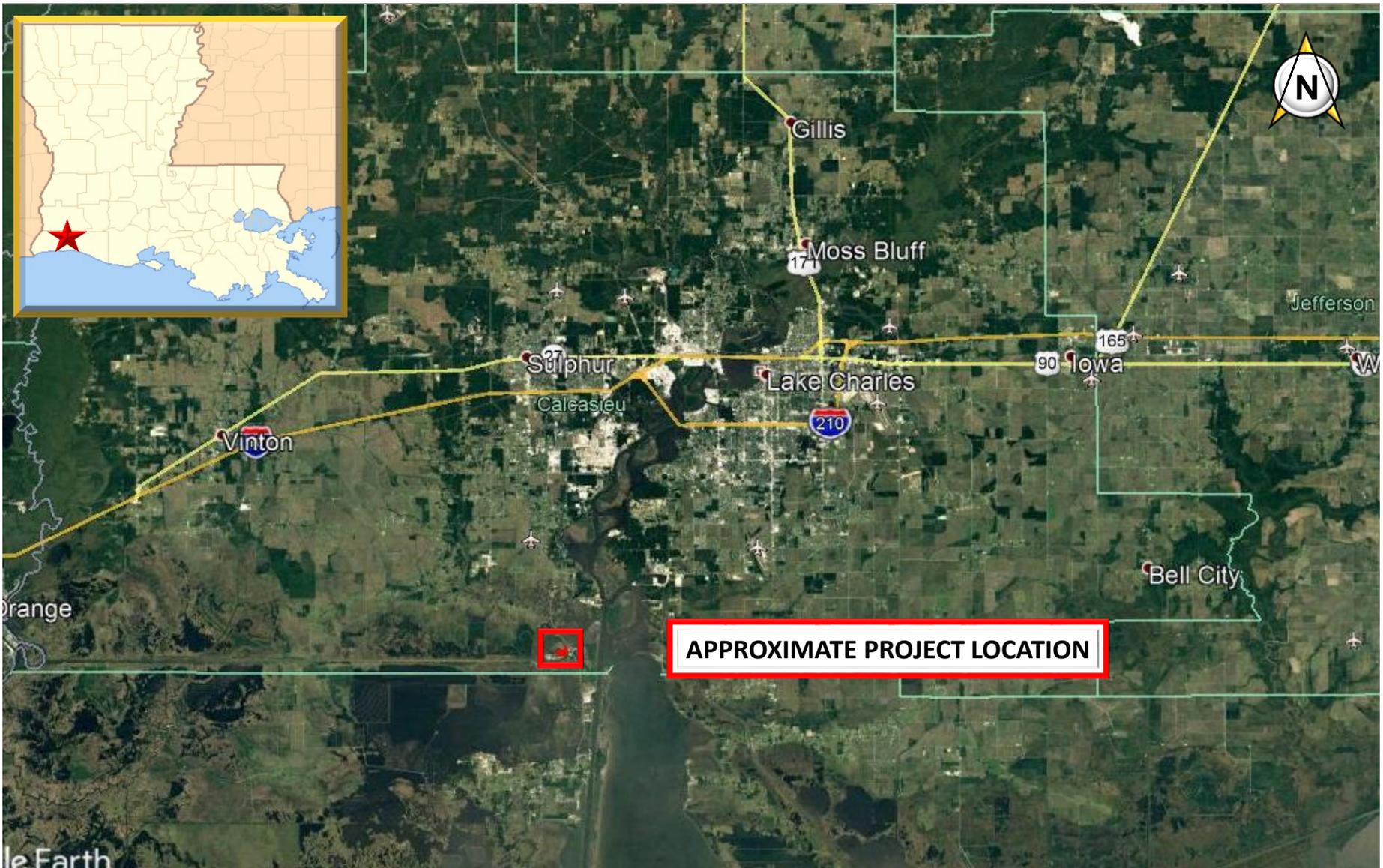
<sup>(3)</sup> Piles driven to firm embedment into medium dense sand.

The estimated preliminary 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 piles, respectively, 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 as well as fill thickness.

## 5 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 Southwest Louisiana Economic Development Alliance for the specific purpose of determining general subsurface information at the subject site to develop a general geotechnical site characterization.

## **APPENDIX**



GEOTECHNICAL ENGINEERING SERVICES  
LED WEST CALCASIEU POST SITE  
CALCASIEU PARISH, LOUISIANA

### SITE VICINITY MAP

PSI PROJECT NO.: 02541140-1  
GOOGLE EARTH IMAGERY DATE: 1/2019





 **APPROXIMATE BORING LOCATIONS**

GEOTECHNICAL ENGINEERING SERVICES  
**LED WEST CALCASIEU POST SITE**  
 CALCASIEU PARISH, LOUISIANA

**EXPLORATION LOCATION PLAN**  
 PSI PROJECT NO.: 02541140-1  
 GOOGLE EARTH IMAGERY DATE: 1/2019

**intertek**  
**psi**

# LOG OF BORING B-1

## PROPOSED LED WEST CALCASIEU PORT SITE CALCASIEU PARISH, LOUISIANA

TYPE OF BORING: AUGER TO WET ROTARY

LOCATION: SEE EXPLORATION PLAN

PSI Project No.: 02541140

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)				
											HP (tsf)	UC (tsf)	TV (tsf)	UU (tsf)	
0.0 - 2.5				Firm gray LEAN CLAY, with trace of sand, gravel, and concrete fragments (FILL)	8	27									
2.5 - 5.0					8	22			82						
5.0 - 7.5	CH			Stiff gray and light red FAT CLAY		24	65	18	47		0.58	0.85			103
7.5 - 10.0	CH			Very stiff orange and gray FAT CLAY		23					1.17				
10.0 - 12.5	CL			Firm orange LEAN CLAY		24	45	17	28		0.50	0.29			105
12.5 - 15.0	CL			Stiff to very stiff orange LEAN CLAY		22					1.00				
15.0 - 17.5						23					0.58				
17.5 - 22.5	CL			Firm to stiff brown LEAN CLAY		26							0.35		
22.5 - 27.5						27					0.58				
27.5 - 32.5	CL			Firm brown and gray LEAN CLAY, with sand and silt lenses		27	33	19	14		0.42				
32.5 - 37.5	CL			Soft to firm dark gray LEAN CLAY		34							0.25	0.40	85
37.5 - 42.5						30							0.25		
42.5 - 47.5	CL			Soft to firm gray LEAN CLAY		55					0.25				
47.5 - 50.0															

DEPTH OF BORING: 100 FEET

DATE DRILLED: 7/18/19

NOTE: N / A = NOT AVAILABLE

▽ GROUNDWATER DURING DRILLING: 12 FEET

▼ GROUNDWATER UPON COMPLETION: N / A

⚡ DELAYED GROUNDWATER: N / A

BORING LOG - JEFFERSON - PSHOUSTON.GDT - 8/26/19 15:47 - 0254



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# LOG OF BORING B-1

## PROPOSED LED WEST CALCASIEU PORT SITE CALCASIEU PARISH, LOUISIANA

TYPE OF BORING: AUGER TO WET ROTARY

LOCATION: SEE EXPLORATION PLAN

PSI Project No.: 02541140

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)				DRY UNIT WEIGHT (pcf)			
							LL	PL	PI		SHEAR STRENGTH (tsf)							
											HP (tsf)	UC (tsf)	TV (tsf)	UU (tsf)				
52.5				Firm gray <b>LEAN CLAY</b>		34												
55.0																		
57.5		SC		Medium dense brown <b>CLAYEY SAND</b>	16	26				44								
60.0																		
62.5		CL		Firm to stiff gray <b>LEAN CLAY</b> - with sand lenses and shell fragments, 63 to 65 feet		51												
65.0																		
67.5						36												
70.0																		
72.5																		
75.0				- with sand, 73 to 75 feet	10	23				77								
77.5						22							0.50					
80.0																		
82.5						20							0.42					
85.0																		
87.5		CL		Very stiff gray <b>LEAN CLAY</b> , with sand	20	25				68								
90.0																		
92.5		SM		Dense gray <b>SILTY SAND</b>	42	22												
95.0																		
97.5																		
100.0				BORING TERMINATED AT 100 FEET	45	25				18								

DEPTH OF BORING: 100 FEET

DATE DRILLED: 7/18/19

NOTE: N / A = NOT AVAILABLE

BORING LOG - JEFFERSON - PSHOUSTON.GDT - 8/26/19 15:47 - 0254



Professional Service Industries, Inc.  
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# LOG OF BORING B-2

## PROPOSED LED WEST CALCASIEU PORT SITE CALCASIEU PARISH, LOUISIANA

TYPE OF BORING: AUGER TO WET ROTARY

LOCATION: SEE EXPLORATION PLAN

PSI Project No.: 02541140

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		HP	UC	TV	UU			
0.0 - 2.5	CH	CH		Firm to stiff brown <b>FAT CLAY</b> - with trace of silt, shell fragments, and roots, 0 to 2 feet		26	53	26	27		0.33				111		
2.5 - 5.0						18					0.58	0.61					
5.0 - 7.5						19					0.50						
7.5 - 10.0	CH	CH		Stiff brown and orange <b>FAT CLAY</b>		28					0.67	0.70	0.63	95			
10.0 - 12.5						23											
12.5 - 15.0	CL	CL	X	Firm to stiff brown <b>SANDY LEAN CLAY</b>		12				61							
15.0 - 17.5						14					27	60					
17.5 - 20.0						14					27	60					
20.0 - 22.5	CL	CL	X	Firm to stiff brown <b>SANDY LEAN CLAY</b>		27							0.45	0.75	96		
22.5 - 25.0						27											
25.0 - 27.5						27											
27.5 - 30.0	CL	CL	X	Soft to firm brown <b>LEAN CLAY</b>		29							0.20				
30.0 - 32.5						28					38	17	21		0.42		
32.5 - 35.0						28					38	17	21		0.42		
35.0 - 37.5	CL	CL	X	Soft to firm brown <b>LEAN CLAY</b>		41					0.33						
37.5 - 40.0						41											
40.0 - 42.5						41											
42.5 - 45.0	CL	CL	X	Firm to stiff brown <b>LEAN CLAY</b>		34							0.45	0.61	83		
45.0 - 47.5						34											
47.5 - 50.0	CL	CL	X	Firm to stiff brown <b>LEAN CLAY</b>		45					0.33						
BORING TERMINATED AT 50 FEET																	

DEPTH OF BORING: 50 FEET

DATE DRILLED: 7/19/19

NOTE: N / A = NOT AVAILABLE

▽ GROUNDWATER DURING DRILLING: 15 FEET

▼ GROUNDWATER UPON COMPLETION: N / A

⚡ DELAYED GROUNDWATER: N / A

BORING LOG - PS-HOUSTON.GDT - 8/26/19 15:47 - 0254



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# KEY TO TERMS AND SYMBOLS USED ON LOGS

**SOIL TYPE**

FAT CLAY	LEAN CLAY	ORGANIC CLAY	SAND	SILT	GRAVEL

**SOIL TYPE**

TOPSOIL	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)

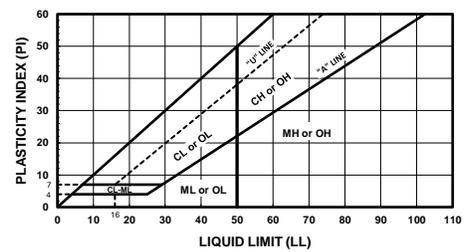
MAJOR DIVISIONS		LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELLY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	GW	WELL-GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN 50% PASSING NO. 4 SIEVE	SW	WELL-GRADED SAND
		SP	POORLY-GRADED SANDS
		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 - 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

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									