

November 6, 2013

# Exhibit V. Iberville Industrial & Technology Park Preliminary Geotechnical Engineering Report

Attention :Jim A. Cavanaugh<br/>Site Development DirectorEmail:jim@brac.orgPhone:(225) 339-1163

#### Re: Geotechnical Site Evaluation Report Iberville Industrial Site Evaluation Iberville Parish, Louisiana PSI Project No. 0193523-01

Dear Mr. Cavanaugh:

Professional Service Industries, Inc. is pleased to submit our Site Evaluation Report for the above referenced project. 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 sq. ft. industrial manufacturing building and depth of groundwater.

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

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Steven L. Gunter, P.E. Department Manager Geotechnical Services

Name: Steven L. Gunter, P.E. Date: November 5, 2013 License No.: 30561

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#### **GEOTECHNICAL SITE EVALUATION REPORT**

#### IBERVILLE INDUSTRIAL SITE STUDY IBERVILLE PARISH, LOUISIANA PSI PROJECT NO.: 0193523-01

PREPARED FOR

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

#### **NOVEMBER 6, 2013**

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 geotechnical site evaluation study for the Dow Industrial site, located in Plaquemine, Louisiana. Our services were provided in general accordance with PSI Proposal No. 193-106847, dated October 4, 2013. Authorization to provide our services was provided by Mr. Adam Knapp (President and CEO with the Baton Rouge Area Chamber) whom signed our Proposal on October 8, 2013.

#### Project Description

The site for the requested geotechnical evaluation is approximately 55 acres in size and is located about 1 mile north of Plaquemine, Louisiana. Primary objectives for this preliminary report are to provide 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 sq. ft. industrial manufacturing building, and the depth of the free groundwater table.

This geotechnical site evaluation report shall 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 project site and relatively limited number of borings performed, variations between borings 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.

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.

#### Purpose and Scope of Services

The purposes of PSI's geotechnical services are to:

- Drill one (1) boring to a terminal depth of 75 feet below existing grade and two (2) borings to a terminal depth of 25 feet below existing grade across the site to facilitate this site characterization study;
- Evaluate subsurface soil conditions and depth-to-water at the project site;
- Perform limited laboratory tests on soil samples recovered from the project site; and,
- Provide 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 sq. ft. industrial manufacturing building and depth of groundwater.

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 project site is located approximately one mile northwest of Plaquemine, Louisiana, bounded generally by Diamond Plastics to the east, Enterprise Boulevard to the west and John Britton Parkway to the north (as illustrated on the Site Vicinity Map provided on Figure No. 1 in the Appendix). The site currently exists as a grass-covered, rowed field at the time of our field exploration. The ground surface generally appeared topographically level, firm and was generally dry. Our ATV-mounted drill rig was required in order to perform this field exploration.

#### Field Exploration

The field exploration included mobilization to the site by a PSI drilling crew, drilling of the soil borings, and recovering soil samples. Boring SB-1 was drilled and sampled to a depth of about 75 feet below existing grade. Borings SB-2 and SB-3 were drilled and sampled to a terminal depth of about 25 feet below existing grade (as illustrated in the Boring Location Plan on Figure No. 2 in the Appendix). As noted previously, the borings were advanced using an ATV-mounted drill rig equipped with a rotary head and hollow-stem flight augers. Boring SB-1 was drilled utilizing wet-rotary drilling techniques, while Borings SB-2 and SB-3 were drilled and sampled utilizing hollow stem augers. Drilling and sampling activities were performed in general accordance with referenced ASTM procedures or other accepted methods. The shallow soil borings (i.e., 25 feet deep) were backfilled with soil cuttings upon completion of drilling and groundwater observations while the deeper soil borings (i.e., 75 feet deep) were backfilled with a cement/bentonite grout mixture per LA DOTD requirements.

Undisturbed samples of cohesive soils were generally obtained using three (3) 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.

For cohesionless soils, Standard Penetration Tests (SPT) were 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, required to advance the split-barrel sampler 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 successive increments of six 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 and compressibility of the soil profile components. Soil samples were obtained utilizing a two-inch O.D. split-barrel sampler in general accordance with procedures

for "Penetration Test and Split-Barrel Sampling of Soils" (ASTM D 1586). These samples were identified according to boring number and depth, placed in polyethylene plastic wrapping to protect against moisture loss and transported to the laboratory.

#### 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 tests and unconsolidated undrained triaxial strength tests (to supplement the field pocket penetrometer testing). The laboratory testing was performed in general accordance with ASTM procedures. Samples not altered by laboratory testing will be retained for sixty (60) days from the date of this report and then be discarded.

#### Subsurface Conditions

Boring SB-1 disclosed about 2-inches of topsoil underlain by firm, fat clay to about 8 feet below grade. From 8 feet to about 13 feet, very soft lean clay was disclosed, followed by a one-foot thick layer of firm fat clay and one foot of silty sand. Beneath the silty sand, soft fat clay was disclosed and extended to about 45 feet, followed by loose to medium dense silt to about 60 feet. Underlying this thick silt layer, firm fat clay was disclosed to about 75 feet, the maximum depth explored.

Boring SB-2 disclosed about 2-inches of topsoil underlain by firm fat clay to about 13 feet. Underlying this fat clay is a firm lean clay layer to about 18 feet underlain by firm fat clay to the boring termination depth of about 25 feet below existing grade.

Boring SB-3 disclosed about 2 inches of topsoil underlain by stiff fat clay to about 6 feet. Underlying this fat clay layer is a 2-foot thick layer of very soft lean clay. From 8 feet to about 13 feet, very soft fat clay was disclosed followed by loose silt to about 18 feet. This silt layer is underlain by soft fat clay to the boring termination depth of about 25 feet below existing grade, the maximum depth explored in this boring.

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

#### **Groundwater Information**

Boring No.	Depth Below Grade Groundwater Encountered (Ft.)	Depth Below Grade After 24 Hours (Ft.)
B-1	*	**
B-2	8	2
B-3	8	3.3

The free groundwater table was encountered as shown in the Table below:

\*Boring was drilled using wet rotary drilling techniques; therefore the initial depth to groundwater was not measured in this boring. \*\* Not measured due to drilling fluid used to drill soil boring and short project duration.

It should be noted that groundwater level fluctuations at this site may occur due to seasonal and climatic variations, the stage of the Mississippi River due to its relative close proximity to the project site, alteration of drainage patterns, land usage and ground cover. We recommend the Contractor determine the actual groundwater levels at the time any future construction activities begin.

#### 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 movement which the structure can withstand without damage.

Based on the limited number of soil borings, 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, although due to the presence of fat clay (CH) soil in the upper 6 to 13 feet of the soil profile of the borings, potential vertical rise (PVR) would need to be further evaluated. PVR at this site could be alleviated by undercutting the fat clay soils to a predetermined depth and replacing with moisture conditioned, properly compacted lean clay (CL) soils, or with the addition of chemical treatment such as lime mixing. Detailed column loads for a typical 100,000 sq. ft. 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 60 to 100 kips with wall loads on the order of 3.0 kips per lineal foot.

Foundation systems may include shallow foundations (for lightly loaded structures with allowance for some settlement), mat foundations, deep foundations such as driven piles or auger cast-in-place (ACIP) piles or drilled piers for this project. Pile/pier foundations are recommended for the support of the heavy structures or settlement sensitive structures at this site. The choice of type of deep foundation should be based on the tolerance criteria for the performance of the structures and economics of construction. Lightly loaded structures can generally be supported on shallow spread footings/grade beam system, or mat foundations, as long as the PVR issues described above are mitigated. These foundations will be governed by the anticipated load and settlement tolerances.

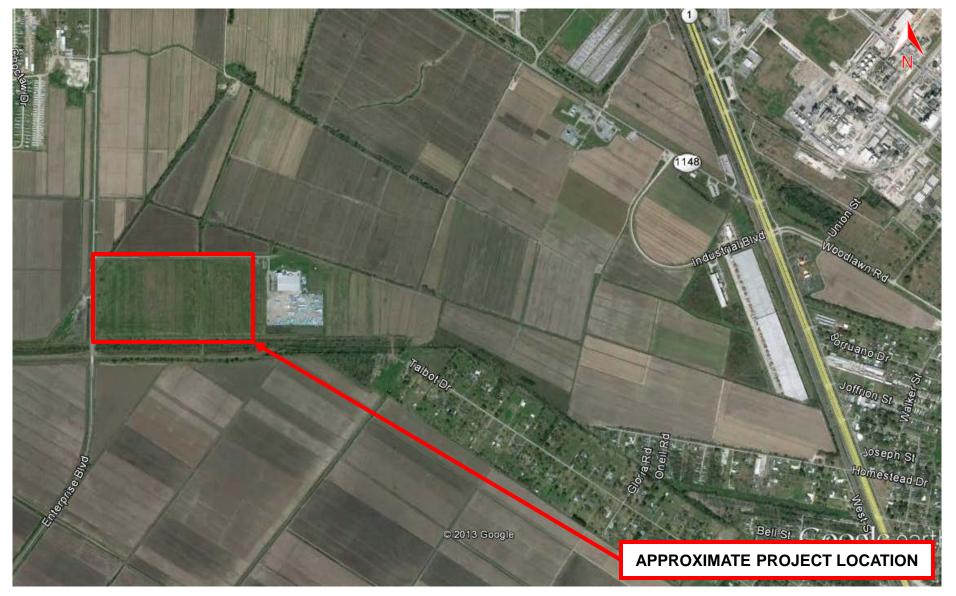
As stated previously, the opinions and information presented in this site evaluation report are estimates for preliminary consideration only, and are based on a very limited geotechnical exploration, and are not to be used for final design and construction.

#### **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 site of the referenced project. Upon authorization through a supplemental services agreement, PSI will be available to perform a thorough geotechnical study and provide complete and final recommendations.

APPENDIX

# **SITE VICINITY MAP**



	GEOTECHNICAL ENGINEERING SERVICES	DATE:	11/2013	
	IBERVILLE INDUSTRIAL SITE Plaquemine, louisiana	DRAWN:	WV	
FIGURE 1	PSI PROJECT NO.: 0193523-01	CHKD:	SG	En



# **BORING LOCATION PLAN**



	GEOTECHNICAL ENGINEERING SERVICES	DATE:	11/2013	
	IBERVILLE INDUSTRIAL SITE PLAQUEMINE, LOUISIANA	DRAWN:	WV	
FIGURE 2	PSI PROJECT NO.: 0193523-01	CHKD:	SG	E



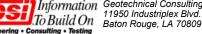
### LOG OF BORING SB-1 IBERVILLE INDUSTRIAL SITE PLAQUEMINE, LOUISIANA

TYP	E OF E	BORIN	-	VET ROTARY						P	SI Pro	oject N	lo.: 0	19352	3-01
<sub>⊢</sub> .	ш	30L	WATER LEVELS	LATITUDE: N 30° 18' 39.6" LONGITUDE: W 91° 16' 37.1"	<u>⊢</u>	ű Ű				(%	SF	IEAR S	TRENG	TH	DRY UNIT WEIGHT (lbs/ft <sup>3</sup> )
іц т	DEPTH, FT. SOIL TYPE USCS SYMBOL	ΥME	Р Ш		N-BLOWS/FT.	% PASSING No. 200 SIEVE	≘⊨	2 E E	PLASTICITY INDEX	MOISTURE CONTENT (%)			s/it )		( <sup>3</sup>
L T	- 	s S	ER	BORING LOCATION PLAN: APPENDIX SHEET NO. 2		PAS 200	LIQUID	PLASTIC LIMIT	AST	NTEP	PEN	ANE	0		TINI (lbs/
B	о Х	JSC	VAT	SOIL DESCRIPTION		°No.				₹Ö	HANDPEN	TORVANE	nc	n	RYL
<u> </u>	////		>	2-INCHES TOPSOIL	<u>г</u>		LL	PL	PI		_	⊢ –		<u> </u>	
		СН		Firm, gray fat CLAY w/ roots	'					43	0.38				
				-w/ ferrous stains						46	0.38				
-5-										47	0.38				
										32	0.50				
		CL		Very soft, tan and gray lean CLAY w/ silt						37	0.00	0.23			
-10-				-becomes gray						57	0.00	0.25			
					_										
		CH SM		Firm, gray fat CLAY w/ silt Gray, silty SAND						35	0.13	0.53		0.28	86
-15-		CH		Soft, gray fat CLAY	_										
				-w/traces of organics and silt											
										33	0.25				
-20-				1											
				-w/ 1.5" sand layer, 4" sandy silt layer							0.40	0.00			
-25-										46	0.13	0.38			
				-w/ large wood fragments and roots						84	0.13	0.48			
-30-															
										42	0.25				
-35-															
-40-										58	0.25				
40															
<u> </u>															
										53	0.25				
-45-		ML		Loose, gray SILT							0.20				
	$\left\{ \left  \left  \right  \right  \right\}$	IVIL													
<u> </u>	$\left\{ \left  \left  \right  \right  \right\}$				8	94				28					
-50- DFP		BORI	NG	75 feet	1	1	1	I	1	1	1	I	ļ		I
	E DRIL														
				tion lines represent approximate boundaries.											
	SII	ngon	iuuu	m Geotechnical Consulting Services 11950 Industriplex Blvd.											

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#### LOG OF BORING SB-1 **IBERVILLE INDUSTRIAL SITE** PLAQUEMINE, LOUISIANA

PSI Project No.: 0193523-01 TYPE OF BORING: WET ROTARY SHEAR STRENGTH (tons/ft<sup>2</sup>) WATER LEVELS LATITUDE: N 30° 18' 39.6" DRY UNIT WEIGHT (lbs/ft<sup>3</sup>) SYMBOL % PASSING No. 200 SIEVE MOISTURE CONTENT (%) SOIL TYPE Ē တ္မ LONGITUDE: W 91° 16' 37.1" PLASTICITY INDEX N-BLOWS/FT PLASTIC LIMIT LIQUID DEPTH, I SAMPI BORING LOCATION PLAN: APPENDIX SHEET NO. 2 HANDPEN TORVANE USCS Я З SOIL DESCRIPTION ΡI ΡL LL Stiff, gray SILT (layer continued from previous page) ML 27 11 Х -becomes medium dense -55--becomes loose  $\bigtriangledown$ 8 24 -60-1 СН Firm, gray fat CLAY w/ organics 96 0.25 0.50 0.32 68 55 53 0.25 75 Boring terminated at 75 feet. -80--85--90--95 ·100-DEPTH OF BORING: 75 feet DATE DRILLED: 10/31/13 NOTES: The stratification lines represent approximate boundaries. Information Geotechnical Consulting Services 11950 Industriplex Blvd.



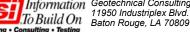
#### LOG OF BORING SB-2 **IBERVILLE INDUSTRIAL SITE** PLAQUEMINE, LOUISIANA

PSI Project No.: 0193523-01 TYPE OF BORING: HOLLOW STEM AUGER UNIT WEIGHT (lbs/ft<sup>3</sup>) SHEAR STRENGTH (tons/ft<sup>2</sup>) WATER LEVELS LATITUDE: N 30° 18' 40.2" **SYMBOL** % PASSING No. 200 SIEVE MOISTURE CONTENT (%) ഗ LONGITUDE: W 91° 16' 24.4" SOIL TYPE Ē PLASTICITY INDEX N-BLOWS/FT PLASTIC LIMIT LIQUID DEPTH, I SAMPL BORING LOCATION PLAN: APPENDIX SHEET NO. 2 HANDPEN TORVANE USCS З З DRYI SOIL DESCRIPTION PL ΡI LL 2-INCHES TOPSOIL СН 43 0.50 Firm, gray fat CLAY w/ grass, roots and ferrous V stains 45 0.25 0.24 71 -w/ ferrrous nodules 53 0.25 -w/ traces of calcareous nodules 0.35 79 42 0.38 T -w/ ferrous stains and nodules 48 0.50 0.35 76 Firm, gray lean CLAY w/ silt and traces of fine sand, CL 35 0.25 large root 15-Firm, gray fat CLAY w/ roots СН 0.25 58 w/ silt lenses and tree fragments 54 0.13 25 Boring terminated at 25 feet. -30-35-40 -45--50-DEPTH OF BORING: 25 feet GROUNDWATER DURING DRILLING (FT): 8 DATE DRILLED: 10/30/13 DELAYED GROUNDWATER (FT): 2@24 hours NOTES: The stratification lines represent approximate boundaries. Information Geotechnical Consulting Services



#### LOG OF BORING SB-3 IBERVILLE INDUSTRIAL SITE PLAQUEMINE, LOUISIANA

PSI Project No.: 0193523-01 TYPE OF BORING: HOLLOW STEM AUGER UNIT WEIGHT (lbs/ft<sup>3</sup>) SHEAR STRENGTH (tons/ft<sup>2</sup>) WATER LEVELS LATITUDE: N 30° 18' 36.1" SYMBOL % PASSING No. 200 SIEVE MOISTURE CONTENT (%) ഗ്ല LONGITUDE: W 91° 16' 45.3" SOIL TYPE Ē PLASTICITY INDEX N-BLOWS/FT PLASTIC LIMIT LIQUID DEPTH, I SAMPI BORING LOCATION PLAN: APPENDIX SHEET NO. 2 HANDPEN TORVANE USCS З З DRY ( SOIL DESCRIPTION ΡI ΡL LL 2-INCHES TOPSOIL СН 43 0.63 Stiff, gray fat CLAY w/ ferrous nodules and stains, grass and roots V 81 24 57 0.50 45 -becomes very soft 0.13 0.40 93 31 Very soft, gray lean CLAY w/ silt, ferrous nodules and CL 33 20 28 13 0.13 stains V Very soft, gray fat CLAY СН 37 0.00 0.23 88 Firm, gray SILT ML 4 34 15-СН Soft, gray fat CLAY w/ silt lenses and roots 48 0.13 0.18 78 36 0.25 25 Boring terminated at 25 feet. -30-35-40--45--50-DEPTH OF BORING: 25 feet GROUNDWATER DURING DRILLING (FT): 8 DATE DRILLED: 10/30/13 DELAYED GROUNDWATER (FT): 3.3@24 hours NOTES: The stratification lines represent approximate boundaries. Information Geotechnical Consulting Services





Information PROFESSIONAL SERVICE INDUSTRIES, INC. 11950 INDUSTRIPLEX BLVD. BATON ROUGE, LOUISIANA Telephone: (225) 293-8378 Fax: (225) 650-2978

## **KEY TO SYMBOLS**

