Exhibit W

Bridgeview Park Site Preliminary Geotechnical Engineering Report

LOUISIANA ECONOMIC DEVELOPMENT
OpportunityLouisiana.com

Bridgeview Park Site Preliminary Geotechnical Engineering Report

08013

GEOTECHNICAL ENGINEERING REPORT

PROPOSED MAINTENANCE BUILDING
HIGHWAY 90 AND HIGHWAY 18
WESTWEGO, LOUISIANA

PSI FILE NUMBER 254-95066-1

PREPARED FOR

PERRIN & CARTER, INC.
3501 RIDGELAKE DRIVE
METAIRIE, LOUISIANA 70002

JUNE 30, 2009

BY

PROFESSIONAL SERVICE INDUSTRIES, INC.
724 CENTRAL AVENUE
JEFFERSON, LOUISIANA 70121

psi Information To Build On
Engineering • Consulting • Testing

Information To Build On
Engineering • Consulting • Testing

June 30, 2009

Perrin & Carter, Inc.
3501 Ridgelake Drive
Metairie, Louisiana 70002

Attention: Mr. Mike Carter

Re: Geotechnical Engineering Report
Proposed Maintenance Building
Highway 90 and Highway 18
Westwego, Louisiana
PSI File Number: 254-95066-1

Dear Mr. Carter:

Professional Service Industries, Inc. (PSI) is pleased to transmit our Geotechnical Engineering Report for the referenced project. This report includes the results of field and laboratory testing, and recommendations for foundation design as well as general site development.

We appreciate the opportunity to perform this Geotechnical Study 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 our office.

Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, INC.

Srilakshmi Debur Nagarajan, M. S.
Project Manager
Geotechnical Services

Tony Y. Maroun, P.E.
Vice President

STATE OF LOUISIANA
TONY Y. MAROUN
License No. [illegible]
PROFESSIONAL ENGINEER
6/30/09

SND/TYM:gsm

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EXECUTIVE SUMMARY

An exploration and evaluation of the subsurface conditions have been completed for the proposed maintenance building that will be constructed at the intersection of Highway 90 and Highway 18 in Westwego, Louisiana.

The project includes the construction of a pre-engineered metal building having a footprint of approximately 12,000 square feet. The metal building will include a garage and an office area. One end of the building will have a mezzanine level which will be used for maintenance and light storage area. The garage area will be used for repairing solid waste dumpster trucks. The floor in the garage area will be designed for HS20 highway loading conditions. Based on the information provided to us, the anticipated interior column loads are approximately 100 tons. We understand that small portions of the site will be paved for cars and light duty trucks which will be located mainly at the entrance of the building. Concrete paving aprons are also planned adjacent to the building which will be used as access for waste dumpster trucks into maintenance area. Detailed grading information was not available at the time of this report. However, we understand that less than two (2) feet of fill may be needed within the garage area and less than three (3) feet of fill within the mezzanine and office area to achieve the design grades.

The subsurface soil conditions at the site was characterized by one (1) soil boring to a depth of 80 feet below the existing ground surface. Based on the borings, about six (6) inches of gray sandy topsoil with organics was encountered at the ground surface. This was followed by firm to very stiff gray and brown sandy clay and fat clay extending to a depth of 18 feet and by dark gray organic clay extending to a depth of 23 feet. The organic clay was underlain by very soft to soft gray fat clay extending to a depth of 58 feet. Underlying this was loose to medium dense gray silty sand and clayey sand extending to a depth of 80 feet, the maximum depth explored. Groundwater was measured in the boring at a depth of 3.5 feet below existing grade upon completion of drilling.

The results of this exploration indicate that the near surface soils at this site are poor in bearing quality and compressible in nature. Considering the magnitude of the structural loads, the proposed maintenance building should be supported on a deep pile foundation. Consideration was given to treated timber piles to support the structure including the floor slab. Details related to site development, foundation design, and construction considerations are included in subsequent sections of this report.

The owner/designer should not rely solely on this Executive Summary and must read and evaluate the entire contents of this report prior to utilizing our engineering recommendations in preparation of design/construction documents.

PROJECT INFORMATION

Project Authorization

Professional Service Industries, Inc. (PSI) has completed a geotechnical exploration for the proposed maintenance building to be constructed at the intersection of Highway 90

and Highway 18 in Westwego, Louisiana. This exploration was accomplished in general accordance with PSI Proposal Number 254-950129, dated May 20, 2009.

Project Description

The project includes the construction of a pre-engineered metal building having a footprint of approximately 12,000 square feet. The metal building will include a garage and an office area. One end of the building will have a mezzanine level which will be used for maintenance and light storage area. The garage area will be used for repairing solid waste dumpster trucks. The floor slab in the garage area will be designed for HS20 highway loading condition. Based on the information provided to us, the anticipated interior column loads are approximately 100 tons. We understand that small portions of the site will be paved for cars and light duty trucks which will be located mainly at the entrance of the building. Concrete paving aprons are also planned adjacent to the building which will be used as access for waste dumpster trucks into maintenance area. The concrete paving aprons will also be designed to accommodate HS20 AASHTO highway loads.

The geotechnical recommendations presented in this report are based on the available project information, building locations, and the subsurface materials described in this report. If any of the noted information is incorrect, please inform PSI 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 of changes in the project.

Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions at the site to enable an evaluation of acceptable foundation system for the proposed construction. The scope of services includes one (1) boring drilled to a depth of 80 feet below the existing ground surface, select laboratory testing, and preparation of this geotechnical report. This report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and presents recommendations regarding the following:

- Pile capacity and an estimate of settlement.
- Rigid pavement recommendations.
- Site preparation guidelines.
- Comments regarding factors that will impact construction and performance of the proposed construction.

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.

In addition, PSI did not provide any service to investigate or detect the presence of moisture, mold, or other biological contaminates in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence of the amplification of the same. The client acknowledges that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. The 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 site for the proposed facility is located at the intersection of Highway 90 and Highway 18 in Westwego, Louisiana. The property is bounded by a pasture land to the north and east, Highway 18 (a.k.a. Bridge City Avenue) to the south, an open grassy field, a house, a house trailer and a barn to the west. The project area is currently a flat undeveloped area covered with surface vegetation.

Detailed grading information was not available to us. Based on the information provided to us, minimal amount of fill (less than two (2) feet) will be required within the garage area to achieve final design grades. The office and mezzanine area may require less than three (3) feet of fill to achieve final design grades.

Field Exploration

The field exploration, which was performed to evaluate the engineering characteristics of the foundation materials, included a reconnaissance of the project site, drilling the soil boring, and recovering soil samples. In addition, any groundwater encountered in the test boring was measured and recorded.

One (1) soil boring (B-1) was drilled to a depth of 80 feet, within the footprint of the maintenance building. The boring depth is in reference to the existing ground surface at the time of the field exploration. The number and depth of the boring were determined by the client. The approximate location of the boring is indicated on the plan included in the Appendix, which is a reproduction of a site plan provided to us by Perrin and Carter, Inc.

Drilling and Sampling Procedures

The boring was drilled with a truck-mounted drilling rig. Wet rotary drilling techniques were used to advance the boreholes. Samples were generally obtained continuously from the ground surface to a depth of ten feet and at maximum five-foot intervals thereafter. Drilling and sampling techniques were accomplished in general accordance with ASTM Standard Procedures.

Undisturbed samples of cohesive soils were generally obtained using thin-wall tube sampling procedures 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 Tests (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 and compressibility 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 project number, boring number, and depth and were placed in polyethylene plastic wrapping to protect against moisture loss and were transported to the laboratory in containers to prevent disturbance. All of the samples recovered from the field exploration were identified and evaluated by experienced geotechnical personnel upon arrival at the laboratory.

Laboratory Testing Program

In addition to the field exploration, a supplemental laboratory testing program was conducted to evaluate additional pertinent engineering characteristics of the foundation materials necessary in analyzing the behavior of the foundation system for the proposed maintenance building.

The laboratory testing program included supplementary visual classification and water content tests on the soil samples. In addition, selected samples were subjected to unconfined compressive strength testing. Additional estimates of undrained shear-strength and unconfined compressive strength were determined through the use of a hand torvane and a pocket penetrometer, respectively.

The laboratory testing program was conducted in general accordance with applicable ASTM Specifications. The results of these tests can be found on the accompanying boring logs located in the Appendix.

Subsurface Conditions

Based on the borings, about six (6) inches of gray sandy topsoil with organics was encountered at the ground surface. This was followed by firm to very stiff gray and brown sandy clay and fat clay extending to a depth of 18 feet and by dark gray organic clay

extending to a depth of 23 feet. The organic clay was underlain by very soft to soft gray fat clay extending to a depth of 58 feet. Underlying this was loose to medium dense gray silty sand and clayey sand extending to a depth of 80 feet, the maximum depth explored.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring log included in the appendix should be reviewed for specific information at individual boring location. These records include soil descriptions, stratifications, penetration resistance, locations of the samples, and laboratory test data. The stratifications shown on the boring log represent the conditions only at the actual boring location. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on the boring log. 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.

Groundwater Information

Groundwater was measured at a depth of 3.5 feet below the existing ground surface upon completion of drilling. The groundwater level presented in this report is the level that was encountered at the time of our field activities and may not have become fully static at the time of measurement. However, the groundwater level at this site may vary due to seasonal precipitation and weather conditions. We recommend that the actual groundwater level at the site be determined by the contractor at the time of the construction activities.

Seismic Conditions

The International Building Code (IBC), 2003 Edition, was reviewed to determine the classification for the proposed site. Based on the subsurface conditions encountered and the laboratory test results, the project site is classified as "Class E", as outlined in Section 1615.5.2 of the 2006 IBC.

RECOMMENDATIONS

General

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 the vertical and differential movement which the structure can withstand without damage.

The results of the subsurface exploration indicate that the near surface soils present at this site are poor in bearing quality and compressible in nature. Considering the magnitude of structural loads, these soils are not suitable for support of the proposed maintenance building on a shallow foundation system. A driven foundation system consisting of small treated timber piles and large treated timber piles is being considered for support of the proposed maintenance building. Details related to site preparation,

The recommended pile lengths are from the existing ground surface at the time of drilling and any length of pile needed above this reference should be added to the pile length tabulated below. Taking into consideration the field and laboratory data, the estimated allowable pile compression and tension capacities are as follows:

EXTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITY IN TONS* F.S.=2.0 IN COMPRESSION F.S.=3.0 IN TENSION				
Pile Length** (Feet)	Small Treated Timber Piles (6" Tip – 8" Butt)		Large Treated Timber (7" Tip – 12" Butt)	
	Compression	Tension	Compression	Tension
40	6	4.5	8	6.5
45	7	5	9	7
50	--	--	10	8
55	--	--	11	9
60	--	--	15	10
65	--	--	20	11

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

**** Pile Lengths measured from the existing ground surface at the boring location**

The estimated pile capacities include a design factor of safety of two (2) in compression and three (3) in tension. It is understood that the garage area will require less than two (2) feet of fill and the office and mezzanine will require less than three (3) feet of fill to achieve final design grade. Therefore, the pile capacities provided herein have been reduced for downdrag considering up to three (3) feet of fill. Should more than three (3) feet of fill be required, the recommended pile capacities should be further evaluated to consider the drag loads imparted on the piles.

Settlement

It is estimated that long term total settlements of piles in single widely spaced rows or in clusters of up to eight (8) piles and loaded to their allowable capacities will be on the order of one (1) inch. Differential settlements are expected to be about 50 percent of the total settlement.

Pile Installation

Pile driving hammers used to drive foundation piles should be selected according to pile type, length, size, and weight of pile, as well as potential vibrations resulting from pile driving operations. Care should be taken to assure that the hammer selected is capable of achieving the desired penetration without causing damage to the piles or causing excessive vibrations which could damage existing, nearby structures. Hammers having a rated energy in the range of 7,500 to 10,000 foot-pounds are satisfactory for the small timber piles (6" tip – 8" butt). For large timber piles (7"tip – 12" butt), hammers having a rated energy in the range of 15,000 to 20,000 foot-pounds are recommended.

Each pile should be driven to the desired tip elevation and driving resistance without interruption in the driving operations. Driving of the center piles in the cluster first will

better facilitate driving operations. Accurate records of the final tip elevation and driving resistances should be obtained during the pile driving operations.

Pile Driving Monitoring

Pile driving should be monitored by the geotechnical engineer (PSI) or his representative. Sometimes, premature refusal occurs due to poor performance of the hammer rather than from soil resistance. Any changes in hammer blow counts should be carefully examined before making any decisions about the pile penetration.

Vibration Monitoring During Pile Driving

Thresholds of vibration induced cracking are generally site specific and depend on the type and age of the structure, the frequency of ground vibration, and the type of soil supporting the structure. Research by the U.S. Bureau of Mines (USBM) and other investigative groups have established criteria relating the occurrence of structural damage to certain frequencies and level of ground motion. According to the USBM, within the range of four (4) to 12 hertz, the maximum particle velocity recommended to preclude the threshold damage to plaster-on-wood for old structures is 0.5 inch per second (ips) and 0.1 inch per second (ips) established for historic monuments. Considering the type of structures adjacent to the site, a threshold limit for vibration of 0.25 ips, which is used in the area by structural engineers, should be maintained to limit vibration and minimize its impact on adjacent structures.

Pile Load Test

The pile capacity must be verified by field load testing a test pile. The pile should be tested in compression as outlined by ASTM D1143 and the local building code. The pile load test should be performed under the guidance of the soils engineer so that the data may be interpreted and the recommended pile capacities adjusted, if necessary, according to the load test results.

Pavement Recommendations

The performance of pavements depends upon several factors including (1) the characteristics of the supporting soils; (2) the magnitude and frequency of wheel load applications; (3) quality of construction materials; (4) the contractor's placement and workmanship abilities; and (5) the desired period of design life. As requested, PSI has evaluated rigid pavement for the proposed fire station.

We understand that small portions of the site will be paved for employee cars and light duty trucks which will be located west at the entrance and south of the building. Concrete aprons are also planned on the east, west and north sides of the building which will be used as access for waste dumpster trucks into the maintenance area. The concrete aprons are designed to accommodate HS20 AASHTO highway loads. Detailed grading information was not available at the time this report was prepared. However, it is understood that about one (1) to two (2) feet of fill may be required to achieve the parking lot design grades.

lot design grades. Although no specific traffic loading information was provided to us, it is assumed that the traffic will consist mostly of solid waste dumpster trucks, occasional delivery trucks and cars.

The recommended pavement sections presented below are considered typical and minimum for the assumed parameters. We understand that budgetary considerations sometimes warrant thinner pavement sections than those presented. However, the client, the owner, and the project designers should be aware that thinner pavement sections may result in increased maintenance costs and lower than anticipated pavement life.

Our scope of services did not include extensive sampling for determination of coefficient of subgrade reaction (k) of the existing subgrade or potential sources of imported fill for the specific purpose of a detailed pavement analysis. Instead, we have assumed pavement related design parameters that are considered to be typical for the area soil types. The pavement subgrade should be prepared as discussed in the site preparation section of the report to develop a Coefficient of Subgrade Reaction (k) value of 100 psi per inch which could be used for the rigid pavement design.

The following pavement sections can be used as follows:

RIGID PAVEMENT		
Pavement Materials	**Minimum Thickness, Inches**	
	Light Duty (Parking)	**Heavy Duty (Apron & Access Drive)**
Portland Cement Concrete	6	8
Compacted Structural Fill	12 min.	12 min.

Proper finishing of concrete pavement requires the use of appropriate construction joints to reduce the potential for cracking. Construction joints should be designed in accordance with current Portland Cement Association guidelines. Joints should be connected with smooth, greased or sleeved dowels and should be sealed to reduce the potential for water infiltration into pavement joints and subsequent infiltration into the supporting soils. The design of steel reinforcement should be in accordance with accepted codes. The concrete should have a minimum flexural strength of 650 psi at 28 days. The concrete should also be designed with 3±1 percent entrained air to improve workability and durability.

CONSTRUCTION CONSIDERATIONS

Construction and Testing

Many problems can be avoided or solved in the field if proper inspection and testing services are provided. It is recommended that the site preparation and foundation be monitored by the geotechnical engineer or his representative.

Drainage and Groundwater Concerns

Water should not be allowed to collect in excavations or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff.

Groundwater was measured at a depth of 3.5 feet in the boring upon completion of drilling. However, it is possible that seasonal variations will cause fluctuations of the water table. Any water accumulation should be removed from the excavations by pumping. Should excessive and uncontrolled amounts of seepage occur, the geotechnical engineer should be consulted.

Excavations

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavation. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor's or other parties compliance with local, state, and federal safety regulations.

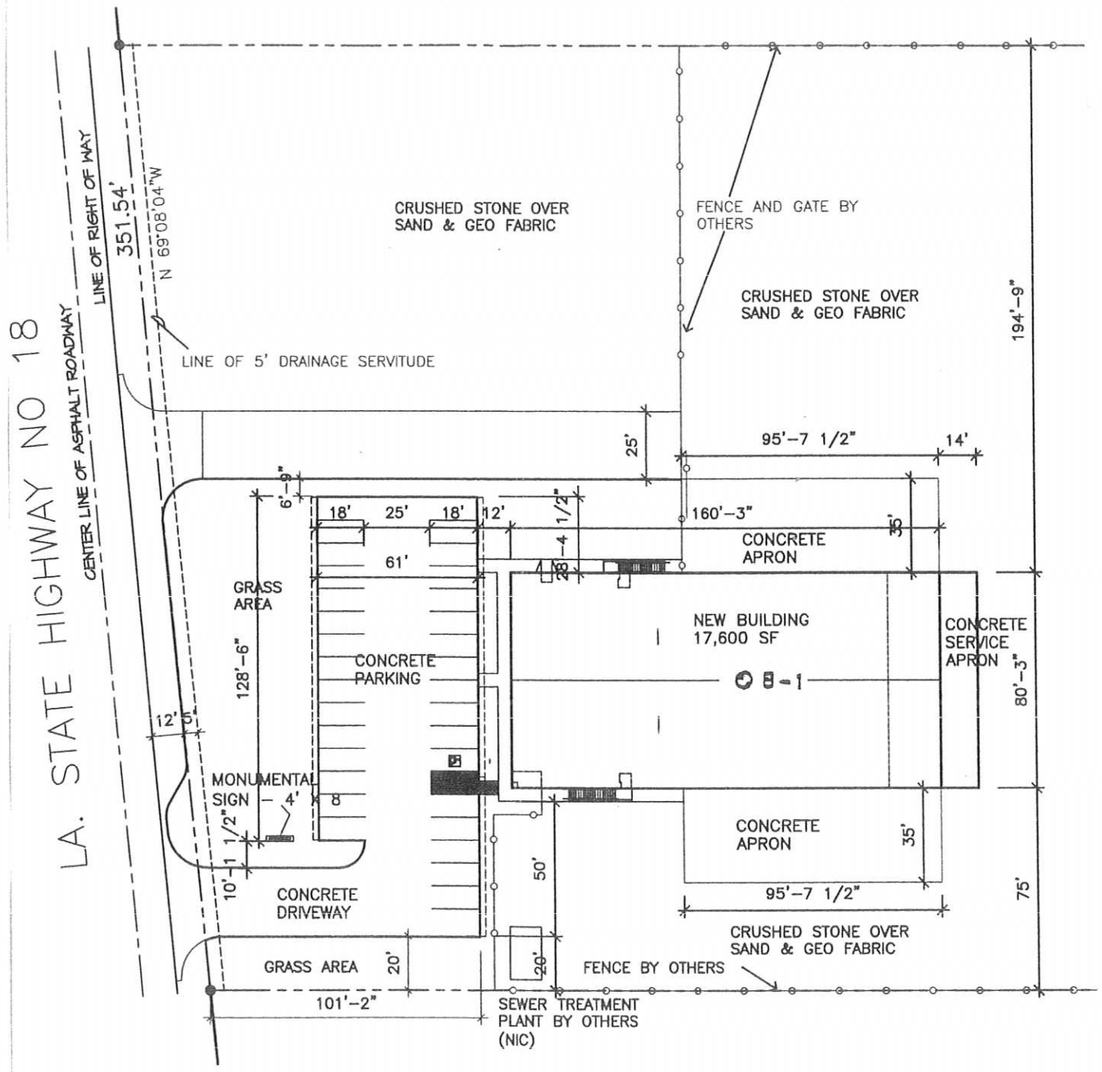
REPORT LIMITATIONS

The recommendations submitted in this report are based on the available project information and subsurface information obtained by PSI. 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 the foundation recommendations are required. If PSI is not notified of such changes, PSI will not be responsible for the impact of those changes on the project.

The geotechnical engineer 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.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project. This report has been prepared for the exclusive use of Perrin & Carter, Inc. for the specific application to the proposed maintenance building to be constructed at the intersection of Highway 90 and Highway 18 in Westwego, Louisiana.

APPENDIX



Boring Location

Proposed Maintenance Building
Highway 90 and Highway 18
Westwego, Louisiana

Boring Location Diagram

Professional Service Industries, Inc.
724 Central Ave
Jefferson, La 70121 ph. (504) 733-9411

Date: 6/19/2009 | Project No.: 254-95066-1

Drawing Provided by: Perrin & Carter, Inc

LOG OF BORING B-1

PROPOSED MAINTENANCE BUILDING
HIGHWAY 90 & HIGHWAY 18
WESTWEGO, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING AREA | PSI PROJECT NO.: 254-95066

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			6" gray sandy topsoil with organics			4.00			22			
			Very stiff brown Sandy Clay with a trace of shell fragments		0.74	1.50		78	41			
			Firm gray and brown Fat Clay									
5			-with a trace of silt seams, 4' to 6'		0.56	1.00		85	36			
			-with a trace of organics, 6' to 8'				0.35		40			
10					0.70	1.50		86	36			
15			-with a trace of organics, 13' to 15'				0.30		66	95	69	
20			Soft dark gray organic Clay		0.37		0.10	34	118			
25			Very soft gray soft Fat Clay				0.15		84			
30			-with sand and silt layers, 23' to 45'		0.23		0.10	73	53			
35							0.10		50			
40					0.18		0.10	70	48			
45							0.15		49			
50					0.20		0.10	59	70			

DEPTH OF BORING: 80 Feet
DATE: 6-13-09

GROUNDWATER: Measured at 3.5 feet upon completion of drilling

LOG OF BORING B-1 (continued)

PROPOSED MAINTENANCE BUILDING
HIGHWAY 90 & HIGHWAY 18
WESTWEGO, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING AREA | PSI PROJECT NO.: 254-95066

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			Very soft gray soft Clay									
55			-with sand seams, 53' to 55'				0.25		65			
60			Loose to medium dense gray Silty Sand	6					26			18
65				21					25			
70			-with clay, 68' to 75'	4					26			25
75				5					27			
80			Loose gray Clayey Sand	8					29			46
			Boring terminated at 80 feet									
85												
90												
95												
100												

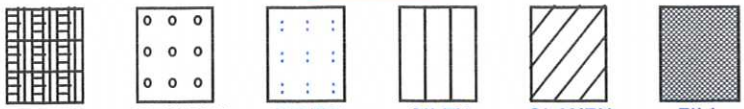
DEPTH OF BORING: 80 Feet
DATE: 6-13-09

KEY TO TERMS AND SYMBOLS USED ON LOGS

SOIL TYPE

SAMPLER TYPE

MODIFIERS



UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

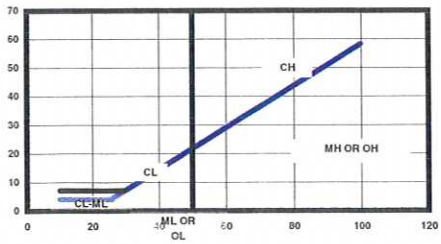
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND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

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	SHEAR STRENGTH IN TONS/FT^2
VERY SOFT	0. TO 0.125
SOFT	0.125 TO 0.25
FIRM	0.25 TO 0.5
STIFF	0.5 TO 1.0
VERY STIFF	1.0 TO 2.0
HARD	> 2.0 OR 2.0+

RELATIVE DENSITY - GRANULAR SOILS

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



ABBREVIATIONS

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

NOTE: PLOT INDICATES SHEAR STRENGTH AS OBTAINED BY ABOVE TESTS

▼ DELAYED GROUNDWATER LVL

▽ LEVEL GROUNDWATER ENCOUNTERED

CLASSIFICATION OF GRANULAR SOILS

U.S. STANDARD SIEVE SIZE(S)

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

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

152	76.2	19.1	4.76	2.0	0.42	0.074	0.002

GRAIN SIZE IN MM