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May 22, 2009

Duplantis Design Group, PC
34 Louis Prima Drive
Covington, Louisiana 70433

Attention: Mr. Paul Whittington

Re: Geotechnical Engineering Report
Proposed Research and Technology Park
University of New Orleans (UNO)
North Shore Campus
Daney Street
Slidell, Louisiana
PSI File Number 254-95023-1

Dear Paul:

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

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5/22/09

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FINAL GEOTECHNICAL ENGINEERING REPORT

PROPOSED RESEARCH AND TECHNOLOGY PARK
UNIVERSITY OF NEW ORLEANS (UNO)
NORTH SHORE CAMPUS
DANEY STREET
SLIDELL, LOUISIANA

PSI FILE NUMBER 254-95023-1

PREPARED FOR

DUPLANTIS DESIGN GROUP, PC
34 LOUIS PRIMA DRIVE
COVINGTON, LOUISIANA 70433

MAY 22, 2009

BY

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

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EXECUTIVE SUMMARY

An exploration and evaluation of the subsurface conditions have been completed for the proposed Research and Technology Park for the University of New Orleans (UNO) to be constructed off Daney Street near the intersection of I-10 and Fremeaux Road in Slidell, Louisiana. This report presents the results of our field exploration and laboratory testing as well as recommendations for foundation and pavement design including site development.

The site for the proposed development encompasses about 24.7 acres of heavily wooded property located off Daney Street in Slidell, Louisiana. A drainage ditch, which crosses through the middle of the property, will be backfilled and re-routed along the western boundary of the site. The project will include the construction of one (1), three (3) story building on the east side of the existing drainage ditch having a footprint of about 20,000 square feet. Additionally, three (3) buildings each having four (4) stories and a footprint of approximately 25,000 square feet will be constructed to the west of the existing drainage ditch. The buildings will be either of steel or cast-in-place concrete construction. It is understood that the ground floor of the buildings may be used for parking. A surface parking lot with about 1,064 spaces will also be provided for this development. Two (2) new detention ponds will be constructed to handle surface run-off.

Detailed structural loading information was not available at the time this report was prepared. However, it is assumed that maximum column and wall loads will be on the order of 300 to 500 kips and eight (8) to ten (10) kips per linear foot, respectively.

Topographic information provided to us indicates that existing ground surface elevation ranges between 7.74 and 11 feet. The ground floor of the buildings will be used for parking at a finished grade of about 12 to 13 feet. Therefore, about four (4) to five (5) feet of fill will be needed to achieve the design grades in the building areas. Considering parking lot finished grades between 10 and 12 feet, about 2.5 to five (5) feet of fill will be required in the parking area. Up to nine (9) feet of cut is anticipated in the detention pond areas.

The site was characterized by drilling a total of 19 soil borings to depths ranging between six (6) to 80 feet below the existing ground surface. Borings B-1 through B-8 were drilled to a depth of 80 feet in the building areas. Eight (8) borings were drilled to a depth of six (6) feet in the parking areas. Three (3) borings were advanced to a depth of 15 feet in the detention pond areas. Based on the borings, about 12 inches of brown silty topsoil with organics was encountered in the borings throughout the project area. This was generally followed by firm to stiff lean clay with silt, firm silty clay or loose gray silt to a depth of about two (2) feet. Below this, there was firm to stiff tan and gray lean clays to depths of six (6) to eight (8) feet and followed by firm to stiff tannish gray fat clays to depths of about 57 to 62 feet. This was generally underlain by medium dense to very dense gray silty sand to poorly graded sand to a depth of at least 80 feet, the maximum depth explored. Groundwater was measured at depths ranging from 3.5 to 12 feet below the existing ground surface during drilling.

The near surface silt or silty clay or lean clays with silt generally encountered to a depth of two (2) feet are extremely moisture sensitive and could loose their strength and become unstable when saturated with water. Depending on the site conditions encountered at the time of construction, these potentially unstable soils may have to be undercut and replaced with compacted structural fill.

The results of this exploration indicate that the near surface soils present at this site are fair in bearing quality. However, due to high magnitude of the structural loads anticipated for the four (4) buildings, a shallow foundation system will undergo excessive amounts of settlement and will not be tolerable by the heavily loaded structures. Therefore, consideration was given to a deep pile foundation system to support the four buildings. PSI has evaluated small and large treated timber piles, pre-cast square concrete piles, and auger-cast piles for this project. Shallow foundations, consisting of square spread footings or continuous footings were also evaluated to support any other lightly loaded structures. Details related to site preparation, foundation and pavement design, and construction considerations are presented 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 Research and Technology Park of UNO to be constructed off Daney Street near the intersection of I-10 and Fremeaux Road in Slidell, Louisiana. Our services were accomplished in general accordance with PSI Proposal Number 254-950023R dated January 23, 2009.

Project Description

The project will include the construction of one (1), three (3) story building on the east side of the existing drainage ditch having a footprint of about 20,000 square feet. Additionally, three (3) buildings each having four (4) stories and a footprint of approximately 25,000 square feet will be constructed to the west of the existing drainage ditch. The buildings will either be of structural steel or cast-in-place concrete. It is understood that the ground floor of the buildings may be used for parking. A surface parking lot with about 1,064 spaces will also be provided for this development. In addition, two (2) new detention ponds are planned within the proposed development.

Detailed structural loading information was not available at the time this report was prepared. However, it is assumed that maximum column and wall loads will be on the order of 300 to 500 kips and eight (8) to ten (10) kips per linear foot, respectively.

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 evaluation of acceptable foundation and pavement systems for the proposed development. Our scope of services included drilling a total of 19 soil test borings at the site to depths ranging from six (6) to 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:

- Foundation types, depths, allowable bearing capacities, allowable pile capacities, and an estimate of settlement;
- General pavement design criteria and pavement subgrade preparation;
- Suitability of the on-site materials for use as structural fill;
- Site preparation including fill placement and compaction requirements;
- 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 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. However, it is understood that an environmental site assessment for this property was performed by PSI and submitted under a separate cover.

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 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 property for the proposed development lies west of the proposed Summit Boulevard currently under construction. It encompasses about 24.7 acres of heavily wooded property and is located off Daney Street near the intersection of I-10 and Fremeaux road in Slidell, Louisiana. The property is bounded by Daney Street and a residential community to the north, an existing cemetery and a wooded area to the west, and wooded areas to the south. The east side of the property was recently cleared for a mixed use development. A three (3) feet wide, about four (4) feet deep drainage ditch bisects the property near the center. It is understood that the ditch will be backfilled and a new drainage ditch will be constructed along the western boundary of the property. At the time of our field exploration, the site was heavily wooded. Several pathways were cleared with special equipment to access the boring locations. The ground surface was wet, loose and extremely soft with ponding water along the pathways.

PSI was provided with a grading plan prepared by Duplantis Design Group, PC during preparation of this geotechnical report. Based on our review of the plans, a summary of site grading information is presented in the following table.

Facility/Structure	Existing Ground Surface Elevation (ft)	Proposed Finished Grades at Ground Level (ft)	Amount of Cut/Fill (ft)
Building #1	8 to 9	12 to 13	4 (Fill)
Building #2	8 t 9	12 to 13	4 (Fill)
Building #3	7.99 to 8	12 to 13	4 (Fill)
Building #4	7.74 to 8.17	12 to 13	4 (Fill)
Parking Lot	7 to 11	10 to 12	2.5 to 5 (Fill)
Detention Pond #1	9.5 at top bank of pond	2 at bottom of pond	7.5 (Cut)
Detention Pond #2	8 at top bank of pond	-1 at bottom of pond	9 (Cut)

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 borings and recovering undisturbed and representative disturbed soil samples. Water level measurements of any groundwater encountered in the test borings were also observed and recorded.

The project site was characterized by drilling a total of 19 borings to depths ranging from six (6) to 80 feet below existing ground surface. The number and depths of the borings were determined by PSI and were located in the field by Duplantis Design Group, PC personnel. The following table summarizes the location and depth of the borings drilled for this project. Approximate locations of the borings are indicated on a site plan included in the Appendix of this report.

Structure/Facility	Boring Number	Boring Depth* (ft)
Building #1 (3 story, 20,000 sq. ft. footprint)	B-1, B-2	80
Building #2 (4 story, 25,000 sq. ft. footprint)	B-3, B-4	80
Building #3 (4 story, 25,000 sq. ft. footprint)	B-5, B-6	80
Building #4 (4 story, 25,000 sq. ft. footprint)	B-7, B-8	80
Parking Lot	P-1, P-3, P-5, P-6, P-8, P-9, P-10, P-11	6
Detention Pond #1	P-2	15
Detention Pond #2	P-4, P-7	15

***Boring depths are in reference to the existing ground surface.**

Drilling and Sampling Procedures

The borings were drilled with a rubber track mounted SIMCO 2800 drilling rig. Hollow stem auger and wet rotary drilling techniques were used to advance the boreholes. Samples were generally obtained continuously from the ground surface to a depth of about ten (10) feet and at maximum five (5) 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 three (3) inch diameter thin-wall tube samplers (Shelby 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 and semi-cohesive soils, generally Standard Penetration Tests (SPT) were also performed at intervals 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).

The samples were identified according to boring number and depth, placed in polyethylene plastic wrapping to protect against moisture loss, and transported to the laboratory in special containers to prevent disturbance. All of the samples obtained 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 determine additional pertinent engineering characteristics of the foundation materials. The laboratory testing program included visual classification and water content tests on all samples. In addition, selected samples were subjected to unconfined compressive strength tests, Atterberg Limits determination and percent finer than the #200 sieve tests. Additional estimates of unconfined compressive strength and undrained shear strength were also determined through the use of a hand penetrometer, and a torvane, respectively.

All phases of the laboratory testing program were conducted in general accordance with applicable ASTM Standard Procedures. The results of these tests are to be found on the accompanying boring logs in the Appendix.

Subsurface Conditions

Based on the borings, about 12 inches of brown silty topsoil with organics was encountered in the borings throughout the project area. This was generally followed by firm to stiff lean clay with silt, firm silty clay or loose gray silt to a depth of about two (2) feet. Below the silty soil, there was firm to stiff tan and gray lean clay to depths of six (6) to eight (8) feet and followed by firm to stiff tannish gray fat clays to depths of about 57 to 62 feet. The fat clay was generally underlain by medium dense to very dense gray silty sand to poorly graded sand to a depth of at least 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 logs included in the appendix should be reviewed for specific information at 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. 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 depths ranging from 3.5 to 12 feet below existing ground surface during drilling. The measurement of groundwater was conducted during the drilling operations and it may not have become fully static at the time of measurement. It should be noted that some of the shallow groundwater encountered in the borings is likely perched water from recent rainfall. In any event, groundwater could fluctuate at the site due to seasonal precipitation and variation in weather conditions. We recommend that actual groundwater levels at the site be determined by the contractor at the time of the construction activities.

Seismic Conditions

The Standard Building code, 1999 Edition was reviewed to determine the seismic conditions at the site. As outlined in Section 1607, the subsurface conditions at the site correspond with a soil profile Type S_4 and a site coefficient (S) of 2.0. The International Building code, 2003 Edition was also reviewed to determine the site class. According to Section 1615, the site is classified as Class D.

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

The results of this exploration indicate that the near surface soils present at this site are fair in bearing quality. However, due to the high magnitude of buildings structural loads, a shallow foundation system will undergo excessive amount of settlement and therefore will not be suitable for support of the proposed structures. Therefore, a deep pile foundation system, consisting of small and large treated timber piles, square pre-cast concrete piles, and auger cast piles was considered to support the four (4) mid-rise buildings. A shallow foundation system, consisting of square spread footings or isolated wall footings, was also evaluated to support any lightly loaded structures. Details related to site preparation, foundation and pavement design, and construction considerations are presented in subsequent sections of this report.

Site Preparation

Site preparation is expected to include, but not be limited to stripping and removal of vegetation, topsoil, and any other deleterious material from the areas to be developed. Based on the borings, it is recommended that a minimum of 12 inches of the surficial topsoil with organic materials be stripped from the building and parking areas and extending at least five (5) feet beyond the perimeter of the buildings. The actual depth of stripping should be determined by a representative of the geotechnical engineer at the time of construction. Depending on the site condition at the time of construction, about 12 inches of the silty clay or lean clay or silt present below the topsoil will likely be saturated and unstable requiring additional undercutting to provide a firm subgrade prior to placement of structural fill.

It is understood that the drainage ditch, that bisects the proposed pad area of Building No. 2, will be backfilled and re-routed along the western boundary of the property. The ditch is about three (3) feet wide with steep slopes. About 12 to 18 inches of water was noted in the bottom of the ditch at the time of our field exploration. Based on topographic information provided, the bottom of the ditch is at elevation 5.3 feet. Considering finished grades of about 12 to 13 feet, up to 7.5 feet of fill may be required to bring the deepest portion of the ditch to design elevation. Prior to fill placement, it is recommended that the ditch bottom be undercut at least 12 inches to remove the anticipated soft deposits and provide a stable base prior to fill placement. The actual depth of the muck undercutting should be determined by the Geotechnical Engineer or his representative at the time of construction.

The exposed subgrade in the building and parking areas should be proof-rolled with a loaded tandem axle dump truck or similar heavy rubber tired vehicle. Soils, which are observed to rut or deflect excessively under the moving load, should be undercut and replaced with properly compacted structural fill. The proof rolling, undercutting and filling activities should be witnessed by a representative of the geotechnical engineer and should be performed during a period of dry weather.

After subgrade preparation has been completed, fill placement may begin. The first layer of fill should be placed in a relatively uniform horizontal lift and be adequately keyed into the stripped and scarified subgrade soils. The structural fill materials should be free of organic or other deleterious materials, have a maximum particle size of less than two (2) inches and have a liquid limit less than 40 and plasticity index between eight (8) and 18. Sandy clays or clayey sands are recommended for use as structural fill.

The structural fill should be compacted to at least 95 percent of the soil's maximum dry density as determined by ASTM Designation D698 (Standard Proctor). The fill should be placed in maximum lifts of eight inches of loose material and should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. Each lift of compacted structural fill should be tested by a representative of the geotechnical engineer prior to placement of subsequent lifts. The edge of compacted fill should extend at least five (5) feet beyond the edge of the buildings prior to sloping. Adequate drainage must be provided prior to and during site work. The site should be graded to promote rapid runoff.

Pile Foundation

Consideration was given to small treated timber piles (6" tip – 8" butt) and large treated timber piles (7" tip – 12" butt) to support the proposed buildings. The small and large timber piles have maximum allowable compression load capacity of eight (8) and 25 tons, respectively and should conform to ASTM D25 for treatment and quality and have the minimum dimensions discussed herein. Higher capacity piles, consisting of 12 and 14 inch square pre-cast concrete piles and 14 and 16 inch diameter auger cast piles, were also evaluated to support the proposed buildings.

Medium dense to dense silty sand was encountered in few borings between 58 and 80 feet. Therefore, the piles at this site will generally derive their support through "skin friction" along their embedded lengths, as well as "end bearing" when tipped into dense sand below 60 feet.

Taking into consideration the field and laboratory data, the estimated allowable single pile compression and tension capacities are presented in the following tables. The recommended pile lengths are from the existing ground surface at the time of drilling; however a pile cutoff of up to three (3) feet should not have an impact on the recommended capacities. The recommended allowable single pile capacities are as follows:

Estimated Allowable Single Pile Load Capacity in Tons*
F.S.=2 in Compression
F.S.=3 in Tension

Pile Length in Feet	Small Treated Timber Pile (6" Tip-8" Butt)		Large Treated Timber Pile (7" Tip-12" Butt)	
	Compression	Tension	Compression	Tension
40	8	7	19	12
45	--	--	22	14
50	--	--	25	16

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

Estimated Allowable Single Pile Load Capacity in Tons*
F.S.=2.0 in Compression
F.S.=3.0 in Tension

Length in Feet	12 Square Pre-cast Concrete Pile		14 Square Pre-cast Concrete Pile	
	Compression	Tension	Compression	Tension
40	32	20	37	23
45	36	23	42	26
50	41	25	48	30
55	45	28	53	33
60**	85	40	95	36

***Capacities are soil pile related capacities and consideration should be given to the structural integrity of the pile member.**
****Piles embedded firmly into dense sand.**

An alternate foundation system, consisting of auger cast-in-place piles, was also considered for the structure. The recommended pile lengths and capacities for various pile sizes are tabulated below:

Estimated Allowable Single Pile Load Capacity, Tons* F.S.=2.0 in Compression F.S.=3.0 in Tension				
Pile Depth in Feet	14" Diameter Auger Cast Pile		16" Diameter Auger Cast Pile	
	Compression	Tension	Compression	Tension
40	29	18	34	21
45	33	21	38	24
50	38	23	43	27
55	40	26	48	29
60**	80	28	95	33

***Capacities are soil-pile related capacities and consideration should be given to the structural integrity of the pile member.**
****Piles embedded firm into dense sand.**

The pile capacities presented in this report include a factor of safety of two (2) in compression and three (3) in tension or uplift.

Pile Settlement

It is estimated that long term settlements of piles loaded to their allowable capacities will be on the order of one (1) inch. This assumes that fill thickness will be limited to four (4) feet. We should be contacted to evaluate the effects of downdrag on pile capacity if fill thickness will exceed four (4) feet. Differential settlement is anticipated to be on the order of 50 percent of the total settlement.

Spacing and Group Effect

All piles should have a minimum center-to-center spacing of at least three (3) pile diameters. Group effect should be minimal for piles in clusters of up to nine (9) piles spaced at a minimum of three (3) pile diameters. For larger pile clusters, group effect could become a factor and should be evaluated in accordance with the local building code.

Pile Load Test

It is recommended that the pile capacities be verified by field load tests. It is recommended that at least one (1) pile of each type used for the various structures be installed to the design tip elevation and load tested. The pile load tests should be performed under the guidance of the Geotechnical Engineer so that the data may be interpreted and the recommended pile capacities adjusted, if necessary, according to the load tests results.

Pile Driving Monitoring

We recommend that the pile driving be monitored by the geotechnical engineer 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.

Pile Installation

Driven Piles (Pre-Cast Concrete)

Driving of the square pre-cast concrete piles into the medium dense sand encountered in the borings between the depths of 30 and 48 feet could be met with high and erratic driving resistance. Pre-drilling to facilitate driving of the piles to tip elevation will be required. Pre-drilling should be performed with a "fish tail" bit no larger than 75 percent of the pile diameter or width and should be limited to a depth of 10 feet from the pile tip elevation.

Driving hammers used to install the foundation piles should be selected according to the 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. Driving hammers having a rated energy in the range of about 30,000 to 40,000 foot-pounds are believed to be satisfactory to drive the pre-cast concrete piles.

Each pile should be driven to the desired tip elevation and driving resistance should be monitored 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.

Auger Cast Piles

A successful auger cast pile installation will depend upon the expertise of the contractor and the techniques he uses. While this installation can be monitored to determine that the piles are installed in general accordance with the project specifications, and accepted practices, it is not possible to make an accurate determination of the capacity of each individual pile. We therefore recommend that the auger cast pile installation contractor and the on-site personnel have at least five years of continuous experience in this technique including a successful track record of installing similar piles in the area.

Because of the possibility of soil intrusion during auger withdrawal and non-vertical piles, the job specifications should be carefully prepared and continuous inspection of the pile installation maintained. Full time observation by qualified personnel working under the supervision of the Geotechnical Engineer should be maintained during installation to monitor the depth and the amount of grout pumped versus the rate of auger withdrawal.

Confirmation should be made that the design pile diameter is maintained during the entire pile installation operations. In addition, grout return depths and grout factors should be checked to ensure the drilled hole is completely filled with grout. Grout factors should not drop below 120 percent of the theoretical volume of the pile. It is the piling contractor's responsibility to properly estimate the grout volume and implement appropriate installation methods to insure production of continuous grout shafts without undue soil disturbance.

It is further recommended that the consistency of the grout as measured by the U.S. Army Corps of Engineers Specifications CRN-C-179 (0.75 inch orifice) be on the order of eighteen (18) to twenty four (24) seconds. The grout should be sampled and grout cubes cast to verify the compressive strength in accordance with the project specifications.

Vibration Survey and Monitoring

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). A threshold of 0.25 ips has been adopted by the local engineering community and is recommended for the project. Furthermore, a site specific survey to collect vibration data during performance of the load test and during driving of the job piles is recommended.

Shallow Footings for Lightly Loaded Structures

Based on the field data and laboratory test results, single story lightly loaded structures may be supported on a shallow foundation system, provided the site condition is mitigated as discussed in the site preparation section of this report. Spread footings and continuous footings, bearing at least two (2) feet below finished grade on compacted structural fill, could be designed for maximum net allowable bearing pressures of 2,500 psf and 2,000 psf, respectively, based on dead loads and design live loads. Minimum dimensions of twenty-four (24) inches for column footings and eighteen (18) inches for continuous footings should be used in foundation design to minimize the possibility of a localized bearing failure.

The uplift resistance of shallow spread footings formed in open excavations should be limited to the weight of the foundation concrete and the soil above it. For preliminary design purposes, the uplift resistance can be computed by using a total unit weight of 115 pcf for the structural fill placed and compacted above the footing and a unit weight of 150 pcf for the concrete. Concrete reinforcing steel should be properly sized to resist uplift forces. We recommend that a factor of safety of at least 1.5 be used when determining the allowable uplift resistance of spread footings.

Soil resistance to horizontal forces is developed by lateral earth pressures acting on the face of the footing and by friction or adhesion on the footing base. We recommend that the allowable passive pressure be computed for spread footings below grade using the following equation:

$$P_p = 350\ H\ \text{(Sand)}$$
$$P_p = 1500 + 120\ H\ \text{(Clay)}$$

where P_p is the lateral soil resistance in psf (pounds per square foot) and H is the depth in feet. For exterior footings, H is measured from one (1) foot below adjacent finished grade, provided that the adjacent finished grade extends level and at least beyond a point that makes a 45-degree angle from the bottom of the exterior footing to the finished ground surface.

The top foot of passive resistance at foundations should be neglected unless the ground surface around the footing is covered by concrete or pavement. The resistance to sliding of spread footing bearing in structural fill can be computed by multiplying the footing base contact area by a sliding friction factor of 0.38. Spread footings should also be sized to resist overturning due to moment forces. Concrete reinforcing steel should be properly sized to resist horizontal and moment forces.

The foundation excavations should be observed by a representative of PSI prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the materials discussed in this report. Soft or loose soil zones encountered at the bottom of the footing excavations should be removed to the level of firm soils or adequately compacted fill as directed by the geotechnical engineer. Cavities formed as a result of excavation of soft or loose soil zones should be backfilled with compacted select fill or graded compacted crushed stone, as determined by the Geotechnical Engineer.

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 prior to or after concrete placement. 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.

Settlement of Shallow Footings

Based on results of the field and laboratory tests and the anticipated foundation loads, we estimate that the maximum foundation settlement will not exceed one (1) inch. Differential settlement is estimated to be less than ¾ inch. While settlement of this magnitude is generally considered tolerable for structures of the type proposed, the design of any masonry walls should include provisions for liberally spaced, vertical control joints to minimize the effects of cosmetic cracking.

Floor Slabs

The floor slabs for the proposed buildings may be soil supported on at least two (2) feet of compacted low plasticity structural fill. Preparation of the subgrade should be performed as recommended in this report to identify any soft or unstable soils which should be removed from the floor slab areas prior to fill placement and/or floor slabs construction.

Polyethylene sheeting should be placed between the fill and the floor slabs to act as a vapor barrier. The floor slabs should have an adequate number of joints to reduce cracking resulting from any differential movement and shrinkage.

Retaining Walls

Should retaining walls be planned at the site, the foundations for the retaining walls may be supported on shallow footings as recommended in the previous sections of this report. The walls must also be designed to resist lateral earth pressures which will be induced by the weight of the backfill materials, hydrostatic pressures on the walls and any adjacent slab surcharge loads exerted on the walls. It is recommended that the walls be backfilled with a free draining material such as clean sand. A drainage system should be provided near, or at the base of the walls to collect and remove groundwater and prevent build-up of hydrostatic pressures.

For design purposes, equivalent fluid pressures of 38 and 80 pounds per square foot per foot of wall height may be used as the horizontal component of the active earth pressure on the retaining walls, above and below the groundwater, respectively. The following assumptions were made:

MATERIAL	UNIT WEIGHT, PCF	FRICTION ANGLE, ϕ	COEFFICIENT OF EARTH PRESSURE			FRICTION COEFFICIENT
			Ko	Ka	Kp	
Free Draining Granular fill	115	30°	0.5	0.33	3.0	0.42

Utility Lines

It is recommended that aggregate bedding material be placed beneath the RCP culverts to distribute the load and minimize initial subsidence. The bedding should be at least 6 inches in thickness and should extend one-half of the pipe diameter beyond the edge of either side of the pipe or a minimum of 12 inches, whichever is greater. The RCP should be side bedded to the mid-height of the pipe or to the pipe spring line if arch pipe is used. The bedding material should consist of well-graded, free draining stone, such as #57 Limestone or equivalent. A geotextile fabric should be placed at the interface of the bedding material and natural subgrade to minimize migration of the bedding material into the very soft subsoils. A geotextile fabric should also be placed around the pipe at each joint to reduce potential migration of the sand fill or base into the joints of the pipe.

The trench excavation should be backfilled to the surface with granular fill. The fill should be placed in lifts not exceeding 8 inches and compacted to 95 percent of the maximum dry density, as determined by ASTM D698.

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. PSI has evaluated both rigid and flexible pavements for this project.

Limited grading information provided to us indicates the existing ground surface elevation in the parking areas range from seven (7) to 11 feet. Considering finished parking lot grades of 10 to 12 feet, about 2.5 feet to five (5) feet of fill will be required in the parking area to achieve the parking lot design grades. Actual traffic loading condition was not provided to us. However, the traffic is assumed to consist mainly of cars, light trucks and heavy delivery trucks and occasional garbage collection trucks.

The recommended pavement sections presented are considered typical and minimum for the assumed parameters in the general site area and anticipated traffic condition. We understand that budgetary considerations sometimes warrant thinner pavement sections than those presented. However, 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. The pavement subgrade should be prepared as discussed in the site preparation section of this report.

Our scope of services did not include extensive sampling for determination of Coefficient of Subgrade Reaction (k) and California Bearing Ratio (CBR) of 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.

Specific design parameters considered in the pavement analyses are as follows:

CBR	4
Modulus of subgrade reaction, k	125 pci
Reliability	85%
Deviation	0.45 Asphalt
	0.35 Rigid
Initial Serviceability	4.2
Terminal Serviceability	2.0
Modulus of Rupture	550 psi
Modulus of Elasticity	3.4×10^6 psi
Load Transfer	3.2 Dowels or Keys
Drainage Coefficient	1.0

Design Life	20 Years
Layer Coefficients	0.41 Asphalt 0.14 Limestone Base 0.08 Granular Structural Fill

We have estimated the subgrade soils will be prepared to achieve a Coefficient of subgrade reaction (k) of 125 psi per inch, which could be used for rigid pavement design and a CBR of 4 for flexible pavement design. Consequently, typical pavement sections can be used as follows:

RIGID PAVEMENT Recommended Minimum Thickness, inches		
Pavement Materials	Light Duty	Heavy Duty
Portland Cement Concrete	5	6
Compacted Granular Structural Fill	12	12

FLEXIBLE PAVEMENT Recommended Minimum Thickness, inches		
Pavement Materials	Light Duty	Heavy Duty
Asphaltic Concrete Wearing Course	3	4
Compacted 610 Limestone Base	8	10
Compacted Structural Fill	12	12

Portland Cement Concrete pavements should be utilized where waste disposal containers are located. The concrete paved area should be sufficiently large so that the front wheels of the collection truck are supported on the rigid pavement. In this area and in areas, which will be accessed by heavy trucks (solid waste trucks, delivery trucks, etc.), a minimum concrete pavement thickness of seven (7) inches is recommended, underlain by 12 inches of compacted granular structural fill.

The asphaltic concrete should meet the requirements of the latest edition of Louisiana Standard Specifications for Roads and Bridges and should be compacted to a minimum of 95 percent of the density of the laboratory molded specimen.

The crushed limestone base should meet the requirements of the latest edition of Louisiana Standard Specification for Roads and Bridges (LSSRB) Section 1003.03, and be compacted to at least 95 percent of the maximum dry density determined by ASTM D 698 (Standard Proctor) within 3 percent of optimum moisture content. The granular fill under the rigid pavement should meet the requirements of the Louisiana Standard Specifications for Roadway and Bridge Construction and should be compacted to 95 percent of the maximum dry density as determined by ASTM D698.

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 and the American Concrete Institute guidelines. Joints should be sealed to reduce the potential for water infiltration into pavement joints and subsequent infiltration into the supporting soils. Load transfer devices at the pavement joints should be designed in accordance with accepted codes. The concrete should have a minimum compressive strength of 3,500 psi at 28 days. The concrete should also be designed with 5 $\pm$ 1 percent entrained air to improve workability and durability.

Geotextile Fabric

A woven geotextile consisting of MIRAFI 600X or equivalent may be placed over the soft subgrade in the parking areas as needed to improve the subgrade condition under the direction of the geotechnical engineer. The geotextile, which is sold in rolls of various sizes, should be installed per the manufacturer's recommendations and be overlapped a minimum of two (2) feet. The geotextile fabric should meet or exceed the following properties.

Property	Test Method	Minimum Average Roll Values
Grab tensile strength, lbs.	ASTM D4632	315
Grag tensile elongation, %	ASTM D4632	15
Mullen burst strength, psi	ASTM D3786	600
Puncture resistance, lbs.	ASTM D4833	120
Trapezoid tear strength, lbs.	ASTM D4533	120
UV resistance after 500 hrs, % strength resistance	ASTM D4355	70

Detention Ponds

It is understood that two (2) detention ponds will be constructed within the development. Pond No. 1 will be constructed on a 0.34 acre to the east of the existing drainage ditch and south of Building No. 1. Detention Pond No. 2 will be located to the west of the drainage ditch and in between Buildings 2, 3, and 4. The area for Pond No. 2 will be about 0.76 acre.

Based on topographic information provided to us, existing ground surface elevation is about 9.5 feet at Pond No. 1 and about eight (8) feet at Pond No. 2. The final bottom elevations for the ponds are +2 and -1 feet respectively. Therefore, up to 7.5 and nine (9) feet of cut will be required for Ponds 1 and 2, respectively.

Borings P-2, P-4, and P-7 were drilled to a depth of 15 feet below the existing ground surface in the detention pond areas. Based on these borings, about 12 inches of brown silty topsoil with organics was encountered at the ground surface. This was followed by loose gray silt or soft silty clay or lean clay with silt to a depth of two (2) feet. Below this, firm to stiff tannish gray lean clay was encountered and extended to depths of eight (8) to 12 feet. The lean clay was underlain by stiff to very stiff gray fat clay to a depth of at least 15 feet, the maximum depth explored. Groundwater was encountered at depths of 5.5 to 7.5 feet below grade in the detention pond borings.

The silty topsoil with organics encountered at the ground surface should be stripped and hauled off site. This material is not suitable for use as structural fill. The lean clays encountered in the detention pond borings could be used in the parking areas (below the upper 3 feet) provided they are processed to achieve the required degree of compaction. The fat clays could also be used in the parking area. Where deep fill is required, the fat clay may be placed in lifts and compacted to the required degree of compaction without lime treatment. However, the fat clay should be treated with about four (4) to six (6) percent of hydrated lime, by dry weight, if used within 18 inches of the surface. Bulk samples of the detention pond material should be obtained and tested in the laboratory to verify the suitability of the material prior to use as structural fill.

Although no side slope information was available at the time this report was prepared, a 3H:1V slope shall be adequate in the type of material encountered. A coefficient of permeability on the order of $1x10^{-8}$ cm/sec was estimated for the lean to fat clay encountered at the proposed bottom elevation of the detention pond. Groundwater was measured at depths ranging from 5.5 to 7.5 feet below existing ground surface in the detention area. Therefore, depending on the final pond bottom elevation, some water seepage may be anticipated requiring some dewatering to facilitate construction of the pond.

CONSTRUCTION CONSIDERATIONS

It is recommended that PSI be retained to provide observation and testing of construction activities involved in the foundations and pavements, earthwork, and related activities of this project. PSI cannot accept any responsibility for any conditions, which deviated from those described in this report, nor for the performance of the foundations and pavements if not engaged to also provide construction observation and testing for this project to ensure that the recommendations presented herein are implemented.

Moisture Sensitive Soils/Weather Related Concerns

The upper soils encountered at this site are extremely sensitive to disturbances caused by construction traffic and changes in moisture content. During wet weather periods, an increase in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils which become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

Drainage and Groundwater Concerns

Water should not be allowed to collect in the foundation excavation, floor slab areas, or on prepared subgrades in 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. Positive site surface drainage should be provided to reduce infiltration of surface water around the perimeter of the buildings and beneath the floor slabs.

Groundwater was encountered in the building borings between 3.5 to 12 feet at the time of our field exploration. Therefore, it is possible that seasonal variations will cause fluctuations of the water table. Additionally, perched water may be encountered in discontinuous zones within the overburden silty sandy clay. Any water accumulation should be removed from 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 excavations. 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 or other regulations.

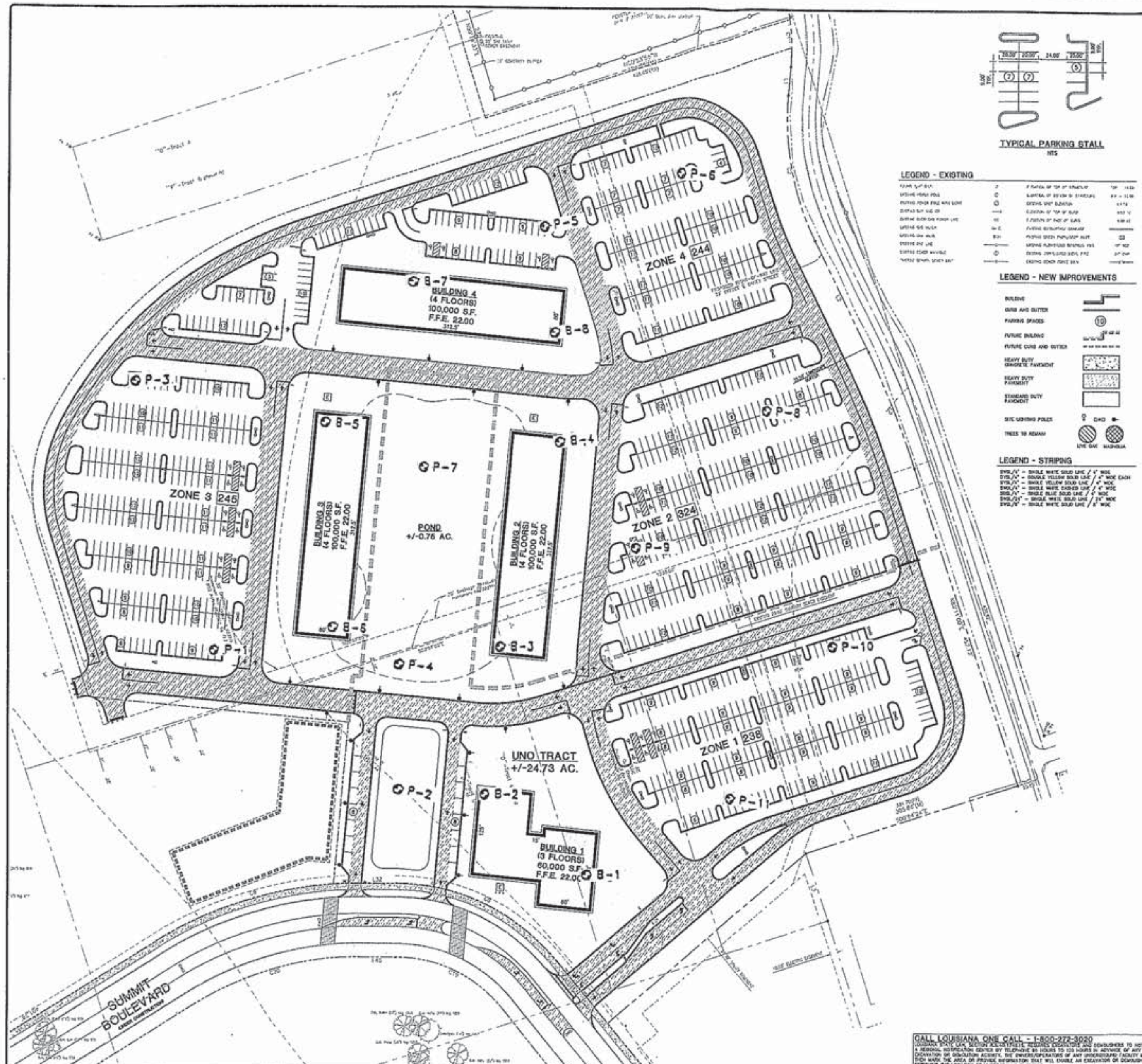
REPORT LIMITATIONS

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. This report has been prepared for the exclusive use of Duplantis Design Group, PC for the specific application to the proposed Research and Technology Park for the University of New Orleans to be constructed on Daney Street near the intersection of I-10 and Fremeaux Road in Slidell, Louisiana.

APPENDIX



SITE PLAN NOTES:

SITE LAYOUT NOTES:

AREA ANALYSIS

PHASE 1	+/- 8.79 ACRES
PHASE 2	+/- 15.94 ACRES
U.N.O. TRACT	+/- 24.73 ACRES

PARKING ANALYSIS

BUILDING 1 PARKING RATIO	60,000 S.F. 208 SPACES 3.47 / 1000 S.F.
BUILDING 2 PARKING RATIO	100,000 S.F. 328 SPACES 3.28 / 1000 S.F.
BUILDING 3 PARKING RATIO	100,000 S.F. 261 SPACES 2.61 / 1000 S.F.
BUILDING 4 PARKING RATIO	100,000 S.F. 248 SPACES 3.48 / 1000 S.F.
TOTAL BUILDING AREA TOTAL PARKING RATIO	360,000 S.F. 1063 SPACES 2.96 / 1000 S.F.

* PARKING REQUIRED: 11 SPACES PER CLASSROOM, LAB, OR OTHER TEACHING ROOM.

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DATE:

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ST. TAMMANY PARISH, LOUISIANA
BY UNIVERSITY OF NEW ORLEANS
NEW ORLEANS, LOUISIANA

DRAWN
CHECKED
ISSUED DATE
ISSUED FOR REVIEW
PROJECT NO.
FILE
SHEET

C-10V

LOG OF BORING B-1

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 1 | PSI PROJECT NO.: 254-95023

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
			12" tan gray silty topsoil with organics		0.83	1.5		106	19	33	17	70
			Firm to stiff tan dark gray Lean Clay with silt									
			-with sand layers, 2' to 4'			2.0			17	34	21	
5			Stiff to very stiff tan and gray Fat Clay with silt and sand layers		1.55	1.75		107	20			
			▼			1.25			24			
					1.38	2.0		102	24			
10												
			-with silt seams, 13' to 15'			2.0			25			
15												
			-soft, 18' to 20'		0.43		0.40	92	30	53	37	
20												
			-with sand layers, 23' to 35'			1.25			27			
25												
					1.30	1.75		81	41			
30												
							0.30		32			
35												
			-becomes grayish blue at 38'		1.20	1.50		95	28			
40												
						1.5			24			
45												
			-with silt and sand seams, 48' to 50'		1.34	2.0		96	26			
50												

DEPTH OF BORING: 80 Feet | GROUNDWATER: Measured at 6.5 feet during drilling

DATE: 4-10-09

psi *Geotechnical Consulting Services*
Jefferson, Louisiana

LOG OF BORING B-1 (continued)

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 1 | PSI PROJECT NO.: 254-95023

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
			Firm tannish gray Fat Clay with silt and sand layers									
			-with trace of organics, 53' to 55'				0.35		42			
55												
			Dense gray Silty Sand	40					30			23
60												
			Very dense gray and brown poorly graded Sand	84					18			
65												
				50					21			
70												
				50/5"					14			7
75												
				86					14			
80												
			Boring terminated at 80 feet									
85												
90												
95												
100												

DEPTH OF BORING: 80 Feet
DATE: 4-10-09

LOG OF BORING B-2

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 1 | PSI PROJECT NO.: 254-95023

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
			12" dark gray silty clay topsoil with organics Soft gray and brown Lean Clay with silt				0.25		24	31	13	
			Firm gray and brown Lean Clay with sand and silt		0.54	1.0		98	23			
5						1.0			25			
			Stiff gray and brown Fat Clay -with sand seams, 6' to 8'		1.48	1.5		96	26			
						1.25			29	66	46	
10			▼									
15			-with silt and sand seams, 13' to 15'		1.04	2.0		85	35			
20						1.75			41			
25					0.84	1.75		79	41			
30						2.0			34			
35			-with sand layers, 33' to 35'		0.49	1.0		79	41			
40			Medium dense gray and brown Silty Sand	11					26			13
45				22					26			
50			Soft grayish green Fat Clay		0.49		0.30	86	34			

DEPTH OF BORING: 80 Feet | GROUNDWATER: Measured at 12 feet during drilling

DATE: 4-17-09

Geotechnical Consulting Services
Jefferson, Louisiana

LOG OF BORING B-2 (continued)

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 1 | PSI PROJECT NO.: 254-95023

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
			Firm grayish green Fat Clay									
55					0.54		0.35	90	31			
60			Dense to very dense light gray and brown Silty Sand	39					21			
65				39					21			45
70				52					22			
75				68					21			
80			Very dense brown poorly graded Sand	73					18			
			Boring terminated at 80 feet									
85												
90												
95												
100												

DEPTH OF BORING: 80 Feet
DATE: 4-17-09

LOG OF BORING B-3

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 2 | PSI PROJECT NO.: 254-95023

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
			12" brown silty topsoil with organics Soft brown and tan Lean Clay with silt and sand				0.25		24	26	9	77
			Stiff gray Lean to Fat Clay		1.88	1.75		107	21			
5					1.62			107	21	51	37	
			▼			1.25			24			
10					1.15	1.5		91	28			
15			-with sand layers, 13' to 15'			2.0			42			
20					1.11	1.75		79	42			
25						2.0			41			
30			Soft grayish brown Fat Clay with sand		0.48		0.35	90	27	56	33	
35			Loose to medium dense gray Silty Sand -with pieces of gravel, 33' to 35'	9					20			17
40				15					22			
45				29								23
50			Firm soft gray Fat Clay		0.60		0.35	87	35			

DEPTH OF BORING: 80 Feet | GROUNDWATER: Measured at 6.5 feet during drilling

DATE: 4-20-09

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LOG OF BORING B-3 (continued)

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY — LOCATION: BUILDING NO. 2 — PSI PROJECT NO.: 254-95023

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 Fat Clay									
			-with trace of organics, 53' to 55'				0.15		38			
55												
			Stiff gray and brown Sandy Clay									
				13					25			
60												
			Dense to very dense light gray Silty Sand									
			-with trace of clay, 63' to 65'	44					22			
65												
			-becomes brown and gray	86					14			18
70												
			Very dense gray poorly graded Sand									
				50/6"					13			
75												
				50/5"					17			7
80												
			Boring terminated at 80 feet									
85												
90												
95												
100												

DEPTH OF BORING: 80 Feet
DATE: 4-20-09

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Jefferson, Louisiana

LOG OF BORING B-4

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 2 | PSI PROJECT NO.: 254-95023

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
			12" gray brown silty topsoil w/organics				0.30		87	34	18	78
			Firm gray and brown Lean Clay with sand									
			Firm to stiff tannish gray Lean Clay with silt and sand seams		0.81	1.5		102	23			
5					1.09	1.0		106	22	45	30	
			▼									
						2.25			20			
			Stiff tan and gray Fat Clay			2.0			22			
10												
15					1.09	3.0		98	25			
20						2.0			36			
25			-with silt and sand seams, 23' to 25' -soft, 23' to 25'		0.24	1.0		83	44			
30			Medium dense grayish brown Silty Sand with trace of clay	15					26			
35			Soft grayish brown Sandy Clay		0.34	1.0		100	25			
40			Very soft to soft grayish green Fat Clay				0.35		36			
45					0.14		0.15	68	55	91	62	
			Stiff grayish green Fat Clay			1.5			31			
50												

DEPTH OF BORING: 80 Feet | GROUNDWATER: Measured at 5.5 feet during drilling

DATE: 4-27-09

psi *Geotechnical Consulting Services*
Jefferson, Louisiana

LOG OF BORING B-4 (continued)

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 2 | PSI PROJECT NO.: 254-95023

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
			Stiff grayish green Fat Clay									
55						1.75			44			
			Very dense gray and brown poorly graded Sand	80					16			
60												
65				79					17			9
70				50/6"					17			
75				50/5"					16			
80				98					15			9
			Boring terminated at 80 feet									
85												
90												
95												
100												

DEPTH OF BORING: 80 Feet
DATE: 4-27-09

psi *Geotechnical Consulting Services*
Jefferson, Louisiana

LOG OF BORING B-5

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY　　LOCATION: BUILDING NO. 3　　PSI PROJECT NO.: 254-95023

DEPTH, FT.	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
	12" gray silty topsoil with organics Firm gray Lean Clay with sand		0.58		0.35	107	22			
					0.40		21	43	26	84
5	-becomes tan and brown lean clay at 4'		0.74	1.0		104	26			
	▼	5					21	47	31	
10	Firm to stiff gray Fat Clay with silt seams		1.55	2.0		99	26			
15				2.0			29			
20	-soft, 18' to 20'		0.18		0.15	80	42			
25				1.5			43			
30	-with silt and sand seams, 28' to 30' -soft, 28' to 30'		0.34		0.25	95	29			
35				1.0			35			
40			1.19	1.5		95	33			
45	Very stiff grayish green Sandy Clay			2.25			26			
50	Soft grayish green Fat Clay		0.29	2.0		89	28			

DEPTH OF BORING: 80 Feet　　GROUNDWATER: Measured at 7 feet after drilling

DATE: 4-21-09

psi *Geotechnical Consulting Services*
Jefferson, Louisiana

LOG OF BORING B-5 (continued)

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 3 | PSI PROJECT NO.: 254-95023

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
			Stiff grayish green Sandy Clay									
55						2.0			36			
60			Medium dense to very dense brown Silty Sand	18					20			14
65				24					19			
70				85					19			
75				50/4"					16			13
80				88					17			
			Boring terminated at 80 feet									
85												
90												
95												
100												

DEPTH OF BORING: 80 Feet
DATE: 4-21-09

psi *Geotechnical Consulting Services*
Jefferson, Louisiana

LOG OF BORING B-6

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 3 | PSI PROJECT NO.: 254-95023

DEPTH, FT.	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
	12" dark gray sandy topsoil with organics Soft gray and tan Lean Clay with sand		0.28		0.3	102	23	35	18	75
	Firm to stiff brown and tan Lean Clay ▼			1.0			25			
5			1.74	2.5		112	19			
	Firm to stiff gray and brown Fat Clay			1.50			26			
			1.17	2.5		109	21			
10										
15	-with silt and sand seams, 13' to 15'			2.0			35			
20			0.92	2.0		83	39			
25				1.75			36	79	47	
30	-becomes soft, 28' to 30'		0.47	1.0		96	28			
35				1.0			45			
40	Loose gray Sandy Silt with clay pockets		0.32		0.05	95	30			
45		8					36			
50	Firm grayish green Fat Clay with silt seams			1.0			35			

DEPTH OF BORING: 80 Feet | GROUNDWATER: Measured at 3.5 feet after drilling

DATE: 4-22-09

LOG OF BORING B-6 (continued)

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 3 | PSI PROJECT NO.: 254-95023

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
			Firm grayish green Fat Clay with silt seams									
55					0.61		0.30	97	29			
			Medium dense to dense gray Silty Sand -with clay pockets, 58' to 60'	11					21			
60												
65				35					20			46
			Very dense gray and brown poorly graded Sand	50/6"					14			
70												
75				50/3"					16			
80				99					18			10
			Boring terminated at 80 feet									
85												
90												
95												
100												

DEPTH OF BORING: 80 Feet
DATE: 4-22-09

LOG OF BORING B-7

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 4 | PSI PROJECT NO.: 254-95023

DEPTH, FT.	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
	12" gray silty topsoil with organics Soft gray brown Sandy Lean Clay				0.25		24	30	16	63
	Firm to stiff gray Lean Clay with sand		0.79	1.5		111	19			
5				2.0			19	36	21	
	Very stiff light gray and tan Fat Clay		1.66	3.0		113	18			
	-with silt seams, 8' to 10'			2.25			29			
10										
15			0.66	1.5		89	35			
20				2.0			44			
25	-with silt and sand seams, 23' to 25		1.04	1.5		82	41			
30	-with sand layers, 28' to 30'			1.0			31			
35	Soft grayish green Lean Clay with sand		0.39	1.0		87	32	44	8	75
40	Firm to stiff grayish green Fat Clay			1.25			35			
45	-with silt and sand seams, 43' to 45'		0.75	1.0		91	32			
50				1.0			34			

DEPTH OF BORING: 80 Feet | GROUNDWATER: Measured at 6 feet after drilling

DATE: 4-23-09

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LOG OF BORING B-7 (continued)

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 4 | PSI PROJECT NO.: 254-95023

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
			Stiff grayish green Fat Clay									
55						1.5			46			
			Medium dense to dense light gray Silty Sand	17					19			
60												
65				43					20			41
70				82					21			
75				78					21			
80				86					21			
			Boring terminated at 80 feet									
85												
90												
95												
100												

DEPTH OF BORING: 80 Feet
DATE: 4-23-09

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LOG OF BORING B-8

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 4 | PSI PROJECT NO.: 254-95023

DEPTH, FT.	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
	12" dark gray silty topsoil with organics Soft tan and brown Sandy Lean Clay				0.20		22			
	Firm to stiff tannish gray Lean Clay		0.70	1.5		107	19	42	27	
5				1.25			19			
			1.88	3.0		115	17			
10	Stiff brown and tan Fat Clay			1.75			27			
15	-with sand seams, 13' to 15'		0.77	2.5		99	27			
20				2.0			36			
25			0.69	2.5		83	37			
30	Loose gray and brown Silty Sand -with clay pockets, 28' to 30'	12					26			32
35		15					26			
40	Firm gray Fat Clay with silt seams		0.57	1.0		69	57			
45					0.40		36			
50			0.92	1.0		77	42			

DEPTH OF BORING: 80 Feet | GROUNDWATER: Measured at 8.5 feet after drilling

DATE: 4-24-09

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LOG OF BORING B-8 (continued)

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING NO. 4 | PSI PROJECT NO.: 254-95023

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
			Stiff gray Fat Clay with silt and sand seams									
55						1.5			48			
60			Very soft gray and tan Lean Clay with silt and sand seams		0.16		0.30	109	22			
65			Dense to very dense brown Silty Sand	39					18			31
70				50/5"					17			
75				50/6"					17			6
80				50/2"					15			
			Boring terminated at 80 feet									
85												
90												
95												
100												

DEPTH OF BORING: 80 Feet
DATE: 4-24-09

LOG OF BORING P-1

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: PARKING LOT | PSI PROJECT NO.: 254-95023

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
			12" brown silty topsoil with organics						21			70
			Gray and brown Sandy Lean Clay									
									21			
5									22			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 6 Feet | GROUNDWATER: Measured at 6 feet during drilling
DATE: 4-16-09

LOG OF BORING P-2

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: DETENTION POND #1 | PSI PROJECT NO.: 254-95023

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
			10" dark gray silty clay topsoil with organics Soft grayish Sandy Lean Clay				0.25		24	32	18	79
			Stiff to very stiff gray and brown Lean Clay with sand layers		1.39	2.25		111	20			
5						2.0			22	46	34	81
						2.0			20			
						3.0			20	38	28	
10												
			Very stiff tan and gray Fat Clay			2.25			27			
15												
			Boring terminated at 15 feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet | GROUNDWATER: Measured at 7.5 feet during drilling

DATE: 4-10-09

LOG OF BORING P-3

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: HAND AUGER — LOCATION: PARKING LOT — PSI PROJECT NO.: 254-95023

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
			12" brown silty topsoil with organics						22			
			Brown and gray Sandy Lean Clay						23			
5			Brown and gray Fat Clay with sand seams						24			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 6 Feet — GROUNDWATER: Not encountered during drilling

DATE: 4-16-09

LOG OF BORING P-4

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY   LOCATION: DETENTION POND #2   PSI PROJECT NO.: 254-95023

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
			12" brown silty topsoil with organics Soft dark gray Silty Clay		0.30		0.20	98	23	25	6	82
			Stiff to very stiff gray Lean Clay with sand			2.0			19	44	31	88
5			▼			1.75			22			
						4.0			18	42	30	89
			Stiff tannish gray Fat Clay			2.0			24			
10												
						1.50			26	51	36	
15			Boring terminated at 15 feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet   GROUNDWATER: Measured at 5.5 feet during drilling

DATE: 4-10-09

LOG OF BORING P-5

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: PARKING LOT | PSI PROJECT NO.: 254-95023

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
			12" brown silty topsoil with organics						21			
			Gray and brown Sandy Lean Clay									
									24			
5			▼						23			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 6 Feet | GROUNDWATER: Measured at 5 feet during drilling

DATE: 4-16-09

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LOG OF BORING P-6

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: PARKING LOT | PSI PROJECT NO.: 254-95023

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
			12" brown silty topsoil with organics Gray and brown Silt						22			69
			Firm gray Lean Clay						22	25	11	
5			▼						23			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 6 Feet

GROUNDWATER: Not encountered during drilling

DATE: 4-16-09

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LOG OF BORING P-7

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: WET ROTARY LOCATION: DETENTION POND #2 PSI PROJECT NO.: 254-95023

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
			12" dark gray organic sand topsoil Soft to stiff brown and tan Lean Clay with sand				0.25		22	31	13	75
			Stiff to very stiff brown and tan Lean Clay with sand seams			2.25			19			
5						2.0			19	45	33	78
						2.75			17	28	14	
			Very stiff tannish gray Fat Clay			2.5			21			
10												
						2.5			25	55	36	
15												
			Boring terminated at 15 feet									
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 15 Feet GROUNDWATER: Not encountered during drilling

DATE: 4-24-09

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LOG OF BORING P-8

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: PARKING LOT | PSI PROJECT NO.: 254-95023

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
			12" brown silty topsoil with organics Gray and brown Sandy Clay						19			64
			Brown and tan Lean Clay						21	24	10	
5									24			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 6 Feet
GROUNDWATER: Not encountered during drilling
DATE: 4-16-09

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LOG OF BORING P-9

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: PARKING LOT | PSI PROJECT NO.: 254-95023

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
			12" brown silty topsoil with organics						12			
			Gray and brown Lean Clay with sand						18			74
5									14			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 6 Feet | GROUNDWATER: Not encountered during drilling

DATE: 4-16 -09

LOG OF BORING P-10

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: HOLLOW STEM AUGER — LOCATION: PARKING LOT — PSI PROJECT NO.: 254-95023

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
			12" dark gray silty topsoil with organics Soft gray and brown Sandy Fat Clay				0.25		31			
			Stiff brown and gray Lean Clay with sand			2.0			22	48	34	80
5						2.0			22			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 6 Feet — GROUNDWATER: Not encountered during drilling

DATE: 4-10-09

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LOG OF BORING P-11

UNO RESEARCH AND TECHNOLOGY PARK
DANEY STREET
SLIDELL, LOUISIANA

TYPE OF BORING: HOLLOW STEM AUGER | LOCATION: PARKING LOT | PSI PROJECT NO.: 254-95023

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
			12" dark gray silty sand topsoil with organics Soft gray and brown Lean Clay with silt				0.20		23			
			Stiff brown and gray Fat Clay -with silt and sand seams, 2' to 6'			1.5			22			
5						1.25			18			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 6 Feet | GROUNDWATER: Not encountered during drilling

DATE: 4-10-09

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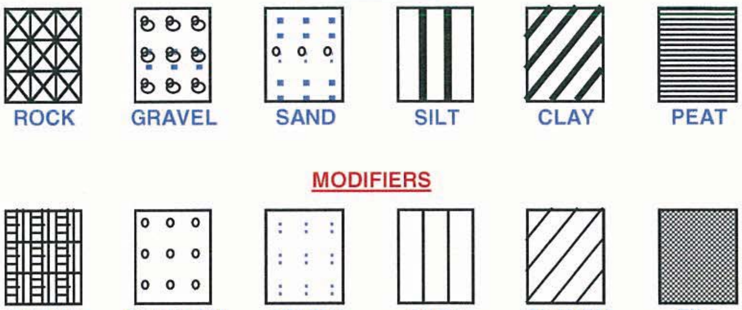
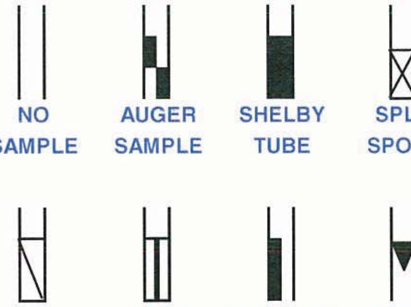
KEY TO TERMS AND SYMBOLS USED ON LOGS

SOIL TYPE



SAMPLER TYPE



UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

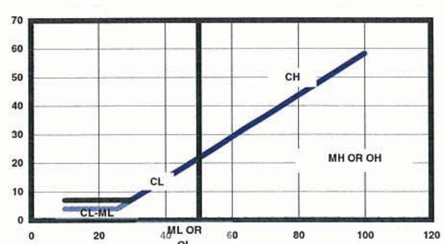
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND 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

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