Information To Build On
Engineering • Consulting • Testing

February 28, 2006

Broadmoor Design Group
2740 North Arnoult Road
Metairie, Louisiana 70011

Attention: Mr. Dean Duplantier

Re: Geotechnical Engineering Report
Proposed Readiness Center
for the 1st Battalion
141st Field Artillery
Jackson Barracks
New Orleans, Louisiana
PSI File Number: 254-65023-1

Dear Mr. Duplantier:

Professional Service Industries, Inc. 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 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.

STATE OF LOUISIANA
TONY Y. MAROUN
License No. 26198
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

Malay Ghose Hajra, Ph.D., P.E.
Department Manager
Geotechnical Services

Tony Y. Maroun, P.E.
Vice President

MGH/TYM:gsm

GEOTECHNICAL ENGINEERING REPORT

PROPOSED READINESS CENTER
FOR THE 1ST BATTALION
141ST FIELD ARTILLERY
JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

PSI FILE NUMBER 254-65023-1

PREPARED FOR

BROADMOOR DESIGN GROUP
2740 NORTH ARNOULT ROAD
METAIRIE, LOUISIANA 70011

FEBRUARY 28, 2006

BY

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

TABLE OF CONTENTS

EXECUTIVE SUMMARY

An exploration and evaluation of the subsurface conditions have been completed for the proposed Readiness Center that will be constructed within Jackson Barracks in New Orleans, Louisiana. A total of seven (7) borings were drilled at the site. This included three (3) borings (B-1 through B-3) to a depth of 100 feet within the proposed building area and four (4) shallow borings (P-1 through P-4) to a depth of six (6) feet in the proposed parking area.

Although no plan with the building location was provided, we understand the site for the proposed development is partially occupied by an existing structure that will be demolished to accommodate the new construction. In addition, a roadway crosses the proposed building and other portions occupied by a gravel parking area. The project will include the construction of a four (4) story structure with a structural steel frame and load bearing masonry walls having a plan area of approximately 30,000 to 40,000 square feet. The facility will be used to prepare and deploy troops; therefore, it will be a multi-purpose structure designed to accommodate troop equipment and armored and transport vehicles. Structural loading information provided to us indicates that maximum column and wall loads will be on the order of 300 kips and 6 kips per linear foot, respectively.

Detailed grading information was not available at the time this report was prepared. However, since the site is already developed, it is assumed that about two (2) feet of fill will be needed to achieve the building floor slab design elevation.

Based on the borings, about six (6) to ten (10) inches of brown silty topsoil with organics or 10 inches of gravel was encountered at the surface. Underlying the topsoil or gravel is a stratum of firm gray and brown lean to fat clay to depths of four (4) to six (6) feet and followed by soft dark gray and brown organic clay to depths ranging from 10 to 17 feet. The organic clay is generally underlain by very soft to soft gray fat clay to a depth of about 50 feet and followed by medium dense to very dense gray and tan poorly graded sand or clayey sand to at least 100 feet, the maximum depth explored. Groundwater was measured at depths ranging from four (4) to six (6) feet below the existing ground surface upon completion of drilling.

The results of this exploration indicate that the near surface soils at the site are poor in bearing quality and compressible in nature. These soils are not suitable for support of the proposed facility on a shallow foundation system. Therefore, a driven pile foundation system is recommended for support of the proposed building including the floor slab. Details related to site development, foundation and pavement 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 Readiness Center to be constructed within Jackson Barracks in New Orleans, Louisiana. The exploration was accomplished in general accordance with PSI Proposal Number 254-650023 dated February 7, 2006. Authorization to proceed with the geotechnical investigation was given on February 15, 2006.

Project Description

The project includes the construction of a four (4) story structure with a structural steel frame and load bearing masonry walls having a plan area of approximately 30,000 to 40,000 square feet. The facility, which will be used to prepare and deploy troops will be a multi-purpose structure designed to accommodate equipment, armored and transport vehicles. No traffic loading information was available at the time this report was prepared. However, based on our experience with other Readiness Centers, we assumed that traffic will consist of military transport vehicles, water and fuel trucks and heavy wreckers. About 200 units will be using the facility once per month corresponding to Equivalent Single Axle Loading ($ESAL_{18}$) of about 160,000.

The geotechnical recommendations presented in this report are based on the available project information, building location, 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 an acceptable foundation and pavement system for the proposed construction. The scope of service includes seven (7) borings drilled to depths of six (6) to 100 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, allowable pile capacities and an estimate of settlement;
- General pavement design criteria and pavement subgrade preparation;
- Site preparation;
- Comments regarding factors that will impact construction and performance of the proposed construction;
- Flexible and rigid pavement recommendations.

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, an environmental site assessment is advisable at this site.

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 Readiness Center is located in Area C within Jackson Barracks Military Facility in New Orleans, Louisiana. At the time of the field exploration, the project area was partially occupied by an existing building and a gravel parking area. A roadway, which bisects the building area, will be relocated and the existing building will be demolished to accommodate construction of the new facility. The ground surface appeared level, firm and dry at the time of our drilling operations.

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 test borings, and recovering soil samples. In addition, groundwater encountered in the test borings was also measured and recorded.

Three (3) borings (B-1 through B-3) were drilled to a depth of 100 feet in the building area and four (4) shallow borings (P-1 through P-4) were drilled to a depth of six (6) feet in the parking area. The boring depths are in reference to the existing ground surface at the time of the field exploration. The number and depth of borings were determined by Broadmoor Design Group and were located in the field by PSI personnel. The approximate locations of the borings are indicated on the plan included in the Appendix, which is a reproduction of a site plan provided by Broadmoor Design Group.

Drilling and Sampling Procedures

The borings were drilled with an ATV mounted drilling rig. Wet rotary and continuous flight auger techniques were used to advance the boreholes. Samples were generally obtained contiguously from the ground surface to a depth of ten feet and at maximum five-foot intervals thereafter. The parking lot borings were advanced using hand-augering technique. The drilling and sampling procedures 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) were performed to obtain standard penetration values of the soil. The standard penetration value (N) is defined as the number of blows of a 140 pound hammer, falling 30 inches, required to advance the split-barrel sampler 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 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 to 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 and pavement systems for the proposed facility.

The laboratory testing program included supplementary visual classification and water content tests on all the soil samples. In addition, selected samples were subjected to unconfined compression testing, percent passing the #200 sieve, and Atterberg Limits determination. 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) to ten (10) inches of brown silty topsoil with organics and about 10 inches of gravel was encountered at the project site. This was generally followed by firm gray and brown lean to fat clay to depths of four (4) to six (6) feet. Underlying the fat clay is a layer of soft dark gray and brown organic clay to depths ranging from 10 to 17 feet and followed by very soft to soft gray fat clay to a depth of about 50 feet. Below this, there was generally medium dense to very dense gray and tan poorly graded sand or clayey sand to at least 100 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 resistance, 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. Water level information obtained during field operations is also shown on the boring logs. 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 four (4) to six (6) feet below existing grade 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, groundwater levels at this site may vary due to recent rainfall, proximity to bodies of water, or some mechanical control. We recommend that the Contractor determine the actual groundwater levels at the site at the time of the construction activities.

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 movements which the structure can withstand without damage.

The results of this exploration indicate that the near surface soils present at this site are compressible in nature and poor in bearing quality. In light of the soil conditions encountered at the site and the anticipated structural loads, it is recommended that a driven pile foundation system be used for support of the proposed building including the floor slab. Details related to site preparation and foundation design are discussed further below.

Site Preparation

Site preparation is expected to include, but not be limited to, the demolition and removal of the existing structures and foundation elements and pavements. Once the existing buildings and pavement have been removed, the utilities should be re-located as necessary. Furthermore, any topsoil, vegetation, and any other deleterious material should be removed from the areas to be developed and hauled off the site.

Consideration should be given to the presence of the existing foundations and their effect on the proposed construction. It is expected that the existing structure is pile supported. Therefore, a review of existing piles should be made to determine if they are in conflict with the new piles. If such conflict exists, the existing piles may have to be extracted to allow for installation of new piles. Otherwise, the existing piles could be left in place and cut off at least two (2) feet below the new pile supported foundation. Any existing pile located in the proposed pavement area should be cut off at least 3 feet below the pavement subgrade.

After removal of the topsoil, the exposed subgrade in the parking area should be proofrolled with a tandem axle dump truck or similar rubber tired vehicle. Soils, which are observed to rut or deflect excessively under the moving load should be undercut and replaced with properly compacted fill. The amount of undercutting will primarily depend on the site conditions at the time of construction. The proofrolling and undercutting activities should be witnessed by a representative of the geotechnical engineer and should be performed during a period of dry weather.

The fill should be placed in relatively uniform horizontal lifts and should be compacted to at least 95 percent of the Standard Proctor maximum dry density as determined by ASTM Designation D698. Compaction requirements may be waived in the pile-supported areas.

The structural fill material could consist of locally available "pumped river sand" having less than 10 percent fines passing the #200 sieve. The fill should be placed in maximum lifts of eight (8) inches of loose material and should be compacted within the range of -1 to +3 percent of the optimum moisture content. 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 the placement of subsequent lifts.

Pile Foundation

The near surface soils are poor in bearing quality and compressible in nature. These soils are not suitable for support of the proposed building on a shallow foundation. In view of this, analyses were made with regard to a pile foundation system for support of the proposed building. Consideration was given to large treated timber piles (7" tip - 12" butt) installed at a minimum depth of 55 feet below existing site grades. The treated timber piles should conform to ASTM D25 for treatment, quality and dimensions discussed herein. The piles on this site will generally derive their support through "skin friction" along their embedded lengths as well as end bearing when tipped in the dense sand.

Taking into consideration the field and laboratory data, the estimated allowable pile compression and tension capacities are tabulated below. The recommended pile lengths are from the existing ground surface at the time of drilling; however a pile cutoff of up to 2 feet should not have an impact on the recommended capacities.

ALLOWABLE SINGLE PILE LOAD CAPACITY IN TONS* F.S.=2.0 IN COMPRESSION, F.S. = 3.0 IN TENSION		
Pile Tip Embedment Below Existing Ground Surface (ft)*	Large Treated Timber Pile (7" tip - 12" butt)	
	Compression	Tension
55-60	25	11

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

*** Piles should be embedded into dense sand.**

The estimated pile capacities include a factor of safety of two (2) in compression and three (3) in tension.

Floor Slab

The building floor slab, including the sidewalks and landings immediately adjacent to the building, should be pile supported. The floor slab should have an adequate number of joints to reduce cracking resulting from any differential movement and shrinkage. It is also recommended that a polyethylene sheeting vapor barrier be provided at the floor slab/fill soil interface.

All utility lines in the building area should be hung from the slab. Hangers and connections used should be made of stainless steel, meeting the applicable Building Code. Flexible connections must be provided at the interface of pile supported and non-pile supported areas to accommodate at least eight (8) inches of settlement.

Settlement

It is estimated that long term total settlement of piles installed at a minimum of 3 feet center to center will be on the order of 1 inch. This estimate assumes that the maximum fill thickness will not exceed two (2) feet; however, settlement will depend on the amount of fill placed on the site. Differential settlement is anticipated to be on the order of 50 percent of the total settlement.

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 six (6) 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 building code and the criteria given in the Appendix.

Pile Installation

Pile driving hammers used to drive the 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. Hammer with rated energy of 12,000 to 15,000 foot-pounds are satisfactory for the large timber piles.

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.

Some pile heaving may be experienced during installation of adjacent displacement type piles. It is therefore recommended that the tip elevation of the piles be recorded and if significant heave is noted after driving of subsequent piles, provisions must be made for reseating them.

Pile Driving Monitoring

It is recommended 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 Load Test

It is recommended that the pile capacity be verified with a pile load test. 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. PSI has evaluated both rigid and flexible pavements for this project.

Detailed grading information was not available at the time this report was prepared. Therefore, it is assumed that about two (2) feet of fill will be needed to achieve the parking area design grades. Detailed traffic loading information was not provided to us at this time. However, based on our experience with other Readiness Centers, we assumed that traffic could consist of military transport vehicles, fuel and water tankers, and heavy wreckers. It is assumed that these vehicles will be using the facility once per month corresponding to Equivalent Single Axle Loading ($ESAL_{18}$) of about 160,000. Light duty traffic consists mostly of daily cars and light trucks.

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.

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.

We have estimated that the near surface soils have a Coefficient of subgrade reaction (k) of 100 psi per inch, which could be used for rigid pavement design and a CBR of 3.0 for flexible pavement design. Additionally, we assumed the following:

CBR	3
Modulus of Subgrade Reaction, k	100 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 Base Course
	0.08 Granular Structural Fill

Using the above parameters, the recommended pavement sections are as follows:

FLEXIBLE PAVEMENT E_{18} **: 160,000**		
Pavement Materials	**Minimum Thickness, Inches**	
	Light Duty	Heavy Duty
Asphaltic Concrete Wearing Course	3	4
Compacted 610 Limestone Base	8	12
Compacted Structural Fill	12	12

RIGID PAVEMENT E_{18} **: 240,000**		
Pavement Materials	**Minimum Thickness, Inches**	
	Light Duty	Heavy Duty
Portland Cement Concrete	6	7
Compacted Granular 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 underlain by 12 inches of sand base is recommended.

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 sand base could consist of "pumped river sand" having less than 10 percent fines passing a No. 200 sieve. The sand 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 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 ± 1percent entrained air to improve workability and durability. Long term pavement performance requires good drainage and performance of periodic maintenance activities. Therefore, water should not be allowed to enter or exit the base to preserve its integrity and prolong the life of the pavement.

Due to the soil conditions at the site and long term settlement potential, it is recommended that a proper design be considered at the pavement and pile supported structures interface to accommodate the settlement of the pavement, provide a smooth transition from the pavement to the pile supported sidewalk, and avoid abrupt and excessive grade change. Taking into consideration the subsurface conditions at the site and the placement of about two (2) feet of fill in the parking area, settlement in the parking lot is estimated to be on the order of two (2) to three (3) inches over the life of the pavement. However, flexible connections, capable of accommodating at least six (6) inches of settlement, should be provided for lines exiting the building area to non-pile supported areas.

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, foundation and pavement be monitored by the geotechnical engineer or his representative.

Drainage Consideration

Water should not be allowed to collect in excavations 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.

Groundwater was encountered in the borings at depths ranging from four (4) to six (6) feet below existing grade during drilling. However, it is possible that seasonal variations will cause fluctuations, or a water table to be present in the upper soils at a later time. The Contractor should determine the groundwater level at the time of construction.

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.

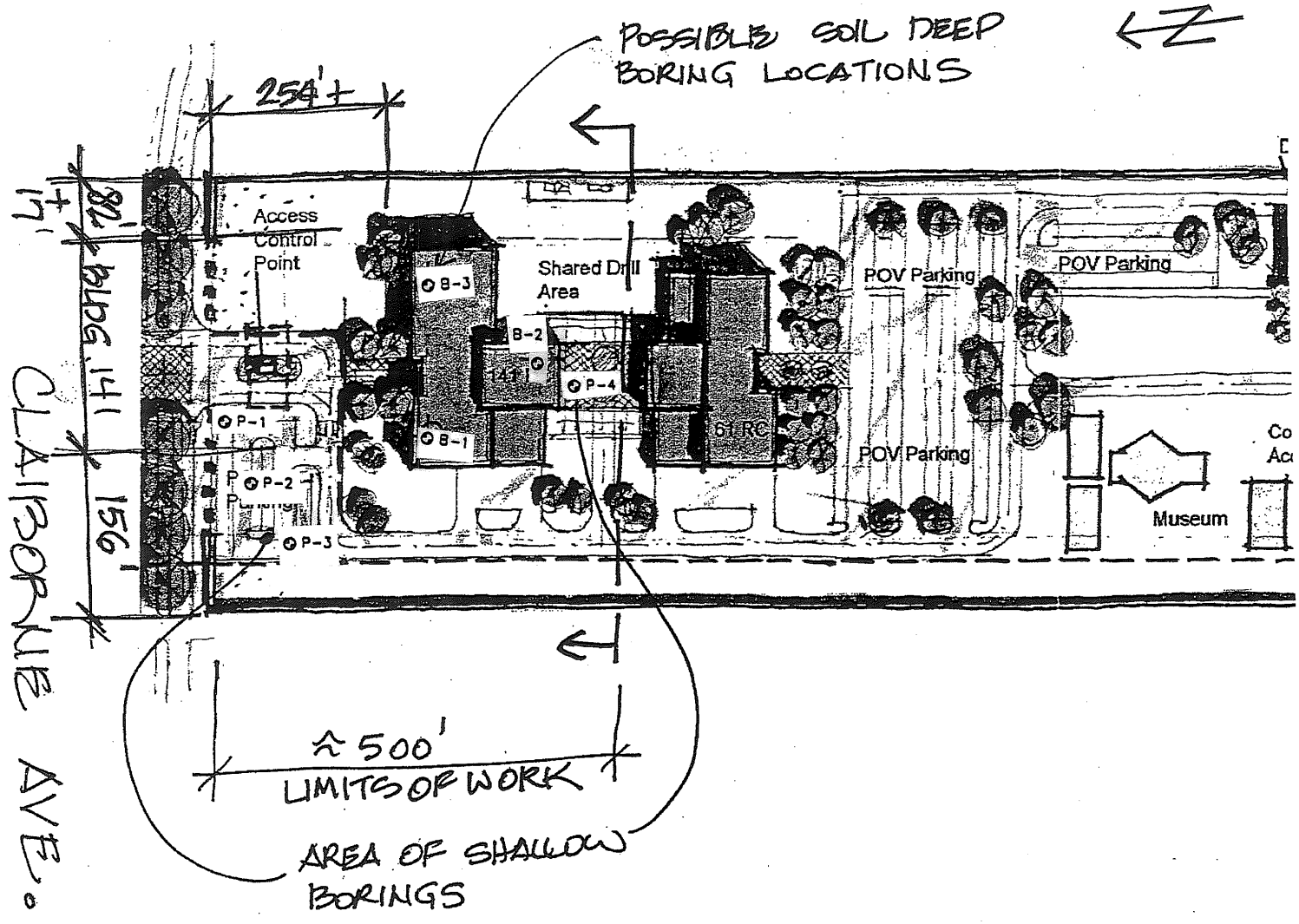
REPORT LIMITATIONS

The recommendations submitted in this report are based on the available subsurface information obtained by PSI and details furnished by Broadmoor Design Group. 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 pecifications 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 specific use of Broadmoor Design Group for the specific application to the proposed Readiness Center to be constructed in Area C in Jackson Barracks in New Orleans, Louisiana.

APPENDIX



Boring Location

Proposed Readiness Center Jackson Barracks New Orleans, Louisiana	Boring Location Diagram	Professional Service Industries, Inc. 724 Central Ave Jefferson, La 70121 ph. (504) 733-9411 Date: 2/28/06 | PSI Project No.: 254-65023-1 Drawing Provided by: Broadmoor Design Group

LOG OF BORING B-1

PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING AREA | PSI PROJECT NO.: 254-65023

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
			8" brown silty topsoil with organics		0.79	0.75		74	45			
			Firm dark gray Fat Clay									
			-sand pockets, 2' to 4'				0.45		56			
5			Soft gray Fat Clay		0.22		0.20	49	91			
			Soft dark gray Organic Clay with peat				0.15		107			
10					0.09		0.10	46	96			
			Soft gray Fat Clay									
15							0.15		79			
20					0.21		0.15	61	67			
25							0.20		43			
30					0.25		0.20	66	57			
35							0.25		67			
40					0.37		0.25	61	64			
45							0.25		70			
50					0.30		0.25	60	68			

DEPTH OF BORING: 100 FEET | GROUNDWATER: Measured at 4' upon completion

DATE: 2/14/06

LOG OF BORING B-1 (continued)

PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING AREA | PSI PROJECT NO.: 254-65023

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
55			Very dense gray poorly graded Sand	70					23			9
60				86					22			
65				69					24			
70			Very dense gray Silty Sand	55					31			41
75								109	20			28
80								105	21			
85									29			19
90				30					29			
95				39					28			34
100				32					27			
			Boring terminated at 100 feet									

DEPTH OF BORING: 100 FEET
DATE: 2/14/06

LOG OF BORING B-2

PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING AREA | PSI PROJECT NO.: 254-65023

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" brown silty topsoil with organic Firm gray & brown Lean Clay w/pieces of gravel (Fill)				0.5		25			
			Firm gray and brown Fat Clay		0.64	0.5		74	45			
5			Soft dark gray Organic Clay				0.20		101			
			Soft gray Fat Clay		0.15		0.15	53	75			
10							0.20		88			
			Soft dark brown and black Peat		0.28		0.20	28	166			
15												
			Very soft to soft gray Fat Clay				0.15		50	49	29	
20												
					0.22		0.10	67	57			
25												
							0.20		79			
30												
					0.31		0.15	73	49			
35												
							0.20		65			
40												
					0.35		0.20	59	68			
45												
							0.30		72			
50												

DEPTH OF BORING: 100 FEET | GROUNDWATER: Measured at 6' upon completion

DATE: 2/14/06

LOG OF BORING B-2 (continued)

PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING AREA | PSI PROJECT NO.: 254-65023

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
			Medium dense to dense gray and tan poorly graded Sand									
				30					23			10
55												
				33					23			
60												
				17					26			
65												
				30					29			12
70												
				65					24			
75												
			-with clay layers, 78' to 80'	20					52			
80												
			-changes to clayey sand at 83'	43					25			21
85												
				48					21			
90												
			Dense gray Clayey Sand to sandy clay	44					29			
95												
				54					31			54
100												
			Boring terminated at 100 feet									

DEPTH OF BORING: 100 FEET
DATE: 2/14/06

LOG OF BORING B-3

PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING AREA | PSI PROJECT NO.: 254-65023

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" gravel and sand Very dense gravel and Sand (Fill)	83					8			
			Soft gray Fat Clay	6					63			
5			Soft dark brown and black Organic Clay with peat ▼	5	0.14		0.10	34	117 143	168	130	99
10			Very soft to soft gray and dark gray Fat Clay				0.15		81			
15							0.15		61			
20					0.20		0.10	66	61			
25							0.20		47			
30					0.29		0.15	71	52	58	36	
35							0.20		62			
40							0.25		58			
45							0.25		46			
50							0.25		73			

DEPTH OF BORING: 100 FEET | GROUNDWATER: Measured at 5' upon completion

DATE: 2/14/06

LOG OF BORING B-3 (continued)

PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: WET ROTARY | LOCATION: BUILDING AREA | PSI PROJECT NO.: 254-65023

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
			Medium dense to dense gray and tan Sand									
55				26					26			14
60				17					31			
65				33					27			21
70				41					20			
75				36					23			9
80				39					24			
85				21					32			34
90				45					22			
95				35					23			40
100				35					21			
			Boring terminated at 100 feet									

DEPTH OF BORING: 100 FEET
DATE: 2/14/06

LOG OF BORING P-1

PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: PARKING AREA | PSI PROJECT NO.: 254-65023

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" brown silty topsoil with organics						39			
			Gray and brown Fat Clay with trace of organics						42			
									51			
5									53			
									84			
									79			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 6 FEET | GROUNDWATER: Not encountered

DATE: 2/22/06

LOG OF BORING P-2

PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: PARKING AREA | PSI PROJECT NO.: 254-65023

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
			4" brown silty topsoil with organics						25			
			Gray and brown Fat Clay						17			
			-trace of organics, 2' to 4'						68			
			-with sand pockets, 4' to 6'						70			
5									71			
									70			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 22 FEET | GROUNDWATER: Not encountered

DATE: 2/22/06

LOG OF BORING P-3

PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: PARKING AREA | PSI PROJECT NO.: 254-65023

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" brown silty topsoil with organics						28			
			Gray Clayey Sand (Fill)						40			
			Gray and brown Fat Clay						79			
									71			
5									71			
									75			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 22 FEET | GROUNDWATER: Not encountered

DATE: 2/22/06

LOG OF BORING P-4

PROPOSED READINESS CENTER FOR THE 1ST BATTALION
141ST FIELD ARTILLERY, JACKSON BARRACKS
NEW ORLEANS, LOUISIANA

TYPE OF BORING: HAND AUGER | LOCATION: PARKING AREA | PSI PROJECT NO.: 254-65023

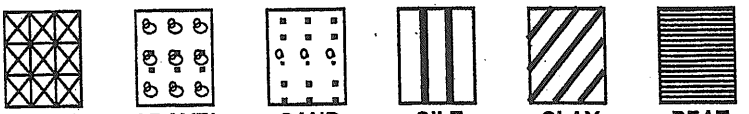
DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENTROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			4" brown silty topsoil with organics						42			
			Gray and brown fat clay						48			
									55			
			-trace of organics, 4' to 6' ▼						54			
5									82			
									79			
			Boring terminated at 6 feet									
10												
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 22 FEET | GROUNDWATER: Not encountered

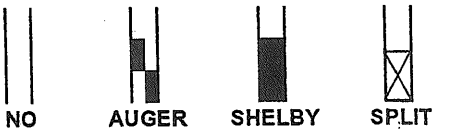
DATE: 2/22/06

KEY TO TERMS AND SYMBOLS USED ON LOGS

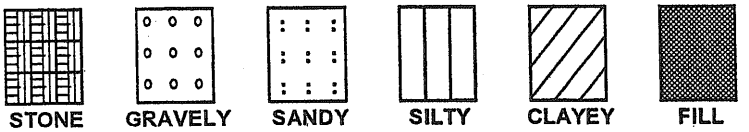
SOIL TYPE

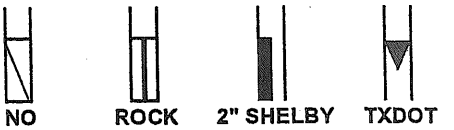


SAMPLER TYPE



MODIFIERS





UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

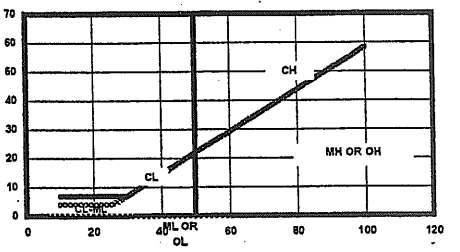
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND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

BOULDERS	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

ALLOWABLE GROUP PILE CAPACITY*

$$Q_a = \frac{PxLxC}{(FSF)} + \frac{2.6\, q_u\, (1 + 0.2\, w/b)A}{(FSB)}$$

Q_a = Allowable load carrying capacity of group pile (pounds)

P = Perimeter distance of pile group (feet)

L = Length of pile, (feet)

C = Average weighted cohesion of soil along length of pile (PSF)

q_u = Average unconfined compressive strength of soil below pile tip (PSF)

w = Width of base of pile group, (feet)

b = Length of base of pile group, (feet)

A = Base area of pile group, (square feet)

(FSF) = Factor of safety for the friction area = 2

(FSB) = Factor of safety for the base area = 3

* The recommended single pile capacity should not be exceeded.

PILE SPACING**

In order to facilitate driving, minimum pile spacing shall be either 3 feet or as computed by the following formula, whichever is greater:

$SPAC = 0.05\ (L_1) + 0.025\ (L_2) + 0.0125\ (L_3)$

SPAC = Center to Center of Pile (feet)

L_1 = Pile Penetration up to 100 feet

L_2 = Pile Penetration from 101 to 200 feet

L_3 = Pile Penetration pass 201 feet

** Greater pile spacing than the minimum value may be required in order to satisfy group effect as given by the above allowable group pile capacity formula.