STRATUM ENGINEERING, LLC
Geotechnical Engineering ♦ Testing and Inspection Services

November 29, 2022

Jindal Tubular USA, LLC
13092 Sea Plane Road
Bay St. Louis, Mississippi 39520
Phone: (228) 822-1823

Attn: Mr. Rama Krishna

Re: Geotechnical Investigation
Proposed Warehouse Relocation
Jindal Tubular Facility
Bay St. Louis, Mississippi
SE Project No. G22-111

Dear Mr. Krishna

Stratum Engineering, LLC (SE) is pleased to submit our Geotechnical Engineering Report for the above referenced project. This report includes the results of the field exploration and laboratory testing, and recommendations for foundation design as well as general site development.

We appreciate the opportunity to perform this geotechnical study and look forward to continued participation during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted,
STRATUM ENGINEERING, LLC

William "Dean" McInnis, P.E.
Senior Project Manager

Tony Y. Maroun, P.E.
Principal

TONY YOUSSEF MAROUN
REGISTERED PROFESSIONAL
ENGINEER
P.E. 15193
11/29/22
MISSISSIPPI

WDM/TYM:jkh

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PROJECT INFORMATION

Project Authorization

Stratum Engineering, LLC (SE) has completed a geotechnical exploration for the proposed Warehouse Relocation to be constructed at the Jindal Tubular Facility in Bay St. Louis, Mississippi. The exploration was accomplished in general accordance with SE Proposal No. G22-182, dated October 19, 2022.

Project Description

We understand that the project will include the relocation of a 15,000 square foot warehouse from the north end of the facility near Mulatto Bayou to the south end near the Port Bienville Railroad. The building will have a steel frame and will be surrounded by a stone covered parking area. Detailed structural loading information was unavailable at the time this report was prepared; however, we assumed that maximum column loads will be less than 75 kips. The floor slab load is assumed to be less than 300 pounds per square feet.

The geotechnical recommendations presented in this report are based on the available project information, building location, and subsurface materials described in this report. If any of the noted information is incorrect, please inform SE in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the client. SE 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 a cost effective foundation system for the proposed warehouse. Two (2) borings were drilled to depths of 20 feet below the existing ground surface within the building footprint. The approximate locations of the borings are indicated on a plan included in the Appendix. The plan is a reproduction of a Google Earth photo of the Jindal Tubular Facility.

Our scope of services included a reconnaissance of the project site, drilling the soil borings, select laboratory testing, and preparation of this Geotechnical Report. The report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and provides recommendations regarding the following:

- Foundation type, allowable bearing capacity, and an estimate of settlement;
- Seismic site classification;
- Site preparation, including subgrade preparation and fill compaction requirements;
- Factors influencing construction and performance of the proposed facility.

The scope of geotechnical 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.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The Jindal Tubular Facility encompasses a large tract of land situated between Port and Harbor Drive and Mulatto Bayou in Bay St. Louis. The facility consists of multiple pre-engineered metal warehouse structures surrounded by aggregate surfaced yard and parking areas. Similarly, the site of the proposed warehouse is covered with a mixture of sandy topsoil with gravel. Detailed grading information was unavailable at the time the report was prepared. However, we assumed that minimal amount of fill may be needed to achieve the floor slab design grade.

Drilling, Sampling, and Laboratory Testing Procedures

The borings were drilled with an All-Terrain Vehicle (ATV) mounted drilling rig. Auger and wet rotary drilling techniques were used to advance the borings. Samples were generally obtained continuously from the ground surface to a depth of ten feet and at maximum five foot intervals thereafter. Drilling and sampling techniques were accomplished in general accordance with ASTM Standards.

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 and were wrapped in aluminum foil prior to placement in a plastic wrapping to preserve moisture. The samples were transported to the laboratory in containers to prevent disturbance.

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. 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 D1586). 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. The split spoon samples were identified according to the project number, boring number and depth, and were also placed in polyethylene plastic wrapping to protect against moisture loss

The laboratory testing program included supplementary visual classification and water content tests on all of 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 unconfined compressive strength were made using a hand penetrometer. The laboratory testing was performed in general accordance with ASTM Standard Procedures.

Subsurface Conditions

Based on the borings, the surface is generally covered with about 10 inches of sandy topsoil with gravel underlain by a mixture of silty sand and aggregate extending to about 2 feet. The surface material was underlain by medium dense silty and clayey sand and followed by loose to medium dense clayey sand extending to a depth of 8 feet. Below the clayey sand, medium dense poorly graded sand was encountered to at least 20 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 the boring locations. These records include soil descriptions, stratification, penetration resistances, and locations of the samples and laboratory test data. The stratification 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 stratification represents 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 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 Conditions

Groundwater was initially encountered in the borings at a depth of 7 feet during drilling and was later measured at a depth of 5 feet upon completion of the drilling operations. It should be noted that groundwater level will fluctuate with seasonal variations in rainfall, extended periods of drought and surface runoff. Therefore, it is recommended that the actual groundwater level at the site be determined by the contractor at the time of the construction activities, if needed.

IBC Site Classification

The International Building Code (IBC), 2012 edition, was reviewed to determine the site classification for seismic design. Based on the soils encountered in the borings and our experience in the general vicinity, the site can be classified as Site Class "D", as outlined in Section 1613.3.2 of the Building Code.

EVALUATION 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 the exploration indicate that the soils at the site are fair in bearing quality and suitable for supporting the facility on a shallow foundation system provided the site is prepared as recommended in the report. Details related to site preparations and foundation recommendations, as well as construction considerations, are presented in subsequent sections of the report.

Site Preparation

The surface at the new warehouse site is mostly covered with a mixture of sand and gravel. Therefore, these materials may remain in place provided they are free of surface vegetation. Any topsoil with organics and other deleterious materials encountered in the development area should be stripped and removed from the site.

The exposed subgrade in the building area should be proofrolled with a rubber tired vehicle weighing about 20 tons. Soils, which are observed to rut or deflect excessively under the moving load, should be undercut and replaced with compacted structural fill. 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.

After the subgrade preparation and observation have been completed, the structural fill should be placed in a relatively uniform horizontal lift and should be adequately keyed into the stripped and scarified soils. The structural fill should consist of sandy clays or clayey sands having a maximum liquid limit of 40 percent and a maximum plasticity index of 20. The fill should be compacted to at least 95 percent of the fill's maximum dry density as determined by ASTM D698 (Standard Proctor).

The structural fill should be placed in maximum lifts of eight (8) 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. In-place density measurements should be taken to assure that the above degree of compaction is achieved. The compacted structural fill should extend five (5) feet beyond the perimeter of the building prior to sloping. Adequate drainage should be provided prior to and during site work. The site should be graded to promote rapid runoff.

Crowning of the building pad during fill placement, particularly in wet periods, is highly recommended to minimize ponding of water and allow rapid runoff of surface water. Construction traffic should not be allowed on the building pad during wet weather, where practical.

Shallow Footings

Based on the field data and laboratory test results, the proposed warehouse may be supported on a shallow foundation system, provided the site is prepared as discussed in the Site Preparation section of this report. Spread footings and continuous footings bearing at least two (2) feet below the finished grade in the medium dense naturally occurring sand or on compacted structural fill, could be designed for maximum allowable bearing pressures of 2,500 and 2,000 psf, respectively. 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 above bearing capacities include a design factor of safety of three (3).

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 the 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 equations:

$$P_p = 360H \text{ (Sand)}$$

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 footings 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.

The foundation excavations should be observed by a representative of SE 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 structural fill, as determined by the Geotechnical Engineer.

The concrete should be placed in the footing excavations 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

Settlement of spread footings, designed for the recommended bearing pressure, is estimated to be less than one (1) inch. Differential settlement will be about 50 percent of the total settlement. While settlement of this magnitude is generally considered tolerable for structures of the type proposed, the design of masonry walls should include provisions for liberally spaced, vertical control joints to minimize the effects of cosmetic cracking.

Floor Slab

The soil supported floor slab for the proposed warehouse should bear on a minimum of two (2) feet of compacted structural fill. Placement of the new fill and preparation of the subgrade should be performed in accordance with the Site Preparation section of the report to identify any soft or unstable soils which should be removed from the floor slab area prior to additional fill placement and/or floor slab construction.

For design purposes, a Modulus of Subgrade Reaction (k) of 125 pci for the compacted structural fill may be used in the floor slab design. However, a higher Modulus of Subgrade Reaction, on the order of 300 pci, can be used with the addition of 6 inches of aggregate base. The aggregate base will better distribute the floor load to the underlying subsurface soils and provide a good working surface during construction. The aggregate base under the floor slab should consist of 610 crushed limestone conforming to the following grading requirements:

U.S. Standard Sieve Size	% Passing, by Weight
1 ½"	100
1"	90-100
¾"	70-100
No.4	35-65
No.40	12-32
No.200	5-12

The crushed limestone should be compacted to 95 percent of its maximum dry density as determined by ASTM D698. The floor slab should have an adequate number of joints to reduce cracking resulting from any differential movement and shrinkage. When practical, the floor slab should not be rigidly connected to columns, walls or foundations. Consideration should be given to placing polyethylene sheeting between the fill and the floor slab, particularly in the office areas or other areas receiving floor coverings, to act as a vapor barrier and protect the slab from potential problems commonly associated with moisture migration through floor slabs in controlled environments.

CONSTRUCTION CONSIDERATIONS

It is recommended that SE be retained to provide observation and testing of construction activities involved in the foundations and related activities of this project. SE cannot accept any responsibility for any conditions which deviate from those described in this report, nor for the performance of the foundations, if not engaged to also provide construction observation and testing for this project.

Moisture Sensitive Soils/Weather Related Concerns

The upper soils encountered at this site are relatively 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 that 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 excavations, floor slab area, or on the prepared subgrade 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 building.

Groundwater was measured in the borings at an approximate depth of 5 feet upon completion of the drilling operations. However, 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 soils. Any water accumulation should be removed from the excavations by pumping. If excessive and uncontrolled amounts of seepage occur, the Geotechnical Engineer should be consulted to provide additional recommendations, if necessary.

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 ensure 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 excavation, 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. SE 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 subsurface information obtained by SE and design details furnished by Dammon Engineering, Inc. and Jindal Tubular USA, LLC. 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, SE should be notified immediately to determine if changes in the foundation recommendations are required. If SE is not notified of such changes, SE 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 in to the design documents. At that time, it may be necessary to submit supplementary recommendations. If SE is not retained to perform these functions, SE will not be responsible for the impact of those conditions on the project. This report has been prepared for the exclusive use of Jindal Tubular USA, LLC for the specific application to the proposed Warehouse Relocation to be constructed at the south end of the Jindal Tubular Facility in Bay St. Louis, Mississippi.

APPENDIX

STRATUM ENGINEERING, LLC

STRATUM ENGINEERING, LLC

BORING LOCATION PLAN

SE PROJECT NO. G22-111

GEOTECHNICAL ENGINEERING SERVICES
PROPOSED WAREHOUSE RELOCATION
JINDAL TUBULAR FACILITY
BAY ST. LOUIS, MISSISSIPPI

STRATUM ENGINEERING, LLC

LOG OF BORING B-1

PROPOSED WAREHOUSE RELOCATION
JINDAL TUBULAR FACILITY
BAY ST. LOUIS, MISSISSIPPI

TYPE OF BORING: WET ROTARY **LOCATION:** BUILDING AREA **PROJECT NO.:** G22-111

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" Sandy Topsoil with gravel Dense gray Poorly Graded Sand with aggregate	36					4			
			Medium dense tannish gray Silty Clayey Sand	11					12	19	6	39
5			Loose reddish tan Clayey Sand ▼	9					13			
			▽		0.78	1.00		112	18	42	26	29
			Medium dense tannish gray Poorly Graded Sand	20					21			
10												
				20					27			6
15												
				25					25			
20												
			Boring Terminated at 20 Feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet **GROUNDWATER:** Measured at 5 Feet Upon Completion of Drilling
DATE: 10/26/2022

STRATUM ENGINEERING, LLC

LOG OF BORING B-2

PROPOSED WAREHOUSE RELOCATION
JINDAL TUBULAR FACILITY
BAY ST. LOUIS, MISSISSIPPI

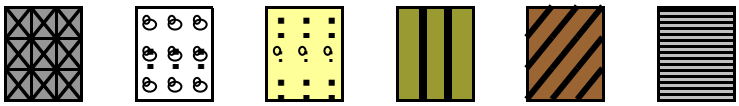
TYPE OF BORING: WET ROTARY **LOCATION:** BUILDING AREA **PROJECT NO.:** G22-111

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" Sandy Topsoil with gravel Medium dense gray Silty Sand	11					9			31
			Loose to medium dense reddish tan Clayey Sand	9					17			
5			▼		1.70	2.00		116	16	38	23	32
			▽			0.50			20			
			Medium dense tannish gray Poorly Graded Sand	25					24			6
10												
			- dense at 13'	33					24			
15												
				17					24			4
20												
			Boring Terminated at 20 Feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet **GROUNDWATER:** Measured at 5 Feet Upon Completion of Drilling
DATE: 10/26/2022

KEY TO TERMS AND SYMBOLS USED ON LOGS

SOIL TYPE

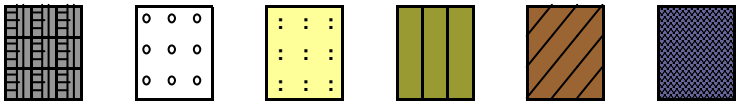


ROCK | GRAVEL | SAND | SILT | CLAY | PEAT

SAMPLER TYPE

NO SAMPLE | AUGER SAMPLE | SHELBY TUBE | SPLIT SPOON

MODIFIERS



STONE | GRAVELY | SANDY | SILTY | CLAYEY | FILL

NO RECOVERY | ROCK CORE | 2" SHELBY TUBE | TXDOT CONE

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

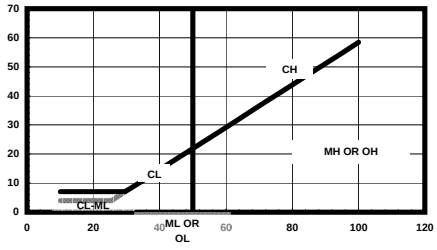
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS LESS THAN 50% PASSING NO. 200 SIEVE	GRAVEL & GRAVELY SOILS LESS THAN 50% PASSING NO. 4 SIEVE	CLEAN GRAVEL (LITTLE OR NO FINES	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND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

152	76.2	19.1	4.76	2.0	0.42	0.075	0.002

GRAIN SIZE IN MM