Geotechnical Testing Laboratory, Inc.

Engineering and Construction Materials Testing Services

November 22, 2017

RE: Geotechnical Investigation Services

380 Skyline Drive
Many, Sabine Parish, Louisiana
Report No. 11-17-184

Geotechnical Testing Laboratory, Inc. is pleased to submit this report of subsurface exploration for the above referenced project. Included in the report are the results of the exploration and recommendations concerning the design and construction of the foundations as well as general site development.

We appreciate the opportunity to have provided you with our geotechnical engineering services. If you have any questions concerning this report, or if we may be of further service, please contact our office.

Respectfully submitted,
Geotechnical Testing Laboratory, Inc.

N. J. Gorsha, P.E.
Louisiana Registration No. 20082

Ken Gorsha
President

11/22/17
STATE OF LOUISIANA
N.J. GORSHA
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REGISTERED
PROFESSIONAL ENGINEER
IN
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Geotechnical Investigation Services

380 Skyline Drive
Many, Sabine Parish, Louisiana
Report No. 11-17-184

Prepared By:

Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, Louisiana 71301

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APPENDICES

Geotechnical Investigation Services

380 Skyline Drive
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Introduction:

This report transmits the findings of a geotechnical investigation performed for the above-referenced project. The purpose of this investigation was to define and evaluate the general subsurface conditions in the immediate vicinity of a proposed residence. Specifically, the study was planned to determine the following:

- Subsurface stratigraphy within the limits of our exploratory borings.
- Classification, strength, and compressibility characteristics of the foundation strata.
- Suitable foundation systems and allowable soil bearing pressures.
- Construction requirements for the placement of select earth fills.

The purpose of this report is to provide the owner, structural engineer, civil engineer, and other design team professionals with recommendations for the design and construction of the proposed project. This report should not be used by the contractor in lieu of project plans and specifications.

Project Authorization:

Formal authorization to perform the work was provided by (Client), by accepting our November 1, 2017 written proposal. Authorization to proceed was provided on November 2, 2017. Field procedures were conducted on November 14, 2017. To accomplish the intended purposes, a three-phase study program was conducted which included:

- a field investigation consisting of two exploratory test borings with samples obtained at selected intervals;
- a lab testing program designed to evaluate the expansive and strength characteristics of the subsurface soils; and,
- an engineering analysis of the field and laboratory test data for foundation design recommendations.

No additional analysis was requested. A brief description of the field and laboratory test procedures are provided in the Appendix.

Project Description:

We understand that the project will consist of a two-story, wood-framed residence with approximately 2,300 square feet of heated area. The new log cabin structure will reportedly have a pier-and beam foundation with the first floor elevated above the existing grades to permit a crawl space between the finished floor and natural ground.

For the purpose of this report, we have assumed that maximum pier loads will not exceed approximately 25 kips (1 kip = 1,000 pounds). Based on the existing site topography, it appears that the building pad area is at-grade for the anticipated construction. If grade changes greater than two (2) feet are anticipated, these should be discussed with our geotechnical engineer prior to finalizing design.

If any of this information should change significantly or be in error, it should be brought to our attention so that we may review recommendations made in this report.

Site and Subsurface Conditions:

The site for the proposed residence is at physical address 380 Skyline Drive in Many, Sabine Parish, Louisiana. Toledo Bend Reservoir is positioned along the northwest property line. The site was noted to slope downward to the northwest with visually-estimated elevation differences of between approximately four (4) and five (5) feet. The site was vegetated with weeds and grass at the time of drilling. The drilling rig experienced moderate difficulty moving about the site.

Subsurface Stratigraphy:

The subsurface conditions at the proposed building site were explored by drilling a total of two (2) borings to depths between approximately 15 and 25 feet. A site plan was not available to this office at the time this report was prepared. Borings B-1 and B-2 were drilled near the southeast and northwest corners of the building, respectively. The general site location is shown on the Site Location Map included in the Appendix of this report.

The stratification of the soils encountered during field drilling operations is presented on the boring logs in the Appendix. The stratification of the subsurface materials shown on the boring logs represents the subsurface conditions encountered at the actual boring locations and variations may occur across the site. The lines of demarcation represent the approximate boundary between the soil types, but the actual transition may be gradual. The following subsurface descriptions are of a generalized nature to highlight the major stratification features. The boring logs should be reviewed for more detailed information.

In order of increasing depth, the borings generally encountered the following soil strata beneath the surface: fat clay (CH) and lean to fat clay (CL-CH). A layer of very dense iron oxide was encountered at a depth of approximately eight (8) feet in Boring B-1.

Groundwater Conditions:

Groundwater seepage was not observed during advancement of the test borings and, after short time lapses, the borings remained dry and un-caved. The subsurface water regime is subject to change with variations in climatic conditions. Future construction activities may also alter the surface and/or subsurface drainage patterns of this site. Therefore, groundwater conditions should be explored at the start of construction by others. If there is a noticeable variance from the observations reported herein, then GTL should be notified immediately to review the effect, if any, such data may have on the design recommendations. It is not possible to predict future ground water conditions based upon short-term observations.

Foundation Recommendations:

Potential Vertical Rise (PVR) values were estimated to vary between approximately 3.25 and 4.5 inches for this site. One (1) inch of PVR is generally accepted as the maximum allowable value for design and construction in the geographical area. The surficial soils encountered by the borings are considered to be highly expansive. In order to limit the PVR to a value of one (1) inch or less, this will require the placement of a minimum of seven (7) feet of select fill beneath all areas of the building. Generally, when the depth of excavation is greater than five (5) to six (6) feet, drilled shafts or driven piles become more economical to install. The recommendations herein address deep foundations for the main structure.

Foundation Subgrade Preparation:

To prepare for the foundation construction, we recommend that all topsoil, vegetation, roots, and any soft soils in the building area be stripped from the site and either properly disposed or stockpiled for later use in landscaping. Utilities should be located and rerouted as necessary.

Option 1 - Drilled Shafts:

Loads for the structure should be supported on drilled shafts with underreams. Underreamed shafts should have a minimum bell diameter to shaft diameter ratio of 2.0 to resist uplift forces associated with shrinking and swelling of the site soils that may be created by soil-to-shaft adhesion in the zone of expansive clays. A maximum bell diameter to shaft diameter ratio of 3.0 is also recommended.

Shafts should be founded at a minimum depth of 15 feet below the existing ground surface and should not extend below a depth of 25 feet. Such shafts may be proportioned using a maximum allowable net end bearing pressure of 6,000 lbs/ft², plus an average unit allowable skin friction pressure of 400 lbs/ft² based on dead load plus live load considerations. Skin friction values for downward capacity should be ignored for the surficial five (5) feet and the bottom portion of the shaft equal to one-half the base diameter above the top of the underream. The factor of safety for the above values is 2.0.

Drilled Shaft Considerations:

It is recommended that the design and construction of drilled piers should generally follow methods outlined in the manual titled Drilled Shafts: Construction Procedures and Design Methods (Publication No: FHWA-IF-99-025, August 1999).

We emphasize that close engineering supervision is essential during installation of the drilled pier foundations in order to assure that construction is performed in accordance with the plans and specifications. Also, to insure proper construction of the drilled piers at this site, close coordination between the drilling and concreting operations is considered to be of great importance. Detailed inspection of drilled shaft construction should be made to verify that the shafts are vertical and founded in the proper bearing stratum and to verify that all loose materials have been removed prior to concrete placement.

Option 2 - Driven Piles:

The bearing capacity of the naturally occurring soil was evaluated from the results of the Standard Penetration Tests (SPT) and the Unified Soil Classifications. These test results indicate that the existing soil has a low bearing capacity with respect to shear strength. The superstructure loads may be supported on Class B creosote treated timber piles founded at a minimum depth of 20 feet below the existing ground surface. The final depth of the piles may be selected from the following table after considering the estimated structural total loads.

Depth of Embedment (feet)	Allowable Compressive Single Pile Capacity (kips)
20	20
25	25

Consideration may also be given to using Class 5 piles. Such piles may be selected from the following table.

Depth of Embedment (feet)	Allowable Compressive Single Pile Capacity (kips)
20	15
25	20

If desired, allowable capacities for larger piles may be provided upon request. The factor of safety for these calculations is at least 2.0. Total settlement is estimated to be on the order of one (1) inch or less for foundation units designed in accordance with recommendations

provided herein. Differential settlements (between adjacent piles) are estimated to be on the order of ½ inch or less.

The supports between the bottom of all supports at ground surface and the bottom of the structure should be braced in both directions to resist lateral sway from wind loads. Resistance to uplift from wind loads should be provided by earth anchors consisting of either helical piers or earth screws. The foundation contractor should be responsible for the placement and depth of the anchors.

Driven Pile Considerations:

It is recommended that the installation of driven piles should generally follow methods outlined in Section 804 of the Louisiana Standard Specifications for Roads and Bridges, 2006 Edition. LaDOTD specifications may vary and clarifications may be necessary where this information conflicts with LaDOTD requirements.

Detailed inspection of driven pile construction should be made to verify that the piles are driven vertically and founded in the proper bearing stratum. The installation of all piling should be monitored by personnel familiar with the construction techniques required to install timber piles.

The presence of a very dense layer of iron oxide that was encountered in Boring B-1 indicates that pre-drilling for the piles may be necessary to stabilize the driven piles to prevent lateral drifting prior to achieving the final depth. Pilot holes may extend to a depth no deeper than 10 feet. The piling should be driven below the depth of the pilot hole to depths shown on the final plans, but not less than the required bearing resistance shown on the plans. In any case, piling should not be driven beyond the point where the blow count exceeds 30 blows per foot for timber piles and 250 blows per foot for concrete piles. If damage to the pile is apparent, driving should cease.

All pile driving should be performed with power hammers. Steam or air hammers should be operated at not less than 80 percent of the manufacturer's rated capacity. All piles, including test pile, should be driven with the same hammer.

Seismicity:

Based on Section 1613 of the IBC-2012, a Site Class of D has been estimated for this site due to the lack of subsurface information to a depth of 100 feet. According to the USGS website for Seismic Hazard Design Parameters, the project site has a mapped 0.2 second spectral response acceleration (S_s) of 0.094 g. The project also has a mapped 1.0 second spectral response acceleration (S_l) of 0.059. The design spectral response accelerations, S_{DS} and S_{Dl}, were determined to be 0.100 g and 0.094 g, respectively. Based on Tables 1613.3.5(1) and 1613.3.5(2), the site has an assigned Seismic Design Category of B for structures classified as Risk Categories I, II, and III. For structures classified as Risk Category IV, site has an assigned Seismic Design Category of C.

Construction Considerations:

Excessive movement should not occur if customary measures are taken to minimize moisture variations beneath the structure to preclude loss of shear strength of foundation soils. Proper surface drainage should be maintained, and landscape irrigation systems should be located and operated in a manner to minimize wetting of building foundations. Positive drainage away from the building should be provided at all times, including during construction. If positive drainage is not provided, water will pond around or below the building and excessive total and differential movements may occur.

Secondary Design Considerations:

The following information has been assimilated after examination of numerous problems dealing with soil strata throughout Louisiana. It is presented here for implementation by others. If these features are not incorporated, then performance of the structure may be **"at-risk".**

1. Roof drainage should be **routed via pipe or a hard surface at least 5 feet from the structure.**
2. The **depth of frost penetration** in the vicinity of the project site is estimated to be approximately six inches.
3. Pavements, sidewalks, and the general ground surface should be sloped away from the structure on all sides. Water must not be allowed to pond within 5 feet of the building.
4. Backfill for utility lines should be compacted to at least 95 percent of the standard compaction test (ASTM D-698).
5. Surficial soils of the type encountered at this site are subject to erosion. Therefore, unpaved areas should be protected from erosion by the establishment of a good vegetation cover.
6. Clayey fill has been specified for Select Fill to reduce the potential migration of water beneath the proposed establishment. Drainage details must focus on routing water away from the structure. Excessive water intrusion can produce undesirable latent vertical movement.
7. Landscaping elements, including irrigation systems must not be allowed to introduce excess water to the structure subgrade. Monitor irrigation controls frequently and adjust to avoid over-watering of plants positioned in close proximity to the structure.

Safety Considerations:

Prior to the commencement of construction, the owner and the contractor should make themselves aware of and become familiar with applicable local, state, and federal safety regulations, including the current Occupational Safety and Health Association (OSHA) Excavation and Trench Safety Standards. Construction site safety generally is the sole responsibility of the contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. We are providing this information solely as a service to our client. Under no circumstances should the information provided herein be construed that GTL is assuming responsibility for construction site safety of the contractor's activities. Such responsibility is not being implied and should not be inferred.

Drainage:

Water should not be allowed to collect near the foundations of the project either during or after construction. Undercut or excavated areas should be sloped toward a sump area to facilitate removal of any collected groundwater or surface runoff. Proper drainage should be provided by sloping the ground surface away from the structure.

Weather Considerations:

The soils encountered in the surficial zone at this site are expected to be relatively sensitive to disturbances caused by construction traffic when wet. The contractor should be aware of the importance of proper maintenance of surface drainage. Depending on weather-related ground conditions, contractor’s maintenance of drainage during construction, and other factors, some difficulty may be encountered by the contractor in achieving compaction on initial lifts of fill placed on loose or soft subgrade. This will be exacerbated by wet weather, particularly if the contractor allows surface drainage to enter and pond in the excavations.

Fine-grained soils are expected to be relatively sensitive to disturbances caused by construction traffic and to changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support characteristics. In addition, soil which becomes 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. Earthwork activities performed during cooler, wetter months may certainly offer more difficulties than if performed during warmer, drier periods.

If construction is performed during wet conditions, work platforms can be created for earthwork by mixing fly ash, hydrated lime, cement, or combinations of these additives. Quick lime may also be used in areas where dusting is of concern, if proper worker safety considerations are observed. Pumping subgrades are possible at the site and it is recommended that bid documents incorporate this possibility into the bid schedule.

The use of geotextiles and geogrids may be warranted in situations where the subgrade is very wet and highly unstable, if such use is necessary to maintain a mandatory construction schedule during wet weather.

Groundwater Control:

Due to potential variations in groundwater levels, difficulty during excavation and construction of the proposed foundation is possible. Shallow groundwater was not encountered at this site. However, it is reasonable to anticipate that groundwater conditions may vary as noted previously. It is suggested that contract documents address the need for maintaining controls to preclude water from draining into excavations. Some dewatering through shaping of work areas to shed water, and construction of temporary ditches with sumps and pumping may be necessary to remove the loose soils and allow placement of imported select fill in a dry manner. Excavated soils intended for re-use as select fill may require special methods in order to dry the soil to a suitable moisture content prior to re-placing the soil as select fill.

Protection of Work:

Subgrade areas, base courses, and lifts of fill that have been successfully moisture conditioned, processed, and compacted in lifts to the required density, successfully proofrolled, and approved must be protected from changes in moisture and other influences. Satisfactorily completed areas may be adversely affected by prolonged exposure to dry weather, precipitation, equipment traffic, or by excavations and uncontrolled backfilling for utilities, and other disturbances rendering such areas unsatisfactory. Such areas should be reworked prior to continuing with subsequent construction.

Geotechnical Risk:

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools which geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations presented in the preceding sections constitutes GTL's professional estimate of those measures that are necessary for the proposed structure to perform according to the proposed design based on the information generated and referenced during this evaluation, and GTL’s experience in working with these conditions.

Limitations:

The exploration and analysis of the conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the foundation design. The recommendations submitted are based on the available soil information and preliminary design details furnished for the proposed project. Any revision of the plans for the proposed facility from those enumerated in this report should be brought to our attention so that we may determine if changes in the foundation recommendations are required. If deviations from the noted subsurface conditions are encountered during construction, GTL should be retained to determine if changes in foundation recommendations are required. If GTL is not retained to perform these functions, we will not be responsible for the performance of the structure.

The findings, recommendations, specifications, or professional advice contained herein have been made after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

The scope of services did not include any environmental assessment for 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, or unusual or suspicious items or conditions are strictly for the information of the client. Prior to purchase or development of this site, an environmental assessment is advisable.

The scope of services did not include a geologic investigation to address any faults, large scale subsidence, or other macro geologic features not specifically addressed in this report or the agreement between GTL and the client.

After the plans and specifications are more complete, it is recommended that the soils and foundation engineer be provided the opportunity to review the final design and specifications in order that the earthwork and foundation recommendations may be properly interpreted and implemented. At that time, it may be necessary to submit supplementary recommendations.

This report has been prepared for the exclusive use of our client for the specific application to the referenced project. GTL cannot be responsible for interpretations, opinions, or recommendations made by others based on the data contained in this report.

This report was prepared for design purposes only and may not be sufficient for purposes of preparing an accurate bid for construction. Contractors reviewing this report are advised that the discussions and recommendations contained herein were provided exclusively to and for use by the project owner.

END OF REPORT TEXT

SEE FOLLOWING APPENDIX w/BORING LOGS & TEST RESULTS

APPENDIX A

FIELD AND LABORATORY PROCEDURES

Field and Laboratory Procedures

380 Skyline Drive
Many, Sabine Parish, Louisiana
Report Number 11-17-184

I. Field Operations:

Subsurface conditions were evaluated by advancing two (2) intermittent sample borings on November 14, 2017 within the project area. Boring locations were selected and staked in the field by representatives of Geotechnical Testing Laboratory, Inc. An illustration of the approximate site location with respect to the area investigated is provided on the Site Location Map in the Appendix of this report. Descriptive terms and symbols used on the logs are in accordance with the Unified Soil Classification System.

A truck-mounted rotary drill rig was used to make the test borings. Each boring was advanced in the dry using flight auger drilling techniques. Intermittent undisturbed samples were obtained in the following manner.

Standard penetration tests were performed in accordance with ASTM D-1586 procedures. This test is conducted by recording the number of blows required for a 140-pound hammer falling 30 inches to drive a split-spoon sampler eighteen inches into the substrata. Depths at which split-spoon samples were taken are indicated by two crossed lines in the "Samples" column on the Log of Boring. The number of blows required to drive the sampler for each 6-inch increment were recorded. The penetration resistance is the number of blows required to drive the split-spoon sampler the final 12-inches of penetration. Information related to the penetration resistance is presented under the "Field Data" heading of the Log of Boring as the Standard Penetration (Blows/Foot). These samples were visually examined, logged, and packaged for transport to our laboratory.

Cohesive strata were sampled in accordance with ASTM D-1587 procedures by means of pushing a thin walled Shelby tube a distance of two feet into the substrata. Consistency of the sample was measured in the field by means of a calibrated hand penetrometer. Such values, in tons per square foot, are provided under the "Field Data" heading on the Log of Boring. Depths which these undisturbed samples were obtained are indicated by a shaded portion in the "Samples" column of the Log of Boring. All samples were prudently extruded in the field were sealed to maintain "in-situ" conditions, labeled, and packaged for transport to our laboratory.

The presence of ground water was monitored during drilling operations. Initial water seepage readings are provided under "Groundwater Information" in the right hand column of the Log of Boring. Upon boring completion, water levels were allowed to rise and stabilize for several minutes prior to final water readings. These readings are found under “Groundwater Information”. Soil sloughing from the walls of the boring are also recorded here as depth of cave-in.

II. Laboratory Studies:

Upon return to the laboratory, all samples were visually examined and representative samples were selected for testing. Tests were performed on selected samples recovered from the test borings to verify classification and to determine pertinent engineering properties of the substrata. Individual test and ASTM designations are provided below:

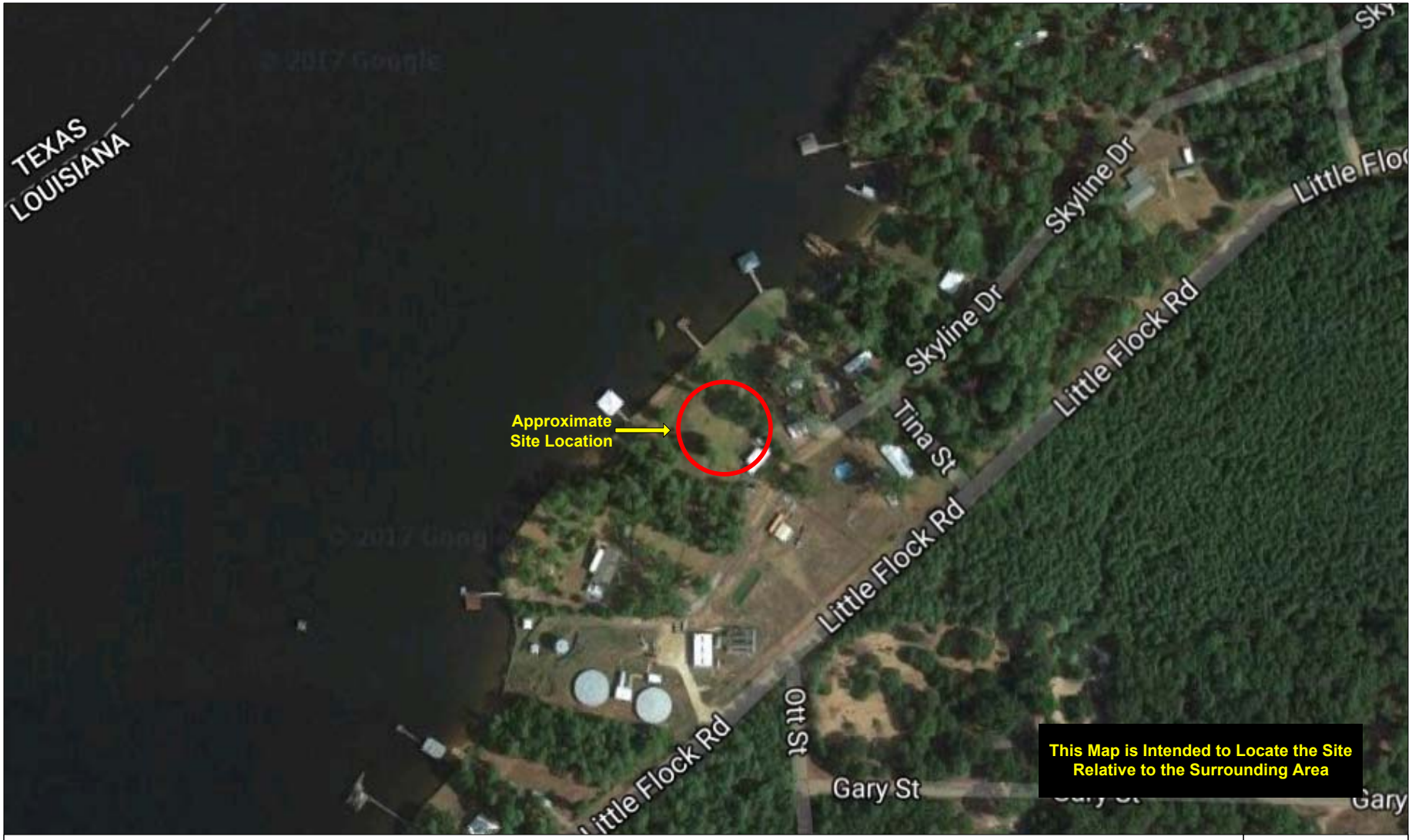
Test	ASTM Designations
Atterberg Limits	ASTM D 4318
Moisture Content	ASTM D 2216
Percent Minus #200	ASTM D 1140
Unconfined Compression (Soil)	ASTM D 2166

Results for soil classifications are located on the Log of Boring in their respective columns under "Laboratory Data."

Samples obtained during our field studies and not consumed by laboratory testing procedures will be retained free of charge for a period of 30 days. Arrangements for storage beyond that period of time must be made in writing to ***Geotechnical Testing Laboratory, Inc.***

APPENDIX B

SITE LOCATION MAP



Site Location Map

PROJECT			
380 Skyline Drive, Many, Sabine Parish, Louisiana			
SCALE	DATE	FILENAME	
Not to Scale	11/17/2017	11-17-184	

APPENDIX C

BORING LOGS AND SOIL CLASSIFICATION CHART

LOG OF BORING B-1

Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

LOCATION: **Many, Sabine Parish, Louisiana**
FILE NO.: **11-17-184**
DRILL DATE: **11/14/17**

DRILLING METHOD(S):
CME 45B, 4.5" I.D. Hollow Stem Auger

DRILLER: **R. Leggett** CHECKED BY: **K. Gorsha**

GROUNDWATER INFORMATION:
No Water Seepage Noted While Drilling
No Water Observed Upon Completion
Boring Walls Remained Open

SURFACE ELEVATION: **Not Determined**

FIELD DATA			LABORATORY DATA							
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (Lb./Sq. Ft.)	DESCRIPTION OF STRATUM
			N = 4	30	72	27	45	97			Firm Reddish Brown & Gray FAT CLAY (CH)
			N = 4	31							
	5		P = 1.25	30	74	27	47	98	81	2128	- stiff, gray & yellowish brown below 4.5 feet
			P = 1.25	33					80	2420	
											8.0'
			N = 50-4"	15					87	3905	Very Dense Red Iron Oxide
											9.5'
	10		P = 2.25	31	95	31	64	99	83	3929	Stiff Gray & Yellowish Brown FAT CLAY (CH) w/calcareous nodules
			P = 1.75	28					91	3181	
	15										17.0'
				23	50	20	30	93		**	Stiff Gray & Yellowish Brown LEAN to FAT CLAY (CL-CH) w/sandy silt (ML)s seams
	20										
			N = 15	32							
	25										
	30										30.0'
											Boring Terminated @ 30.0 Feet

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
Boring Made Near Southeast Corner of Pad
GPS Coordinates: N 31° 21'54.42" / W 93° 38'19.59"
Stratification Is Not Exact
** = Disturbed Sample

GTL LOG - LOG A GNNL01.GDT - 11/17/17 05:56 - H:\GINT PROJECTS\2017 JOBS\11-17-184.GPJ

LOG OF BORING B-2

Geotechnical Testing Laboratory, Inc.
226 Parkwood Drive
Alexandria, LA 71301
Telephone: (318) 443-7429

LOCATION: **Many, Sabine Parish, Louisiana**
FILE NO.: **11-17-184**
DRILL DATE: **11/14/17**

DRILLING METHOD(S):
CME 45B, 4.5" I.D. Hollow Stem Auger

DRILLER: **R. Leggett** CHECKED BY: **K. Gorsha**

GROUNDWATER INFORMATION:
No Water Seepage Noted While Drilling
No Water Observed Upon Completion
Boring Walls Remained Open

SURFACE ELEVATION: **Not Determined**

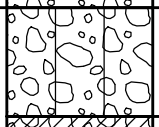
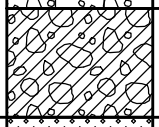
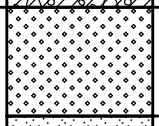
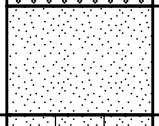
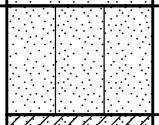
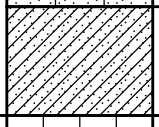
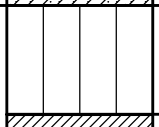
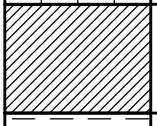
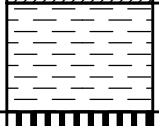
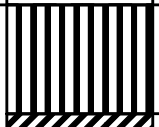
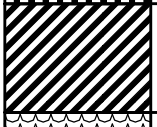
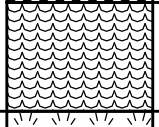
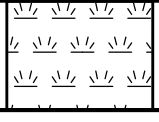
	FIELD DATA			LABORATORY DATA							
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (Lb./Sq. Ft.)	DESCRIPTION OF STRATUM
											Stiff Red & Brown FAT CLAY (CH)
			N = 10	33							
			P = 1.50	36	91	29	62	97	77	2432	- yellowish brown & gray below 3.0 feet
	5		P = 1.50	38					78	2727	
			P = 1.75	38	94	31	63	98	77	3040	
			P = 1.50	32					86	2689	
	10										12.0'
			N = 14	28	55	18	37				Dense Red Iron Oxide over Stiff Yellowish Brown & Gray LEAN to FAT CLAY (CL-CH) w/sandy silt (ML)s layers
	15										15.0'
											Boring Terminated @ 15.0 Feet

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
Boring Made Near Northwest Corner of Pad
GPS Coordinates: N 31° 21'54.59" / W 93° 38'19.64"
Stratification Is Not Exact
** = Disturbed Sample

GTL LOG - LOG A GNNL01.GDT - 11/17/17 05:56 - H:\GINT PROJECTS\2017 JOBS\11-17-184.GPJ

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS