Geotechnical Testing Laboratory, Inc.

Engineering and Construction Materials Testing Services

Exhibit 17 - Preliminary Geotechnical Study

January 29, 2015

Meyer, Meyer, LaCroix & Hixson, LLC
100 Engineer Place
Alexandria, Louisiana 71303

Attention: Mr. Jacob Dillehay, E.I.

RE: Preliminary Geotechnical Investigation Services
LED Site Certification – Town of Jena, Louisiana
Jena, LaSalle Parish, Louisiana
GTL Report No. 01-15-011

Dear Mr. Dillehay:

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

We appreciate the opportunity to have provided you with our geotechnical engineering services and look forward to assisting you by providing additional investigation services for individual projects during the development of the subject tract. 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

1/29/15
STATE OF LOUISIANA
N.J. GORSHA
REG. No. 20082
REGISTERED
PROFESSIONAL ENGINEER
IN
ENGINEERING

Distribution: (3) Meyer, Meyer, LaCroix & Hixson, LLC

NJG/krg

Preliminary Geotechnical Investigation Services
LED Site Certification – Town of Jena, Louisiana
Jena, LaSalle Parish, Louisiana
GTL Report No. 01-15-011

Prepared For:

Meyer, Meyer, LaCroix & Hixson, LLC
100 Engineer Place
Alexandria, Louisiana 71303

Prepared By:

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

TABLE OF CONTENTS

APPENDIX

Preliminary Geotechnical Investigation Services
LED Site Certification – Town of Jena, Louisiana
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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 general vicinity of a planned industrial complex. 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.

The purpose of this report is to provide the owner, structural engineer, civil engineer, and other design team professionals with preliminary recommendations to consider 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 Mr. Glenn A. Turner, P.E., Vice President with Meyer, Meyer, LaCroix & Hixson, LLC (Client), by accepting our December 1, 2014 written proposal. Authorization to proceed was provided on the same day. Field procedures were conducted on January 20, 2015, and were delayed due to inclement weather and site access. To accomplish the intended purposes, a three-phase study program was conducted which included:

- a field investigation consisting of three 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 preliminary 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:

The project will be the development of an industrial park site. We understand that the industrial park could consist of a number of structures varying from one (1) story to four (4) stories in height. Preliminary structural information was not available at the time this report was prepared. The proposed buildings should consist of either steel or wood framing and could be supported on either shallow foundations, or on drilled shafts bearing at depths sufficient to resist the anticipated loadings. The pavements will most likely consist of light duty pavements for passenger cars and pickup trucks and heavy duty pavements for tractor-trailer trucks.

For the purpose of this report, we have assumed that column loads could be between 25 and 150 kips, and that maximum continuous wall loads will be between one (1) and four (4) kips per linear foot. Maximum uniform and isolated concentrated floor loads are expected to be 125 psf and five (5) kips, respectively. Grade changes are expected to be nominal with no more than two (2) to three (3) feet of cut or fill.

Information pertaining to anticipated traffic loads and volumes was not available. For the purpose of our pavement analysis of this report, we assume that the industrial traffic could consist of up to 250 repetitions of light passenger cars and pick-up trucks, 25 medium-sized delivery trucks and vans, and up to 25 heavy tractor-trailer trucks per day.

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 project site is located southwest of the intersection of State Highway 8 and Hanger Road in Jena, LaSalle Parish, Louisiana. The site was noted to slope downward to the southwest with estimated elevation differences on the order of 10 to 11 feet. The site was vegetated with heavy timber and underbrush at the time of drilling. The drilling rig experienced moderate difficulty moving about the site.

Subsurface Stratigraphy:

The subsurface conditions around the perimeter of the proposed site were explored by drilling a total of three (3) borings to depths between approximately 20 and 60 feet. The borings were located in the field by the drilling crew as shown on the Plan of Borings 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: lean clay (CL), poorly graded sand (SP-SM), lean to fat clay (CL-CH), and silty sand (SM).

Groundwater Conditions:

Seepage was observed at depths of 15 and 43 feet during advancement of the test borings, but the holes remained dry and un-caved shortly after completion of the drilling. We feel that the seepage was most likely from a perched water table that probably fluctuates with seasonal rainfall. 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:

Due to very limited access to the site, the soil parameters presented herein are based on single borings placed at irregular intervals around the perimeter of the property. Aerial photographs indicate the presence of drainage gullies across the general area. The deviations between the boring locations indicate variable subsurface conditions across the site and should not be assumed as representative of the entire site. Thus, the findings presented herein should be considered preliminary in nature and should be confirmed through further investigation prior to

development of the subject parcel. Prior to developing any section of the tract, a specific subsurface investigation should be obtained and tailored to the individual project. This report should not be used in lieu of a final geotechnical investigation addressing site specific needs for the intended projects.

Detailed information on structural systems and planned grading was not available to us at the time this report was prepared. Based on the size and type of anticipated structures, as well as the findings from this investigation, a system of shallow footings with an on-grade floor slab, in conjunction with the recommended subgrade preparation is believed to be the most practical and economical means of support. However, heavier building loads could result in the use of deep foundations. The dense to very dense soil consistencies revealed in Boring B-1 essentially preclude driven piles. Therefore, deep foundations will be limited to discussion of drilled, straight-sided, cast-in-place concrete shafts. Recommendations for both foundation types are discussed separately below followed by general pavement recommendations.

A Potential Vertical Rise (PVR) value of less than one (1) inch was determined 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 moderately expansive.

Trees or tree stumps located within any of the building limits should be grubbed and removed. The diameter of the excavation should be at least three (3) feet larger than the tree diameter and dry soils and roots ½ inch in diameter or greater should be grubbed to a minimum depth of four (4) feet below finished subgrade elevation. The resulting depression should be backfilled and compacted with select fill as discussed in a subsequent section of this report.

Shallow Foundations:

Based on the limited information from our preliminary borings, the grading for the building pads should provide not less than 12 inches of density-approved select fill below the finished subgrade elevation for the slabs and should extend at least five (5) feet beyond the perimeter of the buildings. The fill can be used to elevate the building pads so that positive drainage is provided away from the buildings. Where feasible, elevating the building pad with fill is generally desirable because this aids in providing positive drainage away from the floor slabs and foundations and helps prevent water from collecting in the filled areas.

Shallow foundations may utilize individual or continuous footings bearing within the upper five (5) feet of the surficial zone. The provision of at least one (1) to two (2) feet of select fill should be anticipated to provide a suitable subgrade for the structures. Typical bearing capacity values for shallow spread footings may vary from between approximately 1,500 psf to 2,500 psf for soils with consistencies of medium dense or medium stiff. Strip footings for continuous wall loads may be estimated between 1,150 and 2,000 pounds per linear foot.

The above allowable soil bearing values should result in a total settlement of one (1) inch, with approximately ½ inch occurring differentially (between adjacent individual footings or within 10 feet of a continuous footing). Approximately half of this settlement should occur during construction. The remaining long-term settlement of ½ inch (¼ inch occurring differentially) should be tolerable. These settlement estimates are valid for footings up to five (5) feet in plan dimensions.

Construction of select fill as specified herein beneath the building should result in the development of a modulus of subgrade reaction (k_s) to range between 125 and 150 pounds per cubic inch based upon empirical equations that estimate the results of a plate load test. For

warehouse slabs exposed to fork lift loads, the subgrade modulus may be increased to between 300 and 350 pci by placing eight (8) inches of crushed limestone base or equal below the slab.

Select Fill:

Select fill material should be free of organic or other deleterious materials, homogeneous mixture, have a maximum particle size of three (3) inches, have a liquid limit less than 40 and plasticity index between 8 and 20, and consist of silty-clayey sands (SM-SC), low plasticity sandy clays (CL), or clayey sands (SC) as defined by the Unified Soil Classification System. It appears that most of the on-site surficial soils could meet the requirement for use as select fill on this project. If a fine-grained material is used for fill, very close moisture content control will be required to achieve the recommended degree of compaction.

Fill should be placed in maximum lifts of eight (8) inches of loose materials and should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value and a minimum of 95% of the maximum density as determined by the Standard Proctor (ASTM D-698) test.

Deep Foundations:

Deep foundations could be considered for use at this site due to special equipment or building loads. Shafts should be founded at a minimum estimated depth of 15 feet and should develop enough capacity at a depth of 30 feet below the existing ground surface. The table below presents the estimated allowable single shaft capacities for an 18 inch diameter shaft founded at depths between 15 and 30 feet below present ground surface.

Diameter of Shaft (inches)	Depth of Shaft (feet)	Allowable Single Shaft Capacity (kips)	
		Compressive	Uplift
18	15	60	35
	20	65	40
	25	70	50
	30	100	60

The factor of safety for these calculations is estimated to be 2.0. Depending upon the time of construction, groundwater could be encountered in the drilled shafts. Casing for installing drilled shafts is always a possible necessity when dealing with the unknowns inherent with subsurface conditions. It is prudent for contract documents to include this option.

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 0.120 g. The project also has a mapped 1.0 second spectral response acceleration (S_1) of 0.069. The design spectral response accelerations, S_{DS} and S_{D1}, were determined to be 0.128 g and 0.110 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.

OSHA Classification for Excavations:

For excavations deeper than four feet, the side slopes should conform to applicable federal, state and local regulations. The guidelines provided in the construction requirement section should be followed. A review of the boring logs and testing for the site indicates that the soils should be classified as a Type B Soil contingent on monitoring of the excavation to confirm the

absence of free water seeping during the time the excavation is open. For this type of excavation, a slope of 1H:1V is allowed if the excavation is 20 feet or less in depth. Federal rules require daily inspection of excavations by a competent person when workers are present.

Pavements:

Information for this pavement analysis is inferred from the building borings. Our scope of services did not include extensive sampling and CBR testing of existing subgrade or potential sources of imported base material 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. It has been assumed that the constructed pavement subgrade will consist of well compacted soils. Based on experience, it is anticipated that the compacted native subgrade will yield a California Bearing Ratio (CBR) of between 5.0 and 10.0.

The general pavement design information presented in this report is based on subsurface conditions inferred by the test borings, information published by The Asphalt Institute, the Portland Cement Association, and past experience in the locale. The published information was utilized in conjunction with the available field and laboratory test data to develop general pavement designs based on the AASHTO structural numbering system.

Pavements to be utilized by light vehicular traffic may be either flexible or rigid pavement sections supported on well-compacted subgrade or select fill. However, Portland cement concrete pavements should be utilized where large loads (i.e. waste disposal containers, etc.) are located. Both flexible and rigid pavement sections have been designed using general engineering design criteria referenced above.

Subgrade:

It is paramount to the satisfactory performance of pavements that the subgrade be stable under loads and compacted prior to deployment of flexible base or concrete. All pavement subgrade should be proof rolled prior to beginning placement of pavement section materials. Stable subgrade is especially critical to the successful performance of flexible pavement sections. The surficial soils within the proposed paving limits should be tested to determine the average plasticity index (PI) value. If the average PI of the subgrade is above a value of 22, the upper eight (8) inches of subgrade should be either removed and replaced with imported fill, or treated with lime to reduce the PI to an acceptable limit.

If fill is imported to complete the pavement grading, the material may consist of usable soils as determined by Section 302 of the *Louisiana Standard Specifications for Roads and Bridges, 2006 Edition* (LA SSFRB). If the fill has 50 percent or more silt, the material should have a maximum liquid limit of 45 with a plasticity index between 11 and 25. For fill with a silt content less than 50 percent, the plasticity index should be between 0 and 25.

Fill should be placed in maximum lifts of eight (8) inches of loose materials and should be compacted within the range of one (1) percentage point below to three (3) percentage points above the optimum moisture content value and a minimum of 95% of the maximum density as determined by the Standard Proctor (ASTM D-698) test.

Base:

Granular base should meet the requirements for Item 1003.03(b) of the LA SSFRB for crushed stone or Item 1003.03(c) for recycled Portland cement concrete. The material should be compacted to 95 percent of the maximum density defined by the Modified Proctor (ASTM D-1557).

Asphaltic Pavement Materials:

Surface or wearing course asphaltic concrete should consist of a Type 3 Wearing Course Mixture contained in Item 501 of the LA SSFRB. Field density results should be based on the Theoretical Maximum Specific Gravity in accordance with DOTD TR 327. Minimum density requirements should be 89.0 percent for parking lots and shoulders and 92.0 percent for Travel Lane Wearing, Binder and Base Courses. Placement and processes should be in strict accordance with Part V of the above referenced specifications.

Portland Cement Concrete:

Concrete compressive strength should be a minimum of 3,000 psi at 28 days. The concrete should be designed with 5 percent (± 1 percent) entrained air to improve workability and durability. The design of steel reinforcement should be in accordance with local or accepted codes.

Optional Subbase:

Consideration could be given to using a base below concrete pavements to provide a consistently firm surface upon which to place the concrete and reduce instability. The table below presents the options to reduce the likelihood of a pumping subgrade below the pavements.

REDUCED PUMPING SUBBASES			
Recommended Thickness	**Type Material**	**LA SSFRB Designation**	**Maximum P.I.**
4.0"	Crushed Stone	Item 1003.03(b)	4
4.0"	Clean Sand	Item 1003.02(a)	N/P
6.0"	Sand-Clay-Gravel	Item 1003.04(b)	15

Granular base material should be compacted to 95 percent of the maximum density defined by the Modified Proctor (ASTM D-1557). Clean sand and sand-clay-gravel mixtures should be compacted to 95 percent of Standard Proctor density (ASTM D-698).

Traffic and Design Data:

Commercial pavement sections presented herein are based upon minimum material thickness as recommended by the Asphalt Institute and the Portland Cement Association. These sections are not based upon anticipated traffic loads as these were not available at the time this report was prepared. For the purposes of this report, we have assumed average traffic should consist of up to 250 repetitions of light passenger automobile and pick-up trucks, 25 medium-sized delivery trucks or vans, and 25 tractor-trailer trucks per day.

Recommended Pavement Sections:

The table below presents a summary of both rigid and flexible pavement sections for light and heavy duty applications. It should be noted that the pavement sections as presented below are minimums. If it is desired to reduce potential cracking, greater thickness of select fill and/or greater pavement section thickness could be utilized. In addition, long term pavement performance requires good drainage and performance of periodic maintenance activities.

MINIMUM PAVEMENT RECOMMENDATIONS *		
Pavement Type	**Light Duty (Parking Stalls)**	**Heavy Duty (Entries & Drives)**
Portland Cement Concrete	5.0" Portland Cement Concrete 8.0" Density-Approved Subgrade or Imported Fill	7.0" Portland Cement Concrete 8.0" Density-Approved Subgrade or Imported Fill
Asphalt Over Crushed Stone Base	2.0" Item 501 Type 3 Surface 6.0" Item 1003.03 (b) Base 8.0" Density-Approved Subgrade or Imported Fill	3.0" Item 501 Type 3 Surface 12.0" Item 1003.03 (b) Base 8.0" Density-Approved Subgrade or Imported Fill
*Materials should meet general requirements of the Louisiana DOTD Standard Specifications for Construction of Roads & Bridges, and specific requirements listed herein.		

Concrete thickness at trash receptacles should be a minimum of seven (7) inches. All paving recommendations are based on stable subgrade.

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 site conditions reported herein are considered preliminary in detail and scope and are not intended to form a basis for pavement and foundation design. The information submitted is based on the available soil information only and not on design details for the intended projects.

The findings, recommendations 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 plans are more complete, it is recommended that the soils and foundation engineer be retained to provided a subsurface investigation tailored to meet the specific needs of the project.

This report has been prepared for the exclusive use of our client for the general application for 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 general purposes only and should not be considered sufficient for purposes of preparing accurate plans 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

FIELD AND LABORATORY PROCEDURES
PLAN OF BORINGS
LOG OF BORINGS
HYDROMETER ANALYSIS
SOIL CLASSIFICATION CHART

Field And Laboratory Procedures
LED Site Certification - Town of Jena, Louisiana
Jena, LaSalle Parish, Louisiana
GTL Report Number 01-15-011

I. Field Operations:

Subsurface conditions were evaluated by advancing three (3) intermittent sample borings on January 26, 2015 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 boring locations with respect to the areas investigated is provided on the attached Plan of Borings. Descriptive terms and symbols used on the logs are in accordance with the Unified Soil (USCS) 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.

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. After boring completion, water levels were allowed to rise and stabilize for several minutes prior to final water readings. These readings are also 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 tests and ASTM designations are as follows:

Test	ASTM Test Designations
Atterberg Limits	D4318
Moisture Content	D2216
Partial Gradation	D1140
Hydrometer Analysis	D422

Results for soil classifications are tabulated 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.***

Plan of Borings

PROJECT			
LED Site Certification - Town of Jena, Louisiana, Jena, LaSalle Parish, Louisiana			
SCALE	DATE	FILE NUMBER	CLIENT
Not to Scale	1/28/2015	01-15-011	***Meyer, Meyer, LaCroix & Hixson, LLC***

N

LOG OF BORING B-1

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

CLIENT: LaSalle Economic Development District
PROJECT: LED Site Certififcation
LOCATION: Jena, LaSalle Parish, Louisiana
FILE NO.: 01-15-011
DRILL DATE: 1/26/15

DRILLING METHOD(S):
Diedrich D-50, Rotary Wash

LOGGED BY: R. Leggett CHECKED BY: H. Carroll, E.I.

GROUNDWATER INFORMATION:
Water Seepage Noted @ 43.0 Feet While Drilling
No Water Observed Upon Completion
Boring Walls Remained Uncaved

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 = 12	12							Stiff Tan & Gray LEAN CLAY (CL) w/silt
			N = 12	18	35	23	12	96			
			N = 17	16							- very stiff @ 4.0 feet
			N = 20	17							6.5'
			N = 24	15	37	19	18	82			Very Stiff Yellowish Brown & Gray LEAN CLAY (CL)s w/sand
	10		N = 22	12							
											12.0'
			N = 9	6	NP	NP	NP	11			Loose Yellowish Brown & Gray, Poorly Graded, SAND (SP-SM) w/silt
	20		N = 9	13							
											23.5'
			N = 9	10							Loose Gray Silty SAND (SM)
	30		N = 30	6							- dense @ 29.0 feet
			N = 51	12							- very dense @ 34.0 feet
	40		N = 18	16							- medium dense @ 39.0 feet
			N = 43	19	NP	NP	NP	20			- dense @ 44.0 feet
	50		N = 50	15							- gray & yellowish brown below 49.0 feet
			N = 45	18	NP	NP	NP	16			
	60		N = 52	17							- very dense @ 58.5 feet
											60.0'
											Boring Terminated @ 60.0 Feet

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
See Plan of Borings for Location
GPS Coordinates: 31°40'16.4" N / 92°9'36.3" W
Stratification and Groundwater Depths Are Not Exact

LOG OF BORING B-2

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

CLIENT: LaSalle Economic Development District
PROJECT: LED Site Certififcation
LOCATION: Jena, LaSalle Parish, Louisiana
FILE NO.: 01-15-011
DRILL DATE: 1/26/15

DRILLING METHOD(S):
Diedrich D-50, Rotary Drill

LOGGED BY: R. Leggett CHECKED BY: H. Carroll, E.I.

GROUNDWATER INFORMATION:
Water Seepage Noted @ 15.5 Feet While Drilling
No Water Observed Upon Completion
Boring Walls Remained Uncaved

SURFACE ELEVATION: Not Determined

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	ATTERBERG LIMITS LL	PL	PI	MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (Lb./Sq. Ft.)	DESCRIPTION OF STRATUM
			N = 7	21	33	22	11	98			Firm Yellowish Brown & Gray LEAN CLAY (CL)
			N = 7	23							
			N = 8	22							- stiff, yellowish brown & gray @ 4.0 feet
	5										5.0'
			N = 13	23	51	24	27	95			Stiff Yellowish Brown & Gray LEAN to FAT CLAY (CL-CH)
			N = 11	23							
			N = 7	26							- firm below 9.0 feet
	10										
			N = 7	31	52	25	27	98			
	15										16.0'
			N = 11	11							Medium Dense Yellowish Brown & Gray Silty SAND (SM)
											20.0'
	20										Boring Terminated @ 20.0 Feet

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
See Plan of Borings for Location
GPS Coordinates: 31°40'13.3" N / 92°9'37.5" W
Stratification and Groundwater Depths Are Not Exact

LOG OF BORING B-3

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

CLIENT: LaSalle Economic Development District
PROJECT: LED Site Certififcation
LOCATION: Jena, LaSalle Parish, Louisiana
FILE NO.: 01-15-011
DRILL DATE: 1/26/15

DRILLING METHOD(S):
Diedrich D-50, Rotary Drill

LOGGED BY: R. Leggett CHECKED BY: H. Carroll, E.I.

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

SURFACE ELEVATION: Not Determined

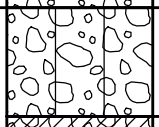
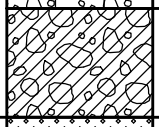
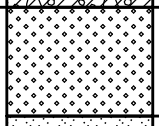
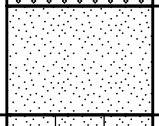
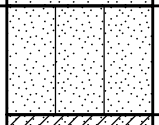
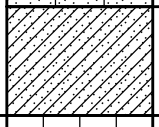
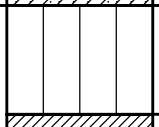
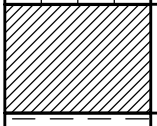
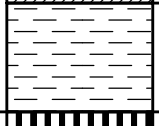
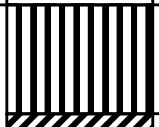
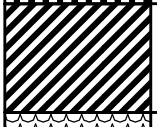
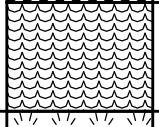
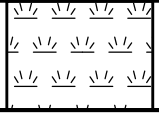
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT	MOISTURE CONTENT (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	ATTERBERG LIMITS PI	MINUS NO. 200 SIEVE (%)	DRY DENSITY (Lbs./Cu.Ft.)	COMPRESSIVE STRENGTH (Lb./Sq. Ft.)	DESCRIPTION OF STRATUM
			N = 6	25							Firm Yellowish Brown & Gray LEAN CLAY (CL)
			N = 9	20	43	26	17	96			- stiff @ 2.5 feet
											3.5'
			N = 8	16							Stiff Yellowish Brown & Gray LEAN CLAY (CL)s w/sand
	5		N = 13	18	38	18	20	87			
			N = 11	21							
											8.5'
			N = 7	25	46	24	22	95			Firm Yellowish Brown & Gray LEAN to FAT CLAY (CL-CH)
	10										
	15		N = 7	29							
											18.0'
			N = 11	12	NP	NP	NP	16			Medium Dense Yellowish Brown & Gray Silty SAND (SM)
	20										20.0'
											Boring Terminated @ 20.0 Feet

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE

NOTES:
See Plan of Borings for Location
GPS Coordinates: 31°40'24.3" N / 92°9'43.9" W
Stratification and Groundwater Depths Are Not Exact

GTL LOG 1 - LOG A GNNL01.GDT - 1/29/15 08:40 - Z:\GINT PROJECTS\2015 JOBS\01-15-011.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