



Geotechnical, Environmental & Construction Materials Testing

GEOTECHNICAL ENGINEERING SERVICES REPORT

For

NEW TWO-STORY RESTAURANT
WETLAND BREWING COMPANY
639 GIROD ST.
MANDEVILLE, LA
SESI FILE NO: B10-050

Presented to

KVS ARCHITECTURE & ASSOCIATES
347 GIROD ST.
MANDEVILLE LA, 70448

Prepared by

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July 29, 2010

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Geotechnical, Environmental & Construction Materials Testing

July 29, 2010

KVS Architecture & Associates
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Mandeville LA, 70448

Attn.: Christen W. Smith

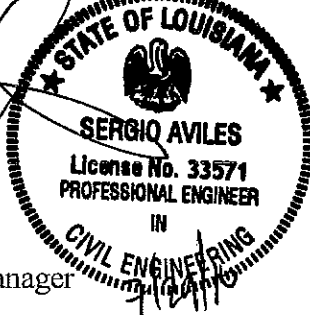

Re: Geotechnical Subsurface Exploration
New Two-Story Restaurant
Wetland Brewing Company
639 Girod St.
Mandeville, LA
SESI File No: B10-050

Dear Mr. Smith:


Southern Earth Sciences, Inc. (SESI) is pleased to submit our Geotechnical Subsurface Exploration Report for the above referenced project. The report includes the results of field and laboratory testing and recommendations for the foundation design and general site preparation as related to soils.

We appreciate the given opportunity to perform this Geotechnical Study and look forward to continue participating 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,
SOUTHERN EARTH SCIENCES, INC



Sergio Aviles, PE
Geotechnical Department Manager



M. Rajasubhar, PhD
Geotechnical Project Engineer

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Appendix

Boring Location Plan

Key to Terms and Symbols Used on Logs

Boring Logs

1.0 Project Information

1.1 Project Authorization

Southern Earth Sciences, Inc. (SESI) has completed a subsurface exploration for the proposed new Two-Story Restaurant in Mandeville, Louisiana. Our geotechnical engineering services were performed in general accordance with our Geotechnical Proposal No. P10-077.06 dated June 04, 2010. Authorization to proceed with this investigation was received from K. Vaughan Sollberger, Jr., on June 15, 2010 via mail.

1.2 Project Description

It is our understanding the proposed project will consist of the design and construction of approximately 7,300 SF new two-story restaurant building of steel and masonry construction with a slab-on-grade foundation system. No structural load information was provided at the time of this report; however, we assume that the design column loads to be in the order of 20 kips, continuous wall loads of five (5) kips per lineal foot, and floor loads of 250 psf would apply. Further, a grading plan is not available at this time; however, less than or equal to two (2) feet of fill is anticipated to achieve the design grade.

2.0 Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions at the site to enable an evaluation of an acceptable foundation and pavement systems for the proposed new two-story restaurant building. As proposed by SESI, we drilled two (2) borings to a depth of 20 feet within the proposed building footprint and three (3) borings to a depth of six (6) feet in the driveway and parking areas.

The scope of services also included conducting laboratory tests on selected samples recovered from the soil borings. These tests included visual description and classification, moisture content, liquid limit, plastic limit, and unconfined compressive strength. Both field and laboratory testing procedures are briefly discussed in this report.

This report includes a site description, discusses the conditions of the existing subsoil materials at the site, and presents recommendations on the following:

- Site preparation;
- Foundation type, depth, and estimated settlement;
- Pavement type, layer thickness, pavement material type;
- Comments regarding factors that will impact construction and performance of the proposed project.

The scope of geotechnical services did not include an environmental site assessment for determining the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or around the site. Any statement in this report or on the



boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

In addition, SESI did not provide any service to investigate or detect the presence of moisture, mold, or other biological contaminants in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence or amplification of the same. The client acknowledges that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. The client further acknowledges that site conditions are outside of SESI's control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, SESI cannot and shall not be held responsible for the occurrence or recurrence of mold amplification.

3.0 Site Location

The proposed two-story restaurant building for Wetland Brewing Company will be constructed at 639 Girod St., in Mandeville, Louisiana. It is our understanding that the location had an existing building that has been demolished and foundation elements were removed / cleared from the site.

4.0 Field Exploration

The field exploration performed to evaluate the engineering characteristics of the foundation materials, included a reconnaissance visit to the project site by a SESI representative, drilling the soil borings and recovering soil samples.

As previously mentioned, two (2) borings to a depth of 20 feet and three (3) borings to a depth of six (6) feet were drilled for this project. The depths and locations of the borings were as proposed by SESI, and were located in the field by our firm using tape measurements referenced to physical elements/boundaries of the site at the time of field exploration. The Boring Location Plan, included in the Appendix, presents the approximate location of the borings.

5.0 Drilling and Sampling Procedures

The borings were drilled with a truck-mounted drill rig using auger and rotary head wash drilling techniques to advance the borehole. Undisturbed samples were continuously obtained from the ground surface to a depth of ten (10) feet, then at five-foot intervals to the depth of the boring. They were obtained using thin-walled tube sampling procedures in general accordance with ASTM D-1587 *Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes*. These samples were extruded in the field with a hydraulic ram, and were identified according to project number, boring number and depth, wrapped in aluminum foil and placed in plastic bags to preserve the natural moisture condition; then, they were transported to the laboratory in special containers to prevent disturbance.

When undisturbed samples could not be recovered, disturbed samples were obtained in accordance to the procedures of ASTM D-1586 *Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*. These samples were also identified according to project number, boring number and depth, and were placed in plastic bags to preserve the natural moisture condition.

6.0 Laboratory Testing Program

A supplemental laboratory testing program was conducted to determine additional pertinent engineering characteristics of the subsurface materials. This program included visual description and classification and determination of the moisture content (ASTM D2216 *Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*) on all samples. Furthermore, selected samples were subjected to ASTM D4318 *Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils*, ASTM C136 *Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates*, LADOTD TR-407 *Standard Test Method for Grain Size Determinations of Soils*, and ASTM D2166 *Standard Test Method for Unconfined Compressive Strength of Cohesive Soils*. The results of these tests are found in the accompanying boring logs located in the Appendix.

7.0 Subsurface Conditions

7.1 Subsurface Materials

Subsurface conditions encountered in the borings were similar. Generally, they revealed the presence of fill material within the top two (2) feet, followed by predominately soft to stiff lean and fat clays from two (2) feet to a depth of 20 feet, the maximum depth explored. Pockets of soft clay layers were noted in borings B-1 from four (2) to six (6) feet and two (2) and four (4) feet in borings P-1 and P-3, respectively. The clay material was sampled in tan, light and dark gray colors with variable amounts of silt, sand pockets, ferrous nodules and ferrous stains. All references to depth are made with respect to the existing ground surface at the time the borings were performed.

The above subsurface description is a generalized nature to highlight the major subsurface materials features and characteristics. The boring logs, included in the Appendix, present specific information at individual boring location including: soil description, stratification, ground water level, unconfined compressive strength, samples' location, and laboratory tests results. This information represents the actual conditions at the 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.

7.2 Groundwater

The groundwater level was detected as follows:

GROUND WATER TABLES		
Borehole	Initial Reading	After 15 Minutes
B-1	7.2 feet	5.9 feet
B-2	7.4 feet	5.3 feet
P-1	NE	NE
P-2	NE	NE
P-3	NE	NE

Note: NC - No Change; NE – Not encountered

It should be noted that the groundwater conditions are likely to change due to topography, permeability, weather, and other soil and terrain properties. Therefore, we recommend that the contractor determine the actual groundwater levels at the site at the time of the construction activities.

8.0 Discussion

Upon review of the existing subsoil conditions and laboratory test results, we consider that the proposed project is feasible from a geotechnical point of view, if and when the included recommendations are correctly interpreted and applied.

Generally, the encountered subsoil materials provided fair strength parameters; this is based on the unconfined compressive strength results. Essentially clays at all boring locations tended to be medium stiff to stiff in consistency, except for pockets of weak clay layers between depths of four (2) to six (6) feet in B-1; two (2) to four (4) feet in P-1; and two (2) to four (4) feet in P-3, which showed soft consistency. Based on these conditions and the provided and assumed design data, the proposed structure can be supported on shallow foundations, if undercut to four (4) and replaced with compacted structural fill material, or pile foundations. Recommendations for shallow and driven pile foundations are presented in Section 9.2 and 9.3, respectively.

Please review the following sections for further information on the corresponding site and foundation recommendations.

9.0 Recommendations

9.1 Site Development Recommendations

9.1.1 Site Preparation

Prior to the development of any structure or fill deposit, the complete earthwork area must be properly cleaned. The cleaning activities shall include the removal of all surface vegetation, debris and any foreign matter present on the site.

In addition, SESI recommends that all the existing foundation elements, topsoil, organics, and any soft or loose soils present shall be stripped from the site. At a minimum, four (4) feet should be stripped / undercut within the building footprint to remove the any existing concrete foundations, disturbed soils from demolition and weak soil layers and 12 inches should be stripped within the parking and driveway areas; however, the actual stripping / undercutting depth should be determined by a representative of the Geotechnical Engineer at the time of construction. Any material stripped from the site should be removed or wasted.

9.1.2 Remedial Action

As previously mentioned, disturbed/weak soils were encountered at shallow depths at boring locations B-1. Remedial action would consist of undercutting these disturbed/weak soils to a depth of at least four (4) feet and replacing them with structural fill, as outlined below. The undercutting and replacing with fill shall consider the footprint of the structure plus a five (5) feet strip around its perimeter. Due to the limited number of borings, the lateral extent and depth of disturbed/weak soils beyond the borings B-1 and B-2 is unknown; as such, it is also recommended that any localized soft pockets encountered directly beneath the footing locations should be replaced with compacted structural fill for at least four (4) feet below the footing.

9.1.3 Proof Rolling

Upon completion of the stripping activities, the exposed areas shall be properly proof rolled in order to prepare the natural terrain to receive the design structural fill and traffic loads. The proof roll consists of compacting the exposed surface with a 20- to 25-ton loaded dump truck. Surface soils that are observed to rut or deflect excessively under the truck load should be undercut and replaced with the proper structural fill. These activities should be performed during a period of dry weather and should be supervised by a Geotechnical Engineer or a representative.

9.1.4 Structural Fill Materials

After subgrade preparation and observation has been completed, structural fill placement, if necessary, may begin. The first layer of structural fill should be placed in a relatively uniform horizontal lift and be adequately keyed into the properly prepared subgrade soils. The structural fill should consist of lean clays, sandy lean clays (CL) or clayey sands (SC) having the following recommended material properties:

- a. Percent Passing U.S. Sieve #200: 50 percent minimum
- b. Liquid Limit: 40 maximum
- c. Plasticity Index: 10 to 20 maximum
- d. Inert Material (Non-Expansive)
- e. Free of Organics
- f. Maximum Particle Size: 2-in

This material must be certified and approved by the Geotechnical Engineer prior to its use.

9.1.5 Structural Fill Deposit Construction

After all surface preparation and observation has been completed, the structural fill activities may begin. These activities must be performed in a sequential order where lower elevations must be worked before higher ones. The structural fill shall be deposited in lifts of eight (8) inches of loose material. Each lift shall be compacted and certified by the Geotechnical Engineer or a representative prior to placement of other lifts. The passing criteria shall be a 95% of the maximum dry density as determined by ASTM D-698, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))*, and a moisture content between one (1) below and three (3) above percentages of the optimum moisture content. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. As a guideline, it is recommended that field density tests be performed at a frequency of not less than one test per 2,500 square feet.

It is important to maintain the structural fill thickness as uniform as possible. Uneven fill thicknesses under a structure may cause differential soil responses to the applied loads which can produce cracking, settling, or tilting of the structure. Uniform fill areas shall consider the footprint of the structure plus a five (5) feet strip around its perimeter.

Fill slopes shall be maintained at a maximum 2 Horizontal: 1 Vertical steepness. The runoff of water across the faces of the slopes shall be avoided by appropriate drainage ways. In addition, appropriate drainage ways shall be maintained at all earthwork surface areas in order to not affect compaction.

9.2 Shallow Foundation Recommendations

9.2.1 Foundation Parameters

Assuming the site is prepared in accordance with the "Site Preparation" section, the building may be supported on shallow footings. Square spread footings and continuous wall footings bearing on top of the fill or at least two (2) feet below finished grade on compacted structural fill may be designed for net allowable bearing capacities of 2,000 and 1,280 psf, respectively. Minimum dimensions of 24 inches for spread footings and 18 inches for continuous footings should be used in the foundation design to reduce the possibility of a local bearing failure.

Total settlements and differential settlements for spread footings up to four (4) feet in width and continuous footings up to 2.5 feet in width are expected to be less than one (1) inch. Settlement was estimated based on total sustained dead loads of 70 percent of the above recommended net allowable bearing capacities plus two (2) feet of structural fill that is anticipated to achieve the design grade. The structural engineer shall confirm if these magnitudes are within tolerance limits; if not, SESI shall be notified in order to provide some remedial measures and/or change the foundation type.

The bottom of the excavation must be dry, clean and free of loose materials and construction debris. It should be observed by the Geotechnical Engineer or a representative prior to steel or concrete placement. Concrete shall be poured as quickly as possible to avoid exposure of the footing materials to moisture changes (wetting or drying). Surface run-off water should be channeled away from the excavation and not be allowed to pond. If for any reason the excavation is required to be open for more than one day, it shall be protected to minimize moisture loss/gain.

9.2.2 Floor Slab

The floor slab shall be supported on the new compacted structural fill. In addition, we recommend a capillary water barrier placed directly below the building slab. This barrier shall consist of the usual membrane vapor barrier followed by a minimum thickness of four (4) inches of concrete sized aggregate, either crushed limestone or gravel, size No. 57 or 67 as per ASTM C-33, *Standard Specification for Concrete Aggregates*. Positive drainage shall be provided to prevent the continual saturation of the capillary water barrier. In all cases, the moisture/vapor barrier should be design and constructed in accordance to the latest edition of the International Building Code.

9.2.3 Foundation Maintenance

Other preventive measures to minimize the damage potential of expansive soils are the following:

- a) Surface Drainage – always drain away from the foundation; on vegetated ground, a minimum slope of 5% is required. Never allow water to accumulate close or around the foundation.
- b) Landscaping
 - Avoid placing plants immediately adjacent to the foundation.
 - Avoid placing sprinkler system pipes near the foundation (they could leak).
 - Direct sprinkler heads away from the foundation.
 - Trees shall be planted at a minimum distance of half the anticipated canopy diameter or twenty (20) feet, whichever is larger, from the foundation edge. If existing trees are closer than this, they should be thoroughly soaked at least twice a week during dry periods and once a week during moderate rainfall periods.

9.3 Driven Pile Foundation

Driven pile foundation systems were evaluated for the proposed new two-story restaurant. Allowable compression capacity is provided in the following table for a treated timber pile. Due to the possible construction disturbances, the top five (5) feet of soil was neglected in our calculations, therefore a pile cutoff of up to five (5) feet below the ground surface will have no effect on the estimated pile capacities. Pile capacities for pile types and/or lengths other than those listed below can be provided upon request.

The presented allowable compression capacity for piles are based on a factor of safety (FS) of two (2), assuming a pile load test is conducted to verify the design (see Section 9.3.6). If a pile load test is not conducted, we would recommend a reduction in allowable capacity to provide for a FS in compression of at least 3.0.

Table 1.0 Estimated Capacities for Timber Piles (12-inch butt, minimum 8-inch tip diameter).*

Pile Length (ft)	Allowable Compression Capacity (Tons)
15	5.0

*These are soil-pile related capacities. The structural capacity of the piles to support design loads is beyond our scope of services and must be verified by others. Pile lengths are referenced from the existing ground surface at the time of field exploration.

9.3.1 Settlement

The estimated settlement of individual piles properly driven to the design depths and loaded to the design capacities presented in section 9.3 will be less than one (1) inch. Once a pile load test is performed, SESI can evaluate the capacity and settlement for pile groups.

9.3.2 Group Effects

Piles shall be installed at a minimum center-to-center spacing of four (4) pile diameters or side dimensions. For this spacing and with the pile cap in firm contact with the soil, a reduction in capacity due to group effects should not be required. If the pile cap will not be in firm contact with the soil, group effects could reduce the pile capacities and should be evaluated accordingly when the actual pile length and layout are known.

9.3.3 Lateral Capacity

For deep foundations, the lateral loads are resisted by the soil as well as the rigidity of the pile. Analyses can be performed by methods ranging from chart solutions to finite difference methods. It is recommended that once the pile type, length and group dimensions are determined, our office be contacted to perform lateral load analysis for the proposed project.

9.3.4 Pile Installation

All pile driving operations shall be performed under experienced supervision and with efficiently operating mechanical equipment. The hammer selection is the responsibility of the contractor and shall be adequately large enough to reach proposed tip elevations and develop the required capacities, but taking into account the potential vibrations resulting from pile driving operations.

Piles in large groups should be driven from the center outward. Any piles which have heaved a quarter of an inch (1/4") or more during driving of subsequent piles shall be re-driven to their original final resistance or their original embedment if originally driven to full penetration.

In no case shall the contractor be allowed to change pile driving equipment, pile types and or sizes without written approval from the Geotechnical Engineer.

9.3.5 Pile Driving Monitoring

Records of pile size and length, driving equipment, driving resistance versus depth, tip evaluation of piles, etc. shall be permanently kept.

Sometimes premature refusal occurs due to poor performance of the hammer rather than from soil resistance. Any changes in hammer blow counts shall be carefully examined before making any decisions about the pile penetration.

Since testing and inspection services are within SESI's scope of work, we recommend that our firm be retained to assist you to monitor the driving of test piles, select the pile s to be tested, monitor the pile load test, evaluate the results of the load test, establish final pile lengths, and maintain vibration and driving records of all piles installed.

9.3.6 Pile Load Tests

It is recommended that pile capacities be verified by field load tests and/or pile dynamic analyses (PDA). At least one (1) test pile shall be driven in the proposed foundation area and tested in compression as outlined by ASTM D 1143, *Standard Test Method for Deep Foundations Under Static Axial Compression Load* or by dynamic pile analyses (PDA). The PDA tests or pile load test(s) shall be performed under the guidance of the Geotechnical Engineer so that the data may be interpreted and the recommended pile capacity adjusted, if necessary, according to the load test results. Piles should be allowed to set for a minimum of 14 days prior to loading.

9.3.7 Pile Driving Resistance

To determine the driving characteristics, a few probe piles should be driven beneath the proposed structures, preferably in the vicinity of the borings. Probe piles will become working piles, and must be accurately located in accordance with the project's construction drawings. Exact driving resistance recommendations should be determined based on the actual pile driving equipment selected by the contractor and the driving results of the probe piles. In order to properly evaluate

refusal, it is recommended to do a GRLWEAP analysis after deciding the type of hammer for pile driving.

10.0 Pavement Recommendations

10.1 Pavement Sections

Actual traffic type and frequency anticipated has not been provided, but assumed to consist mostly of passenger vehicles and light trucks. Moreover, our scope of work did not include extensive sampling and CBR testing of the existing subgrade or potential sources of imported fill for the specific purpose of a detailed pavement analysis. Instead, we have assumed pavement-related design parameters that are considered to be typical for the area soil types.

The pavement subgrade should be prepared as discussed in Section 9.1 (Site Development Recommendations). The recommended pavement thicknesses presented below are considered typical and minimum for the assumed parameters at the site. We understand that budgetary considerations sometimes warrant thinner pavement sections than those presented. However, the client, the owner and the project designers should be aware that thinner pavement sections may result in increased maintenance costs and lower than anticipated pavement life.

It is estimated that the near surface soils could be assigned a minimum CBR of 3 or a Modulus of Subgrade Reaction (k) of 100 pci. Making the above CBR and “k” assumptions, it is possible to use a typical “standard” pavement section consisting of the following:

RIGID PAVEMENT		
Pavement Materials	Minimum Thickness, Inches	
	Parking	Driveway
Portland Cement Concrete	5	6
Compacted Limestone Aggregate Base Course	8	8

This thickness should provide better distribution of surface loads to the subgrade without causing deformation of the surface. The aggregate base course should meet the requirements of Sub-Section 1003 of the latest edition of the Louisiana Standard Specifications for Roads and Bridges Manual (LSSRB), and should be compacted to at least 95 percent of maximum dry density near the optimum moisture content in accordance with ASTM D698, *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))*.

Pavement materials may be placed after the subgrade or structural fill has been properly proof rolled or compacted and fine-graded. These activities shall be accomplished following the

Louisiana Department of Transportation and Development Standard Specifications for Road and Bridge Construction guidelines.

Proper finishing of concrete pavement requires the use of appropriate construction joints to reduce cracking. Construction joints shall be designed in accordance with the current Portland Cement Association and the American Concrete Institute guidelines. Joints should be sealed to reduce the potential for water infiltration into the supporting soils. The design of steel reinforcement should be in accordance with current accepted codes.

FLEXIBLE PAVEMENT		
Pavement Materials	Minimum Thickness, Inches	
	Parking	Driveway
Asphaltic Concrete Wearing Course	3	3 ½
Compacted Limestone Aggregate Base Course	7	8
Compacted Structural Fill	6	6

Asphaltic concrete should meet the requirements of Part V of the latest edition of the LSSRB. The aggregate base should meet the requirements of Sub-Section 1003 of the LSSRB. The base and structural fill should be compacted to at least 95 percent of the maximum dry density near the optimum moisture content in accordance with ASTM D698.

Water should not be allowed to pond behind curbs and saturate the base. In down grade areas, the limestone base shall extend through the slope to provide an exit path for any water accumulating under the pavement.

11.0 Construction Considerations

11.1 Observation and Testing

The preceding recommendations require a close supervision of the Geotechnical Engineer or representative; therefore, it is recommended that SESI be retained to provide observation and testing for the complete duration of all earthwork and foundation activities for this project. SESI cannot accept responsibility for any conditions deviated from those described in this report, nor for the performance of the foundation if not engaged to provide construction observation and testing.

11.2 Moisture Sensitive Soils/Weather Related Concerns

Most of the subsurface materials encountered at this site are expected to be sensitive to disturbances caused by changes in moisture content. During wet weather periods, the increment of the moisture content of the soil may cause a significant reduction of the soil strength and support capabilities. Furthermore, soils that become wet may be slow to dry, thus significantly retarding the progress of

grading and compaction activities. For these reasons, it will be advantageous to perform earthwork and foundation construction activities during dry weather.

11.3 Excavations Regulations

In the Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated, by this federal regulation, that excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with the new OSHA guidelines.

The contractor is solely responsible for designing and constructing stable, temporary excavations and shall 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. SESI 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.

12.0 Report Limitations

The analyses and recommendations presented in this report are based on the existing field conditions at the time of the investigation. Furthermore, they are based on the assumption that the exploratory borings are a representation of the subsoil conditions throughout the site. Please note that variations in the subsoil conditions may occur between and beyond borings. If variations in those conditions are encountered during construction, SESI shall be notified immediately in order to assess the situation, confirm the recommendations included in this report, or modify them according to their own judgment. If SESI is not notified of such variations, SESI will not be responsible for the impact of those variations on the project.

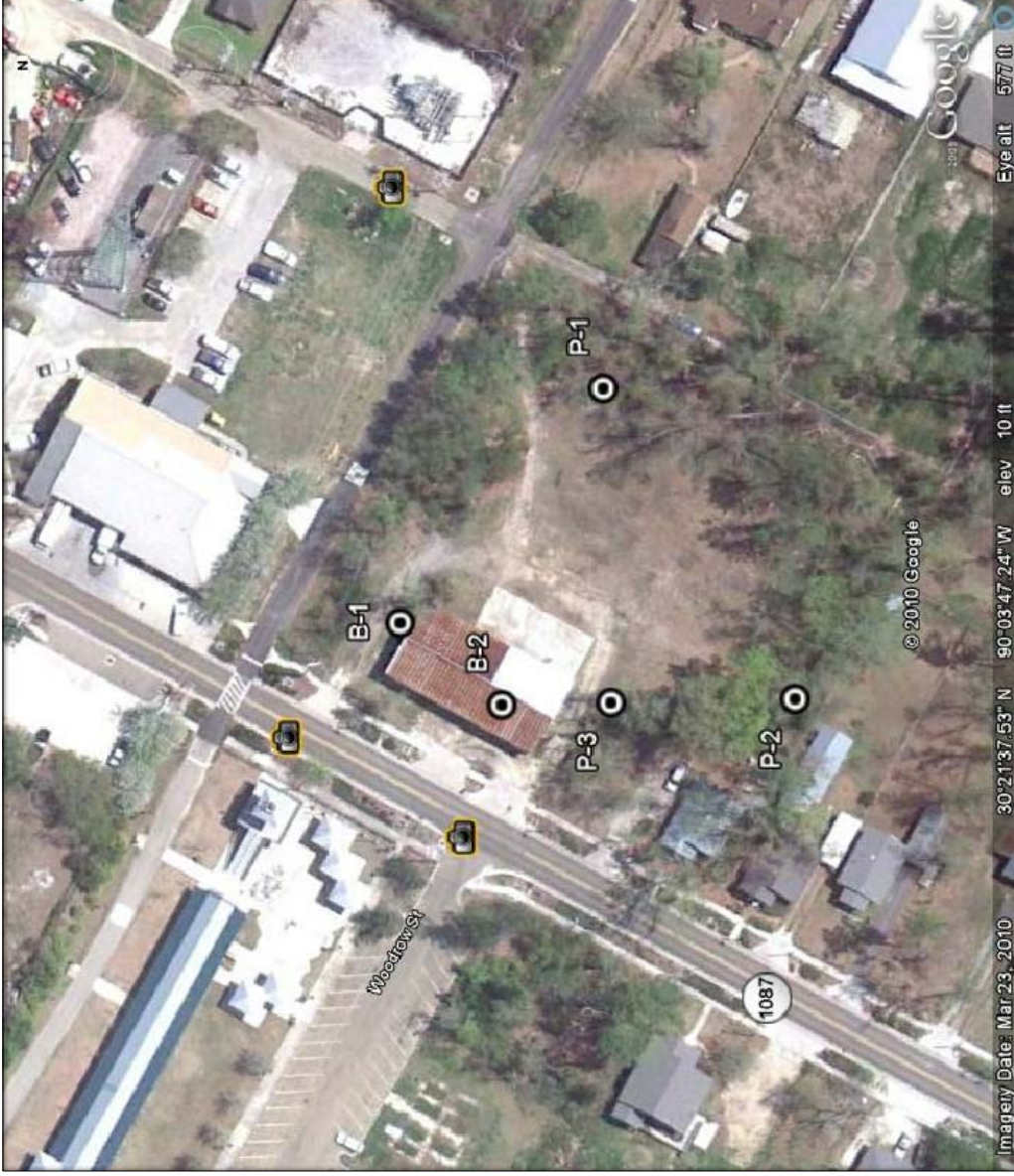
Furthermore, this report is based on the design considerations presently known to us. Project designers must be aware of this situation to check if any important design parameter has been overlooked or requires additional clarification. If the nature of the project should change, the recommendations given in this report shall be re-evaluated. If SESI is not notified of such changes, SESI will not be responsible for the impact of those changes on the project.

SESI shall be retained for the review of final design drawings and specifications in order to ascertain whether their recommendations have been correctly interpreted and implemented and to confirm or modify them. SESI is not responsible for the adequacy of recommendations if they do not inspect the construction. The only warranty regarding our services is that the findings, recommendations, specifications, or professional advice contained herein have been made in

accordance with the generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

This report has been prepared for the exclusive use of Wetland Brewing Company and their design/construction team associated to this specific project.

APPENDIX



WETLAND BREWING COMPANY
 MANDEVILLE, LA
 SESI PROJECT NO. B10-050


SOUTHERN EARTH SCIENCES, INC.
 An Employee Owned Company
 www.seearth.com
 Geotechnical, Environmental & Construction Materials Testing

FIGURE 1
 BORING LOCATION PLAN



BORING LOG

BORING _____
 JOB NO. _____
 DATE _____
 TECHNICIAN _____

DEPTH (FEET)	SAMPLE	Standard Penetration (Blows/Ft.) or Penetrometer (TSF)	Drill Method:					DRILLER _____	
			Initial Water Level:					RIG _____	
			Compressive Strength (TSF)	Moisture Content (%)	Dry Unit Weight (PCF)	Atterberg		MATERIAL CLASSIFICATION	
						LL	PI		

Description of strata as follows:
 Strength (or Consistency), Color, Minor Constituent,
 Major Constituent, additional observations.

Field evaluation of shear strength/relative density:
 Standard Penetration Test (ASTM D-1586) in Blows/Ft.
 Pocket penetrometer readings in Tons/Sq. Ft.

Graphical presentation of material type:

Clay	Silt	Sand	Gravel or Shell
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LABORATORY INFORMATION

As determined by Unconfined Compression (ASTM D-2166 or Undrained Triaxial (ASTM D-2850), if noted.

Determined using applicable portions of ASTM D-2166 and ASTM D-2216.

Determined using ASTM D-2216 or D-4959.

Determined using ASTM D-4318. Provides data for application of Unified Classification System (UCS).

COMMENTS:

- Shelby Tube Sample
 - Sealed in Tube
 - Split-spoon Sample
 - No Recovery
 - Auger Sample
- Sample recovery method.

BORING LOG

BORING NO.: B-1
PROJECT: WETLAND BREWING COMPANY
PROJECT LOCATION: MANDEVILLE, LA
BORING LOCATION: N 30° 32' 38.15" W 90° 3' 47.46"
BORING ELEVATION: EXISTING GROUND
GEOL/ENGR: SA
METHOD: AUGER/ROTARY WASH DRILLING

PROJECT NO.: B10-050
DATE DRILLED: 07/02/10
DATE COMPLETED: 07/02/10
WATER LEVEL: 7.2'
WATER LEVEL DATE: 07/02/10
LOGGED BY: CM
DRILLER: KM

DEPTH (FEET)	SAMPLE	Standard Penetration (Blows/Ft.) or Penetrometer (TSF)	Unconfined Compressive Strength (tsf)	Moisture Content (%)	Dry Unit Weight (PCF)	LL	PI	Symbol	MATERIAL CLASSIFICATION
	X	10 b/ft 7/6/4		9				X	GRAVEL and FILL
	X	2 b/ft 1/1/1		17				/	Light Gray Lean CLAY (CL) ---with sand and gravel
5			0.46	25	97	41	25	/	---soft, light gray, with fine sand and ferrous stains
			0.96	20	104	57	41	/	Medium Stiff, Light Gray and Tan fat CLAY (CH) ---with sand pockets
10				33				/	---tan, light gray and red, with ferrous nodules
15			0.67	42	79	85	56	/	---medium stiff, tan and light gray
20				43				/	---light gray and tan
									Bottom @ 20'

COMMENTS: WATER LEVEL ROSE TO 5.9' AFTER 15 MIN

SPLIT SPOON
 SHELBY TUBE

BORING LOG

BORING NO.: B-2
PROJECT: WETLAND BREWING COMPANY
PROJECT LOCATION: MANDEVILLE, LA
BORING LOCATION: N 30° 21' 37.6" W 90° 3' 48.0"
BORING ELEVATION: EXISTING GROUND
GEOL/ENGR: SA
METHOD: AUGER/ROTARY WASH DRILLING

PROJECT NO.: B10-050
DATE DRILLED: 07/02/10
DATE COMPLETED: 07/02/10
WATER LEVEL: 7.4'
WATER LEVEL DATE: 07/02/10
LOGGED BY: CM
DRILLER: KM

DEPTH (FEET)	SAMPLE	Standard Penetration (Blows/Ft.) or Penetrometer (TSF)	Unconfined Compressive Strength (tsf)	Moisture Content (%)	Dry Unit Weight (PCF)	LL	PI	Symbol	MATERIAL CLASSIFICATION
0 - 1	D			9					Dark Gray FILL and GRAVEL
1 - 5	X	5 b/ft 5/3/2	(1)	16					Light Gray Lean CLAY (CL) ---with sand and silt pockets
5 - 7			0.80	20	101	53	34		Medium Stiff, Gray and Red fat CLAY (CH) ---with sand
7 - 10			1.63	21	106	36	22		Stiff, Light Gray and Tan Lean CLAY (CL) ---with sand pockets
10 - 15			0.95	21	95	51	32		Stiff, Light Gray fat CLAY (CH) ---with sand and silt pockets
15 - 20				40					---light gray and tan
20 - 21			1.64	38	86	49	30		Stiff, Light Gray and Tan Lean CLAY (CL) ---with sand
21 - 30									Bottom @ 20' (1) SAND=40.1% SILT=42.3% CLAY=17.6%

COMMENTS: WATER LEVEL ROSE TO 5.3' AFTER 15 MIN

DISTURBED SAMPLE SPLIT SPOON
 SHELBY TUBE

BORING LOG

BORING NO.: P-1
PROJECT: WETLAND BREWING COMPANY
PROJECT LOCATION: MANDEVILLE, LA
BORING LOCATION: N 30° 21' 37" W 90° 3' 46"
BORING ELEVATION: EXISTING GROUND
GEOL/ENGR: SA
METHOD: AUGER/ROTARY WASH DRILLING

PROJECT NO.: B10-050
DATE DRILLED: 07/02/10
DATE COMPLETED: 07/02/10
WATER LEVEL: NE
WATER LEVEL DATE: 07/02/10
LOGGED BY: CM
DRILLER: KM

DEPTH (FEET)	SAMPLE	Standard Penetration (Blows/Ft.) or Penetrometer (TSF)	Moisture Content (%)	LL	PI	Symbol	MATERIAL CLASSIFICATION
0 - 5		3 b/ft 1/2/1	21	37	24		Dark Gray FILL
5 - 6			26				Tan and Dark Gray Lean CLAY (CL) ---with sand pockets
6 - 6'			21				---gray and red
6' - 30'						Bottom @ 6'	

COMMENTS: NE : NOT ENCOUNTERED

DISTURBED SAMPLE SPLIT SPOON
 SHELBY TUBE

BORING LOG

BORING NO.: P-2
PROJECT: WETLAND BREWING COMPANY
PROJECT LOCATION: MANDEVILLE, LA
BORING LOCATION: N 30° 21' 36" W 90° 3' 48"
BORING ELEVATION: EXISTING GROUND
GEOL/ENGR: SA
METHOD: AUGER/ROTARY WASH DRILLING

PROJECT NO.: B10-050
DATE DRILLED: 07/02/10
DATE COMPLETED: 07/02/10
WATER LEVEL: NE
WATER LEVEL DATE: 07/02/10
LOGGED BY: CM
DRILLER: KM

DEPTH (FEET)	SAMPLE	Standard Penetration (Blows/Ft.) or Penetrometer (TSF)	Moisture Content (%)	LL	PI	Symbol	MATERIAL CLASSIFICATION
0 - 1	X	9 b/ft 4/4/5	22 ⁽¹⁾				Brown SANDY SILT (ML) ---with gravel
1 - 2	X	7 b/ft 4/3/4	11	32	18		Tan Lean CLAY (CL) ---with silt and sand pockets
2 - 3	X	13 b/ft 4/6/7	18	54	39		Light Gray fat CLAY (CH) ---with silt and sand
3 - 6							Bottom @ 6' (1) GRAVEL= 8.2% SAND=62.2% SILT/CLAY=29.6%
6 - 30							

COMMENTS: NE : NOT ENCOUNTERED

SPLIT SPOON

BORING LOG

BORING NO.: P-3
PROJECT: WETLAND BREWING COMPANY
PROJECT LOCATION: MANDEVILLE, LA
BORING LOCATION: N 30° 21' 37" W 90° 3' 48"
BORING ELEVATION: EXISTING GROUND
GEOL/ENGR: SA
METHOD: AUGER/ROTARY WASH DRILLING

PROJECT NO.: B10-050
DATE DRILLED: 07/02/10
DATE COMPLETED: 07/02/10
WATER LEVEL: NE
WATER LEVEL DATE: 07/02/10
LOGGED BY: CM
DRILLER: KM

DEPTH (FEET)	SAMPLE	Standard Penetration (Blows/FL) or Penetrometer (TSF)	Unconfined Compressive Strength (tsf)	Moisture Content (%)	Dry Unit Weight (PCF)	LL	PI	Symbol	MATERIAL CLASSIFICATION
	X	16 b/ft 14/10/6		10				X	Dark Gray FILL and GRAVEL
	X	4 b/ft 3/2/2		17		21	9	/	Light Gray and Tan Lean CLAY (CL)
5	■		3.03 ⁽¹⁾	17	111			/	---stiff, light gray, with fine sand and silt
10									Bottom @ 6'
15									(1) SAND=36.3% SILT=29.9% CLAY=33.8%
20									
25									
30									

COMMENTS: NE : NOT ENCOUNTERED

SPLIT SPOON
 SHELBY TUBE

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GEOTECHNICAL ENGINEERING SERVICES REPORT

For

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SESI FILE NO: B10-042**

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