Exhibit X. LSU Innovation Park Geotechnical Engineering Report A

Geotechnical Engineering Report

Emerge Center - LSU South Campus

Baton Rouge, Louisiana

October 23, 2012

Terracon Project No. EH125101

Prepared for:

Coleman Partners

Baton Rouge, Louisiana

Prepared by:

Terracon Consultants, Inc.

Baton Rouge, Louisiana

October 23, 2012

Terracon

Coleman Partners
3377 North Boulevard
Baton Rouge, Louisiana 70806

Attn: Mr. Heltz
E: jheltz@cparch.com

Re: Geotechnical Engineering Report
Emerge Center - LSU South Campus
Baton Rouge, Louisiana
Terracon Project Number: EH125101

Dear Mr. Heltz:

We have completed the geotechnical engineering services for the above-referenced project. This work was performed in accordance with our proposal number PEH120313 dated August 27, 2012.

This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs and pavements for the proposed project.

We should collaborate with you as you finalize the designs. We should also review the pertinent aspects of the plans and specifications and provide construction materials and engineering testing services when the project moves into construction.

Sincerely,
Terracon Consultants, Inc.

STATE OF LOUISIANA
LYNNE E. ROUSSEL
License No. 35152
PROFESSIONAL ENGINEER

Lynne E. Roussel, P.E.
Project Engineer

Stephen E. Greaber, P.E.
Principal

Enclosure

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EXECUTIVE SUMMARY

This report provides the results of a geotechnical study for a proposed Emerge Center to be constructed at the LSU South Campus in Baton Rouge, Louisiana. Based upon the soil borings and CPT probes made, and the associated laboratory testing performed, we have made the following conclusions and recommendations in this report:

- The surficial lean clay is moisture sensitive. This relatively flat site could become difficult to access in wet periods, so good drainage (short term and long term) is important.
- The soft soils encountered below approximately 4 feet at the site are normally consolidated and placement of the building on shallow foundation is not feasible due to the anticipated excessive settlement. The structure and slab can be supported on a driven timber pile foundation system.
- A rigid (portland cement concrete) paving system can be used for this site. Due to anticipate marginal stability from elevated moisture of the near surface lean clays, lime treatment should be specified to stabilize the subgrade soils under new pavement areas.
- On-site native lean clay soils typically appear suitable for use as general engineering fill; however, if they do not meet the low plasticity criteria, they should not be utilized within 24 inches of the finished grade beneath building areas.
- The 2009 International Building Code, Table 1613.5.2 IBC seismic site classification for this site is D.
- Close monitoring of the construction operations discussed herein will be important for achieving the design subgrade support. We therefore recommend that Terracon be retained to monitor this portion of the work.

This summary should be used in conjunction with the entire geotechnical engineering report for design purposes. The details were not included or fully developed in this section. The report must be read in its entirety for a comprehensive understanding of the items contained herein. We recommend that you read the **GENERAL COMMENTS** section for an understanding of the report and its limitations.

GEOTECHNICAL ENGINEERING REPORT
Emerge Center - LSU South Campus
Baton Rouge, Louisiana
Terracon Project Number EH125101
October 23, 2012

1.0 INTRODUCTION

Coleman Partners is planning the construction of the Emerge Center at the LSU South Campus in Baton Rouge, Louisiana. Six borings, designated B-01 through B-06, and three Cone Penetrometer Test (CPT) probes were performed to depths of approximately 4 to 50 feet below the existing ground surface within the proposed building and pavement areas. Logs of the borings and CPT probes along with a site location map, and soil boring and CPT Probe location plan are included in Appendix A of this report.

We performed this exploration to provide information and geotechnical engineering recommendations relative to:

- soil conditions
- groundwater conditions
- site preparation
- foundation design and construction
- floor slab design and construction
- seismic considerations
- pavement design and construction

2.0 PROJECT INFORMATION

The following paragraphs present the project information that was available at the time this report was prepared. Should this information be incorrect, or changed significantly, please contact this office so that we could reevaluate our analysis and recommendations.

2.1 Information Sources

Project information was provided by Coleman Partners representative, Mr. Jonathan Heltz, who provided plans for the proposed development.

2.2 Project Description

Item	Description
Site layout	See Exhibit A-2, Boring Location Plan
Building construction	A new one-story structure approximately 26,500 square feet in plan. The existing pavement may be used or will be replaced. The structure will be steel frame or reinforced masonry with veneer finish.

Item	Description
Finished floor elevation	Not provided.
Maximum loads	Columns: <50 kips (assumed) Walls: <3 kips per linear foot (assumed) Slabs: <125 psf max (assumed)
Estimated settlement Sensitivity	We are not aware of any construction that will have movement (shrink/swell or settlement) sensitivity in excess of normal.
Pavement construction	Light and medium duty pavement, assumes car parking only for light duty, car and relatively light delivery trucks for medium duty. Existing concrete pavement is in poor condition with elevated subgrade moistures.
Grading	Not provided but assumed to be less than 2 feet.

2.3 Site Location and Description

Item	Description
Location	LSU South Campus, Baton Rouge, Louisiana Approximate Latitude: 30.36100 degrees Longitude 91.14191 degrees
Existing improvements	Vacant lot with concrete pavement along GSRI Road.
Current ground cover	Grass and concrete pavement.
Existing topography	Flat.

3.0 SUBSURFACE CONDITIONS

The soil borings and CPT probes encountered conditions that are typical for the geologic setting, based upon our experience in the vicinity of this site. The following paragraphs summarize our findings and opinions relative to the subsurface conditions.

3.1 Geology

The site is in an area of Natural Levee deposits, very close to Alluvial deposits of Holocene age. These Holocene Age deposits are broadly present throughout the area and are commonly characterized by firm to stiff clays and silty clays. At greater depth significant silt and sand layering may be present. The soils within the Natural Levee deposits are typically normally consolidated and tend to be compressible.

3.2 Soil Conditions

Beneath approximately 2 to 3 inches of organic laden soil and approximately 3 inches of concrete, the soil borings typically encountered medium stiff to very stiff lean clay (Unified Soil

Classification System symbol, CL) 'crust' from the existing ground surface to approximately 4 feet. Below 4 feet, soft lean clay (CL) was identified to the boring termination depth of 10 feet. Soft lean clay (CL) was noted near the surface below the concrete at Boring B-06 in the existing parking area. Considering the widely-spaced borings, other soft areas may exist across the site and below the pavement.

The CPT probe data generally noted the presence of soft to medium stiff clays and lean clays to a depth of 40 feet. Below 40 feet, alternating layers of very stiff clay and medium dense sand were identified to a depth of 50 feet.

Conditions encountered at each boring/CPT location are indicated on the individual boring logs and CPT logs, respectively. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in situ, the transition between materials may be gradual. Details for each of the borings and CPT probes can be found on the boring logs in Appendix A of this report. Additional laboratory test results, if any, are presented in Appendix B.

3.3 Groundwater Conditions

The boreholes were observed while drilling and after completion of drilling for the presence and level of groundwater. Groundwater was encountered in the three deeper borings at a depth of about 8 feet below grade. The drilling operations were suspended for about 15 minutes to observe the change in water level over that time period. The water level rose to a depth of between 2 and 5 feet. The remaining borings did not encountered groundwater during drilling. Specific observations of groundwater level as recorded for each boring are noted on the boring logs in Appendix A.

Due to the low permeability of the soils encountered in the borings, a relatively long period of time may be necessary for the groundwater level to develop and stabilize in a borehole in these materials. Long term observations in piezometers or observation wells sealed from the influence of surface water are often required to define the field or in-situ groundwater level in materials of this type.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors that are not evident at the time of drilling. Therefore, the groundwater levels that may prevail during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for this project.

3.4 Seismic Conditions

Code Used	Site Classification
2009 International Building Code (IBC) [1]	E [2]

1. In general accordance with the *2009 International Building Code and ASCE 7-10.*
2. Chapter 20 of ASCE 7-10, Minimum Design Loads for Building and Other Structures requires a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope does not include the required 100 foot soil profile determination. Borings and CPT soundings for the building extended to a maximum depth of approximately 50 feet and this seismic site class definition assumes that subsurface conditions encountered extend to a depth of 100 feet. Based on our knowledge of the geologic formation, the assumed site classification is considered reasonable. Additional exploration to deeper depths could be performed to confirm the conditions below the current depth of exploration. Alternatively, a geophysical exploration could be utilized to define the seismic site class.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

The information provided by the developers for this project has been combined with our findings from the site exploration and laboratory testing to develop guideline recommendations for site preparation, foundation design, and pavement design. These recommendations are detailed in the following paragraphs.

4.1 Geotechnical Considerations

The near surface, lean clay soils are moisture sensitive and good drainage should be completed early in the construction sequence and maintained after construction. The soils below 2 feet were very moist to wet. Maintaining the integrity of the upper stiff “crust” will be difficult with repetitive traffic from construction traffic. Additional site preparation recommendations, including subgrade improvement, fill placement, and excavations are provided in the **Section 4.2**.

The soft soils encountered below approximately 4 feet at the site are normally consolidated and placement of the building on shallow foundation is not feasible due to the anticipated excessive settlement. The structure can be supported on a driven timber pile foundation system. **Section 4.3** addresses deep foundation support of the structure and floor slab.

A rigid (portland cement concrete) paving system can be used for this site. Due to anticipate marginal stability from elevated moisture of the near surface lean clays, lime treatment should be specified to stabilize the existing subgrade soils in the pavement area. **Section 4.5** addresses design of pavement systems.

Appropriate quality assurance and quality control provisions are essential to the successful implementation of the recommendations provided in the subsequent paragraphs for site preparation and foundation construction and are subject to the proper construction practices and materials. **Section 5** addresses the required quality assurance and quality control provisions that are within the scope of this project.

4.2 Earthwork

A critical aspect of the successful construction project is the earthwork. Good earthwork is also critical to the overall performance of the foundation and pavement systems for the building. This section provides recommendations for site preparation, material types, compaction requirements, utility trench backfill, grading and drainage, and construction considerations.

4.2.1 Site Preparation

The combination of a relatively flat, and poorly drained site, and moisture sensitive, near surface soils creates the need to establish good drainage as far in advance of construction as possible. Good drainage should be established throughout the site preparation and construction process. This is particularly important if any aspects of construction are attempted during wet periods.

After establishing drainage, the site should be cleared and grubbed to remove trees, grass and topsoil including: stumps, roots, organic laden soil, organic matter, and any rubble or debris encountered. When trees are removed, the entire root ball should be excavated such that the remaining roots measure 1 inch in diameter, or less, and the remaining excavation should be sloped to allow compaction equipment to achieve uniform backfill compaction.

Where the existing pavement is removed, soft saturated clays maybe present under pavement. These soft areas may require mitigation such as overexcavation or lime treatment. After the site has been adequately grubbed and cleared, the entire construction area should be proof-rolled to observe for the presence of weak, yielding or pumping foundation soils. A heavily loaded rubber-tired vehicle should be used for the proof-rolling operation. The vehicle should weigh between 10 and 20 Tons (total weight). If soft areas are encountered, they should be mitigated. If the areas are isolated, mitigation by limited overexcavation and replacement with competent soils or lime treatment as approved by the geotechnical engineer at the time of construction, may suffice.

4.2.2 Excavations

The shallow utility excavations will be made within the medium stiff to very stiff lean clays with minimal difficulty. Groundwater seepage is possible but should be controllable with standard sump pump techniques. Any stormwater or groundwater that enters the excavations should be removed promptly.

At a minimum, all temporary excavations should be sloped or braced as required by Occupational Safety and Health Administration (OSHA) regulations to provide stability and safe working conditions. Temporary excavations greater than 5 feet in depth may be required during grading operations. The grading contractor is responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required, to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, state and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

4.2.3 Fill Material Types

Fill used to bring the site to grade should meet the following material property requirements:

Fill Type [1]	USCS Classification	Acceptable Location for Placement
Lean Clay, Clayey Sand	CL, SC (LL<45, 10<PI<25)	All locations and elevations
On-site soils	Varies	The on-site lean clay soils appear suitable for use as fill.

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris. A sample of each material type should be submitted to the geotechnical engineer for evaluation.

4.2.4 Compaction Requirements

Item	Description
Fill Lift Thickness	9 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used
Compaction Requirements [1]	Minimum 95% of the standard Proctor maximum dry density (ASTM D 698)
Moisture Content of Cohesive Soil	Within the range of 2% below to 3% above the optimum moisture content value as determined by the standard Proctor test at the time of placement and compaction with stability present.
Moisture Content of Granular Material [2]	Workable moisture levels

1. Fill should be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
2. Specifically, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the cohesionless fill material pumping when proof-rolled.

4.2.5 Utility Trench Backfill

All trench excavations should be made with sufficient working space to permit construction including backfill placement and compaction. If utility trenches are backfilled with relatively clean granular material, they should be capped with at least 18 inches of cohesive fill in non-pavement areas to reduce the infiltration and conveyance of surface water through the trench backfill.

Utility trenches are a common source of water infiltration and migration. All utility trenches that penetrate beneath the building should be effectively sealed to restrict water intrusion and flow through the trenches that could migrate below the building. We recommend constructing an effective clay “trench plug” that extends at least 5 feet out from the face of the building exterior. The plug material should consist of clay compacted at a water content at or above the soils optimum water content. The clay fill should be placed to completely surround the utility line and be compacted in accordance with recommendations in this report.

4.3 Driven Timber Pile Foundations

Due to the presence of soft and compressible soil conditions and the anticipated structural loads, driven treated timber piles appear to be a viable option for the support of the proposed structure and floor slab. The following paragraphs provide additional design recommendations and construction considerations for installation of a timber pile deep foundation and slab support system.

4.3.1 Axial Capacities

The piles should be installed to a target tip depth of 47 feet below existing grade into the layered stiff clay and medium dense sand stratum identified below approximately 40 to 45 feet. The following table shows the allowable pile capacity for a 12-inch butt, 7-inch tip ASTM D25 Class B timber pile driven to 47 feet below existing grade. A factor of safety of 2 was used.

ASTM D25 Class B Timber Pile (12-inch butt, 7-inch tip)

Pile Length (ft)	Axial Compression Allowable Capacity (tons)
47	20

The above allowable axial load can be increased by 30% for highly transient loads such as maximum wind loads. In the case of uplift loading, only skin friction of the pile should be considered to resist uplift loads. Neglecting adhesion in the upper 4 feet of the pile, an allowable uplift capacity of 4 tons pile is recommended. The project structural engineer should evaluate the uplift capacity considering connection limitations of timber piles. Piles should be spaced no closer than 3 pile diameters (center to center). For pile groups, the final design should be checked to evaluate the need for group efficiency reductions.

4.3.2 Pile Load Test

A field load test must be performed to verify the predicted allowable axial capacity. The load test should consist of the installation of the predominant pile type and depth planned for construction. The test pile should be loaded to a minimum of 250% of its design capacity. We should oversee the load testing program and reevaluate our capacity predictions based upon the test results. Observation of pile installation is necessary to confirm actual pile capacities, and, therefore, required pile lengths.

4.3.3 Lateral Capacity

We have not performed lateral capacity analyses. If lateral loads exceed 2 tons/pile, a detailed analysis of lateral load capacity should be performed after the actual loading conditions have been determined and after the foundation type has been selected.

4.3.4 Settlement

Piles capable of supporting the anticipated axial loading are not expected to undergo large settlement. Long-term settlement of deep foundations is not anticipated to exceed one inch for driven piles under the allowable compressive loads.

However, if more than two feet of fill will be placed at this site to achieve final grade, fill induced settlements may create downdrag effects on the piles and may result in a reduction in the allowable capacity of the pile or pile settlement. Our office should be notified if fill in excess of two feet is planned so that we can evaluate the effect on the pile capacity, and other potential settlement related development issues.

4.3.5 Driven Timber Pile Installation

The timber piles should be installed using a conventional pile hammer with an energy rating of between 7,500 and 15,000 ft-lb. Pile driving should not be difficult in the upper cohesive soils.

The driving criteria should be established at the time of construction based on the characteristics of the pile driving hammer used and the required pile capacity. A pile driving analyzer (PDA) should be used during the initial pile driving operations to check the performance of the hammer being used and to verify the field pile capacity. Vibration monitoring should be performed if movement-sensitive structures are located within 200 feet of the installation.

Proper site preparation, construction techniques, and quality control are important for the integrity of the deep foundation system. These construction efforts should be monitored and documented by the geotechnical engineer’s representative.

4.4 Floor Slabs

Details concerning floor slab design were not available at the time of our exploration. The floor slab should be designed as a structural slab with grade beams supported by timber piles as designed by the structural engineer.

4.5 Pavements

Based on experience with similar projects, a portland cement concrete (rigid) pavement system can be used. The existing concrete pavement is in poor condition with a marginally stable subgrade due to elevated moisture. It is recommended that the pavement be removed and replaced with new concrete pavement over existing lime treated subgrade.

4.5.1 Subgrade Preparation

On most project sites, the site grading is accomplished relatively early in the construction phase. Fills are placed and compacted in a uniform manner. However, as construction proceeds, excavations are made into these areas, rainfall and surface water saturates some areas, heavy traffic from concrete trucks and other delivery vehicles disturbs the subgrade and many surface irregularities are filled in with loose soils to improve trafficability temporarily. As a result, the pavement subgrades, initially prepared early in the project, should be carefully evaluated as the time for pavement construction approaches.

Subgrade stability is a transient condition affected by weather and construction traffic. We recommend the stability of the subgrade be evaluated and the pavement subgrades subjected to a proof roll within two days prior to commencement of actual paving operations or placement of any formwork. Areas unstable under proof-roll should be moisture conditioned and recompacted or lime treated. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fills. To improve the stability of the moisture sensitive lean clays, upon removal of the existing pavement the subgrade below the planned new pavement should be lime treated.

4.5.2 Design Considerations

Anticipated traffic volumes and loading conditions for this facility were not provided, but we have made assumptions based our experience with similar projects. We have also assumed 20-year design life. We expect that the pavements within the facility are likely to be subjected to two loading conditions:

- Light Duty: passenger vehicle parking only.
- Medium Duty: passenger vehicles at a frequency of 1,000 vehicles per week along with school buses, medium sized delivery and trash collection trucks at a frequency of less than 40 per week and no tractor-trailer trucks.

Pavement thickness can be determined using AASHTO, Asphalt Institute and/or other methods if specific wheel loads, axle configurations, frequencies, and desired pavement life are provided. Terracon can provide thickness recommendations for pavements subjected to loads other than personal vehicle and occasional delivery and trash removal truck traffic if this information is provided.

Pavement design methods are intended to provide structural sections with adequate thickness over a particular subgrade such that wheel loads are reduced to a level the subgrade can support. The support characteristics of the subgrade for pavement design do not account for shrink/swell movements. Thus, the pavement may be adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell related movement of the subgrade.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to parking lots and drives should slope down from pavement edges at a minimum 2%;
- The subgrade and the pavement surface should have a minimum ¼ inch per foot slope to promote proper surface drainage;
- Install pavement drainage surrounding areas anticipated for frequent wetting (e.g., maintenance areas, wash racks);
- Install joint sealant and seal cracks immediately;
- Seal all landscaped areas in, or adjacent to pavements to reduce moisture migration to subgrade soils;
- Place compacted, low permeability backfill against the exterior side of curb and gutter; and,
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

4.5.3 Estimates of Minimum Pavement Thickness

Typical Pavement Section Thickness (inches)				
Traffic Area	**Alternative**	**Portland Cement Concrete [1,2]**	**Lime Treated Base Course [3]**	**Total Thickness**
Light Duty (Car Parking Stalls)	PCC	5.0	12.0	9.0
Medium Duty (Drive Areas)	PCC	6.0	12.0	10.0
Entrances & Trash Container Pad [4]	PCC	8.0	12.0	12.0

1. 4,000 psi at 28 days, 4-inch maximum slump and 5 to 7 percent air entrained.
2. Standard design and construction details for rigid pavements are contained in ACI330R-08. It is recommended that the design engineer refer to this document for more detailed information. A critical aspect of concrete pavements for facilities of this nature is joint spacing and related details. ACI330R-08 addresses these important details.
3. The subgrade should be lime treated in general accordance with procedures outlined in LSSRB section 304, Type D treatment. A lime addition rate of 8% by volume is recommended and the mixture should be compacted to 95% of its maximum standard proctor dry density and within +2% or -2% of optimum.
4. The trash container pad should be large enough to support the container and the tipping axle of the collection truck. The trash container pad should be designed as a structural slab for the anticipated axle loads.

4.5.4 Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration.

4.5.5 Pavement Maintenance

The pavement sections provided in this report represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. We recommend that preventive maintenance should be planned and provided for through an on-going pavement management program. Preventive maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Preventive maintenance consists of crack and joint sealing, and patching as necessary. Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventive maintenance. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

5.0 GENERAL COMMENTS

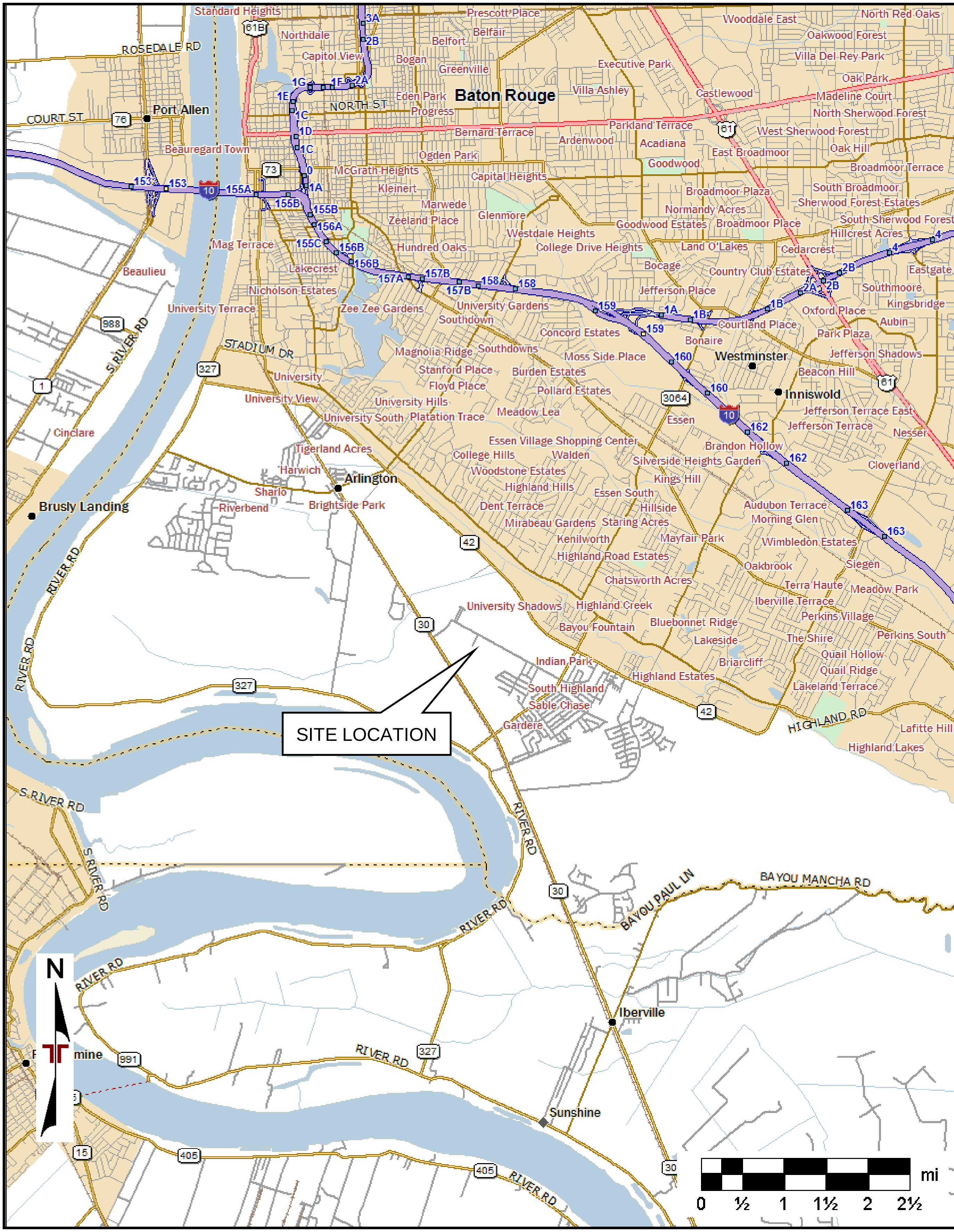
Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon should also be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information presented earlier in the report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION AND METHODS



Project Manager: RSC	Project No. EH125101
Drawn by: MIS	Scale: See Above
Checked by: RSC	File Name: A-1
Approved by: RSC	Date: 10/19/2012

Terracon

2822 O'Neal Lane Building B Baton Rouge, Louisiana 70816
PH. (225) 344-6052 FAX. (225) 344-6346

SITE LOCATION PLAN

EMERGE CENTER – LSU SOUTH CAMPUS

BATON ROUGE, LOUISIANA

EXHIBIT

A-1

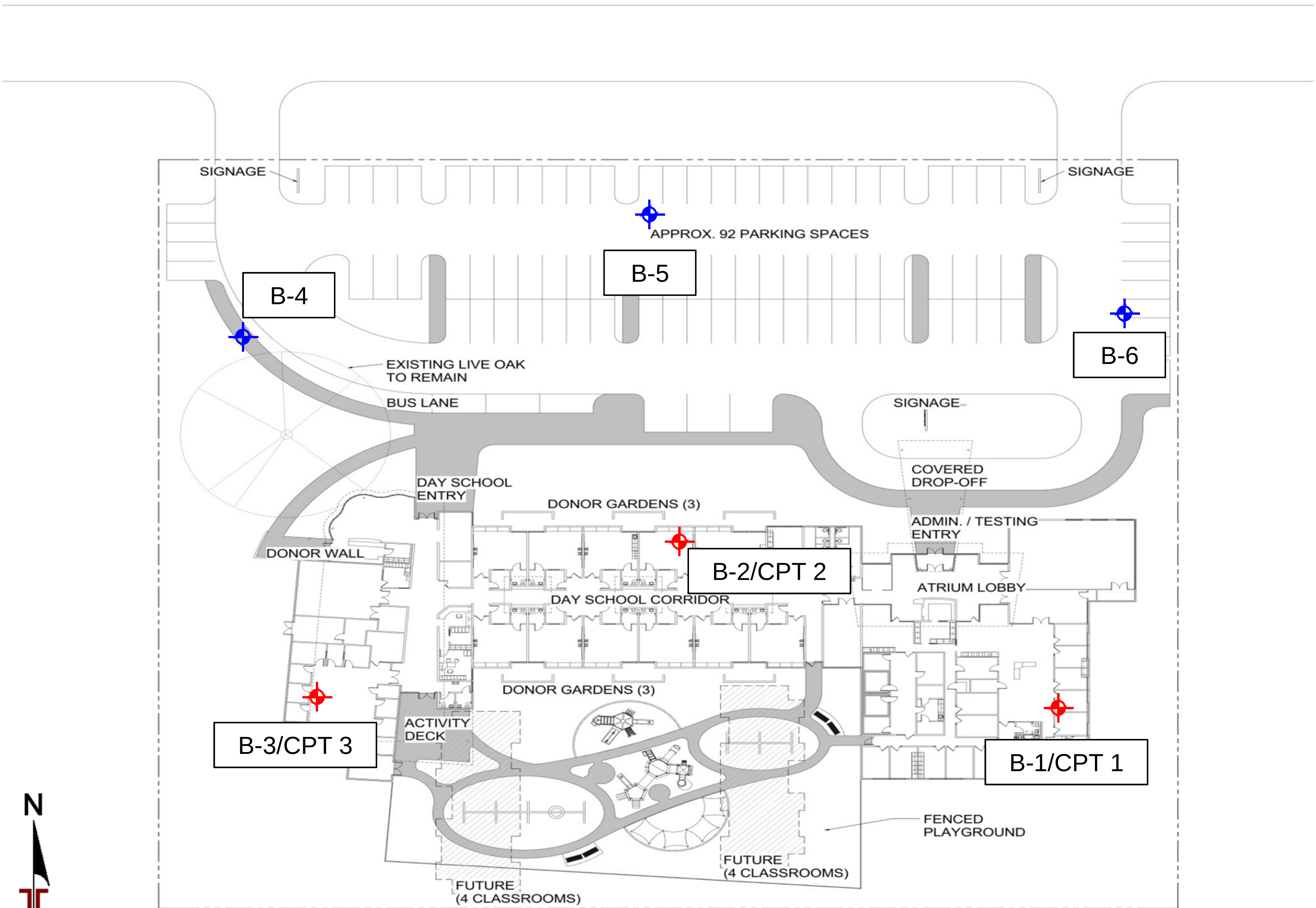


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DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: RSC
Drawn by: MIS
Checked by: RSC
Approved by: RSC

Project No. EH125101
Scale: See inset
File Name: Exhibit A-2
Date: 10/19/2012

Terracon

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BORING LOCATION PLAN

EMERGE CENTER – LSU SOUTH CAMPUS
GSRI ROAD & GULF SOUTH PARKWAY
BATON ROUGE, LOUISIANA

EXHIBIT
A-2

FIELD EXPLORATION AND METHODS

The field exploration was conducted utilizing standard procedures developed by Terracon Consultants, Inc. (Terracon) for studies of this nature. The information collected during the field exploration was documented by a Terracon Engineering Technician. The following paragraphs describe the field methods utilized. One or more soil borings were performed for this study. This Appendix includes detailed soil boring log(s) which present the data collected and provide a description of soil and groundwater conditions encountered. A legend that describes the terms and symbols used in the boring log(s) is included in **APPENDIX C**.

Site Reconnaissance

The engineering technician walked the project site and documented observations that are of significance to the geotechnical exploration. Such observations include: topography, vegetation, trees, drainage, other structures, surface soil conditions, and trafficability.

These observations were reported to the project engineer in the form of field notes. The project engineer reviewed the results of the field reconnaissance with the engineering technician in a project meeting subsequent to the field exploration.

Soil Exploration and Sampling

The soil boring(s) were advanced using our track-mounted drilling rig and equipment at the approximate location(s) shown on Exhibit A-2, Boring Location Plan. The location(s) were measured from known points.

Soil Boring: The boring(s) were advanced by rotating a four-inch diameter, continuous-flight earth auger with the drilling rig, removing the auger from each boring, and cleaning the cuttings from the auger before sampling or reinserting the auger back into the bore hole. This technique allowed for the observation of soil cuttings and description of soil conditions encountered. This dry auger technique allows detection of free groundwater within the boring.

Soil Sampling: The soil sampling program included the collection of undisturbed and representative soil samples. Relatively undisturbed samples, usually collected in cohesive soils, were obtained by pushing a three-inch diameter, Shelby tube sampler a distance of two feet into the soil in general accordance with ASTM D1587. Depths at which these undisturbed samples were obtained are indicated by a shaded portion in the "Samples" column of the attached boring log(s).

After the Shelby tube was removed from each boring, the sample was visually classified. Relative strength estimates of the sample were obtained by a hand-held pocket penetrometer. These penetrometer readings showing the estimated unconfined compressive strength in units of tons per square foot are indicated by the symbol "(HP)" in the "Field Test Results" column of each boring log. The sample was extruded in the field and the samples were wrapped and sealed to minimize moisture loss. The sample was placed in a crate and transported to the Terracon laboratory.

Disturbed soil samples were also collected during the exploration by the auger method in accordance with ASTM D 1452 (AASHTO T203). The spiral-type (solid-stem) auger consisted of a flat thin metal strip, machine twisted to a spiral configuration of uniform pitch having at one end, a sharpened or hardened point, with a means of attaching a shaft or extension at the opposite end. Depths at which these auger samples were obtained are indicated by in the the attached boring logs. The soil content from the auger was visually classified, labeled and placed in a sealed container to minimize moisture loss during transportation to the laboratory.

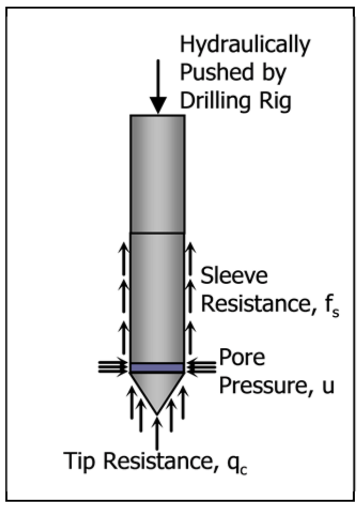
Groundwater Observations: During the soil boring advancement and sampling operation, observations for free groundwater were made. Information regarding water level observations is recorded in the "groundwater" column on the soil boring log(s). Other information regarding water level observations has been noted under "Groundwater Level Data" at the bottom of each log.

Boring Abandonment: Upon completion of the field exploration phase of this study, each boring was sealed in accordance with State regulations.

Cone Penetration Testing

The field investigation included the Cone Penetrometer Tests (CPTs) as directed by the project engineer. The locations of CPT probing are shown in Exhibit A-2, Boring Location Plan.

At each designated location, a CPT test was performed by pushing a 10-square centimeter electric cone penetrometer at an approximate rate of 20 millimeters/second using the hydraulic cylinders of the drilling rig. The cone penetrometer is equipped with electronic load cells to measure tip resistance and sleeve resistance, and a pressure transducer is measure the generated ambient pore pressure, as illustrated in the insert diagram.



Digital data representing the tip resistance, the sleeve penetration, the pore pressure and the CPT probe inclination are typically measured at 50 mm intervals during penetration using a CPT data acquisition system or logger. These data are transferred to an on-site computer using a cable transmission system. This process allowed continuous monitoring of the data as the cone is advanced in a real-time fashion.

Upon completion of the test, the data collected were downloaded directly from the CPT data logger to an on-site computer. The collected data were then interpreted using a software package provided by the cone manufacture to provide the cone and sleeve resistance, pore pressure and inclination. The software also allows interpretation of soil types (clay, silt, sand, etc.), soil unit weight, and selected soil parameters, such as undrained shear strength, overconsolidation ratio, and equivalent standard penetration resistance. The conventional field data from the soil boring and the available laboratory test results (presented in Appendices A and B) can also correlate with the interpreted CPT data for a particular site.

The testing and calibration of the CPT device was conducted in general conformance with ASTM D 5778. The resulting CPT data are included in this Appendix.

BORING LOG NO. B-01

PROJECT: Emerge Center - LSU South Campus

CLIENT: Coleman Partners
Baton Rouge, Louisiana

SITE: 7670 GSRI
Baton Rouge, Louisiana

LOCATION See Exhibit A-2

Latitude: 30.361° Longitude: -91.14191°

GRAPHIC LOG	DEPTH	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY (CL), brown, medium stiff										
			▽		0.50 (HP)	UC	0.82	9.5	28	95	36-21-15
		5			0.25 (HP)						
					0.75 (HP)						
	soft		▽		0.25 (HP)	UC	0.35	10.8	43	79	44-20-24
	10.0	10									
	Boring Terminated at 10 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
0'-10' - Short flight auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data, (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:
0 Ft.:2" Topsoil with 6" Gravel/Soil Mix

WATER LEVEL OBSERVATIONS

▽ *Groundwater initially observed at 8 feet*

▽ *Rise after 15 minutes*

Terracon
2822 O'Neal Lane, Building B
Baton Rouge, Louisiana

Boring Started: 10/4/2012	Boring Completed: 10/4/2012
Drill Rig: Geoprobe	Driller: J. Osiek
Project No.: EH125101	Exhibit A-4

BORING LOG NO. B-02

PROJECT: Emerge Center - LSU South Campus

CLIENT: Coleman Partners Baton Rouge, Louisiana

SITE: 7670 GSRI Baton Rouge, Louisiana

LOCATION See Exhibit A-2

Latitude: 30.36148° Longitude: -91.14225°

GRAPHIC LOG DEPTH	Description	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY (CL), tan to light gray, very stiff				1.75 (HP)	UC	3.03	8.2	16	116	33-15-18
					2.00 (HP)						
4.0	**LEAN CLAY (CL)**, brown, soft	5	▽		0.50 (HP)						
			▽		0.25 (HP)	UC	0.25	11.5	34	86	35-21-14
10.0		10			0.75 (HP)						
	Boring Terminated at 10 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
0'-10' - Short flight auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data, (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:
0 Ft.:3" Topsoil

WATER LEVEL OBSERVATIONS

▽ *Groundwater initially observed at 8 feet*

▽ *Rise after 15 minutes*

Terracon
2822 O'Neal Lane, Building B
Baton Rouge, Louisiana

Boring Started: 10/4/2012	Boring Completed: 10/4/2012
Drill Rig: Geoprobe	Driller: J. Osiek
Project No.: EH125101	Exhibit A-5

BORING LOG NO. B-03

PROJECT: Emerge Center - LSU South Campus

CLIENT: Coleman Partners
Baton Rouge, Louisiana

SITE: 7670 GSRI
Baton Rouge, Louisiana

LOCATION See Exhibit A-2

Latitude: 30.36147° Longitude: -91.14281°

GRAPHIC LOG / DEPTH	Description	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY (CL), brown, medium stiff										
				■	0.50 (HP)	UC	0.73	7.7	26	96	34-22-12
		5	▽	■	0.50 (HP)						
	soft			■	0.25 (HP)	UC	0.43	7.7	35	89	36-23-13
10.0		10	▽	■	0.75 (HP)						
	Boring Terminated at 10 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
0'-10' - Short flight auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data, (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

0 Ft.:3" Topsoil with 8" Gravel/Soil Mix

WATER LEVEL OBSERVATIONS

▽ *Groundwater initially observed at 8 feet*

▽ *Rise after 15 minutes*

Terracon
2822 O'Neal Lane, Building B
Baton Rouge, Louisiana

Boring Started: 10/4/2012	Boring Completed: 10/4/2012
Drill Rig: Geoprobe	Driller: J. Osiek
Project No.: EH125101	Exhibit A-6

BORING LOG NO. B-04

PROJECT: Emerge Center - LSU South Campus

CLIENT: Coleman Partners
Baton Rouge, Louisiana

SITE: 7670 GSRI
Baton Rouge, Louisiana

LOCATION See Exhibit A-2

Latitude: 30.36205° Longitude: -91.14244°

GRAPHIC LOG	DEPTH	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY (CL), brown, soft to medium stiff				4.50 (HP)						
					0.50 (HP)				31	89	38-20-18
	4.0										
	Boring Terminated at 4 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
0'-6' - Short flight auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data, (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

0 Ft.:3" Topsoil

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
2822 O'Neal Lane, Building B
Baton Rouge, Louisiana

Boring Started: 10/4/2012	Boring Completed: 10/4/2012
Drill Rig: Geoprobe	Driller: J. Osiek
Project No.: EH125101	Exhibit A-7

BORING LOG NO. B-05

PROJECT: Emerge Center - LSU South Campus

CLIENT: Coleman Partners Baton Rouge, Louisiana

SITE: 7670 GSRI Baton Rouge, Louisiana

LOCATION See Exhibit A-2

Latitude: 30.36202° Longitude: -91.14206°

GRAPHIC LOG	DEPTH	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY (CL), brown, medium stiff				0.75 (HP)	UC	0.97	5	27	94	45-22-23
					0.50 (HP)						
	4.0										
	Boring Terminated at 4 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
0'-6' - Short flight auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data, (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

0 Ft.:3" Concrete

WATER LEVEL OBSERVATIONS

No free water observed

Terracon

2822 O'Neal Lane, Building B
Baton Rouge, Louisiana

Boring Started: 10/4/2012	Boring Completed: 10/4/2012
Drill Rig: Geoprobe	Driller: J. Osiek
Project No.: EH125101	Exhibit A-8

BORING LOG NO. B-06

PROJECT: Emerge Center - LSU South Campus

CLIENT: Coleman Partners Baton Rouge, Louisiana

SITE: 7670 GSRI Baton Rouge, Louisiana

LOCATION See Exhibit A-2

Latitude: 30.36162° Longitude: -91.14141°

GRAPHIC LOG	DEPTH	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	STRENGTH TEST: TEST TYPE	STRENGTH TEST: COMPRESSIVE STRENGTH (tsf)	STRENGTH TEST: STRAIN (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY (CL), brown, soft				0.50 (HP)						
	4.0				0.25 (HP)	UC	0.45	7.2	37	83	45-23-22
	Boring Terminated at 4 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
0'-6' - Short flight auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Exhibit A-3 for description of field procedures.

See Appendix B for description of laboratory procedures and additional data, (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:
0 Ft.:3" Concrete

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
2822 O'Neal Lane, Building B
Baton Rouge, Louisiana

Boring Started: 10/4/2012	Boring Completed: 10/4/2012
Drill Rig: Geoprobe	Driller: J. Osiek
Project No.: EH125101	Exhibit A-9

Terracon

Emerge Center - LSU South Campus
7670 GSRI (Baton Rouge,Louisiana)
Project No: EH125101

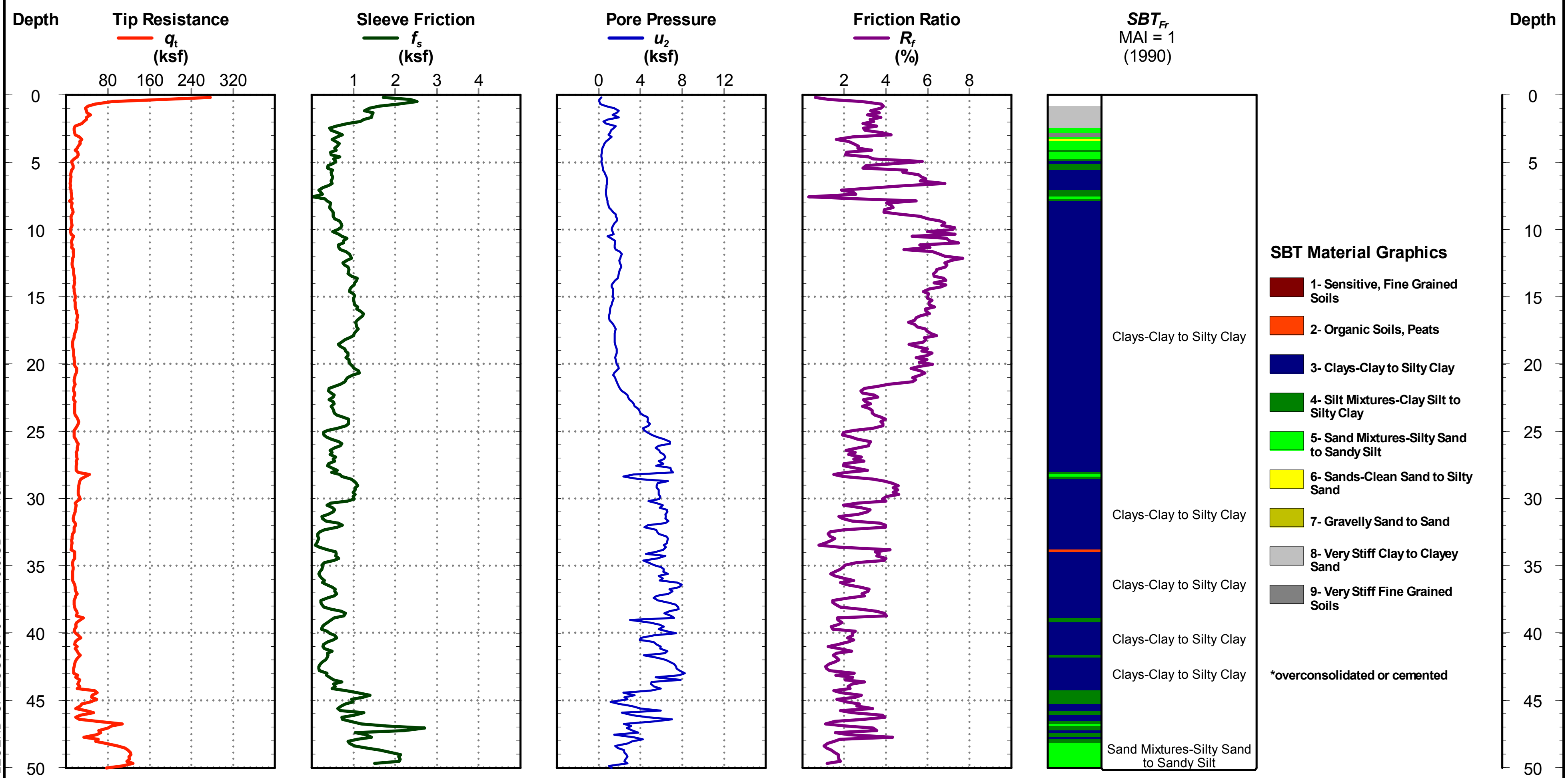
Cone Penetration Test

CPT_1

Date: Oct. 4, 2012
Estimated Water Depth: 0
Rig/Operator: j.b.osiek

Northing:
Easting:
Elevation:

Total Depth: 50.0
Termination Criteria:
Cone Size:



CPT_1

Electronic Filename: EH125101_CPT_1.cpt

Terracon

Emerge Center - LSU South Campus
7670 GSRI (Baton Rouge,Louisiana)
Project No: EH125101

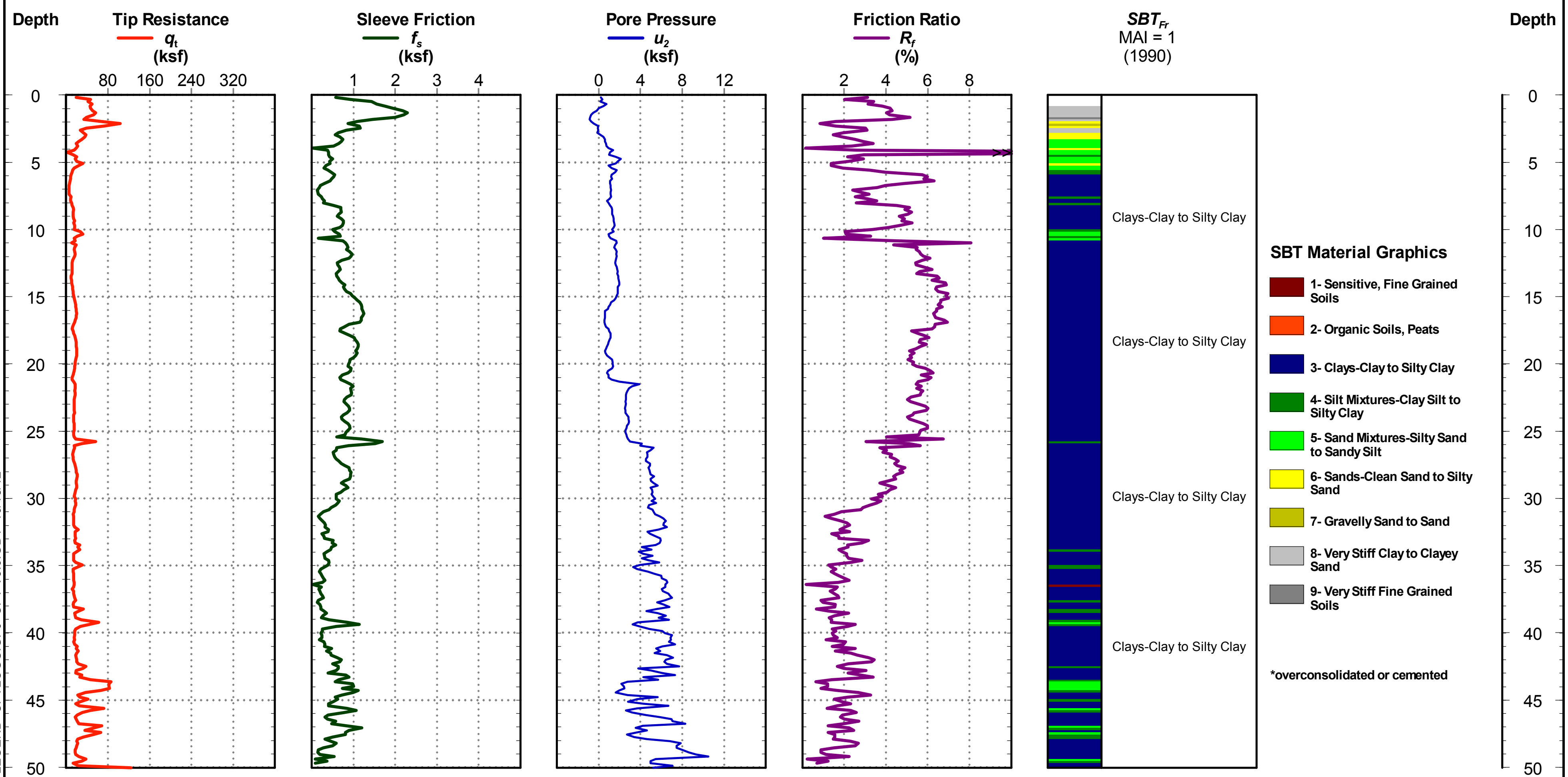
Cone Penetration Test

CPT_2

Date: Oct. 4, 2012
Estimated Water Depth: 0
Rig/Operator: j.b.osiek

Northing:
Easting:
Elevation:

Total Depth: 50.0
Termination Criteria:
Cone Size:



CPT REPORT - STANDARD WITH LEGEND CPTLOGS.GPJ CPT V3.0.GDT 10/18/12

CPT_2

Electronic Filename: EH125101_CPT_2.cpt

Terracon

Emerge Center - LSU South Campus
7670 GSRI (Baton Rouge,Louisiana)
Project No: EH125101

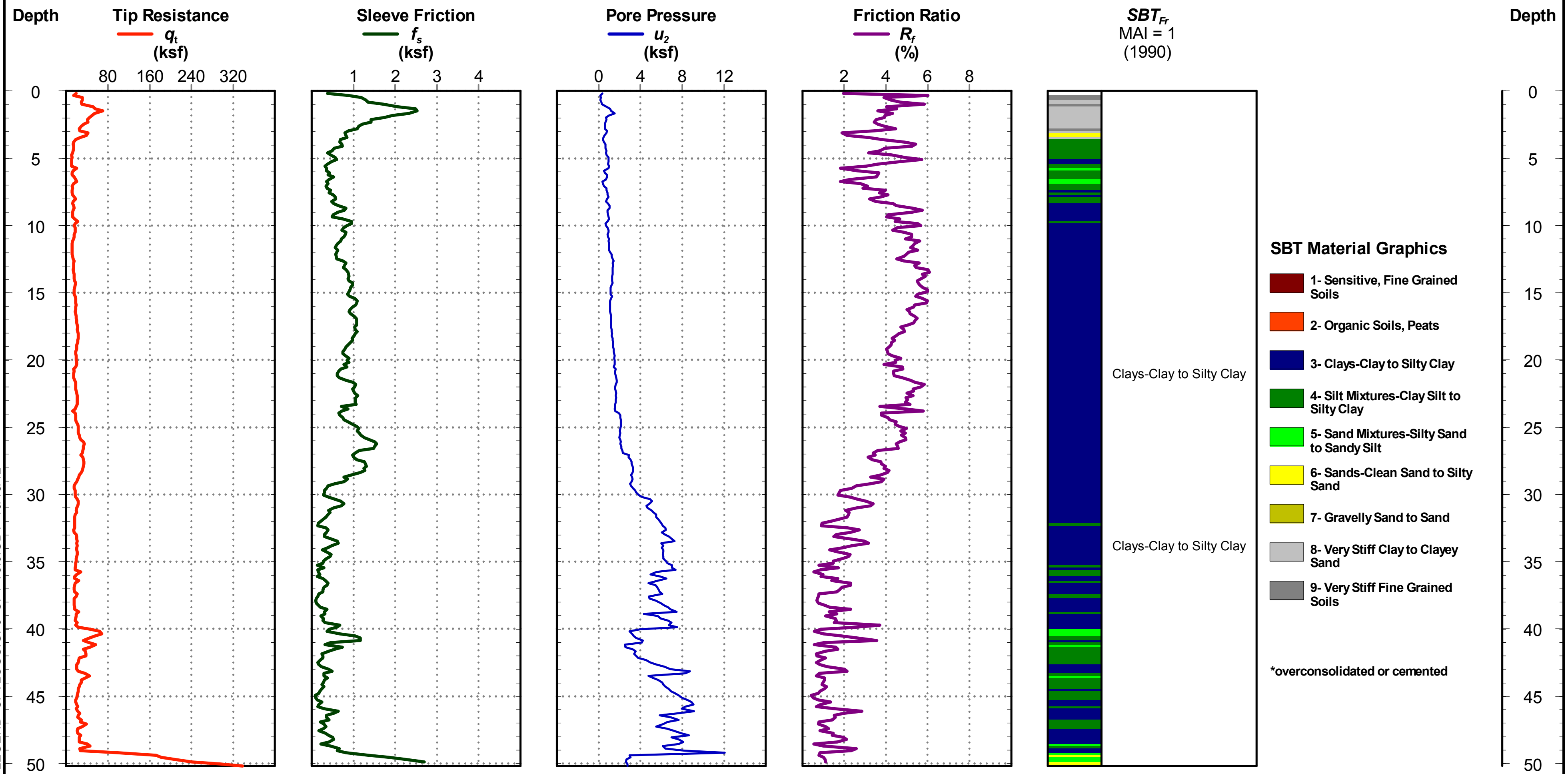
Cone Penetration Test

CPT_3a

Date: Oct. 4, 2012
Estimated Water Depth: 0
Rig/Operator: j.b.osiek

Northing:
Easting:
Elevation:

Total Depth: 50.2
Termination Criteria:
Cone Size:



CPT REPORT - STANDARD WITH LEGEND CPTLOGS.GPJ CPT V3.0.GDT 10/18/12

CPT_3a

Electronic Filename: EH125101_CPT_3a.cpt

APPENDIX B
LABORATORY TESTING AND TEST METHODS

LABORATORY TESTING AND TEST METHODS

The soil samples were delivered to the Terracon laboratory for testing. The project engineer reviewed each field boring log and assigned laboratory testing on selected samples to provide the data necessary for the anticipated designs.

Laboratory testing was accomplished to determine the engineering properties of the soils encountered. These procedures are discussed below.

Index Properties

Moisture Content: Moisture content tests were performed to better understand the classification and shrink/swell potential of the soils encountered. These tests were performed in general accordance with ASTM D 2216. The results of these tests are tabulated within the Laboratory Data section of the attached boring log(s).

Atterberg Limits: Liquid limit (LL) and plastic limit (PL) determinations were performed to assist in classification by the Unified Soil Classification System (USCS). These tests were performed in general accordance with ASTM D 4318. The plasticity index (PI) was calculated as LL - PL for each Atterberg limit determination. The results of these tests are tabulated within the Laboratory Data section of each boring log.

Strength Tests

Unconfined Compression: The undrained shear strength of selected undisturbed soil samples was determined by means of unconfined compression tests (ASTM D 2166). In an unconfined compression test, a cylindrical sample of soil is subjected to a uniformly increasing axial strain until failure develops. For cohesive soils, the undrained shear strength, or cohesion, is taken to be equal to one-half of the maximum observed normal compressive stress on the sample during the test.

The results of the unconfined compression tests are provided as undrained shear strength values within the Laboratory Data section of each boring log. Also shown are the natural water contents and unit dry weights determined as a part of each compression test.

APPENDIX C
SUPPORTING DOCUMENTS

EXPLANATION OF BORING LOG INFORMATION

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING

- Auger
- Split Spoon
- Shelby Tube
- Macro Core
- No Recovery
- Rock Core
- Ring Sampler

WATER LEVEL OBSERVATIONS

- Water Level Initially Encountered
- Water Level After a Specified Period of Time
- Water Level After a Specified Period of Time
- No Water Level Observed

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Water level variations will occur over time. In low permeability soils, accurate determination of water levels is not possible with short term water level observations.

FIELD TESTS

(HP)	Hand Penetrometer (tsf)
(T)	Torvane (tsf)
(b/f)	Standard Penetration Test (blows per foot)
(PID)	Photo-Ionization Detector (ppm)
(OVA)	Organic Vapor Analyzer (ppm)

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Std. Penetration Resistance (blows per foot)**	**Descriptive Term (Consistency)**	**Undrained Shear Strength (kips per square foot)**	**Std. Penetration Resistance (blows per foot)**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium-Stiff	0.50 to 1.00	5 - 7
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 14
Very Dense	≥ 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	above 4.00	≥ 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Descriptive Term(s) of other constituents	Percent of Dry Weight
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	≥ 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	≥ 30

Terracon

Exhibit C-1

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]					Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$[E]		GW	Well-graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3$[E]		GP	Poorly graded gravel[F]
		Gravels with Fines: More than 12% fines[C]	Fines classify as ML or MH		GM	Silty gravel[F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel[F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[E]		SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3$[E]		SP	Poorly graded sand[I]
		Sands with Fines: More than 12% fines[D]	Fines classify as ML or MH		SM	Silty sand[G,H,I]
			Fines classify as CL or CH		SC	Clayey sand[G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	$PI > 7$ and plots on or above "A" line[J]		CL	Lean clay[K,L,M]
			$PI < 4$ or plots below "A" line[J]		ML	Silt[K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay[K,L,M,N]
			Liquid limit - not dried			Organic silt[K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay[K,L,M]
			PI plots below "A" line		MH	Elastic Silt[K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay[K,L,M,P]
			Liquid limit - not dried			Organic silt[K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains $\geq$ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains $\geq$ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains $\geq$ 30% plus No. 200 predominantly sand, add "sandy" to group name.

[M] If soil contains $\geq$ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] $PI \geq 4$ and plots on or above "A" line.

[O] $PI < 4$ or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.

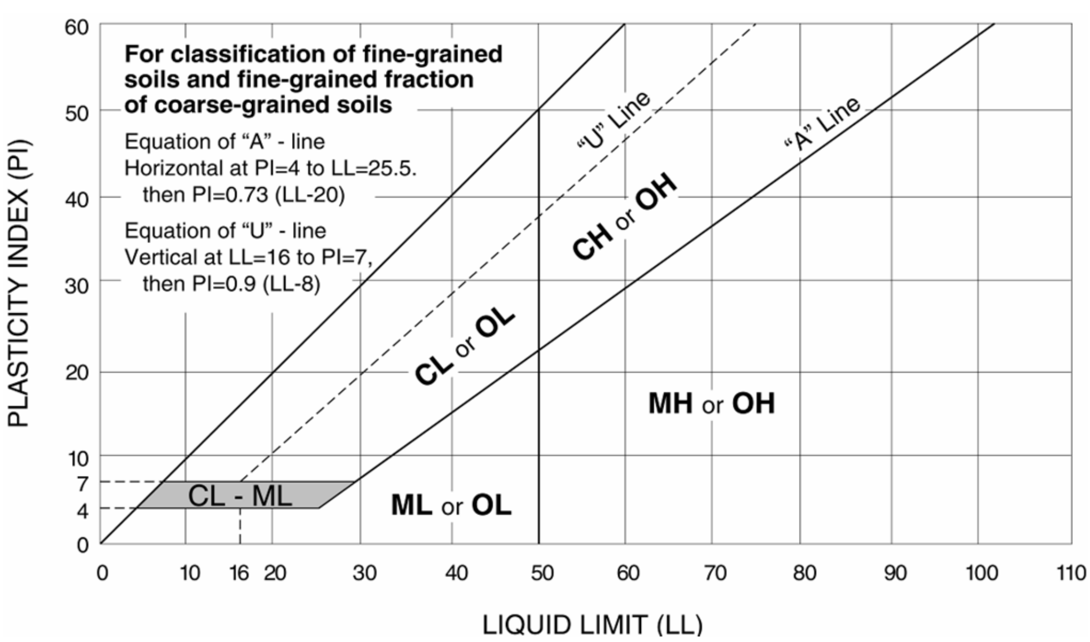


Exhibit C-2