

July 20, 2015

Continental 339 Fund, LLC
W134 N8675 Executive Parkway
Menomonee Falls, Wisconsin 53051

Attn: Mr. Ryan Cao
Construction Project Engineer

Re: Geotechnical Engineering Report
Proposed Springs at River Chase
Brewster Road
Covington, Louisiana
SE Project No. G15-053

Dear Mr. Cao:

Stratum Engineering, LLC (SE) is pleased to submit our Geotechnical Engineering Report for the above referenced project. This report includes the results of our field exploration and laboratory testing, and recommendations for foundation and pavement design, as well as general site development for the proposed apartment complex to be constructed at the River Chase Development in Covington, Louisiana.

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

Respectfully submitted,
STRATUM ENGINEERING, LLC

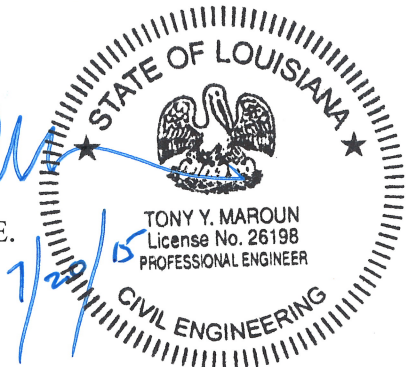


William "Dean" McInnis, E.I.
Project Manager

WDM/TYM:wdm



Tony Y. Maroun, P.E.
Principal



EXECUTIVE SUMMARY

An exploration and evaluation of the subsurface conditions have been completed for the proposed Springs at River Chase to be constructed off Brewster Road in Covington, Louisiana.

The site encompasses about 24 acres of undeveloped, heavily wooded property on the south side of Brewster Road just east of River Chase Drive. Limited topographic information provided to us indicates existing surface elevation range from about +16.3 to +19.4 feet. Considering a tentative finished floor elevation (FFE) of +20.0 feet, about one (1) to 3 feet of fill will be required to reach the ground floor slabs design grade.

The project includes the construction of multiple freestanding apartment buildings. The structures will have wood frames and post tensioned floor slabs having footprints of about 11,250 square feet each. Detailed structural loading information was also unavailable at the time this summary was prepared. However, maximum wall loads are anticipated to be about 2 to 3 kips per linear foot.

A total of 27 borings were drilled to a depth of 10 to 20 feet below the ground surface in the building, parking, and detention areas. Based on the borings, the surface at the site is generally covered with 8 to 12 inches of silty topsoil with organics. The topsoil was underlain by soft to stiff silty or lean clay to about 2 to 6 feet where alternating layers of stiff to very stiff lean and fat clay were encountered extending to a depth of at least 20 feet, the maximum depth explored. Groundwater was measured at about 3 to 11 feet in most of the borings during the drilling operation.

Silty soil covered the surface across the site. Depending on the site conditions at the time of construction, these moisture sensitive soils could become problematic and may have to be removed and replaced by compacted structural fill.

The near surface soils at the site are fair in bearing quality and capable of supporting the structures on a shallow foundation system with floor slabs on grade provided the near surface moisture sensitive material is removed and replaced with compacted structural fill. Spread footings and continuous footings, bearing at least two (2) feet below the finished grade in the naturally occurring stiff clay or on compacted structural fill, could be designed for maximum allowable bearing pressures of 2,500 psf and 2,000 psf, respectively, based on dead loads and design live loads. The floor slabs should be soil supported on a minimum of three (3) feet of compacted low plasticity structural fill to mitigate the expansive soil conditions encountered at the site.

Based on the subsurface soil condition encountered at the site and the anticipated residential type of traffic loads, consideration was given to flexible and rigid pavements to accommodate the development. Details related to site development, foundation design and construction considerations are included in subsequent sections of this report.

The owner/designer should not rely solely on this Executive Summary and must read and evaluate the entire contents of this report prior to utilizing our engineering recommendations in preparation of design/construction documents.

PROJECT INFORMATION

Project Authorization

Stratum Engineering, LLC (SE) has completed a geotechnical exploration for the proposed Springs at River Chase to be constructed off Brewster Road in Covington, Louisiana. The exploration was accomplished in general accordance with SE Proposal No. G15-014R, dated January 20, 2015 and revised on May 28, 2015.

Project Description

The project includes the construction of fourteen (14), freestanding 2-story apartment buildings and associated parking areas and drives. The residential structures will have wood frames and load bearing walls with footprints of about 11,250 square feet. They will likely be supported on post tensioned slabs. Although structural loading information was not available at the time the report was prepared, it is expected that the buildings will have maximum column and wall loads of less than 50 kips and 2 to 3 kips per linear foot, respectively. In addition, a small clubhouse structure and a swimming pool will be provided on the west side of the property. A large shared water quality pond area will also be constructed along the Christwood Ditch along the southern edge of the site.

Traffic loads are expected to be typical of an apartment complex consisting of light passenger vehicles and occasional heavy delivery and solid waste trucks. Consideration will be given to flexible and rigid pavements to accommodate the complex.

The geotechnical recommendations presented in this report are based on the available project information, building locations, and the subsurface materials described in this report. If any of the noted information is incorrect, please inform SE in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the client. SE will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions at the site to enable an evaluation of cost effective foundation and pavement systems for the proposed apartment complex. A total of twenty-seven (27) borings were drilled to depths of 10 to 20 feet below the existing ground surface. A diagram depicting the boring locations is attached in the Appendix. The following table summarizes the borings drilled at the site:

Area	No. of Borings	Boring Depth, Feet
Apartment Buildings	16	20
Detention Area	2	20
Parking Areas	9	10

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

- Foundation types, allowable bearing capacity, and an estimate of settlement;
- Flexible and rigid pavement recommendations;
- Seismic site classification;
- Site preparation, including subgrade preparation and fill compaction requirements;
- Suitability of the existing soils for use as structural fill;
- Factors influencing construction and performance of the proposed improvements.

The scope of geotechnical services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The site encompasses about 24 acres of undeveloped property located on the south side of Brewster Road just east of the recently constructed River Chase Drive. The Christwood Ditch and berm extend along the south and east sides of the property before connecting with the I-12 Ditch along the north side of the property adjacent to Brewster Road. The property is currently undeveloped and heavily wooded with low lying area adjacent to the Christwood Ditch berm where standing water was encountered during the field investigation due to recent rain events.

Detailed grading information was unavailable at the time of this report; however, limited topographic information provided to us indicates existing surface elevation range from about +16.3 to +19.4 feet. Considering a tentative finished floor elevation (FFE) of +20.0 feet, about one (1) to 3 feet of fill will be required to reach the ground floor slabs design grade. One (1) to 2 ½ feet of fill may also be required to achieve the parking lot design grades.

Drilling, Sampling, and Laboratory Testing Procedures

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

Undisturbed samples of cohesive soils were generally obtained using thin-wall tube sampling procedures in general accordance with the procedures for “Thin-Walled Tube Geotechnical Sampling of Soils” (ASTM D1587). These samples were extruded in the field with a hydraulic ram and were wrapped in aluminum foil prior to placement in a plastic wrapping to preserve moisture. The samples were transported to the laboratory in containers to prevent disturbance.

The laboratory testing program included supplementary visual classification and water content tests on all of the soil samples. In addition, selected samples were subjected to percent passing the #200 sieve and Atterberg Limits determination. Additional estimates of unconfined compressive strength and undrained shear strength were made using a hand penetrometer and a torvane, respectively. The laboratory testing was performed in general accordance with ASTM Standard Procedures.

Subsurface Conditions

The site was characterized by a total of twenty-seven (27) borings drilled across the property. Based on the borings, the surface at the site is generally covered with 8 to 12 inches of silty topsoil with organics. The topsoil was underlain by soft to stiff silty or lean clay to about 2 to 6 feet where alternating layers of stiff to very stiff lean and fat clay were encountered and extended to a depth of at least 20 feet, the maximum depth explored.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the Appendix should be reviewed for specific information at the boring locations. These records include soil descriptions, stratification, penetration resistances, laboratory test data and locations of the samples. The stratification shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations.

The stratification represents the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on the boring logs. The samples, which were not altered by laboratory testing, will be retained for 60 days from the date of this report and then will be discarded.

Groundwater Conditions

Groundwater was measured at depths ranging between 3 and 11 feet during the drilling operation. The shallow groundwater measurement was likely influenced by the excessive amount of water encountered at the surface at a few locations due to the previous day rain event. It should be noted that groundwater levels will fluctuate with seasonal variations in rainfall, extended periods of drought and surface runoff. Therefore, it is recommended that the actual groundwater level at the site be determined by the contractor at the time of the construction activities.

IBC Site Classification

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

EVALUATION AND RECOMMENDATIONS

General

The type and depth of foundation suitable for a given structure primarily depends on several factors including the subsurface conditions, the function of the structure, the loads it may carry, the cost of the foundation and the criteria set by the Design Engineer with respect to vertical and differential movement which the structure can withstand without damage.

The results of the exploration indicate that moisture sensitive silty soils were encountered across the site and extended 2 to 3 feet below the surface and deeper at isolated locations. These near surface silty soils were relatively stable at the time of the field exploration. However, they are extremely sensitive to moisture and could lose their support capability if they become saturated requiring removal and replacement. Since a portion of the field exploration took place after a period of rain, our ATV mounted drill rig required mobility assistance to gain access to some of the boring locations. Provided positive drainage is maintained at the site and the upper soils are protected, particularly after periods of rain, the proposed apartment complex may be supported on a shallow foundation system bearing in the naturally occurring stiff clay or on compacted structural fill.

For budgetary purposes, it may be prudent to assume that 24 inches of the moisture sensitive silty soil below the topsoil will likely be removed should construction take place during the wet season or after a period of extended rain.

Potential Vertical Rise

Field and laboratory test results indicate that the soils encountered at the site exhibit medium shrink and swell potential. Therefore, mitigation of the site condition will be necessary to maintain the potential vertical movement to less than one (1) inch.

The estimated amount of vertical movement of a foundation or floor slab constructed on swelling clays is referred to as the Potential Vertical Rise (PVR). To reduce the potential for shrinkage and swelling of the site soils, it is important that consideration be given to reducing the potential for moisture changes of the site soils. At a minimum, positive drainage away from the new buildings should be provided. If positive drainage is not provided, water will pond around, or below, the structures and excessive total and differential movements may occur.

A Potential Vertical Rise (PVR) value of about one (1) to 2 ½ inches was calculated using the TEX-124E method assuming an active zone of ten (10) feet which is typical for the area. Due to the characteristics of the clay soils encountered in the borings, it is recommended that at least 3 feet of low swell potential compacted structural fill be provided under the building pads and extending for a distance of five (5) feet beyond the building perimeters to reduce the estimated PVR to less than 1 inch. Provisions of the buffer zone should be achieved by undercutting, raising the site grade or a combination of both.

Swelling or shrinkage occurs in the soils due to changes in moisture content. Ponding of water around the slabs may also result in reduction of soil strength, thereby causing movements. It is important to minimize the possibility of moisture content changes by considering the following precautions:

1. Direct surface runoff away from the structure by sloping the subgrade away from the slabs.
2. Extend paving or other impervious covering to the slab edges.
3. Extend downspouts so that the discharge is at least 5 feet from the slabs.
4. Further increase the fill thickness under the slabs.
5. If shrubs or bushes are placed next to the structures, an impervious membrane should be used to separate the slabs from the shrubs to limit any infiltration of water under the slabs. The minimum distance between a tree and the slabs should be about one-half the expected height of the tree.
6. Good rigidity of the structure foundations should be assured by stiffening the wall footings in order to minimize the detrimental effect of differential settlement.

Site Preparation

Site preparation is expected to include, but not be limited to, stripping of all topsoil with organics and other deleterious materials as well as undercutting the surficial silty soil as necessary to provide a stable subgrade. Based on the borings, about 8 to 12 inches of silty topsoil was encountered at this site. However, the actual stripping and undercutting depths should be determined by a representative of the Geotechnical Engineer at the time of construction.

Furthermore, the silty material encountered below the topsoil extended generally about 2 feet below the surface and as deep as 4 feet below the surface at some of the boring locations. Depending on the site condition at the time of construction, the moisture sensitive silty soils could lose their support capabilities if subjected to high moisture and may need to be removed and replaced with compacted structural fill. Therefore, it will be prudent that adequate drainage be provided across the site to keep the near surface silty material drained and minimize the amount of undercut during construction.

The subgrade should be proofrolled using a single axle rubber tired vehicle weighing about 20 tons. Soils, which are observed to rut or deflect excessively under the moving load, should be undercut and replaced with properly compacted structural fill. The proofrolling and undercutting activities should be witnessed by a representative of the Geotechnical Engineer and should be performed during a period of dry weather.

After subgrade preparation and observation have been completed, the initial layer of fill should be placed in a relatively uniform horizontal lift and be adequately keyed into the stripped and scarified subgrade soils. The structural fill may consist of sandy clays or clayey sands and should have a maximum liquid limit of 40 and a maximum plasticity index of 20 percent.

The fill should be placed in maximum lifts of eight (8) inches of loose materials and should be compacted within one (1) percentage point below and three (3) percentage points above the optimum moisture content. If water must be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. The fill should be compacted to at least 95 percent of the Standard Proctor maximum dry density as determined by ASTM D698 Standard Procedures. Adequate drainage should be provided prior to and during site work. The site should be graded to promote rapid runoff.

Shallow Footings

Provided the site is prepared as outlined above, the proposed apartment complex may be supported on a shallow foundation system. Spread footings and continuous footings bearing at least two (2) feet below the finished grade in the stiff clay or compacted structural fill, could be designed for maximum allowable bearing pressures of 2,500 psf and 2,000 psf, respectively. Minimum dimensions of twenty-four (24) inches for column footings and eighteen (18) inches for continuous footings should be used in foundation design to minimize the possibility of a localized bearing failure. The above bearing capacities include a design factor of safety of 3.

The uplift resistance of shallow spread footings formed in open excavations should be limited to the weight of the foundation concrete and the soil above it. For preliminary design purposes, the uplift resistance can be computed by using a total unit weight of 115 pcf for the structural fill placed and compacted above the footing, and a unit weight of 150 pcf for the concrete. Concrete reinforcing steel should be properly sized to resist uplift forces. We recommend that a factor of safety of at least 1.5 be used when determining the allowable uplift resistance of spread footings.

Soil resistance to horizontal forces is developed by lateral earth pressures acting on the face of the footing and by friction or adhesion on the footing base. We recommend that the allowable passive pressure be computed for spread footings below grade using the following equation:

$$P_p = 2000 + 120H \text{ (Clay)}$$

where P_p is the lateral soil resistance in psf (pounds per square foot) and H is the depth in feet. For exterior footings, H is measured from one (1) foot below adjacent finished grade, provided that the adjacent finished grade extends level and at least beyond a point that makes a 45-degree angle from the bottom of the exterior footing to the finished ground surface.

The top foot of passive resistance at foundations should be neglected unless the ground surface around the footing is covered by concrete or pavement. The resistance to sliding of spread footings bearing in structural fill can be computed by multiplying the footing base contact area by a sliding friction factor of 0.38. Spread footings should also be sized to resist overturning due to moment forces.

The foundation excavations should be observed by a representative of SE prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and are consistent with the materials discussed in this report. Soft or loose soil zones encountered at the bottom of the footing excavations should be removed to the level of firm soils or adequately compacted fill as directed by the Geotechnical Engineer. Cavities formed as a result of excavation of soft or loose soil zones should be backfilled with compacted structural fill or graded crushed stone, as determined by the Geotechnical Engineer.

Footing excavations should be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond prior to or after concrete placement. The foundation concrete should be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture.

Foundation Settlement

Settlement of a spread footing designed for the recommended bearing pressure is estimated to be less than one (1) inch. Differential settlements could be 50 percent of the total settlement. While settlement of this magnitude is generally considered tolerable for the structure, the design of masonry or brick walls should include provisions for liberally spaced vertical control joints to minimize the effects of cosmetic cracking.

Floor Slabs

The soil supported floor slabs for the proposed apartment buildings should bear on a minimum of three (3) of compacted low plasticity structural fill. Placement of the new fill and preparation of the subgrade should be performed in accordance with the Site Preparation section of the report to identify any soft or unstable soils which should be removed from the floor slab areas prior to additional fill placement and/or floor slab construction. Polyethylene sheeting should be placed between the fill and the floor slabs to act as a vapor barrier. The floor slabs should have an adequate number of joints to reduce cracking resulting from any differential movement and shrinkage.

Utility Lines

It is recommended that aggregate bedding material be placed beneath the RCP culverts to distribute the load and minimize initial subsidence. The bedding material should be at least 6 inches in thickness and should extend one-half of the pipe diameters beyond the edge of either side of the pipe or a minimum of 12 inches, whichever is greater. The RCP should be side bedded to the mid-height of the pipe or to the pipe spring line if arch pipe is used. The bedding material should consist of 6 inches of well-graded, free draining aggregate, meeting the requirements of #57 stone. A geotextile fabric should also be placed around the pipe at each joint to reduce potential migration of the fill into the joints of the pipe.

The trench excavation should be backfilled to the surface with granular fill. The fill should be placed in lifts not exceeding 8 inches and compacted to 95 percent of the maximum dry density, as determined by ASTM D698.

Pavement Recommendations

The performance of pavements depends upon several factors including (1) the characteristics of the supporting soils; (2) the magnitude and frequency of wheel load applications; (3) the quality of construction materials; (4) the contractor's placement and workmanship abilities; and (5) the desired period of design life. SE has evaluated both rigid and flexible pavements for your considerations.

Grading information for the parking areas was not available at the time the report was prepared. However, limited topographic information revealed the ground surface elevation across the site in the parking ranges from +16.3 to +19.4 feet. Considering the proposed FFE of +20.0 feet for the apartment buildings, about one (1) to 2 ½ feet of fill may be needed in the parking areas and drives to achieve the design grades.

Although traffic information was not available to us at the time the report was prepared, traffic was assumed to be typical of an apartment complex consisting mainly of cars, light trucks and occasional heavy delivery and waste collection trucks.

The recommended pavement sections presented are considered typical and minimum for the assumed parameters in the general site area and anticipated traffic condition. We understand that budgetary considerations sometimes warrant thinner pavement sections than those presented. However, the owner and the project designers should be aware that thinner pavement sections may result in increased maintenance cost and lower than anticipated pavement life.

Our scope of services did not include extensive sampling for determination of Modulus of Subgrade Reaction (k) and California Bearing Ratio (CBR) 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. We have assumed the subgrade soils will be prepared to achieve a Modulus of Subgrade Reaction (k) of 100 psi per inch which could be used for rigid pavement design, and a CBR value of 3 for flexible pavement design.

The general pavement design information presented in this report is based on information published by AASHTO and the Portland Cement Association as well as past experience in the area. The published information was utilized in conjunction with the available field data and laboratory test results to develop general pavement recommendations.

Specific design parameters considered in the pavement analyses are as follows:

CBR	3
Modulus of Subgrade Reaction, k	100 pci
Reliability	85%
Deviation	0.45 Asphalt 0.35 Rigid
Initial Serviceability	4.2
Terminal Serviceability	2.0
Modulus of Rupture	650 psi
Modulus of Elasticity	3.4×10^6 psi
Load Transfer	3.2 Dowels or Keys
Drainage Coefficient	1.0
Design Life	20 Years
Layer Coefficients	0.41 Asphalt 0.14 Limestone or Crushed Concrete 0.08 Structural Fill

The recommended minimum sections for the light and heavy duty pavements are as follows:

FLEXIBLE PAVEMENT RECOMMENDED MINIMUM THICKNESS		
Pavement Materials	Light Duty	Heavy Duty
Asphaltic Concrete Wearing Course	1 ½"	2"
Asphaltic Concrete Binder Course	1 ½"	2"
Compacted Class II Base	6"	10"
Compacted Structural Fill	12"	12"

RIGID PAVEMENT RECOMMENDED MINIMUM THICKNESS		
Pavement Materials	Light Duty	Heavy Duty
Portland Cement Concrete	6"	7"
Compacted Granular Fill (Sand)	12"	12"

Portland Cement Concrete pavement should be utilized for trash enclosures. The area should be sufficiently large so that the front wheels of the collection truck are supported on the rigid pavement. In this area, and in areas which will be accessed by heavy trucks (solid waste trucks and delivery trucks), a minimum concrete pavement thickness of seven (7) inches is recommended underlain by 12 inches of compacted granular fill.

Proper finishing of concrete pavement requires the use of appropriate construction joints to reduce the potential for cracking. Construction joints should be designed in accordance with current Portland Cement Association guidelines. Joints should be connected with smooth, greased or sleeved dowels and should be sealed to reduce the potential for water infiltration into pavement joints and subsequent infiltration into the supporting soils. The design of steel reinforcement should be in accordance with accepted codes. The concrete should have a minimum compressive strength of 4,000 psi at 28 days.

The asphaltic concrete should meet the requirements of the latest edition of the Louisiana Standard Specifications for Roadways and Bridges (LSSRB) and should be compacted to a minimum of 95 percent of the density of the laboratory molded specimen.

The Class II Base may consist of 610 limestone or crushed concrete meeting the requirements of the latest edition of LSSRB, Section 1003.03. The sand base under the rigid pavement shall meet the requirements of LSSRB, Section 1003.07. The Class II Base in the flexible pavement section and the sand base under the concrete should be compacted to at least 95 percent of the maximum dry density determined by ASTM D698 (Standard Proctor) within 3 percent of the optimum moisture content.

Geotextile Fabric

Should soft conditions be encountered, a woven geotextile consisting of MIRAFI 600X or equivalent may be placed over the soft subgrade to improve its condition. The fabric may be used as needed under the direction of the Geotechnical Engineer. The geotextile, which is sold in rolls of various sizes, should be installed per the manufacturer's recommendations and be overlapped a minimum of two (2) feet. The geotextile fabric should meet or exceed the following properties.

Property	Test Method	Minimum Average Roll Values
Grab tensile strength, lbs	ASTM D4632	315
Grab tensile elongation, %	ASTM D4632	15
Mullen burst strength, psi	ASTM D3786	600
Puncture resistance, lbs	ASTM D4833	120
Trapezoid tear strength, lbs.	ASTM D4533	120
UV resistance after 500 hrs, % strength resistance	ASTM D4355	70

Detention Area

Borings D-1 and D-2 were drilled within the proposed water quality pond area with consideration given to using the excavated pond material as fill to grade the site. Based on the borings, the near surface silty soils encountered in the upper 4 feet of boring D-1 are extremely moisture sensitive and not considered to be suitable fill. The lean and fat clays exhibit medium to high plasticity characteristics requiring lime treatment on the order of four (4) to 6 percent of lime, by weight, to improve their properties and facilitate placement. The lean to fat clays should be limited for use in the parking areas provided the upper 12 inches is treated with lime. Furthermore, bulk samples of the material should be obtained during construction to verify their properties prior to use in the field.

CONSTRUCTION CONSIDERATIONS

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

Moisture Sensitive Soils/Weather Related Concerns

The upper soils encountered at this site are extremely sensitive to disturbances caused by construction traffic and changes in moisture content. During wet weather periods, an increase in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

The site contractor should be responsible for maintaining a firm and stable subgrade condition. Should the near surface soils become wet, the contractor should be prepared to mitigate these conditions by repeated aeration and exposure to sunlight or by admixture treatment. A representative of the Geotechnical Engineer should be present during the site work activities to evaluate the condition of the improved soil and verify the material is adequate prior to placement of additional fill.

Drainage and Groundwater Concerns

Water should not be allowed to collect in the foundation excavations, floor slab areas, or on the prepared subgrade in the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff. Positive site surface drainage should be provided to reduce infiltration of surface water around the buildings.

Groundwater was measured at 3 to 11 feet during the drilling operation. However, it is possible that seasonal variations will cause fluctuations of the water table. Additionally, perched water may be encountered in discontinuous zones within the overburden soils, particularly after extended periods of rain. Any water accumulation should be removed from the excavations by pumping. If excessive and uncontrolled amounts of seepage occur, the Geotechnical Engineer should be consulted to provide additional recommendations, if necessary.

Excavations

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its “Construction Standards for Excavations, 29 CFR, Part 1928, Subpart P”. This document was issued to better ensure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavation or footing excavation, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor’s “responsible person”, as defined in 29 CFR, Part 1926, should evaluate the soil exposed in the excavations as part of the contractor’s safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

We are providing this information solely as a service to our client. SE does not assume responsibility for construction site safety or the contractor’s or other parties’ compliance with local, state, and federal safety or other regulations.

REPORT LIMITATIONS

The recommendations submitted in this report are based on the available subsurface information obtained by SE and design details furnished by Continental Properties Company and Duplantis Design Group. If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, SE should be notified immediately to determine if changes in the foundation recommendations are required. If SE is not notified of such changes, SE will not be responsible for the impact of those changes on the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

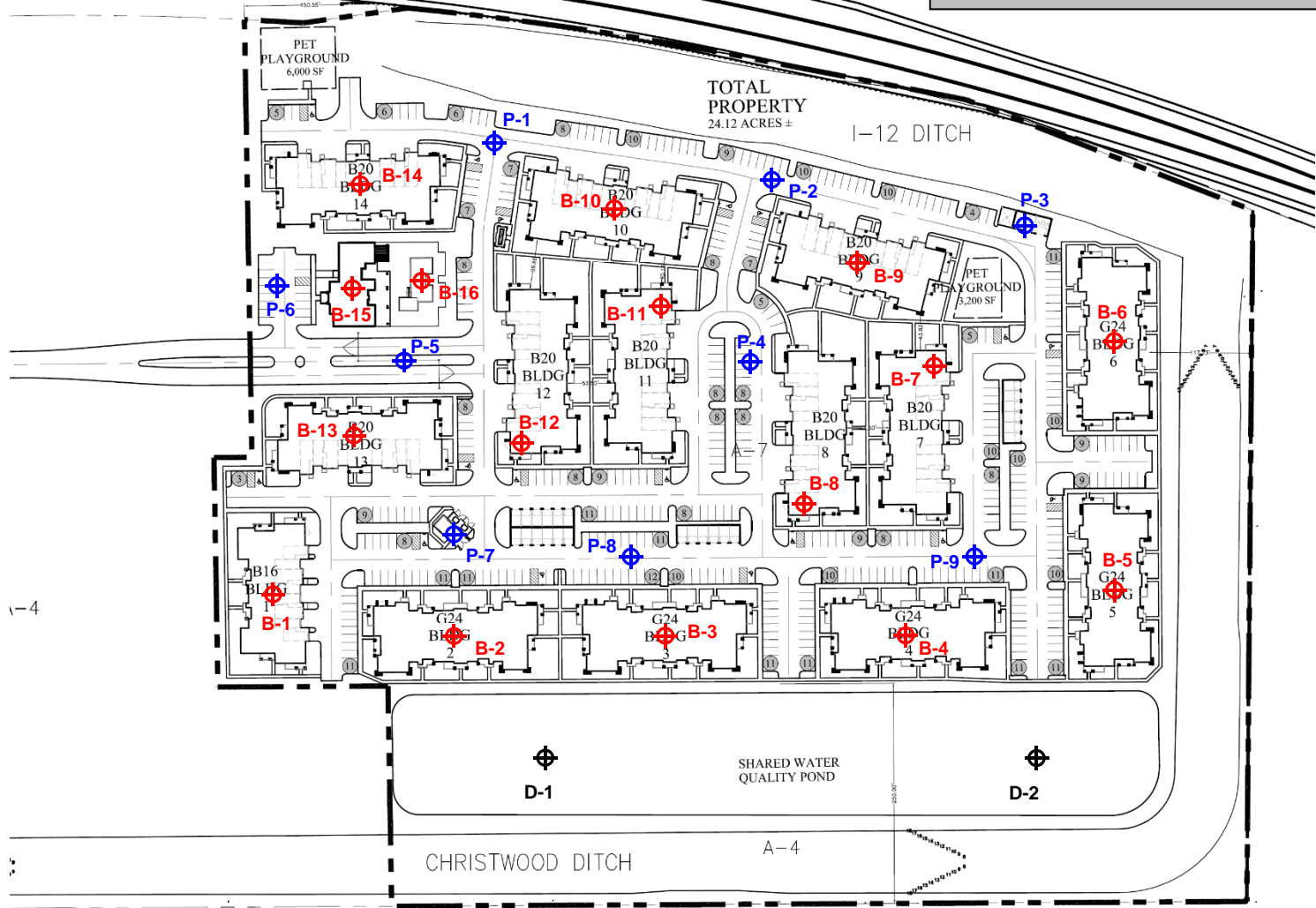
After the plans and specifications are more complete, the Geotechnical Engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated in to the design documents. At that time, it may be necessary to submit supplementary recommendations. If SE is not retained to perform these functions, SE will not be responsible for the impact of those conditions on the project. This report has been prepared for the exclusive use of Continental 339 Fund, LLC for the specific application to the proposed Springs at River Chase to be constructed off Brewster Road in Covington, Louisiana.

APPENDIX



R ROAD

BORING COLOR KEY
B-1 to B-16 = BUILDING BORINGS (20' DEEP)
D-1 and D-2 = DETENTION POND BORINGS (20' DEEP)
P-1 to P-9 = PARKING BORINGS (10' DEEP)



BORING LOCATION PLAN

GEOTECHNICAL ENGINEERING SERVICES
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA



LOG OF BORING B-1
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	
	[Hatched Soil Type]		8" Silty Sandy Topsoil with organics			1.25			26				
			Stiff gray Silty Clay										
			Stiff to very stiff tannish gray Fat Clay			1.50			24	74	55	90	
5			- with silt seams and sand lenses, 4' to 8'		2.07	2.00		112	19				
						2.25			25				
						2.50			23				
10				▽									
				Firm to stiff tannish gray Lean Clay with silt seams		0.79	1.00		103	28			
15													
20				Stiff tannish gray Fat Clay			1.25			34			
			Boring terminated at 20 feet										
25													
30													
35													
40													
45													
50													

DEPTH OF BORING: 20 Feet
 DATE: 6/15/2015

GROUNDWATER: Encountered at 10 ½ Feet During Drilling



LOG OF BORING B-2
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	
	[Hatched]		10" Silty Sandy Topsoil with organics			0.50			27				
			Soft to firm tannish gray Fat Clay with silt seams - becomes stiff to very stiff at 2'				2.00			25			
5	[Hatched]		Firm to stiff tannish gray Lean Clay		0.49	1.00		108	23				
			Stiff to very stiff tannish gray Fat Clay				2.00			24	54	39	94
10	[Hatched]		▽ - firm to stiff at 13'			2.50			27				
							0.67	1.00		101	27		
15	[Hatched]					1.25			30				
20													
	[White]		Boring terminated at 20 feet										
25													
30													
35													
40													
45													
50													

DEPTH OF BORING: 20 Feet
 DATE: 6/15/2015

GROUNDWATER: Encountered at 11 Feet During Drilling



LOG OF BORING B-3
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	[Diagonal Hatching]		8" Silty Sandy Topsoil with organics			1.50			22			
			Stiff gray Silty Clay									
			Stiff tannish gray Lean Clay				1.25			28		
5					1.45	1.50		107	22	49	33	93
						1.75			22			
10				- very stiff at 8'		2.25			21			
15				Stiff olive green Fat Clay with silt seams		1.10	1.25		93	32		
20				- very stiff at 18'			2.75		36			
				Boring terminated at 20 feet								
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 7/3/2015

GROUNDWATER: Encountered at 8 Feet During Drilling



LOG OF BORING B-4
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	[Hatched Pattern]		12" Silty Sandy Topsoil with organics				0.25		21			
			Soft to firm gray Silty Clay									
			Stiff to very stiff tannish gray Lean Clay with silt seams			1.75						
5					2.94	2.75		110	20			
					1.50			20				
10			▽		2.00			22		46	30	94
	[Hatched Pattern]		Firm to stiff tannish gray Fat Clay with silt seams		0.87	1.00		99	26			
15												
20				- stiff to very stiff at 18'			2.00		32			
			Boring terminated at 20 feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 7/3/2015

GROUNDWATER: Encountered at 8 1/2 Feet During Drilling



LOG OF BORING B-5
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	
	[Hatched Soil Type]		10" Silty Sandy Topsoil with organics				0.20		24				
			Very soft gray Silty Clay										
			Firm to stiff tannish gray Fat Clay			1.00			38				
5			Firm to stiff tannish gray Lean Clay		1.17	1.00		104	26				
						1.75			23				
10				∇		2.00			23			90	
15				Firm to stiff tannish gray Fat Clay with silt seams		0.65	1.00		103	27			
20							1.75		32				100
			Boring terminated at 20 feet										
25													
30													
35													
40													
45													
50													

DEPTH OF BORING: 20 Feet
 DATE: 6/26/2015

GROUNDWATER: Encountered at 8 1/2 Feet During Drilling



LOG OF BORING B-6
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	Diagonal Hatching		8" Silty Sandy Topsoil with organics			1.00			28			
			Firm to stiff gray Silty to Lean Clay			0.75			22			
5	Diagonal Hatching		Stiff to very stiff tannish gray Lean Clay		1.44	1.50		113	21	44	24	
			- with silt seams, 8' to 15'			2.00			20			
10					2.78	2.75		110	20			
							1.50			21		
20	Diagonal Hatching		Stiff tannish gray Fat Clay			1.75			27			
			Boring terminated at 20 feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 6/30/2015

GROUNDWATER: Encountered at 8 1/2 Feet During Drilling



LOG OF BORING B-7
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			12" Silty Sandy Topsoil with organics			0.75			23			
			Firm gray Silty Clay									
			Stiff tannish gray Fat Clay with silt seams			1.50			26	52	34	
5			Very stiff tannish gray Lean Clay		3.84	3.75		112	18			
						2.50			18			
						2.00			19			
10												
15					2.40	2.50		106	22			
20			Stiff tannish gray Fat Clay with silt seams			1.50			23			
			Boring terminated at 20 feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 7/1/2015

GROUNDWATER: Encountered at 7 1/2 Feet During Drilling



LOG OF BORING B-8
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			8" Silty Sandy Topsoil with organics			0.75			21		NP	
			Medium gray Silt									
			Firm to stiff tannish gray Fat Clay			0.75			28			
5						1.00			25			
			Stiff to very stiff tannish gray Lean Clay		1.31	1.50		106	24			
10						2.50			20			
			Firm to stiff tannish gray Fat Clay with silt seams		1.11	1.00		98	28			
15												
20			- very stiff at 18'			2.50			36			
			Boring terminated at 20 feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 6/29/2015

GROUNDWATER: Encountered at 8 Feet During Drilling



LOG OF BORING B-9
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	[Hatched Soil Type]		8" Silty Sandy Topsoil with organics			1.75			18			
			Stiff gray Silty Clay									
			Firm to stiff tannish gray Lean Clay with silt seams									
5					0.93	1.75		103	22	38	22	92
				- soft to firm at 6'		0.50			25			
10				- becomes very stiff at 8'		2.50			20			
15					1.27	2.00		107	20			
20				Very stiff tannish gray Fat Clay with sand			2.25			25		
			Boring terminated at 20 feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 7/1/2015

GROUNDWATER: Encountered at 8 Feet During Drilling



LOG OF BORING B-10
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	
	[Diagonal Hatching]		8" Silty Sandy Topsoil with organics			2.50			20				
			Stiff to very stiff tannish gray Lean to Fat Clay			2.00			21				
5			- with silt seams, 4' to 15'		1.00	1.50		104	23				
						2.50			21	50	35	95	
10						1.50			23				
						2.45	2.50		103	23			
15													
20				Stiff tannish gray Sandy Lean Clay			1.75			18			
				Boring terminated at 20 feet									
25													
30													
35													
40													
45													
50													

DEPTH OF BORING: 20 Feet
 DATE: 7/1/2015

GROUNDWATER: Encountered at 7 1/2 Feet During Drilling



LOG OF BORING B-11
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			12" Silty Sandy Topsoil with organics				0.20		24			
			Very soft gray Silty Clay									
			Stiff to very stiff tannish gray Lean Clay			2.50			19			
5					1.51	1.75		106	24			
						2.50			23			
			▽									
10					1.21	1.25		101	24			
			Stiff to very stiff tannish gray Lean Clay with sand			2.00			26			
15												
20						1.50			26			
			Boring terminated at 20 feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 6/30/2015

GROUNDWATER: Encountered at 8 Feet During Drilling



LOG OF BORING B-12
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	[Hatched]		8" Silty Sandy Topsoil with organics			0.75			23			
			Firm gray Silty Clay									
			Soft to stiff tannish gray Lean Clay		0.29	0.50		93	29			
5						1.25			25			
	[Hatched]		Very stiff tannish gray Fat Clay		2.08	2.50		109	19	52	35	91
10						2.25			19			
				- stiff at 13'			1.50			28		
15												
	[Hatched]		Stiff to very stiff tannish gray Fat Clay with sand			2.00			25			
20												
			Boring terminated at 20 feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 7/3/2015

GROUNDWATER: Encountered at 7 1/2 Feet During Drilling



LOG OF BORING B-13
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	[Diagonal Hatching]		10" Silty Sandy Topsoil with organics			0.50			22			
			Soft to firm tannish gray Silty Clay			0.75			24			
5	[Diagonal Hatching]		Stiff to very stiff tannish gray Lean Clay with silt seams		1.40	2.25		102	21			
					1.50		23					
10					1.38	2.00	102	24				
15	[Diagonal Hatching]		Stiff tannish gray Silty Clay			1.75			17			
20			Stiff to very stiff tannish gray Fat Clay with silt seams			2.00			27			
25	[Diagonal Hatching]		Boring terminated at 20 feet									
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 7/2/2015

GROUNDWATER: Encountered at 7 1/2 Feet During Drilling



LOG OF BORING B-14
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE		
	[Hatched]		10" Silty Sandy Topsoil with organics			2.25			18					
			Very stiff gray Lean Clay with silt seams			3.00			19	47	28	90		
5	[Hatched]		Stiff to very stiff tannish gray Fat Clay		1.80	2.00		106	22					
					2.50		23							
10					1.75		22							
					1.34	2.25	96	29						
15	[Hatched]		Stiff tannish gray Fat Clay with sand			1.50			28					
20														
	[White]		Boring terminated at 20 feet											
25														
30														
35														
40														
45														
50														

DEPTH OF BORING: 20 Feet
 DATE: 7/2/2015

GROUNDWATER: Encountered at 8 Feet During Drilling



LOG OF BORING B-15
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			8" Silty Sandy Topsoil with organics			1.00			26			
			Firm to stiff gray Silty Clay			1.50						
			Stiff tannish gray Lean Clay			1.25		99				
5					1.20	1.25			27			
						2.50			24			
10			Stiff tannish gray Fat Clay with silt seams			1.25			22			
15					1.49	1.75		97	28			
20			- very stiff at 18'			2.25			37			
			Boring terminated at 20 feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 7/2/2015

GROUNDWATER: Encountered at 7 1/2 Feet During Drilling



LOG OF BORING B-16
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: BUILDING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			8" Silty Sandy Topsoil with organics			1.00			23			
			Firm to stiff gray Silty Clay			1.50						
			Stiff tannish gray Lean Clay			1.50						
5					0.73	1.00		102	22			
			- becomes very stiff at 6'			2.50			21			
						2.50			19			
10						2.50						
15					2.85	3.50		107	17			
20						2.50			21			
			Boring terminated at 20 feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 7/2/2015

GROUNDWATER: Encountered at 8 1/2 Feet During Drilling



LOG OF BORING D-1
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: DETENTION AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
			10" Silty Sandy Topsoil with organics Loose gray Silt			0.50	0.25		26	24	2	87
5			Stiff tannish gray Lean Clay with silt seams			1.25			28			
						3.00			19			92
10						3.00			20			
15						2.25			25			
20			Very stiff tannish gray Fat Clay			2.25			41			
			Boring terminated at 20 feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 7/3/2015

GROUNDWATER: Encountered at 7 Feet During Drilling



LOG OF BORING D-2
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: DETENTION AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
0	[Hatched Pattern]		10" Silty Sandy Topsoil with organics			0.75			32			
5			Firm to stiff gray Silty to Lean Clay			0.75			26			
5	[Hatched Pattern]		Very stiff tannish gray Fat Clay with silt seams			1.00			33			
10						2.50			22	54	35	
15						2.50			26			
20						3.00			25			88
20			- stiff at 18'			1.50			32			
20			Boring terminated at 20 feet									
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 20 Feet
 DATE: 6/29/2015

GROUNDWATER: Encountered at 3 Feet During Drilling



LOG OF BORING P-1
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: PARKING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	
	SOIL TYPE	SAMPLES	8" Silty Sandy Topsoil with organics			0.75			19				
			Firm gray Silty Clay										
			Very stiff tannish gray Fat Clay				3.00			19	51	35	93
5								2.50			24		
								2.50			19		
10						2.50			22				
			Boring terminated at 10 feet										
15													
20													
25													
30													
35													
40													
45													
50													

DEPTH OF BORING: 10 Feet
 DATE: 7/1/2015

GROUNDWATER: Dry Upon Completion of Drilling



LOG OF BORING P-2
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: PARKING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	[Hatched Pattern]		8" Silty Sandy Topsoil with organics			2.50			22			
			Stiff to very stiff tannish gray Lean Clay with silt seams			1.50			23	34	13	91
5							2.00		27			
							2.25		22			
10				Very stiff tannish gray Fat Clay			2.50		24			
			Boring terminated at 10 feet									
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 10 Feet
 DATE: 7/1/2015

GROUNDWATER: Dry Upon Completion of Drilling



LOG OF BORING P-3
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: PARKING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	[Hatched Pattern]		10" Silty Sandy Topsoil with organics			2.50			20	41	25	
			Very stiff tannish gray Lean Clay with silt seams			2.50			23			
5						2.50			17			
				- stiff at 6'			1.75			19		
10	[Hatched Pattern]		Very stiff tannish gray Lean to Fat Clay			2.50			20			
			Boring terminated at 10 feet									
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 10 Feet
 DATE: 7/1/2015

GROUNDWATER: Dry Upon Completion of Drilling



LOG OF BORING P-4
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: PARKING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	[Hatched Pattern]		8" Silty Sandy Topsoil with organics			1.25			27			
			Stiff gray Silty Clay									
			Stiff to very stiff tannish gray Lean Clay			1.50			28			
5						2.25			19			
						2.50			23			
10	[Hatched Pattern]		Stiff tannish gray Lean Clay with sand			1.75			25			
			Boring terminated at 10 feet									
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 10 Feet
 DATE: 6/30/2015

GROUNDWATER: Dry Upon Completion of Drilling



LOG OF BORING P-5
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: PARKING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	5		8" Silty Sandy Topsoil with organics			2.50			19			
			Very stiff gray Silty Clay									
			Stiff to very stiff tannish gray Lean Clay with silt seams			2.00			24			
						2.00			19			
						2.50			20			
5					2.50			20				
10			Boring terminated at 10 feet									
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 10 Feet
 DATE: 7/2/2015

GROUNDWATER: Dry Upon Completion of Drilling



LOG OF BORING P-6
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: PARKING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	[Diagonal Hatching]		8" Silty Sandy Topsoil with organics			2.25			15	26	6	89
			Very stiff gray Silty Clay									
			Very stiff tannish gray Lean Clay with silt seams			2.50			20			
5						2.50			18			
	[Dotted Pattern]					2.50			20			
10			Medium tan Sandy Silt			2.50			11			
			Boring terminated at 10 feet									
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 10 Feet
 DATE: 7/2/2015

GROUNDWATER: Dry Upon Completion of Drilling



LOG OF BORING P-7
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: PARKING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE
	[Hatched Pattern]		8" Silty Sandy Topsoil with organics			0.50			25			
			Firm gray Lean Clay			0.75			24	36	18	
5			- becomes very stiff tannish gray at 4'			2.50			20			
						2.50			19			
10				Very stiff tannish gray Fat Clay with sand			2.50			26		
			Boring terminated at 10 feet									
15												
20												
25												
30												
35												
40												
45												
50												

DEPTH OF BORING: 10 Feet
 DATE: 6/15/2015

GROUNDWATER: Dry Upon Completion of Drilling



LOG OF BORING P-8
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: PARKING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	
5	[Hatched]		10" Silty Sandy Topsoil with organics Firm tannish gray Lean Clay with silt seams - becomes very stiff tannish gray at 2'			0.75			20				
							2.50			18			
10	[Hatched]		Very stiff olive green Fat Clay - with silt seams at 8'			2.50			24				
								2.50		23			
15			Boring terminated at 10 feet										
20													
25													
30													
35													
40													
45													
50													

DEPTH OF BORING: 10 Feet
 DATE: 6/15/2015

GROUNDWATER: Dry Upon Completion of Drilling



LOG OF BORING P-9
PROPOSED SPRINGS AT RIVER CHASE
BREWSTER ROAD
COVINGTON, LOUISIANA

TYPE OF BORING: AUGER ROTARY

LOCATION: PARKING AREA

PROJECT NO.: G15-053

DEPTH, FT.	SOIL TYPE	SAMPLES	DESCRIPTION	N-BLOWS/FT.	UNCONFINED COMPRESSIVE STRENGTH tsf	HAND PENETROMETER tsf	TORVANE tsf	UNIT DRY WEIGHT pcf	MOISTURE CONTENT %	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	
	Hatched pattern		8" Silty Sandy Topsoil with organics			2.25			18				
			Very stiff gray Silty Clay										
			Very stiff tannish gray Fat Clay				2.25			24	65	47	
5							2.00			19			
				- with silt seams, 6' to 10'			2.50			23			
10						2.50			27				
			Boring terminated at 10 feet										
15													
20													
25													
30													
35													
40													
45													
50													

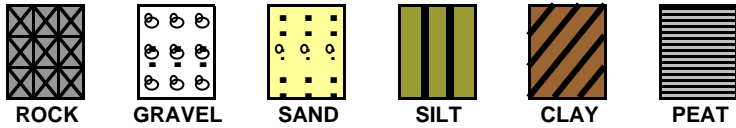
DEPTH OF BORING: 10 Feet
 DATE: 6/29/2015

GROUNDWATER: Dry Upon Completion of Drilling



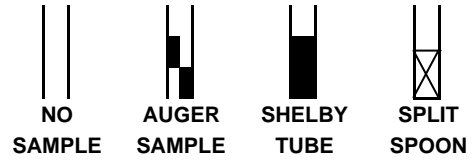
KEY TO TERMS AND SYMBOLS USED ON LOGS

SOIL TYPE



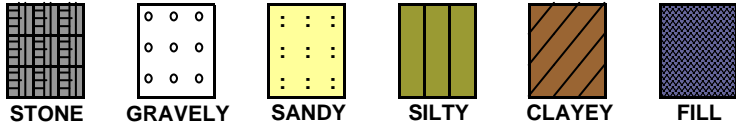
ROCK GRAVEL SAND SILT CLAY PEAT

SAMPLER TYPE

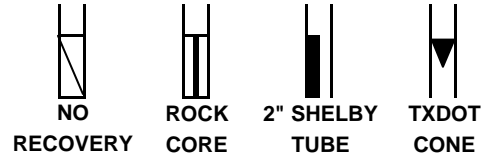


NO SAMPLE AUGER SAMPLE SHELBY TUBE SPLIT SPOON

MODIFIERS



STONE GRAVELLY SANDY SILTY CLAYEY FILL



NO RECOVERY ROCK CORE 2" SHELBY TUBE TXDOT CONE

UNIFIED SOIL CLASSIFICATION SYSTEM - ASTM D 2487 (1980)

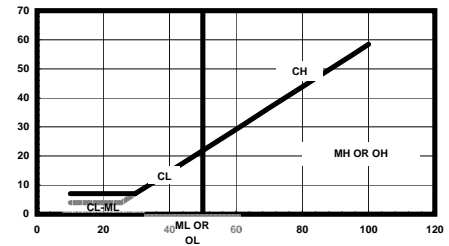
MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS	
COARSE GRAINED SOILS	GRAVEL & GRAVELLY SOILS	CLEAN GRAVEL (LITTLE OR NO FINES)	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES	
		LESS THAN 50% PASSING NO. 4 SIEVE	GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES	
	SANDS	CLEAN SANDS (LITTLE FINES)	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES	
		MORE THAN 50% PASSING NO. 4 SIEVE	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES	
	50% PASSING NO. 200 SIEVE	W/ APPRECIABLE FINES	SW	WELL GRADED SAND, GRAVELY SAND (LITTLE FINES)	
		SANDS WITH APPRECIABLE FINES	SP	POORLY GRADED SANDS, GRAVELY SAND (L-FINES)	
	FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	SM	SILTY SANDS, SAND-SILT MIXTURES
			INORGANIC SILTS & VERY FINE SANDS, ROCK FLOUR	SC	CLAYEY SANDS, SAND-CLAY MIXTURES
			SILTY OR CLAYEY FINE SANDS OR CLAYEY SILT W/ LOW PI	ML	INORGANIC SILTS & CLAYS OF LOW TO MEDIUM PI LEAN CLAY
		SANDY SILTS & SILTY CLAYS OF LOW PI	CL	GRAVELY CLAYS, SANDY CLAYS, SILTY CLAYS	
OL			ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PI		
SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS		
HIGHLY ORGANIC SOIL	ARTIFICIALLY DEPOSITED AND OTHER UNCLASSIFIED SOILS AND MAN-MADE SOIL MIXTURES	CH	INORGANIC CLAYS OF HIGH PLASTICITY FAT CLAYS		
		OH	ORGANIC CLAYS OF MED TO HIGH PI, ORGANIC SILT		
		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS		

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	SHEAR STRENGTH IN TONS/FT ²
VERY SOFT	0. TO 0.125
SOFT	0.125 TO 0.25
FIRM	0.25 TO 0.5
STIFF	0.5 TO 1.0
VERY STIFF	1.0 TO 2.0
HARD	> 2.0 OR 2.0+

RELATIVE DENSITY - GRANULAR SOILS

CONSISTENCY	N-VALUE (BLOWS/FOOT)
VERY LOOSE	0-4
LOOSE	4-9
MEDIUM DENSE	10-29
DENSE	30-49
VERY DENSE	> 50 OR 50+



ABBREVIATIONS

- HP - HAND PENETROMETER UC - UNCONFINED COMPRESSION TEST
- TV - TORVANE UU - UNCONSOLIDATED UNDRAINED TRIAXIAL
- MV - MINIATURE VANE CU - CONSOLIDATED UNDRAINED

NOTE: PLOT INDICATES SHEAR STRENGTH AS OBTAINED BY ABOVE TESTS



CLASSIFICATION OF GRANULAR SOILS

U.S. STANDARD SIEVE SIZE(S)

	6"	3"	3/4"	4	10	40	200		
BOUL- -DERS	COBBLES	GRAVEL		SAND			SILT	CLAY	
		COARSE	FINE	COARSE	MEDIUM	FINE			
	152	76.2	19.1	4.76	2.0	0.42	0.075		0.002
	GRAIN SIZE IN MM								