GEOServices, LLC, Geotechnical and Materials Engineers

February 25, 2020

JRG Development, LLC
12248 Patagonia Way
Knoxville, Tennessee 37922

Attention: Mr. Rick Gentry

Subject: **REPORT OF GEOTECHNICAL EXPLORATION**
Gentry Place Apartments
Washington Pike
Knoxville, Tennessee 37917
GEOServices Project No. 21-20086

Dear Mr. Gentry:

We are submitting the results of the geotechnical exploration performed for the subject project. The geotechnical exploration was performed, in accordance with our Proposal No. 11-20035, dated January 16, 2020. The following report presents our findings and recommendations for the proposed project. Should you have any questions regarding this report, or if we can be of any further assistance, please contact us at your convenience.

Sincerely,

GEOServices, LLC

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REPORT OF

GEOTECHNICAL EXPLORATION

Gentry Place Apartments
Washington Pike
Knoxville, Tennessee 37917

GEOServices Project No. 21-20086

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GEOServices, LLC, Geotechnical and Materials Engineers

TABLE OF CONTENTS

<u>**Contents**</u> <u>**Page**</u>

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of our geotechnical exploration was to explore the subsurface conditions for the proposed Gentry Place Apartments to be located west of Washington Pike in Knoxville, Tennessee. This report provides geotechnical recommendations for general site preparation including excavation and fill requirements, foundation design, slab-on-grade construction, pavements, and seismic design parameters.

1.2 PROJECT INFORMATION AND SITE DESCRIPTION

This project consists of developing a parcel of approximately 8 acres located west of Washington Pike in Knoxville, Tennessee. Project information was provided by Mr. Rick Gentry of JRG Development, LLC on December 15, 2019 which included a drawing titled *Site Layout Plan: C3.1* dated December 15, 2019 as prepared by Silvus Engineering Consulting (SEC).

Based on the provided information, we understand the development will include five, three-story apartment structures. The proposed construction will also include a detention pond, single-story office, and trash compactor along with the associated pavement areas. We have assumed the apartment structures will likely be wood-framed with a brick or composite veneer and a concrete slab-on-grade. We anticipate maximum column and continuous wall foundation loads of less than 150 kips and 5 kips per linear foot, respectively.

Based on the provided drawing, existing surface elevations range from approximately 1018 feet Mean Sea Level (MSL) to 998 feet MSL, generally sloping downwards from west to east. Final grading information has not been provided at this time. However, given the existing site grades we anticipate maximum earthwork cuts and fills of 10 feet, or less, will be required to reach finished grades.

The property is bisected by a possible stream running from the northwestern edge of the property to the southeastern edge. Multiple apparent ditch lines and some standing water was observed at the time of our site assessment. Groundcover consists of open grassy clearings in the northern and southwestern portions of the property, with dense underbrush and mature hardwood trees covering the majority of the site. The property contains what appears to be multiple former building foundations and trash/debris throughout the site. The property is bordered by Washington Pike to the east, residential structures to the south and west, and commercial structures to the north.

1.3 SCOPE OF STUDY

This geotechnical exploration involved a site reconnaissance, field drilling, laboratory testing, and engineering analysis. The following sections of this report present discussions of the field exploration, site conditions, and conclusions and recommendations. Following the text of this report, Appendix A presents figures and test boring records.

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

2.0 EXPLORATION AND TESTING PROGRAMS

2.1 FIELD EXPLORATION

The site subsurface conditions were explored by drilling twenty-four (24) soil test borings spread across the site. The borings were located in the field by GEOServices personnel using a hand-held GPS unit following clearing for access to the boring locations. The soil test borings were drilled between February 10 and 12, 2020 and advanced using 3¼-inch hollow stem augers and a Geoprobe® 7822DT track mounted drill rig. The approximate locations of the soil test borings are shown on Figure 2 of Appendix A of this report. The depths referenced in this report represent those that existed at the time of the exploration. Detailed logs for soil test borings can also be found in Appendix A.

Within each boring, Standard Penetration Testing (SPT) and split-spoon sampling were performed on 2½-foot intervals in the upper 10 feet and on 5-foot centers thereafter. SPT and split-spoon sampling were performed in accordance with ASTM D 1586.

In split-spoon sampling, a standard 2-inch O.D. split-spoon sampler is driven into the soil at the bottom of the boring with a 140-pound hammer falling a distance of 30 inches. The number of blows required to advance the sampler the last 12 inches of the standard 18 inches of total penetration (or second and third 6-inch increments when sampling 24 inches) is recorded as the SPT resistance (N-value). These N-values are indicated on the boring logs at the test depth and provide an indication of the consistency or relative density of the soil.

2.2 LABORATORY TEST PROGRAM

After completion of the field drilling and sampling phase of this project, the soil samples were returned to our laboratory where they were visually-manually classified in general accordance with the Unified Soil Classification System (USCS – ASTM D 2487) by a GEOServices geotechnical professional. Select samples were then tested for moisture content (ASTM D 2216), Atterberg limits (ASTM D 4318), and organic content (ASTM D 2974).

3.0 SUBSURFACE CONDITIONS

3.1 GEOLOGIC CONDITIONS

The project site, and most of East Tennessee, lies in the Appalachian Valley and Ridge Physiographic Province. The Province is characterized by elongated, northeasterly-trending ridges formed on highly resistant sandstones and shales. Between ridges, broad valleys and rolling hills are formed primarily on less resistant limestones, dolomites and shales.

Published geologic information indicates that the site is underlain by the Maryville Limestone, Rogersville Shale, Rutledge Limestone and Pumpkin Valley Shale Formations of the Conasauga Group. In the vicinity of the site, the Rogersville Shale is interfingered with the Rutledge and Maryville Limestone Formations. The Rogersville Shale weathers to a light-greenish, micaceous, residuum with weathered shale structure. The Rutledge Limestone consists of blue-gray limestone and interbedded dolomitic limestone weathering to an orange-red clay. The Maryville Limestone consists of a dark blue-gray, very fine-grained massive limestone with some argillaceous beds.

The Pumpkin Valley Shale is typically composed of dull-brown to maroon shale inter-fingered with blocky, sandy siltstone and containing minor amounts of dolomite. The Pumpkin Valley Shale typically weathers to produce a lean clay residual soil containing some sand and having a shale structure.

Since this site is underlain by carbonate rock it is susceptible to the typical carbonate hazards of irregular weathering, cave and cavern conditions, and overburden sinkholes. Carbonate rock, while appearing very hard and resistant, is soluble in slightly acidic water. This characteristic, plus differential weathering of the bedrock mass, is responsible for the hazards. Of these hazards, the occurrence of sinkholes is potentially the most damaging. In East Tennessee, sinkholes occur primarily due to differential weathering of the bedrock and "flushing" or "raveling" of overburden soils into the cavities in the bedrock. The loss of solids creates a cavity or "dome" in the overburden. Growth of the dome over time or excavation over the dome can create a condition in which rapid, local subsidence or collapse of the roof of the dome occurs. Such a feature is termed a sinkhole.

A certain degree of risk with respect to sinkhole formation and subsidence should be considered at any site located within geologic areas underlain by potentially soluble rock units. While a rigorous effort to assess the potential for sinkhole formation on this site was beyond the scope of this evaluation, our borings did not encounter obvious indications of sinkhole development. We did observe possible surface signs of sinkhole activity at the site in the form of a possible sink (disappearing stream) located on the southern end of the previously mentioned stream bisecting the site (generally west of boring B-13). However, closed depressions, which denote past sinkhole activity, are not shown on the United States Geological Survey (USGS – Fountain City Quadrangle, TN) topographic map in the immediate vicinity of the site. Based on these findings and our experience with this formation at other sites, we consider that this site has a moderate potential for sinkhole activity.

3.2 SOIL STRATIGRAPHY

The following subsurface description is of a generalized nature to highlight the subsurface stratification features and material characteristics at the boring locations. The boring logs included in Appendix A of this report should be reviewed for specific information at each boring location. Information on actual subsurface conditions exists only at the specific boring locations and is relevant only to the time that this exploration was performed. Variations may occur and should be expected at the site.

Surficial Materials

Each of the borings encountered surficial layer of topsoil ranging from 4 to 6 inches in thickness, with the exception of boring B-9.

Existing Fill

Borings B-10, B-11, B-14, and B-15 encountered apparent fill material underlying the surficial topsoil. Fill is a material which has been transported and placed by the activities of man. The fill soils generally consisted of gray, brown, and tan lean (low plasticity) clays with varying amounts of organics, sand and gravel. The fill materials ranged in depth from 3 to 5.5 feet below existing ground surface, after which each boring encountered apparent residual soil. The exception was boring B-9 which encountered roughly 3 feet of concrete and foundation debris.

The SPT N-values within the fill soils ranged from 5 to 14 blows per foot (bpf), indicating firm to stiff soil consistency. Laboratory testing of selected samples of the fill soils indicated in-situ moisture contents ranging from about 21 to 26 percent. Organic content determination of a selected fill soil sample indicated an organic content of 3.6 percent, by weight.

Residual Soils

Below the surficial material or fill, each boring encountered residual soil. The residual soils encountered consisted of orangish brown, tan, lean and fat (high plasticity) clays with varying amounts of weathered shale fragments, sand, and some fine roots.

The SPT N-values within the residual soils generally ranged from 4 bpf to 50 blows with one inch of penetration, indicating soft to very hard consistencies. We note the higher N-values of more than about 20 bpf were often encountered in the zone overlying auger refusal or in the presence of weathered shale fragments which likely inflated the values somewhat. The resdiuum was most commonly firm to stiff, with the soft materials generally isolated to the upper to 3 to 6 feet below the existing ground surface.

Laboratory testing of selected samples of the residual soils indicated in-situ moisture content values ranging from about 16 to 38 percent. We note that moisture content values of less than about 20 percent were present in samples which contained weathered shale fragments. Atterberg limits testing was performed on selected samples of the residual soil from borings B-3 and B-15 at a depth ranging from approximately 3 to 5 feet below existing grade. The testing of these selected samples indicated liquid limit values ranging from 31 to 40 percent and plasticity index values of 9 to 22 percent. According to the USCS, the soils were classified as Lean Clay (CL), based on the plasticity testing alone. Organic content determinations on a selected residual soil sample indicated organic contents of about 4 to 5 percent, by weight.

Weathered Rock

Underlying the residual soils in borings B-1, B-3, B-4, B-5, B-7, B-8, B-14, B-16, P-1 and P-2, weathered rock was encountered at depths ranging from approximately 3 to 12 feet beneath the existing ground surface. The weathered rock encountered consisted of gray, tan, and orangish brown shale and or shaley limestone. The SPT N-values within the weathered rock generally ranged from 33 bpf to 50 blows to penetrate 2 inches, indicating hard to very hard consistencies. Limited laboratory testing indicated the moisture contents of the weathered rock samples ranged from about 9 to 34 percent.

Auger Refusal

Auger refusal was encountered in each boring (with the exception of borings P-3, P-4, P-5, and D-2) at depths ranging from 3.1 to 18 feet below existing grade. Auger refusal is a designation applied to materials that cannot be penetrated by the power auger used to drill the borings. Where encountered, auger refusal may indicate dense gravel or chert layers, boulders, rock ledges or pinnacles, or the top of continuous bedrock.

Ground Water

Groundwater was not encountered during or upon completion of the drilling activities. We note that stabilized water levels can sometimes be difficult to obtain as the encountered soils are known to be relatively impermeable. In addition, each boring was backfilled upon completion in consideration of safety so delayed water levels were not recorded.

It is possible for groundwater to exist within the depths explored during other times of the year depending upon climatic and rainfall conditions. Additionally, discontinuous zones of perched water may exist within the overburden materials or at the soil to rock or weathered rock interface. The groundwater information presented in this report is the information that was collected at the time of our field activities. The following table indicates the approximate surficial materials thickness along with weathered rock depth and termination depth relative to the estimated ground surface and bottom of hole elevations.

Table 1 –Boring Summary Information

Boring	Surficial Material Thickness (inches)	Weathered Rock Depth (feet)	Auger Refusal Depth (feet)	Firm, or worse, soil depth (feet)	Fill Depth (feet)
B-1	4	3.0	18.0	3.0	
B-2	6		17.0	3.0	
B-3	4	8.0	17.0	3.0	
B-4	6	5.5	8.0	3.0	
B-5	6	12.0	14.3	3.0	
B-6	6		17.0		
B-7	6	8.0	9.0	6.0	
B-8	6	5.5	6.2	3.0	
B-9	3 Feet*		8.0		3.0
B-10	4		18.0	3.0	3.0
B-11	4		18.0	3.0	6.0
B-12	4		17.0	6.0	
B-13	6		3.1	3.0	
B-14	6	7.5	9.2	7.5	5.5
B-15	6		8.0	8.0	3.0
B-16	6	8.0	15.5	5.5	
P-1	6	3.0	8.5	3.0	
P-2	6	3.0	9.5	3.0	
P-3	6				
P-4	6			5.5	
P-5	6			10.0	
P-6	6		8.0	8.0	
D-1	6		7.5	3.0	
D-2	6			3.0	

Note: Depths should be considered approximate.
*Encountered concrete and foundation debris.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 SITE ASSESSMENT

Based on the results of our geotechnical exploration, it is our opinion that the site is generally adaptable for the proposed construction. However, geotechnical related challenges are present which will affect development of the site. These challenges include the potential for difficult excavation, karst geology of the site and the possibility of encountering zones of lower consistency fill and residual soils.

4.1.1 Excavation Difficulty

During our exploration, auger refusal was encountered in the majority of borings at depths ranging from 3.1 to 18 feet beneath the existing ground surface. Furthermore, weathered rock (generally consisting of weathered shale) was encountered in the majority of the borings at depths ranging from 3 to 12 feet beneath the existing ground surface. Where excavations extend to depths where auger refusal was encountered, or into the weathered rock layers, excavation difficulty should be expected. The removal of rock at sites such as this will typically require the use of pneumatic hammers (hoe ram) or blasting. The removal of weathered rock or rock in confined excavations, such as for utilities, often can be extremely difficult.

Based on the provided site plan, it appears some buildings may be situated in areas of relatively shallow weathered rock and some in clay soil. Since finished grades are not yet available, it is not possible as of this writing to evaluate the materials which may be exposed at the foundation bearing elevation. We do note that the combination of differing bearing conditions (i.e., soil and rock) may result in excessive differential foundation settlement which could lead to structural distress. Recommendations to reduce the potential for point loading of foundations and slabs are provided herein.

4.1.2 Karst Geology

While a rigorous effort to assess the potential for sinkhole formation was beyond the scope of this evaluation, we did observe possible surficial indications of sinkhole activity during our site reconnaissance (consisting of the previously mentioned sink or disappearing stream located west of boring B-13).

It is our opinion that the risk of sinkhole development at this site is no greater than at other sites having similar geologic settings which have been developed successfully. However, the owner must be willing to accept a moderate risk of future sinkhole development at this site. The risk of sinkhole development can be reduced by following the recommendations provided in the *Sinkhole Risk Reductions and Corrective Actions* section of this report. Additional measures to reduce the risk of sinkhole development at this site may be considered if the owner is concerned about the potential for sinkhole formation. GEOServices would be pleased to discuss these measures with the project team, if requested.

Removal of overburden soils typically increases the risk of minor collapses should any void space exist within the subsurface. Fortunately, these collapses if they occur, typically occur during construction when remedial efforts are more manageable. The type and magnitude of any remedial efforts are best handled with the consideration of location and overall risk. Therefore, should any collapses occur, GEOServices should be contacted to provide specific remedial efforts. In addition, we recommend the owner include a budget contingency to handle sinkhole dropouts during construction.

4.1.3 Existing Fill Soils and Debris on Site

Based on historical aerial imagery (Google Earth), the site previously included multiple residential structures. As previously mentioned, apparent fill materials were encountered within several of the soil test borings. In addition, during our site reconnaissance and limited clearing, we observed several piles of household trash and building debris scattered across the site. The debris consisted of tires, wood, plastic, glass, fencing, wire, block, etc. While the debris appeared to be surficial, the client should understand there may be deeper zones or pockets of fill materials scattered across the site. Should debris laden fill or deleterious materials be encountered during grading or construction and/or between our boring locations, we recommend these materials be completely undercut. It may be beneficial to strip the site to segregate the trash and debris from the residual soils which are suitable for reuse as new fill.

4.1.4 Upper Soft to Firm Soil

A zone of upper soft to firm soil was encountered to depths of about 3 to 6 feet below existing grade in the majority of the borings. Furthermore, firm zones were encountered to a depth of 10 feet in the proposed parking/drive locations. Given the possibility of additional existing fill and/or upper zones of lower consistency residual soil, we recommend careful observation and testing at the time of construction. Testing of the soils exposed in shallow foundation excavations as well as proofrolling of the soils at the subgrade elevation is discussed in this report. Undercutting and replacement to correct foundation and subgrade support conditions will be required where lower consistency, or otherwise unsuitable soils, are encountered. The owner should budget for undercutting and replacement at this site.

Some remediation of the near surface soils should be anticipated in areas where fill or upper lower consistency soils are encountered. However, the extent and quantity of unsuitable soils will likely depend on the construction schedule and weather. If construction is anticipated to commence in the dryer months (June to August) remediation of the near-surface soils will likely be reduced. Any area observed to be unsuitable for use as subgrade should be remediated at the geotechnical engineer's direction.

4.2 SITE PREPARATION RECOMMENDATIONS

4.2.1 Site Preparation

Demolition of existing structures and structural remnants should include the complete removal of below grade items (including concrete foundations, slabs and walls) and pavements (including basestone). Existing basements or pits, if present, should be excavated with a 2H:1V side slope and the excavation should be backfilled using structural soil fill or compacted dense graded aggregate. Additionally, utilities to be abandoned should be completely removed and their trenches backfilled using structural soil fill. Utilities to remain in use should be rerouted outside of the proposed building areas

Site stripping within the proposed construction areas should include the removal of debris, trash, mature tree root systems, vegetation, topsoil, unsuitable fill and rock fragments greater than 6 inches in any dimension. The stripping operations should extend a minimum of 5 feet beyond the limits of proposed pavement areas and 10 feet beyond building footprints. These areas should be observed by a geotechnical engineer upon grading to confirm the recommendations in this report are followed.

Along with tree and respective root system removal, the surrounding soils are generally upturned and loosened. If the disturbed soils are suitable and are to remain, they will require additional compactive effort and testing prior to proof-roll testing and fill placement. The client should budget for additional fill placement after the removal of these root systems.

After the completion of stripping operations and excavation to reach the planned subgrade elevation, we recommend that the subgrade be proofrolled with a fully-loaded, tandem-axle dump truck or other pneumatic-tired construction equipment of similar weight. The geotechnical engineer or his representative should observe proofrolling. Areas judged to perform unsatisfactorily (e.g., pumping and/or rutting) by the engineer should be undercut and replaced with structural soil fill or remediated at the geotechnical engineer's recommendation. Areas to receive structural soil fill should also be proofrolled prior to the placement of new fill. Proofrolling operations should extend a minimum distance of 10 feet beyond the building footprints and 5 feet beyond pavement areas.

Alternatives to improve subgrades may consist of undercutting and replacement, the use of a biaxial geogrid, tracking surge stone into soft soil, or combinations thereof. Generally, subgrade improvement for pavement areas consists of undercutting and replacing a minimum of 2 to 3 feet below the subgrade elevation with structural soil fill or compacted dense graded aggregate. The depth of undercutting should be determined based upon observations and tests performed at the time of construction. Given that lower consistency existing soils were encountered in several of the soil test borings, we recommend the project budget include an allowance for subgrade support correction.

4.2.2 Structural Soil Fill

Material considered suitable for use as structural fill should be clean soil free of organics and other deleterious material, containing no rock fragments greater than 6 inches in any dimension. Preferably, structural soil fill material should have a standard Proctor maximum dry density of 90 pounds per cubic foot (pcf), or greater, and a PI value of 35 percent, or less. The material to be used as structural fill should be tested by the geotechnical engineer to confirm that it meets the project requirements before being placed.

Based on the results of the laboratory testing, the site soils classified as low plasticity (lean) clay which are free of deleterious materials may be suitable for re-use as structural soil fill; however, moisture conditioning may be required. As mentioned previously it is recommended that the site be stripped to segregate debris from potential borrow soils prior to earthwork grading. The debris and debris containing fill materials are not suitable for reuse as new fill.

Structural fill should be placed in loose, horizontal lifts not exceeding 8 inches in thickness. Each lift should be compacted to at least 98 percent of the soil's maximum dry density per the standard Proctor method (ASTM

D 698) and within the range of minus (-) 2 percent to plus (+) 3 percent of the optimum moisture content. Each lift should be tested by geotechnical personnel to confirm that the contractors' method is capable of achieving the project requirements before placing subsequent lifts. Areas which have become soft or frozen should be removed before additional structural fill is placed.

4.2.3 Dense Graded Aggregate

Dense graded aggregate (DGA) fill may be used as backfill in undercut excavations and in utility trench excavations. The DGA used for this section should be Type A and Grading D or E in accordance with Section 903.05 of the Tennessee Department of Transportation (TDOT) specifications. The DGA fill should be placed in loose, horizontal lifts not exceeding 8 inches in loose thickness. Each lift should be compacted to at least 98 percent of maximum dry density per the standard Proctor method (ASTM D 698). Each lift should be compacted, tested by geotechnical personnel and approved before placing subsequent lifts.

4.3 FOUNDATION RECOMMENDATIONS

4.3.1 Shallow Foundations

Upon completion of site preparation, as previously recommended and based on our assumptions of proposed grades, it is our opinion the proposed apartments can be supported using a system of shallow foundations bearing on approved and tested structural soil fill or suitable residual materials in accordance with the recommendations of this report. We recommend that if soft or unstable soils are encountered during foundation excavations, they be undercut and backfilled with structural soil fill or compacted DGA. Shallow foundation supported on structural soil fill or suitable residual soils may be designed for an allowable soil bearing capacity of 2,500 pounds per square foot (psf).

We recommend that continuous foundations be a minimum of 18 inches wide and isolated spread footings be a minimum of 24 inches wide to reduce the possibility of a localized punching shear failure. Exterior foundations should be designed to bear at least 18 inches below finished exterior grade to develop the design bearing pressure and to protect against frost heave.

A combination of differing bearing conditions (i.e., soil and rock) can cause differential foundation settlement and result in unsatisfactory long-term performance of the structure. Where bedrock is exposed at the foundation bearing elevation, the remedial treatment may consist of removing the bedrock to a depth of at least 12 inches below the foundation bearing level. The excavation may then be backfilled using structural soil fill or compacted DGA to the foundation bearing elevation to reduce the potential for differential stresses caused by point loading. The removal of rock from foundations will likely require the use of a pneumatic hammer (difficult excavation).

Foundations in transition areas between one or more bearing condition should be given special consideration. These considerations should include additional reinforcement or a thickened foundation section and closely spaced control joints in the masonry to either side of the transition.

The available lateral capacity of shallow foundations includes a soil lateral pressure and coefficient of friction as described in the IBC, Section 1806. Footings will be embedded in material similar to those described as Class 5 in Table 1806.2. Where footings are cast neat against the sides of excavations, an allowable lateral bearing pressure of 100 psf per foot depth below natural grade may be used in computations. Resistance to lateral sliding represented by a value of adhesion of 130 psf may be used for clays similar to those described as soil Class 5. An increase of one-third in the allowable lateral capacity may be considered for transient load combinations, including wind or earthquake, unless otherwise restricted by design code provisions.

A geotechnical representative should be retained to perform foundation subgrade tests to confirm that the recommendations provided in this report are consistent with the site conditions encountered. Some undercutting of lower consistency fill soils where encountered in foundation excavations should be anticipated. A dynamic cone penetrometer (DCP) is commonly utilized to provide information that is compared to the data obtained in the geotechnical report. Where unacceptable materials are encountered, the material should be excavated to stiff, suitable soils or remediated at the geotechnical engineer's direction.

Based on the known subsurface conditions, geology, and past experience, we estimate foundations supported on tested and approved structural soil fill or residual soils should experience maximum total and differential settlements of 1 inch and ¾ inch, respectively. The settlement information provided was with maximum column and continuous foundation loads on the order of 150 kips and 5 kips per linear foot (kpf), respectively, and an allowable bearing pressure of 2,500 psf. Additionally, this information assumes that the site is prepared in accordance with our recommendations provided in this report. If these parameters are determined to be incorrect, we should be notified to reevaluate the settlements for the building.

4.3.2 Slabs-on-Grade

For slab-on-grade construction, the site should be prepared as previously described. Undercutting and replacement of lower consistency existing fill or residual soils will be required where encountered at the subgrade elevation.

We recommend concrete slabs be underlain by at least one foot of approved soil or aggregate. This may require the removal of bedrock to prevent the point loading of slabs. The excavation to remove the rock should be backfilled using compacted DGA.

We recommend that the subgrade be topped with a minimum 4-inch layer of crushed stone to act as a capillary moisture block. The subgrade should be proofrolled and approved prior to the placement of the crushed stone. Based on the conditions encountered on this site, we recommend that the floor slabs be designed using a subgrade modulus of 100 pounds per cubic inch (pci). This modulus is appropriate for small diameter loads (i.e. a 1ft x 1ft plate) and should be adjusted for wider loads.

4.4 SEISMIC DESIGN CRITERIA

In accordance with the International Building Code, 2018, we are providing the following seismic design information. After evaluating the SPT N-value data from the soil test borings, it was determined that the site subsurface conditions most closely matched the description for "Seismic Site Class D" or "Stiff Soil Profile". Table 2 provides the spectral response accelerations for both short and 1-second periods, which may be used for design.

Table 2 – Seismic Design Parameters

Structure	S_S g	S_1 g	S_{DS} g	S_{D1} g
Proposed Apartment Complex	0.570	0.128	0.511	0.200

The short and 1-second period values indicate the structure should be assigned a Seismic Design Category "D" using the published information. The provided values are based on the results of our field exploration and the assumption that the structure will be designed utilizing a Risk Category I, II or III. If these assumptions are incorrect, we should be contacted to reevaluate the seismic design information.

For structures assigned a Seismic Design Category D, Sections 1803.5.12 of the 2018 IBC requires the determination of seismic lateral earth pressures on foundation walls and retaining walls supporting more than 6 feet of backfill height. If walls of more than 6 feet are included in the project design, GEOServices should be retained to develop the seismic lateral earth pressures.

In accordance with IBC 2018 sections 1803.5.11 and 1803.5.12, we have provided a discussion on the following geologic and seismic hazards: slope instability, liquefaction, total/differential settlement, and surface displacement due to faulting or seismically induced lateral spread or lateral flow.

Liquefaction occurs when soil, primarily saturated cohesionless soils, undergo a loss in strength due to monotonic, transient, or repeated disturbance that commonly occurs during a seismic event (Kramer 1996). This loss of strength occurs due to increased pore water pressures caused by an undrained condition. The increase in pore water pressure decreases the effective stress in the soil, thus reducing the soils ability to support any applied loads. For liquefaction to occur, there must be an increase in pore pressure meaning the soil must be saturated and be able to behave in an undrained condition. According to the NHI 2011 Reference Manual on LRFD Seismic Analysis and Design of Transportation Geotechnical Features and Structural Foundations, if any of the following criteria are satisfied then a significant liquefaction hazard does not exist:

- The geologic materials underlying the site are either bedrock or have very low liquefaction susceptibility according to the relative susceptibility ratings shown in the Estimated Susceptibility of Sedimentary Deposits to Liquefaction During Strong Ground Motion table presented by Youd and Perkins in 1978.

- The soils below the groundwater table at the site are one of the following:
    - Clayey soils which have a clay content greater than 15%, liquid limit greater than 35%, or natural water content less than 90% of the liquid limit.
    - Sand with a minimum corrected SPT $(N_1)_{60}$ value of 30 blows/foot.

- The water table is deeper than 50 feet below the ground surface or proposed finished grade at the site.

We note that the borings encountered plastic soils having clay contents likely above 15 percent. Additionally, based on experience in this geologic region and immediate vicinity of the site, it is our opinion that a liquefaction hazard does not exist for the subject development. As such, we do not expect significant additional total and differential settlement, lateral soil movement, reduction in bearing capacity or lateral soil reaction, permanent increase in soil lateral pressure, or flotation of buried structures in accordance with Sections 1803.5.11 and 1803.5.12 of the 2018 IBC.

We also noted mapped faults on the geologic maps we reviewed for this project vicinity of the site. However, the known faults within the East Tennessee valley are generally ancient, with no known active faults reaching the surface. Therefore, it is our opinion that surface displacement due to faulting or seismically induced lateral spreading or lateral flow, is not a seismic hazard that will affect the subject development. In addition, seismically induced slope instability is also not expected to be a seismic hazard that will affect the subject development.

4.5 PAVEMENT DESIGN RECOMMENDATIONS

Following site preparation as previously recommended, the pavements can be grade supported on suitable soils or properly placed structural soil fill. Proofrolling of the subgrade be performed to identify soft or unstable soils which should be undercut from the pavement area prior to fill placement or pavement construction.

4.5.1 Flexible Pavement Design

AASHTO flexible pavement design methods have been utilized for pavement recommendations. Our recommendations are based on the assumptions that the subgrade has been properly prepared as described previously which will require subgrade stabilization to improve support conditions at this site. Based on our experience with similar developments, we recommend the following light and heavy-duty flexible pavement sections:

Table 3 - Flexible Pavement Recommendations

Pavement Materials	Light-Duty (in)	Heavy-Duty (in)
Bituminous Asphalt Surface Mix	1.5	1.5
Bituminous Asphalt Base Mix	2.0	3.0
Compacted Crushed Aggregate Base	6.0	8.0

We recommend a base stone equivalent to a Type A and Grading D in accordance with Section 903.05 of the TDOT specifications. The bituminous asphalt pavement should be Grading "E" as per Section 411 for the surface mix and Grading “BM” as per section 307 for the binder mix. Compaction requirements for the crushed aggregate base and the bituminous asphalt pavement should generally follow TDOT specifications.

4.5.2 Rigid Pavement Design

AASHTO rigid pavement design methods have been utilized for the rigid pavement recommendations. In areas of trash dumpster pads or areas where large trucks will traverse, we recommend the use of a concrete pavement section. Our recommendations are based on the assumptions that the subgrade has been properly prepared. Based on our experience with similar developments, we recommend the following rigid pavement section:

Table 4 - Rigid Pavement Recommendations

Pavement Materials	Light-Duty (in)	Heavy-Duty (in)
4,000 psi Type I Concrete	6.0	8.0
Compacted Crushed Aggregate Base	4.0	6.0

Concrete should be reinforced with welded wire fabric or reinforcing bars to assist in controlling cracking from drying shrinkage and thermal changes. Sawed or formed control joints should be included for each 225 square feet of area or less (15 feet by 15 feet). Saw cuts should not cut through the welded wire fabric or reinforcing steel and dowels should be utilized at formed and/or cold joints.

4.5.3 General

Our recommendations are based upon the assumption that the subgrade has been properly prepared as described in previous sections and that if used, off-site soil borrow to be used to backfill to the final subgrade meets the requirements of the structural fill section.

The paved areas should be constructed with positive drainage to direct water off-site and to minimize surface water seeping into the pavement subgrade. The subgrade should have a minimum slope of 1 percent. In down grade areas, the basestone should extend through the slope to allow water entering the basestone to exit. For rigid pavements, water-tight seals should also be provided at formed construction and expansion joints.

We understand that budgetary considerations sometimes warrant thinner pavement sections than those presented. However, the client, owner, and project designers should be aware that thinner pavement sections may result in increased maintenance costs and lower than anticipated pavement life. If thinner pavement sections are warranted, alternate reinforced pavement sections can be considered, including the use of geogrid reinforcement.

4.6 LATERAL EARTH PRESSURES

For the design of cast-in-place concrete retaining walls, we have provided equivalent fluid pressures for two backfill conditions for cantilever-type walls. These are 1) active earth pressure for granular backfill (clean sand or gravel) and 2) at-rest earth pressure for granular backfill. The equivalent fluid pressures provided have assumed a level backfill and a wall with a vertical face. The designer should confirm other aspects of retaining wall design, including an evaluation of local and global stability, with respect to the proposed walls and site design.

As mentioned previously, walls of more than 6 feet in height must consider the seismic lateral earth pressures. If walls of more than 6 feet are proposed, GEOServices should be consulted with regards to the design lateral earth pressure values.

The provided parameters should not be used for the design of other wall types, such as walls that will retain in-situ materials. Alternative wall types such as mechanically stabilized earth (MSE), soldier pile or others should be designed by a specialty contractor or proprietary wall manufacturer. No other information has been provided at this time regarding the use of retaining walls.

Condition 1 - The active earth pressure for granular backfill will result in an equivalent fluid pressure of 35 pounds per cubic foot (pcf). If the granular backfill is to develop active earth pressure conditions, walls must be flexible and/or free to rotate or translate at the top approximately one inch laterally for every 20 feet of wall height.

Condition 2 - The at-rest earth pressure for granular backfill will result in an equivalent fluid pressure of 55 pcf. For retaining walls that will not rotate or translate, such as building walls or other walls rigidly connected to structures, at-rest conditions will develop.

In each case, forces from surcharge loading including sloping backfill should be added to the equivalent fluid pressures. The walls should be properly drained to remove water or hydrostatic pressure should be added to the design pressure.

The wedge of clean aggregate backfill should have a minimum width of 1 foot at the base of the wall or the width of the footing heel, whichever is greater, and increase in width a minimum of 0.6 feet per foot of wall height. The aggregate should be fully encapsulated with a properly designed geotextile (filter fabric) to prevent migration of the adjacent soils into the aggregate. Aggregate placed behind the retaining wall should be placed in accordance with the compaction recommendations of this report. However, we caution that operating compaction equipment directly behind the wall can create lateral earth pressures far in excess of those recommended for design. Therefore, we recommend using hand operated, smaller compaction equipment in non-vibratory modes within 5 feet of the front of the wall.

For rigid, cast-in-place concrete walls, an ultimate friction factor of 0.35 between foundation concrete and the bearing soils may be used when evaluating friction. Also, an ultimate passive earth pressure resistance of well-compacted soil fill can be approximated by a uniformly acting resistance of 1,000 psf. However, to limit deformation when relying on passive strength, we recommend using a minimum safety factor of 3.0 applied to the ultimate passive resistance value.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 FOUNDATION CONSTRUCTION

Foundation excavations should be opened, the subgrade evaluated, remedial work performed (if required), and concrete placed in an expeditious manner. Exposure to weather often reduces foundation support capabilities, thus necessitating remedial measures prior to concrete placement. It is also important that proper surface drainage be maintained both during construction (especially in terms of maintaining dry footing trenches) and after construction. Soil backfill for footings should be placed in accordance with the recommendations for structural fill presented herein.

5.2 EXCAVATIONS

Weathered shale was encountered at depths ranging from 3 to 12 feet below the existing ground surface in several of the borings. Auger refusal was encountered in the majority of the borings at depths ranging from 3.1 to 18 feet below the existing ground surface. Where excavations extend to the depths where weathered rock or auger refusal was encountered in the borings, then excavation difficulty should be anticipated.

Auger refusal conditions generally correspond to materials which require hoe-ramming and/or blasting for removal. The removal of weathered rock or rock in confined excavations such as for utilities and foundations can often be extremely difficult. Typically, soils penetrated by augers can be removed with conventional earthmoving equipment. However, excavation equipment varies, and field refusal conditions may vary. Generally, the weathering process is erratic and variations in the rock profile can occur in small lateral distances. Therefore, it is possible that pinnacles or ledges requiring difficult excavation techniques may be encountered at more shallow depths between our boring locations.

Based on the proposed grades being unknown at the time of this report and the subsurface conditions encountered, we anticipate difficult excavation will be necessary during grading for this site and the owner should make allowances in the project budget for rock removal.

Excavations should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is usually solely responsible for site safety. This information is provided only as a service, and under no circumstances should GEOServices be assumed responsible for construction site safety.

5.3 HIGH PLASTICITY SOIL CONSIDERATIONS

Based on our experience in the East Tennessee area, soils with plasticity indices (PI) less than 30 percent have a slight potential for volume changes with changes in moisture content, and soils with a PI greater than 50 percent are highly susceptible to volume changes. Between these values, we consider the soils to be moderately susceptible to volume changes. Based on the limited lab testing, we anticipate the on-site residual soils will have a slight potential for volume change.

Plastic soils have the potential to shrink or swell with significant changes in moisture content. Unlike other areas of the country where high plasticity soils cause considerable foundation problems, East Tennessee does not typically endure long periods of severe drought or wet weather. However, in recent years drought conditions have been sufficient to cause soil shrinkage and related structural distress of buildings, floor slabs and pavements at sites underlain by high plasticity soils.

At sites that have high plasticity soils, certain precautions should be considered to minimize or eliminate the potential for volume changes. The most effective way to eliminate the potential for volume changes is to remove highly plastic soils and replace them with compacted fill of non-expansive material. Testing and recommendations for the required depth of removal can be provided, if needed. If removal of the highly plastic soils is not desirable, then measures should be taken to protect the soils from excessive amounts of wetting or drying. In addition, modification of the soils by lime or cement treatment can be utilized to reduce the soil plasticity.

Several construction considerations may reduce the potential for volume changes in the subgrade soils. Foundations should be excavated, checked, and concreted in the same day to prevent excessive wetting or drying of the foundation soils. The floor subgrade should be protected from excessive drying and wetting by covering the subgrade prior to slab construction. The site should be graded in order to drain surface water away from the building both during and after construction.

Installing moisture barriers around the perimeter of the slab will help limit the moisture variation of the soil and reduce the potential for shrinking or swelling. In addition, roof drains should discharge water away from the building area and foundations. Heat sources should be isolated from foundation soils to minimize drying of the foundation soils. Trees and large shrubs can draw large amounts of moisture from the soil during dry weather and should be kept well away from the building to prevent excessive drying of the foundation soils. Watering of lawns or landscaped areas should be performed to maintain moisture levels during dry weather.

Structural details to make the building flexible should be considered to accommodate potential volume changes in the subgrade. Floor slabs should be liberally jointed to control cracking, and the floor slab should not be structurally connected to the walls. Walls should incorporate sufficient expansion/contraction joints to allow for differential movement.

5.4 MOISTURE SENSITIVE SOILS

The plastic fine-grained soils encountered at this site will be sensitive to disturbances caused by construction traffic and changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. Construction traffic patterns should be varied to prevent the degradation of previously stable subgrade. In addition, the soils at this site which become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. We caution if site grading is performed during the wet weather season; increases in the undercut volumes should be expected.

Further for site fills, methods such as discing and allowing the material to dry will be required to meet the required compaction recommendations. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather. However, November through March is typically the difficult grading period due to the limited drying conditions which exist.

5.5 DRAINAGE AND SURFACE WATER CONCERNS

To reduce the potential for additional undercut and construction induced sinkholes, water should not be allowed to collect in the foundation excavations, on floor slab areas, or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of collected rainwater, subsurface water, or surface runoff. Positive site surface drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slab. The grades should be sloped away from the building and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and floor slab areas of the building.

5.6 SINKHOLE RISK REDUCTION AND CORRECTIVE ACTIONS

Based on our experience, corrective actions can also be performed to reduce the potential for sinkhole development at this site. These corrective actions would decrease but not eliminate the potential for sinkhole development. Much can be accomplished to decrease the potential of future sinkhole activity by proper grade selection and positive site drainage.

In general, the portions of a site that are excavated to achieve the desired grades will have a higher risk of sinkhole development than the areas that are filled, because of the exposure of relic fractures in the soil to rainfall and runoff. On the other hand, those portions of a site that receive a modest amount of fill (or that have been filled in the past) will have a decreased risk of sinkhole development caused by rainfall or runoff because the placement of a cohesive soil fill over these areas effectively caps the area with a relatively impervious “blanket” of remolded soil. Therefore, the recommendations that follow incorporate a modest remedial treatment program designed to make the surface of the soil in excavated areas less permeable.

Although it is our opinion that the risk of ground subsidence associated with sinkhole formation cannot be eliminated, we have found that several measures are useful in site design and development to reduce this potential risk. These measures include:

- Maintaining positive site drainage to route surface waters well away from structural areas both during construction and for the life of the structure.
- The scarification and re-compaction of the upper 6 to 10 inches of soil in earthwork cut areas.
- Verifying that subsurface piping beneath structures is carefully constructed and pressure tested prior to its placement in service.

- The use of pavement or lined ditches, particularly in cut areas, to collect and transport surface water to areas away from structures.

Site grades in areas prone to sinkhole development should provide positive surface drainage of water away from proposed building and parking areas both during and after construction. The risk of sinkhole development will be greater if water is allowed to pond. Backfill in utility trenches or other excavations should consist of compacted, well-graded material such as dense graded aggregate or compacted on site soils. The use of an open graded stone (such as No. 57 stone) is not recommended unless the stone backfill is provided an exit path and not allowed to pond. If sinkhole conditions are observed, the type of corrective action is most appropriately determined by GEOServices on a case by case basis.

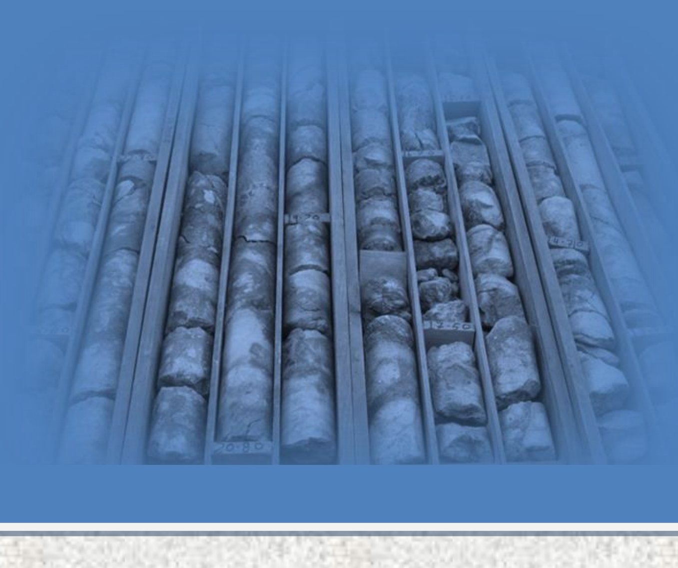
6.0 LIMITATIONS

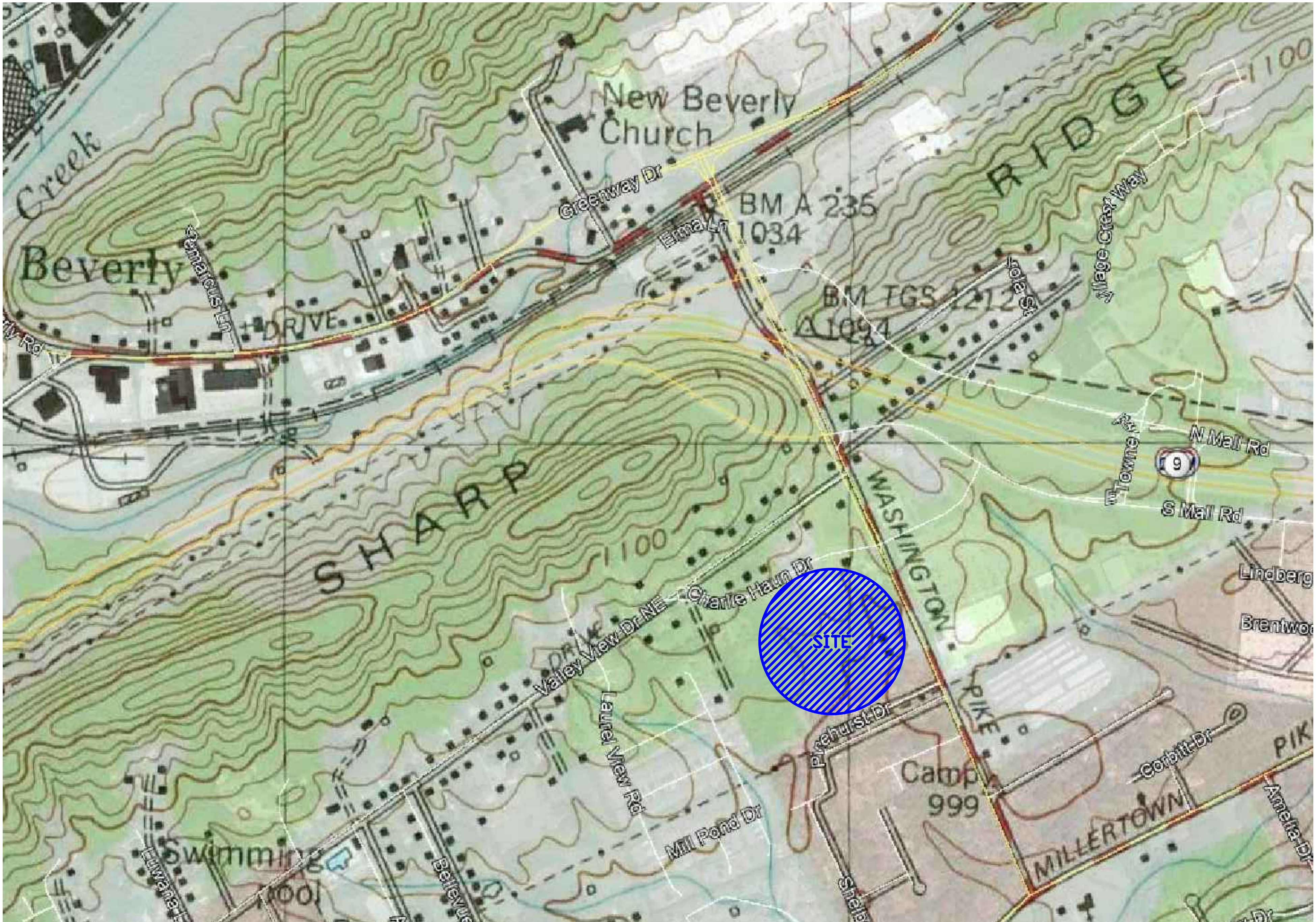
This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. This report is for our geotechnical work only, and no environmental assessment efforts have been performed. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

The analyses and recommendations submitted herein are based, in part, upon the data obtained from the exploration. The nature and extent of variations between the borings will not become evident until construction. We recommend that GEOServices be retained to observe the project construction in the field. GEOServices cannot accept responsibility for conditions which deviate from those described in this report if not retained to perform construction observation and testing. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the structures are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed, and conclusions modified or verified in writing. Also, if the scope of the project should change significantly from that described herein, these recommendations may need to be re-evaluated.

GEOServices, LLC, Geotechnical and Materials Engineers

APPENDIX A





N

NOTES:

1.) BASE MAP: USGS QUADRANGLE (FOUNTAIN CITY, TENNESSEE)

GEOServices, LLC, Geotechnical and Materials Engineers
2561 Willow Point Way
Knoxville, Tennessee 37931
Office: 865-539-8242
Fax: 865-539-8252

SITE VICINITY MAP

GENTRY PLACE APARTMENTS

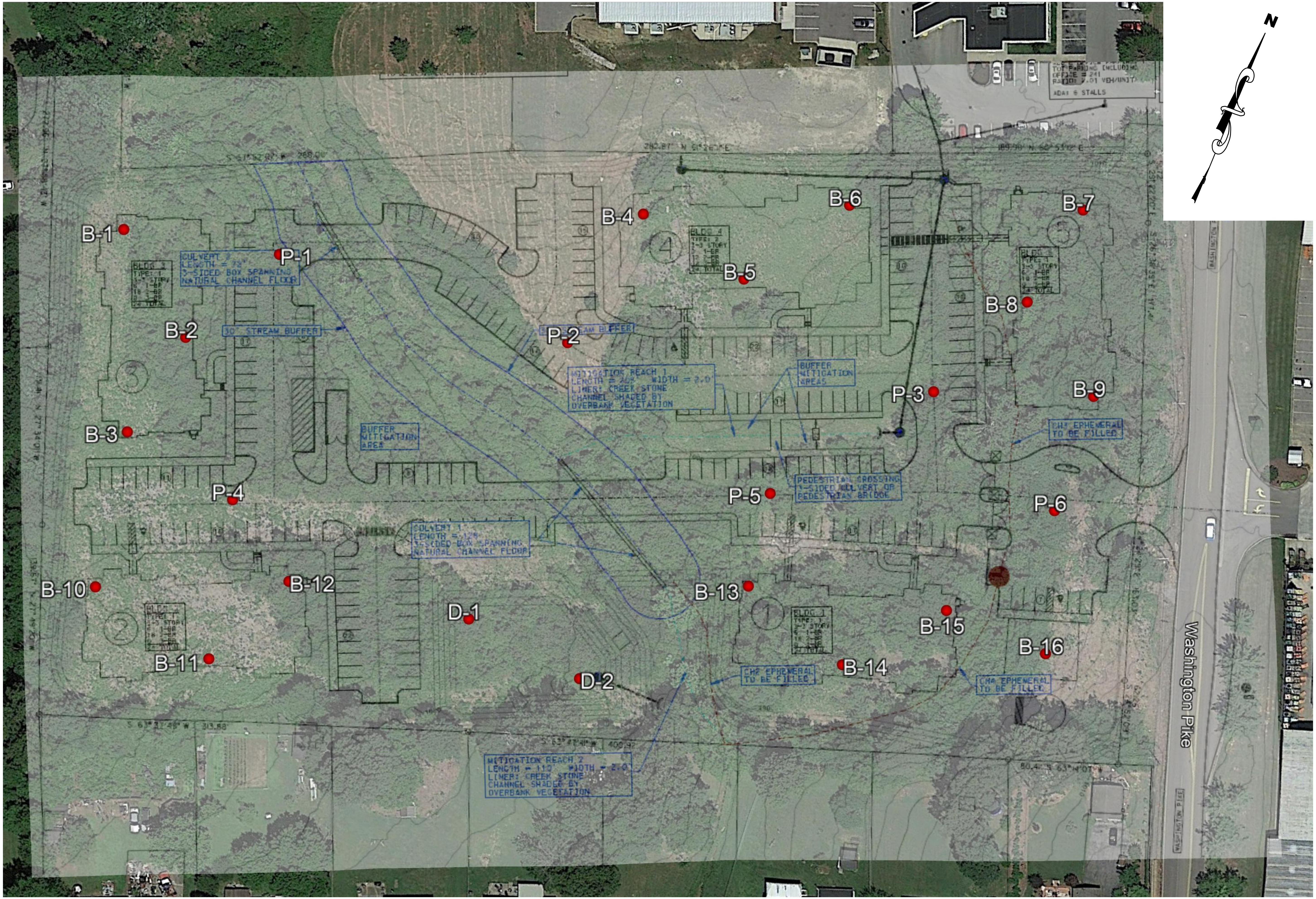
WASHINGTON PIKE

KNOXVILLE, TENNESSEE

DRAWN BY:	PGA
APPROVED BY:	MBH
SCALE:	N.T.S.
JOB NO.:	21-20086
DATE:	2/5/2020

FIGURE

1



NOTES:
1.) BORING LOCATIONS ARE SHOWN IN GENERAL ARRANGEMENT ONLY.
2.) DO NOT USE BORING LOCATIONS FOR DETERMINATIONS OF DISTANCES OR QUANTITIES.
3.) BASE MAP PROVIDED BY: JMB Investment Co.

SOIL TEST BORING LOCATION PLAN

GENTRY PLACE APARTMENTS

WASHINGTON PIKE

KNOXVILLE, TENNESSEE

DRAWN BY:	PGA
APPROVED BY:	MBH
SCALE:	N.T.S.
JOB NO.:	21-20086
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Figure 2

GENERAL NOTES

FINE AND COARSE GRAINED SOIL PROPERTIES

PARTICLE SIZE

BOULDERS:	GREATER THAN 300 mm
COBBLES:	75 mm to 300 mm
GRAVEL:	4.74 mm to 75 mm
COARSE SAND:	2 mm to 4.74 mm
MEDIUM SAND:	0.425 mm to 2 mm
FINE SAND:	0.075 mm to 0.425 mm
SILTS & CLAYS:	LESS THAN 0.075 mm

COARSE GRAINED SOILS (SANDS & GRAVELS)

N-VALUE	RELATIVE DENSITY
0 - 4	VERY LOOSE
5 - 10	LOOSE
11 - 30	MEDIUM DENSE
31 - 50	DENSE
OVER 50	VERY DENSE

FINE GRAINED SOILS (SILTS & CLAYS)

N-VALUE	CONSISTENCY	Qu, PSF
0 - 2	VERY SOFT	0 - 500
3 - 4	SOFT	500 - 1000
5 - 8	FIRM	1000 - 2000
9 - 15	STIFF	2000 - 4000
16 - 30	VERY STIFF	4000 - 8000
OVER 31	HARD	8000 +

STANDARD PENETRATION TEST (ASTM D1586)

THE STANDARD PENETRATION TEST AS DEFINED BY ASTM D1586 IS A METHOD TO OBTAIN A DISTURBED SOIL SAMPLE FOR EXAMINATION AND TESTING AND TO OBTAIN RELATIVE DENSITY AND CONSISTENCY INFORMATON. THE 1.4 INCH I.D./2.0 INCH O.D. SAMPLER IS DRIVEN 3-SIX INCH INCREMENTS WITH A 140 LB. HAMMER FALLING 30 INCHES. THE BLOW COUNTS REQUIRED TO DRIVE THE SAMPLER THE FINAL 2 INCREMENTS ARE ADDED TOGETHER AND DESIGNATED THE N-VALUE. AT TIMES, THE SAMPLER CAN NOT BE DRIVEN THE FULL 18 INCHES. THE FOLLOWING REPRESENTS OUR INTERPRETATION OF THE STANDARD PENETRATION TEST WITH VARIATIONS.

BLOWS/FOOT (N-VALUE)	DESCRIPTION
25	25 BLOWS DROVE SAMPLER 12" AFTER INITIAL 6" SEATING
75/10"	75 BLOWS DROVE SAMPLER 10" AFTER INITIAL 6" SEATING
50/PR	PENETRATION REFUSAL OF SAMPLER AFTER INITIAL 6" SEATING

SAMPLING SYMBOLS

ST:	UNDISTURBED SAMPLE
SS:	SPLIT SPOON SAMPLE
CORE:	ROCK CORE SAMPLE
AU:	AUGER OR BAG SAMPLE

SOIL PROPERTY SYMBOLS

N:	STANDARD PENETRATION, BPF
M:	MOISTURE CONTENT %
LL:	LIQUID LIMIT %
PI:	PLASTICITY INDEX %
Qp:	POCKET PENETROMETER VALUE, TSF
Qu:	UNCONFINED COMPRESSIVE STRENGTH, TSF
DUW:	DRY UNIT WEIGHT, PCF

ROCK PROPERTIES

ROCK QUALITY DESIGNATION (RQD)

PERCENT	QUALITY
90 TO 100	EXCELLENT
75 TO 90	GOOD
50 TO 75	FAIR
25 TO 50	POOR
0 TO 25	VERY POOR

ROCK HARDNESS

VERY SOFT:	ROCK DISINTEGRATES OR EASILY COMPRESSES TO TOUCH: CAN BE HARD TO VERY HARD SOIL.
SOFT:	ROCK IS COHERANT BUT BREAKS EASILY TO THUMB PRESSURE AT SHARP EDGES AND CRUMBLES WITH FIRM HAND PRESSURE.
MODERATELY HARD:	SMALL PIECES CAN BE BROKEN OFF ALONG SHARP EDGES BY CONSIDERABLE HARD THUMB PRESSURE: CAN BE BROKEN BY LIGHT HAMMER BLOWS.
HARD:	ROCK CAN NOT BE BROKEN BY THUMB PRESSURE, BUT CAN BE BROKEN BY MODERATE HAMMER BLOWS.
VERY HARD:	ROCK CAN BE BROKEN BY HEAVY HAMMER BLOWS.

GEOS
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Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-1
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-1
DRY ON COMPLETION ?: Yes

DATE	February 10, 2020		SURFACE ELEV.		FT.
REFUSAL:	Yes	DEPTH 18.0 FT.	ELEV.	-18.0	FT.
SAMPLED	18.0 FT.	5.5 M			
TOP OF ROCK		DEPTH FT.	ELEV.		FT.
BEGAN CORING		DEPTH FT.	ELEV.		FT.
FOOTAGE CORED (LF)		FT.			
BOTTOM OF HOLE DEPTH		18.0 FT.	ELEV.	-18.0	FT.
BORING ADVANCED BY:			POWER AUGERING	X	

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION:	DEPTH	DRY	FT.
	ELEV.		FT.
AFTER 1 HRS:	DEPTH	TNP	FT.
	ELEV.		FT.
AFTER 24 HRS.	DEPTH	TNP	FT.
	ELEV.		FT.

PROPOSED FFE: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	1 - 4 - 4 N = 8				19.8	Lean CLAY (CL) - with shale-like structure and trace weathered shale fragments - tan and orangish brown - moist - firm (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	11 - 33 - 45 N = 78				10.8	
5.0	-5.0										
		6.0	7.5	3	SS	18 - 38 - 49 N = 87				21.5	
7.5	-7.5										
		8.5	8.8	4	SS	50/4" N = 50/4"				8.6	
10.0	-10.0										Weathered ROCK (WR) - shale - gray and orangish brown - dry to wet - very hard (RESIDUUM)
12.5	-12.5										
		13.5	13.8	5	SS	50/4" N = 50/4"					
15.0	-15.0										
17.5	-17.5										
											Auger Refusal at 18.0 Feet
20.0	-20.0										

REMARKS:

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

GEOServices, LLC, Geotechnical and Materials Engineers

LOG OF BORING B-2
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-2
DRY ON COMPLETION ?: Yes

DATE: February 11, 2020
SURFACE ELEV.: FT.
REFUSAL: Yes DEPTH 17.0 FT. ELEV. -17.0 FT.
SAMPLED: 17.0 FT. 5.2 M
TOP OF ROCK: DEPTH FT. ELEV. FT.
BEGAN CORING: DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF): FT.
BOTTOM OF HOLE DEPTH: 17.0 FT. ELEV. -17.0 FT.
BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: FT.

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION:	DEPTH DRY FT.	ELEV. FT.
AFTER 1 HRS:	DEPTH TNP FT.	ELEV. FT.
AFTER 24 HRS.	DEPTH TNP FT.	ELEV. FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M
		1.0	2.5	1	SS	2 - 4 - 4 N = 8				
2.5	-2.5									
		3.5	5.0	2	SS	3 - 5 - 9 N = 14				
5.0	-5.0									
		6.0	7.5	3	SS	6 - 11 - 15 N = 26				
7.5	-7.5									
		8.5	10.0	4	SS	10 - 15 - 19 N = 34				
10.0	-10.0									
12.5	-12.5									
		13.5	15.0	5	SS	5 - 5 - 6 N = 11				
15.0	-15.0									
17.5	-17.5									
20.0	-20.0									

STRATUM DESCRIPTION

Topsoil (6 Inches)

Lean CLAY (CL) - with trace wheathered shale fragments - orangish brown - moist - firm (RESIDUUM)

Lean CLAY (CL) - with shale-like strucure and weathered shale fragments - orangish brown and tan - moist - stiff to very stiff (RESIDUUM)

Gravelly Lean CLAY (CL) - with weathered shale fragments and shale-like structure - gray and tan - moist to wet - hard to stiff (RESIDUUM)

Auger Refusal at 17.0 Feet

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-3
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-3
DRY ON COMPLETION ?: Yes

DATE	February 10, 2020		SURFACE ELEV.		FT.
REFUSAL:	Yes	DEPTH 17.0 FT.	ELEV.	-17.0	FT.
SAMPLED	17.0 FT.	5.2 M			
TOP OF ROCK		DEPTH FT.	ELEV.		FT.
BEGAN CORING		DEPTH FT.	ELEV.		FT.
FOOTAGE CORED (LF)		FT.			
BOTTOM OF HOLE DEPTH		17.0 FT.	ELEV.	-17.0	FT.

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION:	DEPTH	DRY	FT.
	ELEV.		FT.
AFTER 1 HRS:	DEPTH	TNP	FT.
	ELEV.		FT.
AFTER 24 HRS.	DEPTH	TNP	FT.
	ELEV.		FT.

BORING ADVANCED BY: POWER AUGERING X

PROPOSED FFE: FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	1 - 2 - 3 N = 5				22.7	Lean CLAY (CL) - tan - moist - firm (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	4 - 5 - 8 N = 13		31	9	17.0	Gravelly Lean CLAY (CL) - with weathered shale fragments and shale-like structure - gray and orangish brown - moist - stiff to hard (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	4 - 5 - 9 N = 14				15.9	
7.5	-7.5										
		8.5	9.7	4	SS	16 - 13 - 50/2" N = 63/8 "					Weathered ROCK (WR) - shale - gray - dry - very hard (RESIDUUM)
10.0	-10.0										
12.5	-12.5										
		13.5	14.2	5	SS	18 - 50/2 " N = 50/2 "					
15.0	-15.0										
											Auger Refusal at 17.0 Feet
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-4
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-4
DRY ON COMPLETION ? Yes

DATE: February 12, 2020
SURFACE ELEV. ____ FT.
REFUSAL: Yes DEPTH 8.0 FT. ELEV. -8.0 FT.
SAMPLED: 8.0 FT. 2.4 M
TOP OF ROCK DEPTH ____ FT. ELEV. ____ FT.
BEGAN CORING DEPTH ____ FT. ELEV. ____ FT.
FOOTAGE CORED (LF) ____ FT.
BOTTOM OF HOLE DEPTH 8.0 FT. ELEV. -8.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. ____ FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. ____ FT.
AFTER 24 HRS. DEPTH TNP FT. ELEV. ____ FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: ____ FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	1 - 2 - 3 N = 5					
2.5	-2.5										Lean CLAY (CL) - with trace sand - gray and tan - moist to dry - firm to very stiff (RESIDUUM)
		3.5	5.0	2	SS	3 - 7 - 10 N = 17					
5.0	-5.0										
		6.0	7.5	3	SS	14 - 26 - 24 N = 50					Weathered ROCK (WR) - shaly limestone with trace sand - gray and black - dry - very hard (RESIDUUM)
7.5	-7.5										
											Auger Refusal at 8.0 Feet
10.0	-10.0										
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOS
GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-5
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-5
DRY ON COMPLETION ?: Yes

DATE: February 12, 2020
SURFACE ELEV.: FT.
REFUSAL: Yes DEPTH 14.3 FT. ELEV. -14.3 FT.
SAMPLED: 14.3 FT. 4.4 M
TOP OF ROCK: DEPTH FT. ELEV. FT.
BEGAN CORING: DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF): FT.
BOTTOM OF HOLE DEPTH: 14.0 FT. ELEV. -14.0 FT.
BORING ADVANCED BY: POWER AUGERING X

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. FT.
AFTER 24 HRS.: DEPTH TNP FT. ELEV. FT.

PROPOSED FFE: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	4 - 4 - 4 N = 8					Lean CLAY (CL) - with shale-like structure and trace weathered shale fragments - orangish brown and gray - moist - firm (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	4 - 8 - 6 N = 14					Lean CLAY (CL) - with weathered shale fragments and shale-like structure - gray and tan - dry to moist - hard to stiff (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	9 - 21 - 21 N = 42					
7.5	-7.5										
		8.5	10.0	4	SS	4 - 5 - 7 N = 12					
10.0	-10.0										
12.5	-12.5										Weathered ROCK (WR) - shale - gray - dry - very hard (RESIDUUM)
		13.5	14.3	5	SS	15 - 50/3 " N = 50/3 "					
											Auger Refusal at 14.3 Feet
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-6
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-6
DRY ON COMPLETION ?: Yes

DATE	February 12, 2020		SURFACE ELEV.	FT.
REFUSAL:	Yes	DEPTH 17.0 FT.	ELEV.	-17.0 FT.
SAMPLED	17.0 FT.	5.2 M		
TOP OF ROCK		DEPTH FT.	ELEV.	FT.
BEGAN CORING		DEPTH FT.	ELEV.	FT.
FOOTAGE CORED (LF)		FT.		
BOTTOM OF HOLE DEPTH		17.0 FT.	ELEV.	-17.0 FT.

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION:	DEPTH DRY FT.	ELEV. FT.
AFTER 1 HRS:	DEPTH TNP FT.	ELEV. FT.
AFTER 24 HRS.	DEPTH TNP FT.	ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
2.5	-2.5	1.0	2.5	1	SS	2 - 4 - 5 N = 9					Lean CLAY (CL) - with trace root structure - tan - moist - stiff (RESIDUUM)
5.0	-5.0	3.5	5.0	2	SS	5 - 8 - 2 N = 10					Lean CLAY (CL) - with shale-like strucure and trace weathered shale fragments - tan and gray - moist to wet - very stiff to stiff (RESIDUUM)
7.5	-7.5	6.0	7.5	3	SS	4 - 8 - 11 N = 19					
10.0	-10.0	8.5	10.0	4	SS	4 - 6 - 6 N = 12					
12.5	-12.5										
15.0	-15.0	13.5	15.0	5	SS	3 - 3 - 3 N = 6					Gravelly Lean CLAY (CL) - with weathered shale fragments and shale-like structure - gray - wet - firm (RESIDUUM)
17.5	-17.5										Auger Refusal at 17.0 Feet
20.0	-20.0										

REMARKS:

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Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-7
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-7
DRY ON COMPLETION ? Yes

DATE: February 12, 2020
SURFACE ELEV.: FT.
REFUSAL: Yes DEPTH 9.0 FT. ELEV. -9.0 FT.
SAMPLED: 9.0 FT. 2.7 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 9.0 FT. ELEV. -9.0 FT.

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION:	DEPTH DRY FT.		ELEV. FT.
AFTER 1 HRS:	DEPTH TNP FT.		ELEV. FT.
AFTER 24 HRS.	DEPTH TNP FT.		ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	2 - 2 - 3 N = 5				31.4	Lean CLAY (CL) - with root structure - tan - moist - firm (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	2 - 3 - 3 N = 6				29.8	Lean CLAY (CL) - with shale-like structure - tan and orangish brown - moist - firm to stiff (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	4 - 5 - 7 N = 12				29.2	
7.5	-7.5										
		8.5	8.7	4	SS	50/2 " N = 50/2 "				34.1	Weathered ROCK (WR) - shale - gray and tan - moist - very hard (RESIDUUM)
											Auger Refusal at 9.0 Feet
10.0	-10.0										
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-8
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-8
DRY ON COMPLETION ? Yes

DATE: February 12, 2020
SURFACE ELEV. ____ FT.
REFUSAL: Yes DEPTH 6.2 FT. ELEV. -6.2 FT.
SAMPLED: 6.2 FT. 1.9 M
TOP OF ROCK DEPTH ____ FT. ELEV. ____ FT.
BEGAN CORING DEPTH ____ FT. ELEV. ____ FT.
FOOTAGE CORED (LF) ____ FT.
BOTTOM OF HOLE DEPTH 6.0 FT. ELEV. -6.0 FT.
BORING ADVANCED BY: POWER AUGERING X

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION:	DEPTH	DRY	FT.
	ELEV.		FT.
AFTER 1 HRS:	DEPTH	TNP	FT.
	ELEV.		FT.
AFTER 24 HRS.	DEPTH	TNP	FT.
	ELEV.		FT.

PROPOSED FFE: ____ FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	2 - 2 - 2 N = 4					Lean CLAY (CL) - with wood organics and trace sand - gray - wet - soft (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	2 - 4 - 5 N = 9					Fat CLAY (CH) - tan and orangish brown - moist - stiff (RESIDUUM)
5.0	-5.0	6.0	6.2	3	SS	50/2 " N = 50/2 "					Weathered ROCK (WR) - limestone - tan - dry - very hard (RESIDUUM)
											Auger Refusal at 6.2 Feet
7.5	-7.5										
10.0	-10.0										
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-9
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-9
DRY ON COMPLETION ? Yes

DATE	February 12, 2020	SURFACE ELEV.	FT.
REFUSAL:	Yes	DEPTH 8.0 FT.	ELEV. -8.0 FT.
SAMPLED	8.0 FT.	2.4 M	
TOP OF ROCK		DEPTH FT.	ELEV. FT.
BEGAN CORING		DEPTH FT.	ELEV. FT.
FOOTAGE CORED (LF)		FT.	
BOTTOM OF HOLE DEPTH		8.0 FT.	ELEV. -8.0 FT.

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION:	DEPTH DRY FT.	ELEV. FT.
AFTER 1 HRS:	DEPTH TNP FT.	ELEV. FT.
AFTER 24 HRS.	DEPTH TNP FT.	ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
0.0 – 3.0											Concrete and Asphalt (Augered through with no samples taken)
2.5	-2.5										
		3.5	5.0	2	SS	2 - 3 - 3 N = 6					Lean CLAY (CL) - with trace weathered shale fragments - orangish brown and tan - moist - firm (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	2 - 3 - 5 N = 8					
7.5	-7.5										
8.0											Auger Refusal at 8.0 Feet
10.0	-10.0										
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-10
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-10
DRY ON COMPLETION ?: Yes

DATE: February 10, 2020
SURFACE ELEV.: FT.
REFUSAL: Yes DEPTH 18.0 FT. ELEV. -18.0 FT.
SAMPLED: 18.0 FT. 5.5 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF): FT.
BOTTOM OF HOLE DEPTH 18.0 FT. ELEV. -18.0 FT.
BORING ADVANCED BY: POWER AUGERING X

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION: DEPTH DRY FT. ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT. ELEV. FT.

PROPOSED FFE: FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	1 - 2 - 3 N = 5					Lean CLAY (CL) - with trace topsoil, trace wood organics and trace root organics - gray, brown and tan - wet (FILL)
2.5	-2.5										
		3.5	5.0	2	SS	3 - 4 - 8 N = 12					
5.0	-5.0										
		6.0	7.5	3	SS	3 - 5 - 6 N = 11					
7.5	-7.5										
		8.5	10.0	4	SS	4 - 7 - 9 N = 16					
10.0	-10.0										Fat CLAY (CH) - with trace limestone fragments at depth - orangish brown - moist to wet - stiff to hard (RESIDUUM)
12.5	-12.5										
		13.5	15.0	5	SS	7 - 15 - 29 N = 43					
15.0	-15.0										
17.5	-17.5										
											Auger Refusal at 18.0 Feet
20.0	-20.0										

REMARKS:

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Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-11
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-11
DRY ON COMPLETION ? Yes

DATE: February 10, 2020
SURFACE ELEV.: FT.
REFUSAL: Yes DEPTH 18.0 FT. ELEV. -18.0 FT.
SAMPLED: 18.0 FT. 5.5 M
TOP OF ROCK: DEPTH FT. ELEV. FT.
BEGAN CORING: DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF): FT.
BOTTOM OF HOLE DEPTH: 18.0 FT. ELEV. -18.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. FT.
AFTER 24 HRS.: DEPTH TNP FT. ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
2.5	-2.5	1.0	2.5	1	SS	1 - 2 - 3 N = 5				20.5	Lean CLAY (CL) - with wood organics, plastic fragments and organic odor - gray and brown - wet (FILL)
5.0	-5.0	3.5	5.0	2	SS	4 - 5 - 9 N = 14				22.3	Lean CLAY (CL) - with gravel - gray, orangish brown and brown - moist (FILL)
7.5	-7.5	6.0	7.5	3	SS	5 - 9 - 8 N = 17				37.5	Fat CLAY (CH) - orangish brown and tan - moist to wet - very stiff (RESIDUUM)
10.0	-10.0	8.5	10.0	4	SS	4 - 7 - 9 N = 16				26.2	
12.5	-12.5										
15.0	-15.0	13.5	15.0	5	SS	6 - 7 - 9 N = 16				34.8	
17.5	-17.5										Auger Refusal at 18.0 Feet
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-12
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-12
DRY ON COMPLETION ?: Yes

DATE: February 10, 2020
SURFACE ELEV.: FT.
REFUSAL: Yes DEPTH 17.0 FT. ELEV. -17.0 FT.
SAMPLED: 17.0 FT. 5.2 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 17.0 FT. ELEV. -17.0 FT.
BORING ADVANCED BY: POWER AUGERING X

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION: DEPTH DRY FT. ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT. ELEV. FT.

PROPOSED FFE: FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (4 Inches)
		1.0	2.5	1	SS	2 - 2 - 4 N = 6					Lean CLAY (CL) - tan - moist - firm to stiff (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	2 - 3 - 5 N = 8					
5.0	-5.0										
		6.0	7.5	3	SS	3 - 5 - 8 N = 13					
7.5	-7.5										
		8.5	10.0	4	SS	5 - 8 - 12 N = 20					Fat CLAY (CH) - with trace limestone fragments - tan and gray - moist - very stiff (RESIDUUM)
10.0	-10.0										
12.5	-12.5										
		13.5	15.0	5	SS	5 - 7 - 10 N = 17					
15.0	-15.0										
17.5	-17.5										Auger Refusal at 17.0 Feet
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-13
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-13
DRY ON COMPLETION ?: Yes

DATE: February 12, 2020
SURFACE ELEV.: FT.
REFUSAL: Yes DEPTH 3.1 FT. ELEV. -3.1 FT.
SAMPLED: 3.1 FT. 0.9 M
TOP OF ROCK: DEPTH FT. ELEV. FT.
BEGAN CORING: DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF): FT.
BOTTOM OF HOLE DEPTH: 3.0 FT. ELEV. -3.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT. ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	1 - 2 - 3 N = 5					Lean CLAY (CL) - tan - moist - firm (RESIDUUM)
2.5	-2.5	3.0	3.1	2	SS	50/1 " N = 50/1 "					No Recovery
											Auger Refusal at 3.1 Feet
5.0	-5.0										
7.5	-7.5										
10.0	-10.0										
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-14
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-14
DRY ON COMPLETION ?: Yes

DATE: February 11, 2020
SURFACE ELEV.: FT.
REFUSAL: Yes DEPTH 9.2 FT. ELEV. -9.2 FT.
SAMPLED 9.2 FT. 2.8 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF) FT.
BOTTOM OF HOLE DEPTH 9.0 FT. ELEV. -9.0 FT.
BORING ADVANCED BY: POWER AUGERING X

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT. ELEV. FT.

PROPOSED FFE: FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	1 - 2 - 3 N = 5				21.7	
2.5	-2.5										Lean CLAY (CL) - with wood organics, trace sand and trace gravel - gray, brown and tan - moist (FILL)
		3.5	5.0	2	SS	1 - 2 - 3 N = 5				25.6	
5.0	-5.0										Lean CLAY (CL) - with trace weathered shale fragments - tan and gray - moist - firm to hard (RESIDUUM)
		6.0	7.5	3	SS	2 - 2 - 6 N = 8				31.6	
7.5	-7.5										Weathered ROCK (WR) - shaly limestone with clay - tan and gray - moist - very hard (RESIDUUM)
		8.5	9.2	4	SS	2 - 50/2 " N = 50/2 "				29.8	
											Auger Refusal at 9.2 Feet
10.0	-10.0										
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING B-15
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-15
DRY ON COMPLETION ?: Yes

DATE: February 11, 2020
SURFACE ELEV.: FT.
REFUSAL: Yes DEPTH 8.0 FT. ELEV. -8.0 FT.
SAMPLED: 8.0 FT. 2.4 M
TOP OF ROCK: DEPTH FT. ELEV. FT.
BEGAN CORING: DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF): FT.
BOTTOM OF HOLE DEPTH: 8.0 FT. ELEV. -8.0 FT.
BORING ADVANCED BY: POWER AUGERING X

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. FT.
AFTER 24 HRS.: DEPTH TNP FT. ELEV. FT.

PROPOSED FFE: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	2 - 2 - 3 N = 5				24.0	Lean CLAY (CL) - with trace sand, trace gravel and trace wood organics - orangish brown - moist (FILL)
2.5	-2.5										
		3.5	5.0	2	SS	2 - 1 - 3 N = 4		40	22	26.7	Lean CLAY (CL) - tan - moist - soft to firm (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	2 - 3 - 5 N = 8				33.7	
7.5	-7.5										Auger Refusal at 8.0 Feet
10.0	-10.0										
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

GEOServices, LLC, Geotechnical and Materials Engineers

LOG OF BORING B-16
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: B-16
DRY ON COMPLETION ?: Yes

DATE: February 11, 2020
SURFACE ELEV.: FT.
REFUSAL: Yes DEPTH 15.5 FT. ELEV. -15.5 FT.
SAMPLED: 15.5 FT. 4.7 M
TOP OF ROCK DEPTH FT. ELEV. FT.
BEGAN CORING DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF): FT.
BOTTOM OF HOLE DEPTH 15.5 FT. ELEV. -15.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT. ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	1 - 3 - 4 N = 7					Lean CLAY (CL) - with trace weathered shale fragments - orangish brown, tan and gray - moist - firm (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	2 - 3 - 5 N = 8					
5.0	-5.0										
		6.0	7.5	3	SS	6 - 12 - 18 N = 30					Gravelly Lean CLAY (CL) - with weathered shale fragments and shale-like structure - gray and tan - moist - very stiff (RESIDUUM)
7.5	-7.5										
		8.5	9.3	4	SS	40 - 50/3 " N = 50/3 "					Weathered ROCK (WR) - shale - gray - dry - very hard (RESIDUUM)
10.0	-10.0										
12.5	-12.5	13.5	13.7	5	SS	50/2 " N = 50/2 "					
15.0	-15.0										
											Auger Refusal at 15.5 Feet
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING P-1
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: P-1
DRY ON COMPLETION ? Yes

DATE: February 11, 2020
SURFACE ELEV. ___ FT.
REFUSAL: Yes DEPTH 8.5 FT. ELEV. -8.5 FT.
SAMPLED 8.5 FT. 2.6 M
TOP OF ROCK DEPTH ___ FT. ELEV. ___ FT.
BEGAN CORING DEPTH ___ FT. ELEV. ___ FT.
FOOTAGE CORED (LF) ___ FT.
BOTTOM OF HOLE DEPTH 8.5 FT. ELEV. -8.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. ___ FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. ___ FT.
AFTER 24 HRS. DEPTH TNP FT. ELEV. ___ FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: ___ FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	2 - 1 - 3 N = 4					Lean CLAY (CL) - with trace weathered shale fragments - tan - wet - soft (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	4 - 20 - 30 N = 50					Weathered ROCK (WR) - shale - gray and tan - dry to moist - hard to very hard (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	21 - 26 - 45 N = 71					
7.5	-7.5										
		8.0	8.2	4	SS	50/2 " N = 50/2 "					Weathered ROCK (WR) - shaly limestone - gray and black - wet - very hard (RESIDUUM)
											Auger Refusal at 8.5 Feet
10.0	-10.0										
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

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GEOServices Project # 21-20086

LOG OF BORING P-2
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: P-2
DRY ON COMPLETION ? Yes

DATE: February 12, 2020
SURFACE ELEV.: FT.
REFUSAL: Yes DEPTH 9.5 FT. ELEV. -9.5 FT.
SAMPLED: 9.5 FT. 2.9 M
TOP OF ROCK: DEPTH FT. ELEV. FT.
BEGAN CORING: DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF): FT.
BOTTOM OF HOLE DEPTH: 9.5 FT. ELEV. -9.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. FT.
AFTER 24 HRS.: DEPTH TNP FT. ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	3 - 3 - 3 N = 6					Lean CLAY (CL) - with shale-like structure and trace weathered shale fragments - gray and tan - moist - firm (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	4 - 11 - 22 N = 33					Weathered ROCK (WR) - shale - gray and tan - dry - hard (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	18 - 27 - 36 N = 63					Weathered ROCK (WR) - shaly limestone - gray - dry - very hard (RESIDUUM)
7.5	-7.5										
		8.0	9.3	4	SS	30 - 48 - 50/4" N = 98/10 "					
											Auger Refusal at 9.5 Feet
10.0	-10.0										
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

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Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING P-3
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: P-3
DRY ON COMPLETION ?: Yes

DATE: February 12, 2020
SURFACE ELEV. ____ FT.
REFUSAL: No   DEPTH ____ FT.   ELEV. ____ FT.
SAMPLED: 10.0 FT.   3.0 M
TOP OF ROCK   DEPTH ____ FT.   ELEV. ____ FT.
BEGAN CORING   DEPTH ____ FT.   ELEV. ____ FT.
FOOTAGE CORED (LF) ____ FT.
BOTTOM OF HOLE DEPTH 10.0 FT.   ELEV. -10.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT.   ELEV. ____ FT.
AFTER 1 HRS: DEPTH TNP FT.   ELEV. ____ FT.
AFTER 24 HRS. DEPTH TNP FT.   ELEV. ____ FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: ____ FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	2 - 4 - 5 N = 9					Lean CLAY (CL) - tan - moist - stiff (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	6 - 8 - 11 N = 19					Lean CLAY (CL) - with trace weathered shale fragments - tan, orangish brown and gray - moist - stiff to very stiff (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	6 - 6 - 8 N = 14					
7.5	-7.5										
		8.0	10.0	4	SS	4 - 7 - 10 N = 17					
10.0	-10.0										Boring Terminated at 10.0 Feet
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

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Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING P-4
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: P-4
DRY ON COMPLETION ?: Yes

DATE: February 10, 2020 | SURFACE ELEV.: FT.
REFUSAL: No | DEPTH 10.0 FT. | ELEV. -10.0 FT.
SAMPLED: 10.0 FT. | 3.0 M
TOP OF ROCK: DEPTH FT. | ELEV. FT.
BEGAN CORING: DEPTH FT. | ELEV. FT.
FOOTAGE CORED (LF): FT.
BOTTOM OF HOLE DEPTH: 10.0 FT. | ELEV. -10.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. FT.
AFTER 24 HRS.: DEPTH TNP FT. ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LABORATORY RESULTS LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	2 - 1 - 3 N = 4					Lean CLAY (CL) - tan - moist - soft (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	2 - 1 - 3 N = 4					Fat CLAY (CH) - orangish brown - moist - soft (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	6 -9 - 11 N = 20					Fat CLAY (CH) - with limestone fragments at depth - tan and orangish brown - moist - very stiff (RESIDUUM)
7.5	-7.5										
		8.0	10.0	4	SS	6 - 10 - 13 N = 23					
10.0	-10.0										Boring Terminated at 10.0 Feet
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

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GEOServices Project # 21-20086

LOG OF BORING P-5
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: P-5
DRY ON COMPLETION ? Yes

DATE: February 12, 2020
SURFACE ELEV. ______ FT.
REFUSAL: No DEPTH ______ FT. ELEV. ______ FT.
SAMPLED: 10.0 FT. 3.0 M
TOP OF ROCK DEPTH ______ FT. ELEV. ______ FT.
BEGAN CORING DEPTH ______ FT. ELEV. ______ FT.
FOOTAGE CORED (LF) ______ FT.
BOTTOM OF HOLE DEPTH 10.0 FT. ELEV. -10.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. ______ FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. ______ FT.
AFTER 24 HRS. DEPTH TNP FT. ELEV. ______ FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: ______ FT.

STRATUM DEPTH FT.	ELEV.	SAMPLE DEPTH FROM FT.	TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	Qu	LAB LL	PI	%M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	2 - 2 - 3 N = 5					Lean CLAY (CL) - tan - moist to wet - very soft to firm (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	2 - 1 - 1 N = 2					
5.0	-5.0										
		6.0	7.5	3	SS	2 - 3 - 4 N = 7					
7.5	-7.5										
		8.0	10.0	4	SS	2 - 3 - 4 N = 7					
10.0	-10.0										Boring Terminated at 10.0 Feet
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

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Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING P-6
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: P-6
DRY ON COMPLETION ? Yes

DATE: February 12, 2020 | SURFACE ELEV. ___ FT.
REFUSAL: Yes | DEPTH 8.0 FT. | ELEV. -8.0 FT.
SAMPLED: 8.0 FT. | 2.4 M
TOP OF ROCK: DEPTH ___ FT. | ELEV. ___ FT.
BEGAN CORING: DEPTH ___ FT. | ELEV. ___ FT.
FOOTAGE CORED (LF): ___ FT.
BOTTOM OF HOLE DEPTH: 8.0 FT. | ELEV. -8.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. | ELEV. ___ FT.
AFTER 1 HRS: DEPTH TNP FT. | ELEV. ___ FT.
AFTER 24 HRS.: DEPTH TNP FT. | ELEV. ___ FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: ___ FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	2 - 2 - 2 N = 4					Lean CLAY (CL) - with trace weathered shale fragments - tan and gray - moist to wet - soft to firm (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	2 - 2 - 4 N = 6					
5.0	-5.0										
		6.0	7.5	3	SS	2 - 2 - 4 N = 6					
7.5	-7.5										
											Auger Refusal at 8.0 Feet
10.0	-10.0										
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING D-1
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: D-1
DRY ON COMPLETION ? Yes

DATE	February 11, 2020	SURFACE ELEV.	FT.		
REFUSAL:	Yes	DEPTH 7.5 FT.	ELEV. -7.5 FT.		
SAMPLED	7.5 FT.	2.3 M			
TOP OF ROCK		DEPTH FT.	ELEV. FT.		
BEGAN CORING		DEPTH FT.	ELEV. FT.		
FOOTAGE CORED (LF)		FT.			
BOTTOM OF HOLE DEPTH		7.5 FT.	ELEV. -7.5 FT.		

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION:	DEPTH DRY FT.	ELEV. FT.
AFTER 1 HRS:	DEPTH TNP FT.	ELEV. FT.
AFTER 24 HRS.	DEPTH TNP FT.	ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	1 - 3 - 3 N = 6					
2.5	-2.5										
		3.5	5.0	2	SS	3 - 3 - 6 N = 9					Lean CLAY (CL) - with trace limestone fragments at depth - tan - moist - firm to stiff (RESIDUUM)
5.0	-5.0										
		6.0	7.5	3	SS	2 - 4 - 6 N = 10					
7.5	-7.5										Auger Refusal at 7.5 Feet
10.0	-10.0										
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

GEOServices, LLC, Geotechnical and Materials Engineers

Gentry Place Apartments
Knoxville, Tennessee
GEOServices Project # 21-20086

LOG OF BORING D-2
SHEET 1 OF 1

DRILLER: M&W - Rick Brock
ON-SITE REP.:

BORING NO. / LOCATION: D-2
DRY ON COMPLETION ? Yes

DATE: February 12, 2020
SURFACE ELEV. FT.
REFUSAL: No DEPTH FT. ELEV. FT.
SAMPLED: 10.0 FT. 3.0 M
TOP OF ROCK: DEPTH FT. ELEV. FT.
BEGAN CORING: DEPTH FT. ELEV. FT.
FOOTAGE CORED (LF): FT.
BOTTOM OF HOLE DEPTH: 10.0 FT. ELEV. -10.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
COMPLETION: DEPTH DRY FT. ELEV. FT.
AFTER 1 HRS: DEPTH TNP FT. ELEV. FT.
AFTER 24 HRS. DEPTH TNP FT. ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X
PROPOSED FFE: FT.

STRATUM DEPTH FT.	STRATUM DEPTH ELEV.	SAMPLE DEPTH FROM FT.	SAMPLE DEPTH TO FT.	SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS N-Value	FIELD RESULTS Qu	LABORATORY RESULTS LL	LABORATORY RESULTS PI	LABORATORY RESULTS %M	STRATUM DESCRIPTION
											Topsoil (6 Inches)
		1.0	2.5	1	SS	1 - 2 - 4 N = 6					Lean CLAY (CL) - with trace weathered shale fragments - tan - moist - firm to stiff (RESIDUUM)
2.5	-2.5										
		3.5	5.0	2	SS	3 - 4 - 6 N = 10					
5.0	-5.0										
		6.0	7.5	3	SS	2 - 6 - 8 N = 14					
7.5	-7.5										
		8.0	10.0	4	SS	3 - 4 - 8 N = 12					
10.0	-10.0										Boring Terminated at 10.0 Feet
12.5	-12.5										
15.0	-15.0										
17.5	-17.5										
20.0	-20.0										

REMARKS:

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APPENDIX B

SOIL DATA SUMMARY

Boring Number	Sample Number	Depth (feet)	Natural Moisture Content	Atterberg Limits			Soil Type	Percent Organic Content
				LL	PL	PI		
B-1	1	1.0-2.5'	19.8%					
	2	3.5-5.0'	10.8%					
	3	6.0-7.5'	21.5%					
	4	8.5-10.0'	8.6%					
B-3	1	1.0-2.5'	22.7%					
	2	3.5-5.0'	17.0%	31	22	9	CL	
	3	6.0-7.5'	15.9%					
B-7	1	1.0-2.5'	31.4%					
	2	3.5-5.0'	29.8%					3.9
	3	6.0-7.5'	29.2%					
	4	8.5-10.0'	34.1%					
B-11	1	1.0-2.5'	20.5%					
	2	3.5-5.0'	22.3%					
	3	6.0-7.5'	37.5%					
	4	8.5-10.0'	26.2%					
	5	13.5-15.0'	34.8%					
B-14	1	1.0-2.5'	21.7%					
	2	3.5-5.0'	25.6%					3.6
	3	6.0-7.5'	31.6%					
	4	8.5-10.0'	29.8%					
B-15	1	1.0-2.5'	24.0%					
	2	3.5-5.0'	26.7%	40	18	22	CL	5.0
	3	6.0-7.5'	33.7%					