



**REPORT OF GEOTECHNICAL
CONSULTING SERVICES**

Proposed Commercial Building
1198 Walnut Street
Starke, Bradford County, Florida

UES Project No. 0230.2300118.0000
UES Report No. 2048812v3

Prepared for:

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November 29, 2023

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Attention: Ms. Megan McDermott

Reference: **Report of Geotechnical Consulting Services**
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Ms. McDermott:

Universal Engineering Sciences, LLC (UES) has completed the geotechnical engineering services for the subject project in Starke, Bradford County, Florida. This geotechnical Report is submitted in satisfaction of the contracted scope of services as summarized in UES Proposal No. 2027535, dated July 5, 2023.

This Report presents the results of our field subsurface exploration and laboratory soil testing programs, and recommendations for geotechnical site preparation and foundation design, construction considerations, and pavement and stormwater pond design parameters.

We appreciate the opportunity to have assisted you on this project and look forward to a continued association. Please do not hesitate to contact our office if you should have any questions, or to assist your office with the remaining phases of project design and construction.

Respectfully submitted,
UNIVERSAL ENGINEERING SCIENCES, LLC
Florida Registry No. 549

A handwritten signature in blue ink, appearing to read "Jacob Parker", is written in a cursive style.

Jacob Parker
Staff Engineer

This item has been electronically signed and sealed by Keith L. Butts, PE on the date adjacent to the seal using Digital Signature. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Keith L. Butts, P.E.
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1.0 INTRODUCTION

1.1 GENERAL

In this report, we present the results of the subsurface exploration of the site for the proposed Commercial Building located in Starke, Bradford County, Florida. We have divided this report into the following sections:

- SCOPE OF SERVICES - Defines what we did,
- FINDINGS - Describes what we encountered,
- RECOMMENDATIONS - Describes what we encourage you to do,
- LIMITATIONS - Describes the restrictions inherent in this report,
- APPENDICES - Presents support materials referenced in this report.

2.0 SCOPE OF SERVICES

2.1 PROJECT DESCRIPTION

We understand that the proposed project will include the development of a commercial building at 1198 Walnut Street in Starke, Bradford County, Florida. At the time of our field exploration, the project site was wooded with a single-family residence located within the project site. Based on the provided site plan, we understand the proposed development will include constructing an approximately 5,000 square-foot commercial building with associated paved parking/drive areas, and a stormwater pond.

Our office was not provided with Foundation Plans or any other construction-related information other than that discussed herein. If our understandings and assumptions of project issues are incorrect our conclusions and recommendations will not be considered valid until we have had the opportunity to review all pertinent issues. Considering the limitations stated above and based on prior experience with structures of this type, we assumed the following structural loading conditions: ground floor slab loads not exceeding 200 psf, a maximum of 2 kips per linear feet (klf) on wall footings, and a maximum load of 20 kips on individual footings. We understand the building construction will require little to no cuts and nominal structural fill placement operations (2 feet or less) for leveling of the proposed building footprint and building pad construction.

If our foundation loading estimates and assumptions are incorrect, we should be advised so that we may review our engineering evaluations, conclusions and recommendations. The above constitutes all of the project information provided to our office at the time of this Report preparation.

We note that, our authorized scope of services and this Report do not address any other specific project elements, such as earth retaining walls, sidewalks, or slope stability issues that may be part of the overall project site plan. Since other site improvements could have detrimental effects on the performance of a foundation system at this site, UES, or another qualified geotechnical consultant, should be consulted to review the entire site development

plan and conduct additional services as required to minimize any impact of associated improvements on foundation performance.

Our recommendations have been based upon the above considerations. If any of this information is incorrect, or if you anticipate any changes, please inform UES so that we may review our recommendations.

2.2 PURPOSE

The purposes of this exploration were:

- Perform a subsurface exploration to gather information concerning the near-surface soil conditions,
- To conduct a series of laboratory tests on selected subsurface soil specimens, recovered from the field exploration program to assist with engineering soil classifications,
- Classify and stratify the various soil strata encountered in the soil test borings,
- To evaluate and discuss geotechnical issues deemed relevant to the proposed on-site building construction,
- To evaluate the groundwater level in the area of exploration and make appropriate recommendations,
- To prepare building foundation design and construction recommendations,
- To discuss technical suitability of subgrade soils for pavement section support and provide parameters for pavement design,
- To discuss and provide subsurface soil design parameter values for the design of the on-site stormwater management areas.

This report presents an evaluation of site conditions on the basis of traditional geotechnical procedures for site characterization. The recovered samples were not examined, either visually or analytically, for chemical composition or environmental hazards. UES would be pleased to perform these services, if you desire.

Our exploration was confined to the zone of soil likely to be stressed by the proposed construction. Our work did not address the potential for surface expression of deep geological conditions such as sinkholes, which are common in the vicinity of the subject site. This evaluation requires a more extensive range of field services than performed in this study. We will be pleased to conduct an investigation to evaluate the probable effect of the regional geology upon the proposed construction, if you desire.

2.3 FIELD EXPLORATION

The field geotechnical testing activities were started on October 4, 2023 and completed on October 5, 2023. Field tests for the geotechnical study included three (3) soil test borings to a depth of 20 feet below the ground surface within the project area for the proposed building area, four (4) soil test borings to a depth of 6 feet within the proposed pavement areas, and two (2) soil test borings to a depth of 15 feet within the proposed pond area. The actual test locations shown are approximate and were staked in the field by UES personnel using existing landmarks and site features, and the dimensions provided on the boring location. All boreholes were backfilled upon field work completion. The soil test boring locations have been presented on the attached Boring Location Plan.

Representative portions of the subsurface soil samples recovered were transported to our soils laboratory. The soil samples were visually classified by a member of our geotechnical staff. It should be noted that soil conditions might vary between soil test boring locations, and between the subsurface soil strata interfaces which have been shown on the Boring Logs. The soil test boring data reflect information from the specific test locations only.

2.3.1 Standard Penetration Test (SPT) Borings

Penetration tests were performed in accordance with ASTM Procedure D-1586, *Penetration Test and Split-Barrel Sampling of Soils*. This test procedure generally involved driving a 1.4-inch I.D. split-tube sampler into the soil profile in six-inch increments for a minimum distance of 18 inches using a 140-pound hammer free-falling 30 inches. The total number of blows required to drive the sampler the second and third 6-inch increments has been designated as the N-value and provides an indication of in-place soil strength, density, and consistency.

2.4 LABORATORY TESTING

2.4.1 Visual Classification

The soil samples recovered from the soil test borings were returned to our laboratory where a geotechnical engineer visually reviewed the field descriptions in accordance with ASTM D-2488. Using the results of the laboratory tests, our visual examination, and our review of the field boring logs we classified the soil borings in accordance with the current Unified Soil Classification System (USCS). We then selected representative soil samples for laboratory testing.

2.4.2 Index Testing

Laboratory testing was performed on selected samples of the soils encountered in the field exploration to better define soil composition and properties. Testing was performed in accordance with ASTM procedures and included Percent passing No. 200 Sieve (ASTM D-1140), Natural Moisture Content (ASTM D-2216), Atterberg limits (ASTM D-4318), and Permeability Test (ASTM D-2434). The test results have been presented on the attached Boring Logs.

3.0 FINDINGS

3.1 GENERAL AREA SOIL INFORMATION

The United States Department of Agriculture (USDA) *Soil Survey of Bradford County, Florida* describes the near-surface soil profile in the project parcel as Plummer-Plummer wet, sands. It should be noted that the Soil Survey was determined from the predevelopment conditions, and current conditions may vary from the published data.

Plummer sands are characterized as nearly level, poorly drained soil with a normal seasonal high-water level at 0.5 to 1.5 feet below the ground surface. Relevant engineering index properties for the Plummer sands have been summarized in Table 1.

Table 1 – Relevant Engineering Index Properties of Plummer sands						
Depth, Inches	Texture	Classification	% Passing #200 Sieve	Plasticity Index	Shrink-swell Potential	Permeability
0-56	Sand, fine sand	SM, SP-SM	5-20	NP	Low	2.0 – 20 in/hr
56-80	Sandy loam, sandy clay loam, fine sandy loam	SM, SC, SM-SC	20-48	NP – 10	Low	0.6 – 2.0 in/hr

Plummer wet sands are characterized as nearly level, poorly drained soil with a normal seasonal high-water level at 0.5 feet above the ground surface to 1 foot below the ground surface. Relevant engineering index properties for the Plummer wet sands have been summarized in Table 2.

Table 2 – Relevant Engineering Index Properties of Plummer wet sands						
Depth, Inches	Texture	Classification	% Passing #200 Sieve	Plasticity Index	Shrink-swell Potential	Permeability
0-50	Sand, fine sand	SP, SP-SM	5-20	NP	Low	2.0 – 20 in/hr
50-80	Sandy loam, sandy clay loam	SM, SC, SM-SC	20-48	NP – 10	Low	0.6 to 2.0 in/hr

3.2 SURFACE CONDITIONS

UES personnel visited the project site prior to and during the performance of the field portion of this geotechnical study. Our on-site observations have been summarized as follows. At the time of our exploration, the project site was wooded with a single-family residence located within the project site.

3.3 GENERALIZED SOIL PROFILE

The results of our field exploration and laboratory analysis, together with pertinent information obtained from the borings, such as soil profiles, and groundwater levels, have been presented on the boring logs included in Appendix A. The Key to Boring Logs, Soil Classification Chart has also been included in Appendix A. The soil profiles were prepared from field logs after the recovered samples were examined by a geotechnical engineer. The stratification lines shown on the boring logs represent the approximate boundaries between soil types and may not depict exact subsurface soil conditions. The actual soil boundaries may be more transitional than depicted. A generalized profile of the soils encountered at our boring locations has been presented in Table 3. For detailed soil profiles, please refer to the attached boring logs.

TABLE 3 - GENERALIZED SOIL PROFILE			
Typical Depth (feet, bls)		Soil Description	Range of SPT "N" Values (blows/ft)
From	To		
Surface	2.5 to 7	Very loose to medium dense, SAND with silt to silty SAND with/without clay, and silty clayey SAND [SP-SM, SM, SM-SC]	3 to 26
2.5 to 7	6 to 20*	Loose to dense, clean SAND, SAND with clay/silt, clayey and very clayey SAND, silty SAND with various amounts of clay, stiff to hard CLAY [SP, SP-SM, SP-SC, SM, SC, CH]	7 to 52

*-Denotes maximum termination depth of the borings

3.4 GROUNDWATER DEPTH

Groundwater was encountered at depths between 11 to 13 feet below existing grades at the time of the field activities. Groundwater was not encountered in borings P-1, P-2, P-3, and P-4 at the time of our field exploration. The encountered groundwater level at each boring location has been shown on the attached boring logs. Fluctuations of a temporary perched groundwater level condition on this project parcel will occur seasonally above the restrictive clayey soils as a result of rainfall, surface runoff, and nearby construction activities.

3.5 LABORATORY TESTING

The soil samples recovered from the field exploration program were placed in containers and returned to our soil laboratory, where a member of our geotechnical staff visually examined and classified the samples. Laboratory soil tests were performed to aid in the classification of the soils, and to help in the evaluation of engineering characteristics of the soils. Representative soil samples were selected for moisture content, percent fines determination, Atterberg limits, and permeability testing. The test results have been presented on the attached Boring Logs.

3.5.1 Percent Passing No. 200 Sieve

Certain recovered soil samples were selected to determine the percentage of fines. In these tests the soil sample was dried and washed over a U.S. No. 200 mesh sieve. The percent of soil by weight passing the sieve was the percentage of fines or portion of the sample in the silt and clay size range. These tests were conducted in accordance with ASTM Procedure D-1140, *Standard Test Methods for Amount of Material in Soils Finer than the No. 200 Sieve*.

3.5.2 Moisture Content

Certain recovered soil samples were selected to determine their moisture content. The moisture content was the ratio expressed as a percentage of the weight of water in a given mass of soil to the weight of the solid particles. These tests were conducted in accordance with ASTM Procedure D-2216, *Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock*.

3.5.3 Permeability Testing

Representative soil samples were selected to determine the permeability rate of the near surface sandy soils. A constant head permeability test was performed on the sample. This test was conducted following the concepts outlined in ASTM D-2434, *Standard Test Method for Permeability of Granular Soils* (Constant Head).

3.5.4 Atterberg Limits

A recovered soil sample was selected for Atterberg Limits testing to evaluate the soil plasticity characteristics. The soil's Plasticity Index (PI) is the range of moisture content over which the soil deforms as a plastic material. It is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL). The LL is the moisture content at which the soil will flow as a heavy viscous fluid. The PL is the lowest moisture content at which the soil is sufficiently plastic so as to be manually rolled into a 1/8-inch diameter thread. These tests were conducted in accordance with *ASTM Procedure D-4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils*.

4.0 RECOMMENDATIONS

4.1 GENERAL

In this section of the report, we present our recommendations for groundwater control, building foundations, site preparation, and construction related services. The following recommendations have been based upon a review of the attached soil test data, our limited understanding of the proposed construction, and experience with similar projects and subsurface conditions.

4.2 GEOTECHNICAL CONSIDERATIONS

Recommendations for foundation design are dependent, among other factors, on the amount of total settlement and more importantly differential settlement between various structural elements that can be safely tolerated by the individual structures.

It should be noted that differential settlement underneath the proposed structure is a function of the uniformity or variability of the subsurface conditions within the zone of influence of the building footprint. The more uniform the subsurface conditions, the less the differential settlement. If the anticipated total and differential settlements estimated in section 4.4.5 of this report exceed the tolerable limits as set forth by the Structural Engineer, we should be advised so that we may consider other foundation system alternatives.

Very loose soils were encountered in the upper 4 feet in boring B-1 and have the potential to settle with time potentially generating intolerable settlements within the proposed structure. These sands are typically improved through the use of large vibratory rollers in conjunction within limited undercutting and replacement. Specifics regarding the recommended surface compaction have been provided in Section 4.5 of this report.

To avoid creating an unstable condition in the underlying clayey soils, we recommend self-propelled vibrating equipment remain a minimum of two feet above the clayey soils. The sandy soils could be compacted with a vibratory roller operating in static mode or with a track-mounted dozer to avoid disturbance of the clayey soils prior to operation. We recommend a minimum of 2 feet of soil be present over the clayey soils prior to operation of construction equipment. Excessive disturbance of the clayey soils will degrade the strength characteristics of the soil and may result in an unstable soil which will require over-excavation and subsequent backfilling with selected material.

The surficial strata of silty/clayey soils prevalent on the site will generally exhibit sensitivity to even slight changes in moisture content and will lose most of their strength when wet. When such moisture sensitive soils are exposed to construction traffic, a loss of soil strength may result. After disturbance and when wet, these fine-grained soils may rut and deflect significantly, do not provide adequate subgrade support, and require remediation or moisture conditioning. It has not been uncommon for construction equipment to severely disturb the upper several feet of the subgrade during initial phases of site earthwork operations, especially when site preparation work has been performed while the soils were wet. This may result in the need for both undercutting and replacement of the disturbed soils or drying and re-compaction of the affected soils.

We recommend that we be provided the opportunity to review the project plans and specifications to confirm that our recommendations have been properly interpreted and implemented. If the structural loadings or the building locations change significantly from those discussed previously, we request the opportunity to review and possibly amend our recommendations with respect to those changes. The discovery of any subsurface conditions during construction which deviate from those encountered in the borings should be reported to us immediately for observation, evaluation, and recommendations.

The discovery of any subsurface conditions during construction which deviate from those encountered in the borings should be reported to us immediately for observation, evaluation, and recommendations.

4.4 GROUNDWATER CONSIDERATIONS

The groundwater level will fluctuate seasonally depending upon local rainfall. The rainy seasons in North Central Florida are normally between June and September and December and February. Based upon our review of regional hydrogeology and the Bradford County Soil Survey, we estimate the normal seasonal high groundwater level will generally be about 2 to 4 feet below the existing ground surface. It should be noted that the estimated normal seasonal high groundwater levels across the site may vary once additional borings are completed during the final geotechnical exploration.

It should be noted that the normal estimated seasonal high water levels do not provide any assurance that groundwater levels will not exceed these estimated levels during any given year in the future. Should the impediments to surface water drainage be present, or should rainfall intensity and duration, or total rainfall quantities, exceed the normally anticipated rainfall quantities, groundwater levels might once again exceed our seasonal high estimates.

4.5 BUILDING FOUNDATION

Based on the results of our exploration, we consider the subsurface conditions at the site adaptable for support of the proposed structure when constructed on a properly designed shallow foundation system.

It should be understood that some aesthetic cracking and other minor architectural type nuisance issues may occur during the useful life of the structure. Our recommendations provide for prudent geotechnical site preparation and foundation construction methods in consideration of the above conditions. Provided the site preparation and earthwork construction recommendations outlined in Section 4.7 of this report are performed, the following parameters could be used for foundation planning.

4.5.1 Bearing Pressure

The net maximum allowable soil bearing pressure for use in shallow foundation design should not exceed 2,000 psf. Net bearing pressure is defined as the soil bearing pressure at the foundation bearing level in excess of the natural overburden pressure at that level. The foundations should be designed based on the maximum load which could be imposed by all loading conditions.

4.5.2 Foundation Size

The minimum widths recommended for any isolated column footings and continuous wall footings are 24 inches and 18 inches, respectively. Even though the maximum allowable soil bearing pressure may not be achieved, these width recommendations should control the minimum size of the foundations.

4.5.3 Bearing Depth

The exterior foundations should bear at a depth of at least 18 inches below the finished exterior grades and the interior foundations should bear at a depth of at least 12 inches below the finish floor elevation to provide confinement to the bearing level soils. It is recommended that stormwater be diverted away from the building exteriors to reduce the possibility of erosion beneath the exterior footings.

4.5.4 Bearing Material

Based on our findings, the foundations may bear in either the compacted suitable existing soils or compacted structural fill. The bearing level soils, after compaction, should exhibit densities equivalent to at least 95 percent of the modified Proctor maximum dry density (ASTM D-1557) to a depth of at least **two feet** below the foundation bearing level. It should be noted that the final depth of improvement required below the footings will be dependent on the actual structural loads and the proposed footing elevations. We recommend that the bottom of all footings be probed to confirm the suitability of the bearing soils.

4.5.5 Settlement Estimates

Post-construction settlement of the structure will be influenced by several interrelated factors, such as (1) subsurface stratification and strength/compressibility characteristics; (2) footing size, bearing level, applied loads, and resulting bearing pressures beneath the foundations; and (3) site preparation and earthwork construction techniques used by the Contractor. Our settlement estimates for the structure are based on the use of site preparation/earthwork construction techniques as recommended in Section 4.7 of this report. Any deviation from these recommendations could result in an increase in the estimated post-construction settlement of the structure.

Using the recommended allowable bearing pressure, the assumed maximum structural loads and the field data which we have correlated to geotechnical strength and compressibility characteristics of the subsurface soils, we estimate that total settlement of the structure could be on the order of one inch or less.

Differential settlement results from differences in applied bearing pressures and variations in the compressibility characteristics of the subsurface soils. Based on field and laboratory testing data obtained, we anticipate that differential settlement of the structure should be within tolerable magnitudes (½" inch or less).

4.5.6 Ground Floor Slab

The floor slabs can be constructed as a slab-on-grade member using a modulus of subgrade reaction (K) of 100 pci provided the subgrade materials are compacted as outlined in Section 4.7. It is recommended the floor slab bearing soils be covered with an impervious membrane to reduce moisture entry and floor dampness. A 10-mil thick plastic membrane is commonly used for this purpose. Care should be exercised not to tear large sections of the membrane during placement of reinforcing steel and concrete.

4.6 PAVEMENTS RECOMMENDATIONS

4.6.1 Assumptions

We assume that a flexible asphaltic pavement section will be used for the pavement areas on this project. The following recommendations have been based on the pavement areas being prepared as recommended in this report.

At the time of this exploration, specific traffic loading information was not provided to us. We have assumed the following conditions for our recommended minimum pavement design.

- the subgrade soils are prepared as described in this report
- a twenty (20) year design life
- terminal serviceability index (Pt) of 2.5
- reliability of 90 percent
- total equivalent 18 kip single axle loads (E_{18} SAL) up to 100,000 for light duty pavements – primarily car and pickup truck traffic (parking stalls)
- total equivalent 18 kip single axle loads (E_{18} SAL) up to 500,000 for heavy duty pavements – occasional heavy truck traffic (entrance drives, services lanes, etc.)

The subsurface data suggests that the subgrade soils in these areas consisted of sand with silt and silty sand. Positive drainage around the roadway area should be established to prevent irrigation and stormwater from migrating into the pavement area.

4.6.2 Asphalt (Flexible) Pavements

Based on the results of our soil borings, the assumed traffic loading information and review of the current FDOT Flexible Pavement Design Manual, our minimum recommended pavement component thicknesses for new construction have been presented in Table 4.

Table 4 – Minimum Asphaltic Pavement Component Thickness				
Service Level	Maximum Traffic Loading	Layer Component		
		Surface Course (inches)	Base Course (inches)	Stabilized Subgrade (inches)
Light Duty	up to 100,000 E ₁₈ SAL	1½	6	12
Heavy Duty	up to 500,000 E ₁₈ SAL	2	8	12

4.6.2.1 Stabilized Subgrade

We recommend that the stabilized subgrade materials immediately beneath the base course exhibit a minimum Limerock Bearing Ratio (LBR) of 40 as specified by FDOT compacted to at least 98 percent of the modified Proctor maximum dry density (ASTM D 1557) value.

Based on the results of the borings, additional stabilization of the upper sands within many areas of the site may not be necessary in order to achieve a minimum LBR value of 40 and be suitable for use as a stabilized subgrade to support the proposed pavement sections.

Stabilized subgrade can be imported materials or a blend of on-site and imported materials. If a blend is proposed, we recommend that the Contractor perform a mix design to find the optimum mix proportions. Crushed limerock or crushed concrete base material could be used to stabilize the subgrade soils to meet the recommended LBR values stated previously.

Compaction testing of the stabilized subgrade should be performed to full depth at a frequency of at least one (1) test per 10,000 square feet, or a minimum of 4 tests, whichever is greater.

4.6.2.2 Base Course

We recommend the base course material for the new pavement areas be limerock. The limerock should have a minimum LBR of 100 and should be mined from an FDOT-approved source. Place limerock in maximum 6-inch lifts and compact each lift to a minimum density of 98 percent of the modified Proctor maximum dry density.

Compaction testing of the base course should be performed to full depth at a frequency of at least one (1) test per 5,000 square feet, or at least 2 tests, whichever is greater.

4.6.2.3 Surface Course

We recommend that the surfacing consist of FDOT SuperPave (SP) asphaltic concrete. The surface course should consist of FDOT SP-9.5 fine mix for light-duty areas and FDOT SP-12.5 and/or SP-9.5 fine mix for heavy duty areas. Specific requirements for the SuperPave asphaltic concrete structural course are outlined in the latest edition of FDOT, Standard Specifications for Road and Bridge Construction.

After placement and field compaction, the surfacing should be cored to evaluate material thickness and density. Cores should be obtained at frequencies of at least one (1) core per 5,000 square feet of placed pavement or a minimum of two (2) cores per day's production.

4.6.3 Effects of Groundwater

One of the most critical influences on the pavement performance in North Florida is the relationship between the pavement base course and the seasonal high groundwater level. Sufficient separation will need to be maintained between the bottom of base course and the anticipated seasonal high groundwater level. We recommend that the seasonal high groundwater and the bottom of the base course be separated by at least 24 inches for a limerock base course. If this separation is not achieved through site grading underdrains may be required.

4.6.4 Landscape Areas

In the event that landscape areas adjacent to the pavements include large mounds (>1 foot) of poorly draining organic topsoil or silty/clayey sands, or the pavement is constructed below surrounding grade, we recommend that landscape drains be provided to protect the roadway against adverse effects from over-irrigation and excess rainfall. Poorly draining organic, silty, and clayey material causes the irrigation and rainwater to perch and migrate laterally into the pavement components, which eventually compromises the integrity of the pavement section.

4.6.5 Construction Traffic

Light duty roadways and incomplete pavement sections will not perform satisfactorily under construction traffic loadings. We recommend that construction traffic (construction equipment, concrete trucks, sod trucks, garbage trucks, dump trucks, etc.) be re-routed away from these roadways or that the pavement section is designed for these loadings.

4.7 SITE PREPARATION

We recommend normal, good practice site preparation procedures. These procedures include stripping the site of existing vegetation, trees, topsoil and existing structures and pavements including any foundations, compacting the subgrade and placing necessary fill or backfill to grade with engineered fill. We recommend that the bottom of all footings be probed to confirm the suitability of the bearing soils. A more detailed synopsis of this work is as follows:

1. Prior to construction, the location of any existing underground utility lines within the construction area should be established. Provisions should then be made to relocate interfering utilities to appropriate locations. It should be noted that if underground pipes are not properly removed or plugged, they may serve as conduits for subsurface erosion which may subsequently lead to excessive settlement of the overlying structure.
2. If required, perform remedial dewatering prior to any earthwork operations. Dewatering operations scheduled should be carefully evaluated for possible impacts to the existing foundation systems. Dewatering systems should not be decommissioned until the excavation is backfilled two feet above the groundwater level at the time of construction. Further, the site should always be graded to prohibit ponding of stormwater runoff.
3. Strip the proposed construction limits of all grass, roots, topsoil, trees, existing structures and pavement sections including any foundations, and other deleterious materials within 5 feet beyond the perimeter of the proposed structure and pavement areas. Expect typical stripping at this site to depths of about 6 inches. Deeper clearing and grubbing depths may be encountered in heavily vegetated areas/trees.
4. Excavate the site to the proposed grades. Stockpile the surficial sandy soils for later use as fill.
5. Following site clearing, grubbing, and grading, the same project areas should be proof-rolled using a large, fully loaded rubber-tired vehicle (dump truck) or similar equipment. Proof-rolling will help locate any surficial zones of especially loose or soft or unsuitable soils not encountered in the soil test borings and should help provide more uniformity in the sandy subsurface soil profile. Unusual or unanticipated conditions identified during this process must be immediately brought to the attention of the UES Geotechnical Engineer. Field density testing is not required during proof-rolling operations.
6. Weak subgrade soils identified during proof-rolling operations should be excavated and removed from the site and replaced with granular fill soils. Granular soils used for this purpose should meet the material and placement specifications outlined below.
7. Proof-rolling operations should be followed by surface compaction operations. Surface compaction operations should be completed prior to beginning any vertical construction for the project. Compaction operations should be implemented with a large vibratory compactor after the soil has been properly moisture conditioned. Surface compaction should be performed until an in-place soil density equivalent to at least 95 percent of the modified Proctor maximum dry density (ASTM D-1557) has been achieved to a depth of 2 feet below the final subgrade.

8. Compaction operations should extend to the limits of the cleared/grubbed project areas. Compaction of the existing, near-surface sandy soils will provide for uniformity of foundation/slab settlements and improve the soils' bearing capacity conditions. Typically, the soil should exhibit moisture contents within ± 2 percent of the modified Proctor optimum moisture content during compaction.
9. Should the bearing level soil experience pumping and soil strength loss during the compaction operations, compaction work should be immediately terminated and (1) the disturbed soils removed and backfilled with dry structural fill soils which are then compacted, or (2) the excess pore pressures within the disturbed soils allowed to dissipate before recompacting.
10. Care should be exercised to avoid damaging adjacent structures while the compaction operation is underway. Compaction should cease if deemed detrimental to adjacent structures. UES can provide vibration monitoring services to help document and evaluate the effects of the surface compaction operation on existing structures. We recommend the use of static rolling operations within 100 feet of any existing structures if vibration monitoring is not implemented.
11. Test the subgrade for compaction at a frequency of not less than one test per 2,500 square feet in the building area, or a minimum of three test locations, whichever is greater.
12. Place fill material, as required. Offsite fill material should contain less than 12 percent passing the No. 200 sieve. Place backfill and fill in uniform 10- to 12-inch loose lifts and compact each lift to a minimum density of 95 percent of the modified Proctor maximum dry density. Verification testing should be performed prior to the next lift being placed.
13. Additionally, we recommend that density testing be performed at every other column footing, and one test per every 50 lineal feet of wall footing. Footings should be visually inspected and probed with a static cone penetrometer to verify stability.

4.8 PROPOSED STORMWATER BASIN

UES performs hydraulic conductivity tests, including the two most common, i.e., DRI and remolded laboratory permeability testing, using generally accepted practices of the local engineering community. These common tests are the quickest and most economical for stormwater basin design. However, the User of this information is cautioned that the potential variability of results and reproducibility associated with these types of tests can be significant. It is important to note that there are many factors influencing the permeability of a soil. These factors include, but are not limited to, soil grain size, soil particle arrangement and structure, dispersion of soil fines, density, and degree of saturation, soil heterogeneity, and soil anisotropy. Also, the permeability measured by such tests may not be representative of that of the total effective aquifer thickness. Factors of safety can compensate for part of the inherent test limitations but the Designer must exercise judgment regarding final selection and applicability of provided soil design input parameters.

Should the modeling analysis indicate marginally acceptable compliance with Water Management District design criteria, it may be advisable to perform more extensive and representative in-situ permeability testing by collecting "undisturbed" horizontal and vertical soil samples and/or installing grouted piezometers or wells for slug testing. UES can perform these field tests if desired.

Additionally, the actual exfiltration rates from the basin may be influenced by basin geometry, natural soil variability, in-situ depositional characteristics and soil density, retention volume, and groundwater mounding effects. Also, it is important to note that the upper in-situ soil zone is usually altered during the excavation and grading operations by heavy, vibrating earthwork equipment. Due to these numerous factors cited above, published literature suggests that the permeability of a soil can only be estimated to within an order of magnitude. **Therefore, appropriate factors of safety should be incorporated into the design process.**

The parameters associated with the field and laboratory tests for the borings within the basin location have been presented in Table 5: Stormwater Basin Soil Design Parameters.

Table 5 - Stormwater Basin Soil Design Parameters	
Approximate Test Depth, feet below existing grade	2.5 – 4
Estimated Horizontal Hydraulic Conductivity, feet per day*	13
Estimated Vertical Hydraulic Conductivity, feet per day*	9
Average Depth of Confining/Restrictive Layer, feet bls	4.5
Estimated Fillable Porosity, percentage*	25
Estimated Average Depth of Seasonal High Water Level, feet bls	4

* Representative of the sand with silt/clay material above the confining/restrictive layer

It should be noted that the clayey soils will act as a confining layer and the vertical permeability rate of those soils should be considered to be 0 feet/day. Vertical infiltration will occur in the surficial sand and sand with silt soil stratum, but when water encounters the clayey soils it will have only a horizontal infiltration component.

4.9 SUITABILITY OF THE SITE SOILS FOR USE AS FILL MATERIALS

The recovered soil samples were classified using visual and textural means, and limited laboratory testing. We offer the following guidelines for the use of on-site soil, such as those excavated from the proposed stormwater basin area, as fill material for the project.

Soil materials excavated and classified as fine sands to sand with silts and sand with clay (SP, SP-SM, SP-SC), with typically 12% fines or less (silt/clay fraction), may be considered suitable for use as utility trench backfill, as well as building pad and pavement subgrade structural fill, provided said materials are properly dried, placed, and compacted.

Soil materials excavated and classified as silty or clayey sand [SM, SC], with typically 12% to 25% fines, may also be considered suitable for use as building pad and pavement subgrade structural fill, after significant drying and some mixing with the fine sand material described above. Proper placement, proof rolling and compaction must also be performed.

Soil materials excavated and classified as silty/clayey sand (greater than 25% fines), silt or clay (SM, SC, ML, MH, CL, and CH) and any organic-laden soils (5% or greater organics by weight) should not be reused as fill beneath buildings or pavement sections. These materials could be used in green areas, if applicable and in non-structural applications where excessive ground subsidence will not create functional or aesthetic problems. It should be noted that silt and clay materials will retain water and if used may become saturated and soft for a significant period of time following a rain event.

Soil borings for a typical geotechnical report are widely spaced and generally not sufficient for reliably detecting the presence of isolated, anomalous surface or subsurface conditions, or reliably estimating unsuitable or suitable material quantities. Accordingly, UES does not recommend relying on our boring information to negate presence of anomalous materials or for estimation of material quantities unless our contracted services *specifically* include sufficient exploration for such purpose(s) and within the report we so state that the level of exploration provided should be sufficient to detect such anomalous conditions or estimate such quantities. Therefore, UES will not be responsible for any extrapolation or use of our data by others beyond the purpose(s) for which it is applicable or intended.

5.0 REPORT LIMITATIONS

This report has been prepared for the exclusive use of ***GH&G Alexander, LLC, Express Oil Change, LLC***, and other designated members of his Design/Construction Team associated with the prospective site development. No other site or project facilities should be designed using the soil information contained in this report. As such, UES will not be responsible for the performance of any other site improvement designed using the data in this report.

This report should not be relied upon for final design recommendations or professional opinions by unauthorized third parties without the expressed written consent of Universal Engineering Sciences. Unauthorized third parties that rely upon the information contained herein without the expressed written consent of Universal Engineering Sciences, LLC assume all risk and liability for such reliance.

The recommendations submitted in this report have been based upon the data obtained from the soil borings performed at the locations indicated on the Boring Location Plan and from other information as referenced. This report does not reflect any variations that may occur between the boring locations. The nature and extent of such variations may not become evident until the course of construction. If variations become evident, it will then be

necessary for a re-evaluation of the recommendations of this report after performing on-site observations during the construction period and noting the characteristics of the variations.

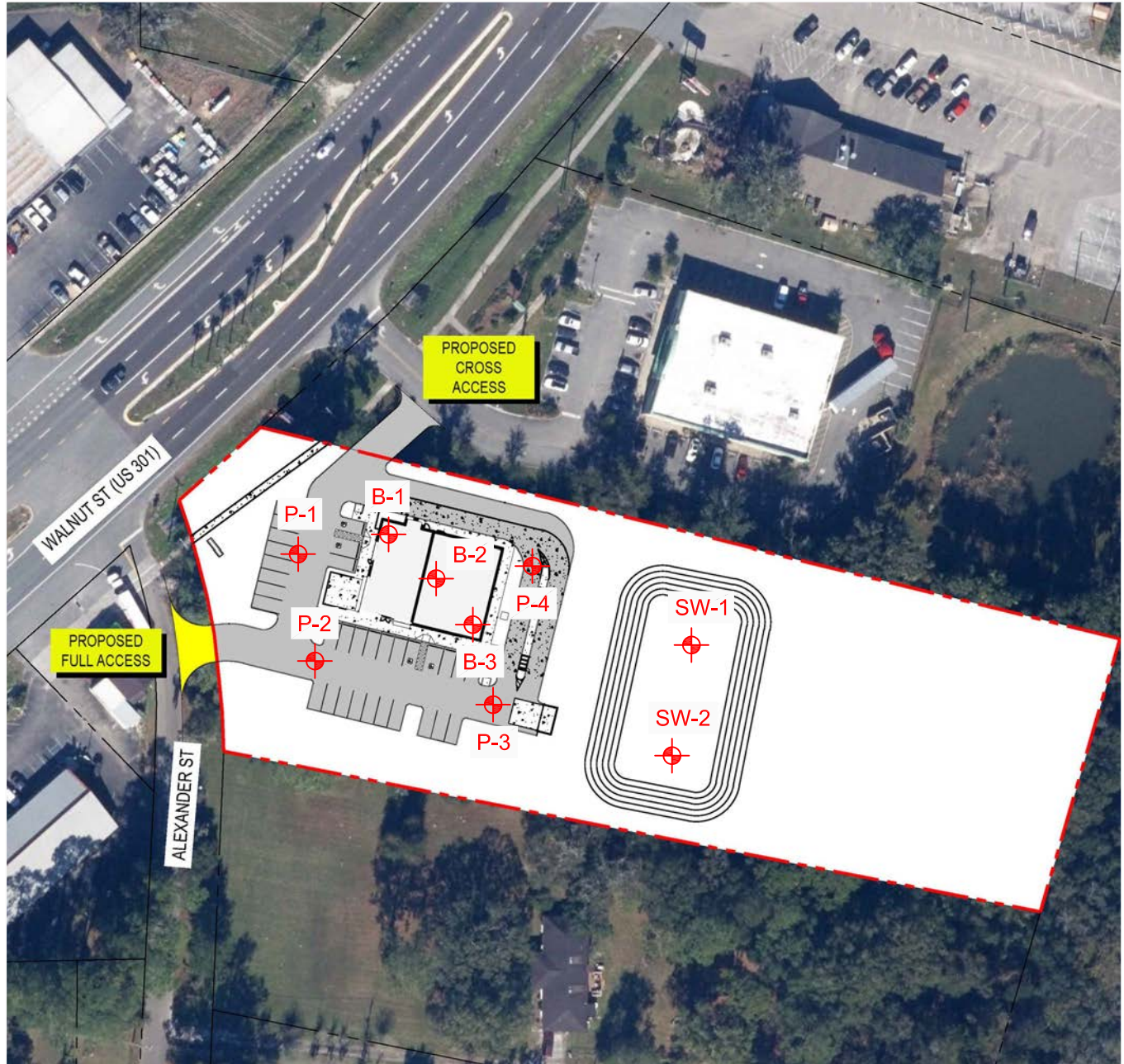
Borings for a typical geotechnical report are widely spaced and generally not sufficient for reliably detecting the presence of isolated, anomalous surface or subsurface conditions, or reliably estimating unsuitable or suitable material quantities. Accordingly, UES does not recommend relying on our boring information for estimation of material quantities unless our contracted services *specifically* include sufficient exploration for such purpose(s) and within the report we so state that the level of exploration provided should be sufficient to detect anomalous conditions or estimate such quantities. Therefore, UES will not be responsible for any extrapolation or use of our data by others beyond the purpose(s) for which it is applicable or intended.

All users of this report are cautioned that there was no requirement for UES to attempt to locate any manmade buried objects or identify any other potentially hazardous conditions that may exist at the site during the course of this exploration. Therefore, no attempt was made by UES to locate or identify such concerns. UES cannot be responsible for any buried manmade objects or environmental hazards which may be subsequently encountered during construction that are not discussed within the text of this report. We can provide this service if requested.

During the early stages of most construction projects, geotechnical issues not addressed in this report may arise. Because of the natural limitations inherent in working with the subsurface, it is not possible for a geotechnical engineer to predict and address all possible problems. For a further description of the scope and limitations of this report, please review the document attached within Appendix B, "Important Information about Your Geotechnical Engineering Report", prepared by GBA/The Geoprofessional Business Association.

APPENDIX A





LEGEND

 BORING LOCATION

NOTE: ALL SOIL TEST BORING LOCATIONS SHOWN ARE APPROXIMATE.



PROPOSED COMMERCIAL BUILDING

1198 WALNUT STREET

STARKE, FLORIDA

BORING LOCATION PLAN

DRAWN BY: KD	DATE: 10/24/23	CHECKED BY: KB	DATE: 10/24/23
SCALE: NTS	PROJECT NO: 0230.2300118.0000	REPORT NO: 2048812	PAGE NO: A - 1

0230.2300118-A



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0230.2300118.0000

REPORT NO.: 2048812

PAGE: A-3

PROJECT: PROPOSED COMMERCIAL BUILDING
1198 WALNUT STREET
STARKE, FLORIDA

BORING DESIGNATION: **B-2**
SECTION:

SHEET: **1 of 1**
RANGE:

CLIENT: GH & G FLORIDA, LLC

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):

DATE STARTED: 10/4/23

WATER TABLE (ft): 12.7

DATE FINISHED: 10/4/23

DATE OF READING: 10/4/23

DRILLED BY: S. HILLIGOSS

EST. W.S.W.T. (ft): 3.5

TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N VALUE	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORGANIC CONTENT (%)
									LL	PI		
0						Brown SAND, with silt [SP-SM]						
1												
2		1-2-4	6			Loose light brown and gray SAND, with silt [SP-SM]						
3						Loose light brown SAND, with silt [SP-SM]						
4		3-4-3	7			Loose to medium dense tan and orange silty SAND [SM]						
5		3-3-6	9									
6												
7		7-12-14	26			Medium dense orange and tan very clayey SAND [SC]						
8		18-16-13	29			Dense gray and orange very clayey SAND [SC]						
9												
10		10-15-18	33									
11												
12												
13												
14						Hard gray and dark orange CLAY [CH]						
15		4-17-20	37									
16												
17												
18												
19						Loose tan and orange silty SAND, trace clay [SM]						
20		2-2-5	7			Boring Terminated at 20'						



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0230.2300118.0000

REPORT NO.: 2048812

PAGE: A-4

PROJECT: PROPOSED COMMERCIAL BUILDING
1198 WALNUT STREET
STARKE, FLORIDA

BORING DESIGNATION: **B-3**
SECTION:

SHEET: **1 of 1**
RANGE:

CLIENT: GH & G FLORIDA, LLC

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):

DATE STARTED: 10/5/23

WATER TABLE (ft): 11

DATE FINISHED: 10/5/23

DATE OF READING: 10/5/23

DRILLED BY: M. BOATRIGHT

EST. W.S.W.T. (ft): 2

TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N VALUE	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORGANIC CONTENT (%)
									LL	PI		
0						Loose brown and gray SAND, with silt [SP-SM]						
1												
2		2-3-3	6	▽		Loose gray clayey SAND [SC]						
3												
4		4-4-4	8			Loose tan and orange silty SAND, with clay [SM]						
5						Medium dense light brown and light gray silty SAND, with clay [SM]						
6		6-6-9	15			Medium dense light gray silty SAND, with clay [SM]	18	16				
7		11-14-12	26			Medium dense light gray clayey SAND [SC], trace silt						
8						Medium dense light gray very clayey SAND [SC]						
9		8-6-8	14			Medium dense light gray clayey SAND [SC], trace silt						
10		9-9-8	17			Very stiff gray CLAY [CH]						
11				▽								
12						Stiff orange and gray CLAY [CH]						
13												
14												
15		5-6-7	13									
16												
17						Loose tan and orange silty SAND [SM], trace clay						
18												
19												
20		2-3-4	7			Boring Terminated at 20'						



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0230.2300118.0000

REPORT NO.: 2048812

PAGE: A-5

PROJECT: PROPOSED COMMERCIAL BUILDING
1198 WALNUT STREET
STARKE, FLORIDA

BORING DESIGNATION: **P-1**
SECTION:

SHEET: **1 of 1**
RANGE:

CLIENT: GH & G FLORIDA, LLC

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):

DATE STARTED: 10/4/23

WATER TABLE (ft): NE

DATE FINISHED: 10/4/23

DATE OF READING: 10/4/12

DRILLED BY: S. HILLIGOSS

EST. W.S.W.T. (ft): 2

TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N VALUE	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORGANIC CONTENT (%)
									LL	PI		
0						Brown SAND, with silt [SP-SM]						
1												
2		3-3-4	7	▽		Loose light brown and tan SAND, with silt [SP-SM]						
3						Loose tan silty clayey SAND [SM-SC]						
4		3-2-2	4			Loose tan and orange silty clayey SAND [SM-SC]						
5						Medium dense gray silty SAND [SM]						
6		4-8-10	18									
						Boring Terminated at 6'						



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0230.2300118.0000

REPORT NO.: 2048812

PAGE: A-6

PROJECT: PROPOSED COMMERCIAL BUILDING
1198 WALNUT STREET
STARKE, FLORIDA

BORING DESIGNATION: **P-2**
SECTION:

SHEET: **1 of 1**
RANGE:

CLIENT: GH & G FLORIDA, LLC

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):

DATE STARTED: 10/4/23

WATER TABLE (ft): NE

DATE FINISHED: 10/4/23

DATE OF READING: 10/4/23

DRILLED BY: S. HILLIGOSS

EST. W.S.W.T. (ft): 2

TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N VALUE	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORGANIC CONTENT (%)
									LL	PI		
0						Loose brown silty SAND [SM]						
1												
2		3-4-3	7	▽		Medium dense tan and orange silty SAND [SM]						
3												
4		3-5-5	10			Medium dense gray, tan and orange silty SAND, with clay [SM]						
5												
6		3-5-5	10			Boring Terminated at 6'						



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0230.2300118.0000

REPORT NO.: 2048812

PAGE: A-7

PROJECT: PROPOSED COMMERCIAL BUILDING
1198 WALNUT STREET
STARKE, FLORIDA

BORING DESIGNATION: **P-3**
SECTION:

SHEET: **1 of 1**
RANGE:

CLIENT: GH & G FLORIDA, LLC

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):

DATE STARTED: 10/5/23

WATER TABLE (ft): NE

DATE FINISHED: 10/5/23

DATE OF READING: 10/5/23

DRILLED BY: M. BOATRIGHT

EST. W.S.W.T. (ft): 3

TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N VALUE	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORGANIC CONTENT (%)
									LL	PI		
0						LIMEROCK						
1						Loose brown and gray silty SAND [SM]						
2		4-3-4	7				12	14				
3												
4		3-5-3	8			Medium dense orange and gray clayey SAND [SC]						
5		4-7-7	14									
6						Boring Terminated at 6'						



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0230.2300118.0000

REPORT NO.: 2048812

PAGE: A-8

PROJECT: PROPOSED COMMERCIAL BUILDING
1198 WALNUT STREET
STARKE, FLORIDA

BORING DESIGNATION: **P-4**
SECTION:

SHEET: **1 of 1**
RANGE:

CLIENT: GH & G FLORIDA, LLC

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):

DATE STARTED: 10/5/23

WATER TABLE (ft): NE

DATE FINISHED: 10/5/23

DATE OF READING: 10/5/23

DRILLED BY: M. BOATRIGHT

EST. W.S.W.T. (ft): 2

TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N VALUE	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORGANIC CONTENT (%)
									LL	PI		
0						Loose brown and gray SAND, with silt [SP-SM]						
1												
2		2-1-3	4			Loose light brown and tan silty SAND [SM]						
3						Medium dense orange and tan clayey SAND [SC]						
4		4-6-6	12			Medium dense tan and orange very clayey SAND [SC]						
5		8-10-13	23									
6						Boring Terminated at 6'						



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0230.2300118.0000

REPORT NO.: 2048812

PAGE: A-9

PROJECT: PROPOSED COMMERCIAL BUILDING
1198 WALNUT STREET
STARKE, FLORIDA

BORING DESIGNATION: **SW-1**
SECTION:

SHEET: **1 of 1**
RANGE:

CLIENT: GH & G FLORIDA, LLC

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):

DATE STARTED: 10/5/23

WATER TABLE (ft): 11

DATE FINISHED: 10/5/23

DATE OF READING: 10/5/23






DRILLED BY: M. BOATRIGHT

EST. W.S.W.T. (ft): 3.5

TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	S A M P L E	BLOWS PER 6" INCREMENT	N VALUE	W.T.	S Y M B O L	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORGANIC CONTENT (%)
									LL	PI		
0						Very loose brown SAND, with silt [SP-SM]						
1												
2		1-1-2	3			Loose tan SAND, with silt [SP-SM]						
3												
4		3-4-5	9				9.9	13			13	
5		4-5-13	18			Medium dense gray clayey SAND, with silt [SC]	21	16				
6						Medium dense tan and orange clayey SAND [SC]						
7		14-12-11	23			Medium dense tan and orange very clayey SAND [SC]						
8		13-12-14	26									
9						Dense tan and orange clayey SAND [SC]						
10		14-15-17	32									
11												
12												
13						Medium dense light brown SAND, trace clay [SP-SC]						
14						Very stiff brown CLAY [CH]						
15		6-7-8	15			Boring Terminated at 15'						

SYMBOLS AND ABBREVIATIONS

SYMBOL	DESCRIPTION
N-Value	No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive a Standard Spoon 1 Foot
WOR	Weight of Drill Rods
WOH	Weight of Drill Rods and Hammer
	Sample from Auger Cuttings
	Standard Penetration Test Sample
	Thin-wall Shelby Tube Sample (Undisturbed Sampler Used)
RQD	Rock Quality Designation
	Stabilized Groundwater Level
	Seasonal High Groundwater Level (also referred to as the W.S.W.T.)
NE	Not Encountered
GNE	Groundwater Not Encountered
BT	Boring Terminated
-200 (%)	Fines Content or % Passing No. 200 Sieve
MC (%)	Moisture Content
LL	Liquid Limit (Atterberg Limits Test)
PI	Plasticity Index (Atterberg Limits Test)
NP	Non-Plastic (Atterberg Limits Test)
K	Coefficient of Permeability
Org. Cont.	Organic Content
G.S. Elevation	Ground Surface Elevation

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% retained on the No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GM	Silty gravels and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS 5% or less passing No. 200 sieve	SW**	Well-graded sands and gravelly sands, little or no fines
			SP**	Poorly graded sands and gravelly sands, little or no fines
		SANDS with 12% or more passing No. 200 sieve	SM**	Silty sands, sand-silt mixtures
			SC**	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays	
		OL	Organic silts and organic silty clays of low plasticity	
	SILTS AND CLAYS Liquid limit greater than 50%	MH	Inorganic silts, micaceous or diamictaceous fine sands or silts, elastic silts	
		CH	Inorganic clays or clays of high plasticity, fat clays	
		OH	Organic clays of medium to high plasticity	
		PT	Peat, muck and other highly organic soils	

*Based on the material passing the 3-inch (75 mm) sieve

** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY

(Sands and Gravels)

Very loose – Less than 4 Blow/Foot
Loose – 4 to 10 Blows/Foot
Medium Dense – 11 to 30 Blows/Foot
Dense – 31 to 50 Blows/Foot
Very Dense – More than 50 Blows/Foot

CONSISTENCY

(Silts and Clays)

Very Soft – Less than 2 Blows/Foot
Soft – 2 to 4 Blows/Foot
Firm – 5 to 8 Blows/Foot
Stiff – 9 to 15 Blows/Foot
Very Stiff – 16 to 30 Blows/Foot
Hard – More than 30 Blows/Foot

RELATIVE HARDNESS

(Limestone)

Soft – 100 Blows for more than 2 Inches
Hard – 100 Blows for less than 2 Inches

MODIFIERS

These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample

Trace – 5% or less
With Silt or With Clay – 6% to 11%
Silty or Clayey – 12% to 30%
Very Silty or Very Clayey – 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample

Trace – Less than 3%
Few – 3% to 4%
Some – 5% to 8%
Many – Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample

Trace – 5% or less
Few – 6% to 12%
Some – 13% to 30%
Many – 31% to 50%

APPENDIX B



Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply this report for any purpose or project except the one originally contemplated.*

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an

assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by:* the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time to perform additional study.* Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help

others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.



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CONSTRAINTS & RESTRICTIONS

The intent of this document is to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report.

WARRANTY

Universal Engineering Sciences has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

UNANTICIPATED SOIL CONDITIONS

The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings.

The nature and extent of variations between borings may not become known until excavation begins. If variations appear, we may have to re-evaluate our recommendations after performing on-site observations and noting the characteristics of any variations.

CHANGED CONDITIONS

We recommend that the specifications for the project require that the contractor immediately notify Universal Engineering Sciences, as well as the owner, when subsurface conditions are encountered that are different from those present in this report.

No claim by the contractor for any conditions differing from those anticipated in the plans, specifications, and those found in this report, should be allowed unless the contractor notifies the owner and Universal Engineering Sciences of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of Universal Engineering Sciences to monitor field conditions and changes, to verify design assumptions and to evaluate and recommend any appropriate modifications to this report.

MISINTERPRETATION OF SOIL ENGINEERING REPORT

Universal Engineering Sciences is responsible for the conclusions and opinions contained within this report based upon the data relating only to the specific project and location discussed herein. If the conclusions or recommendations based upon the data presented are made by others, those conclusions or recommendations are not the responsibility of Universal Engineering Sciences.

CHANGED STRUCTURE OR LOCATION

This report was prepared in order to aid in the evaluation of this project and to assist the architect or engineer in the design of this project. If any changes in the design or location of the structure as outlined in this report are planned, or if any structures are included or added that are not discussed in the report, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions modified or approved by Universal Engineering Sciences.

USE OF REPORT BY BIDDERS

Bidders who are examining the report prior to submission of a bid are cautioned that this report was prepared as an aid to the designers of the project and it may affect actual construction operations.

Bidders are urged to make their own soil borings, test pits, test caissons or other investigations to determine those conditions that may affect construction operations. Universal Engineering Sciences cannot be responsible for any interpretations made from this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which will affect construction operations.

STRATA CHANGES

Strata changes are indicated by a definite line on the boring logs which accompany this report. However, the actual change in the ground may be more gradual. Where changes occur between soil samples, the location of the change must necessarily be estimated using all available information and may not be shown at the exact depth.

OBSERVATIONS DURING DRILLING

Attempts are made to detect and/or identify occurrences during drilling and sampling, such as: water level, boulders, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation of driving resistance, obstructions, etc.; however, lack of mention does not preclude their presence.

WATER LEVELS

Water level readings have been made in the drill holes during drilling and they indicate normally occurring conditions. Water levels may not have been stabilized at the last reading. This data has been reviewed and interpretations made in this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tides, and other factors not evident at the time measurements were made and reported. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon such assumptions of variations.

LOCATION OF BURIED OBJECTS

All users of this report are cautioned that there was no requirement for Universal Engineering Sciences to attempt to locate any man-made buried objects during the course of this exploration and that no attempt was made by Universal Engineering Sciences to locate any such buried objects. Universal Engineering Sciences cannot be responsible for any buried man-made objects which are subsequently encountered during construction that are not discussed within the text of this report.

TIME

This report reflects the soil conditions at the time of exploration. If the report is not used in a reasonable amount of time, significant changes to the site may occur and additional reviews may be required.



Universal Engineering Sciences, LLC
GENERAL CONDITIONS

SECTION 1: RESPONSIBILITIES **1.1** Universal Engineering Sciences, LLC, and its subsidiaries and affiliated companies ("UES"), is responsible for providing the services described under the Scope of Services. The term "UES" as used herein includes all of UES's agents, employees, professional staff, and subcontractors. **1.2** The Client or a duly authorized representative is responsible for providing UES with a clear understanding of the project nature and scope. The Client shall supply UES with sufficient and adequate information, including, but not limited to, maps, site plans, reports, surveys, plans and specifications, and designs, to allow UES to properly complete the specified services. The Client shall also communicate changes in the nature and scope of the project as soon as possible during performance of the work so that the changes can be incorporated into the work product. **1.3** The Client acknowledges that UES's responsibilities in providing the services described under the Scope of Services section is limited to those services described therein, and the Client hereby assumes any collateral or affiliated duties necessitated by or for those services. Such duties may include, but are not limited to, reporting requirements imposed by any third party such as federal, state, or local entities, the provision of any required notices to any third party, or the securing of necessary permits or permissions from any third parties required for UES's provision of the services so described, unless otherwise agreed upon by both parties in writing.

SECTION 2: STANDARD OF CARE **2.1** Services performed by UES under this Agreement will be conducted in a manner consistent with the level of care and skill ordinarily exercised by members of UES's profession practicing contemporaneously under similar conditions in the locality of the project. No other warranty, express or implied, is made. **2.2** Execution of this document by UES is not a representation that UES has visited the site, become generally familiar with local conditions under which the work is to be performed, or correlated personal observations with the requirements of the Scope of Services. It is the Client's responsibility to provide UES with all information necessary for UES to provide the services described under the Scope of Services, and the Client assumes all liability for information not provided to UES that may affect the quality or sufficiency of the services so described.

SECTION 3: SITE ACCESS AND SITE CONDITIONS **3.1** Client will grant or obtain free access to the site for all equipment and personnel necessary for UES to perform the work set forth in this Agreement. The Client will notify any possessors of the project site that Client has granted UES free access to the site. UES will take reasonable precautions to minimize damage to the site, but it is understood by Client that, in the normal course of work, some damage may occur, and the correction of such damage is not part of this Agreement unless so specified in the Scope of Services. **3.2** The Client is responsible for the accuracy of locations for all subterranean structures and utilities. UES will take reasonable precautions to avoid known subterranean structures, and the Client waives any claim against UES, and agrees to defend, indemnify, and hold UES harmless from any claim or liability for injury or loss, including costs of defense, arising from damage done to subterranean structures and utilities not identified or accurately located. In addition, Client agrees to compensate UES for any time spent or expenses incurred by UES in defense of any such claim with compensation to be based upon UES's prevailing fee schedule and expense reimbursement policy.

SECTION 4: BILLING AND PAYMENT **4.1** UES will submit invoices to Client monthly or upon completion of services. Invoices will show charges for different personnel and expense classifications. **4.2** Payment is due 30 days after presentation of invoice and is past due 31 days from invoice date. Client agrees to pay a finance charge of one and one-half percent (1 ½ %) per month, or the maximum rate allowed by law, on past due accounts. **4.3** If UES incurs any expenses to collect overdue billings on invoices, the sums paid by UES for reasonable attorneys' fees, court costs, UES's time, UES's expenses, and interest will be due and owing by the Client.

SECTION 5: OWNERSHIP AND USE OF DOCUMENTS **5.1** All reports, boring logs, field data, field notes, laboratory test data, calculations, estimates, and other documents prepared by UES, as instruments of service, shall remain the property of UES. Neither Client nor any other entity shall change or modify UES's instruments of service. **5.2** Client agrees that all reports and other work furnished to the Client or his agents, which are not paid for, will be returned upon demand and will not be used by the Client for any purpose. **5.3** UES will retain all pertinent records relating to the services performed for a period of five years following submission of the report or completion of the Scope of Services, during which period the records will be made available to the Client in a reasonable time and manner. **5.4** All reports, boring logs, field data, field notes, laboratory test data, calculations, estimates, and other documents prepared by UES, are prepared for the sole and exclusive use of Client, and may not be given to any other entity, or used or relied upon by any other entity, without the express written consent of UES. Client is the only entity to which UES owes any duty or duties, in contract or tort, pursuant to or under this Agreement.

SECTION 6: DISCOVERY OF UNANTICIPATED HAZARDOUS MATERIALS **6.1** Client represents that a reasonable effort has been made to inform UES of known or suspected hazardous materials on or near the project site. **6.2** Under this agreement, the term hazardous materials include hazardous materials, hazardous wastes, hazardous substances (40 CFR 261.31, 261.32, 261.33), petroleum products, polychlorinated biphenyls, asbestos, and any other material defined by the U.S. EPA as a hazardous material. **6.3** Hazardous materials may exist at a site where there is no reason to believe they are present. The discovery of unanticipated hazardous materials constitutes a changed condition mandating a renegotiation of the scope of work. The discovery of unanticipated hazardous materials may make it necessary for UES to take immediate measures to protect health and safety. Client agrees to compensate UES for any equipment decontamination or other costs incident to the discovery of unanticipated hazardous materials. **6.4** UES will notify Client when unanticipated hazardous materials or suspected hazardous materials are encountered. Client will make any disclosures required by law to the appropriate governing agencies. Client will hold UES harmless for all consequences of disclosures made by UES which are required by governing law. In the event the project site is not owned by Client, Client it is the Client's responsibility to inform the property owner of the discovery of unanticipated hazardous materials or suspected hazardous materials. **6.5** Notwithstanding any other provision of the Agreement, Client waives any claim against UES, and to the maximum extent permitted by law, agrees to defend, indemnify, and save UES harmless from any claim, liability, and/or defense costs for injury or loss arising from UES's discovery of unanticipated hazardous materials or suspected hazardous materials including any costs created by delay of the project and any cost associated with possible reduction of the property's value. Client will be responsible for ultimate disposal of any samples secured by UES which are found to be contaminated.

SECTION 7: RISK ALLOCATION **7.1** Client agrees that UES's liability for any damage on account of any breach of contract, error, omission, or professional negligence will be limited to a sum not to exceed \$50,000 or UES's fee, whichever is greater. If Client prefers to have higher limits on contractual or professional liability, UES agrees to increase the limits up to a maximum of \$1,000,000.00 upon Client's written request at the time of accepting UES's proposal provided that Client agrees to pay an additional consideration of four percent of the total fee, or \$400.00, whichever is greater. If Client prefers a \$2,000,000.00 limit on contractual or professional liability, UES agrees to increase the limits up to a maximum of \$2,000,000.00 upon Client's written request at the time of accepting UES's proposal provided that Client agrees to pay an additional consideration of four percent of the total fee, or \$800.00, whichever is greater. The additional charge for the higher liability limits is because of the greater risk assumed and is not strictly a charge for additional professional liability insurance. **7.2** Client shall not be liable to UES and UES shall not be liable to Client for any incidental, special, or consequential damages (including lost profits, loss of use, and lost savings) incurred by either party due to the fault of the other, regardless of the nature of the fault, or whether it was committed by Client or UES, their employees, agents, or subcontractors; or whether such liability arises in breach of contract or warranty, tort (including negligence), statutory, or any other cause of action. **7.3** As used in this Agreement, the terms "claim" or "claims" mean any claim in contract, tort, or statute alleging negligence, errors, omissions, strict liability, statutory liability, breach of contract, breach of warranty, negligent misrepresentation, or any other act giving rise to liability.

SECTION 8: INSURANCE **8.1** UES represents it and its agents, staff and consultants employed by UES, is and are protected by worker's compensation insurance and that UES has such coverage under public liability and property damage insurance policies which UES deems to be adequate. Certificates for all such policies of insurance shall be provided to Client upon request in writing. Within the limits and conditions of such insurance, UES agrees to indemnify and save Client harmless from and against loss, damage, or liability arising from negligent acts by UES, its agents, staff, and consultants employed by it. UES shall not be responsible for any loss, damage or liability beyond the amounts, limits, and conditions of such insurance or the limits described in Section 7, whichever is less. The Client agrees to defend, indemnify, and save UES harmless for loss, damage or liability arising from acts by Client, Client's agents, staff, and others employed by Client. **8.2** Under no circumstances will UES indemnify Client from or for Client's own actions, negligence, or breaches of contract. **8.3**

To the extent damages are covered by property insurance, Client and UES waive all rights against each other and against the contractors, consultants, agents, and employees of the other for damages, except such rights as they may have to the proceeds of such insurance.

SECTION 9: DISPUTE RESOLUTION **9.1** All claims, disputes, and other matters in controversy between UES and Client arising out of or in any way related to this Agreement will be submitted to mediation or non-binding arbitration, before and as a condition precedent to other remedies provided by law. **9.2** If a dispute arises and that dispute is not resolved by mediation or non-binding arbitration, then: (a) the claim will be brought in the state or federal courts having jurisdiction where the UES office which provided the service is located; and (b) the prevailing party will be entitled to recovery of all reasonable costs incurred, including staff time, court costs, attorneys' fees, expert witness fees, and other claim related expenses.

SECTION 10: TERMINATION **10.1** This agreement may be terminated by either party upon seven (7) days written notice in the event of substantial failure by the other party to perform in accordance with the terms hereof, or in the case of a force majeure event such as terrorism, act of war, public health or other emergency. Such termination shall not be effective if such substantial failure or force majeure has been remedied before expiration of the period specified in the written notice. In the event of termination, UES shall be paid for services performed to the termination notice date plus reasonable termination expenses. **10.2** In the event of termination, or suspension for more than three (3) months, prior to completion of all reports contemplated by the Agreement, UES may complete such analyses and records as are necessary to complete its files and may also complete a report on the services performed to the date of notice of termination or suspension. The expense of termination or suspension shall include all direct costs of UES in completing such analyses, records, and reports.

SECTION 11: REVIEWS, INSPECTIONS, TESTING, AND OBSERVATIONS **11.1** Plan review, private provider inspections, and building inspections are performed for the purpose of observing compliance with applicable building codes. Threshold inspections are performed for the purpose of observing compliance with an approved threshold inspection plan. Construction materials testing ("CMT") is performed to document compliance of certain materials or components with applicable testing standards. UES's performance of plan reviews, private provider inspections, building inspections, threshold inspections, or CMT, or UES's presence on the site of Client's project while performing any of the foregoing activities, is not a representation or warranty by UES that Client's project is free of errors in either design or construction. **11.2** If UES is retained to provide construction monitoring or observation, UES will report to Client any observed work which, in UES's opinion, does not conform to the plans and specifications provided to UES. UES shall have no authority to reject or terminate the work of any agent or contractor of Client. No action, statements, or communications of UES, or UES's site representative, can be construed as modifying any agreement between Client and others. UES's performance of construction monitoring or observation is not a representation or warranty by UES that Client's project is free of errors in either design or construction. **11.3** Neither the activities of UES pursuant to this Agreement, nor the presence of UES or its employees, representatives, or subcontractors on the project site, shall be construed to impose upon UES any responsibility for means or methods of work performance, superintendence, sequencing of construction, or safety conditions at the project site. Client acknowledges that Client or its contractor is solely responsible for project jobsite safety. **11.4** Client is responsible for scheduling all inspections and CMT activities of UES. All testing and inspection services will be performed on a will-call basis. UES will not be responsible for tests and inspections that are not performed due to Client's failure to schedule UES's services on the project, or for any claims or damages arising from tests and inspections that are not scheduled or performed.

SECTION 12: ENVIRONMENTAL ASSESSMENTS Client acknowledges that an Environmental Site Assessment ("ESA") is conducted solely to permit UES to render a professional opinion about the likelihood or extent of regulated contaminants being present on, in, or beneath the site in question at the time services were conducted. No matter how thorough an ESA study may be, findings derived from the study are limited and UES cannot know or state for a fact that a site is unaffected by reportable quantities of regulated contaminants as a result of conducting the ESA study. Even if UES states that reportable quantities of regulated contaminants are not present, Client still bears the risk that such contaminants may be present or may migrate to the site after the ESA study is complete.

SECTION 13: SUBSURFACE EXPLORATIONS **13.1** Client acknowledges that subsurface conditions may vary from those observed at locations where borings, surveys, samples, or other explorations are made, and that site conditions may change with time. Data, interpretations, and recommendations by UES will be based solely on information available to UES at the time of service. UES is responsible for those data, interpretations, and recommendations, but will not be responsible for other parties' interpretations or use of the information developed or provided by UES. **13.2** Subsurface explorations may result in unavoidable cross-contamination of certain subsurface areas, as when a probe or boring device moves through a contaminated zone and links it to an aquifer, underground stream, or other hydrous body not previously contaminated. UES is unable to eliminate totally cross-contamination risk despite use of due care. Since subsurface explorations may be an essential element of UES's services indicated herein, Client shall, to the fullest extent permitted by law, waive any claim against UES, and indemnify, defend, and hold UES harmless from any claim or liability for injury or loss arising from cross-contamination allegedly caused by UES's subsurface explorations. In addition, Client agrees to compensate UES for any time spent or expenses incurred by UES in defense of any such claim with compensation to be based upon UES's prevailing fee schedule and expense reimbursement policy.

SECTION 14: SOLICITATION OF EMPLOYEES Client agrees not to hire UES's employees except through UES. In the event Client hires a UES employee within one year following any project through which Client had contact with said employee, Client shall pay UES an amount equal to one-half of the employee's annualized salary, as liquidated damages, without UES waiving other remedies it may have.

SECTION 15: ASSIGNS Neither Client nor UES may delegate, assign, sublet, or transfer its duties or interest in this Agreement without the written consent of the other party.

SECTION 16: GOVERNING LAW AND SURVIVAL **16.1** This Agreement shall be governed by and construed in accordance with the laws of the jurisdiction in which the UES office performing the services hereunder is located. **16.2** In any of the provisions of this Agreement are held illegal, invalid, or unenforceable, the enforceability of the remaining provisions will not be impaired and will survive. Limitations of liability and indemnities will survive termination of this agreement for any cause.

SECTION 17: INTEGRATION CLAUSE **17.1** This Agreement represents and contains the entire and only agreement and understanding among the parties with respect to the subject matter of this Agreement, and supersedes any and all prior and contemporaneous oral and written agreements, understandings, representations, inducements, promises, warranties, and conditions among the parties. No agreement, understanding, representation, inducement, promise, warranty, or condition of any kind with respect to the subject matter of this Agreement shall be relied upon by the parties unless expressly incorporated herein. **17.2** This Agreement may not be amended or modified except by an agreement in writing signed by the party against whom the enforcement of any modification or amendment is sought.

SECTION 18: WAIVER OF JURY TRIAL Both Client and UES waive trial by jury in any action arising out of or related to this Agreement.

SECTION 19: INDIVIDUAL LIABILITY PURSUANT TO FLORIDA STAT. 558.0035, AN INDIVIDUAL EMPLOYEE OR AGENT OF UES MAY NOT BE HELD INDIVIDUALLY LIABLE FOR NEGLIGENCE.