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REPORT OF PRELIMINARY GEOTECHNICAL CONSULTING SERVICES

Proposed Residential Development – Due Diligence
Tax Parcel: 15392-000-000
Ocala, Marion County, Florida

UES Project No. 0230.2200083.0000
UES Report No. 1967925

Prepared for:

[redacted]

Prepared by:

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July 26, 2022

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July 26, 2022

[redacted]

Attention: [redacted]

Reference: **Report of Preliminary Geotechnical Consulting Services**
Proposed Residential Development – Due Diligence
Tax Parcel: 15392-000-000
Ocala, Marion County, Florida
UES Project No. 0230.2200083.0000 UES Report No. 1967925

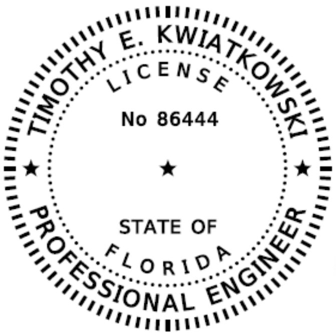
[redacted]

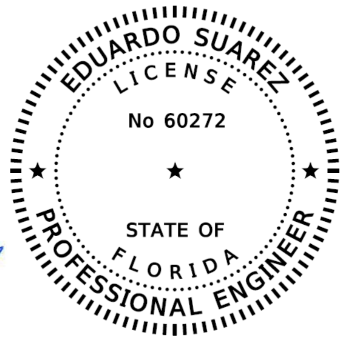
Universal Engineering Sciences, LLC (UES) has completed the preliminary geotechnical engineering services for the subject project in Ocala, Marion County, Florida. This geotechnical Report is submitted in satisfaction of the contracted scope of services, as summarized in UES Proposal No. 1943365, dated March 24, 2022.

This Report presents the results of our field subsurface exploration and laboratory soil testing programs, and preliminary recommendations for geotechnical site preparation and foundation design and construction, and stormwater management system. These recommendations have been provided on the limited information available at the time, and once specific structure, pavement areas, stormwater areas, grading, and other miscellaneous structure areas are known additional geotechnical evaluation will be required.

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
Certificate of Authorization 549





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This item has been electronically signed and sealed by Eduardo Suarez, 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.

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EXECUTIVE SUMMARY

We have prepared this executive summary solely to provide a general overview. Do not rely on this executive summary for any purpose except that for which it was prepared. Rely on the full report for information about findings, recommendations, and other concerns.

Project Location and Description

The project parcel is located at Tax Parcel: 15392-000-00 in Ocala, Marion County, Florida. We understand that this site is being considered as a proposed residential development. We expect the proposed development will consist of the construction of multi-family residential buildings, and associated pavement and stormwater management areas.

Soil and Groundwater Conditions

The soil test borings generally encountered very loose to loose sand to sand with silt [SP/SP-SM] to depths of 0 to 8 feet followed by silty-clayey sands to clay [SM-SC/SC/CH] to depths of 9 to 20 feet. Below the clayey soils, the soil test borings generally encountered weathered limestone to the boring termination depths of 20 feet. The groundwater level was generally encountered between depths of 8 to 14 feet below existing grades at the boring locations at the time of our exploration. Fluctuations of perched groundwater level conditions on this project parcel should be expected to occur seasonally as a result of rainfall, surface runoff, and nearby construction activities.

Site Preparation

Based on our exploration, the primary geotechnical considerations for the design and construction of the proposed structure are the presence of very loose sandy soils in the near-surface profile, shallow pockets of potentially expansive clay soils, and shallow limestone layers/boulders that may be difficult to excavate. Subsurface sandy soils will undergo immediate settlements upon application of surface loads, and this could be a result of both fill placement for building pad construction and building construction. In light of the above, it becomes important to compact the subgrade soils as much as possible prior to both building pad fill placement and foundation construction.

Limestone boulders/layers were encountered in the upper 10 feet in some of the borings. Hard lenses of limestone/chert may be encountered that require greater than normal removal techniques. If limestone is found during the foundation excavations, we recommend that all excavation cut into the limestone deposit extend at least 2 feet below the required bottom elevation of the excavation.

Our local experience has found that clay layers are often laterally discontinuous, which makes it more difficult to ascertain their presence on a given project parcel. Within some of the proposed building envelope at this site, we found shallow, discontinuous deposits of potentially expansive soils (CH). In order to reduce the distress, the foundation design, site grading and surface drainage must address the potential shrink/swell movement. Therefore, where present on site, these shallow deposits of expansive soils must be addressed through site grading, over-excavation and replacement, site drainage and stiffened foundation. Undercuts should extend at least 4 feet past the foundation edges. The over-excavated areas should be backfilled with a compacted, low permeability, non-plastic engineered fill material. The low permeability backfill should continue to an elevation consistent with the top of the adjacent clay layers to minimize the potential for surface water to become trapped in the previously excavated areas. Finished grades can also be adjusted to provide the recommended separation from the expansive clay by adding fill to the site.

Geotechnical site preparation will generally consist of site clearing and grubbing, subgrade proof-rolling and compaction of the site below the footing and slab areas, and structural fill placement for general site grading and building pad construction.

Foundation Design

Based on the results of our preliminary 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. Assuming all potentially expansive soils are removed a minimum of 4 feet below the bottom of footings and floor slab, and positive drainage is established, a conventional shallow foundation system may be used for support of the proposed building construction on this project with the understanding that some aesthetic cracking and other minor architectural type nuisance issue may occur during the useful life of the structure.

Following completion of the recommended preliminary building site preparation and structure pad preparation activities, the proposed structure(s) may be supported on a shallow foundation system designed with a maximum average soil bearing pressure of 2,000 pounds per square foot (psf).

Potential Geotechnical Constraints to site Development

Our interpretation of the site soil and groundwater conditions is based on our general knowledge of the area, subsurface borings performed and laboratory analysis conducted. UES did identify geotechnical considerations that may impact the planned development of the site, as we currently understand it, using conventional construction practices. The identified considerations are:

1. Very loose surficial sandy soils that will necessitate compaction.

2. Shallow deposits of Clayey Sands to Clays [SC, CH] that may not be re-usable as fill in utility excavations.

3. The subgrade after excavation, in some areas may include clayey sands, which will be difficult to compact. The clayey sandy soils may require stringent moisture control during compaction, particularly during rainy periods.

4. Due to the presence of near surface clays it is important that the construction design incorporate factors to minimize water seepage around the proposed structures. Design factors may include underdrain/drainage intercepting water runoff from the slopes, and positive drainage around structures.

5. Potentially expansive clay soils. Where present, the potentially detrimental effect of the expansive clays can be remediated through site grading, over-excavation and replacement, site drainage and stiffened foundation.

6. Some of the soil borings encountered shallow limestone layers/boulders. Utility trenches, and some foundation excavation areas, may encounter limestone boulders/layers resulting in difficult excavation operations. It should be anticipated that some removal of cemented limestone will be required if encountered within 2 feet of the proposed bottom of the footings.

1.0 INTRODUCTION

1.1 GENERAL

In this report, we present the results of the preliminary subsurface exploration of the site for a proposed residential development located in Ocala, Marion 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

The project parcel is located at Tax Parcel: 15392-000-00 in Ocala, Marion County, Florida. We understand that this site is being considered as a proposed residential development. We expect the proposed development will consist of the construction of multi-family residential buildings, and associated pavement and stormwater management areas.

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 5 kips per linear feet (klf) on wall footings, and a maximum load of 50 kips on individual footings. We understand the building construction will require little to no cuts and nominal structural fill placement operations (3 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 are based upon the above considerations. If any of this information is incorrect, or if you anticipate any changes, please inform Universal Engineering Sciences so that we may review our recommendations.

2.2 PURPOSE

The purposes of this preliminary exploration were:

- Perform a preliminary subsurface exploration to gather information concerning the near-surface soil conditions,
- To perform a series of laboratory tests on selected subsurface soil specimens, recovered from the field exploration program to assist with engineering soil classifications,
- To classify and stratify the various soil strata encountered in the soil test borings,
- To evaluate the groundwater level in the area of exploration and make appropriate recommendations,
- To prepare preliminary foundation design and construction recommendations,
- To discuss technical suitability of subgrade soils for fill suitability, flexible pavement section support and provide preliminary parameters for pavement design,
- To discuss subsurface soil drainage characteristic the design of the on-site stormwater management system.

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. Universal Engineering Sciences would be pleased to perform this service, 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. 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 July 12, 2022 and completed on July 13, 2022. Field tests for the geotechnical study included six (6) soil test borings to depths of 20 to 25 feet within the limits of the proposed development areas. The actual test locations shown are approximate and were staked in the field by UES personnel using existing landmarks and site features. All boreholes were backfilled upon field work completion. The soil test boring locations are shown in the attached Boring Location Plan drawing. The subsurface soil conditions found in the soil test borings are presented in **Appendix A**.

Representative portions of the subsurface soil samples recovered were transported to our soils laboratory. The soil samples were visually classified by an experienced geotechnical engineer. 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), and Atterberg Limits (ASTM D-4318). The test results have been presented on the attached Boring Logs.

3.0 FINDINGS

3.1 REGIONAL GEOLOGY

The general geology of Marion County is characterized by a surface veneer of Pleistocene and Pliocene sands and sandy clays overlying the Miocene age Hawthorn Group, a highly variable mixture of interbedded quartz sands, clays, carbonates, pebbles and grains occurring in thickness of up to 150 feet. Underlying the Hawthorn Group is the upper Eocene age Ocala Formation, occurring as a uniform limestone, which is approximately 200 feet thick and overlies the Eocene age Avon Park Formation, which can be up to 500 feet thick. Both the Ocala and Hawthorn Formations dip to the northeast by approximately one degree. The surface of the upper Floridan Aquifer in the general project site area is estimated in the elevation range of +40 feet, NGVD.

3.2 KARST TOPOGRAPHY

About 10% of the earths land (and 15% of the United States) crust is composed of, or underlain by, soluble limestone. When limestone interacts with underground water, over time, the water dissolves the limestone to form karst topography, a mix of caves, underground channels, and rough and undulating ground surfaces. The underground water of karst topography carves channels and caves that become susceptible to collapse from the surface. When enough limestone is eroded from underground, a sinkhole may develop. Sinkholes can range in size and depth from a few feet to over 300 feet. The topography of North Central Florida is characteristic of karst terrain, with sinkholes caused by natural climatic variability, as well as, man-made activities, such as, the drop in groundwater levels from well pumping. Per contract scope of services, our exploration was confined to the zone of soil likely to be stressed by the proposed construction. A sinkhole evaluation of the site was not part of our scope of services, and requires a more extensive range of field services than performed in this study.

3.3 GENERAL AREA SOIL INFORMATION

The United States Department of Agriculture (USDA) *Soil Survey of Marion County*, *Florida* describes the near-surface soil profiles in the project parcel as Blichton, Arredondo, and Lochloosa soils. Blichton soil is characterized as gently sloping and poorly drained, with a water table that is within a depth of 10 inches for 1 month to 4 months during most years. During dry periods it recedes to a depth of more than 40 inches. Relevant engineering index properties of Blichton soils are summarized in Table 1.

Table 1 – Relevant Engineering Index Properties of Blichton soils

Depth, Inches	Texture	Classification	% Passing #200 Sieve	Plasticity Index	Shrink-swell Potential	Permeability
0 – 26	Sand	SP-SM, SM	8 – 25	NP	Low	6.0 – 20 in/hr
26 – 30	Sandy loam, fine sandy loam	SM, SM-SC	20 – 30	NP – 7	Low	2.0 – 6.0 in/hr
30 – 77	Sandy clay loam	SC	36 – 45	11 – 24	Moderate	0.6 – 2.0 in/hr
77 – 81	Stratified sandy loam to sandy clay loam	SM, SM-SC	20 – 30	NP – 7	Low	2.0 – 6.0 in/hr

Arredondo sand is described as nearly level to gently sloping and well drained with a water table at a depth of more than 72 inches. Relevant engineering index properties for Arredondo soils have been summarized below in Table 2.

Table 2 – Relevant Engineering Index Properties of Arredondo soils

Depth, Inches	Texture	Classification	% Passing #200 Sieve	Plasticity Index	Shrink-swell Potential	Permeability
0 – 65	Sand	SP-SM, SM	5 – 15	NP	Low	6.0 – 20 in/hr
65 – 70	Loamy sand, loamy fine sand, sandy loam	SM, SM-SC	13 – 25	NP – 7	Low	2.0 – 6.0 in/hr
70 – 90	Sandy loam, fine sandy loam, sandy clay loam	SM-SC, SC	20 – 40	4 – 20	Low	2.0 – 6.0 in/hr

Lochloosa sand is characterized as nearly level to gently sloping and somewhat poorly drained, with a water table that is between depths of 30 to 60 inches for periods of 1 month to 4 months during most years. For brief periods of about 1 week to 3 weeks, it rises to within about 15 inches of the surface. It recedes to a depth of more than 60 inches during dry periods. Relevant engineering index properties of Lochloosa soils are summarized in Table 3.

Table 3 – Relevant Engineering Index Properties of Lochloosa Sand Soils						
Depth, Inches	Texture	Classification	% Passing #200 Sieve	Plasticity Index	Shrink-swell Potential	Permeability
0 – 28	Fine sand	SP-SM, SM	8 – 20	NP	Low	6.0 – 20 in/hr
28 – 32	Fine sandy loam, sandy loam, loamy sand	SM, SM-SC	18 – 30	NP – 6	Low	2.0 – 6.0 in/hr
32 – 57	Sandy clay loam, sandy loam	SM-SC, SC	25 – 40	5 – 18	Low	0.6 – 2.0 in/hr
57 – 69	Sandy clay, sandy clay loam	SC	40 – 50	15 – 25	Low	0.6 – 2.0 in/hr
69 – 75	Sandy clay loam, sandy loam	SM-SC, SC	25 – 40	5 – 18	Low	0.6 – 2.0 in/hr

3.4 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 parcel was undeveloped and wooded. Surface organic soils, surface debris, or rock outcroppings were not observed on the project site. Based on elevations obtained from the Marion County Board of County Commissioners' Interactive Map, site grades range from a high of approximately +65 feet to a low of +45 feet. The surface of the upper Floridan Aquifer in the general project site area is estimated in the elevation range of +40 feet, NGVD.

3.5 SUBSURFACE CONDITIONS

The soil test borings were reviewed to evaluate the subsurface soil strata lateral continuity and uniformity, both parameters that would have an impact in foundation system selection and performance. Soil classifications and descriptions for this geotechnical study are based both on the results of the laboratory soil testing programs and on visual examinations of soil specimens by the Geotechnical Engineer. The subsurface soil conditions encountered in the soil test borings have been summarized in the attached Boring Logs and have been described below.

The soil test borings generally encountered very loose to loose sand to sand with silt [SP/SP-SM] to depths of 0 to 8 feet followed by silty-clayey sands to clay [SM-SC/SC/CH] to depths of 9 to 20 feet. Below the clayey soils, the soil test borings generally encountered weathered limestone to the boring termination depths of 20 feet.

3.6 GROUNDWATER DEPTH

The groundwater level was generally encountered between depths of 8 to 14 feet below existing grades at the boring locations at the time of our exploration. Fluctuations of perched groundwater level conditions on this project parcel should be expected to occur seasonally as a result of rainfall, surface runoff, and nearby construction activities.

3.7 LABORATORY TESTING

The soil samples recovered from the field exploration program were placed in containers and returned to our soils laboratory, where the Geotechnical Engineer visually examined and classified the samples. Laboratory soil tests are 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, and Atterberg Limits testing. The test results have been presented on the attached Boring Logs, and summarized in Table 4.

Table 4 – Laboratory Soil Test Results

Soil Boring	Sample Depth	Type of Test	Results	Soil Description
B-1	4.5 feet	% Finer #200	5 %	Sand
		Moisture Content	4 %	
B-2	3 feet	% Finer #200	53 %	Sandy Clay
		Moisture Content	21 %	
B-3	1.5 feet	% Finer #200	7 %	Sand, with silt
		Moisture Content	4 %	
B-3	14 feet	% Finer #200	82 %	Clay
		Moisture Content	83 %	
B-4	3 feet	% Finer #200	39 %	Clayey Sand
		Moisture Content	15 %	
B-5	3 feet	% Finer #200	13 %	Silty Sand
		Moisture Content	7 %	
B-6	2.5 feet	% Finer #200	66 %	Sandy Clay
		Moisture Content	30 %	
		Atterberg Limits	LL = 41 , PI = 24	

3.7.1 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. This test was conducted in accordance with ASTM Procedure D-1140, *Standard Test Methods for Amount of Material in Soils Finer than the No. 200 Sieve.*

3.7.2 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.*

3.7.3 Atterberg Limits

Certain recovered soil samples were 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 LL, PL and Plasticity Index of Soils.*

4.0 PRELIMINARY RECOMMENDATIONS

4.1 GENERAL

In this section of the report, we present our preliminary 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. **Due to the preliminary design stage of this project, building locations, structural loads, and grading information were unavailable. Therefore, it will be necessary to perform additional geotechnical services including additional test borings once the structure locations, proposed grades, and structural loadings are available.**

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. If the anticipated total and differential settlements estimated herein exceed the tolerable limits as set forth by the Structural Engineer, we should be so advised so that we may consider other foundation system alternatives.

Based on our exploration, the primary geotechnical considerations for the design and construction of the proposed structure are the presence of very loose sandy soils in the near-surface profile, shallow pockets of potentially expansive clay soils, and shallow limestone layers/boulders that may be difficult to excavate. Subsurface sandy soils will undergo immediate settlements upon application of surface loads, and this could be a result of both fill placement for building pad construction and building construction. In light of the above, it becomes important to compact the subgrade soils as much as possible prior to both building pad fill placement and foundation construction.

Limestone boulders/layers were encountered in the upper 10 feet in some of the borings. Hard lenses of limestone/chert may be encountered that require greater than normal removal techniques. If limestone is found during the foundation excavations, we recommend that all excavation cut into the limestone deposit extend at least 2 feet below the required bottom elevation of the excavation.

The clayey sand soils may require stringent moisture control during compaction, particularly during rainy periods. Footings that are excavated through the upper layer of compacted sand fill soils into the native clayey sand, should be visually inspected and tested to verify the in-place density and condition of the subgrade bearing soils.

Our local experience has found that clay layers are often laterally discontinuous, which makes it more difficult to ascertain their presence and extent on a given project parcel with a few soil test borings. If at the time of construction the builder encounters or suspects that clay soils may be near the grade slab or foundation bearing elevations, UES should be contacted to prepare appropriate recommendations. We recommend that the bottom of all footings and building pad areas be probed to confirm the suitability of the bearing soils. Where encountered, shallow deposits of clay soils must be addressed through site grading, over-excavation and replacement, site drainage and stiffened foundation.

Over-excavated areas should be backfilled with a compacted, low permeability, non-plastic engineered fill material. The low permeability backfill should continue to an elevation consistent with the top of the adjacent clay layers to minimize the potential for surface water to become trapped in the previously excavated areas. Low permeability, engineered fill material shall consist of poorly draining, silty sand or clayey sand with between 15% to 30% material passing the No. 200 sieve, a Liquid Limit (LL) value less than 30, and a Plasticity Index (PI) value less than 15, and be free of organics. A crushed limerock base material could be used as the low permeability material. Special compaction equipment and strict moisture control may be required to achieve the minimum compaction specifications. Loose lift thicknesses of 10- to 12-inches or less are recommended. Should the Contractor experience difficulty in achieving the appropriate level of compaction, a thinner lift should be utilized.

Care should be exercised in performing the site preparation procedures due the presence of clayey soils near the existing ground surface. The use of heavy-vibratory equipment is not recommended due to the potential for disturbance and pumping of the near surface clayey soils. To avoid pumping of 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 sand overlying 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 unsuitable soil which will require over-excavation and subsequent backfilling with selected material.

Due to the presence of near surface clayey soil it is important that the foundation design incorporate factors to minimize water seepage around the proposed foundation. The design factors should include undercutting around the perimeter of the structure, positive drainage such that water flows away from the structure, use of low permeability fill, gutters tied into the drainage system, use of drought tolerant landscaping, and limiting irrigating around the structure.

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 possible 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.

If it is determined that structures and or pavement will be constructed in areas with potential expansive clay soils, additional geotechnical exploration and analysis will be required to provide site specific requirements to mitigate the potential damage associated with the shrink/swell activity of these soils.

4.3 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 Marion County Soil Survey, we estimate the normal seasonal high groundwater level will occur deeper than 6 feet below the ground surface in the general area of the project site; however, stormwater can perch on clayey sands when sandy soils are present at the surface. Isolated areas with a transient perched groundwater should be expected to occur. The perched groundwater will be a transient condition, directly related to rainfall, irrigation and site grading.

The potential for transient perched groundwater levels shall be considered during the design of the site grades and during construction.

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. We recommend positive drainage be established and maintained on the site during construction. We further recommend permanent measures be constructed to maintain positive drainage from the site throughout the life of the project.

4.4 BUILDING FOUNDATION SYSTEM EVALUATION

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.

Within some of the proposed building envelopes at this site, we found shallow, discontinuous deposits of potentially expansive soils (CH). As previously stated, the laboratory tests indicate that the clay soils encountered have a high potential for shrink/swell volume changes. It is our opinion that these shallow deposits of expansive soils must be addressed through site grading, over-excavation and replacement, site drainage and stiffened foundation.

Assuming all potentially expansive soil are removed a minimum of 4 feet below the bottom of footings and floor slab, and positive drainage is established, a conventional shallow foundation system may be used for support of the proposed building construction on this project with the understanding that some aesthetic cracking and other minor architectural type nuisance issue may occur during the useful life of the structure. Provided the site preparation and earthwork construction recommendations outlined in Section 4.6 of this report are performed, the following parameters may be used for foundation design.

4.4.1 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.

If the proposed building frame cannot tolerate the estimated magnitudes of differential settlements over a lateral distance of 20 feet, and/or the Owner desires to provide additional reduction of the potential effects of clays on the structure, we recommend the Building Designers consider the use of grade beam foundations, for support of load bearing walls on this project. The deeper concrete section, and top and bottom steel configuration of a typical grade beam foundation, should help mitigate differential settlement concerns. A modulus of subgrade reaction of 100 pounds per cubic inch (pci) may be used for grade beam foundation design.

4.4.2 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. For monolithic slabs, the thickened sections should have minimum width of 12 inches and be embedded a minimum of 12 inches.

4.4.3 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. The thickened section of a monolithic slab/foundation system should be embedded a minimum of 12 inches.

4.4.4 Bearing Material

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. In addition to compaction, the bearing soils must exhibit stability and be free of "pumping" conditions. We recommend that the bottom of all footings be probed to confirm the suitability of the bearing soils.

4.4.5 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 4.6 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 settlements of the structures could be on the order of one inch or less. Differential settlement result from differences in applied bearing pressures and variations in the compressibility characteristics of the subsurface soils. Based on limited field and laboratory testing data obtained, we estimate the potential for volume change in the range of ½ inch.

4.4.6 Ground Floor Slab

The floor slab can be constructed as a slab-on-grade provided the subgrade and subsequent lifts of structural backfill are compacted and tested in accordance with the recommendations included in this report. Conventional floor slabs may be supported upon the compacted fill and should be structurally isolated from other foundation elements or adequately reinforced to prevent distress due to differential movements. The floor slab can be designed using a modulus of subgrade reaction (K) of 100 pounds per cubic inch (pci). 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.

4.5 PAVEMENT RECOMMENDATIONS

4.5.1 Assumptions

We assume that a combination of flexible asphaltic and rigid concrete pavement sections will be used for the pavement areas on this project. Our recommendations for both pavement types are listed in the following sections. The following recommendations are 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 85 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 300,000 for heavy duty pavements – heavy truck traffic (entrance drives, services lanes, etc.)

The available subsurface data suggests that the subgrade soils in these areas consist of clean sandy soils overlying clayey sands to clays. If encountered within 24 inches below the bottom of the base course, we recommend undercutting the clayey sands to clays in accordance with FDOT Standard Plans Index 120-002. The sandy soils may require stringent moisture control to facilitate compaction. Positive drainage around the roadway area should be established to prevent irrigation and stormwater from migrating into the pavement area.

4.5.2 Asphaltic Pavements

4.5.2.1 Layer Components

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 are presented in Table 5.

Table 5 – Minimum Asphaltic Pavement Component Thickness					
Service Level	Maximum Traffic Loading	Layer Component (inches)			Estimated Structural Number *
		Surface Course	Base Course	Stabilized Subgrade	
Light Duty	up to 100,000 $E_{18}SAL$	2	6	12	2.9
Heavy Duty	up to 300,000 $E_{18}SAL$	3	8	12	3.7

* The subgrade should be prepared as recommended in Section 4.5.5

4.5.2.2 Stabilized Subgrade

We recommend that subgrade materials be compacted in place according to the requirements in the "Site Preparation for the New Pavement Areas" section of this report. Further, beneath the limerock base course, stabilize the subgrade materials to a minimum Limerock Bearing Ratio (LBR) of 40, as specified by Florida Department of Transportation (FDOT) "Standard Specifications for Roadway and Bridge Construction" (SSRBC) requirements for Type B Stabilized Subgrade (FDOT-SSRBC, Section 160). The subgrade material should be compacted to at least 98 percent of the modified Proctor maximum dry density (AASHTO T-180).

The stabilized subgrade can be a blend of existing soil and imported material such as limerock. If a blend is proposed, we recommend that the Contractor perform a mix design to find the optimum mix proportions.

The primary function of stabilized subgrade beneath the base course is to provide a stable and firm subgrade so that the limerock can be properly and uniformly placed and compacted. Depending upon the soil type, the subgrade material may have sufficient stability to provide the needed support without additional stabilizing material. Generally, sands with silt or clay should have sufficient stability and may not require additional stabilizing material. Conversely, relatively "clean" sand will not provide sufficient stability to adequately construct the limerock base course. Universal Engineering Sciences should observe the soils exposed on the finish grades to evaluate whether or not additional stabilization will be required beneath the base course.

4.5.2.3 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 (FDOT-SSRBC, Section 230).

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.

4.5.2.4 Surface Course

For the new pavement areas, 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.

4.5.2.5 Effects of Groundwater

One of the most critical influences on the pavement performance in North Central 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.

4.5.2.6 Curbing

Typical curbing is extruded and placed atop the asphaltic concrete surface. This type of curbing does not act as a horizontal cutoff for lateral migration of storm and irrigation water into the base material and as a result of this it is not uncommon for base and subgrade materials adjacent to these areas to become saturated, promoting subsequent localized pavement deterioration. Consequently, we recommend that most pavements abutting irrigated landscape areas be equipped with an underdrain system that penetrates a minimum depth equivalent to the bottom of the stabilized subgrade to intercept trapped shallow water and discharge it into a closed system or other acceptable discharge point.

Alternatively, curbing around landscaped sections adjacent to the parking lots and driveways could be constructed with full-depth curb sections to reduce horizontal water migration. However, underdrains may still be recommended dependent upon the soil type and spatial relationships. UES should review final grading plans to evaluate the need and placement of pavement and landscape underdrains.

4.5.2.7 Landscape Areas

In the event that landscape areas adjacent to the pavements include large mounds (>1 foot) of poorly draining organic topsoils 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.

4.5.3 Concrete "Rigid" Pavements

Concrete pavement is a rigid pavement that is strong, durable and handles the heavy loads more effectively than asphalt pavement. Concrete pavement is recommended under dumpster areas, and 10 feet in front of trash enclosures, at a minimum.

We recommend using the existing surficial sands or approved structural fill densified to at least 95 percent of Modified Proctor test maximum dry density (ASTM D 1557) without additional stabilization under concrete pavement, with the following stipulations:

1. Prior to placement of concrete, the subgrade soils should be densified as recommended in this report.

2. The stabilized subgrade shall be at least 12 inches thick, “free-draining” (k≥ 5 feet/day), and have a positive seepage discharge point. The stabilized subgrade shall be densified to at least 98 percent of modified Proctor test maximum dry density (ASTM D1557/AASHTO T-180).

3. The surface of the subgrade soils must be smooth, and any disturbances or wheel rutting corrected prior to placement of concrete.

4. The subgrade soils must be moistened prior to placement of concrete.

5. Concrete pavement thickness should be uniform throughout, with exception to the thickened edges (curb or footing).

6. The bottom of the pavement should be separated from the seasonal high groundwater level by at least 12 Inches.

7. We do not recommend the use of a limerock base course directly below the concrete pavement area.

Based on review of the FDOT Rigid Pavement Design Manual and provided that the site is prepared as recommended in this report, we recommend using the minimum design shown in Table 6 for concrete pavements.

Table 6 – Minimum Concrete Pavement Thickness

Maximum Traffic Loading	Minimum Pavement Thickness	Maximum Control Joint Spacing	Recommended Saw Cut Depth
up to 300,000 E_{18}SAL	6 inches	12 feet x 12 feet	2 inches

We recommend using concrete with a minimum 28-day compressive strength of at least 4,000 pounds per square inch. Layout of the saw cut control joints should form square panels, and the depth of Saw cut joints should be made to a depth of ⅓ of the concrete slab thickness.

We recommend allowing Universal to review and comment on the final concrete pavement design, including section and joint details (type of joints, joint spacing, etc.), prior to the start of construction.

For further details on concrete pavement construction, please reference the "Guide to Jointing of Non-Reinforced Concrete Pavements" published by the Florida Concrete and Products Association, Inc., and "Building Quality Concrete Parking Areas", published by the Portland Cement Association.

Specimens should be obtained to verify the compressive strength of the pavement concrete at least every 50 cubic yards, or at least once for each day’s placement, whichever is greater.

4.5.4 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.

4.5.5 Site Preparation for the New Pavement Areas

Following is a list of our recommended site preparation procedures to prepare the new pavement areas for the proposed construction.

1. Strip the pavement areas of any roots, vegetation, debris, organics, etc. Stripping should be performed at least 3 feet beyond pavement edges. We recommend that the stripped surface be observed and probed by representatives of Universal.

2. Following site clearing, grubbing and rough grading, the pavement 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.

3. If encountered within 24 inches below the bottom of the base course, we recommend undercutting clayey sands to clays in accordance with FDOT Standard Plans Index 120-002. Within the pavement areas, compact the exposed soils to at least 95 percent of the Modified Proctor test maximum dry density (ASTM D 1557) to a depth of at least 1 foot below the stripped surface and full depth of fill, or at least 2 feet below the bottom of base course (or concrete pavement) level, whichever is greater.

   Please note that the surficial soils within the new pavement areas may contain varying quantities of silt and clay. These silty/clayey soils tend to readily hold moisture and may require more stringent compactive efforts than clean fine sands.

4. Soil density testing to verify the uniformity of compactive efforts should be performed at a frequency of at least one (1) test for every 5,000 square feet per foot of compacted increment, or at a minimum of four test locations, whichever is greater.

5. Prior to the placement of the base course within the new asphalt pavement areas, the upper 12 inches of subgrade should be stabilized by pounding or mixing limerock into the subgrade in order to provide a stable and firm surface, so that the base course can be properly and uniformly placed and compacted to at least 98 percent of the Modified Proctor maximum dry density (ASTM D 1557). Compliance testing should be performed at a frequency of one test per 10,000 square feet, or at a minimum of three test locations, whichever is greater.

4.6 PRELIMINARY BUILDING SITE PREPARATION

We recommend normal, good practice site preparation procedures. These procedures include: stripping the site of existing vegetation and topsoil, and other debris, compacting the subgrade and placing necessary fill or backfill to grade with engineered fill. We recommend that the bottom of all footings and slab areas be probed to confirm the suitability of the bearing soils. We recommend 4-foot auger borings and penetrometer probe be performed in the proposed footings excavations and building pad areas to determine the depths of undercutting of the clayey material that will be needed. Expansive clays should be removed to a minimum of 4 feet below the bottom of the footings/slab. 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. Strip the proposed construction limits of all grass, roots, topsoil, and other deleterious materials within 5 feet beyond the perimeter of the proposed building footprint(s). Expect typical stripping at this site to depths of 6 to 12 inches. Deeper clearing and grubbing depths may be encountered in heavily vegetated areas.

3. The site should be graded to direct surface water runoff away from the construction areas. Positive drainage of improved areas should be maintained during construction and throughout the design life of the project. 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.

4. Excavate the site to the proposed grades. Stockpile the surficial sandy soils for later use as fill. Perform hand auger borings in the building areas that will be constructed near the existing grade to investigate for clayey soils. Expansive clays should be removed to a minimum of 4 feet below the bottom of the footings/floor slabs. <u>The recommended separation can be achieved either by undercutting the material or filling the site.</u>

5. The over-excavated areas should be backfilled with a compacted, low permeability, non-plastic engineered fill material. The low permeability backfill should continue to an elevation consistent with the top of the adjacent clay layers to minimize the potential for surface water to become trapped in the previously excavated areas. Fill material should consist of poorly draining, silty sand or clayey sand with between 15% to 30% material passing the No. 200 sieve, a Liquid Limit (LL) value less than 30, and a Plasticity Index (PI) value less than 15, and be free or organics. Special compaction equipment (i.e. Sheepsfoot Roller) and strict moisture control may be required to achieve the minimum compaction specifications. Loose lift thicknesses of 10- to 12-inches or less are recommended. Should the Contractor experience difficulty in achieving the appropriate level of compaction, a thinner lift should be utilized. Crushed limerock base material may be used as low permeability fill material.

6. Following site clearing, grubbing and rough 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.

7. Weak subgrade soils identified during proof-rolling operations should be excavated and removed from the site, and replaced with granular fill soils. We recommend that the bottom of all footings be probed to confirm the suitability of the bearing soils. Granular soils used for this purpose should meet the material and placement specifications outlined below.

8. Proof-rolling operations should be followed by backfill compaction operation. Compaction operations should be implemented with a compactor of appropriate size and must be used in static mode. Backfill compaction should be performed until an in-place soil density of 95 percent of the modified Proctor maximum dry density (ASTM D-1557) is achieved to a depth of 2 feet below the final subgrade, or foundation bearing elevations, whichever is greater. If necessary to achieve the recommended soil compaction at depth, the entire project area may be undercut, the exposed subgrade soils compacted, and then the areas backfilled using 6-inch lifts to final subgrade elevation. The subgrade beneath slabs should be compacted to a depth of 1 foot below the beginning grade prior to placing fill.

9. 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 soils should exhibit moisture contents within ± 2 percent of the modified Proctor optimum moisture content during compaction. A minimum of eight (8) complete coverages (in perpendicular directions) should be made in the building area with the roller to improve the uniformity and increase the density of the underlying sandy soils. It should be anticipated that moisture will need to be added to the subgrade in order to achieve the required compaction.

10. Should the bearing level soils 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.

11. The Geotechnical Engineer should be contacted if dissimilar bearing soil conditions, such as soil versus cemented limestone, are exposed beneath any one given footing/slab. Hard lenses of limestone/chert may be encountered that require greater than normal removal techniques. If limestone is found during the foundation excavations, we recommend that all excavation cut into the limestone deposit extend at least 2 feet below the required bottom elevation of the excavation. The undercut area should be covered with geotextile separation fabric and then backfilled with compacted selected material.

12. Care should be exercised to avoid damaging any nearby structures while the compaction operation is underway. Prior to commencing compaction, occupants of adjacent structures should be notified and the existing conditions of the structures be documented with photographs and survey (if deemed necessary). Compaction should cease if deemed detrimental to adjacent structures. Universal Engineering Sciences can provide vibration monitoring services to help document and evaluate the effects of the surface compaction operation on existing structures. In the absence of vibration monitoring it is recommended the vibratory roller remain a minimum of 100 feet from existing structures. Within this zone, use of a vibratory roller operating in the static mode is recommended.

13. Test the subgrade for compaction at a frequency of not less than one test per 2,500 square feet in the building areas, or a minimum of three test locations per building, whichever is greater.

14. Place fill material, as required. Offsite fill material should contain less than 10 percent passing the No. 200 sieve. Place 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.

15. Additionally, we recommend that you test 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 a depth of 2 feet to verify stability.

4.7 STORMWATER MANAGEMENT SYSTEM

4.7.1 Permeability/Infiltration

The locations of components of the stormwater management system were not known at the time of this geotechnical exploration. In effort to provide some preliminary information with respect to the design of the system, UES completed laboratory testing in the near surface soils at a low area within the west side of the property (B-6). The laboratory test data indicates that the surficial very clayey sand to sandy clay soils generally have permeability rates of less than 0.1 feet per day. We anticipate that only negligible amounts of water can be evacuated via the percolation mechanism within the clayey sands.

As previously noted, the USDA Soil Survey generally indicates permeability values of approximately 0.2 to 6 inches per hour for the surficial subgrade soils (sandy loam, sandy clay) at this site. The actual permeability rates may be different due to retention system geometry, soil stratification, retention volume and groundwater mounding effects. We estimate that the effective porosity of the upper sandy soil in the proposed retention pond area is on the order of 0.10 to 0.15. Additional borings will be needed in order to verify the subsurface conditions throughout the stormwater management areas are uniform and assist in determining the volume of any suitable fill which might be utilized in the raising of site grades.

4.7.2 Borrow Suitability

The recovered soil samples were classified using visual and textural means, and limited laboratory testing. We offer below ***preliminary guidelines*** for the use of on-site soils, such as those excavated from the proposed retention pond, as fill material for the project.

Soil materials excavated and classified as fine sands to sand with silt 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 the materials are properly dried, placed, and compacted.

Soil materials excavated and classified as silty fine sands [SM] and silty-clayey sands [SM-SC], with typically 12% to 25% fines and a PI of less than 10, may also be considered suitable for use as utility trench backfill, as well as building pad and pavement subgrade fill, after significant drying and some mixing with the fine sand material described above. Proper placement, proof-rolling and compaction must also be performed. These soils should be placed in 6-inch lifts and compacted.

Soil materials excavated and classified as clayey sand, silt or clay [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 near the final grade 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.

4.8 KARST ANALYSIS DESKTOP ASSESSMENT

Information obtained from the Saint Johns River Water Management District (SJRWMD) Potentiometric Surface Map dated May 2009 suggests the potentiometric level of the Floridan Aquifer in the general area of the project site to be on the order of +40 feet, NGVD in the general site area. A Potentiometric surface map is included in **Appendix B**. According to topographic survey data provided on the Marion County Board of County Commissioners Interactive Map, site topography in the area of the project site generally ranges in elevations at approximately +45 to +65 feet.

Our “desktop” assessment of the presence of karst features included a review of available data from the United States Geological Survey (USGS) and Florida Geological Survey (FGS), and current topography survey. The FGS maintains an inventory of reported sinkholes as a continuation of the work originally performed by the Florida Sinkhole Research Institute. This sinkhole database is generally considered to be a record of more recent sinkholes, and does not incorporate older and more mature karst features such as large lakes. The FGS database is not a definitive or authoritative resource, and should only be used for a generalized overview of recent sinkhole relative density. Our assessment included a search of the FGS database for sinkholes within a 1-mile radius of the subject site. There were twelve (12) sinkholes reported within 1 mile of the subject site. <u>It should be noted that the FGS sinkhole database map defined two (2) depressions within 200 feet of the project site, adjacent to the northwest and southwest corners of the property.</u> We note that the FGS database only contains more recently recorded sinkhole events. This map can provide a false sense of security for areas that have remained rural and undeveloped until more recently. A site Map presenting the FGS recorded subsidence locations local to the subject property is presented in Appendix B.

Our assessment also included a review of the USGS Quadrangle Map (Ocala West). Fewer than 5 mapped natural lakes, including one along the western boundary of the property adjacent to US 441, were identified surrounding the subject property within a one-mile radius of the site. These natural lakes are relic sinkholes that formed in the geologic past. In addition to the natural lakes, there are several manmade stormwater ponds and some borrow pits. The excavation and construction of stormwater ponds and borrow pits can affect natural hydrogeologic processes.

Some of these areas appear to have exposed groundwater as a result of excavation and construction operations.

Our desktop analysis also included a review of a USDA Soil Survey aerial image of the project area. Based on the USDA Soil Survey aerial, at least ten (10) depressions were identified within a 1-mile radius of the project site. As mentioned above, it should be noted that the Florida Geological Survey sinkhole database map, and USDA Aerial imagery defined three (3) total depressions within 200 feet of the property. It should be noted that the USDA defined one (1) depression within the project site, along the north boundary of the property.

Based on Sinkhole Type, Development and Distribution Map prepared by USGS, the subject site is located within an Area I sinkhole region. Area I suggests bare or thinly covered limestone. Sinkholes are few, generally shallow and broad, and develop gradually; solution sinkholes dominate.

4.9 TRENCH BEDDING AND BACKFILLING RECOMMENDATIONS

We assume that proposed sewer and other deep utility lines at the site may have invert elevations several feet below existing grades. In general, the soils at this approximate level are fine sands with silt or clay (SP-SM, SP-SC), silty-clayey sands (SM-SC, SC) to clays (CH). The fine sand with silt or clay type soils, when excavated from below the water table, may require spreading and drying prior to reuse to achieve a moisture content sufficient to obtain the recommended degree of compaction. Silty-clayey sand type soils will require extensive aeration and drying prior to reuse. Sandy to fat clay should not be reused as fill/backfill.

The following recommendations should be followed while installing the proposed utility lines.

- Where required, the soils in the areas of excavations for the installation of the proposed gravity/force main lines should be dewatered prior to the start of excavation. The groundwater level should be maintained at least 24 inches below the base of the trench and compaction surface during construction and backfill activities.

- After proper dewatering, excavate the trench as per the design configuration. Excavated trenches should be set back to a stable configuration or shored, in either case in accordance with OSHA requirements. Adequate bracing should be provided if necessary to prevent side slope failures.

- Compact the trench bottom a minimum density of 95 percent of the Modified Proctor maximum dry density to a depth of 1-foot below the bottom of the pipe or place the pipe in gravel bedding as described by FDOT Design Standards. Remove rock, boulders or other hard lumpy or unyielding material to depth of 12 inches below the bottom of the pipe elevation. The subgrade after excavation in some areas may include silty-clayey sands [SM-SC/SC] [A-2-4]/[A-2-6], which will be difficult to compact. If these soils are soft in nature, they should be over-excavated and removed under the direction of the testing agency representative. Alternatively, approximately 6 to 12 inches of #57 stone (gravel) may be placed at the bottom and compacted to stabilize the subgrade. When utilizing graded stone material, sufficient amount of sand should be added to fill all voids created by the use of 57 stone. Some areas may also include very clayey sands or sandy clay [SC/CL/CH][A-6]/[A-7]; these soils should be over-excavated and removed under the direction of the testing agency representative.

- Fill materials above the spring-line of the pipe should be compacted to a minimum of 95 percent of the Modified Proctor maximum dry density (AASHTO T-180/ASTM D-1557). Native soils consisting of clean sands with less than 12 percent fines may be used as backfill material provided they are inorganic, have moisture contents below the optimum level and are properly placed. As possible, we recommend you avoid using silty and clayey sands as backfill material for this project.

- If imported materials are used as trench backfill material, the imported fill should contain less than 5 percent soil fines passing a number 200 sieve. You may also use imported fill material containing 5 to 12 percent soil fines; however, strict moisture control measures will be required, particularly for placement of these materials in excavations extending below the groundwater level.

- Backfill placed around the pipe and extending up to a level of 12 inches above the top of the pipe should be placed in loose, 6-inch lifts and compacted with light-weight equipment such as a small plate compactor. The remaining backfill may be placed in loose, 12-inch lifts across the full trench width and compacted. All backfill lifts should be compacted to a minimum density of 95 percent of the Modified Proctor maximum dry density prior to the placement of additional backfill. Compaction within the backfill trench should be performed using light-weight compaction equipment until the backfill has attained a level of at least 4 feet above the crown of the pipe. Beneath pavement areas, the top 12 inches of backfill should be compacted to at least 98 percent.

- Compliance test for densities should be performed as recommended by FDOT standards. Additionally, local jurisdictional compaction requirements should be followed when stricter than the recommendations herein.

4.10 DRAINAGE MEASURES

Due to the presence of near surface clays it is important that any construction design incorporate factors to minimize water seepage around the proposed foundation. The design factors should include undercutting around the perimeter of the structure, positive drainage such that surface water flows away from the structure, installation of underdrain, gutters tied into the drainage system use of drought tolerant landscaping plus limiting irrigation around the structure. No trees should be located within 25 feet of the structure.

4.11 MISCELLANEOUS ISSUES

Sidewalks and other flatwork founded on the clay soils may be subject to upward and downward movement from shrink/swell clay activity. Liberal use of crack control joints should minimize this impact. Alternatively, flexible construction, such as pavers, could be considered.

Some tree roots from mature trees will likely not penetrate the clay soils and will tend to grow on top of these clays, seeking moisture from the surface and sandier soils above the clays. The roots can heave sidewalks, driveways, and even foundation and slabs. The roots that do penetrate the clays will de-hydrate them in a localized area and cause the clay soils to shrink. We recommend that this be taken into account when selecting the types of vegetation planted, as well as, the proximity to the potentially affected surface improvements. Trees should be not planted and existing trees should be removed to a minimum distance of 25 feet from the building footprint.

Utility connections to the structure should be designed and installed with flexible connections to accommodate the expected differential foundation movement.

4.12 EXCAVATIONS

Excavations should be sloped as necessary to prevent slope failure and to allow backfilling. Temporary excavations below a depth of 4 feet should be sloped in accordance with OSHA regulations. Where lateral confinement will not permit slopes to be laid back, the excavation should be shored in accordance with OSHA requirements. During excavation, excavated material should not be stockpiled at the top of the slope within a horizontal distance equal to the excavation depth. Provisions for maintaining workman safety within excavations is the sole responsibility of the contractor.

4.13 POTENTIAL GEOTECHNICAL CONTRAINTS TO SITE DEVELOPMENT

Our interpretation of the site soil and groundwater conditions is based on our general knowledge of the area, subsurface borings performed and laboratory analysis conducted. UES did identify geotechnical considerations that may impact the planned development of the site, as we currently understand it, using conventional construction practices. The identified considerations are:

1. Very loose surficial sandy soils that will necessitate compaction.

2. Shallow deposits of Clayey Sands to Clays [SC, CH] that may not be re-usable as fill in utility excavations.

3. The subgrade after excavation, in some areas may include clayey sands, which will be difficult to compact. The clayey sandy soils may require stringent moisture control during compaction, particularly during rainy periods.

4. Due to the presence of near surface clays it is important that the construction design incorporate factors to minimize water seepage around the proposed structures. Design factors may include underdrain/drainage intercepting water runoff from the slopes, and positive drainage around structures.

5. Potentially expansive clay soils. Where present, the potentially detrimental effect of the expansive clays can be remediated through site grading, over-excavation and replacement, site drainage and stiffened foundation.

6. Some of the soil borings encountered shallow limestone layers/boulders. Utility trenches, and some foundation excavation areas, may encounter limestone boulders/layers resulting in difficult excavation operations. It should be anticipated that some removal of cemented limestone will be required if encountered within 2 feet of the proposed bottom of the footings.

5.0 REPORT LIMITATIONS

This Report has been prepared for the exclusive use of [redacted]d other members of the Design/Construction Team for the specific project discussed in this Report. This Report has been prepared in accordance with generally accepted local geotechnical engineering practices; no other warranty is expressed or implied.

The scope is limited to the specific project and locations described herein. Our description of the project's design parameters represents our understanding of the significant aspects relevant to soil and foundation characteristics. In the event that any changes in the design or location of the structures as outlined in this report are planned, we should be informed so the changes can be reviewed and the conclusions of this report modified, if required, and approved in writing by UES.

The recommendations submitted in this report are 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 and/or additional testing during the construction period and noting the characteristics of the variations.

Please note that this exploration was preliminary in nature, and was designed to help determine the presence of any near surface constraints which would significantly impact the intended development of the subject site, as well as affect the cost of construction. The information obtained from this exploration is not sufficient for final design of foundation systems, building and pavement grades, and stormwater ponds.

We strongly recommended that the information obtained from this preliminary exploration be supplemented with a more comprehensive subsurface exploration once the site plan have been finalized. Deeper soil borings are also required if you wish to evaluate the presence of deeper deposits of unsuitable soils on site. The foundations for the building and the pavement grades should be designed based on the information obtained from a comprehensive geotechnical exploration program.

This report has not been prepared to meet the full needs of design professionals, contractors, or any other parties. Any use of this report without the guidance of the geotechnical engineer who prepared it constitutes improper usage which could lead to erroneous assumptions, faulty conclusions, and other problems.

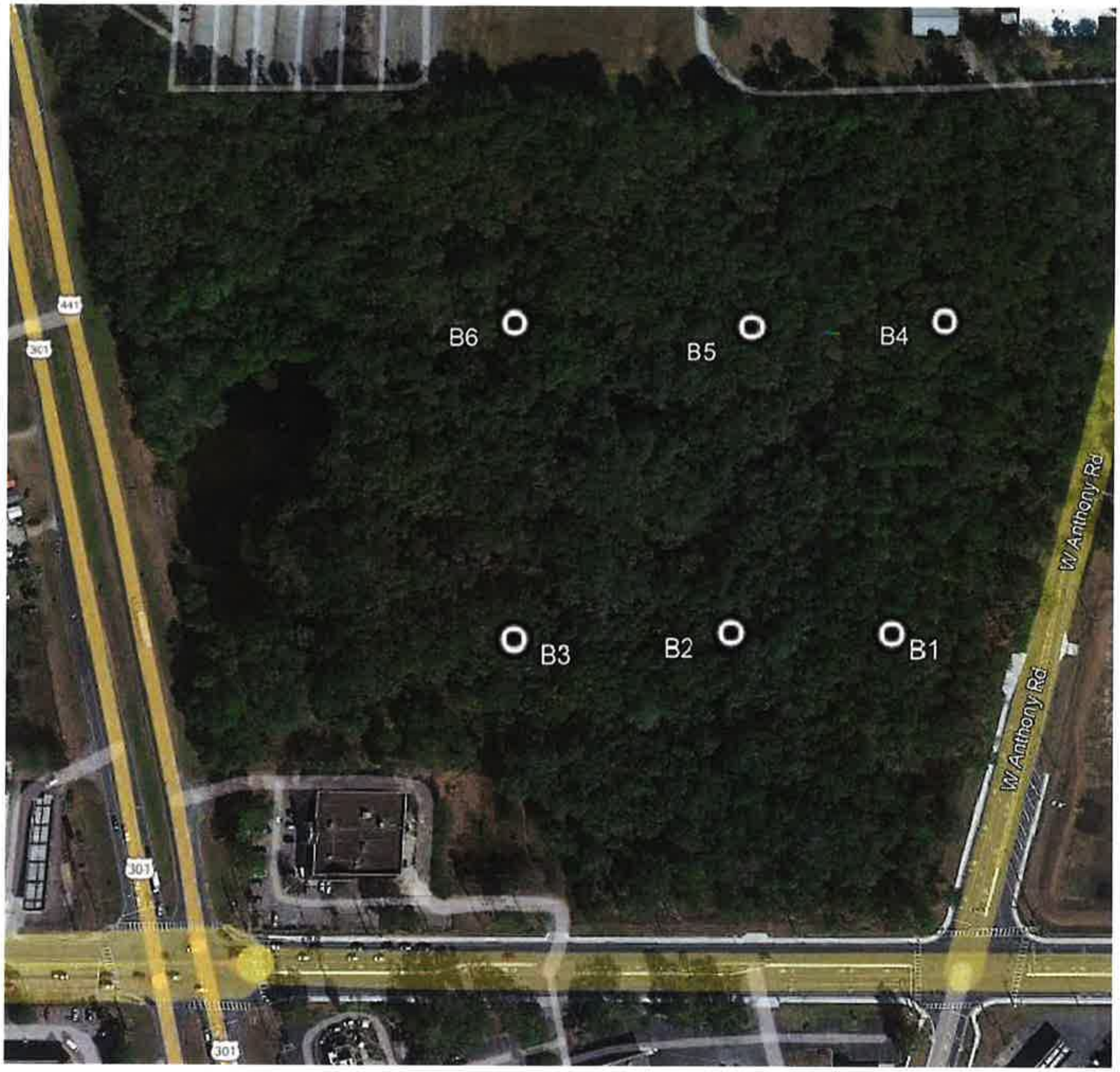
During the early stages of most construction projects, geotechnical issues not addressed in this report may arise. Because of the natural limitations inherent in working with the subsurface, it is not possible for a geotechnical engineer to predict and address all possible problems. A GBA publication, "Important Information About Your Geotechnical Engineering Report" appears in Appendix C, and will help explain the nature of geotechnical issues. Further, we present documents in Appendix C: Constraints and Restrictions, to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report.

APPENDIX A

Boring Location Plan

Boring Logs

Key to Boring Logs



LEGEND

◎ BORING LOCATION

NOTE: ALL BORING LOCATIONS SHOWN ARE APPROXIMATE.

N

0230.2200083-A

UNIVERSAL ENGINEERING SCIENCES

OCALA PROPERTY
WEST ANTHONY ROAD AND NW 35TH TERRACE
OCALA, FLORIDA

BORING LOCATION PLAN

DRAWN BY:	KD	DATE:	7/25/22	CHECKED BY:	ES	DATE:	7/25/22
SCALE:	NTS	PROJECT NO:	0230.2200083.0000	REPORT NO:	1967925	PAGE NO:	A - 1

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 0230.2200083.0000
REPORT NO.: 1967925
PAGE: A-2

PROJECT: OCALA PROPERTY
WEST ANTHONY ROAD AND NW 35TH TERRACE
OCALA, FLORIDA

BORING DESIGNATION: **B-1** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: [redacted]
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 14
DATE OF READING: 7/12/22
EST. W.S.W.T. (ft):

DATE STARTED: 7/12/22
DATE FINISHED: 7/12/22
DRILLED BY: M. BOATRIGHT
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N VALUE	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./DAY)	ORGANIC CONTENT (%)
0						Gray SAND [SP]						
1						Very loose tan and light orange SAND, with silt [SP-SM]						
2	X	1/12"-1	1									
4	X	1-1-1	2									
5	X	1-1-1	2				5	4				
6						Loose tan and light orange SAND [SP]						
7	X	2-2-2	4									
8	X	3-3-6	9			Loose to medium dense orange clayey SAND [SC]						
10	X	6-7-7	14									
12.5						Soft green and orange CLAY [CH], with limestone fragments						
14				▼								
15	X	2-1-1	2									
19						Soft CLAY and Rock mix						
20	X	3-2-1	3			Weathered LIMESTONE						
21.5	X	3/12"-2	2									
22.5						LIMESTONE						
25	X	4-9-15	24			Boring Terminated at 25'						

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0230.2200083.0000
REPORT NO.:	1967925
PAGE:	A-3

PROJECT: OCALA PROPERTY
WEST ANTHONY ROAD AND NW 35TH TERRACE
OCALA, FLORIDA

BORING DESIGNATION: **B-2** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: [redacted]
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 12
DATE OF READING: 7/12/22
EST. W.S.W.T. (ft):

DATE STARTED: 7/12/22
DATE FINISHED: 7/12/22
DRILLED BY: M. BOATRIGHT
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N VALUE	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./DAY)	ORGANIC CONTENT (%)
0						Gray and brown SAND, with silt [SP-SM]						
1	X					Very loose tan and orange SAND [SP]						
2	X	WOH-1-1	2									
3	X					Firm to stiff gray and orange sandy CLAY [CL]						
4	X	2-3-3	6				53	21				
5	X	5-4-5	9									
7	X	3-4-7	11									
8	X	3-3-3	6			Firm green, gray and orange CLAY [CH]						
10	X	2-3-3	6									
12				▼								
14	X					LIMESTONE						
15	X	4-2-1	3									
20	X	5-6-13	19			Boring Terminated at 20'						

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 0230.2200083.0000
REPORT NO.: 1967925
PAGE: A-4

PROJECT: OCALA PROPERTY
WEST ANTHONY ROAD AND NW 35TH TERRACE
OCALA, FLORIDA

BORING DESIGNATION: **B-3** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: [redacted]
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 10
DATE OF READING: 7/13/22
EST. W.S.W.T. (ft):

DATE STARTED: 7/13/22
DATE FINISHED: 7/13/22
DRILLED BY: M. BOATRIGHT
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N VALUE	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./DAY)	ORGANIC CONTENT (%)
0						Brown SAND, with silt [SP-SM]						
2	X	1-1-1	2			Very loose to loose light orange and tan SAND [SP]	7	4				
4	X	3-3-3	6									
5	X	3-4-4	8			Loose light brown and orange very clayey SAND [SC]						
7	X	5-4-6	10			Stiff to firm gray and orange sandy CLAY [CL], with limestone fragments						
8	X	2-2-2	4			Soft gray, light green and orange CLAY [CH]						
10	X	2-1-2	3	▼								
12						Very soft gray CLAY [CH]						
15	X	WOR	WOR				82	83				
20	X	WOR	WOR			Very soft CLAY [CH], with limestone fragments						
21	X	1-3-3	6			LIMESTONE						
22						Boring Terminated at 21.5'						

BORING OCALA PROPERTY.GPJ GAINESVILLE TEMPLATE.GDT 7/25/22

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0230.2200083.0000
REPORT NO.:	1967925
PAGE:	A-5

PROJECT: OCALA PROPERTY
WEST ANTHONY ROAD AND NW 35TH TERRACE
OCALA, FLORIDA

BORING DESIGNATION: **B-4** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: [redacted]

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 12
DATE OF READING: 7/12/22
EST. W.S.W.T. (ft):

DATE STARTED: 7/12/22
DATE FINISHED: 7/12/22
DRILLED BY: M. BOATRIGHT
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N VALUE	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORGANIC CONTENT (%)
0						Brown SAND, with silt [SP-SM]						
1	X					Loose light orange SAND, with silt [SP-SM]						
2	X	1-1-3	4			Medium dense to loose orange and light brown very clayey SAND [SC]						
4	X	5-6-7	13				39	15				
4.5	X					LIMESTONE Boulder						
5	X	13-23-16	39									
5.5	X					Medium dense light brown and orange clayey SAND [SC]						
6.5	X	7-6-6	12			Stiff to firm gray and orange sandy CLAY [CL]						
8	X	7-6-5	11									
10	X	3-3-4	7									
12				▼								
14	X					LIMESTONE						
15	X	3-42-50/4"	50/4"									
20	X	40-19-17	36			Boring Terminated at 20'						

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0230.2200083.0000
REPORT NO.:	1967925
PAGE:	A-6

PROJECT: OCALA PROPERTY
WEST ANTHONY ROAD AND NW 35TH TERRACE
OCALA, FLORIDA

BORING DESIGNATION: **B-5** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: [redacted]
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 12
DATE OF READING: 7/13/22
EST. W.S.W.T. (ft):

DATE STARTED: 7/13/22
DATE FINISHED: 7/13/22
DRILLED BY: M. BOATRIGHT
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	BLOWS PER 6" INCREMENT	N VALUE	W.T.	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	PI	K (FT./DAY)	ORGANIC CONTENT (%)
0 – 1				Gray CLAY [CH]						
1 – 2				Loose brown SAND, with silt [SP-SM]						
2 – 4.5	2-3-3	6		Loose light brown silty SAND [SM]	13	7				
	2-2-2	4								
4.5 – 7.5	5-5-5	10		Stiff to very stiff orange and light brown sandy CLAY [CL], with trace cemented sand						
	6-8-8	16								
7.5 – 11.5	3-3-5	8		Stiff green and orange CLAY [CH]						
	3-5-6	11								
11.5 – 14			▼ (12)	Loose orange and light brown clayey SAND [SC]						
14 – 19	7-4-3	7		Firm gray, green and orange CLAY [CH]						
19 – 21.5	1-1-2	3		Soft to firm gray and orange CLAY [CH], with limestone fragments						
	2-3-2	5								
21.5				Boring Terminated at 21.5'						

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0230.2200083.0000
REPORT NO.:	1967925
PAGE:	A-7

PROJECT: OCALA PROPERTY
WEST ANTHONY ROAD AND NW 35TH TERRACE
OCALA, FLORIDA

BORING DESIGNATION: **B-6** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: [redacted]

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 8
DATE OF READING: 7/13/22
EST. W.S.W.T. (ft):

DATE STARTED: 7/13/22
DATE FINISHED: 7/13/22
DRILLED BY: M. BOATRIGHT
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N VALUE	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./DAY)	ORGANIC CONTENT (%)
0						Brown SAND [SP], with trace cemented sand						
1.5	X	2-3-2	5			Firm brown and orange sandy CLAY [CL]	66	30	41	24		
3	X	3-3-4	7									
5	X	2-2-4	6			Firm to stiff gray and orange CLAY [CH], with limestone fragments						
6.5	X	3-3-3	6									
8	X	4-4-5	9	▼								
8.5						Stiff CLAY and Limestone						
9	X	1-4-4	8			LIMESTONE						
14	X	2-5-12	17									
19	X	1-4-7	11									
20						Boring Terminated at 20'						

UNIVERSAL ENGINEERING SCIENCES

KEY TO BORING LOGS

SYMBOLS

22	Number of Blows of a 140-lb Weight Falling 30 in. Required to Drive Standard Spoon One Foot
WOR	Weight of Drill Rods
S	Thin-Wall Shelby Tube Undisturbed Sampler Used
90% Rec.	Percent Core Recovery from Rock Core-Drilling Operations
	Sample Taken at this Level
	Sample Not Taken at this Level
	Change in Soil Strata
	Free Ground Water Level
	Seasonal High Ground Water Level

GRANULAR MATERIALS

Relative Density	Safety Hammer SPT N (Blows/Ft.)	Automatic Hammer SPT N (Blows/Ft.)
Very Loose	Less than 4	Less than 3
Loose	4-10	3-8
Medium Dense	10-30	8-24
Dense	30-50	24-40
Very Dense	>50	>40

COHESIVE MATERIALS

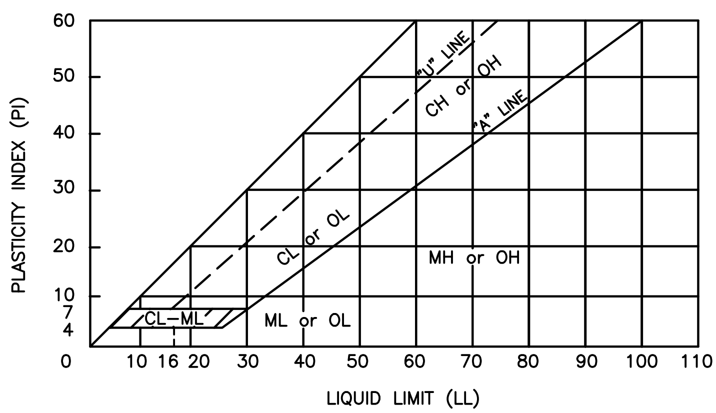
Consistency	Safety Hammer SPT N (Blows/Ft.)	Automatic Hammer SPT N (Blows/Ft.)
Very Soft	Less than 2	Less than 1
Soft	2-4	1-3
Firm	4-8	3-6
Stiff	8-15	6-12
Very Stiff	15-30	12-24
Hard	>30	>24

UNIFIED CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve*	**GRAVELS** 50% or more of coarse fraction retained on No. 200 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, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes 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 silty 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 diatomacaceous fine sands or silts, elastic silts
			CH	Inorganic clays or high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly organic Soils			PT	Peat, muck and other highly organic soils

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

PLASTICITY CHART



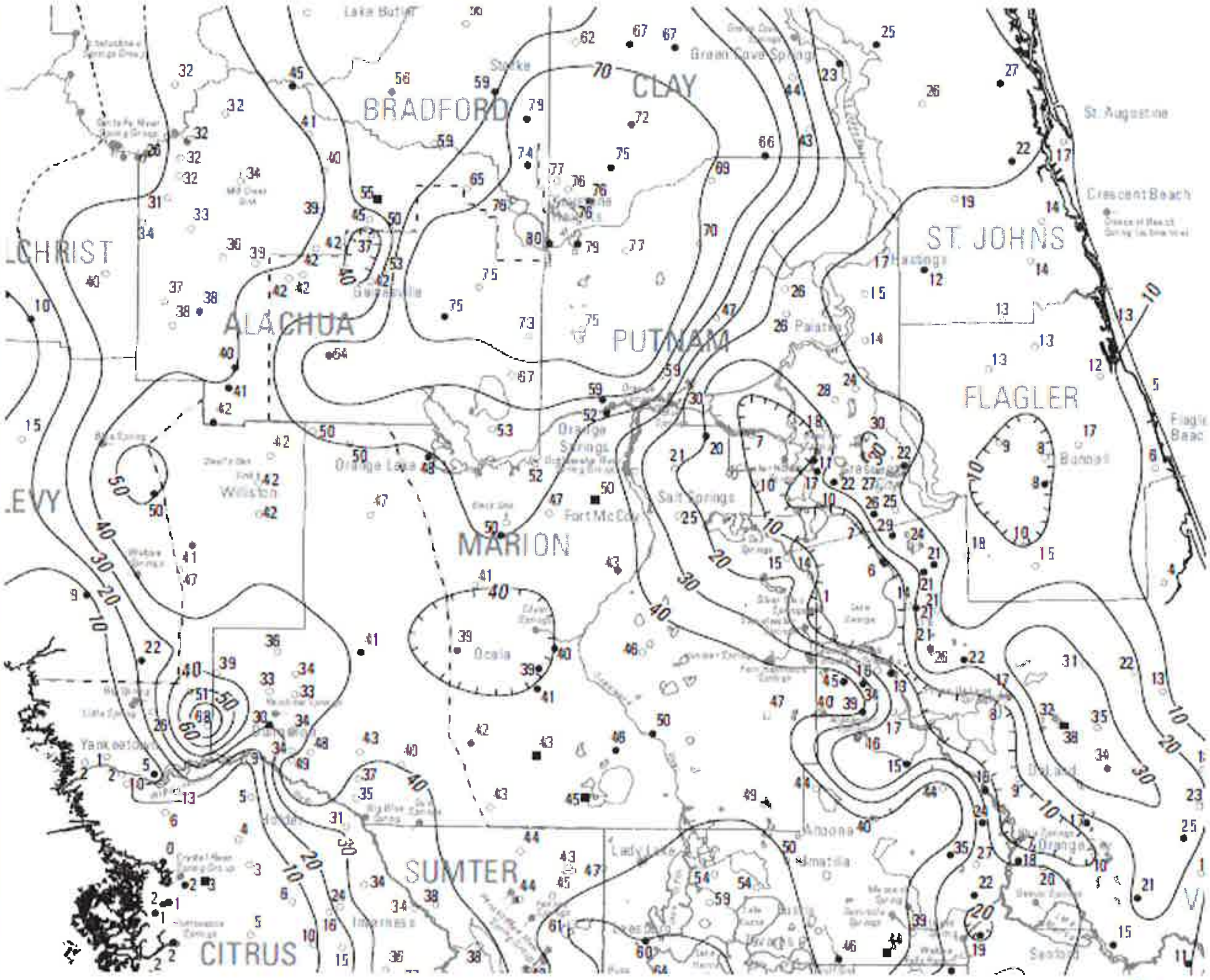
APPENDIX B

Potentiometric Surface Map

FGS Subsidence Incident Reports

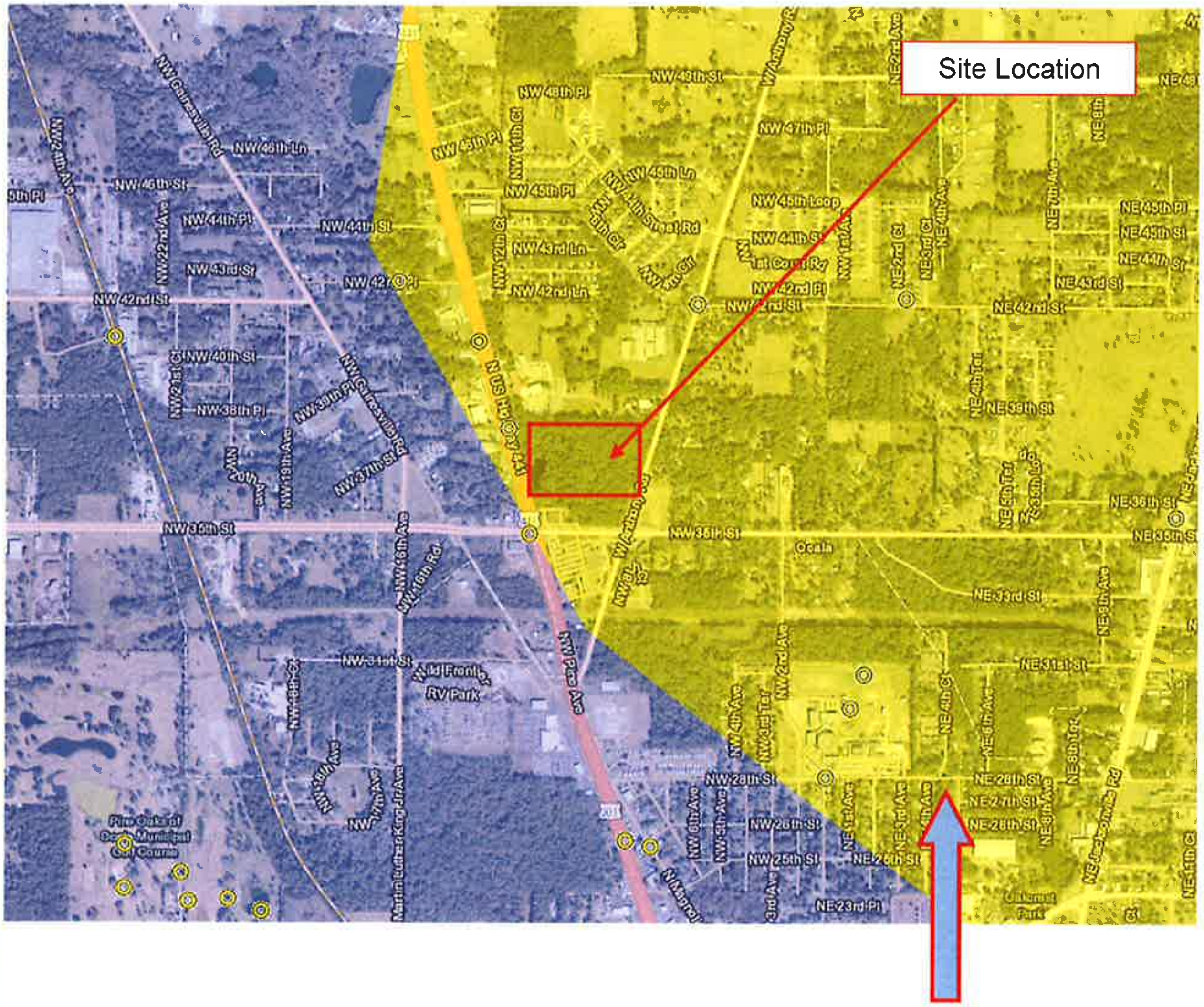
USDA Soil Survey of Marion County

USGS Quadrangle Map, Dunnellon Florida



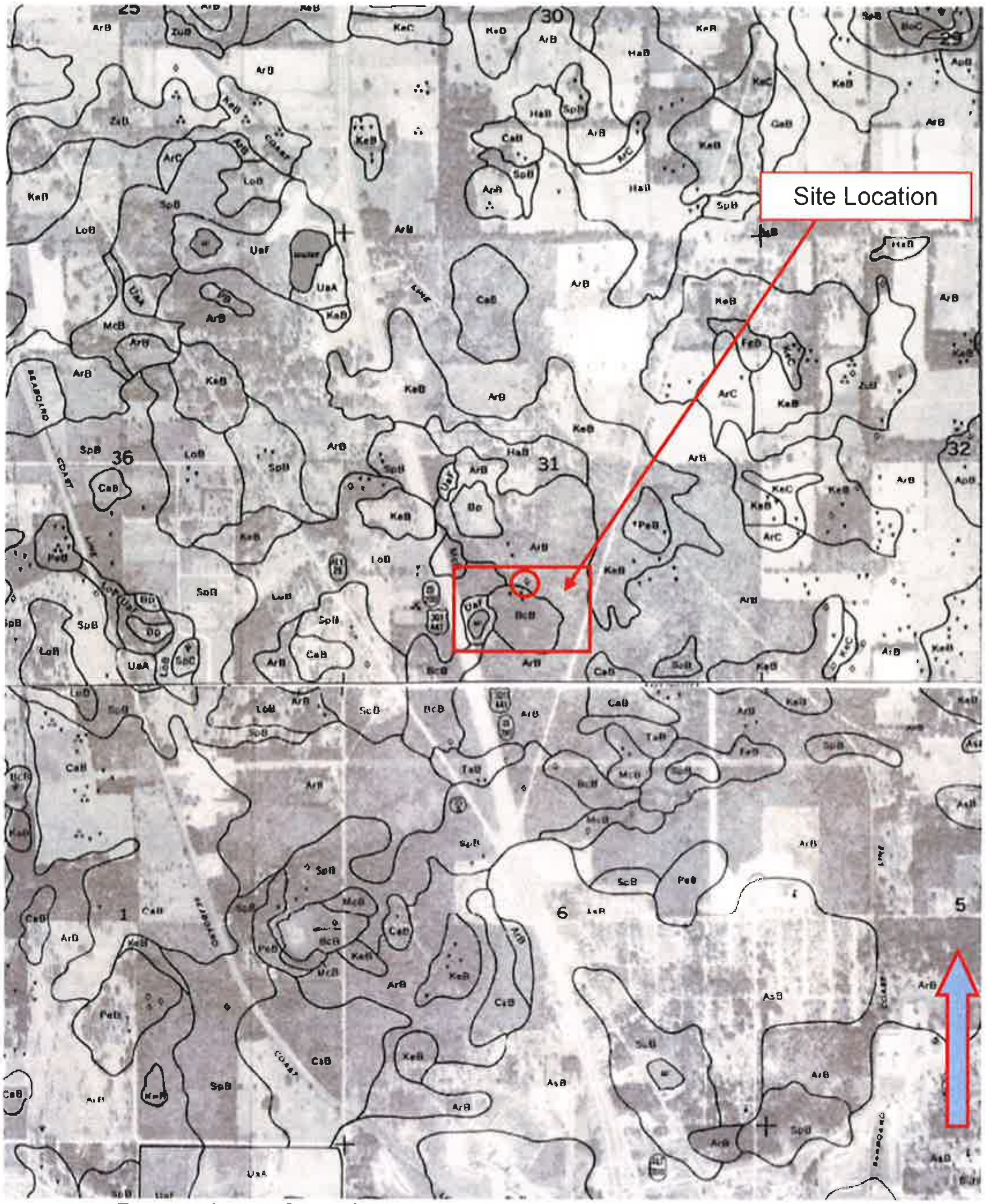
UNIVERSAL ENGINEERING SCIENCES

[redacted] Tax Parcel: 15392-000-00 – W. Anthony Road Ocala, Marion County, Florida		
Potentiometric Surface of the Upper Floridan Aquifer SJRWMD May 2009		
DATE: 07-21-22	UES PROJECT NO.: 0230.2200083	APPENDIX NO.: B
SCALE: N.T.S.	REPORT NO.: 1967925	FIGURE NO.: B-1



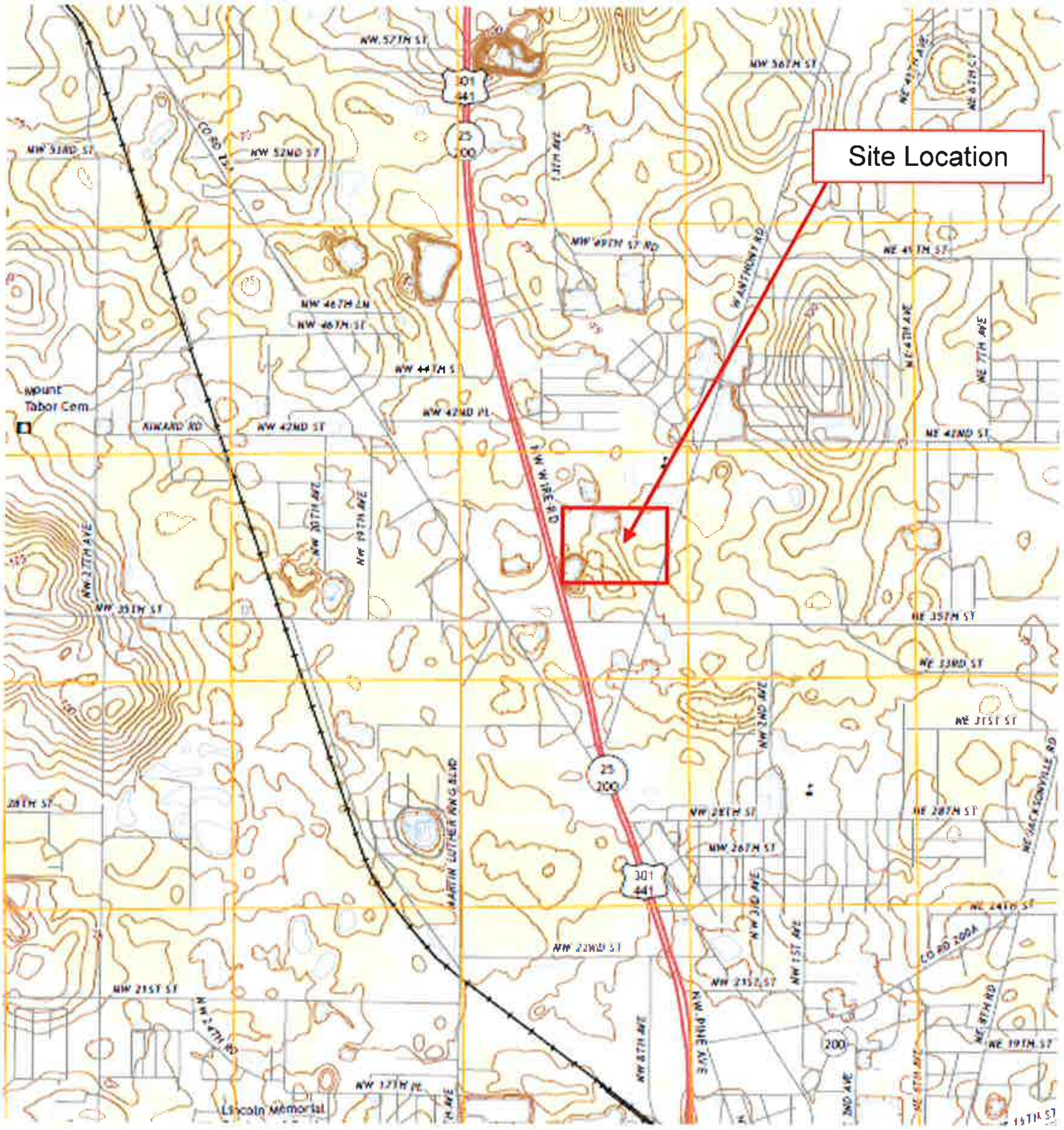
UNIVERSAL ENGINEERING SCIENCES	[redacted] **Tax Parcel: 15392-000-00 – W. Anthony Road** **Ocala, Marion County, Florida**
	FGS Subsidence Reports

DATE: 07-21-22	UES PROJECT NO.: 0230.2200083	APPENDIX NO.: B
SCALE: N.T.S.	REPORT NO.: 1967925	FIGURE NO.: B-2



○ Depression or Sink (Observed adjacent to project site)

UNIVERSAL ENGINEERING SCIENCES	**Sargi Property Ocala – Due Diligence** **Tax Parcel: 15392-000-00 – W. Anthony Road** **Ocala, Marion County, Florida**		
	USDA Soil Survey Map		
	DATE: 07-21-22	UES PROJECT NO.: 0230.2200083	APPENDIX NO.: B
	SCALE: N.T.S.	REPORT NO.: 1967925	FIGURE NO.: B-3



UNIVERSAL ENGINEERING SCIENCES	**Sargi Property Ocala – Due Diligence Tax Parcel: 15392-000-00 – W. Anthony Road Ocala, Marion County, Florida**		
	UGSG Quadrangle Maps		
	DATE: 07-21-22	UES PROJECT NO.: 0230.2200083	APPENDIX NO.: B
	SCALE: N.T.S.	REPORT NO.: 1967925	FIGURE NO.: B-4

APPENDIX C

Important Information About Your Geotechnical Engineering Report
Constraint and Restrictions

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.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in 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.

Geotechnical-Engineering 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 given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives 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 this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- 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. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include 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.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering 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 subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

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

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