GEOTECHNICAL EXPLORATION

TAVARES STARBUCKS
TAVARES, LAKE COUNTY, FLORIDA

UES PROJECT NO. 0130.2400043.0000
UES REPORT NO. 2072701

PREPARED FOR:

Tavares Outparcel LLC DBA Red Bell Partners
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ATTN: MR. NICK JONES

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February 22, 2024

Materials Testing
Geotechnical Engineering
Environmental
Building Sciences & Safety
Inspections & Code Compliance
Virtual Design Consulting

February 22, 2024

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Attention: Mr. Nick Jones, Managing Member
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Reference: **Geotechnical Exploration**
Tavares Starbucks
29925 FL -19
Tavares, Lake County, Florida 32778
UES Project No. 0130.2400043.0000
UES Correspondence No. 2072701

Dear Mr. Jones,

UES has completed the Geotechnical Exploration at the above referenced site in Tavares, Florida. The scope of our exploration was planned in conjunction with and authorized by you. This exploration was performed in general accordance with UES Proposal No. 2067404 dated January, 2024 and generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made.

The following report presents the results of our field exploration with a geotechnical engineering interpretation of those results with respect to the project characteristics as provided to us. We have included our estimates of the seasonal high groundwater level at the boring locations, and geotechnical recommendations for foundation design, pavement design, and site preparation. *Generally, the site was found to be suitable for the proposed development following the typical site preparation procedures presented in this report. However, a good compaction protocol must be followed in areas where very loose sands were encountered to depths greater than 5 feet below existing grades.*

We appreciate the opportunity to have worked with you on this project and look forward to a continued association. Please do not hesitate to contact us if you should have any questions, or if we may further assist you as your plans proceed.

Respectfully Submitted,
UNIVERSAL ENGINEERING SCIENCES, LLC.
Certificate of Authorization No. 549

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1.0 PROJECT DESCRIPTION

We understand that the proposed project will include designing process for a new commercial development of Starbucks retail building located at 29925 FL-19, Tavares, Lake County, Florida. We were provided with a conceptual site plan showing the property and the proposed improvements. The site plan indicated one (1) single-story retail building, trash enclosure, and parking and drive areas. We have assumed stormwater will be collected off-site within a master system.

Preliminary structural loading information was not available at the time of this report. Based on our experience with similar projects, we have assumed maximum column loads will be on the order of 40 kips and maximum wall loads will be on the order of 4 kips per linear foot. We anticipate that minimal (i.e. less than 3 feet of) structural fill will be necessary to achieve finished grades in the proposed building and pavement areas of the site.

Should any of the above information or assumptions made by UES be inconsistent with the planned development and construction, we request that you contact us immediately to allow us the opportunity to review the new information in conjunction with our report and revise or modify our engineering recommendations accordingly, as needed.

No site or project facilities/improvements, other than those described herein, should be designed using the soil information presented in this report. Moreover, UES will not be responsible for the performance of any site improvement so designed and constructed.

2.0 PURPOSE

The purposes of this exploration were:

- to explore and evaluate the subsurface conditions at the site with special attention to potential problems that may impact the proposed development,
- to provide our estimates of the seasonal high groundwater level at the boring locations and
- to provide geotechnical engineering recommendations for foundation design, pavement design, and site preparation.

3.0 SITE DESCRIPTION

The subject site is located within Section 6, Township 20 South, and Range 26 East in Lake County, Florida. More specifically, the subject site is located at 29925 FL-19, Tavares, Florida, as shown in the attached Appendix. At the time of drilling, the site consisted of vacant parcel.

3.1 SOIL SURVEY

There is one (1) soil type mapped within the general area of the site according to the USDA NRCS Soil Survey of Lake County. A brief summary of the mapped surficial soil type(s) is presented in Table I on the following page.

TABLE I
SUMMARY OF PUBLISHED SOIL DATA [1]

Soil Symbol	Soil Type	Hydrologic Group	Drainage Characteristics	Depth of Published Seasonal High GWT (feet)
8	Candler sand, 0 to 5 percent slopes	A	Excessively drained	>6½

[1] Data obtained from the NRCS online webpage, accessed on 2/22/2024

Figure I: Web Soil Survey
(Image obtained from the USDA NRCS Web Soil Survey online webpage, accessed on 2/22/2024)

3.2 TOPOGRAPHY

According to information obtained from the United States Geologic Survey (USGS) "Eustis, Florida" quadrangle map, the predevelopment ground surface elevation across the site area ranges from approximately +80 feet National Geodetic Vertical Datum (NGVD). A copy of a portion of the USGS Map is included in Appendix A.

4.0 SCOPE OF SERVICES

The services conducted by UES during our geotechnical exploration were as follows:

- Two (2) Standard Penetration Test (SPT) boring to a depth of 15 feet below existing land surface (bls) within the proposed building footprint.
- Two (2) SPT boring to a depth of 10 feet bls within the proposed parking and roadway areas surrounding the building.

- One (1) SPT boring to a depth of 15 feet bls within the proposed trash enclosure area.

- Secured samples of representative soils encountered in the soil borings for review, laboratory analysis and classification by a Geotechnical Engineer.

- Measured the existing site groundwater levels and provide an estimate of the seasonal high groundwater level at the boring locations.

- Assessed the existing soil conditions with respect to the proposed construction.

- Prepared a report which documents the results of our exploration and analysis with geotechnical engineering recommendations.

5.0 FIELD EXPLORATION

The five (5) SPT borings, designated B-01, B-02, R-01, R-02, and TP-01 as shown on the attached Boring Location Plan in Appendix B, were performed in general accordance with the procedures of ASTM D 1586 "Standard Method for Penetration Test and Split-Barrel Sampling of Soils". SPT sampling was performed continuously within the top 10 feet to detect variations in the near surface soil profile and on approximate 5 feet centers thereafter.

The SPT soil borings were performed with a truck-mounted drilling rig. The borings were located using the provided site plan, measuring from existing on-site landmarks shown on an aerial photograph, and by using handheld GPS devices. No survey control was provided prior to performing our field work. Hence, the indicated test boring locations should be considered accurate to the degree of the methodologies used. The approximate boring locations are shown in Appendix B.

6.0 LABORATORY TESTING

The soil samples recovered from the test borings were returned to our laboratory and visually classified in general accordance with ASTM D 2487 "Standard Classification of Soils for Engineering Purposes" (Unified Soil Classification System). We selected representative soil samples from the borings for laboratory testing to aid in classifying the soils and to help to evaluate the general engineering characteristics of the site soils. The results of these tests are shown on the boring logs in Appendix B. A summary of the tests performed is shown in Table II.

TABLE II
LABORATORY METHODOLOGIES

Test Performed	Number Performed	Reference
Wash No. 200 Sieve Determination	5	ASTM D 1140 "Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75-µm) Sieve"
Moisture Content	5	ASTM D 2216 "Laboratory Determination of Water (Moisture) Content of Soil by Mass"

7.0 SUBSURFACE CONDITIONS

7.1 GENERALIZED SOIL PROFILE

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

TABLE III
GENERAL SOIL PROFILE

Typical Depth (feet, bls)		Soil Description	Typical Range of SPT "N" Values
From	To		
Surface	15*	Very loose to medium dense fine SAND and fine SAND with silt content [SP, or SP-SM]	3 to 17

*Denotes maximum termination depths of borings

8.0 GROUNDWATER CONDITIONS

8.1 EXISTING GROUNDWATER LEVEL

We measured the water levels in the boreholes on February 16, 2024 during our drilling operations. No groundwater was encountered at all boring locations within the upper 10- feet below existing grade at the time of our exploration, prior to the introduction of drilling fluid (mud).

Fluctuations in groundwater levels should be anticipated throughout the year, primarily due to seasonal variations in rainfall, surface runoff, and other factors that may vary from the time the borings were conducted.

8.2 SEASONAL HIGH GROUNDWATER LEVEL

Based on historical data, the rainy season in Central Florida is between June and October of the year. In order to estimate the seasonal high water level at the boring locations, many factors are examined, including the following:

- Measured groundwater level
- Drainage characteristics of existing soil types
- Current & historical rainfall data
- Natural relief points (such as lakes, rivers, wetlands, etc.)
- Man-made drainage systems (ditches, canals, retention basins, etc.)
- On-site types of vegetation
- Review of available data (soil surveys, USGS maps, etc.)
- Redoximorphic features (mottling, stripping, etc.)

Based on the results of our field exploration and the factors listed above, we estimate that the seasonal high groundwater level at the boring locations will generally form at depths greater than 10 feet below existing grades at our boring locations. The estimated seasonal high groundwater levels at the boring locations are shown on the attached boring logs.

It should be noted that the estimated seasonal high water levels provided should be considered accurate to about ½ foot +/- and 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 exceed our seasonal high estimates. Further, it should be understood that changes in the surface hydrology and subsurface drainage from on-site and/or off-site improvements could have significant effects on the normal and seasonal high groundwater levels.

9.0 FOUNDATION DESIGN RECOMMENDATIONS

The following recommendations are made based upon a review of the attached soil test data, our understanding of the proposed construction, and experience with similar projects and subsurface conditions. The applicability of geotechnical recommendations is very dependent upon project characteristics such as improvement locations, and grade alterations. UES must review the final site and grading plans to validate all recommendations rendered herein.

Additionally, if subsurface conditions are encountered during construction, which were not encountered in the borings, report those conditions immediately to us for observation and recommendations.

9.1 STRUCTURAL AND GRADING INFORMATION

We understand that the proposed project will include construction of a new Starbucks retail building structure located at29925 FL-19, Tavares, Lake County, Florida.

Based on our experience with similar project, we have assumed maximum column loads will be on the order of 40 kips and maximum wall loads will be on the order of 4 kips per linear foot. We anticipate that minimal (i.e. less than 3 feet of) structural fill will be necessary to achieve finished grades in the proposed building and pavement areas of the site.

Prior to finalizing any design, the structural/grading information outlined above should be confirmed by the project structural/civil engineer. This is crucial to our evaluation and estimates of settlements. If any of this information is incorrect or if you anticipate any changes, please inform UES immediately so that we may review and modify our recommendations as appropriate.

9.2 ANALYSIS

Based on the results of the soil boring, the near surface soils within the proposed building areas appear to be very loose to medium dense fine SAND and fine SAND with varying silt contents to a depth of 15 feet below grade. It is our opinion that the proposed structure can be supported on properly designed and constructed shallow foundation systems. Provided that the site preparation recommendations outlined in this report are followed, the parameters outlined below may be used for foundation design.

9.3 BEARING PRESSURE

Provided our suggested site preparation procedures are followed, we recommend designing shallow footing foundations for a **maximum allowable net soil bearing pressure of 2,500 pounds per square foot (psf)**. The allowable net bearing pressure is that pressure that may be transmitted to the soil in excess of the minimum surrounding overburden pressure. The allowable bearing pressure should include dead load plus sustained live load. Per the Florida Building Code (FLBC), the foundations should be designed for the most unfavorable effects due to the combinations of loads specified in the FLBC.

9.4 FOUNDATION SIZE

The minimum width recommended for an isolated column footing is 24 inches. For continuous wall or slab on grade foundations, the minimum footing width should comply with the current FLBC, but under no circumstances should be less than 12 inches. Even though the maximum allowable soil bearing pressure may not be achieved, these width recommendations should control the size of the foundations.

9.5 BEARING DEPTH

The base of all footings should be at least 12 inches below finished grade elevation in accordance with the FLBC. We recommend stormwater and surface water be diverted away from the building exterior, both during and after construction, to reduce the possibility of erosion beneath the exterior footings.

9.6 BEARING MATERIAL

The bearing level soils should exhibit a density of at least 95 percent of the maximum dry density as determined by ASTM D 1557 (Modified Proctor) to a depth of at least **2 feet below foundation** level as described in this report. In addition to compaction, the bearing soils must exhibit stability and be free of "pumping" conditions.

9.7 SETTLEMENT ESTIMATES

Post-construction settlement of the structures will be influenced by several interrelated factors, such as (1) subsurface stratification and strength/compressibility characteristics of the bearing soils to a depth of approximately twice the width of the footing; (2) footing size, bearing level, applied loads, and resulting bearing pressures beneath the foundation; (3) site preparation and earthwork construction techniques used by the contractor, and (4) external factors, including but not limited to vibration from offsite sources and groundwater fluctuations beyond those normally anticipated for the naturally-occurring site and soil conditions which are present.

Our settlement estimates for the structure are based upon adherence to our recommended site preparation procedures presented in this report. Any deviation from these recommendations could result in an increase in the estimated post-construction settlement of the structures. Furthermore, should building loads change from those assumed by us, greater settlements may be expected.

Due to the sandy nature of the surficial soils, following the compaction operations we expect the majority of settlement to be elastic in nature and occur relatively quickly, on application of the loads, during and immediately following construction. Using the recommended maximum allowable bearing pressure, the assumed maximum structural loads, and the field and laboratory test data which we have correlated into the strength and compressibility characteristics of the subsurface soils, **we estimate the total post-construction vertical settlement of the proposed structures to be on the order of 1 inch or less.**

Differential settlement results from differences in applied bearing pressures and the variations in the compressibility characteristics of the subsurface soils. Assuming our site preparation recommendations are followed, **we anticipate post-construction differential settlement of less than ½ inch.**

9.8 FLOOR SLABS

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. For the slab design, we recommend using a subgrade modulus (k) of 100 pounds per cubic inch, which can be achieved by compacting the subgrade soils as recommended in this report. We recommend using a sheet vapor barrier (in accordance with Florida Building Code requirements) beneath the building slab-on-grade to help control moisture migration through the slab.

10.0 PAVEMENT RECOMMENDATIONS

10.1 GENERAL

We assume that the proposed parking and drive areas will consist of a combination of flexible asphaltic and rigid concrete pavement sections with typical commercial traffic. 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.

10.2 ASPHALTIC PAVEMENTS

10.2.1 Layer Components

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 the site preparation section of this report
- a twenty (20) year design life
- terminal serviceability index (P_t) of 2.5
- reliability of 90 percent
- total equivalent 18 kip single axle loads (E_{18}SAL) up to 35,000 for light duty pavements - car and pickup truck traffic
- total equivalent 18 kip single axle loads (E_{18}SAL) up to 250,000 for heavy duty pavements – occasional heavy truck traffic (delivery, trash collection, service lanes, etc.)

We recommend using a three-layer pavement section for the proposed asphaltic parking/drive areas consisting of stabilized subgrade, base course, and surface course. Based on the results of our soil borings, the assumed traffic loading information and review of the 2020 FDOT Flexible Pavement Design Manual, our minimum recommended pavement component thicknesses are presented in Table IV. Where applicable, the local municipality minimum standards should be followed when more stringent than the recommendations herein.

TABLE IV
MINIMUM ASPHALTIC PAVEMENT COMPONENT THICKNESSES

Traffic Loading	Layer Component (inches)		
	Surface Course	Base Course	Subgrade
Light Duty	1½*	6	12
Heavy Duty*	2½	8	12

*Roads which will accommodate heavy truck traffic should be designed as heavy duty

10.2.2 Subgrade

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

Stabilized subgrade can be imported materials or a blend of on-site and imported materials. If a blend is proposed, we recommend that the contractor perform a mix design to find the optimum mix proportions. Compaction testing of the subgrade should be performed to full depth at a frequency of at least one (1) test per 10,000 square feet.

10.2.3 Base Course

Based on the results of our exploration and our experience in the project area, limerock, soil-cement and recycled crushed concrete are suitable base course materials for this project. However, local municipality standards may govern the use of recycled crushed concrete use as an alternative base course material. We recommend the civil engineer consult with the local municipalities prior to selecting the base course material for this project.

For a limerock base, the base course should be compacted to a minimum density of 98 percent of the Modified Proctor maximum dry density and exhibit a minimum LBR of 100. The limerock material should comply with the latest edition of the Florida Department of Transportation (FDOT) Road and Bridge Construction specifications.

For a soil-cement base, we recommend the contractor perform a soil-cement design with a minimum seven (7)-day strength of 300 pounds per square inch (psi) on the materials he intends to use. Place soil-cement in maximum 6-inch lifts uniform and compact in place to a minimum density of 95 percent of the maximum dry density according to specifications in ASTM D-558, "Moisture Density Relations of Soil Cement Mixtures".

Place and finish the soil-cement according to Portland Cement Association requirements. Final review of the soil-cement base course should include manual "chaining" and/or "soundings" seven days after placement. Shrinkage cracks will form in the soil-cement mixture and you should expect reflection cracking on the surface course.

Recycled Concrete Aggregate (RCA) may provide a cost-effective alternative material in lieu of limerock or soil cement base courses. Local availability, along with municipality standards, typically governs the use of crushed concrete use as an alternative base course material. The advantages of using crushed concrete as a pavement base course include its high strength (stronger than limerock), resistance to groundwater related distress, and lack of reflection cracking caused by thermal expansion and contraction.

If RCA base is used, the base course material should be sourced from an FDOT approved supplier. The base should be compacted to a minimum density of 98 percent of the Modified Proctor maximum dry density and exhibit a minimum LBR of 150. The base material should comply with the gradation requirements listed in the latest edition of the FDOT Road and Bridge Construction Specifications.

Compaction testing of the base course should be performed to full depth at a frequency of at least one (1) test per 10,000 square feet,

10.2.4 Surface Course

For the pavements, 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 topped with SP-9.5 fine mix for heavy duty areas. The asphalt concrete should be placed within the allowable lift thicknesses for fine Type SP mixes per the latest edition of FDOT, Standard Specifications for Road and Bridge Construction.

The asphaltic concrete should be compacted to an average field density of 93 percent of the laboratory maximum density determined from specific gravity (G_{mm}) methods, with an individual test tolerance of **+2 percent and -1.2% of the design G_{mm}**. Specific requirements for the SuperPave asphaltic concrete structural course are outlined in the latest edition of FDOT, Standard Specifications for Road and Bridge Construction.

Note: If the Designer (or Contract Documents) limits compaction to the static mode only or lifts are placed one-inch thick, then the average field density should be 92 percent, with an individual test tolerance of + 3 percent, and -1.2% of the design G_{mm}.

After placement and field compaction, the wearing surface should be cored to evaluate material thickness and density. Cores should be obtained at frequencies of at least one (1) core per 10,000 square feet of placed pavement, or a minimum of two (2) cores per day's production.

10.2.5 Effects of Groundwater

One of the most critical influences on the pavement performance in 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 12 inches for RCA and soil-cement base courses, and at least 18 inches for a limerock base course.**

The separation should be confirmed by reviewing the final site grading and paving plan. If the separation is not provided by grading, the installation of underdrains will be required.

10.2.6 Landscape Underdrains

In the event that landscape areas adjacent to the pavements include large mounds (>1 foot) of poorly draining organic topsoils or silty/clayey sands, we recommend that landscape drains be provided to protect the roadway against adverse effects from over-irrigation or excess rainfall.

10.3 CONCRETE "RIGID" PAVEMENTS

Concrete pavement is a rigid pavement that transfers much lighter wheel loads to the subgrade soils than a flexible asphalt pavement; therefore, requiring less subgrade preparation. Concrete pavement is recommended in truck court areas, under the dumpster areas, and 10 feet in front of the trash enclosures, at a minimum.

We recommend using the existing surficial sands or approved structural fill densified to at least 98 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 prepared as recommended in the Site Preparation section of this report.

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

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

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

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

Based on the results of the soil borings and review of the FDOT Rigid Pavement Design Manual, we recommend using the minimum design shown in Table V on the following page for concrete pavements.

TABLE V
MINIMUM CONCRETE PAVEMENT THICKNESSES

Service Level	Minimum Pavement Thickness	Maximum Control Joint Spacing	Recommended Saw Cut Depth
Light Duty	6 inches	12 feet x 12 feet	2 inches
Heavy Duty	7 inches	14 feet x 14 feet	2⅓ 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 ⅓ of the concrete slab thickness.

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

11.0 SITE PREPARATION

We recommend normal, good practice site preparation procedures for the new construction areas. These procedures include: stripping/clearing of the site to remove existing vegetation, roots, topsoils, organics, debris, pavement, utility lines, etc. Following stripping, the exposed subgrade soils should be proof-rolled, and all subgrade and subsequent fill/backfill soils should be properly densified. A more detailed description of this work is presented in this section.

1. Prior to construction, existing underground utility lines and other below grade structures within the construction area should be located. Provisions should be made to relocate interfering utilities to appropriate locations. It should be noted that if underground improvements are not properly removed or plugged, they may serve as conduits for subsurface erosion which may lead to excessive settlement of overlying structures.

2. Perform any necessary remedial dewatering prior to any earthwork operations. Dewatering should be performed to a depth of at least **2 feet below the bottom of any excavations or compacted surface**.

3. Strip the proposed construction limits of existing improvements, vegetation, topsoil, roots, organic soils, debris and other deleterious materials within and 5 feet beyond the perimeter of the new construction areas. Expect clearing and grubbing to depths of 6 to 12 inches. We strongly recommend that the stripped/excavated surfaces be observed and probed by representatives of UES.

4. Proof-roll the exposed subsurface soils under the observation of UES, to locate any soft areas of unsuitable soils, and to increase the density of the shallow loose fine sand soils. If deemed necessary by UES, in areas that continue to "yield", remove any deleterious materials and replace with a clean, compacted sand backfill.

5. Place fill/backfill as necessary. All fill should consist of clean sand with less than 12 percent soil fines and be free of organics, debris and other deleterious materials. Fill soils containing between 5 and 12 percent fines may require strict moisture control. Place fill in maximum 12-inch loose, uniform lifts and compact each lift at least 95 percent of the Modified Proctor maximum dry density.

6. After approval of the stripped surface, within the at-grade (or below grade) foundation areas, compact the upper **2 feet of the exposed subgrade soils** (including the 5 feet margin) to at least 95 percent of the Modified Proctor test maximum dry density (ASTM D 1557).

7. Within the pavement areas, the upper 12 inches of subgrade beneath the base course or concrete slabs (sub-base) should be stabilized and compacted to at least 98 percent of the Modified Proctor maximum dry density.

8. Test the subgrade and each lift of fill for compaction at a frequency of not less than one test per 2,500 square feet in the building areas and 10,000 square feet of pavement areas, with a minimum of 4 tests in each area.

9. Prior to the placement of reinforcing steel and concrete, verify compaction within the footing trenches to a depth of 2 feet. We recommend testing every column footing and at least one test every 100 feet of wall footing, with a minimum of 4 tests per building. Re-compaction of the foundation excavation bearing level soils, if loosened by the excavation process, can typically be achieved by making several passes with a walk-behind vibratory sled or jumping jack.

Stability of the compacted soils is essential and independent of compaction and density control. If the near surface soils or the structural fill experience "pumping" conditions, terminate all earthwork activities in that area. Pumping conditions occur when there is too much water present in the soil-water matrix. Earthwork activities are actually attempting to compact the water and not the soil. The disturbed soils should be dried in place by scarification and aeration prior to any additional earthwork activities.
Vibrations produced during vibratory compaction operations at the site may be significantly noticeable within 100 feet and may cause distress to adjacent structures if not properly regulated. Provisions should be made to monitor these vibrations so that any necessary modifications in the compaction operations can be made in the field before potential damages occur. UES can provide vibration monitoring services to help document and evaluate the effects of the surface compaction operation on existing structures. It is recommended that large vibratory rollers remain a minimum of 50 feet from existing structures. Within this zone, the use of a static roller or small hand guided plate compactors is recommended.

12.0 DEWATERING AND EXCAVATION CONSIDERATIONS

Based on the groundwater level conditions encountered, dewatering **will likely not** be required for the successful construction of this project. Where excavations will extend only a few feet below the groundwater table, a sump pump may be sufficient to control the groundwater table. Deeper excavations may require well points and/or sock drains to control the groundwater table. Regardless of the method(s) used, we recommend drawing down the water level at least 2 feet below the bottom of the excavation. The actual method(s) of dewatering should be determined by the contractor. The design and discharge of the dewatering system must be performed in accordance with applicable regulatory criteria (i.e. water management district, etc.) and compliance with such criteria is the sole responsibility of the contractor.

Excavations should be sloped as necessary to prevent slope failure and to allow backfilling. As a minimum, temporary excavations below 4-foot depth 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.

13.0 LIMITATIONS

This report has been prepared for the exclusive use of **Tavares Outparcel LLC DBA Red Bull Partners** and other designated members of their design/construction team associated with the proposed construction for the specific project discussed in this report. No other site or project facilities should be designed using the soil information contained in this report. As such, UES will not be responsible for the performance of any other site improvement designed using the data in this report.

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

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 which may occur between the boring locations. The nature and extent of such variations may not become evident until the course of construction. If variations become evident, it will then be necessary for a re-evaluation of the recommendations of this report after performing on-site observations during the construction period and noting the characteristics of the variations. Borings for a typical geotechnical report are widely spaced and generally not sufficient for reliably detecting the presence of isolated, anomalous surface or subsurface conditions, or reliably estimating unsuitable or suitable material quantities. Accordingly, UES does not recommend relying on our boring information for estimation of material quantities unless our contracted services ***specifically*** include sufficient exploration for such purpose(s) and within the report we so state that the level of exploration provided should be sufficient to detect anomalous conditions or estimate such quantities. Therefore, UES will not be responsible for any extrapolation or use of our data by others beyond the purpose(s) for which it is applicable or intended.

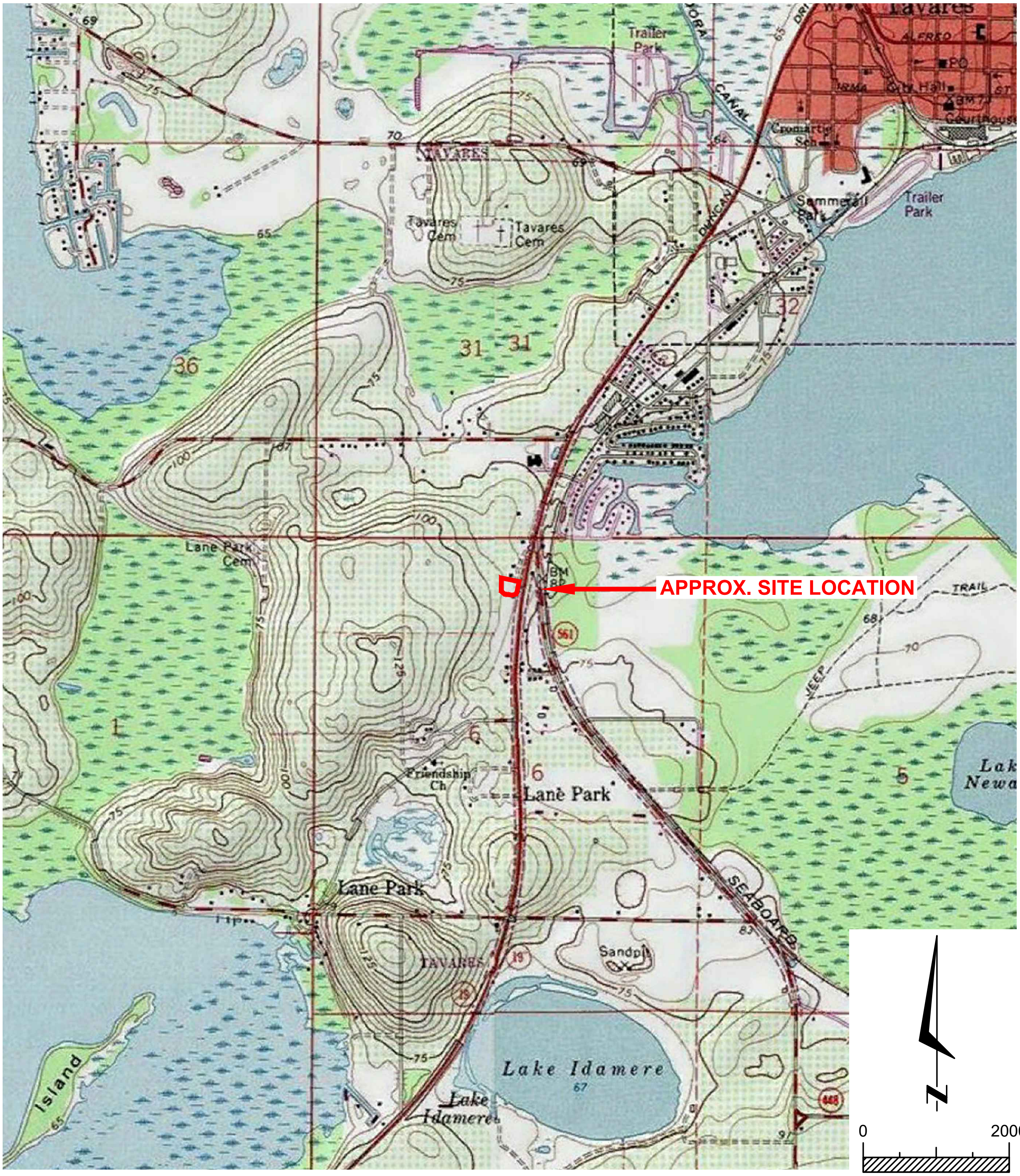
All users of this report are cautioned that there was no requirement for UES to attempt to locate any man-made buried objects or identify any other potentially hazardous conditions that may exist at the site during the course of this exploration. Therefore, no attempt was made by UES to locate or identify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

During the early stages of most construction projects, geotechnical issues not addressed in this report may arise. Because of the natural limitations inherent in working with the subsurface, it is not possible for a geotechnical engineer to predict and address all possible problems. Geotechnical Business Council (GBC) publication, "Important Information About This Geotechnical Engineering Report" appears in Appendix, and will help explain the nature of geotechnical issues.

Further, we present documents in Appendix: Constraints and Restrictions, to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report.

* * * * * * * * *

APPENDIX A



SOURCE: USGS QUADRANGLE MAP OF "EUSTIS, FLORIDA".

UES

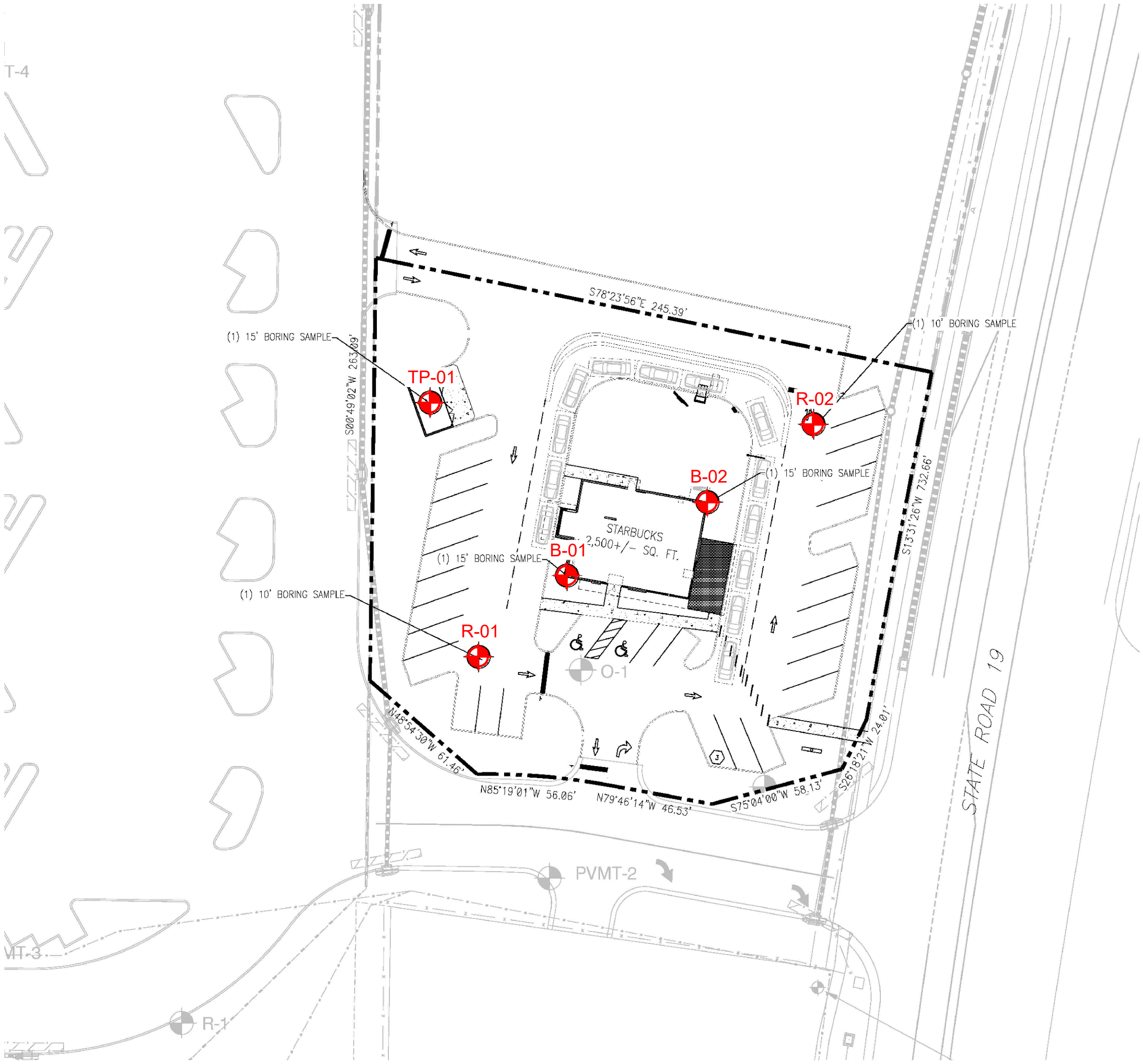
GEOTECHNICAL EXPLORATION
TAVARES STARBUCKS
TAVARES, LAKE COUNTY, FLORIDA

SITE LOCATION MAP

DRAWN BY:	N.F.	DATE:	2 - 19 - 2024	CHECKED BY:	K.E.	DATE:	2 - 22 - 2024
SCALE:	AS SHOWN	PROJECT NO:	0130.2400043.0000	REPORT NO:	2072701	PAGE NO:	A-1

24-0173-01

APPENDIX B



LEGEND

APPROX. STANDARD PENETRATION TEST
BORING LOCATION (SPT)
PERFORMED 2/16/2024

THIS DRAWING CREATED USING PLAN PROVIDED BY CLIENT.

UES

GEOTECHNICAL EXPLORATION
TAVARES STARBUCKS
TAVARES, LAKE COUNTY, FLORIDA

BORING LOCATION PLAN

DRAWN BY:	N.F.	DATE:	2 - 19 - 2024	CHECKED BY:	K.E.	DATE:	2 - 22 - 2024
SCALE:	AS SHOWN	PROJECT NO:	0130.2400043.0000	REPORT NO:	2072701	PAGE NO:	B-1

24-0173-01

UES BORING LOG

PROJECT NO.:	0130.2400043.0000
REPORT NO.:	2072701
PAGE:	B-2.1

PROJECT: GEOTECHNICAL EXPLORATION
TAVARES STARBUCKS
LAKE COUNTY, FLORIDA

BORING I.D.: **B-01** SHEET: **1 of 1**
SECTION: 6 TOWNSHIP: 20 S RANGE: 26 E

CLIENT: TAVARES OUTPARCEL, LLC
LOCATION: SEE BORING LOCATION PLAN
REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED, NE = NOT ENCOUNTERED

G.S. ELEVATION (ft): N.S. DATE STARTED: 2/16/24
WATER TABLE (ft): NE DATE FINISHED: 2/16/24
DATE OF READING: 2/16/2024 DRILLED BY: ORL - AI/MW
EST. SHGWT (ft): >10 TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N BLOWS / FT	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT/ DAY)	ORG. CONT. (%)
0						Loose brown fine SAND [SP]						
	X	4-4-5	9									
						-- medium dense						
	X	7-6-7	13									
						-- loose, orange						
5	X	5-4-3	7									
	X	2-2-2	4				3	5				
	X	2-2-2	4									
10	X	2-2-2	4									
15	X	3-3-3	6									
						BORING TERMINATED AT 15.0 FEET						
20												

W-13338.GPJ

UES BORING LOG

PROJECT NO.:	0130.2400043.0000
REPORT NO.:	2072701
PAGE:	B-2.2

PROJECT: GEOTECHNICAL EXPLORATION
TAVARES STARBUCKS
LAKE COUNTY, FLORIDA

BORING I.D.: **B-02** SHEET: **1 of 1**
SECTION: 6 TOWNSHIP: 20 S RANGE: 26 E

CLIENT: TAVARES OUTPARCEL, LLC
LOCATION: SEE BORING LOCATION PLAN
REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED, NE = NOT ENCOUNTERED

G.S. ELEVATION (ft): N.S. DATE STARTED: 2/16/24
WATER TABLE (ft): NE DATE FINISHED: 2/16/24
DATE OF READING: 2/16/2024 DRILLED BY: ORL - AI/MW
EST. SHGWT (ft): >10 TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N BLOWS / FT	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT/ DAY)	ORG. CONT. (%)
0						Loose dark grey fine SAND [SP]						
	X	4-4-4	8									
						-- brown						
	X	5-5-4	9									
5	X	3-3-2	5									
	X	1-2-2	4									
	X	1-2-2	4				2	5				
						-- very loose						
10	X	2-1-2	3									
						-- loose						
15	X	3-2-2	4									
						BORING TERMINATED AT 15.0 FEET						
20												

W-13338.GPJ

UES BORING LOG

PROJECT NO.:	0130.2400043.0000
REPORT NO.:	2072701
PAGE:	B-2.3

PROJECT: GEOTECHNICAL EXPLORATION
TAVARES STARBUCKS
LAKE COUNTY, FLORIDA

BORING I.D.: **R-01**
SHEET: **1 of 1**
SECTION: 6 TOWNSHIP: 20 S RANGE: 26 E

CLIENT: TAVARES OUTPARCEL, LLC
LOCATION: SEE BORING LOCATION PLAN
REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED, NE = NOT ENCOUNTERED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): NE
DATE OF READING: 2/16/2024
EST. SHGWT (ft): >10
DATE STARTED: 2/16/24
DATE FINISHED: 2/16/24
DRILLED BY: ORL - AI/MW
TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N BLOWS / FT	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT/ DAY)	ORG. CONT. (%)
0						Loose brown orange fine SAND with silt [SP - SM]						
	X	3-2-3	5				6	5				
	X	3-3-6	9									
5	X	8-6-4	10									
	X	3-3-3	6									
	X	3-2-3	5									
10	X	3-3-3	6			BORING TERMINATED AT 10.0 FEET						
15												
20												

W-13338.GPJ

UES BORING LOG

PROJECT NO.:	0130.2400043.0000
REPORT NO.:	2072701
PAGE:	B-2.4

PROJECT: GEOTECHNICAL EXPLORATION
TAVARES STARBUCKS
LAKE COUNTY, FLORIDA

BORING I.D.: **R-02** SHEET: **1 of 1**
SECTION: 6 TOWNSHIP: 20 S RANGE: 26 E

CLIENT: TAVARES OUTPARCEL, LLC
LOCATION: SEE BORING LOCATION PLAN
REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED, NE = NOT ENCOUNTERED

G.S. ELEVATION (ft): N.S. DATE STARTED: 2/16/24
WATER TABLE (ft): NE DATE FINISHED: 2/16/24
DATE OF READING: 2/16/2024 DRILLED BY: ORL - AI/MW
EST. SHGWT (ft): >10 TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N BLOWS / FT	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	PI	K (FT/ DAY)	ORG. CONT. (%)
0						Medium dense brown orange fine SAND [SP]						
	X	7-10-7	17									
	X	7-7-6	13				3	4				
						-- loose						
5	X	4-3-3	6									
	X	2-2-2	4									
	X	2-2-2	4									
10	X	3-3-3	6			BORING TERMINATED AT 10.0 FEET						
15												
20												

W-13338.GPJ

UES BORING LOG

PROJECT NO.:	0130.2400043.0000
REPORT NO.:	2072701
PAGE:	B-2.5

PROJECT: GEOTECHNICAL EXPLORATION
TAVARES STARBUCKS
LAKE COUNTY, FLORIDA

BORING I.D.: **TP-01** SHEET: **1 of 1**
SECTION: 6 TOWNSHIP: 20 S RANGE: 26 E

CLIENT: TAVARES OUTPARCEL, LLC
LOCATION: SEE BORING LOCATION PLAN
REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED, NE = NOT ENCOUNTERED

G.S. ELEVATION (ft): N.S. DATE STARTED: 2/16/24
WATER TABLE (ft): NE DATE FINISHED: 2/16/24
DATE OF READING: 2/16/2024 DRILLED BY: ORL - AI/MW
EST. SHGWT (ft): >10 TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N BLOWS / FT	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT/ DAY)	ORG. CONT. (%)
0						Medium dense brown fine SAND with rocks [SP]						
	X	6-6-6	12			-- loose, brown orange, no rocks						
	X	5-3-2	5			-- medium dense						
5	X	5-7-7	14			-- loose	5	8				
	X	7-5-4	9									
	X	3-2-2	4									
10	X	2-2-2	4									
15	X	3-3-3	6			BORING TERMINATED AT 15.0 FEET						
20												

W-13338.GPJ

KEY TO BORING LOGS

SYMBOLS AND ABBREVIATIONS

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

UNIFIED SOIL CLASSIFICATION SYSTEM

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

*Based on the material passing the 3-inch (75 mm) sieve
** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY
(Sands and Gravels)
Very loose – Less than 4 Blow/Foot
Loose – 4 to 10 Blows/Foot
Medium Dense – 11 to 30 Blows/Foot
Dense – 31 to 50 Blows/Foot
Very Dense – More than 50 Blows/Foot

CONSISTENCY
(Silts and Clays)
Very Soft – Less than 2 Blows/Foot
Soft – 2 to 4 Blows/Foot
Firm – 5 to 8 Blows/Foot
Stiff – 9 to 15 Blows/Foot
Very Stiff – 16 to 30 Blows/Foot
Hard – More than 30 Blows/Foot

RELATIVE HARDNESS
(Limestone)
Soft – 100 Blows for more than 2 Inches
Hard – 100 Blows for less than 2 Inches

MODIFIERS

These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample
Trace – 5% or less
With Silt or With Clay – 6% to 11%
Silty or Clayey – 12% to 30%
Very Silty or Very Clayey – 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample
Trace – Less than 3%
Few – 3% to 4%
Some – 5% to 8%
Many – Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample
Trace – 5% or less
Few – 6% to 12%
Some – 13% to 30%
Many – 31% to 50%

APPENDIX C

Important Information about This

Geotechnical-Engineering Report

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

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

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

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

Read the Full Report

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

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

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

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

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

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

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

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

Most Geotechnical Findings Are Professional Opinions

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

A Report's Recommendations Are Not Final

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

A Geotechnical-Engineering Report Is Subject to Misinterpretation

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

Do Not Redraw the Engineer's Logs

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

Give Constructors a Complete Report and Guidance

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

Read Responsibility Provisions Closely

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

Environmental Concerns Are Not Covered

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

Obtain Professional Assistance To Deal with Mold

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

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

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

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
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.

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