UNIVERSAL ENGINEERING SCIENCES

GEOTECHNICAL EXPLORATION

SURELOCK SELF STORAGE
INNOVATION WAY
ORLANDO, ORANGE COUNTY, FLORIDA

UES PROJECT NO. 0130.1800473.0000
UES REPORT NO. **1651179.V2**

PREPARED FOR:

Surelock Self Storage, LLC
2510 Teton Stone Run
Orlando, FL 32828
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April 15, 2019

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April 15, 2019

Surelock Self Storage, LLC
2510 Teton Stone Run
Orlando, FL 32828

Attention: Mr. Bouik Koshmer
bouik1@yahoo.com

Reference: **Geotechnical Exploration**
Surelock Self Storage
Innovation Way
Orlando, Orange County, Florida
UES Project No. 0130.1800473.0000
UES Report No. **1651179.V2**

Dear Mr. Koshmer:

Universal Engineering Sciences, Inc. (UES) has completed a geotechnical exploration at the above referenced site in Orlando, Orange County, Florida. The scope of our exploration was planned in conjunction with Dave Schmitt Engineering (DSE) and authorized by you. This exploration was performed in accordance with UES Proposal No. 1616018 dated October 15, 2018 and with 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 geotechnical recommendations for foundation design, pavement design, site preparation, and stormwater pond design. *Based on our findings, in order to successfully developed the proposed 1-story self-storage structures, a* ***Mechanically Stabilized Soil Layer (MSL)*** *will be required to help support the structures, as presented in this report.*

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, INC.
Certificate of Authorization No. 549

Gautham S. Pillappa, P.E.
Senior Geotechnical Engineer

RICARDO C. KIRIAKIDIS LICENSE No. 70602 STATE OF FLORIDA PROFESSIONAL ENGINEER

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Cc - Client
Mr. Dave Schmitt, PE, DSE

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1.0 PROJECT DESCRIPTION

We understand that the proposed project will include the construction of 453-unit self-storage units, within four (4) buildings. We have been provided with an Overall Site Plan (prepared by Dave Schmitt Engineering, Inc. and dated November 17, 2017). The site plan indicates four (4) 1-story buildings (Buildings A, B, C, D), approximately 80,347 square feet in total area, stormwater pond area and associated parking and drive areas.

Further, we have been informed that the vertical construction will consist of two phases; the first phase will include the construction of all the building pads for the 8 proposed buildings, stormwater pond, parking/pavement areas and Buildings A through Building D and the second phase will include the vertical construction of Building E through Building H.

The subject property is located east of Innovation Way in Orange County. *Please note that this area was used as a borrow source and appears to have been backfilled in the early 2000's*.

UES has been asked to perform a geotechnical exploration of the subject site. Our scopes of services have been designed to evaluate the subsurface conditions on subject site for the proposed site improvements.

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.

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, site preparation and stormwater pond design.

This report presents an evaluation of site conditions on the basis of geotechnical procedures for site characterization. The recovered samples were not examined, either visually or analytically, for chemical composition or environmental hazards. We would be glad to provide you with a proposal for these services at your request.

3.0 SITE DESCRIPTION

The subject site is located within Sections 12, Township 23 South, Range 31 East in Orange County, Florida. More specifically, the site is located east of Innovation Way and west of South Alafaya Trail, as shown on the attached Figures A-1 and B-1. At the time of drilling, the majority of the site was moderately vegetated and covered by some trees and underbrush. *Please note*

that this area was used as a borrow source and appears to have been backfilled in the early 2000's.

3.1 SOIL SURVEY

There are two (2) native soil types mapped within the general area of the site according to the USDA NRCS Soil Survey of Orange County. A brief summary of the mapped surficial (native) soil type(s) is presented in Table I. ***Please note that the surficial soil types and their associated engineering properties may have been altered during the past development of the subject site (sand mining and backfilling/usage as C&D Landfill).***

TABLE I
SUMMARY OF PUBLISHED SOIL DATA

Soil Symbol	Soil Type	Hydrologic Group	Drainage Characteristics	Depth of Published Seasonal High GWT (feet)
44	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	B/D	Very poorly drained	0 to 1.5
99	Water	--	--	--

3.2 TOPOGRAPHY

According to information obtained from the United States Geologic Survey (USGS) "Narcoossee NW, Florida" quadrangle map, and partial Google Earth imagery, the ground surface elevation across the site area ranges from approximately ±70 to ±75 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:

- UES drilled thirteen (13) Standard Penetration Test (SPT) borings to depths of 20 feet to 25 feet below existing land surface (bls) within the proposed building, parking and stormwater pond areas, during our October-November 2018 exploration.

- Subsequently, UES drilled four (4) additional SPT borings to depths of 60 feet to 65 feet below existing land surface (bls) within the proposed building areas during our January 2019 exploration.

- 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.

- Conducted laboratory testing on selected soil samples obtained in the field to determine their engineering properties.

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

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

5.0 FIELD EXPLORATION

The SPT soil borings were performed with an ATV mounted drilling rig. Horizontal and vertical survey control was not provided for the test locations prior to our field exploration program. UES located the test borings by using the provided site plan, measuring from existing on-site landmarks shown on an aerial photograph, and by using handheld GPS devices. The indicated test locations should be considered accurate to the degree of the methodologies used. The approximate boring locations are shown in Appendix B.

The SPT borings, designated B-01 through B-12, R-01 through R-03, P-01 and P-02 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 to 10 feet to detect variations in the near surface soil profile and on approximate 5 feet centers thereafter.

Ground surface elevations at the boring locations would be beneficial to help us to identify any anomalies in our measured and estimated seasonal high groundwater levels, as well as improve the usefulness the groundwater information during the civil engineering design of the site.

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
Grain Size Analysis (#200 wash only)	12	ASTM D 1140 “Amount of Material in Soils Finer than the No. 200 (75 - µm) sieve”
Moisture Content	17	ASTM D 2216 “Laboratory Determination of Water (Moisture) Content of Soil by Mass”
Organic Content	5	ASTM D 2974 “Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils”

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. For detailed soil profiles, please refer to the attached boring logs.

TABLE III
GENERALIZED SOIL PROFILE

Typical Depth (feet, bls)		Soil Description	Range of SPT "N" Values (blows/ft)
From	To		
Surface	**13 to 18**	**Very loose to very dense LANDFILL WASTE AND DEBRIS.**	**1 to 50/3"**
13 to 18	65*	Very loose to dense silty-clayey fine SAND [SC-SM]	1 to 46
* denotes maximum termination depth of the borings 50/1" = 50 blows for 1 inch of penetration			

7.2 NOTABLE FINDINGS – LANDFILL WASTE & CONSTRUCTION DEBRIS

Deleterious materials consisting of **landfill waste** and **construction debris** were encountered to depths of about 18 feet below grade at most of the boring locations. The landfill waste and debris was found to consist of varying proportions of concrete, asphalt, wood, plastic, etc. ***Without the construction of a Mechanically Stabilized Soil Layer (MSL) within the building areas, these waste materials are unsuitable for support of structures and other settlement sensitive improvements. We recommend using Tensar geogrid Tx-7 or equivalent for the preparation of the MSL.***

In order to help reduce the potential for distress and extend the useful life of the parking lots constructed within the property limits, we recommend the implementation of a partial excavation program and geogrid reinforced subgrade. Preliminary recommendations for subgrade preparation and construction of the pavements within the landfill limits are included in Section 10.0.

8.0 GROUNDWATER CONDITIONS

8.1 EXISTING GROUNDWATER LEVEL

We measured the water levels in the boreholes from October 31, 2018-November 2, 2018 and January 29-31, 2019. The encountered groundwater levels ranged from approximately 0.3 feet

to 6 feet below existing grade. The encountered groundwater level at each of the boring locations is shown on the attached boring logs. 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 majority of the boring locations will likely range from approximately existing ground surface *(standing water as a transient perched condition)* to 3 feet below existing grade during a normal rainfall year. The large variance in groundwater is in part due to the variance in the landfill debris across the site. **The estimated seasonal high groundwater level at the stormwater pond boring logs is shown in Appendix B.**

Ground surface elevations at the boring locations would be beneficial to help us to identify any anomalies in our measured and estimated seasonal high groundwater levels, as well as improve the usefulness the groundwater information during the civil engineering design of the site.

It should be noted that the 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 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.

The following sections may be used for shallow foundation design provided that the buildings are constructed as per the Mechanically Stabilized Soil Layer (MSL) and typical site preparation procedures presented in Section 9.2.

9.1 STRUCTURAL AND GRADING INFORMATION

It is our understanding that the proposed development will consist four (4) 1-story buildings (Buildings A, B, C, D), approximately 80,347 square feet in total area, with associated parking, pond and landscape areas.

We have assumed that the maximum column loads will not exceed 100 kips and that maximum wall loads will not exceed 8 kips per lineal foot. We have assumed that fills on the order of 4 feet or less 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 a 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 MECHANICALLY STABILIZED SOIL LAYER

Based on the results of borings performed within building areas, the near surface soils consist mostly of **landfill waste** and debris. In order to provide support to the foundations and distribute the loading to the native subgrade, a minimum 2.5 feet thick geosynthetic/fine aggregate structural fill section is recommended. For our analysis, we have utilized the commercially available software Dimension Solution v2.0 and implemented the basic principles of Terzaghi's Bearing Capacity Theory. Our analysis was based on a factor of safety against bearing capacity failure of FS = 3.7.

Based on our analysis and technical discussions with representatives of **Tensar**, we believe that the reinforced fill section beneath the building foundations will need to consist of the following components (from top to bottom) at a minimum:

- 8 inches of fine aggregate structural fill
- Tensar Triaxial TX-7 geogrid
- 8 inches of fine aggregate structural fill
- Tensar Triaxial TX-7 geogrid
- 8 inches of fine aggregate structural fill
- Tensar Triaxial TX-7 geogrid
- 6 inches of fine aggregate structural fill

The initial layer of 6 inches of structural fill can be placed directly on top of the exposed subgrade, followed by the aggregate/geogrid section as shown above. The reinforced section should extend a minimum of 10 feet beyond the edges of the building limits.

All geosynthetic roll layers should be installed and overlapped in accordance with manufacturer's recommendations. In addition, the aggregate material should comply with strength, compaction and gradation requirements specified by the geogrid manufacturer.

9.3 ANALYSIS

Based on the results of the soil borings performed within the proposed lots, the near surface soils appear to be mostly very loose to medium dense sands to a depth of 10 feet below grade. note that these soils contain significant amounts of **landfill waste** and debris. It is our opinion that proposed structures can be supported on properly designed and constructed shallow foundation systems. Provided that the MSL layer is prepared in conjunction with the typical site preparation recommendations outlined in this report.

9.4 BEARING PRESSURE

Provided our suggested site preparation procedures are followed, we recommend designing the conventional, shallow footing foundations for a **maximum allowable bearing pressure of 2,000 pounds per square foot (psf), or less, as dictated by the project loads**. The allowable net soil 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.

9.5 FOUNDATION SIZE

The minimum width recommended for an isolated column footing is 24 inches. For continuous wall or thickened edge monolithic slab footings, the minimum widths should comply with the current Florida Building Code, but under no circumstances be less than 18 inches in width. Even though the maximum allowable soil bearing pressure may not be achieved, these width recommendations should control the size of the foundations.

9.6 BEARING DEPTH

The base of all footings should be at least *18 inches* below finished grade elevation and at least 2 feet (24 inches) away from the upper most layer of the MSL Geogrid. 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.

9.7 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 Section 11 of this report at the time of construction. In addition to compaction, the bearing soils must exhibit stability and be free of "pumping" conditions.

9.8 SETTLEMENT ESTIMATES

Post-construction settlement of the structure 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 off-site 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 the adherence to our recommended site preparation procedures presented in Section 11.0 of 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 structure to be on the order of about 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 to be on the order of about ½ inch or less.

9.9 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 120 pounds per cubic inches, 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 LANDFILL DEBRIS REMEDIATION

The vast majority of the subject property will be covered by paved parking areas. Based on the results of our borings, landfill waste and debris laden fill soils were encountered to varying depths throughout the project site. Removal and replacement of the debris laden soils would not be an economically viable option for this project due to the size of the paved areas and to meet FDEP requirements. **Therefore, it is our opinion that the construction of a geogrid reinforced subgrade section would be the most practical remedial option to help extend the useful life of the pavements constructed over the debris laden soils.** More detailed recommendations for the geogrid reinforced section are included in Section 10.5.

10.2 GENERAL

We understand that the proposed roadways will consist of a flexible pavement section with typical light duty traffic with occasional heavy duty traffic (dump trucks, moving trucks etc.). At

the time of this exploration, specific traffic loading information was not provided to us. All pavements should be designed in accordance with the latest edition of the Orange County Road Construction Specifications. Our recommendations for design of the roadways are listed in the following sections.

10.3 ASPHALTIC PAVEMENTS

10.3.1 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 Section 11.0 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 2018 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

Service Level	Layer Component		
	Surface Course (inches)	Base Course (inches)	Stabilized Subgrade (inches)
Light Duty	1½	6	12
Heavy Duty	2½	8	12

10.3.2 Stabilized Subgrade

The subgrade immediately beneath the base course (sub-base) should be compacted to at least 98 percent of the Modified Proctor maximum dry density (ASTM D 1557) value.

For a limerock base, the upper 6 inches of subgrade should be stabilized to a minimum LBR of 40 as specified by FDOT and Florida Bearing Value (FBV) of 50 psi.

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, or every 500 lineal feet of roadway, whichever is greater.

10.3.3 Base Course

Based on review of the Orange County roadway design standards, the base course may be either limerock or soil-cement. As an alternative, we have provided recommendations for recycled crushed concrete base if deemed acceptable by local municipality standards.

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 or 500 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 reclaimed concrete aggregate 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 a 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 and be placed in accordance with the latest edition of the FDOT Road and Bridge Construction Specifications in order to ensure consistency of the crushed concrete material, additional LBR and sieve gradation tests should be performed at a minimum frequency of one test per 10,000 square feet, and for each visual change in material. *In addition, the crushed concrete base material must meet the requirements of Orange County Resolution 2014-M-59 and specifications for Graded Crushed Concrete Aggregate Base (a.k.a. Recycled Concrete Aggregate (RCA) which became effective on September 23, 2014.*

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, or every 500 lineal feet of roadway, whichever is greater.

10.3.4 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 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.

10.3.5 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 soil-cement or crushed concrete base course, and at least 18 inches for a limerock base course. ***Note that Orange County may not accept the use of roadway underdrains.***

10.3.6 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, we recommend that landscape drains be provided to protect the roadway against adverse effects from over-irrigation or excess rainfall. Poorly draining 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.

10.4 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 Section 11.0 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 our exploration and review of the FDOT Rigid Pavement Design Manual, our recommended minimum concrete pavement design is shown in Table V.

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.

10.5 GEOGRID REINFORCED SUBGRADE

In order to reduce the potential for distress and extend the useful life of the pavements, we recommend the construction of a geogrid reinforced subgrade. We recommend the installation of a bridge lift of sand above the exposed subgrade in order to place the geogrid properly.

For this project, we would recommend using a Tensar TX-160 geogrid. The installation of the geogrid would significantly improve the performance of the pavement section and reduce the amount of maintenance over the design life project. At a minimum, the geogrid should be

installed above the stabilized subgrade, immediately below the base course. Additional layers of geogrid may need to be placed depending on final grading design.

11.0 SITE PREPARATION

We recommend normal, good practice site preparation procedures for the new construction areas. These procedures include: demolition of existing structures (if any) and complete removal of debris, stripping/clearing of the site to remove vegetation, roots, **organic topsoil,** debris, 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. Strip the proposed construction limits of vegetation, topsoil, roots, existing pavement sections and improvements, 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. Deeper clearing and grubbing depths may be encountered over portions of the site. We strongly recommend that the stripped/excavated surfaces be observed and probed by representatives of UES.

2. 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.

3. Place fill 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.

4. Within the at-grade (or below grade) foundation areas, subgrade compaction of at least 95 percent of the Modified Proctor should be achieved to a depth of at least 2 feet below bottom of foundations and slab levels.

5. Within the pavement areas, the upper 12 inches of subgrade beneath the base course (sub-base) or concrete slabs should be compacted to at least 98 percent of the Modified Proctor maximum dry density. Within the asphaltic pavement areas, the subgrade should be stabilized as recommended in Section 10.2.2.

6. 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 one test per 10,000 square feet in the pavement areas, with a minimum of 4 tests in each area.

7. Prior to the placement of reinforcing steel and concrete, verify compaction within the footing trenches to a depth of 2 feet. 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. 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.

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 STORMWATER DESIGN PARAMETERS

We understand that the proposed project will likely include one (1) stormwater pond. UES performed two (2) SPT borings within the pond footprint. We note that fill debris was encountered at both pond borings P-01 and P-02. We recommend that these soils be excavated and replaced by backfill with less than 5 percent fines if the pond is designed as a dry pond (depending on final site grades). Borings P-01 and P-02 encountered landfill waste and debris from existing grade to a depth of approximately 18.5 feet below grade. This was followed by native silty-clayey fine sand [SC-SM] to the termination depth of 20 feet below grade. The encountered groundwater and estimated seasonal high groundwater table are shown on the attached logs in Appendix B. A fillable porosity of 20 can be used to analysis purposes. For select backfill with fines content under 5 percent, the horizontal hydraulic conductivity can be assumed to be 15 feet per day; the estimated vertical hydraulic conductivity can be two-thirds of this value. The fines content of the backfill should be determined by laboratory testing during the construction phase.

Additionally, the actual exfiltration rates from the stormwater retention ponds may be influenced by pond geometry, natural soil variability, in-situ depositional characteristics and soil density, retention volumes, and groundwater mounding effects. *Appropriate factors of safety should be incorporated into the design process.*

In case the pond is designed as a wet pond, then the average wet season water level can be estimated to be one foot below the estimated seasonal high groundwater table.

The stormwater management pond bottom and side slopes should be stabilized according to applicable Water Management District and local municipality guidelines.

Additionally, due to the former usage of the subject site as a landfill area, UES recommends the client obtain clearances from appropriate environmental regulation agencies (FDEP, Orange County EDP etc.)

13.0 SUITABILITY OF ON SITE MATERIALS FOR USE AS FILL MATERIAL

The soils excavated from stormwater management areas are usually re-used as structural fill throughout the development. Table VI lists the suitability of materials for use as structural fill based on percent fines content.

TABLE VI
SUITABILITY OF EXCAVATED MATERIAL FOR USE AS FILL

Designation	USCS Soil Classification	% Fines Passing No. 200 Sieve	Suitability for Use as Structural Fill
Group A	SP	0-5	Favorable, freely draining, “clean” sands
Group B	SP-SC, SP-SM	5-12	Suitable, will require aeration and moisture control
Group C	SM, SC, SC-SM	12-20	Poor, impedes infiltration, limit overall use, extremely sensitive to water, do not use in pavement or pond areas
Group D	SM, SC, SC-SM, CH, MH	>20	Very Poor, not recommended for structural fill, may be used as stabilizing material in pavement subgrade
Group E	PT, OL, SM-OL	Organic	Unsuitable, must be completely removed and replaced with Group A or B soils

Based on the results of our soil borings and laboratory testing program, the soils encountered at the stormwater pond (Borings P-01 and P-02) consist of Group D and Group E soils as shown on the respective boring logs in Appendix B.

Clean sandy soils (Group A) with less than 5 percent soil fines are best suited for fill usage, since they are typically free-draining and require minimal moisture control during placement and compaction.

The sands with silt (Group B), with contents of 5 to 12 percent soil fines, will require somewhat greater care, since these soils are less freely-draining and might require aeration and drying prior to usage, during use in the rainy season, and when placed near the groundwater table.

Soils classified as silty or clayey, Group C (greater than 12 percent fines, but less than or equal to 20 percent fines), may impede infiltration and cause a perched water condition, especially when compacted. Although not preferable, these soils may be used by contractors experienced with using these materials as fill. These materials require stringent moisture control during stockpiling, placement and compaction. They will also be problematic during compaction. These soils dry very slowly and will have to be compacted with no vibration (a sheep foot roller, for example) in smaller, 6 inch compacted lifts. A more common use for these materials is in construction of stabilized subgrade.

Soils classified as silty or clayey, Group D (greater than 20 percent fines), will impede infiltration and cause a perched water condition. We do not recommend using these soils as structural fill material as they will require stringent moisture control during stockpiling, placement and compaction. They will also be problematic during compaction. Group D soils also dry very slowly and will have to be compacted with no vibration (a sheep foot roller, for example) in smaller, 6 inch compacted lifts.

Soils containing organic materials, Group E, may not be used as structural fill. These materials may only be used in non-structural areas such as green areas or landscaping. We do not recommend that these materials are placed directly beneath sodded areas if they contain significant amounts of organic materials. Highly organic soils are typically poor drainage materials, and may cause ponding or wetness for some time following rain events if placed directly beneath sod.

14.0 DEWATERING AND EXCAVATION CONSIDERATIONS

Depending upon the time of year construction commences and the depth of excavation required, some dewatering may 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.

15.0 CONSTRUCTION RELATED SERVICES

We recommend the owner retain UES to provide inspection services during the site preparation procedures for confirmation of the adequacy of the earthwork operations. Field tests and observations include verification of foundation and pavement subgrades by monitoring earthwork operations and performing quality assurance tests of the placement of compacted structural fill courses.

The geotechnical engineering design does not end with the advertisement of the construction documents. The design is an on-going process throughout construction. Because of our familiarity with the site conditions and the intent of the engineering design, we are most qualified to address site problems or construction changes, which may arise during construction, in a timely and cost-effective manner.

16.0 LIMITATIONS

This report has been prepared for the exclusive use of **Surelock Self Storage** 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 Universal Engineering Sciences, Inc. 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. A Geotechnical Business Council (GBC) publication, "Important Information About This 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

UNIVERSAL
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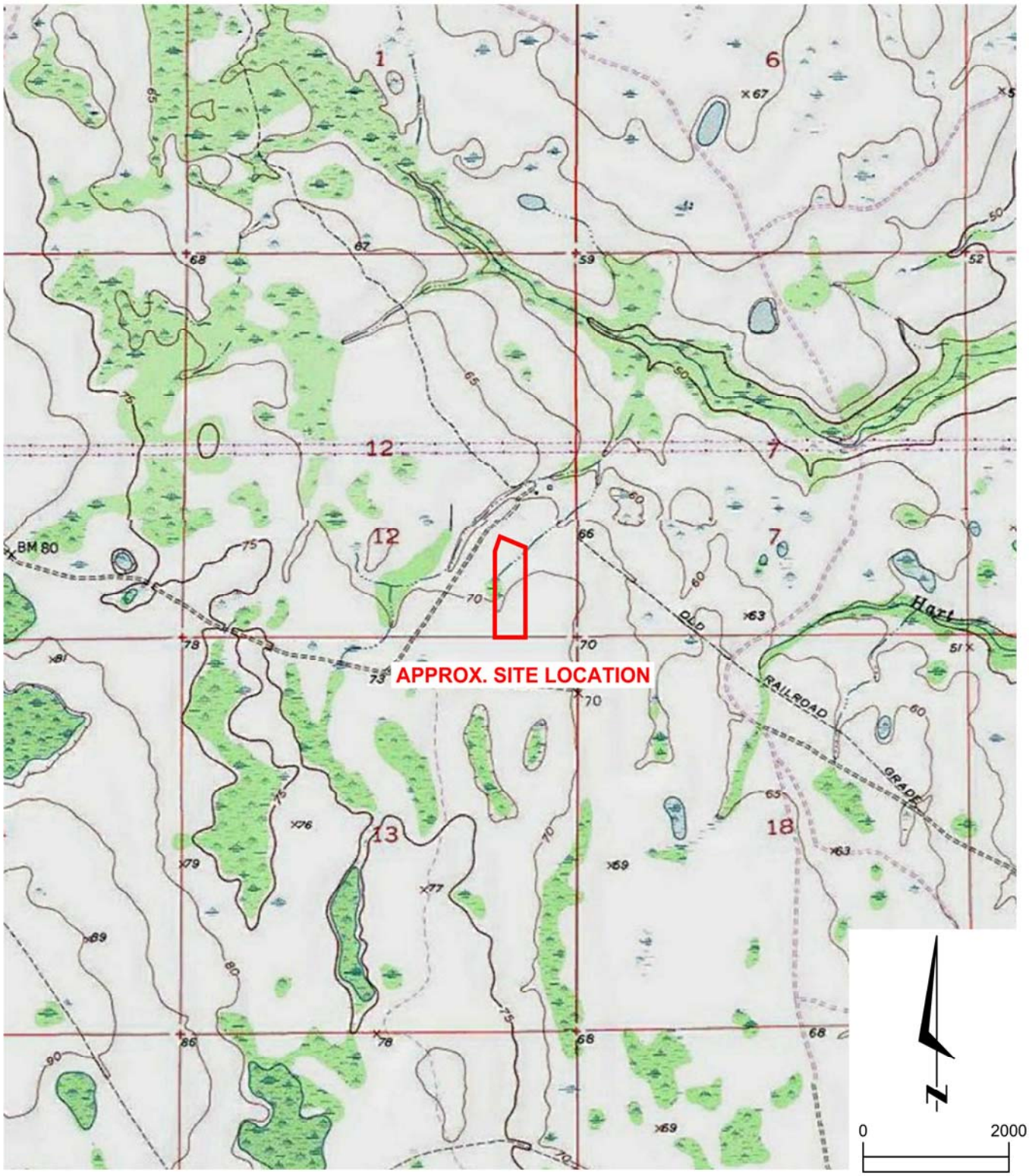

SOURCE: USGS QUADRANGLE MAP OF "NARCOOSSEE NW, FLORIDA".

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GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
INNOVATION WAY
ORANGE COUNTY, FLORIDA

SITE LOCATION MAP

DRAWN BY:	N.F.	**DATE:**	11 - 5 - 18	**CHECKED BY:**	G.P.	**DATE:**	2.25.2019
SCALE:	AS SHOWN	**PROJECT NO:**	0130.1800473.0000	**REPORT NO:**	1651179	**PAGE NO:**	A-1

18-0643-01

APPENDIX B

UNIVERSAL
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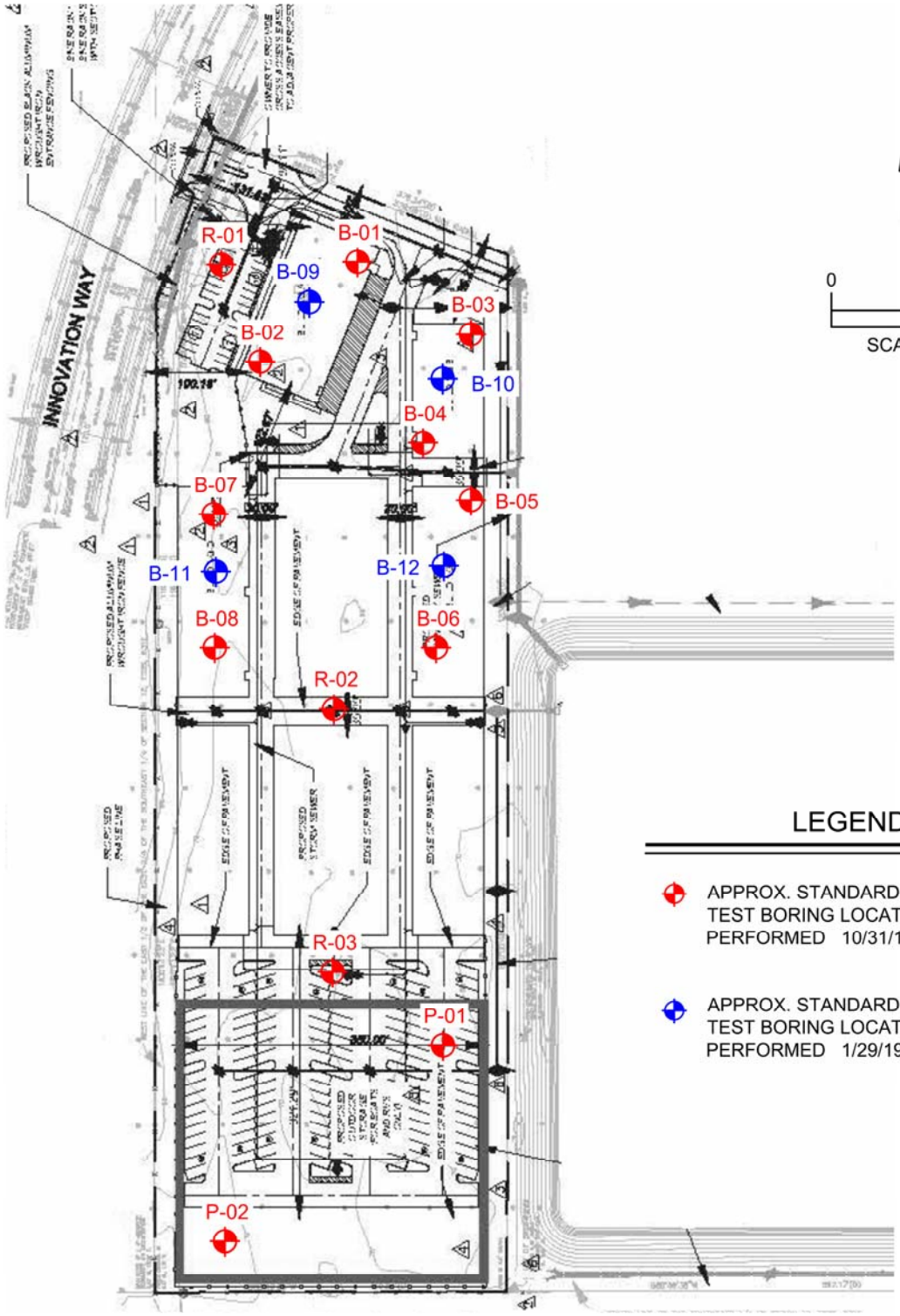

THIS DRAWING CREATED USING PLAN PROVIDED BY CLIENT.

UNIVERSAL ENGINEERING SCIENCES

GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
INNOVATION WAY
ORANGE COUNTY, FLORIDA

BORING LOCATION PLAN

DRAWN BY:	N.F.	**DATE:**	11 - 5 - 18	**CHECKED BY:**	G.P.	**DATE:**	2.25.2019
SCALE:	AS SHOWN	**PROJECT NO:**	0130.1800473.0000	**REPORT NO:**	1651179	**PAGE NO:**	B-1

18-0643-01

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
REPORT NO.:	1651179
PAGE:	B-2.1

PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-01** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 6.0
DATE OF READING: 11/2/2018
EST. SHGWT (ft):

DATE STARTED: 11/2/18
DATE FINISHED: 11/2/18
DRILLED BY: ORL - JB/DM/DK
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												
		11-9-10	19			Medium dense grey brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
		6-6-3	9			-- loose						
5		3-2-2	4	▼		-- very loose						
		2-1-1	2			-- dark brown						
		1-2-2	4			-- brown						
		1-2-2	4			-- dark brown						
10												
		50/3"	50/3"			-- very dense						
15												
		2-4-2	6			Loose grey silty clayey fine SAND [SC-SM]						
20												
		3-2-2	4			-- very loose						
25						BORING TERMINATED AT 25.0 FEET						
30												
35												
40												
45												
50												
55												
60												
65												

W-10167.GPJ

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
REPORT NO.:	1651179
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-02** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 6.0
DATE OF READING: 11/2/2018
EST. SHGWT (ft):

DATE STARTED: 11/2/18
DATE FINISHED: 11/2/18
DRILLED BY: ORL - JB/DM/DK
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												
		8-8-10	18			Medium dense grey brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
		7-6-6	12									
5		6-3-2	5	▼		-- loose						
		2-2-2	4			-- very loose						
		2-1-2	3			-- dark brown						
		1-1-2	3									
10												
		1-0-1	1									
15												
		2-3-2	5			Loose grey silty clayey fine SAND [SC-SM]						
20												
		3-4-3	7			-- grey green						
25						BORING TERMINATED AT 25.0 FEET						
30												
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
REPORT NO.:	1651179
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-03**
SECTION: TOWNSHIP: RANGE:
SHEET: **1 of 1**

CLIENT: SURELOCK SELF STORAGE
LOCATION: SEE BORING LOCATION PLAN
REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 6.0
DATE OF READING: 11/2/2018
EST. SHGWT (ft):

DATE STARTED: 11/2/18
DATE FINISHED: 11/2/18
DRILLED BY: ORL - JB/DM/DK
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												
		3-4-4	8			Loose very dark brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
		5-6-11	17			-- medium dense						
5		9-5-4	9	▼		-- dark brown						
		3-2-2	4			-- loose						
		2-1-4	5			-- very loose, brown						
10		2-3-2	5			-- loose						
		2-2-3	5			Loose light grey silty clayey fine SAND [SC-SM]						
15												
		4-5-4	9			-- light grey green						
20												
		4-3-5	8									
25						BORING TERMINATED AT 25.0 FEET						
30												
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
REPORT NO.:	1651179
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-04** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 5.5
DATE OF READING: 11/2/2018
EST. SHGWT (ft):

DATE STARTED: 11/2/18
DATE FINISHED: 11/2/18
DRILLED BY: ORL - JB/DM/DK
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												
		4-6-5	11			Medium dense very dark brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
		5-7-9	16									
5		9-7-5	12	▼								
		2-2-4	6			-- loose, dark brown						
		2-5-1	6									
		2-2-6	8									
10												
		1-2-3	5			Loose light grey silty clayey fine SAND [SC-SM]						
15												
		5-5-4	9									
20												
		3-2-4	6									
25						BORING TERMINATED AT 25.0 FEET						
30												
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-05** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 5.0
DATE OF READING: 11/1/2018
EST. SHGWT (ft):

DATE STARTED: 11/1/18
DATE FINISHED: 11/1/18
DRILLED BY: ORL - JB/DM/DK
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												
		4-5-6	11			Medium dense dark brown grey FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
		7-6-11	17			-- dark brown						
5		7-10-8	18	▼								
		6-7-7	14									
		8-8-11	19									
		4-3-3	6			-- loose						
10												
		2-1-1	2			-- very loose, dark grey brown	14	27				
15												
		2-2-2	4			Very loose grey green silty clayey fine SAND [SC-SM]						
20												
		2-3-2	5			-- loose, with rock						
25						BORING TERMINATED AT 25.0 FEET						
30												
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-06** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 5.0
DATE OF READING: 11/1/2018
EST. SHGWT (ft):

DATE STARTED: 11/1/18
DATE FINISHED: 11/1/18
DRILLED BY: ORL - JB/DM/DK
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												
		4-5-8	13			Medium dense dark grey brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
		8-7-13	20			-- dark brown						
5		8-15-8	23	▼								
		5-9-8	17									
		6-22-6	29									
		4-3-3	6			-- loose, dark grey brown						
10												
		1-1-1	2			-- very loose						
15												
		2-2-3	5			Loose grey green brown silty clayey fine SAND [SC-SM]						
20												
		2-2-2	4			-- very loose, grey green	18	25				
25						BORING TERMINATED AT 25.0 FEET						
30												
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
REPORT NO.:	1651179
PAGE:	B-2.7

PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-07** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 5.0
DATE OF READING: 11/1/2018
EST. SHGWT (ft):

DATE STARTED: 11/1/18
DATE FINISHED: 11/1/18
DRILLED BY: ORL - JB/DM/DK
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												
		4-5-7	12			Medium dense very dark brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
		6-10-10	20			-- light grey brown						
5		8-5-2	7	▼		-- loose, grey brown						
		2-3-3	6			-- grey orange						
		4-5-4	9									
		4-3-5	8									
10												
		2-3-4	7			-- grey green						
15												
		2-1-2	3			Very loose grey green silty clayey fine SAND [SC-SM]						
20												
		1-1-1	2			-- trace rocks	13	31				
25												
		4-5-5	10			-- loose, light grey						
30						BORING TERMINATED AT 30.0 FEET						
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
REPORT NO.:	1651179
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-08** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 5.0
DATE OF READING: 11/1/2018
EST. SHGWT (ft):

DATE STARTED: 11/1/18
DATE FINISHED: 11/1/18
DRILLED BY: ORL - JB/DM/DK
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												
		6-6-7	13			Medium dense very dark brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
		11-10-8	18			-- light grey tan						
5		3-2-3	5	▼		-- loose						
		5-3-6	9			-- orange						
		5-6-7	13			-- medium dense, grey brown						
10		4-4-5	9									
		1-2-2	8			Loose grey brown green silty clayey fine SAND [SC-SM]						
15												
		2-2-2	4			-- very loose						
20												
		1-0-1	1			-- grey green brown, with rock	12	30				
25												
		5-6-5	11			-- medium dense, light grey						
30						BORING TERMINATED AT 30.0 FEET						
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
REPORT NO.:	1651179
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-09** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 1.1
DATE OF READING: 1/30/2019
EST. SHGWT (ft):

DATE STARTED: 1/30/19
DATE FINISHED: 1/30/19
DRILLED BY: ORL - KR/JB/DM
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				▼								
		1-1-1	2			Very loose very dark brown orange FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
		4-4-9	13			-- medium dense						
5		8-10-12	33			-- dark brown						
		8-6-6	13			-- brown						
		6-7-9	16			-- dark brown						
		5-5-6	11			-- brown						
10												
		5-6-6	13			-- grey brown						
15												
		2-2-1	3			Very loose, light brown silty clayey fine SAND [SC-SM]						
20												
		2-2-1	3			-- dark grey green						
25												
		3-4-2	6			-- loose, with concrete debris & rocks						
30												
		9-6-6	12			-- medium dense						
35												
		12-5-5	10			-- loose, grey green						
40												
		7-5-5	10									
45												
		3-5-4	9			-- dark grey green, wth shell & some rock fragments						
50												
		3-4-3	7			-- grey green	26	26				
55												
		8-12-10	22			-- medium dense						
60						BORING TERMINATED AT 60.0 FEET						
65												

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BORING LOG

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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-10** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 2.2
DATE OF READING: 1/30/2019
EST. SHGWT (ft):

DATE STARTED: 1/30/19
DATE FINISHED: 1/30/19
DRILLED BY: ORL - KR/JB/DM
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												
	X	2-1-2	3	▼		Very loose very dark brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
	X	6-15-17	32			-- dense, dark brown						
5	X	13-26-30	56			-- very dense						
	X	49-19-14	33			-- with rocks & concrete debris						
	X	7-5-6	11			-- dense						
	X	2-2-1	3			-- medium dense -- very loose						
10												
15	X	4-4-5	9			Loose grey brown silty clayey fine SAND [SC-SM]						
20	X	3-3-4	7									
25	X	3-3-4	7			-- light brown						
30	X	5-5-4	9			-- trace consolidated sands and rock fragments						
35	X	8-9-10	19			-- medium dense, grey green, with rock fragments & trace shell						
40	X	9-9-8	17									
45	X	10-13-12	25									
50	X	5-3-4	7			-- loose, shade darker	37	37				
55	X	7-10-9	19			-- medium dense						
60	X	21-25-21	46			-- dense BORING TERMINATED AT 60.0 FEET						
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-11** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 0.3
DATE OF READING: 1/29/2019
EST. SHGWT (ft):

DATE STARTED: 1/29/19
DATE FINISHED: 1/29/19
DRILLED BY: ORL - KR/JB/DB/NR
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				▼								
		3-3-5	8			Loose very dark brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
		4-4-7	11			-- medium dense						
5		4-5-5	10			-- brown						
		2-3-3	6			-- loose						
		5-7-8	15			-- light brown						
		8-11-15	26			-- medium dense						
10						-- grey brown						
		6-4-4	8			-- loose						
15												
		3-2-3	5			Loose light brown silty clayey fine SAND [SC-SM]						
20												
		2-4-2	6			-- grey green, with some course limestone & sands						
25												
		7-4-4	8			-- with trace rock fragments						
30												
		6-5-6	11			-- medium dense, with concrete debris & limesilt						
35												
		9-9-6	15			-- with shell						
40												
		5-3-2	5			-- loose	12	20				
45												
		16-16-10	26			-- medium dense						
50												
		12-9-4	13									
55												
		15-10-8	18			-- grey brown						
60												
		4-5-4	9			-- loose, grey green	22	34				
65						BORING TERMINATED AT 65.0 FEET						

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
REPORT NO.:	1651179
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **B-12** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 0.3
DATE OF READING: 1/31/2019
EST. SHGWT (ft):

DATE STARTED: 1/31/19
DATE FINISHED: 1/31/19
DRILLED BY: ORL - KR/JB/DM
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				▼								
	X	3-3-4	7			Loose very dark brown fine SAND [FILL]						
	X	7-12-25	37			-- dense, with wood						
5	X	15-5-6	11			-- medium dense						
	X	5-6-6	12			-- dark brown						
	X	8-11-15	26									
	X	7-8-8	16			-- light brown						
10												
	X	6-8-8	16			-- light grey brown						
15												
	X	4-4-3	7			-- loose						
20												
	X	3-2-2	4			Loose grey brown silty clayey fine SAND with some rock fragments & course sand [SC-SM]	15	32				
25												
	X	11-6-7	13			-- medium dense						
30												
	X	9-9-9	18			-- grey green,, with shell						
35												
	X	5-5-6	11									
40												
	X	13-9-9	18									
45												
	X	5-4-3	7			-- loose	29	35				
50												
	X	2-5-6	11			-- medium dense						
55												
	X	13-20-21	41			-- dense						
60						BORING TERMINATED AT 60.0 FEET						
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **P-01** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 5.0
DATE OF READING: 10/31/2018
EST. SHGWT (ft): 3.0

DATE STARTED: 10/31/18
DATE FINISHED: 10/31/18
DRILLED BY: ORL - JB/DM/DK
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												
		5-6-4	10	▽		Loose dark brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL] {Group E}		15				4
		2-2-2	4			-- very loose						
5		5-4-4	10	▼		-- loose						
		5-6-14	20			-- medium dense						
		6-5-6	11			-- grey brown						
10		5-3-4	7			-- loose						
15		1-4-2	6			-- grey brown						
20		4-4-6	10			Loose light grey fine SAND with clay [SP-SC] {Group D}	8	27				
						BORING TERMINATED AT 2.0 FEET						
25												
30												
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
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PAGE:	B-2.14

PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **P-02** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 5.0
DATE OF READING: 10/31/2018
EST. SHGWT (ft): 3.0

DATE STARTED: 10/31/18
DATE FINISHED: 10/31/18
DRILLED BY: ORL - JB/DM/DK
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												
		2-4-4	8	▽		Loose brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL] {Group E}						
		9-5-6	11			-- medium dense, light brown						
5		4-4-3	7	▼		-- loose						
		2-3-6	9			-- very dark brown						
		5-8-9	17			-- medium dense						
		6-10-11	21			-- grey brown						
10												
		4-4-5	9			-- loose						
15												
		5-2-1	3			Loose light grey green brown silty clayey fine SAND [SC-SM] {Group D}	13	25				
20						BORING TERMINATED AT 20.0 FEET						
25												
30												
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
REPORT NO.:	1651179
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **R-01** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 5.5
DATE OF READING: 11/2/2018
EST. SHGWT (ft): 3.5

DATE STARTED: 11/2/18
DATE FINISHED: 11/2/18
DRILLED BY: ORL - JB/DM/DK
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 very dark grey brown FILL [FILL]						
		2-2-5	7			Loose very dark grey brown fine SAND [SP]						
		6-6-7	13	▽		-- medium dense, light brown						
5		3-3-5	8	▼		-- loose						
		4-5-8	13			Loose dark red brown fine SAND with silt [SP-SM]						
		5-7-7	14			-- medium dense						
10		5-8-8	16			-- dark brown						
15		3-3-4	7			Loose grey brown silty clayey fine SAND [SC-SM]						
						BORING TERMINATED AT 15.0 FEET						
20												
25												
30												
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **R-02** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 5.0
DATE OF READING: 11/1/2018
EST. SHGWT (ft): 3.0

DATE STARTED: 11/1/18
DATE FINISHED: 11/1/18
DRILLED BY: ORL - JB/DM/DK
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												
		2-1-3	4	▽		Very loose dark brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]		49				10
		3-4-7	11			-- medium dense						
5		4-4-8	12	▼								
		3-1-1	2			-- very loose						
		1-0-1	1									
		1-0-1	1									
10												
		2-1-2	3			-- dark grey brown		85				14
15												
		4-5-4	9			Loose light grey brown silty clayey fine SAND [SC-SM]						
20						BORING TERMINATED AT 20.0 FEET						
25												
30												
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	0130.1800473.0000
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PROJECT: GEOTECHNICAL EXPLORATION
PROPOSED SURELOCK SELF STORAGE
ORANGE COUNTY, FLORIDA

BORING I.D.: **R-03** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SURELOCK SELF STORAGE

LOCATION: SEE BORING LOCATION PLAN

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

G.S. ELEVATION (ft): N.S.
WATER TABLE (ft): 5.0
DATE OF READING: 11/2/2018
EST. SHGWT (ft): 3.0

DATE STARTED: 11/2/18
DATE FINISHED: 11/2/18
DRILLED BY: ORL - JB/DM/DK
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												
		2-4-5	9	▽		Loose very dark brown FILL, including some to many debris (concrete, wood, plastic and some metal pieces) [FILL]						
		5-7-6	13			-- medium dense, with concerte		94				9
5		3-4-2	6	▼		-- loose, with wood						
		2-1-1	2			-- very loose						
		1-0-0	0					50				8
		0-1-0	1			-- dark grey						
10												
		1-1-1	2			-- dark grey brown						
15												
		3-3-3	6			Loose light grey silty clayey fine SAND [SC-SM]						
20						BORING TERMINATED AT 20.0 FEET						
25												
30												
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL
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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

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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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