# ECS Florida, LLC

## Preliminary Geotechnical Engineering Report

## Tuskawilla Retail Development

170 Tuskawilla Road
Winter Springs, Seminole County, Florida

ECS Project Number 24:6366

November 15, 2018
**Revised December 15, 2020**

November 15, 2018
**Revised December 15, 2020**

Equinox Development Properties, Inc.
630 South Maitland Avenue, Suite 100
Maitland, Florida 32751

Attention: Ms. Kirsten Davis

ECS Project No. 24:6366

Reference: Preliminary Geotechnical Engineering Report
**Tuskawilla Retail Development**
170 Tuskawilla Road
Winter Springs, Seminole County, Florida

Dear Ms. Davis:

ECS Florida, LLC (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our Proposal No. 24:12884-GP dated August 17, 2018. This report presents our understanding of the geotechnical aspects of the project, the results of the field exploration and laboratory testing conducted, and the design and construction aspects. **This report has been revised at the request of your group based on the revised scope of the project.**

It has been our pleasure to be of service to Equinox Development Properties, Inc. during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify the assumptions of subsurface conditions made for this report. Should you have any questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

**ECS Florida, LLC**

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## EXECUTIVE SUMMARY

The following paragraphs provide a brief discussion of our findings and recommendations. Please refer to the complete report for more detailed discussion.

ECS Florida, LLC (ECS) has completed the subsurface exploration for the proposed Tuskawilla Retail Development (approximately 9.95 acres in size) located at 170 Tuskawilla Road in Winter Springs, Seminole County, Florida. The project information summarized below is based exclusively on the information made available to us by your group at the time of this report. Our findings, conclusions and recommendations are summarized below.

### PROJECT INFORMATION:

- Site Location : 170 Tuskawilla Road in Winter Springs, Seminole County, Florida
- Building Scope: Four (4) one-story retail structures & two (2) out parcel buildings
- Building Type: Concrete Masonry Unit (CMU) and steel framed structures.
- Assumed Loads: Max. Column loads = 80 kips, Max. wall loads = 5 klf
- Earthwork: Estimated fills of up to 3 feet and cuts up to 10 feet (pond area)
- SWM Facility: Two (2) dry ponds, one (1) wet pond and five (5) exfiltration systems

### SUBSURFACE CONDITIONS:

- Field Exploration: 19 SPT borings drilled within the subject property limits to the depths ranging between 10 feet and 20 feet below the existing ground surface.
- Site Conditions: Heavily wooded except in the north eastern corner of the property, where there is an existing structure with associated parking area.
- Probable Fill: Not encountered
- Natural Soils: SAND (SP), and SAND WITH SILT (SP-SM)
- Refusal Materials: Not encountered within the depths of borings
- Groundwater: Encountered between 3.5 feet and 5.5 feet below the ground surface at the boring locations, seasonal high water table is anticipated to be between 2.5 feet and 5 feet below the existing grades.

### GEOTECHNICAL & CONSTRUCTABILITY CONSIDERATIONS

- **Wet fill soils:** We anticipate soils excavated from the proposed pond area will be used for structural fill across the site for grading purposes. Due to a higher groundwater table, soils anticipated to be used as structural fill are expected to be wet. Wet soils will require a drying period prior to being compacted for structural fill. Due to the granular nature of the material encountered; however, we anticipate that the soils should dry relatively quickly if spread during hot/dry conditions.

- **High groundwater table:** High groundwater was observed across the site and will need to be considered with respect to the dewatering of utility excavations.

- **Existing Structure:** An existing structure was noted within the eastern portion of the site. The existing structure and its associated subsurface foundations and utilities should be removed prior to the placement of structural fill or foundations for the proposed building areas.

**PRELIMINARY DESIGN & CONSTRUCTION RECOMMENDATIONS:**

- Shallow foundations:

| | |
|---|---|
| Max. Net Allow. Bearing Pressure | = 3,000 psf |
| Min. Exterior (Unheated) Embedment | = 18 inches |
| Min. Interior (Heated) Embedment | = Minimum 24 inches |
| Slab Subgrade Modulus: | = 100 pci |

**Based on the information provided to us, it should be noted that the recommendations made in our report are preliminary in nature. Therefore, a final geotechnical exploration report meeting regulatory standards may be necessary in future for final design recommendations.** The recommendations made in our report are based on the loading assumptions noted above. A final site development plan has not been provided to us. Once the final site plan is developed along with the proposed grading information, we recommend that our office be contacted to review these items and propose a final geotechnical scope of exploration. Final recommendations regarding the bearing capacity, settlements, and foundation design must be made after completion of a final geotechnical exploration program.

This summary should not be considered apart from the entire text of the report with all the qualifications and considerations mentioned herein. Details of our conclusions and recommendations are discussed in the report text.

# 1.0 INTRODUCTION

## 1.1 GENERAL

The purpose of this study was to provide geotechnical information for the design of structure foundations and construction consideration and recommendations for the proposed Tuskawilla Retail Development. This report includes preliminary recommendations regarding the new buildings, pavements, stormwater management area, and associated utilities. This report contains the results of our subsurface explorations and laboratory testing programs, site characterization, engineering analyses, and recommendations for the design and construction of the proposed development. The recommendations developed for this report are based on project information supplied by Equinox Development Properties, Inc.

## 1.2 SCOPE OF SERVICES

In order to explore the subsurface soil conditions and to determine the depth and character of soils on this site, a total of nineteen (19) soil test borings were performed within the proposed area of the development. A Conceptual Sketch dated August 8, 2018 of the proposed development prepared by Kimley-Horn and Associates, Inc. was provided prior to the field exploration and a revised Conceptual Sketch dated October 30, 2018 was provided **after** the field exploration had been completed. **Additionally, this report has been revised based on an updated Overall Site Plan dated November 3, 2020 prepared by Marcus Gieger with Kimley-Horn**. The Boundary and Topographic Survey dated October 15, 2018 prepared by Shannon Surveying, Inc. was also provided at the time of writing this report.

Conclusions and recommendations contained in this report are based upon these soil borings, a site reconnaissance, laboratory test results of boring samples, and provided plans. This preliminary report discusses our exploratory and testing procedures, presents our findings and evaluations and includes the following:

- A brief review and description of our field and laboratory test procedures and the results of testing conducted.
- A review of surface topographical features and site conditions.
- A review of area and site geologic conditions.
- A review of subsurface soil stratigraphy with pertinent available physical properties.
- Copies of our soil test boring logs.
- Preliminary recommendations for site preparation and construction of compacted fills, including an evaluation of on-site soils for use as compacted fills and delineation of potentially unsuitable soils and/or soils exhibiting excessive moisture at the time of sampling.
- Evaluation and recommendations relative to groundwater control.
- Preliminary foundation recommendations for the proposed retail buildings.
- Preliminary recommendations for pavement design.
- Stormwater management design parameters for the ten (10) proposed stormwater management facilities anticipated within the property.

The recommendations contained herein were developed from the data obtained in the soil test borings, which indicate subsurface conditions at these specific locations at the time of exploration. Soil conditions may vary between the borings. If during the course of construction variations appear evident; the Geotechnical Engineer should be informed so that the conditions can be addressed.

### 1.3 AUTHORIZATION

Our services were provided in accordance with our Proposal No. 24:12884-GP dated August 17, 2018 and as authorized by you on September 22, 2018, and includes the Terms and Conditions of Service outlined with our Proposal/Contract between ECS Florida, LLC and Equinox Development Properties, Inc.

## 2.0 PROJECT INFORMATION

### 2.1 PROJECT LOCATION

The subject site is located to the southwest of the intersection between Tuskawilla Road and State Road 434, more specifically at 170 Tuskawilla Road in Winter Springs, Seminole County, Florida. The subject property (approximately 9.95 acres in size) is pentagonal in shape, generally bounded to the north by State Road 434, to the east by Tuskawilla Road, to the south by a vacant property and to the west by a residential community. A Conceptual Sketch is included below and within Appendix A of this report.


**Figure 2.1.1 – Approximate Site Location**

### 2.2 PAST SITE HISTORY/USES

A review of available aerial imagery dated back to 1980 and our knowledge of the site, we understand that the site is primarily heavily wooded with a retail building located within the north eastern corner of the proposed area of development which appears to have been built in either the 1980s or 1990s.

### 2.3 CURRENT SITE CONDITIONS

Based on our site reconnaissance and review of the topographic data, provided by you from Shannon Surveying Inc., dated October 15, 2018, the site is sloping from the south downward to primarily the northwestern portion of the proposed development with existing ground surface elevations varying approximately between EL. +46 feet-datum and EL. +42.5 feet-datum. A boring location survey was not performed as a part of our scope.

### 2.4 PROPOSED CONSTRUCTION

Our understanding of the proposed construction is based on information provided by Equinox Development Properties, Inc and the Overall Site Plan dated November 3, 2020 prepared by Marcus Gieger with Kimley-Horn. Based on our understanding of the project, the proposed

construction would likely consist of multiple structures including, four (4) one-story retail buildings (approximately between 4,280 and 19,209 square feet, respectively) two (2) out parcel building (approximately 2,325 and 3,056 square feet). Site features are to include a stormwater , one (1) wet pond, two (2) dry retention pond areas within the southern portion of the site, and the associated paved parking areas with five (5) underground exfiltration systems within the northern portion of the property, driveway lanes, and utilities.

We would anticipate based on current site grading as well surrounding grading for adjacent commercial properties that the proposed structures may be supported on conventional shallow foundations bearing at an assumed elevation of EL. +42 feet-datum on natural soils. We assumed that finished floor elevation of the proposed structures would be approximately at EL. +44 feet-datum. Based on the existing and proposed grades, we expect maximum fills for the structures to be on the order of 3 feet given the current conceptual drawings for the development. We understand structural loads for the retail structures will be up to approximately 80 kips for column loading, and we have assumed continuous wall loading up to about 5 kips per linear foot.

# 3.0 FIELD EXPLORATION

## 3.1 FIELD EXPLORATION PROGRAM

The field exploration was planned with the objective of providing an assessment of the site, characterizing the project site in general geotechnical and geological terms and to evaluate subsequent field and laboratory data to assist in the determination of geotechnical recommendations.

### 3.1.1 Test Borings

Prior to performing the subsurface exploration, underground utilities were located through the Sunshine State One-Call system. The soil test borings were located in the field by an ECS representative utilizing a hand held GPS unit as reference. The Boring Location Diagram in the Appendix A indicates the approximate location of the borings. The soil test borings were completed with the following drilling and sampling equipment:

- ATV drill rig
- Mud Rotary drilling utilizing 3 ¼ inch hollow-stem augers
- Manual hammer
- Conventional split-spoon soil sampler

Representative soil samples were obtained by means of the split-barrel sampling procedure in accordance with ASTM Specification D 1586. In this procedure, a two-inch O.D., split-spoon sampler is driven into the soil a distance of 18 inches by a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler through the final 12-inch interval, after initial setting of 6 inches, is termed the Standard Penetration Test (SPT) N-value and is indicated for each sample on the boring logs (attached in Appendix B). The SPT values can be used as a qualitative indication of the in-place relative density of cohesionless soils, and as a relative indication of consistency in cohesive soils. This indication is qualitative, since many factors can significantly affect the standard penetration resistance value and prevent a direct correlation between drill crews, drill rigs, drilling procedures, and hammer-rod-sampler assemblies.

A field log of the soil encountered at each boring was maintained by the drilling crew. After recovery, each geotechnical sample was removed from the sampler and visually classified by the driller. Representative portions of each sample were then sealed in containers and transported to our laboratory in Orlando, Florida for further visual examination and laboratory testing. After completion of the drilling operations, the boreholes were backfilled with auger cuttings.

Please note that ground surface elevations noted on our boring logs were interpolated from the Boundary and Topographic Survey dated October 15, 2018 prepared by Shannon Surveying, Inc.; however, we recommend that the boring locations are surveyed for elevations to extend the usefulness of the subsurface information obtained.

## 3.2 REGIONAL/SITE GEOLOGY

Based on the Geologic Map of Florida, Central Florida geologic conditions can generally be described in terms of three basic sedimentary layers. The near-surface layer is primarily composed of sands containing varying amounts of silt and clay fines that are underlain by a layer of clay, clayey sand, locally referred to as the "Hawthorn Group" which is underlain by phosphate, and limestone. The thickness of these strata varies throughout Central Florida. In general, the surficial sands typically extend to depths of 40 feet to 70 feet below the ground surface, while the "Hawthorn Group" ranges from nearly absent in some locations to thicknesses greater than 100 feet. The limestone formation may be several thousand feet thick.

The groundwater hydrogeology of Central Florida can be described in terms of the nature and relationship of the three basic geologic strata. The near surface and upper stratum are fairly permeable and comprise the water table (unconfined) aquifer. The deep limestone formation of the Floridian aquifer is highly permeable due to the presence of large interconnected channels and cavities throughout the rock. The Floridian aquifer is the primary source of drinking water in Central Florida. These two permeable strata are separated by the relatively low permeability clays in the "Hawthorn Group." The amount of groundwater flow between the two aquifer systems is dependent on the thickness and consistency of the "Hawthorn Group" clay confining beds which, as previously stated, varies widely throughout Central Florida. The following Figure 3.2.1 shows the regional geologic map.

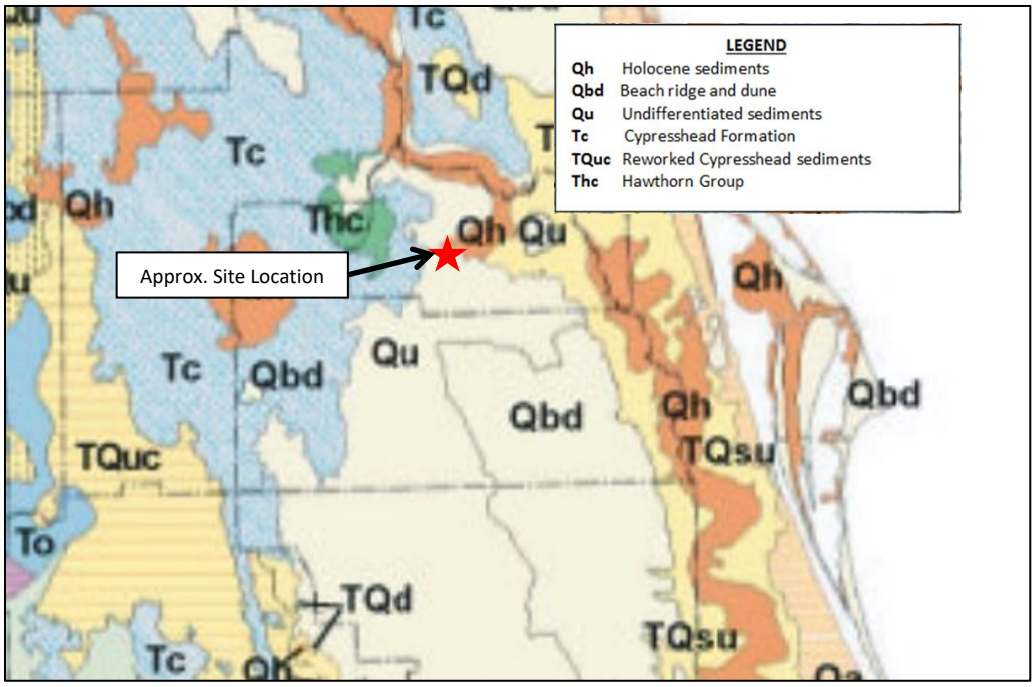



**Figure 3.2.1 Regional Geologic Map** (Geologic Map of Florida, 2001)

## 3.3 KARST GEOLOGY

Areas within Central Florida are known to have karst geology. Karst terrain is characterized by voids, soil domes, soil raveling, interrupted drainage, disappearing streams, and topographical

features such as sinkholes and closed depressions. These features are the result of the dissolution of soluble bedrock such as limestone by groundwater and/or the infiltration of surface water.

As water enters fractures, bedding planes, and other bedrock discontinuities within soluble bedrock, it slowly dissolves the rock and enlarges the discontinuities. Over geologic time, this results in the formation of solution channels or underground passages and ravines which may develop into surficial manifestations such as sinkholes and closed depressions. The dissolution of bedrock is generally a very slow process. However, soil may be eroded or raveled into the enlarged bedrock fractures, creating soil domes. Eventually, soil in these features can be lost through groundwater movement, resulting in surface depressions and potential sudden ground subsidence.

The soils derived from and overlying the carbonate bedrock are typically a clayey and silty soil with varying amounts of sand and rock fragments. The bedrock within the general geographic region is characterized by jointed and faulted soluble carbonate lithologies interbedded with non-carbonate lithologies. These carbonate formations are generally moderately to highly solution prone.

The degree of weathering or solutioning is often controlled by lithological variations and structural orientations. Where structural discontinuities intersect or in areas which are highly fractured, solutioning is intensified creating low areas and seams that are typically filled with residual clayey soils. Conversely, more competent, high areas represent slightly- to non-fractured lithologies that are often coarser grained and only slightly solution prone.

The underlying carbonate formations of the project geographic area are susceptible to Karst-related sinkhole development. Contributing characteristics and factors controlling the development include subsurface structural deformation, joint sets, and thick carbonate bedding within the area. Due to the shallow nature of the exploration performed, the borings did not reveal overt signs of soils associated with karst activity or carbonate rocks.

### 3.4 SOIL SURVEY MAPPING

Based on the Soil Survey for Seminole County, Florida by the US Department of Agriculture (USDA) Soil Conservation Service the predominant predevelopment soil type(s) at the site is identified and a summary of characteristics of this soil series is included below in Table 3.4.1.

**Table 3.4.1 Soil Survey**

| Soil Type | Constituents | Drainage Class | Water Table Depth |
|---|---|---|---|
| **20—Myakka and EauGallie** | Fine sand | Poorly drained | 0.5 to 1.5 feet |
| 24—Paola-St. Lucie sands, 0 to 5 percent slopes | Sand | Excessively drained | - |
| 31—Tavares-Millhopper complex, 0 to 5 percent slopes | Fine sand and sandy loam | Moderately well drained | 3.5 to 6 feet |

Soil mapping of the site vicinity showing soil numbers (20, 24, and 31) are presented in Figure 3.4.1 below.


**Figure 3.4.1 Site Soil Survey**

## 3.5 SUBSURFACE CHARACTERIZATION

The site subsurface conditions were evaluated with 19 SPT borings advanced to the depths ranging between 10 feet and 20 feet below the existing ground surface at the approximate locations shown on the Boring Location Diagram in Appendix A.

The quantity of borings, boring locations, and drilling depths were developed by ECS prior to performing subsurface exploration based on the type and location of the proposed development from the Kimley-Horn Conceptual Sketch dated August 8, 2018.

The subsurface exploration at each boring location indicated generally SAND (SP) and SAND WITH SIL (SP-SM) from existing grade to the maximum termination of the borings (20 feet below existing grade). The soil auger was able to reach the termination depth at each of the borings. SPT N-values ranged from 5 to 19 blows per foot (bpf). The loose soils encountered were primarily observed within the upper 10 feet of the subsurface profiles

The subsurface conditions at each boring are summarized in Table 3.5.1. The subsurface conditions presented in Table 3.5.1 and shown on the Boring Logs should be considered approximate, based on interpretation of the exploration data using normally accepted geotechnical engineering judgments. It should be noted that transitions between different soil strata are typically less distinct than what is shown on the exploration records. Subsurface conditions between the actual boring locations will vary.

**Table 3.5.1 Subsurface Stratigraphy**

| Approximate Depth Range (ft) | Approximate Elev. Range (ft) (1) | Stratum | Description | Ranges of SPT(2) N-values (bpf) |
|---|---|---|---|---|
| 0 – 20(3) | +45.5 to +22.5 | I | SAND (SP), SAND WITH SILT (SP-SM) | 5 to 19 |

Notes: (1) Please note elevations at the boring locations were estimated based upon the Boundary and Topographic Survey dated October 15, 2018 prepared by Shannon Surveying, Inc. and should be considered approximate.
(2) Standard Penetration Test.
(3) Maximum Termination Depth.

## 3.6 GROUNDWATER OBSERVATIONS

Groundwater levels were measured in our borings as noted on the soil boring logs in Appendix B. The groundwater table was measured approximately between 3.5 feet and 5.5 feet below the existing grades at the boring locations within the drilling depths at the time of our exploration. No further groundwater measurements were made subsequent to drilling operations.

Variations in the long-term water table may occur as a result of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors. The groundwater will fluctuate seasonally depending upon local rainfall. The rainy season in Central Florida is normally between June and September. Based upon our site specific field data, our review of the USDA Soils Survey of Seminole County, the topography of the area, the expected regional hydrogeology and our experience in the area, we estimate the seasonal high groundwater levels likely to be encountered approximately between 2.5 feet and 5 feet below existing grades at the boring locations. Please refer to the individual boring logs presented in Appendix B for boring specific groundwater levels.

Variations in the location of the long-term groundwater level may occur as a result of changes in precipitation, evaporation, surface water runoff, and other factors not apparent at the time of this exploration. The summary of groundwater conditions within the boring locations are provided below in Table 3.6.1.

**Table 3.6.1 Summary of Groundwater Conditions**

| Boring ID | Approximate Ground Surface Elevation (ft-datum) * | Encountered Ground Water Table Depth (ft) | Encountered Groundwater Table Elevation (ft-datum) | Estimated Seasonal High Ground Water Table Depth (ft) | Estimated Seasonal High Ground Water Elevation (ft-datum) |
|---|---|---|---|---|---|
| B-1 | 44 | 4.5 | 39.5 | 3.5 | 40.5 |
| B-2 | 44 | 5 | 39 | 4 | 40 |
| B-3 | 43.5 | 3.5 | 40 | 2.5 | 41 |
| B-4 | 44.5 | 4.5 | 40 | 3.5 | 41 |
| B-5 | 45 | 5.5 | 39.5 | 4.5 | 40.5 |
| B-6 | 45.5 | 5 | 40.5 | 4 | 41.5 |
| B-7 | 42.5 | 4 | 38.5 | 3 | 39.5 |
| B-8 | 43 | 4.5 | 38.5 | 3.5 | 39.5 |
| B-9 | 45 | 5.5 | 39.5 | 5 | 40 |
| B-10 | 45.5 | 5.5 | 40 | 5 | 40.5 |
| B-11 | 45 | 5.5 | 39.5 | 4.5 | 40.5 |
| B-12 | 44 | 5.5 | 38.5 | 4.5 | 39.5 |
| B-13 | 44.5 | 4 | 40.5 | 3 | 41.5 |
| B-14 | 45 | 5 | 40 | 4 | 41 |
| B-15 | 45 | 5 | 40 | 4 | 41 |
| B-16 | 45 | 5 | 40 | 4 | 41 |
| B-17 | 43.5 | 4.5 | 39 | 3.5 | 39.5 |
| B-18 | 44.5 | 4.5 | 40 | 4 | 40.5 |
| B-19 | 45 | 4 | 41 | 3.5 | 41.5 |

Note: * Elevations at the boring locations were estimated using the Boundary and Topographic Survey dated October 15, 2018 prepared by Shannon Surveying, Inc.

## 4.0 LABORATORY TESTING PROGRAM

The laboratory testing performed by ECS for this project consisted of selected tests performed on samples obtained during our field exploration operations. The following paragraphs briefly discuss the results of the completed laboratory testing program.

### 4.1 VISUAL CLASSIFICATION

Each soil sample from the test borings was visually classified on the basis of texture and plasticity in accordance with the Unified Soil Classification System (USCS) and ASTM D 2488 (Description and Identification of Soils-Visual/Manual Procedures). After classification, the various soil types were grouped into the major zones noted on the boring logs in Appendix B. The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs are approximate; in situ, the transitions may be gradual.

The soil samples from our current exploration will be retained in our laboratory for a period of two months after the subsurface exploration program is completed, after which they will be discarded unless other instructions are received as to their disposition.

### 4.2 INDEX TESTING

The index testing performed by ECS for this project consisted of selected tests performed on samples obtained during our field exploration operations. Index property tests were performed on representative soil samples obtained from the test borings in order to aid in classifying soils according to the Unified Soil Classification System (USCS) and to quantify and correlate engineering properties. The index testing program included natural moisture content tests (ASTM D 2216) and percent passing the No. 200 sieve (ASTM D 6913). The results of the index testing results conducted are included in Appendix C of this report.

## 5.0 PRELIMINARY DESIGN RECOMMENDATIONS

The following sections provide preliminary recommendations for foundation design, pavements and the stormwater management facilities. Loose soils and shallow groundwater condition are likely to be encountered near-surface. The existing building, associated asphalt pavement and utilities within the eastern portion of the property will need to be removed prior to proposed development. Based on our subsurface exploration, the proposed site is feasible given the preliminary recommendations provided within this report. Details associated with the preliminary geotechnical recommendations are provided below.

### 5.1 BUILDING DESIGN

Based upon information provided at the time this report was prepared, the site is feasible for the proposed development from a geotechnical perspective**.** It is our professional opinion that subsurface conditions are not likely to significantly impact the construction of the proposed development. However, a temporary dewatering program during the installation of the foundations may be necessary based upon the final grades especially during the rainy season given the shallow estimated seasonal high groundwater level.

As previously noted, the site appears to consist of an existing structure within the eastern portion of the property. Uncontrolled fill soils which could contain construction debris and organics from in-place or placed topsoil grubbing operations, while not encountered during this exploration, may be present within the depths of excavation. Special attention should be taken to observe such conditions, if encountered during the foundation excavations. If uncontrolled fill soils are observed, we recommend test pits be performed within the vicinity of the foundation during a final geotechnical exploration in order to access the potential extents and depths of these materials.

All asphalt pavement, structural and site components (foundation, slabs, and utilities) of the existing facility located within the proposed building pad or canopy areas should be removed prior to construction; however, the existing limerock may remain in place if determined to be suitable based upon the design criteria, laboratory testing and satisfactory proofroll testing as determined by the Geotechnical Engineer of Record.

### 5.2 FOUNDATIONS

We anticipate that the proposed structures for this site can be supported on a shallow foundations after adequate site preparation procedures. Upon successful completion of the recommended site preparation procedure, the anticipated structures would be able to be supported on shallow foundations sized to exert a maximum allowable soil bearing pressure of 3,000 pounds per square foot (psf).

The estimate of maximum allowable bearing pressure is based on assumed column and wall foundation loads of 80 kips and 5 kips per linear foot, respectively bearing at an elevation of approximately EL. +42 feet-datum on natural or controlled, compacted fill soils. If loads are higher than assumed, ECS should be contacted to review the foundation recommendations. Based on the Conceptual Sketch dated October 30, 2018 prepared by Kimley-Horn and existing site grades, we assumed the final finished floor elevation of the proposed structure to be approximately at EL. +44 feet-datum. The estimate of allowable bearing pressure may be refined based on more

precise estimates of loads (provided by the structural engineer) and proposed site grades. The foundations should be designed based on the maximum load which could be imposed by all loading conditions.

All shallow foundations should be embedded at least 18 inches below lowest adjacent grade. Further, we recommend minimum foundation widths of 18 and 24 inches of strip and square footings, respectively, even though the maximum allowable soil bearing pressure may not be developed in all cases.

Post-construction settlements of the structure will be influenced by several interrelated factors, including: (1) strength and compressibility characteristics of the subsurface; (2) footing size, bearing level, applied loads, and resulting bearing pressures beneath the foundations; and (3) site preparation and earthwork construction techniques used by the contractor. Our settlement estimates for the structure are based on the use of the earthwork construction techniques as recommended in Section 6.2 of this report. Any deviation from these recommendations could result in an increase in the estimated post-construction settlements of the structure.

Assuming the site preparation procedure as outlined is followed; we estimate that total post construction settlements of the structure are likely to be 1 inch or less. If the recommended earthwork construction techniques outlined in this report are followed, differential settlements of 0.75 inch or less should be anticipated. The above settlement estimates are based on the assumed maximum structural loads, recommended maximum allowable bearing pressure, and the field data.

**5.3 STORMWATER MANAGEMENT SYSTEM DESIGN PARAMETERS**

It is our understanding that the proposed development is likely to include a proposed three (3) stormwater dry retention pond areas within the southern portion of the proposed development and seven (7) exfiltration systems within the northern portion of the site. Based on the laboratory test results obtained from the borings performed around the underground exfiltration systems areas (B-2 through B-6, B-8, B-9, B-11, B-12, B-14 and B-16), two (2) dry pond areas (B-1, B-7, and B-13) and wet pond area (B-18 and B-19), the upper stratum is classified predominantly as Fine SAND (SP) and Fine SAND with SILT (SP-SM) to the maximum termination of depth of borings (20 feet below existing grades).

The groundwater table was encountered between approximately 4 feet to 5.5 feet below the existing grades at the boring locations within the drilling depths at the time of our exploration, and therefore the seasonal high groundwater level is estimated to between approximately between 3 feet to 5 feet below existing grades.

Table 5.3.1 outlines the recommended design parameters for the proposed stormwater dry pond area within the southern portion of the property.

**Table 5.3.1 Dry Stormwater System Design Subsurface Input Design Parameters**

| Stormwater System ID | Boring ID | Average Seasonal High Ground Water Table Elevation (ft-datum)* | Average Base of Aquifer Elevation (ft-datum) * | Fillable Porosity | Average Horizontal Saturated Hydraulic Conductivity of Mobilized Surficial Aquifer, Kh (ft/day) | Average Vertical Unsaturated Hydraulic Conductivity of Mobilized Surficial Aquifer, Kv (ft/day) |
|---|---|---|---|---|---|---|
| SMA-A.1 | B-1 & B-7 | 40.0 | 34.0 | 0.25 | 51** | 17** |
| SMA-A.2 | B-13 | 41.5 | 35.0 | 0.25 | | |
| SMA-C | B-8, B-11, B-14, B-16 | 40.5 | 32.6 | 0.25 | 51** | 17** |
| SMA-D | B-9 & B-12 | 39.8 | 29.5 | 0.25 | 51** | 17** |
| SMA-E | B-6 & B-9 | 40.8 | 29.2 | 0.25 | 51** | 17** |
| SMA-F | B-3 | 41 | 22.5 | 0.25 | 51** | 17** |
| SMA-G | B-2, B-3, B-5, B-6 & B-8 | 40.5 | 27.9 | 0.25 | 55 | 37 |
| | | | | | 51** | 17** |

Notes: : * Elevations at the boring locations were estimated using the available Boundary and Topographic Survey dated October 15, 2018 prepared by Shannon Surveying, Inc., and therefore these elevations should be considered approximate to the closest half foot.

** Average Horizontal Saturated Hydraulic Conductivity of Mobilized Surficial Aquifer ($K_h$) and Average Vertical Unsaturated Hydraulic Conductivity of Mobilized Surficial Aquifer ($K_v$) factored values selected by Kimley Horn for recovery analysis..

**Table 5.5.1 Stormwater System Design Parameters**

| Stormwater System ID | Boring ID | Average Seasonal High Ground Water Table Elevation (ft-datum)* | Average Wet Season Groundwater Table Elevation (ft-datum) * | Average Normal Seasonal Low Ground Water Table Elevation (ft-datum) * | Average Horizontal Saturated Hydraulic Conductivity of Mobilized Surficial Aquifer, Kh (ft/day) | Average Vertical Unsaturated Hydraulic Conductivity of Mobilized Surficial Aquifer, Kv (ft/day) |
|---|---|---|---|---|---|---|
| SMA-B | B-18 & B-19 | 41.0 | 40.5 | 39.5 | 51 | 34 |

Notes: : * Elevations at the boring locations were estimated using the available Boundary and Topographic Survey dated October 15, 2018 prepared by Shannon Surveying, Inc., and therefore these elevations should be considered approximate to the closest half foot.

**Please note that the hydraulic conductivity values presented in table above do not incorporate any factors of safety, except as otherwise noted**. Appropriate factors of safety will have to be applied during design and drawdown analysis. Moreover, please note that parameters presented in the table above are based on assumptions made to ground surface elevations noted on our boring logs are approximately based on the Boundary and Topographic Survey dated October 15, 2018 prepared by Shannon Surveying, Inc. our surface elevations with one-foot contour intervals; therefore, should be considered approximate to the closest half foot. We recommend that boring location survey be performed by a professional surveyor to extend the usefulness of the subsurface information obtained.

ECS can perform a baseflow/groundwater seepage analysis once the stormwater pond configurations have been established. The stormwater pond bottom and side slopes should be stabilized according to applicable Water Management district and local municipality guidelines.

**5.4 PAVEMENT DESIGN CONSIDERATIONS**

As discussed in the aforementioned Design Considerations Section 5.0, the subsurface conditions are suitable for the proposed pavement design.

**General Recommendations:** Our scope of services did not include extensive sampling and Limerock Bearing Ratio (LBR) testing of existing subgrade or potential sources of imported fill for the specific purpose of a detailed pavement analysis. Instead, we have assumed pavement-related design parameters that are considered to be typical for the area soil types and roadway type as per the "FDOT Standards & Specifications". The recommended pavement thicknesses presented in this report section are considered typical and minimum for the assumed parameters in the general site area. We understand that budgetary considerations sometimes warrant thinner pavement sections than those presented. However, the client, the owner, and the project designers should be aware that thinner pavement sections may result in increased maintenance costs and lower than anticipated pavement life. We recommend the following pavement section designs included in Table 5.6.1 below.

**Table 5.4.1 Pavement Sections**

| | Asphalt | | Concrete | |
|---|---|---|---|---|
| **Component** | **Standard** | **Heavy** | **Standard** | **Heavy** |
| Stabilized Subgrade | 12" | 12" | 12" | 12" |
| Base Course | 6" | 8" | N/A | N/A |
| Surface Course | 1.5" | 2" | 5" | 6" |

All pavement subgrades should be prepared in accordance with the recommendations presented in the section entitled Earthwork Operations.

In areas where Portland cement concrete pavement is planned, the concrete should be placed upon a minimum of 12 inches of compacted, free draining material and compacted to 98 percent of the Modified Proctor maximum dry density (ASTM D1557).

In areas where asphaltic concrete pavements are used, we suggest stabilizing the subgrade materials to a minimum Florida Bearing Value (FBV) of 75 pounds per square inch (psi). As an alternate for the FBV, materials can have a LBR of 40 percent. All stabilized subgrade materials should be compacted to 98 percent of the Modified Proctor (ASTM D-1557) maximum dry density and meet specification requirements for Type B or Type C Stabilized Subgrade by the Florida Department of Transportation (FDOT). The stabilized subgrade may consist of imported material or a blend of on-site soils and imported materials. If a blend is proposed, we recommend that the contractor performs a mix design to find the optimum mix proportions.

**Base Course:** Based on the groundwater conditions encountered at the subject property, it is our professional opinion that crushed concrete or limerock are likely to be the economical and feasible base course options for this project.

Limerock should follow a minimum LBR of 100 percent and should be mined from an FDOT approved source. Place limerock in maximum six-inch lifts and compact each lift to a minimum density of 95 percent of the Modified Proctor maximum dry density (ASTM D-1557).

Crushed concrete should follow the FDOT specification for material qualifications and placement. Place crushed concrete base in maximum 6-inch lifts and compact to a minimum density of 95 percent of the Modified Proctor (ASTM D-1557) maximum dry density according to their specification. Perform compliance testing for the base course to a depth of one foot at a frequency of one test per 5,000 square feet, or at a minimum of two test locations, whichever is greater.

**Effects of Groundwater:** One of the most critical influences on the pavement performance in Central Florida is the relationship between the pavement subgrade and the seasonal high groundwater level. Roadways and parking areas that have not considered these effects typically exhibit signs of deterioration due to degradation of the base and the base/surface course bond. Regardless of the type of base selected, we recommend that the seasonal high groundwater (SHGWT) and the bottom of the base course be separated by at least 12 inches for crushed concrete and 18 inches for limerock. Please note that a higher separation criterion between SHGWT and bottom of the base course may be required based on reviewing agency indication.

**Landscape Drains and Curbing:** If needed, where landscaped sections are located adjacent to parking lots or driveways, we recommend that drains be installed around these landscaped sections to protect the asphalt pavement from excess rainfall and over irrigation. Migration of irrigation water from the landscape areas to the interface between the asphalt and the base usually occurs unless landscape drains are installed. This migration often causes separation of the wearing surface from the base and subsequent rippling and pavement deterioration. The underdrains or strip drains should be routed to a positive outfall at the pavement area catch basins.

It is recommended that curbing around landscaped sections adjacent to parking lots and driveways be constructed with full-depth curb sections. Using extended curb sections which lie directly on top of the final asphalt level, or eliminating curbing entirely, can allow migration of irrigation water from the landscaped areas to the interface between the asphalt and the base. This migration often causes separation of the wearing surface from the base and subsequent rippling and pavement deterioration.

# 6.0 SITE CONSTRUCTION RECOMMENDATIONS

## 6.1 SUBGRADE PREPARATION

### 6.1.1 Stripping and Subgrade Preparation

The subgrade preparation should consist of stripping vegetation, rootmat, topsoil, any existing fill materials and any other soft or unsuitable materials from the 10-feet expanded building limit and 5-feet expanded pavement limits. Stripping limits should be extended an additional 1 foot for each foot of fill required at the structure's exterior edge. These activities should include removing soft and/or wet soils or otherwise unsuitable surface materials.

**It should be anticipated that existing subgrade materials from the site will be loose and wet. A contingency should be included in the budget for isolated undercutting during proofroll operations.** In the building areas, the depth of the soft wet soil, if encountered, should be removed to stable soil and replaced with approved structural fill. If the depth of unsuitable material is identified to be deeper than 3 feet below design subgrade in foundation or pavement areas, then alternative pavement subgrade stabilization may be considered. This could consist of excavating down a maximum of 3 feet below the pavement subgrade elevation, placing geogrid (such as Mirafi BXG-11 or approved equivalent), and then placing granular material over the grid to the design subgrade elevation. The actual depth of the undercut and/or remedial approach will vary depending on the conditions and should be evaluated at the time of construction.

The contractor should have a dewatering plan prepared in order to control high groundwater conditions observed on site. The amount and frequency of precipitation may also affect the groundwater conditions. The contractor should make provisions to keep excavations dry during construction to maintain the integrity of the exposed soils and help reduce the potential for otherwise unnecessary remedial work.

Erosion and sedimentation shall be controlled in accordance with Best Management Practices and current state, local, and NPDES requirements. At the appropriate time, we would be pleased to provide a proposal for construction materials testing and NPDES related services.

### 6.1.2 Proofrolling

Following the stripping operations and prior to the placement of structural fills or structural elements, the exposed subgrade soils should be observed by a geotechnical engineer or their approved representative. Proofrolling using a loaded dump truck, having an axle weight of at least 10 tons, may be used at this time to aid in identifying localized soft or unsuitable materials that should be removed. Any soft or unsuitable material encountered during proofrolling should be removed to a stable subgrade and replaced with an approved backfill compacted to the criteria given below.

**Due to the loose soils encountered within this exploration a representative of the Geotechnical Engineer of Record is recommended to be on-site during the proofroll of the building pad areas to confirm the suitability of the natural soils prior to the placement of structural fill or foundations. The natural soils within the building pad areas should be densified with a 20 ton smooth drum roller that should traverse the pads in a perpendicular (orthogonal) pattern using**

**the maximum vibratory setting prior to commencing proofroll operations and subsequent structural fill placement.**

## 6.2 EARTHWORK OPERATIONS

### 6.2.1 Structural Fill Materials

After subgrade preparation and observation has been completed and a stable subgrade exists, fill placement may begin. Structural fill materials should not be placed on soils which have been recently subjected to precipitation. Wet soils should be removed prior to the placement of engineered fill, granular sub-base materials, foundation/slab concrete, or paving materials.

Materials used as structural fill for shallow fill areas should consist of approved material classified as SP, SP-SM, SM, SC or more granular, which are free of debris, particles larger than 3 inches in diameter (4-inches for trench/utility backfill), organic inclusions, cinders, ash, or excess moisture. **It should be noted that the soils observed within the proposed dry pond area would be considered suitable for use as structural fill; however, due to the nature of the high groundwater table there should be consideration with respect to a time allowance for these soils to dry prior to compactive effort being applied. Due to the coarse, granular nature of the soils, we would expect the soils to dry relatively quickly during periods of no precipitation.**

Prior to placement of structural fill, representative bulk samples (about 50 pounds) of on-site and off-site borrow should be submitted to ECS for laboratory testing, which will include natural moisture content, grain-size distribution, and moisture-density relationships for compaction. Import materials should be tested prior to being hauled to the site to determine if they meet project specifications.

The structural fill, consisting of suitable on-site soils or off-site granular borrow material, or a mixture thereof, should be placed in essentially horizontal lifts with a maximum loose thickness of 8 inches and moisture conditioned to within $\pm$3 percentage points of the optimum moisture content. Structural fill should be placed and compacted to a minimum compaction of 95% of the maximum dry density in accordance with the Modified Proctor method (ASTM D1557).

Each lift of compacted engineered fill should be tested by a representative of the geotechnical engineer prior to placement of subsequent lifts. Compaction testing should be performed at the rate of at least 1 test per 2,500 square feet for each lift of fill within the building pad and at the rate of at least 1 test per 5,000 square feet for each lift of fill outside of the building pad, with a minimum of 3 tests per lift of fill within the building footprint. The elevation and location of the tests should be accurately identified at the time of fill placement. Areas which fail to achieve the required degree of compaction should be recompacted and retested until minimum compaction is achieved. Failing test areas may require adjustments in moisture content or other suitable remedial activities in order to achieve the required compaction.

The expanded limits of the proposed construction areas should be well defined, including the limits of the fill zones for buildings, pavements, and slopes, etc., at the time of fill placement. Grade controls should be maintained throughout the filling operations.

Compaction equipment suitable to the soil type being compacted should be used to compact the subgrades and fill materials. Sheepsfoot compaction equipment should be suitable for the fine-

grained soils (Clays and Silts). A vibratory steel drum roller should be used for compaction of coarse-grained soils (Sands) as well as for sealing compacted surfaces. In confined areas such as utility trenches, portable compaction equipment and thin lifts of 3 to 4 inches may be required to achieve specified degrees of compaction.

At the end of each work day, all fill areas should be graded to facilitate drainage of any precipitation and the surface should be sealed by use of a smooth-drum roller to limit infiltration of surface water. During placement and compaction of new fill at the beginning of each workday, the contractor may need to scarify existing subgrades to a depth on the order of 4 inches so that a weak plane will not be formed between the new fill and the existing subgrade soils.

Positive site drainage should be maintained during earthwork operations in an effort to maintain the integrity of the site surface soil. When wet, the site soils may degrade quickly with disturbance from contractor operations and will be extremely difficult to stabilize for fill placement. Consequently, the contractor should be prepared to implement aggressive mechanical or chemical drying, depending upon the actual site conditions. We strongly recommend that mass grading for the project be performed during the drier summer months to help facilitate favorable moisture conditions for the site soils. If water must be added to raise the moisture content of the soil, it should be uniformly applied and thoroughly mixed into the soil. In addition to maintaining proper site drainage for the purpose of maintaining the integrity of the site soils, care must be taken to control the surface water flow due to the inherent risks associated with risk for sinkhole development as previously discussed.

**6.3 UTILITY INSTALLATIONS**

**Utility Subgrades and Excavation:** The soils encountered in our exploration are expected to be generally suitable for support of utility pipes to include an underground storage tank (UST). The pipe subgrade, especially where existing fill was encountered, should be observed and probed for stability by the testing agency to evaluate the suitability of the materials encountered. Any loose or unsuitable materials encountered at the utility pipe subgrade elevation should be removed and replaced with suitable compacted structural fill or pipe bedding material. Based upon the type of soils and high groundwater table encountered on site, the contractor will need to consider installing trench boxes during deep utility and UST excavations.

**Utility Backfilling:** The granular bedding material should be at least 4 inches thick, but not less than that specified by the project drawings and specifications. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the requirements for structural fill given in this report. Compacted backfill should be free of topsoil, roots, ice, or any other material designated as unsuitable. The backfill should be moisture conditioned, placed, and compacted in accordance with the recommendations of this report. Where the utility and UST will be located below water, the contractor should be aware of potential buoyancy and tie down the pipes or UST structure. In addition, soil backfill will not be able to be compacted. In this case, backfill can consist of FDOT 57 stone to approximately 1 foot over the water level, a fabric separator placed, followed by compacted fill to design subgrade.

**Utility Excavation Dewatering:** Groundwater will likely be encountered for UST and utility excavations. Depending on the amount of controlled fill and the depth of the utility, pumping from the excavations may not be enough for the installation of the utility and UST. Well points

would need to be considered if localized dewatering equipment such as sump pumps are unable to control water during the installation of the utilities and UST. It is expected that removal of perched water which seeps into excavations could be accomplished by pumping from sumps excavated in the trench bottom and which are backfilled with FDOT Size No. 57 Stone or open graded bedding material. Should water conditions beyond the capability of sump pumping be encountered, the contractor should submit a Dewatering Plan in accordance with project specifications.

**6.4 GENERAL CONSTRUCTION CONSIDERATIONS**

**Site Drainage and Surface Water Control:** Adequate temporary and permanent control of surface water runoff will be required in order to allow site access, grading and construction to proceed. Standing water or ice should be removed from the completed building pad and pavement subgrades as soon as practical after each precipitation event without damaging the subgrade throughout the construction period. This may include the use of temporary under-drains, sump pits and pumps, plowing, or other means. In addition, the building pad and pavement subgrades should be maintained on a regular basis to grade out any ruts or low points where water may accumulate, and to aerate and/or re-compact any areas disturbed by weather or construction activities. The responsibility for this maintenance role should be clearly defined in the contract documents.

**Subgrade Protection:** Measures should also be taken to limit site disturbance, especially from rubber-tired heavy construction equipment, and to control and remove surface water from development areas, including structural and pavement areas. It would be advisable to designate a haul road and construction staging area to limit the areas of disturbance and to prevent construction traffic from excessively degrading sensitive subgrade soils and existing pavement areas. Haul roads and construction staging areas could be covered with excess depths of aggregate to protect those subgrades. The aggregate can later be removed and used in pavement areas.

**Excavation Safety:** Cuts or excavations associated with utility excavations may require forming or bracing, slope flattening, or other physical measures to control sloughing and/or prevent slope failures. Contractors should be familiar with applicable OSHA codes to ensure that adequate protection of the excavations and trench walls is provided.

**Erosion Control:** Install soil erosion and sedimentation control devices, as well as temporary stormwater management facilities, as specified by Site/Civil Engineer. Maintain positive drainage conditions throughout construction, avoiding unnecessary ponding of stormwater in excavations or low areas of the site. Seal-roll exposed soil or subgrade surfaces prior to rain events, and promptly remove any standing water immediately afterwards.

**6.5 CONSTRUCTION OBSERVATION AND TESTING**

Regardless of the thoroughness of a geotechnical engineering study, there is always a possibility that subsurface conditions between test borings may be different from those encountered at the test boring locations, that conditions are not as anticipated by the designers, or that the demolition or construction process has altered the subsurface conditions. Therefore, geotechnical engineering construction observation should be performed under the supervision of a qualified

Geotechnical Engineer who is familiar with the intent of the recommendations presented in this report. Such observation services are recommended to evaluate whether the conditions anticipated in the design actually exist, or whether the recommendations presented in the report should be modified where necessary.

## 7.0 CLOSING

The report has been prepared for the exclusive use of Equinox Development Properties Inc., and their design team. ECS has prepared this report of findings, evaluations, and recommendations to guide geotechnical-related design and construction aspects of the project.

The description of the proposed project is based on information provided to ECS by Equinox Development Properties Inc. If any of this information is inaccurate, either due to our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted immediately in order that we can review the report in light of the changes and provide additional or alternate recommendations as may be required to reflect the proposed construction.

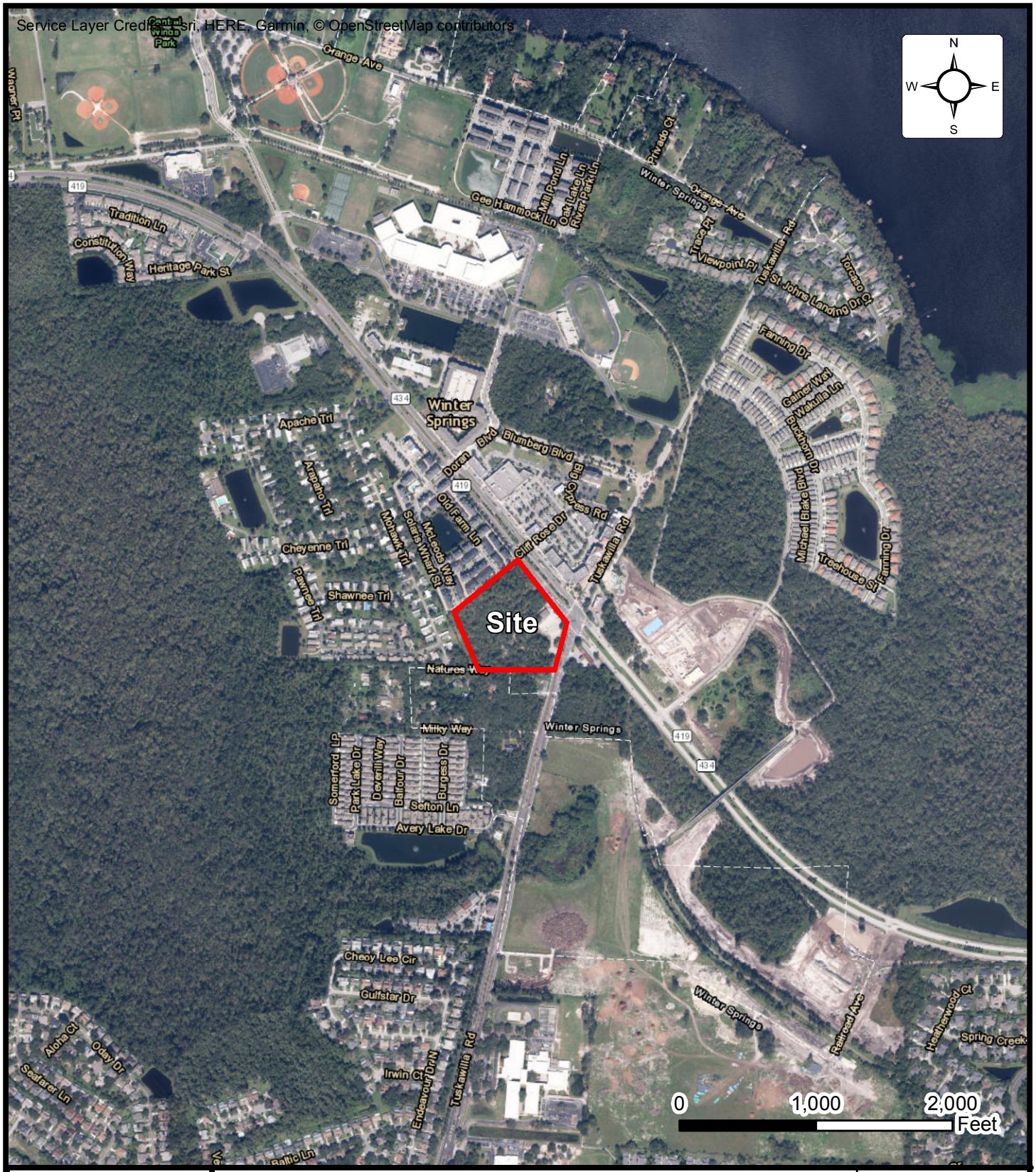
We recommend that ECS be allowed to review the project's plans and specifications pertaining to our work so that we may ascertain consistency of those plans/specifications with the intent of the geotechnical report.

Field observations, monitoring, and quality assurance testing during earthwork and foundation installation are an extension of and integral to the geotechnical design recommendation. We recommend that the owner retain these quality assurance services and that ECS be allowed to continue our involvement throughout these critical phases of construction to provide general consultation as issues arise. ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

The scope of this investigation was limited to the evaluation of the load-carrying capabilities and load stability of the soils and bedrock. Oil, hazardous waste, radioactivity, irritants, pollutants, radon or other dangerous substances and conditions were not the subject of this study. Their presence and/or absence are not implied, inferred or suggested by this report or results of this study.

# APPENDIX A – Diagrams

Site Location Diagram
Boring Location Diagram




# Site Line Location Diagram
# TUSKAWILLA RETAIL DEVELOPMENT

**170 TUSKAWILLA ROAD, WINTER SPRINGS, FL**

**EQUINOX DEVELOPMENT PROPERTIES, INC.**

| | |
|---|---|
| ENGINEER | JPH |
| SCALE | 1 " = 1000' |
| PROJECT NO. | 6366 |
| SHEET | 1 OF 1 |
| DATE | 11/8/2018 |


# Boring Location Diagram

## EQUINOX DEVELOPMENT PROPERTIES, INC.

# TUSKAWILLA RETAIL DEVELOPMENT

## 170 TUSKAWILLA RD, WINTER SPRINGS, FL

| | |
|---|---|
| ENGINEER | JPH |
| SCALE | AS NOTED |
| PROJECT NO. | 24:6366 |
| SHEET | 1 OF 1 |
| DATE | 12/11/2020 |

# APPENDIX B – Field Operations

Reference Notes for Boring Logs
Boring Logs (B-1 through B-19)
Cross Section A-A'
Cross Section B-B'
Cross Section C-C'

# REFERENCE NOTES FOR BORING LOGS

| MATERIAL[1,2] | |
|---|---|
| | **ASPHALT** |
| | **CONCRETE** |
| | **GRAVEL** |
| | **TOPSOIL** |
| | **VOID** |
| | **BRICK** |
| | **AGGREGATE BASE COURSE** |
| | **FILL[3] MAN-PLACED SOILS** |
| **GW** | **WELL-GRADED GRAVEL** gravel-sand mixtures, little or no fines |
| **GP** | **POORLY-GRADED GRAVEL** gravel-sand mixtures, little or no fines |
| **GM** | **SILTY GRAVEL** gravel-sand-silt mixtures |
| **GC** | **CLAYEY GRAVEL** gravel-sand-clay mixtures |
| **SW** | **WELL-GRADED SAND** gravelly sand, little or no fines |
| **SP** | **POORLY-GRADED SAND** gravelly sand, little or no fines |
| **SM** | **SILTY SAND** sand-silt mixtures |
| **SC** | **CLAYEY SAND** sand-clay mixtures |
| **ML** | **SILT** non-plastic to medium plasticity |
| **MH** | **ELASTIC SILT** high plasticity |
| **CL** | **LEAN CLAY** low to medium plasticity |
| **CH** | **FAT CLAY** high plasticity |
| **OL** | **ORGANIC SILT or CLAY** non-plastic to low plasticity |
| **OH** | **ORGANIC SILT or CLAY** high plasticity |
| **PT** | **PEAT** highly organic soils |

| DRILLING SAMPLING SYMBOLS & ABBREVIATIONS | | | |
|---|---|---|---|
| SS | Split Spoon Sampler | PM | Pressuremeter Test |
| ST | Shelby Tube Sampler | RD | Rock Bit Drilling |
| WS | Wash Sample | RC | Rock Core, NX, BX, AX |
| BS | Bulk Sample of Cuttings | REC | Rock Sample Recovery % |
| PA | Power Auger (no sample) | RQD | Rock Quality Designation % |
| HSA | Hollow Stem Auger | | |

| PARTICLE SIZE IDENTIFICATION | | |
|---|---|---|
| **DESIGNATION** | | **PARTICLE SIZES** |
| Boulders | | 12 inches (300 mm) or larger |
| Cobbles | | 3 inches to 12 inches (75 mm to 300 mm) |
| Gravel: | Coarse | ¾ inch to 3 inches (19 mm to 75 mm) |
| | Fine | 4.75 mm to 19 mm (No. 4 sieve to ¾ inch) |
| Sand: | Coarse | 2.00 mm to 4.75 mm (No. 10 to No. 4 sieve) |
| | Medium | 0.425 mm to 2.00 mm (No. 40 to No. 10 sieve) |
| | Fine | 0.074 mm to 0.425 mm (No. 200 to No. 40 sieve) |
| Silt & Clay ("Fines") | | <0.074 mm (smaller than a No. 200 sieve) |

| COHESIVE SILTS & CLAYS | | |
|---|---|---|
| **UNCONFINED COMPRESSIVE STRENGTH, $Q_P$[4]** | **SPT[5] (BPF)** | **CONSISTENCY[7] (COHESIVE)** |
| <0.25 | <3 | Very Soft |
| 0.25 - <0.50 | 3 - 4 | Soft |
| 0.50 - <1.00 | 5 - 8 | Firm |
| 1.00 - <2.00 | 9 - 15 | Stiff |
| 2.00 - <4.00 | 16 - 30 | Very Stiff |
| 4.00 - 8.00 | 31 - 50 | Hard |
| >8.00 | >50 | Very Hard |

| GRAVELS, SANDS & NON-COHESIVE SILTS | |
|---|---|
| **SPT[5]** | **DENSITY** |
| <5 | Very Loose |
| 5 - 10 | Loose |
| 11 - 30 | Medium Dense |
| 31 - 50 | Dense |
| >50 | Very Dense |

| RELATIVE AMOUNT[7] | COARSE GRAINED (%)[8] | FINE GRAINED (%)[8] |
|---|---|---|
| Trace | ≤5 | ≤5 |
| Dual Symbol *(ex: SW-SM)* | 10 | 10 |
| With | 15 - 20 | 15 - 25 |
| Adjective *(ex: "Silty")* | ≥25 | ≥30 |

| WATER LEVELS[6] | | |
|---|---|---|
| | WL | Water Level (WS)(WD) |
| | | (WS) While Sampling |
| | | (WD) While Drilling |
| | SHW | Seasonal High WT |
| | ACR | After Casing Removal |
| | SWT | Stabilized Water Table |
| | DCI | Dry Cave-In |
| | WCI | Wet Cave-In |

*[1] Classifications and symbols per ASTM D 2488-09 (Visual-Manual Procedure) unless noted otherwise.*

*[2] To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.*

*[3] Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-**FILL**)].*

*[4] Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).*

*[5] Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf).*

*[6] The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.*

*[7] Minor deviation from ASTM D 2488-09 Note 16.*

*[8] Percentages are estimated to the nearest 5% per ASTM D 2488-09.*

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-4 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

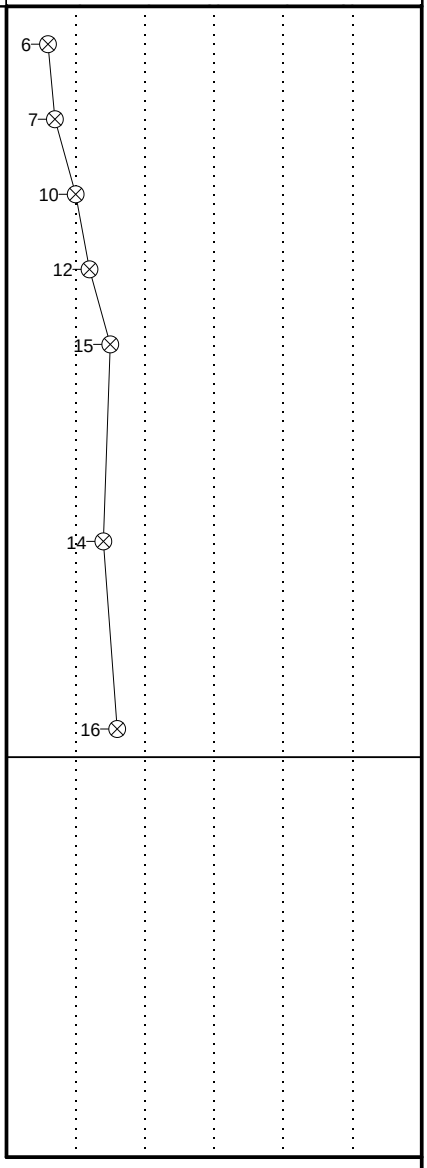
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 44'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | | 3 2 4 4 4 4 3 4 4 |
| | S-2 | SS | 24 | 24 | | | 40 | |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, loose to medium dense | | | 5 4 6 5 6 5 7 9 7 |
| | S-4 | SS | 24 | 24 | | | | 8 7 7 7 |
| | S-5 | SS | 24 | 24 | | | 35 | |
| 10 | | | | | | | | |
| | S-6 | SS | 18 | 18 | (SP) SAND, light gray, wet, medium dense | | 30 | 7 7 7 |
| 15 | | | | | | | | |
| | S-7 | SS | 18 | 18 | | | 25 | 6 7 9 |
| 20 | | | | | END OF BORING @ 20' | | | |
| | | | | | | | 20 | |
| 25 | | | | | | | | |
| | | | | | | | 15 | |
| 30 | | | | | | | | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 4.5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 3.5' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-9 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

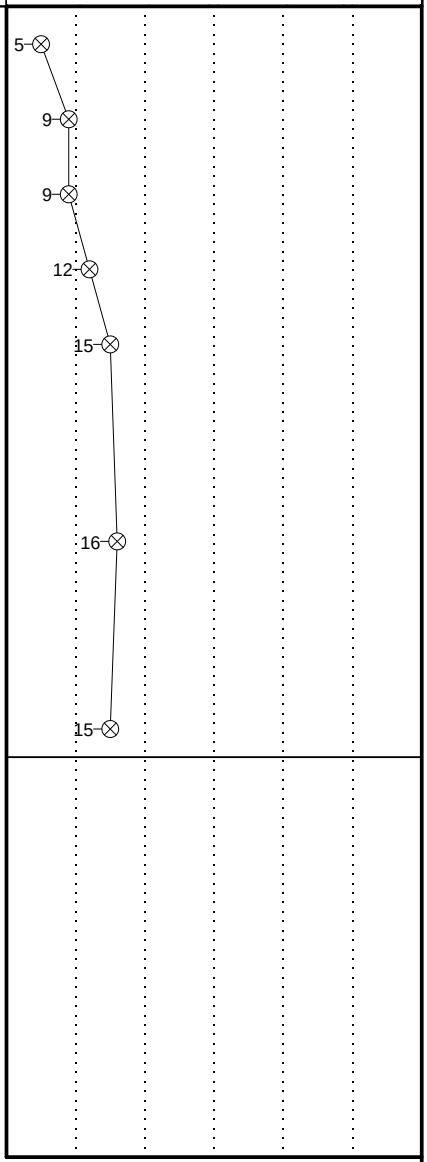
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 44'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | | 2 2 3 5 |
| | S-2 | SS | 24 | 24 | | | | 4 5 4 4 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, loose to medium dense | | 40 | 3 5 4 6 |
| | S-4 | SS | 24 | 24 | | | | 6 5 7 7 |
| | S-5 | SS | 24 | 24 | | | 35 | 6 8 7 8 |
| 10 | | | | | (SP) SAND, light gray, wet, medium dense | | | |
| | S-6 | SS | 18 | 18 | | | 30 | 6 7 9 |
| 15 | | | | | | | | |
| | S-7 | SS | 18 | 18 | | | 25 | 8 7 8 |
| 20 | | | | | END OF BORING @ 20' | | 20 | |
| 25 | | | | | | | 15 | |
| 30 | | | | | | | | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 4' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-15 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

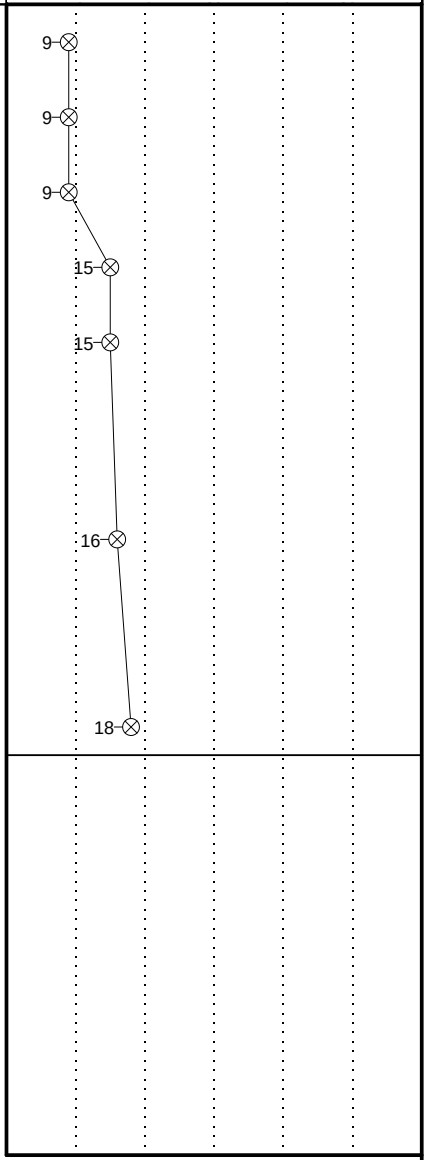
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 43.5'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | | 3 5 4 |
| | S-2 | SS | 24 | 24 | | | 40 | 4 3 4 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, loose to medium dense | | | 5 4 5 |
| | S-4 | SS | 24 | 24 | | | | 5 4 6 |
| | S-5 | SS | 24 | 24 | | | 35 | 7 8 7 |
| 10 | | | | | | | | 7 5 7 |
| | S-6 | SS | 18 | 18 | (SP) SAND, light gray, wet, medium dense | | 30 | 8 9 6 |
| 15 | | | | | | | | 7 9 |
| | S-7 | SS | 18 | 18 | | | 25 | 8 8 10 |
| 20 | | | | | END OF BORING @ 20' | | | |
| | | | | | | | 20 | |
| 25 | | | | | | | | |
| | | | | | | | 15 | |
| 30 | | | | | | | | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 3.5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 2.5' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-5 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

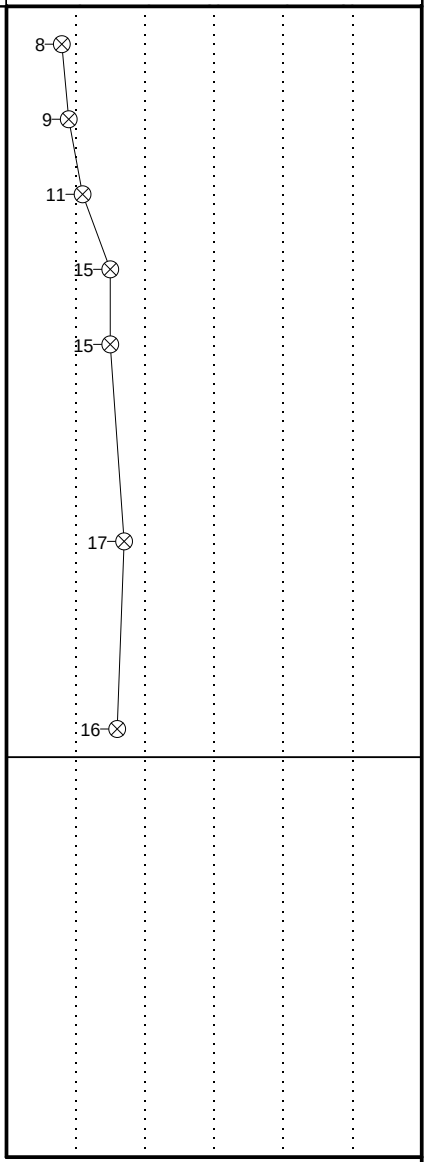
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION 44.5'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | | 4 3 5 |
| | S-2 | SS | 24 | 24 | | | | 4 5 5 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, medium dense | | 40 | 4 6 7 |
| | S-4 | SS | 24 | 24 | (SP) SAND, light gray, wet, medium dense | | | 5 8 7 |
| | S-5 | SS | 24 | 24 | | | 35 | 8 7 7 |
| 10 | | | | | | | | 8 |
| | S-6 | SS | 18 | 18 | | | 30 | 6 7 10 |
| 15 | | | | | | | | |
| | S-7 | SS | 18 | 18 | | | 25 | 6 8 8 |
| 20 | | | | | END OF BORING @ 20' | | 20 | |
| 25 | | | | | | | 15 | |
| 30 | | | | | | | | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 4.5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 3.5' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-10 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

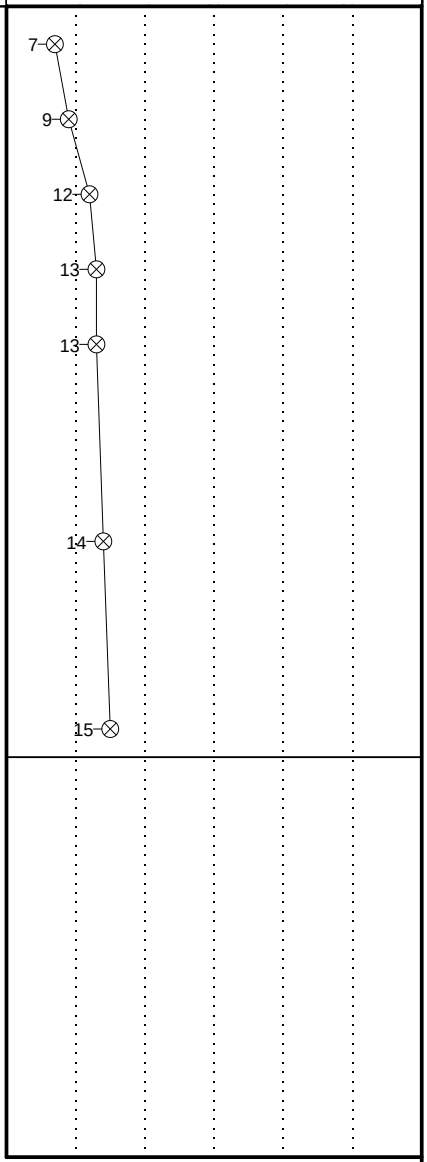
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 45'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | 45 | 3 4 4 3 3 3 2 4 5 5 5 |
| | S-2 | SS | 24 | 24 | | | | |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, medium dense | | 40 | 4 5 7 8 6 7 6 7 8 7 6 8 |
| | S-4 | SS | 24 | 24 | | | | |
| | S-5 | SS | 24 | 24 | (SP) SAND, light gray, wet, medium dense | | | |
| 10 | | | | | | | 35 | |
| | S-6 | SS | 18 | 18 | | | | 6 7 7 |
| 15 | | | | | | | 30 | |
| | S-7 | SS | 18 | 18 | | | | 5 7 8 |
| 20 | | | | | END OF BORING @ 20' | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 5.5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 4.5' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-14 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 45.5'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | 45 | 3 2 3 |
| | S-2 | SS | 24 | 24 | | | | 3 4 3 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, loose to medium dense | | 40 | 3 5 4 |
| | S-4 | SS | 24 | 24 | | | | 4 5 7 |
| | S-5 | SS | 24 | 24 | (SP) SAND, light gray, wet, medium dense | | | 6 7 8 7 6 6 5 8 |
| 10 | | | | | | | 35 | |
| | S-6 | SS | 18 | 18 | | | | 7 7 9 |
| 15 | | | | | | | 30 | |
| | S-7 | SS | 18 | 18 | | | | 6 7 10 |
| 20 | | | | | END OF BORING @ 20' | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 4' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-3 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

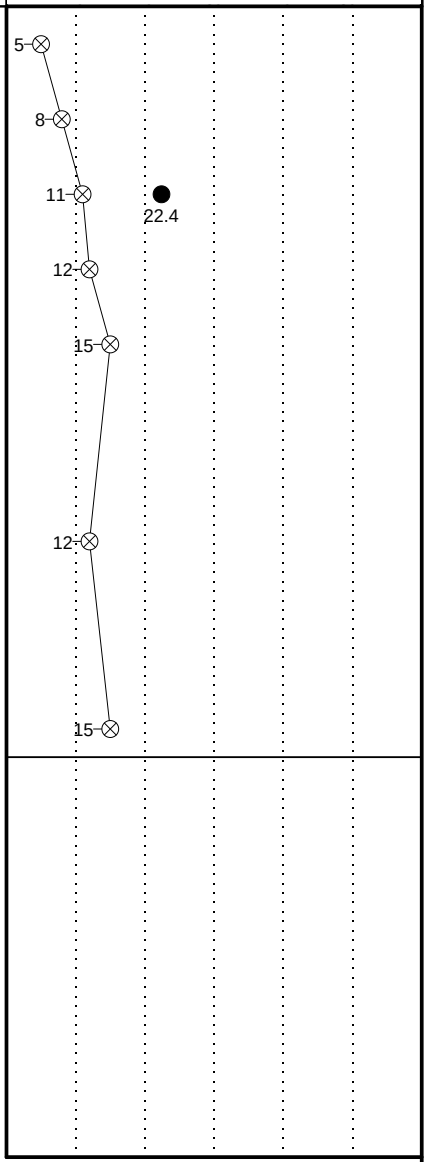
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 42.5'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | | 2 3 2 2 2 |
| | S-2 | SS | 24 | 24 | | | 40 | 5 4 4 6 5 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, brown, wet, medium dense | | | 6 5 7 6 7 |
| | S-4 | SS | 24 | 24 | | | 35 | 5 8 6 8 7 |
| | S-5 | SS | 24 | 24 | | | | 7 |
| 10 | | | | | (SP) SAND, light gray, wet, medium dense | | 30 | |
| | S-6 | SS | 18 | 18 | | | | 6 5 7 |
| 15 | | | | | | | 25 | |
| | S-7 | SS | 18 | 18 | | | | 5 8 7 |
| 20 | | | | | END OF BORING @ 20' | | 20 | |
| 25 | | | | | | | 15 | |
| 30 | | | | | | | | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 4' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 3' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-2 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 43'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, gray to light gray, moist, loose | | 43 | 4 3 4 4 4 5 4 5 5 5 |
| | S-2 | SS | 24 | 24 | | | 40 | |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, brown, wet, medium dense | | | 4 6 5 7 6 8 7 8 9 9 8 7 |
| | S-4 | SS | 24 | 24 | | | 35 | |
| | S-5 | SS | 24 | 24 | | | | |
| 10 | | | | | (SP) SAND, light gray, wet, medium dense | | 30 | |
| | S-6 | SS | 18 | 18 | | | | 5 8 9 |
| 15 | | | | | | | 25 | |
| | S-7 | SS | 18 | 18 | | | | 7 8 8 |
| 20 | | | | | END OF BORING @ 20' | | 20 | |
| 25 | | | | | | | 15 | |
| 30 | | | | | | | | |

7 | 7.8 | 9 | 11 | 15 | 17 | 17 | 16

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 4.5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 3.5' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-19 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

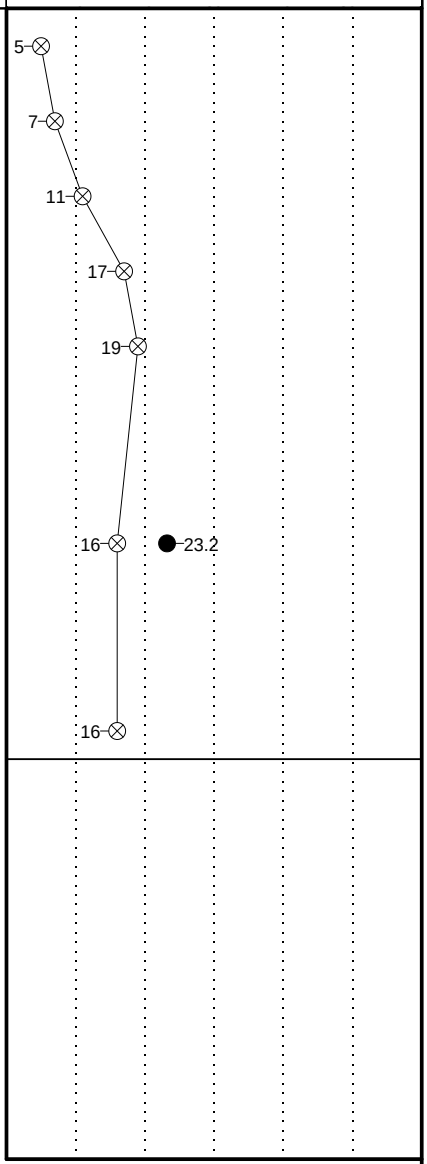
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 45'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, gray to light gray, moist, loose | | 45 | 3 2 3 3 |
| | S-2 | SS | 24 | 24 | | | | 4 3 4 5 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, brown, wet, medium dense | | 40 | 4 6 5 7 |
| | S-4 | SS | 24 | 24 | | | | 6 8 9 8 |
| | S-5 | SS | 24 | 24 | | | | 9 9 10 9 |
| 10 | | | | | | | 35 | |
| | | | | | (SP) SAND, gray, wet, medium dense | | | |
| | S-6 | SS | 18 | 18 | | | | 6 7 9 |
| 15 | | | | | | | 30 | |
| | S-7 | SS | 18 | 18 | | | | 8 8 8 |
| 20 | | | | | END OF BORING @ 20' | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 5.5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 5' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-18 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 45.5'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | 45 | 3 4 5 |
| | S-2 | SS | 24 | 24 | | | | 4 4 5 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, brown, wet, medium dense to loose | | 40 | 5 5 4<br>6 5 7 |
| | S-4 | SS | 24 | 24 | | | | 7 8 7 |
| | S-5 | SS | 24 | 24 | | | | 5 6 5 |
| 10 | | | | | | | 35 | 5 4 5 |
| | S-6 | SS | 18 | 18 | (SP) SAND, light gray, wet, medium dense | | | 5 7 10 |
| 15 | | | | | | | 30 | |
| | S-7 | SS | 18 | 18 | | | | 6 6 7 |
| 20 | | | | | END OF BORING @ 20' | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |

Penetrometer plot: 9, 10, 12, 12, 23.4, 9, 17, 13

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 5.5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 5' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-12 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

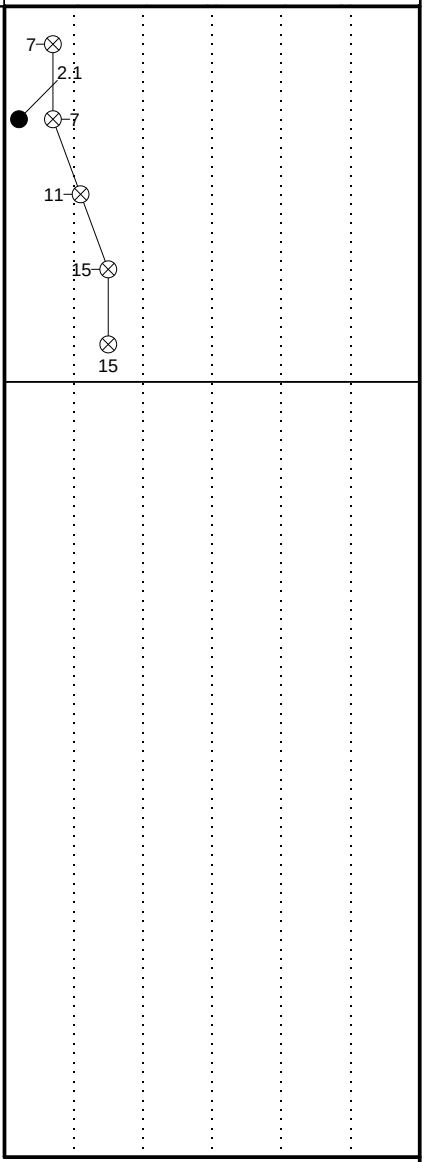
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 45'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | 45 | 4 4 3 |
| | S-2 | SS | 24 | 24 | | | | 5 2 4 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, brown, wet, medium dense | | 40 | 3 4 4 |
| | S-4 | SS | 24 | 24 | | | | 6 5 7 |
| | S-5 | SS | 24 | 24 | | | | 6 8 7 |
| 10 | | | | | END OF BORING @ 10' | | 35 | 9 6 8 |
| 15 | | | | | | | 30 | 7 10 |
| 20 | | | | | | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 5.5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 4.5' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-17 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 44'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Asphalt Thickness [2.00"]<br>Limerock Thickness [5.00"]<br>(SP) SAND, brown, moist, loose to medium dense | | 44 | 4 4 5 |
| | S-2 | SS | 24 | 24 | | | | 5 4 4 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, brown, moist to wet, loose | | 40 | 6 5 6 |
| | S-4 | SS | 24 | 24 | | | | 5 5 5 |
| | S-5 | SS | 24 | 24 | | | 35 | 5 7 4 |
| 10 | | | | | END OF BORING @ 10' | | | 4 4 4 |
| 15 | | | | | | | 30 | 5 5 4 |
| 20 | | | | | | | 25 | 4 6 |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |

9 – 11 – 10 – 13.8 – 8 – 8

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 5.5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 4.5' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-6 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION

170 Tuskawilla Road, Winter Springs, Seminole County, FL

| NORTHING | EASTING | STATION |
|---|---|---|
| | | |

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

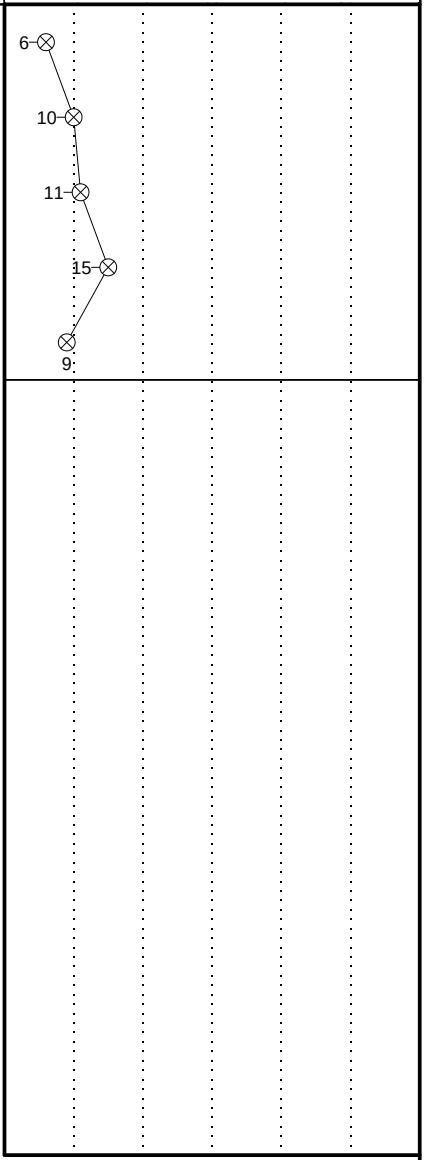
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION 44.5'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | | 3 2 4 |
| | S-2 | SS | 24 | 24 | | | | 3 6 5 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, brown, wet, medium dense | | 40 | 5 5 6 |
| | S-4 | SS | 24 | 24 | | | | 5 7 8 |
| 10 | S-5 | SS | 24 | 24 | (SP) SAND, light gray, wet, loose | | 35 | 7 6 4 |
| | | | | | END OF BORING @ 10' | | | 7 |
| 15 | | | | | | | 30 | |
| 20 | | | | | | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 4' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 3' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-11 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION

170 Tuskawilla Road, Winter Springs, Seminole County, FL

| NORTHING | EASTING | STATION |
|---|---|---|
| | | |

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION 45'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | 45 | 4 3 2 |
| | S-2 | SS | 24 | 24 | | | | 3 4 4 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, medium dense | | 40 | 4 3 5 |
| | S-4 | SS | 24 | 24 | (SP) SAND, light gray, wet, medium dense | | | 7 6 7 |
| | S-5 | SS | 24 | 24 | | | | 6 5 7 |
| 10 | | | | | END OF BORING @ 10' | | 35 | 7 6 8 |
| 15 | | | | | | | 30 | 7 8 |
| 20 | | | | | | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |

5 8 13 12 22.1 15

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 4' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-8 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION

170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC%

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

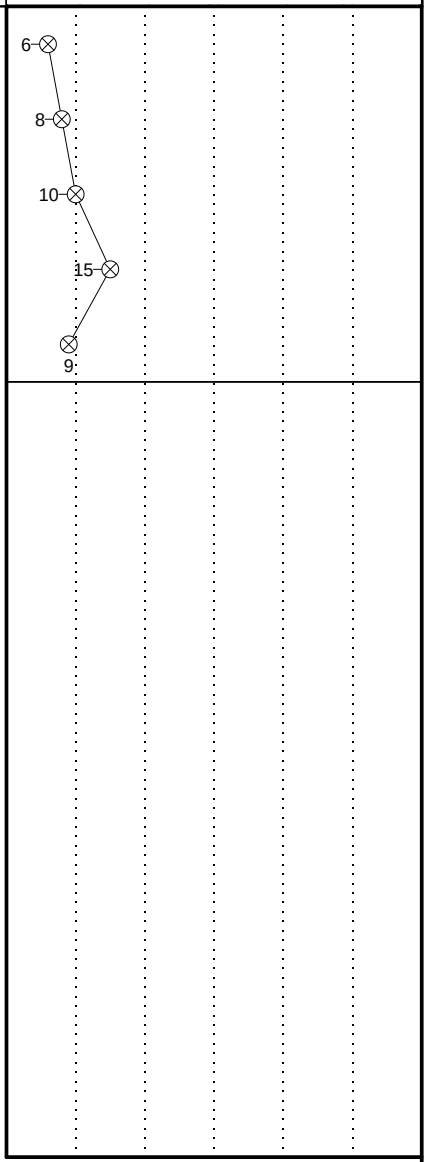
STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 45'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | 45 | 4 3 3 3 4 |
| | S-2 | SS | 24 | 24 | | | | 5 5 3 5 4 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, loose | | 40 | 5 5 5 4 6 |
| | S-4 | SS | 24 | 24 | (SP) SAND, light gray, wet, medium dense to loose | | | 8 7 7 5 4 |
| | S-5 | SS | 24 | 24 | | | | 5 7 |
| 10 | | | | | END OF BORING @ 10' | | 35 | |
| 15 | | | | | | | 30 | |
| 20 | | | | | | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 4' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-16 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

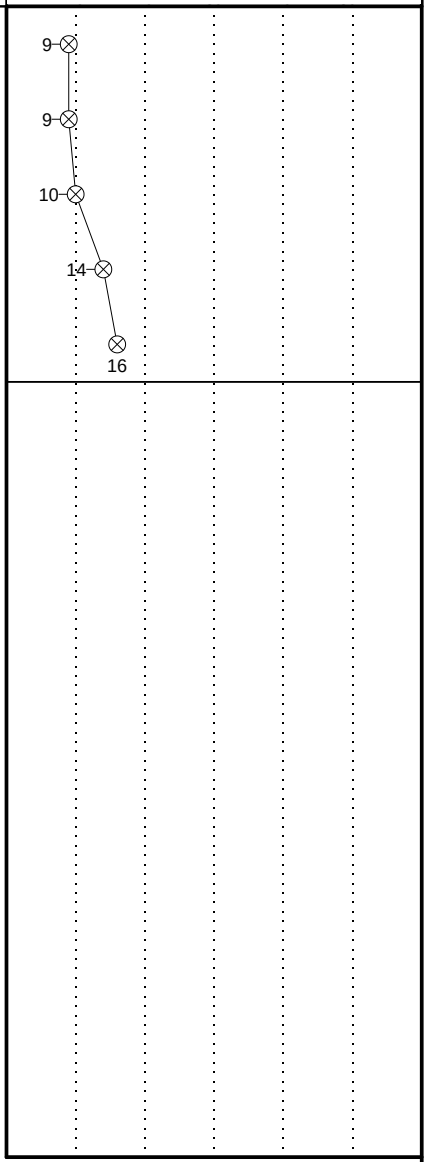
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ▰ LOSS OF CIRCULATION

SURFACE ELEVATION 45'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | 45 | 2 5 4 3 3 5 4 6 6 5 5 5 6 5 9 7 8 7 9 9 |
| | S-2 | SS | 24 | 24 | | | | |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, loose to medium dense | | 40 | |
| | S-4 | SS | 24 | 24 | | | | |
| | S-5 | SS | 24 | 24 | | | | |
| 10 | | | | | END OF BORING @ 10' | | 35 | |
| 15 | | | | | | | 30 | |
| 20 | | | | | | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 4' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-1 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 43.5'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | | 6 |
| | S-2 | SS | 24 | 24 | | | 40 | 6 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, loose to medium dense | | | 9 |
| | S-4 | SS | 24 | 24 | | | | 13 |
| | S-5 | SS | 24 | 24 | | | 35 | 12 |
| 10 | | | | | END OF BORING @ 10' | | | |
| 15 | | | | | | | 30 | |
| 20 | | | | | | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 4.5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 3.5' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-7 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

STANDARD PENETRATION BLOWS/FT

ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 44.5'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | | 4 5 4 4 4 3 5 4 6 5 7 6 7 4 7 6 7 5 8 7 7 |
| | S-2 | SS | 24 | 24 | | | | |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, medium dense | | 40 | |
| | S-4 | SS | 24 | 24 | | | | |
| | S-5 | SS | 24 | 24 | | | 35 | |
| 10 | | | | | END OF BORING @ 10' | | | |
| 15 | | | | | | | 30 | |
| 20 | | | | | | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |

9 9 13 13 15

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 4.5' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 4' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

| CLIENT | Job #: | BORING # | SHEET |
|---|---|---|---|
| Equinox Development Properties, Inc. | 24:6366 | B-13 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Tuskawilla Retail Development GEO | Kimley Horn |

SITE LOCATION: 170 Tuskawilla Road, Winter Springs, Seminole County, FL

NORTHING | EASTING | STATION

CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% | WATER CONTENT% | LIQUID LIMIT%

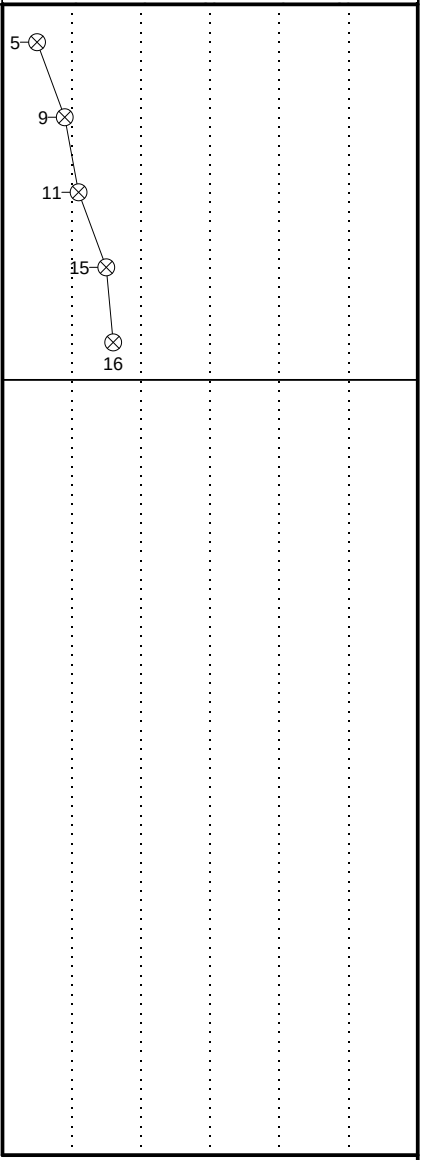
STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING | LOSS OF CIRCULATION

SURFACE ELEVATION 45'

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 24 | 24 | Topsoil Thickness [3.00"]<br>(SP) SAND, light gray, moist, loose | | 45 | 3 3 2 |
| | S-2 | SS | 24 | 24 | | | | 4 5 4 |
| 5 | S-3 | SS | 24 | 24 | (SP-SM) SAND WITH SILT, dark brown, wet, medium dense | | 40 | 5 4 6 |
| | S-4 | SS | 24 | 24 | | | | 5 7 6 |
| | S-5 | SS | 24 | 24 | | | | 8 7 7 |
| 10 | | | | | END OF BORING @ 10' | | 35 | 6 9 7 9 |
| 15 | | | | | | | 30 | |
| 20 | | | | | | | 25 | |
| 25 | | | | | | | 20 | |
| 30 | | | | | | | 15 | |




THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 4' WS ☐ WD ☒ | BORING STARTED 10/08/18 | CAVE IN DEPTH |
| WL(SHW) 3.5' WL(ACR) | BORING COMPLETED 10/08/18 | HAMMER TYPE Manual |
| WL | RIG ATV FOREMAN Gary | DRILLING METHOD Mud Rotary |

## SOIL CLASSIFICATION LEGEND

GW - WELL GRADED GRAVEL
GM - SILTY GRAVEL
GP - POORLY GRADED GRAVEL
GC - CLAYEY GRAVEL
SW - WELL GRADED SAND
ML - LOW PLASTICITY SILT
ST - SHELBY TUBE
CL - LOW PLASTICITY CLAY
MH - HIGH PLASTICITY SILT
SM - SILTY SAND
RC - ROCK CORE
SP - POORLY GRADED SAND
SC - CLAYEY SAND
CH - HIGH PLASTICITY CLAY
PM - PRESSURE METER
OH - HIGH PLASTICITY ORGANIC SILTS AND CLAYS
OL - LOW PLASTICITY ORGANIC SILTS AND CLAY
PT - PEAT

NOTE: NUMBERS IMMEDIATELY TO THE LEFT OF THE BORING PROFILE ARE SPT-N VALUES.

WR - WEATHERED ROCK
PWR - PARTIALLY WEATHERED ROCK
- FILL
- POSSIBLE FILL
- PROBABLE FILL

## SURFACE MATERIALS

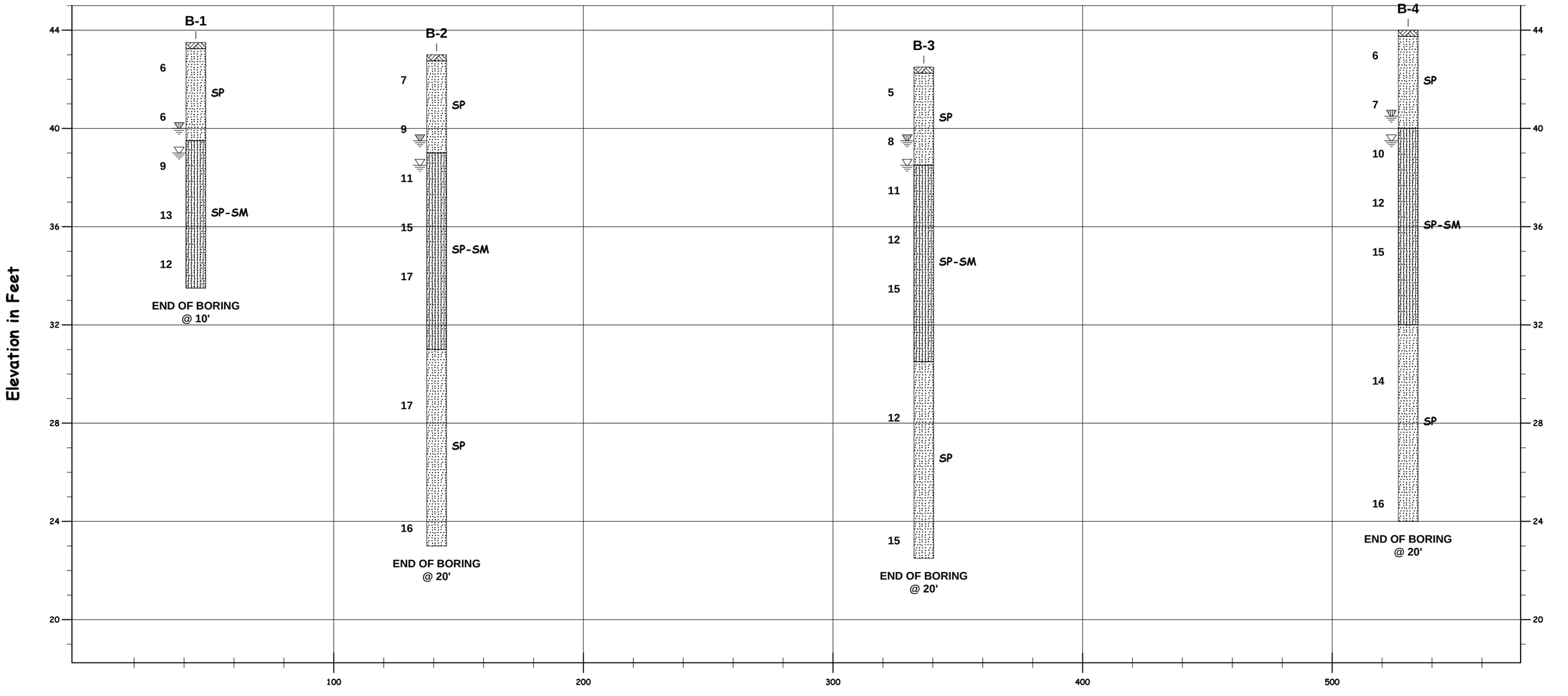
TOPSOIL
ASPHALT
GRAVEL
CONCRETE
VOID

## ROCK TYPES

IGNEOUS
METAMORPHIC
SEDIMENTARY

## SYMBOL LEGEND

WATER LEVEL - DURING DRILLING/SAMPLING
WATER LEVEL - SEASONAL, HIGH WATER
WATER LEVEL - AFTER CASING REMOVAL
WATER LEVEL - AFTER 24 HOURS
PLASTIC LIMIT% WATER CONTENT% % PASSING #200 SIEVE [88%] LIQUID LIMIT%




NOTES:
1 SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
2 PENETRATION TEST RESISTANCE IN BLOWS PER FOOT (ASTM D1586).

# Subsurface Soil Profile
# Cross Section A-A

**Tuskawilla Retail Development GEO**
**Equinox Development Properties, Inc.**
**170 Tuskawilla Rd, Winter Springs, Seminole County, FL**

PROJECT NO.: 6366 | DATE: 11/14/2018 | VERTICAL SCALE: 1"=4'

## SOIL CLASSIFICATION LEGEND

GW - WELL GRADED GRAVEL
GP - POORLY GRADED GRAVEL
GM - SILTY GRAVEL
GC - CLAYEY GRAVEL
SW - WELL GRADED SAND
ML - LOW PLASTICITY SILT
ST - SHELBY TUBE
CL - LOW PLASTICITY CLAY
MH - HIGH PLASTICITY SILT
SM - SILTY SAND
RC - ROCK CORE
SP - POORLY GRADED SAND
SC - CLAYEY SAND
CH - HIGH PLASTICITY CLAY
PM - PRESSURE METER
OH - HIGH PLASTICITY ORGANIC SILTS AND CLAYS
OL - LOW PLASTICITY ORGANIC SILTS AND CLAY
PT - PEAT

NOTE: NUMBERS IMMEDIATELY TO THE LEFT OF THE BORING PROFILE ARE SPT-N VALUES.

WR - WEATHERED ROCK
PWR - PARTIALLY WEATHERED ROCK
- FILL
- POSSIBLE FILL
- PROBABLE FILL

## SURFACE MATERIALS

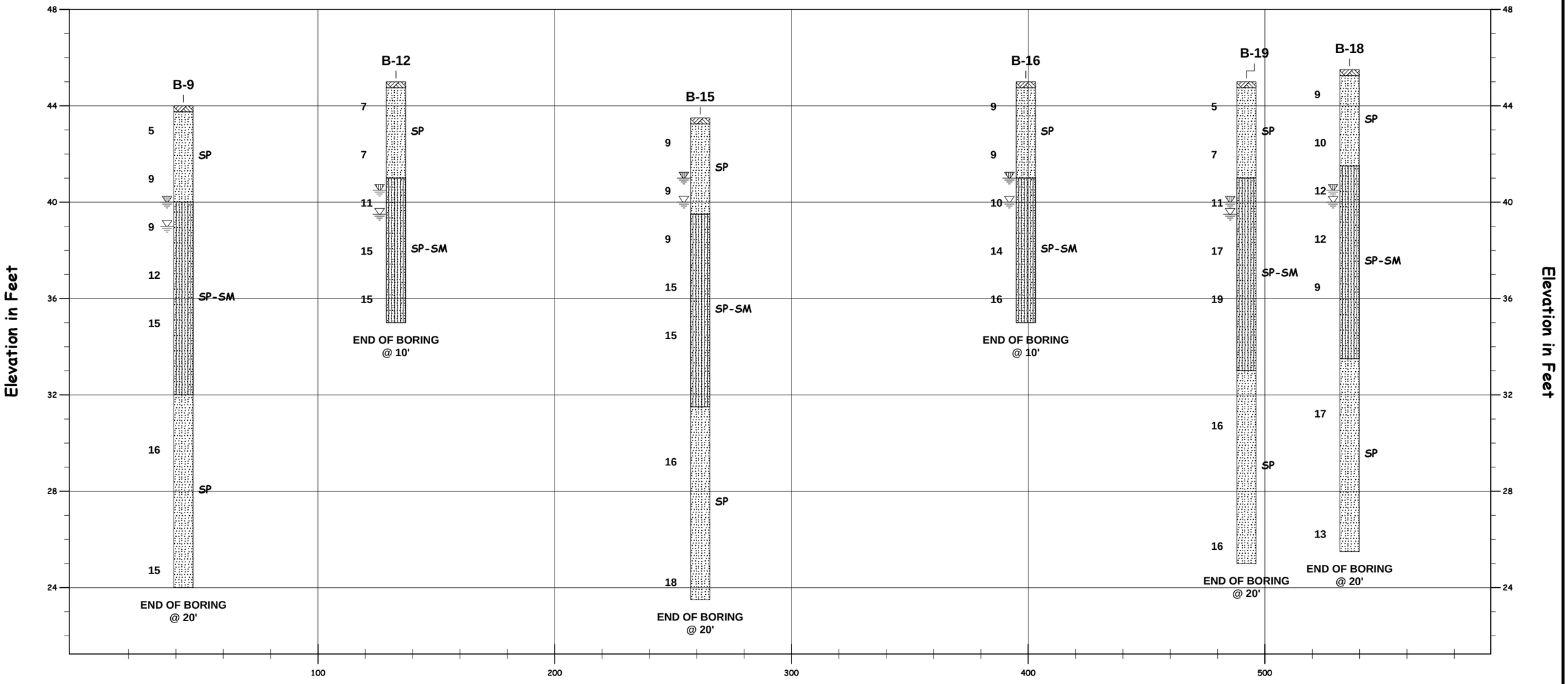
TOPSOIL
CONCRETE
ASPHALT
VOID
GRAVEL

## ROCK TYPES

IGNEOUS
METAMORPHIC
SEDIMENTARY

## SYMBOL LEGEND

WATER LEVEL - DURING DRILLING/SAMPLING
WATER LEVEL - SEASONAL, HIGH WATER
WATER LEVEL - AFTER CASING REMOVAL
WATER LEVEL - AFTER 24 HOURS
PLASTIC LIMIT% | WATER CONTENT% | % PASSING #200 SIEVE [88%] | LIQUID LIMIT%




NOTES:
1 SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
2 PENETRATION TEST RESISTANCE IN BLOWS PER FOOT (ASTM D1586).

# Subsurface Soil Profile
# Cross Section B-B

**Tuskawilla Retail Development GEO**
**Equinox Development Properties, Inc.**
**170 Tuskawilla Rd, Winter Springs, Seminole County, FL**

PROJECT NO.: 6366 | DATE: 11/14/2018 | VERTICAL SCALE: 1"=4'

## SOIL CLASSIFICATION LEGEND

GW - WELL GRADED GRAVEL
GP - POORLY GRADED GRAVEL
GM - SILTY GRAVEL
GC - CLAYEY GRAVEL
SW - WELL GRADED SAND
ML - LOW PLASTICITY SILT
CL - LOW PLASTICITY CLAY
MH - HIGH PLASTICITY SILT
SM - SILTY SAND
SP - POORLY GRADED SAND
SC - CLAYEY SAND
CH - HIGH PLASTICITY CLAY
OH - HIGH PLASTICITY ORGANIC SILTS AND CLAYS
OL - LOW PLASTICITY ORGANIC SILTS AND CLAY
PT - PEAT
WR - WEATHERED ROCK
PWR - PARTIALLY WEATHERED ROCK
- FILL
- POSSIBLE FILL
- PROBABLE FILL

ST - SHELBY TUBE
RC - ROCK CORE
PM - PRESSURE METER

NOTE: NUMBERS IMMEDIATELY TO THE LEFT OF THE BORING PROFILE ARE SPT-N VALUES.

## SURFACE MATERIALS

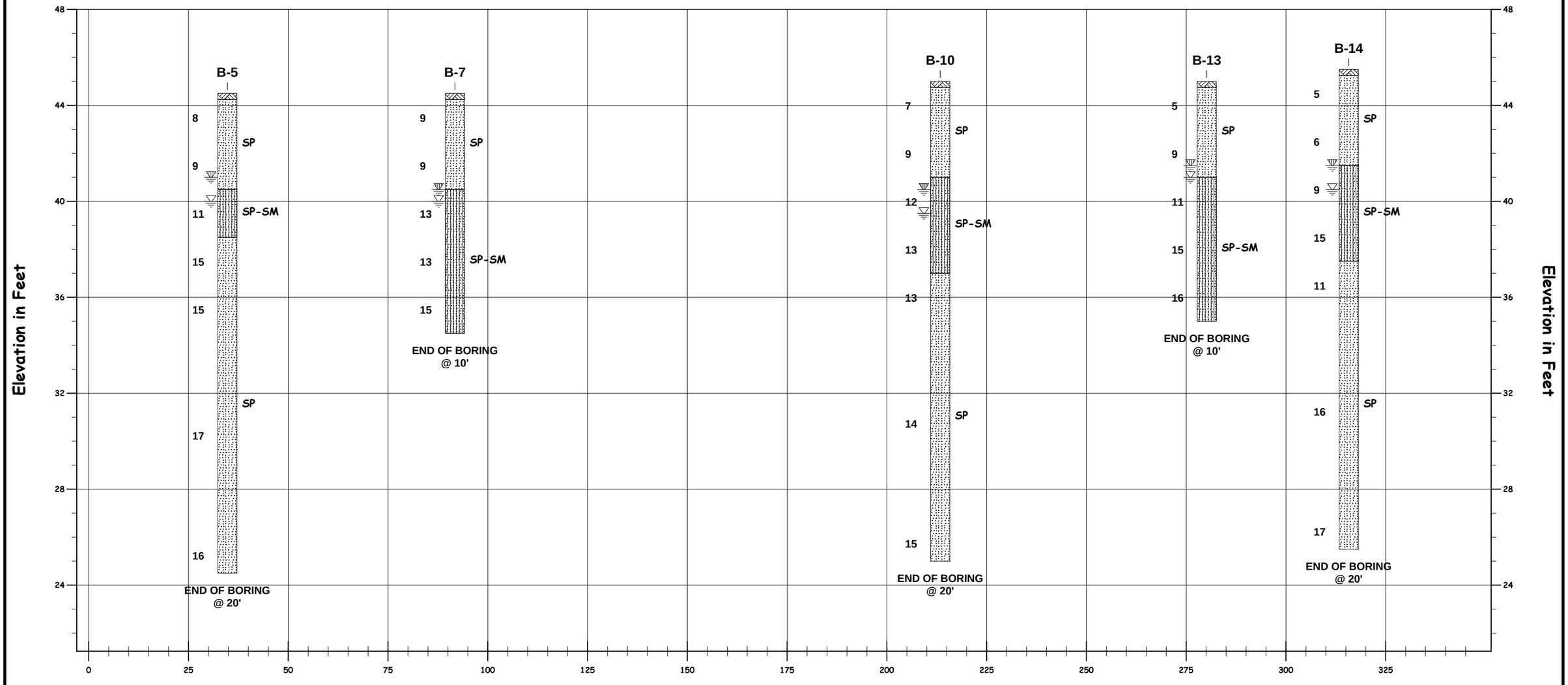
TOPSOIL
ASPHALT
GRAVEL
CONCRETE
VOID

## ROCK TYPES

IGNEOUS
METAMORPHIC
SEDIMENTARY

## SYMBOL LEGEND

WATER LEVEL - DURING DRILLING/SAMPLING
WATER LEVEL - SEASONAL, HIGH WATER
WATER LEVEL - AFTER CASING REMOVAL
WATER LEVEL - AFTER 24 HOURS
PLASTIC LIMIT% WATER CONTENT% % PASSING #200 SIEVE [88%] LIQUID LIMIT%




NOTES:
1 SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
2 PENETRATION TEST RESISTANCE IN BLOWS PER FOOT (ASTM D1586).

# Subsurface Soil Profile
# Cross Section C-C

**Tuskawilla Retail Development GEO**
**Equinox Development Properties, Inc.**
**170 Tuskawilla Rd, Winter Springs, Seminole County, FL**

PROJECT NO.: 6366 | DATE: 11/14/2018 | VERTICAL SCALE: 1"=4'

# APPENDIX C – Laboratory Testing

Laboratory Testing Results Summary

# Laboratory Testing Summary



| Sample Source | Sample Number | Depth (feet) | MC[1] (%) | Soil Type[2] | Atterberg Limits[3] | | | Percent Passing No. 200 Sieve[4] | Moisture - Density (Corr.)[5] | | CBR Value[6] | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | LL | PL | PI | | Maximum Density (pcf) | Optimum Moisture (%) | | |
| B-3 | S-3 | 4.00 - 6.00 | 22.4 | SP-SM | | | | 5.8 | | | | |
| B-2 | S-2 | 2.00 - 4.00 | 7.8 | SP | | | | 2.7 | | | | Kh = 55 ft/day<br>Kv = 37 ft/day |
| B-19 | S-6 | 13.50 - 15.00 | 23.2 | SP | | | | 1.7 | | | | |
| B-18 | S-4 | 6.00 - 8.00 | 23.4 | SP-SM | | | | 5.1 | | | | Kh = 51 ft/day<br>Kv = 34 ft/day |
| B-12 | S-2 | 2.00 - 4.00 | 2.1 | SP | | | | 0.7 | | | | |
| B-17 | S-3 | 4.00 - 6.00 | 13.8 | SP-SM | | | | 8.9 | | | | |
| B-11 | S-4 | 6.00 - 8.00 | 22.1 | SP | | | | 0.9 | | | | |

**Notes:** 1. ASTM D 2216, 2. ASTM D 2487, 3. ASTM D 4318, 4. ASTM D 1140, 5. See test reports for test method, 6. See test reports for test method

**Definitions:** MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content (ASTM D 2974)

**Project No.** 24:6366
**Project Name:** Tuskawilla Retail Development GEO
**PM:** DAS
**PE:** JPH
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