

# REPORT OF GEOTECHNICAL INVESTIGATION

**PROPOSED STARBUCKS**

**ST. LUCIE WEST BOULEVARD & SW CASHMERE BOULEVARD**

**PARCEL ID NO.: 3430-602-0001-000-5**

**PORT ST. LUCIE, ST. LUCIE COUNTY, FLORIDA**



*Prepared for:*

**REGENCY CENTERS  
2700 North Military Trail  
Suite 380  
Boca Raton, Florida 33431**

*Prepared by:*

**WHITESTONE ASSOCIATES, INC.  
4 Harvard Circle  
Suite 850  
West Palm Beach, Florida 33409**

**Anthony J. Barbone  
Geotechnical Specialist**

**Kevin A. Feath, P.E.  
Principal**

**Whitestone Project No.: GF2321125.000  
December 15, 2023**

*Office Locations:*

NEW JERSEY

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FLORIDA

NEW HAMPSHIRE

NEW YORK



December 15, 2023

*via email*

**REGENCY CENTERS**  
2700 North Military Trail  
Suite 380  
Boca Raton, Florida 33431

Attention: Ms. Paula Henrique  
Senior Project Manager

**Regarding: REPORT OF GEOTECHNICAL INVESTIGATION  
PROPOSED STARBUCKS  
ST. LUCIE WEST BOULEVARD & SW CASHMERE BOULEVARD  
PARCEL ID NO.: 3430-602-0001-000-5  
PORT ST. LUCIE, ST. LUCIE COUNTY, FLORIDA  
WHITESTONE PROJECT NO.: GF2321125.000**

Dear Ms. Henrique:

Whitestone Associates, Inc. (Whitestone) is pleased to submit the attached *Report of Geotechnical Investigation* for the above-referenced project. The attached report presents the results of Whitestone's soils exploration efforts and presents recommendations for design of the proposed structural foundations, floor slabs, pavements, utilities, and related earthwork associated with the proposed site development.

Whitestone's Geotechnical Division appreciates the opportunity to be of continued service to Regency Centers. Please note that Whitestone has the capability to conduct the additional geotechnical engineering services recommended herein. Please contact us at (561) 717-7006 with any questions regarding the enclosed report.

Sincerely,

**WHITESTONE ASSOCIATES, INC.**



Anthony J. Barbone  
Geotechnical Specialist



Kevin A. Feath, P.E.  
Principal

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Enclosures  
Copy: Peter G. Read, P.E., Whitestone Associates, Inc.  
Laurence W. Keller, P.E., Whitestone Associates, Inc.

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# REPORT OF GEOTECHNICAL INVESTIGATION

Proposed Starbucks  
St. Lucie West Boulevard & SW Cashmere Boulevard  
Port St. Lucie, St. Lucie County, Florida

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# **REPORT OF GEOTECHNICAL INVESTIGATION**

**Proposed Starbucks  
St. Lucie West Boulevard & SW Cashmere Boulevard  
Port St. Lucie, St. Lucie County, Florida**

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## SECTION 1.0

### Summary of Findings and Recommendations

An exploration and evaluation of the subsurface conditions has been conducted on the site of the proposed Starbucks to be located at the southwestern quadrant of the intersection between St. Lucie West Boulevard and SW Cashmere Boulevard in Port St. Lucie, St. Lucie County, Florida. The site of the proposed construction is shown on the *Boring Location Plan* included as Figure 1. A *Site Location Map* is provided as Figure 2.

Based on the August 23, 2023 *Overall Site Plan* prepared by Kimley-Horn & Associates, Inc. (KHA), the proposed site development includes construction of an approximately 2,160-square feet, single-story Starbucks building with a finish floor elevation of 23.0 feet above NAVD 88 including menu boards, trash enclosure, and associated pavements, landscaping, and utilities. No new stormwater management (SWM) areas and/or site retaining walls are indicated. Detailed site grading has not been finalized. However, based on existing grades, Whitestone assumes the site will be developed at or near existing site elevations, with maximum cuts and fills of less than approximately one foot.

Whitestone's geotechnical investigation included conducting a reconnaissance of the project site, drilling borings, and collecting soil samples for laboratory analysis. The data from this exploration and analysis were analyzed by Whitestone in light of the project information provided by Regency Centers.

A summary of Whitestone's findings is presented in the following table and detailed descriptions of the subsurface conditions encountered are presented in Section 4.0.

Subsurface Profile	Description	Bottom of Stratum (fbgs)
<i>Surface Cover</i>	The subsurface tests were conducted within existing grass covered and/or asphaltic pavement covered areas. Approximately one inch to six inches of topsoil and one inch of asphalt, underlain by four inches of limerock subbase materials were encountered at the surface.	0.3 - 0.5
<i>Existing Fill</i>	A boring conducted within the proposed trash enclosure (B-3) encountered exiting fill beneath the asphalt surface cover that consisted of poorly graded sand with variable amounts of silt and gravel. The existing fill extended to a depth of three fbgs.	3.0
<i>Coastal Plain Deposits</i>	Generally consisting of sand (USCS: SP, SP-SM, and SC) with variable amounts of clay and silt, and occasional trace amounts of roots. The coastal plain deposits extended to the boring termination depths that ranged from approximately 10 fbgs to 20 fbgs.	20.0+
<i>Groundwater</i>	Static groundwater was encountered at a depth of approximately seven fbgs.	7.0

fbgs: feet below ground surface.



Recommendations developed upon consideration of these findings are summarized in the table below and presented in greater detail in the indicated sections of the report.

<b>Geotechnical Consideration</b>	<b>Recommendation</b>	<b>Report Section</b>
<i>Foundation System</i>	Whitestone recommends supporting the proposed building on conventional spread and continuous wall footings designed to bear within the improved and approved underlying site natural soils and/or on properly placed and compacted structural fill. Although not anticipated within the proposed building footprint, existing fill, if encountered, should be evaluated, inspected and approved prior structural support. Limited areas of overexcavation and replacement/ recompaction of the natural site soils should be anticipated prior to foundation support due to the upper very loose to loose zones of natural soils encountered.	5.5
<i>Floor Slab &amp; Pavements</i>	The site soils are anticipated to be suitable for ground-supported floor slabs and pavements following compaction improvement efforts and proofroll inspections. Areas requiring overexcavation and replacement / recompaction of the upper very loose to loose zones of natural soils and existing fill encountered should be anticipated.	5.6 & 5.7
<i>Groundwater Control</i>	Static groundwater was encountered at a depth of approximately seven fbgs. Additionally, perched/trapped water conditions may be encountered within the existing fill, at the existing fill/natural soil interface, and/or within finer-grained portions of the natural site soils, especially following precipitation events. As such, construction phase dewatering for the site development is primarily anticipated to consist of removing surface water runoff and trapped water during site excavations. Therefore, at least and temporary groundwater control measures should be implemented, as described herein.	5.4
<i>On-Site Soil Reuse</i>	The majority of the site soils (USCS: SP, SP-SM, and SC) encountered within anticipated excavation depths above the groundwater level are anticipated to be suitable for selective reuse as structural fill and/or backfill provided and that moisture levels are maintained within two percent of optimum moisture content and any organic/deleterious debris encountered is removed. The reuse of the finer-grained soils including the site clayey sand soils (USCS: SC) typically is possible only during ideal weather conditions. These soils will require stringent moisture conditioning, including aerating and drying to achieve proper compaction. Reuse of site soils below the groundwater level, if encountered, will require a significant drying effort prior to reuse. Immediate reuse of the finer-grained site soils or soils located below the groundwater level should not be anticipated. Imported materials may be required to expedite earthwork operations, especially if the construction schedule or the site area restricts moisture control operations, such as air drying the soil.	5.3



<b>Geotechnical Consideration</b>	<b>Recommendation</b>	<b>Report Section</b>
<i>Sinkhole Potential</i>	The subject site is underlain by limestone bedrock, which is water soluble and may be susceptible to solution cavities and void formation that can result in surficial depressions or sinkholes. The results of the subsurface investigation did not identify global elevated risk for sinkhole development. Whitestone also recommends that potential sinkhole formation is visually evaluated at the beginning of construction and daily during construction activities.	5.2



## **SECTION 2.0**

### **Introduction**

#### **2.1 AUTHORIZATION**

Ms. Paula Henrique of Regency Centers issued authorization to Whitestone to conduct a geotechnical investigation on this site relevant to the construction of the proposed Starbucks development. The geotechnical investigation was conducted in accordance with Whitestone's November 2, 2023 proposal to Regency Centers.

#### **2.2 PURPOSE**

The purpose of this subsurface exploration and analysis was to:

- ▶ ascertain the various soil profile components at test locations;
- ▶ estimate the engineering characteristics of the proposed foundation, floor slab, and pavement bearing and subgrade materials;
- ▶ provide geotechnical criteria for use by the design engineers in preparing the foundation, slab, and pavement design;
- ▶ provide recommendations for required earthwork and subgrade preparation;
- ▶ record groundwater and bedrock levels (where encountered) at the time of the investigation and discuss the potential impact on the proposed construction; and
- ▶ recommend additional investigation and/or analysis (if warranted).

#### **2.3 SCOPE**

The scope of the exploration and analysis included the subsurface exploration, field testing and sampling, laboratory analyses, and an engineering analysis and evaluation of the foundation materials. This *Report of Geotechnical Investigation* is limited to addressing the site conditions related to the physical support of the proposed construction. Any references to suspicious odors, materials, or conditions are provided strictly for the client's information.

##### **2.3.1 Field Exploration**

Field exploration of the project site was conducted by means of six borings (identified as B-1 through B-6) conducted within the proposed building, trash enclosure, and pavement areas and advanced with a custom track rig using mud rotary and split spoon sampling techniques. The subsurface tests were backfilled with excavated soils generated from the investigation and the boring conducted within an existing paved area



was resurfaced with asphaltic cold patch as appropriate. The approximate locations of the subsurface tests completed by Whitestone are shown on the attached *Boring Location Plan* included as Figure 1. *Records of Subsurface Exploration* are provided in Appendix A.

The subsurface tests were conducted in the presence of a Whitestone engineer who conducted field tests, recorded visual classifications, and collected samples of the various strata encountered. The test areas were located in the field using normal taping procedures, estimated right angles, and a hand held global positioning unit. These locations are presumed to be accurate within a few feet.

The borings and Standard Penetration Tests (SPTs) were conducted in general accordance with ASTM International (ASTM) designation D 1586. The SPT resistance value (N) can be used as an indicator of the consistency of fine-grained soils and the relative density of coarse-grained soils. The N-value for various soil types can be correlated with the engineering behavior of earthworks and foundations. The split spoon sampling was conducted using a safety hammer.

Groundwater level observations were recorded during the field drilling operations and prior to backfilling the bore holes. Groundwater elevations derived from sources other than seasonally observed groundwater monitor wells may not be representative of true groundwater levels.

### **2.3.2 Laboratory Program**

In addition to the field investigation, a laboratory program was conducted to determine additional, pertinent engineering characteristics of representative samples of on-site soils. The laboratory program was conducted in general accordance with applicable ASTM standard test methods and included physical testing of proposed building foundation bearing and pavement subgrade stratum.

**Physical/Textural Analyses:** Representative samples of selected strata encountered were subjected to a laboratory testing program that included Atterberg limits determinations (ASTM D-4318), moisture content determinations (ASTM D-2216), and particle size analysis through the No. 200 sieve (ASTM D-1140) in order to conduct supplementary engineering soil classifications in general accordance with ASTM D-2487. The soil strata tested were classified by the Unified Soil Classification System (USCS) and results of the laboratory testing are summarized in the below table. Quantitative test results are provided in Appendix B.

The engineering classifications are useful when considered in conjunction with the additional site data to estimate properties of the soil types encountered and to predict the soil's behavior under construction and service loads.



PHYSICAL/TEXTURAL ANALYSES SUMMARY							
Boring No.	Sample	Depth (fbgs)	% Passing No. 200 Sieve	Moisture Content (%)	Liquid Limit	Plastic Index	USCS Classification
B-1	S-2	2.0 - 4.0	4.1	6.9	Non-Plastic		SP
B-1	S-4	6.0 - 8.0	18.5	17.2	25	12	SC

**Organic Content Analyses:** Representative samples of a suspected organic stratum were tested for organic content by the Loss on Ignition (LOI) method of testing (ASTM D-2974). The results of the laboratory testing program are presented in tabular format in the following table. Quantitative test results are provided in Appendix B.

ORGANIC CONTENT TESTING SUMMARY				
Boring No.	Sample	Depth (fbgs)	USCS Classification	Organic Content (%)
B-1	S-2	2.0 - 4.0	SP	0.6
B-1	S-4	6.0 - 8.0	SC	2.3



## SECTION 3.0

### Site Description

#### 3.1 LOCATION AND DESCRIPTION

The subject site is part of the Cashmere Corners shopping center and is located at the southwestern quadrant of the intersection between St. Lucie West Boulevard and SW Cashmere Boulevard in Port St. Lucie, St. Lucie County, Florida. The site is bound to the north by St. Lucie West Boulevard followed by a stormwater pond, to the east by SW Cashmere Boulevard followed by a grocery store development, to the south and west by the Cashmere Corners shopping center development. The location of the site is shown on the *Boring Location Plan* included as Figure 1.

#### 3.2 EXISTING CONDITIONS

**Surface Cover/Development:** At the time of the investigation, the site consisted of a grass covered and periodically paved outparcel of the Cashmere Corner shopping mall. Based on available historical aerials, the site has historically consisted of undeveloped land dating back to at least the year 1958. Between the year 1999 and the year 2007 the overall shopping mall became apparent. The site has remained relatively unchanged from the year 2007 to the present day.

**Topography:** Based on the December 9, 2014 (last revised June 3, 2015) *Topographic Survey* prepared by KHA, the subject site has a high elevation of approximately 23 feet above NAVD 88 in the southwestern portion of the site and a low elevation of approximately 20.5 feet above NAVD 88 in the southern portion of the site.

**Utilities:** At the time of Whitestone's subsurface field investigation underground electric, water, and communication lines were present along the subject property adjacent roadway rights-of-way. Other utilities were not observed at the subject site by Whitestone but may be present. The utility information contained in this report is presented for general discussion only and is not intended for construction purposes.

**Site Drainage:** Surface run-off generally follows existing topography and vertically through exposed soil surface cover portions of the site.

#### 3.3 SITE GEOLOGY

The site is located within the Atlantic Coastal Complex Province of the Barrier Island Sequence District. According to the Florida Geological Survey *Geologic Map of the State of Florida 1:100,000 Scale*, the immediate underlying bedrock formation consists of the Pleistocene-age Anastasia Formation. The



additional underlying bedrock layers mapped at the site include the Undifferentiated Quaternary sediments, Dunes, Peace River Formation, Hawthorne Group – Arcadia Formation, Suwanee Limestone, Ocala Limestone, and Avon Park Formation. The unconsolidated soils at the site, which includes the natural site soils, generally consist of orangish brown, variably fossiliferous interbedded sands, often cemented with calcite, and coquinoid limestone. The deeper underlying bedrock formations, which include the Ocala Limestone and Avon Park Formation, generally consists of cream to light-brown to tan and white to orangish gray, sandy, variably fossiliferous limestone occasionally interbedded with tan to brown, fossiliferous dolostone. The overburden materials at the site include shelly sand and clay coastal plain deposits and fill materials associated with past and present development of the site.

The site is mapped by United States Geological Survey as being within a humid climate karst area. Karst conditions, including solution cavities, are known to exist in areas where limestone bedrock is present. The limestone bedrock, which is water soluble and susceptible to solution cavities and void formation, can result in surficial depressions or sinkholes. Based on a review of Florida Department of Environmental Protection (FDEP) *Subsidence and Swallet Incident Reports*, the closest reported subsidence or swallet incident was approximately 5.5 miles from the subject site. The results of Whitestone’s subsurface investigation and visual site inspection did not identify conditions typically indicative of an elevated risk for sinkhole development, e.g., subsurface voids and/or solution channels.

### **3.4 PROPOSED CONSTRUCTION**

Based on the above referenced *Overall Site Plan* prepared by KHA, the proposed site development includes construction of an approximately 2,160-square feet, single-story Starbucks building with a finish floor elevation of 23.00 feet above NAVD 88 including menu boards, trash enclosure, and associated pavements, landscaping, and utilities. No new SWM areas and/or site retaining walls are indicated. Detailed site grading has not been finalized. Based on the proposed finish floor elevation and existing grades, Whitestone assumes the subject site will be redeveloped at or near existing grades, with maximum cuts/fills on the order of less than approximately one foot.

Detailed structural loading has not yet been developed. Based on past experience with similar facilities, Whitestone expects that the proposed structures will consist of a combination of masonry and metal framing with ground-supported concrete foundations and floor slabs. The maximum design loads are less than the following:

- ▶ column load - 60 kips;
- ▶ wall load - 1.0 kip per linear foot;
- ▶ floor slab load - 125 pounds per square foot; and
- ▶ pavement load - 25,000 (18) kip single axle loads.



The scope of Whitestone's investigation and the professional advice contained in this report were generated based on the project details and loading noted herein. Any revisions or additions to the design details enumerated in this report should be brought to the attention of Whitestone for additional evaluation as warranted.



## SECTION 4.0

### Subsurface Conditions

Details of the subsurface materials encountered are presented on the *Records of Subsurface Exploration* presented in Appendix A of this report. The subsurface soil conditions encountered in the borings conducted consisted of the following generalized strata in order of increasing depth.

#### 4.1 SUBSURFACE SOIL CONDITIONS

**Surface Cover:** The subsurface tests were conducted within either grass covered or asphaltic pavement covered areas. Borings conducted within the grass covered areas encountered approximately one inch to six inches of topsoil at the surface. The boring conducted within the existing paved area encountered approximately one inch of asphaltic concrete pavement at the surface, underlain by four inches of limerock subbase materials.

**Existing Fill:** Beneath the existing pavement, the boring conducted in the proposed trash enclosure (B-3) encountered existing fill that consisted of poorly graded sand with variable amounts of silt and gravel. The existing fill extended to a depth of three fbgs. SPT N-values recorded within this stratum were 11 blows per foot (bpf) and 20 bpf.

**Coastal Plain Deposits:** Underlying the surface cover and/or fill material, the borings encountered natural coastal plain deposits that generally consisted of poorly graded sand (USCS: SP and SP-SM) with a variable amount of silt and/or clayey sand (USCS: SC) occasional trace amounts of roots and organics were encountered within this stratum. The subsurface tests were terminated within this stratum at depths that ranged from approximately 10 fbgs to 20 fbgs. SPT N-values recorded within this stratum ranged between two bpf and 38 bpf, indicating very loose to dense relative densities and averaging approximately 14 bpf.

#### 4.2 GROUNDWATER

Static groundwater was encountered in the borings conducted at a depth of approximately seven fbgs, corresponding to elevations ranging from approximately 15.5 feet above NAVD 88 to 16 feet above NAVD 88. Static and perched/trapped water conditions are expected to fluctuate seasonally and following periods of precipitation.



## **SECTION 5.0**

### **Conclusions and Recommendations**

#### **5.1 GENERAL**

The results of the subsurface investigation and analysis indicate that the proposed structures may be supported by conventional ground supported shallow foundations bearing on the improved and approved natural site soils and/or properly placed structural fill materials contingent upon construction phase improvement, evaluation, and approval. Although not anticipated within the proposed building footprint, existing fill, if encountered, should be evaluated, inspected, and approved prior structural support. A majority of the existing site soils are also anticipated to be suitable for supporting floor slabs and pavements also contingent upon construction phase evaluation and improvement. Limited areas of ground improvement by overexcavation and replacement/recompaction of the upper natural site soils should be anticipated within the proposed foundation, floor slab and pavement areas prior to structural support due to the very loose to loose zones of natural soils encountered and inherent variability of the existing fill.

The site is underlain by bedrock including limestone and dolostone. Karst conditions including solution cavities are known to exist where carbonate bedrock is present. Sinkholes and loss of ground support can occur in areas underlain by carbonate rock. However, the results of Whitestone's subsurface investigation did not identify conditions typically indicative of an elevated risk for sinkhole development, e.g., subsurface voids and/or solution channels.

#### **5.2 SITE PREPARATION AND EARTHWORK**

**Surface Cover Stripping:** Prior to stripping operations, all utilities should be identified and secured. The existing surface cover topsoil and pavements to be stripped should be removed from within and at least five feet beyond the limits of areas requiring structural backfill placement and/or structural support. Although not anticipated, any existing structural elements, such as concrete foundations, walls or slabs encountered during excavations, should be removed entirely from below proposed foundations and their zones of influence (as determined by lines extending at least one foot laterally beyond footing edges for each vertical foot of depth) and excavated to at least two feet below proposed construction subgrade levels elsewhere, such as below the floor slab and pavements, provided they do not interfere with proposed below grade construction.

**Surface Preparation/Proofrolling:** Prior to placing any fill, backfill or subbase materials to raise or restore grades to the proposed building and/or pavement subgrade elevations, the exposed soils should be compacted to a firm and unyielding surface with a minimum of four passes in two perpendicular directions



of a minimum 20-ton, vibratory smooth drum roller. The surface should be proofrolled with a loaded tandem axle truck in the presence of the geotechnical engineer to help identify soft or loose pockets that may require removal and replacement or further investigation. Any fill or backfill should be placed and compacted in accordance with Section 5.3.

**Weather Performance Criteria:** Portions of the natural site soils and existing fill are moderately to highly moisture sensitive and may soften when exposed to water. As such, every effort must be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations and prepared subgrades to rainfall. Accordingly, excavation and fill placement procedures should be conducted during favorable weather conditions. Overexcavation of saturated soils and replacement with controlled structural fill per Section 5.3 of this report may be required prior to resuming work on disturbed subgrade soils. According to the Climate Atlas of the United States, the wettest weather months at the subject site are June through September.

**On-Site Soil Protection and Maintenance:** The site soils will degrade when exposed to inclement weather and/or repeated construction traffic. However, if properly protected and maintained as recommended herein, the site soils will provide adequate support for the proposed construction. The site contractors should employ appropriate means and methods to protect the subgrade including, but not limited to the following:

- ▶ leaving the existing pavement surface cover in-place as long as practical to protect the subgrade from inclement weather and construction traffic;
- ▶ sealing exposed subgrade soils on a daily basis with a vibratory smooth drum roller;
- ▶ regrading the site as needed to maintain positive drainage away from open earthwork construction areas and to prevent standing water;
- ▶ removing wet surficial soils and ruts immediately; and
- ▶ limiting exposure to construction traffic and precipitation especially following inclement weather.

Because the subsurface soils will soften when exposed to water, every effort must be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations to rainfall. Overexcavation of saturated soils and replacement with controlled structural fill and/or one foot to two feet of open graded gravel/limerock (such as three-quarter inch crushed limerock/stone) may be required prior to resuming work on disturbed subgrade soils.

**Pavement Subgrade Stabilization and Inspection:** Pavement subgrade soils that are exposed to inclement weather and heavy construction traffic will degrade and require either extensive drying time or overexcavation and replacement in order to provide a suitable subgrade for pavements. Overexcavation of unstable soils within pavement areas typically should be limited to approximately 1.5 feet below planned



subgrade unless directed otherwise by the owner's geotechnical engineer, provided that a reinforcing geogrid approved by the owner's geotechnical engineer is used. Alternatively, unstable materials may be completely overexcavated and either aerated and recompactd or replaced with imported structural fill per Section 5.3. However, this option is likely least economical.

Geogrids typically are economical when proposed undercut depths exceed approximately 18 inches. The geogrid (Tensar TriAx TX130S, or similar) should be placed directly on the exposed subgrade and backfill should consist of a well-graded gravel and sand blend. The services of the geotechnical engineer should be retained to inspect soil conditions during construction and to provide specific recommendations for stabilizing subgrades. Additionally, a geotechnical engineer should be retained to verify the suitability of prepared pavement subgrades for support of design loads.

**Carbonic Rock Area Considerations:** Carbonate rock formations are soluble in mildly acidic water and characteristically contain subsurface voids and solution cavities of varying sizes. Sinkholes occur when soil overlying the void washes into underlying voids in sufficient quantities to cause a surficial collapse. Naturally formed sinkholes typically require thousands to tens of thousands of years to form, however, sinkhole development can be greatly accelerated by acts of man. For this reason, care should be exercised when constructing structures within a sinkhole prone area. Many triggering mechanisms have their origin in rapidly fluctuating, or artificially fluctuating groundwater levels. These conditions may be caused by situations beyond the owner's control, including saturating rains, droughts, drawdown from neighborhood wells, or changes to drainage patterns. Sinkholes can form undetected, even if prudent design and construction practices are implemented.

**Site Planning Considerations:** At a minimum, the recommended measures to reduce sinkhole occurrence include relatively minor site planning considerations and construction measures to minimize risks inherent to the region. In addition to the recommendations for minimizing potential sinkhole formation presented throughout appropriate subsections of this report, additional design measures should be incorporated into the site plan for the referenced property. Such measures should include avoiding the placement of subsurface irrigation or infiltration design based SWM systems adjacent to buildings or other structures, where feasible, and proper subgrade grading to avoid concentrations of surface runoff. Additionally, excavations for footing and utilities should not be exposed to rain and surface runoff due to potential increased risk of sinkhole formation and degradation of subgrade materials. Any excavation that must remain open for more than one day may be sealed at the base with a lean concrete mud mat to help prevent sinkhole formation.

Regional development also should be monitored during the life of the facility to identify conditions that might affect groundwater levels or drainage patterns. If prudent design measures and construction phase considerations are properly implemented, the long-term risk of potential sinkhole activity may be reduced. Sinkholes can form undetected even if prudent design and construction practices are implemented.



**Sinkhole Remediation:** Although no open sinkholes were identified during the investigation, sinkholes can develop during relatively short time periods and risk of sinkhole occurrence generally increases during construction because of exposed soil conditions and temporary drainage issues. Early formation of sinkholes often can be detected by depressions at the ground surface or within excavations. If suspicious depression areas develop during construction, the locations should be probed or excavated in the presence of the geotechnical engineer to determine if additional investigation is required. In the event that new sinkholes occur during construction, Whitestone preliminarily recommends excavating the sinkhole to expose the throat (cavity) and backfilling the area with grout or lean concrete. If a depression is observed during construction, Whitestone should be notified immediately for remediation recommendations.

### 5.3 STRUCTURAL FILL AND BACKFILL

**Imported Fill Material:** Any imported material placed as structural fill or backfill to raise elevations or restore design grades should consist of clean, relatively well-graded sand or gravel with a maximum particle size of three inches and five percent to 15 percent of material finer than a #200 sieve. Silts, clays, and silty or clayey sands and gravels with higher percentage of fines and with a liquid limit less than 40 and a plasticity index less than 20 may be considered subject to the owner's approval, provided that the required moisture content and compaction controls are met during favorable weather conditions. The material should be free of clay lumps, organics, and deleterious material. Imported structural fill material should be approved by a qualified geotechnical engineer prior to delivery to the site.

**On-Site Materials:** Whitestone anticipates that a majority of the existing fill and natural site soils (USCS: SP, SP-SM, and SC) will be suitable for selective reuse as structural fill/backfill provided that soil moisture contents are controlled within two percent of optimum moisture level and objectionable/deleterious materials, if encountered, are segregated. Additionally, the site soils must be properly evaluated during the construction phase as described in Section 5.11. The clayey sand soils with a higher percentage of fine-grained materials (USCS: SC) are moderately to highly moisture sensitive and reuse of these soils with more than 12 percent fines typically is possible only during ideal weather conditions. The clayey sand site soils and soils below the groundwater level will require stringent moisture conditioning, including aerating and drying to achieve proper compaction. Immediate reuse of the clayey sands and soils below the groundwater table should not be anticipated. Imported materials may be required to expedite earthwork operations, especially if the construction schedule or the site area restricts moisture control operations, such as air drying the soil. Materials that become exceedingly wet will require discing and aerating.

**Compaction and Placement Requirements:** On-site soils used as fill or backfill should be placed in maximum nine-inch loose lifts and compacted using a 20-ton smooth drum vibratory drum roller during mass grading activities or a small walk-behind roller or hand-held vibratory compactor within excavations. All structural fill and backfill, including five feet outside exterior building walls, should be compacted to at least 95 percent of the maximum dry density within two percent of the optimum moisture content as determined by ASTM D 1557 (Modified Proctor).



**Structural Fill Testing:** A sample of the imported fill material or any on-site material proposed for reuse as structural fill or backfill should be submitted to the geotechnical engineer for analysis and approval at least one week prior to its use. The placement of all fill and backfill should be monitored by a qualified engineering technician to ensure that the specified material and lift thicknesses are properly installed. A sufficient number of in-place density tests should be conducted to ensure that the specified compaction is achieved throughout the height of the fill or backfill.

## **5.4 GROUNDWATER CONTROL**

Static groundwater was encountered during this investigation at a depth of approximately seven fbs, corresponding to elevations ranging from approximately 15.5 feet above NAVD 88 to 16 feet above NAVD 88. Additionally, perched/trapped water may be encountered within the existing fill at the existing fill/natural soil interface, and/or above finer-grained layers of the natural site soils. As such, construction phase dewatering is anticipated to consist of removing surface water runoff, infiltrating water, or trapped water at this site. Deeper utilities may require more extensive dewatering depending on the final installation depths. Whitestone anticipates that construction phase dewatering, if required, would include installing temporary sump pits and filtered pumps within trenches and excavations. Brief ponding of stormwater may occur across the site after heavy rains.

## **5.5 FOUNDATIONS**

**Shallow Foundation Design Criteria:** Contingent upon construction phase evaluation, improvement of very loose to loose zones, and approval, Whitestone recommends supporting the proposed building on conventional shallow spread and continuous footings designed to bear within the improved and approved natural soils and/or structural fill materials, provided these materials are properly evaluated, placed and compacted in accordance with Sections 5.2, 5.3, and 5.11 of this report. Although not anticipated within the proposed building footprint, existing fill, if encountered, should be evaluated, inspected, and approved prior structural support. Areas of overexcavation and replacement/recompaction of natural soils should be anticipated prior to foundation support. Foundations bearing within the improved and approved site soils and/or structural placed fill/backfill materials may be designed using a maximum allowable net bearing pressure of 2,500 pounds per square foot.

All footing bottoms should be improved by in-trench compaction in the presence of the geotechnical engineer. Regardless of loading conditions, proposed foundations should be sized no less than minimum dimensions of 18 inches for continuous wall footings and 36 inches for isolated column footings.

Footings should be designed such that the maximum toe pressure due to the combined effect of vertical loads and overturning moment does not exceed the recommended maximum allowable net bearing pressure. In addition, positive contact pressure should be maintained throughout the base of the footings such that no uplift or tension exists between the base of the footings and the supporting soil. Uplift loads should be



resisted by the weight of the concrete. Side friction should be neglected when proportioning the footings such that lateral resistance should be provided by friction resistance at the base of the footings. An allowable coefficient of friction against sliding of 0.35 is recommended for use in the design of concrete foundations bearing within the on-site soils or imported structural backfill.

**Inspection Criteria:** Whitestone recommends that the suitability of the bearing soils along the footing bottoms be verified by a geotechnical engineer prior to placing concrete for the footings. Special attention should be given to areas underlain by very loose to loose upper natural soils that are present within the proposed building footprint. In the event that isolated areas of unsuitable materials are encountered in footing excavations, overexcavation and replacement of the materials or deeper foundation embedment may be necessary to provide a suitable footing subgrade. Any overexcavation to be restored with structural fill will need to extend at least one foot laterally beyond footing edges for each vertical foot of overexcavation. Lateral overexcavation may be eliminated if grade is restored with lean concrete. The bottom of overexcavated foundation trench areas should be compacted with vibratory smooth drum rollers, walk-behind compactors, vibrating plates or plate tampers (“jumping jacks”) to compact locally disturbed materials and densify any underlying loose zones. Any standing water within the footing excavation should be removed with a mechanical pump prior to concrete placement.

**Settlement:** Whitestone estimates post construction settlements of new foundations will be on the order of less than one inch if the recommendations outlined in this report are properly implemented. Differential settlement between individual footings should be less than one-half inch.

**Foundation Embedment:** Footings should be placed at least 18 inches below adjacent exterior grades, or the minimum depth required by local building codes, to maintain adequate confinement.

## **5.6 FLOOR SLABS**

Whitestone anticipates that majority of the improved and approved site soils will provide suitable support for the proposed floor slab, contingent upon construction phase evaluation, compaction improvement, proofrolls, and approval. The exposed subgrade should be compacted and inspected via proofrolling in accordance with Sections 5.2, 5.3, and 5.11 of this report. Areas of overexcavation and replacement/recompaction of upper very loose to loose natural soils should be anticipated throughout the building footprint due to the upper loose zones encountered. Although not anticipated within the proposed building footprint existing fill, if encountered, should be evaluated and inspected prior structural support. Any areas that become softened or disturbed as a result of wetting and/or repeated exposure to construction traffic should be removed and replaced with compacted structural fill. The properly prepared site soils and structural fill/backfill materials are expected to yield a minimum subgrade modulus (k) of 150 psi/in.

A minimum four inch layer of three-quarter inch maximum size Florida Department of Transportation (FDOT) crushed limerock (AASHTO No. 57 stone size or similar) with an LBR of at least 100 should be



installed below the floor slab to provide a uniform subgrade and capillary break. A moisture vapor barrier should be placed beneath the floor slab in accordance with local building code requirements and/or where recommended by the flooring manufacturer.

## 5.7 PAVEMENT DESIGN CRITERIA

**General:** The majority of the improved and approved existing fill, natural soils, and/or compacted structural fill/backfill placed to raise or restore design elevations are anticipated to be suitable for support of the proposed pavements provided these materials are properly evaluated, compacted, and proofrolled in accordance with Sections 5.2, 5.3, and 5.11 of this report during favorable weather conditions. Areas of overexcavation and replacement/recompaction should be anticipated due to the inherent variability of the existing fill encountered and the upper very loose to loose zones of natural soils encountered throughout the site. Subgrade stabilization with a triaxial geogrid, approved by the owner's geotechnical engineer, may be used to minimize depths of overexcavation (if necessary) as discussed further in Section 5.3.

**Design Criteria:** A preliminary LBR value of 40 has been assigned to the properly prepared subgrade soils for pavement design purposes. This value was correlated with pertinent soil support values and assumed traffic loads to prepare flexible and rigid pavement designs per the *AASHTO Guide for the Design of Pavement Structures*.

Design traffic loads were assumed based on typical volumes for similar facilities and correlated with 18-kip equivalent single axle loads (ESAL) for a 20 year life. An estimated maximum load of 25,000 ESAL was used for all pavement areas, respectively, assuming the pavement primarily will accommodate automobile and limited truck traffic.

**Pavement Section:** The recommended flexible pavement section is presented below in tabular format:

FLEXIBLE PAVEMENT SECTION DESIGN		
Layer	Material	Standard Duty Thickness (Inches)
Asphalt Top Course	FDOT Section 334 Type SP-12.5 (Superpave Asphalt Concrete); PG 67-22	2.0
Granular Base Course	Crushed Limerock with minimum LBR of 100, compacted to 98% Modified Proctor maximum dry density	6.0
Stabilized Subgrade	Subgrade with minimum LBR of 40, compacted to 98% Modified Proctor maximum dry density	12.0

A rigid concrete pavement should be used to provide suitable support at areas of high traffic or severe turns (such as at access areas and garbage dumpster aprons). The recommended rigid pavements are presented below in tabular format:



RIGID PAVEMENT SECTION		
Layer	Material	Standard Duty Thickness (inches)
Surface	4,000 psi air-entrained concrete	5.0 <sup>1</sup>
Base Course	Crushed Limerock with minimum LBR of 100, compacted to 98% modified Proctor maximum dry density	6.0
Stabilized Subgrade	Subgrade with minimum LBR of 40, compacted to 98% Modified Proctor maximum dry density	12.0

Note <sup>1</sup>: The outer edges of concrete pavements are susceptible to damage as trucks move from rigid pavement to adjacent flexible pavement. Therefore, the thickness at the outer two feet of the rigid concrete pavement should be 12 inches. The concrete should be reinforced with at least one layer of six-inch by six-inch W5.4/W5.4 welded wire fabric (ASTM A185) or contain fiber reinforcement.

**Additional Design Considerations:** The pavement section thickness designs presented in this report are based on the design parameters detailed herein and are contingent on proper construction, inspection, and maintenance. Additional pavement thickness may be required by local code. The designs are contingent on achieving the minimum soil support value in the field. To accomplish this requirement, all subgrade soil and supporting fill or backfill must be properly evaluated, placed, and prepared as detailed in Sections 5.2, 5.3, and 5.11 of this report. Proper drainage must be provided for the pavement structure including appropriate grading and surface water control, as well as measures to drain water from the subgrade.

The performance of the pavement also will depend on the quality of materials and workmanship. Whitestone recommends that FDOT standards for materials, workmanship, and maintenance be applied to this site. Project specifications should include verifying that the installed asphaltic concrete material composition is within tolerance for the specified materials and that the percentage of air voids of the installed pavement is within specified ranges for the respective materials. All rigid concrete pavements should be suitably air-entrained, jointed, and reinforced.

## 5.8 RETAINING WALL/LATERAL EARTH PRESSURES

No earth retaining walls and/or below grade walls were identified on the *Overall Site Plan* prepared by KHA. Whitestone should be notified if retaining and/or below grade walls or structures resisting lateral earth pressures are planned.

## 5.9 SEISMIC AND LIQUEFACTION CONSIDERATIONS

The subsurface conditions are most consistent with a Site Class D as defined by the *2020 Florida Building Code*. Based on the seismic zone and soil profile, liquefaction considerations are not expected to have a substantial impact on design.



## **5.10 EXCAVATIONS**

The site soils encountered during this investigation are consistent with Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA) that require a maximum unbraced excavation angle of 1.5:1 (horizontal:vertical). Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA) to ensure that safe excavation methods and/or shoring and bracing requirements are implemented.

## **5.11 SUPPLEMENTAL POST INVESTIGATION SERVICES**

**Construction Inspection and Monitoring:** The owner's geotechnical engineer should conduct inspection, testing, and consultation during construction as described in previous sections of this report. Monitoring and testing should also be conducted to verify the ground improvement within the building pad and pavement areas recommended herein is conducted, and suitable materials used for controlled fill/backfill are properly placed and compacted over suitable subgrade soils. The overexcavation and replacement/recompaction of any unsuitable existing fill and/or loose upper natural soils encountered within the proposed building footprint and pavement areas that are unsuitable for structural design support in their current condition should be witnessed and documented by the owner's geotechnical engineer. The proper placement of structural backfill within the building pad and pavement areas should also be documented by the owner's geotechnical engineer.



## **SECTION 6.0**

### **General Comments**

Supplemental recommendations may be required upon finalization of construction plans or if significant changes are made in the characteristics or location of the proposed structure. Soil bearing conditions should be checked at the appropriate time for consistency with those conditions encountered during Whitestone's geotechnical investigation.

The recommendations presented herein should be utilized by a qualified engineer in preparing the project plans and specifications. The engineer should consider these recommendations as minimum physical standards that may be superseded by local and regional building codes and structural considerations. These recommendations are prepared for the sole use of Regency Centers for the specific project detailed and should not be used by any third party. These recommendations are relevant to the design phase and should not be substituted for construction specifications.

The possibility exists that conditions between borings may differ from those at specific testing locations, and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may alter soil and rock conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered.

Whitestone assumes that a qualified contractor will be employed to conduct the construction work, and that the contractor will be required to exercise care to ensure all excavations are conducted in accordance with applicable regulations and good practice. Particular attention should be paid to avoiding damaging or undermining adjacent properties and maintaining slope stability.

Whitestone recommends that the services of the geotechnical engineer be engaged to test and evaluate the soils in the footing excavations prior to concreting in order to determine that the soils will support the bearing capacities. Monitoring and testing also should be conducted to verify that suitable materials are used for controlled fills and that they are properly placed and compacted over suitable subgrade soils.

The exploration and analysis of the foundation conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the foundation design. The recommendations submitted for the proposed construction are based on the available soil information and the design details furnished by Regency Centers. Deviations from the noted subsurface conditions encountered during construction should be brought to the attention of the geotechnical engineer.

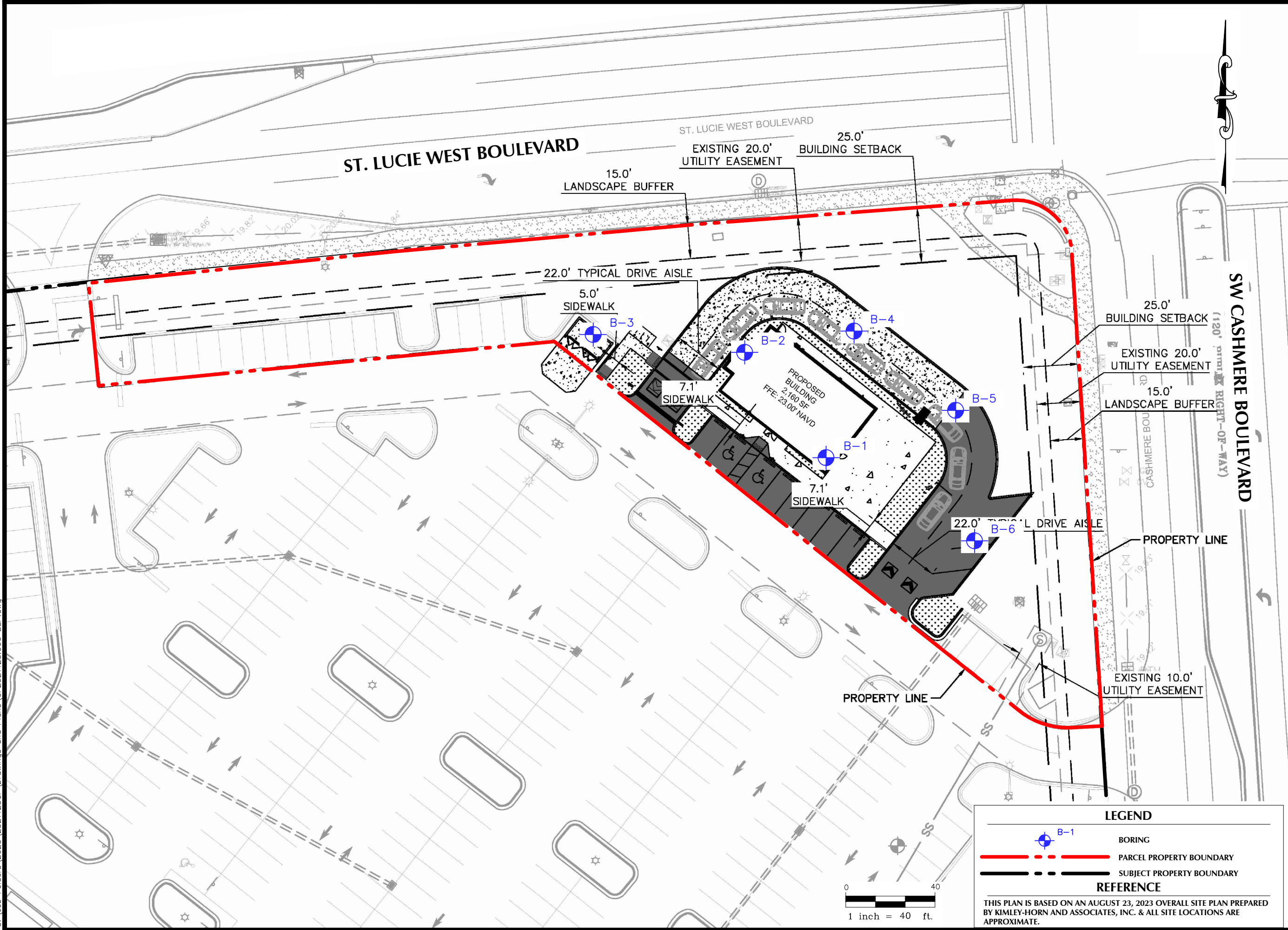
*The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.*



**FIGURE 1**  
**Boring Location Plan**



O:\Job\_Folders\2023\2321125GF Drawings and Plans\GF2321125.000 BLP.dwg



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561.717.7006 WHITESTONEASSOC.COM

DRAWING TITLE:  
**BORING LOCATION PLAN**

CLIENT:  
**REGENCY CENTERS**

PROJECT:  
PROPOSED STARBUCKS  
ST. LUCIE WEST BOULEVARD & SW CASHMERE BOULEVARD  
PORT ST. LUCIE, ST. LUCIE COUNTY, FL

PROJECT #: <b>GF2321125.000</b>	
DESIGNED BY: <b>GR</b>	PROJ. MGR.: <b>KAF</b>
DATE: <b>12/4/23</b>	FIGURE: <b>1</b>
SCALE: <b>1" = 40'</b>	

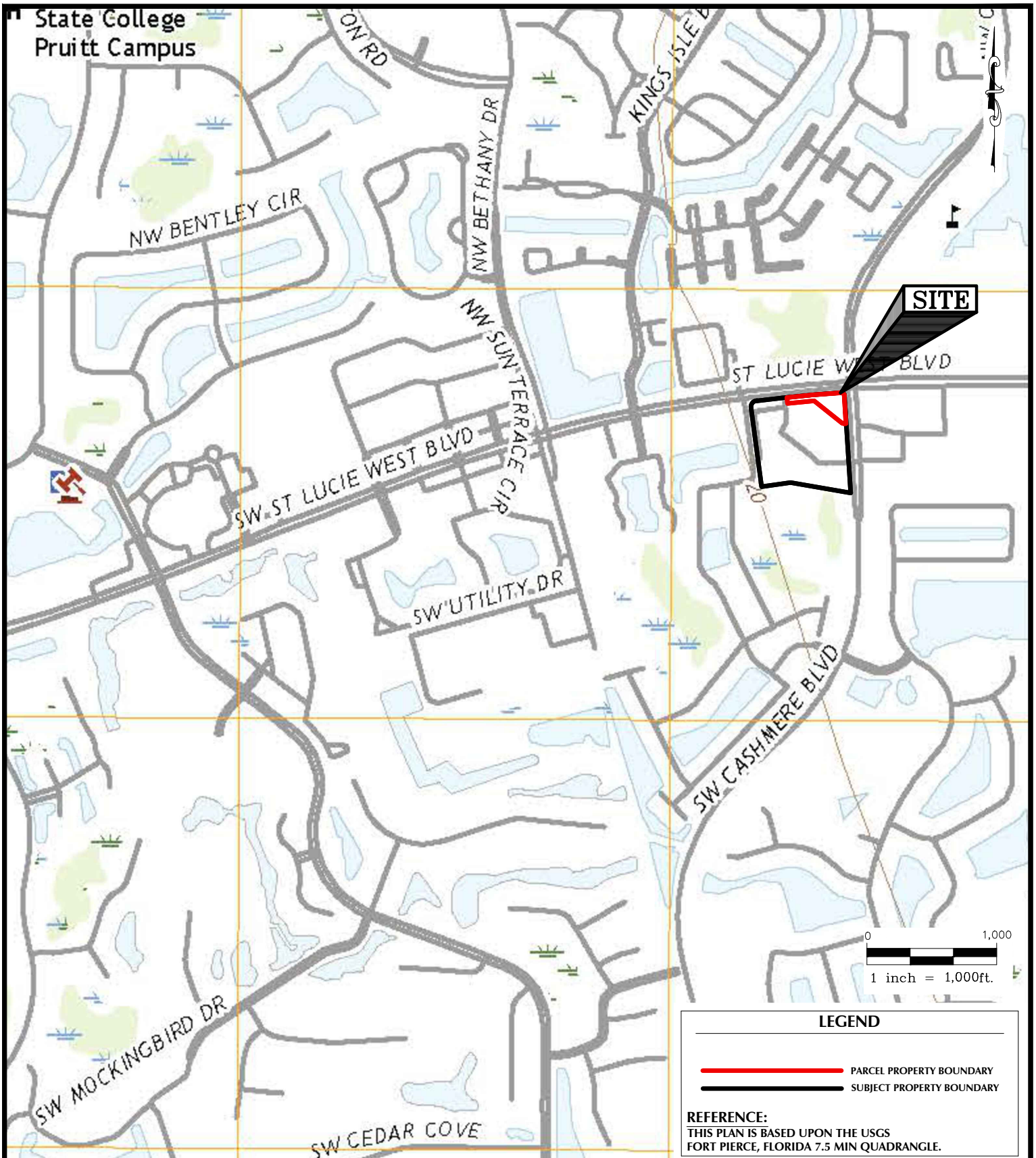




## **FIGURE 2**

### **Site Location Map**





PROJECT #:  
**GF2321125.000**

DESIGNED BY:  
**TC**

PROJ. MGR.:  
**KAF**

DATE:  
**12/14/23**

FIGURE:

**2**

SCALE:  
**1" = 1,000'**

**DRAWING TITLE:**  
**SITE LOCATION MAP**

**CLIENT:**

**REGENCY CENTERS**

**PROJECT:**

**PROPOSED STARBUCKS  
ST. LUCIE WEST BOULEVARD & SW CASHMERE BOULEVARD  
PORT ST. LUCIE, ST. LUCIE COUNTY, FL**



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# **APPENDIX A**

## **Records of Subsurface Exploration**



# RECORD OF SUBSURFACE EXPLORATION

Boring No.: **B-1**

Page 1 of 1

<b>Project:</b> Proposed Starbucks						<b>WAI Project No.:</b> GF2321125.000								
<b>Location:</b> St. Lucie West Boulevard & SW Cashmere Boulevard; Port St. Lucie, St. Lucie County, FL						<b>Client:</b> Regency Centers								
<b>Surface Elevation:</b> ± 23.0 feet						<b>Date Started:</b> 11/17/2023			<b>Water Depth   Elevation</b> (feet bgs)   (feet)			<b>Cave-In Depth   Elevation</b> (feet bgs)   (feet)		
<b>Termination Depth:</b> 20.0 feet bgs						<b>Date Completed:</b> 11/17/2023								
<b>Proposed Location:</b> Building						<b>Logged By:</b> SCR			<b>During:</b> 7.0   16.0 ▼					
<b>Drill / Test Method:</b> Mud Rotary / SPT						<b>Contractor:</b> PIC			<b>At Completion:</b> 7.0   16.0 ▼			<b>At Completion:</b> ---   --- ☒		
						<b>Equipment:</b> Geoprobe			<b>24 Hours:</b> ---   --- ▼			<b>24 Hours:</b> ---   --- ☒		

SAMPLE INFORMATION						DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)			
						0.0	TOPSOIL	1" Topsoil	
0 - 2	S-1	X	1 - 1 - 1 - 1	18	2	1.5	COASTAL PLAIN DEPOSITS	Dark Grayish-Brown Poorly Graded Sand, Moist, Very Loose (SP)	Organic Staining
2 - 4	S-2	X	2 - 4 - 5 - 6	20	9			As Above, Gray, Loose (SP)	LOI = 0.6%
4 - 6	S-3	X	8 - 8 - 7 - 6	20	15	5.0		As Above, Light Grayish-Brown, Medium Dense (SP)	
6 - 8	S-4	X	4 - 5 - 9 - 6	20	9	6.0		Gray Clayey Sand, Moist to Wet, Loose (SC)	LL= 25, PI= 12 LOI= 2.3%
8 - 10	S-5	X	2 - 2 - 3 - 3	15	5	10.0		As Above, Wet (SC)	Mud Rotary Starting @ 8.0 fbgs
13 - 15	S-6	X	6 - 9 - 12 - 12	20	21	13.0		Gray Poorly Graded Sand with Silt, Wet, Medium Dense (SP-SM)	Frequent shells
18 - 20	S-7	X	6 - 10 - 18 - 16	20	28	15.0		As Above, Light Gray (SP-SM)	Trace shells
						20.0		Boring Log B-1 Terminated at a Depth of 20.0 Feet Below Ground Surface	
						25.0			



# RECORD OF SUBSURFACE EXPLORATION

Boring No.: **B-2**

Page 1 of 1

<b>Project:</b> Proposed Starbucks		<b>WAI Project No.:</b> GF2321125.000	
<b>Location:</b> St. Lucie West Boulevard & SW Cashmere Boulevard; Port St. Lucie, St. Lucie County, FL		<b>Client:</b> Regency Centers	
<b>Surface Elevation:</b> ± 23.0 feet	<b>Date Started:</b> 11/17/2023	<b>Water Depth   Elevation</b> (feet bgs)   (feet)	<b>Cave-In Depth   Elevation</b> (feet bgs)   (feet)
<b>Termination Depth:</b> 20.0 feet bgs	<b>Date Completed:</b> 11/17/2023	<b>During:</b> 7.0   16.0 ▼	<b>At Completion:</b> ---   --- ☒
<b>Proposed Location:</b> Building	<b>Logged By:</b> SCR	<b>At Completion:</b> 7.0   16.0 ▼	<b>24 Hours:</b> ---   --- ▼
<b>Drill / Test Method:</b> Mud Rotary / SPT	<b>Contractor:</b> PIC	<b>24 Hours:</b> ---   --- ▼	<b>24 Hours:</b> ---   --- ☒
	<b>Equipment:</b> Geoprobe		

SAMPLE INFORMATION						DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)			
						0.0	TOPSOIL	2" Topsoil	
0 - 2	S-1		1 - 2 - 3 - 4	18	5		COASTAL PLAIN DEPOSITS	Dark Poorly Graded Sand with Silt, Moist, Loose (SP-SM)	Organic Staining
2 - 4	S-2		8 - 8 - 11 - 11	22	19	3.0		As Above, Medium Dense (SP-SM)	Organic Staining
4 - 6	S-3		20 - 14 - 12 - 11	24	26	5.0		Light Gray to Brown Poorly Graded Sand, Moist, Medium Dense (SP)	
						5.5		As Above (SP)	
								Gray Clayey Sand, Moist, Stiff (SC)	
6 - 8	S-4		7 - 6 - 7 - 5	24	13			Gray Poorly Graded Sand, Moist, Medium Dense (SP)	Mud Rotary Starting @ 6.0 fbgs
8 - 10	S-5		1 - 1 - 2 - 3	20	3			As Above, Moist to Wet (SP)	
						10.0			
13 - 15	S-6		10 - 18 - 20 - 18	15	38			As Above, Light Grayish-Brown, Dense (SP)	Frequent fine shells
						15.0			
18 - 20	S-7		10 - 12 - 13 - 18	16	25			As Above, Medium Dense (SP)	
						20.0			
								Boring Log B-2 Terminated at a Depth of 20.0 Feet Below Ground Surface	
						25.0			


NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched








# RECORD OF SUBSURFACE EXPLORATION

Boring No.: **B-3**

Page **1** of **1**

<b>Project:</b> Proposed Starbucks		<b>WAI Project No.:</b> GF2321125.000	
<b>Location:</b> St. Lucie West Boulevard & SW Cashmere Boulevard; Port St. Lucie, St. Lucie County, FL		<b>Client:</b> Regency Centers	
<b>Surface Elevation:</b> ± 22.5 feet	<b>Date Started:</b> 11/17/2023	<b>Water Depth   Elevation</b> (feet bgs)   (feet)	
<b>Termination Depth:</b> 10.0 feet bgs	<b>Date Completed:</b> 11/17/2023	<b>Cave-In Depth   Elevation</b> (feet bgs)   (feet)	
<b>Proposed Location:</b> Trash Enclosure	<b>Logged By:</b> SCR	<b>During:</b> 7.0   15.5	<b>At Completion:</b> ---   --- 
<b>Drill / Test Method:</b> Mud Rotary / SPT	<b>Contractor:</b> PIC	<b>At Completion:</b> 7.0   15.5	
	<b>Equipment:</b> Geoprobe	<b>24 Hours:</b> ---   ---	

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
						0.4	PAVEMENT		1" Asphalt, 4" Limerock Subbase	
0 - 2	S-1		10 - 7 - 4 - 8	15	11		FILL		Brown Poorly Graded Sand, Moist (FILL)	Trace Gravel
2 - 4	S-2		9 - 9 - 11 - 12	20	20	3.0			Brown Poorly Graded Sand with Silt, Moist (FILL)	
4 - 6	S-3		11 - 11 - 9 - 8	20	20	5.0	COASTAL PLAIN DEPOSITS		Dark Gray Poorly Graded Sand, Moist, Medium Dense (SP)	Organic Staining
6 - 8	S-4		5 - 5 - 6 - 6	20	11	7.0			As Above (SP)	Trace Silt
8 - 10	S-5		6 - 6 - 7 - 5	24	13	9.0			Greenish-Gray Clayey Sand, Wet, Medium Dense (SC)	
									As Above (SC)	
						10.0			Light Gray to Brown Poorly Graded Sand, Wet, Medium Dense (SP)	
									Boring Log B-3 Terminated at a Depth of 10.0 Feet Below Ground Surface	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched



# RECORD OF SUBSURFACE EXPLORATION

Boring No.: **B-4**

Page 1 of 1

<b>Project:</b> Proposed Starbucks		<b>WAI Project No.:</b> GF2321125.000	
<b>Location:</b> St. Lucie West Boulevard & SW Cashmere Boulevard; Port St. Lucie, St. Lucie County, FL		<b>Client:</b> Regency Centers	
<b>Surface Elevation:</b> ± 22.5 feet	<b>Date Started:</b> 11/17/2023	<b>Water Depth   Elevation</b> (feet bgs)   (feet)	<b>Cave-In Depth   Elevation</b> (feet bgs)   (feet)
<b>Termination Depth:</b> 10.0 feet bgs	<b>Date Completed:</b> 11/17/2023	<b>During:</b> 7.0   15.5 ▼	<b>At Completion:</b> ---   --- ▼
<b>Proposed Location:</b> Pavement	<b>Logged By:</b> SCR	<b>At Completion:</b> 7.0   15.5 ▼	<b>At Completion:</b> ---   --- ▼
<b>Drill / Test Method:</b> Mud Rotary / SPT	<b>Contractor:</b> PIC	<b>24 Hours:</b> ---   --- ▼	<b>24 Hours:</b> ---   --- ▼
	<b>Equipment:</b> Geoprobe		

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0			4" Topsoil	
0 - 2	S-1		1 - 3 - 3 - 7	18	6	0.3	TOPSOIL		Dark Gray Poorly Graded Sand, Moist, Loose (SP)	Organic Staining
							COASTAL PLAIN DEPOSITS			
2 - 4	S-2		5 - 7 - 6 - 8	18	13				As Above, Medium Dense (SP)	
4 - 6	S-3		13 - 11 - 10 - 9	18	21	5.0			As Above, Brown (SP)	
6 - 8	S-4		5 - 6 - 7 - 7	15	9				As Above, Dark Gray, with Roots, Moist to Wet, Loose (SP)	Trace Roots
8 - 10	S-5		6 - 5 - 4 - 4	18	9	9.0			As Above (SP)	
						10.0			Gray Clayey Sand, Wet, Loose (SP-SC)	
Boring Log B-4 Terminated at a Depth of 10.0 Feet Below Ground Surface										
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched







# RECORD OF SUBSURFACE EXPLORATION

Boring No.: **B-6**

Page 1 of 1

<b>Project:</b> Proposed Starbucks		<b>WAI Project No.:</b> GF2321125.000	
<b>Location:</b> St. Lucie West Boulevard & SW Cashmere Boulevard; Port St. Lucie, St. Lucie County, FL		<b>Client:</b> Regency Centers	
<b>Surface Elevation:</b> ± 22.5 feet	<b>Date Started:</b> 11/17/2023	<b>Water Depth   Elevation</b> (feet bgs)   (feet)	<b>Cave-In Depth   Elevation</b> (feet bgs)   (feet)
<b>Termination Depth:</b> 10.0 feet bgs	<b>Date Completed:</b> 11/17/2023	<b>During:</b> 7.0   15.5 ▼	<b>At Completion:</b> ---   --- ☒
<b>Proposed Location:</b> Pavement	<b>Logged By:</b> SCR	<b>At Completion:</b> 7.0   15.5 ▼	<b>24 Hours:</b> ---   --- ▼
<b>Drill / Test Method:</b> Mud Rotary / SPT	<b>Contractor:</b> PIC	<b>24 Hours:</b> ---   --- ▼	<b>Equipment:</b> Geoprobe

SAMPLE INFORMATION						DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)			
						0.0			
						0.5	TOPSOIL	6" Topsoil	
0 - 2	S-1		1 - 1 - 4 - 4	18	4		COASTAL PLAIN DEPOSITS	Dark Brown Poorly Graded Sand With Silt, Moist, Very Loose (SP-SM)	Organic Staining
						2.5		As Above, Medium Dense (SP-SM)	
2 - 4	S-2		8 - 9 - 8 - 8	20	17			Brown Clayey Sand, Moist, Medium Dense, (SC)	
						4.0			
4 - 6	S-3		9 - 10 - 9 - 9	18	19			Brown Poorly Graded Sand, Moist, Medium Dense (SP)	
						5.0			
6 - 8	S-4		5 - 6 - 6 - 7	18	12			As Above, Moist to Wet (SP)	
						6.0			
8 - 10	S-5		7 - 6 - 5 - 4	18	11			As Above, Wet (SP)	
						10.0			
								Boring Log B-6 Terminated at a Depth of 10.0 Feet Below Ground Surface	
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

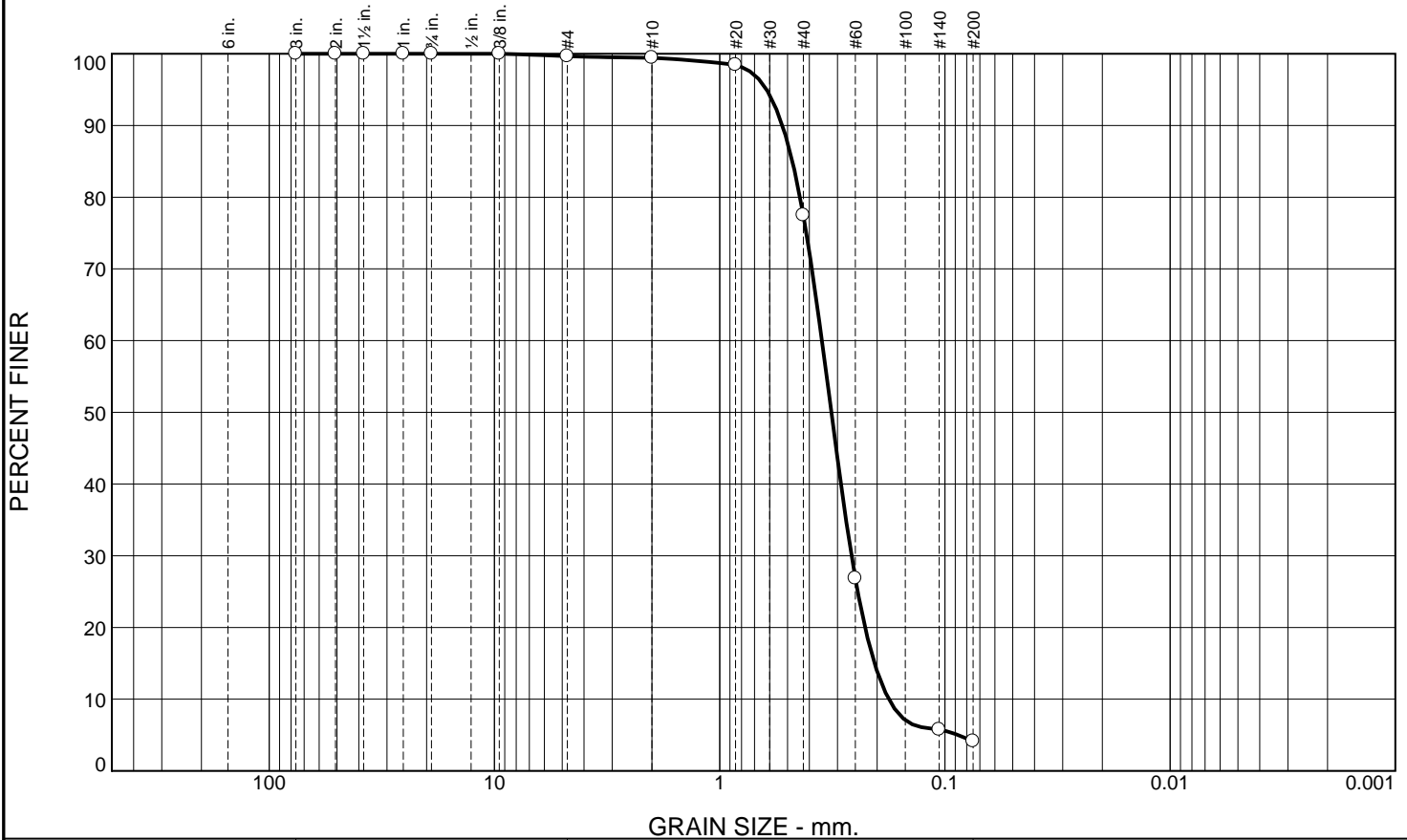


# **APPENDIX B**

## **Laboratory Test Results**



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.3	21.9	73.4	4.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	100.0		
3/8	100.0		
#4	99.7		
#10	99.4		
#20	98.5		
#40	77.5		
#60	26.8		
#140	5.8		
#200	4.1		

\* (no specification provided)

## Material Description

poorly graded sand

## Atterberg Limits

PL= NP

LL= NP

PI= NP

## Coefficients

D<sub>90</sub>= 0.5266

D<sub>85</sub>= 0.4754

D<sub>60</sub>= 0.3515

D<sub>50</sub>= 0.3192

D<sub>30</sub>= 0.2598

D<sub>15</sub>= 0.2055

D<sub>10</sub>= 0.1776

C<sub>u</sub>= 1.98

C<sub>c</sub>= 1.08

## Classification

USCS= SP

AASHTO= A-3

## Remarks

W<sub>n</sub> = 6.9%

Source of Sample: B-1  
Sample Number: S-2

Depth: 2.0' - 4.0'

Date: 11-27-2023

**WHITESTONE  
ASSOCIATES, INC.  
Warren, New Jersey**

**Client:** Regency Centers

**Project:** Proposed Starbucks

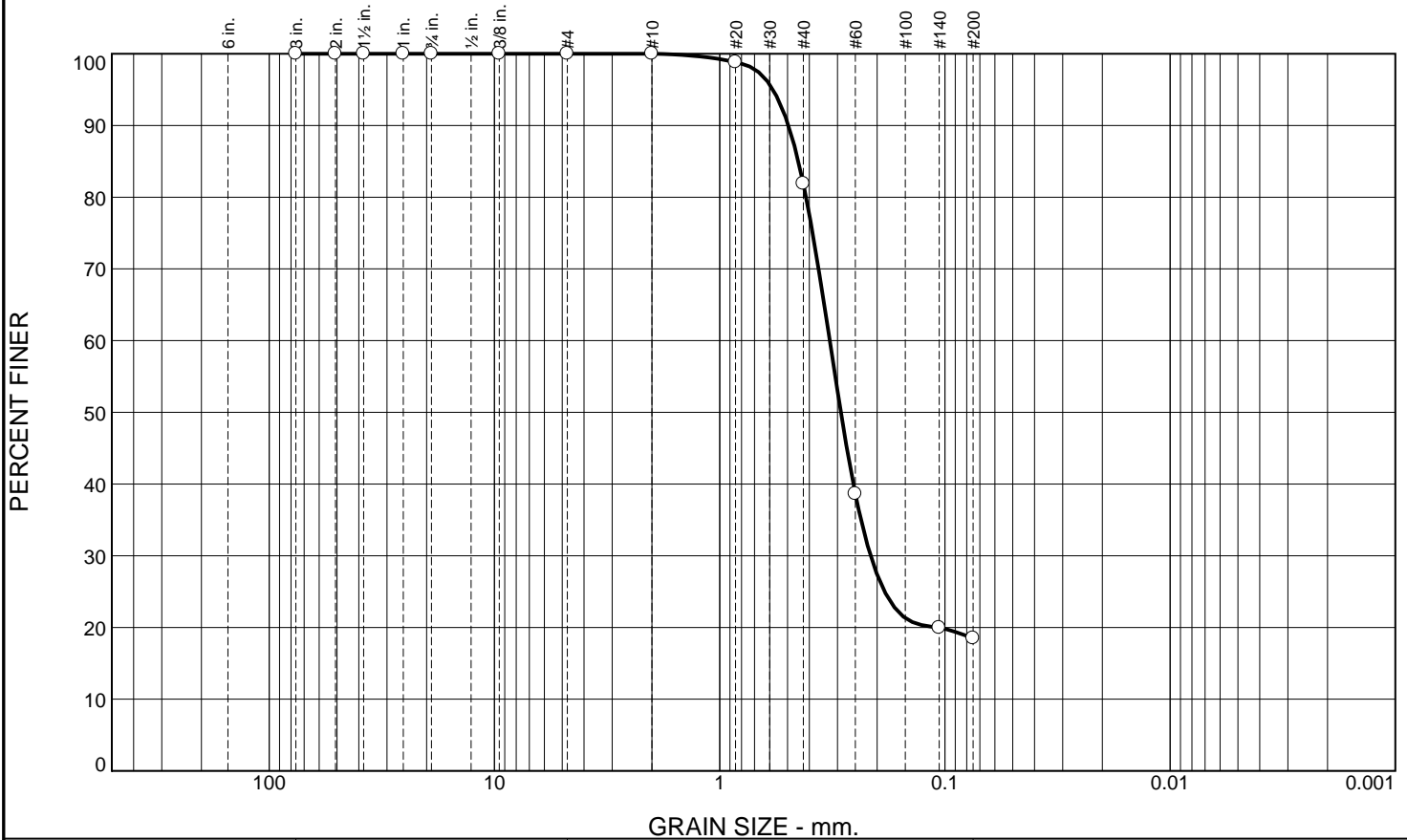
St. Lucie West Blvd. & SW Cashmere Blvd., Port St. Lucie, St. Lucie Co., FL

**Project No:** GF2321125.000

**Figure**



# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	18.1	63.4	18.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	100.0		
3/8	100.0		
#4	100.0		
#10	100.0		
#20	98.8		
#40	81.9		
#60	38.6		
#140	20.0		
#200	18.5		

\* (no specification provided)

## Material Description

clayey sand

## Atterberg Limits

PL= 13

LL= 25

PI= 12

## Coefficients

D<sub>90</sub>= 0.4952

D<sub>85</sub>= 0.4471

D<sub>60</sub>= 0.3245

D<sub>50</sub>= 0.2896

D<sub>30</sub>= 0.2138

D<sub>15</sub>=

D<sub>10</sub>=

C<sub>u</sub>=

C<sub>c</sub>=

## Classification

USCS= SC

AASHTO= A-2-6(0)

## Remarks

W<sub>n</sub> = 17.2%

Source of Sample: B-1  
Sample Number: S-4

Depth: 6.0' - 8.0'

Date: 11-27-2023

**WHITESTONE  
ASSOCIATES, INC.  
Warren, New Jersey**

**Client:** Regency Centers  
**Project:** Proposed Starbucks  
St. Lucie West Blvd. & SW Cashmere Blvd., Port St. Lucie, St. Lucie Co., FL  
**Project No:** GF2321125.000  
**Figure**





## NATURAL MOISTURE CONTENT DETERMINATION + ORGANIC CONTENT DETERMINATION

ASTM D-2974

Client: Regency Centers

Project: Proposed Starbucks

Project Number: GF2321125.000

Project Location: St. Lucie West Boulevard & SW Cashmere Boulevard, Port St. Lucie, St. Lucie County, Florida

### MOISTURE CONTENT

Boring/Sample ID	B-1, S-2	B-1, S-4			
Depth (fbgs)	2.0' - 4.0'	6.0' - 8.0'			
USCS Classification	SP	SC			
Water content (%)	8.0	17.2			

### ORGANIC CONTENT

Boring/Sample ID	B-1, S-2	B-1, S-4			
Depth (fbgs)	2.0' - 4.0'	6.0' - 8.0'			
USCS Classification	SP	SC			
Organic content (%)	0.6	2.3			



# **APPENDIX C**

## **Supplemental Information**

### **(USCS, Terms and Symbols)**



## UNIFIED SOIL CLASSIFICATION SYSTEM

### SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION <u>RETAINED</u> ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		CLEAN SAND (LITTLE OR NO FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	SAND AND SANDY SOILS	MORE THAN 50% OF COARSE FRACTION <u>PASSING</u> NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GC
			SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS <u>LARGER</u> THAN NO. 200 SIEVE SIZE			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS <u>LESS</u> THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
MORE THAN 50% OF MATERIAL IS <u>SMALLER</u> THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS <u>GREATER</u> THAN 50	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
HIGHLY ORGANIC SOILS			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

#### GRADATION\*

% FINER BY WEIGHT

TRACE..... 1% TO 10%  
LITTLE..... 10% TO 20%  
SOME..... 20% TO 35%  
AND..... 35% TO 50%

#### COMPACTNESS\*

Sand and/or Gravel

RELATIVE DENSITY

LOOSE. .... 0% TO 40%  
MEDIUM DENSE.... 40% TO 70%  
DENSE..... 70% TO 90%  
VERY DENSE..... 90% TO 100%

#### CONSISTENCY\*

Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

VERY SOFT..... LESS THAN 250  
SOFT..... 250 TO 500  
MEDIUM..... 500 TO 1000  
STIFF..... 1000 TO 2000  
VERY STIFF..... 2000 TO 4000  
HARD..... GREATER THAN 4000

\* VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE.  
WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.

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## GEOTECHNICAL TERMS AND SYMBOLS

### SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

### SOIL PROPERTY SYMBOLS

- N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.  
 Qu: Unconfined compressive strength, TSF.  
 Qp: Penetrometer value, unconfined compressive strength, TSF.  
 Mc: Moisture content, %.  
 LL: Liquid limit, %.  
 PI: Plasticity index, %.  
 δd: Natural dry density, PCF.  
 ▴: Apparent groundwater level at time noted after completion of boring.

### DRILLING AND SAMPLING SYMBOLS

- NE: Not Encountered (Groundwater was not encountered).  
 SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.  
 ST: Shelby Tube - 3" O.D., except where noted.  
 AU: Auger Sample.  
 OB: Diamond Bit.  
 CB: Carbide Bit  
 WS: Washed Sample.

### RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

#### Term (Non-Cohesive Soils)

#### Standard Penetration Resistance

Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

#### Term (Cohesive Soils)

#### Qu (TSF)

Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

### PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

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