ECS Florida, LLC

Geotechnical Engineering Report

Chipotle Restaurant – Margate

5555 West Atlantic Avenue

Margate, Broward County, Florida 33063

ECS Project Number 25:3770

July 29, 2021

July 29, 2021

Mr. Jeff Zito
Ferber Construction Management, LLC
2655 North Ocean Drive
Suite 401
Singer Island, FL 33404

ECS Project No. 25:3770

Reference: Geotechnical Engineering Report
Chipotle Restaurant - Margate
5555 West Atlantic Avenue
Margate, Broward County, Florida 33063

Dear Mr. Zito:

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. 25:7733, dated February 9, 2021. This report presents our understanding of the geotechnical aspects of the project, the results of the field exploration and laboratory testing conducted, and our design and construction recommendations.

It has been our pleasure to be of service to Ferber Construction Management, LLC 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.

David W. Spangler, State of Florida
Professional Engineer, License No. 58770

This item has been digitally signed and sealed by David W. Spangler on the date indicated here.

Printed Copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

2021.07.29
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Taylor McDade, E.I.
Geotechnical Project Manager
tmcdade@ecslimited.com

David W. Spangler, P.E.
Principal Engineer
Registered, FL PE No 58770
dspangler@ecslimited.com

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EXECUTIVE SUMMARY

The following summarizes the main findings of the geotechnical exploration and soil analysis, particularly those that may have a cost impact on the planned development for the restaurant development, in Margate, Florida. Information gleaned from the executive summary should not be utilized in lieu of reading the entire geotechnical report.

- The fine sands (SP) at the boring locations are generally suitable for use as structural fill material. The silty sand with less than 30 percent fines (SM) encountered may be used as well; however, this material will require moisture conditioning to achieve proper compaction.

- Based on the results of our Standard Penetration Test (STP) soil borings and assumed structural loads, the proposed structures may be supported on shallow foundations bearing on approved structural fill with an allowable net bearing pressure of 2,500 psf.

- We recommend that ECS be provided the opportunity to review the foundation plans and earthwork specifications to verify that our recommendations have been properly interpreted and implemented. ECS should also be retained to perform the construction material testing and observations required for this project, to verify that our recommendations have been satisfied.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design of structure foundations and construction consideration and recommendations for the proposed commercial development. This report includes recommendations regarding the new building, pavements, and associated utilities. The recommendations developed for this report are based on information provided by Ferber Construction Management, LLC.

Our services were provided in accordance with our Proposal No. 25:7733, dated February 9, 2021 as authorized by Ferber Construction Management, LLC. on February 9, 2021 and includes the Terms and Conditions of Service.

This report contains the procedures and results of our subsurface exploration and laboratory testing programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

The report includes the following items.

- 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.
- Final copies of our soil test boring logs.
- Recommendations for site preparation and construction of compacted fills, including an evaluation of on-site soils for use as compacted fills.
- Evaluation and recommendations relative to groundwater control.
- Recommended net allowable bearing capacity and anticipated settlements for the proposed foundation construction.
- Recommended slab-on-grade design and construction.
- General recommendations for pavement design.

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION

The project site is located in the northeast quadrant of the intersection of West Atlantic Boulevard and State Road 7 in Margate, Florida. The site is bordered to the north, east, and west by pavements and commercial structures and to the south by West Atlantic Boulevard. The general site location is shown on the following Figure 2.1.1.

Figure 2.1.1. Site Location

2.2 CURRENT SITE CONDITIONS

The proposed site currently consists of pavement areas. Based on our review of available historic aerials from Google Earth and other sources dating back 1940, the site was heavily wooded prior to 1940. Between 1969 and 1980, the site was developed with pavement for parking for the surrounding commercial structures. The site has remained in that condition through present day. Based upon elevations interpolated from Google Earth, the site is generally flat with ground surface elevations ranging from approximately El.9 to El.10. Note these elevations are approximate within several feet and should not be used for design.

2.4 PROPOSED CONSTRUCTION

Based on the information provided, we understand the proposed construction consists of one (1) single-story restaurant building (approximately 2,318 square feet in footprint) with associated pavement areas.

Building loads have not been provided at this time, however based on our experience with these types of buildings, we anticipate the maximum column loads to be approximately 100 kips and the maximum wall loads to be approximately 5 kips per linear foot.

Grading plans were not provided at the time of our evaluation; however, we have assumed the building and pavement areas will be supported on less than 1 foot of fill above the presently existing ground surface.

If actual building loads or fill/cut heights vary from these conditions, then the recommendations in this report may need to be re-evaluated. We should be contacted if any of the above project information is incorrect so that we may reevaluate our recommendations.

3.0 FIELD EXPLORATION

3.1 FIELD EXPLORATION PROGRAM

The field exploration was planned with the objective of 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

The subsurface conditions were explored by drilling three (3) Standard Penetration Test (SPT) borings within the site boundaries. A track mounted drill rig was utilized to drill the soil test borings. SPT borings were advanced to depths of approximately 10 to 20 feet below the current ground surface. Boring locations were identified in the field by a handheld GPS device. The approximate boring locations are shown on the Boring Location Diagram in Appendix A.

SPT sampling were conducted in the borings at regular intervals in general accordance with ASTM D 1586. Small representative samples were obtained during these tests and were used to classify the soils encountered. The standard penetration resistances obtained provide a general indication of soil shear strength and compressibility.

3.1.2 In-Situ Exfiltration Testing

Constant head open hole exfiltration testing was performed in accordance with procedures of South Florida Water Management District (SFWMD) Usual Condition Test procedure found in the SFWMD Environmental Resource Permit Information Manual Volume IV (September 2010 edition) at the locations denoted as exfiltration test BE-1 and BE-2 on the attached Exfiltration Log found in Appendix B which includes the hydraulic conductivity (K, value).

Tests	K_{IV} –Value (cfs/ft2 –ft head)
BE-1	6.65×10^{-6}
BE-2	9.97×10^{-6}

Note: Refer to the attached Usual Open Hole Test summary sheets for detailed information

3.2 SUBSURFACE CHARACTERIZATION

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the soil and rock strata encountered during our subsurface exploration. For subsurface information at a specific location, refer to the Boring Logs in Appendix B.

Approximate Depth Range (ft)	Stratum	Description	Ranges of SPT[1] N-values (bpf)
0 – 0.25	I	Asphalt Pavement	N/A
0 - 17	II	(SP and SM) Fine SAND and Silty fine SAND, moist to wet, loose to dense	5 to 34
17 – 20	III	Limestone, sampled as SILTY SAND	12

Notes: **(1)** Standard Penetration Test

3.3 GROUNDWATER OBSERVATIONS

Measured Groundwater: Water levels were measured in our borings as noted on the soil boring logs in Appendix B. Groundwater depths measured at the time of drilling ranged from 4 feet to 6.5 feet below ground surface. 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.

Estimated Seasonal High Groundwater: The normal seasonal high groundwater level is affected by a number of factors. The drainage characteristics of the soils, land surface elevation, relief points such as drainage ditches, lakes, rivers, swamp areas, etc., and distance to relief points are some of the more important factors influencing the seasonal high groundwater level.

Based on our interpretation of the site conditions, including the boring logs and the Broward County Soil Survey, we estimate the normal seasonal high groundwater level at the site to be between approximately at the 3 feet to 5.5 feet below the ground surface as shown on the boring logs. It is possible that groundwater levels may exceed the estimated normal seasonal high groundwater level as a result of significant or prolonged rains.

3.4 LABORATORY TESTING

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. Classification and 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 and to quantify and correlate engineering properties.

An experienced geotechnical engineer visually classified each soil sample from the test borings on the basis of texture and plasticity in accordance with the Unified Soil Classification System (USCS), ASTM D-2488 (Description and Identification of Soils-Visual/Manual Procedures), and Atterberg limits (ASTM D-4318). After classification, the geotechnical engineer grouped the various soil types 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.

Selected samples of the soils encountered during the field exploration were subjected to quantitative laboratory testing to better define the composition of the soils encountered and to provide data for correlation to their anticipated strength and compressibility characteristics. The laboratory testing determined the moisture contents and fines contents of selected soil samples. The results of the laboratory testing are shown in the Laboratory Testing Summary included in Appendix B.

4.0 DESIGN RECOMMENDATIONS

4.1 FOUNDATIONS

Provided subgrades and structural fills are prepared as recommended in this report, the proposed structure can be supported by shallow foundations including column footings and continuous wall footings. We recommend the foundation design use the following parameters.

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure (1)	2,500 psf	2,500 psf
Acceptable Bearing Soil Material	SAND (SP) and SILTY SAND (SM) - Stratum I	SAND (SP) and SILTY SAND (SM) - Stratum I
Minimum Width	24 inches	18 inches
Min. Footing Embedment Depth (below slab or finished grade)	24 inches	24 inches
Estimated Total Settlement (2)	Less than 1-inch	Less than 1-inch
Estimated Differential Settlement (3)	Less than ¾ inches between columns	Less than ¾ inches

Notes:

(1) Net allowable bearing pressure is the applied pressure in excess of the surrounding overburden soils above the base of the foundation.
(2) Based on assumed structural loads. If final loads are different, ECS must be contacted to update foundation recommendations and settlement calculations.
(3) Based on maximum column/wall loads and variability in borings. Differential settlement can be re-evaluated once the foundation plans are more complete.

Potential Undercuts: Most of the soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. If soft or unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut and removed. Any undercut should be backfilled with lean concrete ($f'_c \geq$ 1,000 psi at 28 days) up to the original design bottom of footing elevation; the original footing shall be constructed on top of the hardened lean concrete.

4.2 SLABS ON GRADE

Provided subgrades and structural fills are prepared as discussed herein, the proposed floor slabs can be constructed as Ground Supported Slabs (or Slab-On-Grade). A minimum clearance of 2 feet is recommended between the estimated seasonal high groundwater table and the bottom of the floor slab. Based on an assumed lowest finished floor elevation of within 2 feet of existing grades, it appears that the slabs will bear on Stratum I - SAND (SP) and SILTY SAND (SM). Near surficial higher fines SITLY SAND (SM) were observed in borings B-1 and BE-1 and these soils should not be present within one-foot of the bottom of slab. These soils should be undercut and replaced with Poorly Graded SAND (SP) or SAND WITH SILT or CLAY (SP-SM or SP-SC) as needed based upon final proposed grades. Soft or yielding soils may be encountered in some areas. Those soils should be removed and replaced with compacted Structural Fill in accordance with the recommendations included in this report. The following graphic depicts our soil-supported slab recommendations:

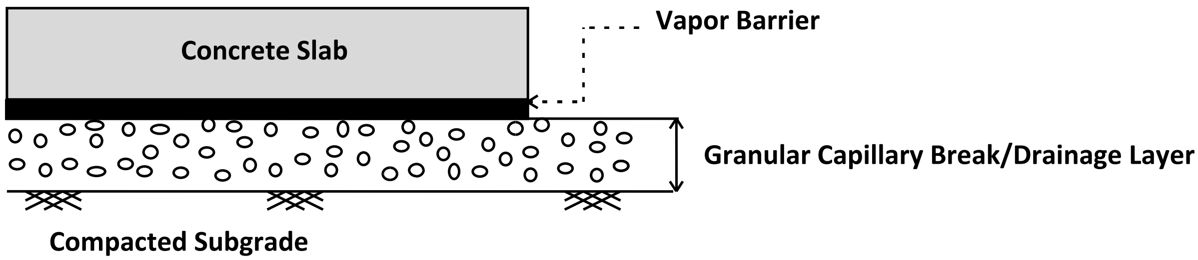


Figure 4.2.1

1. Drainage Layer Material: GRAVEL (GP, GW), SAND (SP, SW) Thickness of Four Inches
2. Subgrade compacted to 98% maximum dry density per ASTM D1557

Soft or yielding soils may be encountered in some areas. Those soils should be removed and replaced with compacted Structural Fill in accordance with the recommendations included in this report.

Subgrade Modulus: Provided the Structural Fill and Granular Drainage Layer are constructed in accordance with our recommendations, the slab may be designed assuming a modulus of subgrade reaction, k_1 of 150 pci (lbs./cu. inch). The modulus of subgrade reaction value is based on a 1 ft by 1 ft plate load test basis.

Vapor Barrier: Before the placement of concrete, a vapor barrier may be placed on top of the granular drainage layer to provide additional protection against moisture penetration through the floor slab. When a vapor barrier is used, special attention should be given to surface curing of the slab to reduce the potential for uneven drying, curling and/or cracking of the slab. Depending on proposed flooring material types, the structural engineer and/or the architect may choose to eliminate the vapor barrier.

Slab Isolation: Soil-supported slabs should be isolated from the foundations and foundation-supported elements of the structure so that differential movement between the foundations and slab will not induce excessive shear and bending stresses in the floor slab. Where the structural configuration prevents the use of a free-floating slab such as in a drop down footing/monolithic slab configuration, the slab should be designed with suitable reinforcement and load transfer devices to preclude overstressing of the slab.

4.3 PAVEMENTS

Subgrade Characteristics: Based on the results of our borings, it appears that the pavement subgrades in cuts will consist mainly of SAND (SP) and SILTY SAND (SM) material. It is recommended that at least one-foot of Poorly-Graded SAND (SP) or SAND WITH SILT or CLAY (SP-SM or SP-SC) be present below roadway bases as high fines soils could create perched stormwater which could be detrimental to pavements that experience frequent high loads. This would also include the removal the existing asphalt. Undercuts may be required in areas in which higher fines or organics are present.

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.

The preliminary pavement sections below are guidelines that may or may not comply with local jurisdictional minimums.

PROPOSED 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"

In general, heavy duty sections are areas that will be subjected to trucks, buses, or other similar vehicles including main drive lanes of the development. Light duty sections are appropriate for vehicular traffic and parking areas.

Large, front loading trash dumpsters frequently impose concentrated front wheel loads on pavements during loading. This type of loading typically results in rutting of asphalt pavement and ultimately pavement failures. For preliminary design purposes, we recommend that the pavement in trash pickup areas consist of a 6-inch thick, 4,000 psi, reinforced concrete slab over 6-inches of dense graded aggregate. When traffic loading becomes available ECS or the Civil Engineer can design the pavements.

Prior to subbase placement and paving, LBR testing of the subgrade soils (both natural and fill soils) should be performed to determine the soil engineering properties for final pavement design.

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. 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.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 SUBGRADE PREPARATION

5.1.1 Stripping and Grubbing

The subgrade preparation should consist of stripping all vegetation, rootmat, topsoil, existing fill, and any soft or unsuitable materials from the 10-foot expanded building and 5-foot expanded pavement limits, and 5 feet beyond the toe of structural fills. Any encountered topsoil and unsuitable materials should be removed prior to the placement of structural fill or construction of structures. Additionally, any underground utilities or underground tanks that will not be part of the new construction should be properly capped and abandoned or removed. ECS should be retained to verify the topsoil and unsuitable surface materials have been removed prior to the placement of structural fill or construction of structures.

5.1.2 Proofrolling

Prior to fill placement or other construction on subgrades, the subgrades should be evaluated by an ECS field technician. The exposed subgrade should be thoroughly proofrolled with construction equipment having a minimum axle load of 20 tons [e.g. fully loaded tandem-axle dump truck]. Proofrolling should be traversed in two perpendicular directions with overlapping passes of the vehicle under the observation of an ECS technician. This procedure is intended to assist in identifying any localized yielding materials.

Where proofrolling identifies areas that are unstable or “pumping” subgrade those areas should be repaired prior to the placement of any subsequent structural fill or other construction materials. Methods of stabilization include undercutting, moisture conditioning, or chemical stabilization. The situation should be discussed with ECS to determine the appropriate procedure. Test pits may be excavated to explore the shallow subsurface materials to help in determining the cause of the observed unstable materials, and to assist in the evaluation of appropriate remedial actions to stabilize the subgrade.

5.1.3 Subgrade Densification

The footings or grade beams may be designed for the provided net allowable soil bearing pressures if bearing on natural soils, or controlled and compacted engineered fill after appropriate soil densification occurs. During mass grading to achieve subgrade levels, the geotechnical engineer should examine the subgrade to determine if excessively organic or soft soils are present. If found, the organic or soft soils should be over-excavated and replaced with compacted fill. After the proofrolling requirement above is met, we recommended that the **subgrade be thoroughly densified with a heavy vibratory roller with a minimum load of 10 tons with at least 10 overlapping passes in each perpendicular direction. The vibrator should be turned on for all passes unless pore water pressure concerns arise (the geotechnical engineer on site can help with this assessment).** Please be sure to engage ECS to observe the site preparation and densification requirements mentioned herein. For this reason, we recommend that ECS Florida, LLC observe the foundation excavations and test the foundation subgrade bearing surfaces, along with conducting the material testing services in order to observe the appropriate conditions have been met for shallow foundation construction. If this testing is not performed to confirm densification of soil has met this desired condition; this could lead to more foundation settlement than recommended.

Should the bearing level soils experience pumping and soil strength loss during the compaction operations, compaction work should be immediately terminated, and (1) the disturbed soils should be removed and backfilled with compacted structural fill, or (2) the excess moisture content within the disturbed soils should be allowed to dissipate before recompacting.

Care should be exercised to avoid damaging any nearby structures while the compaction operation is underway. Prior to commencing compaction, occupants of adjacent structures should be notified, and the existing conditions of the structures should be documented with photographs and survey (if deemed necessary). Compaction should cease if deemed detrimental to adjacent structures, and ECS should be contacted immediately. We recommend the vibratory roller remain a minimum of 50 feet from existing structures. Within this zone, use of a track-mounted bulldozer, or a vibratory roller operating in the static mode, is recommended.

5.1.4 Site Temporary Dewatering

Because of the need for densification of the soils within the upper 2 feet below the stripped surface, temporary groundwater control measures may be required if the groundwater level is within 2 feet below the stripped and grubbed surface at the time of construction. Should groundwater control measures become necessary, dewatering methods should be determined by the contractor. We recommend the groundwater control measures, if necessary; remain in place until compaction of the existing soils is completed. The dewatering method should be maintained until backfilling has reached a height of 2 feet above the groundwater level at the time of construction. The site should be graded to direct surface water runoff from the construction area.

5.2 EARTHWORK OPERATIONS

5.2.1 Structural Fill

Prior to placement of structural fill, representative bulk samples (about 50 pounds) of on-site and/or off-site borrow should be submitted to ECS for laboratory testing, which will typically include Atterberg limits, natural moisture content, grain-size distribution, and moisture-density relationships (i.e., Proctors) for compaction. Import materials should be tested prior to being hauled to the site to determine if they meet project specifications. Alternatively, Proctor data from other accredited laboratories can be submitted if the test results are within the last 90 days.

Satisfactory Structural Fill Materials: Materials satisfactory for use as structural fill should consist of inorganic soils with the following engineering properties and compaction requirements.

STRUCTURAL FILL INDEX PROPERTIES	
Subject	**Property**
Building and Pavement Areas	LL < 40, PI<20
Max. Particle Size	4 inches
Fines Content	Max. 25 % > #200 sieve
Max. organic content	5% by dry weight

STRUCTURAL FILL COMPACTION REQUIREMENTS	
Subject	**Requirement**
Compaction Standard	Modified Proctor, ASTM D1557
Required Compaction, Upper 1 Foot of Fill, Below Roadway Base (Stabilized Subgrade)	98% of Max. Dry Density
Required Compaction	95% of Max. Dry Density
Moisture Content	-2 to +3 % points of the soil's optimum value
Loose Thickness	8 inches prior to compaction

On-Site Borrow Suitability: Deposits of soils (that meet the definition of satisfactory structural fill) are present on the site. These occur mostly at relatively shallow depth below the surface where residual soils are most weathered.

Materials used as structural fill for shallow fill areas should consist of approved material classified as SP, SP-SM, SM 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 is recommended that material to be used for engineered fill be analyzed and approved by the Geotechnical Engineer prior to their use on site. Subgrade soils disturbed by contractor operations should be re-compacted to the specifications of this report. Subgrade soils which are excessively wet but otherwise suitable by soil classification (inorganic soil material meeting the specifications above) are not to be considered unsuitable by definition and should be moisture conditioned and re-compacted.

5.3 FOUNDATION AND SLAB OBSERVATIONS

Protection of Foundation Excavations: Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time. Therefore, foundation concrete should be placed the same day that excavations are made. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1 to 3-inch thick "mud mat" of "lean" concrete should be placed on the bearing soils before the placement of reinforcing steel.

Footing Subgrade Observations: Most of the soils at the foundation bearing elevation are anticipated to be suitable for support of the proposed structure. It is important to have ECS observe the foundation subgrade prior to placing foundation concrete, to confirm the bearing soils are what was anticipated.

Slab Subgrade Verification: Prior to placement of a drainage layer, the subgrade should be prepared in accordance with the recommendations found in **Sections 5.1.2 Proofrolling and 5.1.3 Subgrade Densification**.

5.4 UTILITY INSTALLATIONS

Utility Subgrades: The soils encountered in our exploration are expected to be generally suitable for support of utility pipes. The pipe subgrades should be observed and probed for stability by ECS. Any loose or unsuitable materials encountered should be removed and replaced with suitable compacted Structural Fill, or pipe stone bedding material.

Utility Backfilling: The granular bedding material (often AASHTO #57 stone) should be at least 4 inches thick, but not less than that specified by the civil engineer's project drawings and specifications. We recommend that the bedding materials be placed up to the springline of the pipe. Fill placed for support of the utilities, as well as backfill over the utilities, should satisfy the requirements for Structural Fill and Fill Placement.

Excavation Safety: All excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing, constructing, and maintaining stable temporary excavations and slopes. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation, expressed or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS by Ferber Construction Management, LLC. If any of this information is inaccurate or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our recommendations and provide additional or alternate recommendations that reflect the proposed construction.

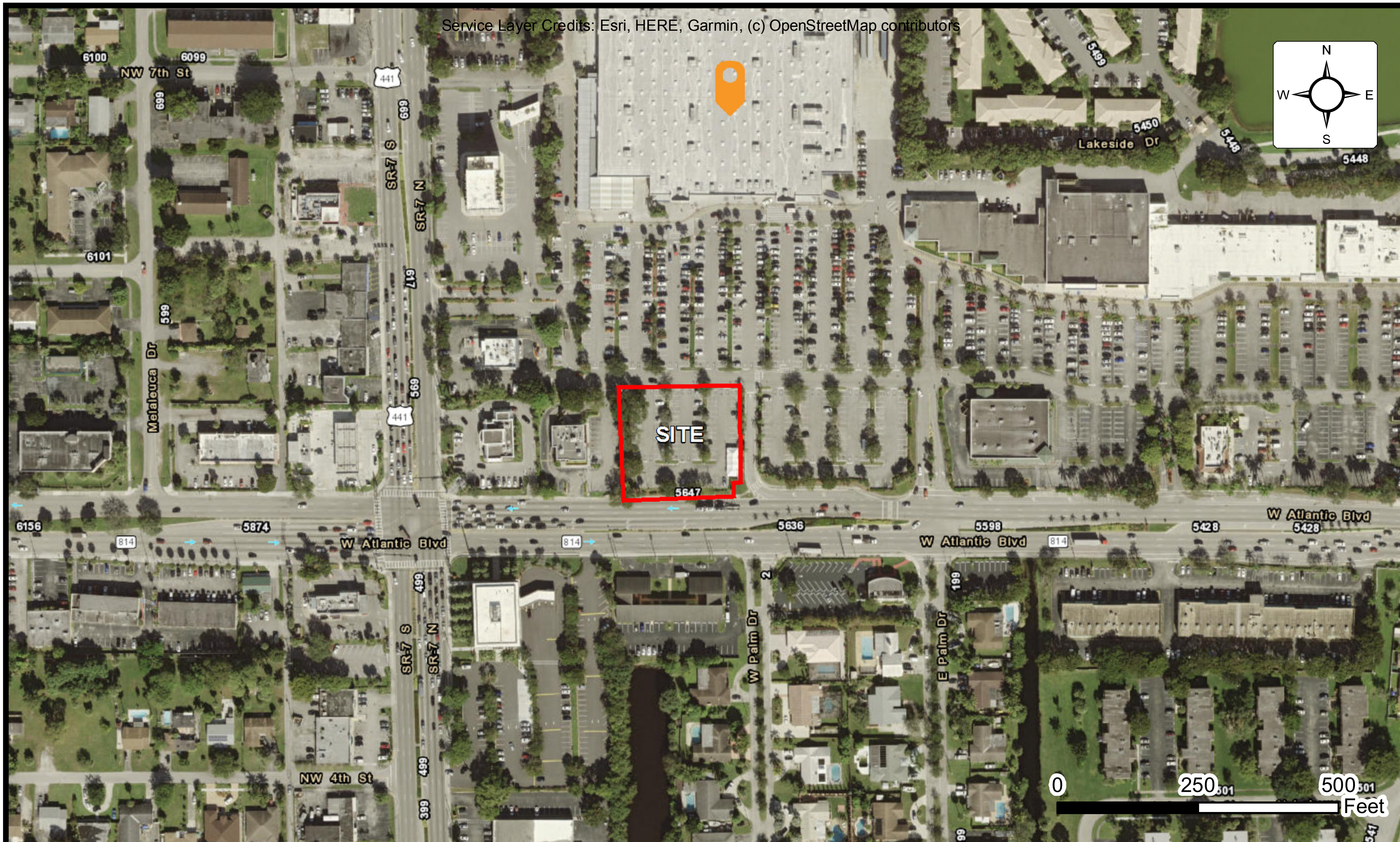
We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

Field observations, and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

APPENDIX A – Drawings & Reports

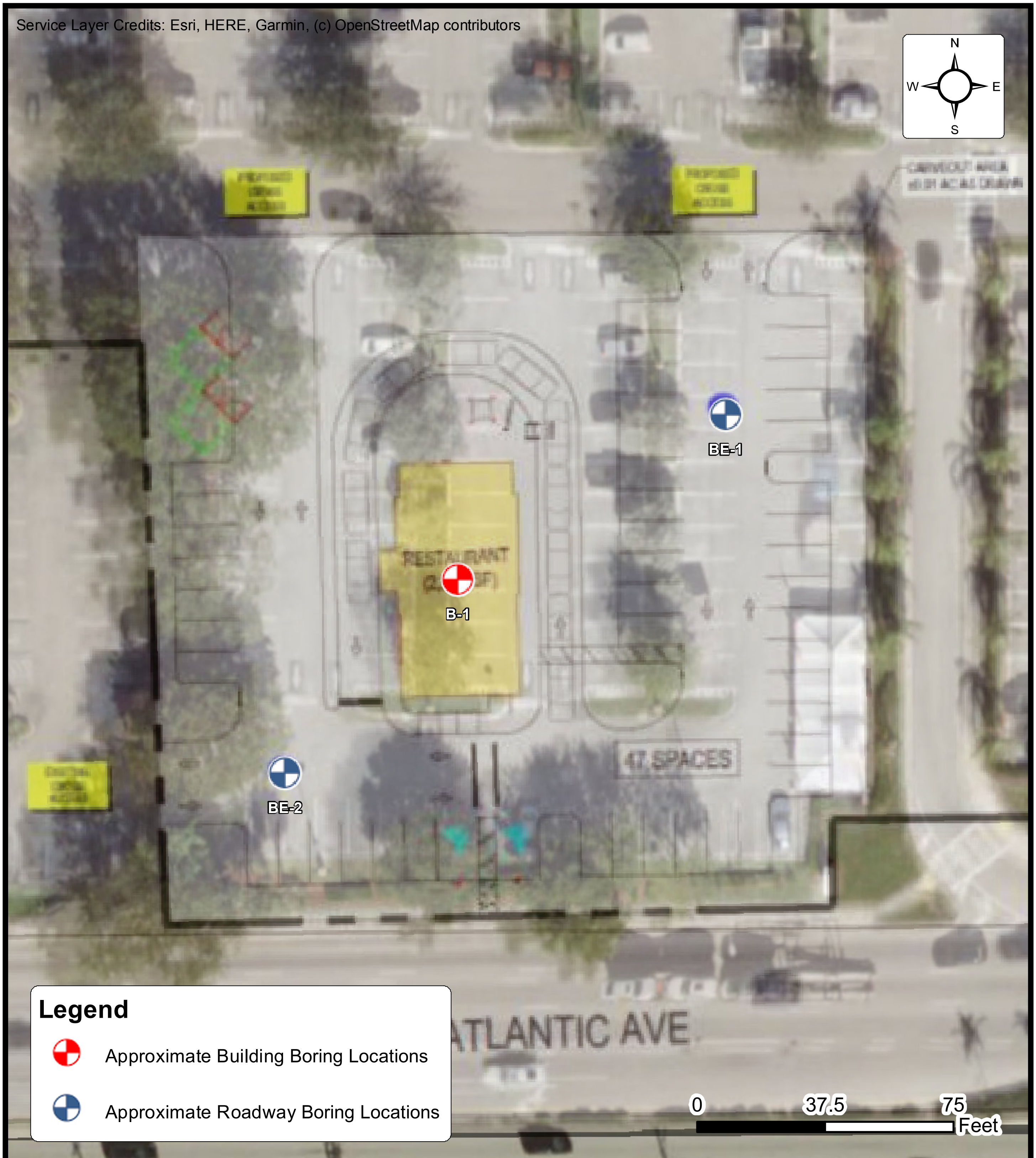
Site Location Diagram
Boring Location Diagram
Soil Survey



SITE LOCATION DIAGRAM
CHIPOTLE RESTAURANT - MARGATE

5555 WEST ATLANTIC AVENUE, MARGATE, FLORIDA
THE FERBER COMPANY, INC

ENGINEER	JM19
SCALE	AS NOTED
PROJECT NO.	25:3770
SHEET	1 OF 1
DATE	7/22/2021



BORING LOCATION DIAGRAM
CHIPOTLE RESTAURANT - MARGATE

5555 WEST ATLANTIC AVENUE, MARGATE, FLORIDA

THE FERBER COMPANY, INC

ENGINEER	JM19
SCALE	AS NOTED
PROJECT NO.	25:3770
SHEET	1 OF 1
DATE	7/22/2021


80° 12' 13" W
80° 12' 10" W
26° 14' 10" N
26° 14' 7" N
579520
579530
579540
579550
579560
579570
579580
579590
579600
579610
579620
2902080
2902070
2902060
2902050
2902040
2902030
2902020
12
19
Soil Map may not be valid at this scale.
Map Scale: 1:484 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 5 10 20 30
Feet
0 20 40 80 120
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Broward County, Florida, East Part
Survey Area Data: Version 16, Jun 8, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 7, 2020—Mar 26, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12	Hallandale fine sand, 0 to 2 percent slopes	0.5	61.5%
19	Margate fine sand, occasionally ponded, 0 to 1 percent slopes	0.3	38.5%
Totals for Area of Interest		**0.8**	**100.0%**

APPENDIX B – Field Operations

Reference Notes for Boring Logs
Subsurface Exploration Procedure: Standard Penetration Testing (SPT)
Boring Logs
Exfiltration test Results

REFERENCE NOTES FOR BORING LOGS

MATERIAL[1,2]

	Material
	ASPHALT
	CONCRETE
	GRAVEL
	TOPSOIL
	VOID
	BRICK
	AGGREGATE BASE COURSE
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, QP[4]	SPT[5] (BPF)	CONSISTENCY[7] (COHESIVE)
<0.25	<2	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

RELATIVE AMOUNT[7]	COARSE GRAINED (%)[8]	FINE GRAINED (%)[8]
Trace	≤5	≤5
With	10 - 20	10 - 25
Adjective *(ex: "Silty")*	25 - 45	30 - 45

GRAVELS, SANDS & NON-COHESIVE SILTS

SPT[5]	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

WATER LEVELS[6]

- ▽ WL (First Encountered)
- ▼ WL (Completion)
- WL (Seasonal High Water)
- WL (Stabilized)

FILL AND ROCK

FILL | POSSIBLE FILL | PROBABLE FILL | ROCK

[1]Classifications and symbols per ASTM D 2488-17 (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). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

[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 2488-17 Note 14.

[8]Percentages are estimated to the nearest 5% per ASTM D 2488-17.

SUBSURFACE EXPLORATION PROCEDURE: STANDARD PENETRATION TESTING (SPT) ASTM D 1586 Split-Barrel Sampling

Standard Penetration Testing, or **SPT**, is the most frequently used subsurface exploration test performed worldwide. This test provides samples for identification purposes, as well as a measure of penetration resistance, or N-value. The N-Value, or blow counts, when corrected and correlated, can approximate engineering properties of soils used for geotechnical design and engineering purposes.

SPT Procedure:

- Involves driving a hollow tube (split-spoon) into the ground by dropping a 140-lb hammer a height of 30-inches at desired depth

- Recording the number of hammer blows required to drive split-spoon a distance of 24 inches (in 3 or 4 Increments of 6 inches each)

- Auger is advanced* and an additional SPT is performed

- One SPT test is typically performed for every two to five feet

- Obtain two-inch diameter soil sample

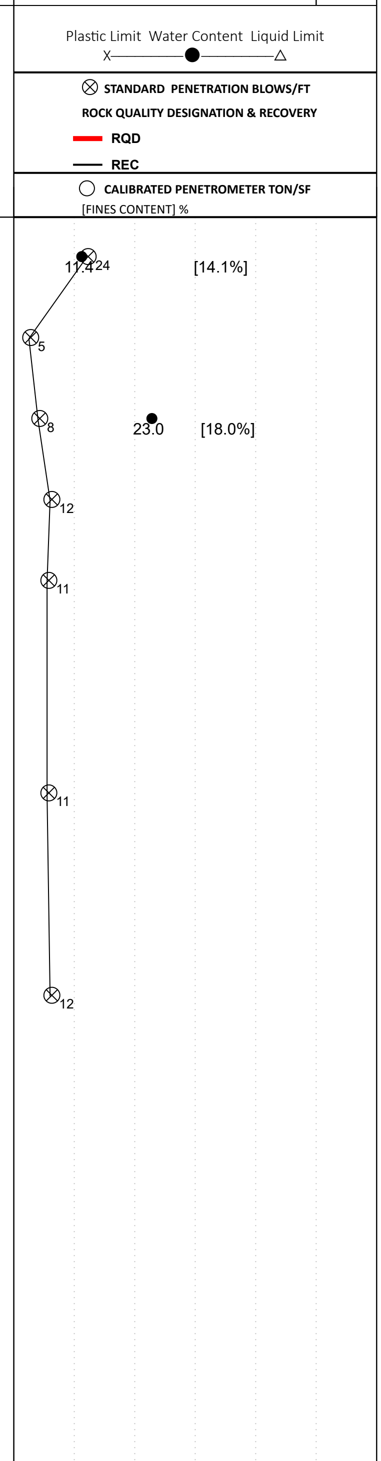
**Drilling Methods May Vary—* The predominant drilling methods used for SPT are open hole fluid rotary drilling and hollow-stem auger drilling.

CLIENT: The Ferber Company, Inc	PROJECT NO.: 25:3770	BORING NO.: B-1	SHEET: 1 of 1
PROJECT NAME: Chipotle Restaurant - Margate	DRILLER/CONTRACTOR: Serco Drilling,Inc		
SITE LOCATION: 5555 West Atlantic Avenue, Margate, Florida 33063			
NORTHING:	EASTING:	STATION:	SURFACE ELEVATION: 9.0

LOSS OF CIRCULATION 100%

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-1	SS	24	24	Asphalt Thickness[3.00"] (SM) SILTY FINE SAND, contains rock fragments, brown to gray, moist, medium dense			26-17-7-5 (24)
	S-2	SS	24	24	(SM) SILTY FINE SAND, tan, wet, loose to medium dense, some limestone fragments			3-2-3-5 (5)
5	S-3	SS	24	24		Seasonal High Water (5.50)	4	3-4-4-4 (8)
	S-4	SS	24	24		First Encountered (6.50)		3-7-5-3 (12)
	S-5	SS	24	24				5-6-5-4 (11)
10							-1	
	S-6	SS	18	18				8-6-5 (11)
15							-6	
	S-7	SS	18	18	(HWR) HIGHLY WEATHERED LIMESTONE, sampled as SILTY SAND (SM), medium dense, wet, tan,			6-6-6 (12)
20					**END OF DRILLING AT 20.0 FT**		-11	
25							-16	
30							-21	



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

WL (First Encountered)	6.50	BORING STARTED:	Jul 03 2021	CAVE IN DEPTH:	
WL (Completion)		BORING COMPLETED:	Jul 03 2021	HAMMER TYPE:	Auto
WL (Seasonal High Water)	5.50	EQUIPMENT: Track	LOGGED BY:	DRILLING METHOD:	
WL (Stabilized)					

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
The Ferber Company, Inc	**25:3770**	**BE-1**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Chipotle Restaurant - Margate	**Serco Drilling,Inc**

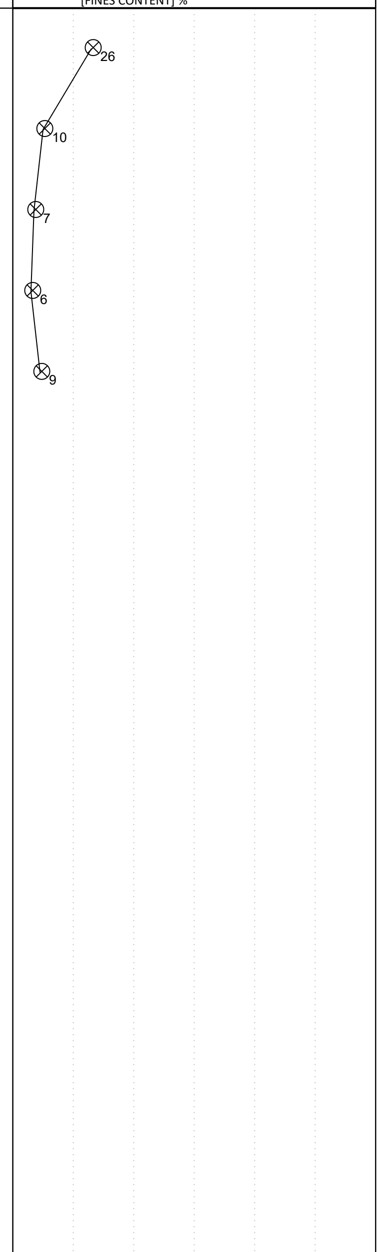
SITE LOCATION:
5555 West Atlantic Avenue, Margate, Florida 33063

NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
			9.0

LOSS OF CIRCULATION 100%
BOTTOM OF CASING

Plastic Limit X — Water Content ● — Liquid Limit △
⊗ STANDARD PENETRATION BLOWS/FT
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC
○ CALIBRATED PENETROMETER TON/SF
[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-1	SS	24	24	Asphalt Thickness[3.00"] (SM) SILTY FINE SAND, contains rock fragments, brown to gray, moist, medium dense			27-14-12-23 (26)
	S-2	SS	24	24	(SP) FINE SAND, tan, moist to wet, loose, some limestone fragments	▼ ▽		16-5-5-5 (10)
5	S-3	SS	24	24			4	5-4-3-4 (7)
	S-4	SS	24	24				4-4-2-2 (6)
	S-5	SS	24	24				2-7-2-4 (9)
10					**END OF DRILLING AT 10.0 FT**		-1	
15							-6	
20							-11	
25							-16	
30							-21	



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

▽ WL (First Encountered) **4.00**	BORING STARTED: **Jul 03 2021**		CAVE IN DEPTH:
▼ WL (Completion)	BORING COMPLETED: **Jul 03 2021**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water) **3.00**	EQUIPMENT: **Track**	LOGGED BY:	DRILLING METHOD:
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
The Ferber Company, Inc	**25:3770**	**BE-2**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Chipotle Restaurant - Margate	**Serco Drilling,Inc**

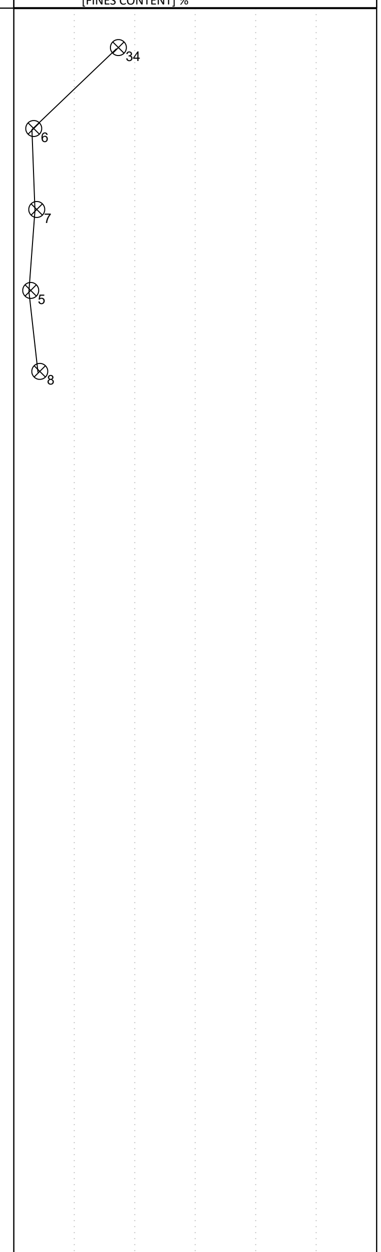
SITE LOCATION:
5555 West Atlantic Avenue, Margate, Florida 33063

LOSS OF CIRCULATION
BOTTOM OF CASING

NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:
			10.0

Plastic Limit Water Content Liquid Limit
STANDARD PENETRATION BLOWS/FT
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC
CALIBRATED PENETROMETER TON/SF
[FINES CONTENT] %

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
	S-1	SS	24	24	Asphalt Thickness[3.00"] (SP) FINE SAND, trace silt, tan, dry, dense, trace limestone fragments			38-20-14-9 (34)
	S-2	SS	24	24	(SP) FINE SAND, tan, moist to wet, loose, some limestone fragments	Seasonal High Water		5-2-4-3 (6)
5	S-3	SS	24	24		First Encountered	5	3-3-4-3 (7)
	S-4	SS	24	24				2-2-3-3 (5)
	S-5	SS	24	24				3-5-3-4 (8)
10					**END OF DRILLING AT 10.0 FT**		0	
15							-5	
20							-10	
25							-15	
30							-20	

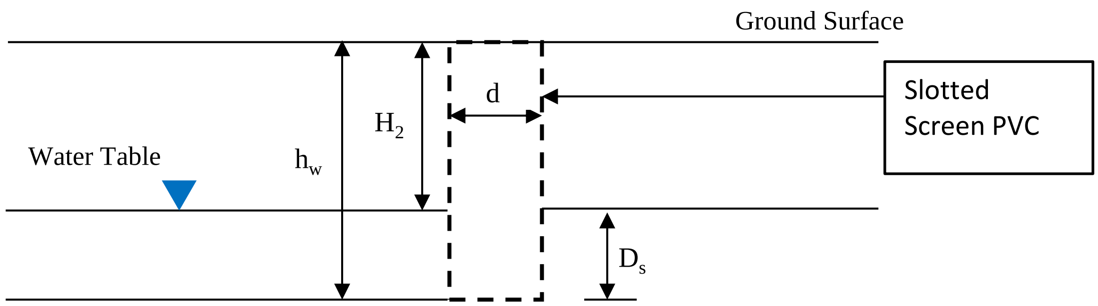


THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) 4.50	BORING STARTED: Jul 03 2021		CAVE IN DEPTH:
WL (Completion)	BORING COMPLETED: Jul 03 2021		HAMMER TYPE: Auto
WL (Seasonal High Water) 3.50	EQUIPMENT: Track	LOGGED BY:	DRILLING METHOD:
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
" USUAL OPEN - HOLE TEST "



$$K_{IV} = 4Q/[\pi d(2H_2^2 + 4H_2Ds + H_2d)]$$

6.65E-06 CFS/FT^2-FT HEAD

Q =	Average Flow Rate =	0.000223 CFS
d =	Diameter of Test Hole =	0.33 feet
H_2 =	Head on Water Table =	4.0 feet
h_w =	Total Hole Depth =	10.0 feet
D_s =	Saturated Hole Depth =	6.0 feet

TEST LOCATION :		BE-1	
DEPTH TO WATER TABLE :	4	ft	Below Existing Grade
DEPTH OF TEST HOLE :	10	ft	Below Existing Grade
AVERAGE FLOW RATE:	0.1	GPM	

SOIL PROFILE :

0.0' - 0.75'	ASPHALT/Base
0.75' - 2.0'	SAND, Brown with Silt/Limestone
2.0' - 10.0'	SAND, Gray with Limestone

NOTES: The soil profile is determined by drilled cuttings & should not be relied upon as an accurate record of soil type or for transition zones.

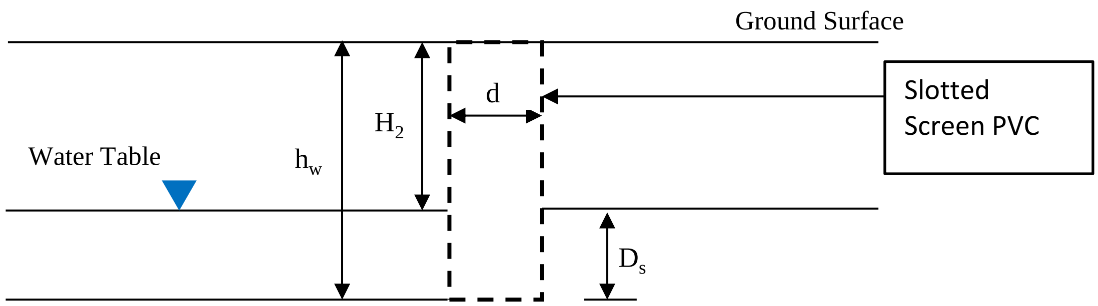
USUAL OPEN HOLE TEST SUMMARY	Test Date	Project No.	Test No.	Tested By	Checked by:
	07/07/21	3770	BE-1	KDM	JM

ECS

Job No.: 25:3770

Chipotle Margate
5555 West Atlantic Blvd
Margate, Broward County, Florida

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
" USUAL OPEN - HOLE TEST "



$$K_{IV} = 4Q/[\pi d(2H_2^2 + 4H_2Ds + H_2d)]$$

9.97E-06 CFS/FT^2-FT HEAD

Q =	Average Flow Rate =	0.000334 CFS
d =	Diameter of Test Hole =	0.33 feet
H_2 =	Head on Water Table =	4.0 feet
h_w =	Total Hole Depth =	10.0 feet
D_s =	Saturated Hole Depth =	6.0 feet

TEST LOCATION :		BE-2	
DEPTH TO WATER TABLE :	4	ft	Below Existing Grade
DEPTH OF TEST HOLE :	10	ft	Below Existing Grade
AVERAGE FLOW RATE:	0.2	GPM	

SOIL PROFILE :

0.0' -0.75'	Asphalt/Base
0.75- 10.0'	SAND, Brown with Silt/Limestone

NOTES: The soil profile is determined by drilled cuttings & should not be relied upon as an accurate record of soil type or for transition zones.

USUAL OPEN HOLE TEST SUMMARY	Test Date	Project No.	Test No.	Tested By	Checked by:
	07/07/21	3770	BE-2	KDM	JM

Job No.: 25:3770

Chipotle Margate
5555 West Atlantic Blvd
Margate, Broward County, Florida

APPENDIX C – Laboratory Testing

Laboratory Test Results Summary

Laboratory Testing Summary

Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		@ LBR (%)	#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)		
B-1	S-1	0-2	11.4	SM				14.1				
B-1	S-3	4-6	23	SM				18				

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, @FM 5-515, #ASTM D2974-20e1 < See test report for D4718 corrected values

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

Project: Chipotle Restaurant - Margate
Client: The Ferber Company, Inc
Project No.: 25:3770
Date Reported: 7/21/2021

Office / Lab	Address	Office Number / Fax
ECS Florida LLC - West Palm Beach	2000 Avenue "P" Suite 3 West Palm Beach, FL 33404	(561)840-3667 (561)840-3668

Tested by	Checked by	Approved by	Date Received
kleimer	kleimer	kleimer	7/15/2021