ECS Florida, LLC

Subsurface Exploration and Geotechnical Engineering Report

Emerson Drive NE Commercial Development Palm Bay

1491 Emerson Drive NE
Palm Bay, Brevard County, Florida 32907

ECS Project Number 24:7573

February 1, 2024

February 1, 2024

Mr. Michael Fraley
The Ferber Company, Inc.
151 Sawgrass Corners Drive, Suite 202
Ponte Vedra Beach, Florida 32082

ECS Project No. 24:7573

Reference: Subsurface Exploration and Geotechnical Engineering Report
Emerson Drive NE Commercial Development Palm Bay
1491 Emerson Drive NE,
Palm Bay, Brevard County, Florida 32907

Dear Mr. Fraley,

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 agreed to scope of work. This report presents our understanding of the geotechnical aspects of the project, the results of the field exploration conducted, and our geotechnical design and construction recommendations for the project. Note that laboratory permeability testing is currently being performed on a sample obtained from within the proposed stormwater management vault area. The results of the permeability testing will be submitted under a separate cover.

It has been our pleasure to be of service to you 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 subsurface conditions estimated 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

Rubben Frenel, P.E.
Senior Project Engineer
Florida Registration No. 86835
RFrenel@ecslimited.com

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.

2024.02.01 17:19:45 -05'00'

David W. Spangler, P.E.
Chief Engineer
Florida Registration No. 58770
Dspangler@ecslimited.com

TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

This executive summary is intended as a very brief overview of the primary geotechnical conditions that are expected to affect foundation design and earthwork construction. Information gleaned from the executive summary should not be utilized in lieu of reading the entire geotechnical report.

- The purpose of this geotechnical exploration was to provide subsurface information for the foundation design and earthwork construction of the proposed Emerson Drive NE commercial development. ECS understands that the proposed development will involve the construction of a single-story building with an approximate footprint of 2,448 SF with associated roadway areas including a trash enclosure area, and a stormwater management vault located in the southern portion of the site.

- Loading information was not provided at the time of this report. Based on similar projects and our experience, ECS estimates the proposed single-story structure will likely consist of maximum column loads of 50 kips and wall loads of 5 kips/ft, respectively. The proposed building may be supported on conventional shallow foundations with an allowable maximum net bearing capacity of 2,500 psf. To densify the existing near surface very loose sands, the exposed surface should be compacted with a heavy vibratory roller having a minimum static, at-drum weight, on the order of 10 tons to 12 tons.Dynamic cone penetrometer (DCP) soundings, performed by hand, should also be performed subsequent to the surface soil heavy compaction operations in the area of the building footprint to confirm densification of the very loose soils within the upper 4 feet of the proposed finish floor elevation.

- For flexible pavement design, we recommend using a three-layer pavement section consisting of stabilized subgrade, base course, and surface course. For rigid pavement, we recommend using a two-layer pavement section of stabilized subgrade and surface course. The pavement layers may be placed on existing, prepared subgrade or compacted fill.

- ECS should be retained to review the design documents for conformance with our recommendations and be retained for construction materials testing and special inspections to facilitate proper implementation of our recommendations.

1.0 INTRODUCTION

The purpose of this geotechnical exploration was to provide subsurface information for the design and construction of the proposed Emerson Drive NE commercial development. ECS understands that the proposed development will involve the construction of a single-story building with associated roadway areas including a trash enclosure area, and a stormwater management vault area located within the southern portion of the site. The recommendations developed for this report are based on project information provided by you, which included a conceptual site plan prepared by Bowman Consulting.

Our services were provided in accordance with our subsurface exploration and geotechnical engineering services proposal submitted on December 22, 2023, which included our Terms and Conditions of Service, and your subsequent acceptance on January 3, 2024.

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 area and site geologic conditions,
- A review of subsurface soil stratigraphy with pertinent available physical properties,
- Final copies of our soil exploration/test boring logs,
- Recommendations for site preparation,
- Recommendations for Engineered Fill placement,
- Recommended soil bearing pressures and foundation type,
- Recommendation for standard and heavy-duty pavement, and
- Evaluation and recommendations relative to groundwater control.
- Earthwork construction recommendations.

Our assessment was confined to the zone of soil likely to be stressed by the proposed construction. Our work did not address the potential for subsurface expression of deep geological conditions, such as sinkhole development related to karst activity. This evaluation requires a more extensive range of field services than performed in this study. We will be pleased to conduct an exploration to evaluate the probable effect of the regional geology upon the proposed construction if you desire.

2.0 PROJECT INFORMATION

2.1 SITE INFORMATION

The site is located at 1491 Emerson Drive NE, in Palm Bay, Brevard County, Florida, at the approximate location shown in the following figure below.

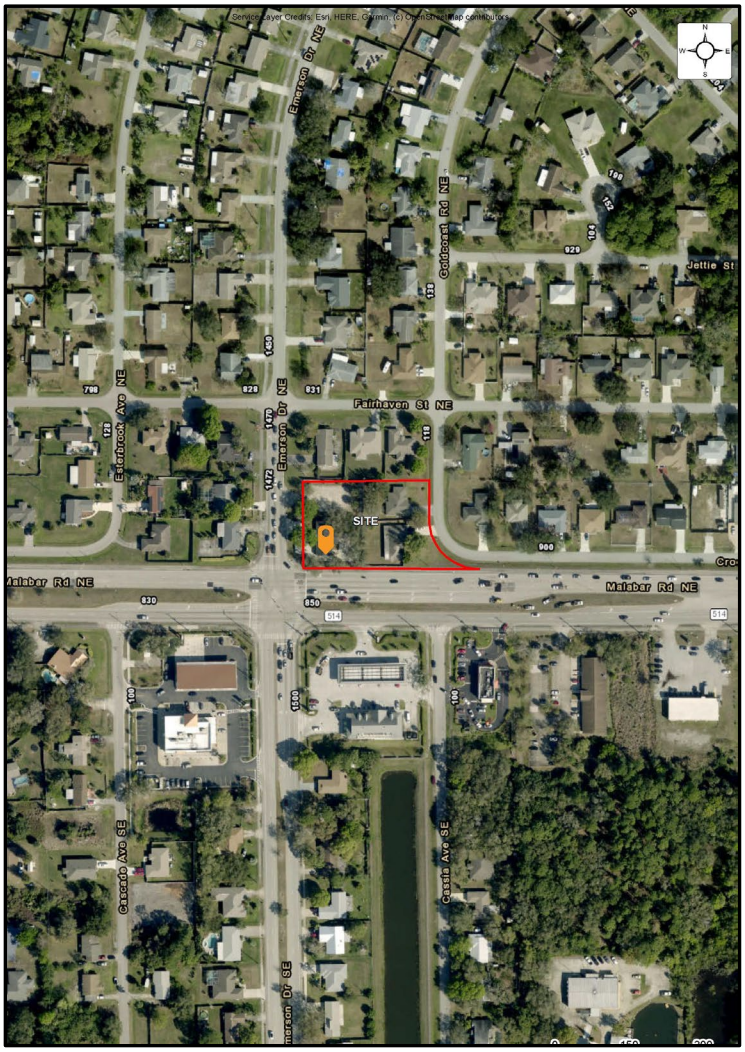


Figure 2.1.1. Site Location

ECS reviewed aerial photographs of the subject property and immediate surrounding properties on History Aerials and Google Earth© Historical Imagery databases dating back to 1958. Based on review of an aerial photographs dating back to 1958, the site appears to have been a vacant/wooded land. By 1984 two (2) buildings appear to have been constructed within the southern half of the site. By 1999 two (2) additional buildings were developed within the northern half of the site. By 2007 the building located in the northwest corner of the site appears to have been removed and replaced with a parking lot. The site has remained unchanged throughout the present day. The ground surface elevations used in this report were inferred from google earth©

and are approximate. Accurate surveyed ground surface elevations should be used for design purposes.

2.2 PROPOSED CONSTRUCTION

Based on the information provided to us, we understand that the project is likely to consist of the construction of a one single-story building with associated roadway and trash enclosure area, and a stormwater management vault area. Structural loading information was not available at the time this report was prepared; however, we have made estimates based on similar projects and past experience.

The following information included in Table 2.2.1 explains our understanding of the structure and its corresponding loads; please note that details of the construction of the proposed building and loads were not available at the time this report was prepared and we have made some estimates based on similar projects and experience.

Table 2.2.1 Design Values

SUBJECT	DESIGN INFORMATION / EXPECTATIONS
# of Stories	One-story above grade
Usage	Commercial
Framing	We anticipate that the building will be principally cast-in-place concrete with minor reinforced masonry or steel frame.
Column Loads	50 kips (Estimated Full Dead and Factored Live)
Wall Loads	5 kips per linear foot (klf) maximum - Estimated
Lowest Finish Floor Elevation	Estimated at 1 foot above existing grades

(1) If actual structural loads differ from these loads ECS must be contacted immediately to revise building foundation recommendations and settlement calculations as needed.
(2) The ground surface elevations were not surveyed by a licensed surveyor; therefore, the elevations shown are approximate and were inferred from Google-Earth© maps. The elevations described in this report should not be relied upon for site design.

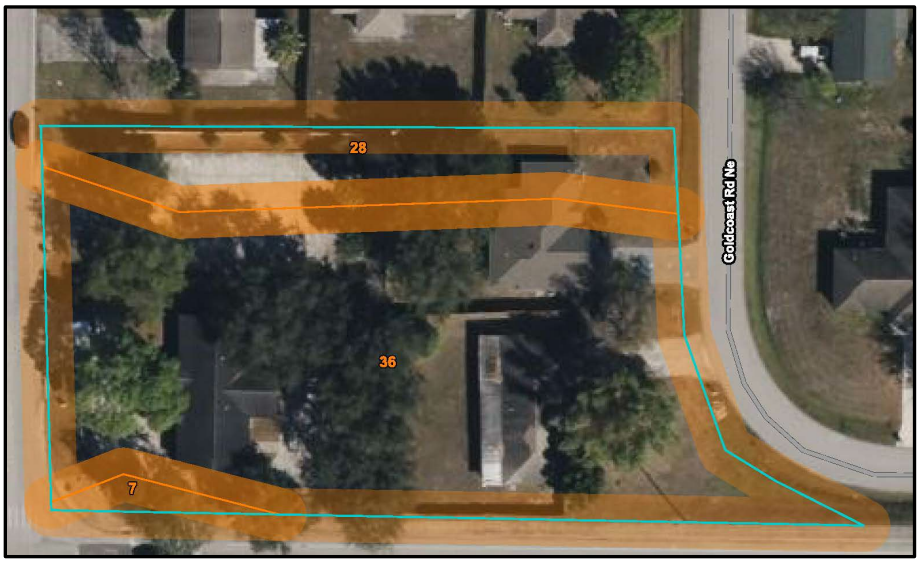
2.3 SOIL SURVEY MAPPING

Based on the Web Soil Survey for Brevard County, Florida, as prepared by the U.S. Department of Agriculture Natural Resource Conservation Service (USDA-NRCS), the predominant soil type existing within the site area boundaries are described in the following table. The site area is illustrated superimposed on the USDA-NRCS Soil Survey Map in the following figure.

Web Soil Survey Data

Soil Type	Constituents	Drainage Class	Water Table
7– Basinger sand, 0 to 2 percent slopes	Sand	Poorly drained	About 3 to 18 inches
28– Immokalee sand, 0 to 2 percent slopes	Sand	Poorly drained	About 6 to 18 inches
36– Myakka sand, 0 to 2 percent slopes	Sand	Poorly drained	About 6 to 18 inches

Soil mapping of the site vicinity included soil types and numbers are presented in figure below, obtained from the USDA Web Soil site.



Site Soil Survey, Brevard County, Florida

3.0 FIELD EXPLORATION AND LABORATORY TESTING

Our exploration procedures are explained in greater detail in Appendix B including the insert titled Subsurface Exploration Procedures. Our scope of work included drilling 8 Standard Penetration Test (SPT) borings. Borings were performed for the proposed building (B-01 and B-02), Roadway areas (R-01 through R-04), Trash Enclosure area (T-01), and Stormwater Management Vault area (SWM-01 and SWM-02).

Boring locations were identified in the field by ECS personnel using GPS techniques prior to mobilization of our drilling equipment and their approximate locations are shown on the Boring Location Diagram in Appendix A. The approximate as-drilled boring locations are shown on the Boring Location Diagram in Appendix A. Ground surface elevations noted on our boring logs were inferred from Google-Earth© and should be considered approximate. We recommend that boring location survey be performed by a professional surveyor to extend the usefulness of the subsurface information gathered. SPT blow counts 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 to provide a general indication of soil density and correlate to shear strength parameters.

3.1 SUBSURFACE CHARACTERIZATION

The following sections provide generalized characterizations of the soil strata. Please refer to the boring logs in Appendix B.

Proposed Generalized Stratigraphy

Approximate Depth (ft)	Elevation [1] (ft)	Stratum	Description	Ranges of SPT[2] N-values (bpf)
0 –10[3] to 20[3]	EL.+28 – EL.+18 to EL. +8	I	Fine to medium SAND (SP), and fine to medium SAND (SP-SM) with SILT, very loose to dense, light gray to dark brown	2 – 30

Notes:
(1) Please note that the ground surface elevations were inferred from Google-Earth© maps; therefore, elevation ranges are approximate.
(2) SPT refers to Standard Penetration Test.
(3) Termination depths of borings.

A graphical presentation of the subsurface conditions is shown on the Generalized Subsurface Profile Diagrams included in Appendix A.

3.2 GROUNDWATER OBSERVATIONS

Water levels were measured in our boring logs in Appendix B. Groundwater depths measured at the time of drilling at 3 feet below the ground surface. Variations in the long-term water table may occur because of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors. Based upon our interpretation of the subsurface data, site condition, and Soil Survey. We estimate the normal seasonal high groundwater level is at approximately 1 foot above the measured levels as indicated on the boring logs.

Based on the Flood Insurance Rate Map (FIRM) Map Number 12009C0660G of Brevard County, effective date March 17, 2014, indicates that the entirety of the site is located within Flood Zone X which has a minimal annual flood hazard chance of 1% and 0.2%.

3.3 LABORATORY TESTING

Each sample was visually classified on the basis of texture and plasticity in accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) including USCS classification symbols, and ASTM D2487 Standard Practice for Classification for Engineering Purposes (Unified Soil Classification System (USCS)). After classification, the samples were grouped in the major zones noted on the boring logs in Appendix B. The group symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

The laboratory testing consisted of classification and index property tests performed on samples obtained during our field exploration operations. Laboratory tests performed included percent fines (ASTM D1140) and moisture content (ASTM D2216. The test results are shown on the boring logs in Appendix B and are tabulated in Appendix C.

Falling head permeability testing was also performed on samples recovered in one of the machine auger borings located within the proposed stormwater management vault area denoted as SWM-01. The falling head permeability test was performed in accordance with ASTM D2434 Standard Test Methods for Measurement of Hydraulic Conductivity of Coarse-Grained Soils. The permeability test results will be submitted under a separate cover.

4.0 DESIGN RECOMMENDATIONS

4.1 BUILDING/STRUCTURE DESIGN

4.1.1 Foundations

Provided subgrades and Engineered 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:

Summary of Shallow Foundation Design Parameters

Design Parameter	Column Footing	Wall Footing
Net Allowable Bearing Pressure (1)	2,500 psf	
Acceptable Bearing Soil Material	Compacted fine to medium SAND (SP) and fine to medium SAND with SILT (SP-SM), Stratum 1 – and/or Engineered Fill	Compacted fine to medium SAND (SP) and fine to medium SAND with SILT (SP-SM), Stratum 1 – and/or Engineered Fill
Minimum Width	24 inches	18 inches
Minimum 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 1/2 inch between columns	Less than 1/2 inch

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 estimated 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 actual loads and foundation plans are more complete.

Potential Undercuts: If soft or unsuitable soils are observed at the footing bearing elevations, the unsuitable soils should be undercut and replaced with approved engineered fill or with lean concrete (f'c ≥ 1,000 psi at 28 days) or No. 57 stone, as applicable, up to the original design bottom of footing elevation.

4.1.2 Floor Slabs

Provided subgrades and Engineered Fills are prepared as discussed herein, the proposed floor slabs can be constructed as Ground Supported Slabs (or Slab-On-Grade). Based on a lowest finished floor

elevation, it appears that the slabs will bear on compacted fill and/or Stratum I –fine to medium SAND (SP) with some silt.

The following graphic depicts our soil-supported slab recommendations:

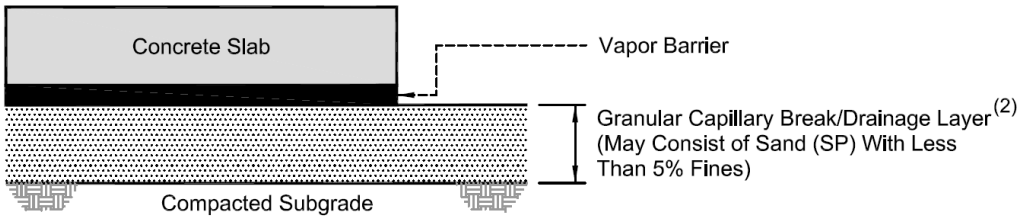


Figure 4.1.2.1

1. Drainage Layer Thickness: 4 inches
2. Drainage Layer Material: GRAVEL (GP, GW), SAND (SP, SW)

If soft or yielding soils is encountered in some areas, those soils should be removed and replaced with compacted Engineered Fill in accordance with the recommendations included in this report.

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.

4.2 SITE DESIGN CONSIDERATIONS

4.2.1 Pavements

The subsurface conditions are adaptable for support of the proposed roadway and trash enclosure areas. It is our professional opinion that groundwater conditions are not likely to impact the construction of the proposed development; however, roadway grades need to be reviewed relative to the seasonal high groundwater table elevation to evaluate the necessity for groundwater control using underdrains based on final grading.

General Recommendations: Our scope of services did not include extensive sampling and Limerock Bearing Ratio (LBR) testing of existing subgrade or potential sources of imported fill for the specific purpose of a detailed pavement analysis. The recommended pavement thicknesses presented in this report section are considered typical and minimum for the provided parameters in the general site area. We understand that budgetary considerations sometimes warrant thinner pavement sections than those presented. However, the client and the project designers should be aware that

thinner pavement sections may result in increased maintenance costs and lower than anticipated pavement life. We recommend the following pavement section designs included in the table below:

Table 4.2.1: Pavement Structures Sections

	Flexible (Hot Mix Asphalt)		Rigid (Concrete)	
Component	**Standard**	**Heavy**	**Standard**	**Heavy**
Surface Course	2 inches	2.5 inches	5 inches	6 inches
Base Course (Limerock)	6 inches	8 inches	-	-
Stabilized Subgrade	12 inches	12 inches	12 inches	12 inches

Hot Mix Asphalt Surface Course (flexible): Prime and tack coats should be applied during the construction of the pavement sections in accordance with per Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction (current edition). Before applying any bituminous material, all loose dust, dirt, and other foreign material which might prevent proper bond with the existing surface should be removed. Care should be taken in cleaning the outer edges, to ensure that the prime or tack coat will adhere. Prior to applying prime coat, the moisture content of the base should be checked to make sure that it does not exceed the optimum moisture.

The hot mix asphalt concrete pavement should consist of a Superpave mix Type SP as per FDOT Standard Specifications for Road and Bridge Construction (current edition), Section 334 Superpave Asphalt Concrete. Recycled Asphalt Pavement (RAP) and other recycled materials may be used as indicated in Section 334, previously mentioned. If this is to be a LEED certified project, credits may be awarded for using such materials.

Base Course: Typically, the most prevalent flexible or rigid pavement base material in South Florida is limerock. Limerock is readily available from FDOT approved mines in South Florida. As an alternative base course, crushed concrete could be used. Limerock should have a minimum LBR value of 100 and should be mined from an FDOT approved source. Limerock should be placed in maximum six-inch lifts and compacted to 98 percent of the Modified Proctor (ASTM D1557) maximum dry density. Limerock pavement base shall be in accordance with Section 911 and 200 of the FDOT Specifications for Road and Bridge Construction (Current Edition).

Stabilized Subgrade: Stabilized subgrade soil material should be stabilized with rock or other materials to a minimum Limerock Bearing Ratio (LBR) value of 40, as specified by FDOT requirements for Type B or Type C Stabilized Subgrade. All stabilized subgrade materials should be compacted to 98 percent of the Modified Proctor (ASTM D1557) maximum dry density. Furthermore, the stabilized subgrade may be imported material or a blend of on-site soils and imported materials. If a blend is proposed, we recommend that the contractor perform a mix design to find the optimum mix proportions. It should be noted that a minimum of 97 percent of the stabilized material should pass a 3½ inch sieve.

Perform compliance testing for 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.

Concrete surface course (rigid): Our recommendations for heavy-duty portland cement concrete (pcc) pavement section is using unreinforced portland cement concrete surface course (Type 1) providing a minimum 28-day compressive strength of 4,000 pounds per square inch (psi). This

section would be placed atop the stabilized subgrade. Appropriate steel reinforcing and jointing should also be incorporated into the design of all pcc. In addition, the concrete should provide a minimum 28-day flexural strength (modulus of rupture) of 600 psi, based on the third point loading of concrete beam samples.

Rigid pavement notes recommendations:

- The surface of the subgrade soils should be free of all soft, unstable, or unsatisfactory soil and smooth and uniform. Any disturbances or wheel rutting corrected prior to placement of concrete.
- The subgrade soils should be moistened not more than 24 hours prior to placement of concrete but there should be no standing water present during concrete placement.
- Concrete pavement thickness should be uniform throughout, with the exception to thickened edges (curbs or footings).
- Maximum Control Joint Spacing should be 12 feet by 12 feet
- Minimum Sawcut depth should be at least 1/4 of concrete thickness
- Isolation joints are recommended at the interface between concrete pavement and fixed objects such as drainage inlets, light poles, etc.
- Control joints should be sawed as soon as the concrete can withstand traffic and concrete surface and aggregate raveling can be prevented.

It is recommended that dowels be used for all construction joints for new pavements, the interface between new pavement and existing pavements, and interface at existing curb and gutter. It is recommended that 3/4-inch diameter smooth dowels 18 inches long spaced 12 inches on center be used. The full length of the dowels should be lightly oiled.

Perform compliance testing for 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.

Underdrains: Satisfactory pavement life is dependent on dry/strong pavement support provided by the base and subgrade courses. Accordingly, a minimum clearance of 2 feet must be maintained between the normal seasonal high groundwater table and the bottom of the limerock base layer. Depending on final pavement grades, underdrains may be required to maintain dry base and subgrade materials.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 Subgrade Preparation

5.1.1 Previous Site Development

When reviewing our recommendations, please note the site is currently developed with three (3) single-story buildings, therefore previous grading activities have occurred in the past. Our

experience with previously graded sites indicates that unexpected conditions can exist that were not encountered by the soil test borings. Unexpected conditions could include areas of soft or loose fill, buried debris, other debris-laden fill, and other obstructions or conditions. There is a possibility that existing underground utilities may be present and should be removed or abandoned in place. It should be noted that if existing or former underground utilities and other underground structures are abandoned and not removed or grouted full, soil may migrate into open voids (e.g., open pipes from utilities), causing subsidence of the overlaying construction. These conditions should be addressed by performing test pits observed by ECS personnel before construction commences. In addition, existing utility lines, if located within proposed construction areas, may cause the new construction to behave unexpectedly due to the variable support conditions caused by old backfill. Furthermore, old backfill along utility lines also may provide inadequate support due to poor compaction. The poor support conditions may result in settlement or distress of the overlying new construction. Based on our experience, existing utility backfill rarely is suitable for support of new foundations. In slab areas, the load support characteristics of the backfill along utility lines typically can be assessed with careful proofrolling and subgrade evaluation during construction. Some undercutting and/or bridging of these backfill areas should be anticipated if utilities are present.

5.1.2 Stripping and Grubbing

The subgrade preparation should consist of stripping all vegetation, rootmat, topsoil, existing fill, existing pavements and aggregate base, and soft or unsuitable materials. ECS should be retained to verify that topsoil and unsuitable surficial materials have been removed prior to the placement of Engineered Fill or construction of structures.

5.1.3 Proofrolling

The exposed cleared 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 Engineered Fill or other construction materials. Methods of stabilization include undercutting or moisture conditioning. 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.

5.1.4 Site Temporary Dewatering

Based on the estimated finished floor and shallow foundation elevations temporary dewatering may not be needed. However, if dewatering is needed for excavations deeper than a depth of 1 foot below existing ground surface, the dewatering system should be determined by the contractor. Regardless of the dewatering method used, we recommend the groundwater control measures, where necessary, remain in place until compaction of the existing subgrade soils is completed, and 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.

Note that discharge of produced groundwater to surface waters of the state from dewatering operations or other site activities is regulated and would require temporary dewatering permits from Brevard county and the State of Florida Department of Environmental Protection (FDEP). This permit is termed a Generic Permit for the Discharge of Produced Groundwater from Any Non-Contaminated Site Activity. If discharge of produced groundwater is anticipated, we recommend sampling and testing of the groundwater early in the site design phase to prevent project delays during construction. ECS can provide the sampling, testing, and professional consulting required to evaluate compliance with the regulations.

5.1.5 Compaction

Subgrade Compaction: Upon completion of subgrade documentation, the exposed subgrade within the ten-foot expanded building limit should be moisture conditioned to within +/- two percent of the soil's optimum moisture content and be compacted with a heavy vibratory roller (minimum ten-ton roller). Subgrade compaction within the expanded building and pavement limits, trash enclosure, and stormwater management vault areas should be to a dry density of at least 98 percent of the Modified Proctor maximum dry density (ASTM D1557). The purpose of the heavy vibratory roller is to densify the near surface very loose sands. Dynamic cone penetrometer (DCP) soundings, performed by hand, should be performed subsequent to the surface soil heavy compaction operations in the area of the building footprint to confirm densification of the very loose soils within the upper 4 feet of the proposed finish floor elevation. Beyond these areas, compaction of at least 95 percent should be achieved. ECS should be called on to document that proper subgrade compaction has been achieved.

Subgrade Compaction Control: The expanded limits of the proposed construction areas should be well defined, including the limits for buildings, fills, and slopes, etc. Field density testing of subgrades will be performed at frequencies in Table 5.1.5.1

Table 5.1.5.1 Frequency of Subgrade Compaction Testing

Location	Frequency of Tests
Expanded Building Limits	One test per 2,000 sq. ft.
Pavement Areas Including Trash Enclosure	One test per 5,000 sq. ft.
Utility Trenches	One test per 200 linear ft.
All Other Non-Critical Areas	One test per 5,000 sq. ft.

Subgrade Stabilization: In some areas, particularly low-lying, wet areas of the site, undercutting of excessively soft materials may be considered inefficient. In such areas the use of a reinforcing geotextile or geogrid might be employed, under the advisement of ECS. Suitable stabilization materials may include medium duty woven geotextile fabrics or geogrids. The suitability and employment of reinforcing or stabilization products should be determined in the field by ECS personnel, in accordance with project specifications.

5.2 ENGINEERED FILL

Prior to placement of Engineered 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 Engineered Fill Materials: Materials satisfactory for use as Engineered Fill should consist of inorganic soils with the following engineering properties and compaction requirements.

ENGINEERED FILL INDEX PROPERTIES	
Subject	**Property**
Building and Pavement Areas	LL < 40, PI<6
Max. Particle Size	4 inches
Fines Content	Max. 25 % > #200 sieve
Max. organic content	5% by dry weight

ENGINEERED FILL COMPACTION REQUIREMENTS	
Subject	**Requirement**
Compaction Standard	Modified Proctor, ASTM D1557
Required Compaction	98% of Max. Dry Density
Moisture Content (Recommended)	-2 to +3 % points of the soil's optimum value
Loose Thickness	8 inches prior to compaction

Fill Placement: Fill materials should not be placed on excessively wet soils. Excessively wet soils or aggregates should be scarified, aerated, and moisture conditioned. **The Stratum I material is suitable to be reused as Engineered Fill material.**

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

Drying and compaction of wet soils is typically difficult during the rainy season. Accordingly, earthwork should be performed during the drier times of the year, if practical. Proper drainage should be maintained during the earthwork phases of construction to prevent ponding of water which tends to degrade subgrade soils.

Engineered Fill material should be placed in horizontal lifts in confined areas such as utility trenches, portable compaction equipment and thin lifts of three inches to four inches may be required to achieve specified degrees of compaction.

We recommend that the grading contractor have equipment on site during earthwork for both drying and wetting fill soils. We do not anticipate significant problems in controlling moisture within the fill during dry weather, but moisture control may be difficult during extended periods of rain.

5.3 FOUNDATIONS AND FLOOR SLABS

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 one to three-inch thick "mud mat" of "lean" concrete should be placed on the bearing soils before the placement of reinforcing steel.

Footing Subgrade Observations: 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 Section 5.1.3 Proofrolling.

5.4 UTILITY INSTALLATIONS

Utility Subgrades: The soils encountered in our exploration are expected to be suitable for support of utility pipes and the stormwater management vault. The pipe subgrades should be observed and probed for stability by ECS. If any loose or unsuitable materials are encountered during excavation, they should be removed and replaced with suitable compacted Engineered Fill, or pipe stone bedding material.

Utility Backfilling: The granular bedding material 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 Section 5.1 Subgrade Preparation and Section 5.2 Engineered Fill.

Temporary Dewatering: Based on the estimated design grades, we anticipate the need for dewatering for the construction of utilities. Minor localized dewatering for shallow utility structures can be achieved using sump pumps. However, if dewatering is needed for excavations deeper than a depth of 1.5 feet, the dewatering system should be determined by the contractor.

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 The Ferber Company, Inc. 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.

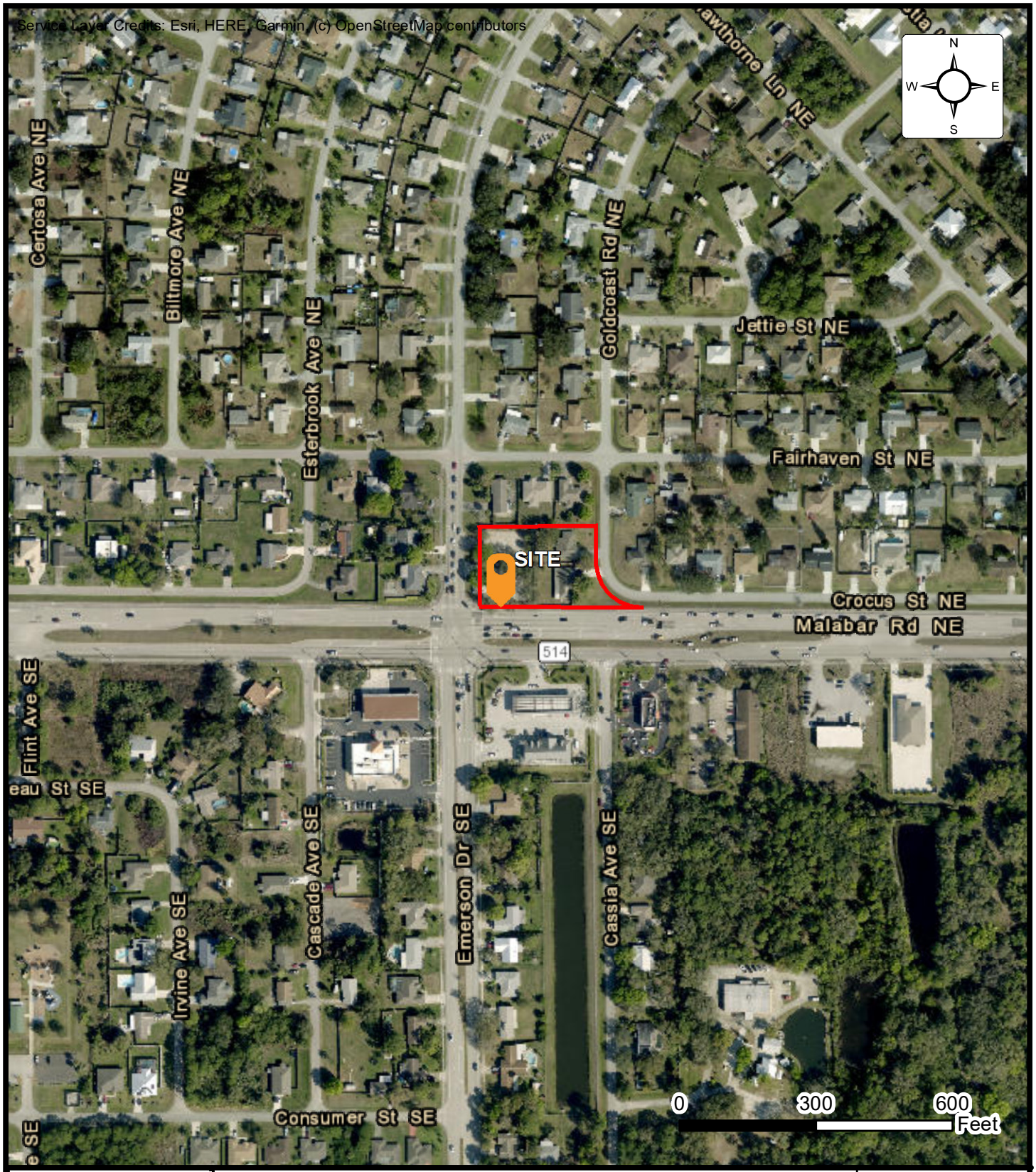
We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

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 – Diagrams

Site Location Diagram
Boring Location Diagram(s)
FEMA National Flood Hazard Map
Diagram(s) Geologic/Soil Survey Map(s)
Generalized Subsurface Profile A-A’ and B-B’

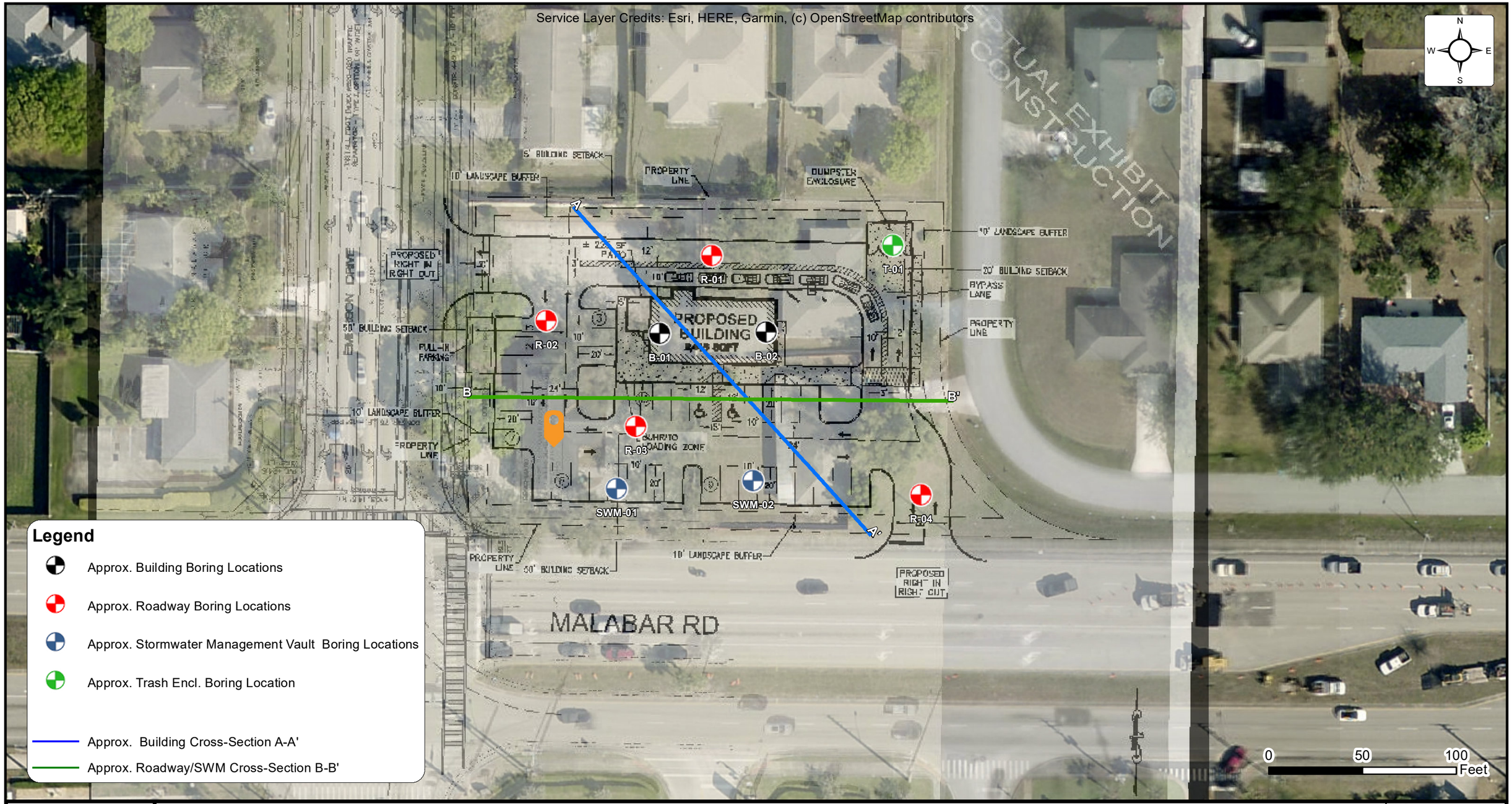


BORING LOCATION DIAGRAM
EMERSON DRIVE NE COMMERCIAL

1491 EMERSON DR NE, PALM BAY, FLORIDA

THE FERBER COMPANY, INC

ENGINEER	RF
SCALE	AS NOTED
PROJECT NO.	24:7573
FIGURE	1 OF 1
DATE	1/31/2024



BORING LOCATION DIAGRAM
EMERSON DRIVE NE COMMERCIAL DEVELOPMENT PALM BAY

1491 EMERSON DR NE, PALM BAY, FLORIDA

THE FERBER COMPANY, INC

ENGINEER	TM13
SCALE	AS NOTED
PROJECT NO.	24:7573
FIGURE	1 OF 1
DATE	1/31/2024

sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Transverse Mercator State Plane Florida East FIPS 0901. The **horizontal datum** was NAD83 HARN, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane Coordinate System used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1900. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by Brevard County and the Florida Division of Emergency Management. The ortho photography is dated 2009.

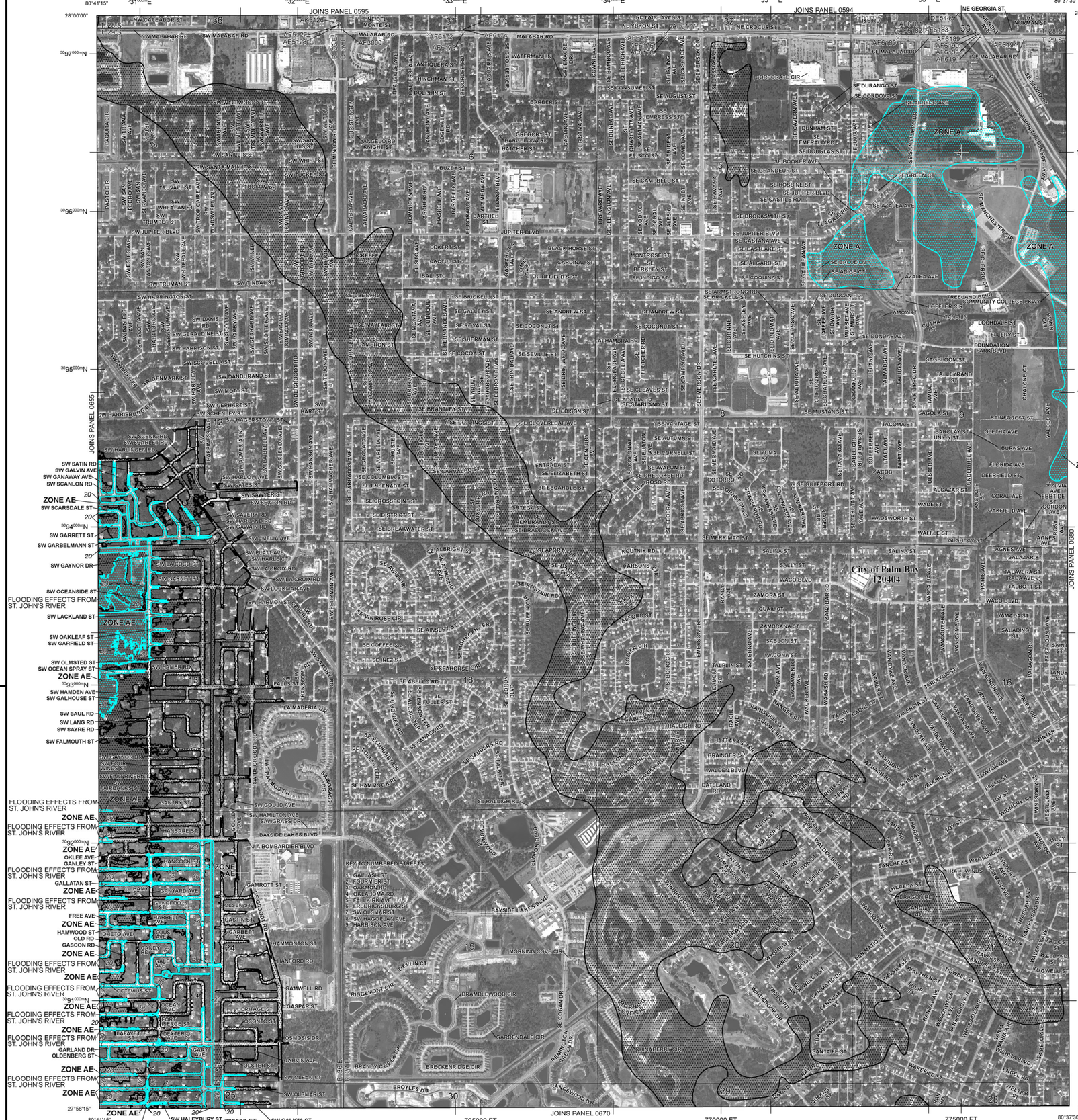
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the **FEMA Mapping Information eXchange** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://www.msc.fema.gov/. Available products may include previously issued Letters of Map Change, a Flood Insurance Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.



The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988
A — A — Cross section line
23 — 23 — Transect line
97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4275000mE — 1000-meter Universal Transverse Mercator grid ticks, zone 17
6000000 FT — 5000-foot grid values: Florida State Plane coordinate system, East Zone (FIPSZONE = 901), Transverse Mercator projection
DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
April 3, 1989

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
March 17, 2014 - to update corporate limits, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to update roads and road names, to reflect updated topographic information, to incorporate previously issued Letters of Map Revision, and to change zone designations.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0660G

FIRM

FLOOD INSURANCE RATE MAP

BREVARD COUNTY, FLORIDA AND INCORPORATED AREAS

PANEL 660 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
PALM BAY, CITY OF	120404	0660	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
12009C0660G

MAP REVISED
MARCH 17, 2014

Federal Emergency Management Agency

Map Scale: 1:629 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 30 60 120 180

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 1:24,000.

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: Brevard County, Florida
Survey Area Data: Version 23, Aug 28, 2023

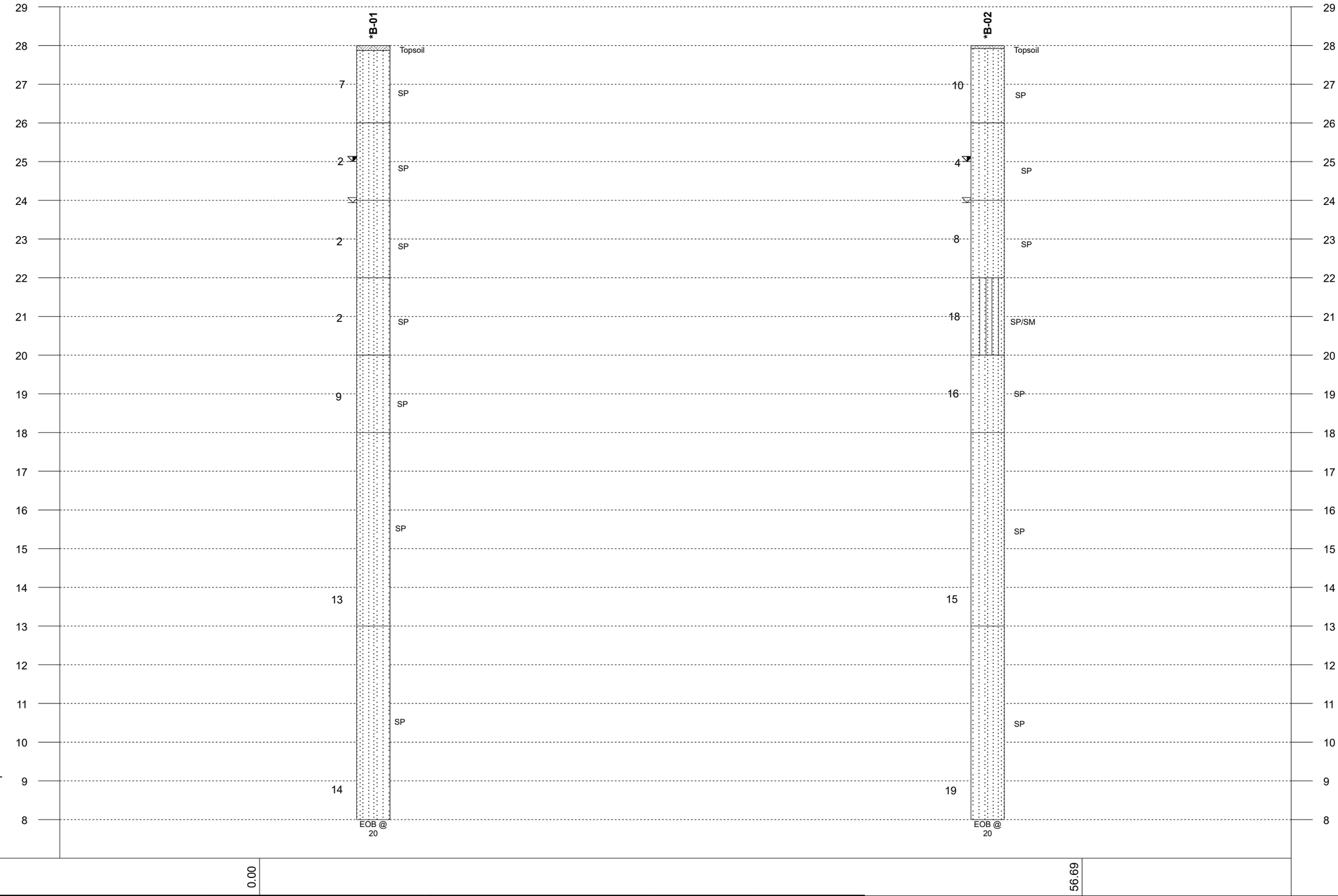
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 19, 2022—Mar 2, 2022

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
7	Basinger sand, 0 to 2 percent slopes	0.0	1.8%
28	Immokalee sand, 0 to 2 percent slopes	0.2	18.5%
36	Myakka sand, 0 to 2 percent slopes	1.0	79.8%
Totals for Area of Interest		**1.2**	**100.0%**



Legend Key

- Topsoil
- Poorly Graded SAND
- Poorly Graded SAND with SILT

7.00

Notes:

1- EOB: END OF BORING AR: AUGER REFUSAL SR: SAMPLER REFUSAL.
2- THE NUMBER BELOW THE STRIPS IS THE DISTANCE ALONG THE BASELINE.
3- SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
4- STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).

Plastic Limit Water Content Liquid Limit X—●—△	WL (First Encountered)	Fill	
[FINES CONTENT %]	WL (Completion)	Possible Fill	
BOTTOM OF CASING	WL (Estimated Seasonal High Water)	Probable Fill	
100 LOSS OF CIRCULATION	WL (Stabilized)	Rock	
CALIBRATED PENETROMETER			

GENERALIZED SUBSURFACE PROFILE A-A'

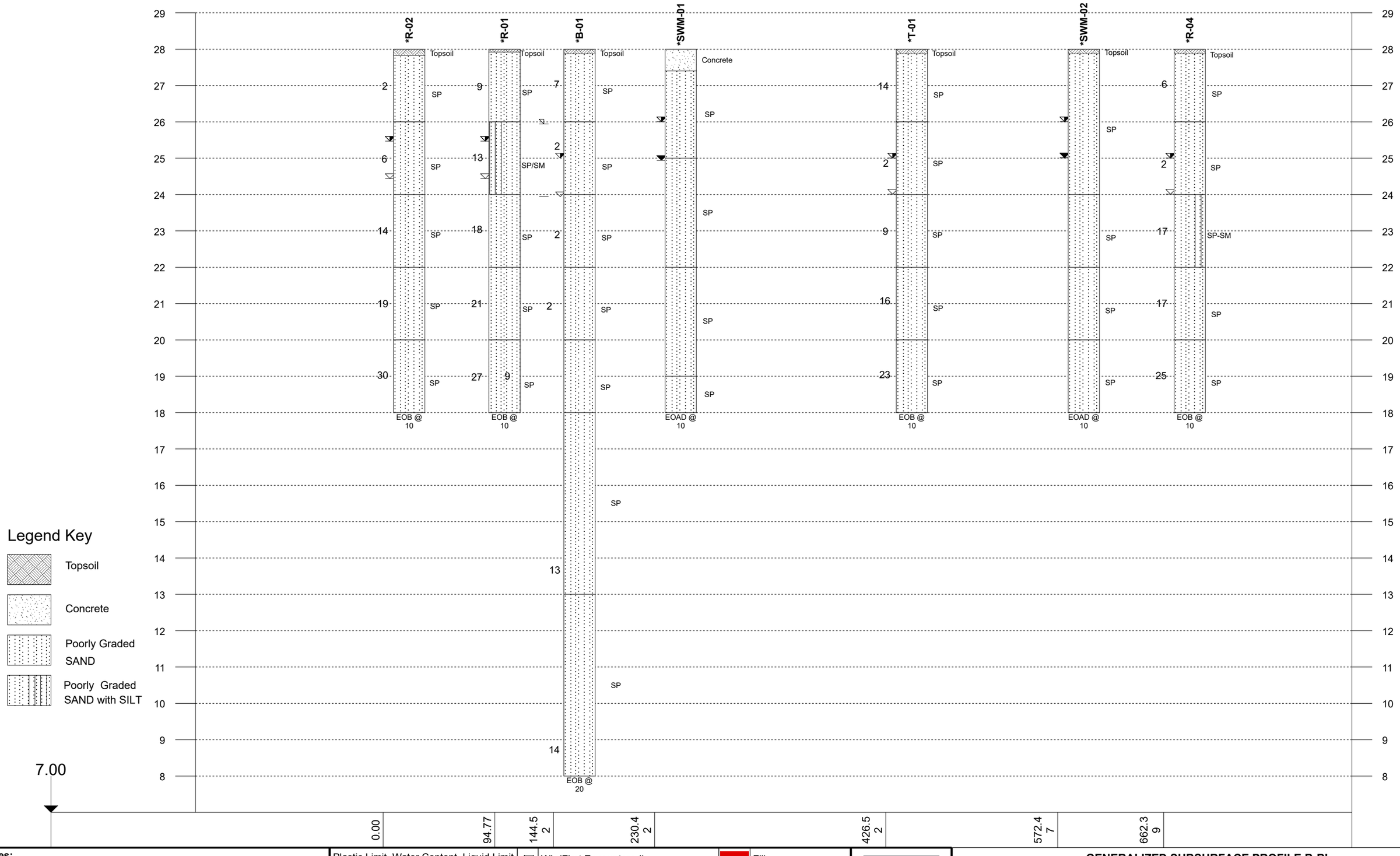
Section Line

Emerson Drive NE Commercial Development Palm Bay

The Ferber Company, Inc

1491 Emerson Dr NE, Palm Bay, Florida, 32907

Project No: 24:7573 Date: 01/31/2024



Notes:

1- EOB: END OF BORING AR: AUGER REFUSAL SR: SAMPLER REFUSAL.
2- THE NUMBER BELOW THE STRIPS IS THE DISTANCE ALONG THE BASELINE.
3- SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
4- STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).

Plastic Limit Water Content Liquid Limit X—●—△	WL (First Encountered)	Fill
[FINES CONTENT %]	WL (Completion)	Possible Fill
BOTTOM OF CASING	WL (Estimated Seasonal High Water)	Probable Fill
LOSS OF CIRCULATION	WL (Stabilized)	Rock
CALIBRATED PENETROMETER		

GENERALIZED SUBSURFACE PROFILE B-B'

Section Line

Emerson Drive NE Commercial Development Palm Bay

The Ferber Company, Inc

1491 Emerson Dr NE, Palm Bay, Florida, 32907

Project No: 24:7573 Date: 01/31/2024

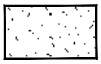
APPENDIX B – Field Operations

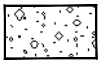
Reference Notes for Boring Logs
Subsurface Exploration Procedure: Standard Penetration Testing (SPT)
Boring Logs

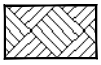
REFERENCE NOTES FOR BORING LOGS

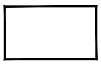
MATERIAL[1,2]

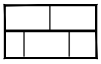

ASPHALT


CONCRETE


GRAVEL

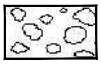

TOPSOIL

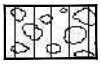

VOID


BRICK

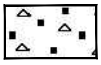

AGGREGATE BASE COURSE

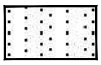

GW **WELL-GRADED GRAVEL**
gravel-sand mixtures, little or no fines

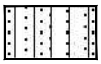

GP **POORLY-GRADED GRAVEL**
gravel-sand mixtures, little or no fines


GM **SILTY GRAVEL**
gravel-sand-silt mixtures

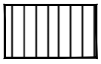

GC **CLAYEY GRAVEL**
gravel-sand-clay mixtures

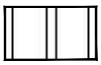

SW **WELL-GRADED SAND**
gravelly sand, little or no fines

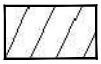

SP **POORLY-GRADED SAND**
gravelly sand, little or no fines


SM **SILTY SAND**
sand-silt mixtures

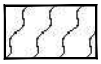

SC **CLAYEY SAND**
sand-clay mixtures

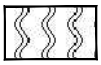

ML **SILT**
non-plastic to medium plasticity

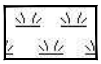

MH **ELASTIC SILT**
high plasticity


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, Q_P[4]	SPT[5] (BPF)	CONSISTENCY[7] (COHESIVE)
<0.25	<2	Very Soft
0.25 - <0.50	2 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

GRAVELS, SANDS & NON-COHESIVE SILTS

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

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

WATER LEVELS[6]

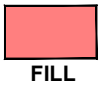

WL (First Encountered)


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 18-24 inches (in 3 or 4 Increments of 6 inches each)

- Auger is advanced* and an additional SPT is performed
- One SPT typically performed for every two to five feet. An approximate 1.5 inch diameter soil sample is recovered.

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

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
The Ferber Company, Inc	**24:7573**	**B-01**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Emerson Drive NE Commercial Development Palm Bay	**ECS**

SITE LOCATION: **1491 Emerson Dr NE, Palm Bay, Florida, 32907**

LOSS OF CIRCULATION

LATITUDE:	LONGITUDE:	STATION:	SURFACE ELEVATION:
27.999336	**-80.648093**		

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)
0	S-1	SS	24	24	Topsoil Thickness[1.50"] (SP) FINE TO MEDIUM SAND, gray to dark gray, moist, loose			2-4-3-1 (7)
	S-2	SS	24	24	(SP) FINE TO MEDIUM SAND, light brown, moist, very loose	▼		1-1-1-2 (2)
5	S-3	SS	24	24	(SP) FINE TO MEDIUM SAND, light brown, wet, very loose	▼	23	1-1-1-1 (2)
	S-4	SS	24	24	(SP) FINE TO MEDIUM SAND, light to dark brown, wet, very loose			0-1-1-3 (2)
	S-5	SS	24	24	(SP) FINE TO MEDIUM SAND, contains rock fragments, dark brown, wet, loose			2-4-5-9 (9)
10					(SP) FINE TO MEDIUM SAND, dark brown, wet, medium dense		18	
	S-6	SS	18	18				3-5-8 (13)
15					(SP) FINE TO MEDIUM SAND, dark brown, wet, medium dense		13	
	S-7	SS	18	18				5-6-8 (14)
20					**END OF BORING AT 20 FT**		8	
25							3	
30							-2	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100

ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC

LIQUID LIMIT

PLASTIC LIMIT

CALIBRATED PENETROMETER TSF: 1 2 3 4 5

WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50

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: **Jan 15 2024**	CAVE IN DEPTH:	
▼ WL (Completion)		BORING COMPLETED: **Jan 15 2024**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	**3.00**	EQUIPMENT: **Truck-mounted**	LOGGED BY: **RF4**	DRILLING METHOD: **Mud rotary**
▽ WL (Stabilized)				

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
The Ferber Company, Inc	**24:7573**	**B-02**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Emerson Drive NE Commercial Development Palm Bay	**ECS**

SITE LOCATION: **1491 Emerson Dr NE, Palm Bay, Florida, 32907**

LOSS OF CIRCULATION

LATITUDE:	LONGITUDE:	STATION:	SURFACE ELEVATION:
27.999337	**-80.647917**		

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)
0	S-1	SS	24	24	Topsoil Thickness[1.00"] (SP) FINE TO MEDIUM SAND, dark brown, moist, medium dense			1-6-4-3 (10)
	S-2	SS	24	24	(SP) FINE TO MEDIUM SAND, brownish gray, moist, loose	▼		2-2-2-1 (4)
5	S-3	SS	24	24	(SP) FINE TO MEDIUM SAND, light to dark brown, wet, loose		23	2-4-4-6 (8)
	S-4	SS	24	24	(SP-SM) FINE TO MEDIUM SAND with SILT, dark brown, wet, medium dense			6-9-9-8 (18)
	S-5	SS	24	24	(SP) FINE TO MEDIUM SAND, dark brown, wet, medium dense			7-7-9-10 (16)
10					(SP) FINE TO MEDIUM SAND, brown, wet, medium dense		18	
	S-6	SS	18	18				4-7-8 (15)
15					(SP) FINE TO MEDIUM SAND, brown, wet, medium dense		13	
	S-7	SS	18	18				7-10-9 (19)
20					**END OF BORING AT 20 FT**		8	
25							3	
30							-2	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100

ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC

LIQUID LIMIT

PLASTIC LIMIT

CALIBRATED PENETROMETER TSF: 1 2 3 4 5

WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50

15.4 [6.5%]

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: **Jan 16 2024**		CAVE IN DEPTH:
▼ WL (Completion)		BORING COMPLETED: **Jan 16 2024**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	**3.00**	EQUIPMENT: **Truck-mounted**	LOGGED BY: **RF4**	DRILLING METHOD: **Mud rotary**
▽ WL (Stabilized)				

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	SHEET:
The Ferber Company, Inc	**24:7573**	**1 of 1**
PROJECT NAME:	AUGER NO.:	SURFACE ELEVATION:
Emerson Drive NE Commercial Development Palm Bay	**SWM-01**	**28.0**
SITE LOCATION:		STATION:
1491 Emerson Dr NE, Palm Bay, Florida, 32907		
NORTHING: **1332543.4**	EASTING: **769701.5**	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	Description	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			Concrete Thickness[7.25"]			
	▽		(SP) FINE TO MEDIUM SAND, dark brown, moist	S-1		
	▼					
			(SP) FINE TO MEDIUM SAND, light gray, wet	S-2		
5		23				
			(SP) FINE TO MEDIUM SAND, brown, wet	S-3		
			(SP) FINE TO MEDIUM SAND, brown, wet	S-4		
10		18	**END OF DRILLING AT 10.0 FT**			
15		13				

REMARKS:

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

▽ WL (First Encountered) **3.00**	▼ WL (Seasonal High) **2.00**	DRILLER:	DATE COMPLETED:	UNITS:	AUGER METHOD:
▼ WL (Completion) **3.00**		**JR**	**Jan 15 2024**	**English**	**Continuous Flight**

FLIGHT AUGER LOG

CLIENT:	PROJECT NO.:	SHEET:
The Ferber Company, Inc	**24:7573**	**1 of 1**
PROJECT NAME:	AUGER NO.:	SURFACE ELEVATION:
Emerson Drive NE Commercial Development Palm Bay	**SWM-02**	**28.0**
SITE LOCATION:		STATION:
1491 Emerson Dr NE, Palm Bay, Florida, 32907		
NORTHING: **1332547.5**	EASTING: **769774.2**	

DEPTH (FT)	WATER LEVELS	ELEVATION (FT)	Description	SAMPLE NUMBER	FINES CONTENT (%)	MOISTURE CONTENT (%)
			Topsoil Thickness[1.50"]			
	▽ ▼		(SP) FINE TO MEDIUM SAND, light gray to light brown, moist	S-1		
5		23	(SP) FINE TO MEDIUM SAND, dark brown, wet	S-2		
			(SP) FINE TO MEDIUM SAND, light brown, wet	S-3		
			(SP) FINE TO MEDIUM SAND, dark brown, wet	S-4		
10		18	**END OF DRILLING AT 10.0 FT**			
15		13				

REMARKS:

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

▽ WL (First Encountered) **3.00**	▼ WL (Seasonal High) **2.00**	DRILLER:	DATE COMPLETED:	UNITS:	AUGER METHOD:
▼ WL (Completion) **3.00**		**JR**	**Jan 15 2024**	**English**	**Continuous Flight**

FLIGHT AUGER LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
The Ferber Company, Inc	**24:7573**	**R-01**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Emerson Drive NE Commercial Development Palm Bay	**ECS**

SITE LOCATION: **1491 Emerson Dr NE, Palm Bay, Florida, 32907**

LOSS OF CIRCULATION

LATITUDE:	LONGITUDE:	STATION:	SURFACE ELEVATION:
27.999449	**-80.648007**		

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)
	S-1	SS	24	24	Topsoil Thickness[1.00"] (SP) FINE TO MEDIUM SAND, contains shell fragments, light gray to brown, moist, loose			2-5-4-4 (9)
	S-2	SS	24	24	(SP-SM) FINE TO MEDIUM SAND with SILT, dark brown, moist to wet, medium dense			4-6-7-11 (13)
5	S-3	SS	24	24	(SP) FINE TO MEDIUM SAND, brown, wet, medium dense		23	5-9-9-9 (18)
	S-4	SS	24	24	(SP) FINE TO MEDIUM SAND, brown, wet, medium dense			7-9-12-11 (21)
	S-5	SS	24	24	(SP) FINE TO MEDIUM SAND, dark brown, wet, medium dense			8-12-15-13 (27)
10					**END OF BORING AT 10 FT**		18	
15							13	
20							8	
25							3	
30							-2	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100

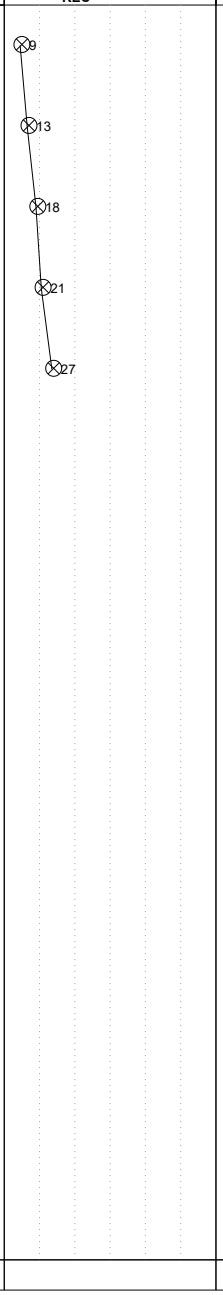
ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC

LIQUID LIMIT

PLASTIC LIMIT

CALIBRATED PENETROMETER TSF: 1 2 3 4 5

WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50



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

WL (First Encountered)	**3.50**	BORING STARTED: **Jan 15 2024**		CAVE IN DEPTH:
WL (Completion)		BORING COMPLETED: **Jan 15 2024**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	**2.50**	EQUIPMENT: **Truck-mounted**	LOGGED BY: **RF4**	DRILLING METHOD: **Mud rotary**
WL (Stabilized)				

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
The Ferber Company, Inc	**24:7573**	**R-02**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Emerson Drive NE Commercial Development Palm Bay	**ECS**		
SITE LOCATION:			LOSS OF CIRCULATION
1491 Emerson Dr NE, Palm Bay, Florida, 32907			
LATITUDE:	LONGITUDE:	STATION:	SURFACE ELEVATION:
27.999354	**-80.648281**		BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)
	S-1	SS	24	24	Topsoil Thickness[2.00"] (SP) FINE TO MEDIUM SAND, dark brown, moist, very loose			1-1-1-1 (2)
	S-2	SS	24	24	(SP) FINE TO MEDIUM SAND, dark brown, moist to wet, loose	▼ ▽		1-2-4-5 (6)
5	S-3	SS	24	24	(SP) FINE TO MEDIUM SAND, brown, wet, medium dense		23	6-7-7-8 (14)
	S-4	SS	24	24	(SP) FINE TO MEDIUM SAND, brown, wet, medium dense			4-5-14-21 (19)
	S-5	SS	24	24	(SP) FINE TO MEDIUM SAND, brown, wet, dense			14-17-13-15 (30)
10					**END OF BORING AT 10 FT**		18	
15							13	
20							8	
25							3	
30							-2	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100

ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC

LIQUID LIMIT, PLASTIC LIMIT

CALIBRATED PENETROMETER TSF: 1 2 3 4 5

WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50

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

▽ WL (First Encountered)	**3.50**	BORING STARTED: **Jan 15 2024**		CAVE IN DEPTH:
▼ WL (Completion)		BORING COMPLETED: **Jan 15 2024**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	**2.50**	EQUIPMENT: **Truck-mounted**	LOGGED BY: **RF4**	DRILLING METHOD: **Mud rotary**
▽ WL (Stabilized)				

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
The Ferber Company, Inc	**24:7573**	**R-03**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Emerson Drive NE Commercial Development Palm Bay	**ECS**		
SITE LOCATION:			LOSS OF CIRCULATION
1491 Emerson Dr NE, Palm Bay, Florida, 32907			
LATITUDE:	LONGITUDE:	STATION:	SURFACE ELEVATION:
27.999199	**-80.648133**		BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)
	S-1	SS	24	24	Concrete Thickness[6.50"] (SP) FINE TO MEDIUM SAND, dark brown, moist, medium dense			4-8-5-6 (13)
	S-2	SS	24	24	(SP) FINE TO MEDIUM SAND, light gray to dark brown, moist to wet, medium dense	▼ ◭		5-10-11-11 (21)
5	S-3	SS	24	24	(SP) FINE TO MEDIUM SAND, brown, wet, medium dense		23	3-9-8-9 (17)
	S-4	SS	24	24	(SP) FINE TO MEDIUM SAND, dark brown, wet, medium dense			8-10-15-23 (25)
	S-5	SS	24	24	(SP) FINE TO MEDIUM SAND, brown, wet, dense			13-10-20-24 (30)
10					**END OF BORING AT 10 FT**		18	
15							13	
20							8	
25							3	
30							-2	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100

ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC

LIQUID LIMIT / PLASTIC LIMIT

CALIBRATED PENETROMETER TSF: 1 2 3 4 5

WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50

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

▽ WL (First Encountered)	**3.50**	BORING STARTED: **Jan 15 2024**		CAVE IN DEPTH:
▼ WL (Completion)		BORING COMPLETED: **Jan 15 2024**		HAMMER TYPE: **Auto**
◭ WL (Seasonal High Water)	**2.50**	EQUIPMENT: **Truck-mounted**	LOGGED BY: **RF4**	DRILLING METHOD: **Mud rotary**
▽ WL (Stabilized)				

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
The Ferber Company, Inc	**24:7573**	**R-04**	**1 of 1**
PROJECT NAME:	DRILLER/CONTRACTOR:		
Emerson Drive NE Commercial Development Palm Bay	**ECS**		
SITE LOCATION: **1491 Emerson Dr NE, Palm Bay, Florida, 32907**			LOSS OF CIRCULATION
LATITUDE: **27.999098**	LONGITUDE: **-80.647662**	STATION:	SURFACE ELEVATION:	BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)
0	S-1	SS	24	24	Topsoil Thickness[1.50"] (SP) FINE TO MEDIUM SAND, brown to dark brown, moist, loose			2-2-4-2 (6)
	S-2	SS	24	24	(SP) FINE TO MEDIUM SAND, brown to dark brown, moist, very loose	▼		1-1-1-2 (2)
5	S-3	SS	24	24	(SP-SM) FINE TO MEDIUM SAND with SILT, dark brown, wet, medium dense		23	3-7-10-10 (17)
	S-4	SS	24	24	(SP) FINE TO MEDIUM SAND, brown, wet, medium dense			5-8-9-9 (17)
	S-5	SS	24	24	(SP) FINE TO MEDIUM SAND, brown, wet, medium dense			6-7-18-8 (25)
10					**END OF BORING AT 10 FT**		18	
15							13	
20							8	
25							3	
30							-2	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100

ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC

LIQUID LIMIT / PLASTIC LIMIT

CALIBRATED PENETROMETER TSF: 1 2 3 4 5

WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50

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: **Jan 16 2024**		CAVE IN DEPTH:
▼ WL (Completion)		BORING COMPLETED: **Jan 16 2024**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	**3.00**	EQUIPMENT: **Truck-mounted**	LOGGED BY: **RF4**	DRILLING METHOD: **Mud rotary**
▽ WL (Stabilized)				

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
The Ferber Company, Inc	**24:7573**	**T-01**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Emerson Drive NE Commercial Development Palm Bay	**ECS**

SITE LOCATION: **1491 Emerson Dr NE, Palm Bay, Florida, 32907**

LOSS OF CIRCULATION

LATITUDE:	LONGITUDE:	STATION:	SURFACE ELEVATION:
27.999463	**-80.647708**		

BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6" (N - Value)
0	S-1	SS	24	24	Topsoil Thickness[1.50"] (SP) FINE TO MEDIUM SAND, contains rock fragments, brown, moist, medium dense			3-6-8-8 (14)
	S-2	SS	24	24	(SP) FINE TO MEDIUM SAND, contains rock fragments, brown, moist, very loose	▼		5-1-1-1 (2)
5	S-3	SS	24	24	(SP) FINE TO MEDIUM SAND, brown, wet, loose	▼	23	1-1-8-5 (9)
	S-4	SS	24	24	(SP) FINE TO MEDIUM SAND, dark brown, wet, medium dense			6-8-8-12 (16)
	S-5	SS	24	24	(SP) FINE TO MEDIUM SAND, dark brown, wet, medium dense			10-10-13-17 (23)
10					**END OF BORING AT 10 FT**		18	
15							13	
20							8	
25							3	
30							-2	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100

ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC

LIQUID LIMIT

PLASTIC LIMIT

CALIBRATED PENETROMETER TSF: 1 2 3 4 5

WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50

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: **Jan 16 2024**		CAVE IN DEPTH:
▼ WL (Completion)		BORING COMPLETED: **Jan 16 2024**		HAMMER TYPE: **Auto**
▼ WL (Seasonal High Water)	**3.00**	EQUIPMENT: **Truck-mounted**	LOGGED BY: **RF4**	DRILLING METHOD: **Mud rotary**
▽ WL (Stabilized)				

GEOTECHNICAL BOREHOLE LOG

APPENDIX C – Laboratory Summary

Laboratory Data 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-02	S-4	6-8	15.4	SP-SM				6.5				

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: Emerson Drive NE Commercial Developm
Client: The Ferber Company, Inc

Project No.: 24:7573
Date Reported: 1/31/2024

Office / Lab	Address	Office Number / Fax
ECS Florida LLC - Orlando	2815 Directors Row Suite 500 Orlando, FL 32809	(407)859-8378 (407)859-9599

Tested by	Checked by	Approved by	Date Received
DHansen	DHansen	DHansen	1/24/2024