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Report of Geotechnical Exploration

St James New Fire Station

5015 Stringfellow Road,
St James City, Lee County, Florida

January 28, 2025
UES Project No.: 0515.2400379.0000

Prepared For:

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January 28, 2025

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Site: **St James New Fire Station**
5015 Stringfellow Road,
St James City, Lee County, Florida
UES Project No. 0515.2400379.0000

Dear Mr. Castellanos:

UES has completed the subsurface exploration and geotechnical engineering evaluation for the above-referenced project in accordance with the geotechnical and engineering service agreement for this project. The scope of services was completed in accordance with UES's Geotechnical Engineering Proposal (0515.0524.00034) planned in conjunction with and authorized by you.

EXECUTIVE SUMMARY

The purpose of this subsurface exploration was to classify the nature of the subsurface soils and general geomorphic conditions and evaluate their impact upon the proposed construction. This report contains the results of the subsurface exploration at the site and UES's engineering interpretations of these, with respect to the project characteristics described to UES including providing recommendations for site preparation and the design of the foundation system.

UES understands that the project will consist of the construction of a fire station facility after the demolition of the existing building located at 5015 Stringfellow Road in St James City, Lee County, Florida. UES anticipates that the proposed facility will be comprised of a one to two-story building with floor slab-on-grade. UES was provided with a site dimension plan prepared by TDM Consulting, Inc., dated August 2024, depicting the proposed construction. No design documents were provided to UES at the time of this report. Specific loading conditions were not available at the time of this report, but for the purposes of evaluating the bearing capacity and settlement values, UES has assumed that the maximum loading conditions will be on the order of **100 kips** for individual column footings and **7 kips per linear foot** (klf) for continuous wall footings. UES has assumed a nominal amount **(1-2 feet)** of fill will be required to raise the site from current elevations. The recommendations provided herein are based upon the above considerations. If the project description has been revised, please inform UES so that UES may review the recommendations with respect to any modifications. No site or project facilities/improvements, other than those described herein, should be designed using the soil information presented in this report. Moreover, UES will not be responsible for the performance of any site improvements so designed and constructed.

The following testing was completed for this study:

- Four (4) Standard Penetration Test (SPT) borings advanced to depths of approximately 30 feet below ground surface (BGS) within the footprint of the proposed fire station.

- One (1) Hand Auger (HA) boring advanced to a depth of approximately 4 feet below ground surface (BGS) within the footprint of proposed fire station.

The subsurface soil conditions encountered at this site generally consist of very loose to dense sands (SP) with (if any) weathered limestone fragments and varying amounts (if any) of shell fragments and loose to medium dense slightly silty sands (SP-SM) with (if any) shell fragments to the boring termination depths. Please refer to "Appendix D: Record of Test Borings" for a detailed account of each boring.

Based on the soil borings and knowledge of the project at the time of this report, the subsurface soil conditions at the project site are generally favorable for the support of the proposed fire station on a shallow foundations with maximum loading conditions on the order of **100 kips** for individual column footings **7 kips** per linear foot (klf) for continuous wall footings. A maximum allowable bearing pressure of **3,000 psf** may be used for foundation design. Based on the projected loads, expected settlement of the structure is less than 1 inch total and less than ½ inch differential between adjacent columns or a horizontal distance of 20 feet.

UES appreciates the opportunity to be of service to you on this project and looks forward to a continued association. Please do not hesitate to contact UES if you have any questions or comments, or if UES may further assist you as your plans proceed.

Respectfully Submitted,
UES
Registry Number 4930

G. Vineetha

Vineetha Garikapati, M.S., E.I.
Geotechnical Project Engineer

Digitally signed by
Carlos A Mercado
Date: 2025.01.28
13:16:42 -05'00'

Carlos A. Mercado, M.S, P.E. No. 71707
State of Florida
Principal Engineer

This document has been digitally signed and sealed by Carlos Mercado on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed, and the signature must be verified on any electronic copies.

TABLE OF CONTENTS

1.0 INTRODUCTION 4
1.1 Scope of Services 4
1.2 Project Description 4

2.0 OBSERVATIONS 4
2.1 Site Inspection 4
2.2 Field Exploration 5
2.3 Visual Classification 5
2.4 Geomorphic Conditions 5
2.5 Hydrogeological Conditions 6

3.0 ENGINEERING EVALUATION AND RECOMMENDATIONS 6
3.1 General 6
3.2 Site Preparation 7
3.3 Design of Footings 8
3.4 Ground Floor Slabs 9

4.0 CONSTRUCTION RELATED SERVICES 9

5.0 REPORT LIMITATIONS 9

6.0 BASIS FOR RECOMMENDATIONS 10

Appendix A - Vicinity Map
Appendix B - Test Location Plan
Appendix C - Notes Related to Borings
Appendix D - Record of Test Borings
Appendix E - Discussion of Soil Groups

1.0 INTRODUCTION

1.1 Scope of Services

The objective of the geotechnical services was to collect subsurface data for the subject project, summarize the test results, and discuss any apparent site conditions that may have geotechnical significance for the proposed structure construction. The scope of the services was limited to the following:

1. Conduct four Standard Penetration Test (SPT) borings and one hand auger (HA) boring to determine the nature and condition of the subsurface soils and prepare record logs of these soil borings depicting the subsurface soil conditions encountered during the field exploration.

2. Review each soil sample obtained during the field exploration for classification and additional testing, if necessary.

3. Evaluate the existing soil conditions found during the exploration with respect to foundation support for the proposed structure.

4. Prepare this report to document the results of the field exploration, engineering analysis and foundation design recommendations.

1.2 Project Description

UES understands that the project will consist of the construction of a fire station facility after the demolition of the existing building located at 5015 Stringfellow Road in St James City, Lee County, Florida. UES anticipates that the proposed facility will be comprised of a one to two-story building with floor slab-on-grade. UES was provided with a site dimension plan prepared by TDM Consulting, Inc., dated August 2024, depicting the proposed construction. No design documents were provided to UES at the time of this report. Specific loading conditions were not available at the time of this report, but for the purposes of evaluating the bearing capacity and settlement values, UES has assumed that the maximum loading conditions will be on the order of **100 kips** for individual column footings and **7 kips per linear foot** (klf) for continuous wall footings. UES has assumed a nominal amount **(1-2 feet)** of fill will be required to raise the site from current elevations. The recommendations provided herein are based upon the above considerations. If the project description has been revised, please inform UES so that UES may review the recommendations with respect to any modifications. No site or project facilities/improvements, other than those described herein, should be designed using the soil information presented in this report. Moreover, UES will not be responsible for the performance of any site improvements so designed and constructed.

2.0 OBSERVATIONS

2.1 Site Inspection

The recovered samples were not evaluated, either visually or analytically, for chemical composition or environmental hazards. UES would be pleased to perform these services for an additional fee, if required.

2.2 Field Exploration

The following testing was completed for this study:

- Four (4) Standard Penetration Test (SPT) borings advanced to depths of approximately 30 feet below ground surface (BGS) within the footprint of the proposed fire station.

- One (1) Hand Auger (HA) boring advanced to a depth of approximately 4 feet below ground surface (BGS) within the footprint of proposed fire station.

The locations of the borings performed are illustrated in “Appendix B: Test Location Plan". The Standard Penetration Test (SPT) boring method was used as the investigative tool within the borings. SPT tests were performed in substantial accordance with ASTM Procedure D-1586, “Penetration Test and Split-Barrel Sampling of Soils”. This test procedure consists of driving a 1.4-inch I.D. split-tube sampler into the soil profile using a 140-pound hammer falling 30 inches. The number of blows per foot for the second and third 6-inch increments is an indication of soil strength.

The soil samples recovered from the soil borings were visually classified and their stratification is illustrated in “Appendix D: Record of Test Borings". It should be noted that soil conditions might vary between the strata interfaces shown on the logs. The soil boring data reflects information from a specific test location only. The boring depths were selected based on UES’s knowledge of vicinity soils and to include the zone of soil likely to be stressed by the proposed construction.

UES located the test borings by using the provided site plan, measuring from existing on-site landmarks shown on an aerial photograph, and by using handheld GPS devices. Horizontal and vertical survey control was not provided for the boring locations. The indicated test locations on the boring location plan should be considered approximate and accurate to the degree implied by the methodologies used to locate the test locations in the field. GPS coordinates can be provided upon request.”

2.3 Visual Classification

Soil samples recovered from the field exploration were returned to UES’s laboratory where they were visually classified in general accordance with ASTM D-2488. Samples were evaluated to obtain an accurate understanding of the soil properties and site geomorphic conditions. After performing a review of the recovered site soils no laboratory testing was deemed necessary. Bag samples of the soil encountered during the field exploration will be held in UES’s laboratory for your inspection for 45 days and then discarded unless UES is notified otherwise in writing.

2.4 Geomorphic Conditions

Boring logs derived from the field exploration are presented in “Appendix D: Record of Test Borings”. The boring logs depict the observed soils in graphic detail. The Standard Penetration Test borings indicate the penetration resistance, or N-values, logged during the drilling and sampling activities. The classifications and descriptions shown on the logs are generally based upon visual characterizations of the recovered soil samples.

All soil samples reviewed have been depicted and classified in general accordance with the Unified Soil Classification System, modified as necessary to describe typical southwest Florida conditions. See “Appendix E: Discussion of Soil Groups", for a detailed description of various soil groups.

The subsurface soil conditions encountered at this site generally consist of very loose to dense sands (SP) with (if any) weathered limestone fragments and varying amounts (if any) of shell fragments and loose to medium dense slightly silty sands (SP-SM) with (if any) shell fragments to the boring termination depths. Please refer to “Appendix D: Record of Test Borings” for a detailed account of each boring.

2.5 Hydrogeological Conditions

On the dates of field exploration, the groundwater table was encountered at a depth of approximately 3 feet to 5 feet below the existing ground surface. The groundwater table will fluctuate seasonally depending upon local rainfall and other site specific and/or local influences such as tidal events. Brief ponding of stormwater may occur across the site after heavy rains.

Horizontal and vertical survey control was not provided for the boring locations. Ground surface elevations at the boring locations would be beneficial to help UES identify any anomalies in our measured and estimated seasonal high groundwater levels, as well as improve the usefulness of the groundwater information during the civil engineering design of the site. UES will not be responsible for the performance of any site improvements designed and constructed based on the reported soil and groundwater depths without horizontal and vertical survey control.

No additional investigation was included in the scope of work in relation to the wet seasonal high groundwater table or any existing well fields in the vicinity. Well fields may influence water table levels and cause significant fluctuations. If a more comprehensive water table analysis is necessary, please contact UES for additional guidance.

3.0 ENGINEERING EVALUATION AND RECOMMENDATIONS

3.1 General

A foundation system for any structure must be designed to resist bearing capacity failures, have settlements that are tolerable, and resist the environmental forces that the foundation may be subjected to over the life of the structure. The soil bearing capacity is the soil’s ability to support loads without plunging into the soil profile. Bearing capacity failures are analogous to shear failures in structural design and are usually sudden and catastrophic.

The amount of settlement that a structure may tolerate is dependent on several factors, including uniformity of settlement, time rate of settlement, structural dimensions, and properties of the materials. Generally, total or uniform settlement does not damage a structure but may affect drainage and utility connections. These can generally tolerate movements of several inches for building construction. In contrast, differential settlement affects a structure’s frame and is limited by structural flexibility.

Compaction of the surface soils is recommended to increase the soil bearing capacity and minimize foundation settlement. The following are the recommendations for overall site preparation and foundation design that UES feels best suited for the proposed construction and existing soil conditions.

UES notes that the applicability of geotechnical recommendations is very dependent upon project characteristics, specifically (1) improvement locations, (2) grade alterations, (3) and actual applied structural loads. For that reason, UES must be provided with and review the preliminary and final site and grading plans, as well as structural design loads to validate all recommendations provided in this report. Without performing this review, UES's recommendations should not be relied upon for final design or construction of any site improvements.

3.2 Site Preparation

UES recommends the following compaction requirements for this project:

- Proof Roll ..... 95% of a Modified Proctor
- Building Pad Fill..... 95% of a Modified Proctor
- Footings ..... 95% of a Modified Proctor

The compaction percentages presented above are based upon the maximum dry density as determined by a "modified proctor" test (ASTM D-1557). All density tests should be performed to a depth of 12 inches below the tested surface unless noted otherwise. All density tests should be performed using the nuclear method (ASTM D-6938) or the sand cone method (ASTM D-1556).

The recommendations for the preparation of the site for the use of shallow foundation systems are presented below. This approach to improving and maintaining the site soils has been found to be successful on projects with similar soil conditions.

1. Initial site preparation should consist of clearing, stripping, and de-grubbing of trees, and vegetation and associated root systems to a depth of their vertical reach. This should be done within and to 5 feet outside the perimeter of the proposed building footprint (including exterior isolated columns).

2. In any areas where deep excavations will be performed during the demolition process (i.e., pool, underground utilities & septic tank removal), the excavations should be replaced with suitable fill and compacted in one-foot lifts as described in this section.

3. Following site stripping and prior the placement of any fill, areas of surficial sand (not exposed limestone) should be compacted ("proof rolled") and tested. UES recommends using a steel drum vibratory roller with sufficient static weight and vibratory impact energy to achieve the required compaction. Density tests should be performed on the proof rolled surface at a frequency of not less than one test per 2,500 square feet, or a minimum of four (4) tests, whichever is greater. Areas of exposed intact limestone shall be visually confirmed by the project geotechnical engineer prior to fill placement, in lieu of proof rolling.

4. Fill material may then be placed in the building pad as required. The fill material should be inorganic (classified as SP, SW, GP, GW, SP-SM, SW-SM, GW-GM, GP-GM) containing not more than 5 percent (by weight) organic materials. **Fill materials with silt-size soil fines in excess of 12% should not be used.** Fill should be placed in lifts with a maximum lift thickness not exceeding 12 inches. Each lift should be compacted and tested prior to the placement of the next lift. Density tests should be performed within the fill at a frequency of not less than one test per 2,500 square feet per lift in the building areas, or a minimum of four (4) tests per lift, whichever is greater.

5. For any footings bearing on a limestone formation, the bottom of all footing excavation shall be examined by the engineer / geologist or his representative to determine the condition of the limestone. The limestone shall be probed for voids and loose pockets of sand. Such areas shall be cleaned to depth of 3 times the greatest horizontal dimension and backfilled with lean concrete.

6. For footings placed on structural fill or compacted native granular soils, the bottom of all footings shall be tested for compaction and examined by the engineer / geologist or his representative to determine if the soil is free of organic and/or deleterious material. Density tests should be performed at a frequency of not less than one (1) density test per each isolated column footing and one (1) test per each fifty (50) lineal feet of wall footings.

7. The contractor should take into account the final contours and grades as established by the plan when executing his backfilling and compaction operations.

Using vibratory compaction equipment at this site may disturb adjacent structures. UES recommends that you monitor nearby structures before and during proof-compaction operations. A representative of UES can monitor the vibration disturbance of adjacent structures. A proposal for vibration monitoring during compaction operations can be supplied upon request.

3.3 Design of Footings

Foundation soils prepared in accordance with the above recommendations should be suitable for supporting the proposed structure on an economical and conventionally designed shallow foundation system. The foundations should be designed for an allowable net soil contact pressure of **3,000 pounds per square foot (psf)** or less.

Shallow foundations should be embedded a minimum of 18 inches below final grade. This embedment shall be measured from the lowest adjacent grade. Isolated column footings should be at least 24 inches in width and continuous strip footings should have a width of at least 18 inches regardless of contact pressure.

Based on the boring information and the maximum loading conditions (**100 kips** for individual column footings and **7 kips** per linear foot (klf) for continuous wall footings), expected settlement of the structure is less than 1 inch total and less than ½ inch differential between adjacent columns or a horizontal distance of 20 feet. Because foundation soils are mostly coarse-grained, the majority of settlement will occur during construction as the load is being applied. All footings and columns should be structurally separated from the floor slab, as they will be loaded differently and at different times, unless a monolithic mat foundation is designed.

3.4 Ground Floor Slabs

The ground floor slabs may be supported directly on the existing grade or on granular fill following the foundation site preparation and fill placement procedures outlined in this report. For purposes of design, a coefficient of subgrade modulus 150 pounds per cubic inch may be used. The ground floor slab should be structurally separated from all walls and columns to allow for differential vertical movement.

Excessive moisture vapor transmission through floor slabs-on-grade can result in damage to floor coverings as well as other deleterious effects. An appropriate moisture vapor retarder should be placed beneath the floor slab to reduce moisture vapor from entering the building through the slab. The retarder should be installed in general accordance with applicable ASTM procedures including sealing around pipe penetrations and at the edges of foundations.

4.0 CONSTRUCTION RELATED SERVICES

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

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

The monitoring and inspection of construction procedures and the supervision of the implementation of the recommendations given herein shall be made by UES. Otherwise, the retained firm shall study this report, perform additional tests as they deem necessary, and submit their own recommendations or assume full responsibility for the outlined recommendations in their entirety.

5.0 REPORT LIMITATIONS

This consulting report has been prepared for the exclusive use of the current project owners and other members of the design team for the proposed St James New Fire Station located at 5015 Stringfellow Road in St James City, Lee County, Florida. This report has been prepared in accordance with generally accepted local geotechnical engineering practices; no other warranty is expressed or implied. The evaluation submitted in this report is based in part upon the data collected during a field exploration. However, the nature and extent of variations throughout the subsurface profile may not become evident until the time of construction. If variations then appear evident, it may be necessary to reevaluate information and professional opinions as provided in this report. In the event changes are made in the nature, design, or locations of the proposed structure, the evaluation and opinions contained in this report shall not be considered valid, unless the changes are reviewed and conclusions modified or verified in writing by UES.

UES is not responsible for damage caused by soil improvement and/or construction activity vibrations related to this project. UES is also not responsible for damage concerning drainage or moisture related issues for the proposed or nearby structures.

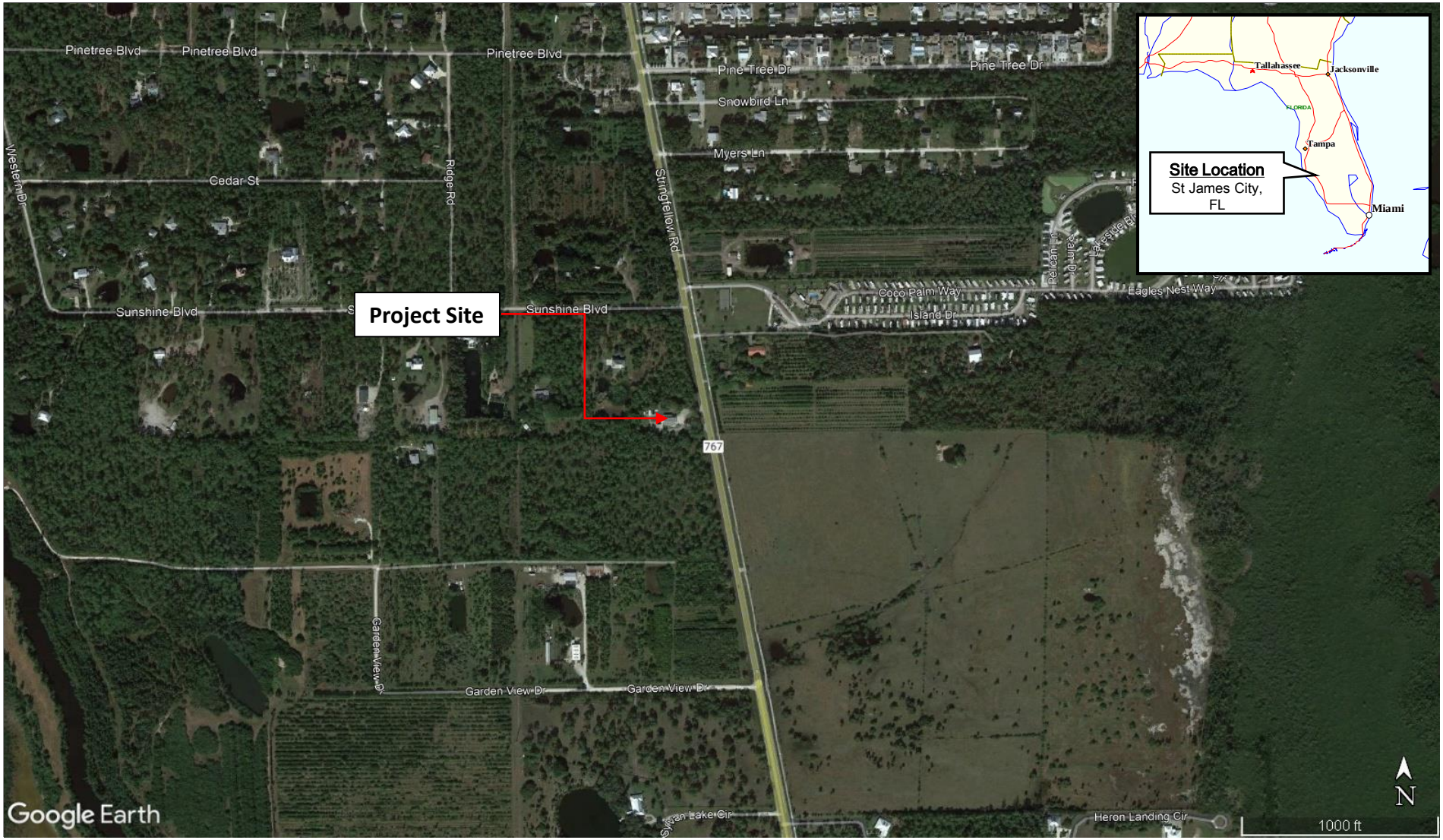
UES should be provided the opportunity to review the final foundation design drawings and specifications to determine whether UES's recommendations have been properly interpreted, communicated, and implemented. If UES is not afforded the opportunity to participate in construction related aspects of foundation installation as recommended in this report or any report addendum, UES will accept no responsibility for the interpretation of UES's recommendations made in this report or on a report addendum for foundation performance.

6.0 BASIS FOR RECOMMENDATIONS

The analysis and recommendations submitted in this report are based on the data obtained from the tests performed at the locations indicated on the attached figure in Appendix B. This report does not reflect any variations which may occur between borings. While the borings are representative of the subsurface conditions at their respective locations and for their vertical reaches, local variations characteristic of the subsurface soils of the region are anticipated and may be encountered. The delineation between soil types shown on the soil logs is approximate and the description represents UES's interpretation of the subsurface conditions at the designated boring locations on the particular date drilled.

Any third-party reliance on UES's geotechnical report or parts thereof is strictly prohibited without the expressed written consent of UES. The methodology (ASTM D-1586) used in performing the borings and for determining penetration resistance is specific to the sampling tools utilized and does not reflect the ease or difficulty of advancing other tools or materials.

Appendix A - Vicinity Map



VICINITY MAP

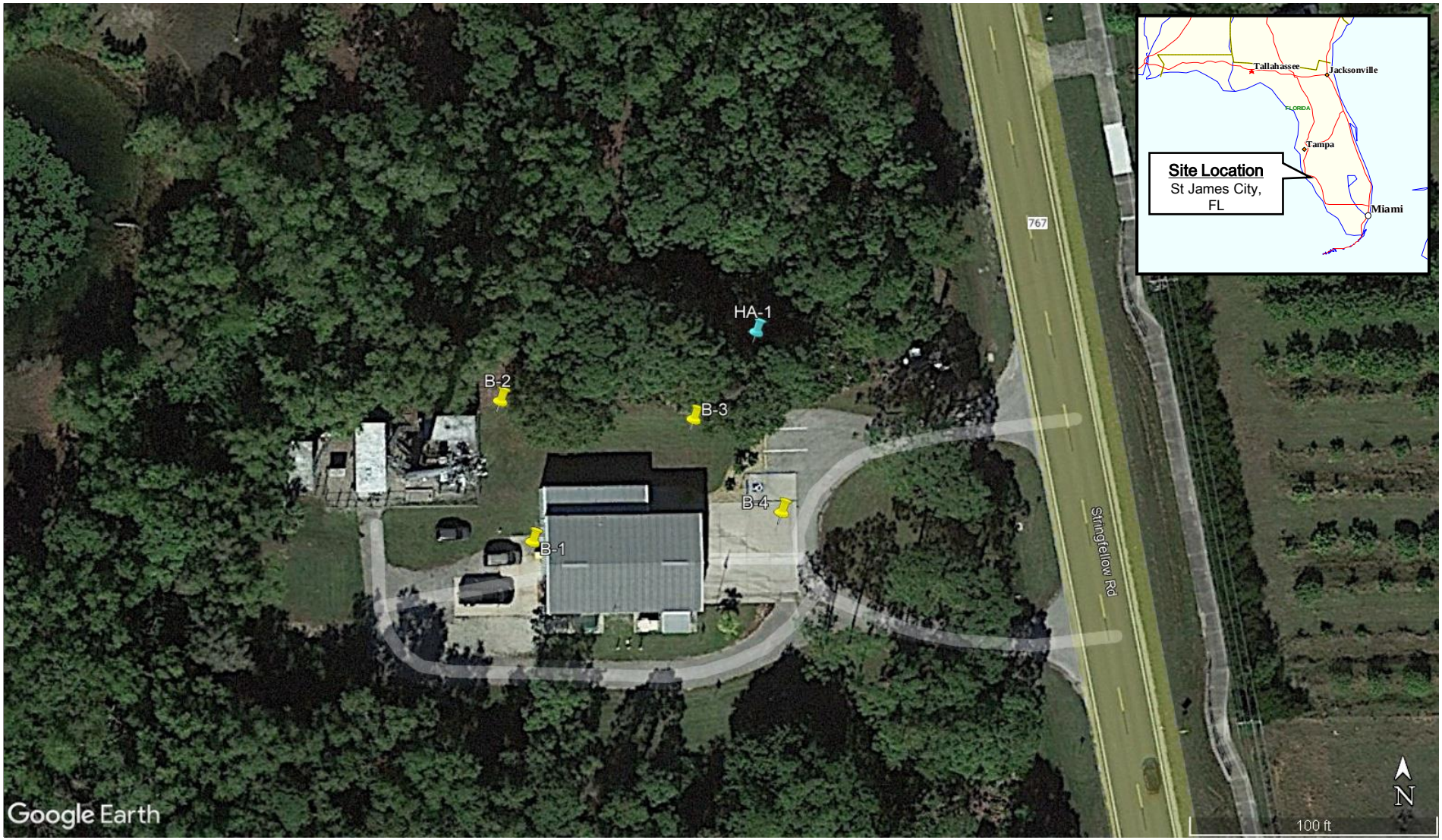
SOURCE: GOOGLE EARTH PRO©

St James New Fire Station
5015 Stringfellow Road
St James City, Lee County, FL

Drawn By:	Checked By:	Date:
VG	AJD	01/28/2025

Project No.:	Approved By:
0515.2400379.0000	Adam Dornacker, P.E.

Appendix B - Test Location Plan



Boring locations are an approximation. Horizontal and vertical survey control was not provided for the boring locations. The indicated test locations on this boring location plan should be considered approximate and accurate to the degree implied by the methodologies used to locate the test locations in the field. GPS coordinates can be provided upon request.

TEST LOCATION PLAN

SOURCE: GOOGLE EARTH PRO©

UES™

St James New Fire Station
5015 Stringfellow Road
St James City, Lee County, FL

Drawn By:	Checked By:	Date:
VG	AJD	01/28/2025

Project No.:	Approved By:
0515.2400379.0000	Adam Dornacker, P.E.

Boring locations are an approximation. Horizontal and vertical survey control was not provided for the boring locations. The indicated test locations on this boring location plan should be considered approximate and accurate to the degree implied by the methodologies used to locate the test locations in the field. GPS coordinates can be provided upon request.

TEST LOCATION PLAN

SOURCE: GOOGLE EARTH PRO©

UES™

St James New Fire Station
5015 Stringfellow Road
St James City, Lee County, FL

Drawn By:	Checked By:	Date:
VG	AJD	01/28/2025

Project No.:	Approved By:
0515.2400379.0000	Adam Dornacker, P.E.

Appendix C - Notes Related to Borings

NOTES RELATED TO RECORDS OF TEST BORING AND GENERALIZED SUBSURFACE PROFILE

1. Groundwater level was encountered and recorded (if shown) following the completion of the soil test boring on the date indicated. Fluctuations in groundwater levels are common; consult report text for a discussion.

2. The boring location was identified and located in the field based on measured and estimated distances from existing site features.

3. The borehole was backfilled to site grade following boring completion, patched with asphalt cold patch mix when pavement was encountered.

4. The Record of Test Boring represents our interpretation of field conditions based on engineering examination of the soil samples.

5. The Record of Test Boring is subject to the limitations, conclusions, and recommendations presented in the report text.

6. The Standard Penetration Test (SPT) was performed in accordance ASTM Procedure D-1586. SPT testing procedure consists of driving a 1.4-inch I.D. split-tube sampler into the soil profile using a 140-pound hammer falling 30 inches.

7. On the Record of Test Boring listed as “Blow Counts”, the N-value is the sum of the SPT hammer blows required to drive the split-tube sampler through the second and third 6-inch increment of the sampling layer, and is an indication of soil strength.

8. Shown on the Record of Test Boring an SPT N-value expressed as 50/2” is descriptive of the fact that 50 hammer blows were required to drive the split-spoon sampler a distance of approximately 2 inches.

9. The soil/rock strata interfaces shown on the Records of Test Boring are approximate and may vary from those in the field. The soil/rock conditions shown on the Records of Test Boring refer to conditions at the specific location tested; soil/rock conditions may vary between test locations.

10. Relative density and consistency for sands/gravels, silts/clays, and limestone are described as follows:

Cohesionless Soils		
Safety SPT (N-Value)	Auto SPT (N-Value)	Relative Density
0 – 4	0 – 3	Very Loose
5 – 10	4 – 8	Loose
11 – 30	9 – 24	Medium Dense
31 – 50	25 – 40	Dense
Over 50	Over 40	Very Dense

Silts and Clays		
Safety SPT (N-Value)	Auto SPT (N-Value)	Consistency
0 – 2	0 – 1	Very Soft
3 – 5	2 – 4	Soft
6 – 7	5 – 6	Firm
8 – 15	7 – 12	Stiff
16 – 30	13 – 24	Very Stiff
Over 30	Over 24	Hard

Limestone	
SPT (N-Value)	Relative Density
0 – 50	Soft
51 – 50 for 0”	Hard

11. Definition of descriptive terms of modifiers for silts/clays/shells/gravels are described as follows:

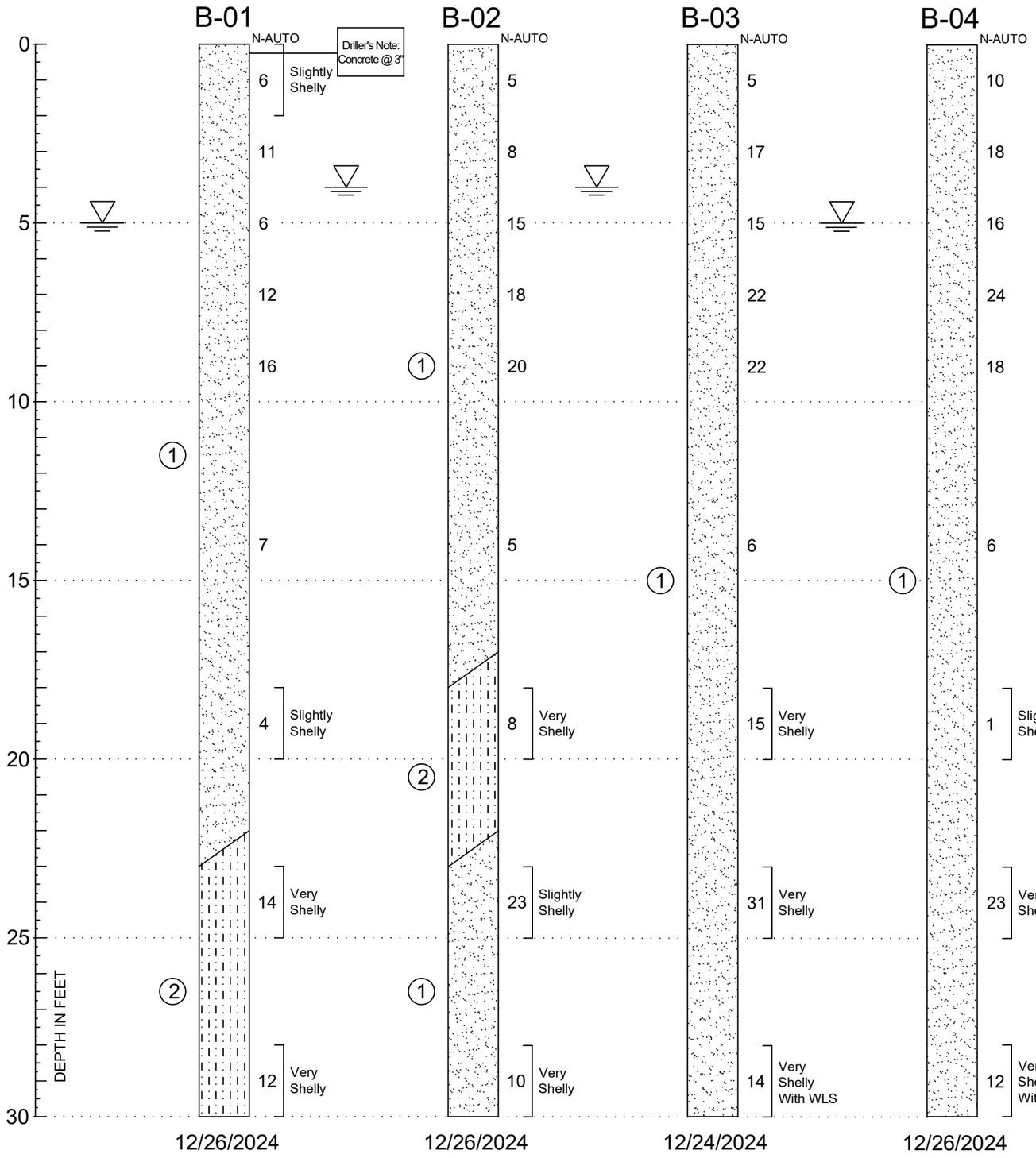
Percentage of Modifier Material	First Qualifier	Second Qualifier
0 – 5	(No mention)	(No mention)
5 – 12	Slightly + Modifier + y	With Trace
12 – 30	Modifier + y	With Some
30 – 50	Very + Modifier + y	And

12. Descriptive characteristics for organic content percentages are described as follows:

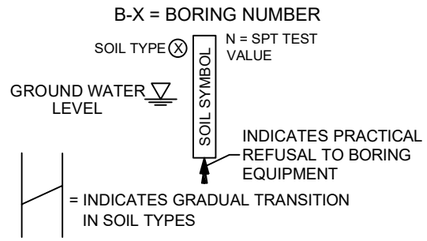
Percentage of Organic Material	Descriptor
0 – 2.5	(No mention)
2.5 – 5	With a Trace of Organics
5 – 20	Organic
20 – 75	Highly Organic
75 – 100	Peat

Appendix D - Record of Test Borings

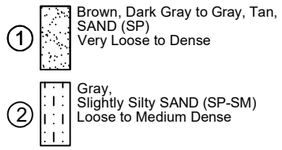
SOIL PROFILES



SOIL PROFILE LEGEND



SOIL LEGEND



NOTES:

N - STANDARD PENETRATION RESISTANCE TEST (SPT) VALUE. NUMBERS TO THE RIGHT OF BORINGS INDICATE SPT VALUE FOR 12-INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).

WOH - BORING INTERVAL ADVANCED UNDER WEIGHT OF HAMMER.

WOR - BORING INTERVAL ADVANCED UNDER WEIGHT OF ROD.

LFC - LOSS OF DRILLING FLUID CIRCULATION.

WLS - WEATHERED LIMESTONE

CS - CEMENTED SANDS

HA - NO RECORDED N VALUE DUE TO HAND AUGERING PROCEDURE

SOIL CLASSIFICATION

CORRELATION OF N - VALUES WITH RELATIVE DENSITY AND CONSISTENCY

COHESIONLESS SOIL			SILTS AND CLAYS		
N - VALUE (SAFETY)	N - VALUE (AUTO)	RELATIVE DENSITY	N - VALUE (SAFETY)	N - VALUE (AUTO)	CONSISTENCY
0 - 4	0 - 3	VERY LOOSE	0 - 2	0 - 1	VERY SOFT
5 - 10	4 - 8	LOOSE	3 - 5	2 - 4	SOFT
11 - 30	9 - 24	MEDIUM DENSE	6 - 7	5 - 6	FIRM
31 - 50	25 - 40	DENSE	8 - 15	7 - 12	STIFF
OVER 50	OVER 40	VERY DENSE	16 - 30	13 - 24	VERY STIFF
			OVER 30	OVER 24	HARD

CORRELATION OF N - VALUES WITH HARDNESS DESCRIPTION

LIMEROCK	
N - VALUE	RELATIVE DENSITY
0 - 50	SOFT
51 - 50/0"	HARD

APPROXIMATE FINES CONTENT	MODIFIERS
5% TO 12%	SLIGHTLY SILTY OR SLIGHTLY CLAYEY
12% TO 25%	SILTY OR CLAYEY
26% TO 49%	VERY SILTY OR VERY CLAYEY

APPROXIMATE SHELL CONTENT	MODIFIERS
0% TO 5%	NO MENTION
5% TO 12%	SLIGHTLY SHELLY
13% TO 30%	SHELLY
31% TO 50%	VERY SHELLY

APPROXIMATE ORGANIC CONTENT	MODIFIERS
0% TO 2.5%	NO MENTION
2.5% TO 5%	WITH A TRACE
5% TO 20%	WITH ORGANICS
20% TO 75%	HIGHLY ORGANIC
75% TO 100%	PEAT

DEFINITION OF DESCRIPTIVE TERMS OF MODIFIERS FOR SILTS/CLAYS/SHELLS/GRAVELS ARE DESCRIBED AS FOLLOWS:

PERCENTAGE OF MODIFIER MATERIAL	FIRST QUALIFIER	SECOND QUALIFIER
5 - 12	SLIGHTLY + MODIFIER + Y	WITH A LITTLE
12 - 30	MODIFIER + Y	WITH SOME
30 - 50	VERY + MODIFIER + Y	AND

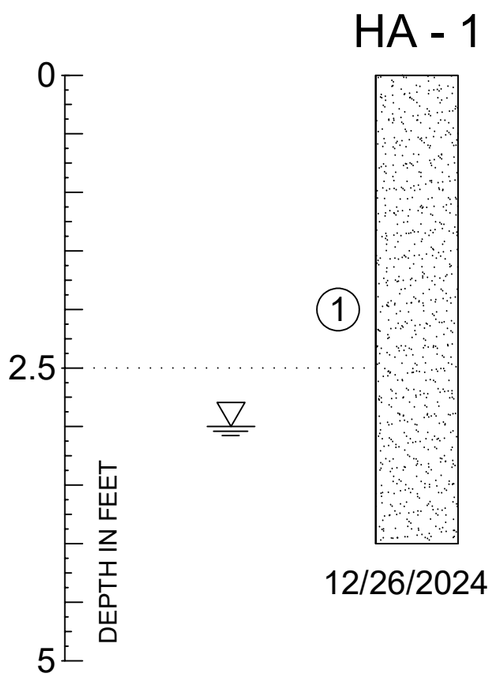
RECORD OF TEST BORINGS

UES
201 Waldo Ave. N.
Lehigh Acres, Florida 33971
239-489-2443
www.teamues.com

Client: Castellanos Tramonte Architects
Project No: 0515.2400379.0000
Project:
St James New Fire Station
5051 Stringfellow RD,
St James City, Lee County, Florida

Date: 01/03/2025
RIG: CME - 55
Drilled By: DB
Drawn By: JR
Approved By: AJD

SOIL PROFILES



SOIL PROFILE LEGEND

B-X = BORING NUMBER

SOIL TYPE (X) — N = SPT TEST VALUE

GROUND WATER LEVEL

SOIL SYMBOL

INDICATES PRACTICAL REFUSAL TO BORING EQUIPMENT

= INDICATES GRADUAL TRANSITION IN SOIL TYPES

SOIL LEGEND

1 — Brown, Dark Gray to Gray, Tan, SAND (SP) Very Loose to Dense

2 — Gray, Slightly Silty SAND (SP-SM) Loose to Medium Dense

NOTES:

N - STANDARD PENETRATION RESISTANCE TEST (SPT) VALUE. NUMBERS TO THE RIGHT OF BORINGS INDICATE SPT VALUE FOR 12-INCHES OF PENETRATION (UNLESS OTHERWISE NOTED).

WOH - BORING INTERVAL ADVANCED UNDER WEIGHT OF HAMMER.

WOR - BORING INTERVAL ADVANCED UNDER WEIGHT OF ROD.

LFC - LOSS OF DRILLING FLUID CIRCULATION.

WLS - WEATHERED LIMESTONE

HA - NO RECORDED N-VALUE DUE TO HAND AUGERING PROCEDURE

CS - CEMENTED SAND

TP - TEST PIT

SOIL CLASSIFICATION

CORRELATION OF N - VALUES WITH RELATIVE DENSITY AND CONSISTENCY

COHESIONLESS SOIL

N - VALUE (SAFETY)	N - VALUE (AUTO)	RELATIVE DENSITY
0 - 3	0 - 3	VERY LOOSE
4 - 10	4 - 8	LOOSE
11 - 30	9 - 24	MEDIUM DENSE
31 - 50	25 - 40	DENSE
OVER 50	OVER 40	VERY DENSE

SILTS AND CLAYS

N - VALUE (SAFETY)	N - VALUE (AUTO)	CONSISTENCY
0 - 2	0 - 1	VERY SOFT
3 - 5	2 - 4	SOFT
6 - 7	5 - 6	FIRM
8 - 15	7 - 12	STIFF
16 - 30	13 - 24	VERY STIFF
OVER 30	OVER 24	HARD

CORRELATION OF N - VALUES WITH HARDNESS DESCRIPTION

LIMEROCK

N - VALUE	RELATIVE DENSITY
0 - 50	SOFT
51 - 50/0"	HARD

APPROXIMATE FINES CONTENT — MODIFIERS

5% TO 12%	SLIGHTLY SILTY OR SLIGHTLY CLAYEY
12% TO 25%	SILTY OR CLAYEY
26% TO 49%	VERY SILTY OR VERY CLAYEY

APPROXIMATE SHELL CONTENT — MODIFIERS

0% TO 5%	NO MENTION
5% TO 12%	SLIGHTLY SHELLY
13% TO 30%	SHELLY
31% TO 50%	VERY SHELLY

APPROXIMATE ORGANIC CONTENT — MODIFIERS

2.5% TO 5%	WITH A TRACE
5% TO 20%	WITH ORGANICS
20% TO 75%	HIGHLY ORGANIC
75% TO 100%	PEAT

DEFINITION OF DESCRIPTIVE TERMS OF MODIFIERS FOR SILTS/CLAYS/SHELLS/GRAVELS ARE DESCRIBED AS FOLLOWS:

PERCENTAGE OF MODIFIER MATERIAL	FIRST QUALIFIER	SECOND QUALIFIER
5 - 12	SLIGHTLY + MODIFIER + Y	WITH A LITTLE
12 - 30	MODIFIER + Y	WITH SOME
30 - 50	VERY + MODIFIER + Y	AND

RECORD OF TEST BORINGS

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Appendix E - Discussion of Soil Groups

DISCUSSION OF SOIL GROUPS

COARSE GRAINED SOILS

GW and SW GROUPS. These groups comprise well-graded gravelly and sandy soils having little or no plastic fines (less than 5 percent passing the No. 200 sieve). The presence of the fines must not noticeably change the strength characteristics of the coarse-grained fraction and must not interface with it's free-draining characteristics.

GP and SP GROUPS. Poorly graded gravels and sands containing little of no plastic fines (less than 5 percent passing the No. 200 sieve) are classed in GP and SP groups. The materials may be called uniform gravels, uniform sands or non-uniform mixtures of very coarse material and very fine sands, with intermediate sizes lacking (sometimes called skip-graded, gap-graded or step-graded). This last group often results from borrow pit excavation in which gravel and sand layers are mixed.

GM and SM GROUPS. In general, the GM and SM groups comprise gravels or sands with fines (more than 12 percent passing the No. 200 sieve) having low or no plasticity. The plasticity index and liquid limit of soils in the group should plot below the "A" line on the plasticity chart. The gradation of the material is not considered significant and both well and poorly graded materials are included.

GC and SC GROUPS. In general, the GC and SC groups comprise gravelly or sandy soils with fines (more than 12 percent passing the No. 200 sieve), which have a fairly high plasticity. The liquid limit and plasticity index should plot above the "A" line on the plasticity chart.

FINE GRAINED SOILS

ML and MH GROUPS. In these groups, the symbol M has been used to designate predominantly silty material. The symbols L and H represent low and high liquid limits, respectively, and an arbitrary dividing line between the two is set at a liquid limit of 50. The soils in the ML and MH groups are sandy silts, clayey silts or inorganic silts with relatively low plasticity. Also included are loess type soils and rock flours.

CL and CH GROUPS. In these groups the symbol C stands for clay, with L and H denoting low or high liquid limits, with the dividing line again set at a liquid limit of 50. The soils are primarily inorganic clays. Low plasticity clays are classified as CL and are usually lean clays, sandy clays or silty clays. The medium and high plasticity clays are classified as CH. These include the fat clays, gumbo clays and some volcanic clays.

OL and OH GROUPS. The soil in the OL and OH groups are characterized by the presence of organic odor or color, hence the symbol O. Organic silts and clays are classified in these groups. The materials have a plasticity range that corresponds with the ML and MH groups.

HIGHLY ORGANIC SOILS

The highly organic soils are usually very soft and compressible and have undesirable construction characteristics. Particles of leaves, grasses, branches, or other fibrous vegetable matter are common components of these soils. They are not subdivided and are classified into one group with the symbol PT. Peat humus and swamp soils with a highly organic texture are typical soils of the group.