CITY OF TAMPA, FLORIDA

GEOTECHNICAL REPORT FOR

Contract 27-C-00004 Lantana-Poinsettia Stormwater Pumping Station Replacement

This report for the referenced projects come from uncontrolled sources and do not conform to WCAG 2.1 at level AA. Individuals with disabilities seeking assistance with the individual project plans or specifications should e-mail Contractadministration@tampagov.net.

City of Tampa

Contract Administration Department

Tampa Municipal Office Building

306 E Jackson Street #280A4N Fourth Floor

Tampa, Florida 33602

OCTOBER 2026

Report of Geotechnical Exploration

For

North Lantana Avenue and East Poinsettia Avenue - Pump Station

MAE Project No. 0135-0001.05
April 11, 2019

Prepared for:

Prepared by:

3110 Cherry Palm Drive, Suite 370
Tampa, Florida 33619
(813) 252-5585

Brett Harbison, State of Florida, Professional Engineer, License No. 74679. This item has been electronically signed and sealed by Brett Harbison, P.E. on 04/11/2019 using a Digital Signature. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

TEN YEARS
MAE
Meskel & Associates Engineering
Geotechnical ⌜ Environmental
Inspection ⌜ Testing

April 11, 2019

Ms. Barbara Graves
City of Tampa
TSS Stormwater Engineering
306 E. Jackson Street
Tampa, Florida 33602

Reference: Report of Geotechnical Exploration
North Lantana Avenue and East Poinsettia Avenue – Pump Station
Tampa, Florida
MAE Project No. 0135-0001.05

Dear Ms. Graves:

Meskel & Associates Engineering, PLLC has completed a geotechnical exploration for the subject project. Our work was performed in general accordance with our proposal dated February 11, 2019. The geotechnical exploration was performed to evaluate the general subsurface conditions within the proposed Lantana Avenue and Poinsettia Avenue Pump Station, and to provide a general soil profile with an estimated seasonal high groundwater level for the proposed pump station design. A summary of our findings is presented below for your convenience; however, we recommend that this report be considered in its entirety.

As further discussed in this report, the borings encountered loose fine sands (SP) to a depth of approximately 6 feet, underlain by loose clayey fine sands (SC) to approximately 18.5 feet, followed by firm to soft clays (CH) to approximately 28.5 feet, and then loose clayey fine sands (SC) to the boring termination depth of 30 feet below the existing ground surface.

Based on our evaluation of the encountered subsurface conditions, it is our opinion that the proposed pump station equipment may be supported on a concrete slab-on-grade foundation system, and the wet-well can be constructed as a cast-in-place concrete structure with a concrete slab floor, provided the site preparations provided in this report are followed.

We appreciate this opportunity to be of service as your geotechnical consultant on this phase of the project. If you have any questions, or if we may be of any further service, please contact us.

Sincerely,
MESKEL & ASSOCIATES ENGINEERING, PLLC
MAE FL Certificate of Authorization No. 28142

Brett H Harbison
Digitally signed by Brett H Harbison
Date: 2019.04.11 13:20:51 -04'00'

W. Josh Mele, E.I.
Staff Engineer

Brett Harbison, P.E.
Director, Geotechnical Services
Registered, Florida No. 74679

Distribution: Ms. Barbara Graves – The City of Tampa pdf

TABLE OF CONTENTS

Subject **Page No.**

1.0 PROJECT INFORMATION 1
1.1 General 1
1.2 Project Description 1
2.0 FIELD EXPLORATION 1
2.1 SPT Borings 1
3.0 LABORATORY TESTING 2
3.1 Visual Classification 2
3.2 Index Tests 2
3.3 Soil Permeability Testing 2
4.0 GENERAL SUBSURFACE CONDITIONS 2
4.1 General Soil Profile 2
4.2 Groundwater Level 3
4.3 Review of the USDA Web Soil Survey Map 3
4.4 Seasonal High Groundwater Level 3
5.0 DESIGN RECOMMENDATIONS 4
5.1 General 4
5.2 Pump Station Foundations Recommendations 4
5.3 Below Grade Structures Design Recommendations 5
5.4 Soil Permeability 6
5.5 Reuse of Onsite Soils 6
6.0 SITE PREPARATION AND EARTHWORK RECOMMENDATIONS 6
6.1 Clearing and Stripping 6
6.2 Temporary Groundwater Control 7
6.3 Surface Compaction 7
6.4 Compaction of Excavation Bottom and Backfilling 8
6.5 Structural Backfill and Fill Soils 8
6.6 Foundation Areas 9
6.7 Excavation Protection 9
7.0 QUALITY CONTROL TESTING 9
8.0 REPORT LIMITATIONS 9

FIGURES

Figure 1. Site Location Map
Figure 2. Boring Location Plan
Figure 3. Generalized Soil Profiles

APPENDICES

Appendix A. Soil Boring Logs
Field Exploration Procedures
Key to Boring Logs
Key to Soil Classification
Appendix B. Summary of Laboratory Test Results
Laboratory Test Procedures

1.0 PROJECT INFORMATION

1.1 General

Project information was provided to us by Ms. Barbra Graves and Mr. Tim Knisely with the City of Tampa (COT). We were provided with a Request for Proposal (RFP) dated January 31, 2019, which outlined the requested scope of services for this project. The RFP also included a Topographic Survey of the project area, prepared by Suncoast Land Surveying, Inc., dated November 29, 2018, which shows the location of the requested soil borings.

1.2 Project Description

The site for the subject project is a gated parcel owned by the City of Tampa, located within the western area of the T-intersection of North Lantana Avenue and East Poinsettia Avenue in Tampa, Florida. The general site location is shown on Figure 1.

We understand that the proposed pump station surface equipment will be supported on concrete slab-on-grade foundation system. We also understand that a base concrete slab will be constructed at the bottom of the proposed wet well structure. We have assumed the planned wet well will be constructed of cast-in-place concrete. We were informed by Mr. Knisely that the wet well dimensions will be 6.34 by 12.34 feet, and the depth of the planned wet well (from ground surface to the bottom base footing) is approximately 9 feet below the existing grade. For our geotechnical analysis, we have assumed that the total loads will not exceed 2,000 pounds per square foot (psf) at grade, and the total applied load of the wet well structure will not exceed 1,500 psf. Grading plans were not provided at the time of our evaluation; however, we have assumed maximum fill heights of no more than 1 to 2 feet above the current grades.

In addition, we were informed by Mr. Knisley that the project will not include a pond expansion at this time, but may include a dredging effort; however, details on this future operation was not provided.

If actual project information varies from these conditions, then the recommendations in this report may need to be re-evaluated. Any changes in these conditions should be provided so the need for re-evaluation of our recommendations can be assessed prior to final design.

2.0 FIELD EXPLORATION

A field exploration was performed on February 25, 2019. A copy of the topographic survey provided to us, which shows the approximate boring locations, is included as the *Boring Location Plan*, Figure 2. The boring locations were determined in the field by our personnel using taped measurements from existing roadways and survey controls adjacent to the site and should be considered approximate.

2.1 SPT Borings

To explore the subsurface conditions within the area of the proposed structure, we located and performed two Standard Penetration Test (SPT) borings. Boring B-1 was initially advanced using a hand-held bucket auger to a depth of 4 feet below existing grade to avoid potential utility conflicts. The portion of the boring performed using a hand auger was performed in general accordance with the methodology outlined in ASTM D 1452. The boring was then continued as an SPT boring to a depth of 30 feet below the

existing ground surface. The SPT portion of each boring was continuously sampled to a depth of 10 feet, and thereafter sampled at 5-foot centers in general accordance with the methodology outlined in ASTM D-1586. The bucket auger and split-spoon soil samples recovered during performance of the borings were visually described in the field by the field crew, and representative portions of the samples were transported to our laboratory for classification and testing. Each borehole was backfilled with a cementitious grout upon completion. A summary of the field procedures is included in Appendix A.

3.0 LABORATORY TESTING

3.1 Visual Classification

Representative soil samples obtained during our field exploration were visually classified by a geotechnical engineer using the Unified Soil Classification System (USCS) in general accordance with ASTM D 2488. A *Key to the Soil Classification System* is included in Appendix A.

3.2 Index Tests

Quantitative laboratory testing was performed on selected samples of the soils encountered during the field exploration to better define the composition of the soils encountered and to provide data for correlation to their anticipated strength and compressibility characteristics. The laboratory testing determined the Atterberg limits, the natural moisture and the percent of fine material passing a U.S. No. 200 sieve (percent fines) content of selected soil samples. The results of the laboratory testing are shown in the *Summary of Laboratory Test Results* included in Appendix B. Also, these results are shown on the *Generalized Soil Profiles* on Figure 3, and on the *Log of Boring* records at the respective depths from which the tested samples were recovered.

3.3 Soil Permeability Testing

Our laboratory testing program also included performing constant head permeability testing, performed in general accordance with ASTM D 5084, on the bulk samples collected adjacent to borings B-1 and B-2. Each sample was remolded using medium compaction effort and measured before the sample was introduced into the flexible membrane permeameter. The specimens were then allowed to saturate to a B value greater than or equal to 95 percent prior to hydraulic conductivity testing. The results of the permeability tests are presented in Section 5.4.

4.0 GENERAL SUBSURFACE CONDITIONS

4.1 General Soil Profile

Graphical presentation of the generalized subsurface conditions is presented on Figure 3. Detailed boring records are included in Appendix A. When reviewing these records, it should be understood that the soil conditions will vary between the boring locations. The following table summarizes the soil conditions encountered.

GENERAL SOIL PROFILE – PUMP STATION			
TYPICAL DEPTH (ft)		SOIL DESCRIPTION	USCS[1]
FROM	TO		
0	6	Loose fine sand to fine sand with silt	SP/SP-SM
6	18.5	Loose to medium dense clayey fine sand	SC
18.5	28.5	Firm to soft silty clay	CH
28.5	30	Loose clayey fine sand	SC
(1) Unified Soil Classification System			

4.2 Groundwater Level

The groundwater level was encountered at each of the boring locations and recorded at the time of drilling at an approximate depth of 5.5 feet below the existing ground surface. However, it should be anticipated that the groundwater levels will fluctuate seasonally and with changes in climate. As such, we recommend that the water table be verified prior to construction. Measured groundwater levels are shown the boring profiles and boring logs.

4.3 Review of the USDA Web Soil Survey Map

The results of a review of the USDA Soil Survey Conservation Service (SSCS) Web Soil Survey of Hillsborough County are shown in the table below. There is one predominant soil map unit at the project sight: Zolfo fine sand. The soil drainage class, hydrological group, and estimated seasonal high groundwater level reported in the Soil Survey are as follows:

Map Unit Symbol	Map Unit Name	Drainage Class	Hydrologic Group	Depth to the Water Table[1] (inches)
61	Zolfo fine sand, 0 to 2 percent slopes	Somewhat Poorly Drained	A	18 to 42

[1] The "Water Table" above refers to a saturated zone in the soil which occurs during specified months, typically the summer wet season. Estimates of the upper limit shown in the Web Soil Survey are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

4.4 Seasonal High Groundwater Level

In estimating seasonal high groundwater level, a number of factors are taken into consideration including antecedent rainfall, soil redoximorphic features (i.e., soil mottling), stratigraphy (including presence of hydraulically restrictive layers), vegetative indicators, effects of development, and relief points such as drainage ditches, low-lying areas, etc.

Based on our interpretation of the current site conditions, including the boring logs and review of published data, we estimate the seasonal high groundwater levels at the site to be generally 1 to 2 feet

above the water levels measured at the time of our field work.

It is possible that higher groundwater levels may exceed the estimated seasonal high groundwater level as a result of significant or prolonged rains. Therefore, we recommend that design drawings and specifications account for the possibility of groundwater level variations, and construction planning should be based on the assumption that such variations will occur.

5.0 DESIGN RECOMMENDATIONS

5.1 General

The following evaluation and recommendations are based on the provided project information as presented in this report, results of the field exploration and laboratory testing performed, and the construction techniques recommended in Section 6.0 below. If the described project conditions are incorrect or changed after this report, or subsurface conditions encountered during construction are different from those reported, MAE should be notified so these recommendations can be re-evaluated and revised, if necessary. We recommend that MAE review the foundation plans and earthwork specifications to verify that the recommendations in this report have been properly interpreted and implemented.

5.2 Pump Station Foundations Recommendations

Based on the results of our exploration, we consider the subsurface conditions at the site adaptable for support of the proposed pump station equipment on a slab-on-grade foundation. Provided the site preparation and earthwork construction recommendations outlined in Section 6.0 of this report are performed, the following parameters may be used for design of below-grade utilities.

5.2.1 Bearing Pressure

The maximum allowable net soil bearing pressure for use in slab-on-grade design should not exceed 2,000 psf. The maximum allowable net soil bearing pressure for the wet well base slab should not exceed 1,500 psf. Net bearing pressure is defined as the soil bearing pressure at the foundation bearing level in excess of the natural overburden pressure at that level. The slab-on-grade and wet well base slab foundations should be designed based on the maximum load that could be imposed by all loading conditions.

5.2.2 Bearing Depth

The slab-on-grade supporting surface equipment should bear at a depth of at least 12 inches below the exterior final grades. It is recommended that stormwater be diverted away from these slabs to reduce the possibility of erosion beneath the slabs.

5.2.3 Bearing Material

The subgrade soils below the slab-on-grade should consist of suitable on-site or import structural fill soils. The fine sands (SP) and fine sands with silt (SP-SM) as encountered in the borings are considered suitable onsite soils. These soils should be compacted to at least 95 percent of the soil's modified Proctor Maximum Dry Density (ASTM D-1557) to a depth of at least one foot below the slab bearing levels. Control of the soil's moisture content, particularly for the subgrade soils below the wet well slab, will be necessary to achieve the required level of compaction.

It should be noted that due to the clayey soils encountered at the planned bearing depth of the wet well floor slab, we recommend the wet well bearing depth be continued at least an additional 12 inches and be backfilled with a graded No. 57 stone to provide a stable bearing platform for the wet well base as discussed in Section 6.4 below.

5.3 Below Grade Structures Design Recommendations

Based on the results of the subsurface explorations, laboratory testing, and provided information, as included in this report, we consider the subsurface conditions at the site adaptable for supporting the proposed pump station wet well structure when constructed upon properly prepared subgrade soils. Provided the site preparation and earthwork construction recommendations outlined in Section 6.0 of this report are performed, the following parameters may be used for design of below-grade utilities.

5.3.1 Lateral Pressure Design Parameters

In general, walls that have adjacent compacted fill will be subjected to lateral earth pressures. Walls that are restrained at the top and bottom will be subjected to at-rest soil pressures, while walls that are not restrained at the top, and where sufficient movement is anticipated, will be subjected to active earth pressures. Surcharge effects for sloped backfill, point or area loads behind the walls, and adequate drainage provisions should be incorporated in the wall design. Passive resistance, resulting from footing embedment at the wall toe, could be neglected for safer design. The following soil parameters can be used for the project where suitable fill soils, as described in Section 6.5, are placed adjacent to the overflow structure:

- Backfill Soil Unit Weight, Saturated (γ_{sat}) = 115 pcf
- Backfill Soil Unit Weight, Moist (γ_m) = 110 pcf
- Backfill Soil Angle of Internal Friction (ϕ) = 30 degrees
- Coefficient of Active Earth Pressure, k_a = 0.33
- Coefficient of At-Rest Earth Pressure, k_o = 0.5
- Coefficient of Passive Earth Pressure, k_p = 3.0
- Foundation Soil Unit Weight, Saturated (γ_{sat}) = 120 pcf
- Foundation Soil Angle of Internal Friction (ϕ) = 30 degrees

The above parameters are based on sand backfill (SP, SP-SM) placed and compacted behind the vault walls as discussed in Section 6.5, and on compaction of the wall foundation soils as discussed in Section 6.6. A coefficient of friction for poured in-place concrete of 0.45 may be used in the wall design. The wet well structure should be designed to include all temporary construction and permanent traffic and surcharge loads acting on the walls.

5.3.2 Hydrostatic Uplift Resistance

It is anticipated that the buried structure will exert little or no net downward pressure on the soils, rather, the structure may be subject to hydrostatic uplift pressure when empty. Below grade structures should be designed to resist hydrostatic uplift pressures appropriate for their depth below existing grade and the seasonal high groundwater table. Hydrostatic uplift forces can be resisted in several ways including:

- Addition of dead weight to the structure.
- Mobilizing the dead weight of the soil surrounding the structure through extension of the bottom

slab outside the perimeter of the structure.

A moist compacted soil unit weight of 110 lb/ft^3 may be used in designing the wet well structure to resist buoyancy.

5.4 Soil Permeability

Two constant head permeability tests were performed in general accordance with ASTM D 5084, on the bulk samples collected adjacent to borings B-1 and B-2. Each sample was remolded using medium compaction effort and measured before the sample was introduced into the flexible membrane permeameter. The specimens were then allowed to saturate to a B value greater than or equal to 95 percent prior to hydraulic conductivity testing. The results of the laboratory constant head permeability tests indicated the following permeability values:

Test Location	Test Depth (feet)	Measured Permeability (cm/s)
B-1	5	6.77×10^{-4}
B-2	5	2.78×10^{-3}

The measured permeability rates should not be construed to represent the actual pond exfiltration rate. For design purposes, we recommend a safety factor of 2.5 be applied to the above permeability rate values.

5.5 Reuse of Onsite Soils

Based on the boring results and classification of the soil samples, the fine sands and fine sands with silt (SP, SP-SM) as encountered at the boring locations, are considered suitable for use as fill soil. Clayey soils (SC, CH) as encountered at the borings from 6 feet to the boring termination depths, are not considered suitable for reuse as structural fill or backfill material. These soils should be excavated and stockpiled a safe distance from the construction area to be removed from the site. The soils containing surficial organic material (e.g., topsoil) will require removal and are considered unsuitable for use as structural fill. The organic soils could be used in landscape berms and areas to be grassed.

It should be anticipated the soils excavated from below the groundwater table will have moisture contents in excess of the modified Proctor optimum moisture content and will require stockpiling or spreading to bring the moisture content within 2 percent of the soil's optimum moisture content corresponding to the required degree of compaction.

6.0 SITE PREPARATION AND EARTHWORK RECOMMENDATIONS

Site preparation as outlined in this section should be performed to provide more uniform foundation bearing conditions, to reduce the potential for post-construction settlements of the planned pump station structure.

6.1 Clearing and Stripping

Prior to construction, the location of existing underground utility lines within the construction area should be established. Provisions should then be made to relocate interfering utilities to appropriate locations. It should be noted that, if underground pipes are not properly removed or plugged, they may serve as

conduits for subsurface erosion, which may subsequently lead to excessive settlement of overlying structures.

The "footprint" of the proposed slab-on-grade foundation plus a minimum additional margin of 5 feet, should be stripped of all surface vegetation, stumps, debris, organic topsoil, or other deleterious materials. During grubbing operations, roots with a diameter greater than 0.5-inch, stumps, or small roots in a concentrated state, should be grubbed and completely removed.

Based on visual inspection, it should be anticipated that 6 to 12 inches of topsoil and soils containing significant amounts of organic materials may be encountered across the site. The actual depths of unsuitable soils and materials should be determined by MAE using visual observation and judgment during earthwork operations. Any topsoils removed from the construction areas can be stockpiled and used in areas to be grassed.

6.2 Temporary Groundwater Control

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

Note that discharge of produced groundwater to surface waters of the state from dewatering operations or other site activities is regulated and requires a permit from 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. MAE can provide the sampling, testing, and professional consulting required to evaluate compliance with the regulations.

6.3 Surface Compaction

The exposed surface areas outside of the excavation should be compacted with a vibratory drum roller having a minimum static, at-drum weight, on the order of 3 tons. Typically, the material should exhibit moisture contents within ±2 percent of the modified Proctor optimum moisture content (ASTM D 1557) during the compaction operations. Compaction should continue until densities of at least 95 percent of the modified Proctor maximum dry density (ASTM D 1557) have been achieved within the upper 2 feet of the compacted natural soils at the sites. Prior to compaction, proof-rolling of these areas with a loaded dump truck is recommended to locate any unforeseen soft areas or unsuitable surface or near-surface soils.

Should the surface soils experience pumping and soil strength loss during the compaction operations, compaction work should be immediately terminated. The disturbed soils should be removed and backfilled with dry structural fill soils, which are then compacted, or the excess moisture content within the disturbed soils should be allowed to dissipate before recompacting.

Care should be exercised to avoid damaging any nearby structures while the compaction operation is underway. Prior to commencing compaction, occupants of adjacent structures should be notified, and

the existing conditions of the structures should be documented with photographs and survey. Compaction should cease if deemed detrimental to adjacent structures, and MAE should be contacted immediately. It is recommended that the vibratory roller remain a minimum of 50 feet from existing structures. Within this zone, use of a track-mounted bulldozer or a vibratory roller, operating in the static mode, is recommended.

6.4 Compaction of Excavation Bottom and Backfilling

Once the clearing and stripping has been completed, excavation for the wet well may commence. The excavations should extend at least 5 feet in all directions outside the lateral dimensions of the structure. Once the wet well excavation has achieved the target depth, backfill placement can commence. The temporary dewatering method should remain in-place to facilitate compaction of the bottom soils for the wet well, and to facilitate the backfilling operation. The bottom soils for the wet well slab should be compacted to 95 percent of their modified Proctor maximum dry density for a depth of 12 inches below subgrade elevation. It should be noted, the borings encountered loose clayey sands (SC) and firm to soft silty clays (CH) from approximately 6 feet to the boring termination depths. Therefore, we recommend the excavation for the wet well bearing depth be continued at least an additional 12 inches and be backfilled with a graded No. 57 stone to provide a stable bearing platform for the wet well base. The excavation bottom soils should be overlain with a filter fabric to act as a separation layer between the clayey soils and the stone backfill. The fabric should continue up the sides of the excavation to separate the soil backfill from the adjacent silty soils. The stone should be placed in 2 lifts of equal thickness but with no lift greater than 12 inches thick, with each lift compacted to form a stable working surface.

Backfill soil placed against the sides of the structure above the subgrade stone should consist of sand soils as defined in Section 6.5 below. The backfill should be placed in maximum 6-inch lifts, with each lift compacted with hand-held equipment as defined in Section 6.5. Backfill placed more than 5 feet away from the structure walls may be placed in lifts up to 12 inches in thickness, with each lift compacted with appropriate compaction equipment to achieve the same level of compaction. Dewatering should remain in place until the level of backfill is at least 2 feet above the groundwater table at the time of construction.

6.5 Structural Backfill and Fill Soils

Any structural backfill or fill required for site development should be placed in loose lifts not exceeding 12 inches in thickness and compacted by the use of the above described vibratory drum roller operating in static mode or a track-mounted bulldozer if compaction operations are within 50 feet of a nearby structure. The lift thickness should be reduced to 8 inches if the roller operates in the static mode or if track-mounted compaction equipment is used. If hand-held compaction equipment is used, the lift thickness should be further reduced to 6 inches.

Structural fill is defined as a non-plastic, inorganic, granular soil having less than 10 percent material passing the No. 200 mesh sieve and containing less than 4 percent organic material. The fine sand and slightly silty or clayey fine sand, without roots, as encountered in the borings, are suitable as fill materials and, with proper moisture control, should densify using conventional compaction methods. It should be noted that soils with more than 12 percent passing the No. 200 sieve will be more difficult to compact, due to their nature to retain soil moisture, and may require drying. Typically, the material should exhibit moisture contents within ±2 percent of the modified Proctor optimum moisture content (ASTM D 1557) during the compaction operations. Compaction should continue until densities of at least 95 percent of the modified Proctor maximum dry density (ASTM D 1557) have been achieved within each lift of the compacted structural fill.

We recommend that material excavated from the wet well, which will be reused as backfill, be stockpiled a safe distance from the excavations and in such a manner that promotes runoff away from the open trenches and limits saturation of the materials.

6.6 Foundation Areas

The foundation bearing level soils, after compaction, should exhibit densities equivalent to 95 percent of the modified Proctor maximum dry density (ASTM D 1557), to a depth of one foot below the bearing level. For confined areas, such as the footing excavations, any additional compaction operations can probably best be performed by the use of a lightweight vibratory sled or roller having a total weight on the order of 500 to 2000 pounds.

6.7 Excavation Protection

Excavation work for the pump station construction will be required to meet OSHA Excavation Standard Subpart P regulations for Type C Soils. The use of excavation support systems will be necessary where there is not sufficient space to allow the side slopes of the excavation to be laidback to at least 2H:1V (2 horizontal to 1 vertical) to provide a safe and stable working area and to facilitate adequate compaction along the sides of the excavation.

The method of excavation support should be determined by the contractor but can consist of a trench box, drilled-in soldier piles with lagging, interlocking steel sheeting or other methods. The support structure should be designed according to OSHA sheeting and bracing requirements by a Florida registered Professional Engineer.

7.0 QUALITY CONTROL TESTING

A representative number of field in-place density tests should be made in the upper 2 feet of compacted natural soils, in each lift of compacted backfill and fill, and in the upper 12 inches below the bearing levels in the footing excavations. The density tests are considered necessary to verify that satisfactory compaction operations have been performed. We recommend density testing be performed as listed below:

- one location for every 5,000 square feet of slab foundation area;
- one test per lift of backfill placed against the wet well walls.

8.0 REPORT LIMITATIONS

This report has been prepared for the exclusive use of the City of Tampa for specific application to the design and construction of the *North Lantana Avenue and East Poinsettia Avenue – Pump Station* project. An electronically signed and sealed version, and a version of our report that is signed and sealed in blue ink, may be considered an original of the report. Copies of an original should not be relied on unless specifically allowed by MAE in writing. Our work for this project was performed in accordance with generally accepted geotechnical engineering practice. No warranty, express or implied, is made.

The analyses and recommendations contained in this report are based on the data obtained from this project. This testing indicates subsurface conditions only at the specific locations and times, and only to the depths explored. These results do not reflect subsurface variations that may exist away from the boring locations and/or at depths below the boring termination depths. Subsurface conditions and water

levels at other locations may differ from conditions occurring at the tested locations. In addition, it should be understood that the passage of time may result in a change in the conditions at the tested locations. If variations in subsurface conditions from those described in this report are observed during construction, the recommendations in this report must be re-evaluated.

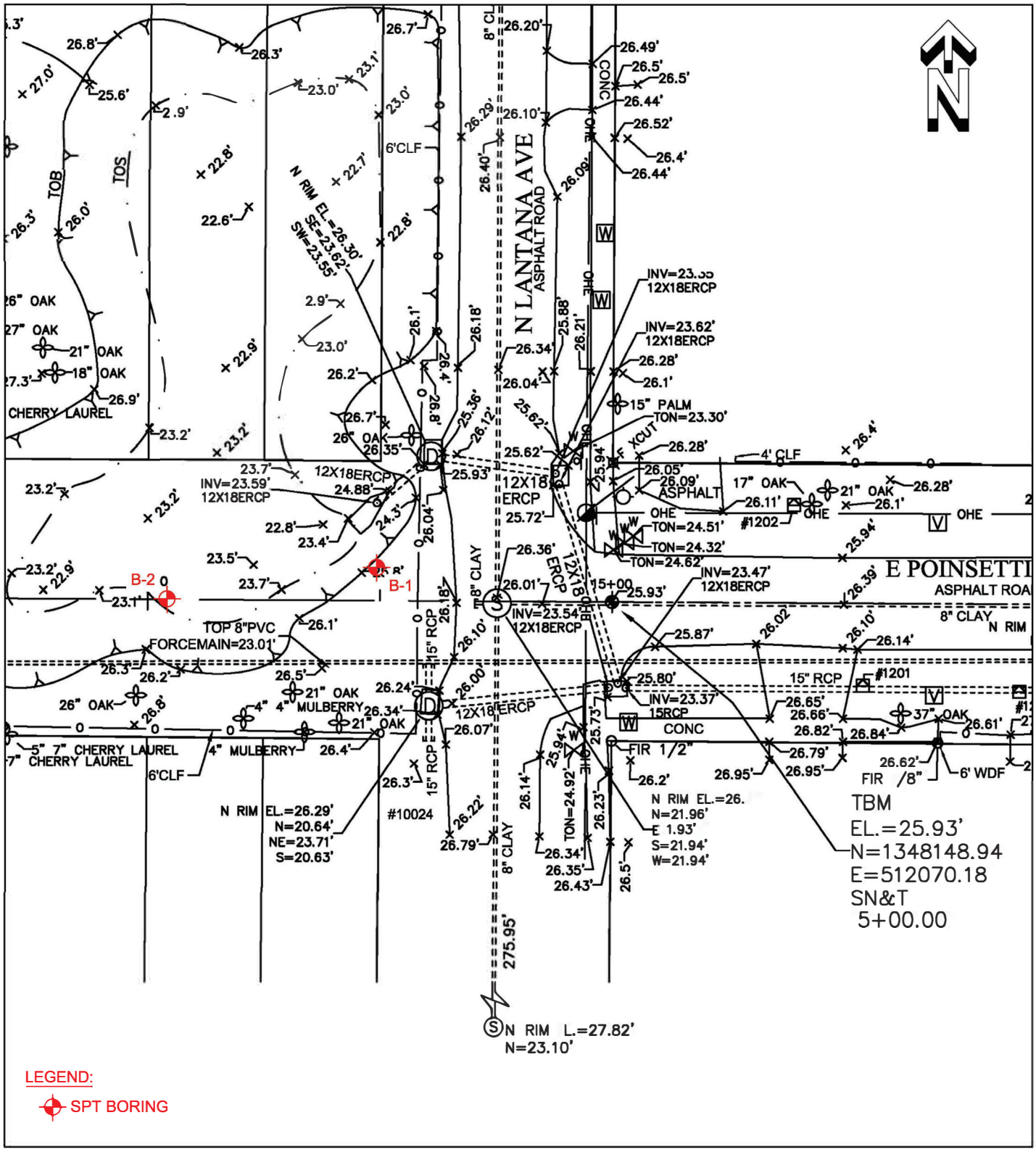
The scope of our services did not include any environmental assessment or testing for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the subject site. Any statements made in this report, and/or notations made on the generalized soil profiles or boring logs, regarding odors or other potential environmental concerns are based on observations made during execution of our scope of services and as such are strictly for the information of our client. No opinion of any environmental concern of such observations is made or implied. Unless complete environmental information regarding the site is already available, an environmental assessment is recommended.

If changes in the design or location of the pump station structure occur, the conclusions and recommendations contained in this report may need to be modified. We recommend that these changes be provided to us for our consideration. MAE is not responsible for conclusions, interpretations, opinions or recommendations made by others based on the data contained in this report.



Site Location Map

PREPARED BY	PROJECT NAME	
Meskel & Associates Engineering	**N Lantana Ave and E Poinsettia Ave-Pump Station and Retention Pond Expansion Tampa, Florida**	
	REFERENCE	SCALE
	Delorme XMap 7.0	NTS
PREPARED FOR	MAE PROJECT NO.	**FIGURE NO.**
City of Tampa	0135-0001.05	1



eference: opographic Survey dated 11/29/2018 was provided by City of Tampa.

Boring Location Plan

PREPARED BY	PROJECT NAME	
Meskel & Associates Engineering FL Certificate of Authorization No. 28142 3110 Cherry Palm Drive Suite 370, Tampa, FL 33619	N Lantana Ave and E Poinsettia Ave-Pump tation and Retention Pond Expansion Tampa, Florida	
	DATE	SCALE
	3/11/2019	NTS
PREPARED FOR	MAE PROJECT NO.	FIGURE NO.
City of Tampa	0135-0001.05	2

B-1
Latitude 28°0 ' 30.46"N
Longitude: 82° 6'48.82"W

N

HA
w = 14
-200 = 4
Gr y fine SAND, tr ce lt nd root fr g e t , poorly graded. (SP)

7
w = 28
-200 = 36
6
Loo e, Light gr y cl yey fine SAND, poorly gr ded. (SC)

6
Loo e, Light gr y very clayey fine SAND, poorly graded. (SC)

6
Loo e, Light gr y cl yey fine SAND w th silt, poorly graded. (SC)

w = 59
-200 = 71
LL = 161
I = 132
3
Firm, L ght greenish gray dy lty CLAY. (CH)

2
Soft, Very p le brow ilty CLAY. (CH)

Loo e, Very p le brow clayey fine SAND w th highly weathered l estone, poorly graded. (SC)

7
Loo e, Light brow h gr y clayey fine SAND w th gravel (highly weathered l estone), poorly graded. (SC)

BT @ 30.'
D te Drilled: 2/25/2019
Boring Grouted upon Termi at o .

B-
Latitude 28°0 ' 30.37"N
Longitude: 82° 6'49.17"W

N

5
Loo e, Light gr y fine SAND, tr ce root fr g e t , poorly graded. (SP)

4
Loo e, P le brow fine SAND, poorly gr ded. (S)

9
Med u de e, Wh te fine SAND w th silt, poorly graded. (SP-SM)

9
Med u de e, Very light gr y fine SAND w th s lt, poorly graded. (SP-SM)

10
Med u de e, Light gr y cl yey fine SAND, poorly gr ded. (SC)

w = 21
-200 = 18
LL = 79
I = 50
6
Loo e, Brow clayey fine SAND, poorly gr ded. (SC)

3
Fr , Light gree h gr y ilty CLAY. (CH)

1
Soft, Brow ilty CLAY. (CH)

Loo e, Light olive gr y clayey fine SAND w th gr vel (h ghly we thered lime to e), poorly gr ded. (SC)

5

BT @ 30.'
D te Drilled: 2/25/2019
Boring Grouted upon Termi at o .

Depth (ft)

0 5 10 15 20 25 30 35

F e S d
F e S d w th S lt
Clayey F e S d
Clay

Legend

N St dard enetrat on Resi t ce, Blows/Foot
BT Bor g Ter ted t Depth Below Ex t g Gr de
(SP) U ified So l Cl fic tio Sy te (USCS)
Depth to Grou dw ter at T e of Dr lling
w N tur l Mo ture Co te t (%)
-200 % P g No. 200 U.S. Sta d rd S eve
LL L quid L t
HA Bor g Adv ced by h d-held bucket auger due to possible underground ut lit e .
PI l tic ty Index

REVISIONS					
DATE	BY	DESCRIPTI N	DATE	BY	DESCRIPTI N

BRETT H HARBIS N, P E P E NO : 74679
TEN YEARS
Meskel & Associates Engineering
FL Cer ifica e of Authorization No 28142
3110 Cherry Palm Drive, Sui e 370, Tampa, FL 33619

City of T

DATE:	MAE PR JECT N
3/20/2019	0135-0001.05

SHEET TITLE:
Generalized Soil rof les

PR JECT NAME:
N Lantana Ave and E o ettia Ave- u p Station and Retention Pond Expans o
Ta pa, Flor da

FI E N
3

Appendix A

Meskel & ssociates Engineering, P C
FL Certific te of Authorization No. 28142
3110 Cher y Palm Drive, Suite 70
T m a, FL 33619
P: (813)252-5585 F: (904)519- 992

Meskel & Associates Engineering

BORING B-1

PROJECT NO. 0135-0001.05

PROJECT N ME N Lantana Ave and E Poinsettia Ave-Pump Station and Retention Pond Ex nsion

PROJECT OC TION Tampa, Florid **CLIENT** City of Tam

TE ST RTE 2/25/19 **COMP ETE** 2/25/19 **TIT E** 28°02'30.46"N **LONGIT E** 82°26'48.82"W

RIL ING CONTR CTOR Swint Drilling Services, Inc. **RIL ING METHO** Standa d Penetration Test

OGGE D BY CB **CHECKED BY** W. Josh Mele **GROUND ELEV TION** — **H MMER TYPE** Autom tic

DEPTH (ft)	SAMPLE DEPTH NUMBER	MATERIAL DESCRIPTION	USCS	GRAPHIC LOG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0	1	y fine SAND , t ce silt nd root f gments, poorly gr ded.	SP											
	2													
5		▽					14	4						
	4	Loose, Light gray clayey fine SAND, oo ly graded.	SC		4 4	7								
	5				2 4		28							
10		Loose, Light gray ve y clayey fine SAND, oo ly graded.	SC											
15					2									
		Loose, Light gray clayey fine SAND with silt, poorly gr ded.	SC											
20	7	Firm, Light greenish gray silty CLAY.	CH		WOH 1 2		59	71		161	1 2			

NOTES *Boring Advanced by h nd-hel bucket uger to 6 f et ue to possible un rgroun utilities.*

GRO N TER EVELS

▽ **T TIME OF DRI ING** 5 ft 6 in *▽ **EN OF Y** ---

(Continued t age)

NEW MAE LOG LAT/LONG-EOD - NEW TEMPLATE 7-30-12.GDT - 3/20/19 10:53 - F:\GINT\GINT FILES\PROJECTS\0135-0001.05\LANTANA.GPJ

Meskel & Associates Engineering, PLLC
F Cert f cate of Author zat on No. 28142
3110 Cher y Pal Dr ve, Suite 370
Ta pa, FL 33619
P: (813)252-5585 F: (904)519-6992

Meskel & Associates Engineering

BORING B-

PROJ C NO. 0135-0001.05

PROJ C NAM N Lantana Ave and E Poinsettia Ave-Pump Station and Retention Pond Expansion

PROJ C LOCA ION Tampa, Florida **CLI NT** City of Tampa

DEPTH (ft)	SAMP E DEPTH NUMBER	MATERIAL DESCRIPTION	USCS	GRAPHIC OG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
20		Firm Light greenish gray silty C AY. *(continued)*	CH											
25	8	Soft, Very pale brown silty C AY.	CH		WOH/ 12" ↓ 2	2								
		Loose, Very pale brown clayey fine SAND w th highly weathered limestone, poorly graded.	SC											
30	9	Loose, Light brownish gray clayey f ne SAND w th gravel (highly weathered limestone), poorly graded.	SC		3 4 3	7								
		Bottom of o ehole at 30 feet. Boring Grouted upon Ter ination.												

NOT WOH-Sampler advanced by weight of ham e only.

GRO ND WA ER L VELS

▽ **A TIM OF DRILLING** 5 ft 6 in *▽ **END OF DAY** ---

NEW MAE OG LAT/L ONG-EOD - NEW TEMPLATE 7-30-12.GDT - 3/20/19 10:53 - F:\GINT\GINT FILES\PROJECTS\0135-0001.05\LANTANA.GPJ

Meskel ssociates Engineering, PLLC
F Certificate f Authorizati n No. 28142
3110 Cherry Palm Drive, Suite 0
Tam a, FL 33619
P: (813)252-5585 F: (904)519-6992

Meskel & Associates Engineering

BO NG B-2

PROJECT NO. 0135-0001.05

PROJECT N ME N Lantana Ave and E Poinsettia Ave-Pump Station and Retention Pond Ex ansion

PROJECT LOC T ON Tampa, Florida **CL ENT** City of Tam a

TE T RTE 2/25/19 **COMPLETE** 2/25/19 **LAT TU E** 28°02'30.37"N **LONG TU E** 82°26'49.17"W

ILL NG CONT CTO Swint Drilling Services, Inc. **ILL NG METHO** Standard Penetration Test

LOGGED BY CB **CHECKED BY** W. Josh Mele **GROUND ELEV T ON** — **H MMER TYPE** Automatic

DEPTH (ft)	SAMP E DEPTH NUMBER	MATERIAL DESCRIPTION	USCS	GRAPHIC OG	BLOW COUNTS	N-VALUE	MOISTURE CONTENT (%)	FINES CONTENT (%)	ORGANIC CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	POCKET PEN. (tsf)	RECOVERY % (RQD)	REMARKS
0	1	ose, Light gray fine SAND, trace root fragments, rly graded.	SP		1 1 4	5								
	2	ose, Pale brown fine SAND, poorly graded.	SP		2 2 2	4								
5		▽ Medium dense, White fine SAND with silt, orly graded.	SP-SM		2 6	9								
	4	Medium dense, Very light gray fine SAND with silt, orly graded.	SP-SM		2 1	9								
10	5	Medium dense, Light gray clayey fine SAND, orly graded.	SC		5 4 6	10								
15	6	ose, Brown clayey fine SAND, poorly graded.	SC		2 2 4	6	21	18		9	50			
20		Firm, Light greenish gray silty C AY.	CH		1 1 2									

NOTE

G OUN W TER LEVELS

▽ **T TIME OF D LLING** 5 ft 6 in *▽ **EN OF Y** ---

(Continued t age)

NEW MAE OG LAT/L ONG-EOD - NEW TEMPLATE 7-30-12.GDT - 3/20/19 10:53 - F:\GINT\GINT FILES\PROJECTS\0135-0001.05\LANTANA.GPJ

Meskel & Associates ngi neering, PLLC
F Cert f wate of A5thor "at on c o. 382z3
422K Cher y %al Nr e, S5ite 4xK
I a (a, F 44J29
%1D824v373H7787 F1D9Kzv729HJ993

Meskel & Associates Engineering

BORING B-

%AXR 3 MF 3

PROJ C NO. K247HKKK2.K7

PROJ C NAM c a ntana Abe and R %oinsettia A eH%5 (Station and Uetention %ond RQ(ansion

PROJ C LOCA ION I a (a, Florida **CLI NT** City of I am(a

NR%d G Dfv 3K	SA) % R NR%d G c T) VRU	) AI RUQAL NRSCUC%d 0Mc	TSCS	XUA%GQC M X	V MB CMTc I S	cH A TR	) MGSI TUR CMc I Rc I DE v	FQ@RS CMc I Rc I DE v	MUXAc QC CMc I Rc I DE v	CO TON O) O	%LASI QCOOY @NRP	%MCWRI %Rc . Dsfv	URCM- RUY E D0 Nv	UR) AUWS
		Firm gh t greenish gray silty C AY. *(continued)*	CG											
37	8				B MGu 236 ↓ 2	2								
		Soft, Vropn silty C AY.	CG											
4K	9	o ose, Light oli e gray wlayey f ne SAc N p th grabel Dh ghly p eathered limestonev (oo ly graded.	SC		2 3 4	7								
		Vottom of \ o ehole at 4K feet. Voring X o5ted 5(on I e nation.												

NOT B MGHSam(ler ad anwed \ y p eight of ham e only.

GRO ND WA R L VELS

▽ **A TIM OF DRILLING** 7 ft J in *▽ **N D OF DAY** HHH

cRB) AR MX Al uM c XHRMN Hc RB I R) % AI R XH4K423.X NI H4uBK029 2K74 HF1X@I /X@I FQR S/%JM: RCI S/K247HKKK2.K7/ Ac I Ac A.X%

FIELD EXPLORATION PROCEDURES

Standard Penetration Test (SPT) Borings

The Standard Penetration Test (SPT) boring(s) were performed in general accordance with the latest revision of ASTM D 1586, "Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils." The borings were advanced by rotary drilling techniques. A split-barrel sampler was inserted to the borehole bottom and driven 18 to 24 inches into the soil using a 140-pound hammer falling an average of 30 inches per hammer blow. The number of hammer blows for the final 12 inches of penetration (18" sample) or for the sum of the middle 12 inches of penetration (24" sample) is termed the "penetration resistance, blow count, or N-value." This value is an index to several in-situ geotechnical properties of the material tested, such as relative density and Young's Modulus.

After driving the sampler, it was retrieved from the borehole and representative samples of the material within the split-barrel were containerized and sealed. After completing the drilling operations, the samples for each boring were transported to the laboratory where they were examined by a geotechnical engineer to verify the field descriptions and classify the soil, and to select samples for laboratory testing.

Hand Auger Boring

The auger boring(s) were performed manually by the use of a hand-held bucket auger in general accordance with the latest revision of ASTM D 1452, "Standard Practice for Soil Exploration and Sampling by Auger Borings." Representative samples of the soils brought to the ground surface by the auger were placed in sealed containers and transported to our laboratory where they were examined by a geotechnical engineer to verify the field descriptions and classify the soil, and to select samples for laboratory testing.

KEY TO BORING LOGS – USCS

Soil Classification

Soil classification of samples obtained at the boring locations is based on the Unified Soil Classification System (USCS). Coarse grained soils have more than 50% of their dry weight retained on a #200 sieve. Their principal descriptors are: sand, cobbles and boulders. Fine grained soils have less than 50% of their dry weight retained on a #200 sieve. They are principally described as clays if they are plastic and silts if they are slightly to non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

BORING LOG LEGEND

Symbol	Description
N	Standard Penetration Resistance, the number of blows required to advance a standard spoon sampler 12" when driven by a 140-lb hammer dropping 30".
WOR	Split Spoon sampler advanced under the weight of the drill rods
WOH	Split Spoon sampler advanced under the weight of the SPT hammer
50/2”	Indicates 50 hammer blows drove the split spoon 2 inches; 50 Hammer blows for less than 6-inches of split spoon driving is considered “Refusal”.
(SP)	Unified Soil Classification System
-200	Fines content, % Passing No. 200 U.S. Standard Sieve
w	Natural Moisture Content (%)
OC	Organic Content (%)
LL	Liquid Limit
PI	Plasticity Index
NP	Non-Plastic
PP	Pocket Penetrometer in tons per square foot (tsf)

MODIFIERS

SECONDARY CONSTITUENTS
(Sand, Silt or Clay)

Trace	Less than 5%
With	5% to 12%
Sandy, Silty or Clayey	12% to 35%
Very Sandy, Very Silty or Very Clayey	35% to 50%

ORGANIC CONTENT

Trace	Less than 5%
Organic Soils	5% to 20%
Highly Organic Soils (Muck)	20% to 75%
PEAT	Greater than 75%

MINOR COMPONENTS
(Shell, Rock, Debris, Roots, etc.)

Trace	Less than 5%
Few	5% to 10%
Little	15% to 25%
Some	30% to 45%

RELATIVE DENSITY (Coarse-Grained Soils)

Relative Density	N-Value *
Very Loose	Less than 3
Loose	3 to 8
Medium Dense	8 to 24
Dense	24 to 40
Very Dense	Greater than 40

CONSISTENCY (Fine-Grained Soils)

Consistency	N-Value *
Very Soft	Less than 1
Soft	1 to 3
Firm	3 to 6
Stiff	6 to 12
Very Stiff	12 to 24
Hard	Greater than 24

RELATIVE HARDNESS (Limestone)

Relative Hardness	N-Value *
Soft	Less than 50
Hard	Greater than 50

* Using Automatic Hammer

Unified Soil Classification System (USCS)
(from ASTM D 2487)

Major Divisions			*Group Symbol*	*Typical Names*
Coarse-Grained Soils More than 50% retained on the 0.075 mm (No. 4) sieve	**Gravels** 50% or more of coarse fraction retained on the 4.75 mm (No. 4) sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands 50% or more of coarse fraction passes the 4.75 (No. 4) sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		Sands with Fines	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine-Grained Soils More than 50% passes the 0.075 mm (No. 200) sieve	**Silts and Clays** Liquid Limit 50% or less		ML	Inorganic silts, very fine sands, rock four, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly/sandy/silty/lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays Liquid Limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays or high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils

Prefix: G = Gravel, S = Sand, M = Silt, C = Clay, O = Organic
Suffix: W = Well Graded, P = Poorly Graded, M = Silty, L = Clay, LL < 50%, H = Clay, LL > 50%

Appendix B

eskel & Associates Engineering, PLLC
FL Certificate of Authorization No. 142
3110 Cherry alm Drive, Suite 370
Tampa, FL 33619
P: (13) 252-5585 F: 04)519-

Meskel & Associates Engineering

SU ARY LABO ATO TEST ESULTS

PR JECT N . 0135-0001.05

PR JECT NA E N Lantana Ave and E oinsettia Ave-Pump Station and Retention Pond Expansion **DATE.** 3/11/201

PR JECT L CATI N Tampa, Florida **CLIENT** City of Tampa

Borehole	Sample No.	Approx. Depth (ft)	%<#200 Sieve	Water Content (%)	Organic Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	USCS Classification	Comments
B-1	3	5	4	14	---	---	---	---	SP	
B-1	5		3		---	---	---	---	SC	
B-1	7	0	71	59	---	161		132	CH	
B-2		15	18	1	---	79		50	SC	

Note: "---" Untested Parameter

LAB SUMMARY_MAE_ALL PROJECTS-USCS - GINT STD US LAB.GDT - 3/20/19 11:32 - F:\GINT\GINT FILES\PROJECTS\0135-0001.05\LANTANA.GPJ

LABORATORY TEST PROCEDURES

Percent Fines Content

The percent fines or material passing the No. 200 mesh sieve of the sample tested was determined in general accordance with the latest revision of ASTM D 1140. The percent fines are the soil particles in the silt and clay size range.

Natural Moisture Content

The water content of the tested sample was determined in general accordance with the latest revision of ASTM D 2216. The water content is defined as the ratio of “pore” or “free” water in a given mass of material to the mass of solid material particles.

Atterberg Limits

The Atterberg Limits consist of the Liquid Limit (LL) and the Plastic Limit (PL). The LL and PL were determined in general accordance with the latest revision of ASTM D 4318. The LL is the water content of the material denoting the boundary between the liquid and plastic states. The PL is the water content denoting the boundary between the plastic and semi-solid states. The Plasticity Index (PI) is the range of water content over which a soil behaves plastically and is denoted numerically by the difference between the LL and the PL. The water content of the sample tested was determined in general accordance with the latest revision of ASTM D 2216. The water content is defined as the ration of “pore” or “free” water in a given mass of material to the mass of solid material particles.