TIERRA

February 18, 2022

Habitat for Humanity of Hillsborough County
509 East Jackson Street
Tampa, FL 33602

Attn: Lanette Glass

RE: Geotechnical Engineering Services Report
Habitat for Humanity
205 Windhorst Road
Hillsborough County, Florida
Tierra Project No. 6511-22-019

Ms. Glass:

Tierra, Inc. (Tierra) has completed geotechnical engineering services for the above-referenced project. The results of our field exploration program and subsequent geotechnical recommendations are presented in this report.

Tierra appreciates the opportunity to be of service to Habitat for Humanity of Hillsborough County on this project. We look forward to working with you on future projects. If you have any questions or comments regarding this report, please contact us at your earliest convenience.

Respectfully Submitted,

TIERRA, INC.

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TABLE OF CONTENTS

PROJECT DESCRIPTION

Project Information

The project site is located at 205 Windhorst Road in Hillsborough County, Florida. Based on the information provided, the proposed project includes the design and construction of a new single-family subdivision (23 lots) with a stormwater pond (0.63 acres) and a paved road.

Scope of Services

The objective of our study will be to obtain information concerning subsurface conditions at the site in order to base engineering estimates and recommendations in each of the following areas:

1. General location and description of potentially deleterious materials discovered in the borings which may interfere with construction progress, including existing fills or surficial organics.

2. Feasibility of utilizing shallow spread foundation systems to support of the proposed structures. Suitability of a slab-on-grade.
3. Design parameters required for the proposed structure foundation systems, including allowable bearing pressures, foundation levels and soil compaction recommendations.

4. Design parameters to support the drainage design including depth to confining layer (max 20 feet), Seasonal High Groundwater Table (SHGWT) estimates, hydraulic conductivity, and fillable porosity.

5. Identification of groundwater levels.

6. General pavement section design parameters and construction considerations.

In order to meet the preceding objectives, we provided the following services:

1. Reviewed the “Brandon, Florida” Quadrangle Map published by the United States Geological Survey (USGS), as well as the Soil Survey of Hillsborough County, Florida, published by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).

2. Performed site reconnaissance. Coordinated utility clearance via Sunshine One Call.

3. Executed a program of subsurface exploration consisting of borings, subsurface sampling and field testing as follows:

   <u>Structure Areas</u>

   - Performed five (5) Standard Penetration Test (SPT) borings to a depth of 10 feet below existing grades.

Stormwater Pond

- Performed two (2) Standard Penetration Test (SPT) borings to a depth of 20 feet below existing grades.
- Performed two (2) hand auger borings to a depth of 10 feet to estimate the SHGWT.
- Performed two (2) field hydraulic conductivity (permeability) tests.

Paved Roadway

- Performed five (5) hand auger borings to a depth of 5 feet below existing grades.

4. Collected groundwater measurements at the boring locations. Estimated the seasonal high groundwater level at selected boring locations.

5. Visually examined the recovered soil samples in the laboratory and perform appropriate laboratory testing on selected soil samples obtained from the borings to classify the soils according to the Unified Soil Classification System (USCS).

6. Prepared this engineering report in accordance with the scope of services herein that summarizes the course of study pursued, the field data generated, subsurface conditions encountered and our engineering recommendations in each of the pertinent topic areas.

The scope of our services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic materials in the soil, bedrock, groundwater, or air, on or below or around this site. Also, the scope of our services did not include determination of potential sinkhole activity. Any statements in this report or on the boring logs regarding odors, colors, unusual or suspicious items or conditions are strictly for the information of our client.

REVIEW OF PUBLISHED DATA

USGS Quadrangle Map

Based on the "Brandon, Florida" USGS Quadrangle Map, the natural ground elevation at the project site is approximately +55 to +65 feet, National Geodetic Vertical Datum of 1929 (NGVD 29).

USDA Soil Survey

Based on a review of the Hillsborough County Soil Survey published by the USDA NRCS, there is one (1) primary soil-mapping unit noted within the project footprint. The general soil description is presented in the following paragraph and table, as described in the Soil Survey.

Candler-Urban land complex, 0 to 5 percent slopes (Soil Unit 9): The Candler component makes up 45 percent of the map unit. Slopes are 0 to 5 percent. This component is on ridges on marine terraces on coastal plains. The parent material consists of eolian deposits and/or sandy and loamy marine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is excessively drained. Water movement in the most restrictive layer is high. Available water to

a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent.

SUMMARY OF USDA SOIL SURVEY HILLSBOROUGH COUNTY, FLORIDA							
USDA Map Symbol and Soil Name	**Depth (in)**	**Soil Classification**		**Permeability (in/hr)**	**pH**	**Seasonal High Water Table**	
		USCS	**AASHTO**			**Depth (feet)**	**Months**
(9) Candler Urbanland	0 - 6	SP-SM, SP	A-3	6.0 – 20.0	4.5 - 6.0	>6.0	Jan-Dec
	6 - 76	SP-SM, SP	A-3	6.0 – 20.0	4.5 - 6.0		
	76 - 80	SP-SM	A-2-4, A-3	6.0 – 20.0	4.5 - 6.0		
	Information Not Provided						

It should be noted that information contained in the USDA NRCS Soil Survey may not be reflective of current soil and groundwater conditions, particularly if recent development in the project vicinity has modified existing soils or surface/subsurface drainage.

SUBSURFACE EXPLORATION

Boring Location Plan

Prior to commencing our subsurface explorations, a boring location plan was developed based on requested locations provided by Habitat for Humanity and/or their representatives. The borings were located in the field by representatives of Tierra using hand-held, non-survey grade Global Positioning System (GPS) equipment with a manufacturer's reported accuracy of ± 10 feet. The approximate boring locations are presented on the **Boring Location Plan** in the **Appendix**.

Soil Borings

The subsurface conditions at the project site were explored with SPT borings and auger borings performed to depths ranging from approximately 10 to 20 feet and 5 to 10 feet below existing grades, respectively. The SPT borings were performed with the use of a mechanical drill rig using Bentonite Mud rotary drilling procedures. The soil sampling for the SPT borings was performed in accordance with American Society for Testing and Materials (ASTM) Test designation D-1586. The initial 4 feet were manually hand augered to verify utility clearance. SPT resistance N-values were taken at intervals of 2 feet to a depth of approximately 10 feet and on intervals of 5 feet thereafter to the boring termination depth.

The auger borings were performed by manually advancing a bucket auger into the ground, typically in 6-inch increments. As each soil type was revealed, representative samples were sealed, labeled and transferred to our laboratory for classification and analyses. The results of the borings are presented on the **Soil Profiles** sheet in the **Appendix**.

Field Permeability Testing

Tierra performed two (2) constant head, open-end pipe hydraulic conductivity tests (FDOT methodology) within the proposed pond area. The tests were performed at depths of approximately 8 feet below the existing ground surface. The locations of the field permeability tests are depicted on the **Boring Location Plan**.

RESULTS OF SUBSURFACE EXPLORATION

Soil Conditions

Generally, the borings encountered sandy soils (SP/SP-SM/SC) to the boring termination depths. The soil strata encountered within the borings performed at the project site are summarized in the following table:

Stratum Number	Soil Description	USCS Symbol
1	Gray to Brown to Yellow Brown Sand to Sand with Silt	SP/SP-SM
2	Brown Clayey Sand	SC

The subsurface soil stratification is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The **Soil Profiles** sheet provided in the **Appendix** should be reviewed for specific information at individual boring locations. These profiles include soil descriptions, stratifications and penetration resistances. The stratifications shown on the boring profiles represent the conditions only at the actual boring location. Variations did occur and should be expected between boring locations.

Groundwater Information

At the time of our field activities, the groundwater level not encountered within the depth of the hand auger borings performed. As a result, GNE (Groundwater Not Encountered) is presented adjacent to these soil profiles on the **Soil Profiles** sheets in the **Appendix**. The groundwater level at the SPT boring locations was not apparent beyond a depth of 10 feet due to the introduction of drilling fluid. GNA (Groundwater Not Apparent) is presented adjacent to these soil profiles on the **Soil Profiles** sheets in the **Appendix**.

It should be noted that groundwater conditions will vary with environmental variations and seasonal conditions, such as the frequency and magnitude of rainfall patterns, as well as man-made influences (i.e. existing swales, drainage ponds, underdrains, and areas of covered soils, such as paved parking lots).

Seasonal High Groundwater Table Estimates

Based on the subsurface conditions encountered, the information provided in the Soil Survey of Hillsborough County, Florida published by the USDA and past experience with similar soil conditions, Tierra estimates the SHGWT within the project site to be below 10 feet below existing grades within the proposed pond. Similarly, the SHGWT is estimated to be below a depth of 5 feet

along the roadway (i.e. "RB" boring termination depths. If more specific SHGWT estimates are needed to assist in site development and/or drainage design, then temporary piezometers can be installed to measure groundwater depths and provide more accurate estimations. The estimated SHGWT levels at individual auger boring locations are presented on the **Soil Profiles** and **Summary of Geotechnical Parameters** table in the **Appendix**.

As previously noted, the locations of our borings were based on our hand-held GPS devices and should be considered approximate. If the SHGWT levels are critical to design, Tierra recommends the locations of our borings be survey located.

EVALUATION AND RECOMMENDATIONS

General

The soil types encountered in the borings performed for this study appear suitable for the proposed development provided the geotechnical recommendations presented in this report are included in the design and implemented during construction.

Engineering evaluations and recommendations for the proposed improvements provided in the following sections of this report are based on the subsurface conditions encountered in the borings performed. If the final design criteria deviates from what is stated in this report, Tierra should be given the opportunity to review the new information and amend our recommendations, if necessary.

On Site Soil Suitability

The suitability of soils for reuse in construction should be evaluated against the project engineering fill requirements. Variations in the subsurface stratification should be expected between borings. All fill should be placed in accordance with current Hillsborough County specifications and/or jurisdictional requirements.

In general, the soils of Stratum 1 (SP/SP-SM) may be moved and used for grading purposes, site leveling, general engineering fill, structural fill and backfill in other areas, provided the fill is free of organic materials, clay, debris or any other material deemed unsuitable for construction and evaluated against engineering fill requirements. The appropriate specifications should be consulted to determine the specific use/suitability of the soil types encountered during construction.

Site Preparation

Prior to construction, the location of any existing underground utilities within the construction area should be established. Material suitable for re-use may be stockpiled; however, any material stockpiled for re-use shall be tested for conformance to material specifications as indicated in the following paragraphs of this report. Provisions should then be made to relocate any interfering utility lines within the construction area to appropriate locations and backfilling the resulting excavations with compacted structural fill. In this regard, it should be noted that if abandoned underground pipes are not properly removed or plugged, they might serve as conduits for subsurface erosion, which subsequently may result in excessive settlement.

The site should be cleared; this primarily includes removing any deleterious materials currently on the site (deleterious materials may include but are not limited to organics, vegetation, trees and/or stumps, roots and structural remnants). Following clearing and grubbing and prior to construction,

Tierra recommends that the existing subgrade within the lots (structure areas) and pavement areas to a minimum depth of one (1) foot below stripped grade be compacted to a dry density of at least 95% of the Modified Proctor maximum dry density.

Foundation Recommendations

Based on our evaluation and analyses, the Stratum 1 soils should be capable of supporting the anticipated structural loads on shallow foundations after proper subgrade preparation and surface compaction. The foundations and floor slabs should bear on properly placed and compacted cohesionless (sand)/structural fill or properly compacted soils encountered in the borings. The existing near surface sandy soils should be improved by compaction after clearing operations to improve foundation support and reduce total and differential settlement.

Based on the anticipated construction and loading conditions presented herein, field results indicate shallow foundations may be designed for a net maximum allowable bearing pressure of 2,000 psf after proper site preparation. The foundations and floor slabs should bear on properly placed and compacted cohesionless (sand) structural fill or properly compacted sandy soils encountered at the site. Foundations should be embedded so that the bottoms of the foundations are a minimum of 12 inches below adjacent grades. Strip or wall footings should be a minimum of 16 inches wide and pad or column footings should be a minimum of 30 inches wide. The minimum footing sizes should be used regardless of whether or not the foundation loads and allowable bearing pressures dictate a smaller size. These minimum footing sizes tend to provide adequate bearing area to develop bearing capacity and account for minor variations in the bearing materials. Footings should be constructed in a dry fashion. Footing excavations should be covered during rain events. Uncovered excavations may become oversaturated and difficult to compact during rain events. Surface run-off water should be drained away from the excavations and not allowed to pond within any foundation or floor slab areas. It is important that the structural elements be centered on the footings such that the load is transferred evenly unless the footings are proportioned for eccentric loads.

The settlement of shallow foundations supported on compacted sand fill and/or natural sandy soils should occur rapidly after loading. Thus, the expected settlement should occur during construction as dead loads are imposed**.** Provided the recommended site preparation operations are properly performed and the recommendations previously stated are utilized, the total settlement of wall and isolated column footings should not exceed approximately ¾ inch. Differential settlement is estimated to be on the order of 1/480 (3/4 inch per 30 feet). Differential settlement of this magnitude is usually considered tolerable for the anticipated construction; however, the tolerance of the proposed structure to the predicted total and differential settlement should be confirmed by the structural engineer. If final loading conditions differ from the loads presented above, Tierra should be given the opportunity to review and amend (if necessary) our recommendations.

Floor Slabs

The proposed floor slabs may be safely supported as a slab-on-grade provided any deleterious materials are removed and replaced with controlled structural fill. It is also recommended that the floor slab bearing soils be covered by a lapped polyethylene sheeting in order to minimize the potential for floor dampness which can affect the performance of flooring such as glued tile and carpet (if any are used). This membrane should consist of a minimum six (6) mil single layer of non-corroding, non-deteriorating sheeting material placed to minimize seams and to cover all of the soil below the building floor. This membrane should be cut in a cross shape for pipes or other

penetrations; the membrane should extend to within one-half inch of pipes or other penetrations. Seams of the membrane should be lapped at least 12 inches. Punctures or tears in the membrane should be repaired with the same or compatible material.

Pavement Considerations

Actual pavement section thickness should be provided by the design civil engineer based on traffic loads, volume, and the owner's design life requirements. The following sections represent minimum thicknesses representative of typical load and construction practices and as such periodic maintenance should be anticipated. All pavement materials and construction procedures should conform to the appropriate City or County requirements.

In general, following the completion of the recommended clearing and grading operations, the compacted fill and natural shallow sandy soils should be acceptable for construction and support of a flexible (limerock, crushed concrete, or shell base) type pavement section or rigid (concrete) pavement section.

Any fill utilized to elevate the cleared pavement areas to subgrade elevation should consist of relatively clean (maximum 12% passing #200 sieve sizes) sands uniformly compacted to a minimum depth of 12 inches to a minimum density of 95% of the modified Proctor maximum dry density. In flexible pavement areas we recommend 12 inches of Type B stabilized subgrade (LBR = 40) compacted to a minimum density of 98% of the modified proctor maximum dry density below the base course. Traffic should not be allowed on the subgrade as the base is placed to avoid rutting. The subgrade should be checked for soundness and be true to line and grade prior to the placement of the base course.

The choice of pavement base type will depend on final pavement grades in relation to the seasonal high groundwater levels presented in this report. If a minimum separation of 18 inches between the bottom of the base and the seasonal high groundwater level is obtained, then a limerock, shell, or crushed concrete base can be utilized. A crushed concrete base should be utilized if the separation between final grade and the seasonal high groundwater is a minimum of 12 inches and less than 18 inches. Base material elevations should not be designed for saturated conditions. If the designer wishes to have base material closer than 12 inches to the SHGWT, then an underdrain system should be utilized that will maintain the 12 inches of separation. The SHGWT should be re-established relative to a known elevation prior to setting final grades. Limerock, shell and crushed concrete base material should meet Florida Department of Transportation (FDOT) requirements including compaction to a minimum density of 98% of the modified Proctor maximum dry density and a minimum Limerock Bearing Ratio (LBR) of 100%. Crushed concrete should have a minimum LBR of 150% and be graded in accordance with FDOT Standard Specification Sections. As a guideline for pavement design, we recommend that the base course be a minimum of 6 inches thick in parking areas and 8 inches thick in heavily traveled drives. Before paving, the base should be checked for soundness.

The asphaltic concrete structural course should consist of at least one and one-half (1½) inches of Type S or SP asphaltic concrete material. The asphaltic concrete should meet standard FDOT material requirements and placement procedures as outlined in the current FDOT Standard Specifications.

As an alternate to the above referenced flexible pavement design, a rigid (concrete) pavement design could be used. The concrete should have a minimum compressive strength of 4,000 psi at 28 days when tested in accordance with ASTM C-39. Based on our experience, a minimum thickness of five (5) inches should be utilized for standard duty applications and a minimum thickness of six (6) inches should be utilized for heavy-duty applications. The steel reinforcement within the concrete pavement should be designed by the project civil engineer. The subgrade soils should be compacted to a minimum density of 95% of the modified Proctor maximum dry density.

Drainage Design Considerations

Tierra performed two (2) field permeability tests at the locations of the PBA auger borings as illustrated on the **Boring Location Plan** at depths of 8 feet below the existing ground surface within the Stratum 1 soils. The field permeability tests were performed and the results evaluated in general accordance with the methodology presented in the FDOT Soils and Foundations Handbook for "Case C". The field permeability test results along with pertinent information related to drainage design are provided on the **Summary of Geotechnical Parameters** table in the **Appdenix**.

It is important to note that the results provided are the measured hydraulic conductivity rates of the in-situ soil conditions encountered at the time of our field activities. No reduction, limiting value, or factors of safety have been applied to these rates. The project drainage engineer should apply an appropriate factor of safety for design and evaluation purposes.

CONSTRUCTION CONSIDERATIONS

General

It is recommended that a qualified and certified material engineering firm be retained to provide observation and testing of construction activities involved in the earthwork, and related activities of this project. Tierra cannot accept any responsibility for any conditions, which deviate from those described in this report, if not engaged to provide construction observation and testing for this project.

Fill Placement and Subgrade Preparation

The following are our recommendations for overall site preparation and mechanical densification work for the construction of the proposed site based on the anticipated construction and our boring results. These recommendations should be used as a guideline for the project general specifications prepared by the design engineer.

1. The site should be cleared; this primarily includes removing any deleterious materials currently on the site (deleterious materials may include but are not limited to roots, stumps, organic soils, pavements, previous structure remnants, or other buried debris). It is recommended that any undesirable material be removed to the satisfaction of Tierra prior to beginning construction at the site. Resulting excavations should be backfilled with compacted structural fill. At a minimum, it is recommended that the clearing operations extend at least five (5) feet beyond the perimeter of the development, where practical.

2. Following the clearing operations, the development area should be proofrolled. The proofrolling may consist of compaction with a large diameter, heavy vibratory drum roller (if

not within 50 feet of existing structures). The vibratory drum roller should have a static drum weight on the order of 8 to 10 tons and should be capable of exerting a minimum impact force of 36,000 pounds (DYNAPAC CA-250 or equivalent is expected to provide acceptable results). Vibratory rollers should not be used within 50 feet of any existing structures. Areas within 50 feet of existing structures should be compacted using a fully loaded 2 cubic yard capacity front-end loader or equivalent (i.e. through non-vibratory means). The proofrolling equipment should make a minimum of eight (8) overlapping passes over the pavement areas with the successive passes aligned perpendicular.

3. Careful observations should be made during proofrolling to help identify any areas of soft yielding soils that may require over excavation and replacement. Backfilling may be done with a well-compacted, suitable fill such as clean sand (i.e. less than 12% passing the No. 200 sieve), gravel or crushed FDOT No. 57 or FDOT No. 67 stone.

4. It is recommended that the subgrade within the residential lot and pavement areas be compacted to a dry density of at least 95% of the modified Proctor maximum dry density to a minimum depth of one (1) foot below stripped grade.

5. Following satisfactory completion of the initial compaction and proofrolling, the pavement areas may be brought up to finished subgrade levels, if needed, using structural fill. Imported fill should consist of sand with less than 12% passing the No. 200 sieve, free of rubble, organics, clay, debris and other unsuitable material. Fill should be tested and approved prior to acquisition. Approved sand fill should be placed in loose lifts not exceeding 12 inches in thickness and should be compacted to a minimum density of 95% of the modified Proctor maximum dry density. Density tests to confirm compaction should be performed in each fill lift before the next lift is placed.

6. Prior to beginning compaction, soil moisture contents may need to be controlled in order to facilitate proper compaction. If additional moisture is necessary to achieve compaction objectives, then water should be applied in such a way that it will not cause erosion or removal of the subgrade soils. Moisture content within the percentage range needed to achieve compaction is recommended prior to compaction of the natural ground and fill.

7. If soft pockets are encountered in the footing excavations, the unsuitable materials should be removed and the proposed footing elevation may be re-established by backfilling. This backfilling may be done with a well-compacted, suitable fill such as clean sand, gravel, or crushed FDOT No. 57 or FDOT No. 67 stone. Sand backfill should be compacted to a minimum density of 95% of the Modified Proctor maximum dry density.

8. Immediately prior to reinforcing steel placement, it is suggested that the bearing surfaces of footing and floor slab areas be compacted using hand operated mechanical tampers. In this manner, any localized areas, which have been loosened by excavation operations, should be adequately re-compacted.

9. Backfill soils placed adjacent to footings or walls should be carefully compacted with a light rubber-tired roller or vibratory plate compactor to avoid damaging the footings or walls. Approved sand fills to provide foundation embedment constraint should be placed in loose lifts not exceeding 6 inches and should be compacted to a minimum density of 95% of the Modified Proctor maximum dry density.

Tierra should be retained to provide on-site observation of earthwork activities. Density tests should be performed in the top one (1) foot of compacted existing ground and each fill lift. It is important that Tierra be retained to observe that the subsurface conditions are as we have discussed herein and that roadway construction, ground modification and fill placement is in accordance with our recommendations.

Drainage and Groundwater Concerns

The groundwater levels presented in this report are the levels that were measured at the time of our field activities. Fluctuation should be anticipated. We recommend that the Contractor determine the actual groundwater levels at the time of construction to determine potential groundwater impacts that may occur during construction. Water should not be allowed to collect on prepared subgrades of the construction either during or after construction.

Backfill

All materials to be used for fill or backfill should be evaluated and, if necessary, tested by Tierra prior to placement to determine if they are suitable for the intended use. Suitable fill materials should be placed and compacted in accordance with the artificial turn manufacturer's requirements for the respective backfill zones and be free of rubble, organics, debris and other unsuitable material.

Excavations and Temporary Side Slopes

Excavations and temporary side slopes should comply with the Occupational Safety and Health Administration's (OSHA) trench safety standards, 29 C.F.R., s. 1926.650, Subpart P, all subsequent revisions or updates of OSHA's referenced standard adopted by the Department of Labor and Employment Security and Florida's Trench Safety Act, Section 553.62, Florida Statutes.

We are providing this information solely as a service to our client. Tierra does not assume responsibility for construction site safety or the contractor's or other party's compliance with local, state, and federal safety or other regulations.

REPORT LIMITATIONS

The analyses, conclusions and recommendations contained in this report are our opinions based on the site conditions and project information described herein and further assume that the conditions observed in the exploratory borings are representative of the subsurface conditions throughout the site, i.e., the subsurface conditions elsewhere on the site are the same as those disclosed by the borings. If, during construction, subsurface conditions different from those encountered in the exploratory borings are observed or appear to be present beneath excavations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary.

The scope of our services did not include an environmental assessment for determining the presence or absence of wetlands or hazardous or toxic materials in the soil, bedrock, groundwater, or air, on or below or around this site. Also, the scope of our services did not include determination of potential sinkhole activity. Any statements in this report or on the boring logs regarding odors, colors, unusual or suspicious items or conditions are strictly for the information of our client

If there is a substantial lapse in time between the submittal of this report and the start of work at the site, or if conditions or project layout are changed due to natural causes or construction operations at or adjacent to the site, we recommend that this report be reviewed to determine the applicability of conclusions and recommendations considering the changed conditions and time lapse.

This report was prepared for the exclusive use of Habitat for Humanity of Hillsborough County and their consultants for evaluating the design of the project as it relates to the geotechnical aspects discussed herein. It should be made available to prospective contractors for information on factual data only and not as a warranty of subsurface conditions included in this report. Unanticipated soil conditions may require that additional expense be made to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

APPENDIX

Boring Location Plan

Soil Profiles

Summary of Geotechnical Parameters

NOTE: BASE MAP PROVIDED BY LEVELUP CONSULTING, LLC

BORING LOCATION PLAN

0 50'

PLAN SCALE

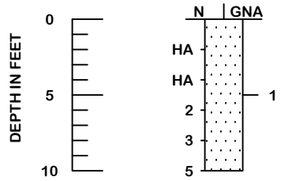
LEGEND

- APPROXIMATE LOCATION OF AUGER BORING
- APPROXIMATE LOCATION OF SPT BORING

DRAWN BY: SW CHECKED BY: TB	APPROVED BY: DRR DATE: FEB 2022	ENGINEER OF RECORD: DANIEL R. RUEL, P.E. FLORIDA LICENSE NO.: 82404	TIERRA 7351 Temple Terrace Highway Tampa, Florida 33637 Phone: 813-989-1354 Fax: 813-989-1355	SCALE: NOTED	PROJECT NUMBER: 6511-22-019	GEOTECHNICAL ENGINEERING SERVICES HABITAT FOR HUMANITY HILLSBOROUGH COUNTY, FLORIDA	SHEET 1

SOIL PROFILES

BOR # B-1
EASTING 563075
NORTHING 1318014
DATE 2/8/2022
DRILLER I. POORAN
HAMMER AUTOMATIC
RIG D-25



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DATE 2/8/2022
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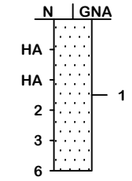
RIG D-25



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DATE 2/8/2022
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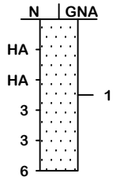

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DATE 2/8/2022
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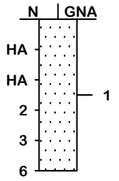
RIG D-25



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NORTHING 1317588
DATE 2/8/2022
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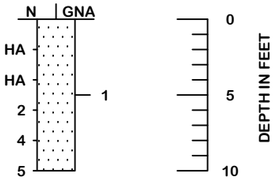

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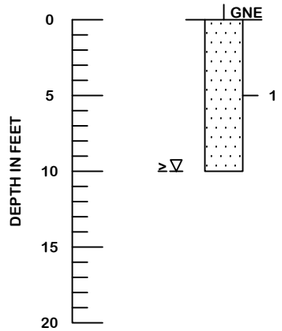
NORTHING 1317812
DATE 2/1/2022



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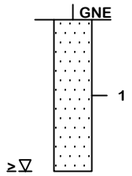
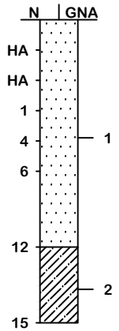
NORTHING 1317626
DATE 2/1/2022



BOR # PBS-1
EASTING 562929
NORTHING 1317865
DATE 2/8/2022
DRILLER I. POORAN
HAMMER AUTOMATIC
RIG D-25



BOR # PBS-2
EASTING 562927
NORTHING 1317691
DATE 2/8/2022
DRILLER I. POORAN
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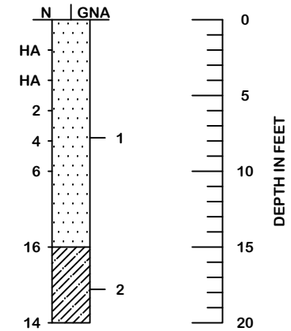
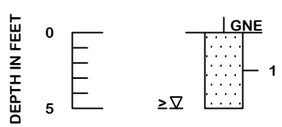
RIG D-25



BOR # RB-1
EASTING 563107
NORTHING 1318109
DATE 2/1/2022



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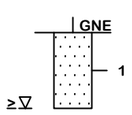
NORTHING 1317906
DATE 2/1/2022



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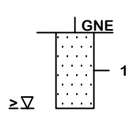
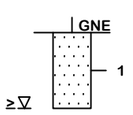
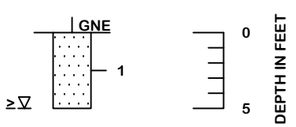
NORTHING 1317706
DATE 2/1/2022



BOR # RB-4
EASTING 563089
NORTHING 1317535
DATE 2/1/2022



BOR # RB-5
EASTING 563017
NORTHING 1317587
DATE 2/1/2022



LEGEND

1 — GRAY TO BROWN TO YELLOW BROWN SAND TO SAND WITH SILT (SP/SP-SM)

2 — BROWN CLAYEY SAND (SC)

N	SPT N-VALUE IN BLOWS/FOOT FOR 12 INCHES OF PENETRATION (UNLESS OTHERWISE NOTED)
SP	UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2488) GROUP SYMBOL AS DETERMINED BY VISUAL REVIEW
GNE	GROUNDWATER TABLE NOT ENCOUNTERED
GNA	GROUNDWATER NOT APPARENT DUE TO DRILLING METHOD USED
HA	HAND AUGERED TO VERIFY UTILITY CLEARANCES
≥▽	SEASONAL HIGH GROUNDWATER LEVEL IS DEEPER THAN DEPTH SHOWN
EASTING	EASTING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83 DETERMINED USING HAND-HELD GARMIN ETREX GPS EQUIPMENT WITH A REPORTED ACCURACY OF +/- 10 FEET
NORTHING	NORTHING COORDINATE REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, FLORIDA WEST ZONE, N.A.D. 83 DETERMINED USING HAND-HELD GARMIN ETREX GPS EQUIPMENT WITH A REPORTED ACCURACY OF +/- 10 FEET

AUTOMATIC HAMMER	
GRANULAR MATERIALS-RELATIVE DENSITY	SPT (BLOWS/FT.)
VERY LOOSE	LESS THAN 3
LOOSE	3 TO 8
MEDIUM	8 TO 24
DENSE	24 TO 40
VERY DENSE	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT (BLOWS/FT.)
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

DRAWN BY: SW
CHECKED BY: TB
APPROVED BY: DRR
DATE: FEB 2022
ENGINEER OF RECORD: DANIEL R. RUEL, P.E.
FLORIDA LICENSE NO.: 82404

TIERRA
7351 Temple Terrace Highway
Tampa, Florida 33637
Phone: 813-989-1354 Fax: 813-989-1355

SCALE: NOTED
PROJECT NUMBER: 6511-22-019

GEOTECHNICAL ENGINEERING SERVICES
HABITAT FOR HUMANITY
HILLSBOROUGH COUNTY, FLORIDA

Summary of Geotechnical Parameters
Habitat for Humanity
Hillsborough County, Florida
Tierra Project No. 6511-22-019

Boring Name	Boring Location[1]		Boring Depth (ft)	Measured Groundwater Table		Hillsborough County USDA Soil Survey Data		Estimated SHGWT Depth[2] (ft)	Field Permeability Test Results				Confining Layer Depth (ft)	Soil Porosity (%)	Suction Head (in)
	Easting	Northing		Date Recorded	Depth (ft)	Map Unit	Estimated SHGWT		Test Depth (ft)	Stratum Tested	In-Situ Horizontal Hydraulic Conductivity Rate, k_h[3] (feet/day)	In-Situ Vertical Hydraulic Conductivity Rate, k_v[3] (feet/day)			
POND															
PBA-1	562920	1317812	10.0	2/1/2022	GNE	9	>6.0	>10	8.0	1	40	40	>10	30	2
PBA-2	562954	1317626	10.0	2/1/2022	GNE	9	>6.0	>10	8.0	1	40	40	>10		
PBS-1	562929	1317865	20.0	2/8/2022	GNA	9	>6.0	N/D	N/A				15.0		
PBS-2	562927	1317691	20.0	2/8/2022	GNA	9	>6.0	N/D	N/A				15.0		

Notes:

[1] Boring locations are in State Plane West coordinates and were determined using a hand-held GPS device with a reported accuracy of ±10 feet.

[2] Seasonal High Groundwater Table (SHGWT) depth estimated based on a combination of factors including the soil stratigraphy, measured groundwater levels, the Hillsborough County, Florida USDA Soil Survey information and existing topography.

[3] These rates are not factored. The designer should apply an appropriate factor of safety, as applicable.

GNA: Groundwater Not Apparent due to drilling method used

GNE: Groundwater Not Encountered.