Andreyev Engineering, Inc.

SANFORD OFFICE
4055 St. John's Parkway
Sanford, Florida 32771
407-330-7763



**March 14, 2025**
**GPGT-25-009**

| | |
|---|---|
| **To:** | **JTD Land Company, LLC**<br>**210 Hangar Road**<br>**Kissimmee, Florida 34741**<br>**Attention: Mr. Craig Harris** |
| **C/O:** | **Halff Associates, Inc.**<br>**902 North Sinclair Avenue**<br>**Tavares, Florida 32778**<br>**Attention: Mr. Scott Harp** |
| **Subject:** | **Geotechnical Investigation, Proposed Stormwater Retention Areas & Paved Roadways, Watermark Property, Howey-in-the-Hills, Lake County, Florida** |

Dear Mr. Harris:

As requested, Andreyev Engineering, Inc. (AEI) has completed a geotechnical investigation for the above-referenced project location. We understand that the proposed facility includes plans for several newly proposed stormwater retention areas and paved roadways, as part of a future residential development. A conceptual site plan showing the proposed locations of the ponds/swales and roadways, including soil boring locations, was provided to AEI by Scott Harp.

This report presents the results of our geotechnical investigation along with an evaluation of the soil and groundwater conditions encountered. In addition, it provides geotechnical engineering recommendations for proper site preparation, pavement section design, and an evaluation of the proposed stormwater system.

## SITE LOCATION AND DESCRIPTION

The subject site is located within Section 2, Township 21 South, and Range 25 East, in Howey-in-the-Hills, Lake County, Florida. We have included the U.S.G.S. Topographic Map, which depicts the location of the site, on the attached **Figure 1**. In addition, the Natural Resources Conservation Service (NRCS) Soil Map, which depicts the location and general soil types of the subject site, is presented on **Figure 2**.

## PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to explore subsurface soil and groundwater conditions within the proposed paved roadway areas and stormwater system areas and provide recommendations for proper site preparation, pavement section design, and evaluation of the stormwater system.

The scope of this investigation included:

- Drilled eight (8) machine auger borings, designated as P-12 through P-18 and B-12, to depths of up to 30 feet below ground surface, within the proposed stormwater retention areas, for soil and groundwater evaluation.

- Collected four (4) shallow depth undisturbed tube samples, from a depth of about 2.5 feet below ground surface, at P-13, P-14, P-16 and P-18 within the stormwater retention areas, and conducted laboratory permeability testing on the undisturbed tube samples, to estimate soil hydraulic conductivity.

- Installed three (3) 2-inch piezometers, at P-12, P-14 and P-17 within the stormwater retention areas, and performed field permeability tests at these locations, to estimate soil hydraulic conductivity.

- Drilled five (5) machine auger borings, designated as R-11 through R-15, to a depth of 20 feet below ground surface, within the proposed paved roadway areas, for soil and groundwater evaluation.

- Performed limited index laboratory tests on selected samples, to assist with soil classification and stratification.

- Estimated normal seasonal high groundwater table levels.

Samples were recovered from the borings and returned to AEI's laboratory for visual classification and stratification. Soil strata were classified according to the Unified Soil Classification System (USCS). Approximate boring locations are shown on **Figure 3**. Results of the auger borings, in profile form, are presented on **Figures 4 and 5**. On the profiles, horizontal lines designating the interface between differing materials represent approximate boundaries. The actual transition between layers is typically gradual.

## NATURAL RESOURCES CONSERVATION SERVICE SOIL SURVEY

The publication titled "Soil Survey of Lake County, Florida" published by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) was reviewed. For your reference, we have included a portion of the NRCS Soil Map which depicts the location of the subject site on the attached **Figure 2**. The six soil map units identified to exist for the subject site are described as:

Soil Map Unit 5: **Apopka Sand, 0 to 5 Percent Slopes**

Brief Description: *"This soil is a nearly level to gently sloping, well-drained sandy soil that has a sandy clay loam subsoil at a depth of 55 inches. This soil has the profile described as representative for the series. In a representative profile the surface layer is very dark gray sand about 6 inches thick. The subsurface layers are yellowish-brown and light yellowish-brown sand to a depth of about 55 inches. The subsoil is red sandy clay loam to a depth of about 84 inches. The water table is at a depth of more than 84 inches. The sandy surface and subsurface layers are rapidly permeable and have very low available water capacity. Permeability in the subsoil is moderate or moderately rapid, and available water capacity is medium to high."*

Soil Map Unit 6: **Apopka Sand, 5 to 12 Percent Slopes**

Brief Description: *"This is a sloping to strongly sloping, well-drained sandy soil. Unless protected by vegetation, it is readily erodible by wind and water. The water table is at a depth of more than 84 inches. The sandy surface and subsurface layers are rapidly permeable. Available water capacity is very low, and the organic matter content is low. The loamy subsoil is moderately permeable or moderately rapidly permeable and has a medium to high available water capacity. In a representative profile the surface layer is very dark gray sand about 6 inches thick. The subsurface layers are yellowish-brown and light yellowish-brown sand to a depth of about 55 inches. The subsoil is red sandy clay loam to a depth of about 84 inches."*

*Soil Map Unit 8: **Candler Sand, 0 to 5 Percent Slopes**

Brief Description: *"This soil is nearly level to gently sloping and is excessively drained. It is on ridges, knolls, and broad uplands. The slopes range from smooth to broken. Typically, the surface layer is dark grayish brown sand about 6 inches thick. The subsurface layer, to a depth of about 63 inches is light yellowish brown and yellowish brown sand. The next layers to a depth of 80 inches or more are yellow sand that has thin strong textural bands. This soil does not have a high water table within 80 inches of the surface. The available water capacity is very low throughout. Permeability is high to very high."*

*Soil Map Unit 9: **Candler Sand, 5 to 12 Percent Slopes**

Brief Description: *"This soil is a sloping to strongly sloping, excessively drained soil found on rolling uplands of the central ridge. Typically, the surface layer of this soil type consists of sand about 5 inches thick. The next layer is sand about 62 inches thick followed by a layer of sand about 13 inches thick. The water table for this soil type is at a depth of more than 80 inches. Available water capacity is very low and permeability is considered to be rapid to very rapid throughout the profile of this soil type."*

*Soil Map Unit 28: **Myakka – Myakka Wet Sands - 0 to 2 Percent Slopes**

Brief Description: *"The Myakka series consists of nearly level, poorly drained soils on the flatwoods. These soils formed in sandy marine deposits. In a typical profile, the surface layer is sand about 6 inches thick underlain by a layer of sand about 14 inches thick. The subsurface layer is sand about 16 inches thick. The substratum layer is sandy clay loam about 44 inches thick. In most years, the water table rises to a depth of less than 10 inches for 1 to 4 months and recedes to a depth of more than 40 inches during dry periods. This soil has low water capacity and permeability is considered to be moderate high to high."*

Soil Map Unit 45: **Tavares Sand, 0 to 5 Percent Slopes**

Brief Description: *"This is a nearly level to gently sloping, moderately well drained soil. It has a very dark grayish-brown sand surface layer about 7 inches thick. Below this is a layer of very pale brown sand that has faint yellowish-brown mottles to a depth of 25 inches. The next layer, to a depth of 34 inches, is a light yellowish-brown sand. Very pale brown sand that has faint yellow mottles is at depth between 34 and 61 inches. Below this is white sand mottled with very pale brown. The water table is at a depth of 40 to 60 inches for more than 6 months of the year. During periods of drought, it is below 60 inches. Tavares sand is very rapidly permeable. Available water capacity and organic matter content are low. This soil has slight limitations for use as foundations* *for low buildings, roads, airports, and paved parking areas. This soil has slight limitations for use as septic tank filter fields as possible contamination of ground water supplies can occur."*

* This soil map unit is not present in the 1975 NRCS Soil Survey publication for Lake County, including revisions made to soil descriptions in 2004, and has been interpreted from an adjacent or nearby county's NRCS Soil Survey publication.

## SOIL AND GROUNDWATER CONDITIONS

The soil types encountered at the boring locations are presented in the form of soil profiles on the attached **Figures 4 and 5**. The stratification presented is based on visual examination of the recovered soil samples and the interpretation of the field logs by a geotechnical engineer.

In general, the borings encountered the following soil Strata:

- Dark Grayish Brown to Dark Brown Fine Sand to Slightly Silty Fine Sand (SP)(SP-SM) with occasional roots and/or other organic debris ***Stratum 1***
- Grayish Brown to Light Brown to Brown Fine Sand (SP) ***Stratum 2***
- Very Pale Brown to Light Brown to Light Orangish Brown to Yellowish Brown Slightly Silty to Silty Fine Sand (SP-SM)(SM) ***Stratum 3***
- Pink to White Slightly Silty to Silty Fine Sand (SP-SM)(SM) ***Stratum 4***
- Light Brown to Brown to Pink Silty-Clayey Fine Sand (SM-SC) ***Stratum 5***
- Light Brown to Orangish Brown to Reddish Brown Clayey Fine Sand (SC) ***Stratum 6***

Please refer to **Figures 3, 4, and 5** for boring locations, strata depths, and encountered soil conditions. The stratification lines represent the approximate boundaries between soil types, the actual transition may be gradual. Minor variations not considered important to our engineering evaluations may have been abbreviated or omitted for clarity.

### Groundwater Conditions

At the time of drilling on February 10 and 11, 2025, groundwater was encountered within the termination depths at seven (7) of the thirteen (13) boring locations. Groundwater was encountered at P-14, P-15, P-16, P-17, P-18, R-15 and B-12, at depths ranging from about 8.0 to 14.0 feet below the existing ground surface. While we do not have accurate elevation data, it appears that the site is generally sloping downward to the south and east. The borings where groundwater was encountered are located along the southern and southeastern portions of the site. The respective measured groundwater levels are shown next to the corresponding soil profiles on **Figures 4 and 5**.

Based on the encountered subsurface conditions, our local experience, antecedent rainfall conditions, and review of the NRCS Soil Survey, the normal seasonal high groundwater levels at the boring locations are generally estimated to exist 1 to 2 feet above the measured levels. However, at P-14, P-15 and P-16, the encountered groundwater levels are well below the top of the confining clay layer (Stratum 6). In these cases, normal seasonal high groundwater levels will exist in a temporary "perched" condition, approximately 0.5 feet above the low permeability Stratum 6 clayey soils. This also applies to the boring locations where groundwater was not encountered. For P-17, P-18, R-14 and B-12, where groundwater exists above the clay layer, the normal seasonal high groundwater levels are estimated to exist at the general 1 to 2 feet above the measured levels. Our estimated normal seasonal high groundwater levels are shown next to the corresponding soil profiles on **Figures 4 and 5**. These levels may not be accurate in all cases, and are based on our interpretation of the soil and groundwater conditions encountered at the boring locations.

## Laboratory Test Results

Laboratory moisture content tests (ASTM D2216) and fines content (percent soil passing ASTM Standard Sieve No.200) tests (ASTM D1140) were performed on eleven (11) selected samples. Four (4) falling head permeability tests were performed on the undisturbed tube samples collected from the immediate vicinities of P-13, P-14, P-16 and P-18, from a depth of about 2.5 feet below ground surface. The results of these tests are presented next to the corresponding depths and soil profiles on **Figures 4 and 5**.

# EVALUATION AND RECOMMENDATIONS

## General

Based on the results of this investigation and our evaluation of the encountered subsurface conditions, it is our opinion that the soils encountered throughout the site are generally suitable to support conventionally designed and constructed flexible or semi-flexible pavements, provided that proper site soil preparation and soil densification procedures are carried out. It is critical that site preparation and soil densification procedures are thorough to ensure consistent and uniform support conditions for the proposed site improvements. The soils encountered in the stormwater retention areas are also generally suitable for drainage of water, however the depth to the confining clay layer (Stratum 6) may be limiting in some cases.

The soil borings encountered a somewhat wide variance in groundwater levels across the site, likely mostly due to the topographical sloping of the ground surface of the site. Six (6) out of the seven (7) locations where groundwater was measured are within the stormwater retention areas, and the remaining one is within a roadway area. The measured depths are not likely to cause issues with design or construction of the proposed site improvements. However at most of the boring locations, we estimate that normal seasonal high groundwater levels will exist in a temporary "perched" condition above the low permeability Stratum 6 clayey soils. As seen on **Figures 4 and 5**, these estimated perched groundwater levels are as shallow as 2.5 feet below ground surface such as at P-13. Both the proposed pavements and stormwater ponds should maintain adequate separation from these estimated normal seasonal high groundwater levels and any Stratum 6 clayey soils to ensure proper performance and longevity. Dependent on the selected pavement section details, there are different requirements for groundwater separation which are aimed at preventing moisture-related issues from affecting the pavement sections. Additionally, pond bottoms should maintain adequate separation from the estimated normal seasonal high groundwater levels and the Stratum 6 clayey soils to ensure proper recovery of stormwater in a dry retention system. Based on the boring results, over-excavation and replacement of the unsuitable Stratum 6 clayey soils may be necessary to maintain separation in some areas such as P-13. Underdrains near the roadways may also help to control perched groundwater conditions. More specific details about these recommendations are provided in the *'Paved Areas'* and *'Stormwater Evaluations'* sections below.

On-site Strata 1 and 2 fine sands, excavated from the site during construction, are considered suitable for use as general fill, provided minimal root/organic content and that the soil's moisture content is maintained near optimum prior to fill placement and compaction. As there were roots and/or other organic debris materials encountered in some of the Stratum 1 soils, we recommend careful attention be paid when using these soils, and to filter/screen the soils if necessary.

More specific recommendations for the proposed site improvements are provided below.

## Site Preparation

The paved roadway areas, plus a minimum margin of 5 feet beyond their outer lines, should be cleared and stripped to remove all surface vegetation, roots, topsoil, organic debris, or any other encountered deleterious materials. Any encountered type(s) of debris will need to be properly removed from beneath all paved areas, plus a five-foot perimeter.

After clearing, grubbing, and any necessary additional site preparation efforts, including potential over-excavation and replacement of Stratum 6 clayey soils, the exposed soils for the pavement areas, plus a minimum margin of 5 feet beyond building lines, should be proof rolled and compacted to a minimum of 95% of the soil's modified Proctor maximum dry density as determined by ASTM Specification D-1557 to a depth of 2 feet before any fill material is placed. All fill required to bring the site to final grade should be inorganic, non-plastic, granular soil (clean sands) with less that 10% passing a U.S. #200 sieve.

All fill should be placed in level lifts not to exceed 12 inches loose and should be compacted to a minimum of 95% of the soil's modified Proctor maximum dry density as determined by ASTM Specification D-1557. In-place density tests should be performed on each lift by an experienced engineering technician working under the direction of a registered geotechnical engineer to verify that the recommended degree of compaction has been achieved. We suggest a minimum testing frequency of one (1) test per lift per 10,000 square feet in pavement areas. This fill should extend a minimum of 5 feet beyond building lines to prevent possible erosion or undermining of footing bearing soils. Further, fill slopes should not exceed 2 horizontal to 1 vertical (2H:1V).

All fill placed in utility line trenches and adjacent to footings beneath slabs on grade should also be properly placed and compacted to the specifications stated above. However, in these restricted working areas, compaction should be accomplished with lightweight, hand-guided compaction equipment and lift thickness should be limited to a maximum of 4 inches loose thickness.

## Paved Areas

Dependent on planned site grades, perched groundwater at the site may cause some limitations for pavement section design and construction. Over-excavation and replacement of unsuitable Stratum 6 clayey soils may be necessary in some areas to maintain adequate separation of the pavement base course from perched groundwater levels. Installing underdrains along with the roadways is another option to help control perched groundwater. However, in general, the compacted subsurface soils will be suitable for support of a flexible (limerock) or semi-flexible (crushed concrete or soil cement) type pavement base after subgrade preparation. The use of one system over another is normally governed by the depth to the encountered and/or seasonal high groundwater table. Soil cement and crushed concrete are a more moisture-tolerant base material than limerock and are typically used in areas where the wet season groundwater table levels are within 12 to 18 inches of the proposed bottom of the pavement section. When using a soil cement base, a minimum 12-inch layer of free draining fine sand is required. For limerock, a two-foot separation should be maintained between the bottom of the pavement base course and the estimated seasonal high groundwater levels. As a possible pavement design alternative, AEI also presents recommendations for a rigid pavement section.

Typical flexible and semi-flexible pavement sections are as follows:

**Limerock Base**

1-1/2" to 2-1/2" asphaltic concrete wearing surface

6" to 8" limerock base course, quality of limerock to be in accordance with current Florida Department of Transportation specifications and compacted to a minimum density equivalent to 98% of the modified Proctor maximum density (AASHTO T-180).

12" stabilized subbase with minimum Limerock Bearing Ratio (LBR) of 40%. The subbase should be compacted to a minimum density equivalent to 98% of the modified Proctor maximum density (AASHTO T-180). The subgrade material, below the subbase, shall be compacted to a minimum density of 98% of the modified Proctor maximum density of the soil.

**Soil-Cement Base**

1-1/2" to 2-1/2" asphaltic concrete wearing surface

6" to 8" soil-cement base designed and constructed in accordance with current Portland Cement Association recommended methods.

12" subgrade consisting of free draining natural fine sand or fine sand fill with less than 7% passing a U.S. #200 sieve. Subgrade to be compacted to a minimum density of 98% of the modified Proctor maximum density (AASHTO T-180).

**Crushed Concrete Base**

1-1/2" to 2-1/2" asphaltic concrete wearing surface

6" to 8" crushed concrete base with the quality of crushed concrete to be in accordance with current Florida Department of Transportation specifications and should have a minimum Limerock Bearing Ratio (LBR) of 150% and be compacted to at least 98% of the modified Proctor maximum dry density per ASTM D-1557.

12" stabilized subbase with minimum Limerock Bearing Ratio (LBR) of 40%. The subbase should be compacted to a minimum density equivalent to 98% of the modified Proctor maximum density per ASTM D-1557. The subgrade material, below the subbase, shall be compacted to a minimum density of 98% of the modified Proctor maximum density of the soil per ASTM D-1557.

| Type of Development | ADT (average daily traffic) | Base Thickness | Wearing Surface Thickness |
|---|---|---|---|
| Residential | < 1,500 | 6" | 1 ½" |
| | >1,500 | 8" | 2 ½" |

The pavement section should be designed based on expected traffic including truck loads. Traffic should not be allowed on the subgrade prior to placement of the base to avoid rutting. The final pavement thickness design should be checked by the project civil engineer using data contained in this report and anticipated traffic conditions.

As a possible pavement section design alternative, AEI presents recommendations for a rigid pavement section as follows:

**Rigid Pavement**

6" reinforced concrete wearing surface: Designed to withstand the design traffic loads and jointed to reduce the chances for crack development. The concrete should have a minimum unconfined compressive strength of 3,000 psi.

12" subgrade: consisting of free draining natural fine sand or fine sand fill. Subgrade to be compacted to a minimum density equivalent to 98% of the modified Proctor maximum density (AASHTO T-180).

## Stormwater Evaluations

Machine auger borings P-12 through P-18 and B-12 were drilled to depths of 30 feet below ground surface within the proposed stormwater retention areas to assess soil drainage characteristics and groundwater conditions, with the exception of P-13 being terminated at 10 feet. P-13 encountered thick/dense clayey soils that the auger rig was not able to push through. The locations of these borings is shown on **Figure 3** and the soil profiles with laboratory results and groundwater information are shown on **Figures 4 and 5**.

As previously mentioned, low permeability Stratum 6 clayey soils are expected to cause perched groundwater conditions in some areas, as shown by P-14, P-15 and P-16. The normal seasonal high groundwater levels at the stormwater boring locations, including perched and apparent levels, are estimated to exist between about 6.5 and 8.5 feet below ground surface. Dependent on the planned grading of the ponds, the estimated normal seasonal high groundwater levels and/or the Stratum 6 clayey soils may encroach on the pond bottoms. In these cases, we recommend over excavation of the low permeability Stratum 6 clayey soils and replacement with free-draining sands. Additionally, care should be taken to ensure the pond bottoms are not being excavated into the clay layer, creating a "bathtub" effect.

Constant-head field permeability tests were performed in the piezometers installed to 30 feet depth at P-12, P-14 and P-17. The tested intervals for these tests were the 20 to 30 foot depth range, which contained some silty soils, which can be expected to slow down water conveyance. Laboratory falling-head permeability tests were performed on the undisturbed tube samples collected from about 2.5 feet depth at P-13, P-14, P-16 and P-18. The results of these tests were combined with the soil profiles to calculate the aquifer parameters in the table below, and are shown next to the corresponding depths and soil profiles on **Figure 4**.

For dry retention stormwater system design, the following normal seasonal high groundwater levels, average hydraulic conductivities, and soil storage coefficients may be used:

| Boring Location | Bottom of Aquifer (ft)* | Avg. Unsat. Vertical Hydraulic Conductivity (ft/day) | Avg. Horizontal Hydraulic Conductivity (ft/day) | Seasonal High Groundwater Level (ft)* | Soil Storage Coefficient |
|---|---|---|---|---|---|
| P-13 | 3.0 | 15.3 | 34.4 | 2.5 (perched) | 0.25 |
| P-14 | 7.0 | 13.2 | 29.6 | 6.5 (perched) | 0.25 |
| P-16 | 7.0 | 26.7 | 59.9 | 6.5 (perched) | 0.25 |
| P-18 | 26.0 | 19.6 | 44.0 | 6.5 (apparent) | 0.25 |

*-feet below existing ground surface at time of drilling

Factors of safety have not been applied to the above weighted average permeability values. For the purpose of recovery analysis in accordance with water management district rules, a factor of safety of 2 should be applied to the unsaturated vertical permeability to account for long-term performance and siltation of the pond bottom.

The following formulas were used in the calculation of both the weighted average horizontal and weighted average vertical permeabilities:

Weighted Average Horizontal Permeability = $\dfrac{Kh_1.L_1 + Kh_2.L_2 + Kh_3.L_3 + ....Kh_n.L_n}{\sum L}$

Weighted Average Vertical Permeability = $\dfrac{\sum L}{\dfrac{L_1}{Kv_1} + \dfrac{L_2}{Kv_2} + \dfrac{L_3}{Kv_3} + .........\dfrac{L_n}{Kv_n}}$

Due to the soil conditions encountered at this site, additional investigations may become necessary to design and construct a stormwater system meeting regulatory requirements. We further recommend that final design of the stormwater system at this site be reviewed by AEI to ensure the data provided in this report has been properly interpreted for the selected stormwater system design, prior to construction. AEI will be glad to assist if further evaluations or groundwater modeling to document stormwater system recovery are needed.

## Excavations

Any and all excavations should be constructed in accordance with applicable local, state and federal regulation including those outlined by the Occupational Safety and Health Administration (OSHA). It is the contractor's sole responsibility for designing and constructing safe and stable excavations. Excavations should be sloped, benched or braced as required to maintain stability of the excavation sides and bottoms. Excavations should take into account loads resulting from equipment, fill stockpiles and existing construction. Any shoring needed to maintain a safe excavation should be designed by a professional engineer registered in the State of Florida in accordance with local, state and federal guidelines.

## LIMITATIONS

This report has been prepared for the exclusive use of JTD Land Company, LLC, and their designers, based on our understanding of the project as stated in this report. Any modifications in design concepts from the description stated in this report should be made known to AEI for possible modification of recommendations presented in this report**.** This exploration was performed in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made as to the professional advice presented herein. Statements regarding all geotechnical recommendations are for use by the designers and are not intended for use by potential contractors. The geotechnical exploration and recommendations submitted herein are based on the data obtained from the soil borings presented on **Figures 4 and 5**. The report does not reflect any variations which may occur adjacent to, between, or away from the borings. The nature and extent of the variations between the borings may not become evident until during construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations presented in this report. An on-site visit may be required by a geotechnical engineer to note the characteristics of the variations during the construction period. This geotechnical study investigated the soil conditions within the proposed stormwater pond areas and pavement areas to drilled depths of 10 to 30 feet below ground surface and was not intended to investigate deeper soil conditions with regard to the presence or absence of Karst activity.

## CLOSURE

AEI appreciates the opportunity to participate in this project, and we trust that the information herein is sufficient for your immediate needs. If you have any questions or comments concerning the contents of this report, please do not hesitate to contact the undersigned.

Sincerely,

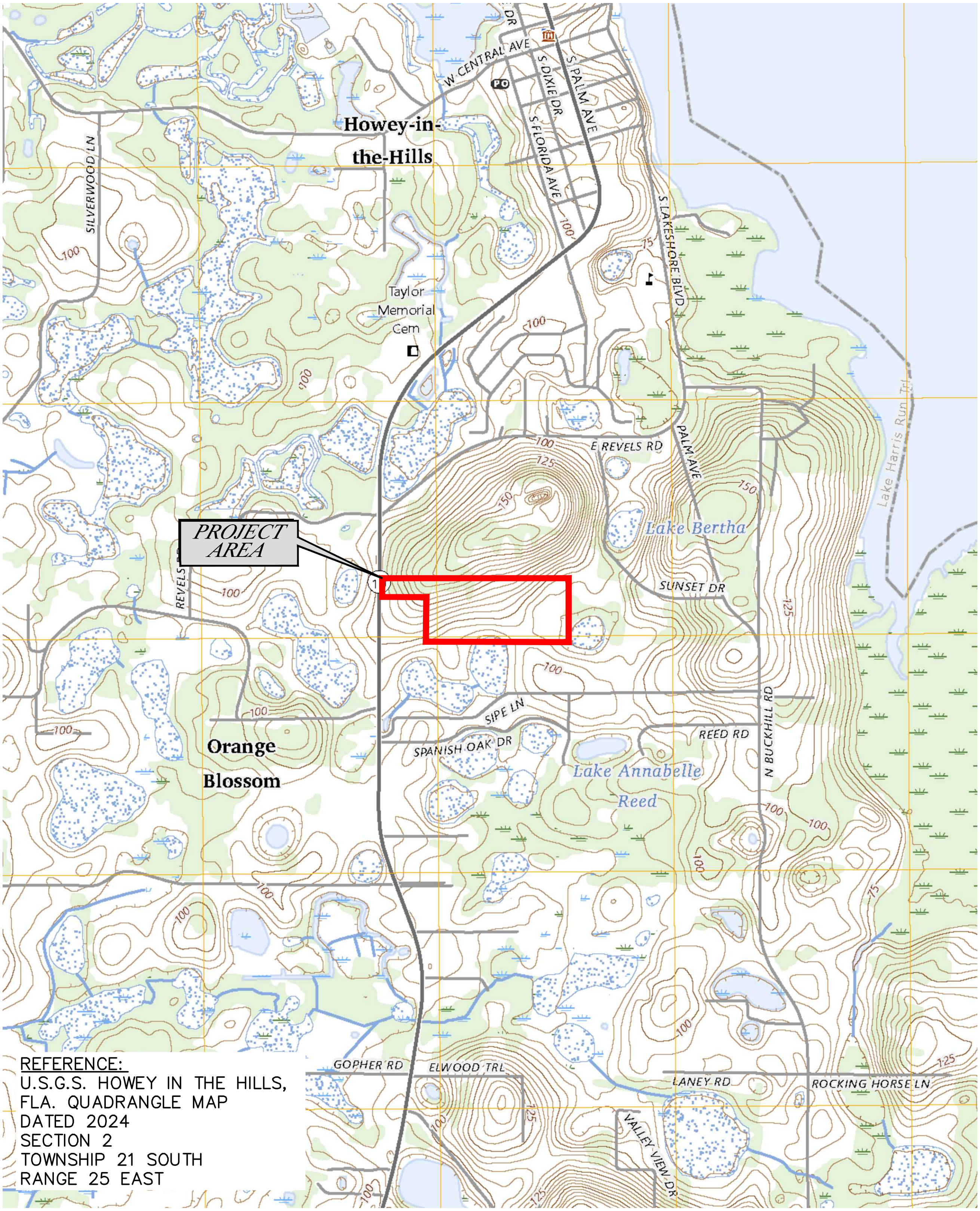
ANDREYEV ENGINEERING, INC.

RAYMOND W. JONES
LICENSE
NO. 58079
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

Frank Moschette, E.I.
Project Engineer

Raymond W. Jones, P.E.
Vice President
Florida Registration No.58079

# FIGURES




REFERENCE:
U.S.G.S. HOWEY IN THE HILLS, FLA. QUADRANGLE MAP
DATED 2024
SECTION 2
TOWNSHIP 21 SOUTH
RANGE 25 EAST

0 2000 4000 Feet

Andreyev Engineering, Inc.

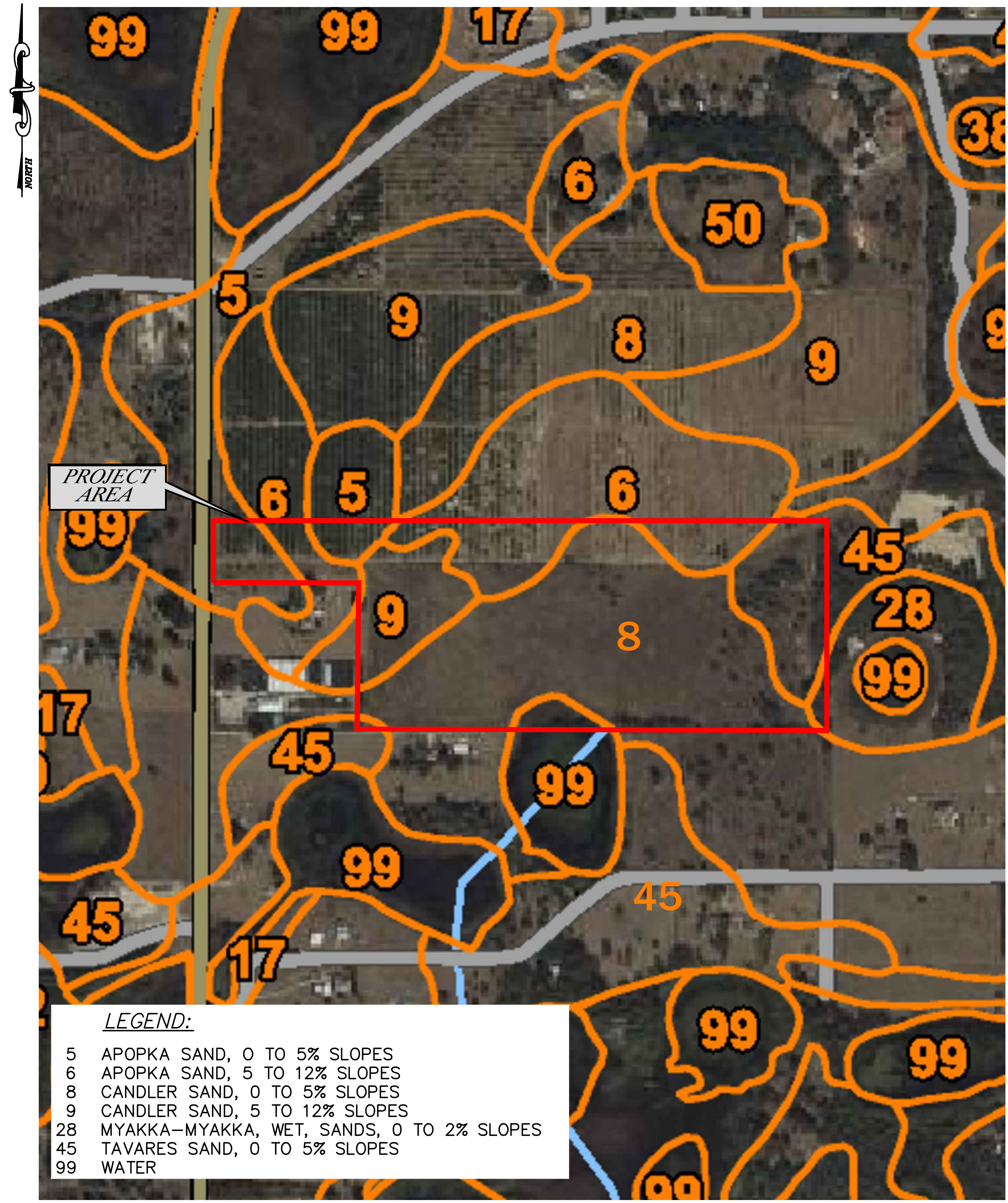
GEOTECHNICAL INVESTIGATION

**WATERMARK PROPERTY**

PROPOSED STORMWATER RETENTION AREAS & PAVED ROADWAYS

HOWEY IN THE HILLS, LAKE COUNTY, FL

| APPROXIMATE SCALE: | DATE: 03/12/25 | ENGINEER: RJ | U.S.G.S. TOPOGRAPHIC MAP |
|---|---|---|---|
| 1"=2000' | PN: GPGT-25-009 | DRAWN BY: DLS | FIGURE 1 |




LEGEND:

5 APOPKA SAND, 0 TO 5% SLOPES
6 APOPKA SAND, 5 TO 12% SLOPES
8 CANDLER SAND, 0 TO 5% SLOPES
9 CANDLER SAND, 5 TO 12% SLOPES
28 MYAKKA-MYAKKA, WET, SANDS, 0 TO 2% SLOPES
45 TAVARES SAND, 0 TO 5% SLOPES
99 WATER

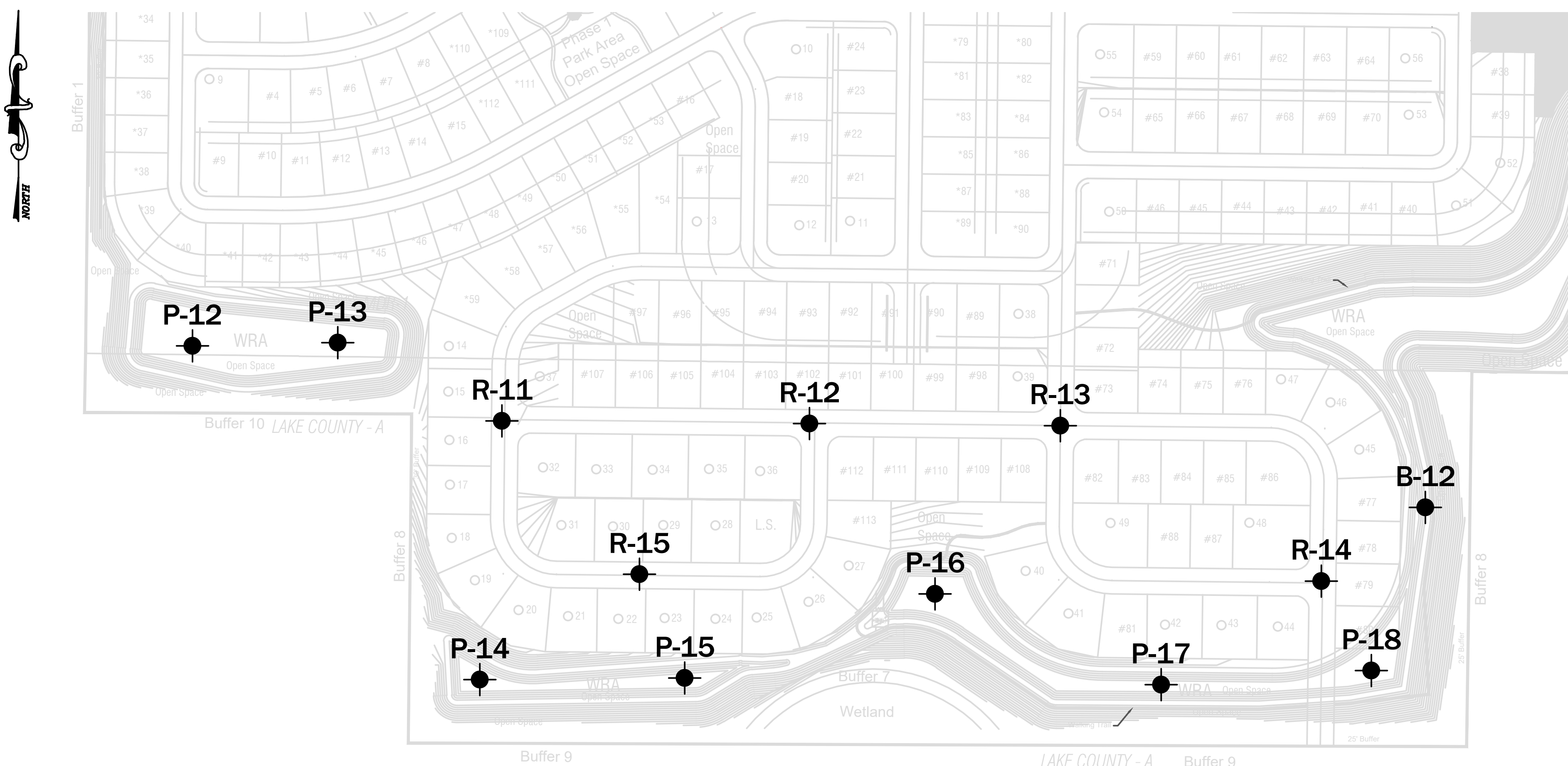
REFERENCE:
U.S.D.A. N.R.C.S. WEB SOIL SURVEY

0 600 1200
Feet

Andreyev Engineering, Inc.

GEOTECHNICAL INVESTIGATION
**WATERMARK PROPERTY**
PROPOSED STORMWATER RETENTION AREAS & PAVED ROADWAYS
HOWEY IN THE HILLS, LAKE COUNTY, FL

| APPROXIMATE SCALE: | DATE: 03/12/25 | ENGINEER: RJ | N.R.C.S. SOIL SURVEY MAP |
|---|---|---|---|
| 1"=600' | PN: GPGT-25-009 | DRAWN BY: DLS | FIGURE 2 |




0 300 600
Feet

*LEGEND:*

APPROXIMATE LOCATION OF MACHINE AUGER BORING

**Andreyev Engineering, Inc.**

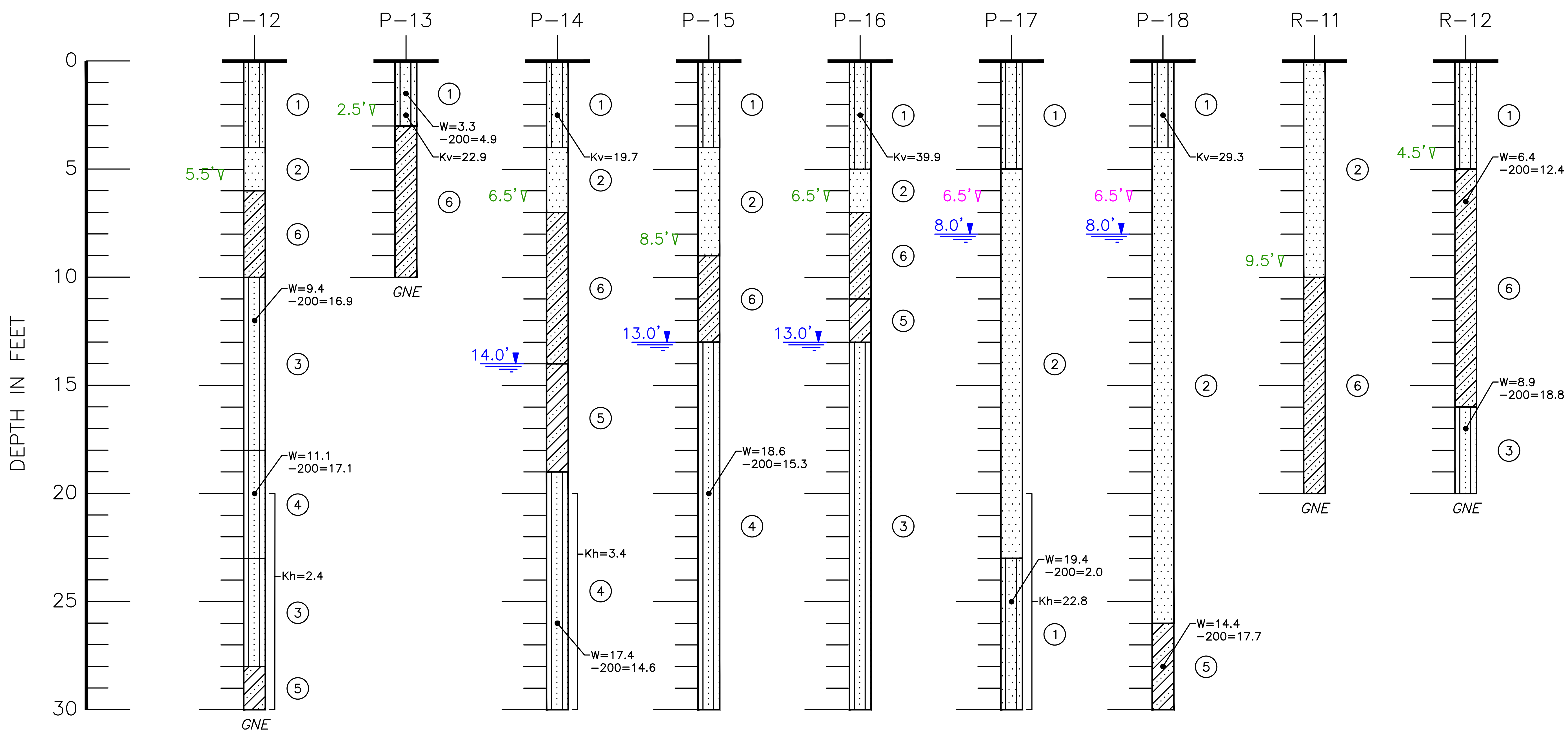
GEOTECHNICAL INVESTIGATION

**WATERMARK PROPERTY**

PROPOSED STORMWATER RETENTION AREAS & PAVED ROADWAYS

HOWEY IN THE HILLS, LAKE COUNTY, FL

| APPROXIMATE SCALE: | DATE: 03/12/25 | ENGINEER: RJ | BORING LOCATION PLAN |
|---|---|---|---|
| 1"=300' | PN: GPGT-25-009 | DRAWN BY: DLS | FIGURE 3 |




*LEGEND:*

1. DARK GRAYISH BROWN TO DARK BROWN FINE SAND TO SLIGHTLY SILTY FINE SAND (SP)(SP–SM) WITH OCCASIONAL ROOTS AND/OR OTHER ORGANIC DEBRIS
2. GRAYISH BROWN TO LIGHT BROWN TO BROWN FINE SAND (SP)
3. VERY PALE BROWN TO LIGHT BROWN TO LIGHT ORANGISH BROWN TO YELLOWISH BROWN SLIGHTLY SILTY TO SILTY FINE SAND (SP–SM)(SM)
4. PINK TO WHITE SLIGHTLY SILTY TO SILTY FINE SAND (SP–SM)(SM)
5. LIGHT BROWN TO BROWN TO PINK SILTY–CLAYEY FINE SAND (SM–SC)
6. LIGHT BROWN TO ORANGISH BROWN TO REDDISH BROWN CLAYEY FINE SAND (SC)

*(SP)* UNIFIED SOIL CLASSIFICATION SYSTEM GROUP SYMBOL

1.0' MEASURED DEPTH TO GROUNDWATER, FEBRUARY 10–11, 2025

*GNE* GROUNDWATER NOT ENCOUNTERED

*W* MOISTURE CONTENT, IN PERCENT

*–200* PERCENT OF FINES PASSING THE U.S. No. 200 SIEVE

*Kv* VERTICAL COEFFICIENT OF PERMEABILITY, IN FEET PER DAY

1.0' APPARENT ESTIMATED SEASONAL HIGH WATER TABLE

1.0' PERCHED ESTIMATED SEASONAL HIGH WATER TABLE

*Kh* HORIZONTAL COEFFICIENT OF PERMEABILITY, IN FEET PER DAY

Andreyev Engineering, Inc.

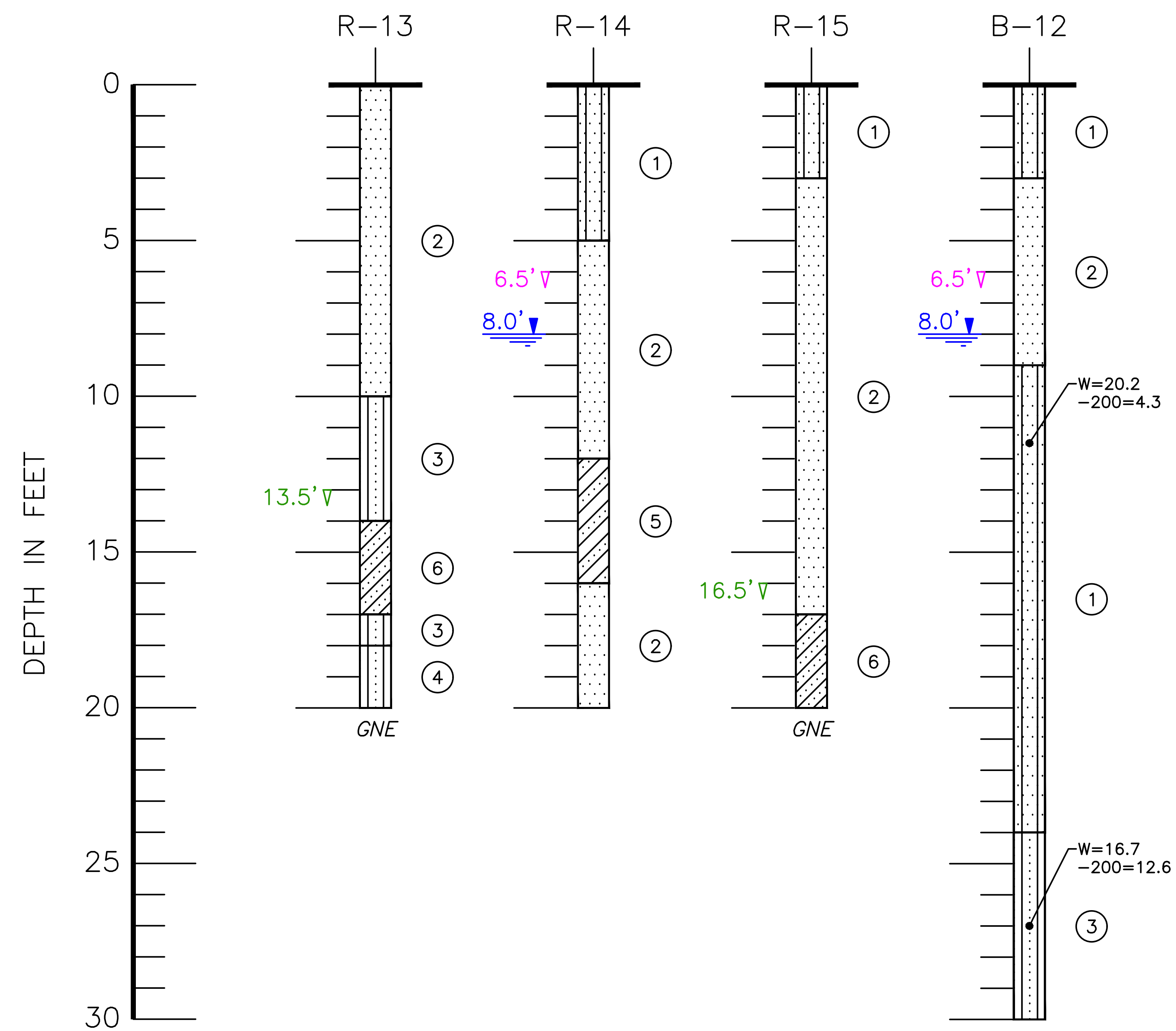
GEOTECHNICAL INVESTIGATION

**WATERMARK PROPERTY**

PROPOSED STORMWATER RETENTION AREAS & PAVED ROADWAYS

HOWEY IN THE HILLS, LAKE COUNTY, FL

| APPROXIMATE SCALE: | DATE: 03/14/25 | ENGINEER: RJ | SOIL PROFILES |
|---|---|---|---|
| 1"=5' | PN: GPGT–25–009 | DRAWN BY: DLS | FIGURE 4 |




*LEGEND:*

① DARK GRAYISH BROWN TO DARK BROWN FINE SAND TO SLIGHTLY SILTY FINE SAND (SP)(SP-SM) WITH OCCASIONAL ROOTS AND/OR OTHER ORGANIC DEBRIS

② GRAYISH BROWN TO LIGHT BROWN TO BROWN FINE SAND (SP)

③ VERY PALE BROWN TO LIGHT BROWN TO LIGHT ORANGISH BROWN TO YELLOWISH BROWN SLIGHTLY SILTY TO SILTY FINE SAND (SP-SM)(SM)

④ PINK TO WHITE SLIGHTLY SILTY TO SILTY FINE SAND (SP-SM)(SM)

⑤ LIGHT BROWN TO BROWN TO PINK SILTY-CLAYEY FINE SAND (SM-SC)

⑥ LIGHT BROWN TO ORANGISH BROWN TO REDDISH BROWN CLAYEY FINE SAND (SC)

*(SP)* UNIFIED SOIL CLASSIFICATION SYSTEM GROUP SYMBOL

1.0' MEASURED DEPTH TO GROUNDWATER, FEBRUARY 10-11, 2025

*GNE* GROUNDWATER NOT ENCOUNTERED

*W* MOISTURE CONTENT, IN PERCENT

*-200* PERCENT OF FINES PASSING THE U.S. No. 200 SIEVE

*Kv* VERTICAL COEFFICIENT OF PERMEABILITY, IN FEET PER DAY

1.0' APPARENT ESTIMATED SEASONAL HIGH WATER TABLE

1.0' PERCHED ESTIMATED SEASONAL HIGH WATER TABLE

*Kh* HORIZONTAL COEFFICIENT OF PERMEABILITY, IN FEET PER DAY

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