Geotechnical Engineering Report
Clearwater Airpark Improvements
Clearwater, Florida
S&ME Project No. 22840287

PREPARED FOR:
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18856 North Dale Mabry Highway
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June 7, 2024

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Native Engineering, PLLC
18856 North Dale Mabry Highway
Lutz, Florida 33548

Attention: Mr. Josh Bradley, P.E.

Reference: **Geotechnical Engineering Report**
Clearwater Airpark Improvements
Clearwater, Florida
S&ME Project No. 22840287

Dear Mr. Bradley:

S&ME, Inc. (S&ME) has completed a subsurface exploration and geotechnical engineering evaluation for the proposed Clearwater Airpark Improvements in Clearwater, Florida. Our services were provided pursuant to S&ME's proposal 22840287 dated January 15, 2024, as authorized by a Subconsultant Agreement between Native Engineering, PLLC and S&ME dated April 24, 2024. The purposes of our services were to explore the subsurface conditions at the site as they relate to the proposed construction and to provide geotechnical engineering recommendations for site preparation, foundation support, pavement design, and stormwater design. This report presents our understanding of the project, discussions about the site and the encountered subsurface conditions, and our conclusions and recommendations.

S&ME appreciates the opportunity to be of service to you on this project. Please contact us if you have any questions.

Sincerely,

S&ME, Inc.

PHILIP J. ERBLAND
No. 52621

Digitally signed by: Philip J Erbland
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This item has been digitally signed and sealed by Philip J. Erbland, P.E. on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

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1.0 Project Information

Project information was provided as attachments to previous emails. This information included a brief description of the subject project, location aerials (property appraiser information), the development proposal, and a proposed, conceptual-level site plan. The project consists of a new 2-story terminal building, 4 new hanger buildings, a new airport office building, replacement of the existing maintenance sheds, a new parking lot, new aprons, and repaved, existing roadway/aprons. Expansion/modification of the existing ponds will also be required (the existing ponds also have an underdrain system to prevent standing water). We have assumed that the new hanger and office buildings will be steel-framed structures with exterior CMU walls and/or metal sheeting and that individual column loads will be a maximum of 40 kips, wall loads will be on the order of 2 kips per lineal foot (klf), and floor and slab-on-grade loads will be less than 150 pounds per square foot (psf). For the 2-story terminal building, we have assumed individual column loads will be a maximum of 75 kips, wall loads will be on the order of 4 klf, and floor and slab-on-grade loads will be less than 150 psf. We also assume that up to one foot of fill will be needed to raise the building and parking/drive areas to final grade(s).

2.0 Scope of Services and Report Format

Our scope of services included conducting a site reconnaissance, field exploration, laboratory testing, and geotechnical engineering assessments of the encountered subsurface conditions as they relate to the proposed development. The following report sections present discussions about the observed site conditions, the field exploration and laboratory testing programs, the encountered subsurface conditions, and our corresponding conclusions and recommendations. Figures and boring logs are presented in Appendix I. Laboratory test results are presented in Appendix II. Summaries of the field and laboratory testing procedures are presented in Appendix II.

3.0 Site Information

3.1 Site Description

The site for this new facility is on the west side of North Hercules Avenues just north of Drew Street. The approximate location of the site is shown on the Site Location Plan, Figure 1 in Appendix I. At the time of our exploration, the site was currently developed with a multiple structures, paved roadways and aprons, and grassed areas.

During our site work, airpark staff informed our field crews that the northern portion of the improvement area was historically used as a landfill. However, a desktop review of readily available public records did not indicate a landfill as past site usage or provide any possible limits of landfill activities.

3.2 Soil Survey Information

Based on our review of the Soil Survey of Pinellas County, Florida, prepared by the U.S. Department of Agriculture Natural Resource Conservation Service (formerly the Soil Conservation Service), the site area planned for improvements is underlain by soils identified as “Matlacha and St. Augustine soils and Urban Land” (Unit 16) and “Myakka soils and Urban Land” (Unit 17). Matlacha and St. Augustine soils are found on ridges on marine terraces and are comprised of somewhat poorly drained sands, loamy fine sands, and sandy loam to depths of 80 inches or more. In undrained areas, the seasonal high groundwater level is reported to range from 18 to 36 inches below the natural ground surface. Myakka soils are found on the flatwoods and are comprised of poorly drained sands to depths of 80 inches or more. In undrained areas, the seasonal high groundwater level is reported to be between 6 and 18 inches below the natural ground surface. Urban land for both units consists of areas that have been modified through cutting, grading, filling, and shaping for urban development resulting in the native soils being significantly disturbed such that no soil information is available.

4.0 Exploration and Testing Programs

4.1 Underground Utility Location

Sunshine 811 was contacted to locate publicly owned utilities prior to our mobilization to the site. In addition, S&ME subcontracted with a private utility locator, ECHO Utility Engineering & Survey (ECHO), who performed Ground Penetrating Radar (GPR) and Electromagnetic (EM) scans within the vicinity of the SPT test locations.

The underground scans indicated no underground utility lines in direct conflict with the soil test borings. However, buried utilities of unknown type were identified near most of the test boring locations. Please see the included field sketches in Appendix I for more detail. Please note that based on past site usage, additional utilities are likely present in areas away from the actual test locations.

4.2 Field Exploration

We conducted a site visit to prepare for the field exploration program and to observe existing field conditions. Test locations were established in the field using a hand-held GPS unit and coordinates obtained from Google Earth, as well as estimates of distance from existing features shown on readily available aerial imagery. Approximate boring locations are shown on the Field Test Location Plan, Figures 2 to 5 in Appendix I. Test locations and depths were selected by S&ME with concurrence of the design team.

The field exploration was conducted between May 10 and May 15, 2024 and consisted of drilling Standard Penetration Test (SPT) and auger borings and conducting Double Ring Infiltrometer and field hydraulic conductivity tests.

The SPT borings were drilled to depths of 20 to 25 feet below the existing ground surface. Each SPT borehole was advanced by a truck-mounted drill rig using a combination of continuous split-spoon soil sampling and mud-rotary drilling methods. Standard penetration testing was performed continuously at 24-inch intervals to 10 feet, then at approximate 5-foot intervals to the boring termination depths. Soil sampling and testing were conducted in general accordance with ASTM D1586. The hand auger borings were manually advanced to a depth of 5 to 7 feet using a bucket auger. Borehole advancement and soil sampling were performed in general accordance with the procedures outlined in ASTM D1452.

Sampler penetration resistance and soils recovered in each sampler and auger were logged by the field crew. Representative soil samples obtained from the borings were sealed in clean, airtight containers for transport to our office for further classification and examination. The depth to groundwater was measured in each borehole. At the completion of drilling and sampling, the SPT boreholes were backfilled with bentonite chips while the auger borings were backfilled with native materials.

At one location in the T-hangar taxilane and in one location in the north apron pavement area, S&ME cored and removed the existing asphalt and base. S&ME then obtained a bulk sample of the upper 12 inches of soil under the base. An additional bulk sample was obtained from the grassed area south of the center taxilane. In the grassed area, we removed the upper 6 inches of soil and then sampled the next 12 inches.

A Double Ring Infiltrometer (DRI) test was performed adjacent to borings SW-1, SW-2, SW-3, and SW-4 at depths of approximately 12 to 18 inches below the existing grade. The test was performed in general accordance with the procedures outlined in ASTM D3385 for a duration of 4 hours. Finally, one cased-hole, falling-head field hydraulic conductivity test was conducted adjacent to each DRI test. The test was conducted by installing nominal 2 inch diameter casing to the test depth in a similar diameter auger borehole. The bottom 12 inches of the casing was screened. The casing was then filled with water to the top and the rate at which the water level inside the casing dropped was recorded.

4.3 Laboratory Testing

Soil samples obtained during the field exploration were packaged and transported to our office for further examination and classification by a geotechnical engineer in order to confirm the field descriptions of the various soil strata. Recovered soil samples were classified visually in general accordance with the Unified Soil Classification System (ASTM D2487). Representative samples were selected for laboratory testing to aid in soil classification and to further define the engineering properties of the soils. The laboratory program included tests for percent fines, organic content, and natural moisture content. The bulk soil samples were selected for California Bearing Ratio (CBR) testing (ASTM D1883). Laboratory test results are presented on the soil boring logs in Appendix I at the depth of the individually tested soil sample. Detailed CBR test results are provided in Appendix II.

5.0 Subsurface Conditions

5.1 Subsurface Conditions

The stratigraphy, soil types, and groundwater levels described below are based on the results of the borings and laboratory testing. Unified Soil Classification System group names and group symbols were used for soil classification. Descriptions below are general. Detailed subsurface characteristics at each boring location are shown on the boring logs in Appendix I.

The borings in the proposed north hanger and apron area (H-1, H-2, P-1, AP-1, and AP-2) consisted mostly of very loose to medium dense fine sands (SP), sands with silt (SP-SM), and clayey sands (SC) from the ground surface (or under the pavement system) to the termination depths of 5 to 20 feet. Debris consisting of glass, metal, bricks and some municipal-type waste were encountered in borings H-1, P-1 and AP-2 to the termination depth and in boring H-2 to about 2 feet. No debris was encountered in boring AP-1 (the furthest south). Additionally, a layer of organic sand was encountered in boring H-2 from about 6 to 8 feet below the ground surface.

The borings in the eastern new hanger areas (borings H-3 through H-9) encountered very loose to medium dense fine sands (SP), sands with silt (SP-SM), and sands with clay (SP-SC) from the ground surface to the termination depth of 20 feet.

The borings in the new office area (MS-1 and T-1) encountered very loose to medium dense fine sands (SP) and sands with silt (SP-SM) from the ground surface to the termination depth of 20 to 25 feet. A trace amount of debris was encountered in the upper 2 feet of the sand soils in boring MS-1 but does not appear to be related to past landfilling activities as the amount of debris was limited.

The borings in the new terminal area (T2 and T-3 and H-10 to H-12) encountered very loose to medium dense fine sands (SP) and sands with silt (SP-SM) from the ground surface to the termination depth of 25 feet. A trace amount of organics was encountered in the upper 2 feet of the sand soils in borings T-2 and H-12.

Borings SW-1 to SW-4 in the planned pond areas encountered very loose to medium dense sands (SP), sands with silt (SP-SM), and sands with clay (SP-SC) from the ground surface to a depth of about 17 to 20 feet. Borings SW-1, SW-2, and SW-4 were terminated in this material at 20 feet while boring SW-3 encountered silty sand (SM) below the upper sands to the termination depth of 20 feet.

The majority of the auger borings in the planned parking/drive areas generally encountered fine sands (SP) and sands with silt (SP-SM) from the ground surface (or under the pavement system) to the termination depth of 5 to 7 feet. Boring CT-1 also encountered a layer of silty sand (SM) from about 5½ feet to boring termination (6½ feet) and boring P-10 encountered a layer of silty sand (SM) from under the pavement base to a depth of about 1½ feet.

Borings P-2, P-3, and P-4 encountered sand with silt (SP-SM) over their depth with debris encountered at various depths. Borings P-2 and P-4 were terminated in debris material while the debris only extended to about 3½ feet in P-3.

The above subsurface description is of a highly generalized nature to highlight the major subsurface stratification features and material characteristics. The logs included in Appendix I should be reviewed for specific information. The transition between materials will be more or less gradual than indicated and may be abrupt. Information on actual subsurface conditions exists only at the specific test locations and is relevant to the time the exploration was performed. Variations may occur and should be expected between boring locations.

5.2 Groundwater Levels

Groundwater was encountered at depths of about 4½ to 5½ feet below the existing ground surface in most of the borings. Groundwater was not encountered in some of the hand auger borings. Groundwater levels may fluctuate due to seasonal changes in precipitation amounts and with construction activity in the area. The groundwater level information presented in this report was collected at the time of our exploration.

5.3 Existing Pavement Data

In boring locations in existing paved areas and at selected bulk sample locations, the existing pavement section was cored and the individual component thicknesses measured. The following table presents the results of the pavement coring.

Table 5-1: Pavement Core Data

Core Location	Asphalt Layer Thickness (inches)	Base Thickness (inches)	Base Type
P-2	5 ¾	No Base	-
P-3	2 ¾	3	Shell
P-4	1 ½	6	Shell
P-8	3	6	Limerock
P-9	2 ¾	16	Limerock
P-10	4	8	Limerock
AP-1	1 ¼	5 ½	Soil Cement
AP-2	2 ¼	5	Soil Cement
CT-1	2 ¼	17	Recycled Asphalt Pavement
CT-2	1	5 ½	Shell
HT-1	2 ½	6	Limerock
HT-2	2	6	Shell

Core Location	Asphalt Layer Thickness (inches)	Base Thickness (inches)	Base Type
TL-1	2	5	Shell
BULK-1	2	7	Limerock
BULK-2	2 ¾	15 ¼	Soil Cement

6.0 DRI/Hydraulic Conductivity Test Results

The DRI tests were performed approximately 12 to 18 inches below the existing grade while the field hydraulic conductivity testing was performed at a depth of 3 to 4 feet below the existing grade. The testing was performed adjacent to borings SW-1, SW-2, SW-3, and SW-4. The following table summarizes the DRI test results:

Table 6-1: DRI Test Result Summary

Test Location	Test Depth (inches)	Measured Vertical Infiltration Rate (in/hour)	Estimated Horizontal Infiltration Rate (in/hour)
SW-1	12	10.5	15.8
SW-2	18	8.8	13.2
SW-3	18	3.5	5.3
SW-4	12	4.4	6.6

The field test results are presented as Figures 6 to 9 in Appendix I and the field testing procedure is summarized in Appendix III.

The results of the field hydraulic conductivity testing is summarized in the following table:

Table 6-2: Field Hydraulic Conductivity Test Result Summary

Location	Test Depth Interval (feet)	Measured Horizontal Hydraulic Conductivity (feet/day)	Estimated Vertical Hydraulic Conductivity (feet/day)
SW-1	3 – 4	11.6	7.7
SW-2	3 – 4	7.4	4.9
SW-3	3 – 4	4.6	3.1
SW-4	3 – 4	4.8	3.2

It is important to note that a suitable factor of safety should be used with all of the above values for design purposes.

7.0 Conclusions and Recommendations

7.1 General

The following report sections present our geotechnical engineering recommendations for site preparation, foundation support, pavement design, and stormwater design. The conclusions and recommendations presented in this report are based on the preceding project information and the results of this exploration. Actual subsurface conditions may vary between or away from the test locations. If it becomes apparent during construction that the conditions encountered vary substantially from those presented herein, this office should be notified at once. At that time, the conditions can be evaluated, and the recommendations of this report modified, in written form, if necessary.

During review of these recommendations, it should be kept in mind that, as with any previously developed site, unexpected subsurface conditions may be encountered. These conditions could include such things as undiscovered fill deposits, previous development remnants, or buried debris. These variable conditions can normally be handled during construction by field engineering evaluation. Because of natural variations in depth, composition and consistency of soils, unsuitable materials and other soil types not encountered by the borings will likely exist between boring locations and should be anticipated.

7.2 Site Geotechnical Considerations

Based on the results of the subsurface information obtained to date, the major geotechnical engineering considerations associated with the planned development of this site are the presence of fill soils containing buried debris as encountered in some of our borings, the presence of organic soils, the shallow groundwater depths encountered in the borings, and the presence of very loose to loose sands encountered from the ground surface to depths of approximately 10 to 17 feet and the potential for settlements of these foundation soils beneath the assumed building loads.

Fill soils are of particular concern because they likely were not placed and compacted in an engineered manner. The encountered fill soils contained varying (often significant) amounts of buried debris consisting of concrete and asphalt pieces, glass, metal, gravel, and organics. This debris was encountered below the depth of normal stripping operations and, if left in place, could adversely affect the performance of the overlying pavements and structures.

It is highly likely that buried debris and other deleterious materials are present at varying depths and concentrations at unexplored locations within the proposed construction areas. In addition, organic contents and moisture contents of organic soils may be higher than noted on the boring logs.

Shallow groundwater levels were encountered at most test boring locations. The shallow groundwater depths will influence site grading to the extent that adequate separations between the estimated seasonal high groundwater levels and the bottoms of planned roadways/aprons and foundations are maintained. The shallow groundwater levels will also influence the design of the proposed stormwater management system. Excavations and below-grade construction should be conducted "in the dry." Based on the encountered groundwater depths, some form of dewatering will be needed to facilitate excavation, as well as backfill and compaction of excavations.

Our assessments indicate that the site is adaptable for the proposed construction. With proper site preparation as discussed below, the proposed building can be supported on a shallow foundation system consisting of conventional spread footings. Similarly, the encountered soils are suitable to provide support for proposed pavements. The recommended site preparation program involves the removal of all unsuitable surface materials (grass turf, roots, buried debris, organic soil, previous development remnants, and other vegetation). Site preparation will also involve densifying the subgrade surfaces to compress loose surface soils, as well as subgrade soils disturbed by other site preparation procedures, thereby creating a more uniform and less yielding soil mass. The above-created conditions will promote uniform settlement, thereby reducing the incidence and magnitude of differential settlement.

7.3 Fill Loads

Based on the provided data, the placement of up to 1 foot of compacted fill may result in total settlements of foundation soils between ¼ to ½ inch. We anticipate that settlements of these magnitudes are within tolerable limits. Since the site soils encountered in our borings within the anticipated depths of influence beneath the new fill are generally sandy in nature, most of the settlements will occur as the fill is placed. If fill heights greater than 1 foot are planned, additional evaluation is recommended to determine if a preload or surcharge program will be required.

7.4 Undercutting and Replacement

7.4.1 North Hanger Area

The composition and relative density of the fill layer cannot be well quantified and as such it poses a settlement risk. The organic soils are also of concern and will increase the settlement risk. In order to support the affected structures on shallow foundations, the upper soils must be modified to reduce the potential settlement. The buried debris and organic sands should be completely removed from beneath proposed building areas, all organic sands soils should be completely removed from beneath proposed pavement areas and both areas replaced with compacted structural fill under the observation of a representative of the Geotechnical Engineer. The undercut depths will vary based on the amount of deleterious material encountered. For estimating purposes, we suggest you assume that undercutting/replacement will be required to an average depth of 10 feet within the entire footprint of the structures and pavement; locally deeper undercut will be required. Dewatering may be necessary during undercut operations. Excavation and logging of test pits prior to construction are recommended to better evaluate the depth, lateral extent, and composition of the debris in the areas where debris was encountered.

Effort should be made to separate the sand soil above the debris from the debris to reduce the amount of material both disposed of and required to be imported. The actual extent of undercutting should be determined in the field at the time of construction by the Geotechnical Engineer or his representative. This will help reduce the excavation required and assist with identifying material suitable for re-use in accordance with Section 8.6. It should be noted that in order to reduce the potential for a sudden change in soil support from the native condition to an area over-excavated and replaced, the edge of the excavated area should be sloped upwards at a slope at least 5H:1V and benched to allow compaction of the interface slope.

Following undercutting, the areas should be proofrolled using a tandem-axle dump truck. Following proofrolling, the area can be filled up to finished grades in compacted lifts. The material which is undercut from above the construction debris can be reused as structural fill assuming it meets the presented fill requirements.

Consideration may be given to leaving buried debris in place beneath proposed pavement areas (as long as there are no organic soils below the debris). In this case, a single layer of high-strength geogrid reinforcement beneath the pavements should be used. The high-strength geogrid will reduce the potential for differential pavement settlements, localized failure from wheel loads, and potentially premature failure of the pavement section. This is discussed further in Section 9.1.

7.4.2 Remaining Building Areas

Total post-construction settlements of the proposed buildings can be reduced to less than 1 inch by removing the existing very loose to loose sandy soils and replacing them in compacted lifts. Prior to fill placement or site work in the building areas, we recommend undercutting the soils within an area 5 feet wider than the footprint of the building to a depth of at least 2 feet below existing grade. The bottom of the excavation should then be proofrolled and compacted using heavy vibratory compaction (in accordance with Sections 8.3 and 8.4) and the soils should then be replaced with structural fill compacted in accordance with the structural fill recommendations discussed in Section 8.5 to the planned finish elevation(s). Based on our findings, the soils to be removed will meet the requirements for structural fill. Undercutting and replacement is only needed in the area beneath the structures.

7.5 Shallow Foundation Design Considerations

Assuming our site preparation recommendations are followed (including undercutting and replacement), the proposed buildings may be supported on shallow foundations. Footings may be designed for maximum allowable soil bearing pressures up to 2,000 psf. Total, post-construction settlements based on this bearing pressure and the assumed loads are anticipated to be about 1 inch, with differential settlement across the building anticipated to be about ½ inch. These settlement values are based on an individual, 4½-foot square footing supporting an assumed load of 40 kips and an individual, 6½-foot square footing supporting an assumed load of 75 kips. Our calculations assumed that up to 1 foot of compacted structural fill will be placed beneath the buildings. If these assumptions are not valid, we should be contacted to revise our settlement analysis.

Foundations should bear at least 18 inches below the finished exterior grade to develop the design bearing pressure. Continuous wall footings should be a minimum of 18 inches wide and individual column footings should be a minimum of 24 inches wide regardless of the resulting contact pressure. This recommendation is made to help prevent a “localized” or “punching” shear failure condition, which could exist with very narrow footings. It is important that the structural elements be centered on the footings such that the load is transferred evenly, in accordance with Florida Building Code requirements, unless the footings are proportioned for eccentric loads.

7.6 Floor Slab Design and Construction

A soil-supported ground floor slab is acceptable at this site provided that our recommendations for site preparation and compaction of fill and backfill are followed. A subgrade modulus (k) of 180 pounds per square inch per inch (psi/in), based on the 12-inch-square plate load test is appropriate for design of the floor slabs. This modulus value should be appropriately reduced when designing the floor slab thickness to accommodate wide area loads. Detailed settlement analyses for the floor slab should be performed if it will be subjected to large, wide area loads

Soils meeting the physical requirements of structural fill should be used as backfill for utility trenches beneath the floor slab. The backfill should be placed and compacted in accordance with the recommendations discussed in Section 8.5. Also, the slab should be designed with proper joints to keep stresses within the appropriate limits, achieve adequate load transfer, and reduce the potential for irregular crack formation.

Based on the results of our exploration and expected grades, the floor slabs will likely not be subjected to hydrostatic pressure from groundwater. However, water vapor transmission through the slab is a design consideration. The need for and design of a vapor retarder or vapor barrier for moisture control is outside our scope of services and should be determined by the project architect or structural engineer based on the planned floor coverings and the corresponding design constraints. Further, health and environmental considerations with respect to any potentially harmful vapor transmission are also outside of our scope.

7.7 Estimated Seasonal High Groundwater Level

The typical seasonal high groundwater level each year is the level in the August through September period at the end of the rainy season during a year of average (normal) rainfall. The seasonal high groundwater level is affected by several other factors. The drainage characteristics of the soils; the land surface elevation; relief points such as lakes, rivers, swamp areas, etc.; and distance to relief points are some of the more important factors influencing the seasonal high groundwater level.

As mentioned, groundwater was measured in the pond borings (SW-1 through SW-4) at depths of 4½ to 5 feet. Our review of the Soil Survey information shows a published seasonal high groundwater level of 6 to 36 inches below the existing ground surface. Based on the soil indicators encountered at the time of our exploration, the seasonal high groundwater level is anticipated to be at a depth of about 2½ feet (± 6 inches) near borings SW-1 through SW-4.

Higher groundwater levels should be expected after periods of heavy and/or prolonged rainfall events. If a more accurate determination of the seasonal water levels is needed, piezometers should be installed around the site so that the water levels during the rainy and dry seasons can be evaluated.

8.0 Site Preparation Recommendations

8.1 Demolition, Stripping and Grubbing

Site preparation should begin with drainage improvements to drain ponded water, lower groundwater levels, and handle stormwater runoff during construction. Site preparation should continue with the removal of all unsuitable surface materials from beneath the proposed building and pavement areas. This should include clearing and grubbing all vegetation, stripping surficial organic-laden soils, and undercutting any unsuitable surface materials from proposed construction areas.

All relic building foundations, pavements, utilities, stumps, and taproots should be completely removed from beneath proposed stormwater pond, building, and pavement areas. Although not indicated on the logs, the contractor should expect that large roots and/or roots in a dense state will be encountered in all excavations. Voids created from the removal of these materials should be cleaned and backfilled with compacted structural fill. The clearing operations should extend at least 10 feet beyond the perimeter of the proposed building and pavement areas. Provisions should then be made to remove or relocate any interfering utility lines within the construction area to appropriate locations. In this regard, it should be noted that if abandoned underground pipes are not properly removed or plugged, they may serve as conduits for subsurface erosion, which may subsequently result in excessive settlements. Strippings, organic soils, fill materials, and debris should be disposed off-site according to the owner's instructions.

8.2 Excavations

Based on the results of the borings and the anticipated grades, excavations are expected to extend through very loose to loose fine sands (SP), sands with silt (SP-SM), and sands with clay (SP-SC). We anticipate that these soils can be removed using conventional excavation equipment.

All excavations should be sloped or shored in accordance with local, state, and federal regulations, including OSHA (29CFR Part 1926) excavation trench safety standards. The contractor is solely responsible for site safety. This information is provided only as a service and under no circumstances should S&ME be assumed to be responsible for construction site safety.

Excavations and below-grade construction should be conducted “in the dry.” Perched and/or trapped water may be present with the depths of excavation after periods of heavy or prolonged rainfall. Prior to excavation, the groundwater level should be lowered and maintained at least two feet below the bottom of the excavation to limit the potential for bottom heave and instability. Dewatering systems should not be decommissioned until excavation, placement and compaction of fill and backfill soils is complete, and sufficient deadweight exists on foundations, pipes, and buried/embedded structures to prevent uplift. The contractor is responsible for verifying groundwater levels during construction. The contractor is also responsible for the design, installation, and maintenance of a properly functioning dewatering system. The design of the dewatering system should be in conjunction with the design of any excavation support system.

Exposed subgrade soils at the bottoms of excavations should be evaluated by the geotechnical engineer or their designated representative prior to backfilling and prior to steel and concrete placement. This evaluation will help determine if individual footings and buried utilities are directly underlain by suitable bearing material. If unsuitable soils or soils that cannot be readily moisture conditioned and compacted are encountered at the bottoms of excavations, then these soils should be over-excavated at least two feet beneath the bottom of the foundation and replaced with compacted structural fill.

Continuous wall footing trenches and individual footing pits should be excavated to footing line and bottom grade. Exposed bearing soils at the bottoms of footing excavations should be compacted to at least 95 percent of the modified Proctor maximum dry density to a depth of at least 2 feet below the bottom of the footing. If necessary, the bottom of footing excavations should be recompacted, or it should be overexcavated, refilled with structural fill, and compacted to achieve the minimum field density to the required depth. A thin layer of non-structural concrete (a "mud mat") can be placed on the compacted subgrade soils after testing to protect the soils and provide a durable working surface for construction. Excavations should be backfilled with suitable compacted soils as discussed in the "Structural Fill" section of this report.

8.3 Evaluation of Exposed Subgrade Soils

Following stripping and grubbing and undercutting operations, the exposed subgrade soils in the building and pavement areas should be evaluated by the geotechnical engineer by proofrolling with a heavily loaded, tandem-axle dump truck or similar rubber-tired equipment. Unstable soils should be undercut and backfilled with compacted structural fill, as recommended by the geotechnical engineer, or scarified and densified in place (after adjusting moisture content to near optimum). In general, the extent and depth of any undercutting will depend upon final grades, weather conditions during construction, the aggressiveness of the earthwork schedule, site drainage, and the grading contractor's experience, means and methods, and equipment.

Proofrolling is extremely important at this site. This phase of site preparation should not be omitted.

8.4 Surface Soil Compaction

After stripping and proofrolling and prior to fill placement, exposed soils should be uniformly compacted to at least 95 percent of the modified Proctor (ASTM D1557) maximum dry density to a depth of at least 24 inches below the compacted surface. Regardless of the degree of compaction achieved, a minimum of eight (8) complete overlapping coverages should be made in the building pad and pavement areas with the compaction equipment to help increase the density and improve the uniformity of the underlying sandy soils. The roller coverage should be divided evenly into two (2) perpendicular directions.

During the compaction process, the moisture content of the soils may need to be adjusted in order to facilitate proper compaction. If additional moisture is needed to achieve compaction, then water should be applied evenly and in such a way that it will not cause erosion or removal of subgrade soils. In the event that applied water does not penetrate sufficiently deep into natural soils to act as a lubricant in the compaction process, it will be necessary to disk or otherwise break up the soils before and during the application of water. In the event that the moisture content is too high, it may be necessary to disk the soil and allow it to dry prior to compaction. A moisture content within two percent of the optimum indicated by the modified Proctor test is recommended prior to compaction of the natural ground and structural fill.

Vibratory compaction equipment should not be allowed to operate within 75 feet of any existing buildings or critical utilities. Within this range, compaction of the exposed subgrade soils and any structural fill should be conducted with lightweight walk-behind vibratory equipment or with rollers in static mode.

8.5 Structural Fill

Structural fill/backfill materials should consist of cohesionless sandy soil containing no more than 12-percent fines (material passing the No. 200 sieve) by weight (Unified Soil Classification of SP, SP-SM, or SP-SC) that are free of organics, debris, roots, deleterious matter, and elongated or flat particles susceptible to degradation. All material being used as fill and backfill should be tested and approved by the geotechnical engineer before placement.

Structural fill should be placed and compacted in loose lift thicknesses appropriate for the compaction equipment being used. For drum rollers at least 30 inches in diameter, the maximum lift thickness should be no more than 12 inches. For smaller, walk-behind compaction equipment, the lift thickness should be 6 inches or less. Each lift should be compacted to a density of at least 95 percent of the modified Proctor maximum dry density. The upper 12 inches of fill in the building floor slab areas should be compacted until densities of at least 95 percent of the modified Proctor maximum dry density are uniformly obtained. Soil moisture content should be adjusted as needed to facilitate placement and compaction.

8.6 Use of On-Site Materials as Structural Fill

Soils meeting the requirements for structural fill as discussed above are preferred beneath foundation elements. Based on the soils encountered in our borings, it is our opinion that the on-site fine sands (SP), sands with silt (SP-SM), and sands with clay (SP-SC) free of debris and deleterious materials are suitable for reuse as structural fill and, with proper moisture control, should densify using conventional compaction equipment. These sandy soils may be reused as fill if debris and deleterious materials are removed (such as by sieving) such that the maximum particle size is 4 inches. The silty sands (SM) encountered are not suitable for reuse as structural fill. These soils will likely be difficult to place, moisture condition, and compact and, as such, are considered unsuitable for reuse as structural fill and general fill. However, if the silty sand soils are properly blended with the sandier materials, they will likely be acceptable for reuse as structural fill. However, the contractor should anticipate importing structural fill from off-site borrow sources. Soils with more than 5 percent organics and any clay soils (CH) cannot be used as fill or backfill and should be disposed off-site in accordance with the owner's instructions.

9.0 Pavement Design Recommendations

We have not been provided with detailed traffic loading information at this time. Minimum pavement section layer thicknesses provided in the following report sections are based on our experience with similar facilities. If this facility will be subject to significant truck traffic, then it will be necessary to perform a detailed pavement design which would consider the desired pavement design life, terminal serviceability, and expected traffic loading. Additionally, if the pavements will be subjected to significant point loads, additional pavement thickness may be needed. The recommendations provided only apply to the vehicle parking/drive areas. Design of the airpark aprons and taxiways was not in our scope.

The CBR testing showed the existing subgrade soils to have CBR values ranging from 18 to 35. A design value of 18 is recommended to be used in pavement design.

9.1 Flexible Pavement Recommendations

We recommend using a layered pavement section consisting of a compacted, stabilized soil subgrade, a compacted graded aggregate base course (compacted Florida Limerock, crushed concrete, or equivalent), and an asphaltic concrete surface course. The asphaltic concrete surface course should consist of a Superpave mix (such as SP-9.5).

The asphaltic concrete mix should be a current FDOT-approved design. Samples of the materials delivered to the project should be tested to verify that the aggregate gradation and asphalt content satisfies the mix design requirements. The asphalt should be compacted to FDOT specifications. After placement and field compaction, the wearing surface should be cored to measure thickness and to perform laboratory density tests. Cores should be obtained at a frequency of at least one (1) core per 3,000 square feet of placed pavement or a minimum of two (2) cores per day's production.

The base material should have a Limerock Bearing Ratio (LBR) of at least 100 and should meet the physical and gradation requirements of graded aggregate base course specified by FDOT. Base material should be placed and compacted in loose lift thicknesses appropriate for the compaction equipment being used to a density of at least 98 percent of the modified Proctor maximum dry density.

The stabilized subgrade should have a minimum LBR of 40. If the site soils do not yield an LBR value of 40, they should be stabilized to obtain an LBR of at least 40. The stabilized subgrade should be compacted to a density of at least 98 percent of the modified Proctor maximum dry density to a depth of at least 12 inches.

Because detailed traffic loading information is currently unavailable, we have generalized our pavement recommendations into two groups. The group descriptions and the recommended component thicknesses are presented in Table 9-1. The component layer thicknesses below are based on a structural number analysis with the following estimated daily traffic volume for a 15-year pavement design life.

Table 9-1: Flexible Pavement Component Recommendations

Layer	Minimum Thickness – Light Duty	Minimum Thickness – Heavy Duty
Asphaltic Concrete (SP-9.5)	1.5 inches	2 inches
Limerock or Crushed Concrete base course with a minimum LBR of 100 compacted to at least 98 percent of the modified Proctor (ASTM D1557) maximum dry density	6 inches	8 inches
Subgrade with a minimum LBR of 40 compacted to at least 98 percent of the modified Proctor (ASTM D1557) maximum dry density	12 inches	12 inches
Light duty: Auto parking areas; light panel, and pickup trucks; 10,000 18-kip equivalent axle loads for a 15-year design life. **Heavy duty:** Driveways; occasional fire trucks, delivery vehicles, and semi-trucks; 50,000 18-kip equivalent axle loads for a 15-year design life.		

9.1.1 *Geogrid Layer*

In the areas where buried debris was encountered (and is anticipated), we recommend a layer of geogrid be installed between the stabilized subgrade and the base course be used if the buried debris will remain in place. A pavement structure with geogrid provides an economical way to relatively uniformly transfer loads to the subgrade and increase the strength of the pavement section. If geogrid is not installed in these areas, the pavement may show increased rutting and cracking or differential settlement, resulting in a shortened service life and increased maintenance costs over the life of the pavement.

A biaxial grid such as Mirafi BXG110 by Tencate Geosynthetics or an engineer-approved equivalent should be adequate to provide the required support. The geogrid should be installed and overlapped per the manufacturer's specifications. The stabilized subgrade should be tested and accepted prior to the installation of grid. Once the subgrade is approved, the geogrid may be installed and the base course should be placed in compacted lifts as detailed in Section 9.1.

This would apply to the pavement areas around borings AP-2, P-1, P-2, P-3, and P-4.

9.2 Rigid Pavement Recommendations

Areas of the site where heavy vehicle loads are anticipated may require the use of rigid pavement. It is suggested that a rigid pavement be used in drive, dumpster, or delivery areas and in areas where emergency vehicles and dumpster/delivery trucks will load, backup, and turn. Further, we recommend that the concrete pavement extend to the full length of the truck beyond the edge of the dumpster pad or delivery area.

The concrete should have a minimum flexural strength of 600 pounds per square inch (psi) at 28 days when tested in accordance with ASTM C-78. Based on our experience, a minimal thickness of 5 inches should be utilized for standard duty applications and a minimal thickness of 7 inches should be utilized for heavy-duty applications.

The subgrade should be prepared to achieve a minimum LBR of 40 to a depth of 12 inches below the concrete base elevation. The subgrade soils should be compacted to a minimum density of 98 percent of the modified Proctor maximum dry density.

Concrete should be reinforced with welded wire fabric or reinforcing bars to assist in controlling cracking from drying shrinkage and thermal changes. We recommend a reinforcing steel mat, preferably #4 bars, spaced at 16 inches on center. However, the steel reinforcement within the concrete pavement should be designed by the civil engineer. Sawed or formed control joints should be included. Saw cuts should not cut through the welded wire fabric or reinforcing steel and dowels should be utilized at formed and/or cold joints.

The recommendation for a geogrid is equally important for concrete pavements which are affected more by differential movement. If there will be concrete pavements underlain by debris, the geogrid layer should be installed 6 inches below the pavement subgrade elevation.

9.3 Pavement Drainage Considerations

One of the most critical influences on the pavement performance in Florida is the separation between the bottom of the pavement subgrade and the seasonal high groundwater level. Many roadways and parking areas have been destroyed as a result of deterioration of the base and the base/surface course bond. Regardless of the type of base selected, we recommend that the seasonal high groundwater level and the bottom of the base course be separated by at least 18 to 24 inches, depending on base type. Limerock base should have a minimum separation of 24 inches from the seasonal high ground water table while crushed concrete should have a minimum separation of 18 inches. If this separation cannot be obtained based on site grades, it will be necessary to provide underdrains. The underdrains should have a positive drainage outlet such that water levels will be lowered to provide the recommended separation.

If silty or clayey soils are encountered within 2 feet of the bottom of the base course, this material should be undercut and replaced with compacted structural fill. It will be necessary to provide a positive drainage outlet (such as underdrains) depending upon site grades such that water does not perch under the base.

10.0 Stormwater Design

Our recommendations for stormwater design are based on the results of borings SW-1 through SW-4 and the result of the DRI/field permeability tests. These borings encountered very loose to medium dense sands (SP), sands with silt (SP-SM) and sands with clay (SP-SC) from the ground surface to a depth of about 17 to 20 feet. Borings SW-1, SW-2 and SW-4 were terminated in this material at 20 feet while boring SW-3 encountered silty sand (SM) below the upper sands to the termination depth of 20 feet.

Groundwater was measured in the pond borings at a depth between of 4½ and 5 feet. The seasonal high groundwater level is estimated to be about 2½ feet (±6 inches) below the existing ground surface at these boring locations. Higher subsurface water levels should be expected after periods of heavy and/or prolonged rainfall events.

For drawdown analyses, a suitable factor of safety should be applied to the measured infiltration rate. Additionally, a fillable porosity of 30 percent may be used for the uppermost fine sands. The silty sands (SM) encountered in the SPT borings will likely restrict the downward flow of water due to the inherently lower permeability rates of soils with higher fines contents. As such, the depth at which the silty sands (SM) were encountered should be considered an aquitard (i.e., base of aquifer) for pond design.

11.0 Guidelines for Earthwork Construction Observation and Testing

Prior to initiating compaction operations, we recommend that representative samples of proposed structural fill be collected and tested to determine their compaction and classification characteristics. The maximum dry density, optimum moisture content, gradation, and plasticity characteristics should be determined. These tests are needed for compaction quality control of the structural fill and existing soils and to determine if the fill material is acceptable.

An engineering technician, under the direction of a geotechnical engineer, should monitor all excavations, undercutting and removal of soils, filling, backfill placement and compaction, and proofrolling operations. A representative number of in-place field density tests should be performed in the compacted existing soils and in each lift of structural fill or backfill to confirm that the required degree of compaction has been obtained. In-place density tests should also be performed at representative locations in the bearing level soils in the footing excavation bottoms. Field density tests should be performed within fill areas at a frequency of not less than one (1) test per 2,500 square feet per lift in the building areas, or at a minimum of two (2) test locations, whichever is greater. For compacted fill placed beneath pavements, field density tests should be performed at a frequency of not less than one (1) test per 5,000 square feet per lift, or at a minimum of two (2) tests per lift, whichever is greater. In addition, we recommend that at least one (1) density test be performed for each column footing, and one (1) density test per lift for every 200 linear feet of utility trenches.

12.0 Limitations

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based on applicable standards of our practice in this geographic area at the time this report was prepared. No other representation or warranty, either express or implied, is made.

We relied on project information provided to us to develop a scope of services and our conclusions and recommendations. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes so that we can modify our recommendations based on this additional information if necessary.

Our conclusions and recommendations are based on limited data from a field exploration program. Subsurface conditions can vary widely between explored areas. Some variations may not become evident until construction. If conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site. Soil samples that were not altered by laboratory testing will be retained for 60 days from the date of this report and then will be discarded.

Unless specifically noted otherwise, our field exploration program did not include an assessment of regulatory compliance, environmental conditions or pollutants, or the presence of any biological materials (mold, fungi, and bacteria). If there is a concern about these items, other studies should be performed. S&ME can provide a proposal and perform these services, if requested. S&ME should be provided with the opportunity to review the final plans and specifications to confirm that earthwork, foundation, and other recommendations are properly interpreted and implemented. The recommendations in this report are contingent on S&ME’s review of final plans and specifications followed by observation and monitoring of earthwork and foundation construction activities.

Appendices

Appendix I – Figures and Soil Boring Logs

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH (DATED FEBRUARY 12, 2023).
THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED AND NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

SITE LOCATION PLAN

CLEARWATER AIRPARK IMPROVEMENTS
CLEARWATER, FLORIDA

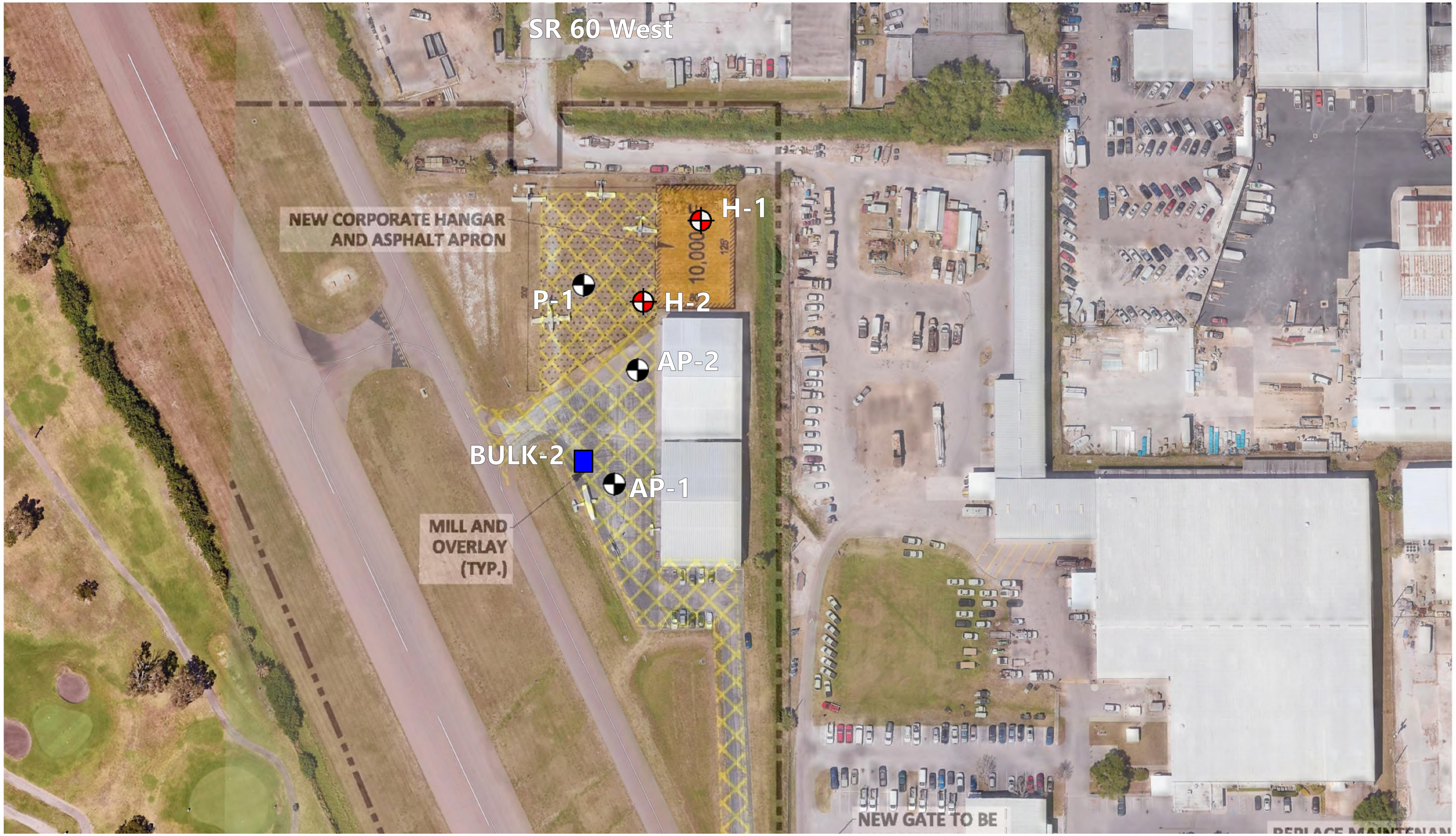
SCALE:
NTS

DATE:
6/4/2024

PROJECT NUMBER
22840287

FIGURE NO.
1

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH (DATED FEBRUARY 12, 2023).
THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED AND NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.



LEGEND

⊕ Approximate SPT Boring Location

🟥 Approximate DRI/Field Hydraulic Conductivity Test Location

◑ Approximate Hand Auger Boring Location

🟦 Approximate Bulk Soil Sample Location

FIELD TEST LOCATION PLAN

CLEARWATER AIRPARK IMPROVEMENTS
CLEARWATER, FLORIDA

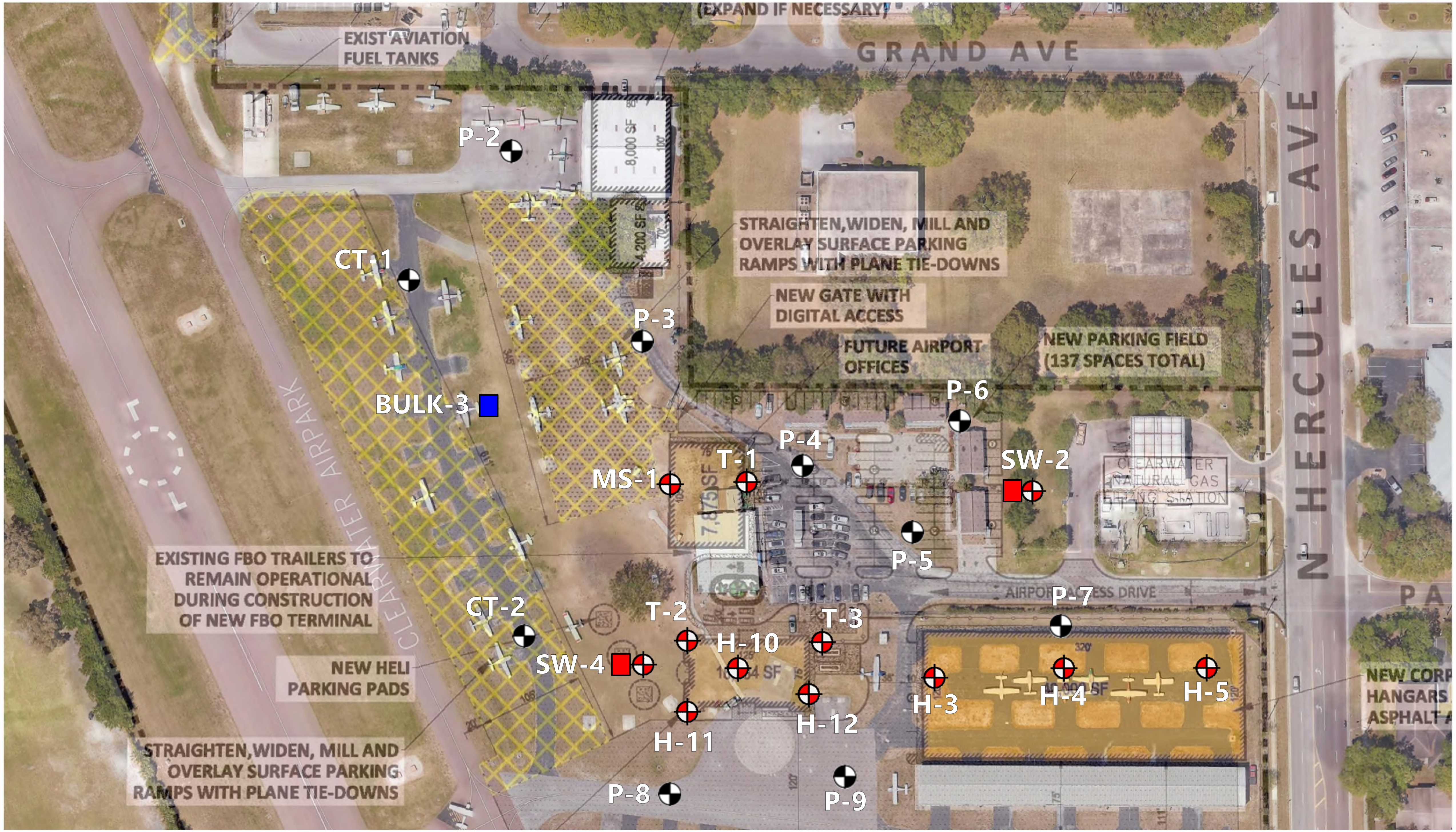
SCALE:
NTS

DATE:
6/4/2024

PROJECT NUMBER
22840287

FIGURE NO.
2

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH (DATED FEBRUARY 12, 2023).
THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED AND NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.



LEGEND

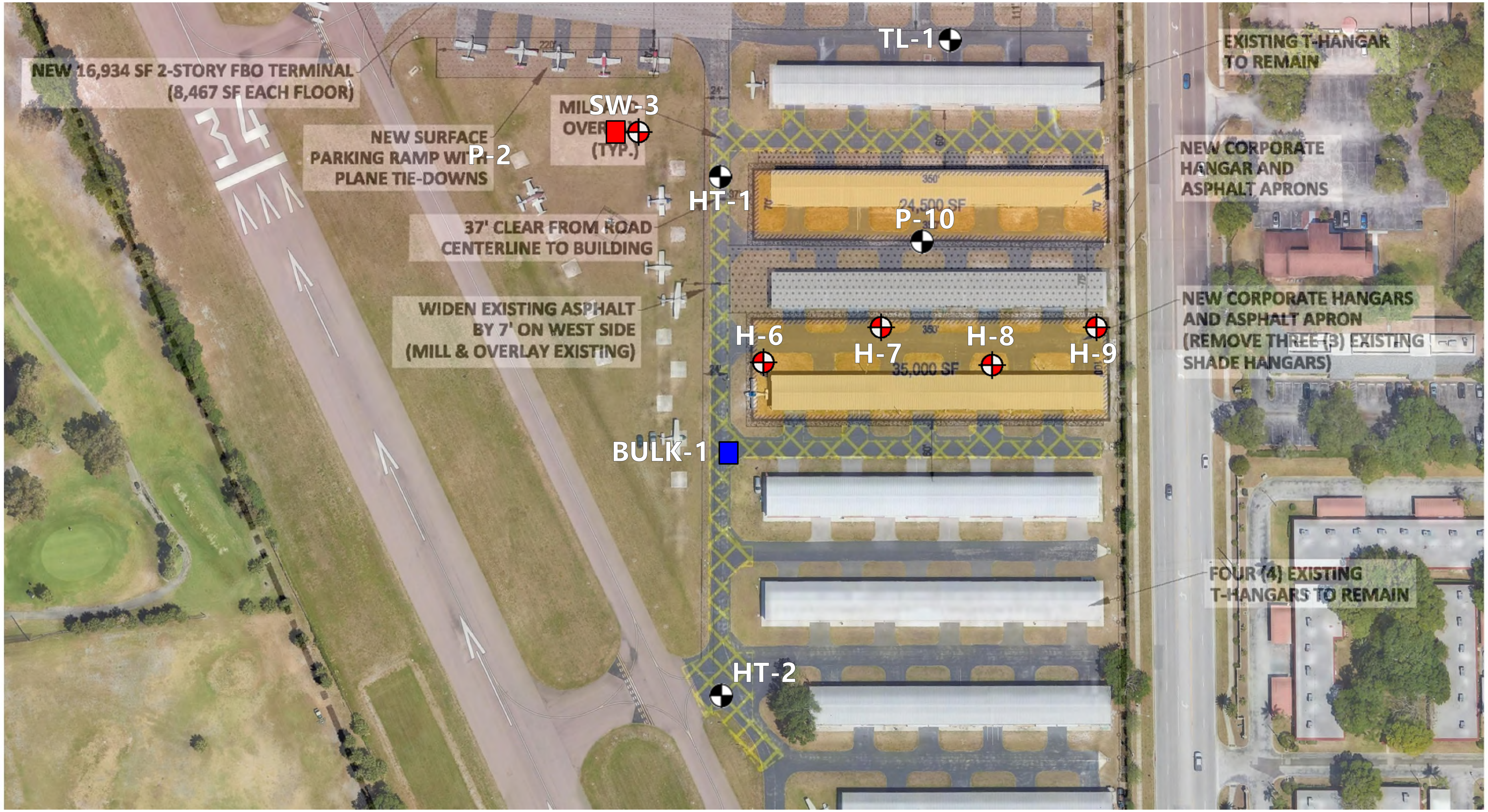
⊕ Approximate SPT Boring Location
◑ Approximate Hand Auger Boring Location
🟥 Approximate DRI/Field Hydraulic Conductivity Test Location
🟦 Approximate Bulk Soil Sample Location

FIELD TEST LOCATION PLAN

CLEARWATER AIRPARK IMPROVEMENTS
CLEARWATER, FLORIDA

SCALE:
NTS
DATE:
6/4/2024
PROJECT NUMBER
22840287
FIGURE NO.
3

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH (DATED FEBRUARY 12, 2023).
THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED AND NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.



LEGEND

⊕ Approximate SPT Boring Location

🟥 Approximate DRI/Field Hydraulic Conductivity Test Location

◐ Approximate Hand Auger Boring Location

🟦 Approximate Bulk Soil Sample Location

FIELD TEST LOCATION PLAN

CLEARWATER AIRPARK IMPROVEMENTS
CLEARWATER, FLORIDA

SCALE:
NTS

DATE:
6/4/2024

PROJECT NUMBER
22840287

FIGURE NO.
4

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH (DATED FEBRUARY 12, 2023).
THIS PLAN IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED AND NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

LEGEND

⊕	Approximate SPT Boring Location	◐	Approximate Hand Auger Boring Location
🟥	Approximate DRI/Field Hydraulic Conductivity Test Location	🟦	Approximate Bulk Soil Sample Location

FIELD TEST LOCATION PLAN

CLEARWATER AIRPARK IMPROVEMENTS
CLEARWATER, FLORIDA

SCALE:
NTS

DATE:
6/4/2024

PROJECT NUMBER
22840287

FIGURE NO.
5

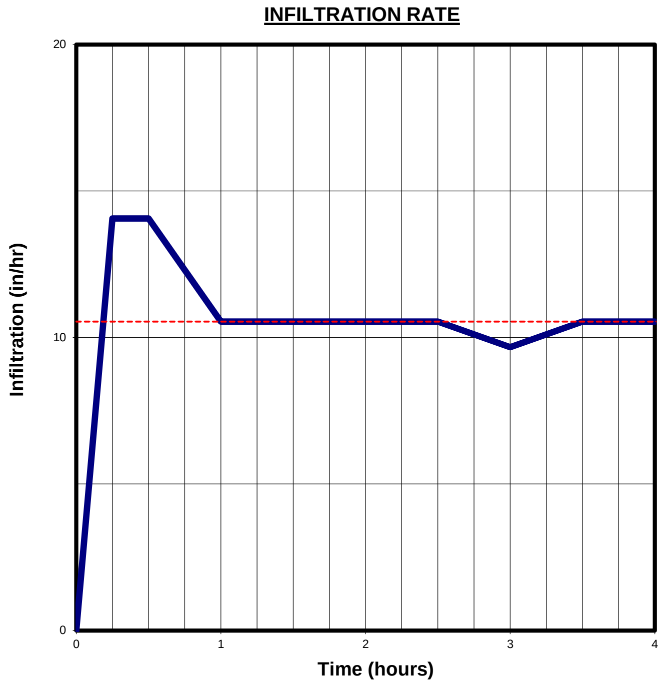
DOUBLE-RING INFILTROMETER TEST RESULTS

(ASTM STANDARD D3385)

Project Name:	Clearwater Airpark Improvements	**Test Date:**	5/10/2024
Project Location:	Clearwater, Florida	**Test Location:**	SW-1
Project Number:	22840287	**Test Depth (in.)**	12
Outer Ring Diameter (in.):	24	**Test Duration:**	4 hours
Inner Ring Diameter (in.):	12	**Test Head (in.)**	12

INFILTRATION RATE: 10.5 inches per hour

Time Increment (minutes)	Infiltration Rate (inches/hour)
15	14.1
15	14.1
15	12.3
15	10.5
30	10.5
30	10.5
30	10.5
30	9.7
30	10.5
30	10.5



SUBSURFACE SOIL DATA

Depth (ft.) From	-	To	BORING DATA (SW-1)
0	-	6	fine sand (SP)
6	-	8	fine sand with silt (SP-SM)
8	-	20	fine sand (SP)

Groundwater level encounterd at depth of 4.5 feet below the existing ground surface at time of drilling.

Seasonal high water level depth of 2.5 feet ± 0.5 feet below the existing ground surface

SOIL SURVEY OF SUMTER COUNTY DATA

Soil ID & Soil Name	Hydrologic Group	SHWL (feet bls)	Drainage	Soil Location
17 - Myakka Soils and Urban Land	A	0.5 - 1.5	Poorly drained	Flatwoods on marine terraces

TEST PROCEDURES:

The double-ring infiltrometer test was performed in general accordance with procedures outlined in the ASTM Standard D3385. Two 18-inch high concentric rings were placed on a prepared test surface at a given depth and driven into the ground 4 to 6-inches. The inner ring used in the test had an inside diameter of approximately 12-inches, while the outer ring had an inside diameter of approximately 24-inches. The test was performed by filling both rings with water to a height of 12 inches. The water level is allowed to drop over a discrete time interval and the volume of water required to maintain the head in the inner ring was recorded for the test duration.

Figure

6

DOUBLE-RING INFILTROMETER TEST RESULTS

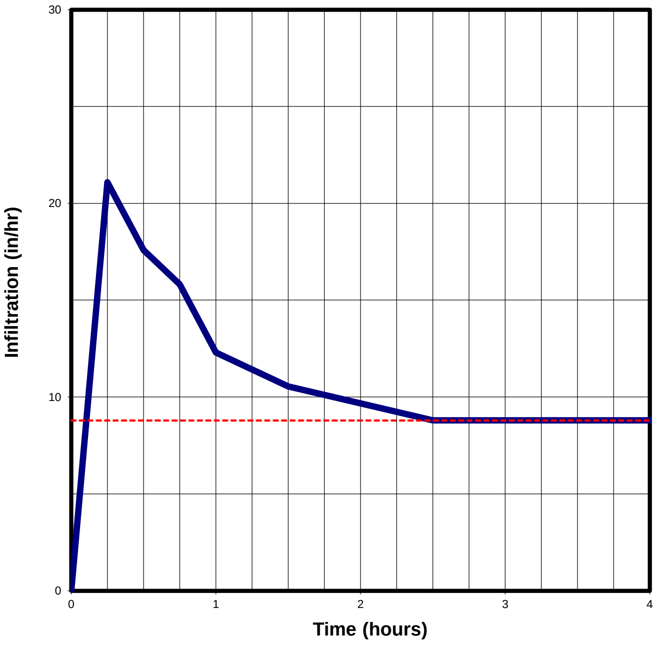
(ASTM STANDARD D3385)

Project Name:	Clearwater Airpark Improvements	**Test Date:**	5/11/2024
Project Location:	Clearwater, Florida	**Test Location:**	SW-2
Project Number:	22840287	**Test Depth (in.)**	18
Outer Ring Diameter (in.):	24	**Test Duration:**	4 hours
Inner Ring Diameter (in.):	12	**Test Head (in.)**	12

INFILTRATION RATE: **8.8 inches per hour**

Time Increment (minutes)	Infiltration Rate (inches/hour)
15	21.1
15	17.6
15	15.8
15	12.3
30	10.5
30	9.7
30	8.8
30	8.8
30	8.8
30	8.8

INFILTRATION RATE



SUBSURFACE SOIL DATA

Depth (ft.) From	-	To	BORING DATA (SW-2)
0	-	2	fine sand with silt (SP-SM)
2	-	4	fine sand (SP)
4	-	8	fine sand with clay (SP-SC)
8	-	20	fine sand (SP)

Groundwater level encounterd at depth of 5 feet below the existing ground surface at time of drilling.

Seasonal high water level depth of 2.5 feet ± 0.5 feet below the existing ground surface

SOIL SURVEY OF SUMTER COUNTY DATA

Soil ID & Soil Name	Hydrologic Group	SHWL (feet bls)	Drainage	Soil Location
17 - Myakka Soils and Urban Land	A	0.5 - 1.5	Poorly drained	Flatwoods on marine terraces

TEST PROCEDURES:

The double-ring infiltrometer test was performed in general accordance with procedures outlined in the ASTM Standard D3385. Two 18-inch high concentric rings were placed on a prepared test surface at a given depth and driven into the ground 4 to 6-inches. The inner ring used in the test had an inside diameter of approximately 12-inches, while the outer ring had an inside diameter of approximately 24-inches. The test was performed by filling both rings with water to a height of 12 inches. The water level is allowed to drop over a discrete time interval and the volume of water required to maintain the head in the inner ring was recorded for the test duration.

Figure

7

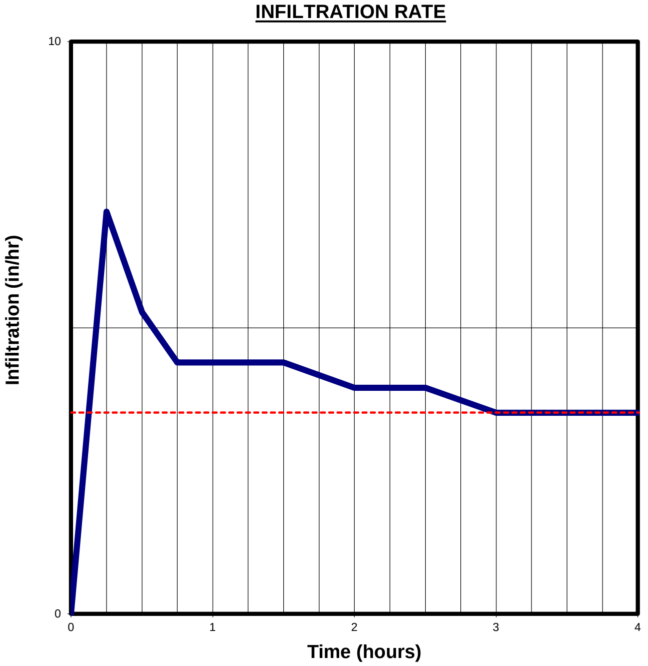
DOUBLE-RING INFILTROMETER TEST RESULTS

(ASTM STANDARD D3385)

Project Name:	Clearwater Airpark Improvements	**Test Date:**	5/10/2024
Project Location:	Clearwater, Florida	**Test Location:**	SW-1
Project Number:	22840287	**Test Depth (in.)**	18
Outer Ring Diameter (in.):	24	**Test Duration:**	4 hours
Inner Ring Diameter (in.):	12	**Test Head (in.)**	12

INFILTRATION RATE: **3.5 inches per hour**

Time Increment (minutes)	Infiltration Rate (inches/hour)
15	7.0
15	5.3
15	4.4
15	4.4
30	4.4
30	4.0
30	4.0
30	3.5
30	3.5
30	3.5



SUBSURFACE SOIL DATA

Depth (ft.) From	-	To	BORING DATA (SW-3)
0	-	2	fine sand with silt (SP-SM)
2	-	4	fine sand (SP)
4	-	8	fine sand with clay (SP-SC)
8	-	12.5	fine sand with silt (SP-SM)
12.5	-	17.5	fine sand (SP)
17.5		20	silty fine sand (SM)

Groundwater level encounterd at depth of 4.5 feet below the existing ground surface at time of drilling.

Seasonal high water level depth of 2.5 feet ± 0.5 feet below the existing ground surface

SOIL SURVEY OF SUMTER COUNTY DATA

Soil ID & Soil Name	Hydrologic Group	SHWL (feet bls)	Drainage	Soil Location
17 - Myakka Soils and Urban Land	A	0.5 - 1.5	Poorly drained	Flatwoods on marine terraces

TEST PROCEDURES:

The double-ring infiltrometer test was performed in general accordance with procedures outlined in the ASTM Standard D3385. Two 18-inch high concentric rings were placed on a prepared test surface at a given depth and driven into the ground 4 to 6-inches. The inner ring used in the test had an inside diameter of approximately 12-inches, while the outer ring had an inside diameter of approximately 24-inches. The test was performed by filling both rings with water to a height of 12 inches. The water level is allowed to drop over a discrete time interval and the volume of water required to maintain the head in the inner ring was recorded for the test duration.

Figure

8

DOUBLE-RING INFILTROMETER TEST RESULTS

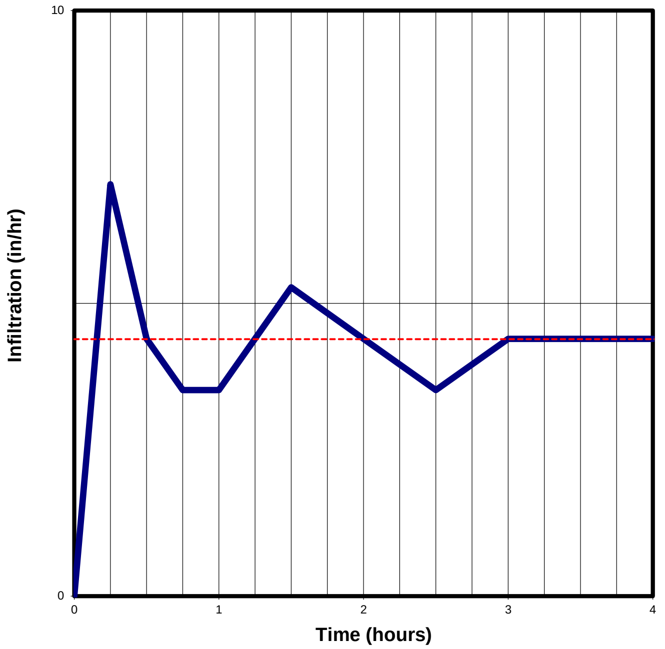
(ASTM STANDARD D3385)

Project Name:	Clearwater Airpark Improvements	**Test Date:**	5/9/2024
Project Location:	Clearwater, Florida	**Test Location:**	SW-4
Project Number:	22840287	**Test Depth (in.)**	12
Outer Ring Diameter (in.):	24	**Test Duration:**	4 hours
Inner Ring Diameter (in.):	12	**Test Head (in.)**	12

INFILTRATION RATE: 4.4 inches per hour

Time Increment (minutes)	Infiltration Rate (inches/hour)
15	7.0
15	4.4
15	3.5
15	3.5
30	5.3
30	4.4
30	3.5
30	4.4
30	4.4
30	4.4

INFILTRATION RATE



SUBSURFACE SOIL DATA

Depth (ft.) From	-	To	BORING DATA (SW-4)
0	-	2	fine sand with silt (SP-SM)
2	-	17.5	fine sand (SP)
17.5	-	20	fine sand with silt (SP-SM)

Groundwater level encounterd at depth of 4.8 feet below the existing ground surface at time of drilling.

Seasonal high water level depth of 2.5 feet ± 0.5 feet below the existing ground surface

SOIL SURVEY OF SUMTER COUNTY DATA

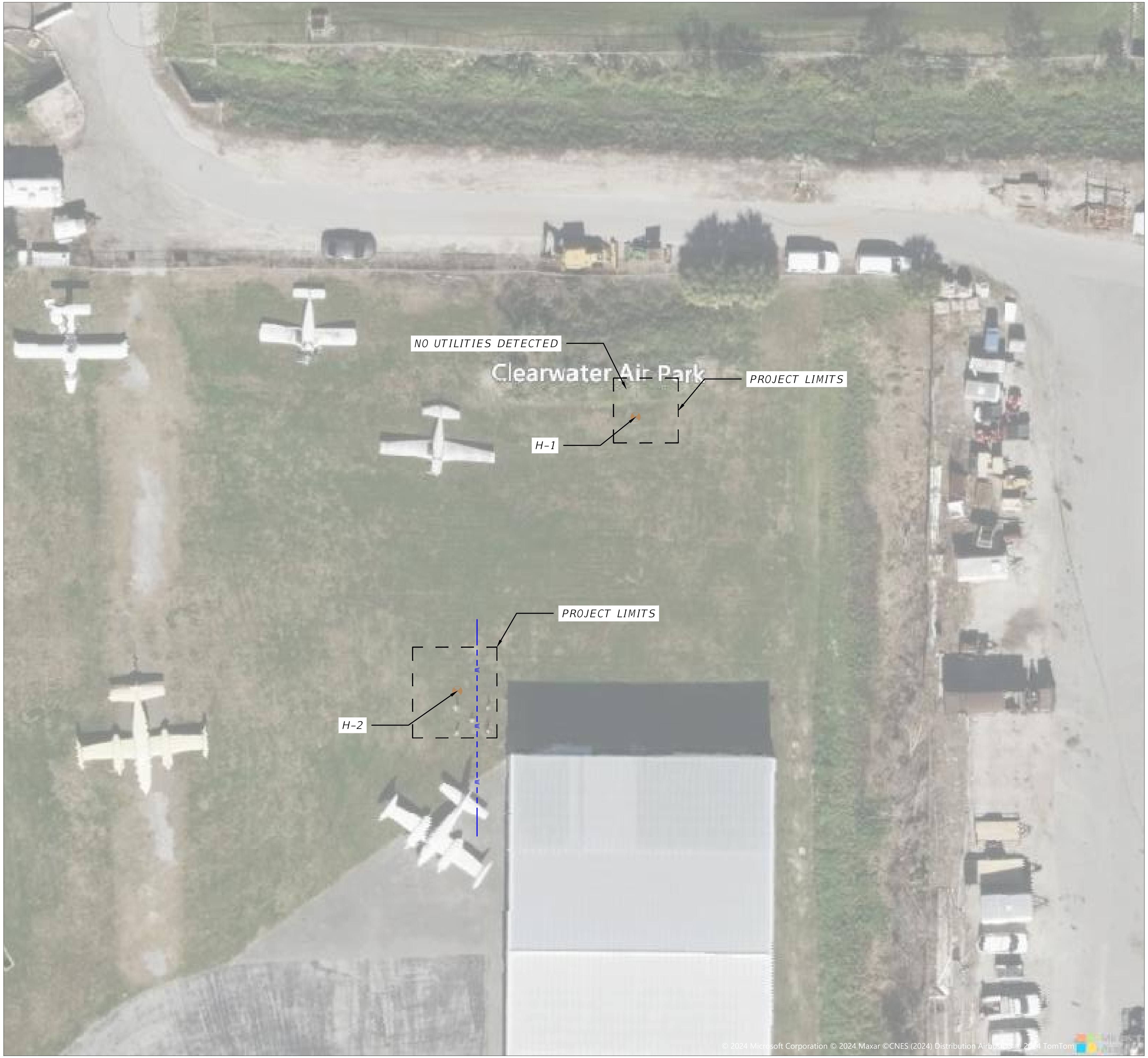
Soil ID & Soil Name	Hydrologic Group	SHWL (feet bls)	Drainage	Soil Location
17 - Myakka Soils and Urban Land	A	0.5 - 1.5	Poorly drained	Flatwoods on marine terraces

TEST PROCEDURES:

The double-ring infiltrometer test was performed in general accordance with procedures outlined in the ASTM Standard D3385. Two 18-inch high concentric rings were placed on a prepared test surface at a given depth and driven into the ground 4 to 6-inches. The inner ring used in the test had an inside diameter of approximately 12-inches, while the outer ring had an inside diameter of approximately 24-inches. The test was performed by filling both rings with water to a height of 12 inches. The water level is allowed to drop over a discrete time interval and the volume of water required to maintain the head in the inner ring was recorded for the test duration.

Figure

9



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NOT TO SCALE

ECHO PROJECT NO: 24-201

CLIENT: S & ME

PROJECT DESCRIPTION: CLEARWATER AIR PARK
CLEARWATER, FLORIDA

NOTES:

THE EXACT LOCATION OF ANY UNDERGROUND UTILITY IS NOT GUARANTEED UNLESS CLEARLY EXPOSED AND VISUALLY VERIFIED AT A SPECIFIC LOCATION. UTILITY CHARACTERISTICS, METHODS OF INSTALLATION, SOIL CONDITIONS AND THE SURROUNDING ENVIRONMENT ALL MAY ADVERSELY IMPACT THE RESULTS OF ANY UTILITY INVESTIGATION WITH SURFACE GEOPHYSICAL INSTRUMENTS AND TECHNOLOGY. NO GUARANTEE IS MADE THAT ALL UTILITIES WILL BE FOUND AND IDENTIFIED. UTILITY INFORMATION SHOWN OUTSIDE OF THE PROJECT LIMITS IS FOR GENERAL INFORMATION ONLY AND OTHER UTILITIES MAY EXIST.

"LOST SIGNAL" INDICATES THE UTILITY COULD NO LONGER BE DETECTED BY STANDARD GEOPHYSICAL PROSPECTING TECHNIQUES INCLUDING ELECTROMAGNETIC DEVICES OR GROUND PENETRATING RADAR. ECHO UES CANNOT GUARANTEE THE POSITION OF THE UTILITY BEYOND THIS POINT AND CAUTIONS THAT UTILITY MAY CONTINUE. FURTHER INVESTIGATION (VACUUM EXCAVATION) WILL BE REQUIRED IF ADDITIONAL INFORMATION IS NECESSARY.

THE AERIAL IMAGERY SHOWN WAS OBTAINED USING AUTODESK CIVIL 3D'S BUILT-IN AERIAL MAP FEATURE OR THE FLORIDA DEPARTMENT OF TRANSPORTATION'S AERIAL PHOTO LOOK-UP SYSTEM AND IS MEANT FOR REFERENCE PURPOSES ONLY. THE ACTUAL GROUND SURFACE MAY DIFFER FROM WHAT IS DEPICTED HEREON.

ABBREVIATIONS

AL	AMMONIA LINE
BE	BURIED ELECTRIC
BT	BURIED TELEPHONE
CATV	CABLE TELEVISION
COMM	COMMUNICATION LINES
FM	FORCE MAIN
FOBT	FIBER OPTIC / BURIED TELEPHONE
FOC	FIBER OPTIC CABLE
FOTV	FIBER OPTIC / CABLE TELEVISION
G	GAS MAIN
GPR	GROUND PENETRATING RADAR
GW	GROUND WIRE
GYP	GYPSUM LINE
IRR	IRRIGATION
NPW	NON-POTABLE WATER/RECLAIMED WATER
OD	OIL DRAIN
PET	FUEL LINE
PW	POND WATER
PWL	POND WATER LINE
SAN	SANITARY SEWER
SL	STREET LIGHT
STM	STORM DRAINAGE
TS	TRAFFIC SIGNAL
UNK	UNKNOWN
W	WATER MAIN

LEGEND

– – – BE – – –	BURIED ELECTRIC
– – – BFO – – –	BURIED FIBER OPTIC
– – – BT – – –	BURIED TELEPHONE
– – – CHW – – –	CHILLED WATER
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– – – S – – –	FORCE MAIN / SANITARY
– – – G – – –	GAS MAIN
– – – GW – – –	GROUND WIRE
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⊗	BORE LOCATION
△	SW LOCATION

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ECHO PROJECT NO: 24-201
CLIENT: S & ME
PROJECT DESCRIPTION: CLEARWATER AIR PARK
CLEARWATER, FLORIDA

NOTES:

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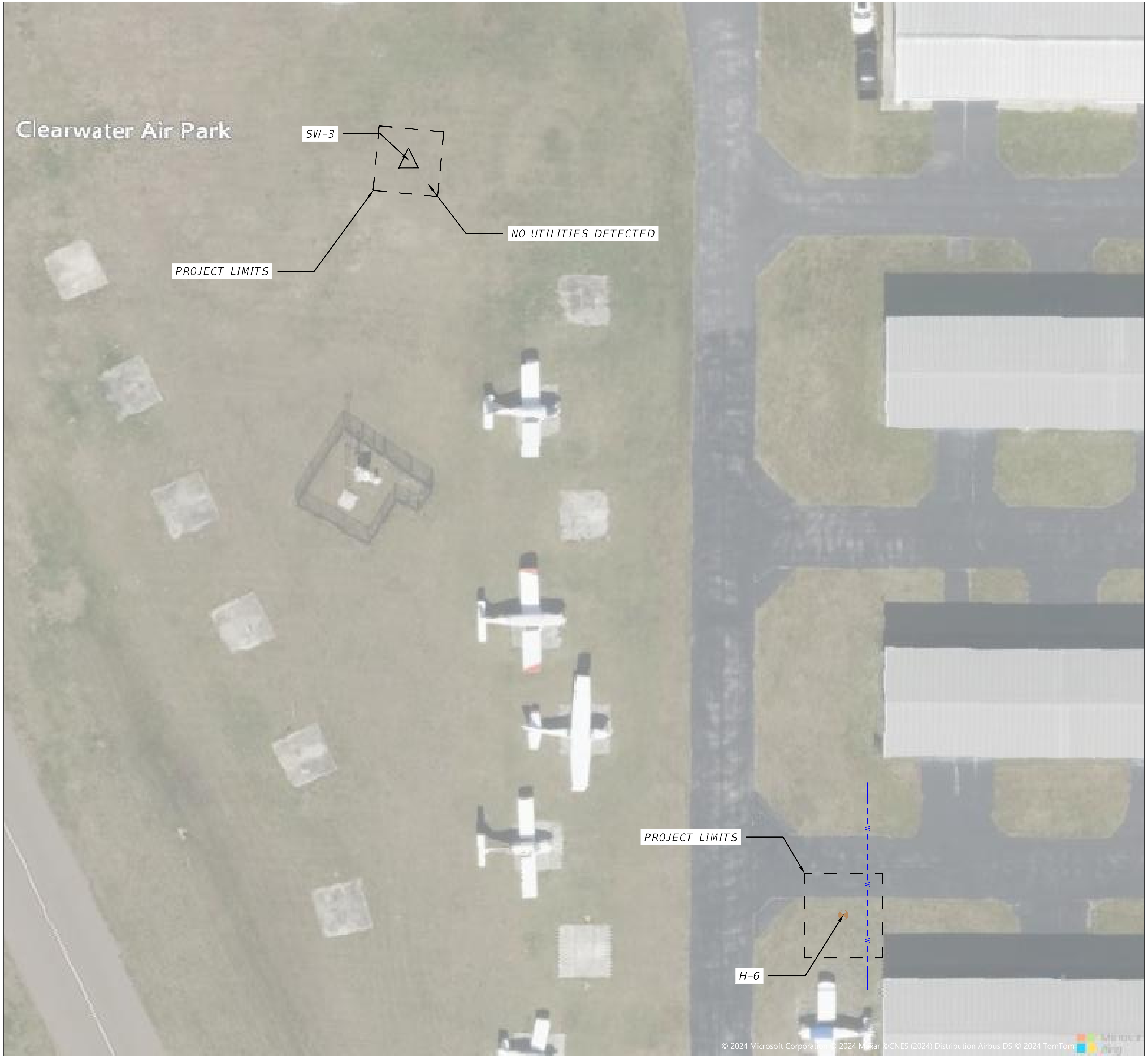

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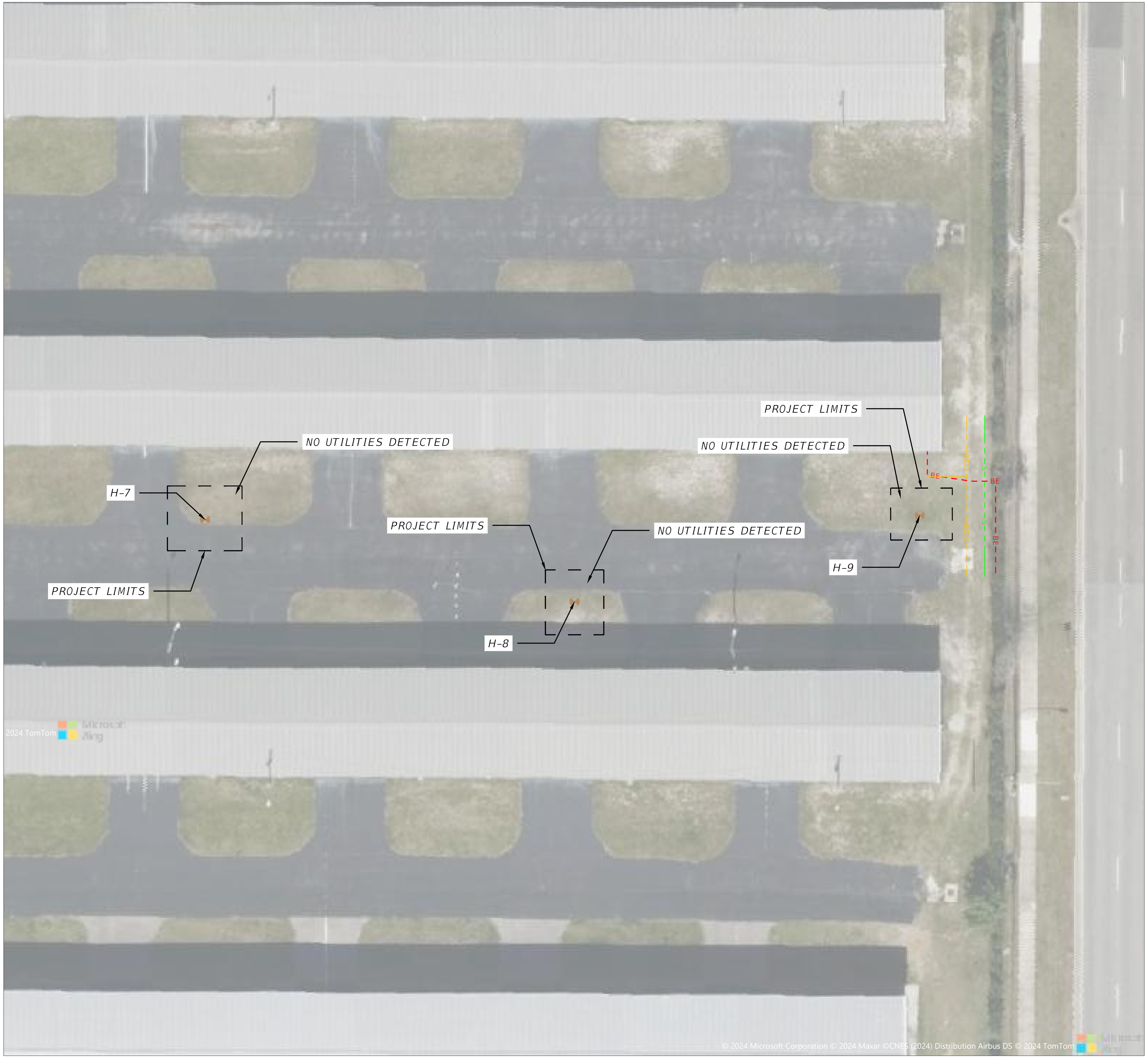

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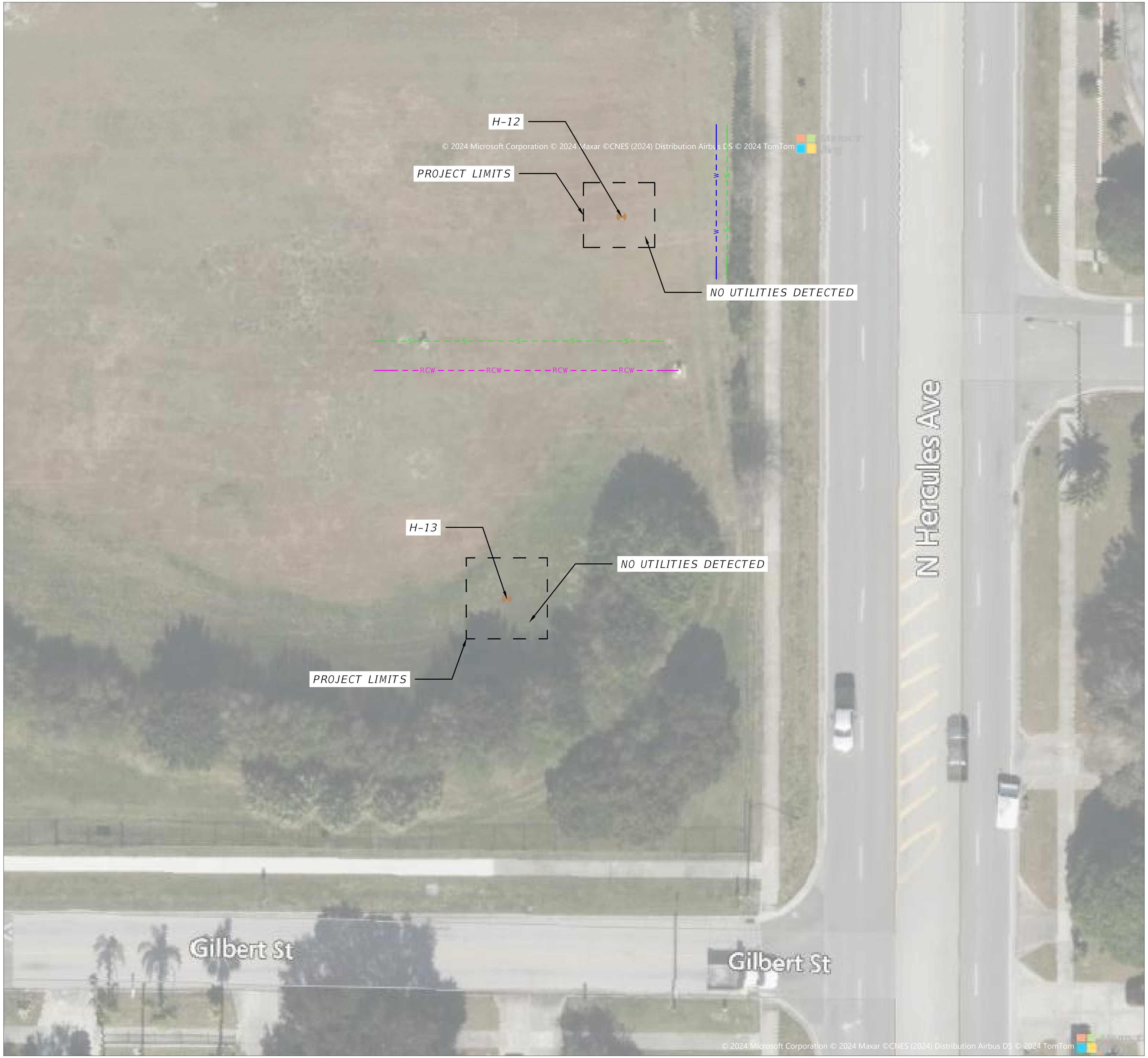

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LEGEND TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES (USCS CLASSIFICATION)

(Shown in Graphic Log)

▩	Fill
■	Asphalt
⬚	Concrete
🟩	Topsoil
⬚	Gravel (GW, GM, GP)
⬚	Sand (SW, SP)
▥	Silt (ML)
▨	Clay (CL, CH)
▤	Organic (OL, OH)
▥	Silty Sand (SM)
▨	Clayey Sand (SC)
▥	Sandy Silt (ML)
▥	Clayey Silt (MH)
▨	Sandy Clay (CL, CH)
▨	Silty Clay (CL, CH)
▦	Partially Weathered Rock
▦	Cored Rock

WATER LEVELS

(Shown in Water Level Column)

▽ = Water Level At Termination of Boring
▼ = Water Level Taken After 24 Hours
◄ = Loss of Drilling Water
HC = Hole Cave

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Soft	0 to 2
Soft	3 to 4
Firm	5 to 8
Stiff	9 to 15
Very Stiff	16 to 30
Hard	31 to 50
Very Hard	Over 50

RELATIVE DENSITY OF COHESIONLESS SOILS

RELATIVE DENSITY	STD. PENETRATION RESISTANCE BLOWS/FOOT
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Over 50

SAMPLER TYPES

(Shown in Samples Column)

■	Shelby Tube
☒	Split Spoon
▮	Rock Core
☐	No Recovery

CONSTITUENT MODIFIERS

Trace: <5%
Few: 5 to <15%
Little: 15 to <30%
Some: 30 to <50%
Mostly: 50 to 100%

TERMS

Standard Penetration Resistance - The Number of Blows of a 140 lb. Hammer Falling 30 in. Required to Drive 1.4 in. I.D. Split-Spoon Sampler 1 Foot, as Specified in ASTM D-1586.

REC - Total Length of Rock Recovered in the Core Barrel Divided by the Total Length of the Core Run Times 100%.

RQD - Total Length of Sound Rock Segments Recovered that are Longer Than or Equal to 4" (mechanical breaks excluded) Divided by the Total Length of the Core Run Times 100%.

TOB - Termination of Boring

N.E. - Not Encountered
-200 - Percent Passing #200 Sieve (%)
LL - Liquid Limit
PI - Plasticity Index
OC - Organic Content (%)
MC - Moisture Content (%)
UC - Unconfined Compressive Strength (psi)
PP - Pocket Penetrometer Resistance (tsf)

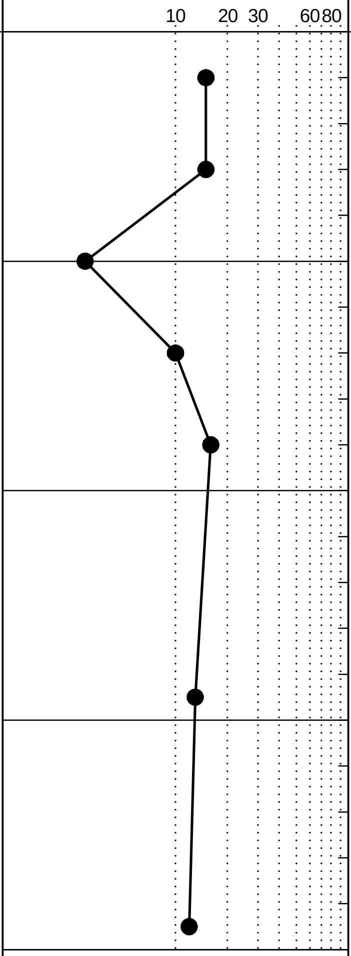
PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG H-1

DATE DRILLED: **5/14/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **20.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5.5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**
NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND WITH SILT (SP-SM) medium dense, gray, fine, with debris (glass, plastic, brick, metal)		SS-1	2	7	8	15
	- - - (-200 = 6.5%)		SS-2	5	9	6	15
5	- - - Very loose	▽	SS-3	3	2	1	3
	SAND (SP) loose, gray, fine, with debris (glass, plastic, brick, metal)		SS-4	5	5	5	10
	- - - Medium dense		SS-5	4	6	10	16
10							
15			SS-6	6	5	8	13
20			SS-7	6	5	7	12
	Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth						

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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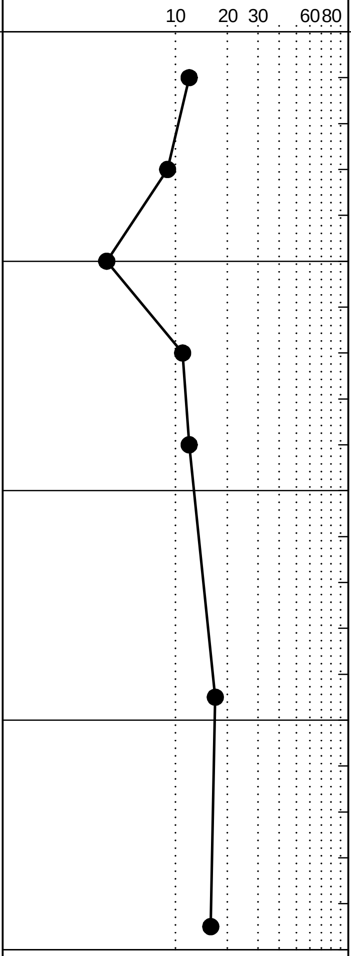
2. ***BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.***
3. ***STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.***
4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG H-2

DATE DRILLED: **5/14/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **20.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5.5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**
NOTES:

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
		SAND (SP) very loose, gray, trace construction debris, fine			SS-1	⧗	2	5	7		12
		SAND WITH SILT (SP-SM) loose, gray, fine			SS-2	⧗	4	3	6		9
5			▽		SS-3	⧗	3	2	2		4
		SAND WITH SILT (SP-SM) medium dense, dark brown, little organics, fine, (-200 = 9.6%, OC = 13%, MC = 80%)			SS-4	⧗	4	5	6		11
10		**SAND (SP)** medium dense, gray, fine			SS-5	⧗	3	6	6		12
15		**CLAYEY SAND (SC)** medium dense, gray, fine			SS-6	⧗	6	9	8		17
20		**SAND (SP)** medium dense, gray, fine			SS-7	⧗	6	8	8		16
		Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth									



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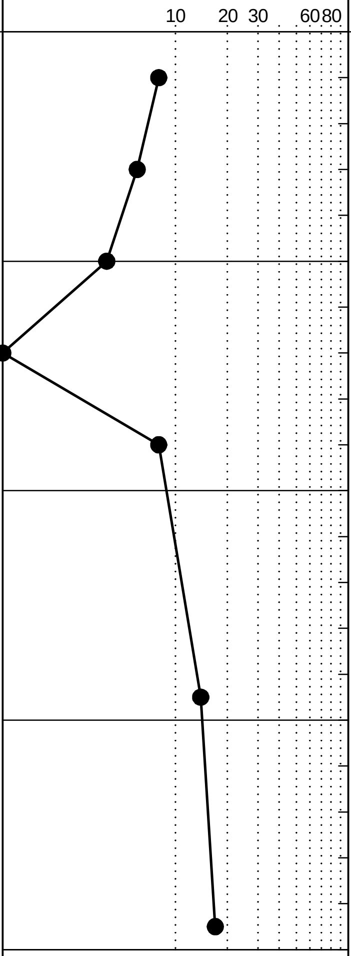
4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG H-3

DATE DRILLED: **5/14/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **20.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**
NOTES:

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
		SAND (SP) loose, gray, trace roots, fine			SS-1		2	3	5		8
		- - - Brown, no roots			SS-2		3	2	4		6
5		**SAND WITH SILT (SP-SM)** very loose, tan, fine	∇		SS-3		3	3	1		4
		SAND (SP) very loose, gray, fine			SS-4		1	WOH	1		1
		- - - Loose			SS-5		5	4	4		8
10											
		SAND WITH SILT (SP-SM) medium dense, gray, fine			SS-6		5	8	6		14
15											
		SAND (SP) medium dense, gray, fine			SS-7		7	9	8		17
20		Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth									

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3. ***STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.***
4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

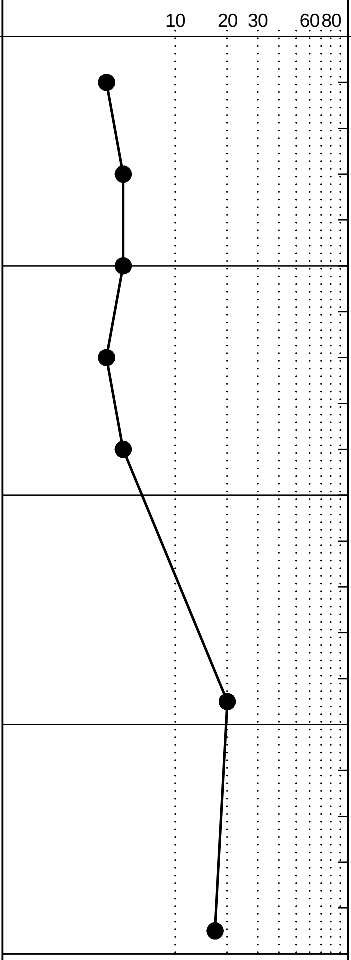
BORING LOG H-4

DATE DRILLED: **5/14/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **20.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**

NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND WITH SILT (SP-SM) very loose, gray, trace roots, fine			SS-1	1	1	3	4
	SAND WITH CLAY (SP-SC) loose, gray, fine			SS-2	2	3	2	5
5		▽		SS-3	2	3	2	5
	SAND WITH SILT (SP-SM) very loose, gray, fine			SS-4	2	2	2	4
	SAND (SP) loose, brown, fine			SS-5	2	3	2	5
10								
15	- - - Medium dense, brown			SS-6	5	7	13	20
				SS-7	6	8	9	17
20	Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth							

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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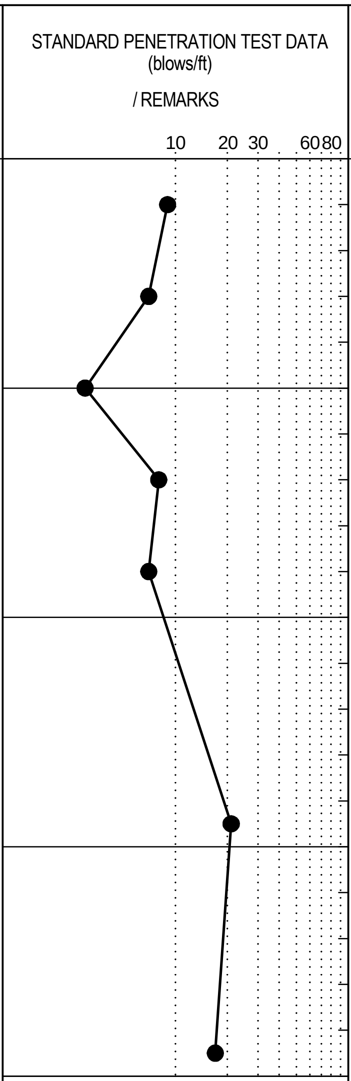
4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG H-5

DATE DRILLED: **5/14/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **20.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5.5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**
NOTES:

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS	N VALUE
		SAND WITH SILT (SP-SM) loose, gray, trace roots, fine			SS-1		1	3	6		9
		- - - Brown, trace cemented nodules			SS-2		3	3	4		7
5		- - - Very loose, gray, no cemented nodules, (-200 =10%)	▽		SS-3		1	2	1		3
		SAND (SP) loose, gray, fine			SS-4		3	2	6		8
		- - - Brown			SS-5		3	3	4		7
10											
		- - - Medium dense			SS-6		8	11	10		21
15											
		- - - Gray			SS-7		3	6	11		17
20		Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth									



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3. STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.
4. WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG H-6

DATE DILLED: **5/13/24**

DRILL RIG: **CME 45-B**

BORING DEPTH: **20.0 ft**

DRILLER: **Swint Drilling Services**

WATER LEVEL: **4.5' ATD**

HAMMER TYPE: **Automatic**

LOGGED BY: **P. Erbland**

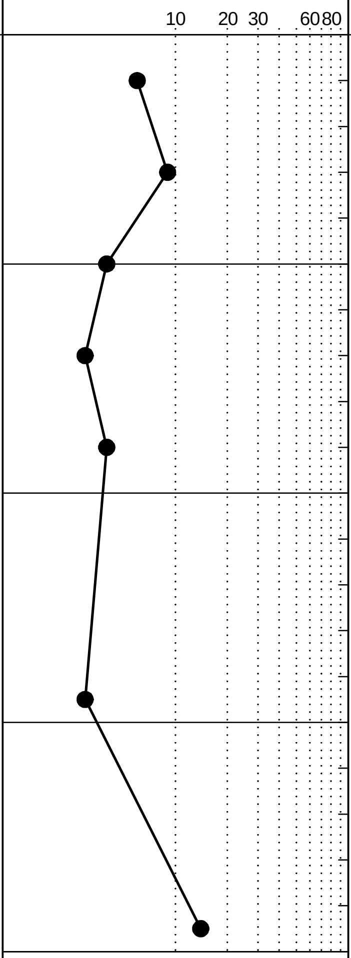
SAMPLING METHOD: **Split spoon**

DRILLING METHOD: **Mud Rotary**

NOTES:

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
		SAND (SP) loose, gray, trace roots, fine			SS-1		1	3	3	6
		- - - Tan, no roots			SS-2		4	5	4	9
5		- - - Very loose, gray	∇		SS-3		2	3	1	4
					SS-4		1	2	1	3
		- - - Brown			SS-5		2	2	2	4
10										
15					SS-6		2	2	1	3
		- - - Medium dense, tan			SS-7		3	6	8	14
20		Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth								

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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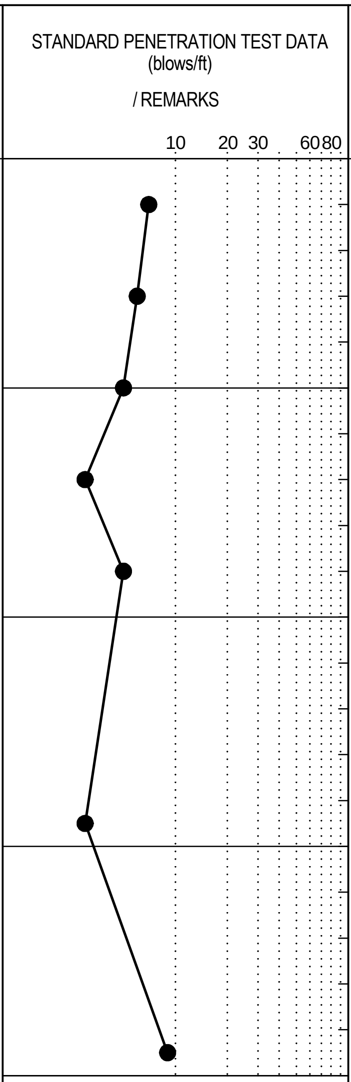
3. ***STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.***
4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG H-7

DATE DRILLED: **5/14/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **20.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5.5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**
NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND WITH SILT (SP-SM) loose, brown, trace roots, fine			SS-1	2	4	3	7
	SAND (SP) loose, brown, fine			SS-2	2	4	2	6
5		▽		SS-3	2	3	2	5
	- - - Very loose			SS-4	1	1	2	3
	- - - Loose			SS-5	5	3	2	5
10								
15	- - - Very loose			SS-6	2	1	2	3
	- - - Loose			SS-7	2	5	4	9
20	Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth							



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PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

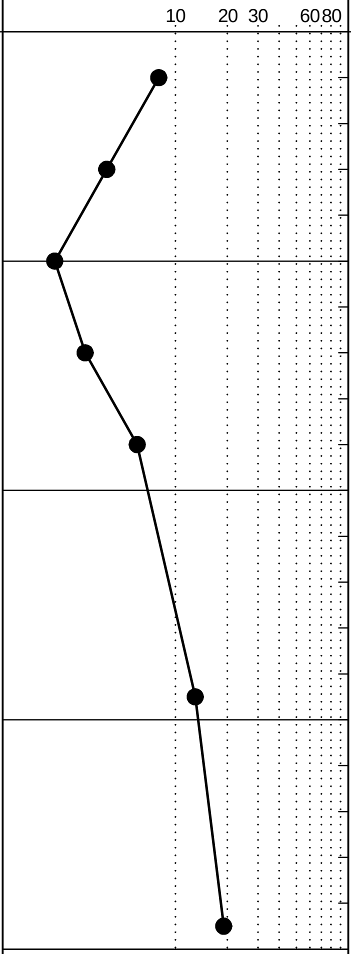
BORING LOG H-8

DATE DRILLED: **5/15/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **20.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**

NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND (SP) loose, tan, trace roots, fine			SS-1	2	4	4	8
	SAND WITH CLAY (SP-SC) very loose, gray, fine			SS-2	2	2	2	4
5	**SAND (SP)** very loose, gray, fine	▽		SS-3	1	1	1	2
				SS-4	1	1	2	3
	- - - Loose, brown			SS-5	2	3	3	6
10								
15	- - - Medium dense			SS-6	4	7	6	13
20				SS-7	4	9	10	19
	Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth							

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

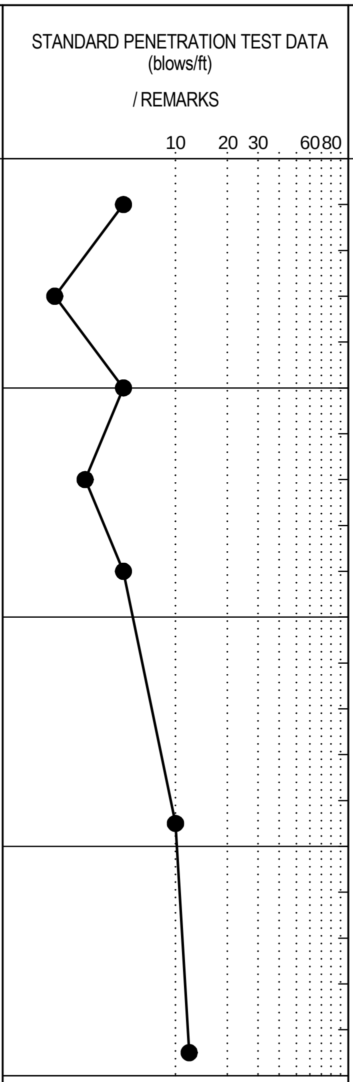
PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG H-9

DATE DRILLED: **5/15/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **20.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**

NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND WITH SILT (SP-SM) loose, gray, trace roots, fine			SS-1	1	3	2	5
	SAND (SP) very loose, tan, fine			SS-2	1	1	1	2
5	- - - Loose, gray	▽		SS-3	3	3	2	5
	- - - Very loose			SS-4	2	1	2	3
	- - - Loose, brown			SS-5	2	2	3	5
10								
15				SS-6	2	4	6	10
	- - - Medium dense			SS-7	3	6	6	12
20	Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth							



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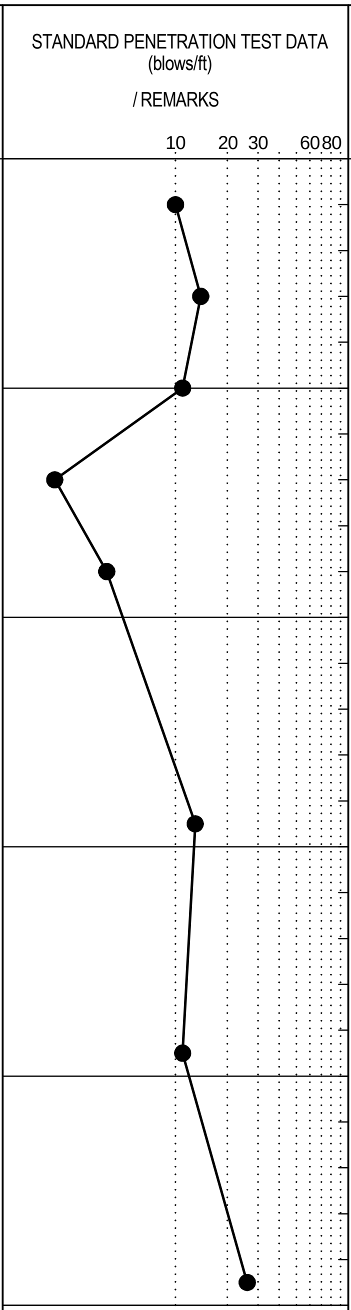
PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG H-10

DATE DRILLED: **5/13/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **25.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5.5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**
NOTES:

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
		SAND (SP) loose, tan, trace roots, fine			SS-1		3	6	4	10
		- - - Medium dense, brown			SS-2		7	8	6	14
5		**SAND WITH SILT (SP-SM)** medium dense, gray, fine	∇		SS-3		6	5	6	11
		SAND (SP) very loose, gray, fine			SS-4		1	1	1	2
		- - - Dark gray			SS-5		2	2	2	4
10										
		- - - Medium dense, gray			SS-6		5	6	7	13
15										
		- - - Brown			SS-7		3	4	7	11
20										
					SS-8		5	11	15	26
25		Boring terminated at 25 ft Backfilled with bentonite chips upon completion Target Depth								



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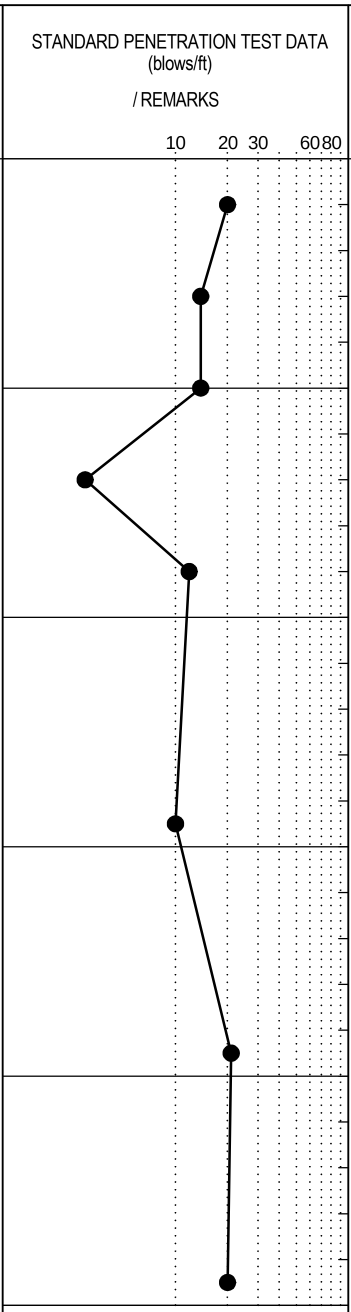
4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG H-11

DATE DRILLED: **5/13/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **25.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5.5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**
NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND (SP) medium dense, gray, trace rock fragments, trace shell fragments, fine			SS-1	4	10	10	20
	- - - Brown, no rock fragments, no shell fragments			SS-2	6	7	7	14
5	- - - Gray	▽		SS-3	5	7	7	14
	- - - Very loose, brown			SS-4	1	1	2	3
	SAND WITH SILT (SP-SM) medium dense, dark gray, fine			SS-5	2	5	7	12
10								
	SAND (SP) loose, dark gray, fine							
15				SS-6	5	4	6	10
	- - - Medium dense, brown							
20				SS-7	4	8	13	21
25				SS-8	6	7	13	20
	Boring terminated at 25 ft Backfilled with bentonite chips upon completion Target Depth							



S&ME BORING LOG \ 22840287 CLEARWATER AIRPARK - SPTS.GPJ \ LIBRARY 2011_06_28.GDT \ 6/4/24

NOTES:

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2. ***BORING, SAMPLING AND PENETRATION TEST DATA IN GENERAL ACCORDANCE WITH ASTM D-1586.***
3. ***STRATIFICATION AND GROUNDWATER DEPTHS ARE NOT EXACT.***
4. ***WATER LEVEL IS AT TIME OF EXPLORATION AND WILL VARY.***

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG H-12

DATE DRILLED: **5/13/24**

DRILL RIG: **CME 45-B**

BORING DEPTH: **25.0 ft**

DRILLER: **Swint Drilling Services**

WATER LEVEL: **5.5' ATD**

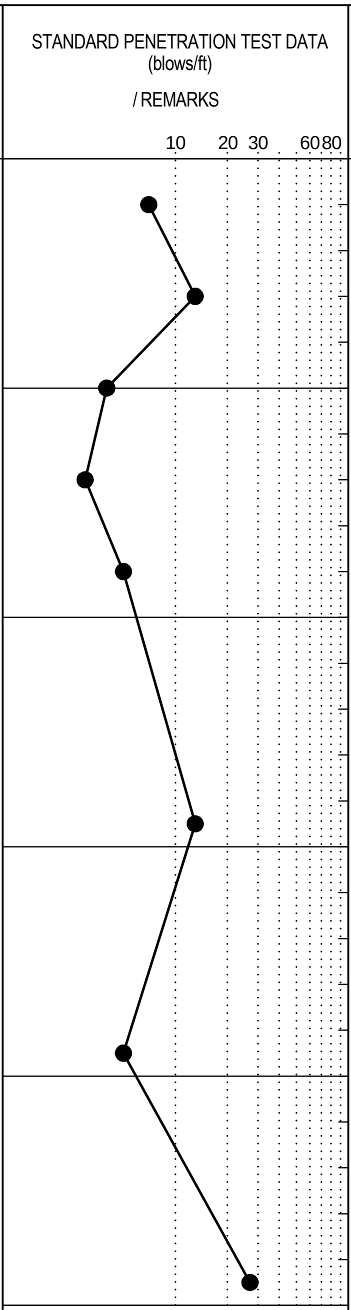
HAMMER TYPE: **Automatic**

LOGGED BY: **P. Erbland**

SAMPLING METHOD: **Split spoon**

DRILLING METHOD: **Mud Rotary**

NOTES:



DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND WITH SILT (SP-SM) loose, brown, trace organics, fine, (-200 = 7.8%, OC = 3.7%, MC = 19%)			SS-1	2	3	4	7
	SAND (SP) medium dense, brown, fine			SS-2	5	6	7	13
5	**SAND WITH SILT (SP-SM)** very loose, gray, fine	▽		SS-3	2	2	2	4
	SAND (SP) very loose, brown, fine			SS-4	1	1	2	3
	- - - Loose, gray			SS-5	2	2	3	5
10								
	SAND WITH SILT (SP-SM) medium dense, dark brown, fine			SS-6	4	6	7	13
15								
	SAND (SP) very loose, brown, fine			SS-7	2	2	3	5
20								
	- - - Medium dense			SS-8	8	13	14	27
25	Boring terminated at 25 ft Backfilled with bentonite chips upon completion Target Depth							

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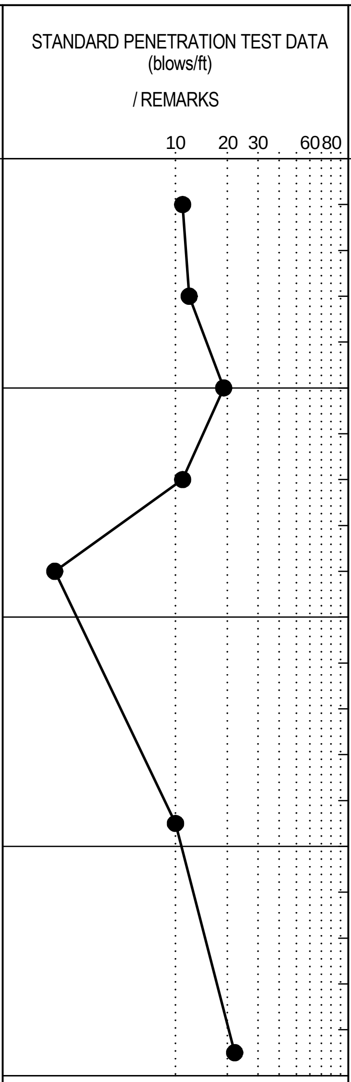
PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG MS-1

DATE DRILLED: **5/14/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **20.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5.5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**
NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND (SP) medium dense, brown, trace debris, fine			SS-1	3	5	6	11
	- - - Gray, no debris			SS-2	4	7	5	12
5	- - - Tan	∇		SS-3	10	9	10	19
	SAND WITH SILT (SP-SM) medium dense, brown, trace cemented nodules, fine			SS-4	10	6	5	11
	SAND (SP) very loose, brown, fine			SS-5	1	1	1	2
10								
	- - - Loose, gray			SS-6	5	8	2	10
15								
	- - - Medium dense			SS-7	4	8	14	22
20	Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth							

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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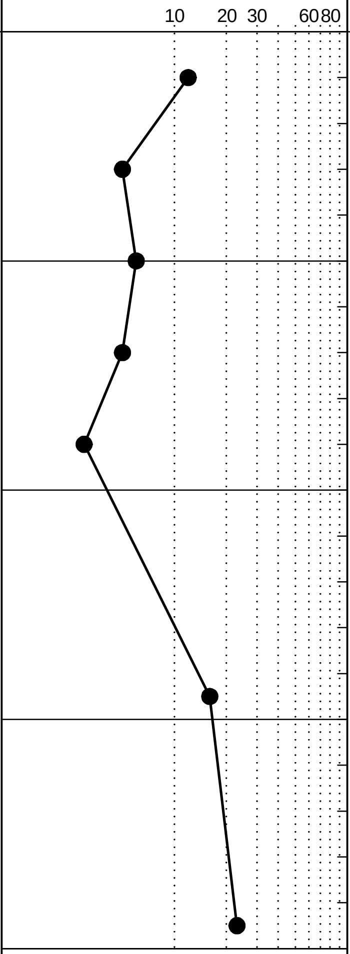
PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG SW-1

DATE DRILLED: **5/14/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **20.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **4.5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**
NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	<u>SAND (SP)</u> medium dense, gray, trace roots, fine			SS-1	2	6	6	12
	- - - Loose, tan, no roots			SS-2	3	3	2	5
5	- - - Brown	∇		SS-3	2	2	4	6
	<u>SAND WITH SILT (SP-SM)</u> loose, dark gray, fine			SS-4	3	4	1	5
	<u>SAND (SP)</u> very loose, dark gray, fine			SS-5	1	1	2	3
10								
15	- - - Medium dense, brown			SS-6	5	8	8	16
20				SS-7	4	11	12	23
	Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth							

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG SW-2

DATE DRILLED: **5/15/24**

DRILL RIG: **CME 45-B**

BORING DEPTH: **20.0 ft**

DRILLER: **Swint Drilling Services**

WATER LEVEL: **5' ATD**

HAMMER TYPE: **Automatic**

LOGGED BY: **P. Erbland**

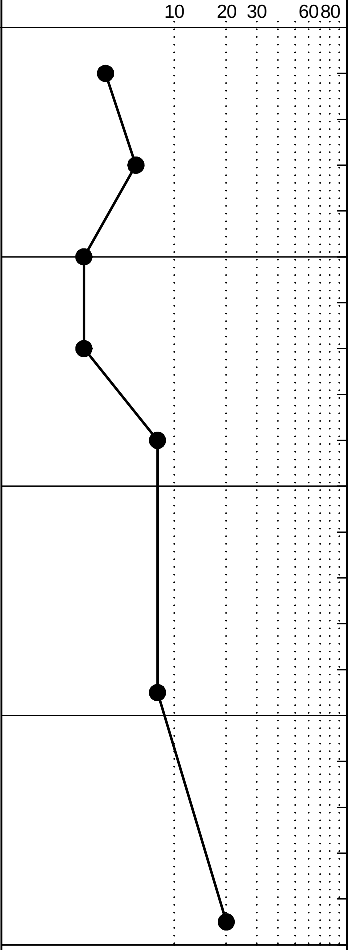
SAMPLING METHOD: **Split spoon**

DRILLING METHOD: **Mud Rotary**

NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND WITH SILT (SP-SM) very loose, gray, trace roots, fine			SS-1		1	2	2	4
	SAND (SP) loose, tan, fine			SS-2		2	4	2	6
5	**SAND WITH CLAY (SP-SC)** very loose, gray, fine, (-200 = 10%)	∇		SS-3		3	2	1	3
				SS-4		2	1	2	3
10	**SAND (SP)** loose, gray, fine			SS-5		3	5	3	8
15	- - - Loose, brown			SS-6		1	3	5	8
20	- - - Medium dense			SS-7		4	7	13	20
	Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth								

STANDARD PENETRATION TEST DATA (blows/ft)
/ REMARKS



S&ME BORING LOG \ 22840287 CLEARWATER AIRPARK - SPTS.GPJ \ LIBRARY 2011_06_28.GDT \ 6/4/24

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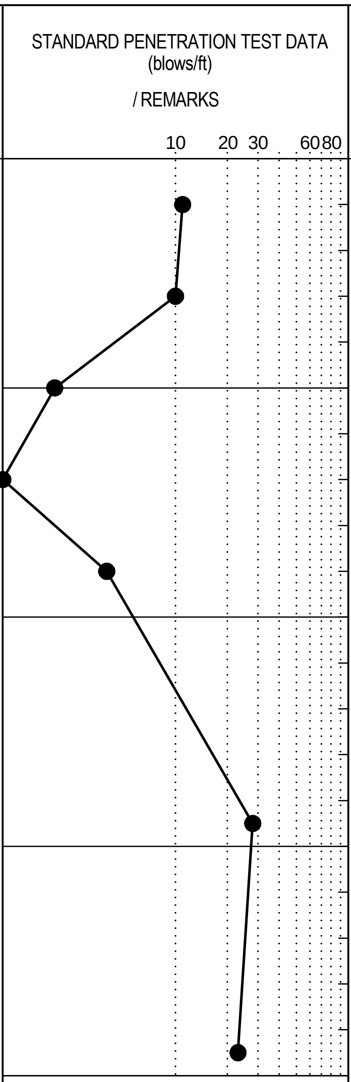
PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG SW-3

DATE DRILLED: **5/15/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **20.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **4.5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**
NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND WITH SILT (SP-SM) medium dense, gray, trace roots, fine			SS-1	3	5	6	11
	SAND (SP) loose, tan, fine			SS-2	4	5	5	10
5	**SAND WITH CLAY (SP-SC)** very loose, gray, trace roots, fine, (-200 = 8.1%)	∇		SS-3	2	1	1	2
	- - - No roots			SS-4	WOH	WOH	1	1
	SAND WITH SILT (SP-SM) very loose, brown, fine			SS-5	1	2	2	4
10								
	SAND (SP) medium dense, brown, fine			SS-6	10	13	15	28
15								
	SILTY SAND (SM) medium dense, brown, fine			SS-7	5	10	13	23
20	Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth							



S&ME BORING LOG \ 22840287 CLEARWATER AIRPARK - SPTS.GPJ \ LIBRARY 2011_06_28.GDT \ 6/4/24

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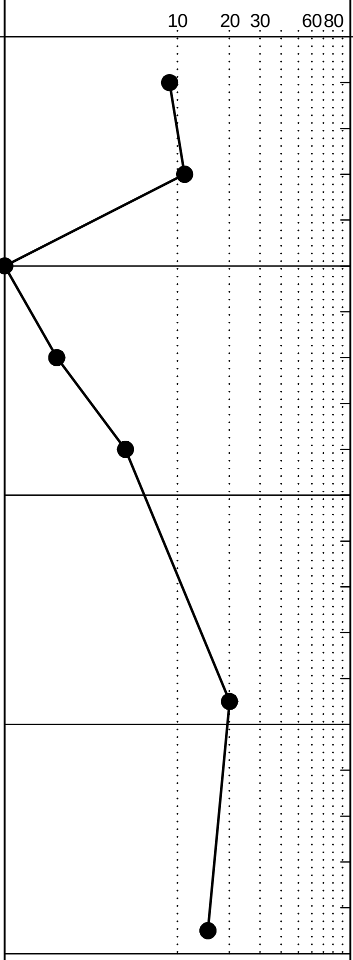
PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG SW-4

DATE DRILLED: **5/14/24**		NOTES:
DRILL RIG: **CME 45-B**	BORING DEPTH: **20.0 ft**	
DRILLER: **Swint Drilling Services**	WATER LEVEL: **4.8' ATD**	
HAMMER TYPE: **Automatic**	LOGGED BY: **P. Erbland**	
SAMPLING METHOD: **Split spoon**		
DRILLING METHOD: **Mud Rotary**		

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND WITH SILT (SP-SM) loose, dark gray, trace roots, fine			SS-1	2	4	5	9
	SAND (SP) medium dense, tan, fine			SS-2	8	7	4	11
5	- - - Very loose	▽		SS-3	1	WOH	1	1
	- - - Gray			SS-4	1	1	1	2
	- - - Loose			SS-5	4	3	2	5
10								
	- - - Medium dense			SS-6	5	10	10	20
15								
	SAND WITH SILT (SP-SM) medium dense, brown, trace cemented nodules, fine			SS-7	2	6	9	15
20	Boring terminated at 20 ft Backfilled with bentonite chips upon completion Target Depth							

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

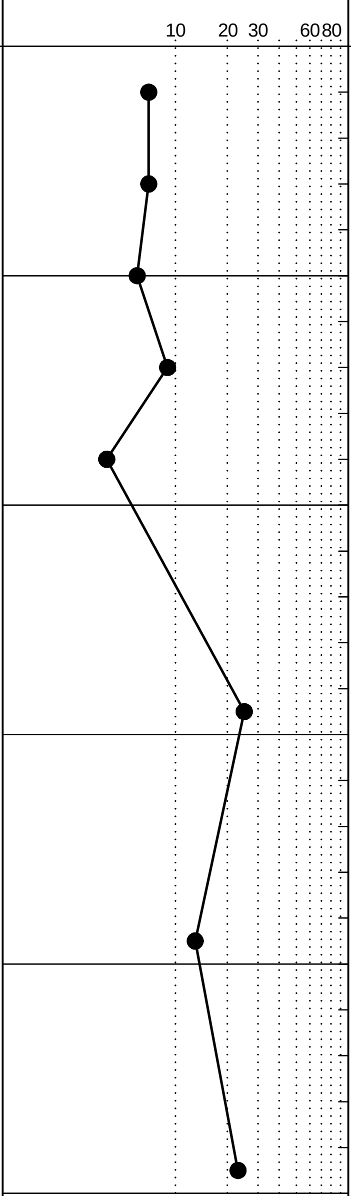
BORING LOG T-1

DATE DRILLED: **5/14/24**	
DRILL RIG: **CME 45-B**	BORING DEPTH: **25.0 ft**
DRILLER: **Swint Drilling Services**	WATER LEVEL: **5.5' ATD**
HAMMER TYPE: **Automatic**	LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**	
DRILLING METHOD: **Mud Rotary**	

NOTES:

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
		SAND (SP) loose, gray, fine			SS-1		2	4	3	7
		- - - Trace roots, trace shell fragments			SS-2		3	4	3	7
5		**SAND WITH SILT (SP-SM)** loose, gray, some rock fragments, some shell fragments, fine	∇		SS-3		3	3	3	6
					SS-4		5	5	4	9
		SAND (SP) very loose, gray, some roots, some shell fragments, fine			SS-5		2	2	2	4
10										
		- - - Medium dense, trace shell fragments			SS-6		6	12	13	25
15										
					SS-7		3	2	11	13
20										
		- - - No shell fragments			SS-8		7	13	10	23
25		Boring terminated at 25 ft Backfilled with bentonite chips upon completion Target Depth								

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG T-2

DATE DRILLED: **5/13/24**

DRILL RIG: **CME 45-B**

BORING DEPTH: **25.0 ft**

DRILLER: **Swint Drilling Services**

WATER LEVEL: **5.5' ATD**

HAMMER TYPE: **Automatic**

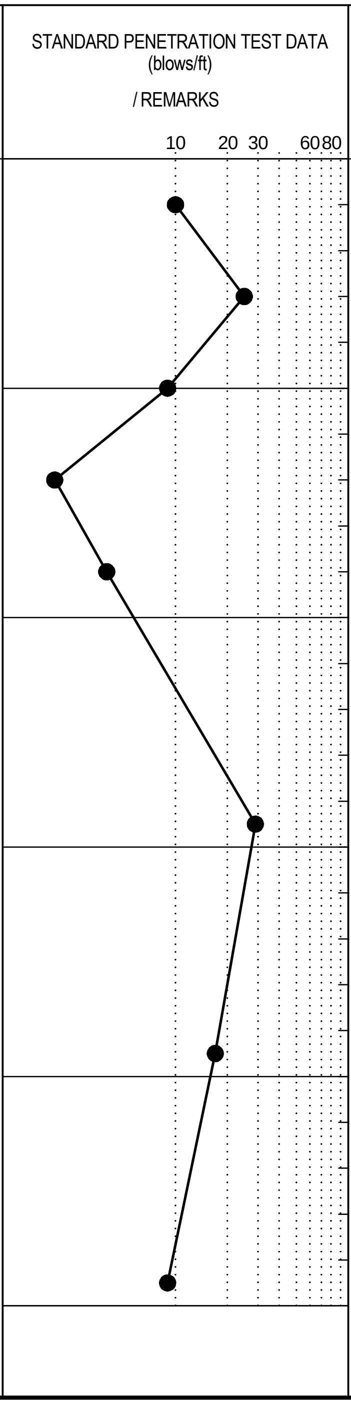
LOGGED BY: **P. Erbland**

SAMPLING METHOD: **Split spoon**

DRILLING METHOD: **Mud Rotary**

NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND WITH SILT (SP-SM) loose, dark gray, trace organics, fine			SS-1	2	4	6	10
	SAND (SP) medium dense, tan, fine			SS-2	10	12	13	25
5	- - - Loose, gray	∇		SS-3	6	5	4	9
	- - - Very loose, brown			SS-4	1	1	1	2
				SS-5	2	2	2	4
10								
15	- - - Medium dense, gray			SS-6	7	16	13	29
20				SS-7	5	8	9	17
25	- - - Loose, brown			SS-8	4	3	6	9
	Boring terminated at 25 ft Backfilled with bentonite chips upon completion Target Depth							



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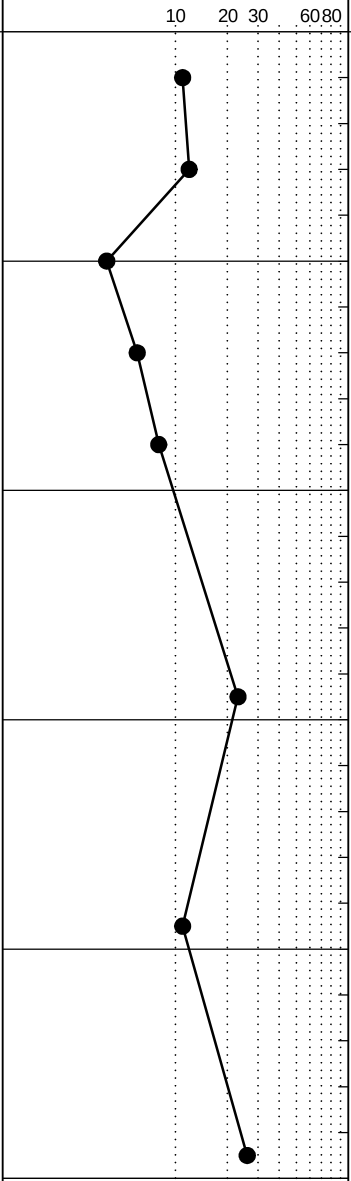
PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
S&ME Project No. 22840287

BORING LOG T-3

DATE DRILLED: **5/14/24**
DRILL RIG: **CME 45-B**
BORING DEPTH: **25.0 ft**
DRILLER: **Swint Drilling Services**
WATER LEVEL: **5.5' ATD**
HAMMER TYPE: **Automatic**
LOGGED BY: **P. Erbland**
SAMPLING METHOD: **Split spoon**
DRILLING METHOD: **Mud Rotary**
NOTES:

DEPTH (feet)	MATERIAL DESCRIPTION	WATER LEVEL	ELEVATION (feet)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT / CORE DATA 1st 6in / RUN #	2nd 6in / REC	3rd 6in / RQD	N VALUE
	SAND (SP) medium dense, brown, some roots, fine			SS-1	⧗	4	5	6	11
	- - - Gray, no roots			SS-2	⧗	5	5	7	12
5	- - - Very loose	▽		SS-3	⧗	5	2	2	4
	SAND WITH SILT (SP-SM) loose, gray, fine			SS-4	⧗	2	3	3	6
	SAND (SP) loose, brown, fine			SS-5	⧗	3	4	4	8
10									
	- - - Medium dense, dark gray								
15				SS-6	⧗	7	9	14	23
	SAND WITH SILT (SP-SM) medium dense, dark brown, fine								
20				SS-7	⧗	2	5	6	11
	- - - Gray								
25				SS-8	⧗	6	12	14	26
	Boring terminated at 25 ft Backfilled with bentonite chips upon completion Target Depth								

STANDARD PENETRATION TEST DATA (blows/ft) / REMARKS



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PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: AP-1

DATE STARTED: **5/10/24**
DATE FINISHED: **5/10/24**
NOTES:
SAMPLING METHOD: **Hand Auger**
PERFORMED BY: **Tierra**
WATER LEVEL: **Not Encountered**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
		PAVEMENT 1.25" asphalt, 5.5" soil cement base		
1 2 3 4 5		**SAND WITH SILT (SP-SM)** gray, fine		

Boring terminated at 5.5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: AP-2

DATE STARTED: **5/10/24**

DATE FINISHED: **5/10/24**

NOTES:

SAMPLING METHOD: **Hand Auger**

PERFORMED BY: **Tierra**

WATER LEVEL: **Not Encountered**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
	🟦	**PAVEMENT** 2.25" asphalt, 5" soil cement base		
1	▨	**SAND WITH SILT (SP-SM)** gray, trace shell fragments, fine		
2	▨			
3	▨	- - - With debris (paper, brick, metal, rocks, plastic)		
4	▨			
5	▨			

Boring terminated at 5.5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: CT-1

DATE STARTED: **5/10/24**

DATE FINISHED: **5/10/24**

NOTES:

SAMPLING METHOD: **Hand Auger**

PERFORMED BY: **Tierra**

WATER LEVEL: **Not Encountered**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
		PAVEMENT 2.25" asphalt, 17" recycled asphalt base		
1				
		SAND WITH SILT (SP-SM) brown, fine, with asphalt fragments		
2				
		- - - No asphalt fragments		
3				
		- - - Dark gray		
4				
5				
		SILTY SAND (SM) dark gray, fine, (-200 = 13%)		
6				

Boring terminated at 6.5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: CT-2

DATE STARTED: **5/10/24**

DATE FINISHED: **5/10/24**

NOTES:

SAMPLING METHOD: **Hand Auger**

PERFORMED BY: **Tierra**

WATER LEVEL: **Not Encountered**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
	🟦	**PAVEMENT** 1" asphalt, 5.5" shell base		
1	▒	**SAND WITH SILT (SP-SM)** brown, fine		–
2 3 4	░	**SAND (SP)** tan, fine		– – –
5	▒	**SAND WITH SILT (SP-SM)** tan, fine		–

Boring terminated at 5.5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: HT-1

DATE STARTED: **5/10/24**
DATE FINISHED: **5/10/24**
NOTES:

SAMPLING METHOD: **Hand Auger**
PERFORMED BY: **Tierra**

WATER LEVEL: **Not Encountered**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
	🟦	**PAVEMENT** 2.5" asphalt, 6" limerock base		
1 2 3 4 5		**SAND WITH SILT (SP-SM)** dark brown to gray, fine - - - Gray, (-200 =5.4%)		
6		**SAND (SP)** brown, fine		

Boring terminated at 6.7 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: HT-2

DATE STARTED: **5/10/24**

DATE FINISHED: **5/10/24**

NOTES:

SAMPLING METHOD: **Hand Auger**

PERFORMED BY: **Tierra**

WATER LEVEL: **5.1' ATD**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
		PAVEMENT 2" asphalt, 6" shell base		
1		**SAND WITH SILT (SP-SM)** gray, fine - - - Dark brown, (-200 =7.4%)		
2				
3		- - - Brown - - - Tan		
4				
5				▽

Boring terminated at 5.5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: P-1

DATE STARTED: **5/9/24**
DATE FINISHED: **5/9/24**
NOTES:
SAMPLING METHOD: **Hand Auger**
PERFORMED BY: **Swint Drilling Services**
WATER LEVEL: **4.5'ATD**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
		SAND WITH SILT (SP-SM) gray, trace roots, trace rock fragments, fine		
1				
		- - - With debris (glass, metal, municipal waste)		
2				
3				
4				
				∇
5				

Boring terminated at 5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: P-2

DATE STARTED: **5/10/24**

DATE FINISHED: **5/10/24**

NOTES:

SAMPLING METHOD: **Hand Auger**

PERFORMED BY: **Tierra**

WATER LEVEL: **Not Encountered**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
		PAVEMENT 5.75" asphalt, no base		
		SAND WITH SILT (SP-SM) gray, trace organics, fine, with debris (glass, brick, metal, rocks, plastic)		
1				
		- - - (-200 = 8.8%, OC = 3%, MC = 30%)		
2				
3				
4				
5				

Boring terminated at 5.5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: P-3

DATE STARTED: **5/10/24**
DATE FINISHED: **5/10/24**
NOTES:
SAMPLING METHOD: **Hand Auger**
PERFORMED BY: **Tierra**
WATER LEVEL: **Not Encountered**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
	🟦	**PAVEMENT** 2.75" asphalt, 3" shell base		
	▨	**SAND WITH SILT (SP-SM)** gray, trace shell fragments, fine		
1	▨			
	▨	- - - With debris (glass, brick, metal, rocks, plastic)		
2	▨			
3	▨			
	▨	- - - Tan, no debris		
4	▨			
5	▨			

Boring terminated at 5.5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: P-4

DATE STARTED: **5/10/24**
DATE FINISHED: **5/10/24**
NOTES:
SAMPLING METHOD: **Hand Auger**
PERFORMED BY: **Tierra**
WATER LEVEL: **Not Encountered**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
	🟦	**PAVEMENT** 1.5" asphalt, 6" shell base		
	▨	**SAND WITH SILT (SP-SM)** gray, trace shell fragments, fine		
1	▨			
2	▨			
	▨	- - - Some wood		
3	▨			
	▨	- - - Light gray, no wood, with debris (glass, brick, metal, rocks, plastic)		
4	▨			
5	▨			

Boring terminated at 5.5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: P-5

DATE STARTED: **5/9/24**
DATE FINISHED: **5/9/24**
NOTES:
SAMPLING METHOD: **Hand Auger**
PERFORMED BY: **Swint Drilling Services**
WATER LEVEL: **5' ATD**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
		SAND (SP) gray, trace roots, fine		
1		- - - No roots		
2				
3		**SAND WITH SILT (SP-SM)** gray, trace shell fragments, fine		
4				
5		Boring terminated at 5 ft Backfilled with cuttings upon completion Target Depth		▽

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: P-6

DATE STARTED: **5/9/24**

DATE FINISHED: **5/9/24**

NOTES:

SAMPLING METHOD: **Hand Auger**

PERFORMED BY: **Swint Drilling Services**

WATER LEVEL: **4.5' ATD**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
		SAND (SP) gray, trace roots, fine		
1 2 3		**SAND WITH SILT (SP-SM)** light brown, fine		
4 5		**SAND (SP)** tan, fine		∇

Boring terminated at 5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: P-7

DATE STARTED: **5/9/24**

DATE FINISHED: **5/9/24**

NOTES:

SAMPLING METHOD: **Hand Auger**

PERFORMED BY: **Swint Drilling Services**

WATER LEVEL: **4.5 ' ATD**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
		SAND (SP) gray, trace roots, fine		
1		- - - Brown, no roots		
2				
3		- - - Light gray		
4				▽
5				

Boring terminated at 5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: P-8

DATE STARTED: **5/10/24**
DATE FINISHED: **5/10/24**

NOTES:

SAMPLING METHOD: **Hand Auger**
PERFORMED BY: **Tierra**

WATER LEVEL: **5' ATD**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
	🟦	**PAVEMENT** 3" asphalt, 6" limerock base		
1	▨	**SAND (SP)** gray, fine		
	▨	- - - Tan		
2	▨			
3	▨			
4	▨			
5	▨			▽

Boring terminated at 5.5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: P-9

DATE STARTED: **5/10/24**
DATE FINISHED: **5/10/24**
NOTES:
SAMPLING METHOD: **Hand Auger**
PERFORMED BY: **Tierra**
WATER LEVEL: **Not Encountered**

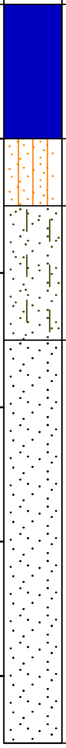
Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
1	🟦	**PAVEMENT** 2.75" asphalt, 16" limerock base		
2 3	▨	**SAND WITH SILT (SP-SM)** brown to gray, fine		
4 5 6	░	**SAND (SP)** light brown, fine		

Boring terminated at 6.5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: P-10

DATE STARTED: **5/10/24**
DATE FINISHED: **5/10/24**
NOTES:
SAMPLING METHOD: **Hand Auger**
PERFORMED BY: **Tierra**
WATER LEVEL: **Not Encountered**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
		**PAVEMENT** 4" asphalt, 8" limerock base		
1		**SILTY SAND (SM)** dark brown, fine		
2		**SAND WITH SILT (SP-SM)** brown, fine		
3		**SAND (SP)** brown, fine		
		- - - Light brown		
4				
5				

Boring terminated at 5.5 ft
Backfilled with cuttings upon completion
Target Depth

PROJECT: **Clearwater Airpark Improvements**
Clearwater, Florida
22840287

HAND AUGER BORING LOG: TL-1

DATE STARTED: **5/10/24**
DATE FINISHED: **5/10/24**
NOTES:

SAMPLING METHOD: **Hand Auger**
PERFORMED BY: **Tierra**

WATER LEVEL: **5' ATD**

Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
	🟦	**PAVEMENT** 2" asphalt, 5" shell base		
1 2	░	**SAND (SP)** tan, fine		
3 4	▒	**SAND WITH SILT (SP-SM)** brown, fine		
5	░	**SAND (SP)** light gray, fine		▽

Boring terminated at 5.5 ft
Backfilled with cuttings upon completion
Target Depth

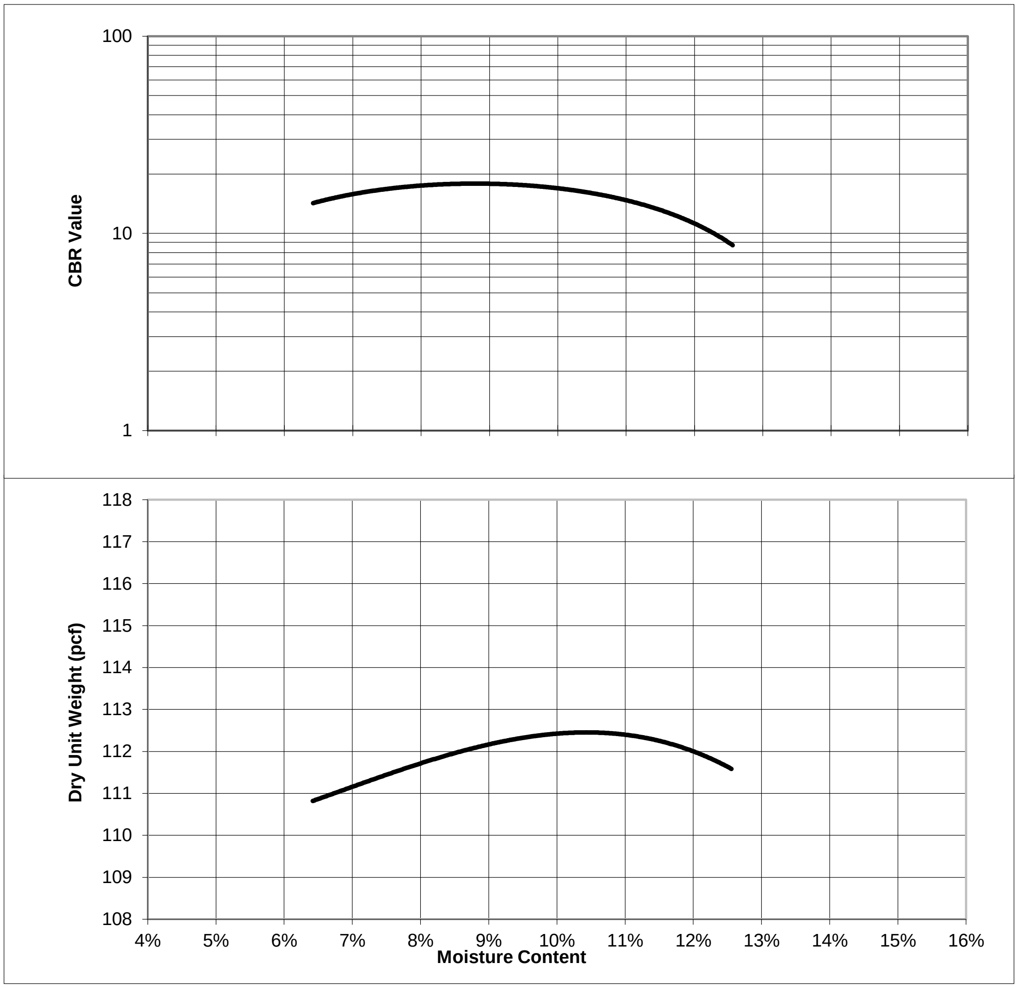
Appendix II – Laboratory Test Results

TIERRA

RESULTS OF CALIFORNIA BEARING RATIO TEST

Tested For:	S & ME, Inc. Tampa, FL 33610	Project:	Clearwater Airpark Improvements
		Project No.	6111-10-109
Date:	5/17/2024	Report No.	Bulk-1

CBR & MOISTURE-DENSITY RELATIONSHIP



CBR Value	18		
Maximum Density	112.5 pcf	Description:	Dark Brown Slightly Silty Sand
Optimum Moisture	10.4 %		
Test Method:	ASTM D-1883: CBR		
Tested By:	J. Shuey	Sample Depth:	3'

cc:

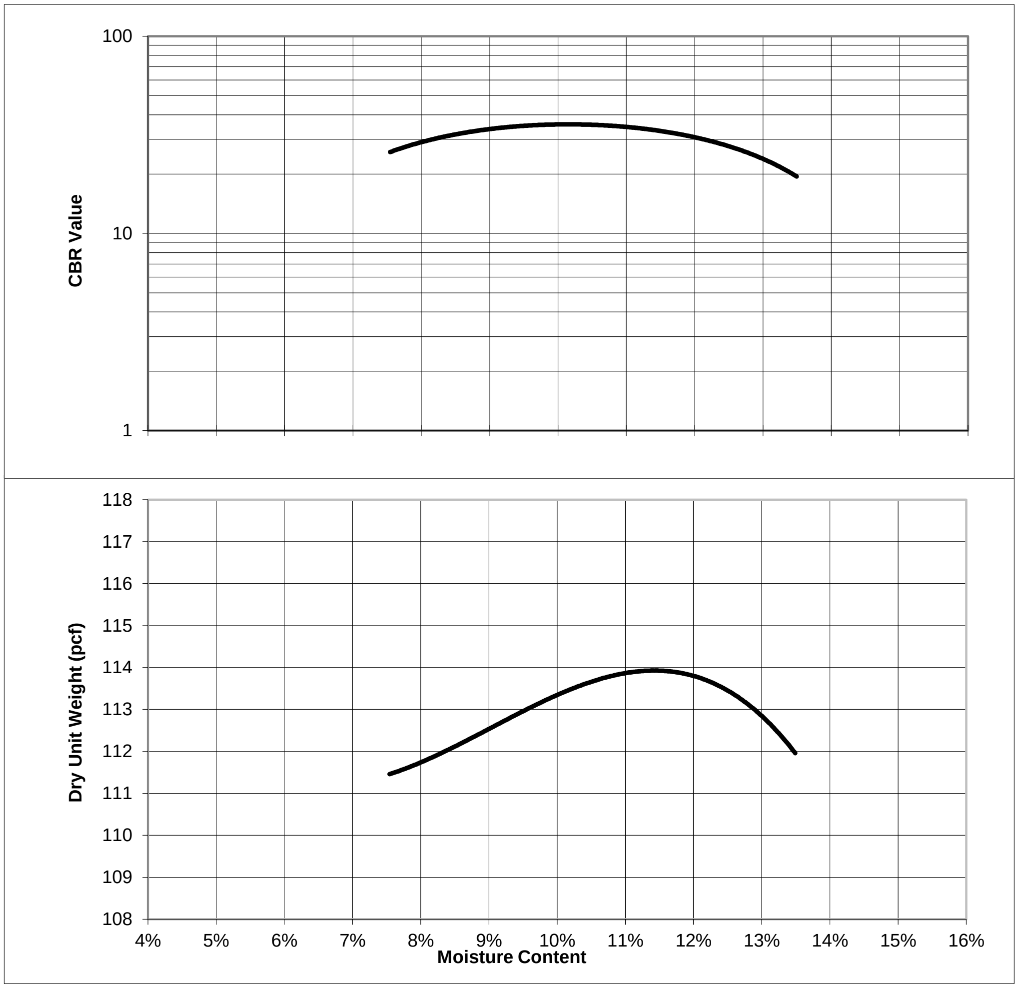
Respectfully Submitted,
TIERRA INC.

TIERRA

RESULTS OF CALIFORNIA BEARING RATIO TEST

Tested For:	S & ME, Inc. Tampa, FL 33610	Project:	Clearwater Airpark Improvements
		Project No.	6111-10-109
Date:	5/20/2024	Report No.	Bulk-2

CBR & MOISTURE-DENSITY RELATIONSHIP



CBR Value	35		
Maximum Density	113.9 pcf	Description:	Brown Slightly Silty Sand with Rock
Optimum Moisture	11.4 %		
Test Method:	ASTM D-1883: CBR		
Tested By:	J. Shuey	Sample Depth:	3'

cc:

Respectfully Submitted,
TIERRA INC.

TIERRA

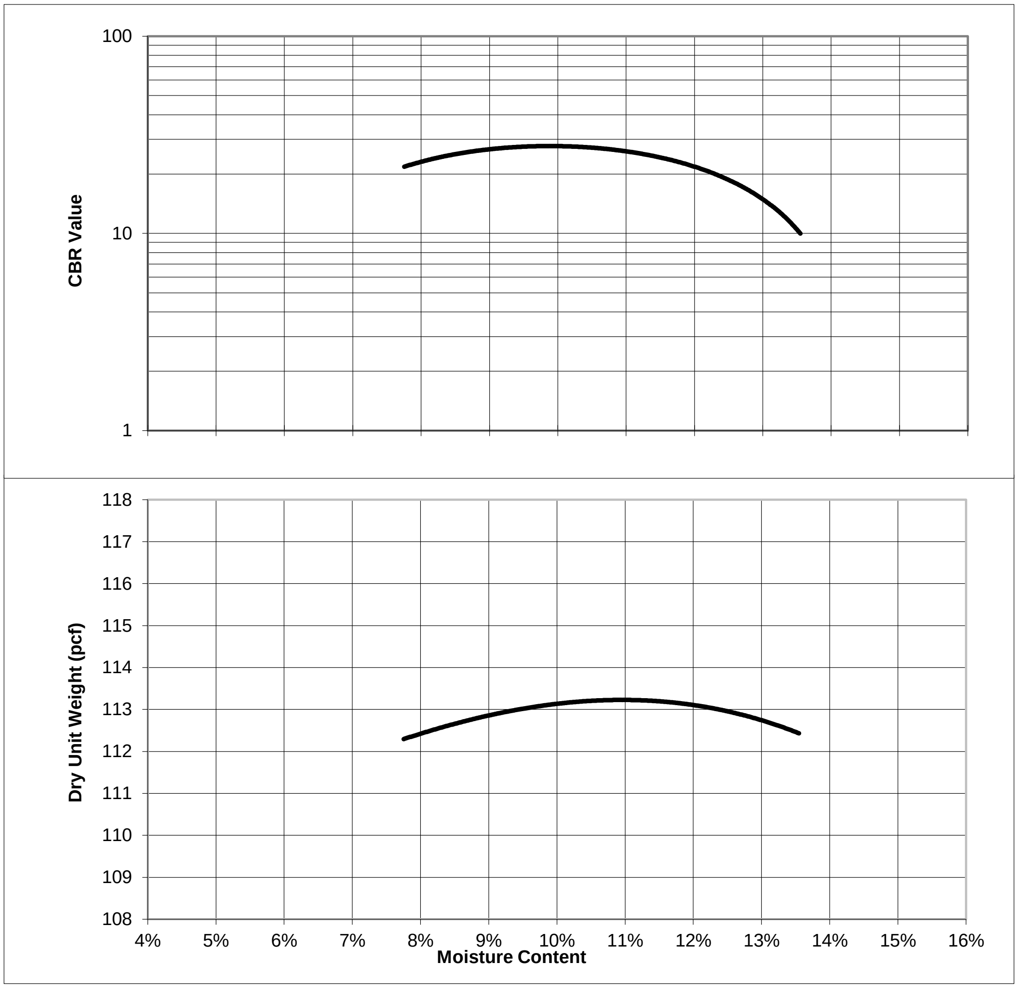
RESULTS OF CALIFORNIA BEARING RATIO TEST

Tested For: S & ME, Inc.
Tampa, FL 33610

Project: Clearwater Airpark Improvements

Project No. 6111-10-109
Date: 5/17/2024
Report No. Bulk-3

CBR & MOISTURE-DENSITY RELATIONSHIP



CBR Value 27
Maximum Density 113.3 pcf
Optimum Moisture 11.0 %
Test Method: ASTM D-1883: CBR
Tested By: J. Shuey

Description: Brown Slightly Silty Sand
Sample Depth: 3'

cc:

Respectfully Submitted,
TIERRA INC.

Appendix III – Field and Laboratory Testing Procedures

FIELD AND LABORATORY TESTING PROCEDURES

Soil Test Boring Procedures (ASTM D1586)

The borings were advanced by a rotary drilling process which utilized a viscous bentonite drilling fluid to flush the cuttings and stabilize the hole. At regular intervals, the drilling tools were withdrawn, and soil samples obtained with a standard 1⅜-inch inside diameter, 2-inch outside diameter, split tube sampler in general accordance with ASTM D1586 "Standard Test Method for Penetration Test and Split Barrel Sampling of Soils".

The sampler was initially seated 6 inches to penetrate any loose cuttings then driven an additional foot to 1½ feet with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the foot increment after the 6-inch seating blows was recorded and is designated as the standard penetration resistance, N-value. Penetration resistance is an index to the soil's strength and density.

The samples were classified in the field by an engineering technician as they were obtained. Representative portions of each soil sample were then sealed in containers and transported to our laboratory. The samples were examined by a geotechnical engineer to visually check the field classification. Boring data, including sampling intervals, penetration resistance N-values, soil classifications, and groundwater level are presented on the Soil Profiles.

Auger Boring Procedures (ASTM D1452)

The hand auger borings were performed in general accordance with ASTM D1452. A 6-inch-long bucket was manually advanced into the soil in approximate 6-inch intervals. The soil was removed from the auger hole at each interval and the samples were classified in the field by an engineering technician as they were obtained. Representative portions of each soil sample were then sealed in containers and transported to our laboratory. The samples were examined by a geotechnical engineer to visually check the field classification.

Double-Ring Infiltrometer Test (ASTM D3385)

Each double-ring infiltrometer test was performed in general accordance with procedures outlined in the ASTM D3385. Two 18-inch-high concentric rings were placed on a prepared test surface at a given depth and driven into the ground 4 to 6 inches. The inner ring used in the test had an inside diameter of approximately 12-inches, while the outer ring had an inside diameter of approximately 24 inches. The test is performed by filling both rings with water. The water level is allowed to drop over a discrete time interval and the volume of water required to maintain the head in the inner ring was recorded for the test duration.

Determination of Soils Finer than No. 200 Sieve (ASTM D1140)

The clay and silt content of granular soils affects their physical properties such as strength, compressibility, and permeability. Selected samples were tested to determine the percent, by weight, of soil particles finer than the No. 200 sieve (silt and clay size particles) in general accordance with procedures outlined in the ASTM D1140. Soil particles finer than 75 microns were flushed through a No. 200 sieve using water. The coarse materials retained on the No. 200 sieve were dried to obtain their dry weight. The dry weight of materials retained on the No. 200 sieve was compared to the dry weight of the total test specimen. The difference in weight, expressed as a percentage of the pre-wash weight, is designated as the percentage of "fines" (silt and clay size particles).

Determination of Organic Content (ASTM D2974)

This test method evaluates the moisture content, ash content, and organic matter in peats and other organic soils, such as organic clay, silt, sand, and "muck" in accordance with ASTM D2974. The organic content measurement is performed by placing a sample of soil in a low-temperature oven. The soil is then dried (as described above) to measure the initial moisture content. The soil is then transferred to a high-temperature kiln, which burns off the organic materials. The organic content is then calculated as the ratio of the weight loss to the dry weight of the soil measured from the low temperature oven; it is expressed as a percent.

Determination of Natural Moisture Content (ASTM D2216)

The natural moisture content was determined using the test procedures outlined in ASTM D2216. The moisture content is defined as the ratio, expressed as a percentage, of the weight of water in a given amount of soil to the weight of the solid particles.

California Bearing Ratio Test (CBR, ASTM D1883)

The California Bearing Ratio, usually abbreviated as CBR, is a punching shear test. It provides data that is a semi-empirical index of the strength and deflection characteristics of a soil that has been correlated with pavement performance to establish design criteria for pavement thickness. The test is performed on a six-inch diameter, five-inch thick disc of compacted soil that is confined in a steel cylinder. Before testing, the sample is inundated under a confining pressure approximately equal to the weight of the future pavement in order to determine the potential swelling, and to simulate the worst possible condition that can occur in the field. A piston, approximately two inches in diameter, is then forced into the soil at a standard rate to determine the resistance to penetration. The CBR is the ratio, expressed as a percentage, of the actual load required to produce a 0.1 inch deflection to that required to produce the same deflection in a certain standard crushed stone. The results of the CBR tests are shown on the attached California Bearing Ratio Test Results sheet.