Jackson County Airport Terminal

JACKSON COUNTY, GEORGIA

August 25, 2022

REPORT OF PRELIMINARY
GEOTECHNICAL EXPLORATION

Prepared By

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GMC PROJECT NUMBER: GATL220011

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August 25, 2022

Mr. Jeff Hester
Goodwyn Mills Cawood, LLC
6120 Powers Ferry Road
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Atlanta, Georgia 30339

RE: REPORT OF PRELIMINARY GEOTECHNICAL EXPLORATION
JACKSON COUNTY AIRPORT TERMINAL
JACKSON COUNTY, GEORGIA
GMC PROJECT GATL210009

Dear Mr. Hester,

Goodwyn Mills Cawood, LLC (Geotechnical & Construction Services Division) is pleased to provide this report of preliminary geotechnical exploration performed for the above referenced project. This report includes the results of our field and laboratory testing and recommendations for foundation design and site development.

We appreciate the opportunity to perform this study on this phase of the project for you and look forward to continued participation during the construction phase of this project. If you have any questions pertaining to this report, or if we may be of further service, please do not hesitate to call.

Sincerely,
GOODWYN MILLS CAWOOD, LLC

GEORGIA REGISTERED No. PE045033 PROFESSIONAL 8·25·22 ENGINEER MICHAEL JOSEPH McNEILL

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Senior Geotechnical Engineer
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Matthew Gonzales
Geotechnical Professional

TABLE OF CONTENTS Page

1.0 PROJECT INFORMATION AND SCOPE OF WORK

1.1 Project Information

A preliminary geotechnical exploration and evaluation have been conducted for the proposed terminal project at the Jackson County Airport located at 500 Sky Harbor Drive in Jefferson, Jackson County, Georgia. The proposed site of the new terminal, hangar and parking areas are located to the west-southwest of the existing apron west of Runway 17-35.

1.2 Scope of Work

The purpose of this exploration was to perform a general evaluation of the subsurface soil conditions at the site and to provide general sitework recommendations, pavement recommendations, and general foundation recommendations. The scope of the exploration and evaluation included performing a total of five (5) soil test borings across the site.

The scope of services for the geotechnical study did not include any environmental assessment for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring records regarding odors, colors, or unusual or suspicious items or conditions are strictly for the information of the client.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration

The boring locations and depths were selected by GMC personnel. Field-testing employed by GMC was performed in general accordance with ASTM standards or generally accepted methods. The field work and site drilling was performed on August 16, 2022.

The borings were performed using a CME 45 drill rig equipped with a rotary head and hollow stem augers (HSA). Soils were sampled using a two-inch OD split barrel sampler in accordance with ASTM D1586 driven with an automatic hammer.

2.2 Laboratory Analyses

The laboratory-testing program included visual classification of all soil samples. The laboratory testing program was conducted in general accordance with applicable ASTM standards and the results are indicated on the Boring Records and summarized in the Appendix.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 General

The site slopes from the existing apron towards the gravel drive (Sky Harbor Way). The site currently had low-lying grasses with storm drainage inlets across the site.

Google Earth Imagery Date March 2022

3.2 Site Geology

Published geologic information indicates that the site is underlain by the Hornblende Gneiss and Amphibolite of the Precambrian-Paleozoic Age of the Piedmont physiographic unit. This formation generally consists of metamorphic biotitic gneiss, mica-schist, or amphibolite as the parent bedrock.

The Piedmont is typically characterized by gently rolling topography and deeply weathered bedrock. The subsurface conditions can consist of up to 70 feet of weathered residual soils (saprolites) underlain by metamorphic and igneous rocks consisting of granite, schist, and gneiss.

The subsurface bedrock in this region has undergone differing rates of weathering, which often produces a considerable variation in depth to competent rock over short horizontal distances. It is also not unusual for lenses and large boulders of hard rock and zones of partially weathered rock to be present within the soil mantle above the general bedrock level. The typical residual soil profile consists of clayey soils near the surface, where soil weathering is more advanced, underlain by sandy silts and silty sands, which often consist of saprolites (native soils which maintain the original fabric of the parent rock).

Generally, the soil becomes harder and denser with depth to the top of parent crystalline rock or "massive bedrock". This transitional zone is termed partially weathered rock (PWR). PWR is defined for engineering purposes as material with standard penetration N-values of more than 100 blows per foot. Weathering of the rock is influenced by joints, fractures, and less resistant rock types therefore, the profile of the PWR and hard rock is irregular. It is not unusual to find boulders, lenses of hard rock, and zones of PWR within the soil mantle, above the general bedrock level.

3.3 Subsurface Conditions

The site was explored by performing five (5) soil test borings advanced to the boring termination depth of 25 feet each. At the surface, approximately 3 inches of organic laden material (topsoil) was encountered. The soils encountered generally consisted of medium to very stiff sandy silt and clay (ML, CL).

The subsurface descriptions contained herein are of a generalized nature to highlight the major soil stratification features and soil characteristics. The boring records included in the Appendix should be reviewed for specific information as to individual boring locations. The stratification shown on the boring records represents conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials, and the transition may be gradual. The elevations shown on the individual boring logs reference the topographical information provided to us.

3.4 Groundwater Information

Groundwater was not encountered in the borings at the time of our drilling. The samples between 20 to 25 feet were wet indicating the possible groundwater levels. The borings were backfilled prior to leaving the site and therefore no long-term groundwater levels were recorded. It is important to note that the groundwater levels may not have stabilized in the borings. Furthermore, groundwater levels may vary due to seasonal conditions, proximity to bodies of water, and recent rainfall.

4.0 SITEWORK RECOMMENDATIONS

4.1 General

In our opinion, the site is suitable for the proposed development. The main development issue for this site is the near surface medium consistency silts that may likely require undercut and replacement. The soils would be suitable for reuse as structural fill material, however moisture conditioning and recompaction would be required. The building and parking areas should be thoroughly proofrolled to determine the extent of the softer soils.

An existing storm drain crosses the proposed terminal and hangar areas. This area may have not been properly compacted for structural areas since the area was in a landscape area. In building areas this storm drain may require relocation prior to building construction. The backfill zone of the storm drain within the parking and drive areas should be thoroughly evaluated to prior fill placement. We recommend that the area be thoroughly proofrolled to determine if the backfill area will need remediated. We recommend that an allowance be made to undercut 2 feet deep and a width of about 8 feet along the backfill zone to provide a properly compacted subgrade in the parking and drive areas.

4.2 Sitework Recommendations

Stripping

Sitework should begin with clearing and grubbing (stripping) of the site and should include the removal of the organic laden material, trees and root balls. We recommend that a minimum of 3 inches of stripping be budgeted based upon the materials encountered in the limited number of borings performed. In the lower lying areas and valleys of the site additional stripping up to 6 inches should be anticipated.

Low Consistency Soils
Soft to medium soils were encountered in the upper 2 to 5 feet of the existing grade. Depending upon final site grading, these soils will likely require undercutting and replacement with properly compacted fill material. If these soils are not remediated as recommended during construction, they can lead to excessive differential settlement to the foundation causing cracking in the footings.

Proofrolling
Once the site is at grade and prior to the placement of any new fill, the areas should be proofrolled with repeated passes of a loaded tandem axle dump truck to locate deeper soft soils. Soils that are observed to rut or deflect excessively under the moving load should be undercut and replaced with properly compacted fill as described in Section 4.4. The proofrolling, undercutting, and filling activities should be witnessed by a qualified representative of the geotechnical engineer and should be performed during a period of dry weather.

Attempts can first be made to compact the problem soils. If dry weather conditions exist prior to and at the time of construction, re-compaction and densification may prove successful. The soils should be scarified and the soil moisture should be adjusted to within 3 percent of optimum moisture for low plasticity soils. Once proofrolling has been accomplished, then re-compaction of the soils may be attempted. In pavement areas where unsuitable soils are encountered, stabilization using geotextile or geogrid with stone may be a more economical option than removal and replacement of the soils.

We recommend a GMC geotechnical engineer or qualified soils' technician observe the proofrolling operations.

4.3 Time of Year Site Preparation Considerations

The time of the year that the sitework begins can affect the project considerably. In this area, the "wet" season is generally between the months of November and April, and the "dry" season from May to October. There are many considerations that need to be addressed prior to bidding a project that could affect the budget based on the time of year a project starts earthwork activities. The time of the year that the geotechnical borings were performed can provide a false sense of actual near surface conditions depending on the time of year and weather conditions. Below are considerations that should be addressed based on the time of the year earthwork is started.

"Wet" Season
During the "wet" season, the amount of undercutting may be greater, therefore resulting in greater excavation costs. The soils are typically proofrolled to determine their suitability for the placement of new fill or subgrade support. During the wet season, the surface soils have a higher moisture content and will tend to pump, therefore, hindering the placement of new fill. In addition, the drying time, time period between rain events, and temperature is not conducive to scarify soils, allow to dry, and recompact. At this time, the decision should be made by the owner to try either scarify/dry/compact the in-place soils, which could take time, or undercut and replace with suitable material, which could increase the sitework costs. Based on our experience, the amount of undercut could be an additional 1 to 2 feet (or greater in localized areas), whereas in drier weather, lesser amounts of undercutting may be necessary, if recompaction or stabilization of soils left in place can be achieved.

Some undercut soils are not always "unsuitable" soil and can be moisture conditioned and reused as fill in the deep areas, if drying conditions are favorable.

"Dry" Season

During the "dry" season, the surface soils have a lower moisture content and will tend to "bridge" or "crust" softer underlying soils. They will generally allow the placement of new fill, but the crust can break down if repeated passes with heavily loaded equipment is persistent. In addition, new fill from cuts or other sources may need to be moisture conditioned prior to compaction. The soils can dry significantly, requiring the addition of water for proper compaction. Water trucks should be used, as necessary, by the contractor to condition the soils within the required specifications.

Contractor Responsibility

The grading contractors have the option of performing their own evaluation of the site conditions to assess the excavation considerations based on the time of year a project is bid. We strongly suggest that the grading contractors conduct their own exploration and evaluation of the site conditions and material management requirements to cost effectively develop the site.

Typically, due to the movement of heavy equipment and weather conditions, the subgrade becomes disturbed during construction. As a result, fine grained clayey soils have a tendency to lose shear strength and support capability. Therefore, additional effort on the Contractor's part will be required to reduce traffic and limit disturbance of soils. It is essential that the subgrade be restored to a properly compacted condition based on optimum moisture and density requirements. Restoration of the subgrade should be addressed in the project specifications.

4.4 Fill Placement

Soil Fill Material

We recommend that soil fill material placed within any building or pavement areas should be placed in loose lifts not exceeding 8-inches in thickness with a maximum particle size of 3 inches. The following table summarizes the compacted fill requirements:

Location	Test Method	Compaction Required (minimum)	Moisture Content
Structural Area and 10' beyond perimeter	ASTM D698 (standard)	98 %	-/+3 percentage points of optimum moisture
Aprons below pavement base material	ASTM D698 (standard)	Upper 12 inches - 98 % Below 12 inches – 95 %	-/+3 percentage points of optimum moisture

Select fill material should meet the following characteristics:

Property	Requirement
Organic Material	≤ 5%
Liquid Limit	< 50%
Plasticity Index	< 30%
Maximum Dry Density	≥ 95 lb/ft^3
Maximum Particle Size	3 inches or less

On-site materials meeting the requirements above should be suitable for reuse as fill material; however, the moisture content of the soil may need to be adjusted to achieve the specified moisture content and compaction requirements. Samples of the proposed fill materials, either from on-site or borrow, should be provided to the geotechnical engineer for Proctor testing and evaluation prior to placement. Density tests should be performed to document compaction and moisture content of any earthwork involving soils and other applicable materials. Field density tests should be performed frequently, with a recommended minimum of one test per 5,000 square feet per lift of fill in structural areas and one test per 10,000 square feet per lift in other areas. Fill material must meet both the specified density and moisture requirements to be considered acceptable.

4.5 Backfilling of Utility Trenches

Backfilling of storm drain and utility trenches must be performed in a controlled manner to reduce settlement of the fill and cracking of overlying floor slabs and pavements. We recommend that utility trenches be backfilled with acceptable borrow or graded aggregate base (GAB) stone in 4-inch loose lifts compacted with mechanical piston tampers to the project requirements. Should seepage occur in utility trenches, it may be necessary to "floor" the trench with dense-graded gravel to provide a working surface. If crushed stone is used to backfill utility trenches, we recommend that graded aggregate base stone (GAB) compacted in lifts be used. Open-graded crushed stone can serve as a channel for seepage toward structures and therefore is not recommended for use as utility trench backfill.

4.6 Subgrade Restoration

Typically, due to the movement of heavy equipment and weather conditions, the subgrade soil becomes disturbed during construction. As a result, these soils have a tendency to lose shear strength and support capability. Therefore, additional effort on the contractor's part will be required to reduce traffic and limit disturbance of soils. It is essential that the subgrade be restored to a properly compacted condition based on optimum moisture and density.

5.0 STRUCTURAL RECOMMENDATIONS

5.1 Foundations

Structures with loads less than approximately 50 kips may be supported on shallow foundations bearing in the residual stiff silts or clays or properly compacted structural fill material. Shallow footings or thickened portions of monolithic slabs can be sized for a maximum net allowable bearing pressure of 2,000 psf. The shallow footings should bear a minimum of 18 inches below final exterior grade in newly placed compacted fill or stiff natural soils. Interior foundations can bear at a minimum depth of 12 inches below finished floor elevation. An increase in the bearing pressure of 1/3 under transient loads, such as wind, is allowed for design purposes. Total settlement of approximately 1½ inches with differential settlement of about half that amount should be expected.

Even though computed footing dimensions may be less, column footings and continuous footings should have minimum width dimensions of 24 inches and 18 inches, respectively. This allows for hand cleaning of materials disturbed during the excavation process and reduces the potential for punching shear failure.

All foundation excavations should be observed by the geotechnical engineer or his representative. The engineer can provide geotechnical guidance to the owner's design team should any unforeseen foundation problems develop during construction. If areas of foundation surfaces prove to be unsuitable, the foundation may need to be over-excavated. The over-excavated area can be backfilled with "lean" concrete, controlled low strength material (CLSM), or well-compacted GAB up to the planned foundation bearing depth.

Foundation concrete should be placed the same day as footings are excavated so that the foundation bearing soils can remain near the existing moisture content. Foundation bearing surfaces should not be disturbed or left exposed during inclement weather. Saturation of the on-site soils can cause a loss of strength and increased compressibility. If bearing soils dry excessively, the can later well and heave foundations. Excavations for footings should be hand cleaned to remove loose soil or mud and the bearing surface should be thoroughly compacted. If concrete placement is not possible immediately after excavation, we recommend that a thin layer (approximately 2 inches) of lean concrete or CLSM be placed on the bearing surface for protection after we have observed and evaluated the exposed bearing surfaces.

5.2 Floor Slabs

It is our opinion that floor slabs can be built on-grade achieving support from properly compacted fills as long as the site is prepared as mentioned in Section 4.2. Ground supported slabs should be founded on a minimum of 4 inches of compacted, granular materials such as crushed stone or a clean sand with less than 10% passing the #200 sieve. Granular materials beneath the slab should be compacted to at least 95% of the standard Proctor density. This layer should provide uniform and immediate support of the slab and act as a capillary break. A vapor retarder should be used on top of the granular layer, as required by the building use.

Care should be taken so that fines from the subgrade are not allowed to contaminate the granular layer. If fines do contaminate this layer, capillary rise and subsequent damage to moisture sensitive floor coverings could occur. On most projects, there is some time lag between initial grading and the time when the contractor is ready to place concrete for the slab-on-grade. Inclement weather just prior to placement of concrete for the slab-on-grade can result in trapped water in the granular layer.

5.3 Seismic Site Classification

Subsurface information (SPT and soil classification) from the borings, published geologic information, and our experience was used to estimate the seismic site classification according to methods in the 2018 International Building Code. Based upon this information, we recommend a Seismic Class of D (Stiff Soil) for this site. Based on our understanding of the project, we have assumed a Risk Category of III. If the Risk Category is different, the values below may need to be revised. According to the ASCE 7/SEI 7-16 hazard standard information, the site has mapped 0.2 second spectral response acceleration (S_S) of approximately 0.205g and a mapped 1.0 second spectral response acceleration (S_1) of approximately 0.087g.

Using this information, Site Class D and Risk Category III, the site coefficients F_a and F_v have been determined to be 1.6 and 2.4, respectively. The design spectral response accelerations S_{DS} and S_{D1} were 0.219g and 0.139g, respectively.

6.0 PAVEMENT

6.1 General

The following pavement sections pertain to the automobile paving areas only and do not provide pavement design for aircraft pavements.

The pavement subgrade should consist of a minimum of 12-inches of low-plasticity soils. All pavement subgrade improvements should extend beneath the pavement surfaces and a minimum of 5 feet beyond the pavement edges with respect to drainage, compaction, density, and materials.

Typically, during construction, the pavement subgrade becomes disturbed because of traffic and environmental conditions. Prior to construction of pavements, it is essential that the subgrade be restored to a properly compacted condition. The specifications should include notes pertaining to subgrade restoration immediately prior to pavement construction. The on-site clayey soils will have a tendency to lose shear strength (and consequently pavement support capability) if they are exposed to excessive moisture. Thus, proper moisture conditioning of the subgrade prior to placement of the pavement base course will result in better pavement performance.

The pavement subgrades should be thoroughly proofrolled prior to fine grading to identify soft soils not encountered during the mass grading of the site. Those soft areas should be undercut and replaced with properly compacted fill.

6.2 Reinforced Concrete Pavement

All Portland cement concrete pavements should contain 4 to 6 percent entrained assuming the mix will contain ¾-inch to 1-inch nominal maximum aggregate size. Concrete slump should be no more than 2 inches when placed by slip forming and no more than 4 inches for non-slip formed concrete. Minimum 28-day concrete compressive strength should be 4,000 psi and minimum flexural strength of 650 psi. Based upon the subsurface conditions, anticipated traffic, and our experience, minimum rigid concrete pavement sections are provided below for reinforced concrete pavement.

GMC

6.2.1 Minimum Rigid Pavement Recommendations

Pavement Area	Rigid Concrete Pavement Thickness	Dense Graded Base Thickness[1]
Parking for Light Automobiles	7.0 inches	4.0 inches Graded Aggregate Base (98% Modified density)
Drives and Dumpster Pad	8.0 inches	6.0 inches Graded Aggregate Base (100% Modified density)

[1] The Graded Aggregate Base may be substituted for 4 inches of 25 mm Superpave Black Base.

Pavement joints, reinforcing, and details should be designed in accordance with the applicable American Concrete Institute (ACI) standards.

Prior to base course or fill placement, we recommend that the pavement subgrade be proofrolled with a tandem axel dump truck. The proofrolling should be observed by the geotechnical engineer or his representative. The pavement subgrades should be thoroughly proofrolled prior to fine grading to identify soft soils not encountered during the mass grading of the site. Those soft areas should be undercut and replaced with properly compacted fill.

6.3 Flexible Pavement

Based on a light duty traffic classification (passenger vehicles only with few trucks/delivery vehicles) pavements should include the following:

6.3.1 Minimum Light Duty Paving Recommendations

Pavement Materials	Thickness (inches)	Structural Coefficient	Structural Value
Wearing Surface (9.5 mm superpave surface)	1.0	0.44	0.44
Binder (19 mm superpave intermediate)	2.0	0.44	0.88
Graded Aggregate Base (GAB) Compacted to 98% Modified Proctor Density	6.0	0.16	0.96
		Structural Number -	**2.28**

Areas subjected to heavy duty traffic should include a heavy-duty pavement section as follows:

6.3.2 Minimum Heavy Duty Paving Recommendations

Pavement Materials	Thickness (inches)	Structural Coefficient	Structural Value
Wearing Surface (9.5 mm superpave surface)	1.0	0.44	0.44
Binder (19 mm superpave intermediate)	3.5	0.44	1.54
Binder (19 mm superpave intermediate)	0.5	0.30	0.15
Graded Aggregate Base (GAB) Compacted to 98% Modified Proctor Density	8.0	0.16	1.28
		Structural Number	**3.41**

The pavement sections represent minimum recommended thickness for a pavement section designed for a 15-year life. However, periodic maintenance should be anticipated over the pavement design life. All pavement materials and construction procedures should conform to the Georgia Department of Transportation's *Standard Specifications for Highway Construction,* latest edition. The graded aggregate base (GAB) stone should be an aggregate as outlined in Section 815, Group I, and should be compacted to at least 98 percent of the modified Proctor (AASHTO T180/ASTM D1557) maximum dry density. The hot mix asphalt should conform to Section 828.

If the pavement loading conditions, traffic information, or required ESALs become available, GMC should be allowed to review our recommendations. It should be noted that the aforementioned pavement section is based on the assumption that the recommended site preparation procedures are followed. These recommendations have not been adjusted to meet any minimum local pavement standards that may exist and should be reviewed with and approved by all authorities having jurisdiction of such.

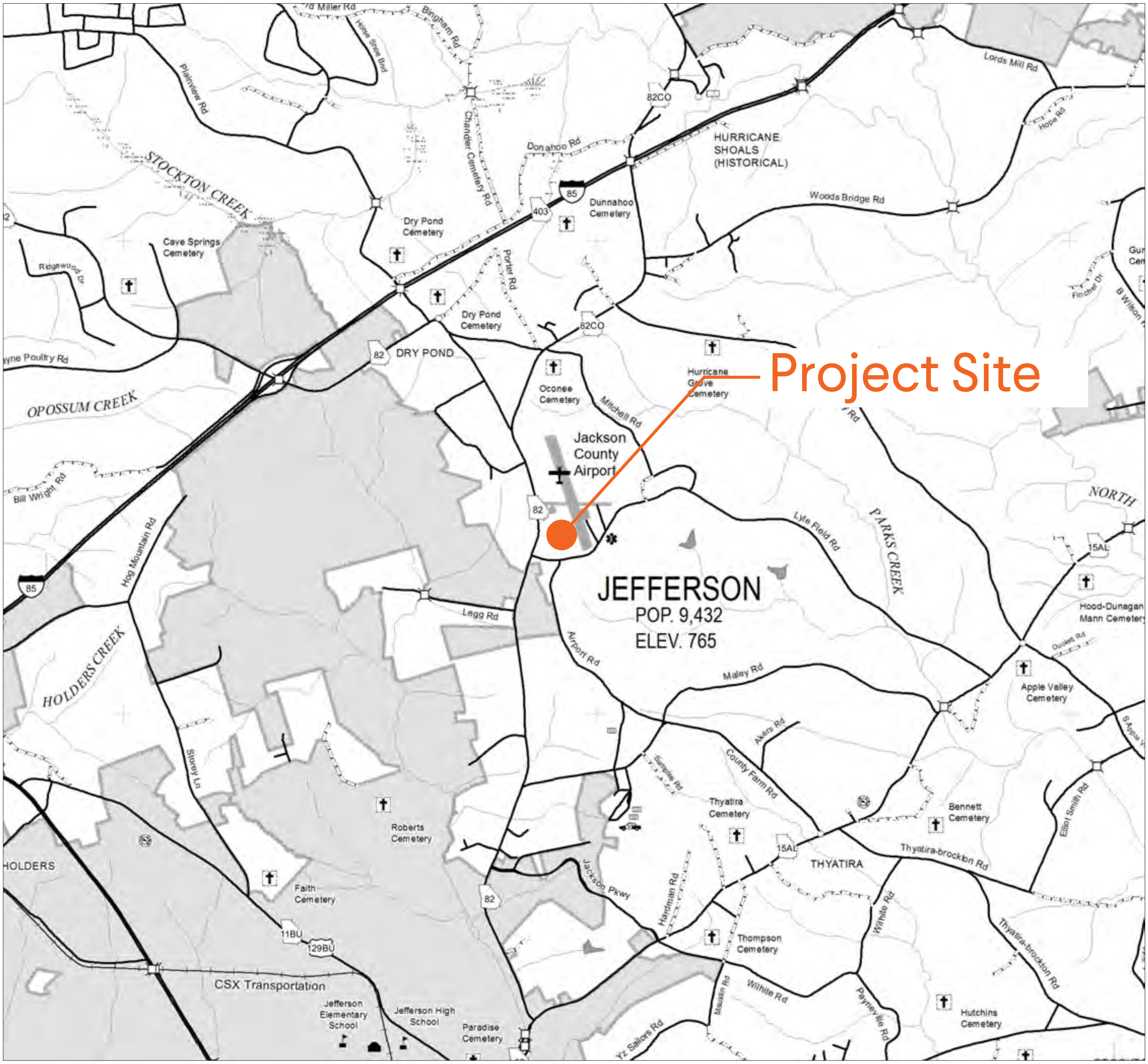
7.0 REPORT LIMITATIONS

The recommendations submitted are based on the available soil information obtained by GMC and design details furnished by GMC for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, we should be notified immediately to determine if changes in the foundation, or other, recommendations are required. If GMC is not retained to perform these functions, GMC cannot be responsible for the impact of those conditions on the performance of the project.

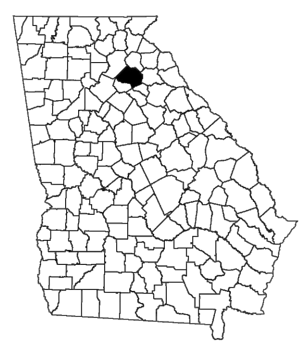
The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations.

APPENDIX



Reference: General Highway Map of Jackson County, Georgia, 2021



Jackson County Airport Terminal
Jackson County, Georgia

Site Location Map

Figure 1

SUPPLEMENTAL DRAWING

GMC # GATL220011

08/18/2022

DRAWN BY: MJM

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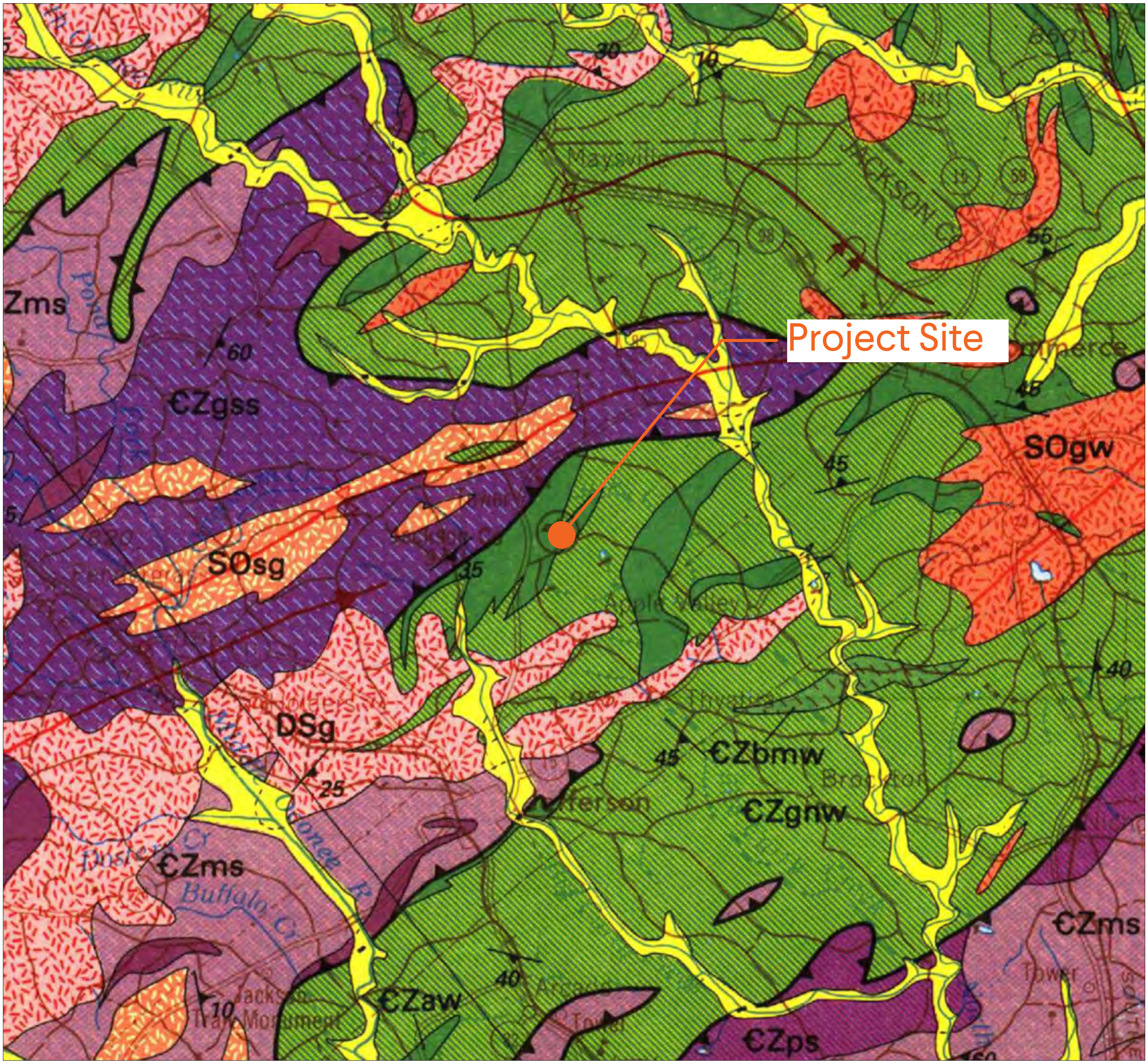
GMC



€Zaw **Hornblende Gneiss and Amphibolite** - Medium-gray to dark gray, fine- to medium-grained, thinly to thickly layered, locally flaggy, hornblende-plagioclase gneiss and amphibolite composed mainly of hornblend and plagioclase (typically andesine) in heterogeneous proportions, with smaller amounts of quartz and epidote-clinozoisite.

Reference: Nelson, A.E., Horton, J.W., Jr., and Clarke, J.W., 1998, Geologic map of the Greenville 1 degree x 2 degrees quadrangle, South Carolina, Georgia, and North Carolina, U.S. Geological Survey, Miscellaneous Investigations Series Map I-2175, 1:250,000

Jackson County Airport Terminal
Jackson County, Georgia

Site Geology Map

Figure 2

SUPPLEMENTAL DRAWING

GMC # GATL220011

08/18/2022

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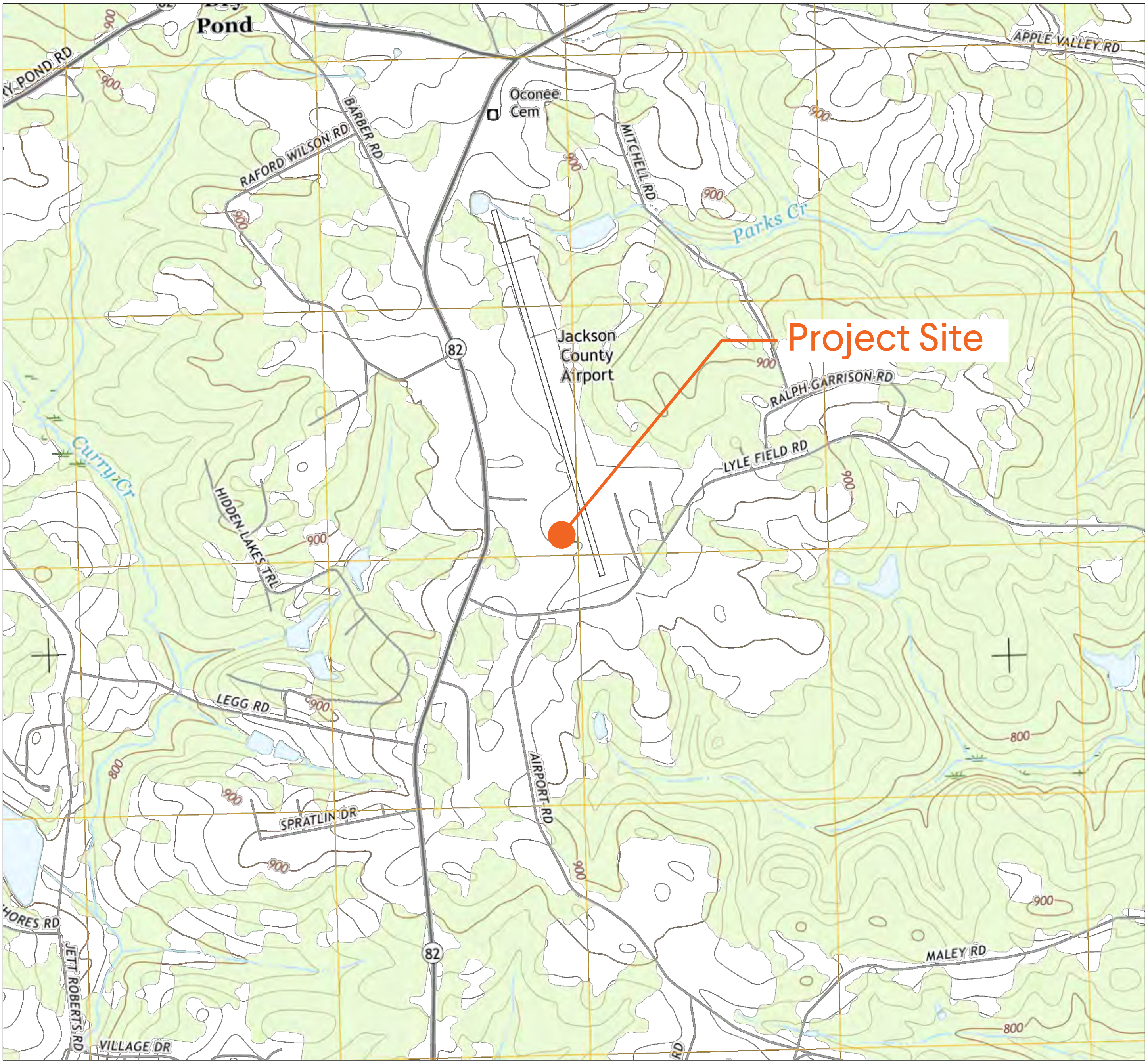

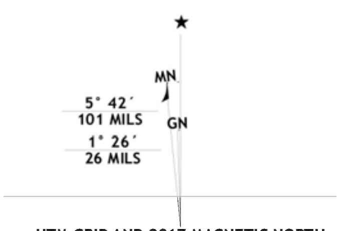

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Reference: USGS Quadrangles 7.5 Minute Series (Topographic)

Jackson County Airport Terminal
Jackson County, Georgia

Apple Valley, GA (2017)
USGS Site Map

Figure 3

SUPPLEMENTAL DRAWING

GMC # GATL220011
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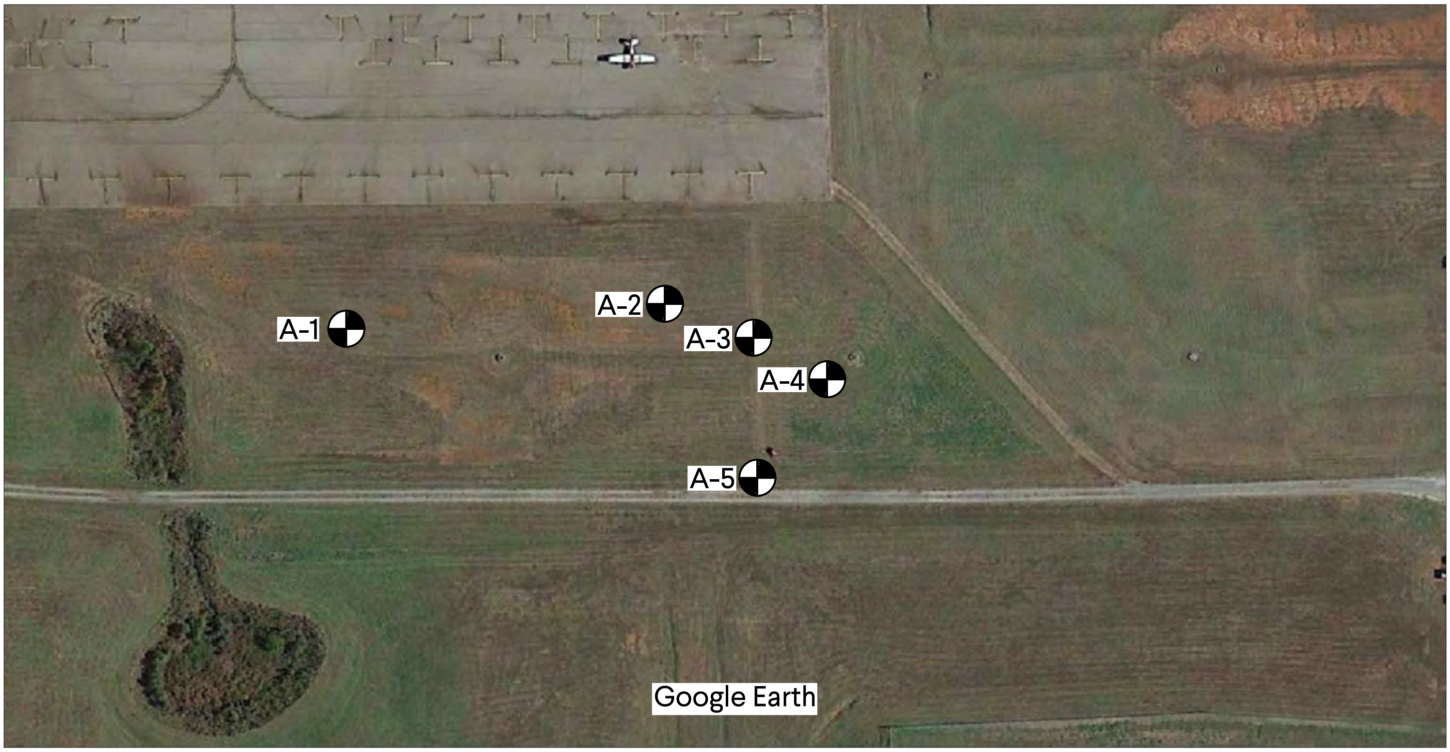

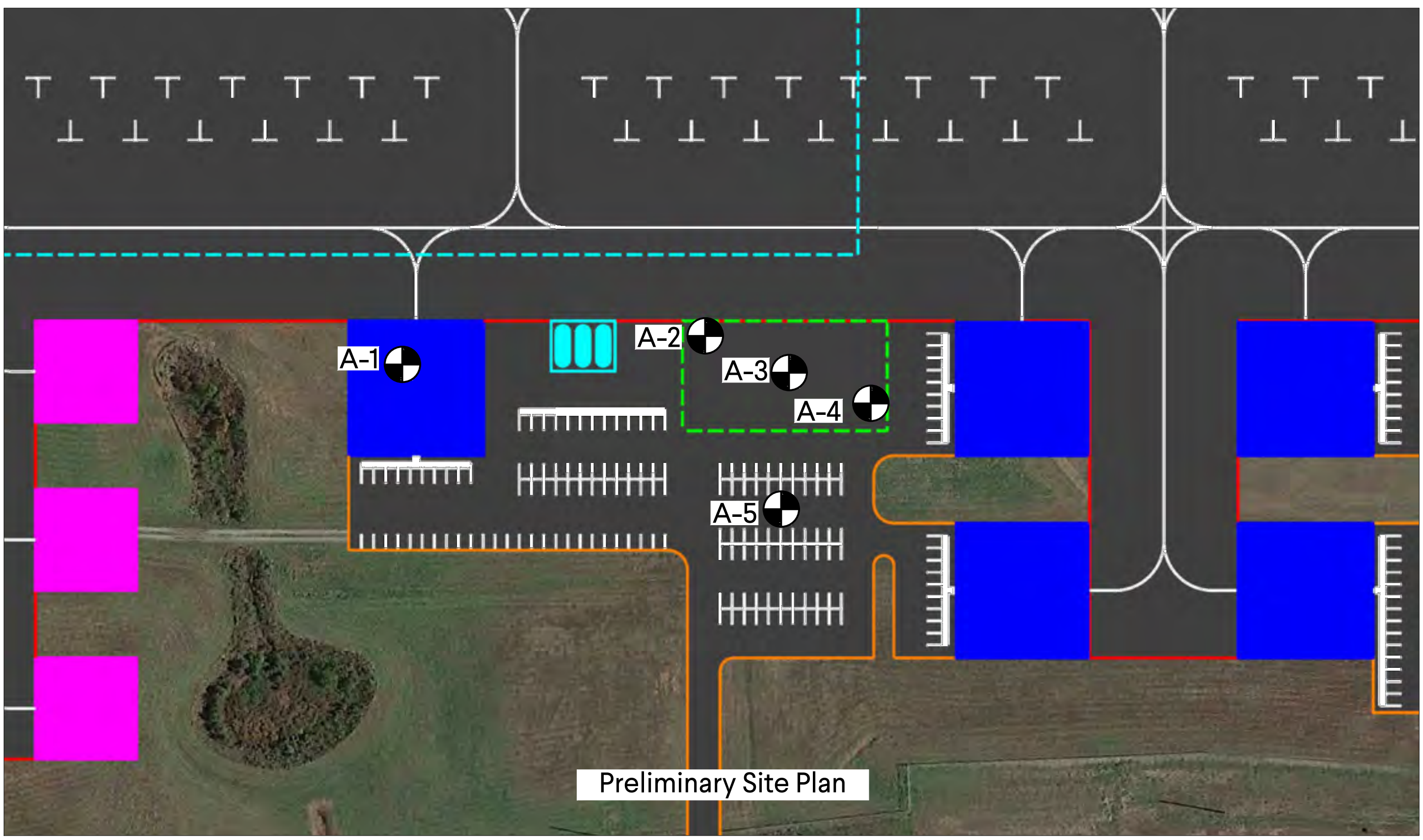

Approximate Boring Location

Reference: GMC drawing adapted from Google Earth Image (Top); GMC Drawing Terminal Apron Development Alt 1 (Bottom)

Jackson County Airport Terminal
Jackson County, Georgia

Boring Location Plan

Figure 4

SUPPLEMENTAL DRAWING

GMC # GATL220011
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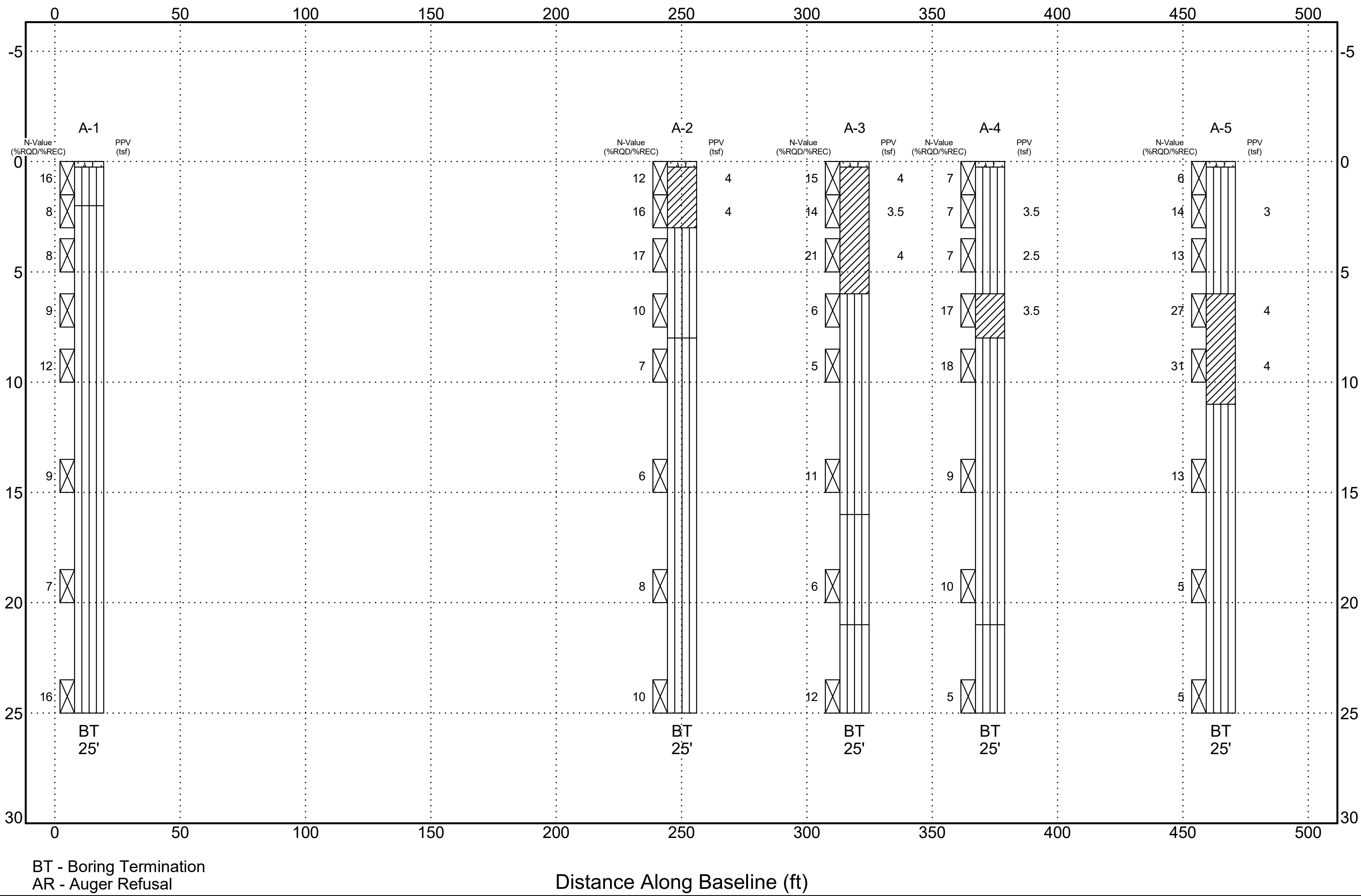
SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SUBSURFACE DIAGRAM
A-A'

CLIENT Jackson County, Georgia
PROJECT NAME Jackson County Airport Terminal
PROJECT NUMBER GATL220011
PROJECT LOCATION Jackson County, Georgia



BT-AR DEPTH WO EL GATL220011 JACKSON COUNTY AIRPORT TERMINAL.GPJ GMC DATA TEMPLATE.GDT 8/25/22

BORING NUMBER A-1

GMC

CLIENT Jackson County, Georgia
PROJECT NAME Jackson County Airport Terminal
PROJECT NUMBER GATL220011
PROJECT LOCATION Jackson County, Georgia
DATE STARTED 8/16/22 **COMPLETED** 8/16/22
GROUND ELEVATION **HOLE SIZE** 4"
DRILLING CONTRACTOR Nicholson Exploration Services, LLC
GROUND WATER LEVELS:
DRILLING METHOD CME 45, Auto-Hammer, HSA w/SPT
AT TIME OF DRILLING None Encountered
LOGGED BY M. McNeill **CHECKED BY** M. McNeill
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
	0		Organic Laden Material (OLM), 3"										
			SANDY SILT (ML), red, brown, very stiff	SS		5-8-8 (16)							
			SANDY SILT (ML), brown, brownish-red, dark gray, medium to stiff, with mica	SS		2-3-5 (8)							
	5			SS		2-4-4 (8)							
				SS		5-5-4 (9)							
	10			SS		5-6-6 (12)							
	15			SS		4-4-5 (9)							
	20			SS		2-4-3 (7)							
	25			SS		3-7-9 (16)							
			Boring was terminated at 25.0 feet.										
	30												
	35												

1.GMC BORINGS GATL220011 JACKSON COUNTY AIRPORT TERMINAL.GPJ GMC DATA TEMPLATE.GDT 8/25/22

BORING NUMBER A-2

GMC

CLIENT Jackson County, Georgia
PROJECT NAME Jackson County Airport Terminal
PROJECT NUMBER GATL220011
PROJECT LOCATION Jackson County, Georgia
DATE STARTED 8/16/22 **COMPLETED** 8/16/22
GROUND ELEVATION **HOLE SIZE** 4"
DRILLING CONTRACTOR Nicholson Exploration Services, LLC
GROUND WATER LEVELS:
DRILLING METHOD CME 45, Auto-Hammer, HSA w/SPT
AT TIME OF DRILLING None Encountered
LOGGED BY M. McNeill **CHECKED BY** M. McNeill
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
	0		Organic Laden Material (OLM), 3"										
			SANDY LEAN CLAY (CL), red, stiff to very stiff	SS		5-6-6 (12)	4						
				SS		4-7-9 (16)	4						
			SANDY SILT (ML), red, brownish-red, dark gray, very stiff to stiff										
	5			SS		4-8-9 (17)							
				SS		4-5-5 (10)							
			SANDY SILT (ML), brown, red, dark gray, medium to stiff, with mica										
	10			SS		2-3-4 (7)							
	15			SS		2-3-3 (6)							
	20			SS		2-5-3 (8)							
			- wet										
	25			SS		4-5-5 (10)							
			Boring was terminated at 25.0 feet.										
	30												
	35												

BORING NUMBER A-3

GMC

CLIENT Jackson County, Georgia
PROJECT NAME Jackson County Airport Terminal
PROJECT NUMBER GATL220011
PROJECT LOCATION Jackson County, Georgia
DATE STARTED 8/16/22 **COMPLETED** 8/16/22
GROUND ELEVATION **HOLE SIZE** 4"
DRILLING CONTRACTOR Nicholson Exploration Services, LLC
GROUND WATER LEVELS:
DRILLING METHOD CME 45, Auto-Hammer, HSA w/SPT
AT TIME OF DRILLING None Encountered
LOGGED BY M. McNeill **CHECKED BY** M. McNeill
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
	0		Organic Laden Material (OLM), 3"										
			SANDY LEAN CLAY (CL), red, stiff to very stiff	SS		6-8-7 (15)	4						
				SS		4-5-9 (14)	3.5						
	5			SS		5-9-12 (21)	4						
			SANDY SILT (ML), brownish-red, red, medium to stiff, with mica	SS		2-4-2 (6)							
	10			SS		2-2-3 (5)							
	15			SS		2-3-8 (11)							
			SANDY SILT (ML), brown, red, dark gray, medium, with mica										
	20			SS		8-4-2 (6)							
			SANDY SILT (ML), brownish-red, stiff										
			- wet										
	25			SS		3-4-8 (12)							
			Boring was terminated at 25.0 feet.										
	30												
	35												

BORING NUMBER A-4

GMC

CLIENT Jackson County, Georgia
PROJECT NAME Jackson County Airport Terminal
PROJECT NUMBER GATL220011
PROJECT LOCATION Jackson County, Georgia
DATE STARTED 8/16/22 **COMPLETED** 8/16/22
GROUND ELEVATION **HOLE SIZE** 4"
DRILLING CONTRACTOR Nicholson Exploration Services, LLC
GROUND WATER LEVELS:
DRILLING METHOD CME 45, Auto-Hammer, HSA w/SPT
AT TIME OF DRILLING None Encountered
LOGGED BY M. McNeill **CHECKED BY** M. McNeill
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
	0		Organic Laden Material (OLM), 3"										
			SANDY SILT (ML), brownish-red, red, medium, with mica	SS		4-3-4 (7)							
				SS		3-3-4 (7)	3.5						
	5			SS		4-2-5 (7)	2.5						
			LEAN CLAY (CL), red, very stiff	SS		6-6-11 (17)	3.5						
	10		SANDY SILT (ML), brownish-red, red, very stiff to stiff, with mica	SS		6-9-9 (18)							
	15			SS		3-3-6 (9)							
	20			SS		5-4-6 (10)							
			SANDY SILT (ML), red, medium, with mica										
	25		- wet	SS		1-1-4 (5)							
			Boring was terminated at 25.0 feet.										
	30												
	35												

GMC

BORING NUMBER A-5

CLIENT Jackson County, Georgia
PROJECT NAME Jackson County Airport Terminal
PROJECT NUMBER GATL220011
PROJECT LOCATION Jackson County, Georgia
DATE STARTED 8/16/22 **COMPLETED** 8/16/22
GROUND ELEVATION **HOLE SIZE** 4"
DRILLING CONTRACTOR Nicholson Exploration Services, LLC
GROUND WATER LEVELS:
DRILLING METHOD CME 45, Auto-Hammer, HSA w/SPT
AT TIME OF DRILLING None Encountered
LOGGED BY M. McNeill **CHECKED BY** M. McNeill
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
	0		Organic Laden Material (OLM), 3"										
			SANDY SILT (ML), brownish-red, red, medium to stiff, with mica	SS		3-3-3 (6)							
				SS		6-6-8 (14)	3						
	5			SS		5-5-8 (13)							
			LEAN CLAY (CL), red, very stiff to hard	SS		6-9-18 (27)	4						
	10			SS		10-13-18 (31)	4						
			SANDY SILT (ML), brownish-red, stiff to medium, with mica										
	15			SS		5-6-7 (13)							
	20			SS		2-2-3 (5)							
			- wet										
	25			SS		2-2-3 (5)							
			Boring was terminated at 25.0 feet.										
	30												
	35												

GMC

FIELD TEST PROCEDURES

General

The general field procedures employed by Goodwyn Mills Cawood, LLC (GMC), are summarized in the American Society for Testing and Materials (ASTM) Standard D420 which is entitled "Investigating and Sampling Soil and Rock". This recommended practice lists recognized methods for determining soil and rock distribution and groundwater conditions. These methods include geophysical and in-situ methods as well as borings.

The detailed collection methods used during this exploration are presented in the following paragraphs.

Standard Drilling Techniques

General: To obtain subsurface samples, borings are drilled using one of several alternate techniques depending upon the subsurface conditions. These techniques are as follows:

In Soils:

a) Continuous hollow stem augers.
b) Rotary borings using roller cone bits or drag bits, and water or drilling mud to flush the hole.
c) "Hand" augers.

In Rock:

a) Core drilling with diamond-faced, double or triple tube core barrels.
b) Core boring with roller cone bits.

Hollow Stem Auger: A hollow stem augers consists of a hollow steel tube with a continuous exterior spiral flange termed a flight. The auger is turned into the ground, returning the cuttings along the flights. The hollow center permits a variety of sampling and testing tools to be used without removing the auger.

Rotary Borings: Rotary drilling involves the use of roller cone or drag type drill bits attached to the end of drill rods. A flushing medium, normally water or bentonite slurry, is pumped through the rods to clear the cuttings from the bit face and flush them to the surface. Casing is sometimes set behind the advancing bit to prevent the hole from collapsing and to restrict the penetration of the drilling fluid into the surrounding soils. Cuttings returned to the surface by the drilling fluid are typically collected in a settling tank, to allow the fluid to be recirculated.

Hand Auger Boring: Hand auger borings are advanced by manually twisting a 4" diameter steel bucket auger into the ground and withdrawing it when filled to observe the sample collected. Posthole diggers are sometimes used in lieu of augers to obtain shallow soil samples. Occasionally these hand auger borings are used for driving 3-inch diameter steel tubes to obtain intact soil samples.

Core Drilling: Soil drilling methods are not normally capable of penetrating through hard cemeted soil, weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound, continuous rock. Material that cannot be penetrated by auger or rotary soil-drilling methods at a reasonable rate is designated as "refusal material". Core drilling procedures are required to penetrate and sample refusal materials.

Prior to coring, casing may be set in the drilled hole through the overburden soils, to keep the hole from caving and to prevent excessive water loss. The refusal materials are then cored according to ASTM D2113 using a diamond studded bit fastened to the end of a hollow, double or triple tube core barrel. This device is rotated at high speeds, and the cuttings are brought to the surface by circulating water. Core samples of the material penetrated are protected and retained in the swivel-mounted inner tube. Upon completion of each drill run, the core barrel is brought to the surface, the core recovery is measured, and the core is placed, in sequence, in boxes for storage and transported to our laboratory.

Sampling and Testing in Boreholes

General: Several techniques are used to obtain samples and data in soils; however, the most common methods in this area are:

a) Standard Penetrating Testing
b) Water Level Readings

These procedures are presented below. Any additional testing techniques employed during this exploration are contained in other sections of the Appendix.

Standard Penetration Testing: At regular intervals, the drilling tools are removed and soil samples obtained with a standard 2-inch diameter split tube sampler connected to an A or N-size rod. The sampler is first seated 6 inches to penetrate any loose cuttings, and then driven an additional 12 inches with blows of a 140-pound safety hammer falling 30 inches. Generally, the number of hammer blows required to drive the sampler the final 12 inches is designated the "penetration resistance" or "N" value, in blows per foot (bpf). The split barrel sampler is designed to retain the soil penetrated, so that it may be returned to the surface for observation. Representative portions of the soil samples obtained from each split barrel sample are placed in jars, sealed and transported to our laboratory.

The standard penetration test, when properly evaluated, provides an indication of the soil strength and compressibility. The tests are conducted according to ASTM Standard D1586. The depths and N-values of standard penetration tests are shown on the Boring Records. Split barrel samples are suitable for visual observation and classification tests but are not sufficiently intact for quantitative laboratory testing.

Water Level Readings: Water table readings are normally taken in the borings and are recorded on the Boring Records. In sandy soils, these readings indicate the approximate location of the hydrostatic water table at the time of our field exploration. In clayey soils, the rate of water seepage into the borings is low and it is generally not possible to establish the location of the hydrostatic water table through short-term water level readings. Also, fluctuation in the water table should be expected with variations in precipitation, surface run-off, evaporation, and other factors. For long-term monitoring of water levels, it is necessary to install piezometers.

The water levels reported on the Boring Records are determined by field crews immediately after the drilling tools are removed, and several hours after the borings are completed, if possible. The time lag is intended to permit stabilization of the groundwater table, which may have been disrupted by the drilling operation.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the cave-in zone. The cave-in depth is measured and recorded on the Boring Records.

Boring Records

The subsurface conditions encountered during drilling are reported on a field boring record prepared by the Driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of coarse gravel, cobbles, etc., and observations of ground water. It also contains the driller's interpretation of the soil conditions between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are kept on file in our office.

After the drilling is completed, a geotechnical professional classifies the soil samples and prepares the final Boring Records, which are the basis for all evaluations and recommendations. The following terms are taken from ASTM D2487 or Deere's Technical Description of Rock Cores for Engineering Purposes, Rock Mechanical Engineering Geology 1, pp. 18-22.

Relative Density of Cohesionless Soils From Standard Penetration Test		**Consistency of Cohesive Soils**	
Very Loose	≤ 4 bpf	Very Soft	≤ 2 bpf
Loose	5 - 10 bpf	Soft	3 - 4 bpf
Medium	11 – 30 bpf	Medium	5 - 8 bpf
Dense	31 - 50 bpf	Stiff	9 - 15 bpf
Very Dense	> 50 bpf	Very Stiff	16 - 30 bpf
(bpf = blows per foot, ASTM D 1586)		Hard	> 30 bpf
Relative Hardness of Rock		**Particle Size Identification**	
Very Soft Rock disintegrates or easily compresses to touch; can be hard to very hard soil.		Boulders	Larger than 12"
		Cobbles	3" - 12"
Soft Rock may be broken with fingers.		Gravel	
		Coarse	3/4" - 3"
Moderately Soft Rock may be scratched with a nail, corners and edges may be broken with fingers.		Fine	4.76mm - 3/4"
		Sand	
Moderately Hard Rock a light blow of hammer is required to break samples.		Coarse	2.0 - 4.76 mm
		Medium	0.42 - 2.00 mm
		Fine	0.42 - 0.074 mm
Hard Rock a hard blow of hammer is required to break sample.		Fines (Silt or Clay)	Smaller than 0.074 mm
Rock Continuity		**Relative Quality of Rocks**	
RECOVERY = $\frac{\text{Total Length of Core}}{\text{Length of Core Run}}$ x 100 %		**RQD** = $\frac{\text{Total core, counting only pieces > 4" long}}{\text{Length of Core Run}}$ x 100 %	
Description	Core Recovery %	Description	RQD %
Incompetent	Less than 40	Very Poor	0 - 25 %
Competent	40 - 70	Poor	25 - 50 %
Fairly Continuous	71 - 90	Fair	50 - 75 %
Continuous	91 - 100	Good	75 - 90 %
		Excellent	90 - 100 %

GMC

LABORATORY TESTING

GENERAL

The laboratory testing procedures employed by Goodwyn Mills Cawood, LLC (GMC) are in general accordance with ASTM standard methods and other applicable specifications.

Several test methods, described together with others in this Appendix, were used during the course of this exploration. The Laboratory Data Summary sheet indicates the specific tests performed.

SOIL CLASSIFICATION

Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply his past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our "Boring Records".

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary; grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D-2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

POCKET PENETROMETER TEST

A pocket penetrometer test is performed by pressing the tip of a small, spring-loaded penetrometer with even pressure to a prescribed depth into a soil sample. This test yields a value for unconfined compressive strength, which may be correlated with unconfined compressive strengths obtained by other laboratory methods.