Geotechnical Engineering Report

New Corporate GA Terminal
Macon, Georgia
April 18, 2023
Terracon Project No. HN225215

Prepared for:
Passero Associates
St. Augustine, Florida

Prepared by:
Terracon Consultants, Inc.
Macon, Georgia

April 18, 2023

Passero Associates
4730 Casa Cola Way, Suite 200
St. Augustine, Florida 32095

Attn: Mr. Stan Price
E: sprice@passero.com

Re: Geotechnical Engineering Report
New Corporate GA Terminal
Middle GA Regional Airport
Macon, Georgia
Terracon Project No. HN225215

Dear Mr. Price:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PHN225215 dated September 10, 2022. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and floor slabs for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Brad Thigpen, P.E.
Project Engineer

GEORGIA REGISTERED No. 17394 PROFESSIONAL ENGINEER THOMAS E. DRIVER

Thomas E. Driver, P.E.
Regional Manager

REPORT TOPICS

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

REPORT SUMMARY

Topic [1]	Overview Statement [2]
Project Description	The project will consist of a proposed new terminal building in the area of the existing Avionics and FBO buildings.
Geotechnical Characterization	The borings typically encountered topsoil or asphalt pavement underlain by fill soils and Coastal Plain soils to the depths explored. The soils typically included silty sands (SM), lean clays (CL), and clayey sands (SC). Fill soils were encountered in borings B-2 and B-8 and extended to depths of 3 feet and 8 feet below exiting ground surface, respectfully. Groundwater was not encountered at the time of boring.
Earthwork	Proofroll the structure pads after site stripping and before placing structural fill. Replace any loose and unstable areas with engineered fill.
Shallow Foundations	Shallow foundations will be acceptable for structural support. Allowable bearing pressure = 2,500 psf Expected maximum settlements: 1-inch total, 1/2-inch differential (may vary depending on final load information). Undercut and remove any loose soils in foundation and floor slab areas to a point 10 feet outside of the edge of the foundation.
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Geotechnical Engineering Report

New Corporate GA Terminal
Middle GA Regional Airport
Macon, Georgia
Terracon Project No. HN225215
April 18, 2023

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed new terminal building to be located at the Middle GA Regional Airport in Macon, Georgia. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Excavation considerations
- Foundation design and construction
- Floor slab and Pavement design and construction
- Seismic site classification per IBC
- Dewatering considerations

The geotechnical engineering Scope of Services for this project included the advancement of 8 soil test borings to depths of 10 to 30 feet below existing site grades.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively. The boring logs are presented in the **Exploration Results** section of this report.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of readily available geologic and topographic maps as well as provided documents and plans.

Item	Description
Parcel Information	The project is located at Middle GA Regional Airport in Macon, Georgia. Approximate Coordinates: 32.7017, -83.6479. See **Site Location.**
Existing Improvements	The property currently has an existing Avionics building and FBO building, as well as asphalt paved areas.
Current Ground Cover	Grass and asphalt pavement.
Existing Topography	The site is relatively flat and level.

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. Our current understanding of the project conditions is as follows:

Item	Description
Information Provided	Our understanding of the project is based upon email correspondence with Stan Price. A boring location plan was provided.
Project Description	The project will consist of a proposed new terminal building in the area of the existing Avionics and FBO buildings.
Proposed Structures	We assume that the building will be a CMU or Steel structure.
Finished Floor Elevation	The FFE for the building is not available at this time.
Maximum Loads (Assumed)	Maximum Column Loads: 75 kips Maximum Approximate Wall Loads: 5 klf Loads for the building have not been provided at this time.
Grading/Slopes	Based upon the provided information, we anticipate cuts and fills on the order of 5 feet or less will be needed to establish finished grades.

GEOTECHNICAL CHARACTERIZATION

Site Geology

The site is located in the Coastal Plain Physiographic Province of Georgia. Soils in the Coastal Plain are the result of the deposition of sediments in a former marine environment. Coastal Plain sedimentary deposits make up about 60 percent of Georgia's surface area, and consist of a southwardly thickening wedge of sediments, which are bordered on the north by the parent rocks of the Piedmont Physiographic Province. The border between these provinces is known as the

"Fall-Line." The Coastal Plain sediments range in age from the Cretaceous to the recent, with the oldest exposed along the "Fall-Line" and the youngest along the coast. Typically, the surface soils consist of complexly interbedded sands, silts, and clays of various mixtures. Sandstones, shales, and limestones comprise the characteristic lithology of the Coastal Plain. These formations are usually found at depths greater than fifty feet but can also be found at or near the ground surface. They are not known to occur near the surface in the site area. Topography in this region of the Coastal Plain is generally flat to gently rolling.

Typical Subsurface Profile

The borings drilled at the site generally encountered topsoil or asphalt pavement underlain by fill soils and Piedmont residual soils. Fill soils were encountered in two of the borings and generally extended to depths of approximately 3 feet to 8 feet below existing ground surface.

Based on the results of the borings, subsurface conditions on the project site can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum	Material Encountered	Consistency/Density
Stratum 1	3 to 6 inches	Topsoil or Asphalt Pavement	
Stratum 2	3 to 8 feet	Fill (B-2 and B-8) – Lean Clay (CL) Coastal Plain – Lean Clay (CL); Clayey Sand (SC)	Soft to Very Stiff
Stratum 3	Boring Termination	Coastal Plain – Silty Sand (SM), Clayey Sand (SC); Lean Clay (CL)	Medium Stiff to Very Stiff; Medium Dense to Dense

The fill soils in borings B-2 and B-8 were relatively loose to a depth of 5 feet below existing ground surface.

Specific conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in situ, the transition between materials may be gradual. Details for each of the borings are presented on the boring logs included in the attachments.

Groundwater

The boreholes were observed while drilling and after completion for the presence and level of groundwater. Groundwater was not encountered at the time of boring.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. In addition, perched water can develop over low permeability soil or rock strata. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

GEOTECHNICAL OVERVIEW

All borings penetrated topsoil or asphalt pavement underlain by fill soils or Coastal Plain soils extending to the maximum depths explored.

Fill soils were encountered in borings B-2 and B-8 and extended to a depth of approximately 3 feet to 8 feet below existing ground surface. The fill soils consisted of lean clays (CL). The Standard Penetration Test (SPT) values in these soils ranged from 3 blows per foot (bpf) to 6 bpf. The sols in the upper 5 feet of these borings were relatively loose. The loose fill soils in these areas, as well as any other areas of soft or loose fill encountered, should be removed or reworked prior to fill placement or structural support. It is anticipated that some undercutting will be required.

Coastal Plain soils were encountered in all borings below the fill soils or beginning at existing ground surface and consisted of silty sand (SM), lean clays (CL) and clayey sand (SC). The Standard Penetration Test (SPT) values in these soils range from 5 blows per foot (bpf) to 50 bpf.

Support of floor slabs and pavements on or above existing fill materials is discussed in this report. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report. To take advantage of the cost benefit of not removing the entire amount of undocumented fill, the owner must be willing to accept the risk associated with building over the undocumented fills following the recommended reworking of the material. Should this be the case, development can be supported on a shallow foundation system.

The **Shallow Foundations** section addresses support of the structures bearing on existing fill, residual soils, or engineered fill. The **Floor Slabs** section addresses slab-on-grade support of the building.

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the borings and our current understanding of the proposed development.

The **Pavements** section addresses the design of pavement systems.

Geotechnical engineering recommendations for foundation systems and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of data presented herein, engineering analyses, and our current understanding of the proposed project.

The **General Comments** section provides an understanding of the report limitations.

EARTHWORK

Earthwork is anticipated to include pavement removal, excavations, and fill placement. The following sections provide recommendations for use in preparation of specifications. Recommendations include quality criteria necessary, to appropriately prepare the site. Graded aggregate base below the asphalt may be used in the fill if separated from the asphalt.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

Site Preparation

We anticipate construction will be initiated by stripping topsoil, asphalt pavement, and loose, soft or otherwise unsuitable material. Stripped materials consisting of vegetation and organic materials should be wasted off site or used to vegetate landscaped areas or exposed slopes after completion of grading operations. Stripping depths between our boring locations and across the site could vary; as such we recommend actual stripping depths be evaluated by Terracon during construction to aid in preventing removal of excess material.

After stripping and removal of unsuitable materials, proofrolling should be performed with heavy rubber tire construction equipment such as a loaded scraper or fully loaded tandem-axle dump truck. A Terracon geotechnical engineer or his representative should observe proofrolling to aid in locating unstable subgrade materials and/or buried debris. Proofrolling should be performed after a suitable period of dry weather to avoid degrading an otherwise acceptable subgrade and to reduce the amount of undercutting / remedial work required. Unstable materials identified should be stabilized as directed by the engineer based on conditions observed during construction. Undercut and replacement and densification in-place are typical remediation methods. **It is anticipated that some of the loose materials encountered in the upper 5 feet of the foundation areas in borings B-2 and B-8 will need to be undercut and replaced.** It is strongly recommended that earthwork be performed during the dryer months of the year to help reduce the amount of reworking and undercutting that will be required.

Existing Fill

Borings B-2 and B-8 encountered relatively loose soils in the upper 3 to 5 feet below existing round surface.

Support of footings, floor slabs, and pavements, on or above existing fill soils, is discussed in this report. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report.

If the owner elects to construct pavements on the existing fill, the following protocol should be followed. Once the planned subgrade elevation has been reached the entire pavement area should be proofrolled. Areas of soft or otherwise unstable material should be undercut and replaced with either new structural fill or suitable, existing on site materials.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill and general fill. Structural fill is material used below, or within 10 feet of structures, pavements or slopes. General fill is material used to achieve grade outside of these areas. Soils used for structural and general fill should meet the following material property requirements:

Soil Type [1,3,4]	USCS Classification	Acceptable Parameters (for Structural Fill)
Fine Grain	CL and ML LL < 45 / PI < 25 More than 25% retained on No. 200 sieve	All Locations and Elevations
Granular	SP, SM, SC, and SW	All Locations and Elevations
On-Site Soils [2]	SC, SM, CL	All Locations and Elevations

1. Structural and general fill should consist of materials relatively free of organic matter, debris, and particles larger than about 4 inches. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.
2. A large portion of the existing fill is expected to be suitable for reuse as new fill provided it is free of organics, debris, and unsuitable materials. Terracon should field evaluate existing fill materials for use.
3. All fill material used for grading activities should have a maximum dry density of at least 90 pounds per cubic foot (pcf) as determined by the standard Proctor test (ASTM D 698).
4. Any materials proposed as fill from off-site sources should be tested for compliance with these criteria before being hauled to the site.

Fill Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Structural Fill	General Fill
Maximum Lift Thickness	■ 8 inches or less in loose thickness when heavy, self-propelled compaction equipment is used ■ 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used	Same as Structural fill
Minimum Compaction Requirements [1,2]	■ 98% of max. dry density below foundations and within 1 foot of finished pavement subgrade ■ 95% of max. dry density above foundations, below floor slabs, and more than 1 foot below finished pavement subgrade	92% of max.
Moisture Content Range [1,2,3]	-3% to +3% of optimum	As required to achieve min. compaction requirements

1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).
2. Fill should be tested for compaction and moisture content during placement. Should the results of the in-place density tests indicate that the specified moisture or compaction requirements have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
3. Moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without pumping when proofrolled.

Grading and Drainage

Adequate positive drainage should be provided during construction and maintained throughout the life of the development to prevent an increase in moisture content of the foundation, pavement and backfill materials. Surface water drainage should be controlled to prevent undermining of fill slopes and structures during and after construction.

It is recommended that all exposed earth slopes be seeded to provide protection against erosion as soon as possible after completion. Seeded slopes should be protected until the vegetation is established. Sprinkler systems should not be installed behind or in front of walls or near slopes.

Earthwork Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

Surface water should not be allowed to pond on the site and soak into the soil during construction. Construction staging should provide drainage of surface water and precipitation away from the building and pavement areas. Any water that collects over or adjacent to construction areas should be promptly removed, along with any softened or disturbed soils. Surface water control in the form of sloping surfaces, drainage ditches and trenches, and sump pits and pumps will be important to avoid ponding and associated delays due to precipitation and seepage.

Groundwater was not encountered at the time of boring. Based on our understanding of the proposed development, we do not expect groundwater to significantly affect construction. If groundwater is encountered during construction, some form of temporary or permanent dewatering may be required. Conventional dewatering methods, such as pumping from sumps, should likely be adequate for temporary removal of any groundwater encountered during excavation at the site. Well points would likely be required for significant groundwater flow, or where excavations penetrate groundwater.

All excavations should be sloped or braced as required by Occupational Safety and Health Administration (OSHA) regulations to provide stability and safe working conditions. Temporary excavations will probably be required during grading operations. The grading contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, state and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork operations should be observed by the Geotechnical Engineer or his representative. Monitoring should include documentation of adequate removal of vegetation and topsoil, proofrolling, and mitigation of unstable areas delineated by the proofroll. Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer or his representative prior to placement of additional lifts. Any areas that do not meet the compaction specifications should be reworked to achieve compliance.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer or his representative. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted in the **Earthwork** section, the proposed structure can be supported by a shallow, spread footing foundation system bearing on Piedmont residual soils or structural fill extending to Coastal Plain soils. Design recommendations for shallow foundations for the proposed structure are presented in the following paragraphs. Final recommendation will be made after loads for the structures have been analyzed.

Shallow foundations may be supported on existing fill soils provided the site has been prepared in accordance with the requirements noted in the **Earthwork** section. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report. Design recommendations for shallow foundations for the proposed structures are presented in the following paragraphs.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing pressure [1, 2]	2,500 psf for conventional shallow foundations.
Required Bearing Stratum [3]	Coastal Plain soils or suitable structural fill.
Minimum Foundation Dimensions	Columns: 24 inches Continuous: 16 inches
Ultimate Coefficient of Sliding Friction [4]	0.35
Minimum Embedment below Finished Grade [5]	Exterior footings: 18 inches Interior footings: 12 inches
Estimated Total Settlement from Structural Loads [2]	1-inch total for conventional shallow foundations
Estimated Differential Settlement [2, 6]	About 1/2 -inch differential

Item	Description
1.	The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Values assume that exterior grades are no steeper than 5% within 10 feet of structure.
2.	Values provided are for maximum loads noted in **Project Description**.
3.	Unsuitable or soft soils should be over-excavated and replaced per the recommendations presented in **Earthwork**.
4.	Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
5.	Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
6.	Differential settlements are as measured over a span of 40 feet.

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. The weight of the foundation concrete below grade may be neglected in dead load computations. Interior footings should bear a minimum of 12 inches below finished grade. Finished grade is the lowest adjacent grade for perimeter footings and floor level for interior footings.

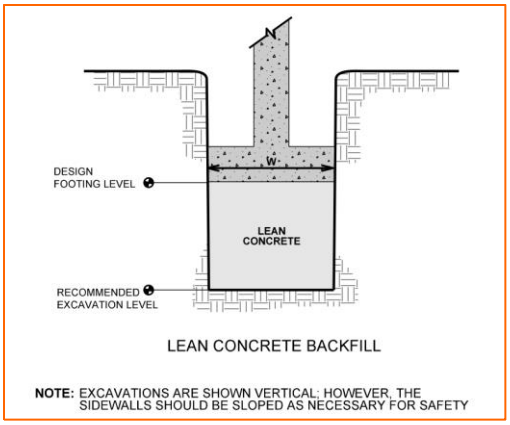
Footings, foundations, and masonry walls should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Foundation excavations should be observed by the geotechnical engineer. If the soil conditions encountered differ from those presented in this report, supplemental recommendations will be required.

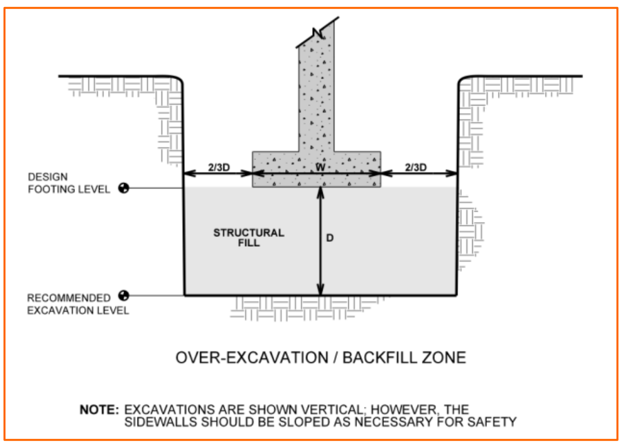
Foundation Construction Considerations

As noted in the **Earthwork** section, soils exposed in footing excavations should be evaluated by the Geotechnical Engineer or his representative. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Should the soils at the bearing level become excessively dry, disturbed or saturated, or frozen, the affected soil should be removed prior to placing concrete. Place a lean concrete mud-mat over the bearing soils if the excavations must remain open over night or for an extended period of time. It is recommended that the geotechnical engineer be retained to observe and test the soil foundation bearing materials.

If unsuitable bearing soils are encountered at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. This is illustrated on the sketch below.



Over-excavation for structural fill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below footing base elevation. The overexcavation should then be backfilled up to the footing base elevation with well-graded granular material placed in lifts of 8 inches or less in loose thickness and compacted to at least 95 percent of the material's maximum standard Proctor dry density (ASTM D-698). The overexcavation and backfill procedure is described in the figure below.



SEISMIC CONSIDERATIONS

Seismic Site Classification

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is a required component in determining the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site subsurface profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7-16 and the

International Building Code (IBC) 2018. For this project we used standard penetration resistance to generate site classification.

Code Used	Site Classification
2018 International Building Code (IBC) [1]	D[2]

1. In general accordance with the 2018 International Building Code.
2. The 2018 International Building *Code (IBC) requires a site soil* profile determination extending a depth of 100 feet for seismic site classification. The current scope requested does not include the required 100-foot soil profile determination. The borings for the building extended to a maximum depth of approximately 20 feet and this seismic site class definition considers that medium dense to dense clayey sand continues below the maximum depth of the subsurface exploration. Additional exploration to deeper depths could be performed to confirm the conditions below the current depth of exploration. Alternatively, a geophysical exploration could be utilized in order to attempt to justify a higher seismic site class.

FLOOR SLABS

Depending upon the finished floor elevation, unsuitable, weak, loose soils may be encountered at the floor slab subgrade level. If encountered, these soils should be replaced with structural fill so the floor slab is supported on at least 2 feet of compacted suitable soils. Proofrolling, as stated above, should serve to identify those areas where undercutting and replacement is needed.

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Interior floor system	Slab-on-grade concrete.
Floor Slab Support [1]	Minimum 12 inches of approved on-site or imported soils placed and compacted in accordance with the **Earthwork** section of this report.[2,3]
Subbase [3]	4-inch compacted layer of free draining, granular subbase material

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
2. We recommend subgrades be maintained at the proper moisture condition until floor slabs are constructed. If the subgrade should become desiccated prior to construction, the affected material should be removed or the materials scarified, moistened, and recompacted. Upon completion of grading operations in the building areas, care should be taken to maintain the recommended subgrade moisture content and density prior to construction of the building floor slabs.
3. The floor slab design should include a capillary break, comprised of free-draining, compacted, granular material, at least 4 inches thick.

A subgrade prepared and tested as recommended in this report should provide adequate support for lightly loaded floor slabs.

The use of a vapor retarder should be considered beneath concrete slabs on grade that will be covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder/barrier.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a water-proof, non-extruding compressible compound.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

On most project sites, the site grading is generally accomplished early in the construction phase. However, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, rainfall, etc. As a result, the floor slab subgrade may not be suitable for placement of base rock and concrete and corrective action may be required.

We recommend the area underlying the floor slab be rough graded and then thoroughly proofrolled with a loaded tandem axle dump truck prior to final grading and placement of base rock. Attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the affected material with properly compacted fill. All floor slab subgrade areas should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to placement of the base rock and concrete.

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

PAVEMENTS

Subgrade Preparation

On this site, the site grading will be accomplished relatively early in the construction phase. Fills are placed and compacted in a uniform manner. However, as construction proceeds, excavations are made into these areas, rainfall and surface water saturates some areas, heavy traffic from concrete trucks and other delivery vehicles disturbs the subgrade and many surface irregularities are filled in with loose soils to improve trafficability temporarily. As a result, the pavement subgrades, initially prepared early in the project, should be carefully evaluated as the time for pavement construction approaches.

We recommend the moisture content and density of the top 12 inches of the subgrade be evaluated and the pavement subgrades be proofrolled within two days prior to commencement of actual paving operations. Areas not in compliance with the required ranges of moisture or density should be moisture conditioned and recompacted. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fills. If a significant precipitation event occurs after the evaluation or if the surface becomes disturbed, the subgrade should be reviewed by qualified personnel immediately prior to paving. The subgrade should be in its finished form at the time of the final review.

After proofrolling and repairing subgrade deficiencies, the entire subgrade should be scarified and developed as recommended in the **Earthwork** section of this report to provide a uniform subgrade for pavement construction. Areas that appear severely desiccated following site stripping may require further undercutting and moisture conditioning.

Pavement Design Considerations

Traffic patterns and anticipated loading conditions were not available at the time that this report was prepared. However, we anticipate that traffic loads will be produced primarily by automobile traffic and occasional delivery and trash removal trucks. The thickness of pavements subjected to heavy truck traffic should be determined using expected traffic volumes, vehicle types, and vehicle loads and should be in accordance with local, city or county ordinances.

Pavement thickness can be determined using AASHTO, Asphalt Institute and/or other methods if specific wheel loads, axle configurations, frequencies, and desired pavement life are provided. Terracon can provide thickness recommendations for pavements subjected to loads other than personal vehicle and occasional delivery and trash removal truck traffic if this information is provided.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to parking lots and drives should slope down from pavement edges at a minimum 2%;
- The subgrade and the pavement surface should have a minimum ¼ inch per foot slope to promote proper surface drainage;
- Install pavement drainage surrounding areas anticipated for frequent wetting (e.g., garden centers, wash racks);
- Install joint sealant and seal cracks immediately;
- Seal all landscaped areas in, or adjacent to pavements to reduce moisture migration to subgrade soils;
- Place compacted, low permeability backfill against the exterior side of curb and gutter; and,
- Place curb, gutter and/or sidewalk directly on low permeability subgrade soils rather than on unbound granular base course materials.

Estimates of Minimum Pavement Thickness

As a minimum, we recommend the following typical pavement sections be considered.

Asphalt (AC) Pavement			
Material	**Light Duty[1] Thickness (inches)**	**Heavy Duty[2] Thickness (inches)**	**GDOT**
Subgrade	Upper 12 inches of existing soil or engineered fill	Upper 12 inches of existing soil or engineered fill	98% of Standard Proctor MMD, -2 to +3% OMC
Aggregate Base	6	8	GAB, Section 815 and 310
Asphalt Binder Course	-	1¾	SP19 - Section 400, 424, 824 and 828
Asphalt Surface Course	2	1¼	SP9.5 - Section 400, 424, 824 and 828

1. Automobiles only.
2. Combined automobiles and trucks

The graded aggregate base should be compacted to a minimum of 98 percent of the material's modified Proctor (ASTM D-1557, Method C) maximum dry density. Where base course thickness exceeds 6 inches, the material should be placed and compacted in two or more lifts of equal thickness.

The listed pavement component thicknesses should be used as a guide for pavement systems at the site for the traffic classifications stated herein. These recommendations assume a 20-year pavement design life. If pavement frequencies or loads will be different than that specified GEC should be contacted and allowed to review these pavement sections.

Asphalt concrete aggregates and base course materials should conform to the Georgia Department of Transportation (GDOT) "Standard Specifications for Construction of Transportation System".

Portland Cement Concrete (PCC) Pavement			
Material	**Light Duty[1] Thickness (inches)**	**Heavy Duty[2] Thickness (inches)**	**Reference**
Subgrade	Upper 12 inches of existing soil or engineered fill	Upper 12 inches of existing soil or engineered fill	GDOT: 98% of Standard Proctor MMD, -3 to +3% OMC
Aggregate Base	4	4	GDOT: GAB, Section 815 and 310
PCC	5	6 ½	ACI

1. Automobiles only.
2. Combined automobiles and trucks.

We recommend a Portland cement concrete (PCC) pavement be utilized in entrance and exit sections, dumpster pads, loading dock areas, or other areas where extensive wheel maneuvering are expected. The dumpster pad should be large enough to support the wheels of the truck which will bear the load of the dumpster.

Although not required for structural support, the base course layer is recommended to help reduce potentials for slab curl, shrinkage cracking, and subgrade "pumping" through joints. Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. All joints should be sealed to prevent entry of foreign material and dowelled where necessary for load transfer.

Portland cement concrete should be designed with proper air-entrainment and have a minimum compressive strength of 4,000 psi after 28 days of laboratory curing. Adequate reinforcement and number of longitudinal and transverse control joints should be placed in the rigid pavement in accordance with ACI requirements. The joints should be sealed as soon as possible (in accordance with sealant manufacturer's instructions and ACI requirements) to minimize infiltration of water into the soil.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section.

We recommend drainage be included at the bottom of the GAB layer at the storm structures to aid in removing water that may enter this layer. Drainage could consist of small diameter weep holes excavated around the perimeter of the storm structures. The weep holes should be excavated at the elevation of the GAB and soil interface. The excavation should be covered with No. 57 stone which is encompassed in Mirafi 140 NL or approved equivalent which will aid in reducing fines from entering the storm system.

Pavement Maintenance

The pavement sections provided in this report represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore, preventive maintenance should be planned and provided for through an on-going pavement management program. Preventive maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Preventive maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventive maintenance. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either substantiate or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)
2	10 (or auger refusal)
6	20 (or auger refusal)

Boring Layout and Elevations: Passero provided the boring layout for the site as shown on the provided site plan. Coordinates were obtained with a handheld GPS unit. If elevations and a more precise boring layout are desired, we recommend borings be surveyed following completion of fieldwork.

Subsurface Exploration Procedures: We advanced the borings a truck-mounted drill rig using continuous flight hollow stem. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above

SITE LOCATION

New Corporate GA Terminal ■ Macon, Georgia
April 18, 2023 ■ Terracon Project No. HN225215

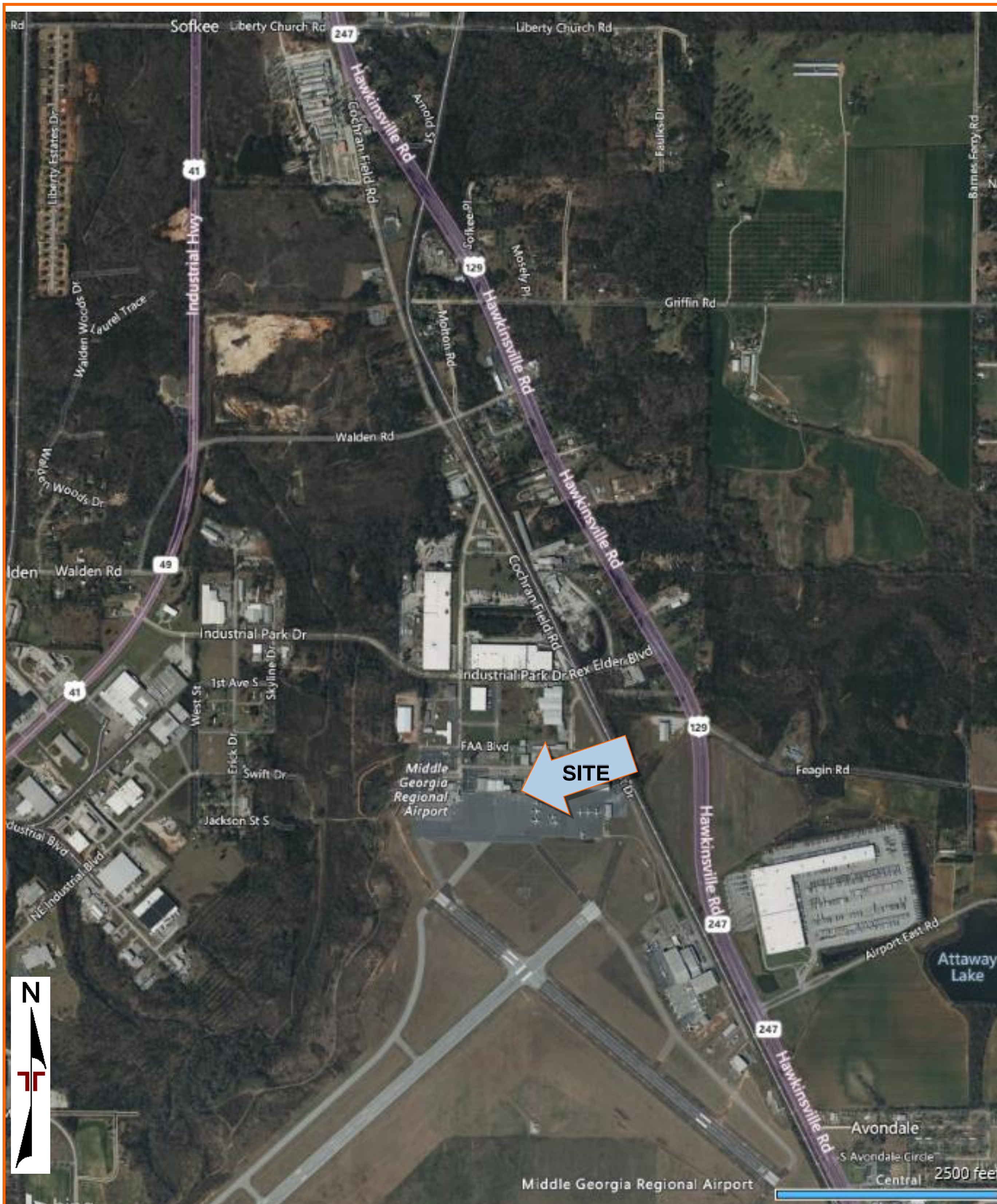


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

New Corporate GA Terminal ■ Macon, Georgia
April 18, 2023 ■ Terracon Project No. HN225215

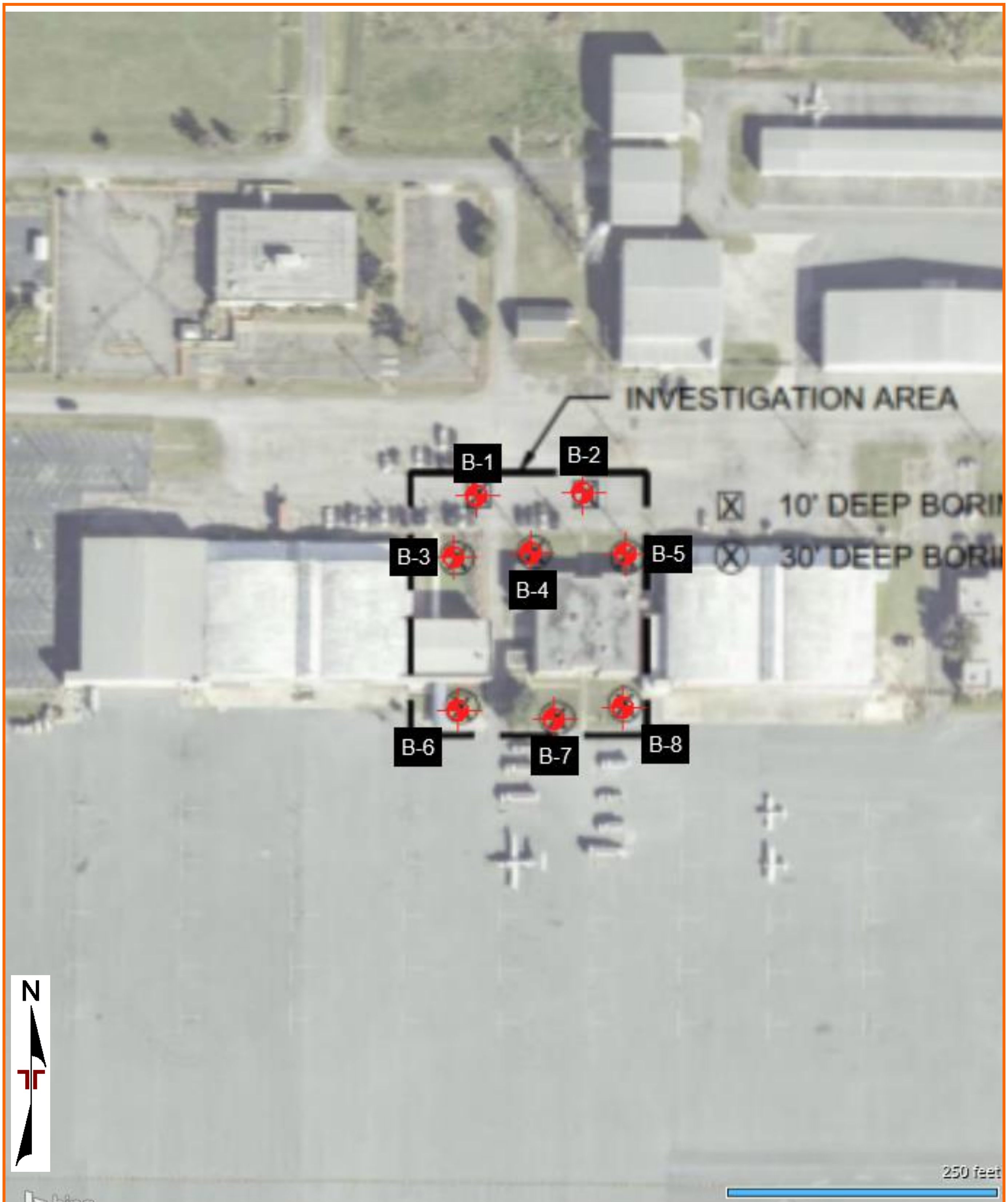


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

New Corporate GA Terminal ■ Macon, Georgia

April 18, 2023 ■ Terracon Project No. HN225215

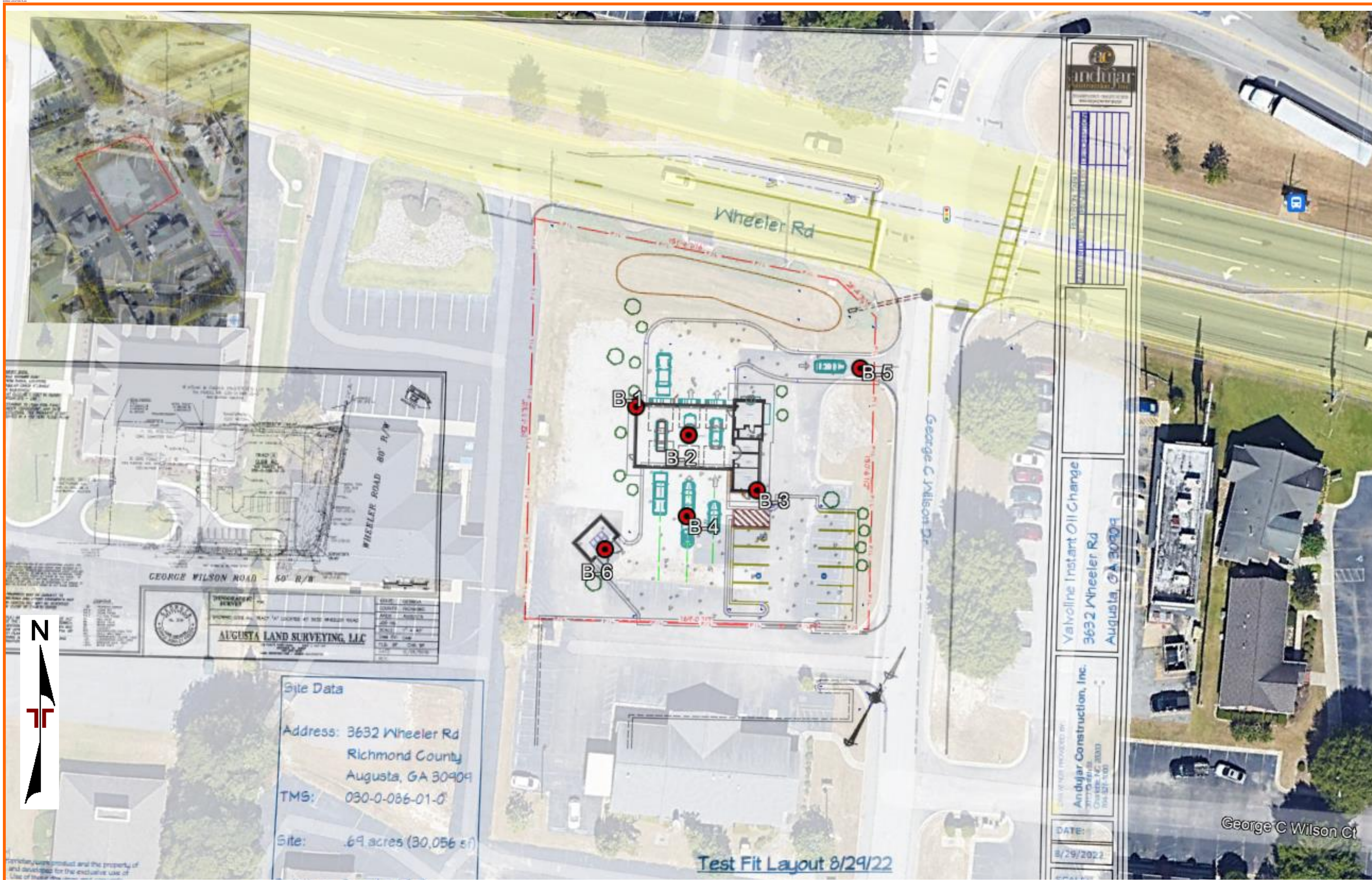


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Note: All attachments are one page unless noted above.

Terracon
514 Hillcrest Indust. Blvd
Macon, GA

Boring Log No. B-1

Location: See Exploration Plan

Latitude: 32.7020° Longitude: -83.6481°

Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results
0.5	**ASPHALT**, Approx 6" of asphalt				
	COASTAL PLAIN - LEAN CLAY (CL), red, stiff			Split spoon	3-4-6 N=10
				Split spoon	5-6-6 N=12
		5		Split spoon	4-6-7 N=13
10.0		10		Split spoon	5-6-8 N=14
	Boring Terminated at 10 Feet				

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevations not obtained

Water Level Observations
Not encountered

Advancement Method
HSA 2.25"

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
C. SHUBERT

Boring Started
03-03-2023

Boring Completed
03-03-2023

Terracon
514 Hillcrest Indust. Blvd
Macon, GA

Boring Log No. B-2

Location: See Exploration Plan

Latitude: 32.7020° Longitude: -83.6478°

Depth (Ft.)	Material Description
0.3	**ASPHALT**, Approx 3" of asphalt
3.0	**FILL - LEAN CLAY (CL)**, red, medium stiff
10.0	**COASTAL PLAIN - LEAN CLAY (CL)**, red, stiff
	Boring Terminated at 10 Feet

Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results
1–2.5		X	1-2-2 N=4
3.5–5		X	2-3-3 N=6
6–7.5		X	6-7-8 N=15
8.5–10		X	8-10-11 N=21

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Not encountered

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
C. SHUBERT

Notes
Elevation Reference: Elevations not obtained

Advancement Method
HSA 2.25"

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Boring Started
03-03-2023

Boring Completed
03-03-2023

Terracon
514 Hillcrest Indust. Blvd
Macon, GA

Boring Log No. B-3

Location: See Exploration Plan

Latitude: 32.7019° Longitude: -83.6482°

Depth (Ft.)	Material Description	Sample Depth (Ft.)	Field Test Results
0.3	**TOPSOIL**, Approx 4" of topsoil		
3.0	**COASTAL PLAIN - CLAYEY SAND (SC)**, black, Hand auger for upper 5'		
12.0	**LEAN CLAY (CL)**, red, very stiff	6–7.5	3-6-10 N=16
		8.5–10	4-5-10 N=15
16.0	**CLAYEY SAND (SM)**, with quartz fragments, red white, very dense	13.5–15	15-23-27 N=50
22.0	**SILTY SAND (SM)**, white yellow, medium dense	18.5–20	6-8-8 N=16
26.0	**CLAYEY SAND (SC)**, white pink red, medium dense	23.5–25	9-14-15 N=29
30.0	**CLAYEY SAND (SC)**, with quartz fragments, purple white, medium dense	28.5–30	9-10-7 N=17

Boring Terminated at 30 Feet

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Not encountered

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
C. SHUBERT

Notes
Elevation Reference: Elevations not obtained

Advancement Method
HSA 2.25"

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Boring Started
03-03-2023

Boring Completed
03-03-2023

Terracon
514 Hillcrest Indust. Blvd
Macon, GA

Boring Log No. B-4

Location: See Exploration Plan

Latitude: 32.7019° Longitude: -83.6479°

Graphic Log Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results
0.3	**TOPSOIL**, Approx 4" of topsoil				
	COASTAL PLAIN - LEAN CLAY (CL), black red, very stiff, Hand auger for upper 5'	5		X	8-8-9 N=17
		10		X	10-10-9 N=19
12.0	**CLAYEY SAND (SC)**, with rock fragments, red, medium dense	15		X	8-9-10 N=19
		20		X	8-10-13 N=23
22.0	**CLAYEY SAND (SC)**, pink orange, medium dense	25		X	8-9-9 N=18
30.0		30		X	9-10-12 N=22
	Boring Terminated at 30 Feet				

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevations not obtained

Water Level Observations
Not encountered

Advancement Method
HSA 2.25"

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
C. SHUBERT

Boring Started
03-03-2023

Boring Completed
03-03-2023

Terracon
514 Hillcrest Indust. Blvd
Macon, GA

Boring Log No. B-5

Location: See Exploration Plan

Latitude: 32.7019° Longitude: -83.6476°

Depth (Ft.)	Material Description	Sample Depth (Ft.)	Field Test Results
0.5	**TOPSOIL**, Approx 6" of topsoil		
6.0	**COASTAL PLAIN - LEAN CLAY (CL)**, red, stiff, Hand auger for upper 2.5'	3.5-5.0	3-4-4 N=8
12.0	**LEAN CLAY (CL)**, red brown, stiff	6.0-7.5	4-6-7 N=13
		8.5-10.0	6-8-8 N=16
22.0	**CLAYEY SAND (SC)**, with rock fragments, orange white, medium dense	13.5-15.0	6-10-11 N=21
		18.5-20.0	6-6-7 N=13
30.0	**SILTY SAND (SM)**, white, medium dense	23.5-25.0	5-6-9 N=15
		28.5-30.0	4-8-9 N=17
	Boring Terminated at 30 Feet		

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Elevations not obtained

Water Level Observations
Not encountered

Advancement Method
HSA 2.25"

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
C. SHUBERT

Boring Started
03-03-2023

Boring Completed
03-03-2023

Terracon
514 Hillcrest Indust. Blvd
Macon, GA

Boring Log No. B-6

Location: See Exploration Plan

Latitude: 32.7015° Longitude: -83.6481°

Depth (Ft.)	Description	Water Level Observations	Sample Type	Field Test Results
0.5	**ASPHALT**, Approx 6" of asphalt			
	COASTAL PLAIN - LEAN CLAY (CL), red, medium stiff to very stiff		X	4-4-3 N=7
			X	8-5-3 N=8
8.0			X	4-6-10 N=16
	CLAYEY SAND (SC), red, medium dense		X	7-9-10 N=19
12.0				
	SILTY SAND (SM), red grey, medium dense		X	5-8-12 N=20
16.0				
	CLAYEY SAND (SC), orange red, medium dense		X	10-10-9 N=19
22.0				
	SILTY SAND (SM), yellow, medium dense		X	6-6-9 N=15
26.0				
	CLAYEY SAND (SC), yellow, medium dense		X	7-7-7 N=14
30.0	***Boring Terminated at 30 Feet***			

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Not encountered

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
C. SHUBERT

Notes
Elevation Reference: Elevations not obtained

Advancement Method
HSA 2.25"

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Boring Started
03-03-2023

Boring Completed
03-03-2023

Terracon
514 Hillcrest Indust. Blvd
Macon, GA

Boring Log No. B-7

Location: See Exploration Plan

Latitude: 32.7015° Longitude: -83.6479°

Depth (Ft.)	Description
0.3	**TOPSOIL**, Approx. 4" of topsoil
12.0	**COASTAL PLAIN - LEAN CLAY (CL)**, red to black, medium stiff to very stiff
16.0	**CLAYEY SAND (SC)**, red to tan, medium dense
22.0	**LEAN CLAY (CL)**, gray to red, stiff
26.0	**SILTY SAND (SM)**, with quartz, red to tan, medium dense
30.0	**SILTY SAND (SM)**, white, medium dense
	Boring Terminated at 30 Feet

Field Test Results (top to bottom):

Field Test Results
6-8-10 N=18
2-2-3 N=5
3-4-5 N=9
4-4-6 N=10
10-10-9 N=19
3-3-5 N=8
5-7-8 N=15
8-8-11 N=19

Columns: Graphic Log | Depth (Ft.) | Water Level Observations | Sample Type | Field Test Results

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Not encountered

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
C. SHUBERT

Notes
Elevation Reference: Elevations not obtained

Advancement Method
HSA 2.25"

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Boring Started
03-03-2023

Boring Completed
03-03-2023

Terracon
514 Hillcrest Indust. Blvd
Macon, GA

Boring Log No. B-8

Location: See Exploration Plan

Latitude: 32.7015° Longitude: -83.6476°

Depth (Ft.)	Material Description
0.3	**ASPHALT**, Approx 3" of asphalt
8.0	**FILL - LEAN CLAY (CL)**, black red, soft to medium stiff
12.0	**COASTAL PLAIN - LEAN CLAY (CL)**, red, medium stiff
22.0	**CLAYEY SAND (SC)**, red orange, medium dense
30.0	**SILTY SAND (SM)**, with rock fragments, white, medium dense
	Boring Terminated at 30 Feet

Sample Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results
1–2.5		X	1-1-2 N=3
3.5–5		X	2-3-3 N=6
6–7.5		X	1-3-2 N=5
8.5–10		X	2-2-4 N=6
13.5–15		X	4-5-5 N=10
18.5–20		X	5-7-10 N=17
23.5–25		X	4-5-5 N=10
28.5–30		X	5-6-8 N=14

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Not encountered

Drill Rig
CME 550X

Hammer Type
Automatic

Driller
C. SHUBERT

Notes
Elevation Reference: Elevations not obtained

Advancement Method
HSA 2.25"

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Boring Started
03-03-2023

Boring Completed
03-03-2023

SUPPORTING INFORMATION

Contents:

Note: All attachments are one page unless noted above.

GENERAL NOTES

SAMPLING

Standard Penetration Test

WATER LEVEL

- Water Initially Encountered
- Water Level After a Specified Period of Time
- Water Level After a Specified Period of Time
- Cave In Encountered

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

N	Standard Penetration Test Resistance (Blows/Ft.)
(HP)	Hand Penetrometer
(T)	Torvane
(DCP)	Dynamic Cone Penetrometer
UC	Unconfined Compressive Strength
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (tsf)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification: Group Symbol	Soil Classification: Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]	GW	Well-graded gravel [F]
			$Cu < 4$ and/or [$Cc<1$ or $Cc>3.0$] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]	SW	Well-graded sand [I]
			$Cu < 6$ and/or [$Cc<1$ or $Cc>3.0$] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.