515 N. Main Street | Hinesville, GA 31313
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912.368.5212
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ME Sack Engineering
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mesack

ADDENDUM No. SEVEN

Date: May 12, 2025

Project: East Side Park Remodel, MES No. 2023-66

Engineer: M.E. Sack Engineering
Hinesville, Georgia

The original plans, specifications, and bid documents are amended to include the following:

Bid Document:

- Replace the previous Bid Form (pgs. 6 - 7) with the enclosed of the same. Note that a line item has been added to account for imported fill material.

Specifications:

- Replace the previous Section 01150 Measurement and Payment with the enclosed of the same. Note that a line item has been added to account for imported fill material.

The following clarifications are offered for questions received. Please note that this will be the last clarification prior to bid. No further questions will be accepted, and the project must be bid based on this latest addendum.

1. *Can you add an optional line item to the bid tab for imported dirt if there's not enough on site or what's on site is not suitable? There's no way to know without boring to determine what's going to be usable and all of us contractors need to be bidding it the same way.*
   - A line item has been added to the bid items and measurement and payment sections of the bid documents to account for imported fill material. Additionally, a preliminary geotechnical report completed for the site is being issued to all bidders for reference.

2. *There are no details on the eave height and the roof pitch on this structure. With this being a basketball court, this information would be helpful in pricing the structure. Can you provide this information so everyone is bidding on the same thing?*
   - The structural design in the plans is based on the following minimum criteria:
     Eave Height = 17 ft
     Gable Slope = 1.25:12
     These values represent the minimum vertical clearance required under the covered portion. Contractors have the option to propose a Pre-Engineered Metal Building (PEMB) design with increased eave heights, provided the gable slope is equal to or greater than the specified 1.25:12.

-END-

B. BID FORM

Bid Item	Quantity	Units	Description	Unit Price	Cost
1	1	LS	Clearing & Grubbing	-	$
2	37,175	CY	Cut/Fill Grading Site	$	$
3	1	LS	Imported Fill Material Complete	-	$
4	1,182	SY	8" Granular Roadway Base	$	$
5	447	SY	6" Granular Roadway Base	$	$
6	996	SY	Concrete Sidewalk	$	$
7	430	SY	1.5" 9.5mm Asphalt	$	$
8	200	SY	Standard Duty Concrete Pavement	$	$
9	38	SY	8" Heavy Duty Concrete Paving	$	$
10	34	LF	4" N-12 Drainage Pipe	$	$
11	1,004	LF	6" PVC Underdrain	$	$
12	38	LF	12" HPPP Drainage Pipe	$	$
13	154	LF	12" RCP Drainage Pipe	$	$
14	576	LF	18" HPPP Drainage Pipe	$	$
15	1	EA	8" Nyloplast Inline Drain	$	$
16	1	EA	4" x 6" Wye Fitting	$	$
17	6	EA	24" Nyloplast Yard Inlet	$	$
18	1	EA	36" Nyloplast Yard Inlet	$	$
19	2	EA	18" Concrete Flared End Section	$	$
20	1	EA	24" Concrete Flared End Section	$	$
21	1	EA	Pedestal Top	$	$
22	1	EA	Junction Box	$	$
23	1	EA	Broad Crested Weir	$	$
24	1	LS	Demolition	-	$
25	1	EA	Water Spigot	$	$
26	52	LF	1" Water Lateral Service Line	$	$
27	1	EA	Connect to Existing Water Service	$	$
28	1	EA	1" Blowoff Valve Assembly	$	$
29	1	LS	Structural Concrete	-	$

B. BID FORM continued

Bid Item	Quantity	Units	Description	Unit Price	Cost
30	1,833	LF	6' Chain Link Fencing	$	$
31	1	LS	Erosion Control and Grassing	-	$
32	46	LF	Aluminum Handrail	$	$
33	1	LS	Traffic Signage	$	$
34	7	EA	Concrete Bollard	$	$
35	16	EA	Concrete Parking Bumper	$	$
36	10	EA	Truncated Dome Strip	$	$
37	1	LS	Electrical and Controls	-	$
38	1	LS	Overhead Steel Structure Complete	-	$
39	1	LS	Amphitheater Complete	-	$
40	1	LS	Grassed Sports Field Complete	-	$
41	1	LS	Mobilization (5% Max)	-	$
				SUBTOTAL	**$**
Alternate Bid Items					
42	1	LS	Artificial Grass Sports Field System Complete	-	$
				TOTAL BID	**$**

SECTION 01150
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 QUANTITIES

A. Quantities: Quantities listed in the Proposal are approximate only and are intended to serve as a guide in comparing bids, and may be increased or decreased without invalidating the unit price bid.

B. Payment: Contractor shall be paid for actual in place quantities as determined by the Engineer field measurements.

C. Discrepancies: In case of discrepancies between the figures shown in the unit prices and totals, the unit prices shall apply and the totals shall be corrected to agree with the unit price.

PART 2 - MEASUREMENT AND PAYMENT

2.01 CLEARING & GRUBBING

A. Measurement: Measurement shall be made on the basis of the percentage complete of the task in accordance with the plans and specifications.

B. Payment: Payment will be made at the lump sum stated in the bid. The price bid shall include furnishing all labor, materials and equipment necessary to complete this item. Work shall include, but is not limited to, removal of all trees, shrubs and undergrowth that presently exist, preventing the construction of this project. All material removed including vegetation, roots and organic mat shall be removed from the site and disposed of at a permitted site. The contractor shall take special care not to disturb the roots of trees that are marked to remain. Trees to be saved shall be marked and approved by the engineer prior. Trees to be saved shall have the appropriate tree protection installed.

2.02 GRADING

A. Measurement: Measurement will be made on the basis of the percent complete of the item of work. All cut and fill quantities are based on the difference between initial topographic data and proposed contours shown on the plans.

B. Payment: Payment will be made at the price bid for each item. Work shall include all equipment, labor and material to complete each task. This item will include, but is not limited to, excavation, material transportation and placement, grading to the lines and grades shown on the plans, compaction and stabilization.

2.03 GRANITE ROADWAY BASE

A. Measurement: Measurement shall be made on the basis of the number of square yards of graded aggregate base applied to the parking lot and roadway at the specified thickness as shown on the construction plans. Irregular areas such as

turnouts, filler strips and intersections will be measured to the closest square yard. Prior to installation of the asphalt all areas will be checked for proper thickness.

B. Payment: Payment will be made on the basis of the number of square yards of granite crusher run (graded aggregated) base at the specified thickness applied to the roadway at the unit price stated in the bid. The price shall include all labor, equipment and material to complete the task. Work shall include, but not be limited to, the furnishing, hauling, placing and compaction of the crusher run base in order to bring the base to the lines, grades, and cross sections shown on the construction plans or established by the Engineer.

2.04 SIDEWALK

A. Measurement: Measurement shall be made on the basis of the number of square yards of sidewalk at the specified thickness and dimension as shown on the construction plans. Irregular areas such as turnouts, filler strips and intersections will be measured to the closest square yard. Prior to installation of the sidewalk all areas will be checked for compaction.

B. Payment: Payment will be made on the basis of the number of square yards of sidewalk installed at the unit price stated in the bid. The price shall include all labor, equipment and material to complete the task. Work shall include, but not be limited to, grading, compaction, construction joints, expansion joints, fiber mesh or wire reinforcing, accommodation for sidewalk pavers, furnishing, hauling, placing and compaction of the concrete in order to bring the sidewalk to the lines, grades, and cross sections shown on the construction plans, form wrecking, final cleanup and surface restoration.

2.05 CONCRETE/ASPHALT PAVING

A. Measurement: Measurement will be made on the basis of the number of square yards of pavement in place at the specified thickness and dimension as shown on the construction plans.

B. Payment: Payment will be made on the basis of the number of square yards of pavement in place in accordance with the unit price bid as stated in the contract. Work shall include, but is not limited to, the furnishing, hauling, placing and compaction of the asphalt in order to bring the pavement to the lines, grades and cross sections as designated on the construction plans and as determined by the Engineer. The unit price bid shall also include surface cleaning, prime, tack and pavement and handicap striping. All striping will be in accordance with MUTCD and local specifications.

2.06 DRAINAGE PIPE

A. Measurement: Measurement will be made on the basis of each linear foot of drainage pipe installed at the elevation, grade and alignment as designated on the construction plans.

B. Payment: Payment will be made on the basis of each linear foot of drainage pipe installed at the elevation, grade and alignment as designated on the construction plans at the unit price bids as stated in the contract. Work shall include, but not be limited to, all excavation, trenching, necessary shoring and sheeting, all pipe

bedding, furnishing and installing pipe, backfill, compaction, complete surface restoration and cleanup.

2.07 DRAINAGE STRUCTURE (Catch Basins, Yard Drain, Junction Box, Headwall, Concrete Flumes, Flared End Section, Pipe End Treatments, Interference Box, Outlet Structures)

A. Measurement: Measurement will be made on the basis of each drainage structure installed at the elevation and location designated on the construction plans.

B. Payment: Payment will be made on the basis of each structure installed at the unit price bid. The unit price bid shall include furnishing all labor, materials and necessary equipment to complete the item of work. Work shall include, but not be limited to, excavation, necessary shoring and sheeting, dewatering, forming, form wrecking, foundations as required, furnishing and installing the structure, placement of grates, manhole rings and covers as applicable, grouting around pipe, 6" stub for future underdrain connection, backfill, compaction, grading, complete surface restoration and cleanup.

2.08 DEMOLITION

A. Measurement: Measurement shall be made on the basis of the percentage completed item in accordance with the plans, specifications and bid documents.

B. Payment: Payment will be made on the basis of the completed item of work. The lump sum price shall include furnishing all labor, materials and equipment necessary to complete this item of work. Work shall include, but is not limited to, removal of any storm pipe, drainage structures, rip rap, or other material that exist and will not be used as part of this project, excavation, disposal at an approved site, backfill, compaction and surface restoration.

2.09 WATER SPIGOT

A. Measurement: Measurement shall be made on the basis of each unit installed in accordance with the construction plans and specifications.

B. Payment: Payment will be made at the unit price bid each unit. Unit price bid shall include furnishing all materials, labor and equipment necessary to complete the installation of the service. Work shall include, but not be limited to, trenching, excavation, furnishing and installing saddle, corporation cock tubing, curb stop and meter box, backfill, pressure testing, disinfection, complete surface restoration and cleanup.

2.10 WATER LINES

A. Measurement: Measurement will be made along the centerline of the pipe trench and through fittings and specials. No deduction in length will be made for fittings or specials.

B. Payment: Payment will be made on the basis of unit price bid per linear foot for a specific line size. Unit price bid shall include all materials, labor and equipment necessary to complete the installation of the watermain. Work shall include, but not be limited to, trenching and excavation, necessary shoring and sheeting,

furnishing and installing pipe, tracer wire, marker tape, backfilling and compaction, concrete blocking, bedding, pressure testing, disinfection, complete surface restoration and cleanup.

2.11 CONNECTIONS TO EXISTING WATERMAINS

A. Measurement: Measurement shall be made on the basis of each connection made to an existing watermain.

B. Payment: Payment shall be made on the basis of unit price bid. Unit price bid shall include furnishing all materials, labor and equipment required to complete the connection. Work shall include, but not be limited to, all trenching and excavation, pressure testing, backfill, disinfection, surface restoration and cleanup, furnishing and installing tapping sleeves & tapping valves if noted o the plans, cutting and removing existing pipe where necessary, fittings, and other accessories required to complete the connection.

2.12 BLOWOFF VALVE ASSEMBLY

A. Measurement: Measurement shall be made on the basis of each unit installed in accordance with the construction plans and specifications.

B. Payment: Payment will be made at the unit price bid for a specific valve assembly. Unit price bid shall include furnishing all materials, labor and equipment necessary to complete the installation of the blowoff valve assembly. Work shall include, but not be limited to, excavation, necessary shoring, sheeting, backfilling, concrete valve box collar, furnishing and installing blowoff valves, valve boxes, pressure testing, disinfection and complete surface restoration and cleanup.

2.13 STRUCTURAL CONCRETE

A. Measurement: Measurement shall be made on the basis of the completed item in accordance with the construction plans and bid items.

B. Payment: Payment will be made on the basis of the completed item of work. The lump sum price shall include furnishing all labor, materials and equipment necessary to complete this item of work. Work shall include, but is not limited to, necessary excavation, shoring and sheeting, dewatering, gravel bedding, castings, foundation, backfill, compaction, complete surface finish, and clean up, for the correct installation of the item.

2.14 6’ CHAIN LINK FENCE

A. Measurement: Measurement shall be made on the basis of each linear foot of chain link fence installed as shown on the plan. The size and type of chain link fence will be shown on the plans.

B. Payment: Payment will be made on the basis of the unit price stated in the bid. The price shall include all labor, materials and equipment necessary to complete the task. The task shall include, but is not limited to, the placement, fastening, and installation of the chain link fence, gate, fence stands, latches, locks, and appurtenances necessary for a freestanding fence and gate for egress/ingress.

2.15 EROSION CONTROL AND GRASSING

A. Measurement: Measurement will be made on the basis of the completed item of work in accordance with "The Manual for Erosion and Sedimentation Control in Georgia". All silt fence will be measured by the linear foot of the silt fence properly installed and trenched in.

B. Payment: Payment will be made on the basis of the price bid for each item. Work shall include all equipment, material, and labor to complete the installation. This item will include but is not limited to trenching, excavation, grading, inlet and outlet protection, furnishing, and installing silt fence, stone, gravel filler, and geotextile filter blanket; temporary and final stabilization; maintaining erosion and sediment control structures and facilities, and establishing a final stand of cover in accordance with the plans and specifications. Retainage on final grassing will be based on the engineer's estimate of the cost to complete the task, which may not be reflected in the contractor's bid price.

2.16 ALUMINIUM HANDRAIL

A. Measurement: Measurement shall be made on the basis of each linear foot of handrail installed at the price bid.

B. Payment: Payment will be made on the basis of each linear foot of handrail installed at the price bid. The price bid shall include all labor, materials, and equipment necessary to complete the task including, but not limited to, tubing, anchor bolts, paint finish, welding, grinding, and installation.

2.17 TRAFFIC SIGNAGE

A. Measurement: Measurement shall be made on the basis of the completed item in accordance with the construction plans and bid items.

B. Payment: Payment will be made in accordance with the lump sum price stated in the bid. The lump sum price shall include all labor, materials, and equipment necessary to complete the work. The work shall include, but is not limited to, removal, replacement, relocation, excavation, drilling, fastening, and installation of signage, posts, complete surface restoration, and cleanup. All signage will be in accordance with ADA, MUTCD, and local specifications.

2.18 CONCRETE BOLLARD

A. Measurement: Measurement shall be made on the basis of each concrete bollard installed in accordance with the construction plans and bid items.

B. Payment: Payment will be made on the basis of each concrete bollard installed at the unit price bid. The price bid shall include all labor, materials, and equipment necessary to complete the task. The task shall include, but is not limited to, the excavation, drilling, furnishing and installing concrete bollards, paint finishing, complete surface restoration, and cleanup.

2.19 PARKING BUMPER

A. Measurement: Measurement shall be made on the basis of each parking bumper installed in accordance with the construction plans and specifications.

B. Payment: Payment will be made at the unit price bid for each parking bumper. Unit price bid shall include furnishing all materials, labor and equipment necessary to complete the installation of the parking bumper. Work shall include, but not be limited to, necessary drilling, installation hardware, furnishing and installing parking bumpers, complete surface restoration and cleanup.

2.20 TRUNCATED DOME

A. Measurement: Measurement shall be made on the basis of each sidewalk truncated dome stamped in accordance with the construction plans and bid items.

B. Payment: Payment will be made on the basis of each truncated dome stamped at the unit price bid. The price bid shall include all labor, materials, and equipment necessary to complete the task. The task shall include, but is not limited to, tamping the pattern into the concrete stamp per GDOT standard, cleanup, surface sealing pigment, and complete restoration.

2.21 ELECTRICAL AND CONTROLS

A. Measurement: Measurement shall be made on the basis of the percentage completed of the task in accordance with the plans and specifications.

B. Payment: Payment will be based on the percent of this task completion at the time of the request based on the price bid. The work shall include equipment, labor, and materials required to complete the task. The task shall include, but is not limited to, supplying and installing all electrical materials, sensors, site lighting, conduit, wire, control panels, breakers, fiber, connection to existing systems, testing,

operational start-up, trenching, excavation, backfill, clean up and surface restoration.

2.22 OVERHEAD STEEL STRUCTURE COMPLETE

A. Measurement: Measurement shall be made on the basis of the percentage completed of the task in accordance with the plans and specifications.

B. Payment: Payment will be made at the lump sum stated in the bid. The price bid shall include furnishing all labor, materials, pre-engineered metal building plans and components, and equipment necessary to complete this item. Work shall include, but is not limited to, excavation, backfill, compacting, construction of concrete foundation, delivery, assembly, and installation of pre-engineered steel building and miscellaneous hardware, general cleanup and surface restoration.

2.23 AMPHITHEATER COMPLETE

A. Measurement: Measurement shall be made on the basis of the percentage completed of the task in accordance with the plans and specifications.

B. Payment: Payment will be made at the lump sum stated in the bid. The price bid shall include furnishing all labor, materials, and equipment necessary to complete this item. Work shall include, but is not limited to, excavation, backfill, compacting, construction of foundations, delivery and construction of structures, and other auxiliaries as required for proper installation and operation, finish paint, general cleanup and surface restoration.

2.24 GRASSED SPORTS FIELD COMPLETE

A. Measurement: Measurement shall be made on the basis of the percentage completed of the task in accordance with the manufacturer specifications as shown in, and in accordance with, the engineer-approved plans and specifications.

B. Payment: Payment will be made at the lump sum stated in the bid. The price bid shall include furnishing all labor, materials, and equipment necessary to complete this item. Work shall include, but is not limited to, excavation, backfill, compacting, paint striping, grassing, irrigation system design and installation, furnishing and assembly of bleachers, goal posts, miscellaneous hardware, and concrete structures as required and in accordance with manufacturer specifications and the approved plans, general cleanup and surface restoration.

2.25 ARTIFICIAL GRASS SPORTS FIELD SYSTEM COMPLETE

A. Measurement: Measurement shall be made on the basis of the percentage completed of the task in accordance with the manufacturer specifications as shown in, and in accordance with, the engineer-approved plans and specifications.

B. Payment: Payment will be made at the lump sum stated in the bid. The price bid shall include furnishing all labor, materials, and equipment necessary to complete this item in accordance with the plans and specifications. Work shall include, but is not limited to, excavation, backfill, compacting, construction of edging, field marking; furnishing and assembly of drainage components and structures as required for functional performance and in accordance with manufacturer specifications and recommendations, and the approved plans and specifications; general cleanup and surface restoration.

2.26 MOBILIZATION

A. Payment will be made for the price as stated in the Contract once the Contractor has established his construction yard, and met the requirements established in the Contract Documents. Mobilization will be recognized as complete once the Contractor has provided a construction schedule and moved his equipment and a substantial amount of material to the job site. Construction must be underway and progressing. Payment for mobilization will be limited to a maximum amount not to exceed 5% of the bid price.

END OF SECTION

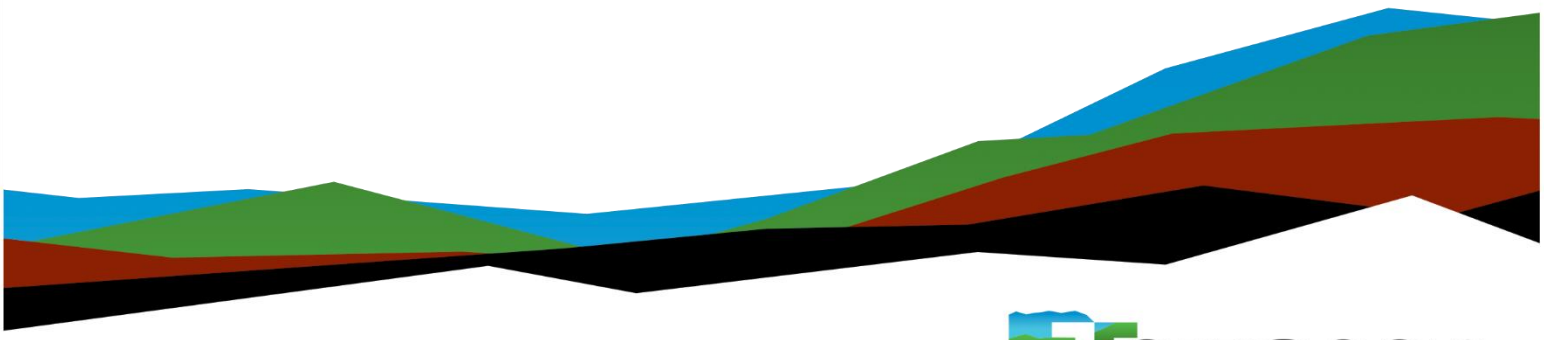
East Side Park Remodel

Geotechnical Engineering Report

May 1, 2024 | Terracon Project No. ES245082

Prepared for:

ME Sack Environmental
515 N Main St
Hinesville, GA 31313



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May 1, 2024

ME Sack Environmental
515 N Main St
Hinesville, GA 31313

Attn: Logan Irvine
P:(912) 368-5212
E:logan@mesack.com

Re: Geotechnical Engineering Report
East Side Park Remodel
120 East Railroad Street
Alamo, GA
Terracon Project No. ES245082

Dear Mr. Irvine:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. PES245082 dated March 15, 2024. 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

Kyle Nicholson, E.I.T.
Staff Geotechnical Engineer

Guoming Lin, Ph.D., P.E., D.GE
Senior Consultant

Table of Contents

Attachments

Note: This report was originally delivered in a web-based format. **Blue 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 terracon logo will bring you back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

Report Summary

Topic [1]	Overview Statement [2]
Project Description	The project is for a park remodel that will consist of improvements to an existing basketball court, a small-medium sized amphitheater structure with concrete seating, a turf football field, a detention pond, and associated parking that will be paved or gravel.
Geotechnical Characterization	▪ In general, the site has a layer of sands to silty sands in the upper 2 to 4 feet below the ground surface (BGS), underlain by medium dense to very dense clayey sands to termination of the borings at 25 feet BGS. See the Soil Stratum tables in the Geotechnical Characterization section of the report for more detail. ▪ Groundwater was not encountered. Termination of deepest boring was 25 feet BGS. ▪ Mottling, an indication of the seasonal high groundwater level, was not encountered.
Earthwork Recommendations	▪ Install a site drainage system. ▪ Strip/grub topsoil when encountered (**Note: rutting of subgrade can cause mixing of topsoil with underlying soils, which may require additional topsoil stripping**). ▪ Level, densify, and proofroll subgrade during subgrade preparation. If any soft/weak areas are detected during proofroll testing, repair subgrade by undercut and backfill. The amount of undercut is based on the weather conditions during construction and the final grade elevation.
Foundation Recommendations	Shallow foundations will be sufficient for all both proposed flex-use buildings. ▪ Allowable bearing pressure = 2,000 psf ▪ Expected settlements: < 1-inch total, <1/2-inch differential
Pavements	We have evaluated two pavement sections based on the assumed traffic loading: light duty pavement for parking (cars/light trucks), and heavy-duty pavement for trash trucks.

	With subgrade prepared as noted in Earthwork Permeable Asphalt: ▪ 4" asphalt open graded friction course over 12" graded aggregate base (GAB) in Light Duty areas ▪ 6" asphalt open graded friction course over 18" graded aggregate base (GAB) in Heavy Duty areas Asphalt Concrete (AC): ▪ 2" AC over 6" GAB in Light Duty areas ▪ 3.5" AC over 8" GAB in Heavy Duty areas Concrete (Portland Cement Concrete, PCC): ▪ 5" PCC over 4" of GAB in Light Duty areas ▪ 7" PCC over 4" of GAB in Heavy Duty areas NOTE: For pavements areas subject to repetitive concentrated loads such as the truck entry/exit driveways and parking areas, we recommend a heavy-duty section and rigid pavements.
Seismic Considerations	For seismic design purposes, the subject site is classified as **Site Class D** in accordance with the International Building Code (IBC) 2018 and ASCE 7-16 Section 11.4.2.
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.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed park remodel to be located at 120 East Railroad Street in Alamo, GA. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

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

The geotechnical engineering Scope of Services for this project included the advancement of test borings, laboratory testing, engineering analysis, and preparation of this report.

Drawings showing the site and boring locations are shown on the **Site Location** and **Exploration Plan**, respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the **Exploration Results** section.

Project Description

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	The following were provided by the client via email communication on March 7, 2024. ▪ Conceptual Site Layout
Project Description	The project is for a park remodel that will consist of improvements to an existing basketball court, a small-medium sized amphitheater structure with concrete seating, a turf football field, a detention pond, and associated parking that will be paved or gravel.

Item	Description
Proposed Structure	The proposed project consists of a small-medium sized amphitheater with concrete seating and a 110’ by 80’ steel cover structure for the existing basketball court.
Building Construction	The amphitheater is to have concrete seating and is assumed to have steel framing and a steel truss roof. The basketball court cover structure will consist of structural steel columns supporting steel roof trusses.
Finished Floor Elevation	Assumed to be near existing grade.
Maximum Loads (assumed)	The following loads are assumed, based on similar sized structures: ▪ Maximum building slab load: **200** psf ▪ Maximum column loads: **20** kips
Pavements (assumed)	We recommend flexible **(asphalt**) and rigid **(concrete)** pavement sections will be considered for this site. Anticipated traffic is as follows: ▪ Autos/light trucks: **150** vehicles per day ▪ Delivery/trash trucks: **5** vehicles per week

Terracon should be notified if any of the above information is inconsistent with the planned construction, especially the grading limits, as modifications to our recommendations may be necessary.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located on 120 East Railroad Street in Alamo, GA. Latitude: 32.1537°, Longitude: -82.7746° See **Site Location**
Existing Improvements	The site is an existing park with a basketball court, baseball field, and associated utilities.
Current Ground Cover	The proposed project site is primarily grassed areas with light tree growth to the rear (East) of the site.

Item	Description
Existing Topography	Relatively level.

Geotechnical Characterization

We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the data and our understanding of the geologic setting and planned construction. In general, the soils are relatively consistent throughout the project area.

The geotechnical characterization forms the basis of our geotechnical calculations and evaluation of site preparation, foundation options and pavement options.

Soil Stratum – Basketball Structure (S1, S7)

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency / Density
1	1	Topsoil: Silty sands with **roots and grass**	N/A
2	20, termination of boring	Clayey sands	Medium dense

Soil Stratum – Amphitheatre (S2)

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency / Density
1	1	Topsoil: Silty sands with **roots and grass**	N/A
2	4	Silty sand to sands	Loose
	18	Clayey sands	Medium dense
3	25, termination of boring		Very dense

Soil Stratum – General Site (SPT3-6)

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency / Density
1	1	Topsoil: Silty sands with **roots and grass**	N/A
2	8-15, termination of boring	Clayey sands	Medium dense

Groundwater Conditions

The SPT borings and hand auger borings were observed while drilling and after completion for the presence and level of groundwater. **Groundwater was not encountered at any of the SPT borings and hand auger boring locations.**

Mottling, a strong indicator of water seepage during seasonal high groundwater levels, was not encountered at any of the SPT borings and hand auger locations.

Infiltration

One (1) constant head infiltration test was performed in general accordance with ASTM D3385 in stormwater pond areas to determine the infiltration rate of the in-situ soils at greater depths than the double ring method.

The constant head infiltration test consists of a pipe set in the ground at the test depth, filled with water, and kept full until the soil below is fully saturated. The volume of water added to keep the water level in the pipe at a fixed level at specific time intervals. The volume infiltrated during timed intervals is converted to an incremental infiltration velocity, usually inches/hour, plotted versus elapsed time. The average incremental velocity is equivalent to the infiltration rate.

The following table summarizes the results from the Constant Head Infiltration test:

Summary of Infiltration Test Results

Test Number	Location (Lat. / Long.)	Area	Infiltration Rate (inches/hour)	Test Depth (feet)	Infiltration Test Type
IR1	**32.1543 / -82.7715**	**Stormwater pond location**	**0.07**	**5**	**Constant Head**

Details of the subsurface conditions encountered at the test location are presented on the individual infiltration test log in the appendix of this report. Stratification boundaries on the log represent the approximate depth of changes in soil types; the transition between materials may be gradual. The tested infiltration rates measured are consistent with the sandy clay to clayey sand soil at the site.

Seismic Site Class

According to the International Building Code (IBC) 2018 and ASCE 7-16, structures should be designed and constructed to withstand the effects of earthquakes and avoid failure during a maximum considered earthquake. The maximum considered earthquake (MCE) is a seismic event that has a 50-year exposure period with a 2% probability of exceedance. The 2,500-year earthquake has a Moment Magnitude (Mw) of 7.3 and a Site Class Adjusted Peak Ground Acceleration (PGAM) of **0.132g**, as determined by data provided by the IBC-2018 and ASCE 7-16 Standards.

Based on our findings from the field exploration and our knowledge of the local geological formation in the project area, the site can be classified as **Site Class D** in accordance with International Building Code (IBC) 2018 and ASCE 7-16. The seismic design parameters obtained based on IBC-2018 and ASCE 7-16 are summarized in the table below.

The design response spectrum curve, as presented in the **Supporting Information** attachment of this report, was developed based on the S_{DS} and S_{D1} values according to IBC-2018 and ASCE 7-16.

Site Location (Latitude, Longitude)	Site Classification	S_s	S_1	F_a	F_v	S_{DS}	S_{D1}
32.1537°, -82.7746°	D	0.164g	0.075g	1.600	2.400	0.175g	0.119g

- In accordance with the 2018 International Building Code and ASCE 7-16.
- The 2018 IBC and ASCE 7-16 require a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope does not include 100-foot soil profile determination. Explorations for this project extended to a maximum depth of 25 feet BGS and this seismic site class definition was provided in consideration of the overall soil conditions as well as the general geology of the area.

Geotechnical Overview

The following evaluation and recommendations are based upon our understanding of the proposed construction and the results from our field exploration. **If the above-described project conditions are incorrect or changed after this report, or subsurface conditions encountered during construction are significantly different from those reported, Terracon should be notified** so we can re-evaluate our recommendations and make appropriate revisions.

Geotechnical Considerations

The subsurface conditions at this site are considered adaptable for the proposed construction. The generalized soil profile is presented in the **Geotechnical Characterization** section.

The column, slab, and wall load and the site grading plan were not provided by the client and have been assumed. The proposed basketball cover structure is expected to have a typical column load of 20 kips and the amphitheater is expected to have a slab load of 200 psf.

If heavier structural loads are required than those discussed above, Terracon should be retained to perform the additional evaluation.

We performed the settlement analyses at the boring locations using the soil parameters derived from the SPT borings and the structural loads discussed above. Based on the results of our settlement analyses, the settlement was estimated to be less than 1.0 inch for the loading conditions for both structures.

As such, all proposed structures for this project can be supported on a shallow foundation system after the subgrade has been improved with densification or undercut and backfill as necessary, resting on the improved subgrade.

We recommend a thorough field quality control program of proofrolling of the subgrade. The bottom of the excavation should be observed for potential unsuitable material. Hand auger boring and dynamic cone penetration (DCP) testing may be performed to evaluate

and confirm the subgrade conditions. It is anticipated that some isolated deeper subgrade soil undercutting and backfilling may be required in the building and the parking areas during subgrade preparation.

No topsoil, organic matter, stumps, undocumented fill, or other unsuitable materials should be left in place below any footing, slab and / or pavement. All foundations should bear on suitable natural soil, or on properly compacted structural fills. Compacted fill below any foundation should be placed directly on suitable natural soil. We recommend Terracon be retained to test the footing, slab and/or pavement subgrade during construction so that Terracon can provide additional recommendations to prepare the subgrade based on the conditions uncovered during the subgrade preparation.

Earthwork

The site work conditions will be largely dependent on the weather conditions and the contractor's means and methods in controlling surface drainage and protecting the subgrade. Site preparation should include installation of a site drainage system, topsoil stripping and grubbing, subgrade preparation, densification, and proof rolling. Rutting of the subgrade can also cause mixing of topsoil/organics with underlying soils which will result in additional required topsoil/organics stripping. Deeper undercut may be needed in some areas to remove unsuitable materials.

Site Preparation

Prior to placing fill, existing vegetation, topsoil, and root mats should be removed. Complete stripping of the topsoil should be performed in the proposed building and parking/driveway areas.

Site Drainage

The site does not have a shallow groundwater table. The upper sandy soils are typically well draining, but the sandy clays and clayey sands in the area of the basketball court are not. An effective drainage system should be installed prior to site preparation and grading activities to intercept surface water and improve overall shallow drainage. The drainage system may consist of perimeter ditches supplemented with parallel ditches and swales. Pumping equipment should be prepared if the above ditch system cannot effectively drain water away from the site, especially during the rainy season. The site should be graded to shed water and avoid ponding over the subgrade.

Densification and Proofrolling

Prior to fill placement on the subgrade, the proposed building and pavement areas should be densified with a heavy-duty static roller to achieve a uniform subgrade. The subgrade underneath the building and the pavement should be thoroughly proofrolled after the completion of densification. Proofrolling will help detect any isolated soft or loose areas that "pump", deflect or rut excessively, and densify the near-surface soils for floor slab support.

A loaded tandem axle dump truck, capable of transferring a load in excess of 20 tons, should be utilized for this operation. Proofrolling should be performed under the Geotechnical Engineer's observation. Areas where pumping, excessive deflection or rutting is observed after successive passes of the proofrolling equipment should be undercut, backfilled and then properly compacted. It is anticipated that some amount of subgrade undercutting may be required under the footings during subgrade preparation.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill. During our field exploration, the project site included fill material placed over proposed building and pavement areas. Earthen materials used for structural should meet the following material property requirements:

Soil Type[1]	USCS Classification	Acceptable Parameters (For Structural Fill)
Granular	GW, GP, GM, GC, SW, SP, SM, SC	Less than 25% Passing No. 200 sieve
Low Plasticity Cohesive	CL	Liquid Limit less than 50 Plasticity index less than 20

1. Structural fill should consist of approved materials free of organic matter and debris. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.

Based on the findings from our hand auger and SPT borings, the subject site consists mostly of clayey sands. The clayey sands and sandy clays are **generally considered suitable for structural fill** however specific soil parameters must be met and tested during construction.

Fill Placement and Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Structural Fill
Maximum Lift Thickness	8 to 10 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
Minimum Compaction Requirements [1]	95% of max. below foundations and finished pavement subgrade
Water Content Range [1]	Granular: -2% to +2% of optimum

1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).

We recommend Terracon be retained during construction to determine the suitability of the on-site soil as fill material.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and topsoil, proofrolling, and mitigation of areas delineated by the proofroll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. One density and water content test should be performed for every 100 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Shallow Foundations

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following general design parameters are applicable for shallow foundations.

Design Parameters

Description	Column	Wall
Net allowable soil bearing pressure [1]	2,500 psf	2,500 psf
Minimum dimensions	24 inches	18 inches
Minimum embedment below finished grade	18 inches	18 inches
Estimated total settlement [2]	< 1 inch	< 1 inch
Estimated differential settlement	<1 inch between columns	<1/2 inch over 40 feet
Ultimate coefficient of sliding friction [3]	0.32	

1. **The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. It assumes any unsuitable fill or soft soils, if encountered, will be replaced with compacted structural fill.**
2. **The foundation settlement will depend upon the variations in the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations. Footings should be proportioned to reduce differential settlements. Proportioning on the basis of equal total settlement is recommended; however, proportioning to relative constant dead-load pressure will also reduce differential settlement between adjacent footings.**
3. **Sliding friction along the base of the footing will not develop where net uplift conditions exist.**

Foundation Construction Considerations

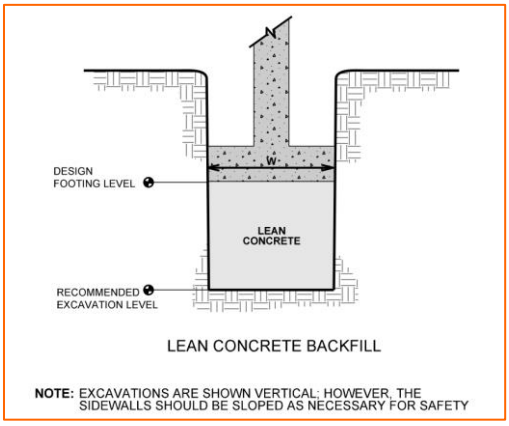
The bottom of all foundation excavations should be free of water and loose soil and rock prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance.

Care should be taken to prevent wetting or drying of the bearing materials during construction. Extremely wet or dry material or any loose or disturbed material in the bottom of the footing excavations should be removed before the foundation concrete is placed. If the soils at bearing level become excessively dry, disturbed, or saturated, the affected soil should be removed prior to placing concrete. A lean concrete mud-mat should

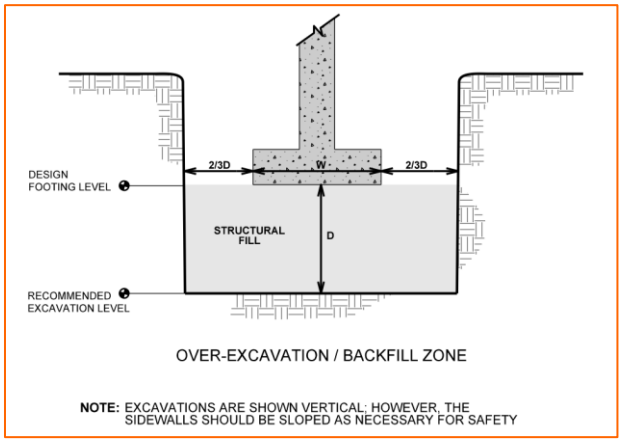
be placed over the bearing soils if the excavations must remain open for an extended period of time.

Regarding the construction of footings, we generally anticipate material suitable for the recommended design bearing pressure will be present at the bottom of the footings. However, it is important that Terracon be retained to observe, test, confirm or evaluate the bearing soil prior to placing reinforcing steel and concrete to determine if additional footing excavation or other subgrade repair is needed for the design loads.

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.



As an alternative, the footings could also bear on properly compacted structural backfill extending down to the suitable soils. Over-excavation for structural fill placement below footings should be conducted as shown below. The over-excavation should be backfilled up to the footing base elevation, with structural fill placed, as recommended in the Earthwork section.



The over-excavation should be backfilled up to the footing base elevation with well-graded granular material placed in lifts of 6 inches or less in loose thickness and compacted to at least 95 percent of the material's maximum dry density as determined by the Modified Proctor test (ASTM D-1557). No. 57 stone is recommended in lieu of structural fill when the volume of excavation is relatively small, re-compaction of the fill is difficult, or the weather conditions or construction schedule becomes a controlling factor.

Floor Slabs

Floor Slab Design Parameters

Item	Description
Floor slab support	Compacted structural fill/inspected and tested natural ground [1]
Modulus of subgrade reaction	120 pounds per square inch per in (psi/in) for point loading conditions
Base course/capillary break [2]	4 inches of free-draining granular material. The on-site soils may be suitable and subjected to field verification during construction.
Vapor barrier	Project Specific [3]
Structural considerations	Floor slabs should be structurally separated from columns and walls to allow relative movements [4]

1. As the existing ground may have been filled or previously disturbed**, we recommend the subgrade be inspected and tested with proofrolling after the topsoil is stripped as outlined in Earthwork section of this report.**
2. **The floor slab design should include a base course comprised of free draining, compacted, granular material, at least 4 inches thick. The granular subbase may be graded aggregate base (GAB) or sands containing less than 5 percent fines (material**

passing the #200 sieve). GAB subbase can also help improve workability of the subgrade especially during rain periods.

3. **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.**
4. **Floor slabs should be structurally independent of any footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation. Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates that any differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks that occur beyond the length of the** structural dowels**.** The structural engineer should account for this potential differential settlement through use of sufficient control joints, appropriate reinforcing, or other means.

Floor Slab Construction Considerations

Prior to construction of grade supported slabs, varying levels of remediation may be required to reestablish stable subgrades within slab areas due to construction traffic, rainfall, disturbance, desiccation, etc. As a minimum, the following measures are recommended:

- The interior trench backfill placed beneath slabs should be compacted in accordance with recommendations outlined in Earthwork section of this report.
- All floor slab subgrade areas should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to placement of the stone base and concrete.
- All floor slab subgrade areas should be proofrolled prior to placement of the stone base and concrete.

Pavements

General Pavement Comments

We understand the proposed development will include paved drives and parking areas at the entrance to the park. This section presents thickness recommendations for asphalt concrete, Portland cement concrete pavements, permeable asphalt pavement, and general considerations for the pavement construction. Pavement thickness design is dependent upon:

- Traffic volumes, loads, traffic pattern, and desired service life of the pavement; subgrade conditions including soil strength and drainage characteristics; paving material characteristics; climatic conditions of the region.

Based on our experience with similar projects, we have assumed the proposed asphalt and concrete pavement sections will experience the following traffic loading for the **pavement design of 20 years.**

- Autos/light trucks: **150** vehicles per day
- Light delivery and trash collection trucks: **20** trucks per week

If heavier /higher volume traffic loading is expected, we should be provided with the information and allowed to review these pavement sections. As typical for pavement, maintenance repairs are typically **required** after a period of 7 to 10 years to keep the pavement in acceptable condition.

The following tables provide options for AC ("asphalt") and PCC ("concrete") sections. In general, concrete pavement performs better in areas with heavier loads and frequent turning. We have designated two pavement sections based on the traffic loading: light duty pavement for customer parking (cars/light trucks), and heavy-duty pavement for delivery and trash collection trucks. Please refer to the following tables for our pavement design recommendations for each section. Concrete pavements are also more commonly used for truck parking.

For pavement support, the subgrade conditions can often be the overriding factor in pavement performance. The subgrade conditions will depend on the in-situ soils at the subgrade level, characteristics of fill material for the subgrade, as well as site preparation procedures.

The upper five feet of the site consisted of mainly clayey soils. The clayey soils typically have poor drainage characteristics and should be properly prepared and compacted to provide adequate pavement subgrade support. Based on the onsite in-situ soils and typical available imported fills, a California Bearing Ratio (CBR) value of 8 has been estimated.

Asphalt Pavement Design Recommendations

Material	Minimum Section Thickness (inches)	
	Light Duty Section	Heavy Duty Section
	Passenger Vehicle Only (e.g., Auto Parking)	Light Delivery and Truck Traffic Areas
Asphalt Surface Course [1]	2	1.5
Asphalt Intermediate Course [1]	0	2
Aggregate Base Course [1]	6	8
Total Pavement Section	8	11.5

1. Asphalt concrete and base course materials should conform to the following SCDOT material specifications.
2. **Section 305 for Graded Aggregate**
3. Section 401 for Hot Mix Asphalt Concrete Mixture.

Notes:

- Proper surface and subgrade drainage system should be installed to avoid saturation of subgrade soils underneath the asphalt pavements. The site drainage should be designed to maintain the groundwater at least 2 feet below the top of the subgrade.
- Some subgrade soil undercutting and backfilling with suitable structural fill will be required if unstable subgrade soils are encountered during subgrade preparation. The use of geogrid (Tensar BX1100 or equivalent) may be necessary to help reduce the depth of undercut to achieve stability if the unstable subgrade soils extend to greater depths. The need for geogrid and/or the need for undercutting and backfilling should be determined in the field during subgrade preparation.

Concrete Pavement Design Recommendations

Material	Minimum Section Thickness (inches)	
	Light Duty Section	**Heavy Duty Section**
	Passenger Vehicle Only (e.g., Auto Parking)	Passenger Vehicles and Truck (e.g., Entrance/Truck Access Driveways, and Dumpster)
Concrete [1]	5	7
Graded Aggregate Base [2]	4	4

1. The concrete should be **air entrained** and have a **minimum** compressive strength of **4,000** psi after 28 days of lab curing per ASTM C-31.
2. Graded aggregate base should conform to the SCDOT material specification Section 501.

Notes:

- Concrete joints should be **properly sealed** to avoid ingress of surface water into the subgrade soils. Proper surface and **subgrade drainage system should be installed to avoid saturation of subgrade soils underneath the concrete pavements.** The site drainage should be designed to maintain the groundwater **at least 2 feet below** the **top of** the **subgrade**.
- Some subgrade soil **undercutting** and backfilling with suitable structural fill **will be required** if unstable subgrade soils are encountered during subgrade preparation. **The use of geogrid** (Tensar BX1100 or equivalent) **may be necessary to help reduce the depth of undercut** to achieve stability if the unstable subgrade soils extend to greater depths. The need for geogrid and/or the need for undercutting and backfilling should be determined in the field during subgrade preparation.

The above rigid and flexible sections **represent the minimum design thicknesses** and, as such, periodic maintenance should be anticipated. Prior to the placement of the subbase (compacted structural fill), the pavement areas should be thoroughly proofrolled.

Pavement Construction Considerations

Pavement subgrades prepared early in the project should be carefully evaluated as the time for pavement construction approaches. We recommend the pavement areas be rough graded and then thoroughly proofrolled with a loaded tandem-axle dump truck. Particular attention should be paid to high traffic areas that were rutted and disturbed and to the areas where backfilled trenches are located.

Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fill. After proofrolling and repairing subgrade deficiencies, the entire subgrade should be scarified to a depth of 12 inches, and uniformly compacted to at least 95% of the materials' **standard** Proctor maximum dry density.

Pavement and Subgrade Drainage

Poor subgrade drainage is the most common cause of pavement failure. Pavement should be sloped to provide rapid drainage of surface water. Water should not be allowed to pond on or adjacent to the pavement which would saturate the subgrade soils and weaken the subgrade support.

Based on our hand auger boring logs, the groundwater depth was not observed. We recommend the site drainage be designed to maintain the groundwater at least two (2) feet below the top of the subgrade. Pavement subgrade drainage should be installed surrounding the areas anticipated for frequent wetting or having poor natural drainage, such as landscaped islands, along curbs and gutters and around drainage structures.

Pavement Maintenance

The performance of pavements will require regular maintenance. One key consideration of such maintenance is to minimize infiltration of water into the pavement base and subgrade. Preventive maintenance should include crack and joint sealing and patching as well as overall surface sealing and overlay. Additional engineering observation and evaluation is recommended prior to any major maintenance.

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 verify or modify our conclusions in writing.

Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Type of Exploration	Maximum Boring Depth (feet)	Location
1	Standard Penetration Test (SPT) Boring	25	Amphitheater
2		20	Basketball Court Structure
1		15	Detention Pond
3		10	Football Field
2	Hand Auger (HA) Boring	5	Parking Areas
1	Constant Head Infiltration (IR) Test	5	Detention Pond

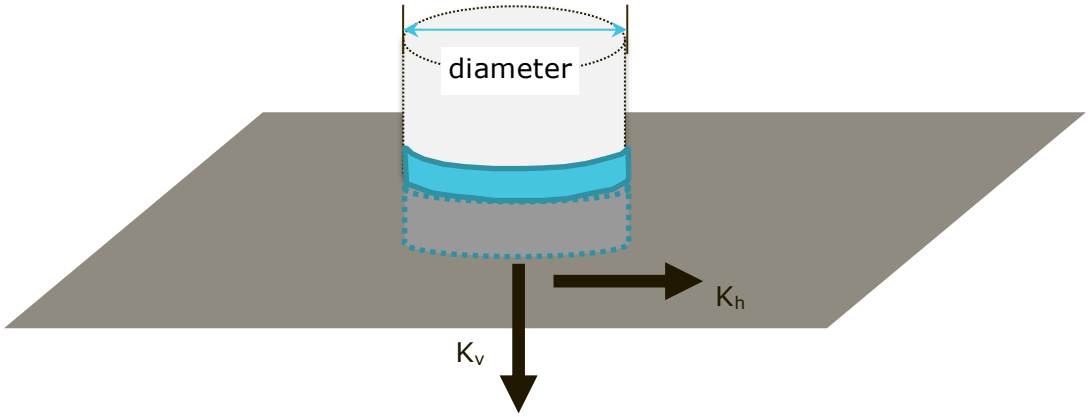
Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ±10 feet) and referencing existing site features. If elevations and a more precise boring layout are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: Soil test borings were performed in accordance with ASTM D1586 with a truck mounted drilling rig using mud rotary techniques. Standard penetration tests (SPT) and sampling were taken at 2-foot intervals in the upper 10 feet and 5 feet intervals thereafter using split-barrel sampling procedures. In the split barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound hammer with a free fall of 30 inches is the standard penetration resistance value (SPT-N). This value is used to estimate the in situ relative density of cohesionless soils and consistency of cohesive soils. Automatic hammer was used to advance the split-barrel sampler in the borings performed on this site.

Hand auger borings were conducted in general accordance with ASTM D1452-80, Standard Practice for Soil Investigation and Sampling by Auger Borings. In this test, hand auger borings are drilled by rotating and advancing a bucket auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The soils are classified in accordance with ASTM D2488.

The infiltration test was conducted in general accordance with ASTM D3385. The test method consists of driving an open cylinder into the ground, filling it with water, and maintaining the water at a constant level. The volume of water added to the cylinder to maintain the water level is the measure of the volume of water that infiltrates the soil.

The volume infiltrated during timed intervals is converted to an incremental infiltration velocity, usually in/hr. and plotted versus elapsed time. The average incremental velocity is equivalent to the infiltration rate.



We also observed the boreholes while drilling and at the completion of drilling for the presence of groundwater. The groundwater level is shown on the attached boring logs. 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 observed 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.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture)
- ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

The laboratory testing program often included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

Site Location Plan

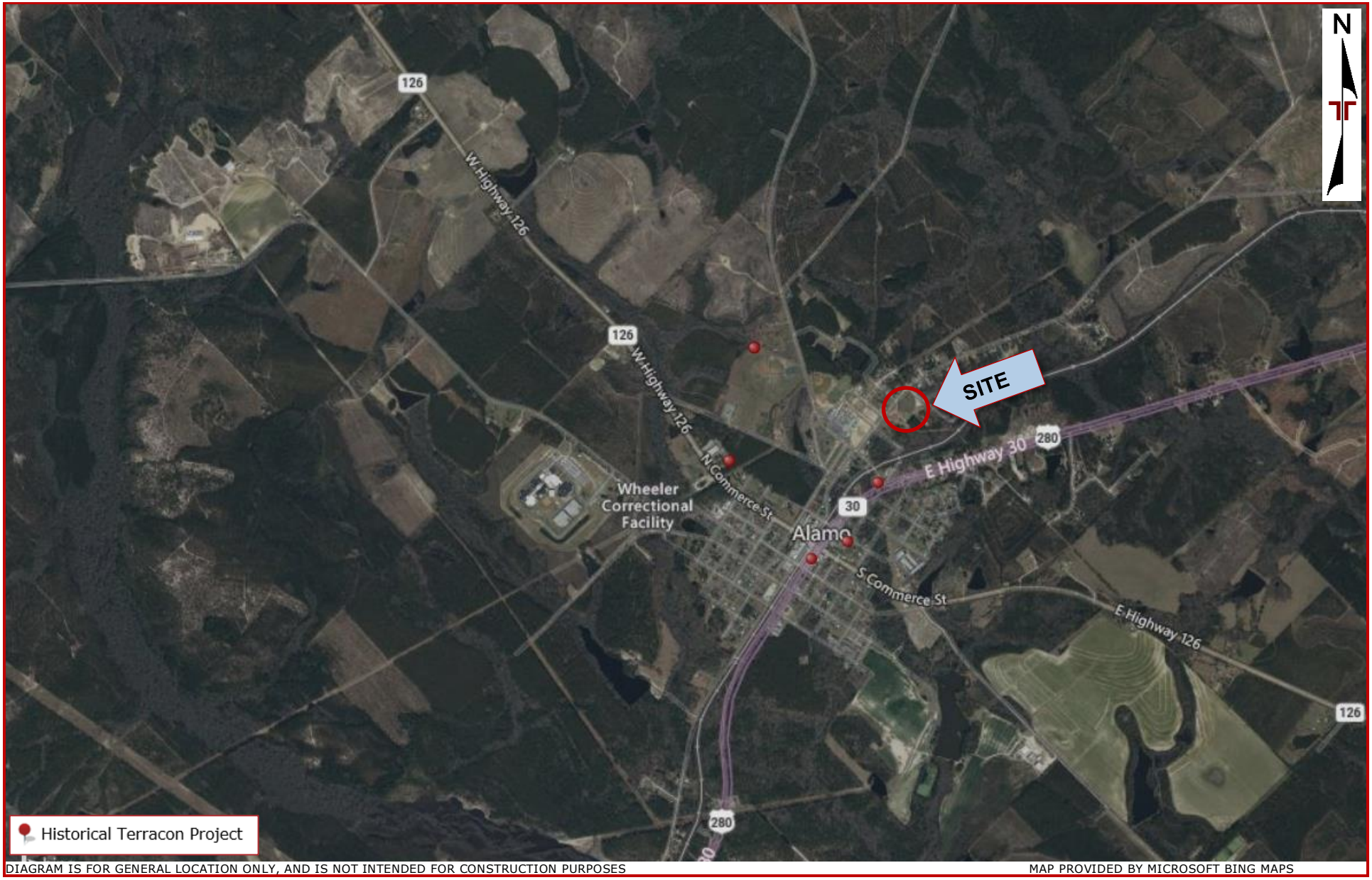


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

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

MAP PROVIDED BY GOOGLE EARTH MAPS

Exploration and Laboratory Results

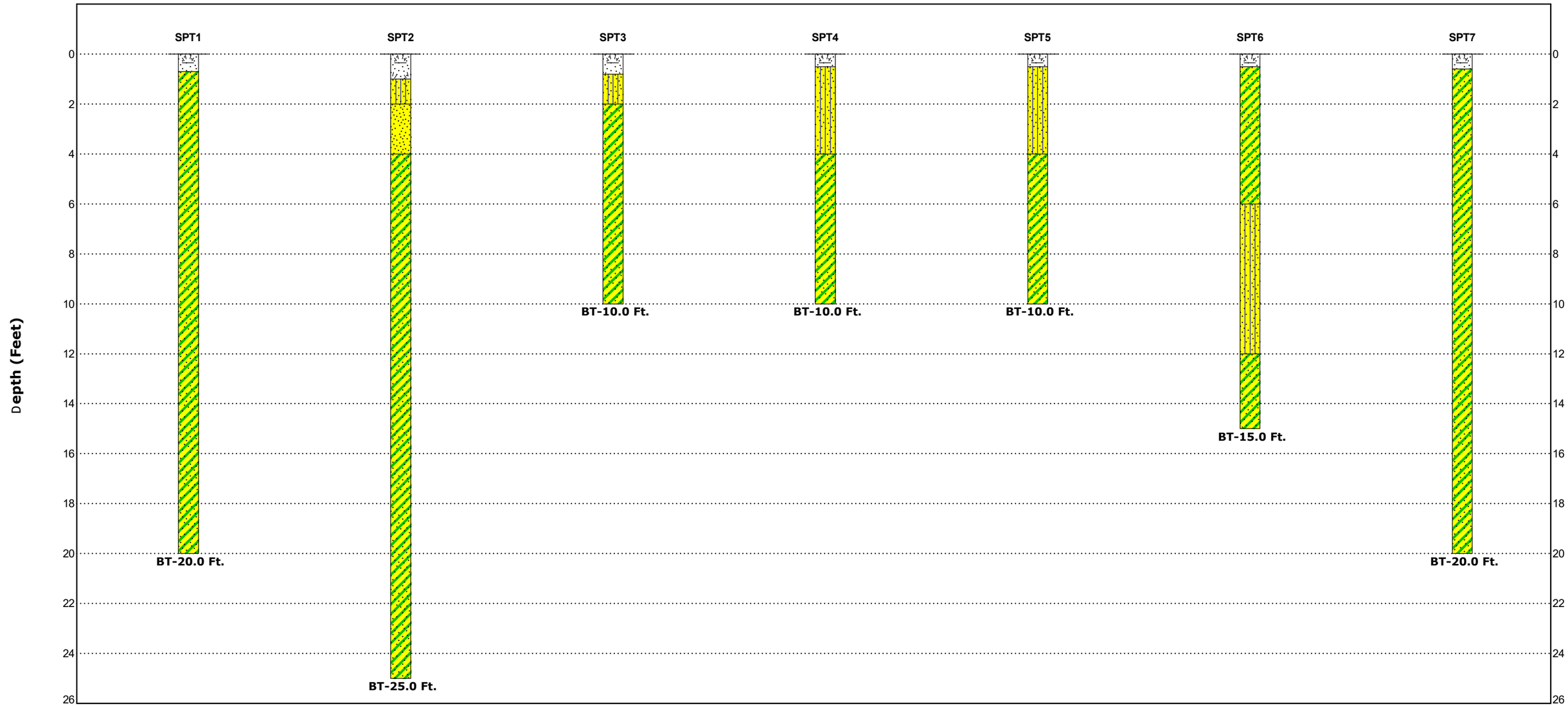
Contents:

Note: All attachments are one page unless noted above.

East Side Park Remodel
East Railroad Street | Alamo, GA
Terracon Project No. ES245082

Subsurface Profile

Terracon
2201 Rowland Ave
Savannah, GA



Notes	Water Level Observations	Explanation	Material Legend
See Exploration Plan for orientation of soil profile. See General Notes in Supporting Information for symbols and soil classifications. Soils profile provided for illustration purposes only. Soils between borings may differ AR - Auger Refusal BT - Boring Termination	Water Level Reading at time of drilling. Water Level Reading after drilling.	SPT1 — Borehole Number Moisture Content — %w LL PL — Liquid and Plastic Limits Sampling (See General Notes) Borehole Lithology AR BT — Borehole Termination Type	Topsoil Clayey Sand Silty Sand Poorly-graded Sand

East Side Park Remodel
East Railroad Street | Alamo, GA
Terracon Project No. ES245082

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. SPT1

Location: See Exploration Plan

Latitude: 32.1543° Longitude: -82.7734°

Graphic Log	Depth (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results
	0.7	**TOPSOIL**, with grass				
		CLAYEY SAND (SC), fine to medium grained, brown/orange, loose				7-5-4-5 N=9
		medium dense				5-7-12-13 N=19
			5			5-8-10-10 N=18
		light brown/orange				10-10-5-6 N=15
						5-5-7-12 N=12
			10			
		light gray/orange				5-7-11 N=18
			15			
						5-6-13 N=19
	20.0		20			
		Boring Terminated at 20 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
Groundwater not encountered

Mottling not encountered

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
Joey

Logged by
LR

Boring Started
04-05-2024

Boring Completed
04-05-2024

Notes

Advancement Method
2.25" Hollow Stem Auger (HSA)

Abandonment Method
Boring backfilled with auger cuttings upon completion.

East Side Park Remodel
East Railroad Street | Alamo, GA
Terracon Project No. ES245082

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. SPT2

Location: See Exploration Plan

Latitude: 32.1544° Longitude: -82.7726°

Depth (Ft.)	Graphic Log	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results
1.0		**TOPSOIL**, with grass				2-2-3-4 N=5
2.0		**SILTY SAND (SM)**, fine grained, dark brown, loose				
4.0		**POORLY GRADED SAND (SP)**, fine to medium grained, brown, loose				1-2-2-2 N=4
		CLAYEY SAND (SC), brown/orange, loose	5			2-2-2-2 N=4
		medium dense				6-5-10-9 N=15
		light gray/brown/orange, dense				2-4-9-12 N=13
		fine to medium grained, light gray/brown/orange, medium dense	10			5-6-7 N=13
		fine to medium grained, light gray/orange, very dense	15			13-50/6"
25.0			20			12-50/5"
		Boring Terminated at 25 Feet	25			

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
Groundwater not encountered

Mottling not encountered

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
Joey

Logged by
LR

Boring Started
04-05-2024

Boring Completed
04-05-2024

Notes

Advancement Method
2.25" Hollow Stem Auger (HSA)

Abandonment Method
Boring backfilled with auger cuttings upon completion.

East Side Park Remodel
East Railroad Street | Alamo, GA
Terracon Project No. ES245082

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. SPT3

Location: See Exploration Plan

Latitude: 32.1553° Longitude: -82.7729°

Graphic Log	Depth (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results
	0.8	**TOPSOIL**, with grass				
	2.0	**SILTY SAND (SM)**, fine grained, dark brown, loose				2-3-3-2 N=6
		CLAYEY SAND (SC), brown/orange, loose				2-4-3-3 N=7
		loose	5			5-3-5-7 N=8
		medium dense				5-7-9-12 N=16
		medium dense				3-3-10-11 N=13
	10.0	***Boring Terminated at 10 Feet***	10			

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
Groundwater not encountered

Mottling not encountered

Notes

Advancement Method
2.25" Hollow Stem Auger (HSA)

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
Joey

Logged by
LR

Boring Started
04-05-2024

Boring Completed
04-05-2024

East Side Park Remodel
East Railroad Street | Alamo, GA
Terracon Project No. ES245082

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. SPT4

Location: See Exploration Plan

Latitude: 32.1550° Longitude: -82.7725°

Graphic Log	Depth (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results
	0.5	**TOPSOIL**, with grass				
		SILTY SAND (SM), fine grained, dark brown, loose				2-2-4-5 N=6
		brown				3-4-3-3 N=7
	4.0	**CLAYEY SAND (SC)**, brown, loose	5			3-2-1-2 N=3
		light gray/orange, very dense				8-6-7-11 N=13
		fine to medium grained, light gray/orange				2-5-12-15 N=17
	10.0	***Boring Terminated at 10 Feet***	10			

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
Groundwater not encountered

Mottling not encountered

Notes

Advancement Method
2.25" Hollow Stem Auger (HSA)

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
Joey

Logged by
LR

Boring Started
04-05-2024

Boring Completed
04-05-2024

East Side Park Remodel
East Railroad Street | Alamo, GA
Terracon Project No. ES245082

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. SPT5

Location: See Exploration Plan

Latitude: 32.1547° Longitude: -82.7722°

Graphic Log	Depth (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results
	0.5	**TOPSOIL**, with grass				
		SILTY SAND (SM), fine grained, brown, loose				2-2-4-5 N=6
	4.0					3-4-4-6 N=8
		CLAYEY SAND (SC), brown/orange, loose	5			2-1-3-4 N=4
		light gray/orange, very stiff				8-10-10-50/-1"
		light brown/orange, hard				3-18-50/3"
	10.0		10			
		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.

Water Level Observations
Groundwater not encountered

Mottling not encountered

Notes

Advancement Method
2.25" Hollow Stem Auger (HSA)

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
Joey

Logged by
LR

Boring Started
04-05-2024

Boring Completed
04-05-2024

East Side Park Remodel
East Railroad Street | Alamo, GA
Terracon Project No. ES245082

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. SPT6

Location: See Exploration Plan

Latitude: 32.1542° Longitude: -82.7714°

Graphic Log	Depth (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results
	0.5	**TOPSOIL**, with grass				
		CLAYEY SAND (SC), brown/orange, loose				3-3-4-5 N=7
		very dense				11-50/5"
		light gray/orange, medium dense	5			7-8-11-13 N=19
	6.0					
		SILTY SAND (SM), with low clay, fine grained, light gray/orange				7-6-8-9 N=14
		loose				5-4-5-6 N=9
	12.0		10			
		CLAYEY SAND (SC), light gray/orange, very dense				5-6-12 N=18
	15.0		15			
		Boring Terminated at 15 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
Groundwater not encountered

Mottling not encountered

Notes

Advancement Method
2.25" Hollow Stem Auger (HSA)

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
Joey

Logged by
LR

Boring Started
04-05-2024

Boring Completed
04-05-2024

East Side Park Remodel
East Railroad Street | Alamo, GA
Terracon Project No. ES245082

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. SPT7

Location: See Exploration Plan

Latitude: 32.1545° Longitude: -82.7737°

Graphic Log	Depth (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results
	0.6	**TOPSOIL**, with grass				
		CLAYEY SAND (SC), brown, loose				
		fine to medium grained, brown/orange, medium dense				2-3-3-5 N=6
						9-13-13-15 N=26
			5			5-8-12-13 N=20
						4-5-7-5 N=12
		gray/orange, medium dense				4-7-5-9 N=12
			10			
						5-7-8 N=15
			15			
		brown/orange, medium dense				6-12-17 N=29
	20.0		20			
		Boring Terminated at 20 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
Groundwater not encountered

Mottling not encountered

Drill Rig
CME-550X

Hammer Type
Automatic

Driller
Joey

Logged by
LR

Boring Started
04-05-2024

Boring Completed
04-05-2024

Notes

Advancement Method
2.25" Hollow Stem Auger (HSA)

Abandonment Method
Boring backfilled with auger cuttings upon completion.

East Side Park Remodel
East Railroad Street | Alamo, GA
Terracon Project No. ES245082

2201 Rowland Ave
Savannah, GA

Boring Log No. HA1

Location: See Exploration Plan

Latitude: 32.1545° Longitude: -82.7734°

Graphic Log	Depth (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type
	0.5	**TOPSOIL**, with grass, fine grained, dark brown, silty sand			
	1.0	**CLAYEY SAND (SC)**, brown/orange and orange	1		
	1.7	**SILTY SAND (SM)**, fine grained, brown			
	5.0	**CLAYEY SAND (SC)**, brown/orange and orange with light gray mottling	2 3 4		
		Boring Terminated at 5 Feet	5		

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
Groundwater not encountered

Mottling encountered @ 0.5 ft BGS

Drill Rig
Hand Auger

Driller

Logged by
LV

Boring Started
04-03-2024

Boring Completed
04-03-2024

Notes

Advancement Method
Manual Advance

Abandonment Method
Boring backfilled with auger cuttings upon completion.

East Side Park Remodel
East Railroad Street | Alamo, GA
Terracon Project No. ES245082

2201 Rowland Ave
Savannah, GA

Boring Log No. HA2

Location: See Exploration Plan

Latitude: 32.1546° Longitude: -82.7730°

Graphic Log	Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type
	TOPSOIL, fine grained, dark brown, silty sand			
	0.5			
	POORLY GRADED SAND (SP), medium grained, brown	1		
		2		
	3.0	3		
	CLAYEY SAND (SC), brown/orange			
		4		
	5.0	5		
	Boring Terminated at 5 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
Groundwater not encountered

Mottling encountered @ 3 ft BGS

Drill Rig
Hand Auger

Driller

Notes

Advancement Method
Manual Advance

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
LV

Boring Started
04-03-2024

Boring Completed
04-03-2024

East Side Park Remodel
East Railroad Street | Alamo, GA
Terracon Project No. ES245082

Terracon
2201 Rowland Ave
Savannah, GA

Boring Log No. IR1

Location: See Exploration Plan

Latitude: 32.1543° Longitude: -82.7716°

Graphic Log	Depth (Ft.)		Depth (Ft.)	Water Level Observations	Sample Type
	0.5	**TOPSOIL**, with grass, fine grained, dark brown, silty sand			
	5.0	**CLAYEY SAND (SC)**, fine to medium grained, brown/orange light gray/brown/orange	1 2 3 4 5		
		Boring Terminated at 5 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
Groundwater not encountered

Mottling not encountered

Drill Rig
Hand Auger

Driller

Notes

Advancement Method
Manual Advance

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Logged by
LV

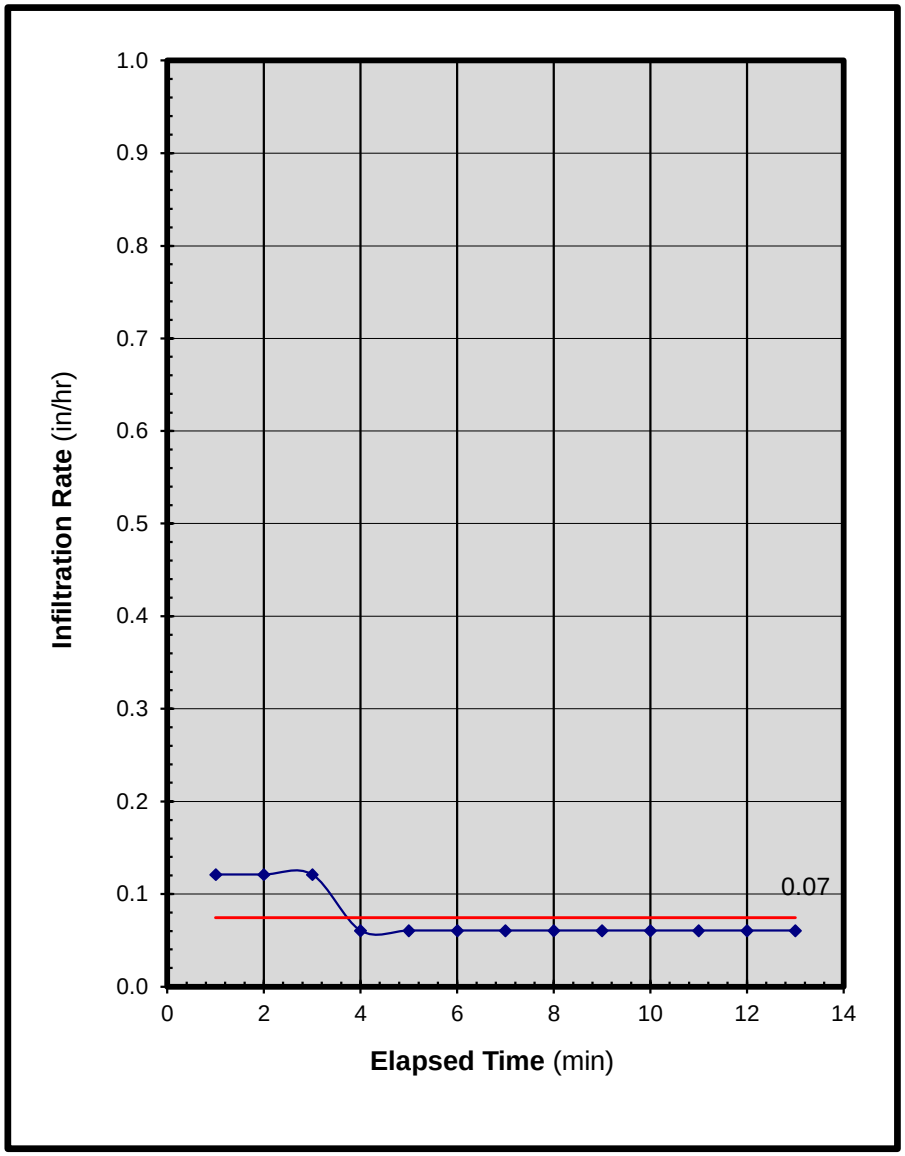
Boring Started
04-03-2024

Boring Completed
04-03-2024

CONSTANT HEAD INFILTROMETER TEST

Location: IR1

Elapsed Time	Quantity of Water	Infiltration Rate
(min)	(ml)	(in/hr)
5	20	0.12
10	20	0.12
15	20	0.12
20	10	0.06
25	10	0.06
30	10	0.06
35	10	0.06
40	10	0.06
45	10	0.06
50	10	0.06
55	10	0.06
60	10	0.06
65	10	0.06
Average (in/hr)		0.07



Soil Profile from Hand Auger Boring Performed Next to Test	
Depth (inch, BGS)	**Soil Description**
0 to 6	Topsoil: dark brown fine to medium grained silty sand (SM) with grass
6 to 36	Brown/orange fine to medium grained clayey sand (SC)
36 to 60	Light gray/brown/orange fine to medium grained clayey sand (SC)
Boring termination depth (in., BGS) = 60	
Groundwater depth (in., BGS) = Not encountered	
Mottling depth (in., BGS) = Not encountered	
Note: BGS = Below Ground Surface	

Test Data
Test Location: IR01
Diameter of Casing (in): 4
Pipe Stick up Above Ground (in): 11
Test Depth (in): 60
Head Maintained Above Test Depth (in): 71
Date Performed: 45385
Performed By: LR/MA
Infiltration Rate (in/hr): 0.07

Terracon
Explore with us
2201 Rowland Ave.
Savannah, GA 31404

Project Name: East Side Park Remodel
Project No.: ES245082
Location: Alamo, GA

Supporting Information

Contents:

Seismic Design Parameters
General Notes
Unified Soil Classification System

Note: All attachments are one page unless noted above.

Seismic Design Parameters Based on IBC2018 Code and ASCE 7-16 Standard

Terracon Project Name: East Side Park Remodel
Terracon Project No: ES245082

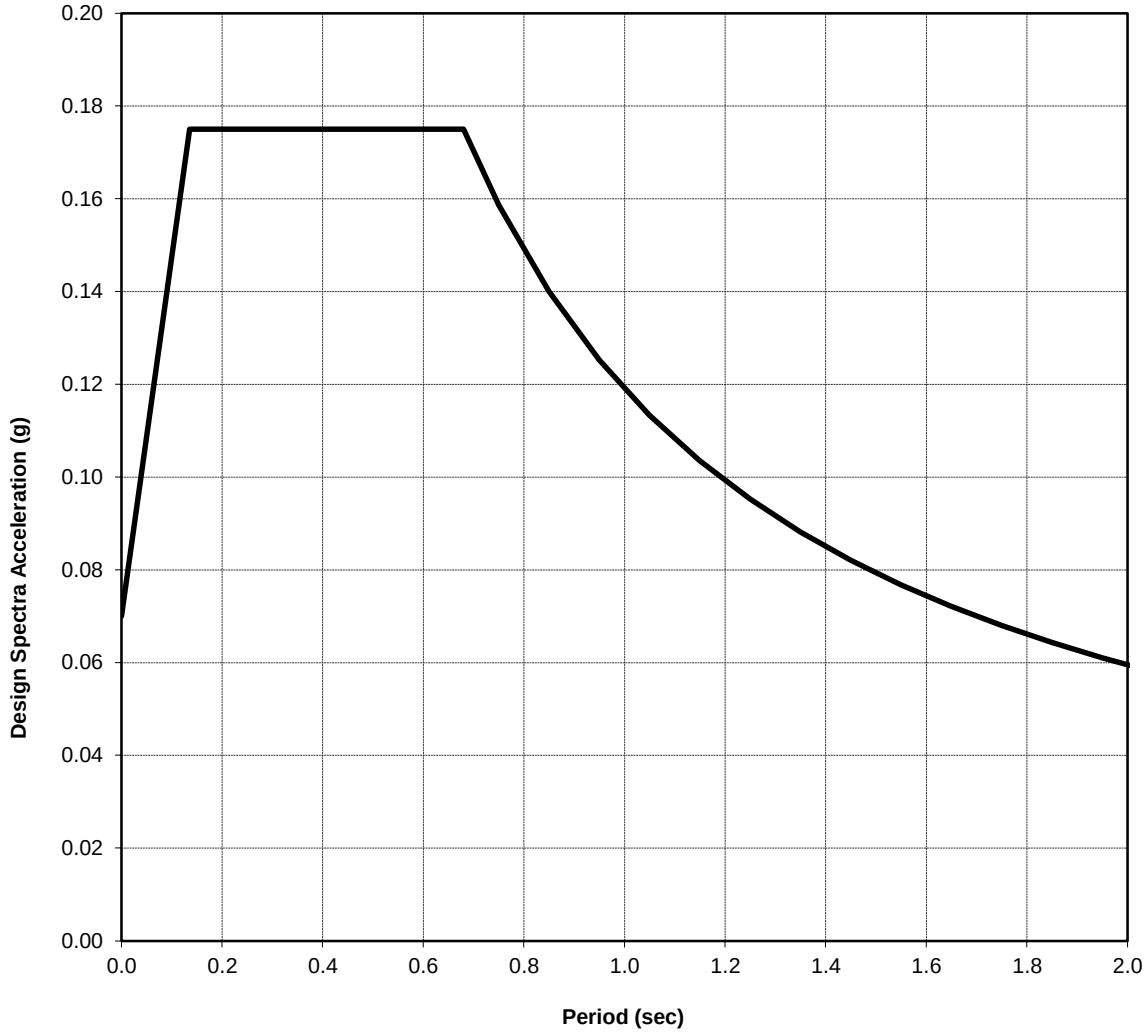
Site Location: Alamo, Georgia
Latitude : 32.1537°
Longitude : -82.7746°

Site Class: **D**

Design Response Spectrum for the Site Class

S_s =	0.164	S_1 =	0.075
F_a =	1.600	F_v =	2.400
S_{MS} =	0.263	S_{M1} =	0.179
S_{DS} =	0.175	S_{D1} =	0.119

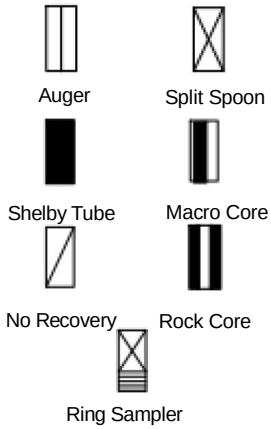
	Period (sec)	Sa (g)
	0.000	0.070
T_0 =	0.136	0.175
	0.200	0.175
T_S =	0.680	0.175
T =	0.750	0.159
	0.850	0.140
	0.950	0.125
	1.050	0.113
	1.150	0.103
	1.250	0.095
	1.350	0.088
	1.450	0.082
	1.550	0.077
	1.650	0.072
	1.750	0.068
	1.850	0.064
	1.950	0.061
	2.050	0.058
	2.150	0.055



GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING



GROUNDWATER

- Groundwater Initially Encountered
- Groundwater Level After a Specified Period of Time
- Static Groundwater Level After a Specified Period of Time
- No Groundwater Observed

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

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. 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 Includes gravels, sands and silts.		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)	Std. Penetration Resistance (blows per foot)	Descriptive Term (Consistency)	Undrained Shear Strength (kips per square foot)	Std. Penetration Resistance (blows per foot)
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	5 - 7
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 14
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	above 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Descriptive Term(s) of other constituents	Percent of Dry Weight
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 4 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 above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	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:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	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] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[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.