



Shelby County Airport Mass Storage Hangar T

ADDENDUM NO. 3

Date: September 22, 2023

RE: Shelby County Airport Mass Storage Hangar T

BID DATE AND TIME:

Thursday, October 5, 2023 at 2:00 p.m.

Location for the bid opening remains the Shelby County Manager's Office, located at 200 West College Street, Room 123, Columbiana, Alabama, 35051

General:

- The Mandatory Pre-Bid Conference Meeting Notes and Sign-In Sheet is included in this addendum.
- The Geotechnical Report for this project is attached. Geotechnical Investigations were conducted by Terracon at this site in July 2023 (report finalized and dated August 11, 2023). The subsequent report is hereby attached. It is understood and agreed that such sub-surface information was obtained and is intended for the Owner's design and estimating purposes only. Such information has been made available for the convenience of all bidders. It is further understood and agreed that each bidder is solely responsible for all assumptions, deductions, or conclusions which he may make or obtain from his examination of the boring logs and other records of subsurface investigations and tests that are furnished by the Owner.

Substitution Request:

- SS-295 Pre-Engineered Metal Hangars – 1.2 – ACI Building Systems – APPROVED

Questions and Clarifications:

Q1 – The specifications call for a 4 foot tall brick façade on the east facing exterior wall of the hangar in Section SS-295-1.6(c.). Please provide information regarding brick and mortar color if available?

A1 – The color required is Acme - Red Richmond with gray mortar or approved equivalent. One supplier that can supply this product locally is Acme Brick (Contact – Mark Bailey 205-445-3526).

Q2 – Is the contractor responsible for any of the inspections during construction?

A2 – The County will provide and pay for the required special inspections / testing as described in Specifications Section 295-7.2. The contractor shall be responsible for paying for the testing and inspections as described in Specifications Section 295-7.2. The contractor shall be responsible for obtaining and paying for the building permit. The building permit shall be obtained from the Shelby County Department of Development Services (Contact – Patrick Anderson 205-620-6650). The contractor will be responsible for coordination of all required inspections during construction. The contractor will also be responsible for supplying the building certification.

Q3 – Is the contractor responsible for direct payment to any utilities?

A3 – The County will pay utilities directly for cost associated with permanent service. The contractor will be responsible for all temporary power required during construction.

Q4. – In Specification Section 80-02 it states that contract time will begin 10 days after the notice to proceed (NTP) is issued, will time be allowed to obtain materials.

A4. – Yes, time will be allowed for procurement of materials. After the contract is executed and the notice to proceed is issued, 120 calendar days will be allowed for materials procurement, after which time the 120 calendar days allowed for contract time of performance shall begin.

Q5. – On plan sheet CU-1.00 Utility Plan – Note 1 says all water lines, meters and hydrants to be installed by the local utility company. Please clarify as to this scope of work.

A5. – This only includes water main, meter and fire hydrants that are owned by the local water utility. The frost proof hydrant and the required water line that serves it from the frost proof hydrant to the water meter are included in the project scope and are to be included in the bid.

Q6. - In the spec section for the metal building mass hangar, it calls for a 4' tall wainscot of brick veneer on the east side of the building. Please confirm this is the side facing Weathervane Road (true East) and not the shorter end of the building (plan east).

A6. – The side that requires the brick façade is the long side of the building facing Weather Vane Road / I-65.

Q7. – If rock is encountered will a change order be executed to address its removal?

A7. – The geotechnical report does not indicate rock. However if rock is encountered the County will perform its removal or issue a change order to the contractor for that required work.

Q8. – Can you provide a structural detail for the building slab?

A8. – The building foundation and slab design shall be the responsibility of the contractor as required in Specification Section 295-24.1.

Q9. – Will exterior building signage be required?

A9. – No, exterior building signage will not be required.

Q10. – Will there be on-site indoor storage available for building insulation?

A10. – Yes, the Airport can make limited indoor space available for insulation storage during the construction phase of the project. Indoor storage will not be available before construction is scheduled to begin. The available space is to be inspected by bidding contractors and if additional indoor space is required for storage of construction materials (i.e. insulation) it is the responsibility of the contractor to provide that required storage on or offsite.

Q11. – Does this project require Buy American certifications?

A11. – Yes, Buy American certifications are required. Below is a link to the current list of nationwide waivers [Nationwide Buy American Waivers Issued | Federal Aviation Administration \(faa.gov\)](#)

Q12. – Are there any on-site borrow sources available?

A12. – Yes, on-site borrow locations are available on the north end of the airfield. The contractor shall use their own judgement as to the suitability of these materials. Upon completion of excavation for borrow material, the contractor shall be required to dress, seed and restore the area to a suitable stable and maintainable condition. Any permitting required by ADEM for said borrow pit is the responsibility of the contractor.

Q13. – Are there any requirements for the bid envelope?

A13. – Yes, the outside of the sealed bid envelope should state “SEALED BID” and include the following minimum details:

Project Name (Mass Storage Hangar T), Contractor's Name and State Licensing Number

Pre-Bid Meeting Notes For the Shelby County Airport in Calera, Alabama

2023 Mass Storage Hangar T Construction Project

September 21, 2023 2:00 PM

- ➔ REMINDER: Bids due on Thursday, October 5, 2023 by 2:00 PM CST at the County Manager's Office, located at 200 West College Street, Columbiana, AL 35051. (not the airport). Send bids to the attention of Trey Gauntt.

Pre-Bid Meeting Agenda

I. Introductions & Registration of Attendees

Project/Grant Oversight

Inez Williams, FAA

Frank Farmer, ALDOT

Taylor Janney, ALDOT

Project Sponsor – Shelby County, AL

Chad Scroggins County Manager

Trey Gauntt Facilities & General Services Manager

Terry Franklin Facilities & General Services Aviation Supervisor

Project Administration

Jennifer Hunt Harp Garver, Project Manager

II. Project Overview

1. Explanation of Mass Storage Hangar Construction Project

- General site grading, and drainage pipe, flume and inlet installation
- Asphalt milling within apron reconstruction area
- Asphalt apron construction and asphalt apron overlay
- Construction of 147x80 Mass Storage Hangar along the existing apron
- Installation of Top-Guided, Bottom-Rolling, Bi-Parting Hangar Doors and Operators.
- Electrical connections and installation of hangar lighting
- Construction of concrete hangar access ramps and sidewalk
- Installation of gutters and roof drain system
- Installation of restroom stub-outs
- Installation of waterline and yard hydrant

2. Contract Time

Contract Time shall be limited to One Hundred Twenty (120) Consecutive Calendar Days

3. Project Phasing

The runway shall remain open for the duration of the project; the apron immediately adjacent to the project site will remain closed for the duration of the project. The contractor shall coordinate with the Airport to allow intermittent access to the adjacent hangar, with Airport escorts, etc. The area shall be temporarily closed during periods of hauling & paving.

No existing pavement to remain may be utilized for storage or staging. All haul routes will be approved by the Engineer prior to use.

All safety features shown on the plans shall be implemented prior to beginning work.

All erosion control shall be implemented prior to beginning work.

Aircraft shall have right of way at all times.

No equipment, personnel, vehicles or storage of materials shall be installed within the object free area of open airfield pavement. (i.e. 250' of runway centerline & 65.5' of taxiway centerline)

4. Items of Work

- a. Federal Aviation Administration technical specifications in conjunction with the Alabama Department of Transportation Standard Specifications for Highway Construction will be utilized on this project as well as several supplemental specifications.
- b. Hangar construction utilizes performance specification, SS-295.

5. Project is funded by the FAA, ALDOT Aeronautics Bureau and Shelby County.

- a. DBE Requirement – 3.40%
- b. Davis Bacon Wage Rates apply - Certified Payroll Reports will be required.
- c. Documentation of Enrollment in E-Verify will be required with Contract.

6. Additional Plan Clarifications:

- a. N/A

III. Construction Process

1. Contractors Staging Area shall be within the footprint of the overall project. Access shall be from the south Terminal gate. Any changes must be approved by the Engineer and the Owner prior to the beginning of construction.
2. Contractor's Safety Requirements – Temporary Marking, Lighting & Barricades as shown on the Construction Safety and Phasing Plan (CSPP), Sheet GC0.01-GC1.01. Contractor shall also be familiar with and follow the latest version of FAA Advisory Circular 150/5370-2, Operational Safety on Airports During Construction.

* Contractor will make himself familiar with the Airport safety areas as described in AC 150/5370-2 and the Contract Documents and be responsible for maintaining the integrity of these safety areas during the construction of the project.
3. Coordination with Airport staff: The Contractor shall maintain continual communication with the airport via the Engineer to ensure coordination of the project with daily airport activities.
4. Construction Inspection: Site is monitored daily by the County/Airport. Construction inspection will likely include periodic site visits timed to coincide with project milestones and FAA/ALDOT inspections.
5. Liquidated damages: \$200/ calendar day.
6. Change orders: All changes orders shall be approved and executed prior to beginning work on the change order.
7. Payments: Construction invoices to be submitted by the contractor every 30 days. Lump sum items will be paid based on percent complete at the time of the invoice. 10% retainage will be held until substantial completion. Estimated turnaround time on invoices is 6-8 weeks.

IV. Basis of Award of Project

The proposal selected will be based on the lowest bid submitted.

The Owner reserves the right to reject a bidder's proposal if irregular or otherwise disqualified. In addition, until the award of a contract is made, the Owner reserves the right to reject any or all proposals, waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the

Owner's best interests. Award of contract will be pending FAA, ALDOT and County review.

1. Required items to be included with the bid:

- a. Bid Form/Proposal (all pages, including unit Price Schedule)
- b. Bid Bond (5%)
- c. List of Proposed Subcontractors (with Erector Experience description)
- d. Statement of Bidder's Qualifications
- e. DBE Participation Reporting Form (3.40%)
- f. Bidder's Certification Forms
- g. Insurance Certification
- h. Copy of State Contractors' License

2. Required items for award of contract:

- a. All items listed above
- b. Performance Bond
- c. Payment Bond
- d. Contract
- e. Application for Sales and Use Tax Certificate of Exemption
- f. Signed e-Verify Enrollment MOU

V. Miscellaneous Items & Open Discussion of Project

- a. There are currently 2 addenda.
- b. CAD file available upon request and submittal of File Transfer Agreement.
- c. Geotechnical Data also available upon request.

VI. Meeting Adjourned / Optional Site Review



Shelby County Airport – Mass Hangar T Construction Project
Shelby County, AL

Pre-Bid Meeting

Thursday, September 21, 2023 – 2:00 pm

SIGN-IN SHEET

Name	Representing	Phone #	Email
DANIEL G PALMER	HANGARS & DOORS UNLD	205-533-2347	HANGARS AND DOORS@gmail.com
BRAO DAVIS	SHELBY COUNTY	205-729-3702	BD DAVIS@SHELBYAL.COM
Trey Gannett	Shelby Co.	205-475-7145	trey@shelbyal.com
Pat Streetman	milam & CO.	205-833-5691	lauren@milamandco.com
JOE ZALEWSKI	JD MORRIS CONST	205-296-4527	JOE@JDMORRISCONSTRUCTION.COM
TRENT LANGLEY	JONES CONTRACTING, INC	256-601-8793	trent@jonescontractingal.com
Russ Jones	Jones Contracting, Inc	256-878-1229	Russ@jonescontractingal.com
FRED PREISS	WILLIFORD ORMAN CONST	205 620-0644	FRED@WILLIFORD-ORMAN.COM
JAKE CARROLL	DUNN BUILDING COMPANY	205-503-3952	jcarroll@dunnbuildingcompany.com
Lance Edwards	Lawler Bldg Systems	205-665-7914	lanceedwards@lawlerspecialties.com
Katie Newell	Parke & Eleazer	205 919 2556	luke@parkeleazer.com



SIGN-IN SHEET

Name	Representing	Phone #	Email
Russ Stone	Coston GC	205.475.3516	russ@costongc.com
Rusty Gentry	Bennett Bldg	251 908 7767	rusty@bennettbuilds.com
JACOB PENNINGTON	CDBC	205-914-9271	jpennington@clementsdean.com
Justin Dean	CDBC	205-356-3503	jdean@clementsdean.com
Josh Beane	Wyatt	205 985 0121	Estimating@wyatthbuilds.com
NATHANIAL WILLIAMS	MUMFORD ENTERPRISES INC	205 966 1747	ENTERPRISES.COM
Jennifer Harp	Garver	256-537-4121	JHHarp@GarverUSA.com

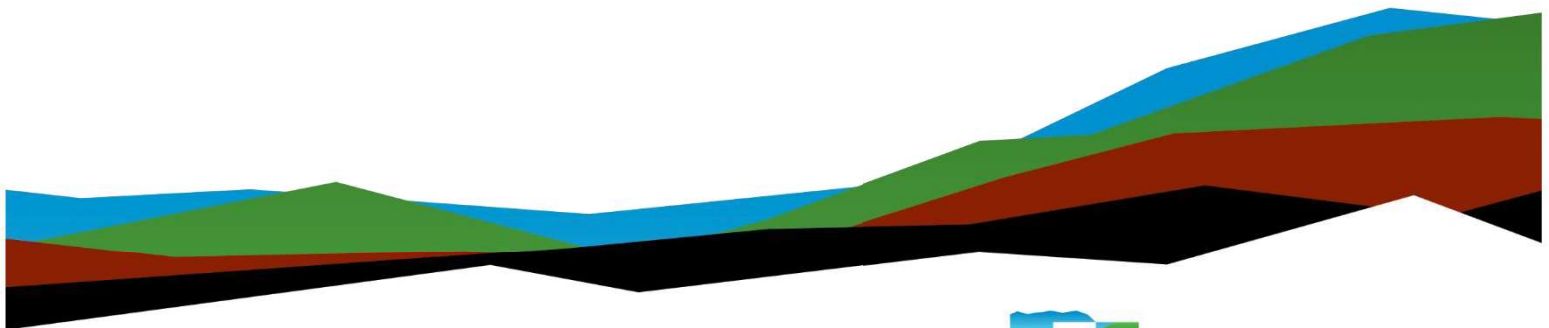
Shelby County Airport Mass Hangar T

Geotechnical Engineering Report

August 11, 2023 | Terracon Project No. E1235124

Prepared for:

Shelby County Department of
Facilities and General Services
280 McDow Road
Columbiana, Alabama



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August 11, 2023

Shelby County Department of Facilities and General Services
280 McDow Road
Columbiana, Alabama 35051

Attn: Mr. Trey Gauntt
Chief Facilities Management Officer

Re: Geotechnical Engineering Report
Shelby County Airport Mass Hangar T
Calera, Alabama
Terracon Project No. E1235124

Dear Mr. Gauntt:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. PE1235124 dated June 26, 2023. 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



Bryan C. Ritehour, P.E.

Senior Engineer

A handwritten signature in black ink, appearing to read 'Matthew S. McCullough'.

Matthew S. McCullough, P.E.

Manager, Geotechnical Services

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Supporting Information

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

Geotechnical Engineering Report

Shelby County Airport Mass Hangar T | Calera, AL
August 11, 2023 | Terracon Project No. E1235124



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.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed Mass Hangar T at the Shelby County Airport in Calera, Shelby County, Calera, AL. 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

The geotechnical engineering Scope of Services for this project included the advancement of 6 test borings, laboratory testing, engineering analysis, and preparation of this report.

Exhibits 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 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 site location and Geotechnical RFP were provided by Mr. Trey Gauntt via email.
Project Description	The project will consist of a new 149 ft. by 80 ft. Mass Hangar at the Shelby County Airport.
Building Construction	Steel framed with a concrete slab on grade
Finished Floor Elevation	Assume to match the existing adjacent buildings

Item	Description
Maximum Loads	<ul style="list-style-type: none"> ■ Walls: 2 kips per linear foot (klf) ■ Columns: 50 kips
Grading/Slopes	No grading plan has been provided. Finish grades are assumed to be within 2 feet of the existing ground surface.
Below-Grade Structures	None
Free-Standing Retaining Walls	None
Pavements	New asphalt pavement will be constructed fronting the hangar. We understand the pavement will be designed by others.

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	<p>The project site is located at the existing Shelby County Airport in Calera, AL.</p> <p>Latitude/Longitude (approximate) 33.1749° N, 86.7803° W (See Site Location)</p>
Existing Improvements	Asphalt pavement and existing hangar
Current Ground Cover	Asphalt
Existing Topography	Relatively level

Geotechnical Characterization

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the [Exploration Results](#) and the GeoModel can be found in the [Figures](#) attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	Surface Layer	Asphalt (3"); Thickness may vary between boring locations
2	Soft Native Soils	Sandy Silt (ML) or Sandy Lean Clay (CL), brown, or medium to dark gray, soft to medium stiff
3	Medium Stiff to Hard Native Soils	Sandy Lean Clay (CL), brown or yellowish brown with light gray, medium stiff to hard

The borings were advanced in the dry using a hollow stem auger drilling technique that allows short term groundwater observations to be made while drilling. Groundwater was not encountered within the maximum drilling depth at the time of our field exploration. Groundwater conditions may be different at the time of construction. Groundwater conditions may change because of seasonal variations in rainfall, runoff, and other conditions not apparent at the time of drilling. Long-term groundwater monitoring was outside the scope of services for this project.

Site Geology

Published geologic maps indicate the site is underlain by the Chepultepec and Copper Ridge Dolomites Undifferentiated geologic formation. The Chepultepec and Copper Ridge Dolomites Undifferentiated consists of light-gray to dark-bluish-gray thick-bedded dolomite and interbedded light-gray limestone that includes abundant chert. The Chepultepec and Copper Ridge Dolomites Undifferentiated is a carbonate-based rock geology and is therefore soluble in slightly acidic groundwater. Weathering is typified by a chemical solutioning process that progresses along joints, fractures and bedding

planes in the bedrock. Internal erosion can also occur around chert cobbles and boulders within the soil mass. This process often results in a highly irregular rock profile that contains deep weathered slots filled with soft soils. Voids or caves may also be present in the bedrock. The weathering of the bedrock and subsequent collapse or erosion of the overburden into these openings results in what is referred to as karst topography. Any construction in karst topography is accompanied by some degree of risk for future internal soil erosion and ground subsidence that could affect the stability of the proposed structure.

Although no evidence of sinkhole activity was observed during our subsurface exploration on the proposed site, it should be noted that this study does not preclude the possibility of future sinkhole occurrence within the area. Even an extensive drilling exploration program could not rule out the possibility of future sinkhole formation at the site. The owner must accept that there is some degree of risk in developing over carbonate rock geology.

Seismic Site Class

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site 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 and the International Building Code (IBC). Based on the soil/bedrock properties observed at the site and as described on the exploration logs and results, our professional opinion is for that a **Seismic Site Classification of D** be considered for the project. Subsurface explorations at this site were extended to a maximum depth of 15.5 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

Geotechnical Overview

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations provided in this report are implemented in the design and construction phases of this project.

Beneath the surface material (about 3 inches of asphalt), the borings encountered native soils. At borings B-2 through B-5, the upper native soils were generally soft with N-values ranging from 2 to 5 blows per foot. The soft soils extended to depths ranging from about 3 to 9 feet below the ground surface. Generally, stiff to very stiff native soils

were encountered beneath the asphalt at borings B-1 and B-6, and beneath the soft native soils at the other boring locations.

Based on the conditions encountered and estimated load-settlement relationships, we recommend that the proposed structure be supported on conventional continuous or spread footing foundations bearing on the medium stiff to very stiff native soils (Geomodel Layer 3). Therefore, the footings should be excavated through the soft native soils. The overexcavation can be backfilled to the design bearing elevation with lean concrete or flowable fill. The following table indicates the estimated depth of suitable bearing material at the boring locations.

Boring No.	Estimated Depth To Suitable Bearing Below Existing Ground
B-1	1.5 feet
B-2	3 feet
B-3	3 to 5 feet
B-4	3 feet
B-5	9 feet

In floor slab and pavement areas, after the demolition and removal of the existing asphalt as required by Project Specifications, but prior to placing any new fill, the subgrade should be compacted and subsequently proof-rolled with an adequately loaded vehicle such as a loaded tandem-axle dump truck. The proof-rolling should be performed under the observation of the Geotechnical Engineer and other members of the design team wanting to attend. Areas deflecting under the proof-roll should be delineated and subsequently addressed by the Geotechnical Engineer. Such unstable areas will require moisture conditioning (i.e., drying) and recompaction. If moisture conditioning (i.e., drying) the subgrade soils enough to achieve stability becomes impractical with regards to the thickness of the soft layer, inclement weather, and/or project schedule, then undercutting and replacement or mechanical stabilization using geogrid could be considered. The extent of the undercutting and/or mechanical stabilization would depend on site and weather conditions and would therefore need to be determined at the time of construction.

During and after subgrade stabilization, Contractor's should take measures to limit heavy construction traffic loading on the subgrade and possibly use reduced material payloads crossing the prepared subgrade. Repeated passes of heavy construction equipment could jeopardize the stable subgrade's integrity.

The near surface soils could become unstable with typical earthwork and construction traffic, especially after precipitation events. The effective drainage should be completed early in the construction sequence and maintained after construction to avoid potential issues. If possible, the grading should be performed during the warmer and drier times of the year. If grading is performed during the winter months, an increased risk for possible undercutting and replacement of unstable subgrade will persist. Additional site preparation recommendations, including subgrade improvement and fill placement, are provided in the **Earthwork** section.

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the **Exploration Results**), engineering analyses, and our current understanding of the proposed project. The **General Comments** section provides an understanding of the report limitations.

Earthwork

The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

Site Preparation For Floor Slab And Pavement Areas

After the demolition and removal of the existing asphalt as required by Project Specifications, but prior to placing any new fill, the subgrade should be compacted using a heavy vibratory roller having a maximum static weight of 12,000 lbs. and capable of exerting a minimum impact energy of 20,000 lbs and subsequently proof-rolled with an adequately loaded vehicle such as a loaded tandem-axle dump truck.

The proof-rolling should be performed under the observation of the Geotechnical Engineer and other members of the design team wanting to attend. Areas deflecting under the proof-roll should be delineated and subsequently addressed by the Geotechnical Engineer. Such unstable areas will require moisture conditioning (i.e., drying) and recompaction. If moisture conditioning (i.e., drying) the subgrade soils enough to achieve stability becomes impractical with regards to thickness of the soft soil layer, weather, and/or project schedule, then undercutting and replacement or mechanical stabilization using geogrid could be considered. The extent of the undercutting and/or mechanical stabilization would depend on site and weather conditions and would therefore need to be determined at the time of construction. Generally, undercut depths can be limited to about 2 feet using mechanical stabilization with biaxial geogrid. Where geogrid stabilization is required, the bottom of the excavation should be covered with a layer of biaxial geogrid (TenCate Mirafi BXG120, Tensar BX 1200, or

equivalent). Adjacent rolls of the geogrid should be overlapped a minimum of 12 inches. The geogrid should then be covered with ALDOT No. 57, ALDOT 825-B crushed stone, or possibly the cherty clay material from the Airport's on-site borrow source. The type and thickness of the crushed stone/cherty soil cover will be determined by the Geotechnical Engineer at the time of stabilization but is generally 12 to 24 inches thick. Tracked equipment should not be allowed to operate directly on the exposed geogrid. The geogrid should be covered with crushed stone, or approved on-site borrow material, before allowing access of tracked equipment. The excavation can then be backfilled with engineered soil fill in accordance with project specifications.

Soft or loose soils are commonly encountered within existing utility trenches. If existing utilities are to be removed or rerouted from the site, all loose soil should be removed, and the trenches should be properly backfilled with new structural fill.

Excavation

We anticipate that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill. Structural fill is material used below, or within 10 feet of structures, pavements or constructed slopes.

Reuse of On-Site Soil: Excavated on-site soil free of debris and organics may be selectively reused as fill, except directly over the geogrid. However, significant moisture conditions (i.e., drying) should be anticipated prior to reusing the material. Material property requirements for on-site soil for use as structural fill are noted in the table below:

Property	Structural Fill
Composition	Free of deleterious material
Maximum particle size	4 inches
Fines content	Not limited
Plasticity	Liquid Limit less than 50 And Plasticity index less than 25
GeoModel Layer Expected to be Suitable ¹	2 and 3

1. Based on subsurface exploration.

Imported Fill Materials: Imported fill materials should meet the following material property requirements. Regardless of its source, compacted fill should consist of approved materials that are free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade.

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

1. Structural fill should consist of approved materials free of organic matter and debris. 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. Additional geotechnical consultation should be provided prior to use of uniformly graded gravel on the site.

Fill Placement and Compaction Requirements

Structural fill should meet the following compaction requirements.

Item	Structural 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
Minimum Compaction Requirements ¹	98% of max.
Water Content Range ¹	Low plasticity cohesive: -2% to +2% of optimum Granular: -3% to +3% of optimum

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

Utility Trench Backfill

Any soft or unsuitable materials encountered at the bottom of utility trench excavations should be removed and replaced with structural fill or bedding material in accordance with public works specifications for the utility be supported. This recommendation is particularly applicable to utility work requiring grade control and/or in areas where

subsequent grade raising could cause settlement in the subgrade supporting the utility. Trench excavation should not be conducted below a downward 1:1 projection from existing foundations without engineering review of shoring requirements and geotechnical observation during construction.

On-site materials are considered suitable for backfill of utility and pipe trenches, provided the material is free of organic matter and deleterious substances. However, material used as trench backfill should comply with the pipe manufacturer or governing municipality's requirements.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs, footings, or pavements, the backfill should satisfy the gradation requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. In areas where hardscapes and/or paving do not abut against the structure, the roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Shallow excavations for the proposed structure are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-

supported improvements such as floor slabs and pavements. 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.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local and/or state regulations.

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 efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and pavements), evaluation and remediation of existing fill materials, as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. Where not specified by local ordinance, one density and water content test should be performed for every 50 linear feet of compacted utility trench backfill and a minimum of one test performed for every 12 vertical inches of compacted backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. If unanticipated conditions are observed, 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 design parameters are applicable for shallow foundations.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing Pressure ^{1, 2}	2,500 psf - foundations bearing on medium stiff to very stiff native soils
Required Bearing Stratum ³	GeoModel Layer 3
Minimum Foundation Dimensions	Per IBC 1809.7
Ultimate Passive Resistance ⁴ (equivalent fluid pressures)	330 pcf (cohesive backfill) 460 pcf (crushed stone)
Sliding Resistance ⁵	0.30 ultimate coefficient of friction – onsite soil or structural fill 0.35 ultimate coefficient of friction - granular material
Minimum Embedment below Finished Grade ⁶	18 inches or as required to reach the required bearing stratum
Estimated Total Settlement from Structural Loads ²	Less than about 1 inch
Estimated Differential Settlement ^{2, 7}	About 1/2 of total settlement

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 20% within 10 feet of structure.
2. Values provided are for maximum loads noted in [Project Description](#). Additional geotechnical consultation will be necessary if higher loads are anticipated.
3. Unsuitable or soft soils should be overexcavated and replaced per the recommendations presented in [Earthwork](#).
4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face. Assumes no hydrostatic pressure. Apply a factor of safety of at least 1.5 when designing for lateral force resistance.
5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Frictional resistance for granular materials is dependent on the bearing pressure which may vary due to load combinations.

6. Embedment necessary to minimize the effects of frost and/or seasonal water content variations or penetrate soft soils. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
7. Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet.

Design Parameters – Overturning and Uplift Loads

Shallow foundations subjected to overturning loads should be proportioned such that the resultant eccentricity is maintained in the center-third of the foundation (e.g., $e < b/6$, where b is the foundation width). This requirement is intended to keep the entire foundation area in compression during the extreme lateral/overturning load event. Foundation oversizing may be required to satisfy this condition.

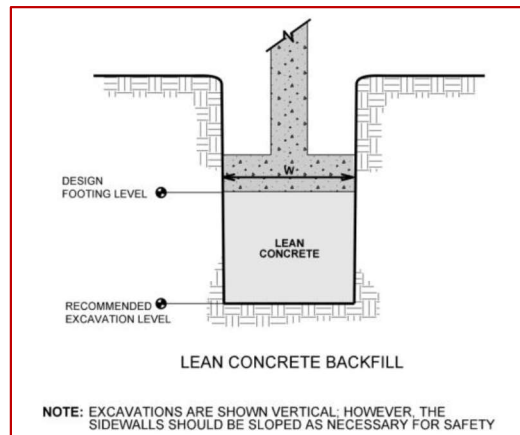
Uplift resistance of spread footings can be developed from the effective weight of the footing and the overlying soils with consideration to the IBC basic load combinations.

Item	Description
Soil Moist Unit Weight	120 pcf
Soil Effective Unit Weight¹	60 pcf
Soil weight included in uplift resistance	Soil included within the prism extending up from the top perimeter of the footing at an angle of 20 degrees from vertical to ground surface

1. Effective (or buoyant) unit weight should be used for soil above the foundation level and below a water level. The high groundwater level should be used in uplift design as applicable.

Foundation Construction Considerations

Due to the soft native soils encountered in borings B-2 through B-5 the foundation excavation should be extended deeper to suitable soils. The footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. The lean concrete replacement zone is illustrated on the sketch below.



As noted in **Earthwork**, the footing excavations should be evaluated under the observation of the Geotechnical Engineer. 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. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

Sensitive soils exposed at the surface of footing excavations may require surficial compaction with hand-held dynamic compaction equipment prior to placing structural fill, steel, and/or concrete. Should surficial compaction not be adequate, construction of a working surface consisting of a lean concrete mud mat may be required prior to the placement of reinforcing steel and construction of foundations.

Floor Slabs

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.

Depending upon the site and weather conditions at the time of construction, unsuitable, weak, and/or loose soils may be observed at the floor slab subgrade level. Any unstable soils should be stabilized as discussed in the **Earthwork** section.

Floor Slab Design Parameters

Item	Description
Floor Slab Support¹	Minimum 4 inches base course meeting material specifications of ACI 302 Subgrade compacted to recommendations in Earthwork
Estimated Modulus of Subgrade Reaction²	100 pounds per square inch per inch (psi/in) for point loads

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. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in [Earthwork](#), and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, 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.

Saw-cut contraction 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 waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

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

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.

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. 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 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 effect 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. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. 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.

Geotechnical Engineering Report

Shelby County Airport Mass Hangar T | Calera, AL
August 11, 2023 | Terracon Project No. E1235124

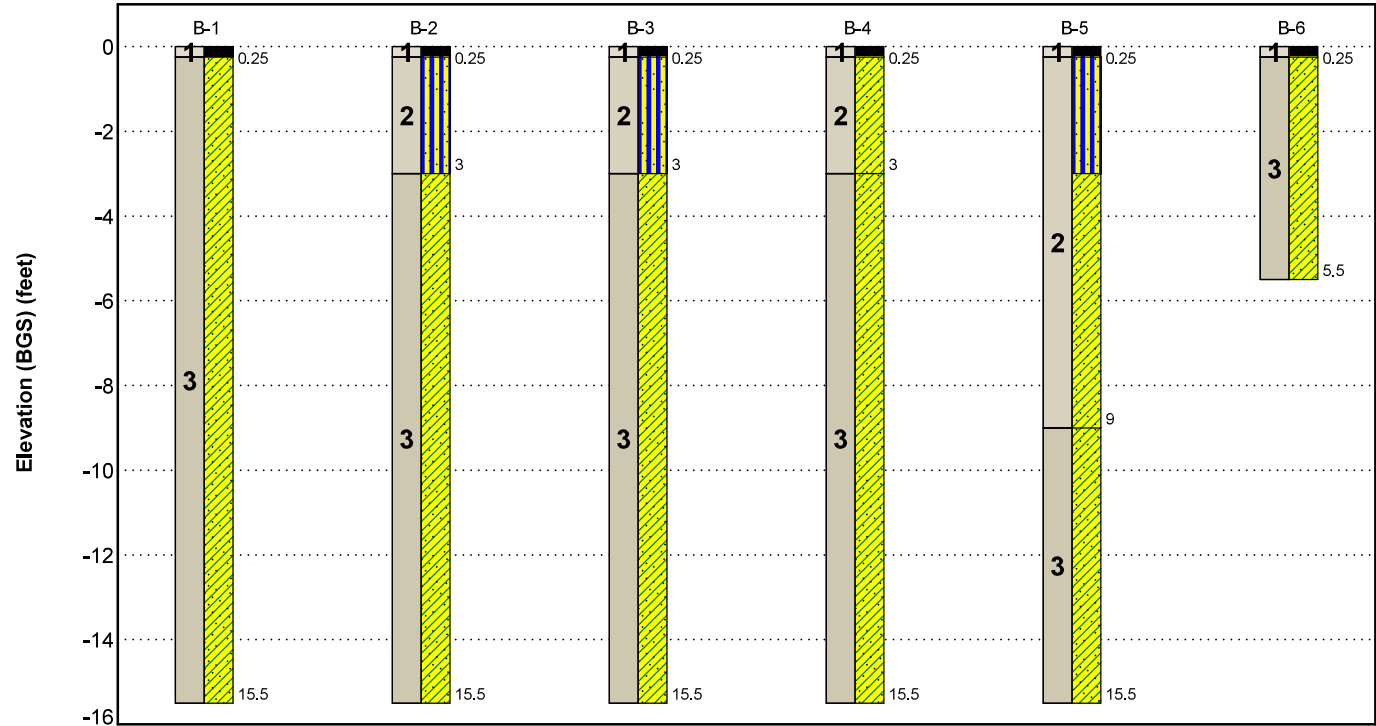


Figures

Contents:

GeoModel

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Surface Layer	Asphalt (3"); Thickness may vary between boring locations
2	Soft Native Soils	Sandy Silt (ML) or Sandy Lean Clay (CL), brown, or medium to dark gray, soft to medium stiff
3	Medium Stiff to Hard Native Soils	Sandy Lean Clay (CL), brown or yellowish brown with light gray, medium stiff to hard

LEGEND

- Asphalt
- Sandy Lean Clay
- Sandy Silt

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Geotechnical Engineering Report

Shelby County Airport Mass Hangar T | Calera, AL
August 11, 2023 | Terracon Project No. E1235124



Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Approximate Boring Depth (feet)	Location
5	15.5	Hangar Building
1	5.5	Proposed Pavement

Boring Layout and Elevations: Terracon personnel provided the boring layout using existing site features. If a more precise boring layout is desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: We advanced the borings with a track-mounted, rotary drill rig using continuous flight augers (solid stem and/or hollow stem, as necessary, depending on soil conditions). 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. For safety purposes, all borings were backfilled with auger cuttings after their completion and the upper portion of the borehole was plugged with a cement mixture.

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

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.

Geotechnical Engineering Report

Shelby County Airport Mass Hangar T | Calera, AL
August 11, 2023 | Terracon Project No. E1235124



Laboratory Testing

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

- Moisture Content
- Atterberg Limits
- Percent Passing 200 Sieve

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.

Geotechnical Engineering Report

Shelby County Airport Mass Hangar T | Calera, AL

August 11, 2023 | Terracon Project No. E1235124



Site Location

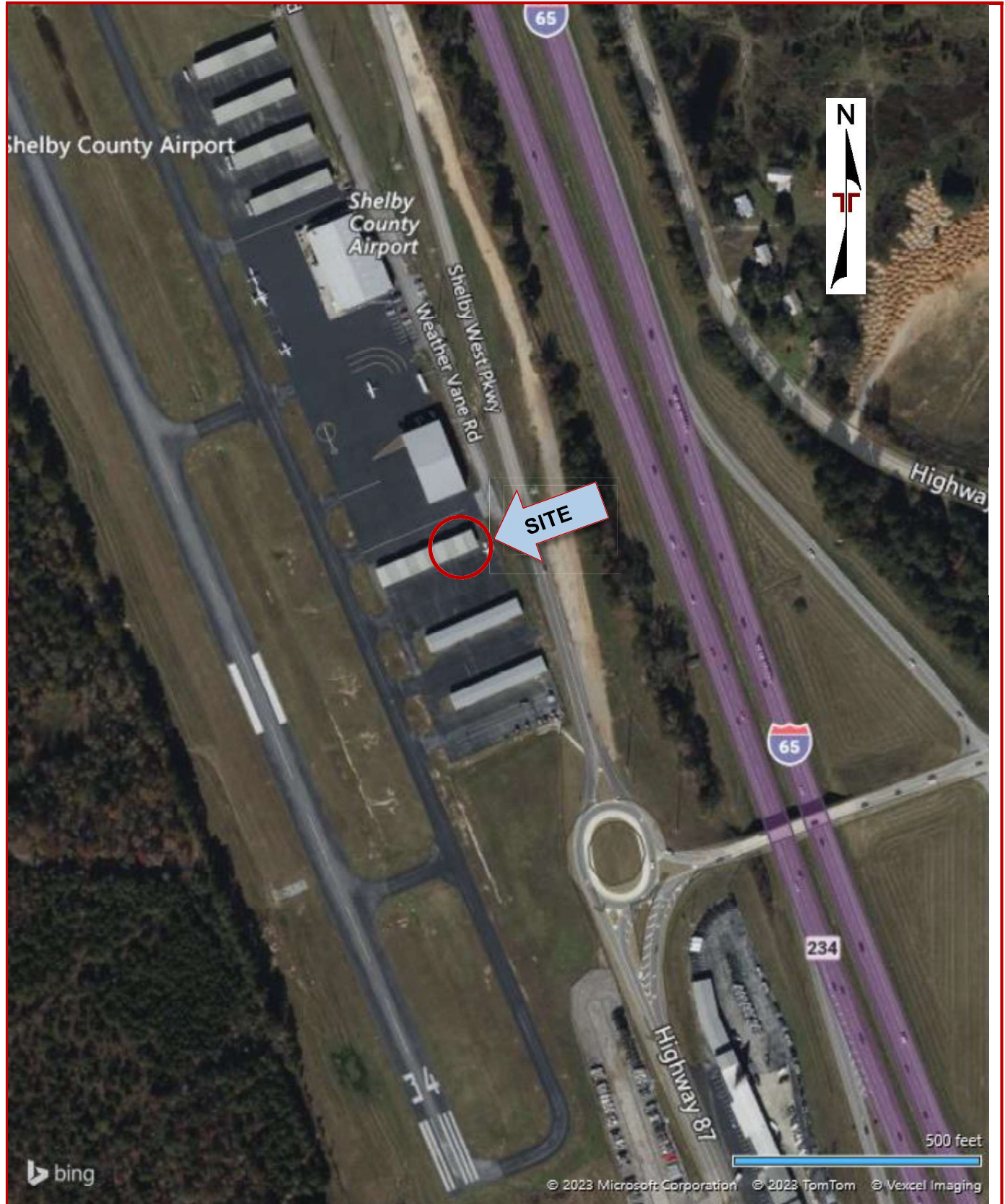


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Geotechnical Engineering Report

Shelby County Airport Mass Hangar T | Calera, AL

August 11, 2023 | Terracon Project No. E1235124



Exploration Plan

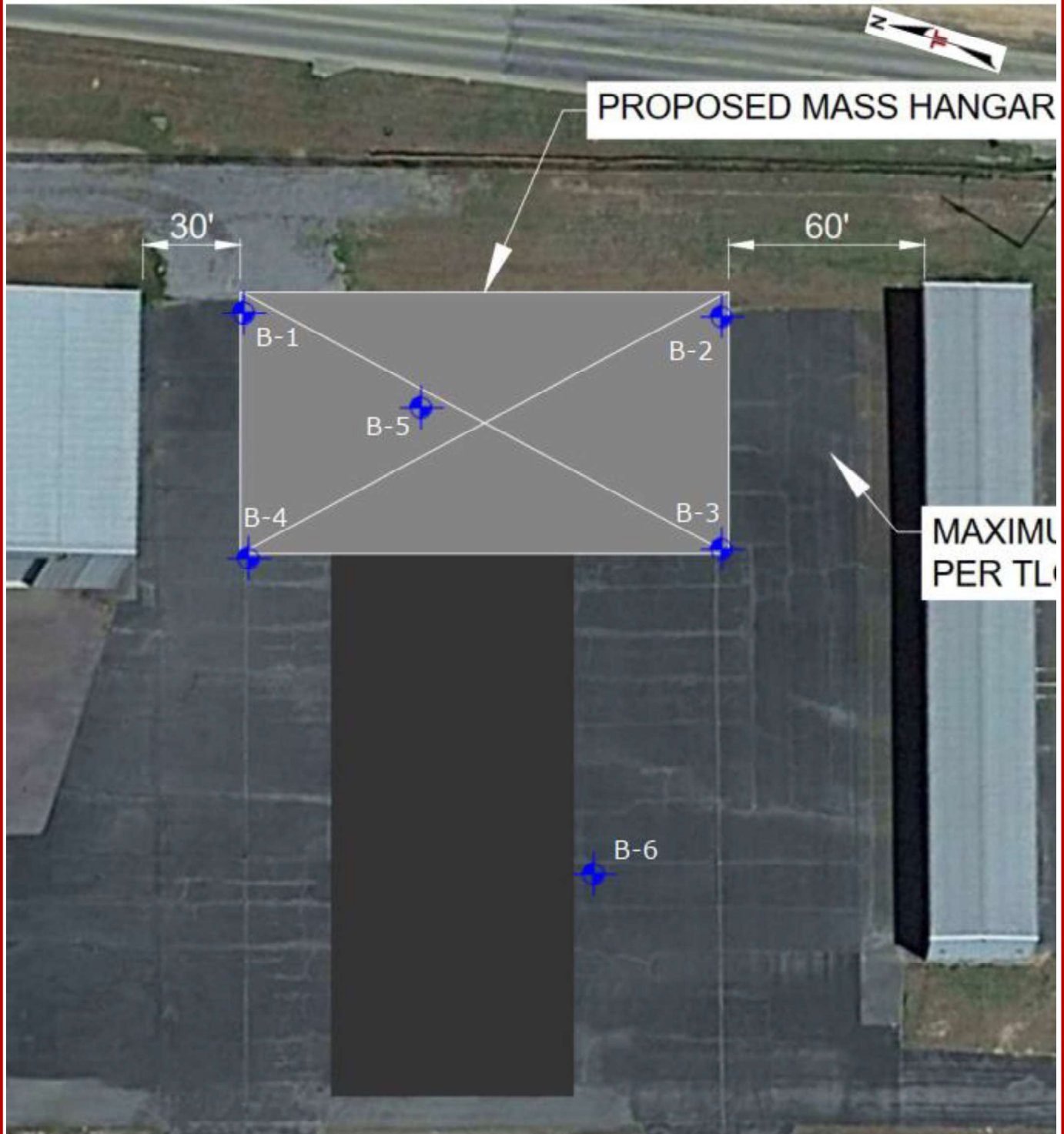


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY SHELBY COUNTY

Exploration and Laboratory Results

Contents:

Boring Logs (B-1 through B-6)

Note: All attachments are one page unless noted above.

Boring Log No. B-1

Model Layer	Graphic Log	Location: See Exploration Plan	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	Percent Fines
								LL-PL-PI	
		Depth (Ft.)							
1		0.3 ASPHALT (3")							
		SANDY LEAN CLAY (CL) , yellowish brown with gray, stiff							
						4-5-6 N=11	14.7		77
		becomes very stiff	5			8-12-15 N=27	21.4		
		contains chert gravel				9-10-11 N=21			
3		becomes stiff	10			6-6-7 N=13			
		becomes brownish yellow and very stiff				6-9-11 N=20			
		15.5	15						
		Boring Terminated at 15.5 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 No water observed at time of drilling			Drill Rig CME 45			
Notes			Advancement Method Continuous flight auger			Driller Smith Drilling			
			Abandonment Method Boring backfilled with auger cuttings upon completion.			Logged by BCR			
						Boring Started 07-05-2023			
						Boring Completed 07-05-2023			

Boring Log No. B-2

Model Layer	Graphic Log	Location: See Exploration Plan	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	Percent Fines
								LL-PL-PI	
		Depth (Ft.)							
1		0.3 ASPHALT (3")							
2		SANDY SILT (ML) , dark gray, soft							
		3.0				3-2-2 N=4	16.9		
		SANDY LEAN CLAY (CL) , yellowish brown, stiff							
			5			4-7-7 N=14	20.3		
		becomes brownish yellow with light gray, contains chert gravel, and very stiff							
						5-9-11 N=20			
3			10			6-9-12 N=21			
			15			12-13-16 N=29			
		15.5							
		Boring Terminated at 15.5 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 No water observed at time of drilling			Drill Rig CME 45			
Notes			Advancement Method Continuous flight auger			Driller Smith Drilling			
			Abandonment Method Boring backfilled with auger cuttings upon completion.			Logged by BCR			
						Boring Started 07-05-2023			
						Boring Completed 07-05-2023			

Boring Log No. B-3

Model Layer	Graphic Log	Location: See Exploration Plan	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	Percent Fines
								LL-PL-PI	
1		Depth (Ft.) 0.3 ASPHALT (3")							
2		SANDY SILT (ML) , dark gray, soft to medium stiff				5-3-2 N=5	12.5		
		3.0							
		SANDY LEAN CLAY (CL) , brown, medium stiff				1-2-3 N=5	14.6		
			5						
		becomes yellowish brown and stiff				4-6-7 N=13			
3			10			5-6-7 N=13			
		becomes very stiff							
		15.5	15			8-12-17 N=29			
		Boring Terminated at 15.5 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 No water observed at time of drilling			Drill Rig CME 45			
Notes			Advancement Method Continuous flight auger			Driller Smith Drilling			
			Abandonment Method Boring backfilled with auger cuttings upon completion.			Logged by BCR			
						Boring Started 07-05-2023			
						Boring Completed 07-05-2023			

Boring Log No. B-4

Model Layer	Graphic Log	Location: See Exploration Plan	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	Percent Fines
								LL-PL-PI	
1		Depth (Ft.) 0.3							
2		ASPHALT (3") SANDY LEAN CLAY (CL) , trace chert gravel, medium gray, soft							
		3.0				1-1-2 N=3	16.6		
3		SANDY LEAN CLAY (CL) , trace chert, tan and light gray, medium stiff							
			5			3-6-6 N=12	18.1		
		becomes very stiff at 7'				6-8-10 N=18			
		chert content increases and becomes hard	10			6-25-50/5" N=50+			
		becomes very stiff							
		15.5	15			15-9-10 N=19			
		Boring Terminated at 15.5 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
No water observed at time of drilling

Drill Rig
CME 45

Notes

Advancement Method
Continuous flight auger

Driller
Smith Drilling

Logged by
BCR

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Boring Started
07-05-2023

Boring Completed
07-05-2023

Boring Log No. B-5

Model Layer	Graphic Log	Location: See Exploration Plan	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	Percent Fines
								LL-PL-PI	
		Depth (Ft.)							
1		0.3 ASPHALT (3")							
		SANDY SILT (ML) , dark gray, soft							
		3.0				3-1-2 N=3	17.9		
2		SANDY LEAN CLAY (CL) , brown, soft							
		contains some chert gravel	5			1-1-1 N=2	20.5		
		9.0				1-2-2 N=4			
		SANDY LEAN CLAY (CL) , some chert gravel, brownish yellow, very stiff	10			5-9-11 N=20			
3		chert content increases							
		15.5	15			11-8-11 N=19			
		Boring Terminated at 15.5 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 No water observed at time of drilling				Drill Rig CME 45		
Notes			Advancement Method Continuous flight auger				Driller Smith Drilling		
			Abandonment Method Boring backfilled with auger cuttings upon completion.				Logged by BCR		
							Boring Started 07-05-2023		
							Boring Completed 07-05-2023		

Boring Log No. B-6

Model Layer	Graphic Log	Location: See Exploration Plan	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	Percent Fines
								LL-PL-PI	
1		Depth (Ft.) 0.3							
		ASPHALT (3")							
		SANDY LEAN CLAY (CL) , with chert gravel, brown, stiff							
3						3-7-7 N=14			
						3-4-6 N=10			
		5.5	5						
		Boring Terminated at 5.5 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
No water observed at time of drilling

Drill Rig
CME 45

Notes

Advancement Method
Continuous flight auger

Driller
Smith Drilling

Logged by
BCR

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Boring Started
07-05-2023

Boring Completed
07-05-2023

Supporting Information






Contents:

General Notes

Unified Soil Classification System

Note: All attachments are one page unless noted above.

General Notes

Sampling	Water Level	Field Tests
 Standard Penetration Test	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time  Cave In Encountered <p>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.</p>	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		
Relative Density	Standard Penetration or N-Value (Blows/Ft.)	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 Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

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. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	Cu≥4 and 1≤Cc≤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}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve		Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}	
		Clean Sands: Less than 5% fines ^D	Cu≥6 and 1≤Cc≤3 ^E	SW	Well-graded sand ^I	
			Cu<6 and/or [Cc<1 or Cc>3.0] ^E	SP	Poorly graded sand ^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:	$\frac{LL\text{ oven dried}}{LL\text{ not dried}} < 0.75$	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
	PI plots below "A" line	MH			Elastic silt ^{K, L, M}	
	Organic:	$\frac{LL\text{ oven dried}}{LL\text{ not dried}} < 0.75$		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

^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.

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

^F If soil contains $\geq 15\%$ 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 $\geq 15\%$ 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 $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ 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.

