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May 8, 2026

DeKalb County Engineering Department
111 Grand Avenue SW, Suite 21
Fort Payne, Alabama 35967

Attn: Benjamin Luther, P.E.
P: (256) 845-8584
E: Bluther@dekalbcountyal.us

Re: Geotechnical Engineering Report
Adamsburg Storm Shelter
County Road 255
Fort Payne, DeKalb County, Alabama
Terracon Project No. LW265018

Dear Mr. Luther:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. PLW265018 dated April 9, 2026. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and pavement 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

Clifton Braxton, E.I.
Staff Engineer

Frank Whitman, P.E.
Senior Engineer

Table of Contents

Figures

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.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed FEMA storm shelter to be located at County Road 255 in Fort Payne, DeKalb County, Alabama. 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
- Graveled drives/parking design and construction

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 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	A site location and description of the project was provided by Benjamin Luther via email.
Project Description	A new storm shelter will be constructed in the Adamsburg community.
Building Construction	Pre-engineered metal building supported by concrete grade beams and a structural slab
Finished Floor Elevation	The FFE is shown as 1467.2 feet on the site plan.
Anticipated Maximum Loads	Walls: 1 to 2 kips per linear foot (klf)

Item	Description
Grading/Slopes	Up to 3 feet of cut is anticipated within the slab shelter's area of construction.
Below-Grade Structures	None
Free-Standing Retaining Walls	None
Graveled Drives/Parking	Anticipated traffic volumes for graveled drives/parking design have been assumed, based on our experience with similar projects site conditions. We have assumed a 20-year lifespan.
Building Code	IBC 2018

Terracon should be notified if any of the above information is inconsistent with the planned construction, 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 west of the intersection of County Road 255 and County Road 78 in Fort Payne, DeKalb County, Alabama. Approximate GPS coordinates: 34.3989, -85.6734 See Site Location
Existing Improvements	No existing improvements.
Current Ground Cover	Grass and vegetation
Existing Topography	Based on the topographic plan provided, the site is relatively flat (1 to 2 feet of relief)

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	Silts	Typically light brown in color. This material was soft to stiff in consistency with varying amounts of sand.
2	Lean Clays	Typically red and tan in color. This material was medium stiff to very stiff in consistency with varying sand content.
3	Weathered Sandstone	Sandstone, weathered in place. Could be penetrated with difficulty by auger.

The boreholes were observed while drilling and after completion for the presence and level of groundwater. Groundwater was not observed at any depth within our borings.

Due to the relatively short amount of time the boreholes remained open after drilling completion, groundwater levels may have not had sufficient time to stabilize. A relatively long period of time may be necessary for a groundwater level to develop and stabilize in the clayey soils present at the site.

Long term observations in piezometers or observation wells sealed from the influence of surface water are often required to define groundwater levels. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. NRCS SSURGO mapping indicates shallow ground water can be seasonally present.

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 that a Seismic Site Classification of C be considered for the project. Subsurface explorations at this site were extended to a maximum depth of 19 feet, where auger refusal was encountered. 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.

Geotechnical Overview

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

The subsurface materials generally consisted of a near surface topsoil layer, underlain by Sandy Silts (GeoModel layer 1), Sandy Lean Clays (GeoModel layer 2), and Weathered Sandstone (GeoModel layer 3) extending to the maximum depth of the borings.

Most of the on-site soils are suitable for the support of foundations and pavements. The Sandy Silts with a medium stiff or better consistency can be left in place for slab and foundation support if they are stable at the time of earthwork and construction. If this material is disturbed by precipitation or construction, undercut may be necessary for foundation or slab support

Based on the conditions encountered and estimated load-settlement relationships, the proposed structures can be supported on conventional continuous or spread footings. Terracon recommends an allowable bearing pressure of 2,000 pounds per square foot (psf) for conventional continuous or spread footings bearing on Sandy Silts or clays (GeoModel layers 1 or 2) or 3,500 psf if bearing on Weathered Sandstone (GeoModel layer 3).

Weathered Sandstone can be encountered at or near the foundation bearing elevation. If the foundation bearing surface varies between weathered sandstone and native clays, overexcavation of the rock and backfill with approved engineered fill may be considered to provide a consistent bearing surface for foundations and utilities.

The on-site silts and clays can become unstable when wet. 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 Shallow Foundations section addresses support of the building directly bearing on native stiff low-to-moderate-plasticity Sandy Silts and clays, or on engineered fill.

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

Earthwork is anticipated to include clearing and grubbing, excavations, and engineered fill placement. 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 and floor slabs.

Site Preparation

Following the stripping of the existing vegetation and planned cuts, the subgrade should be compacted and subsequently proofrolled with an adequately loaded vehicle such as a fully-loaded tandem-axle dump truck. The proofrolling should be performed under the observation of the Geotechnical Engineer or representative. Areas excessively deflecting under the proofroll should be delineated and subsequently addressed by the Geotechnical Engineer. Such unstable areas should either be removed and replaced. Excessively wet or dry material should either be removed or moisture conditioned and recompacted.

Once a stable subgrade is achieved, compacted structural fill soils should then be placed to the proposed design grade and the moisture content and compaction of subgrade soils should be maintained until foundation or pavement construction.

Due to the silty and clayey nature of the onsite soils, the workability of the soils will be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

Subgrade Preparation

Following the removal of any topsoil and organic soils, the subgrade should be compacted and evaluated by a Geotechnical Engineer or qualified personnel. The proofrolling should be performed under the observation of the Geotechnical Engineer or representative. To avoid extensive undercut, the exposed subgrade should not be disturbed or exposed to prolonged rain.

Undercut of any soft, loose, or otherwise unsuitable soils disclosed by the proofroll will be required prior to the placement of any additional fill material. Excessively wet or dry material should either be removed and replaced, or moisture conditioned and recompacted.

The depths of necessary undercut will vary from location to location depending on the building's location, required grading, and site conditions at the time of the earthwork. Grading during wet seasons or in wet site conditions would increase the amount of necessary undercut and replacement.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable; however, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

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.

Most of Terracon's borings encountered rock at depths of 7 feet or greater below present grades. For rock excavation within deeper excavations, the use of a ripper or hydraulic excavator ("ram-hoe") could be required.

Soil Stabilization

Methods of subgrade improvement, as described below, could include scarification, moisture conditioning and recompaction, removal of unstable materials and replacement with granular fill (with or without geosynthetics), and chemical stabilization. The appropriate method of improvement, if required, would be dependent on factors such as schedule, weather, the size of area to be stabilized, and the nature of the instability. More detailed recommendations can be provided during construction as the need for subgrade stabilization occurs. Performing site grading operations during warm seasons and dry periods would help reduce the amount of subgrade stabilization required.

If the exposed subgrade is unstable during proofrolling operations, it could be stabilized using one of the methods outlined below.

- Scarification and Recompaction - It may be feasible to scarify, dry, and recompact the exposed soils. The success of this procedure would depend primarily upon favorable weather and sufficient time to dry the soils. Stable subgrades likely would not be achievable if the thickness of the unstable soil is greater than about 1 foot, if the unstable soil is at or near groundwater levels, or if construction is performed during a period of wet or cool weather when drying is difficult.
- Crushed Stone - The use of crushed stone or crushed gravel is a common procedure to improve subgrade stability. Typical undercut depths would be expected to range from about 12 to 36 inches below finished subgrade elevation. The use of high modulus geotextiles (i.e., engineering fabric or geogrid) could also be considered after underground work such as utility construction is completed. Prior to placing the fabric or geogrid, we recommend that all below grade construction, such as utility line installation, be completed to avoid damaging the fabric or geogrid. Equipment should not be operated above the fabric or geogrid until one full lift of crushed stone fill is placed above it. The maximum particle size of granular material placed over geotextile fabric or geogrid should not exceed 1-1/2 inches.

Further evaluation of the need and recommendations for subgrade stabilization can be provided during construction as the geotechnical conditions are exposed.

Fill Material Types

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

Reuse of On-Site Soil: Excavated on-site soil may be selectively reused as fill. Native silts and clays will be sensitive to moisture conditions (particularly during seasonally wet periods) and will usually require drying prior to compaction.

Material property requirements for on-site soil for use as general fill and structural fill are noted in the table below:

Property	General Fill	Structural Fill
Composition	Free of deleterious material	Free of deleterious material
Maximum particle size	6 inches (or 2/3 of the lift thickness)	3 inches
Fines content	Not limited	Not limited
Plasticity	Not limited	Maximum liquid limit of 55 Maximum plasticity index of 30
GeoModel Layer Expected to be Suitable[1]	1,2,3	1,2

1. Based on subsurface exploration. Actual material suitability should be determined in the field at time of construction.

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, some select CH & CL-ML	Liquid limit less than 55 Plasticity index less than 30
Granular	GW, GP, SM, SC SW, SP	Less than 10% passing No. 200 sieve

1. Structural and general 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.

Fill Placement and Compaction Requirements

Structural and general fill should meet the following compaction requirements.

Item	Structural Fill	General Fill
Maximum Lift Thickness	9 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used	Same as structural fill
Minimum Compaction Requirements [1,2,3]	98% of maximum standard Proctor density at all locations and elevations	92% of max.
Water Content Range [1]	Low plasticity cohesive: -2% to +3% of optimum High plasticity cohesive: 0 to +4% of optimum Granular: -3% to +4% of optimum	As required to achieve min. compaction requirements

1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).
2. High plasticity cohesive fill should not be compacted to more than 100% of standard Proctor maximum dry density.
3. If the granular material is a coarse sand or gravel, or of a uniform size, or has a low fines content, compaction comparison to relative density may be more appropriate. In this case, granular materials should be compacted to at least 70% relative density (ASTM D 4253 and D 4254). Materials not amenable to density testing should be placed and compacted to a stable condition observed by the Geotechnical Engineer or representative.

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 from 1 foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances.

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 or footings, the backfill should satisfy the gradation and expansion index requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

For low permeability subgrades, utility trenches are a common source of water infiltration and migration. Utility trenches penetrating beneath the building should be effectively sealed to restrict water intrusion and flow through the trenches, which could migrate below the building. The trench should provide an effective trench plug that extends at least 5 feet from the face of the building exterior. The plug material should consist of cementitious flowable fill or low permeability clay. The trench plug material should be placed to surround the utility line. If used, the clay trench plug material should be placed and compacted to comply with the water content and compaction recommendations for structural fill stated previously in this report.

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. 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 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. 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.

Excavations or other activities resulting in ground disturbance have the potential to affect adjoining properties and structures. Our scope of services does not include review of available final grading information or consider potential temporary grading performed by the contractor for potential effects such as ground movement beyond the project limits. A preconstruction/ precondition survey should be conducted to document nearby property/infrastructure prior to any site development activity. Excavation or ground disturbance activities adjacent or near property lines should be monitored or instrumented for potential ground movements that could negatively affect adjoining property and/or structures.

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 two test per lift of compacted fill in the building areas and three tests per lift in pavement areas.

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]	GeoModel layer 1 and 2: 2,000 psf GeoModel layer 3: 3,500 psf
Required Bearing Stratum [3]	New engineered fill or firm and stable, native, sandy silts or clays
Ultimate Passive Resistance[4] (equivalent fluid pressures)	320 pcf (cohesive backfill) 420 pcf (granular backfill)
Sliding Resistance [5]	0.30 (native clays) 0.35 (granular material)
Minimum Embedment below Finished Grade [6]	18 inches
Estimated Total Settlement from Structural Loads [2]	Less than about 1 inch
Estimated Differential Settlement [2, 7]	About ¾ 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.
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

Item	Description

pressure which may vary due to load combinations. For fine-grained materials, lateral resistance using cohesion should not exceed ½ the dead load.

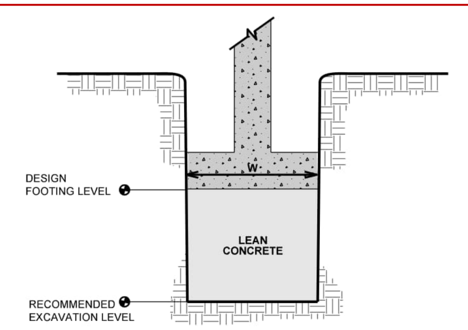
6. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
7. Differential settlements are noted for equivalent-loaded foundations and bearing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

Foundation Construction Considerations

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 either crushed stone or a lean concrete mud mat may be required prior to the placement of reinforcing steel and construction of foundations.

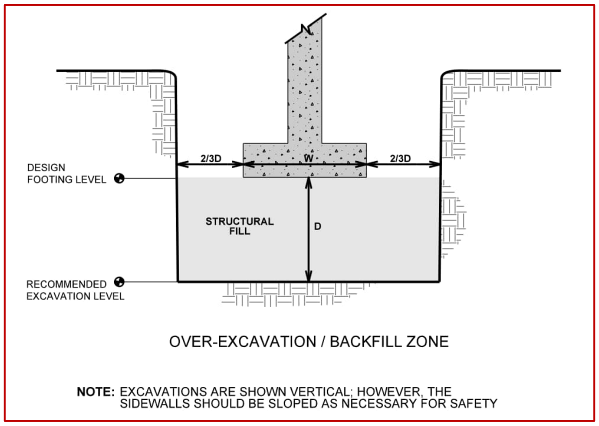
If unsuitable bearing soils are observed at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. The lean concrete replacement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



LEAN CONCRETE BACKFILL

NOTE: EXCAVATIONS ARE SHOWN VERTICAL; HOWEVER, THE SIDEWALLS SHOULD BE SLOPED AS NECESSARY FOR SAFETY

Overexcavation for structural fill placement below footings should be conducted as shown below. The overexcavation should be backfilled up to the footing base elevation, with structural fill placed, as recommended in the Earthwork section.



Gravel-Surfaced Drives and Parking

Subgrade Preparation

On most project sites, the site grading is accomplished relatively early in the construction phase. Fills are typically placed and compacted in a uniform manner. However, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, or rainfall/snow melt. As a result, the aggregate-surfaced roadway or parking area subgrade may not be suitable for construction and corrective action will be required. The subgrade should be carefully evaluated at the time of construction for signs of disturbance or instability. We recommend the subgrade be thoroughly proofrolled with a loaded tandem-axle dump truck prior to final grading. All aggregate-surfaced roadway or parking subgrade areas should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to placement of the aggregate surfacing.

Design Recommendations

Design of aggregate-surfaced roadways for the project has been based in general accordance with the “Aggregate-Surfaced Road Design Catalog” subsection of the 1993 AASHTO “Guide for the Design of Pavement Structures” and based on subsurface conditions observed at the site and laboratory test results.

Our analysis has assumed a “low” traffic volume which is between 10,000 and 30,000 equivalent single axle loads (ESALs) over the life of the gravel surfacing. This traffic volume should be confirmed by the design team; additional geotechnical consultation and revision of recommendations could be necessary with higher traffic volumes.

Recommended minimum aggregate surfacing thickness is provided in the table below.

Recommended Gravel Surface Thickness

Locations	Relative Quality of Roadway Subgrade	Traffic Category	Minimum Aggregate-Surfacing Material Thickness, in.[1]
Car Parking and Access Drives	Poor	Low	9

1. Materials should meet the requirements of ALDOT Class 5 or 6 for Aggregate Base Course.

Quality roadway surfacing materials should consist of a blend of gravel, sand, and fines (clay and silt). We believe the maximum size particle should not exceed 1 inch in diameter and the gravel should be crushed with angular edges (not rounded). The blend of materials should be selected to allow for easy compaction resulting in a firm, low permeable surface promoting surface drainage off the roadway surface. Materials meeting Alabama Department of Transportation (ALDOT) Class 5 or 6 specifications can be used for aggregate surfacing material. Aggregate surfacing material should be placed in lifts not exceeding 6 inches and compacted to a minimum of 95 percent of the maximum dry unit weight as determined by ASTM D1557.

A quality roadway surfacing material should also contain approximately 10 to 25 percent fines (silt and clay-sized particles passing the No. 200 sieve). The fines should exhibit low to moderate plasticity (plastic index less than 15) and will act as a binder to help reduce risk for wash boarding. If the fines content of a roadway surfacing material is comprised mostly of silt, the fines will be non-plastic and the surfacing materials will not have the benefit of the binder or cohesive aspects.

In order to reduce dust, reclaimed asphalt pavement (RAP) may be used as the upper 2 to 4 inches of the aggregate-surfacing. The RAP should be graded to the specified limits for ALDOT Class 5 or 6 aggregate base course but modified to contain 10 to 25 percent fines and properly compacted. Periodic spraying (1 to 2 times a year following maintenance grading) of the surface with magnesium chloride or other dust suppressant may also be considered to reduce dust and wash boarding.

Aggregate-surfaced roadways performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of aggregate-surfaced roadways:

- Site grades should slope a minimum of 10 percent away from the roadways;

- The subgrade and the aggregate-surfaced roadways have a minimum 10 percent slope to promote proper surface drainage;
- Consider appropriate edge drainage; and
- Install pavement drainage in surrounding areas anticipated for frequent wetting.

Maintenance

Periodic maintenance extends the service life of the aggregate-surfaced roadways and parking areas and should include re-grading and replacement of aggregate base course in any deteriorated areas. Thicker aggregate base course sections could be used to reduce the required maintenance and extend the service life of the aggregate-surfaced roadways. Design alternatives which could reduce the risk of subgrade saturation and improve long-term performance include installing surface drains next to any areas where surface water could pond. Properly designed and constructed subsurface drainage will reduce the time subgrade soils are saturated and can also improve subgrade strength and performance.

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.

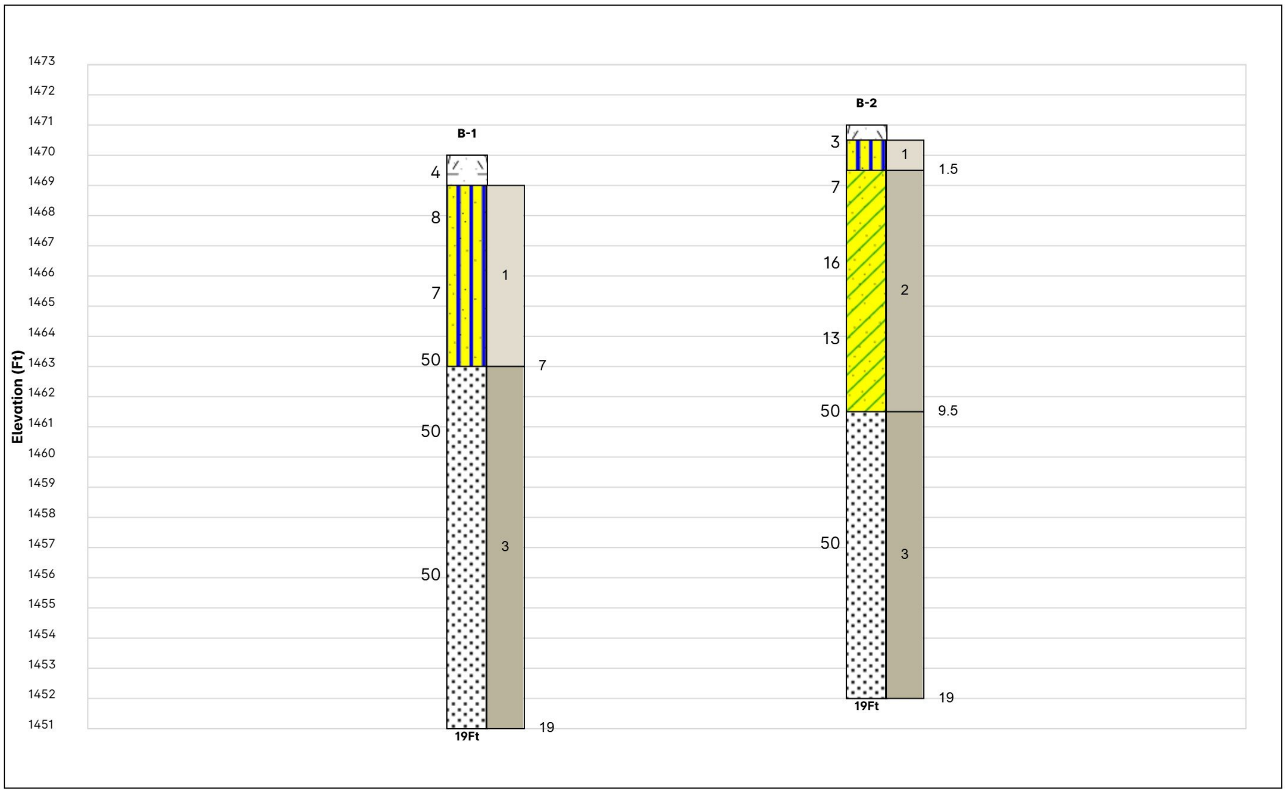
Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly effect excavation 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.

Figures

Contents:

289 Production Ave
Madison, AL 35758-8991

GeoModel



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

#	Layer Name	General Description
1	**Sandy Silts**	Typically light brown in color. This material was soft to stiff in consistency.
2	**Sandy Lean Clays**	Typically red and tan in color. This material was medium stiff to very stiff in consistency.
3	**Weathered Sandstone**	Sandstone, weathered in place. Could be penetrated with difficulty by auger.

Legend	
Topsoil	Sandy Silt
Sandstone	Sandy Lean Clay

Notes:

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time.
Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

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.

First Water Observation

Second Water Observation

Third Water Observation

Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Approximate Boring Depth	Location
2	Auger Refusal at 19 feet	Storm Shelter and Access Drive Area

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. Approximate ground surface elevations were estimated using Google Earth. If elevations and a more precise boring layout are 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 accordance with 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

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:

- Moisture Content
- Atterberg Limits
- Sieve Analysis

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

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

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

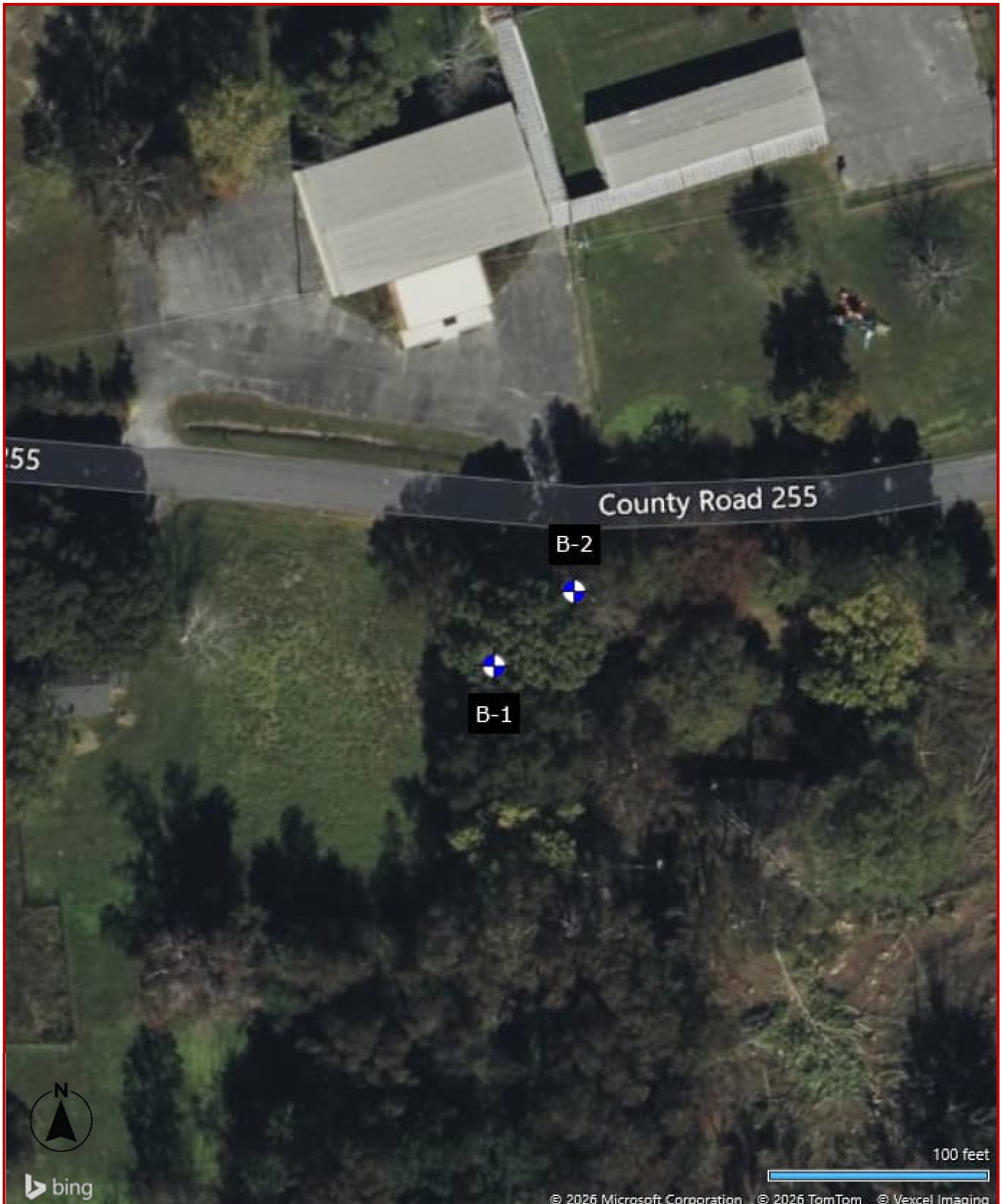


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Adamsburg Storm Shelter
101 County Road 255, Fort Payne, AL, 35967,USA
Terracon Project No. LW265018

Latitude: 34.3988° Longitude: -85.6735°

BORING LOG NO. B-1

Terracon
289 Production Ave
Madison, AL 35758-8991

Surface Elevation:
1470(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Field Test Results	Water Content (%)	Percent Fines	Atterberg Limits LL	PL	PI
		1.0	**TOPSOIL,** 12 inches		1470.0 / 1469.0		2-2-2 N = 4	18				
1		7.0	**SANDY SILT (ML),** light brown, moist, medium stiff to stiff				1-2-6 N = 8	17				
				5			2-3-4 N = 7	16	55	32	25	7
3			**SANDSTONE,** highly weathered		1463.0		12-50/5'' N = 50	23				
				10			12-50/2'' N = 50					
				15			50/2'' N = 50					

Boring Refusal at 19 Ft

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Obtained from Google Earth
Location Comment: Inside of storm shelter boundary

Advancement Method
0-14 Ft. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Equipment
Subcontractor-7822DT Geoprobe

Hammer Type
Automatic

Driller
Earthcore, LLC

Logged By
Cliff Braxton

Start Date
04/21/2026

Adamsburg Storm Shelter
101 County Road 255, Fort Payne, AL, 35967,USA
Terracon Project No. LW265018

Latitude: 34.3988° Longitude: -85.6734°

BORING LOG NO. B-2

Terracon
289 Production Ave
Madison, AL 35758-8991

Surface Elevation:
1471(Ft) +/-

Model Layer	Graphic Log	Lithology Depth (Ft.)	Material Description	Depth (Ft.)	Elevation (Ft.)	Sample Type	Field Test Results	Water Content (%)
		0.5	**TOPSOIL,** 6 inches		1471.0 / 1470.5	X	2-2-1 N = 3	28
1		1.5	**SANDY SILT (ML),** light brown, moist, soft		1469.5			
2			**SANDY LEAN CLAY (CL),** red and tan, moist, medium stiff to very stiff			X	3-3-4 N = 7	16
				5		X	3-8-8 N = 16	25
		9.5				X	3-5-8 N = 13	24
3			**SANDSTONE,** highly weathered	10	1461.5	X	5-13-50/4" N = 50	20
				15			50/1" N = 50	

Boring Refusal at 19 Ft

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

See Supporting Information for explanation of symbols and abbreviations.

Notes
Elevation Reference: Obtained from Google Earth
Location Comment: Offset approximately 50 feet northeast of storm shelter boundary

Advancement Method
0-19 Ft. Hollow Stem Auger

Abandonment Method
Boring backfilled with auger cuttings upon completion.

Equipment
Subcontractor-7822DT Geoprobe

Hammer Type
Automatic

Driller
Earthcore, LLC

Logged By
Cliff Braxton

Start Date
04/21/2026

Facilities | Environmental | Geotechnical | Materials

Supporting Information

Contents:

General Notes

Sampling		
Auger Cuttings	Modified California Ring Sampler	Rock Core
Dynamic Cone Penetrometer	Modified Dames & Moore Ring Sampler	Dual Sampler SPT
Grab Sample	GeoProbe Macro Core or Large Bore	No Recovery
Ring Sampler	Shelby Tube	Standard Penetration Test
Split Spoon	Texas Cone Penetrometer	Vane Shear

Water Level

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

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

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

Descriptive Soil Classification

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

Location And Elevation Notes

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

Strength Terms

Relative Density of Coarse-Grained Soils (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		**Consistency of Fine-Grained Soils** (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
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	5 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	9 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	16 - 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	Soil Classification: Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines [C]	Cu≥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]
			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≥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]
		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] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[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.