Limestone County Turner Treatment Facility

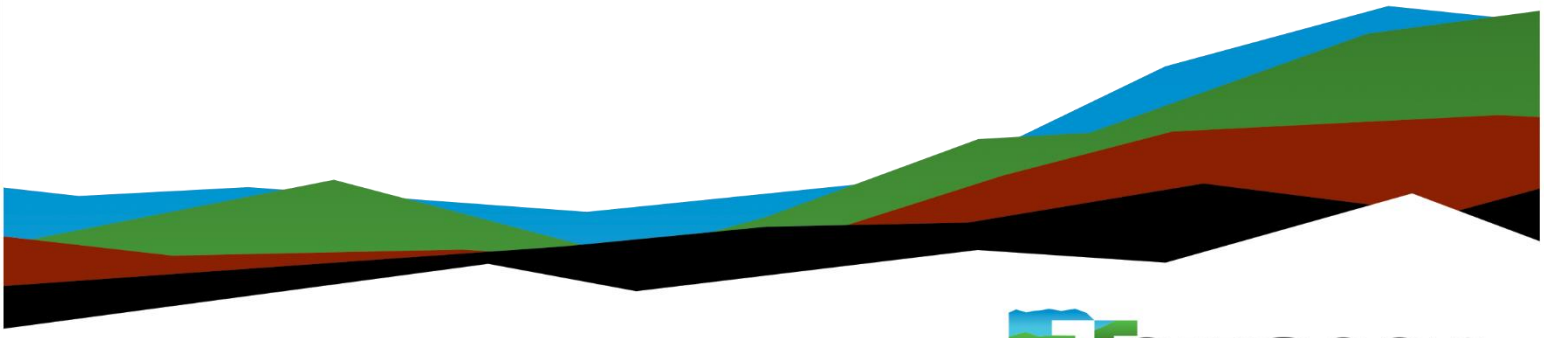
Geotechnical Engineering Report

Tanner, Alabama

May 6, 2025 | Terracon Project No. E5255026

Prepared for:

Engineers of the South, LLC
2143 Arlington Blvd, Suite 3
Florence, Alabama 35630



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May 6, 2025

Engineers of the South, LLC
2143 Arlington Blvd, Suite 3
Florence, AL 35630

Attn: Craig Swinney, P.E.
P: (256) 766-9430
E: craig@engineersofthesouth.com

Re: Geotechnical Engineering Report
Limestone County Turner Treatment Facility
10998 US Hwy-31 N Tanner, AL 35671
Terracon Project No. E5255026

Dear Craig:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. PE5255026 dated April 2, 2025. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and pavements for the proposed project.

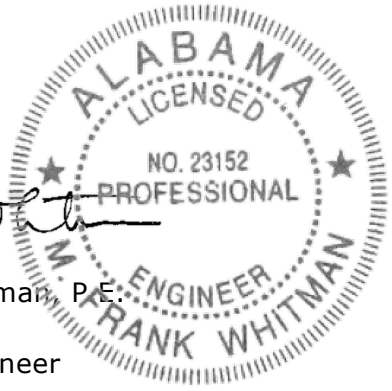
We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon

Weston Krohe, E.I.
Staff Engineer

Frank Whitman, P.E.
Senior Engineer



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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**.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed development to be located at the existing Limestone County Turner Treatment Facility in Tanner, 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
- Pavement design and construction

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

Drawings showing the site and approximate test pit 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 test pit 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 layout plan along with the Carbon Vessel leg loading and analysis was provided by Craig Swinney with Engineers of the South on 3/19/2025 via email.
Project Description	The project includes the construction of a group of Carbon Vessel tanks constructed upon a mat foundation/thickened slab along with an associated asphalt-paved drive.
Finished Floor Elevation	Assumed to be at or near existing grades

Item	Description
Maximum Loads (Client Provided)	We used the following loads in estimating settlement: ▪ Columns: 132 kips/leg (4-legs per vessel)
Grading/Slopes	No elevation changes more than (+/-) 5 feet No new slopes taller than 10 feet or steeper than 3:1 (H:V)
Pavements	Paved driveways will be constructed. Anticipated traffic loading was estimated by the client. ▪ Standard Duty: 2 passenger cars per day ▪ Heavy Duty: 2 trucks per day The pavement design period is 20 years.
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 at the Limestone County Turner Treatment Facility at 10998 US Hwy-31 N Tanner, Alabama 35671 Approximate Lot Size: 1.1 Acres Approximate Latitude/Longitude: 34.7165, -86.9555 See **Site Location**
Existing Improvements	Majority of the site is grassed with an existing water-tank located on the west portion of the site. The Turner water treatment facility is located immediately north of the exploration area.
Current Ground Cover	Maintained grassland along with an existing water-tower. Asphalt pavement along with a structure is located just north of the exploration area.
Existing Topography	Per the client's provided drawing, elevations range from approximately 621 feet to 630 feet, gently sloping downward Northeast.

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 test pit location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	**Fill – Gravelly Fat Clay (CH)**	Typically dark tan in color, with varying sand and gravel contents. Noted only at TP-9
2	**Sandy Fat Clay (CH) – Moderate Plasticity**	Typically red in color, stiff or better in consistency, with varying sand and gravel contents.
3	**Gravelly Fat Clay (CH) – High Plasticity**	Typically tannish red in color, very stiff in consistency, with varying sand and gravel contents.

The test pits were observed during excavation and after completion for the presence and level of groundwater. Groundwater was observed 6.5 to 7 feet below existing grades near the vicinity of the water-tank overflow pond in test pits TP-9 and TP-10.

Due to the relatively short amount of time the test pits remained open after excavation 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 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 test pits were performed. NRCS SSURGO mapping indicates shallow groundwater can be seasonally present among the northern and eastern adjacent properties.

Geologic Hazards

Limestone formations such as the Tuscumbia Limestone underlying the subject site are carbonate-based rocks and are therefore soluble in slightly acidic groundwater. On a geologic time scale, weathering is typified by a chemical solutioning process that progresses along joints, fractures and bedding planes in the bedrock.

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. Surface depressions or sinkholes are formed when the soil overburden is lost into these subsurface voids.

Although no visual evidence of sinkhole activity was observed 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 test pit 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 properties encountered at the site and as described on the exploration logs and results, it is our professional opinion that the **Seismic Site Classification is D**. Subsurface explorations at this site were extended to a maximum depth of 8 feet. The site properties below the test pit depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Deep borings or geophysical testing may be performed to confirm the conditions below the current exploration depth. A classification of C is possible but not guaranteed with site-specific seismic testing.

Geotechnical Overview

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

Subsurface conditions encountered within our test pits typically consisted of Moderate Plasticity Sandy Fat Clays (CH) extending to the maximum depths of the test pits excavations, with near surface existing fill encountered at TP-9 and relatively deep high-plasticity Fat Clays (CH) at TP-10. These soils encountered are generally considered suitable for the support of foundations and pavements, and can be utilized as structural fill.

High-Plasticity Fat Clays (Geomodel Layer 3) were encountered at test pit TP-10, though typically at great enough depths that shrink/swell behavior is unlikely to cause significant movement for foundations or pavements constructed at or near existing grades. These soils should generally be maintained 3-feet below the vessel tanks finish subgrade and 1-foot below pavement finish subgrade. High plasticity fat clays could be present at other areas not depicted within our test pits.

Existing fill, consisting of Gravelly Fat Clay with Sand (CH), was encountered adjacent to the existing pond at TP-9 and is likely present elsewhere. While the fill encountered appeared suitable during exploration, the **Existing Fill** section explains the risks of constructing upon existing fill. Terracon recommends that foundations not bear on existing fill, though construction of pavements above existing fill may be considered

An existing septic tank with field lines is depicted on the provided site plan within the proposed driveway, and the field lines are planned to be abandoned and relocated. The abandoned septic system field lines should be removed from pavement areas.

Local 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 structures directly bearing on native, stiff or better, low to moderate plasticity clays, or on engineered fill. Based on the conditions encountered and estimated load-settlement relationships, the proposed structures can be supported on conventional continuous and spread footings.

Terracon recommends an allowable bearing pressure of 2,500 pounds per square foot (psf) for conventional shallow foundations.

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 removal of topsoil, 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, floor slabs, and pavements.

Site Preparation

Prior to placing fill, any existing vegetation and topsoil should be removed. Complete stripping of vegetation should be performed in areas of proposed construction.

Other than the existing septic tank depicted upon the provided site plan, no evidence of underground facilities (such as cesspools and basements) was observed during the exploration and site reconnaissance. If unexpected fills or underground facilities are encountered during construction, such features should be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Subgrade Preparation

Following removal of vegetation, areas of construction should be scarified to a minimum depth of 10 inches, moisture conditioned as necessary, and compacted per the compaction requirements of this report. Proofrolling should then be performed across the construction areas with an adequately loaded vehicle, such as a fully-loaded tandem-axle dump truck, 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. Compacted structural/general fill soils should then be placed, in their respective locations, to the proposed design grade.

In-situ, the on-site clays are almost always above optimum moisture content and require drying prior to compaction. The moisture content and compaction of subgrade soils should be maintained until foundation construction.

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

The depths of necessary undercut will vary from location to location depending on the required grading and the site conditions at the time of the earthwork. Grading during summer months would reduce the overall volume of necessary undercut. 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.

Existing Fill

Existing fill materials were observed in TP-9, and is likely present elsewhere. We have no records to indicate its degree of control, although the material encountered appeared to be suitable and stable for direct and indirect support of pavements. If suspected fill is encountered during earthwork, a proofroll should be performed after cutting to grade or before placement of fill to better determine the stability. Recommendations for remediation of unstable areas should be provided by the Geotechnical Engineer at the time of the proofroll.

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

Excavation

We anticipate that excavations for the proposed construction can be primarily 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.

Soil Stabilization

Methods of subgrade improvement, as described below, could include scarification, moisture conditioning and recompaction and/or removal of unstable materials and replacement with granular fill (with or without geosynthetics). 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 3 feet or less 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.

- **Chemical Modification** - Improvement of subgrades with lime could be considered for improving unstable soils. Local clays typically respond well to lime drying/stabilization, often 1% to 2% lime by dry weight. Chemical modification should be performed by a pre-qualified contractor having experience with successfully stabilizing subgrades in the project area on similar sized projects with similar soil conditions. Results of chemical analysis of the additive materials should be provided to the geotechnical engineer prior to use. The hazards of chemicals blowing across the site or onto adjacent property should also be considered. Additional testing would be needed to develop specific recommendations to improve subgrade stability by blending chemicals with the site soils. Additional testing could include, but not be limited to, determining the

most suitable stabilizing agent, the optimum amounts required, the presence of sulfates in the soil, and freeze-thaw durability of the subgrade.

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 structural and/or general fill. Native clays may be sensitive to moisture conditions (particularly during seasonally wet periods) and may require moisture conditioning prior to compaction.

Material property recommendations 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 60 Maximum plasticity index of 35
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)
Cohesive	CL, some select CH	Liquid limit less than 60 Plasticity index less than 35
Granular	GW, GP, SW, SP	Less than 10% fines content

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 structure should be effectively sealed to restrict water intrusion and flow through the trenches, which could migrate below the structure. The trench should provide an effective trench plug that extends at least 5 feet from the face of the structure's 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 structures during and after construction and should be maintained throughout the life of the structure. Water retained next to the structure can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential foundation movements, causing damage to structures.

Exposed ground should be sloped and maintained at a minimum 5% away from the structures for at least 10 feet beyond the perimeter of the structure. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After 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 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 pavement 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 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 pounds per square foot (psf)
Required Bearing Stratum [3]	New engineered fill or firm and stable, native soils
Ultimate Passive Resistance [4] **(equivalent fluid pressures)**	310 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.
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.

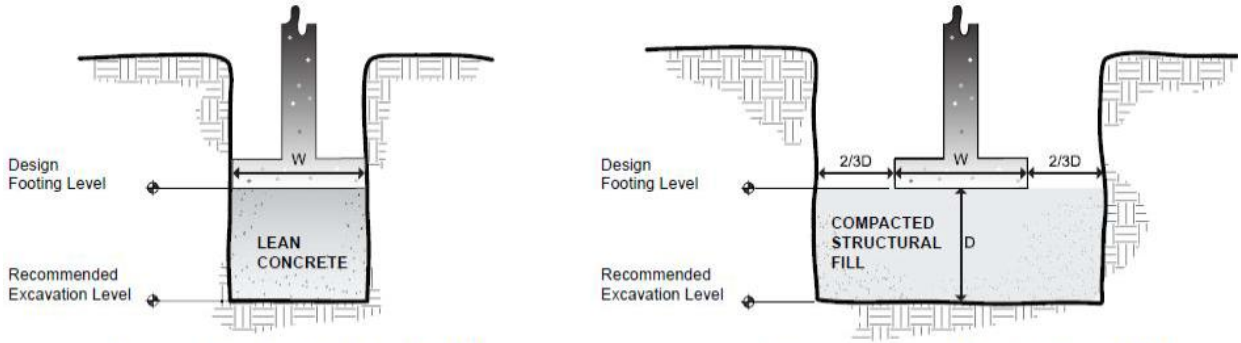
5. Can be used to compute resistance where foundations are placed on suitable soil/materials. Frictional resistance for granular materials is dependent on the bearing pressure which may vary due to load combinations. For fine-grained materials, lateral resistance using cohesion should not exceed ½ the 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 settlement are noted for equivalent-loaded foundations and bearing elevations as measured over a span of 50 feet

Foundation Construction Considerations

The footing excavations should be evaluated under the direction 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 encountered in footing excavations, the excavations 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 excavation. The footings could also bear on properly compacted structural fill extending down to the suitable soil. Overexcavation for compacted backfill placement below footings should extend laterally beyond all edges of the footings at least 8 inches per foot of overexcavation depth below the design footing level. The overexcavation should then be backfilled up to the design footing level in accordance with the **Earthwork** section of this report. The overexcavation and backfill procedures are illustrated in the following figures.



NOTE: Excavations in sketches shown vertical for convenience. Excavations should be sloped as necessary for safety.

Pavements

General Pavement Comments

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the **Earthwork** section.

Pavement Design Parameters

The values used in our design were empirically derived based upon our experience with similar soil types, expected subgrade soils, and our expectation of the quality of the subgrade as prescribed by the **Site Preparation** conditions as outlined in **Earthwork**.

Pavement Section Thicknesses

The following table provides our opinion of minimum thickness for AC sections:

Asphaltic Concrete Design

Layer	Thickness (inches)
	Standard & Medium-Duty Pavement
AC [2, 3]	3
Aggregate Base	6

1. See **Project Description** for more specifics regarding traffic assumptions.

Asphaltic Concrete Design

Layer	Thickness (inches)
	Standard & Medium-Duty Pavement

2. All materials should meet the current Alabama Department of Transportation (ALDOT) Standard Specifications for Highway and Bridge Construction.
3. A minimum 1.5-inch surface course should be used on ACC pavements.

The following table provides our estimated minimum thickness of PCC pavements.

Portland Cement Concrete Design

Layer	Thickness (inches)
	Medium-Duty Pavement
PCC [2]	5
Aggregate Base	4

4. See **Project Description** for more specifics regarding traffic assumptions.
5. All materials should meet the current Alabama Department of Transportation (ALDOT) Standard Specifications for Highway and Bridge Construction.

Areas for parking of heavy vehicles, concentrated turn areas, and start/stop maneuvers could require thicker pavement sections. Edge restraints (i.e. concrete curbs or aggregate shoulders) should be planned along curves and areas of maneuvering vehicles.

Although not required for structural support, a minimum 4-inch thick base course layer is recommended to help reduce potential for slab curl, shrinkage cracking, and subgrade pumping through joints. Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign material and doweled where necessary for load transfer. PCC pavement details for joint spacing, joint reinforcement, and joint sealing should be prepared in accordance with ACI 330 and ACI 325.

Where practical, we recommend early-entry cutting of crack-control joints in PCC pavements. Cutting of the concrete in its "green" state typically reduces the potential for micro-cracking of the pavements prior to the crack control joints being formed, compared to cutting the joints after the concrete has fully set. Micro-cracking of pavements may lead to crack formation in locations other than the sawed joints, and/or reduction of fatigue life of the pavement.

Openings in pavements, such as decorative landscaped areas, are sources for water infiltration into surrounding pavement systems. Water can collect in the islands and migrate into the surrounding subgrade soils thereby degrading support of the pavement. Islands with raised concrete curbs, irrigated foliage, and low permeability near-surface soils are particular areas of concern. The civil design for the pavements with these conditions should include features to restrict or collect and discharge excess water from the islands. Examples of features are edge drains connected to the stormwater collection system, longitudinal subdrains, or other suitable outlets and impermeable barriers preventing lateral migration of water such as a cutoff wall installed to a depth below the pavement structure.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic upkeep should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

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

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.

- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.

Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

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 impact excavation cost. Any parties charged with design of excavation support, dewatering, or working platforms should seek their own site characterization for specific purposes to obtain the specific level of detail necessary. Site safety and

construction cost estimating are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing. 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.

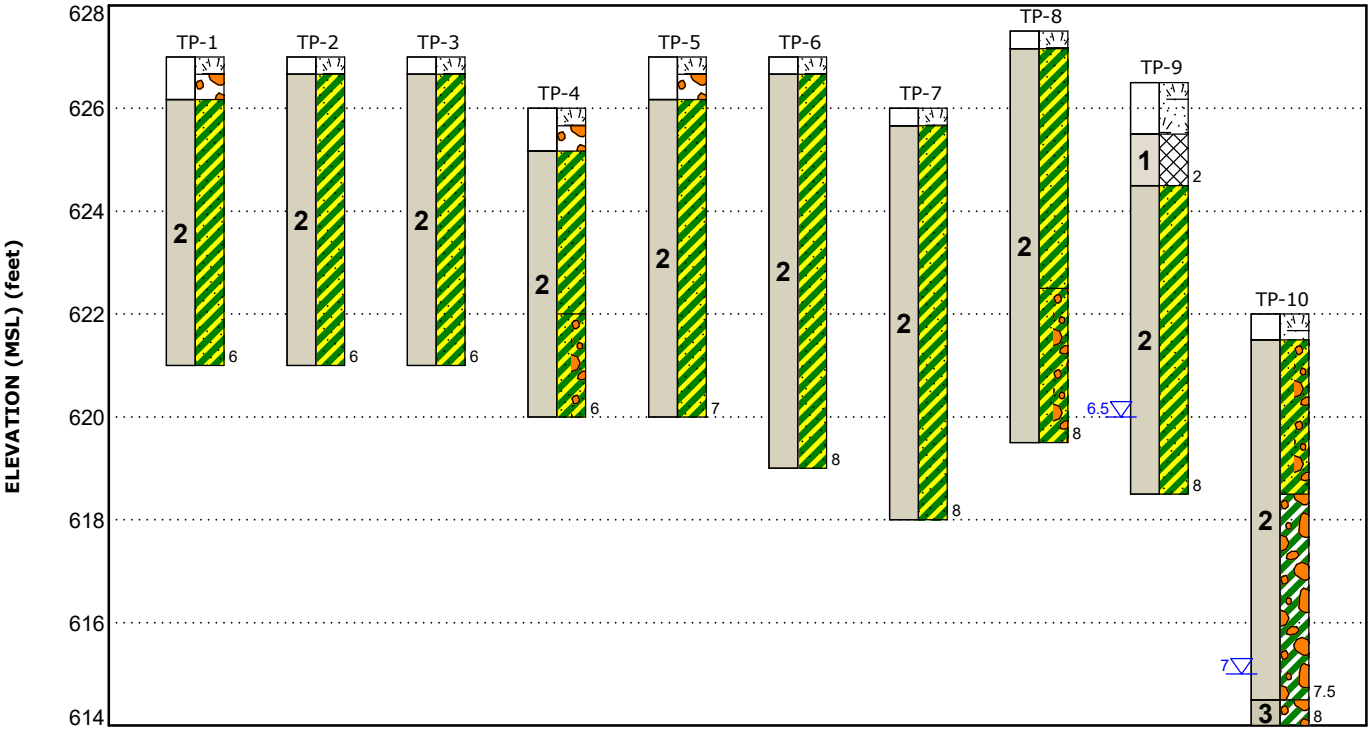
Figures

Contents:

Limestone County Turner Treatment Facility
10998 US Hwy-31 | Tanner, AL
Terracon Project No. E5255026

289 Production Ave
Madison, AL

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	**Fill - Gravelly Fat Clay (CH)**	Typically dark tan in color, with varying sand and gravel contents.
2	**Sandy Fat Clay (CH) - Moderate Plasticity**	Typically red in color, stiff or better in consistency, with varying sand and gravel contents.
3	**Gravelly Fat Clay (CH) - High Plasticity**	Typically tannish red in color, very stiff in consistency, with varying sand and gravel contents.

Legend

- Topsoil
- Sandy Fat Clay
- Fill
- Poorly-graded Gravel
- Sandy Fat Clay with Gravel
- Gravelly Fat Clay

▽ First Water Observation

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.

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.

Attachments

Exploration and Testing Procedures

Field Exploration

Number of Test Pits	Approximate Test Pit Depths	Location
3	6 feet	Vessel Tank Area
7	6 to 8 feet	Drive Lane

Test Pit Layout and Elevations: Terracon personnel provided the test pit layout using handheld GPS equipment (estimated horizontal accuracy of about ±10 feet) and referencing existing site features. Approximate ground surface elevations were estimated using the provided site plan. If elevations and a more precise layout are desired, we recommend test pits be surveyed.

Subsurface Exploration Procedures: Test pits were excavated with an excavator. For safety purposes, all test pits were backfilled with excavated material after their completion.

Our exploration team prepared field test pit logs as part of the excavation operations. These field logs included visual classifications of the materials encountered during excavation and our interpretation of the subsurface conditions between samples. Final test pit logs were prepared from the field logs. The final test pit logs represent the Geotechnical Engineer's interpretation of the field logs.

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
- Sieve Analysis
- Atterberg Limit

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

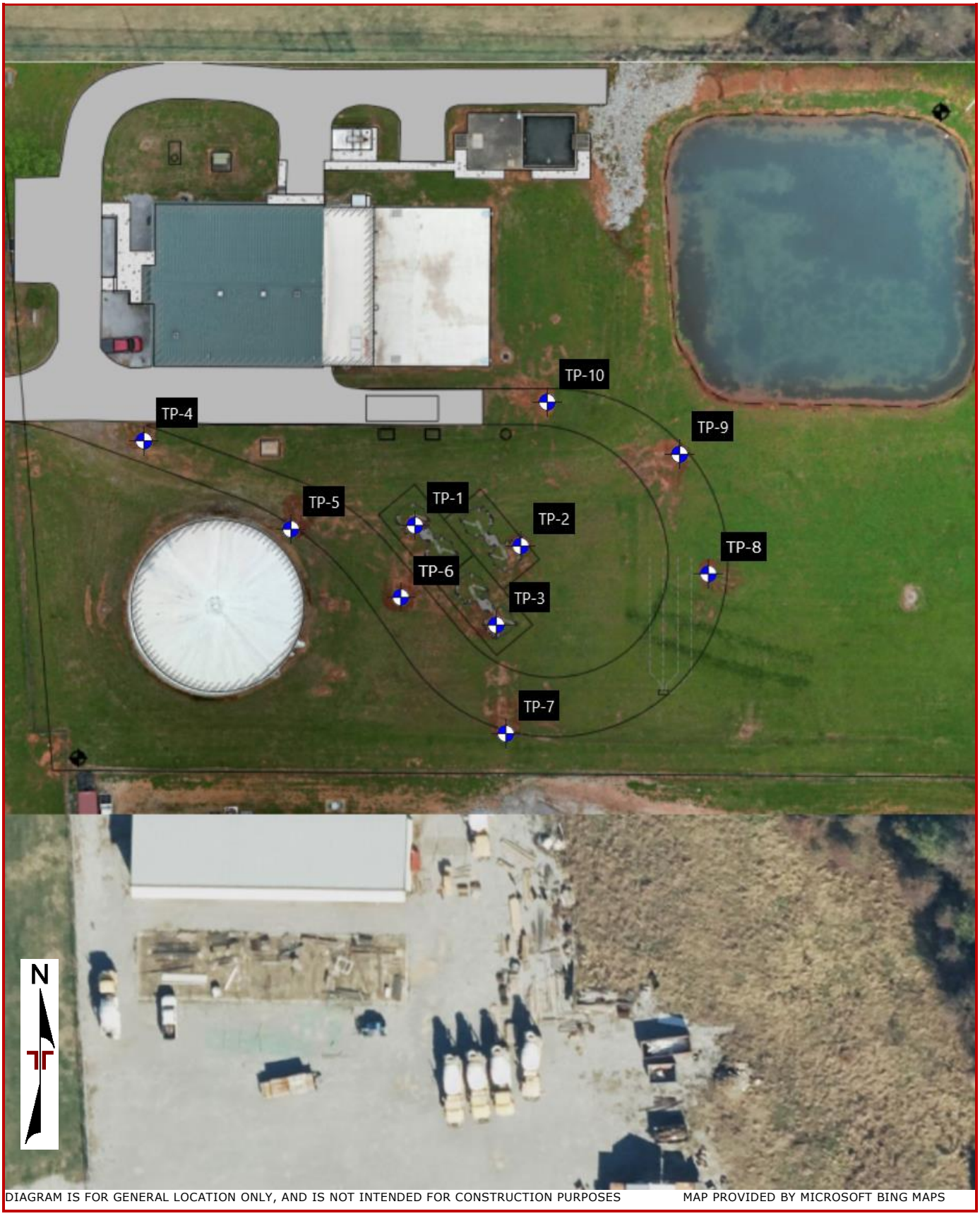


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Test Pit Logs (TP-1 through TP-10)

Limestone County Turner Treatment Facility
10998 US Hwy-31 | Tanner, AL
Terracon Project No. E5255026

289 Production Ave
Madison, AL

Test Pit Log No. TP-1

Location: See Exploration Plan

Latitude: 34.7165° Longitude: -86.9554°

Depth (Ft.) Elevation: 627 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
		TOPSOIL 0.3 / 626.66						
		GRAVEL 0.8 / 626.17						
2		**SANDY FAT CLAY (CH)**, medium plasticity, red, moist, stiff to very stiff						
		6.0 / 621						
		Test Pit Terminated at 6 Feet						

1
2
3
4
5
6

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

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater not encountered

Excavator
John Deere Mini-x 35G

Operator
Limestone Co. Water & Sewer Authority

Logged by
Weston Krohe

Notes

Advancement Method
Excavator

Abandonment Method
Backfilled with excavation spoils

Test Pit Started
04-09-2025

Test Pit Completed
04-09-2025

Limestone County Turner Treatment Facility
10998 US Hwy-31 | Tanner, AL
Terracon Project No. E5255026

Terracon
289 Production Ave
Madison, AL

Test Pit Log No. TP-2

Location: See Exploration Plan

Latitude: 34.7165° Longitude: -86.9553°

Depth (Ft.) Elevation: 627 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
		0.3 626.66 **TOPSOIL**						
2		**SANDY FAT CLAY (CH)**, medium plasticity, red, moist, stiff to very stiff						
		6.0 621 ***Test Pit Terminated at 6 Feet***						

1
2
3
4
5
6

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

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater not encountered

Excavator
John Deere Mini-x 35G

Operator
Limestone Co. Water & Sewer Authority

Logged by
Weston Krohe

Notes

Advancement Method
Excavator

Abandonment Method
Backfilled with excavation spoils

Test Pit Started
04-09-2025

Test Pit Completed
04-09-2025

Limestone County Turner Treatment Facility
10998 US Hwy-31 | Tanner, AL
Terracon Project No. E5255026

289 Production Ave
Madison, AL

Test Pit Log No. TP-3

Location: See Exploration Plan

Latitude: 34.7165° Longitude: -86.9553°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 627 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
		0.3	**TOPSOIL** 626.66							
2			**SANDY FAT CLAY (CH)**, medium plasticity, red, moist, stiff to very stiff	1						
				2						
			18% sand	3				24.0	60-32-28	
				4						
				5						
		6.0	621	6						
			Test Pit Terminated at 6 Feet							

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

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater not encountered

Excavator
John Deere Mini-x 35G

Operator
Limestone Co. Water & Sewer Authority

Logged by
Weston Krohe

Notes

Advancement Method
Excavator

Abandonment Method
Backfilled with excavation spoils

Test Pit Started
04-09-2025

Test Pit Completed
04-09-2025

Limestone County Turner Treatment Facility
10998 US Hwy-31 | Tanner, AL
Terracon Project No. E5255026

289 Production Ave
Madison, AL

Test Pit Log No. TP-4

Location: See Exploration Plan

Latitude: 34.7167° Longitude: -86.9558°

Model Layer	Graphic Log	Depth (Ft.)	Elevation: 626 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
		0.3	**TOPSOIL** 625.66							
		0.8	**GRAVEL** 625.17							
2		4.0	**SANDY FAT CLAY (CH)**, medium plasticity, red, moist, stiff to very stiff 622	1 2 3 4						
		6.0	**SANDY FAT CLAY WITH GRAVEL (CH)**, medium plasticity, red, moist, stiff to very stiff 620	5 6						
			Test Pit Terminated at 6 Feet							

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

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater not encountered

Excavator
John Deere Mini-x 35G

Operator
Limestone Co. Water & Sewer Authority

Logged by
Weston Krohe

Notes

Advancement Method
Excavator

Abandonment Method
Backfilled with excavation spoils

Test Pit Started
04-09-2025

Test Pit Completed
04-09-2025

Limestone County Turner Treatment Facility
10998 US Hwy-31 | Tanner, AL
Terracon Project No. E5255026

289 Production Ave
Madison, AL

Test Pit Log No. TP-5

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.7166° Longitude: -86.9557° Depth (Ft.) / Elevation: 627 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
		TOPSOIL 0.3 / 626.66							
		GRAVEL 0.8 / 626.17							
2		**SANDY FAT CLAY (CH)**, medium plasticity, red, moist, stiff to very stiff	1 2 3 4 5 6						
		7.0 / 620	7						
		Test Pit Terminated at 7 Feet							

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

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater not encountered

Excavator
John Deere Mini-x 35G

Operator
Limestone Co. Water & Sewer Authority

Logged by
Weston Krohe

Notes

Advancement Method
Excavator

Abandonment Method
Backfilled with excavation spoils

Test Pit Started
04-09-2025

Test Pit Completed
04-09-2025

Limestone County Turner Treatment Facility
10998 US Hwy-31 | Tanner, AL
Terracon Project No. E5255026

289 Production Ave
Madison, AL

Test Pit Log No. TP-6

Location: See Exploration Plan

Latitude: 34.7165° Longitude: -86.9554°

Depth (Ft.) Elevation: 627 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
		TOPSOIL 0.3 / 626.66						
2		**SANDY FAT CLAY (CL)**, medium plasticity, red, moist, stiff to very stiff						
		8.0 / 619						
		Test Pit Terminated at 8 Feet						

1 2 3 4 5 6 7 8

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

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater not encountered

Excavator
John Deere Mini-x 35G

Operator
Limestone Co. Water & Sewer Authority

Logged by
Weston Krohe

Notes

Advancement Method
Excavator

Abandonment Method
Backfilled with excavation spoils

Test Pit Started
04-09-2025

Test Pit Completed
04-09-2025

Limestone County Turner Treatment Facility
10998 US Hwy-31 | Tanner, AL
Terracon Project No. E5255026

289 Production Ave
Madison, AL

Test Pit Log No. TP-7

Location: See Exploration Plan

Latitude: 34.7163° Longitude: -86.9553°

Depth (Ft.) Elevation: 626 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
		TOPSOIL 0.3 625.66						
2		**SANDY FAT CLAY (CH)**, red, moist, stiff to very stiff						
		8.0 618						
		Test Pit Terminated at 8 Feet						

1
2
3
4
5
6
7
8

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

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater not encountered

Excavator
John Deere Mini-x 35G

Operator
Limestone Co. Water & Sewer Authority

Logged by
Weston Krohe

Notes

Advancement Method
Excavator

Abandonment Method
Backfilled with excavation spoils

Test Pit Started
04-09-2025

Test Pit Completed
04-09-2025

Limestone County Turner Treatment Facility
10998 US Hwy-31 | Tanner, AL
Terracon Project No. E5255026

289 Production Ave
Madison, AL

Test Pit Log No. TP-8

Location: See Exploration Plan

Latitude: 34.7165° Longitude: -86.9556°

Depth (Ft.) Elevation: 627.5 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
		0.3 627.16 **TOPSOIL**						
2		**SANDY FAT CLAY (CH)**, medium plasticity, red, moist, stiff to very stiff						
		5.0 622.5 **SANDY FAT CLAY WITH GRAVEL (CH)**, medium plasticity, red, very stiff						
		8.0 619.5 ***Test Pit Terminated at 8 Feet***						

1 2 3 4 5 6 7 8

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

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater not encountered

Excavator
John Deere Mini-x 35G

Operator
Limestone Co. Water & Sewer Authority

Logged by
Weston Krohe

Notes

Advancement Method
Excavator

Abandonment Method
Backfilled with excavation spoils

Test Pit Started
04-09-2025

Test Pit Completed
04-09-2025

Limestone County Turner Treatment Facility
10998 US Hwy-31 | Tanner, AL
Terracon Project No. E5255026

289 Production Ave
Madison, AL

Test Pit Log No. TP-9

Location: See Exploration Plan

Latitude: 34.7167° Longitude: -86.9551°

Depth (Ft.) Elevation: 626.5 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
		TOPSOIL 1.0 — 625.5						
1		**FILL - GRAVELLY FAT CLAY WITH SAND (CH)**, medium plasticity, dark tan, moist 2.0 — 624.5						
2		**SANDY FAT CLAY (CH)**, medium plasticity, red, moist, stiff to very stiff 8.0 — 618.5	▽					
		Test Pit Terminated at 8 Feet						

1 2 3 4 5 6 7 8

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

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
▽ Groundwater encountered at 6.5'

Excavator
John Deere Mini-x 35G

Operator
Limestone Co. Water & Sewer Authority

Logged by
Weston Krohe

Notes

Advancement Method
Excavator

Abandonment Method
Backfilled with excavation spoils

Test Pit Started
04-09-2025

Test Pit Completed
04-09-2025

Limestone County Turner Treatment Facility
10998 US Hwy-31 | Tanner, AL
Terracon Project No. E5255026

289 Production Ave
Madison, AL

Test Pit Log No. TP-10

Location: See Exploration Plan

Latitude: 34.7167° Longitude: -86.9552°

Depth (Ft.) Elevation: 622 (Ft.)

Model Layer	Graphic Log	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits LL-PL-PI	Percent Fines
		TOPSOIL 0.5 / 621.5						
		SANDY FAT CLAY WITH GRAVEL (CH), medium plasticity, red, moist, stiff to very stiff						
		6% Gravel, 33% Sand				24.0	53-27-26	
		3.5 / 618.5						
2		**GRAVELLY FAT CLAY (CH)**, medium plasticity, tannish red, moist, very stiff						
		7.5 / 614.5						
3		**GRAVELLY FAT CLAY (CH)**, high plasticity, tannish red, white mottling, wet, very stiff						
		8.0 / 614						
		Test Pit Terminated at 8 Feet						

1 2 3 4 5 6 7 8

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

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
Groundwater encountered at 7'

Excavator
John Deere Mini-x 35G

Operator
Limestone Co. Water & Sewer Authority

Logged by
Weston Krohe

Notes

Advancement Method
Excavator

Abandonment Method
Backfilled with excavation spoils

Test Pit Started
04-09-2025

Test Pit Completed
04-09-2025

Supporting Information

Contents:

Terracon
289 Production Ave
Madison, AL

General Notes

Sampling	Water Level	Field Tests
	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.	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

Relative Density	Standard Penetration or N-Value (Blows/Ft.)
Very Loose	0 - 3
Loose	4 - 9
Medium Dense	10 - 29
Dense	30 - 50
Very Dense	> 50

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

Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)
Very Soft	less than 0.25	0 - 1
Soft	0.25 to 0.50	2 - 4
Medium Stiff	0.50 to 1.00	5 - 8
Stiff	1.00 to 2.00	9 - 15
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	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 4 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu≥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.