

Brakes Plus - Sanger

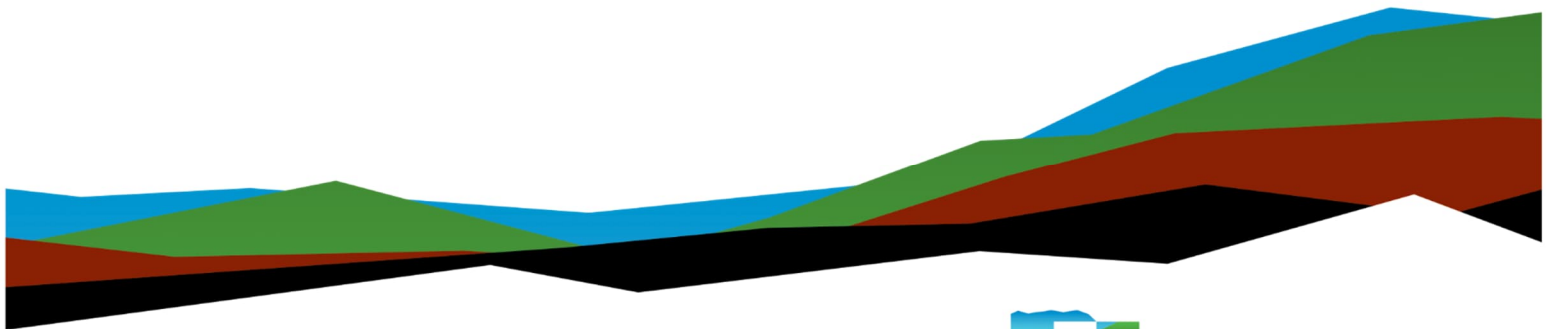
Geotechnical Engineering Report

Sanger, Texas

September 24, 2025 | Terracon Project No. 94255494

Prepared for:

Express Oil Change, LLC
1880 Southpark Drive
Birmingham, AL 35244



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September 24, 2025

Express Oil Change, LLC
1880 Southpark Drive
Birmingham, AL 35244

Attn: Tyler Hendon
P: (205) 703-7758
E: Tyler.hendon@expressoil.com

Re: Geotechnical Engineering Report
Brakes Plus - Sanger
W Chapman Drive and Acker Street
Sanger, Texas
Terracon Project No. 94255494

Dear Mr. Hendon:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. P94255494 dated and authorized on August 26, 2025. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs, 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.

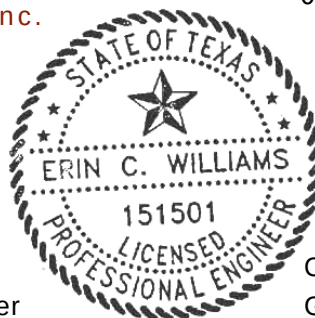
Sincerely,

09/24/2025

Terracon Consultants, Inc.
Registration No. F-3272

A handwritten signature in black ink, appearing to read 'Erin C. Williams'.

Erin C. Williams, P.E., P.G.
Project Geotechnical Engineer



A handwritten signature in blue ink, appearing to read 'Cheryl C. Pedraza'.

Cheryl C. Pedraza, P.E.
Geotechnical Department Manager

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Note: **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  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 project. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface conditions
- Groundwater conditions
- Seismic site classification
- Site preparation and earthwork
- Foundation design and construction
- Floor slab design and construction
- Pavement design and construction

The geotechnical engineering Scope of Services for this project included the advancement of 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 and Laboratory Results](#) section.

Project Description

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

Item	Description
Project Description	The project includes a single-story building with a footprint of about 4,975 square feet. The site will also have associated parking areas and drive lanes.
Building Construction	Steel Frame Grade-supported floor slab
Finished Floor Elevation	We have assumed that finished floor is ± 2 feet of existing grade.

Item	Description
Maximum Loads	<ul style="list-style-type: none"> Columns: 75 kips Walls: 5 kips per linear foot (klf) Slabs: 150 pounds per square foot (psf)
Grading/Slopes	Finished grades will be within ± 4 feet of existing grades, and final slopes are planned an inclination of 4H:1V (Horizontal: Vertical) or flatter.
Below-Grade Structures	None planned
Free-Standing Retaining Walls	None planned
Pavements	<p>Portland cement concrete driveway and parking areas will be constructed on the site.</p> <p>The anticipated ACI traffic categories (per ACI 330-21) and daily truck traffic will consist of:</p> <ul style="list-style-type: none"> Category A: Car parking areas and access lanes, 1 truck per day Category B: Entrance and truck service lanes, 10 trucks per day Category E: Garbage/dumpster pads or fire truck lanes <p>The pavement design period is 20 years.</p>

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

Site Conditions

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

Item	Description
Parcel Information	<p>The project site is located at W Chapman Drive and Acker Street in Sanger, Texas.</p> <p>Latitude / Longitude (approximate): 33.3676°, -97.1852°</p> <p>See Site Location</p>

Item	Description
Existing Improvements / Current Ground Cover	Undeveloped, agricultural field
Existing Topography	Based on the North Central Council of Governments (NCTCOG) topographic maps, the site generally slopes down from southeast to northwest with elevation changes of about 696 to 702 feet.
Geology	The site is situated within the undivided Pawpaw, Weno Limestone and Denton Clay geologic formations.

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 boring are indicated on the individual logs. The individual logs can be found in the [Exploration and Laboratory Results](#) and the GeoModel can be found in the [Figures](#) attachment.

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	Existing Fill Soils	Fat Clay, with limestone fragments, dark brown and tan
2	Native Clay Soils	Fat Clay, dark brown to brown
3	Weathered Bedrock	Limestone, weathered, with clay seams, tan
4	Bedrock	Limestone, gray

Groundwater was not observed in the borings while drilling, or for the short duration the borings could remain open. These groundwater observations provide an indication of the groundwater conditions present at the time the borings were drilled. Groundwater conditions may be different at the time of construction.

A relatively long period may be necessary for a groundwater level to develop and stabilize in a borehole. Long-term observations in piezometers or observation wells sealed from the influence of surface water are often required to define groundwater levels. Long-term groundwater monitoring was outside the scope of services for this project.

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. Perched water seepage can be present in and above the limestone stratum, particularly during or following rainy periods of the year. Groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

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 7-16 and the International Building Code (IBC 2021). 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 B be considered for the project. Subsurface explorations at this site were extended to a maximum depth of 25 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

Geotechnical Overview

Subsurface conditions encountered in the borings consist of clay soils overlying limestone bedrock. Fill materials were present in the borings.

Expansive soils are present on this site. The magnitude of the moisture induced potential vertical movement (PVM) is dependent on several factors including the thickness of active clay soils and moisture levels of the overburden soils at the time of construction. Based on the plasticity index (PI) of the soils and swell tests, the maximum PVM of the site soils is estimated to be on the order of 2 to 3 inches when the soils are in a dry moisture state.

The expansive soils present at this site can subject shallow foundations and floor slabs to significant differential movements due to moisture fluctuations in the soils. This report provides recommendations to help mitigate the effects of soil shrinkage and expansion; however, even if these procedures are followed, some movement and cracking in the structure should be anticipated. The severity of cracking and other damage such as uneven floor slabs will increase if excessive wetting or drying of the expansive soils is allowed to occur during or after construction.

Footings foundations bearing on moisture conditioned soils, flexible base or select fill to top of weathered limestone, or on weathered limestone could be used to support the proposed building if movements of the foundation and slab can be tolerated. The [Footings Foundations](#) section addresses support of the building on spread footings. The Building Pad Preparation section addresses the preparation of the subgrade.

Portland cement concrete (PCC) pavement sections can be used for the pavement area. The [Pavements](#) section addresses the design of pavement systems.

The recommendations contained in this report are based upon the results of field and laboratory testing, 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.

Existing Fill

As noted in [Geotechnical Characterization](#), the borings encountered previously placed fill to depths ranging from about 1½ to 4 feet. The fills contained limestone fragments. Limestone encountered in the fills may be larger than represented on the boring logs. Large boulders and slabs could be present, which may be difficult to excavate and process for use as fill in building and pavement areas. Test pits can be used to verify the size of limestone present in the fills upon request. The possibility of deeper fills at this site and under compacted zones of soil or debris within the fill materials exists. Under compacted zones and debris could lead to unacceptable settlements of building foundations, floor slabs, and pavements.

We recommend removing and replacing all fills within the building pad area and other areas sensitive to movement. Proofrolling, as discussed in Site Preparation, can be considered in lieu of complete removal of the fill outside the building pad and movement

sensitive areas, provided the risk of settlement and cracking of pavements and flatwork can be tolerated. Proofrolling is intended to represent a reasonable approach for treatment of fill; however, it will not eliminate the risk of unexpected movements. Excavation and replacement as described in Building Pad Preparation will rework the fills in the building area. The excavated soil, free of debris or rock greater than 4 inches in dimension, can be used to backfill the excavated areas.

Site Preparation

The site should be stripped and grubbed to remove all vegetation, root balls, deleterious material, and debris. Excavation required to remove the root balls should be backfilled with properly placed and compacted fill as discussed in Fill Placement and Compaction Requirements. The exposed subgrade should then be proofrolled prior to placing any fill. In cut areas, proofrolling should be performed after excavating to final grade. The proofrolling should be performed with a fully loaded, tandem-axle dump truck or other equipment providing an equivalent subgrade loading. A minimum gross weight of 20 tons is recommended for the proofrolling equipment. Where practical, the proofrolling should consist of several overlapping passes in mutually perpendicular directions over a given area. Any soft or pumping areas should be modified using one of the methods discussed in this section.

Methods of remediating soft areas identified during the proofrolling include scarification and compaction at the proper moisture content, lime/cement treatment, or removal of unstable materials and replacement with flexible base (with or without a geogrid). The appropriate method of improvement, if required, would be dependent on factors such as schedule, weather, the size of the area to be stabilized, and the nature of the instability. More detailed recommendations can be provided during construction as the need for subgrade modification occurs. Performing site grading operations during warm seasons and dry periods would help to reduce the amount of subgrade stabilization required.

Building Pad Preparation

The following recommendations are for slab-on-grade construction.

Floor slabs, shallow foundations and flatwork placed on-grade will be subject to movement as a result of moisture induced volume changes in the active clay soils that can occur following construction. The soils expand (heave) with increases in moisture and contract (shrink) with decreases in moisture.

The magnitude of the moisture induced potential vertical movement (PVM) is variable and is influenced by the soil properties, overburden pressures, thickness of clay, and soil moisture levels at the time of construction. Based on the soil types and thickness encountered in the borings, the PVM for slabs placed on grade is estimated to be about 2



to 3 inches for dry soil moisture conditions that can exist prior to construction. The PVM is estimated based on Texas Department of Transportation's Test Procedure Tex-124-E, dry soil conditions, and the results of swell tests.

Reductions in anticipated movements to about ½ to 1 inch can be achieved by using methods developed in this area. Suitable methods for this site consist of moisture conditioning the clay soils and capping them with flexible base or select fill OR replacing the overburden soils with a flexible base or select fill extending to the top of tan limestone.

The moisture conditioning or flexible base/select fill replacement can be achieved by excavation and replacement as described in the following table.

Material	Thickness – Moisture Conditioning Option (1 inch PVR)	Thickness – Flexible Base or Select Fill Option (½ inch PVR)
Flexible Base or Select Fill	12 inches	To the top of weathered limestone
Moisture Conditioned Clays	To the top of weathered limestone	---

The building pad preparation should extend at least 5 feet beyond the building perimeter and include entrances, abutting sidewalks and other flatwork areas sensitive to movement. If the moisture conditioning option is utilized, the select fill/flexible base cap is not required beyond the building perimeter.

The select fill/flexible base cap must be placed above the moisture-conditioned soils in a short period of time (i.e. within 48 hours) following completion of the moisture conditioning process to prevent the loss of soil moisture. If the surface of the moisture conditioned soil is allowed to desiccate prior to placement of the subsequent lift or cap, the desiccated soils should be reworked and placed in a moisture conditioned state.

If the moisture conditioning option is utilized, minimum 10-mil polyethylene sheeting should be placed above the moisture conditioned soils that extend beyond the building perimeter, in areas where pavement or flatwork are not constructed adjacent to the building. The polyethylene sheeting should be covered with 12 to 18 inches of properly compacted, on-site clay soils. If the surface of the moisture conditioned soils is allowed to desiccate prior to placement of the polyethylene sheeting, the desiccated soils should be reworked and placed in a moisture conditioned state.

It should be noted that excessive water from any source, during or after construction, could result in movements greater than the slab was designed to accommodate. For example, should leaks develop in underground water or sewer lines or the grades around the structure allow ponding of water, unacceptable slab movements could develop. Design parameters stated in this report assume the area around the structure will be well drained, landscape beds are not over watered or allow ponding of water, and utility leaks are promptly repaired. Trees should be planted at least one-mature tree height from the building. Root barriers should be installed if trees are planted closer.

Excavation and Replacement (Moisture Conditioning Option)

If movements on the order of 1 inch are acceptable, the subgrade should be moisture conditioned by performing the following steps:

1. Excavate on-site soils to a depth of the top of weathered limestone bedrock. The excavation should extend laterally at least 5 feet beyond the building perimeter and should extend below any flatwork and pavement that is sensitive to movement. The weathered limestone can be left in place undisturbed.
2. Backfill the excavated area with the moisture conditioned soils up to 12 inches below finished building pad elevation as recommended in Compaction Requirements. The excavated soils or imported fill, except for deleterious materials or rock greater than 4 inches, can be placed as moisture conditioned soils in accordance with Fill Placement and Compaction Requirements for moisture conditioned clays.
3. Place 12 inches of select fill or flexible base material over the moisture conditioned subgrade as recommended in the aforementioned table to establish finish building pad elevation. The flexible base material should be compacted as recommended in Fill Placement and Compaction Requirements.

Care should be taken that a lift of moisture conditioned soils is not allowed to desiccate prior to placing a subsequent lift. If the surface of the moisture conditioned soil is allowed to desiccate prior to placement of the cap, the desiccated soils should be reworked and placed in a moisture conditioned state as recommended in this report.

(Flexible Base or Select Fill Replacement Option) If the option to replace the overburden soils with flexible base is utilized, the soils should be excavated to the top of weathered limestone bedrock. The flexible base or select fill should then be placed as compacted as recommended in Fill Placement and Compaction Requirements. The subgrade modification should extend at least 5 feet beyond the building perimeter and include entrances, abutting sidewalks and other flatwork areas sensitive to movement.

Positive drainage must be provided away from the structure to prevent the ponding of water in the fill, during and following construction.

Fill Material Types

Fill materials should meet the following requirements.

Material Type	Description	Appropriate Use
On-Site Soils	Free of vegetation, organic material, debris, and rocks greater than 4 inches in maximum dimension.	<ul style="list-style-type: none"> General site grading Pavement subgrade Utility trench backfill Moisture conditioned soils
Imported Fill	Clay soil free of hazardous chemicals, vegetation, organic material, debris, and rocks greater than 4 inches in maximum dimension, with a liquid limit (LL) of 70 or less	<ul style="list-style-type: none"> General site grading Pavement subgrade Utility trench backfill Moisture conditioned soils
Flexible Base	TxDOT ¹ Item 247, Type A or D, Grade 1-2. Recycled concrete meeting this gradation is acceptable.	<ul style="list-style-type: none"> Building pad preparation Pavement subgrade
Select Fill	Uniformly blended sandy clay to clayey sand with a liquid limit (LL) of 35 or less, a plasticity index (PI) in the range of 6 and 15, and in the range of 30 and 60 percent passing a #200 US sieve.	<ul style="list-style-type: none"> Building pad preparation

1. Texas Department of Transportation

Fill Placement and Compaction Requirements

We recommend that all moisture and compaction requirements are achieved.

Recommendations for compaction are presented in the following table. Fills should be placed at a maximum loose lift thickness of 6 and 9 inches for hand-operated and heavy compaction equipment, respectively.

Item	Compaction	Moisture Content
On-Site Soils or Imported Fills Placed Outside the Moisture Conditioned Zone	A minimum of 95% maximum standard Proctor dry density (ASTM D698)	In the range of 0 to +4 percentage points of optimum moisture content

Item	Compaction	Moisture Content
Moisture Conditioned Soil	In the range of 93% to 98% maximum standard Proctor dry density (ASTM D698)	In the range of +4 to +8 percentage points of optimum moisture content ²
Flexible Base / Select Fill	A minimum of 95% maximum standard Proctor dry density (ASTM D698)	In the range of -2 to +2 percentage points of optimum moisture content
Pavement Subgrades (Upper 6 Inches of Natural or Lime Treated Soil Below Pavement) ¹	A minimum of 95% maximum standard Proctor dry density (ASTM D698)	In the range of 0 to +3 percentage points of optimum moisture content

1. The compaction criteria in the fire lanes and public roadways must meet the requirements of the local governing authority.
2. Swell tests must be performed on the moisture conditioned soils to evaluate the compaction moisture content that results in 1 percent or less swell. The testing program is described in Construction Observation and Testing.

Utility Trenches Outside the Building Pad

Utility trenches are a common source of water infiltration and migration. All utility trenches that penetrate beneath the structure should be backfilled to restrict water intrusion and flow through the trenches that could migrate below the structure. We recommend constructing a clay or flowable fill “trench plug” that extends at least 2 feet out from the exterior perimeter of the building. The clay fill/flowable fill should be placed to surround the entire utility line and it should fill the utility trench in width and height, with the exception of topsoil at the surface. If a clay plug is used, it should consist of a clay soil with a minimum plasticity index (PI) of 30 and should be compacted in accordance with the applicable recommendations as described in Fill Placement and Compaction Requirements. If flowable fill is used, it should meet the requirement of TxDOT Item 401, excavatable characteristics.

Utility lines will be placed in backfilled trenches surrounded by expansive clays capable of moving several inches cyclically throughout the year. This level of movement can lead to bending, cracking, or separation of utility lines and connections. Care should be taken that utility trenches are not left open for extended periods, and they are properly backfilled. Flexible joints and connections should be designed by the MEP to accommodate differential movements along the utility lines, particularly in areas where ground supported utilities and structurally supported utilities converge. Where utilities penetrate grade beams, wall panels, and below-grade walls, an opening should be

provided in the grade beams, wall panels, and below-grade walls and the utility line should be centered in the opening. A clear spacing equivalent to the potential vertical movement (PVM) of the on-site soil should be provided between the outside surface of the utility line and the grade beam, wall panel, and below-grade wall. If moisture conditioning is performed as discussed in Building Pad Preparation, the PVM will be about 1 inch. If the flexible base or select fill replacement option is utilized, as discussed in Building Pad Preparation, the PVM will be about ½ inch.

Earthwork Construction Considerations

Shallow excavations for the proposed structure are anticipated to be accomplished with conventional construction equipment. In some areas, limestone was shallow. The limestone is hard and may be difficult to excavate. Excavations extending into the limestone may require breaker hoes, trenchers, and milling machines equipped with rock teeth. Line drilling can be used to control breaks at the limits of the excavation. The limestone may be very difficult to process down for use as suitable fill in the building and paving areas and may have to be placed in landscape areas (i.e., outside building and pavement areas) or wasted.

The on-site clay soils exposed during construction are anticipated to be relatively stiff and therefore should be able to support lightly loaded construction equipment when dry; however, stability of the subgrade will be affected by rainfall and repetitive construction traffic. If unstable conditions develop, workability of the soils may be improved by scarifying and drying. 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 time of the year. If grading is performed during the winter months, an increased risk for possible undercutting and replacement of unstable subgrade will persist.

The earthwork contractor selected for moisture conditioning (by mechanically mixing of soil and water) should have experience with the process. Disks, plows or other equipment capable of mixing and achieving a uniform moisture content throughout each lift should be used. Proper equipment capable of achieving a uniform moisture content within the moisture conditioned fill is essential. Dry or extremely wet zones within the moisture conditioned fill can result in excess swelling if the fill is dry or settlement if the fill is too wet. Either of these conditions can be detrimental to the long-term performance of the building subgrade.

Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-supported improvements such as floor slabs and pavements. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the



affected material should be removed, or the materials should be scarified, moisture conditioned, and recompactd 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 monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of any existing fill, vegetation, any debris/ deleterious materials, trees, tree roots, and topsoil, proofrolling and mitigation of areas delineated by the proofroll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked as necessary until approved by the Geotechnical Engineer prior to placement of additional lifts as outlined in Fill Placement and Compaction Requirements and as recommended in the following table.

Material Type	Frequency of In-Place Moisture and Density Tests ¹
Building Pad Areas	At least 1 test per 2,500 sf of area per compacted lift with a minimum of 3 tests per lift
Pavement Areas	At least 1 test per 5,000 sf of area per compacted lift with a minimum of 3 tests per lift

Material Type	Frequency of In-Place Moisture and Density Tests ¹
Trench Backfill	At least 1 test for every 100 linear feet per lift of compacted trench backfill

1. If limestone is exposed during site preparation, no compaction is necessary within limestone.

Daily reports documenting activities, test results and a list on non-conforming tests should be provided to the team. The imported fill and flexible base should be sampled and tested on a regular basis to confirm that it does meet the properties recommended in this report.

The following requirements must be met where moisture conditioning is used:

- The soil samples used to determine the soil moisture-density relationship (i.e., Proctor testing) of moisture conditioned materials with a plasticity index (PI) of 30 or higher should be allowed to cure for a minimum period of 48 hours following the addition of water and prior to compaction.
- Prior to the start of the moisture conditioning operations, laboratory swell testing is required on laboratory compaction sample points (i.e., Proctor points) to evaluate the target field moisture contents that result in 1 percent swell or less. Swell tests should be performed on the laboratory compaction sample points (i.e., Proctor points) that are prepared at molding water contents greater than optimum moisture. The swell tests must be performed with a surcharge pressure of 250 psf. The water content that results in 1 percent or less swell should be considered the minimum field target moisture content to be used during moisture conditioning.
- Swell tests must be performed on the moisture conditioned soils during earthwork operations to verify that the target moisture content for the moisture conditioned soil results in 1 percent or less swell at the estimated overburden pressures at completion of grading. Samples of the moisture conditioned fill should be periodically obtained as the fill is being placed, and swell test performed with the applicable overburden pressure applied. Should the swell exceed 1 percent, the specified moisture content of the moisture conditioned soils should be adjusted to achieve 1 percent or less swell. 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.

Site Grades and Drainage

All permanent slopes taller than 6 feet should be 4 Horizontal to 1 Vertical (4H:1V) or flatter. A slope stability analysis should be performed if steeper slopes are considered.

Positive drainage away from the building must be provided during the construction and maintained through the life of the building. Infiltration of water into excavations should be prevented during construction. It is important that subgrade soils are not allowed to become excessively wet or dry. Exposed (unpaved) ground should be sloped away from the building for at least 10 feet beyond the perimeter of the building.

Roof runoff and surface drainage should be collected and discharged away from the building to prevent wetting of the subgrade soil. Roof gutters should be installed and connected to downspouts and pipes directing the roof runoff at least 10 feet away from the building or discharged on to positively sloped flatwork such as the aprons. Also, consideration can be given to having roof drains discharged directly into the storm drainage system.

Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping, final grades should be verified to document effective drainage has been achieved. Grades around the structures should also be periodically inspected and adjusted as necessary as part of the structure's maintenance program. Where paving or flatwork abuts the structures, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration. Water permitted to pond next to the structures can result in greater soil movements than those discussed in this report. Estimated movements described in this report are based on effective drainage for the life of the structures and cannot be relied upon if effective drainage is not maintained.

Landscape Considerations

Sprinkler mains and spray heads should be located at least 5 feet away from the building such that they cannot become a potential point source of water directly adjacent to the building. Watering of vegetation should be performed in a timely and controlled manner and prolonged watering, or prolonged non-watering periods should be avoided. Special care should be taken such that underground utilities do not develop leaks with time.

The owner and landscape designer should be made aware that placing large bushes and trees adjacent to the building may cause significant moisture variations in the soil underlying the building that could cause distress. A general guideline would be to locate trees no closer than a distance equal to the mature tree height for that tree species. Planters located adjacent to the building should preferably be self-contained, or at least designed to drain away from the building.

Footing Foundations

Footing foundations can be used to support the proposed structure. They should be designed in accordance with the recommendations provided in the following table.

Design Parameters – Compressive Loads

Item	Description		
Bearing Stratum ¹	Modified subgrade placed in accordance with recommendations in Building Pad Preparation (Moisture Conditioning option)	Modified subgrade placed in accordance with recommendations in Building Pad Preparation (Flexible Base or Select Fill Replacement option)	Weathered Limestone Bedrock
Maximum Net Allowable Bearing Pressure ^{2, 3}	1,500 psf	2,500 psf	4,000 psf
Minimum Foundation Dimensions	Per IBC		
Minimum Embedment	24 inches below finished grade		12 inches into limestone
Ultimate Passive Resistance ⁴	1,000 psf (uniform) if moisture conditioned soils used as backfill 450 psf/ft (triangular) if flexible base or select fill used as backfill		
Ultimate Sliding Resistance	350 psf adhesion if moisture conditioned soils used as backfill 0.4 coefficient of if flexible base or select fill used as backfill		
Estimated Total Settlement from Structural Loads ³	Less than about 1 inch		About ½ inch
Estimated Differential Settlement from Structural Loads ^{3, 5}	About 50 to 75 percent of total settlement		

Item	Description		
Estimated Vertical Movement Due to Active Clay Soil	About 1 inches	About ½ inch	Less than ½ inch

1. Unsuitable or soft soils should be over excavated and replaced per the recommendations presented in [Earthwork](#).
2. 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.
3. Values provided are for maximum loads noted in [Project Description](#). Additional geotechnical consultation will be necessary if higher loads are anticipated.
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. Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet.

Design Parameters – Overturning and Uplift Loads

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

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

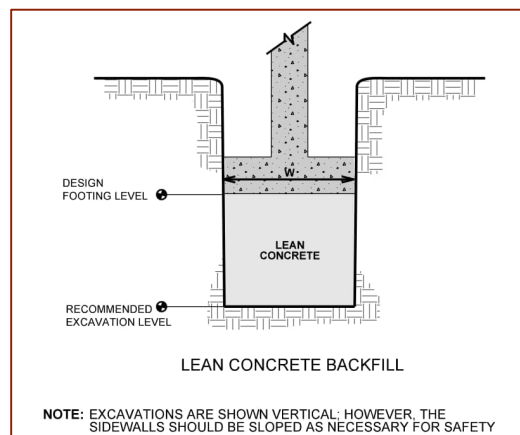
Item	Description
Soil Moist Unit Weight	125 pcf
Soil Effective Unit Weight ¹	63 pcf
Soil Weight Included in Uplift Resistance	Soil included within the prism extending up from the top perimeter of the footing at an angle of 20 degrees from vertical to ground surface

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

Footing 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.

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 following sketch.



Floor Systems

The finished floor elevation is planned within ± 2 feet from existing grade. Terracon should be contacted if the planned grading is changed so that we may review and/or modify the recommendations presented in this report.

Lightly loaded floor slabs and flatwork placed on-grade will be subject to movement as a result of moisture induced volume changes in the active soils that can occur following construction. The soils expand (heave) with increases in moisture and contract (shrink) with decreases in moisture. The movement typically occurs as post construction heave.

Movements of even $\frac{1}{2}$ inch can result in uneven floors, sticking doors, and cracking of floor slabs and wall partitions. Flatwork adjacent to the building should also be supported on modified subgrade if movements on the order of the site PVM cannot be tolerated.

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

Floor Slab and Flatwork on Modified Subgrade

Slab-on-grade construction should only be considered if slab movements on the order of ½ to 1 inch are considered acceptable. If floor movements of about ½ to 1 inch are acceptable, the building floor slab can be supported on a modified subgrade that has been prepared to reduce soil movements according to the Building Pad Preparation section.

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

Floor Slab Design Parameters

Item	Description
Floor Slab Support	For building pad prepared with moisture conditioned soils and a 1-foot cap of flexible base or select fill material <u>OR</u> over excavation and replacement with flexible base or select fill as discussed in Building Pad Preparation.
Estimated Modulus of Subgrade Reaction ¹	<ul style="list-style-type: none"> 100 pounds per square inch per inch (psi/in) for point loads for moisture conditioned option 200 pounds per square inch per inch (psi/in) for point loads if flexible base/select fill option is constructed

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

Floor Slab Construction Considerations

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

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

Pavements

Parking and Drive Lane Pavement Subgrades

Subgrade materials at this site will most likely consist of clay soils. Portland cement concrete pavements can be placed on unmodified, properly compacted subgrade. The pavement subgrades should be proofrolled as discussed in Site Preparation. The exposed pavement subgrade should be scarified to a depth of 6 inches and uniformly compacted to the criteria described in Fill Placement and Compaction Requirements.

If lime treatment of the pavement subgrade is required by the city in fire lanes, a minimum of 8 percent hydrated lime (TxDOT Item 260), by dry weight, is estimated for treating the subgrade soil. The lime application rate should be determined by laboratory testing once the pavement subgrade is rough graded. The lime should be thoroughly mixed and blended with the top 6 inches of the subgrade and uniformly compacted to the criteria described in Fill Placement and Compaction Requirements. Lime treatment should extend a minimum of 1 foot beyond the edge of the pavement.

Pavement subgrades should be protected and maintained in a moist condition until the pavement is placed. Pavement subgrades should be graded to prevent ponding and infiltration of excessive moisture on or adjacent to the pavement subgrade surface.

Site grading is generally accomplished early in the construction phase; however, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, or rainfall. As a result, the pavement subgrade may not be suitable for pavement construction and corrective action will be required. The

subgrade should be carefully evaluated at the time of pavement construction for signs of disturbance or excessive rutting. If disturbance has occurred, pavement subgrade areas should be reworked, moisture conditioned, and properly compacted to the recommendations in this report immediately prior to paving.

Support characteristics of the subgrade for pavement design do not account for shrink/swell movements of an expansive clay subgrade, such as soils encountered on this project. Thus, the pavement may be adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell related movement of the subgrade.

Pavement Sections

Design of portland cement concrete (PCC) pavements are based upon American Concrete Institute (ACI) 330-21 - Commercial Concrete Parking Lots and Site Paving Design and Construction - Guide.

Detailed traffic loads and frequencies were not available; however, we anticipate that traffic will consist primarily of passenger vehicles in the parking areas and passenger vehicles combined with emergency vehicles, occasional garbage trucks, service trucks, and delivery trucks in driveways. If heavier traffic loading is expected or other traffic information is available, Terracon should be provided with the information and allowed to review the pavement sections provided herein.

The anticipated ACI traffic categories (per ACI 330-21) and daily truck traffic will be assumed to consist of:

- Category A: Car parking areas and access lanes, 1 truck per day
- Category B: Entrance and truck service lanes, 10 trucks per day
- Category E: Garbage/dumpster pads or fire truck lanes

The pavement design period is 20 years.

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

Portland Cement Concrete Design

Layer	Thickness (inches)		
	Traffic Category A	Traffic Category B	Traffic Category E ^{2,3}
PCC ¹	5	6	7
Compacted Subgrade	6	6	6

Pavement Maintenance

The pavement sections represent the 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 Design Considerations

Proper joint spacing will 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 the most current ACI 325 and ACI 330 documents.

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 and irrigated foliage 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 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 to prevent ponding of water.
- Subgrade and pavement surfaces should be sloped to promote proper surface drainage.

- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Compacted, on site clay soils should be used as backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than granular material.

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 affect 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

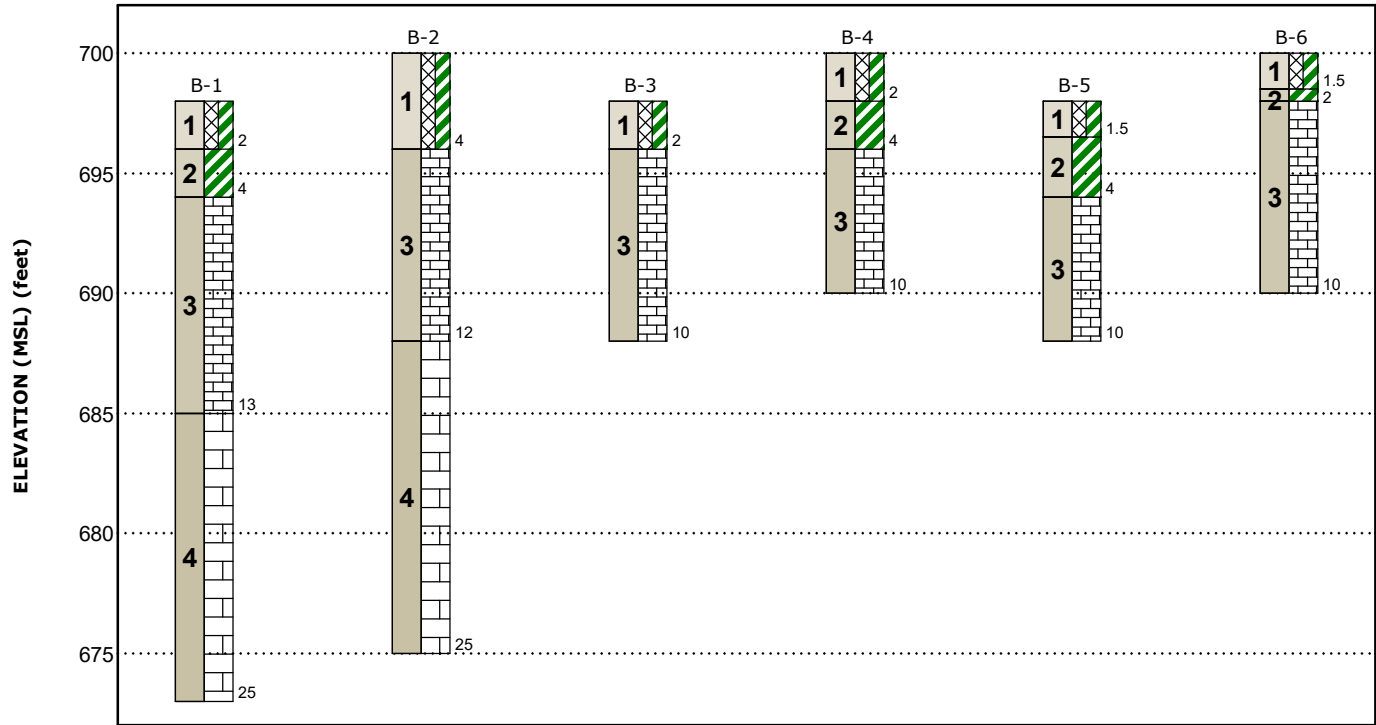
excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation 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:

GeoModel

GeoModel



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

Model Layer	Layer Name	General Description	Legend	
1	Existing Fill Soils	Fat Clay, with limestone fragments, dark brown and tan	 Fat Clay	 Highly Weathered Limestone
2	Native Clay Soils	Fat Clay, dark brown to brown	 Limestone	
3	Weathered Bedrock	Limestone, weathered, with clay seams, tan		
4	Bedrock	Limestone, gray		

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

Borings	Approximate Boring Depth (feet)	Location
B-1 and B-2	25	Building area
B-3 through B-6	10	Parking/driveway 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 obtained by interpolation from topographical information available at www.dfwmaps.com.

Subsurface Exploration Procedures: We advanced the borings with a truck-mounted drill rig using continuous flight augers. Samples were obtained at 2 feet intervals in the upper 10 feet of each boring and at intervals of 5 feet thereafter using push tube sampling procedures. In the push tube sampling procedure, a seamless steel tube with a sharp cutting edge was pushed hydraulically into the soil to obtain a relatively undisturbed sample. The load-carrying capacity of bedrock was evaluated in place by the Texas Department of Transportation (TxDOT) cone penetration test.

We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials 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:

- Water (moisture) content
- Liquid limit, plastic limit, and plasticity index

- Unconfined compressive strength of soil
- Absorption swell tests
- Material finer than 75- μ m (No. 200) sieve

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

The results of the laboratory tests are presented on the individual boring logs, tables, or graphs in [Exploration and Laboratory Results](#).

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted.

Site Location



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

Exploration Plan



Exploration and Laboratory Results

Contents:

Boring Logs (B-1 through B-6)
Summary of Swell Tests

Note: All attachments are one page unless noted.

Boring Log No. B-1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.3677° Longitude: -97.1853° Depth (Ft.) Approximate Elevation: 698 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Strength Test			Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
							Test Type	Compressive Strength (tsf)	Strain (%)			LL-PL-PI	
1		FILL: FAT CLAY , with limestone fragments, dark brown and tan	2.0			4.5+ (HP)				20.9			78.7
2		FAT CLAY (CH) , dark brown to brown, hard	4.0			4.5 (HP)				25.8		66-20-46	
3		LIMESTONE , weathered, with clay seams, tan	5			TC=100/3.5"							
			10			TC=100/1"							
			15			TC=100/0.5"							
4		LIMESTONE , gray	20			TC=100/0.5"							
			25			TC=100/0.5"							
		Boring Terminated at 25 Feet	25										

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.
Elevation Reference: Elevations obtained from publicly available [www.dfwmaps.com](#).

Water Level Observations
No seepage encountered while drilling
Dry at completion

Drill Rig
Truck Rig
Hammer Type
Automatic
Driller
StrataBore

Notes

Advancement Method
Dry auger drilling

Abandonment Method
Boring backfilled with soil cuttings upon completion.

Logged by
Clanahan
Boring Started
09-05-2025
Boring Completed
09-05-2025

Boring Log No. B-2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.3675° Longitude: -97.1852° Depth (Ft.) Approximate Elevation: 700 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Strength Test			Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
							Test Type	Compressive Strength (tsf)	Strain (%)			LL-PL-PI	
1		FILL: FAT CLAY , with limestone fragments, dark brown and tan	4.0			4.25 (HP)				17.0		56-18-38	
						4.5 (HP)	UC	4.00	6	13.8	113		
3		LIMESTONE , weathered, with clay seams, tan	5			TC=100/0.75"							
4		LIMESTONE , gray	10			TC=100/0.75"							
			15			TC=100/2"							
			20			TC=100/0.5"							
			25			TC=100/0.25"							
		Boring Terminated at 25 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.
Elevation Reference: Elevations obtained from publicly available [www.dfwmaps.com](#).

Water Level Observations
No seepage encountered while drilling
Dry at completion

Drill Rig
Truck Rig
Hammer Type
Automatic
Driller
StrataBore

Notes

Advancement Method
Dry auger drilling

Abandonment Method
Boring backfilled with soil cuttings upon completion.

Logged by
Clanahan
Boring Started
09-05-2025
Boring Completed
09-05-2025

Boring Log No. B-3

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.3678° Longitude: -97.1851° Depth (Ft.) Approximate Elevation: 698 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Strength Test			Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
							Test Type	Compressive Strength (tsf)	Strain (%)			LL-PL-PI	
1		FILL: FAT CLAY , with limestone fragments, dark brown and tan	2.0			2.25 (HP)				18.0			
3		LIMESTONE , weathered, with clay seams, tan	696			TC=100/7.5"							
			5			TC=100/1.75"							
			10			TC=100/7.75"							
		Boring Terminated at 10 Feet	10										

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.
Elevation Reference: Elevations obtained from publicly available www.dfwmaps.com.

Water Level Observations
No seepage encountered while drilling
Dry at completion

Drill Rig
Truck Rig
Hammer Type
Automatic
Driller
StrataBore

Notes

Advancement Method
Dry auger drilling

Abandonment Method
Boring backfilled with soil cuttings upon completion.

Logged by
Clanahan
Boring Started
09-05-2025
Boring Completed
09-05-2025

Boring Log No. B-4

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.3676° Longitude: -97.1851° Depth (Ft.) Approximate Elevation: 700 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Strength Test			Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
							Test Type	Compressive Strength (tsf)	Strain (%)			LL-PL-PI	
1		FILL: FAT CLAY , with limestone fragments, light brown and tan 2.0											

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.
Elevation Reference: Elevations obtained from publicly available www.dfwmaps.com.

Water Level Observations
No seepage encountered while drilling
Dry at completion

Drill Rig
Truck Rig
Hammer Type
Automatic
Driller
StrataBore

Notes

Advancement Method
Dry auger drilling

Abandonment Method
Boring backfilled with soil cuttings upon completion.

Logged by
Clanahan
Boring Started
09-05-2025
Boring Completed
09-05-2025

Boring Log No. B-5

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.3674° Longitude: -97.1854° Depth (Ft.) Approximate Elevation: 698 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Strength Test			Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
							Test Type	Compressive Strength (tsf)	Strain (%)			LL-PL-PI	
1		FILL: FAT CLAY , with limestone fragments, dark brown and tan 1.5											

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.
Elevation Reference: Elevations obtained from publicly available www.dfwmaps.com.

Water Level Observations
No seepage encountered while drilling
Dry at completion

Drill Rig
Truck Rig
Hammer Type
Automatic
Driller
StrataBore

Notes

Advancement Method
Dry auger drilling

Abandonment Method
Boring backfilled with soil cuttings upon completion.

Logged by
Clanahan
Boring Started
09-05-2025
Boring Completed
09-05-2025

Boring Log No. B-6

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 33.3674° Longitude: -97.1851° Depth (Ft.) Approximate Elevation: 700 (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Strength Test			Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
							Test Type	Compressive Strength (tsf)	Strain (%)			LL-PL-PI	
1		FILL: FAT CLAY , with limestone fragments, dark brown and tan 1.5											

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.
Elevation Reference: Elevations obtained from publicly available www.dfwmaps.com.

Water Level Observations
No seepage encountered while drilling
Dry at completion

Drill Rig
Truck Rig
Hammer Type
Automatic
Driller
StrataBore

Notes

Advancement Method
Dry auger drilling

Abandonment Method
Boring backfilled with soil cuttings upon completion.

Logged by
Clanahan
Boring Started
09-05-2025
Boring Completed
09-05-2025



SUMMARY OF SWELL TESTS

Boring	Depth (ft)	Liquid Limit	Plasticity Index	Initial Moisture (%)	Final Moisture (%)	Surcharge (psf)	Swell (%)
B-1	2 to 4	66	46	25.8	27.2	250	1.2
B-5	2 to 4	58	40	19.5	21.8	250	1.7

Supporting Information

Contents:

General Notes
Unified Soil Classification System

Note: All attachments are one page unless noted.

General Notes

Sampling	Water Level	Field Tests
 Shelby Tube  Texas Cone Penetrometer	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time  Cave In Encountered <p>Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.</p>	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

Descriptive Soil Classification

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

Location And Elevation Notes

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

Strength Terms

Relative Density of Coarse-Grained Soils (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		Consistency of Fine-Grained Soils (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Relative Density	Standard Penetration or N-Value (Blows/Ft.)	Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	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	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:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OL	Organic clay ^{K, L, M, N}
	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:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OH	Organic clay ^{K, L, M, P}
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 $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
- ^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

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

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

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

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

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.

