PROJECT NO. 23390
MARCH, 2020

GEOTECHNICAL INVESTIGATION
006 REMODEL
EAST COKE ROAD
WINNSBORO, TEXAS

Presented To:
BROOKSHIRE GROCERY COMPANY
TYLER, TEXAS

March 5, 2020
Project No. 23390

Brookshire Grocery Company
430 East Front Street
Tyler, Texas 75702
ATTN: Mr. Keith Lybrand, AIA

GEOTECHNICAL INVESTIGATION
006 REMODEL
EAST COKE ROAD
WINNSBORO, TEXAS

Gentlemen:

Transmitted herewith are copies of the referenced report. Should you have any questions concerning our findings or if you desire additional information, do not hesitate to call.

Sincerely,

REED ENGINEERING GROUP, LTD.
Registration Number F-3114

Derrin G. Williams
Project Geologist

Forrest Whitney Smith, P.G., P.E.
Vice President

March 5, 2020

DGW/FWS/apv

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INTRODUCTION

Project Description

This report presents the results of a geotechnical investigation performed for proposed additions to the existing Brookshire's building located on East Coke Road in Winnsboro, Texas. The general orientation of the building is shown on the Plan of Borings, Plate 1 of the report **Illustrations**.

The project consists of a building addition, gas station kiosk, underground storage tank, and paving replacement. Finished floor elevation is currently unknown. The recommendations provided herein should be reviewed by this office once finished floor elevation has been established. This office should be provided with a site grading plan to allow for evaluation and modification of the recommendations, if necessary.

Authorization

This investigation was authorized via e-mail by Mr. Keith Lybrand, AIA on January 20, 2020.

Purpose and Scope

The purpose of this investigation has been to evaluate the general subsurface conditions and provide recommendations for:

- design of the foundation systems;
- floor slab;
- underground storage tanks;
- pavement subgrade; and
- site preparation and earthwork compaction criteria.

The investigation has included drilling sample borings, performing laboratory testing, analyzing engineering and geologic data and developing geotechnical recommendations. The following sections present the methodology used in this investigation.

Recommendations provided herein are site-specific and were developed for the project discussed in the report **Introduction**. Persons using this report for other than the intended purpose do so at their own risk.

FIELD AND LABORATORY INVESTIGATIONS

General

The field and laboratory investigations have been conducted in accordance with applicable standards and procedures set forth in the 2019 Annual Book of ASTM Standards, Volumes 04.08 and 04.09, "Soil and Rock." These volumes should be consulted for information on specific test procedures.

Field Investigation

Subsurface conditions were evaluated by 26 sample borings drilled to depths of 6 to 20-1/2 feet in February 2020. The locations of the borings are shown on Plate 1 of the report **Illustrations**.

Borings were advanced between sampling intervals by means of a truck-mounted drilling rig equipped with continuous flight augers. Samples of cohesive soils were obtained with 3-inch diameter Shelby tubes (ASTM D1587). Cohesionless soils (sands and gravels) were sampled in conjunction with the Standard Penetration test (SPT) (ASTM D1586).

Delayed water level observations were made in the open boreholes to evaluate ground water conditions. The borings were backfilled at completion of field operations and the pavement was patched.

Sample depth, description of materials, field tests, water conditions and soil classification [Unified Soil Classification System (USCS), ASTM D2488] are presented on the Boring Logs, Plates 2 through 27. Keys to terms and symbols used on the logs are included as Plates 28 and 29.

Laboratory Testing

All samples were returned to the laboratory and visually logged in accordance with the USCS. The consistency of cohesive soils was evaluated by means of a pocket penetrometer. Results of the pocket penetrometer readings are presented on the boring logs.

Laboratory tests were performed to evaluate index properties, confirm visual classification, and evaluate the undrained shear strength of selected samples. Tests and ASTM designations are provided in Table 1.

TABLE 1. TESTS CONDUCTED AND ASTM DESIGNATIONS	
Type of Test	**ASTM Designation**
Atterberg Limits	D4318
Moisture Content	D2216
Partial Gradation	D1140
Soil Suction	D5298
Unconfined Compression (Soil)	D2166

The results of these tests are summarized on Plates 30 through 33. Two lime series tests and one cement series test were performed and are summarized on Plates 34 and 35.

GENERAL SITE CONDITIONS

Geology and Stratigraphy

Subsurface conditions encountered in the borings consisted of fill over residual soil of the Eocene Queen City Sand Formation. Twenty-one borings encountered asphalt or concrete at the surface, which was cored and measured to be between 2-1/2 and 5-3/4 inches thick (asphalt) or 5-3/4 and 8 inches thick (concrete).

Fill was encountered in nine borings and consisted of brown to brownish-red to light gray, moderate plasticity (CL) sandy clay to clayey sand (SC). The fill is associated with the initial development of the site. Below the fill, and at the surface elsewhere, the residual soil consisted of light gray to brownish-red, high plasticity (CH) to CL silty clay and sandy clay to clayey

sand. Below depths of 8 to 19 feet within Borings B-1 through B-10, light gray and brownish-yellow, very dense to dense, clayey sand (SC) to sand (SP) was encountered. These 10 borings terminated within the clayey sand to sand.

Ground Water

Seepage was encountered during drilling in Borings B-1 through B-10 at depths of 9 to 16 feet. Ground water was encountered in the same 10 borings at depths of 7 to 14-1/2 feet at the end of the day or the day after drilling. The depth to, and quantity of ground water, will fluctuate with variations in seasonal and yearly rainfall, however, will be present throughout the year.

Seismic Site Classification

The site has been classified with respect to seismic design criteria contained in the 2015 International Building Code (IBC), Section 1613, and ASCE 7-10, Chapter 20. The criteria require characterization of the upper 100 feet of subsurface materials. Based on the ASCE 7-10 criteria, the site is classified as Site Class D in accordance with Table 20.3-1.

ANALYSIS AND RECOMMENDATIONS

Potential Vertical Movements

Potential Vertical Movements (PVM) were evaluated using an empirical procedure developed by McDowell[1] and modified by the Texas Department of Transportation, TxDOT Test Method 124-E[2] in conjunction with the soil suction tests. Based on the PVM calculations and past experience, potential movements are estimated to be on the order of two to three inches. Movement will be associated with seasonal changes in soil moisture.

[1] McDowell, C. "The Relation of Laboratory Testing to Design for Pavements and Structures on Expansive Soils" (1959). Quarterly of the Colorado School of Mines, Volume 54, No. 4, 127-153.
[2] "Method for Determining the Potential Vertical Rise, PVR." (1978). Texas Department of Transportation, Test Method Tex-124-E.

Ground-supported improvements (i.e., sidewalks and paving) will move in response to changes in soil moisture. The movement will be observed as heave if the soils are dry at the time the pavement or sidewalk is constructed. The movement will be observed as settlement if the soils are moist at the time of construction. Generally, settlement will be limited to the outer perimeter (outer four to five feet) of larger slabs. Prudent watering during extended dry climatic periods can control settlement. Recommendations are provided to limit movement below the building addition; however, some movement of site paving and sidewalks should be anticipated.

The estimated PVM is based on existing site grades. If significant cut and fill will be required below the building addition to establish finished grade, this office should be consulted for additional analysis and recommendations.

Foundation, General

The foundation for the existing structure is unknown. It is recommended that the additions match the existing foundation. Based on past experience in the immediate area, and based on findings from this investigation, it is likely that the foundation is either footings or belled piers.

Foundation Alternative, Belled Piers for Building Addition

Foundation support for concentrated column loads should be provided by reinforced concrete, underreamed (belled) piers. The piers should be founded at a depth of 10 feet below present grade in the brownish-red to light gray silty clay to sandy clay, or on top of ground water if encountered first. The piers should be designed for an allowable bearing pressure of 4.0 kips per square foot (ksf) dead load or 5.0 ksf total load, whichever governs.

Piers proportioned in accordance with the allowable bearing value will have a minimum factor of safety of three considering a shear or plunging failure. The weight of the pier concrete below final grade may be neglected in determining foundation loads. Elastic settlement of properly constructed underreamed piers should be limited to approximately 1/2 inch.

The recommended end bearing value is based on a minimum center-to-center pier spacing of two times the average bell diameter. If piers will be closer than two bell diameters, center-to-center, a reduction in the end bearing is recommended. This office should be contacted for specific recommendations.

Piers will be subjected to uplift associated with swelling within the upper clays. The piers should contain reinforcing steel throughout the pier to resist the tensile uplift forces. Reinforcing requirements may be estimated based on an uplift pressure of 1.2 ksf acting over the top 4 feet of pier surface area. The recommended uplift value is considered a working load. Appropriate factors of safety should be applied in calculating the percent of reinforcement.

"Mushrooming", or widening of the upper portion of the pier shaft, will significantly increase the uplift pressure from the upper clays. "Mushrooms" should be removed from the piers prior to backfill operations.

Pier caps should not be used with the piers unless a minimum void of 4 inches (factor of safety of 1.3) is created below the portion of the cap extending beyond the shaft diameter.

Uplift resistance for underreamed piers will be provided by the weight of the soil overlying the bell and the dead load from the structure. A minimum bell-to-shaft diameter ratio of two to one (2:1) is recommended to resist uplift associated with swelling of the upper soils. A maximum bell-to-shaft diameter ratio of 2.5:1 is recommended to limit possible caving of the bells.

Ground water was encountered within the borings. However, the use of casing or dewatering of pier excavations should not be required if close coordination of drilling and concrete placement is performed, and care is taken not to extend the piers below ground water.

Pier excavations should be dry and free of deleterious materials prior to concrete placement. In no case should the pier shaft excavations remain open for more than four hours prior to concrete placement. If possible, concrete should be placed within 30 minutes of underream construction.

Continuous observation of the pier construction by a representative of this office is recommended. Observation is recommended to confirm the bearing stratum and that the excavations are dry prior to placement of concrete.

Grade Beams, Belled Pier Option

Grade beams should be constructed with a minimum void of 4 inches (Factor of Safety of 1.3) beneath them. A void is recommended to limit potential foundation movements associated with swelling of the underlying soils.

The void can be created below grade beams by use of wax-impregnated cardboard forms. Retainer boards along the outside of the grade beam will not be necessary.

Grade beams should be double-formed. Earth-forming of beams below ground is not recommended because of the inability to control the beam excavation width.

Fill on the outside of perimeter grade beams should be placed in a controlled manner. Backfill should consist of site-excavated clays, or equal, placed and compacted in accordance with the **Earthwork** section. If bedding soils must be used adjacent to the perimeter of the building, the clay/bedding soil interface should be sloped to drain away from the building. Compaction criteria are included in the **Earthwork** section.

Foundation Alternative, Footings for Building Addition

Considering remedial earthwork as discussed in the following **Floor Slab** section, the foundation for the proposed structure may consist of shallow spread or continuous footings. Footings should be founded a minimum of 18 inches below finished grade within compacted and tested fill.

Footings should be designed based on an allowable net bearing pressure of 3.0 ksf, dead load or 4.0 ksf total load, whichever governs. The bearing value for dead load contains a factor of safety of three considering a general shear failure.

A minimum footing width of 18 inches is recommended for continuous footings. A minimum dimension of 24 inches is recommended for spread footings. The footing excavations should be dry and free of all loose soils and deleterious materials prior to concrete placement. Care should be taken to not eccentrically load or point-load the footings.

Properly constructed footings designed in accordance with the bearing pressures should undergo settlement of less than one inch. It is recommended continuous footings or beams spanning between spread footings be reinforced for differential movement of ½ inch over a 20-foot span.

Inspection of the footing excavations by a representative of this office is recommended prior to placement of the concrete.

Floor Slab

Potential movements associated with heave from a dry condition to a moist condition are estimated to be on the order of two to three inches. Additional movement is possible if the clays become saturated, such as can happen from utility leaks and excessive ponding of water adjacent to the perimeter walls.

Two types of floor systems are considered feasible; a suspended floor and a ground-supported (or "floating") slab. The suspended floor is considered the most expensive but does provide the highest degree of confidence that post-construction movement of the floor will not occur. If this alternative is desired, a minimum void of six inches (approximate F.S. of two) is recommended between the soil and the lowest structural element of the floor system. For this alternative, plumbing lines should be suspended a minimum of six inches above the underlying soils. Where plumbing lines transition into the soil, they must be free to move up to three inches without intercepting the structure or distressing plumbing joints.

Use of a ground-supported floor is feasible, provided the risk of some post-construction floor movement is acceptable. The potential movement can be reduced by proper implementation (i.e., construction) of remedial earthwork recommended in the following paragraphs. The risk of the potential movement occurring can be reduced by implementation of positive grading of surface water away from the building and backfilling immediately adjacent to the structure with on-site clays.

Considering a finished floor elevation near existing grades, the most economical means of limiting the potential for post-construction floor movement is to mechanically excavate the upper six feet of soil, mix the soils with water, then recompact the soils at an elevated moisture in controlled lifts.

Currently (March 2020), the soils are relatively moist and the potential for post-construction movement is limited to approximately one inch. Where concrete or asphalt is present in front of the building, there will be no need for subgrade modification provided that the area is not exposed to drying before construction. On the addition to the east of the building, no remedial earthwork will be necessary provided that construction begins before the end of May 2020. If it cannot begin, we recommend shallow borings to evaluate the current moisture conditions immediately prior to construction.

The excavation immediately adjacent to the existing building should extend to the bottom of the existing grade beam and then be sloped at no steeper than one vertical to one horizontal (1V:1H) to the required depth.

At completion of the excavation and recompaction process, a surface seal will be required to maintain the desired moisture. Two types of surface seals can be provided:

- a minimum of 12 inches of "select" fill; or
- a minimum of 6 inches of flexible base.

Experience has shown comparable performance for either of the recommended surface treatments.

The general procedures for the excavation and recompaction process are presented in the following paragraphs.

1. Demolish existing paving and strip vegetation and dispose of the organic materials in accordance with the project specifications.

2. Perform three 10-foot borings east of the building to evaluate the need for subgrade modification. If dry conditions prevail or the borings are not performed, proceed to **Item 3**. If moist conditions prevail, proceed to **Item 4**.

3. Excavate to a depth of six feet below existing grade or a minimum of six feet below finished floor, whichever is greater. Adjacent to the existing building, excavate vertically to the bottom of the grade beam, then at 1V:1H to the required depth. Extend the footprint of the excavated area a minimum of 5 feet beyond the general building lines or footings and a minimum of 10 feet beyond entrances. The lateral extent of the treated area should be reviewed by the owner and design team to address desired reduction of movement outside the structure and surface paving.

4. Scarify the exposed subgrade to a depth of six inches, water as necessary and recompact to the density and moisture recommended in the **Earthwork** section.

5. Compact on-site soils in lifts as outlined in the **Earthwork** section to within 12 inches of finished subgrade (or to subgrade if the lime-stabilized option will be used). Place and compact soils in accordance with recommendations in the **Earthwork** section.

    - Note: If insufficient on-site fill exists to achieve the proposed subgrade for the "select" fill or flexible base, all imported fill for use below the building should consist of "select" fill, flexible base or approved common fill. Balance on-site soils to provide a uniform thickness of "select" fill or flexible base.

6. Place and compact the surface moisture barrier, consisting of either:
    - 12 inches of "select" fill; or
    - 6 inches of flexible base.

Placement recommendations for "select" fill and flexible base are included in the **Earthwork** section.

Consideration should be given to benching the perimeter of the excavation, from the bottom up, at 1V:1H to create a transition between reworked soils and non-reworked soils. This will decrease the potential for concentrated differential movement between treated and untreated areas.

The "select" fill or flexible base cap should be placed within approximately seven working days following completion of the excavation and recompaction operations to limit moisture loss.

Careful consideration should be given to the actual area treated to reduce movements. The potential for post-construction heave will be reduced in the treated areas; however, areas left untreated will result in differential movement. In general, it is recommended the treated area extend beyond the building to reduce the potential for differential movement among the building, the sidewalk and entrance pavement or in areas where site paving is relatively flat because of drainage or ADA considerations. The lateral extent of the treated area should be reviewed by the owner and design team to address desired reduction of movement outside the structure and surface paving.

Potential post-construction floor movement associated with heave, considering a properly reworked subgrade, is anticipated to be on the order of one inch. Additional movement is possible if the clays become saturated, such as can happen from utility leaks and excessive ponding of water adjacent to the perimeter walls.

Positive drainage of water away from the structure must be provided and maintained after construction. Architectural detailing of interior finishes should allow for approximately one inch of differential floor movement.

A minimum 10-mil thick polyethylene sheet is recommended below the floor to limit migration of moisture through the slabs from the underlying clays. This is of particular importance below sections of the floors covered with carpeting, paint or tile. Penetrations and lapped joints should be sealed with a waterproof tape.

Ground-supported floors over expansive soils may be subject to settlement if the underlying clays dry during the life of the structure. Natural desiccation will be limited to the outer four to five feet along the perimeter where surface pavement does not abut the structure. However, roots from trees and shrubs can grow below the structure and increase the zone of desiccation. This process typically requires 8 to 10 years to develop. An effective means of limiting plant root growth is construction of a vertical moisture barrier adjacent to the foundation or extension of paving to the perimeter of the building. If utilized, the barrier should consist of a minimum six-inch wide, five-foot deep lean concrete wall, or other suitable material. Trees and shrubs should be planted outside the barrier.

Kiosk Foundation

The foundation for the kiosk may consist of a monolithic slab-on-grade. The slab should be designed for a potential vertical movement of approximately three inches. Beams should be founded a minimum of 12 inches below finished grade and designed using an allowable bearing pressure of 3.0 ksf.

For the BRAB design procedure, an Effective Plasticity Index (PI) of 27 is recommended. Considering a Climatic Rating, C_w, of 25, a Support Index of 0.91 is recommended for anticipated conditions at completion of grading with no remedial earthwork.

Soil Pressures and Classification for Underground Storage Tank

For purposes of tank hold and utility trench excavations, the subsurface soils within the depths explored should be classified as Type B (cohesive) soil to a depth of 7 feet and Type C (submerged) soil below a depth of 7 feet. These classifications are based on the Occupational Safety and Health Administration (OSHA) guidelines set forth in the Subpart P of the Code of Federal Regulations (CFR-29) Part 1926.

Resistance to uplift will be provided in part by the weight of soil overlying the tank. Uplift resistance will depend on the moist unit weight of the backfill above the tank. A wet unit weight of 125 pounds per cubic foot (pcf) is recommended for typical backfill soils.

Lateral earth pressures against underground tank walls can be estimated based on an equivalent fluid pressure of 55 pcf for active conditions, or 75 pcf for at-rest conditions. These values are applicable for horizontal surface grades, and non-surcharged, drained conditions above ground water. The lateral pressures should be reduced to 50 percent of the above values below ground

water, if encountered. Hydrostatic pressures should be added to the reduced values. The lateral earth pressure values do not incorporate a specific factor of safety. A factor of safety, if applicable, should be integrated into the structural design of the tank.

Earthwork, General

Proper compaction of soil requires both the correct moisture content and "compactive effort" or energy. The compactive effort, or energy, imparted into the soil by the equipment used for compaction, has to be compatible with the lift thickness. The lighter the equipment (lower contact pressure), the thinner the loose lift of soil has to be to achieve adequate compaction.

If the lift of soil is too thick for the energy (compactive effort) exerted by the equipment, insufficient energy will be transferred through the full lift thickness, resulting in a lens of loose, settlement-prone soil at the bottom of the lift.

For example, if track-mounted equipment such as a "dozer" is used for compaction, the thickness of lift will vary with the track contact pressure. For a Caterpillar D-6, with a contact pressure of approximately 1,000 pounds per square foot (psf), a maximum loose lift thickness of 6 inches (compacted lift of 4 inches) is needed to achieve compaction. For a Caterpillar D-10, with a contact pressure of approximately 3,000 psf, a maximum loose lift thickness of 8 inches (compacted lift of 6 inches) is needed to achieve compaction.

If the upper five to six inches of an excessively thick lift is well compacted, it can meet density, and therefore the loose, relatively thin lens at the bottom of the lift will not be detected by density testing resulting in the potential for settlement of under-compacted lenses. Accurately determining lift thickness is virtually impossible after the fact in large-scale mass earthwork

operations, and can only be controlled by the earthwork contractor by “experience”. Alternatively, if the earthwork contractor’s field personnel do not have sufficient experience, a surveyor would need to be hired to accurately survey each lift to evaluate if excessive lifts are being placed.

For equipment with a relatively light contact pressure (any type of equipment with a contact pressure of less than approximately 2,000 psf), there is virtually no “factor of safety” relative to the lift thickness. It is therefore recommended that, if track-mounted equipment is used for compaction, equipment with a minimum contact pressure of 2,500 psf be specified for mass earthwork operations.

Earthwork

All vegetation and topsoil containing organic material should be cleared and grubbed at the beginning of earthwork construction. Areas of the site that will underlie fill or within the building should be scarified to a depth of 6 inches and recompacted to a minimum of 95 percent and a maximum of 100 percent of the maximum density, as determined by ASTM D698, "Standard Proctor". The moisture content should range from +1 to +4 percentage points above optimum.

It is recommended that one-point swell tests at a pressure of 450 psf be performed on laboratory samples compacted to the above recommended density and moisture. If test results indicate that the swell will exceed one percent, the field moisture should be adjusted to limit the potential for swell to less than one percent.

Site-excavated soils should be placed in maximum eight-inch loose lifts (note, loose lift thickness must be compatible with the compaction equipment) and compacted to the moisture and density requirements outlined above. The soils should be uniformly blended with water to achieve the required moisture content.

The final 6 inches of subgrade below pavement should be compacted to a minimum of 95 percent of Standard Proctor, at or above optimum moisture.

Proper backfilling around the building perimeter will reduce the potential for water seepage beneath the structure. Fill against the perimeter of the foundation should consist of site-excavated clays, or equal, placed and compacted in accordance with the recommendations outlined above.

"Select" fill is defined as uniformly blended clayey sand with a PI of between 4 and 15. Select fill should be placed in maximum 8-inch loose lifts and compacted to at least 95 percent of the Standard Proctor density, at a moisture content between -2 to +3 percentage points of optimum moisture.

Flexible base for use below the building slab is defined as crushed stone or crushed concrete meeting the requirements of the 2014 Edition of the Texas Department of Transportation (TxDOT), “Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges”, Item 247 Grade 2, Type A (crushed limestone), or Type D (crushed concrete) or better. Flexible base should be compacted to a minimum of 95 percent of Standard Proctor density, at a moisture content between -2 to +3 percentage points of optimum moisture.

The moisture cap should be placed within approximately seven working days over the reworked subgrade to limit moisture loss within the underlying soils.

Lime stabilization should be conducted in accordance with TxDOT "Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges," 2014 Edition, Item 260. Lime-stabilized soils should be compacted to a minimum of 95 percent of Standard Proctor density, ASTM D698 at or above optimum moisture content.

Pavement

Based on the PVM calculations, potential movements associated with heave are estimated to be on the order of two to three inches within the depths explored considering current conditions.

Both rigid and flexible pavements were analyzed for car and light truck traffic and parking and for drives and service areas.

Generally for rigid or concrete pavement, it is more cost-effective to increase the pavement thickness and construct over a non-stabilized subgrade. However, stabilization does provide an all-weather working platform for the contractor, and this may be beneficial from a construction perspective, especially if construction will occur during the wetter part of the year. Stabilization is also generally recommended if the traffic speed exceeds 30 miles per hour (mph).

Lime stabilization is recommended as part of the flexible or asphaltic pavement section.

Recommended pavement sections for light and moderate traffic conditions are provided in the following paragraphs.

Traffic Condition - Car and light truck traffic.

Rigid Pavement

5" concrete, minimum compressive strength of 3,000 pounds per square inch (psi), over

6" subgrade, scarified and recompacted to a minimum of 95 percent Standard Proctor Density, at or above optimum moisture.

Flexible Pavement over Lime-Treated Base

1-1/2" Hot Mix Asphaltic Concrete (HMAC), TxDOT Item 340, Type "D", Fine Graded Surface Course, over

2-1/2" HMAC, TxDOT Item 340, Type "A" or “B”, Coarse Graded Base Course, over

6" lime-stabilized subgrade, 6 percent hydrated lime (27 pounds per square yard), compacted to a minimum of 95 percent Modified Proctor, ASTM D1557, at or above optimum moisture.

Traffic Condition - Drives and service areas, design thickness based on equivalent of 5 loaded semi-trucks per day, modulus of subgrade reaction, k, of 100 pounds per cubic inch (pci).

Rigid Pavement

6" concrete, minimum compressive strength of 3,000 psi, over

6" scarified and recompacted subgrade.

Flexible Pavement over Lime-Treated Base

1-1/2" HMAC Surface, TxDOT Item 340, Type "D", over

3-1/2" HMAC Base, TxDOT Item 340, Type "A" or "B", over

6" lime-stabilized subgrade, 6 percent hydrated lime (27 pounds per square yard) compacted to a minimum of 95 percent Modified Proctor, ASTM D1557, at or above optimum moisture.

Designs are based on a 20-year service life. Periodic maintenance of asphaltic pavement will be required.

Lime stabilization should be conducted in accordance with TxDOT "Standard Specifications for Construction of Highways, Streets and Bridges," 2014 Edition, Item 260. Lime-stabilized soils should be compacted to a minimum of 95 percent of Modified Proctor density, ASTM D1557, at or above optimum moisture.

Concrete pavements should be lightly reinforced if shrinkage crack control is desired. Reinforcing for 5- and 6-inch pavements should consist of the approximate equivalent of #3 bars (metric #10) at 24 inches on-center. The specific amount of steel should be determined based on spacing of expansion, construction and contraction (saw) joints.

Concrete pavement sections should be saw-cut at an approximate spacing in feet of 2.5 to 3 times the pavement thickness expressed in inches, not to exceed a maximum spacing of 20 feet. (For example, a 5-inch pavement should be saw-cut in approximate 12.5- to 15-foot squares.)

The actual joint pattern should be carefully designed to avoid irregular shapes. Recommended jointing techniques are discussed in detail in "Guide for Design and Construction of Concrete Parking Lots," published by the American Concrete Institute[3].

The above sections are based on the stated analysis and traffic conditions. The pavement designer, typically the civil engineer, should review the anticipated traffic with the building owner or end user. If the anticipated traffic will vary from the stated values, this office can provide alternative sections upon request. Additional thickness or subgrade stabilization may be required to meet the City of Winnsboro development code.

Construction Observation and Testing Frequency

It is recommended the following items (as a minimum) be observed and tested by a representative of this office during construction.

Observation:

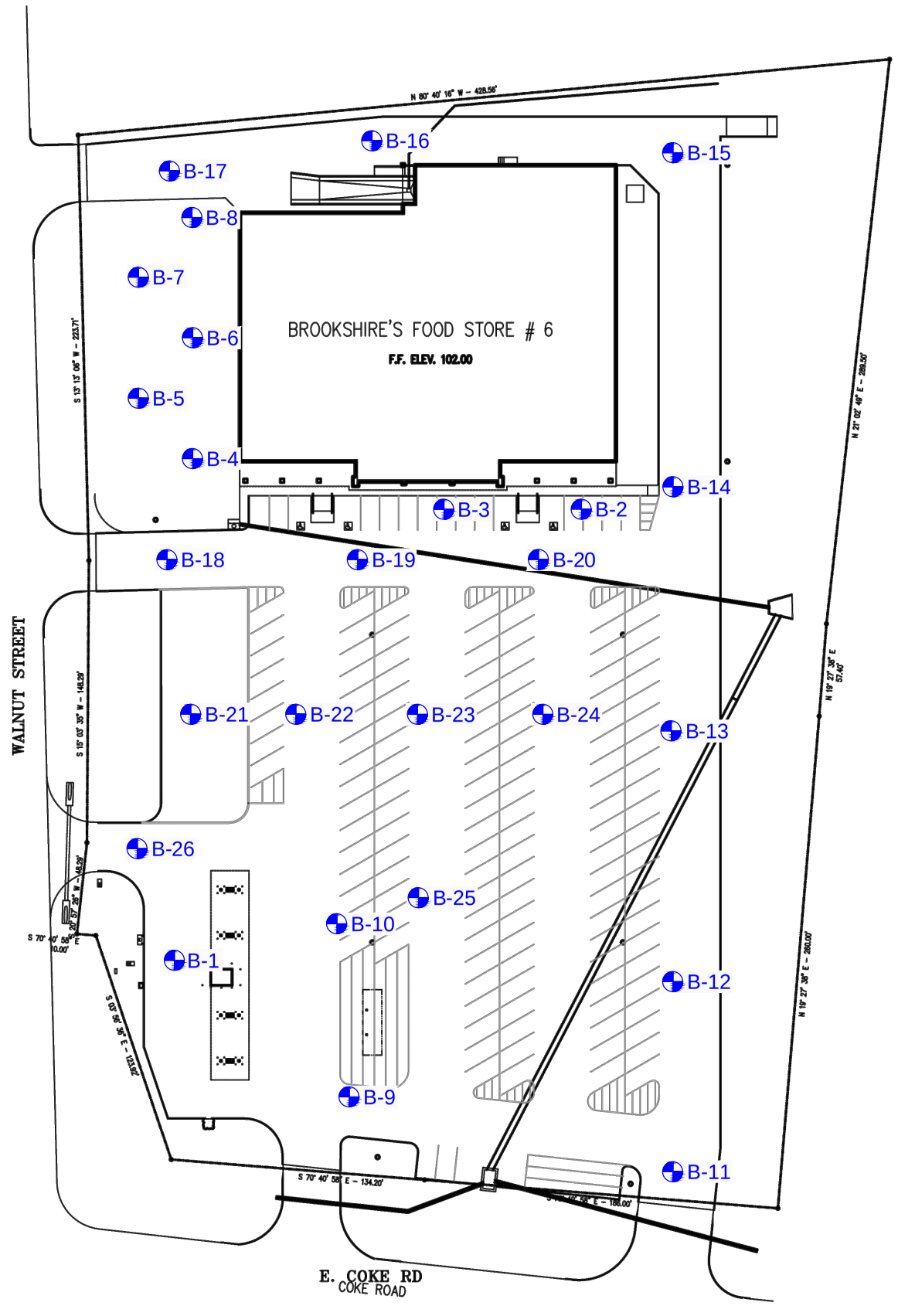
- Fill placement and compaction.
- Foundation construction and concrete placement.

[3] "Guide for Design and Construction of Concrete Parking Lots" (1987). American Concrete Institute, Publication MSP 34, Silver Spring, MD.

Testing:

- Earthwork
    - One test per 5,000 square feet per lift within fills below the building.
    - One test per 10,000 square feet per lift within fills in the paving area.
    - One test per 150 linear feet per lift in utility and grade beam backfill.

The purpose of the recommended observation and testing is to confirm the proper foundation bearing stratum and the earthwork and building pad construction procedures.



NOT TO SCALE:

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

PLAN OF BORINGS

006 Remodel
E. Coke Road
Winnsboro, Texas

Project No. 23390

PLATE 1

Project Number : 23390

Date Completed : 2/17/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ (10 20 30 40 50 60) / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ (1 2 3 4 4.5+ 4.5++)	Elev. (ft)
				CONCRETE (6")		
				SANDY CLAY, light gray, brownish-red, very stiff to hard (CH - CL)		
5				-w/brownish-yellow below 5'		
				SILTY CLAY, light gray & brownish-yellow, very stiff to hard, w/fine sand & hydrocarbon odor (CH)		
10						
					▼ Water level on 2/18/2020 ▽ Seepage during drilling	
15						
				SAND, light gray & brownish-yellow, very dense, w/clay & trace of iron-stained seams, fine (SP)	84>>⊕	
20						
				Total Depth = 20.5 feet Seepage encountered @ 13' during drilling. Water @ 14' after 5 minutes. Water @ 13' & blocked @ 18' @ end of day. Water @ 13' & blocked @ 18' on 2/18/2020.		

BORING LOG B-01

PLATE 2

Project Number : 23390

Date Completed : 2/18/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ (10 20 30 40 50 60) / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ (1 2 3 4 4.5+ 4.5++)	Elev. (ft)
				ASPHALT (5-3/4")		
				SANDY CLAY, brown, very stiff, w/gravel (Fill) (CL)		
				CLAYEY SAND, brownish-red, fine (SC)		
5						
				SANDY CLAY, light gray & brownish-red, very stiff (CL - CH)		
10						
					Seepage during drilling 50 Blows = 4 inches Water level on 2/18/2020	
				SAND, light gray, very dense, w/iron-stained seams & clay, fine (SP)		
15						
					50 Blows = 5 inches	
20				Total Depth = 19.5 feet Seepage encountered @ 14' during drilling. Water @ 14-1/2' after 5 minutes. Water @ 14' & blocked @ 18-1/2' @ end of day. Water @ 14' & blocked @ 18-1/2' on 2/18/2020.		

BORING LOG B-02

PLATE 3

Project Number : 23390

Date Completed : 2/18/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ (10 20 30 40 50 60) / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ (1 2 3 4 4.5+ 4.5++)	Elev. (ft)
				ASPHALT (4-1/4")		
				CLAYEY SAND, brownish-red, fine (SC)		
5				SANDY CLAY, brownish-red, hard (CL)		
10				SAND, light gray, very dense, w/iron-stained seams & trace of clay, fine (SP)		
					▽ Seepage during drilling ▼ Water level on 2/18/2020 50 Blows = 5 inches	
15						
					50 Blows = 4 inches	
20				Total Depth = 19.5 feet Seepage encountered @ 13' during drilling. Water @ 13' after 5 minutes. Water @ 13-1/2' & blocked @ 19' @ end of day. Water @ 13-1/2' & blocked @ 19' on 2/18/2020.		

BORING LOG B-03

PLATE 4

Project Number : 23390

Date Completed : 2/17/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ (10 20 30 40 50 60) / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ (1 2 3 4 4.5+ 4.5++)	Elev. (ft)
				SANDY CLAY, brownish-red & light gray, very stiff to hard (CL - SC)		
5				SANDY CLAY, light gray & brownish-yellow, hard to very stiff (CL - SC)		
10						
				SAND, light gray, very dense, w/iron-stained seams & clay, fine (SP)	Water level on 2/18/2020 Seepage during drilling 84>>⊕	
15						
					50 Blows = 3 inches	
20				Total Depth = 20 feet Seepage encountered @ 14' during drilling. Water @ 15' after 5 minutes. Water @ 14' & blocked @ 17' @ end of day. Water @ 13-1/2' & blocked @ 15' on 2/18/2020.		

BORING LOG B-04

PLATE 5

Project Number : 23390

Date Completed : 2/17/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ (10 20 30 40 50 60) / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ (1 2 3 4 4.5+ 4.5++)	Elev. (ft)
				SANDY CLAY, brownish-red & light gray, very stiff (CH - CL)		
				-w/brownish-yellow below 3'		
5						
				SANDY CLAY, light gray & brownish-yellow, stiff (CL)		
10						
				SAND, light gray, very dense, w/iron-stained seams & trace of clay, fine (SP)		
					Seepage during drilling 50 Blows = 3-1/2 inches Water level on 2/18/2020	
15						
					72>>⊕	
20						
				Total Depth = 20.5 feet Seepage encountered @ 14' during drilling. Water @ 15-1/2' after 3 minutes. Water @ 14' & blocked @ 19' @ end of day. Water @ 14' & blocked @ 15-1/2' on 2/18/2020.		

BORING LOG B-05

PLATE 6

Project Number : 23390

Date Completed : 2/17/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ (10 20 30 40 50 60) / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ (1 2 3 4 4.5+ 4.5++)	Elev. (ft)
				SANDY CLAY, brownish-red & light gray, very stiff to hard (CL - CH)		
				-w/brownish-yellow below 3.5'		
5				SILTY CLAY, light gray & brownish-red, hard, w/some fine sand (CH)		
				CLAYEY SAND, light gray & brownish-yellow, very dense, fine (SC)	50 Blows = 4 inches	
10					Water level on 2/18/2020	
					Seepage during drilling	
				SAND, light gray, very dense, w/iron-stained seams & some clay, fine (SP)	50 Blows = 4 inches	
15						
					50 Blows = 5 inches	
20				Total Depth = 19.5 feet Seepage encountered @ 14' during drilling. Water @ 14-1/2' after 5 minutes. Water @ 13' & blocked @ 18' @ end of day. Water @ 13' & blocked @ 17' on 2/18/2020.		

BORING LOG B-06

PLATE 7

Project Number : 23390

Date Completed : 2/17/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ (10 20 30 40 50 60) / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ (1 2 3 4 4.5+ 4.5++)	Elev. (ft)
				SANDY CLAY, brownish-red & light gray, hard to very stiff (CL - CH)		
				CLAY, light gray & brownish-red, very stiff to hard, w/fine sand (CH)		
5						
					50 Blows = 3-1/2 inches	
10				SAND, light gray & brownish-yellow, very dense to dense, w/iron-stained seams & trace of clay, fine (SP)		
					Seepage during drilling 50 Blows = 3-1/2 inches Water level on 2/18/2020	
15						
					⊕	
20						
				Total Depth = 20.5 feet Seepage encountered @ 14' during drilling. Water @ 17-1/2' after 3 minutes. Water @ 13-1/2' & blocked @ 18' @ end of day. Water @ 14-1/2' & blocked @ 17-1/2' on 2/18/2020.		

BORING LOG B-07

PLATE 8

Project Number : 23390

Date Completed : 2/17/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ (10 20 30 40 50 60) / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ (1 2 3 4 4.5+ 4.5++)	Elev. (ft)
				SANDY CLAY, brownish-red, very stiff (Fill) (CL)		
				SANDY CLAY, light gray & brownish-red, very stiff (CH - CL)		
5						
				CLAYEY SAND, brownish-yellow, fine (SC)		
10					50 Blows = 6 inches	
				SAND, light gray, very dense to dense, w/iron-stained seams & some clay (SP)	Water level on 2/18/2020	
					Seepage during drilling 50 Blows = 5 inches	
15						
					⊕	
20						
				Total Depth = 20.5 feet Seepage encountered @ 14' during drilling. Water @ 14' after 5 minutes. Water @ 12-1/2' & blocked @ 15' @ end of day. Water @ 12-1/2' & blocked @ 14-1/2' on 2/18/2020.		

BORING LOG B-08

PLATE 9

Project Number : 23390

Date Completed : 2/17/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (4-1/4")		
				SANDY CLAY, light gray, brown & brownish-red, hard to soft, w/trace of sandstone fragments & gravel (Fill) (CL)		
5						
					Water level on 2/18/2020	
					Seepage during drilling	
10						
				SANDY CLAY, light gray & brownish-red, very stiff (CL - SC)		
15						
				CLAYEY SAND, light gray, fine (SC)		
20						
				Total Depth = 20 feet Seepage encountered @ 9' during drilling. Water @ 10-1/2' after 5 minutes. Water @ 6-1/2' & blocked @ 8-1/2' @ end of day. Water @ 7' & blocked @ 8-1/2' on 2/18/2020.		

BORING LOG B-09

PLATE 10

Project Number : 23390

Date Completed : 2/18/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ (10 20 30 40 50 60) / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ (1 2 3 4 4.5+ 4.5++)	Elev. (ft)
				ASPHALT (3-3/4")		
				SANDY CLAY, brown, brownish-red & brownish-yellow, very stiff, w/trace of gravel (Fill) (CL)		
5				SANDY CLAY, light gray & brownish-red, very stiff to hard, w/hydrocarbon odor (CH - CL)		
10				-w/gray below 13.5'	▼ Water level on 2/18/2020	
15				SAND, light gray, very dense, fine (SP)	▽ Seepage during drilling	
20				Total Depth = 19.5 feet Seepage encountered @ 16' during drilling. Water @ 12' after 5 minutes. Water @ 12' & blocked @ 18-1/2' @ end of day. Water @ 12' & blocked @ 18-1/2' on 2/18/2020.	50 Blows = 3-1/2 inches	

BORING LOG B-10

PLATE 11

Project Number : 23390

Date Completed : 2/17/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (2-3/4")		
				SANDY CLAY, brownish-red, light gray & brownish-yellow, very stiff (Fill) (CL)		
5				SANDY CLAY, light gray & brownish-red, very stiff (CL)		
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						

BORING LOG B-11

PLATE 12

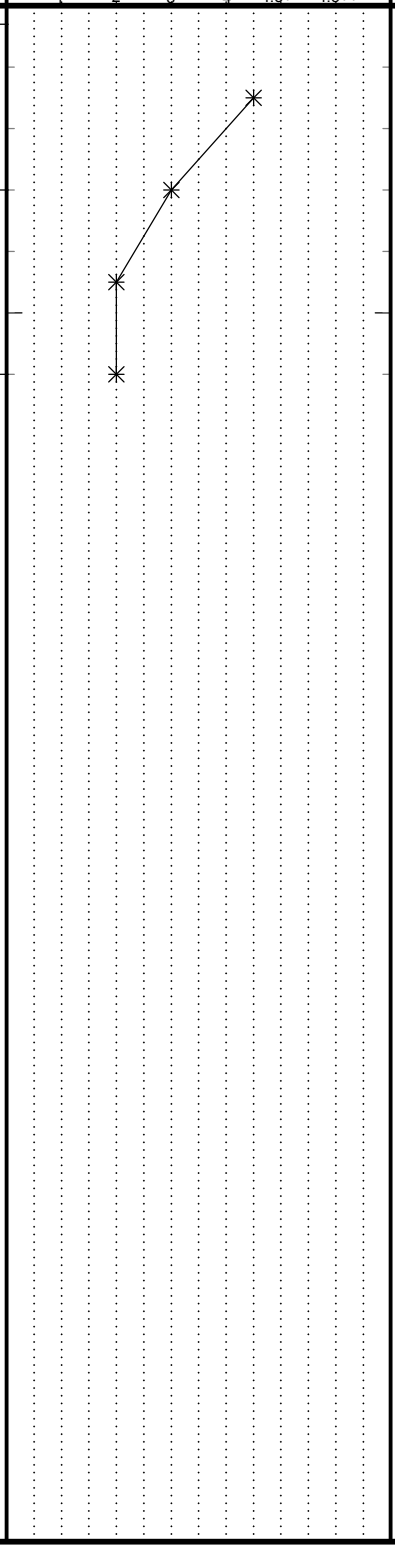
Project Number : 23390

Date Completed : 2/18/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (3-1/4")		
				SANDY CLAY, brown & brownish-red, hard to very stiff, w/ironstone fragments (Fill) (CL)		
				CLAYEY SAND, dark gray to gray, fine (SC)		
5						
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						



BORING LOG B-12

PLATE 13

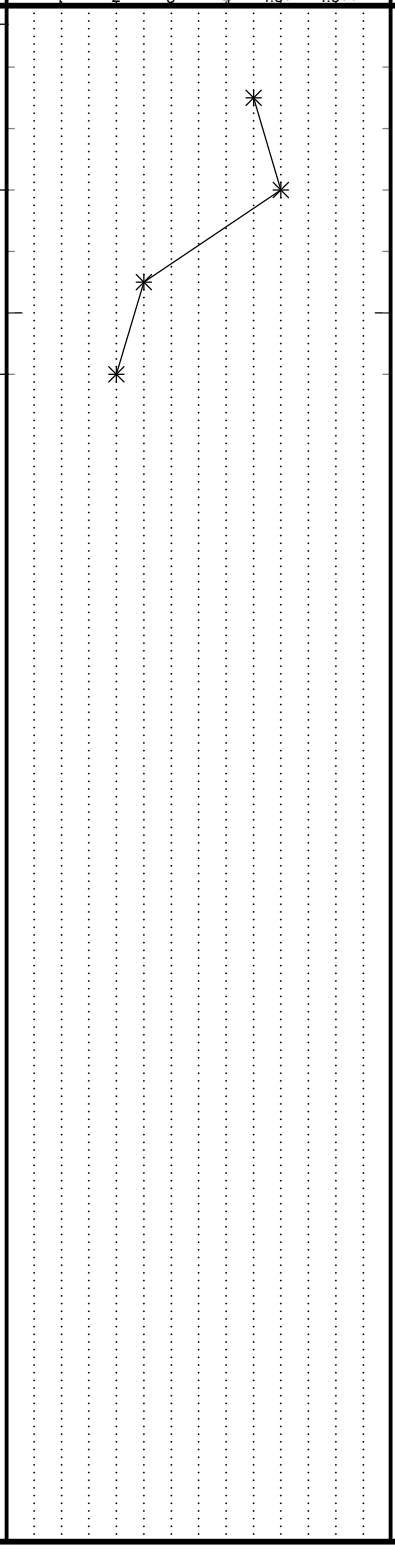
Project Number : 23390

Date Completed : 2/18/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (3-3/4")		
				SANDY CLAY, brownish-red & yellowish-brown, hard (CL)		
				CLAYEY SAND, yellowish-red & brownish-red, fine (SC)		
5						
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						



BORING LOG B-13

PLATE 14

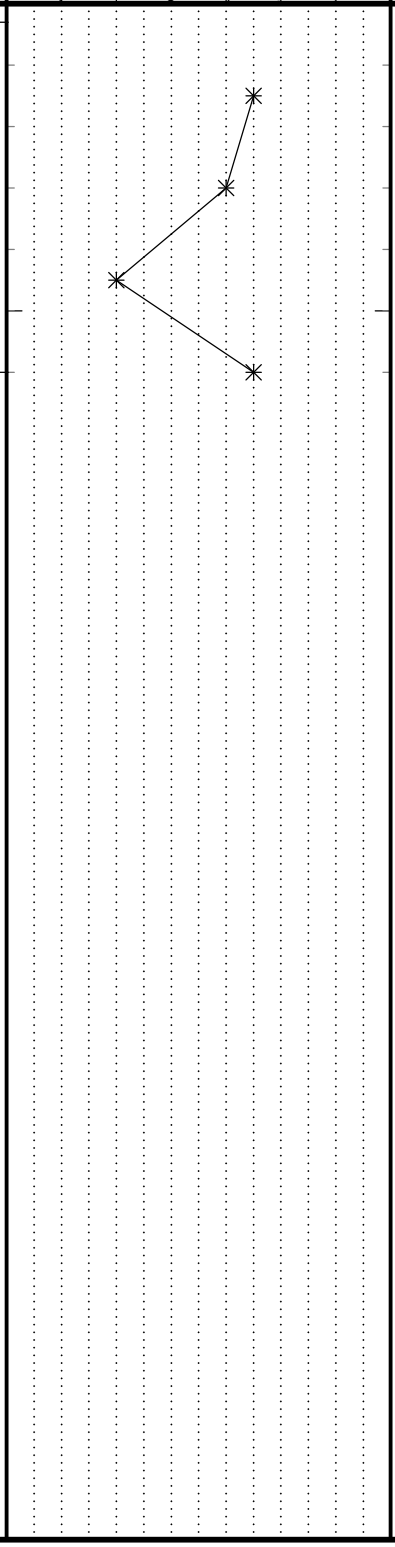
Project Number : 23390

Date Completed : 2/18/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (3-1/2")		
				CLAYEY SAND, yellowish-red & brownish-red, fine (SC - CL)		
				-w/ironstone fragments from 0.3' to 3'		
5						
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						



BORING LOG B-14

PLATE 15

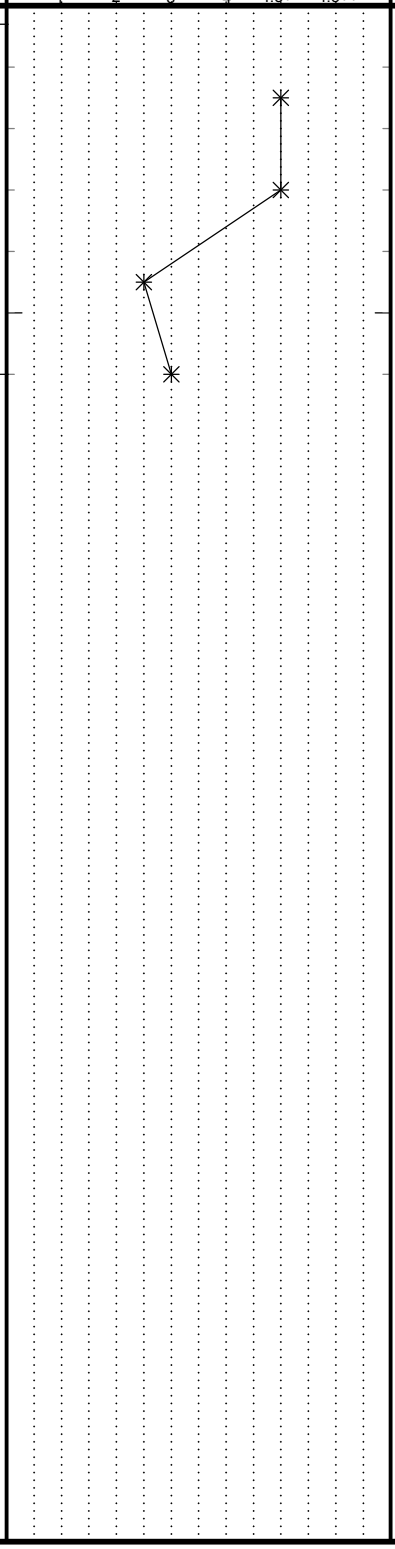
Project Number : 23390

Date Completed : 2/18/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (3")		
				SANDY CLAY, brownish-red & light gray, hard to very stiff (CL)		
5						
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						



BORING LOG B-15

PLATE 16

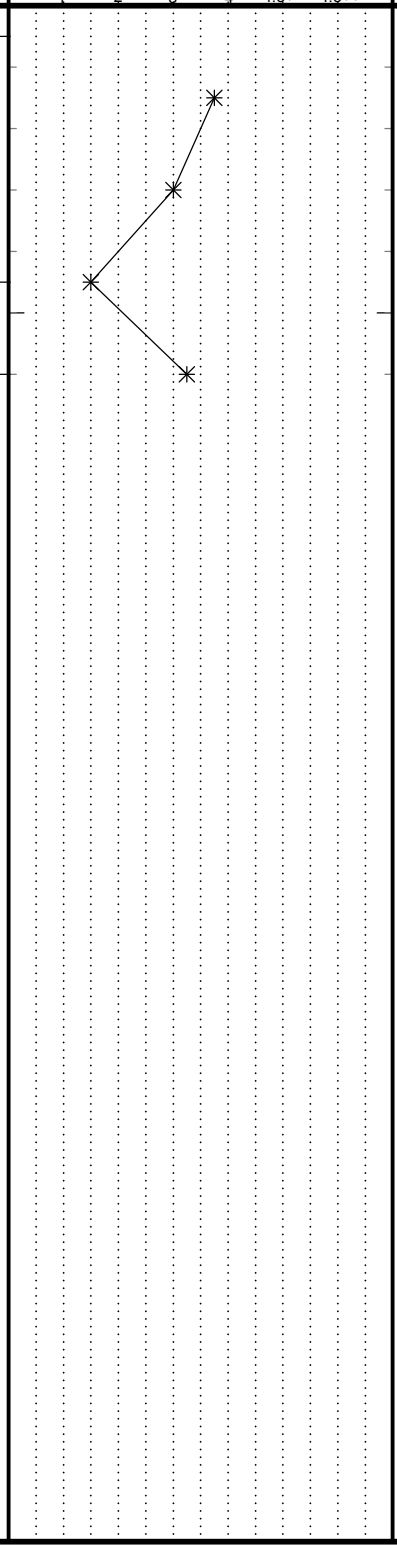
Project Number : 23390

Date Completed : 2/18/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				CONCRETE (5-3/4")		
				SANDY CLAY, brownish-red, brown & gray, very stiff to stiff (Fill) (CL)		
5				SANDY CLAY, brownish-red & light gray, very stiff (CL)		
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						



BORING LOG B-16

PLATE 17

Project Number : 23390

Date Completed : 2/19/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				CONCRETE (6-1/4")		
				SILTY CLAY, brownish-red & light gray, hard, w/fine sand (CH)		
				SANDY CLAY, yellowish-red & light gray, hard (CL)		
5						
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						

BORING LOG B-17

PLATE 18

Project Number : 23390

Date Completed : 2/19/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (4")		
				SANDY CLAY, brownish-red & light gray, hard to very stiff (CL - CH)		
5				SILTY CLAY, light gray & brownish-red, hard, w/some fine sand (CH)		
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						

BORING LOG B-18

PLATE 19

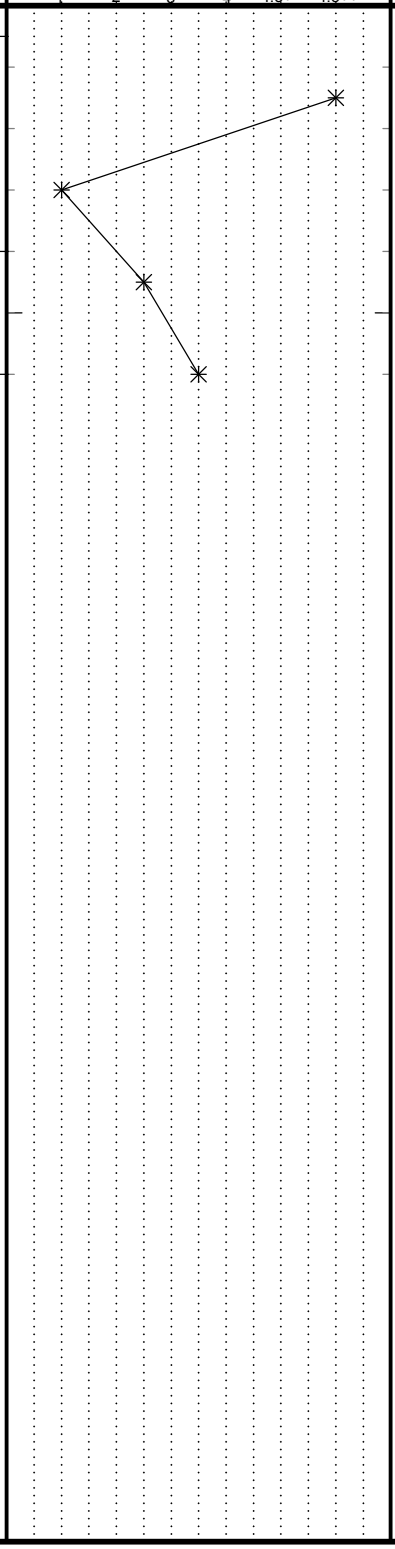
Project Number : 23390

Date Completed : 2/19/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (5-3/4")		
				CLAYEY SAND, yellowish-red & brownish-red, fine (SC - SP)		
5				SANDY CLAY, brownish-red & light gray, very stiff (CL)		
				Total Depth = 6 feet Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						



BORING LOG B-19

PLATE 20

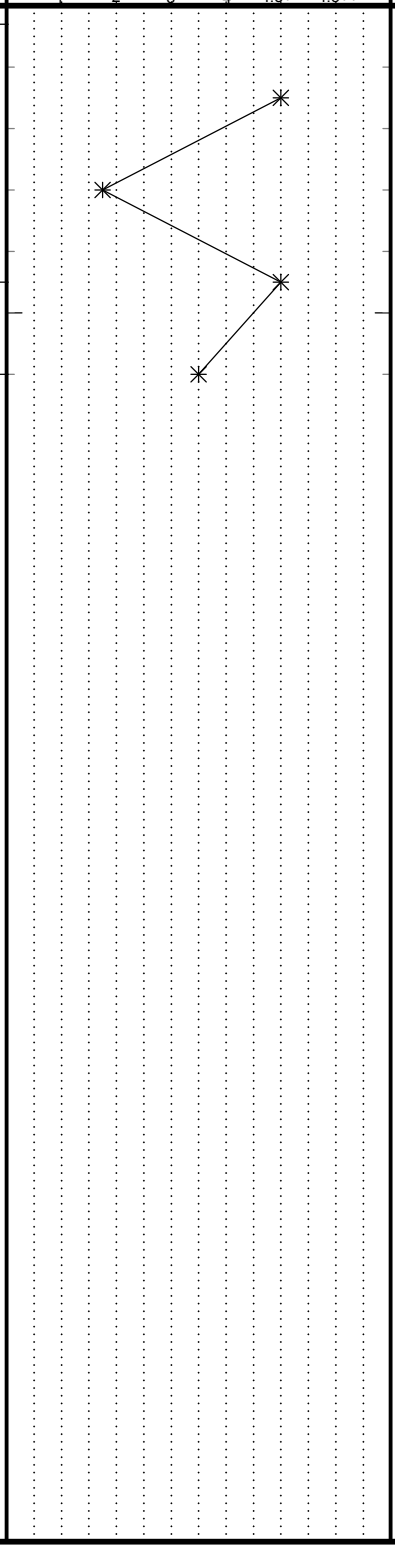
Project Number : 23390

Date Completed : 2/19/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (3-3/4")		
				CLAYEY SAND, brownish-red & yellowish-red, fine (Fill) (SC)		
5				SANDY CLAY, brown, gray & brownish-red, very stiff (Fill) (CL)		
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						



BORING LOG B-20

PLATE 21

Project Number : 23390

Date Completed : 2/19/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (2-1/2")		
				SAND, brown, w/clay, fine (Fill) (SP)		
				SANDY CLAY, brownish-red & light gray, very stiff to hard (CL)		
5				CLAYEY SAND, brownish-red, fine (SC)		
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						

BORING LOG B-21

PLATE 22

Project Number : 23390

Date Completed : 2/19/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (2-1/2")		
				CLAYEY SAND, brown & brownish-red, w/trace of gray, fine (SC - CL)		
5				SANDY CLAY, light gray & brownish-red, hard (CL - CH)		
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						

BORING LOG B-22

PLATE 23

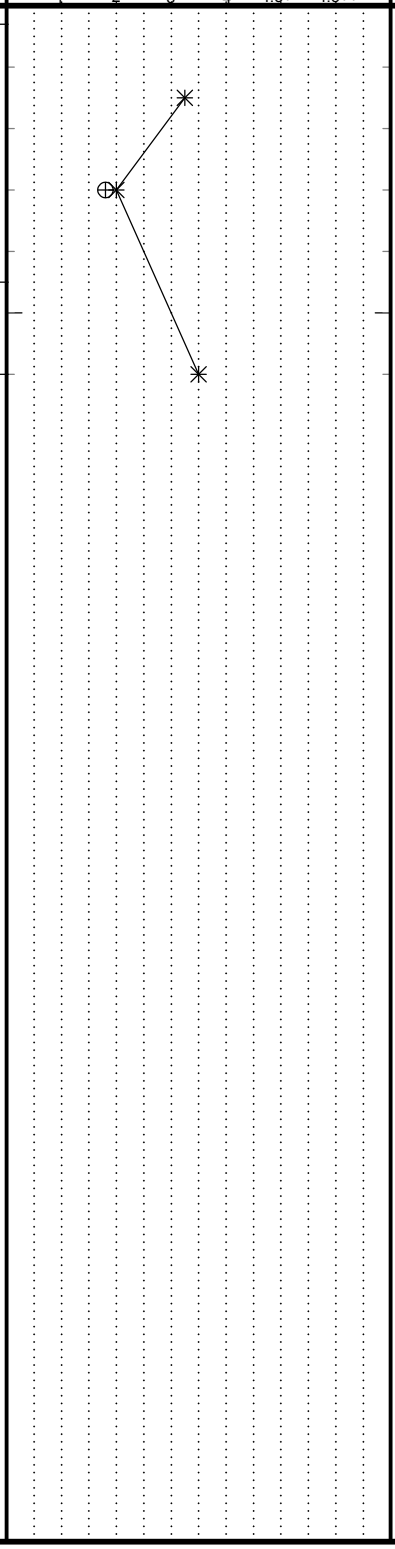
Project Number : 23390

Date Completed : 2/19/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (3-3/4")		
				CLAYEY SAND, brownish-red & yellowish-brown, fine (SC)		
5				SANDY CLAY, light gray & brownish-red, very stiff (CL)		
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						



BORING LOG B-23

PLATE 24

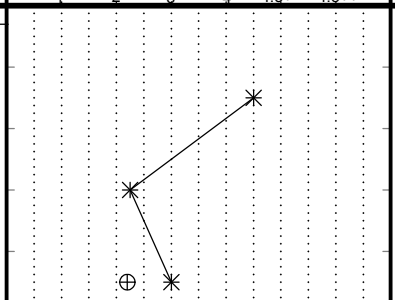
Project Number : 23390

Date Completed : 2/19/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (3")		
				CLAYEY SAND, brownish-yellow & yellowish-red, fine (SC - SP)		
5				-w/brownish-yellow below 4.5'		
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 5' @ end of day.		
10						
15						
20						



BORING LOG B-24

PLATE 25

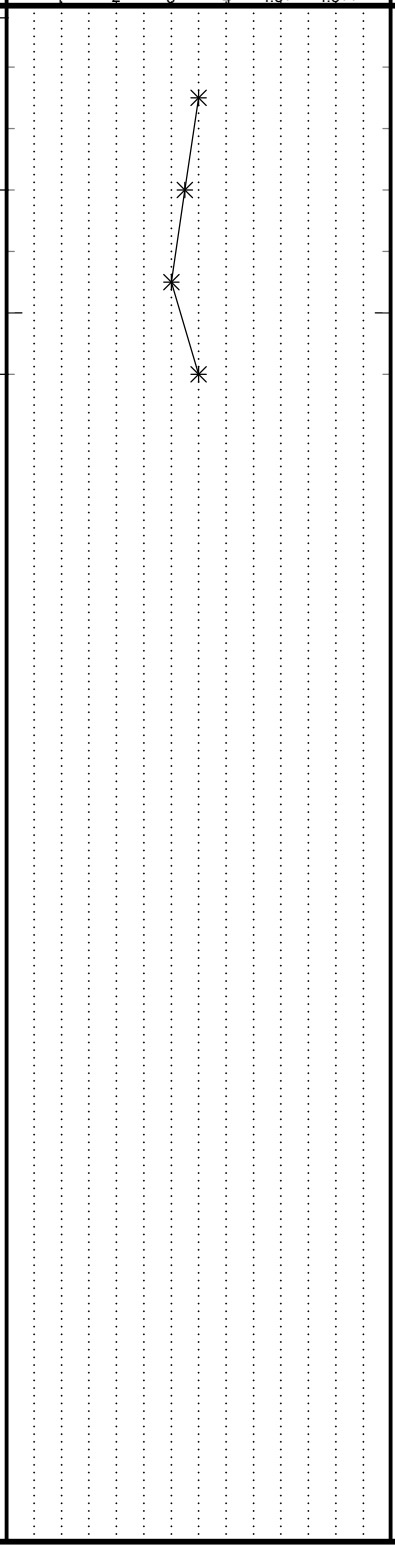
Project Number : 23390

Date Completed : 2/19/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				ASPHALT (2-3/4")		
				SANDY CLAY, brownish-red, gray & brownish-yellow, very stiff (CL)		
				SANDY CLAY, brownish-red & gray, very stiff (CL - CH)		
5				-w/ironstone fragments below 5.5'		
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						



BORING LOG B-25

PLATE 26

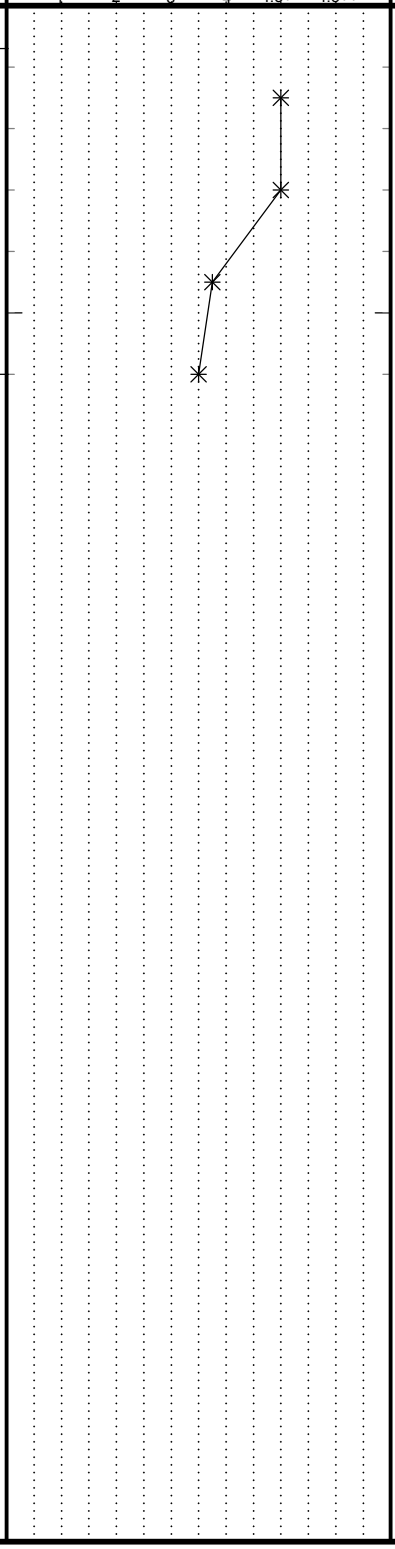
Project Number : 23390

Date Completed : 2/19/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Standard Penetration Tests Blows per Foot - ⊕ 10 20 30 40 50 60 / Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳ 1 2 3 4 4.5+ 4.5++	Elev. (ft)
				CONCRETE (8")		
				SANDY CLAY, brownish-red & light gray, hard to very stiff (CL)		
5						
				Total Depth = 6 feet		
				Dry after 5 minutes. Dry & blocked @ 6' @ end of day.		
10						
15						
20						



BORING LOG B-26

PLATE 27

REED ENGINEERING
GROUP

Project Number : 23390
Date Completed : 2/17/2020

006 Remodel
East Coke Road
Winnsboro, Texas

Location: See Plate 1

Depth (ft)	Sample	rec % (rqd %)	Graphic Log	DESCRIPTION OF STRATA	Elev. (ft)
				CONCRETE (6")	
				SANDY CLAY, light gray, brownish-red, very stiff to hard (CH - CL)	
5				-w/brownish-yellow below 5'	
				SILTY CLAY, light gray & brownish-yellow, very stiff to hard, w/fine sand & hydrocarbon odor (CH)	
10					
15					
				SAND, light gray & brownish-yellow, very dense, w/clay & trace of iron-stained seams, fine (SP)	
20					

SPT N VALUE ⊕
10 20 30 40 50 60

Pocket Penetrometer Readings Tons Per Sq. Ft. - ✳
1 2 3 4 4.5+ 4.5++

Water level on 2/18/2020
Seepage during drilling

84>⊕

Total Depth = 20.5 ft

Seepage encountered @ 13' during drilling. Water @ 14' after 5 minutes. Water @ 13' & blocked @ 18' @ end of day. Water @ 13' & blocked @ 18' on 2/18/2020.

BORING LOG B-01

PLATE 2

GEOTECHNICAL CONSULTANTS

- Fill
- Type of Fill
- Clay (CL) (LL<50)
- Clay (CH) (LL>50)
- SILT (ML) (LL<50)
- SILT (MH) (LL>50)
- CLAYEY SAND (SC)
- SILTY SAND (SM)
- SAND (SP-SW)
- CLAYEY GRAVEL (GRAVELLY CLAY)
- GRAVEL (GP-GW)
- (weathered) SHALE (unweathered)
- (weathered) LIMESTONE (unweathered)
- (weathered) SANDSTONE (unweathered)

- UNDISTURBED (Shelby Tube & NX-Core)
- STANDARD PENETRATION TEST
- DISTURBED
- THD CONE PENETROMETER TEST
- ▽ = Water level at time of drilling.
- ▼ = Subsequent water level and date.

KEYS TO SYMBOLS USED ON BORING LOGS

PLATE 28

GEOTECHNICAL CONSULTANTS

SOIL PROPERTIES

COHESIONLESS SOILS

SPT N-Values (blows / foot)	Relative Density
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
50 +	Very Dense

COHESIVE SOILS

Pocket Penetrometer (T.S.F.)	Consistency
<0.25	Very Soft
0.25-0.50	Loose
0.50-1.00	Medium Stiff
1.00-2.00	Stiff
2.00-4.00	Very Stiff
4.00 +	Hard

ROCK PROPERTIES

HARDNESS	DIAGNOSTIC FEATURES
Very Soft	Can be dented with moderate finger pressure.
Soft	Can be scratched easily with fingernail.
Moderately Hard	Can be scratched easily with knife but not with fingernail.
Hard	Can be scratched with knife with some difficulty; can be broken by light to moderate hammer blow.
Very Hard	Cannot be scratched with knife; can be broken by repeated heavy hammer blows.

DEGREE OF WEATHERING	DIAGNOSTIC FEATURES
Slightly Weathered	Slight discoloration inwards from open fractures.
Weathered	Discoloration throughout; weaker minerals decomposed; strength somewhat less than fresh rock; structure preserved.
Severely Weathered	Most minerals somewhat decomposes; much softer than fresh rock; texture becoming indistict but fabric and structure preserved.
Completely Weathered	Minerals decomposes to soil; rock fabric and structure destroyed (residual soil).

GEOTECHNICAL INVESTIGATION
006 REMODEL
EAST COKE ROAD
WINNSBORO, TEXAS

Summary of Classification and Index Property Tests

Boring No.	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Total Soil Suction (psf)	Percent Passing No. 200 Sieve
B-1	1.5 - 3.0	19.6	--	--	--	4,370	--
	3.0 - 4.5	20.0	54	17	37	8,290	69
	4.5 - 6.0	17.3	--	--	--	1,280	--
	9.0 - 10.0	29.1	--	--	--	1,190	--
	14.0 - 15.0	21.5	--	--	--	1,840	--
B-2	1.5 - 3.0	13.1	NP	NP	NP	1,600	19
	3.0 - 4.5	16.6	--	--	--	1,430	--
	4.5 - 6.0	14.9	--	--	--	3,290	--
	9.0 - 10.0	20.2	--	--	--	1,460	--
B-3	1.5 - 3.0	15.8	--	--	--	520	--
	3.0 - 4.5	15.6	--	--	--	1,300	21
	4.5 - 6.0	18.6	--	--	--	1,690	--
	9.0 - 10.0	14.2	--	--	--	1,300	--
B-4	1.5 - 3.0	22.7	--	--	--	3,730	--
	3.0 - 4.5	14.8	35	16	19	3,880	52
	4.5 - 6.0	9.5	--	--	--	18,810	--
	9.0 - 10.0	20.2	--	--	--	6,310	--
B-5	1.5 - 3.0	21.3	56	20	36	5,850	66
	3.0 - 4.5	17.6	--	--	--	1,210	--
	4.5 - 6.0	15.6	--	--	--	1,510	--
	9.0 - 10.0	17.9	--	--	--	1,250	--
B-6	1.5 - 3.0	16.5	--	--	--	--	--
	3.0 - 4.5	20.8	--	--	--	--	--
	4.5 - 6.0	24.9	46	16	30	--	--

GEOTECHNICAL INVESTIGATION
006 REMODEL
EAST COKE ROAD
WINNSBORO, TEXAS
(Continued)

Summary of Classification and Index Property Tests

Boring No.	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Total Soil Suction (psf)	Percent Passing No. 200 Sieve
B-7	1.5 - 3.0	20.1	--	--	--	--	--
	3.0 - 4.5	21.8	--	--	--	--	--
	4.5 - 6.0	20.9	54	19	35	--	--
B-8	1.5 - 3.0	32.0	--	--	--	5,280	--
	3.0 - 4.5	23.1	55	20	35	2,340	86
	4.5 - 6.0	27.4	--	--	--	880	--
	9.0 - 10.0	17.8	--	--	--	820	--
B-9	1.5 - 3.0	18.7	--	--	--	--	--
	3.0 - 4.5	18.0	--	--	--	--	--
	4.5 - 6.0	21.8	32	14	18	--	66
B-10	1.5 - 3.0	22.8	--	--	--	2,220	--
	3.0 - 4.5	18.2	--	--	--	2,880	--
	4.5 - 6.0	23.3	62	21	41	7,810	86
	9.0 - 10.0	17.8	--	--	--	2,310	--
B-11	1.5 - 3.0	21.9	--	--	--	--	--
	3.0 - 4.5	24.2	--	--	--	--	--
	4.5 - 6.0	21.8	--	--	--	--	--
B-14	1.5 - 3.0	14.8	--	--	--	--	--
	3.0 - 4.5	14.5	--	--	--	--	--
	4.5 - 6.0	15.1	--	--	--	--	--

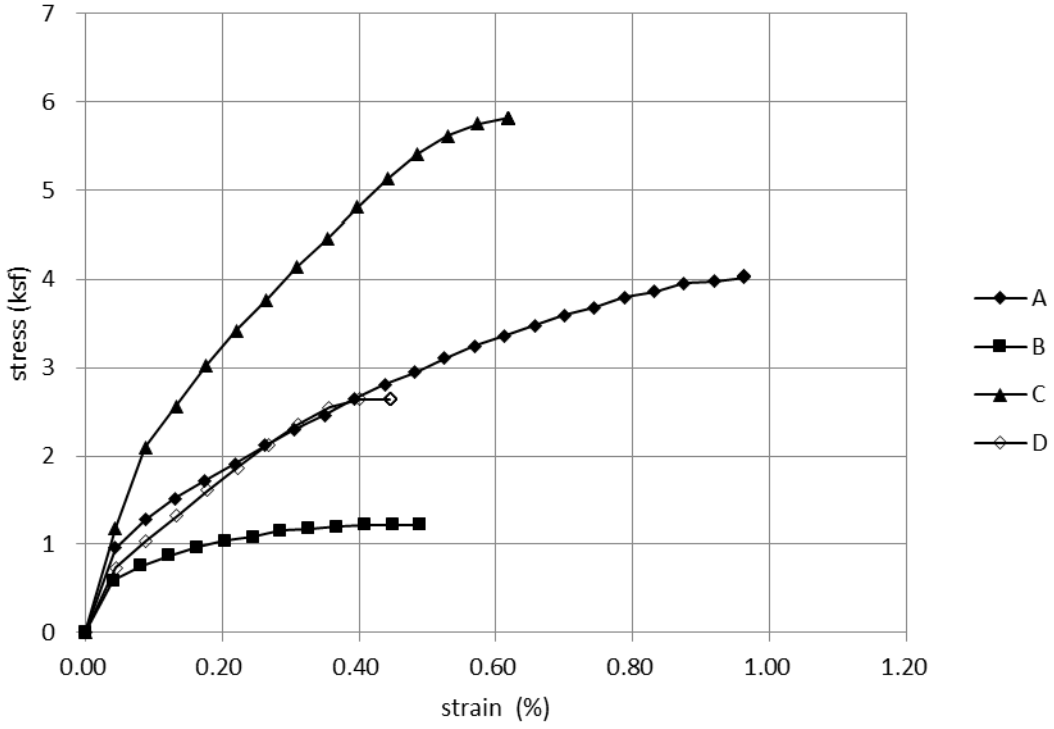
GEOTECHNICAL INVESTIGATION
006 REMODEL
EAST COKE ROAD
WINNSBORO, TEXAS
(Continued)

Summary of Classification and Index Property Tests

Boring No.	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)	Total Soil Suction (psf)	Percent Passing No. 200 Sieve
B-17	1.5 - 3.0	21.2	--	--	--	--	--
	3.0 - 4.5	11.9	--	--	--	--	--
	4.5 - 6.0	13.9	--	--	--	--	--
B-19	1.5 - 3.0	12.4	--	--	--	--	--
	3.0 - 4.5	16.7	--	--	--	--	--
	4.5 - 6.0	30.2	--	--	--	--	--
B-23	1.5 - 3.0	14.7	--	--	--	--	--
	3.0 - 4.5	21.8	--	--	--	--	--
	4.5 - 6.0	18.8	--	--	--	--	--

Summary of Unconfined Compression Tests

Sample Legend	Boring No.	Depth (feet)	Moisture Content (%)	Dry Unit Weight (pcf)	Unconfined Compressive Strength (ksf)
A	B-2	9.0 - 10.0	20.5	107.4	4.0
B	B-3	9.0 - 10.0	21.7	102.3	1.2
C	B-4	9.0 - 10.0	22.2	105.1	5.8
D	B-5	4.5 - 6.0	16.6	110.1	2.6



GEOTECHNICAL INVESTIGATION
006 REMODEL
EAST COKE ROAD
WINNSBORO, TEXAS

Summary of Lime Series Tests

Boring No.	Depth (feet)	Lime Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)
B-11	1.5 - 3.0	0	46	16	30
		4	46	32	14
		6	45	32	13
		8	44	32	12
B-17	1.5 - 3.0	0	55	23	32
		4	54	39	15
		6	53	39	14
		8	52	39	13

GEOTECHNICAL INVESTIGATION
006 REMODEL
EAST COKE ROAD
WINNSBORO, TEXAS

Summary of Cement Series Tests

Boring No.	Depth (feet)	Lime Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (PI)
B-23	1.5 - 3.0	0	20	19	1
		4	20	19	1
		6	22	20	2
		8	23	20	3