5700 Lionfish Way
Fort Worth, TX 76131

WHITWORTH ENGINEERING
DIAMOND JW INC

Report No. ST25-0023

January 30, 2025

Geotechnical Investigation of Site-Specific Subsoil

982 Turner Warnell Road

Mansfield, Texas

Prepared for:

Maurice Ugwuibe

6746 Old Square Dr.

Corpus Christi, Texas

Prepared by:

Whitworth Engineering

5700 Lionfish Way

Fort Worth, TX 76131

: 817-236-6106 : 817-236-6184 : soils@rjwe.com

January 30, 2025

Maurice Ugwuibe
6746 Old Square Dr.
Corpus Christi, Texas

Re: Geotechnical Investigation @ 982 Turner Warnell Road, Mansfield, Texas

Dear Mr. Maurice Ugwuibe,

Per your request, Whitworth Engineering has conducted a geotechnical investigation for the pad site at the above-referenced property. This investigation included an analysis of published information about the subsurface conditions in the area and a subsurface exploration of two (2) test borings. The information collected during this investigation was then used to determine some of the engineering properties of the supporting subsoil. The conclusions of this investigation are included herein.

We appreciate the opportunity to provide this service to you and look forward to assisting you with any of your other construction requirements. Whitworth Engineering has a design team that can assist you with the foundation design and the inspections & testing of construction activities. If you have any questions or comments pertaining to this report, or if we can be of further assistance, please contact our office at 817-236-6106.

Sincerely,

Russell J. Whitworth, P.E.

The seal appearing on this
document was authorized by
Russell J. Whitworth, P.E.
82117
Whitworth Engineering
F-3973

Design Summary

Report Number ST25-0023	Builder Maurice Ugwuibe		
Job Address 982 Turner Warnell Road			
Subdivision -		Legal Description -	
City Mansfield	County Tarrant	GPS North 32.611072	GPS East g13

Geology	USDA	Lab Results	
Formation Woodbine Sand	Formation Woodbine Formation	Classification FAT CLAY (CH)	
Major Aquifer Woodbine	Classification Navo clay loam	Depth(ft) 20	Allowable Soil Bearing(psf) 1460
Minor Aquifer -		#200 88	Em Center(ft) 7.8
Depth to Groundwater 210		2µm 44	Em Edge(ft) 4.0
Boring Groundwater No		LL 57	Ym Center(in) 1.14 (average)
		PI 40	Ym Edge(in) 1.65 (average)
		Shrink/Swell Potential High	PVR(in) 3.1

SOIL MODIFICATION RECOMMENDED

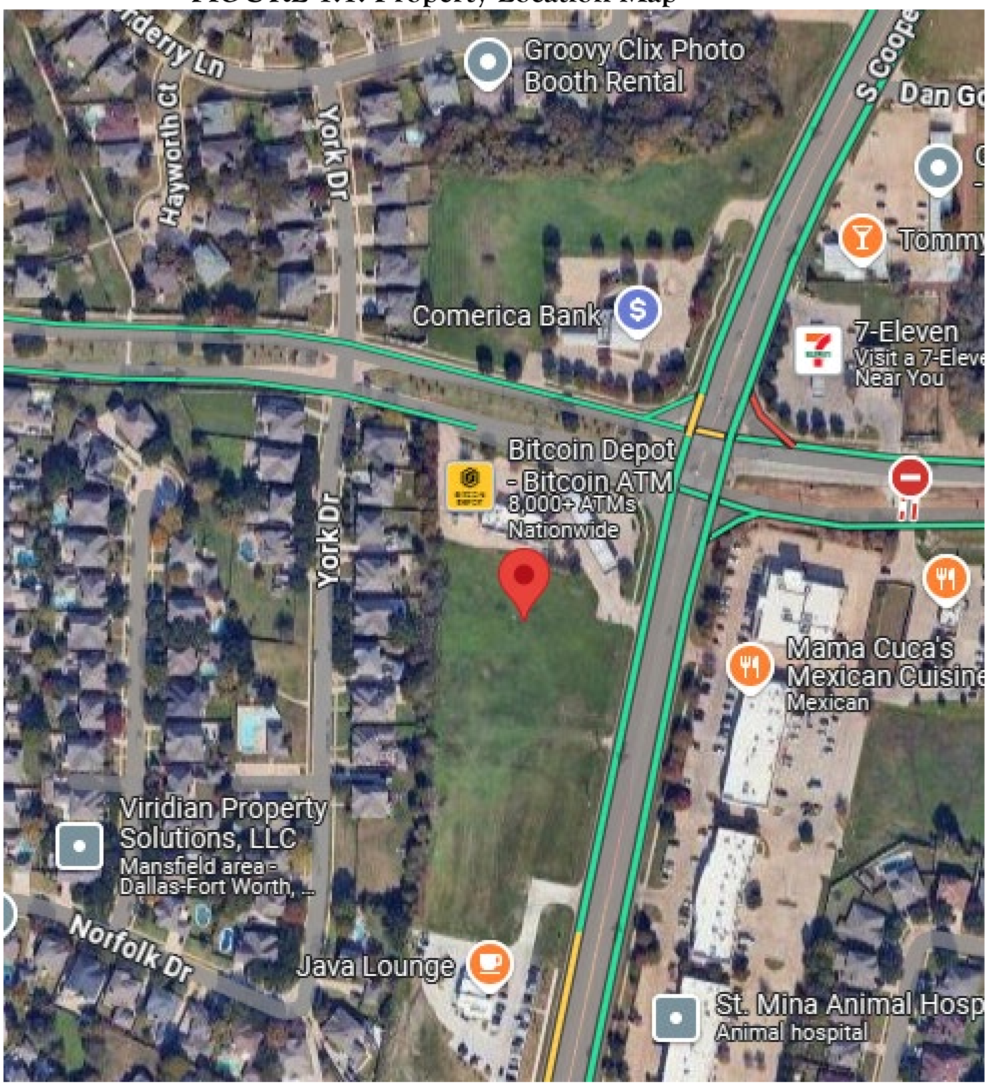
Table of Contents

1.0 Executive Summary

1.1 Project Description

The purpose of this report is to evaluate the engineering properties of the site-specific subgrade soil for the commercial property located at 982 Turner Warnell Road in Mansfield, Texas. A map illustrating the location of the property is included below as Figure 1.1: Property Location Map.

FIGURE 1.1: Property Location Map



1.2 Laboratory Standards

Whitworth Engineering has prepared this Geotechnical Investigation in general accordance with the Current Standards as prepared by the American Society of Testing and Materials (ASTM). Per these standards, many of the testing procedures have a referenced guideline. There are three (3) main types of standards used: guides, test methods, and practices. Provided below is a summary of the ASTM standard guidelines used to prepare this Investigation.

TABLE 1.2: Referenced ASTM Standards Used

ASTM#	*Description*	*Type*
D420	Site Characterization for Engineering Design and Construction	Guide
D421	Dry Preparation of Soil Samples for PSA and Soil Constants	Practice
D422	Particle-Size Analysis (PSA) for Soils	Test
D1140	Amount of Material in Soil Finer than #200 sieve	Test
D1452	Soil Investigation and Sampling by Auger Borings	Practice
D1587	Thin-Walled Tube Sampling of Soils	Practice
D2216	Lab. Determination of Moisture Content by Mass	Test
D2217	Wet Preparation of Soil Samples for PSA and Soil Constants	Practice
D2487	Classification of Soils for Engineering Purposes	Practice
D2488	Description and Identification of Soils (Visual-Manual Procedure)	Practice
D3740	Minimum Requirements for Soil Testing Agencies	Practice
D4220	Preserving and Transporting Soil Samples	Practice
D4318	Atterberg Limits of Soils	Test
D4753	Evaluating, Selecting and Specifying Balances for Soil Testing	Guide
D6026	Using Significant Digits in Geotechnical Data	Practice
D6951	Standard Test Method for use of the Dynamic Cone Penetrometer	Test

1.3 Scope of Services

On January 28, 2025 Whitworth Engineering directed a site inspection of the subject property and two (2) test borings were advanced down to 20 feet below the existing ground. The locations of the borings were based on the location of the commercial structure and the limits of the property. The boring locations are provided in Appendix A of this report. The subject borings were sampled in five (5) foot intervals, unless there was a detectable change in soil layers. Upon collection the samples were logged, placed in labeled bags and transported to the lab.

Particle Size Analysis (ASTM D422)

A Particle Size Analysis (PSA) test was conducted on selected soil samples from each boring. This test was used to determine the size and distribution of the soil particles in a given sample. The subject analysis was made utilizing an H-152 Hydrometer to determine the percent of soil particles finer than two (2) microns (μm) and by washing the tested sample through a #200 sieve.

Material Finer than 200 (ASTM D1140)

This test method determines the amount of material in the soil that is finer than the No. 200 sieve. A properly sampled selection of material is prepared generally by weighing then soaking in a deflocculating agent. The solution is then thoroughly washed. The clay and other particles that are dispersed by washing is removed from the soil. The loss in mass is the calculated and reported.

Atterberg Limits (ASTM D4318)

The Atterberg Limits are a set of tests that are used to determine how a soils volume will vary with a change in the moisture content. The Liquid Limit (LL) is the moisture content at which the soil will flow as a heavy viscous fluid, and the Plastic Limit (PL) is the moisture content at which the soil begins to lose its plasticity and becomes brittle. The difference between LL and PL is referred to as the Plasticity Index (PI) of a soil and is used to classify material.

Soil Classification (ASTM D2487)

Once the aforementioned tests have been reported, the soil can be classified per the Unified Soil Classification System (USCS). The USCS classifies soils using alphabetic sequences of between 2-4 letters; these are typically reported in all caps. The most common soils in the DFW area are Clays (C), Silts (M), and Sands (S) respectively. Fine grained soils, more than 50% finer than a #200 sieve, such as clays and silts are classified as Lean (L) or Fat (H) based on their Atterberg Liquid Limit.

Standard Practice for Description and Identification of Soils (ASTM D2488)

In addition to these testing procedures, soils are primarily visually examined and a series of manual tests are performed to insure proper classification. This procedure helps identify rock in various sizes, organic material, peat, gravel and sands. This practice gives standardized criteria and procedures for describing and identifying soils. It also aids in the evaluation of significant engineering properties as a supplement to ASTM D 2487.

Potential Vertical Rise

The Potential Vertical Rise (PVR) of a soil is used to determine the "potential ability of a soil material to swell at a given density, moisture and loading condition, when exposed to capillary or surface water, and thereby increase elevation of its upper surface, along with anything resting on it" (from Tex 124-E pg 3). The PVR unless otherwise stated in this report is calculated to a depth of 10 feet. The PVR potential below 10 feet is typically very small due to the surcharge of the soil above it. We consider this reasonable as the calculation is based on the dry condition which is more conservative. Furthermore, the calculation does not take into account the loading from the structure to be built which will also reduce the swelling potential. The PVR values are determined using TX DOT, TX124 design spreadsheet.

Dynamic Cone Penetration (ASTM D6951)

The Dynamic Cone Penetration Test of a soil is used to determine the load bearing capacity of materials encountered in foundation exploration work. By determining the number of blows required to drive a conical point 6 inches, one can correlate the Point Bearing capacity for various soil types. The point bearing capacity given for the Dynamic Cone Penetrometer test is based on ASTM D6951 CBR values and CBR bearing capacity values developed by the Portland cement association.

2.0 Investigation of Published Information

2.1 USDA

The United States Department of Agriculture (USDA) has published general soils information for the approximate area of the subject property. This deep, well drained, gently sloping soil is on uplands. Typically, the surface layer is slightly acidic brown clay loam about 5 inches thick. The upper part of the subsoil to a depth of about 15 inches is slightly acidic, reddish brown clay; to a depth of about 34 inches, it is moderately acidic, yellowish brown clay that has red, yellowish brown, and brownish yellow mottles; and to a depth of 44 inches, is slightly acidic, prominently mottled yellowish brown, brownish yellow, light brownish gray, and grayish brown clay. The lower part of the subsoil to a depth of 62 inches is moderately alkaline, brownish yellow clay that has yellowish brown, dark grayish brown, and grayish brown mottles. These soils are well drained and surface runoff is moderate. Permeability is very slow and the available water capacity is high. This soil has poor tilth and can be worked within a narrow range of moisture conditions. Water erosion is a severe hazard. This soil is poorly suited to most urban uses. Shrinking and swelling of the soil with changes in moisture, corrosivity to uncoated swell, and the very slow permeability are the main limitations.

2.2 GAT

According to the Geologic Atlas of Texas, Dallas Sheet, the subject property is located on the Woodbine Formation and consists of sandstone, clay, and shale. This formation is approximately 175-250 feet thickness.

2.3 TWDB

Information published by the Texas Water Development Board (TWDB) suggests that the subject property is located over the Woodbine Sand formation of the Woodbine Aquifer. Well records for the general area of the property indicate groundwater from this formation at approximately 210 feet below the existing ground. However, this is only applicable to usable groundwater. Undetermined quantities of groundwater can become trapped between soil layers or at fractures in the bedrock. This type of groundwater formation will vary in depth and change with climatic conditions.

3.0 Subsurface Exploration

3.1 Site Conditions

The subject property is a commercial lot and the pad site was identified by estimating the likely location based on the client supplied GPS. The approximate locations of the subject borings are illustrated on the Boring Location Plan provided in Appendix A. The subject lot is grassy and the pad site has not been prepared as illustrated in the Site Photos provided below. The subject property has a gentle slope to the north.

Site Photo 3.1.1

Site Photo 3.1.2

3.2 Soil Conditions

The information provided by the Boring Logs suggests that the profile of the site soils consists of FAT CLAY & SANDY SILT.

The design material is a moist, very stiff, brown and dark brown FAT CLAY (CH). This material is fine grained with 88% of the soil particles finer than a #200 sieve and 44% finer than 2 µm. With a LL of 57 and a PI of 40 this soil has a HIGH potential for moisture-induced volume change. For additional soils information, please refer to the Boring Logs in Appendix A.

Trapped groundwater was not present in the borings. Typically, groundwater levels are seasonal and fluctuate with weather conditions. If groundwater is encountered during the construction of the proposed foundation, it should be reported to the engineer immediately.

4.0 Design Analysis

4.1 Potential Soil Movement

To determine the shrink/swell potential of the foundation soil, the soil properties determined from the laboratory tests were used as input values for VOLFLO 1.5 software as developed by Geostructural Tool Kit, Inc. This software uses the unsaturated soil mechanics theory to determine the Edge Moisture (e_m) variation distance and the Differential Soil Movement (y_m), that are used in the design of post-tensioned concrete slabs. These parameters are then evaluated for a center lift condition and an edge lift condition. If designing a PTSOG foundation, the PTI 3rd Edition Manual including Addendum #1 should be used to design the foundation from these soil movement parameters. These parameters are further defined below.

Values:

- Edge Moisture (e_m), feet – The distance from which moisture is expected to migrate through the soil as measured in feet.
- Differential Vertical Movement (y_m), inches – The estimated distance that the soil surface will move from its as-built condition as measured in inches. Both the equilibrium condition and the extreme conditions are shown below. The equilibrium condition assumes that the soil moisture content in the active zone is at or near equilibrium at the time of construction. The extreme condition is reflective of a suction change from unusually moist or dry soils to an unusually dry or moist soil. If this condition is anticipated, it is recommended to use the extreme differential vertical movement (y_m) values for design.

Conditions:

- Center Lift (C) – The situation that occurs when the soil under the center section of the foundation swells up, with dryer edge moisture conditions.
- Edge Lift (E) – The situation that occurs when the soil around the edge of the foundation swells up, with dryer center of slab moisture conditions.

The values that were determined using the critical site-specific values are provided below in Table 4.1: PTI Design Parameters.

Table 4.1: PTI Design Parameters

	Center Lift	**Edge Lift**
e_m, feet	7.8	4.0
y_m, inches (equilibrium)	0.69	0.88
y_m, inches (extreme)	1.58	2.41

The Potential Vertical Rise PVR (from TEX 124-E) for the first 10 feet of this soil was determined to be 3.1 inches. Please see Section 1.3 for a description of this calculation.

4.2 Soil Bearing Capacity

The allowable bearing capacity of the site soil was determined from Dynamic Cone Penetrometer readings taken in the field. Using these values, provided in the Boring Logs in Appendix A, the allowable bearing capacity that should be used for the subsurface soil in the first 5 feet is 1460 PSF.

Based on the Dynamic Cone Penetration test values, drilled piers can be designed with the following values, after excluding the top 5 feet of material for skin friction:

Table 4.2: Pier Design Parameters

Skin Friction	680	psf
Point Bearing at 15 feet	3950	psf

5.0 Design Recommendations

5.1 Building Foundation

Foundation options include structurally suspended slabs, Post-Tensioned Slab on Grade PTSOG (aka waffle slab), conventionally reinforced waffle slabs, pier and beam, and others. A structurally suspended slab will provide the least risk of differential movement; as such, it is always a good recommendation in areas with active soils. As soils become more active, the structurally suspended slab becomes more cost effective.

The most popular foundation constructed in the north central Texas region is the waffle slab (and especially the Post Tensioned Slab on Grade). *PTSOG foundations have an increased risk of movement and distress caused by the swelling and shrinking of active soils related to changes in moisture content. They rely on the builder and owner to follow soil moisture maintenance guidelines during and after construction.* Typical moisture maintenance guidelines are as presented in Section 5.3. Additionally, it is of utmost importance that the grade beams for this type of slab be embedded a minimum of 12 inches into undisturbed subgrade or be supported by piers.

As the PTSOG foundation has a lower initial cost and the associated risk level is typically considered reasonable, experience with foundations throughout the North Central Texas region suggests that PTSOGs are capable of supporting most residential and light commercial structures with minimal effects from the supporting soils. If this type of foundation is chosen, the PTSOG should be designed by a professional engineer who has experience with post-tensioned concrete foundations and should follow the guidelines set forth in the "Design of Post-Tensioned Slabs-on-Grade, Third Edition" (including Addendum #1), as published by the Post-Tensioning Institute (PTI). Under special conditions such as low plasticity and without piers, a uniform thickness slab may be used.

The design soil has a high plasticity index which may result in large movements in the soil when moisture conditions change. A suspended slab, as mentioned above is one option for this site, as the slab and grade beams are isolated from soil movements. The use of soil modification might also be considered by the design

engineer. Soil modification is a means by which the properties of the soil can be improved significantly using one of the following methods:

1. *Removal of the clay soils to a depth of 4 feet extending 5 feet beyond perimeter of slab, then replacing it with a select fill having a PI between 4 and 18 with a maximum particle size of 1/2 inch. Upon completion of excavation, subgrade should be scarified, watered as necessary, then compacted to 92-98% of standard proctor. The fill soils should then be installed in 8 inch loose lifts and be compacted to a minimum of 95% standard proctor (ASTM D698) with a moisture content of -2% to +4% of optimum moisture. This method will require on-site moisture density testing. Although this method is the most effective and offers the most longevity, it is likely the most costly.*
2. *Thorough mechanical injections of a chemical solution containing potassium or diluted sulfuric acid type chemicals to depths of 10 feet extending 5 feet beyond perimeter of slab. Chemical injection changes the properties of the soil, reducing the plasticity. An independent contractor should be used to complete this task. Acceptance is achieved when subsequent swell testing is at or below 1%. This method will require the swell testing to be performed after injections by a third-party testing agency, however, this is offers the most benefit for cost involved.*
3. *Remove existing soil to a depth of 5 feet and re-install in 8 inch lifts at a standard proctor of 92-98% of maximum dry density with a moisture content of minimally 4% over optimum. This method will require on-site moisture density testing. This method will also vary in efficiency as climatic conditions will affect longevity.*

All of these options should extend 5 feet beyond the limits of the proposed slab in all directions to ensure acceptable results. These recommendations are available possibilities and each should be carefully weighed with other alternative constructions selected to perform best by the design engineer. These options are not direction to build as stated, rather proven solutions to be considered.

Other foundation options may also be evaluated by the foundation engineer and the final selection should be made based on the sound engineering principles in conjunction with the risk factor acceptable to the owner and builder.

5.2 Drilled Piers

Cast-in-place concrete piers are an excellent way to supplement the structural properties of a building foundation. Drilled piers can be installed to structurally suspend a building foundation to prevent contact with an unstable soil, as in the case of the Structurally Suspended Foundation. Piers can also be used to supplement a PTSOG that has been constructed on unstable soil by preventing the downward settlement that occurs when a slab experiences edge drop. Experience suggests that unless an unstable soil is present, such as inadequately compacted fill material, most PTSOGs behave similarly with or without drilled piers. However, the use of piers for supplemental support will never be discouraged if the owner chooses to construct them. If site conditions show considerable organics or warrant fill in excess of 18 inches in the foundation area which prevents the bottom of grade beams to be founded into at least 12 inches of undisturbed soil, drilled piers should be considered. Said piers should be designed by the foundation engineer.

5.3 Site Preparation and Maintenance

The building foundation for the proposed structure should be constructed as previously described. However, there are several additional precautions that should be considered when developing a residential or light commercial property. The foundation soil can be influenced by indirect methods such as, but not limited to, fill compaction, site drainage, existing trees, removed trees, landscape beds, leaking pipes and climatic conditions. ***The objective of a proper maintenance program is to maintain as near constant moisture content as possible for the soil under the foundation.***

The following is a list of items to be considered when planning proper foundation maintenance:

1. Drainage:

- Never allow water to pond near or against foundation slabs.
- Maintain positive drainage away from the foundation. The minimum slope shall be 5% for a distance of 10 feet from the edge of the foundation. (5% equals a 6-inch drop in 10 feet)
- Where a horizontal distance of 10 feet is not possible, a berm or swale shall be constructed which provides a minimum 2% slope conveying the water to an acceptable outfall.
- The installation and maintenance of gutters and downspouts are highly recommended; they should be kept clear and discharge water away from the foundation.

2. Landscaping:

- There should be a minimum distance of 6 inches between the top of the slab and the ground.
- Landscape beds must also maintain the minimum positive slope of 5% away from the foundation.
- Where landscape beds are placed adjacent to the foundation, they should be equipped with a moisture barrier and/or area drains which convey water by means of buried pipe to an acceptable outfall.
- Area drains must be checked periodically to ensure that they remain functional.
- Trees remove moisture from the ground in order to survive, and should therefore be watered regularly.
- Trees should be placed at a distance no closer to the foundation than the full height of the mature tree.
- If existing tree removal is not an acceptable option, a root guard system should be constructed around the foundation in the area of the tree(s). Replace and compact any loose fill adjacent to the foundation with native soil. Water is conveyed quickly through sand or granular materials; these materials should not be used adjacent to the foundation unless accompanied by an appropriate drain system.

3. Seasonal Changes:

- Avoid excessive drying around the perimeter of the foundation; when soil pulls away from foundation it is too dry.

- Excessive moisture is also a problem; therefore, avoid overwatering, even during dry seasons.

4. Swimming pools, pipe systems and sprinkler lines:

- Routinely check for leaks.

All property owners should conduct a yearly survey of their foundation and perform any maintenance necessary to improve drainage and prevent the ponding of water adjacent to these structures. ***This is especially important during the first five (5) years after construction because this is usually the time when the most severe adjustment between the new foundation and its supporting soil occurs.***

5.4 Inspections and Testing

The most carefully prepared plans have no value if they are not followed. Even if all major components are present, the results can be a disaster if they are not assembled in the proper order and fashion. Therefore it is recommended that the foundation be inspected before any major concrete pour to verify the dimensions of the structural members of the slab and to verify the placement of the reinforcing steel or cable. If the residence is to be constructed within a city's ETJ, the city will typically require a city inspection. Whitworth Engineering can provide inspection services for residential or light commercial foundations at the owner's request. Testing of the concrete mix is only required by a few local municipalities. Whitworth Engineering can also provide said testing service.

6.0 Report Qualifications and Limitations

This investigation was conducted in accordance with generally accepted geotechnical practices and procedures. The opinions expressed in this report are based on the engineering properties of the referenced samples in association with the values developed from recognized empirical formulas and any other information provided to Whitworth Engineering by the owner or his representatives. The recommendations provided in this report are only applicable to the specific property for which the investigation was conducted for the conditions as they have been reported herein. The engineering properties of soil are not constant; they are influenced by moisture and a number of other factors as previously discussed. Because of this, the recommendations made in this report are only valid for six (6) months from the date of this report. Any major deviations from the site conditions as they have been reported should be forwarded to Whitworth Engineering for further review.

7.0 Pavement Recommendations

7.1 General

The pavement designs shown below are based on the guidelines and recommendations of the American Concrete Pavement Association (ACPA), the Asphalt Institute and our experience and professional opinion.

7.2 Subgrade Characteristics

Based on a California Bearing Ratio (CBR) value of 23 and a corresponding resilient modulus of 16,603 PSI.

7.3 Design Traffic Loading

Assumptions: Design life of 20 years; and Minimum Equivalent Single Axle Load (ESAL) of 200,000 used for rigid concrete pavement.

7.4 Pavement Alternatives

Pavement Type	Surface Course	Base Course	Subgrade
Rigid Concrete; Truck lanes, Approaches and Dumpster Pads	6" Concrete		6" Lime Stabilized 95-100% Compacted
Rigid Concrete; Auto lanes and Parking	5" Concrete	-	6" Lime Stabilized 95-100% Compacted
Flexible Pavement; (HMAC) Truck lanes, Approaches and Dumpster pads	4" HMAC	6" Flex Base Material	6" Lime Stabilized 95-100% Compacted
Flexible Pavement; (HMAC) Auto lanes, and parking	4" HMAC	6" Flex Base Material	6" Lime stabilized 95-100% Compacted

7.5 Recommendations for Installation of Pavement Courses

1. RIGID PAVEMENT

- 4,000 PSI minimum design strength.
- 4 to 6% Air Content using Air Entrainment Agent.
- Minimum 6 sack cement.
- Up to 20% Class C fly ash.
- Concrete shall be Fully Reinforced.
- Contraction joints (sawcuts) shall have a maximum spacing of 15 feet each way.

- Expansion joints shall be smooth dowel joints with the pavement thickness increased 25%. One end of dowels is to be greased and capped using 1 inch expansion joint material in the joint. Redwood, Cedar, or other rigid material should be avoided. Expansion joint spacing should be between 80 and 100 feet and at locations where large pavement sections intersect with smaller sections.
- The following tests should be run on every 75 yards of concrete or each day's operation, whichever is less: 4-Compression test cylinders, tested at 7, 14, 28, and 56 days; Slump test; Air Entrainment Content; and Temperature.

2. HOT MIX ASPHALTIC CONCRETE PAVEMENT (HMAC)

- Hot Mix Asphaltic Concrete Pavement shall conform to TxDOT Item 340, Type D.
- Compaction of the HMAC shall conform to TxDOT Item 340.6 (5) Compaction.
- Asphalt content should be 5.2% ± 0.5% using AC-10 or AC-20. Asphalt content may be adjusted as deemed necessary to maintain laboratory density near optimum value while achieving other mix requirements.
- Aggregate Gradation:

Sieve Size	% Passing
½"	100
3/8"	95-100
No. 4	50-70
No. 10	32-42
No. 40	11-26
No. 80	4-14
No. 200	1-6

3. FLEXIBLE BASE

- Flexible Base Material shall conform to TxDOT Item 247, Type A. Type A material shall be crushed stone produced from oversized quarried aggregate, sized by crushing and produced from a naturally occurring single source. Crushed gravel or uncrushed gravel shall not be acceptable for Type A material. No blending of sources and/or additive materials will be allowed in Type A material.
- Compaction of flex base material shall conform to TEX-115-E to a minimum of 95% of standard proctor at optimum moisture.
- Aggregate Gradation:

Sieve Size	% Retained
1- ¾"	0
7/8"	10-35
3/8"	30-50
No. 4	45-65
No. 40	70-85

- Max increase in material passing No. 40 = 20%, Max Wet Ball Mill = 40, Max Liquid Limit (LL) = 35, Max Plasticity Index (PI) = 10.

4. LIME STABILIZED SUBGRADE

- Lime stabilized subgrade shall conform to TxDOT Item No. 260 with 6% hydrated lime by dry weight measure (25 lbs./sq. yd.) to be mixed with the existing soil after scarifying to a depth of at least 6 inches. The soil and lime mixture shall be compacted to between 95 and 100% of Standard Proctor at a moisture content of -2% to +4% of optimum.

- The lime stabilized subgrade shall extend a minimum of 2 feet past the back of the roadway curbs or edge of asphalt.
- The following tests should be run per every 5,000 sf.: Atterberg limits & Density.

5. SOIL PREPARATION UNDER PAVEMENT

- Remove all vegetation, organic material or other deleterious materials.
- Proof roll the pavement areas with a fully loaded tandem axle dump truck. Any areas which rut excessively or pump shell be undercut and replaced with compacted fill.
- All fill shall be installed in maximum 8 inch lifts, and compacted to between 95 and 100% of Standard Proctor at a moisture content at least 3 percentage points above optimum.
- Do not use any sand as fill under the pavement. Any imported fill shall be similar to the on-site soils and approved by Whitworth Engineering, Inc.
- The following test shall be run per every 5,000 sf.: In-place density & Moisture control.

Log of Boring B1

WHITWORTH ENGINEERING
DIAMOND JW INC

Project #:	ST25-0023	**Date:**	1/28/2025
Client:	Maurice Ugwuibe	**Elevation:**	0
Address:	982 Turner Warnell Road	**GPS North:**	32.611072
City:	Mansfield	**GPS West:**	-97.143173

Sample Legend
S - Shelby Tube
B - Bag
D - Dynamic Cone Penetration Test

Depth, ft	Sample Type	Sample #	Soil Type	Stratum Description	USCS Classification	Moisture Content, %	Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Finer than #200 Sieve, %	Finer than 2 Micron (µm), %	PVR (in) for Dry Condition	Sulfate content (ppm)	Dynamic Cone Penetration Test, # Blows per 6"	Gravel Percent
	B	1		FAT CLAY - moist, very stiff, dark brown and brown.	CH	20	57	18	39	86	43	3.1			0
	D													10	
5															
	B	2			CH	13	53	16	37	87	40				0
10															
	B	3													
15															
	B	4													
20															
				20' EOB (No Water Found)											
25															

Log of Boring B2

WHITWORTH ENGINEERING DIAMOND JW INC

Project #: ST25-0023
Client: Maurice Ugwuibe
Address: 982 Turner Warnell Road
City: Mansfield

Date: 1/28/2025
Elevation: 0
GPS North: 32.611072
GPS West: -97.143173

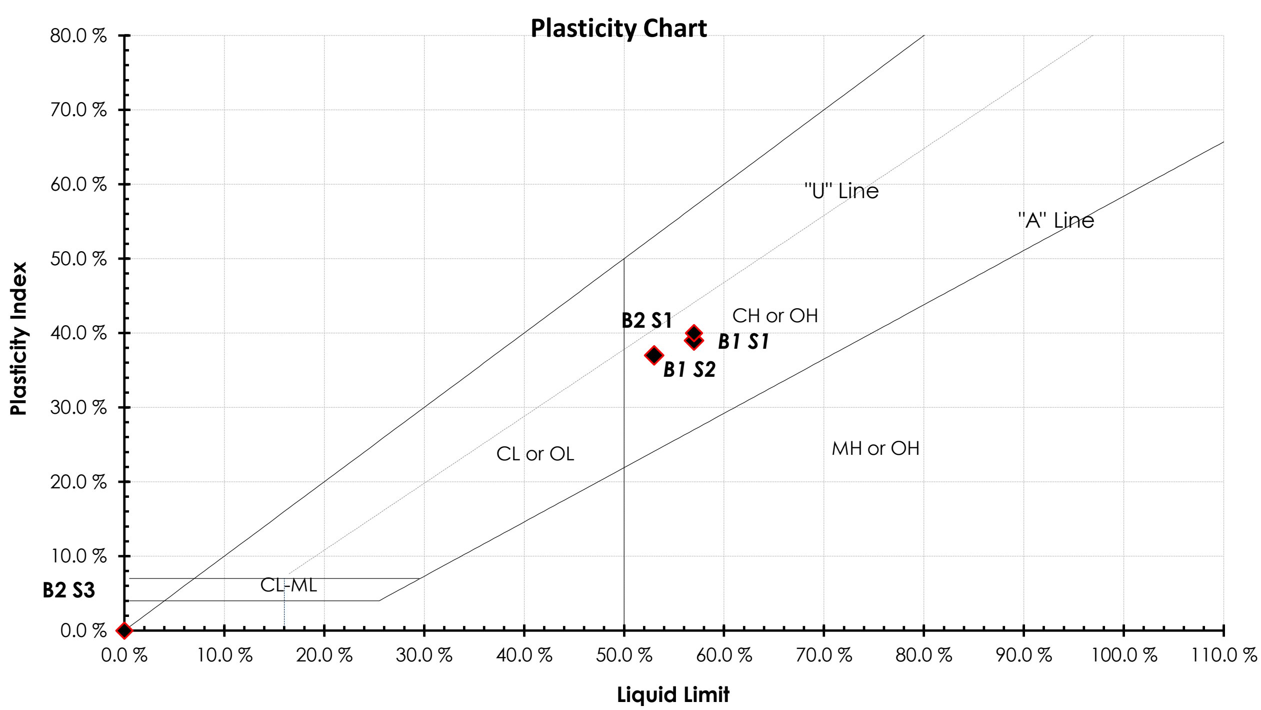
Sample Legend
S - Shelby Tube
B - Bag
D - Dynamic Cone Penetration Test

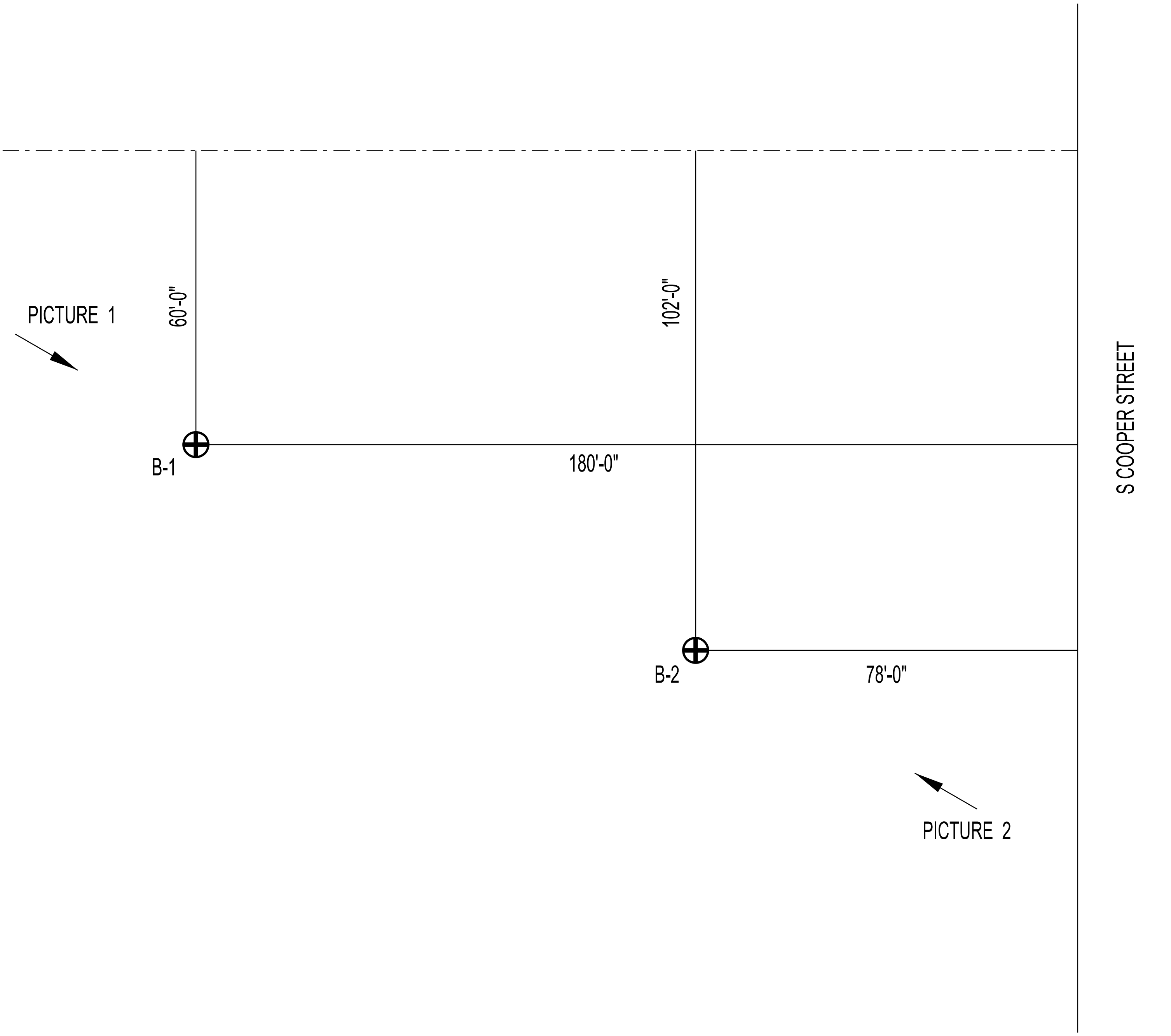
Depth, ft	Sample Type	Sample #	Soil Type	Stratum Description	USCS Classification	Moisture Content, %		Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Finer than #200 Sieve, %	Finer than 2 Micron (µm), %	PVR (in) for Dry Condition	Sulfate Content (ppm)	Dynamic Cone Penetration Test, # Blows per 6"	Gravel Percent
	B	1		FAT CLAY - moist, very stiff, brown and dark brown.	CH	15		57	17	40	88	44	2.7			0
	D														10	
5																
	B	2														
10																
	B	3		SANDY SILT - moist, light brown.	ML	11		0	0	0	57	0				0
15																
	B	4														
20																
				20' EOB (No Water Found)												
25																

KEY TO SYMBOLS AND TERMINOLOGY

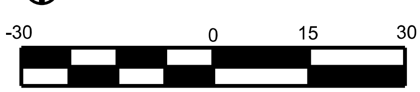
SYMBOL	USCS	DECRIPTION
	CH	FAT CLAY
	CL	LEAN CLAY
	MH	ELASTIC SILT
	ML	SILT
	CL-ML	SILTY CLAY
	SW or SP	SAND
	SM	SILTY SAND
	SC	CLAYEY SAND
		OTHER

Q ALLOW. PSF	CONSISTENCY
0-167	VERY SOFT
167-333	SOFT
333-666	FIRM
666-1333	STIFF
1333-2666	VERY STIFF
2666 +	HARD

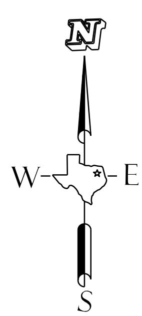




⊕ BORING LOCATION



SCALE: 1"=30'-0"



BORING LOCATION PLANS

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PROJECT #: *ST25-0023*