5700 Lionfish Way
Fort Worth, TX 76131

Report No. ST23-0348

September 27, 2023

Geotechnical Investigation of Site-Specific Subsoil

1 Tryall Ct #1

Lot 70; Block 10; Tract 1

Runaway Bay

Bridgeport, Texas

Prepared for:

RESILIENT EDGE INVESTMENTS & CONSTRUCTIONS LLC

9125 Trail wood Drive

North Richland Hills, Texas

Prepared by:

Whitworth Engineering

5700 Lionfish Way

Fort Worth, TX 76131

September 27, 2023

RESILIENT EDGE INVESTMENTS & CONSTRUCTIONS LLC
Attn: Channy Salazar
9125 Trail wood Drive
North Richland Hills, Texas

Re: Geotechnical Investigation @ 1 Tryall Ct #1, Bridgeport, Texas

Dear Mr. Channy Salazar,

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	Builder		
ST23-0348	RESILIENT EDGE INVESTMENTS & CONSTRUCTIONS LLC		
Job Address			
1 Tryall Ct #1			
Subdivision		Legal Description	
Runaway Bay		Lot 70; Block 10; Tract 1	
City	County	GPS North	GPS East
Bridgeport	Wise	33.1732	-97.879358

Geology	USDA	Lab Results	
Formation	Formation	Classification	
Palo Pinto Limestone	Jasper Creek Formation	SILT	
Major Aquifer	Classification	Depth(ft)	Allowable Soil Bearing(psf)
Cross Timbers	Truce fine sandy loam	5 & 10	2180
Minor Aquifer		#200	Em Center(ft)
-		89	0.0
Depth to Groundwater		2μm	Em Edge(ft)
340		0	0.0
Boring Groundwater		LL	Ym Center(in)
No		0	0 (average)
		PI	Ym Edge(in)
		0	0 (average)
		Shrink/Swell Potential	PVR(in)
		Very Low	0.2

NON-PLASTIC SOILS

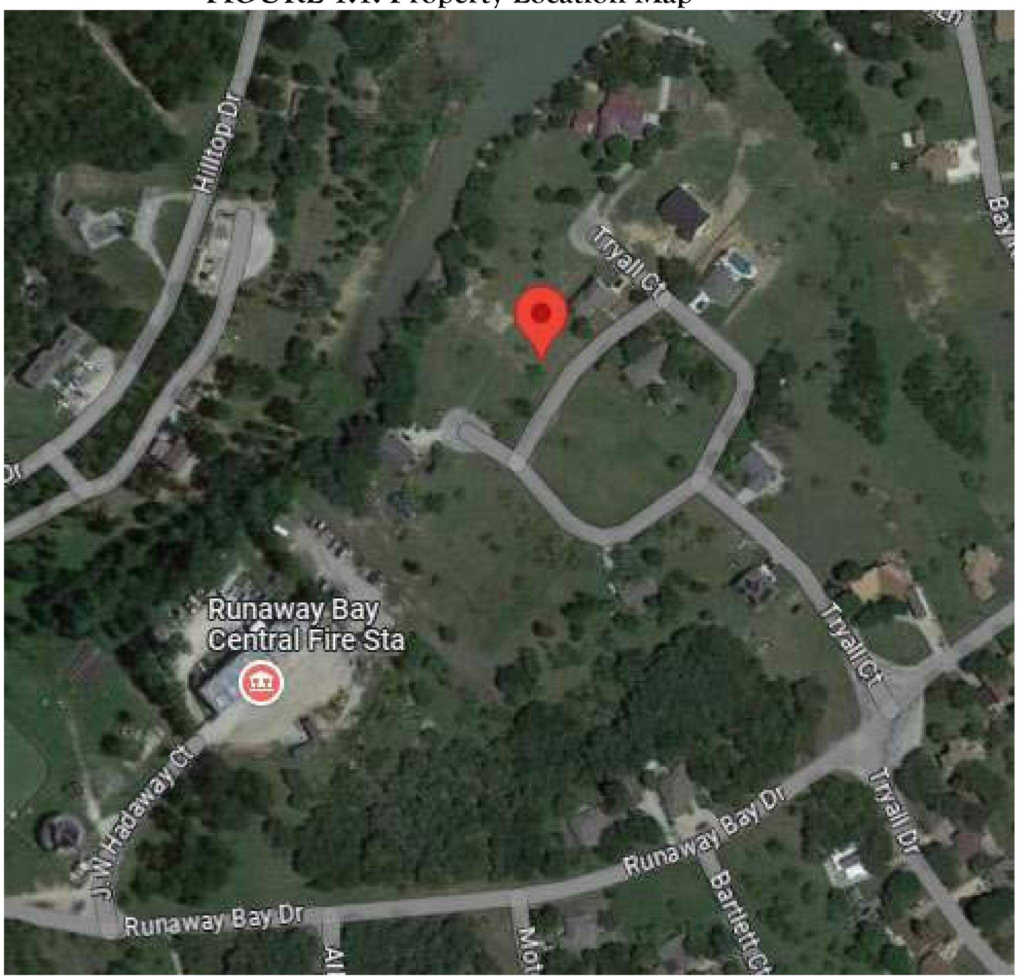
Table of Contents

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 residential property located at 1 Tryall Ct #1 in Bridgeport, Texas. This property is recorded as Lot 70; Block 10; Tract 1 of the Runaway Bay subdivision, per the plat records as listed for Wise County, 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 September 22, 2023 Whitworth Engineering directed a site inspection of the subject property and two (2) test borings were advanced down to 5 & 10 feet below the existing ground. Boring was terminated prior to 20 feet due to bit refusal. The locations of the borings were based on the location of the residential 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. Per this information, the area soil appears to be classified as Truce fine sandy loam (CL-ML). The Truce series consists of deep, loamy soils on uplands. The soils formed in material weathered from shale. Typically, this soil has a neutral, brown fine sandy loam surface layer about 7 inches thick. The subsoil to a depth of 21 inches is slightly acid, yellowish red clay. To a depth of 51 inches it is clay that has fragments of shale in the lower part. It ranges from neutral and dark yellowish brown in the upper part to moderately alkaline and light yellowish brown in the lower part. The underlying material to a depth of 80 inches is moderately alkaline, light gray very shaly clay. This soil is only moderately suited to most urban uses because of slow permeability and shrinking and swelling of the soil resulting from changes in moisture content. Low strength is a limitation for local roads and streets.

2.2 GAT

According to the Geologic Atlas of Texas, Sherman Sheet, the subject property is located in the Jasper Creek Formation and consists of sandstones. This formation is approximately 310-330 feet thick.

2.3 TWDB

Information published by the Texas Water Development Board (TWDB) suggests that the subject property is located over the Palo Pinto Limestone formation of the Cross Timbers Aquifer. Well records for the general area of the property indicate groundwater from this formation at approximately 340 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 single family residential lot and the pad site was identified by staked corners. The approximate locations of the subject borings are illustrated on the Boring Location Plan provided in Appendix A. The subject lot is grassy with a few trees around the pad site as illustrated in the Site Photos provided below. The subject property has a gentle to moderate slope to the west.

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 SILT.

The design material is a moist, very stiff, brown SILT with pulverized rock. Rock layers throughout. This material is fine grained with 89% of the soil particles finer than a #200 sieve and 0% finer than 2 µm. This soil is non-plastic. 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.

There were no values to determine using the critical site-specific data because the soil samples were all non-plastic. The Potential Vertical Rise PVR (from Tex 124-E) for the first 10 feet of this soil was determined to be 0.2 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 2180 PSF. **Sandy or silty soil conditions that exist at this site may dictate the need for casing any piers, widening the grade beams, or the use of helical piers. If helical piers are used additional geotechnical investigations may be necessary.**

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	600	psf
Point Bearing at 10 feet	5890	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.

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.

Log of Boring B1

WHITWORTH ENGINEERING
DIAMOND JW INC

Project #: ST23-0348 **Date:** 9/22/2023

Client: RESILIENT EDGE INVESTMENTS & CONS **Elevation:** 0

Address: 1 Tryall Ct # 1; Lot 70; Block 10 Tract 1 **GPS North:** 33.1732

City: Bridgeport **GPS West:** -97.879358

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		SILT with PULVERIZED ROCK - moist, hard, brown with trace gravel. Rock layers thoughout.	ML	12		0	0	0	89	0	0.2			1
	D														50	
5																
	B	2		5' EOB (No Water Found)												####
10																
	B	3														
15																
	B	4														
20																
25																

Log of Boring B2

WHITWORTH ENGINEERING
DIAMOND JW INC

Project #:	ST23-0348	Date:	9/22/2023
Client:	RESILIENT EDGE INVESTMENTS & CONS	Elevation:	0
Address:	1 Tryall Ct # 1; Lot 70; Block 10 Tract 1	GPS North:	33.1732
City:	Bridgeport	GPS West:	-97.879358

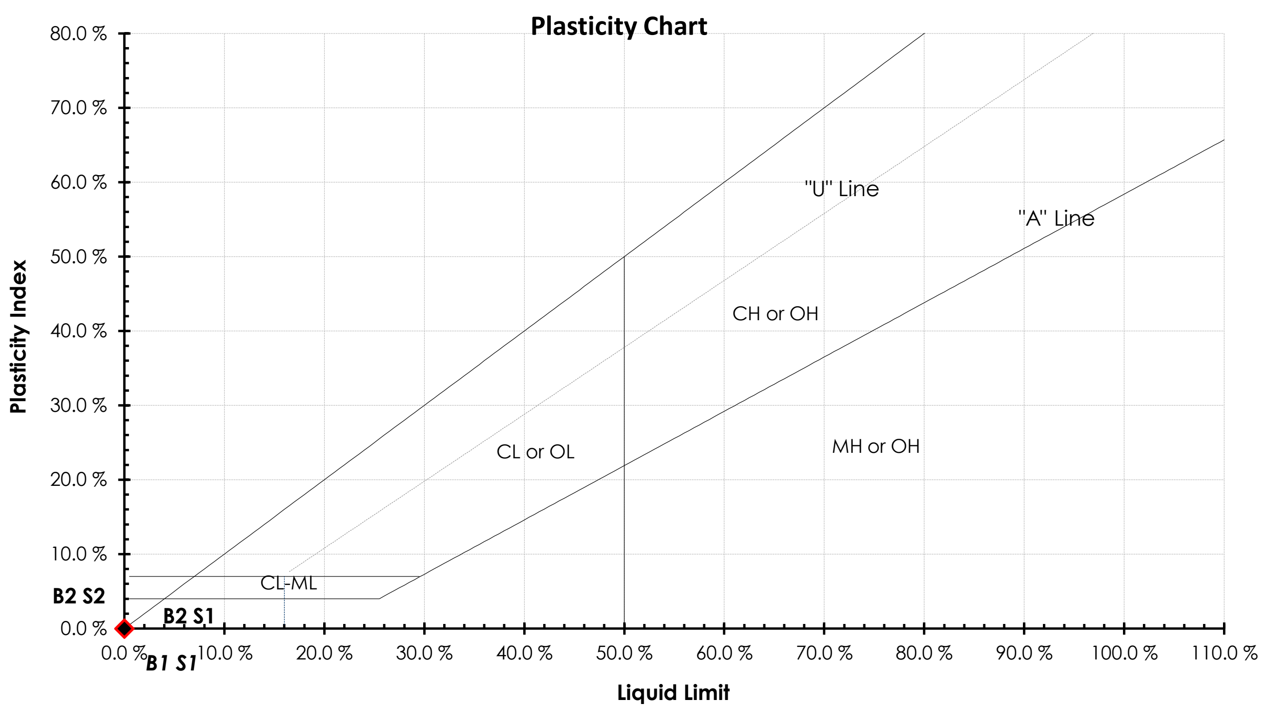
Sample Legend
S - Shelby Tube
B - Bag
D - Dynamic Cone Penetration Test

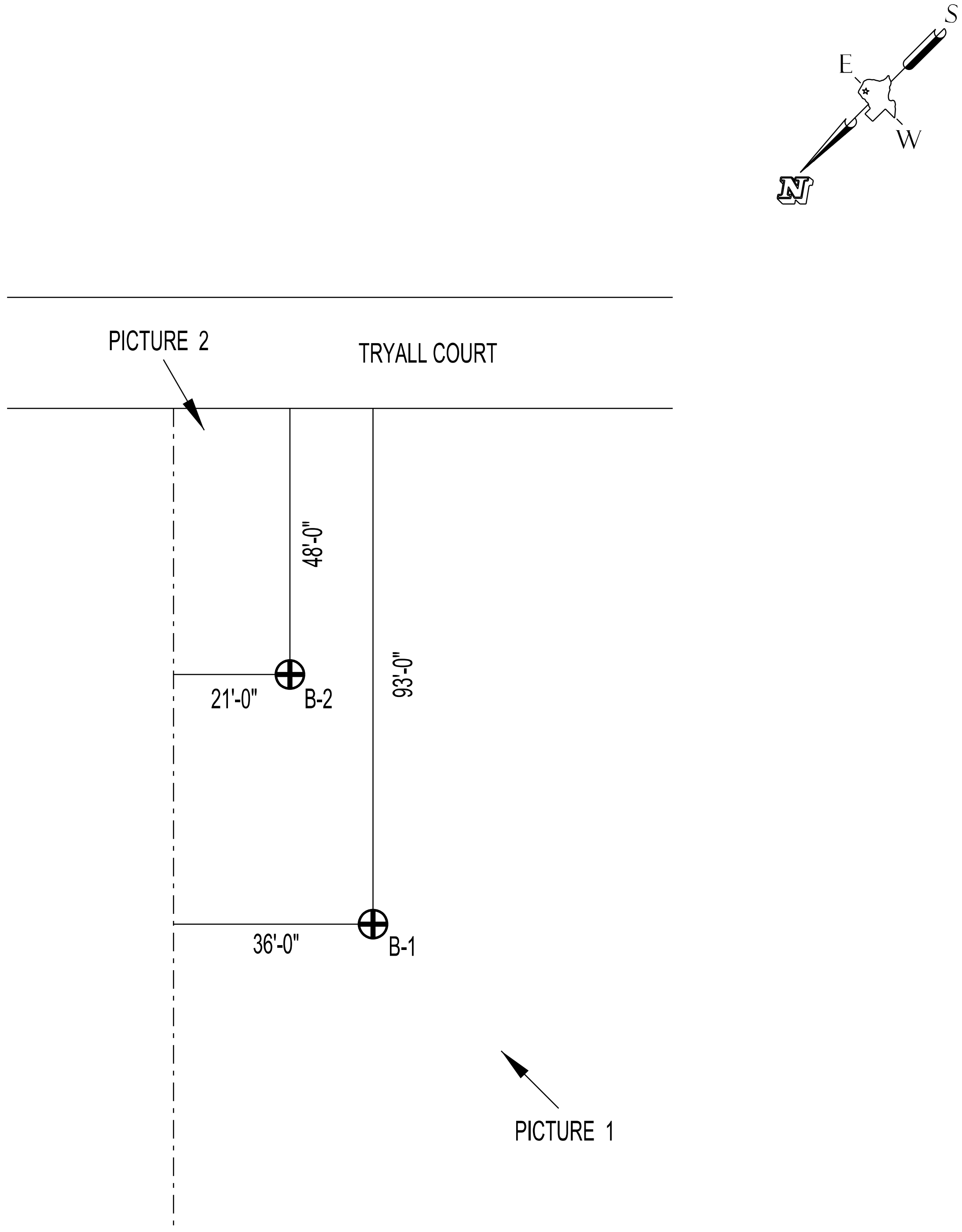
Depth, ft	Sample Type	Sample #	Soil Type	Stratum Description	USCS Classification	Moisture Content, %		Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Finer than #200 Sieve, %	Finer than 2 Micron (µm), %	PVR (in) for Dry Condition	Sulfate Content (ppm)	Dynamic Cone Penetration Test, # Blows per 6"	Gravel Percent
	B	1		SILT with PULVERIZED ROCK - moist, very stiff, brown with trace gravel. Rock layers throughout.	ML	13		0	0	0	94	0	0.2			1
	D														27	
5																
	B	2			ML	17		0	0	0	94	0				1
10																
	B	3		10' EOB (No Water Found)												
15																
	B	4														
20																
25																

KEY TO SYMBOLS AND TERMINOLOGY

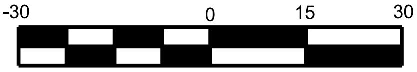
SYMBOL	USCS	DECRIPTION
	CH	FAT CLAY
	CL	LEAN CLAY
	MH	ELASTIC SILT
	ML	SILT
	CL-ML	SILTY CLAY
	SW or SP	SAND
	SM	SILTY SAND
	SC	CLAYEY SAND
		OTHER

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

1 TRYALL COURT #1
LOT 70; BLOCK 10; TRACT 1 - RUNAWAY BAY
BRIDGEPORT, TEXAS

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DRAWN BY: *RMG*

PROJECT #: *ST23-0348*