GEOTECHNICAL ENGINEERING STUDY

CLEAR SPRING MEADOWS
NEW BRAUNFELS, TEXAS
PAVEMENT DESIGN

FROST GEOSCIENCES, INC. PROJECT NO.: FGS-G 21116

REVISED

FEBRUARY 5, 2024

Prepared Exclusively for:

Mr. Trey Rogers
Pulte Group
1718 Dry Creek Way
San Antonio, Texas 78259

Frost GeoSciences
Construction Materials ▪ Forensics
Environmental ▪ Geotechnical

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Frost GeoSciences

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Revised
February 5, 2024

Mr. Trey Rogers
Pulte Group
1718 Dry Creek Way
San Antonio, Texas 78259

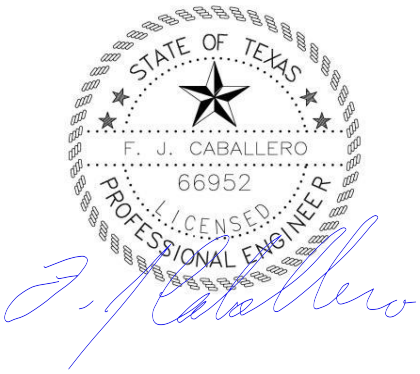
SUBJECT:
Geotechnical Engineering Services
CLEAR SPRING MEADOWS
New Braunfels, Texas
FGS Project No: FGS-G21116

Dear Mr. Rogers:

Frost GeoSciences, Inc. (FGS) is a geotechnical engineering company registered with the Texas Board of Professional Engineers, with registration No. F-9227, and is pleased to submit the results of our Geotechnical Engineering Study for the above referenced project. This report includes the results of field and laboratory testing along with our recommendations for use in preparation of the appropriate design and construction documents for this project.

We appreciate the opportunity to be of service to you in this phase of your project and future projects. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted,
Frost GeoSciences, Inc.



F. J. Caballero, P.E.
Project Engineer

FGS-G-21116

Copies Submitted:
i. One (1) Electronic: Mr. Trey Rogers, Pulte Group, San Antonio, Texas
ii. One (1) File

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PROJECT INFORMATION

Project Authorization:

Frost GeoSciences, Inc. (FGS) has completed a geotechnical engineering study for new pavements to be constructed in the **Clear Spring Meadows in New Braunfels, Texas**. This project was authorized by **Mr. Sean Miller of Pulte Group,** through acceptance of Frost GeoSciences **Proposal No.: FGS-P-G21128 dated May 12, 2021.** Our scope of services for this project is as outlined in that proposal.

Project Description:

We understand that the **Clear Spring Meadows Development** involves the design and construction of both a **One & Two Family Residential Local Streets** and **Residential Collector Streets.** The pavement section design will be in accordance with the **New Braunfels Flexible Pavement Design Criteria.** A Vicinity Map showing the location of the project is included in the section of this report entitled Illustrations.

Purpose and Scope of Services:

The purpose of the geotechnical investigation is to evaluate the subsurface conditions at the project site and develop geotechnical engineering recommendations and guidelines for use in preparing the appropriate design and other related construction documents for this project. Therefore, our scope of services for this project include the following:

- Drill borings and excavate test pits at selected locations within the project limits to evaluate subsurface conditions and to observe the potential presence of subsurface water;
- Perform geotechnical engineering laboratory tests on selected samples recovered during our field activities to evaluate their physical and engineering properties;
- Perform Engineering analyses to develop the appropriate geotechnical engineering recommendations and guidelines, to include:
- Appropriate pavement section thickness recommendations;
- Pavement section material requirements and specifications;
- General site and subgrade preparation within the construction limits; and
- General comments regarding construction methods, sequences and potential difficulties that may arise during overall construction as it relates to the geotechnical engineering aspects of this project.

- Prepare a written report that includes a boring location plan, boring log at each bore site, and results of the laboratory testing program, descriptions of the subsurface conditions encountered and our geotechnical engineering recommendations and guidelines developed for this project.

Our scope of services for this project did not include the assessment of any potential environmental concerns at this site. Therefore, such concerns are not addressed in this report.

SITE AND SUBSURFACE CONDITIONS

Site Description:

The site conditions were assessed using a combination of aerial photography and observations made by the FGS personnel during our field operations. The following site conditions were noted:

- The site is the Clear Spring Meadows Development in New Braunfels, Comal County Texas.

Site Geology:

According to the Bureau of Economic Geology: Geologic Atlas of Texas, San Antonio Sheet (1982), the Site is located on the Cretaceous, Upper Glen Rose Formation (Qle).

- **The Leona Formation (Qle)** is fine calcareous silt that begins grading down into coarse gravel.

Soil Description:

According to the United States Department of Agricultural (USDA) Natural Resources Conservation Service (NRCS) Soil Survey of Guadalupe County (1977), the Site is located on the following soils:

- **The Barbarosa silty clay, 1-3% slopes (BaB)** is a gently sloping soil located on terraces. Areas range from 10 to 50 acres in size. This soil consists of deep, noncalcareous, nearly level to gently sloping, clayey soils, on ancient stream terraces. These soils formed in ancient, calcareous, clayey alluvium. The surface layer is very dark grayish-brown silty clay about 16 inches thick. The next layer, to a depth of 56 inches, is brown, firm clay in the upper part and light yellowish-brown, firm silty clay in the lower part. The lower part is about 10 percent, by volume, concretions and soft masses of lime. The Barbarosa silty clay is well drained. Runoff is medium and the hazard of water erosion is moderate.

- **Branyon Clay, 0-1% slopes (BrA)** is a deep, nearly level soil on ancient high stream terraces in the Blackland Prairie Resource Area. Typically, this soil has an upper layer of very dark gray clay about 52 inches thick. the next layer, about 12 inches thick, is gray, very firm clay in the upper part and pale-brown, extremely firm clay in the lower part. It is underlain by very pale brown,

friable silty clay loam that is about 10 percent by volume limestone pebbles and concretions and soft masses of lime. Surface runoff is slow. Water erosion is a slight hazard.

- **The Barbarosa silty clay, 0-1% slopes (BaA)** is located on terraces. Areas are typically100-200 acres in size and are somewhat irregular to oval shaped. This soil consists of deep, noncalcareous, nearly level to gently sloping, clayey soils, on ancient stream terraces. These soils formed in ancient, calcareous, clayey alluvium. The surface layer is very dark grayish-brown silty clay about 24 inches thick. The next layer, to a depth of 72 inches, is clay. It is reddish brown in the upper part and reddish yellow in the lower part. The Barbarosa silty clay is well drained. Runoff is slow, internal drainage is medium, and permeability is slow. Available water capacity is high. The hazard of water erosion is slight.

- **The Queeny Gravelly Loam, 1-5% slopes (QeC)** is a gently sloping soil found mainly on terraces. Areas range from about 5 to 30 acres in size. The surface layer is very dark grayish-brown gravelly loam about 9 inches thick. The upper part of the underlying material is very pale brown strongly cemented platy caliche about 8 inches thick; the middle part is a white, weakly cemented caliche about 20 inches thick; and the lower part, to a depth of 144 inches, is very gravelly sand. The gravel content of the surface layer is variable, and ranges from practically none to 25 percent by volume. The Queeny soils are well drained. Permeability is moderate in the surface layer and slow in the caliche layer. Available water capacity is very low. Runoff is medium. The hazard of water erosion is slight.

- **The Trinity Clay, frequently flooded (Tw) –** This nearly level soil is in the lowest part of flood plains of creeks. Areas flood 1 to 2 days mainly in spring or in fall of each year. Areas are about 200 to 1,200 feet wide, and they follow the drainage patterns of the creeks. Stream channels make up about 10 percent of the mapped areas. Areas are mainly several hundred acres in size. Slopes have a gradient of less than 1 percent. The profile of this soil is the one described as representative of the series. In places limestone and chert pebbles are on the surface. Included with this soil in mapping are a few spots of Bosque and Seguin soils that are in about the same position as Trinity soils. These spots make up less than 15 percent of the mapped areas. The soil is somewhat poorly drained. It is suited to improved pasture grasses, native range, and recreation. It is not suited to cultivated crops because of frequent flooding.

Subsurface Conditions:

Subsurface conditions at the site were evaluated by drilling a total of **FIFTEEN (15)** soil borings to a depth of **Fifteen (15)** feet and **THREE (2)** test pits to approximately **two (2) feet depth** were excavated to obtain **soil samples to determine the California Bearing Ratio (CBR)** of the soil samples. The borings were drilled to the depth at which they were terminated due to auger refusal, this depth is indicated in each of the Boring Logs. The number of borings and test pits, their locations and their depths were selected by FGS. The borings and test pits were located in the field by FGS personnel using Global Positioning System (GPS) technology. The borings were advanced using solid flight auger drilling methods and soil samples were routinely obtained during the drilling

process; the test pits are routinely excavated to the appropriate depth. Drilling and sampling techniques were accomplished in general accordance with ASTM procedures. Logs of the borings are presented in the Appendix section at the end of the report. A Borehole Location Plan with the location of each boring is presented in the Illustrations section of this report.

The soil samples obtained during our field exploration were transported to our laboratory where they were reviewed by qualified geotechnical engineering personnel. Representative samples were selected and tested to determine pertinent engineering properties and characteristics for use in evaluating the project site. Laboratory testing and soil classification were accomplished in general accordance with ASTM procedures.

Based on the field and laboratory data, it is determined that the stratigraphy of the site is generally as follows:

Stratum	Range of Depth, (feet)	Stratum Description and Classification
I	0.0 to 4.0	Fat Clay (CH), Dark Brown
II	4.0 to 6.0	Chalky Clay (CL), Tan
III	6.0 to 10.0	Clay (CL), Tan with Calcareous
IV	10.0 to 15.0	Marley Weathered Clay (CL), Tan

The subsurface descriptions shown above are general in nature and highlight major subsurface stratification features and material types. The boring logs included in Appendix A should be reviewed for specific information such as soil or rock material descriptions, stratifications, sampling depths and intervals, field test data and laboratory test data. The stratifications shown on each boring log only represent the conditions and approximate boundaries between strata at that actual boring location. The actual transitions between strata may be gradual. Variations will occur and should be expected at locations away from each boring location. Subsurface water level observations made during field operations are also shown on the boring logs. The indicated stratum depths and any subsurface water levels are measured from the ground surface and are estimated to the nearest one-half (½) foot. Portions of any samples that are not altered or consumed by laboratory testing will be retained for 30 days from the date of issuance of this report. Unless otherwise requested by the client and/or depending upon project requirements, all soil samples will be discarded after that retention period.

The **P.I. values** obtained from the soil samples taken **near the surface ranged from 40 to 45 in** the **CLAY** subgrade soil. Due to the characteristics of the materials found in the area, FGS is of the opinion that the Plastic Index (P.I.) value of the material near the surface will pose a problem if not treated with LIME or replaced with a more suitable material.

Soil Corrosiveness:

Soil Corrosiveness testing **was not** performed at this site.

Subsurface Water Information:

The borings were advanced using dry drilling techniques to the depth at which they were terminated due to auger refusal in an attempt to detect the potential presence of subsurface water in the material. **Subsurface water was not encountered in any of the borings** upon completion of drilling operations, however it must be kept in mind that subsurface water levels are generally influenced by seasonal and climatic conditions that result in fluctuations of subsurface water levels over time.

ENGINEERING ANALYSIS AND RECOMMENDATIONS

Pavement Design:

Flexible pavements should be designed and constructed in accordance with the requirements established by local municipalities and the American Association of State Highway and Transportation Officials (AASHTO) "Guide for Design of Pavement Structures", for this project, the Bexar County Flexible Pavement Design Criteria was used.

Below is a table which outlines the Flexible Pavement Design Criteria, which was used in the design of the proposed street sections for this project:

Input Parameters used in Asphalt Pavement Section Calculation

	Residential Collector Streets		One & Two Family Residential Local Streets	
W18	ESAL = 2,000,000		ESAL = 100,000	
R	90%		70%	
So	Flexible	Rigid	Flexible	Rigid
	0.45	0.35	0.45	0.35
Po	4.2	4.5	4.2	4.5
Pt	2.5	2.5	2.0	2.0
ΔPSI	1.7	2.0	2.2	2.5
T	20		20	
SN	Min.	Max.	Min.	Max.
	2.92	5.05	2.58	4.20

In addition to the parameters shown above, the soil resilient modulus, M_R, of the subgrade soil, must be determined. Typically, this value is obtained through California Bearing Ratio (CBR) testing. Field investigations show that all the soil samples obtained within the subgrade at the site are very similar with very similar (CBR) values. These soils are **Dark Brown Clay** **with CBR values ranging between 2.7 to 3.3.** We will **use a CBR of 3.0 for our pavement design values** our pavement sections. Information regarding the moisture density relationships

of the bulk samples of subgrade soil collected at this site and the CBR test results are presented in the Appendix section of this report.

The Pavement Sections for Soils with a **CBR value of 3.0** are presented in the tables below. **It should be noted, the P.I. value of the subgrade material at this site varies between 40 and 45**. The subgrade soils at this site **will require lime to reduce the soil plasticity.**

For the purposes of developing layer thicknesses for the pavement sections shown below, we have used the following structural coefficients in the calculation of pavement structural numbers:

Material Type	Structural Coefficient	Drainage Coefficient
TXDOT Item 340, Hot Mixed Asphaltic Concrete	0.44	1.00
TXDOT Items 292 or 340, Asphalt Treated Base	0.38	1.00
TXDOT Item 247, Flexible Base - Crushed Limestone	0.14	1.00
TXDOT Item 247, Flexible Base	0.08	1.00
Lime Stabilized Subgrade, (6 inch Min.)	0.08	1.00

New Braunfels Minimum Design Thickness

	Residential Local	Residential Collector
PAVEMENT LAYER	**Min. Thickness Inches**	**Min. Thickness Inches**
HMAC	3.0	3.0
Aggregate Base Course	12.0	15.0
Asphalt Treated Base Course	6.0	6.0
Lime & Cement Base Course	6.0	6.0
Mechanically Stabilized Layer	8.0	8.0
Moisture Conditioned Subgrade	6.0	6.0

THE NEW TENSAR PROGRAM CALCULATE THE RESILIENT MODULUS (MR) VALUE WITH THE USE OF THE LABORATORY CALIFORNIA BEARING RATIO, (CBR). In this case the **MR value calculates to 4,500 psi.**

WE WILL USE MR=4,500 PSI FOR OUR PAVEMENT DESIGN.

In accordance with the **New Braunfels, Texas** design parameters we have developed the following flexible pavement recommendations for a **"ONE & TWO FAMILY LOCAL RESIDENTIAL" Street** on a Clay subgrade.

COMPONENT	FLEXIBLE DESIGN SECTION (inches)			
	LOCAL RESIDENTIAL STREET			
	Option # 1	Option # 2	Option # 3	
Type D HMAC Surface	3.0 inches	3.0 inches		
Asphalt Treated Base Course	N/A	N/A		
Flexible Base, (Type A or Type B, Grade 2)	12.0 inches	8.0 inches		
TENSAR GEOGRID (TX-7)	NO	YES		
Design ESAL Value	100,000	100,000		
Actual ESAL Value	340,300	929,500		

In accordance with the **New Braunfels, Texas** design parameters we have developed the following flexible pavement recommendations for a **"RESIDENTIAL COLLECTOR" Street** on a Clay subgrade.

COMPONENT	FLEXIBLE DESIGN SECTION (inches)			
	RESIDENTIAL COLLECTOR			
	Option # 1	Option # 2	Option # 3	Option # 4
Type D HMAC Surface	3.0 inches	3.0 inches		
Asphalt Treated Base Course	N/A	NO		
Flexible Base, (Type A or Type B, Grade 2)	18.0 inches	15.25 inches		
TENSAR GEOGRID (TX-7)	NO	YES		
Design ESAL Value	2,000,000	2,000,000		
Actual ESAL Value	2,035,800	2,038,800		

Pavement Analysis:

The pavement designs presented in the previous paragraphs DOES NOT include designs for lime stabilized subgrade and lime treated subgrade, to be used on pavement sections with a Clay subgrade and a P.I. value greater than 20. The City of **New Braunfels pavement design criteria** does not require that a minimum of six (6) inches of subgrade soil below the pavement structure be treated or stabilized if the subgrade has a P.I. value greater than 20, However we recommend that the subgrade soils be LIME TREATMENTED. In the case that subgrade fill is required to bring the subgrade elevation up to final grade, fills should be made with flexible base, on-site Chalk millings or other material approved by the Project Engineer. Fill material compaction shall be in accordance with subgrade compaction requirement for **New Braunfels, Texas.**

Pavement Material Specifications:

The following guidelines have been prepared for use in the selection and preparation of various materials that may be used to construct the pavement sections. Submittals should be made for each pavement material and should be reviewed by the Geotechnical Engineer and other appropriate members of the design team. The submittals should provide the test information necessary to verify full compliance of the materials with the recommended or specified material properties.

Fill Material - If fill is used to raise the grade, approved fill material underneath the pavement should be used. The fill should be free of deleterious material with a **minimum CBR value of 3.0** and preferably a **Plastic Index below 19**. If the material has a PI greater than 20 the lime application rates should be re-evaluated and sulfate content tested for the fill material. The material should be placed as per applicable city or county guidelines.

Hot-Mix Asphaltic Surface Course – Asphaltic concrete should be plant mixed, hot laid, **Type D** meeting the 2014 TX DOT Standard Specification Item 340. Mix should be compacted to between 92 and 97 percent of the maximum theoretical density as determined by TEX-227-F.

Asphalt Treated Base – Asphalt treated base should be placed in **maximum six (6) inch compacted lifts**. These materials should conform to the requirements of the 2014 TX DOT Standard Specification Item 292, Grade 1 or Item 340, Type A or B.

Flexible Base Course – Flexible base materials should be placed in maximum eight (8) inch **compacted lifts.** The base materials should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D 1557. Flexible base materials should be moisture conditioned to between plus or minus two (+-2) percentage points of the optimum moisture content. Flexible base materials should meet all requirements specified in 2014 TX DOT Standard Specification Item 247, Type A or B, Grade 1 or 2.

Lime Treated Subgrade – Clay subgrade (with P.I. values greater than 20) should be treated with hydrated lime to reduce its plasticity and improve its strength and load carrying ability. Hydrated lime should be mixed with the subgrade soils in accordance with Bexar County Specifications for Lime Treatment to reduce the P.I. value to 20 or less.

Lime Stabilized Subgrade – Clay subgrade (with P.I. values greater than 20) should be stabilized with hydrated lime to reduce its plasticity and improve its strength and load carrying ability. Hydrated lime should be mixed with the subgrade soils. The optimum lime content should result in a soil-lime mixture with a pH of at least 12.4 when tested in accordance with ASTM C 977, Appendix XI and should reduce the P.I. to 20 or less.

3 X 5 Rock Wrapped in Filter Fabric – The City may allow 3 X 5 rock wrapped in Filter Fabric instead of lime stabilization, however the **wrapping fabric must be Mirafi 180N Filter Fabric or equal, and prior approval must be obtained.**

Geogrid – **Tensar TX7** geogrid may be used to provide additional structural support to flexible base materials. The geogrid should be placed as per manufacturer's recommendations at the interface between the flexible base and subgrade.

Moisture Conditioned Subgrade – Exposed subgrade soils that do not need to be stabilized or treated should be scarified and moisture conditioned to between plus or minus three (+-3) percentage points of optimum to a depth of at least six (6) inches. The soils should then be compacted to at least 95 percent of the maximum dry density as determined by ASTM D 698.

Lime Series Curve and Unconfined Compressive Strength:

A Lime Series Curve was developed for the project to determine the optimum amount of hydrated lime required to stabilize the subgrade. The optimum lime content should result in a soil-lime mixture with a pH of at least 12.4 when tested in accordance with ASTM C 977 and should reduce the Plasticity Index to 20 or less. The lime series curve depicts the percent lime added to the subgrade and the resulting pH/P.I. A strength verification test was performed on the lime stabilized subgrade to determine the Unconfined Compressive Strength (UCS) of the soil-lime mixture. **Results of the** Lime Series Curve and the Unconfined Compressive Strength test are presented in the Appendix section of this report. **A 4 % of lime is required to reduce the plasticity value**, this translates into **approximately 17.5 lbs. of lime per square yard** PER SIX (6) INCHES of subgrade. Additional field verification testing will be required during the subgrade stabilization process once the project has started.

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Subgrade Preparation:

The pavement alignment should be stripped of topsoil, vegetation, roots, loose or soft soils and any other deleterious materials. The stripped materials should be removed from the site and properly disposed of or used elsewhere on site. Upon completion of stripping operations, the alignment may be either excavated or filled as necessary to achieve the desired pavement elevation. Prior to the placement of any fill for grade adjustments or the construction of the pavement section, the exposed subgrade should be proof rolled with appropriate construction equipment weighing at least 20 tons. Unstable or non-uniform areas should be removed to expose stable soils and may be replaced with clean, properly compacted flexible base material or other more suitable material approved by the Project Engineer. All fill placed within the paved areas should be free of any deleterious materials and should not contain stones larger than the maximum lift thickness. The fill materials should be placed on prepared surfaces in lifts not to exceed eight (8) inches compacted measure. All fill materials placed in paved areas should be moisture conditioned to between plus or minus three (+-3) percentage points of the optimum moisture content and compacted to at least 95 percent of the maximum dry density as determined by ASTM D 698.

Drainage:

Proper pavement perimeter drainage should be provided and maintained to minimize the infiltration of surface water into the pavement section from surrounding unpaved areas. The infiltration of water into the pavement section typically results in the accelerated degradation of the section with time as vehicular traffic traverses the infiltrated area. Curbs used in paved areas should extend at least three (3) inches into the base materials to help reduce the potential for water infiltration into the pavement section. Prefabricated strip drains or small "French" drains may also be installed behind curbs to intercept and remove water from the pavement perimeter before water infiltrates the pavement section. Furthermore, all concrete and asphalt interfaces should be sealed using a sealant that is compatible with both asphalt and concrete.

Proper pavement drainage is a critical component in the long-term performance of a pavement section. The pavement section recommendations shown above are based on generally recognized structural coefficients. These coefficients reflect the relative strength of each pavement material type and their contribution to the structural integrity of the pavement. The infiltration of water into these pavement materials will generally weaken the materials and result in the degradation of the pavement's performance. Therefore, proper drainage of the pavement should be carefully considered by the project design team to ensure that water rapidly drains from the pavement and does not pond on or around the pavement.

Utilities:

Care should be exercised to make sure that utility lines do not serve as conduits that transmit water beneath foundations or pavements at this site. Secondary backfill for utility lines that are located beneath pavement, sidewalk and building areas should consist of lean clay (CL), flowable fill or other material in accordance with local municipality or utility provider specifications. Proper compaction of trench backfill is essential in pavement areas where settlement of the trench backfill can cause significant distress to the overlaying pavement. Flowable fill materials should be as described in the American Concrete Institute ACI 229R. Granular materials such as sand or gravel are not recommended as secondary backfill in utility trenches located in building pad or pavement areas.

Excavations:

As was discussed previously, these materials that are penetrated by geotechnical augers can generally be excavated with conventional earthmoving equipment. It should be noted that excavation equipment varies and field conditions may vary. Generally, geologic processes (such as faulting, weathering, etc.) are erratic and large variations can occur in small lateral distances. Details regarding "means and methods" to accomplish the work (such as excavation equipment and technique selection) are the sole responsibility of the project contractor.

The Occupational Safety and Health Administration (OSHA) Safety and Health Standards (29 CFR Part 1926, Revised October 1989), require that excavations be constructed in accordance with the current OSHA guidelines. Furthermore, the State of Texas requires that detailed plans and specifications meeting OSHA standards be prepared for trench and excavation retention systems used during construction. The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the

sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavation as part of the contractor's safety procedures.

In no case should slope height, slope inclination or excavation depth exceed those specified in local, state and Federal safety regulations. OSHA addresses the construction of slopes in large excavations that are less than 20 feet deep on OSHA Table B-1. We have provided this information solely as a service to our client. The OSHA regulations and OSHA Table B-1 should be consulted prior to any excavations that would be subject to OSHA regulations. FGS does not assume responsibility for construction site safety or the contractor's or other parties' compliance with local, state and Federal safety or other regulations.

QUALITY CONTROL

Document Review:

Due to the uniqueness of each project and construction site, it is important that all engineering reports, drawings, specifications, change orders and other related documents accurately reflect the recommendations intended by the respective design professionals involved in the project. The performance of the pavements planned for this project will depend on the correct interpretation and implementation of our geotechnical engineering report and guidelines. We should be provided the opportunity to review the final design and construction documents to check that our geotechnical recommendations are properly interpreted and implemented in these documents. This review is not a part of our scope of services for this project and would be an additional service. We cannot be responsible for misinterpretation of our geotechnical recommendations if we have not had an opportunity to review these documents.

Construction Materials Testing:

As the Geotechnical Engineer of Record, we recommend that Frost GeoSciences be retained to monitor the pavement installation and earthwork related activities for this project. Due to our familiarity with this project, it is important that FGS provide these services to make certain that our geotechnical recommendations are interpreted properly and to make certain that actual field conditions are those described in our geotechnical report. We believe this technical overview and on-site surveillance during these activities is essential to provide well-constructed pavements and to check that the intent of these geotechnical recommendations is met.

REPORT LIMITATIONS

The recommendations and guidelines submitted in this report are based on the available subsurface information developed by FGS and project information provided by the client. If there are any changes in the nature, design or location of the project, the opinions, conclusions, recommendations and guidelines submitted in this report should not be used until we are able to review the changes and respond in writing as to whether the information contained within this report remains applicable.

Subsurface conditions at this site have been observed and interpreted at the Boring Locations only. Substantial variations in subsurface materials resulting from local geologic conditions or previous site use may occur away from the boring locations. These variations may not become evident until construction begins. Therefore, any conditions that vary significantly from those described in our report should be reported to FGS immediately. FGS will then determine whether our conclusions, opinions and recommendations remain valid or whether additional investigation and/or engineering analysis is required.

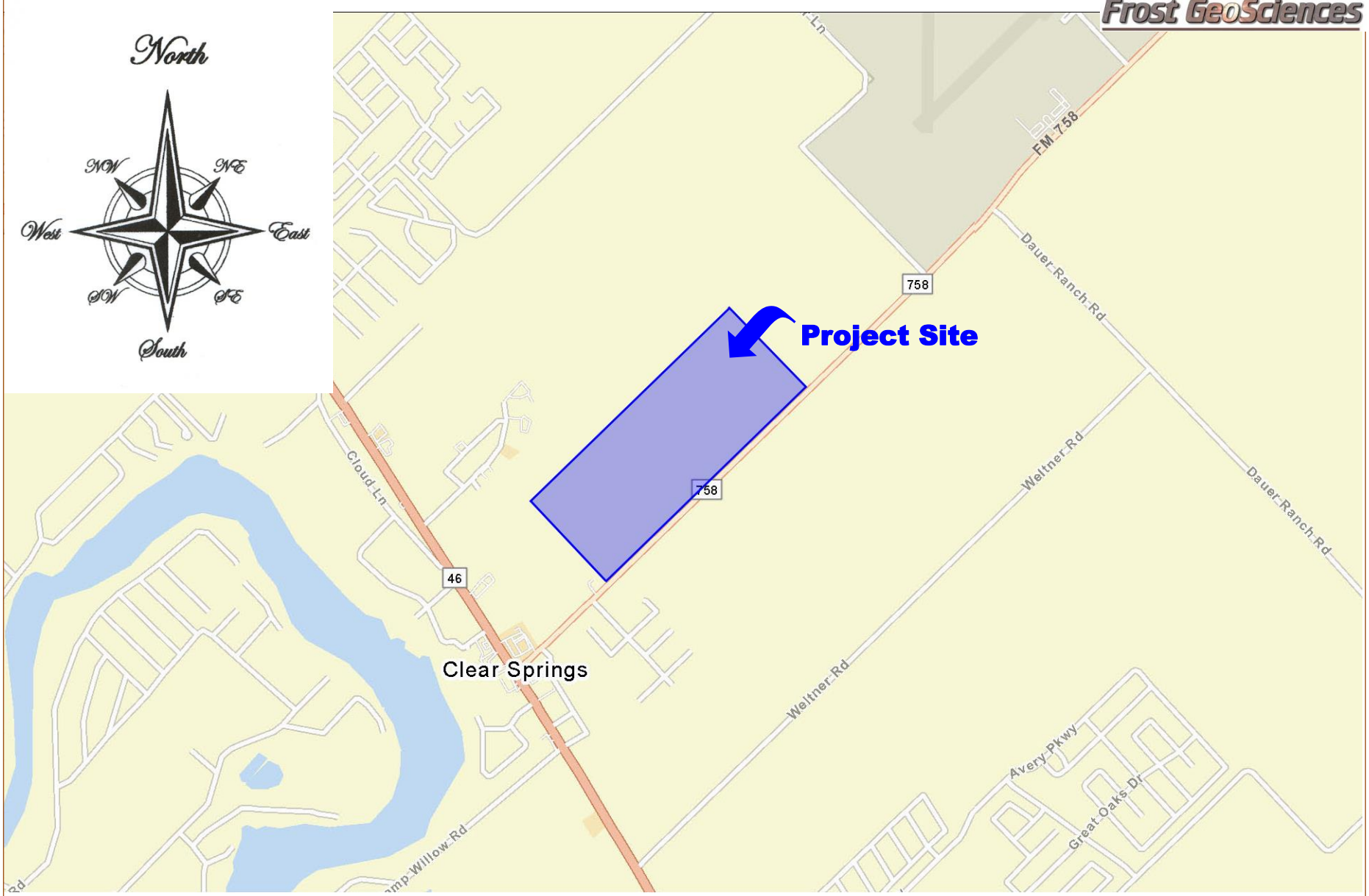
This study has been performed in accordance with accepted geotechnical engineering practice using the standard of care and skill currently exercised by geotechnical engineers practicing in this area. No warranty, expressed or implied, is made or intended. This report has been prepared exclusively for the specified client; project and client's authorized project team for use in preparing the appropriate design and construction documents for this project. This report may be included in the construction documents for this project provided the report is reproduced in its entirety. This report shall not be reproduced or used for any other purpose without the express written consent of Frost GeoSciences, Inc.

ILLUSTRATIONS

Vicinity Map
Boring Location Plan

VICINITY MAP

Frost GeoSciences



PROJECT NAME:
Clear Spring Meadows
New Braunfels, Texas

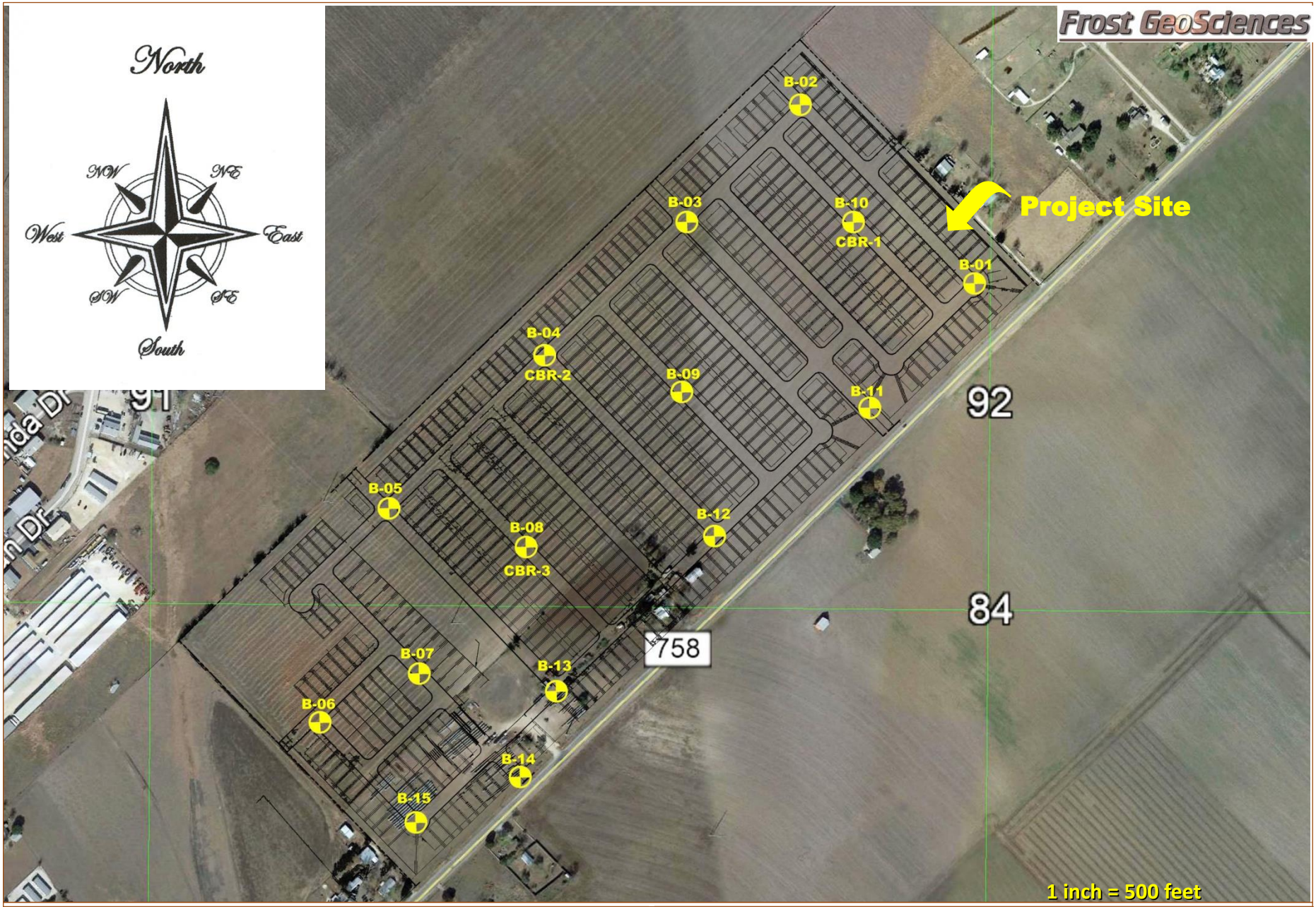
Vicinity Map

PROJECT NO.: FGS-G-21116

DATE: September 21, 2021

BORING PLAN

FGS Project No: FGS-G21116



PROJECT NAME:

Clear Spring Meadows
New Braunfels, Texas

Boring Plan

PROJECT NO.: FGS-G-21116

DATE: September 21, 2021

APPENDIX "A"

Boring Logs
PVR Values
Symbol Key Sheet

BORING LOGS

FGS Project No.: FGS-G21116

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-01
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES (N: BLOWS/FT, P: TONS/SQ FT, T: BLOWS, R: %, RQD: %)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
		N = 6	27	66	21	45						Dark Brown Clay
		N = 29										
	5	N = 21	13	38	9	29						Tan Chalky Clay at 4'
		N = 50/10										Tan Clay with Calcareous
	10	N = 50/10	7	21	10	11						Tan Marley Weathered Clay at 11'
	15											

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

DRILLING METHOD(S):

Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:

Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

REMARKS:

GPS 0591995 3284398

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-02
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES (N: BLOWS/FT, P: TONS/SQ FT, T: BLOWS, R: %, RQD: %)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
		N = 8										Dark Brown Clay
		N = 15	24	65	21	44						
	5	N = 23		40	10	30						Tan Chalky Clay at 4.5'
		N = 50/10	9									
	10											
		N = 52										
	15											

DRILLING METHOD(S):
Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:
Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS 0591791 3284602

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-03
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 8	22	63	20	43						Dark Brown Clay
			N = 18										
	5		N = 42	14	39	9	30						Tan Chalky Clay at 4.5'
			N = 80										
	10												Tan Chalky Clay to Marley Clay at 12'
			N = 50/10	12	62	20	42						Tan Marley Clay
	15												

DRILLING METHOD(S):
Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:
Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS 0591631 3284463

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-04
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

FIELD DATA | LABORATORY DATA

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 7										Dark Brown Clay
			N = 27	28	65	20	45						
	5		N = 25										Tan Clay with Calcareous at 4.5'
			N = 50/10	10	25	12	13						Tan Weathered Marley Clay at 9'
	10												
			N = 50/10										
	15												

DRILLING METHOD(S):
Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:
Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS 0591492 3284302

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-05
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES (N: BLOWS/FT, P: TONS/SQ FT, T: BLOWS, R: %, RQD: %)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
		N = 7	32									Brown Clay
		N = 12		66	22	44						
	5	N = 34	15	67	23	44						Tan Marley Clay at 4.5'
	10	N = 50/10										Tan Weathered Marley Clay with Limestone at 7.5'
		N = 50/10	5	24	11	13						
	15											

DRILLING METHOD(S):

Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:

Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:

GPS 0591286 3284093

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-06
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES (N: BLOWS/FT, P: TONS/SQ FT, T: BLOWS, R: %, RQD: %)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
		N = 14										Brown Clay
		N = 12	17	64	20	44						
	5	N = 30										Gravel layer at 7.5'
		N = 42	28	41	11	30						Tan Clay with Cal at 8'
	10											Tan Marley Clay at 12'
		N = 50/10										
	15											

DRILLING METHOD(S):

Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:

Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:

GPS 0591202 3283850

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-07
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LL	PL	PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 17	24	64	20	44						Brown Clay
			N = 17										
	5		N = 43	5	19	11	8						Gravel Layer at 7.5'
	10		N = 42										Tan Clay with Calcareous at 10'
													Tan Marley Clay at 12'
			N = 50/10	19	62	20	42						
	15												

DRILLING METHOD(S):

Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:

Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:

GPS 0591310 3283910

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-08
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

PAGE 1 of 1

SOIL SYMBOL	DEPTH (FT)	SAMPLES (N: BLOWS/FT, P: TONS/SQ FT, T: BLOWS, R: %, RQD: %)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
		N = 11										Brown Clay
		N = 24	26	64	20	44						
	5	N = 45		44	10	34						Tan Sandy Clay at 7.5'
		N = 50/10	9									Tan Clay with Calcareous at 9'
	10	N = 50/10										Tan Weathered Clay with Limestone at 14'
	15											

DRILLING METHOD(S):

Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:

Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:

GPS 0591450 3284090

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

This log is not valid if separated from the report.

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-09
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 12	27	61	21	40						Brown Clay
			N = 28										
	5		N = 45	16	46	34	12						Tan Sandy Clay at 6'
	10		N = 50/10										Tan Marley Clay at 9'
			N = 50/10	8	22	11	11						Tan Weathered Clay with Limestone at 13'
	15												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

DRILLING METHOD(S):

Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:

Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

REMARKS:

GPS 0591625 3284250

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic • Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-10
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES (N: BLOWS/FT, P: TONS/SQ FT, T: BLOWS, R: %, RQD: %)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
		N = 7										Dark Brown Clay
		N = 13	29	60	18	42						
	5	N = 18										Tan Chalky Clay at 4'
		N = 61	12	42	11	31						Tan Clay with Calcareous
	10	N = 62										Tan Weathered Marley Clay at 13'
	15											

DRILLING METHOD(S):

Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:

Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:

GPS 0591825 3284450

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic • Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-11
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES (N: BLOWS/FT, P: TONS/SQ FT, T: BLOWS, R: %, RQD: %)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
		N = 10	25	61	20	41						Dark Brown Clay
		N = 11										
	5	N = 27	16	36	20	16						Tan Chalky Clay at 4'
		N = 53										
	10	N = 46	22	43	12	31						Tan Clay with Calcareous
	15											

DRILLING METHOD(S):
Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:
Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS 059185 3284225

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-12
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

FIELD DATA | LABORATORY DATA

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT (LL)	ATTERBERG LIMITS: PLASTIC LIMIT (PL)	ATTERBERG LIMITS: PLASTICITY INDEX (PI)	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 3										Dark Brown Clay
			N = 4	15	62	20	42						
	5		N = 33										Tan Clay with Calcareous at 4.5'
			N = 50/10	11	23	11	12						Tan Marley Weathered Clay with Limestone at 8.5'
	10												
			N = 50/10										
	15												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

DRILLING METHOD(S):

Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:

Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

REMARKS:

GPS 0591695 3284095

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-13
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 4	25	64	22	42						Dark Brown Clay
			N = 5										
	5		N = 30	14	44	12	32						Tan Clay with Calcareous at 5'
			N = 50/10										Tan Marley Weathered Clay with Limestone at 9'
	10		N = 50/10	11									
	15												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

DRILLING METHOD(S):

Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:

Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

REMARKS:

GPS 0591495 3283900

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-14
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 4										Dark Brown Clay
			N = 8	20	64	23	41						
	5		N = 27										Tan Clay with Calcareous at 4.5'
			N = 50	11	40	11	29						Tan Marely Clay with Weathered Limestone at 9'
	10		N = 50/10										
	15												

DRILLING METHOD(S):

Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:

Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:

GPS 0591450 3283795

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

LOG OF BORING

Frost GeoSciences
Geologic ▪ Environmental
Geotechnical

PROJECT: Clear Spring Meadows
FM 758
New Braunfels, TX

CLIENT: Plute Group

PROJECT NO.: FGS-G21116
BORING NO.: B-15
DRILLING DATE: 8/23/2021
SURFACE ELEVATION:

FIELD DATA | LABORATORY DATA

SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS R: % RQD: %	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CU.FT	COMPRESSIVE STRENGTH (TONS/SQ FT)	FAILURE STRAIN (%)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			N = 6	22	63	19	44						Dark Brown Clay
			N = 9										
	5		N = 33	25	44	12	32						Tan Clay with Calcareous at 4.5'
			N = 49										Tan Marley Clay with Weathered Limestone at 8.5'
	10		N = 50/10	11	40	11	29						
	15												

DRILLING METHOD(S):
Dry auger drilling techniques were used to the termination depth of the boring.

SUBSURFACE WATER INFORMATION:
Subsurface water was not encountered either during or upon completion of drilling operations and subsurface water observations.

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - TXDOT CONE PENETRATION RESISTANCE
R - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
GPS 0591410 3283700

FROST LOG FGS-G21116.GPJ FROST.GDT 9/10/21

PVR VALUES

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B - 1

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	45	4.0	X		
II	29	6.0	X		
III	29	10.0		X	
IV	11	12.0		X	
V	11	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.24** inches

Effective Plasticity Index

BRAB	PCI
45	33

Soil Support Index

BRAB	PCI
0.67	0.80

Soil/Climatic Rating Factor

$1 - C_w$ = **0.20**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B - 2

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	44	4.0	X		
II	30	6.0	X		
III	30	10.0		X	
IV	30	12.0		X	
V	30	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.32** inches

Effective Plasticity Index

BRAB	PCI
44	36

Soil Support Index

BRAB	PCI
0.68	0.78

Soil/Climatic Rating Factor

$1 - C_w$ = **0.22**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B - 3

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	43	4.0	X		
II	30	6.0	X		
III	30	10.0		X	
IV	30	12.0		X	
V	42	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.37** inches

Effective Plasticity Index

BRAB	PCI
43	36

Soil Support Index

BRAB	PCI
0.69	0.77

Soil/Climatic Rating Factor

$1 - C_w$ = **0.23**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B - 4

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	45	4.0	X		
II	30	6.0	X		
III	13	9.0		X	
IV	13	12.0		X	
V	13	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.04** inches

Effective Plasticity Index

BRAB	PCI
45	30

Soil Support Index

BRAB	PCI
0.67	0.85

Soil/Climatic Rating Factor

$1 - C_w$ = **0.15**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B - 5

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	44	4.0	X		
II	44	6.0	X		
III	13	10.0		X	
IV	13	12.0		X	
V	13	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.27** inches

Effective Plasticity Index

BRAB	PCI
44	31

Soil Support Index

BRAB	PCI
0.68	0.82

Soil/Climatic Rating Factor

$1 - C_w$ = **0.18**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B - 6

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	44	4.0	X		
II	8	6.0	X		
III	30	10.0		X	
IV	30	12.0		X	
V	30	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **1.97** inches

Effective Plasticity Index

BRAB	PCI
44	33

Soil Support Index

BRAB	PCI
0.68	0.80

Soil/Climatic Rating Factor

$1 - C_w$ = **0.20**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B -7

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	44	4.0	X		
II	8	7.0	X		
III	30	10.0		X	
IV	42	12.0		X	
V	42	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.13** inches

Effective Plasticity Index

BRAB	PCI
44	34

Soil Support Index

BRAB	PCI
0.68	0.79

Soil/Climatic Rating Factor

$1 - C_w$ = **0.21**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B -8

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	44	4.0	X		
II	34	7.0	X		
III	30	10.0		X	
IV	30	12.0		X	
V	30	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.50** inches

Effective Plasticity Index

BRAB	PCI
44	37

Soil Support Index

BRAB	PCI
0.68	0.77

Soil/Climatic Rating Factor

$1 - C_w$ = **0.23**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B -9

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	40	4.0	X		
II	12	8.0	X		
III	20	10.0		X	
IV	20	12.0		X	
V	11	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **1.47** inches

Effective Plasticity Index

BRAB	PCI
40	26

Soil Support Index

BRAB	PCI
0.72	0.88

Soil/Climatic Rating Factor

$1 - C_w$ = **0.12**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B -10

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	42	4.0	X		
II	30	8.0	X		
III	31	10.0		X	
IV	25	12.0		X	
V	25	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.31** inches

Effective Plasticity Index

BRAB	PCI
42	34

Soil Support Index

BRAB	PCI
0.70	0.79

Soil/Climatic Rating Factor

$1 - C_w$ = **0.21**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B -11

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	41	4.0	X		
II	16	8.0	X		
III	16	10.0		X	
IV	31	12.0		X	
V	31	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **1.73** inches

Effective Plasticity Index

BRAB	PCI
41	29

Soil Support Index

BRAB	PCI
0.71	0.86

Soil/Climatic Rating Factor

$1 - C_w$ = **0.14**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B -12

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	42	4.0	X		
II	30	8.0	X		
III	12	10.0		X	
IV	12	12.0		X	
V	12	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.17** inches

Effective Plasticity Index

BRAB	PCI
42	30

Soil Support Index

BRAB	PCI
0.70	0.83

Soil/Climatic Rating Factor

$1 - C_w$ = **0.17**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B -13

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	42	4.0	X		
II	32	8.0	X		
III	15	10.0		X	
IV	15	12.0		X	
V	15	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.24** inches

Effective Plasticity Index

BRAB	PCI
42	31

Soil Support Index

BRAB	PCI
0.70	0.83

Soil/Climatic Rating Factor

$1 - C_w$ = **0.17**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B -14

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	41	4.0	X		
II	32	9.0	X		
III	29	10.0		X	
IV	29	12.0		X	
V	29	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.44** inches

Effective Plasticity Index

BRAB	PCI
41	35

Soil Support Index

BRAB	PCI
0.71	0.79

Soil/Climatic Rating Factor

$1 - C_w$ = **0.21**

RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

PVR Calculator

Frost GeoSciences, Inc.
13402 Western Oak
Helotes, Texas 78023

Project Name:	CLEAR SPRING MEADOWS
Project Location:	F. M. 758
Project City:	NEW BRAUNFELS, TEXAS
Project Number:	FGS-G-21116
Boring Number:	B -15

Surcharge Pressure: 1.00 **psi** **Climatic Rating, C_w:** 16

Stratum	Plasticity Index	Bottom Depth (feet)	Moisture Condition		
			Dry	Average	Optimum
I	44	4.0	X		
II	32	9.0	X		
III	29	10.0		X	
IV	29	12.0		X	
V	29	15.0			X
VI					
VII					
VIII					

PVR Results

PVR = **2.58** inches

Effective Plasticity Index

BRAB	PCI
44	36

Soil Support Index

BRAB	PCI
0.68	0.77

Soil/Climatic Rating Factor

$1 - C_w$ = **0.23**

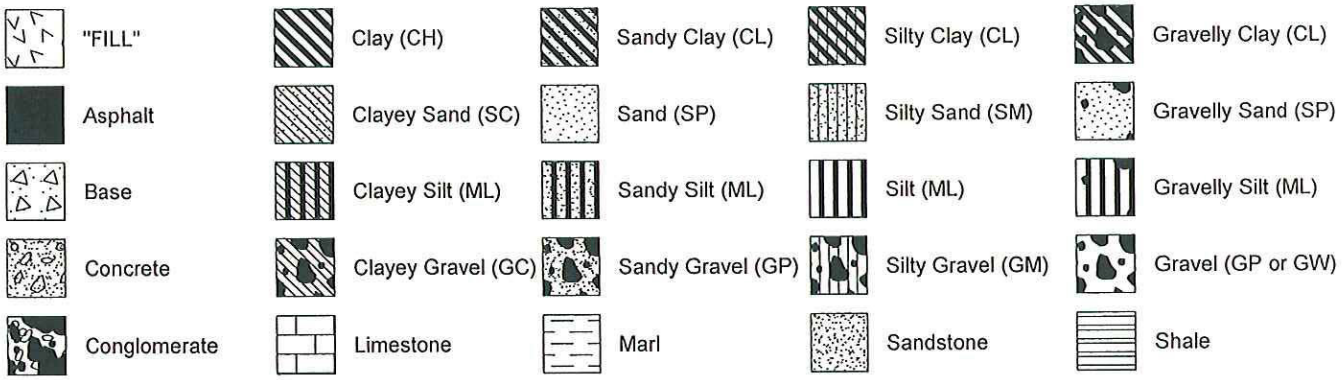
RULES

1.) Depths should not extend greater than 15 feet.
2.) Use only one moisture condition per stratum.
3.) Moisture conditions must be selected using an "x".
4.) Integers or one-half foot intervals must be used.
5.) Use PI = 8 for none expansive layers.
6.) DO NOT USE PI = 0 FOR NON-EXPANSIVE LAYERS.
7.) **Error checking is limited.**

SYMBOL KEY

Symbol Key Sheet

Material Symbols



Strength of Cohesive Soils

Consistency	Undrained Shear Strength, KSF
Very Soft	less than 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very Stiff	2.00 to 4.00
Hard	greater than 4.00

Soil Plasticity

Degree of Plasticity	Plasticity Index (PI)
None	0 to 5
Low	5 to 10
Moderate	10 to 20
Plastic	20 to 40
Highly Plastic	more than 40

Density of Granular Soils

Descriptive Term	SPT Blow Count (blows/ft)
Very Loose	less than 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	more than 50

Standard Penetration Test (ASTM D 1586) Driving Record

Note: Driving is limited to 50 blows per interval, or 25 blows for 0.25 inch advancement, whichever controls. This is done to avoid damaging sampling tools.

Blows Per Foot	Description
25	Sampler was seated 6 inches, then 25 blows were required to advance the sampler 12 inches.
75/8"	Sampler was seated 6 inches, 25 blows were required for the second 6 inch increment and the 50 blow limit was reached at 2 inches of the last increment.
Ref/2"	Sampler could only be driven 2 inches of the 6 inch seating penetration before the 50 blow limit was reached.

Terms Characterizing Structure

Soil Terms	Description
Blocky	Contains cracks or failure planes resulting in rough cubes of material.
Calcareous	Contains appreciable quantities of calcium carbonate.
Fissured	Contains shrinkage cracks, which are frequently filled with fine sand or silt. The fissures are usually near vertical in orientation.
Interbedded	Composed of alternating layers of different soil types.
Laminated	Composed of thin layers of varying color and texture.
Nodules	Secondary inclusions that appear as small lumps about 0.1 to 0.3 inch in diameter.
Partings	Inclusion of different material less than 1/8 inch thick extending through the sample.
Pockets	Inclusion of different material that is smaller than the diameter of the sample.
Seams	Inclusion of different material between 1/8 and 3 inches thick, and extends through the sample.
Slickensided	Has inclined planes of weakness that are slick and glossy in appearance. Slickensides are commonly thought to be randomly oriented.
Streaks or Stains	Stains of limited extent that appear as short stripes, spots or blotches.

Rock Terms	
Bedding Plane	A surface parallel to the surface of deposition, generally marked by changes in color or grain size.
Fracture	A natural break in rock along which no displacement has occurred.
Joint	A natural break along which no displacement has occurred, and which generally intersects primary surfaces.
% Recovery	The ratio of total length of recovery to the total length of core run, expressed as a percentage.
RQD - Rock Quality Designation	The ratio of total recovered length of fragments longer than 4 inches to the total run length, expressed as a percentage.
Weathering	The process by which rock is broken down and decomposed.

Sampler Symbols

APPENDIX "B"

Moisture Density Relationship
CBR Test Results
Lime / Plastic Index Curve
Lime / Unconfined Curve
Moisture Density Relationship
Tensar Design Analysis

MOISTURE DENSITY

13406 Western Oak
Helotes, TX 78023
(210) 372-1315 phone (210) 372-1318 fax

Frost GeoSciences
Construction Materials ▪ Forensics
Environmental ▪ Geotechnical

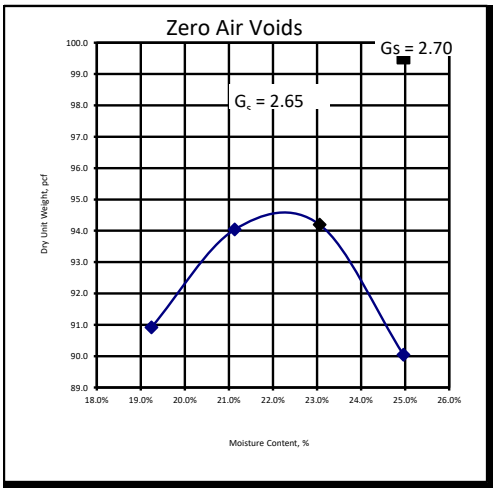
Project #: **FGS-G21116**

Project: **CLEAR SPRING MEADOWS**

Report Date: 9/22/2021
Sample Date: 8/23/2021

Client:	Plute Group		
Report:	ASTM - Standard Proctor	LAB NO:	4102
Material:	Subgrade	Report #:	S1

Moisture-Density Relationship - Subgrade Soil



Test Results

% Moisture	Dry Density Lbs./ft^3
19.2%	90.9
21.1%	94.0
23.1%	94.2
25.0%	90.0

Optimum = 22.2

Maximum = 94.6

Sieve	% Passing
3 inch	100.0%
3/4 inch	100.0%
3/8 inch	100.0%
No. 4	100.0%
No.10	48.2%
No. 40	14.7%
No.100	2.8%
No.200	1.3%

Color: Dark Brown
Description: Clay

Liquid Limit: 66
Plastic Limit: 21
Plasticity Index: 45

Location: Project Site

Desc of Rammer: Mechanical
Preparation Method: Dry
Remarks: No comments at this time.

Test Method (As Applicable): ASTM D-698 A
ASTM D-4318

Respectfully Submitted,
Frost GeoSciences, Inc.

F.J.Caballero, P. E. , Project Manager

13406 Western Oak
Helotes, TX 78023
(210) 372-1315 phone (210) 372-1318 fax

Frost GeoSciences
Construction Materials ▪ Forensics
Environmental ▪ Geotechnical

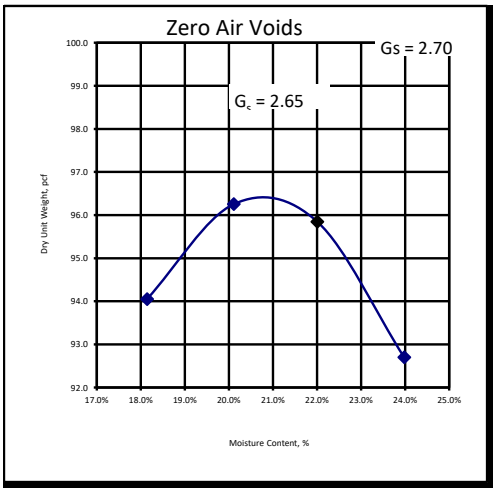
Project #: **FGS-G21116**

Project: **CLEAR SPRING MEADOWS**

Report Date: 9/22/2021
Sample Date: 8/23/2021

Client:	Pulte Group		
Report:	ASTM - Standard Proctor	LAB NO:	4102
Material:	Subgrade	Report #:	S2

Moisture-Density Relationship - Subgrade Soil



Test Results

% Moisture	Dry Density Lbs./ft^3
18.1%	94.1
20.1%	96.3
22.0%	95.8
24.0%	92.7

Optimum = 20.9

Maximum = 96.8

Sieve	% Passing
3 inch	100.0%
3/4 inch	100.0%
3/8 inch	100.0%
No. 4	100.0%
No.10	52.5%
No. 40	17.2%
No.100	2.8%
No.200	1.3%

Color:	Dark Brown
Description:	Clay
Liquid Limit:	61
Plastic Limit:	21
Plasticity Index:	40

Location: Project Site

Desc of Rammer: Mechanical
Preparation Method: Dry
Remarks: No comments at this time.

Test Method (As Applicable): ASTM D-698 A
ASTM D-4318

Respectfully Submitted,
Frost GeoSciences, Inc.

F.J.Caballero, P. E. , Project Manager

13406 Western Oak
Helotes, TX 78023
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Frost GeoSciences
Construction Materials ▪ Forensics
Environmental ▪ Geotechnical

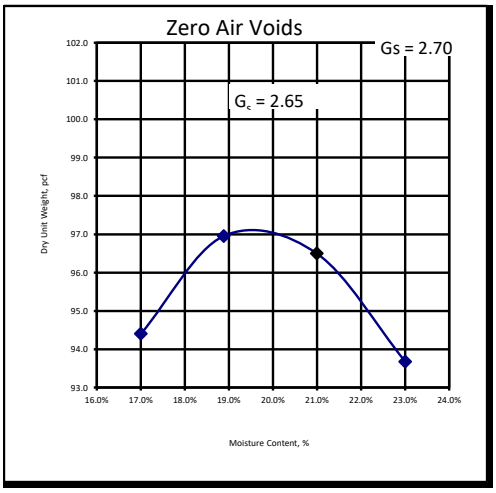
Project #: **FGS-G21116**

Project: **CLEAR SPRING MEADOWS**

Report Date: 7/13/2021
Sample Date: 7/7/2021

Client:	Pulte Group		
Report:	ASTM - Standard Proctor	LAB NO:	4102
Material:	Subgrade	Report #:	S3

Moisture-Density Relationship - Subgrade Soil



Test Results

% Moisture	Dry Density Lbs./ft^3
17.0%	94.4
18.9%	97.0
21.0%	96.5
23.0%	93.7

Optimum = 19.5

Maximum = 97.2

Sieve	% Passing
3 inch	100.0%
3/4 inch	100.0%
3/8 inch	100.0%
No. 4	100.0%
No.10	49.7%
No. 40	14.7%
No.100	2.4%
No.200	1.3%

Color:	Dark Brown
Description:	Clay
Liquid Limit:	61
Plastic Limit:	21
Plasticity Index:	40

Location: Project Site

Desc of Rammer: Mechanical
Preparation Method: Dry
Remarks: No comments at this time.

Test Method (As Applicable): ASTM D-698 A
ASTM D-4318

Respectfully Submitted,
Frost GeoSciences, Inc.

F.J.Caballero, P. E. , Project Manager

CBR RESULTS

Frost GeoSciences, Inc.
13406 Western Oak
Helotes, Texas 78023

CBR (California Bearing Ratio)
ASTM D1883

Project Name: CLEAR SPRING MEADOWS Project #: FGS-G21116
Soil Desc. Dark Brown Clay CBR #1
Tested By: Miguel Gonzalez Jr. Test Date: 09/07/21

Compaction Energy: Rammer: 5.5 lbs. # layers: 3 Blows: 56
w at compaction: 22.20% Mold Dia. 6 in. Soil Ht. 4.584 in.
Volume 0.075 ft.^{3} Opt. M.C. 22.2
Opt. Dry Unit wt. 94.6

	Initial	Final	%S
Date/Time	9/7/2021 3:20pm	9/10/2021 3:20pm	
Swell Data	0.000	0.055	1.20

Mold #	1
Surcharge, lbs.	10
Initial mass of wet soil + mold, lbs.	26.378
Final mass of wet soil + mold, lbs.	26.638
Mass of Mold, lbs.	18.058
Initial mass of wet soil, lbs.	8.32

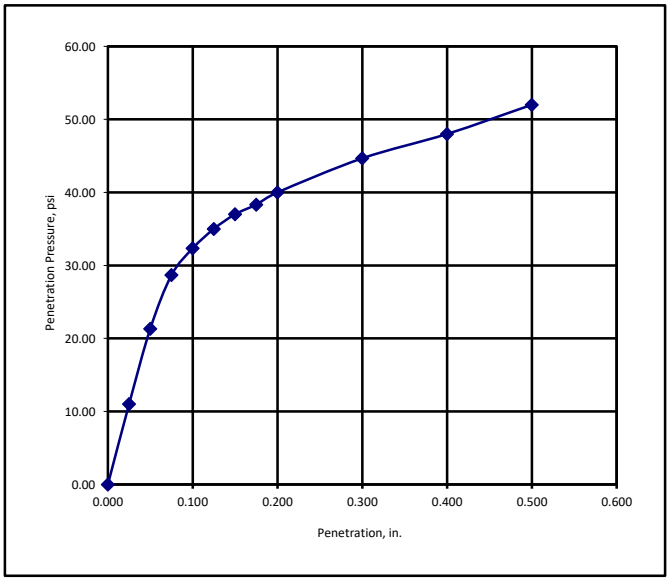
Dry density = 94.5 Comp. 0.99894
Moisture = 22.6 Points Opt. 0.39061

ASTM D2216 Moisture Content

Compaction	Project #	Can No.	Wet Wt. (1)	Dry Wt. (2)	Tare Wt. (3)	(1) - (2) = A	(2) - (3) = B	%MC = A/B*100
Before	GS-G21116		565.6	508.58	127.58	57.02	381	14.96588
After	GS-G21116		676.12	548.85	127.64	127.27	421.21	30.21533

ASTM D1883 Date: 9/7/2021
Time: 3:45pm

Strain, in.	Load, lbs	Stress, psi	CBR
0.000	0.00	0.00	
0.025	33.00	11.00	
0.050	64.00	21.33	
0.075	86.00	28.67	
0.100	97.00	32.33	3.2
0.125	105.00	35.00	
0.150	111.00	37.00	
0.175	115.00	38.33	
0.200	120.00	40.00	2.7
0.300	134.00	44.67	
0.400	144.00	48.00	
0.500	156.00	52.00	



Frost GeoSciences, Inc.
13406 Western Oak
Helotes, Texas 78023

CBR (California Bearing Ratio)
ASTM D1883

Project Name: CLEAR SPRING MEADOWS Project #: FGS-G21116
Soil Desc. Dark Brown Clay CBR #2
Tested By: Miguel Gonzalez Jr Test Date: 09/07/21

Compaction Energy: Rammer: 5.5 lbs. # layers: 3 Blows: 56
w at compaction: 22.20% Mold Dia. 6 in. Soil Ht. 4.584 in.
Volume 0.075 $ft.^3$

	Initial	Final	%S
Date/Time	97/2021 2.55pm	9/10/2021 2:55pm	
Swell Data	0.000	0.045	0.98

Opt. M.C.	22.2
Opt. Dry Unit wt.	94.6
Mold #	1
Surcharge, lbs.	10
Initial mass of wet soil + mold, lbs.	26.576
Final mass of wet soil + mold, lbs.	26.642
Mass of Mold, lbs.	18.156
Initial mass of wet soil, lbs.	8.42

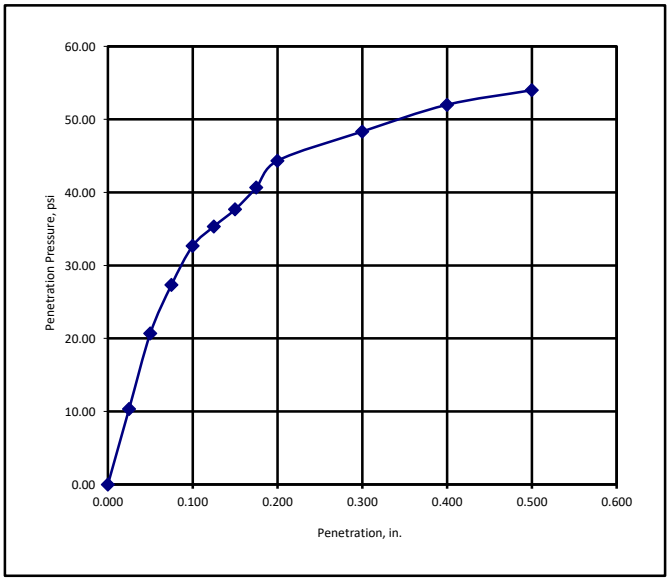
Dry density = 94.5 Comp. 0.99894
Moisture = 22.1 Points Opt. -0.11828

ASTM D2216 Moisture Content

Compaction	Project #	Can No.	Wet Wt. (1)	Dry Wt. (2)	Tare Wt. (3)	(1) - (2) = A	(2) - (3) = B	%MC = A/B*100
Before	GS-G21116		625.22	548.88	126.68	76.34	422.2	18.08148
After	GS-G21116		634.71	539.31	173.54	95.4	365.77	26.08196

ASTM D1883 Date: 9/7/2021
Time: 3:00pm

Strain, in.	Load, lbs	Stress, psi	CBR
0.000	0.00	0.00	
0.025	31.00	10.33	
0.050	62.00	20.67	
0.075	82.00	27.33	
0.100	98.00	32.67	3.3
0.125	106.00	35.33	
0.150	113.00	37.67	
0.175	122.00	40.67	
0.200	133.00	44.33	3.0
0.300	145.00	48.33	
0.400	156.00	52.00	
0.500	162.00	54.00	



Frost GeoSciences, Inc.
13406 Western Oak
Helotes, Texas 78023

CBR (California Bearing Ratio)
ASTM D1883

Project Name: CLEAR SPRING MEADOWS Project #: FGS-G21116
Soil Desc. Dark Brown Clay CBR #3
Tested By: Miguel Gonzalez Jr Test Date: 09/07/21

Compaction Energy: Rammer: 5.5 lbs. # layers: 3 Blows: 56
w at compaction: 19.50% Mold Dia. 6 in. Soil Ht. 4.584 in.
Volume 0.075 ft.^{3}

	Initial	Final	%S
Date/Time	97/2021 3.55pm	9/10/2021 3:55pm	
Swell Data	0.000	0.06	1.31

Opt. M.C.	19.5
Opt. Dry Unit wt.	97.2
Mold #	1
Surcharge, lbs.	10
Initial mass of wet soil + mold, lbs.	26.486
Final mass of wet soil + mold, lbs.	26.676
Mass of Mold, lbs.	18.056
Initial mass of wet soil, lbs.	8.43

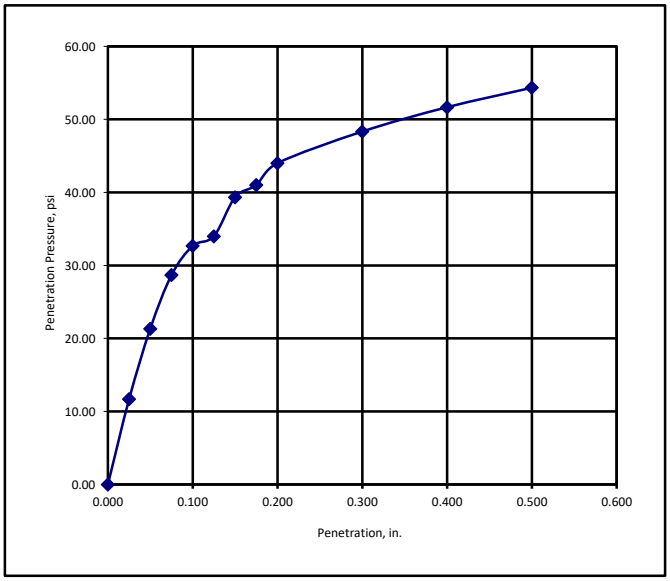
Dry density = 97.1 Comp. 0.99897
Moisture = 19.7 Points Opt. 0.22966

ASTM D2216 Moisture Content

Compaction	Project #	Can No.	Wet Wt. (1)	Dry Wt. (2)	Tare Wt. (3)	(1) - (2) = A	(2) - (3) = B	%MC = A/B*100
Before	GS-G21116		615.22	548.88	128.68	66.34	420.2	15.78772
After	GS-G21116		624.71	539.31	178.54	85.4	360.77	23.67159

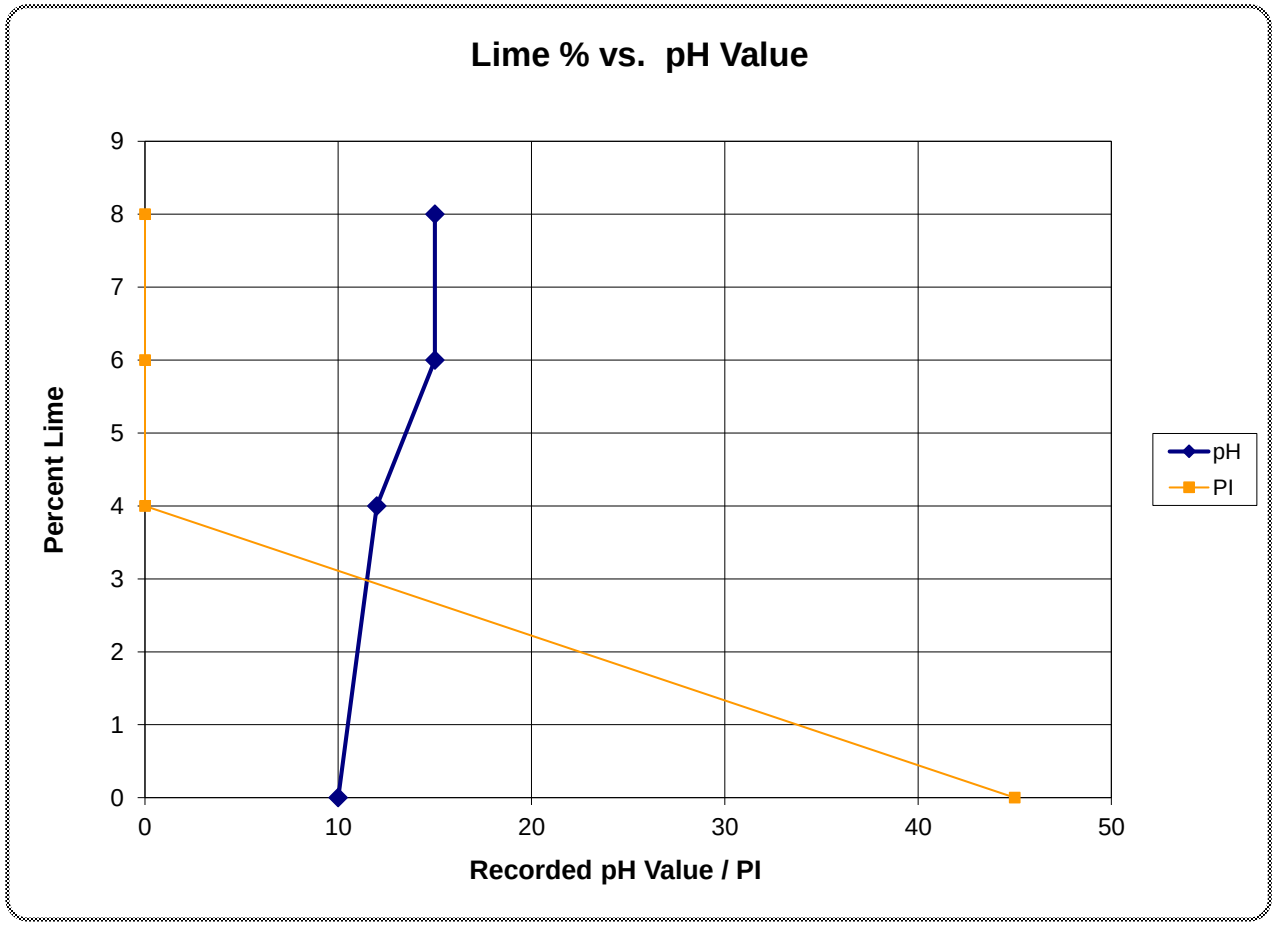
ASTM D1883 Date: 9/7/2021
Time: 3:20pm

Strain, in.	Load, lbs	Stress, psi	CBR
0.000	0.00	0.00	
0.025	35.00	11.67	
0.050	64.00	21.33	
0.075	86.00	28.67	
0.100	98.00	32.67	3.3
0.125	102.00	34.00	
0.150	118.00	39.33	
0.175	123.00	41.00	
0.200	132.00	44.00	2.9
0.300	145.00	48.33	
0.400	155.00	51.67	
0.500	163.00	54.33	



LIME / PLASTIC INDEX CURVE

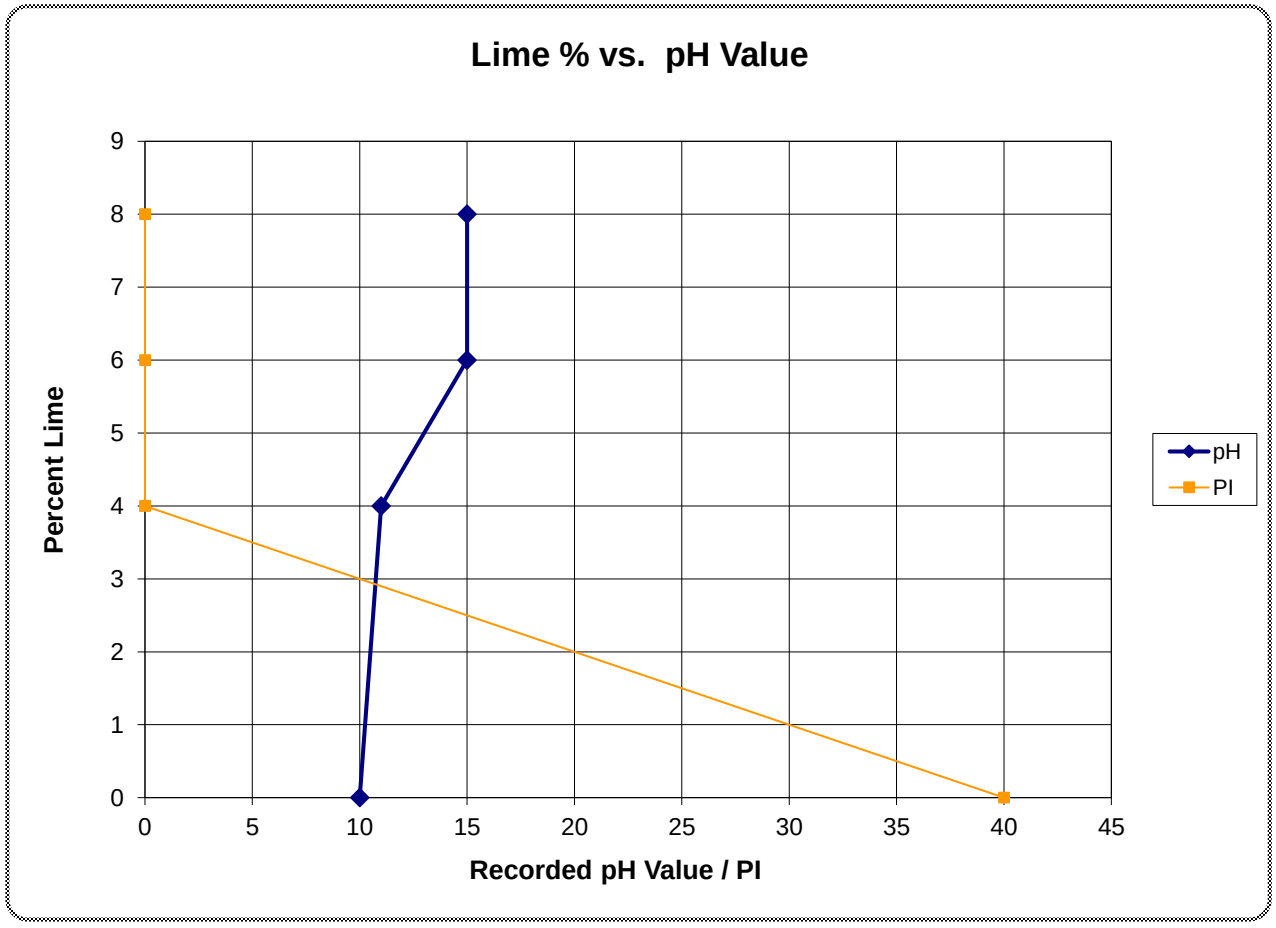
FGS Project No.: FGS-G21116



Project Name: CLEAR SPRING MEADOWS
Project Number: FGS-G21116
Soil Description: Dark Brown Clay S1

%Lime	pH	PI
0	10	45
4	12	0
6	15	0
8	15	0

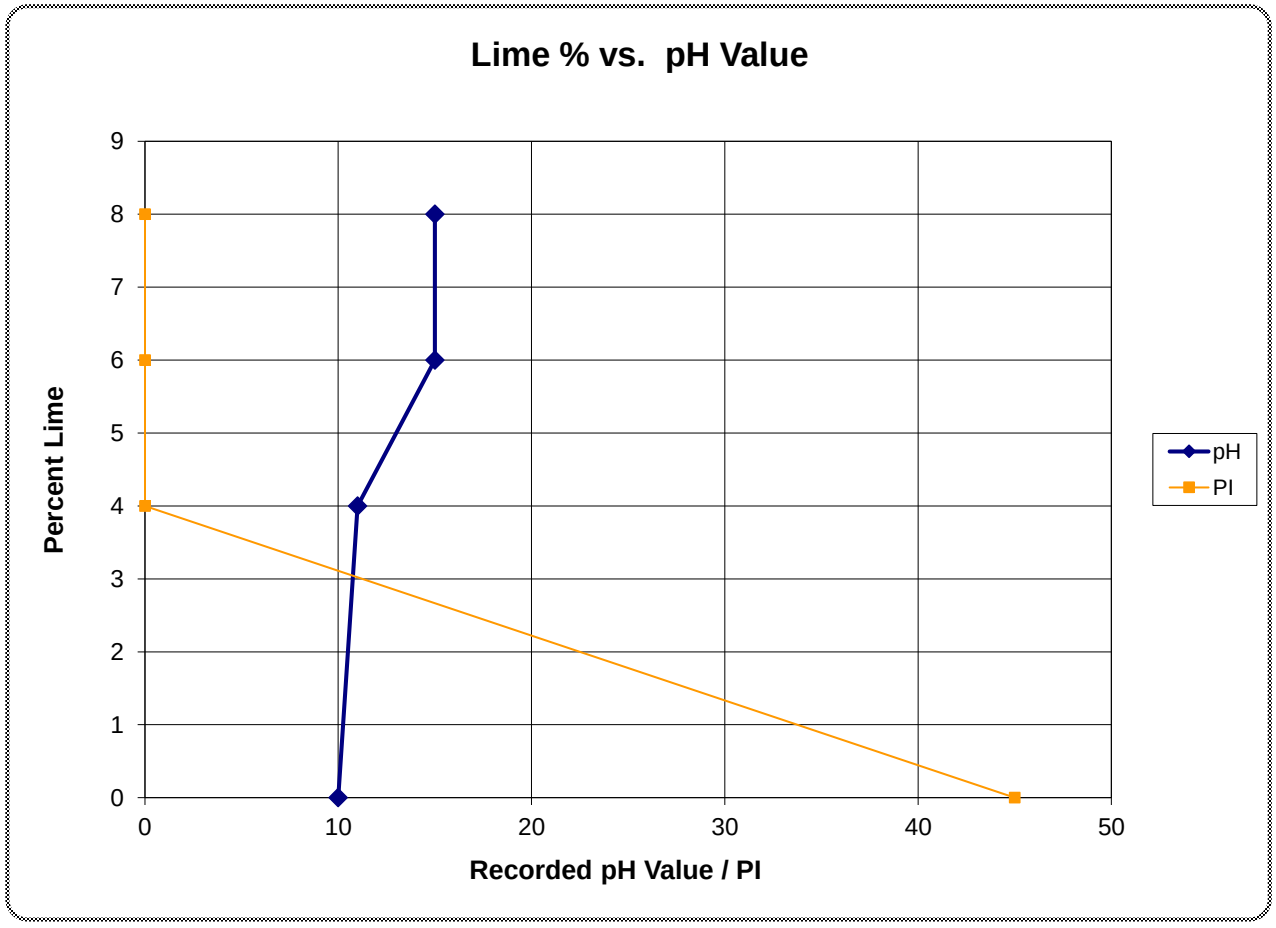
	LIME 6'/,	LIME 8'/.
SET#1	173psi	192psi
SET#2	175psi	192psi



Project Name: CLEAR SPRING MEADOWS
Project Number: FGS-G21116
Soil Description: Dark Brown Clay S2

%Lime	pH	PI
0	10	40
4	11	0
6	15	0
8	15	0

	LIME 6'/,	LIME 8'/.
SET#1	163psi	182psi
SET#2	170psi	183psi



Project Name: CLEAR SPRING MEADOWS
Project Number: FGS-G21116
Soil Description: Dark Brown Clay S3

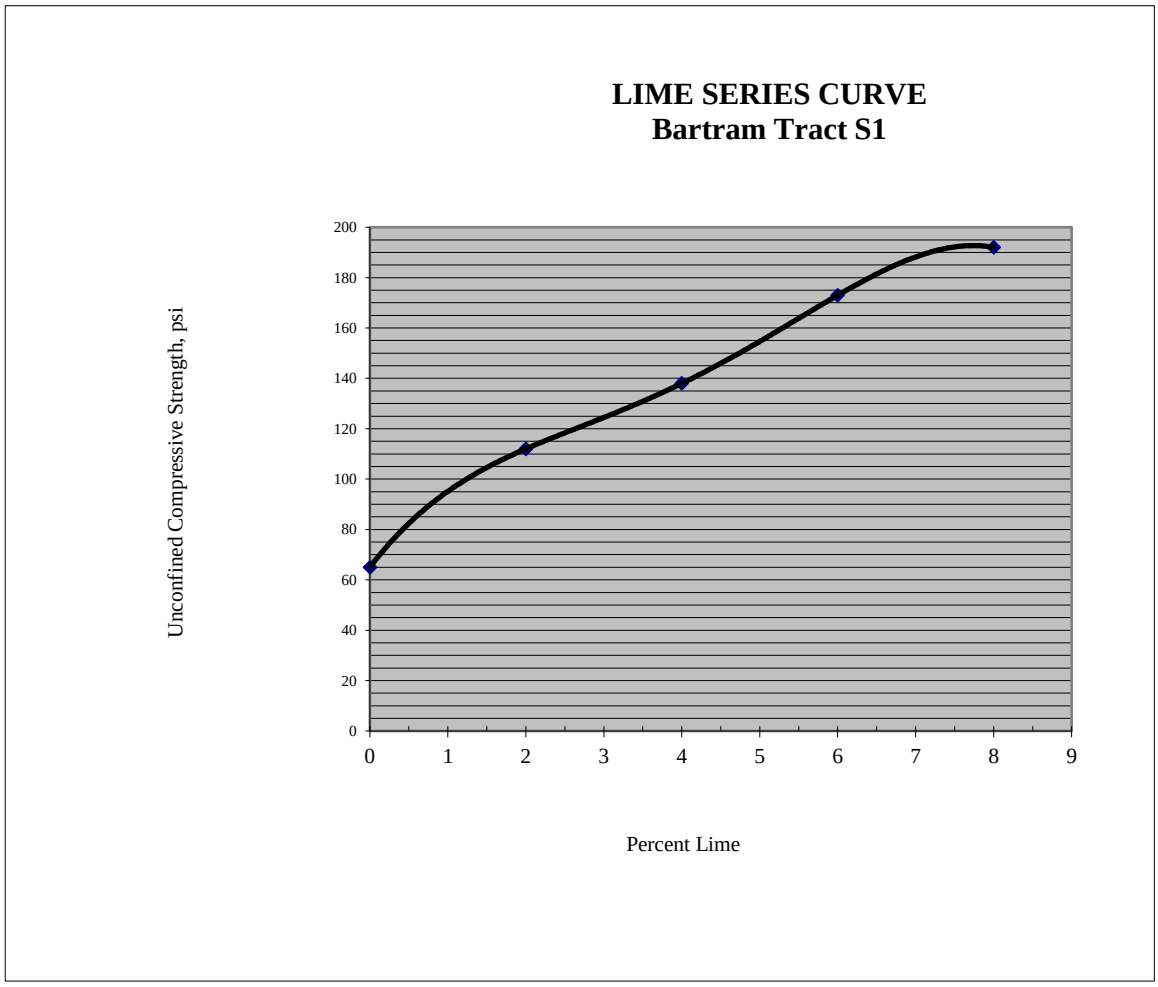
%Lime	pH	PI
0	10	45
4	11	0
6	15	0
8	15	0

	LIME 6'/,	LIME 8'/.
SET#1	173psi	192psi
SET#2	175psi	192psi

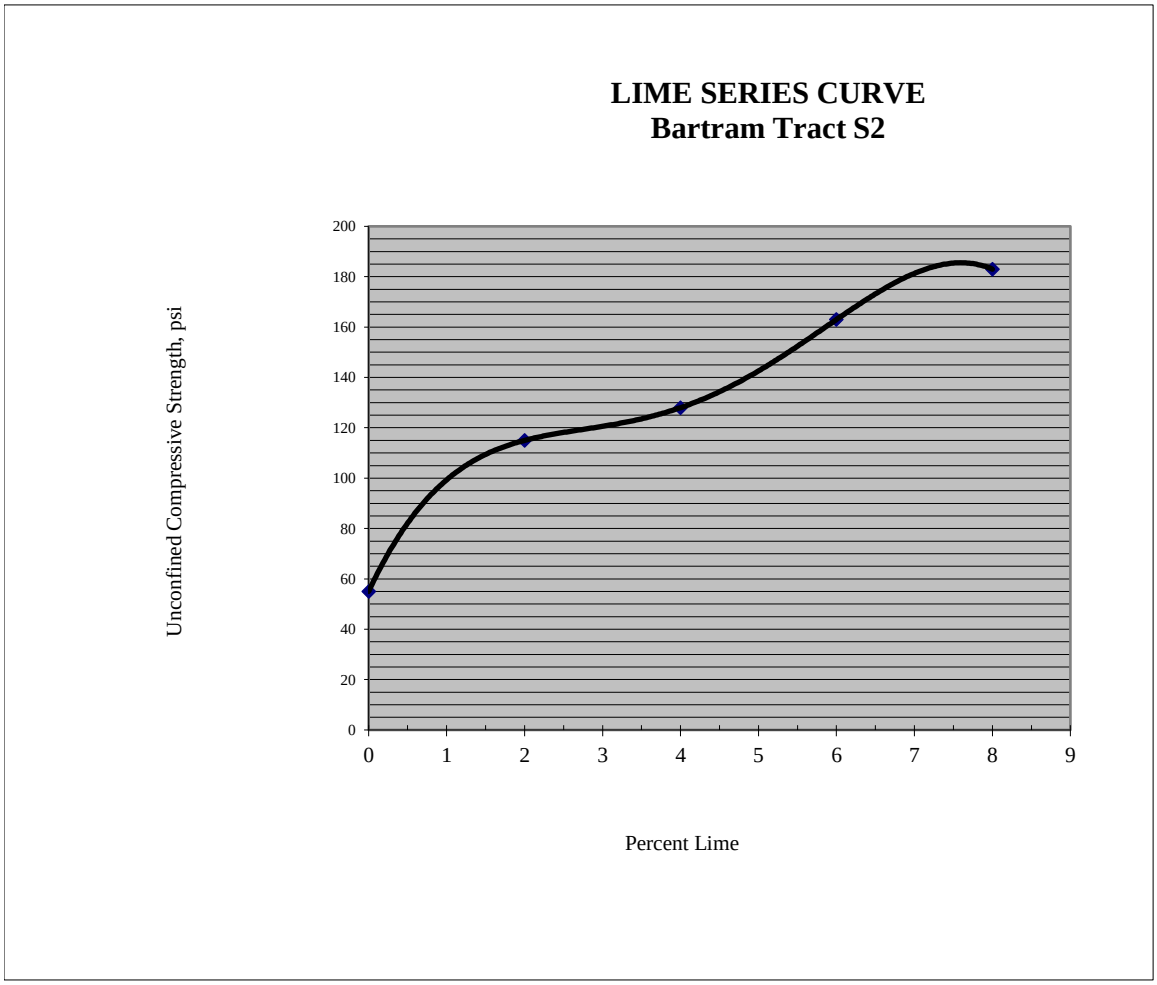
LIME / UNCONFINED STRENGTH CURVE

FGS Project No.: FGS-G21116

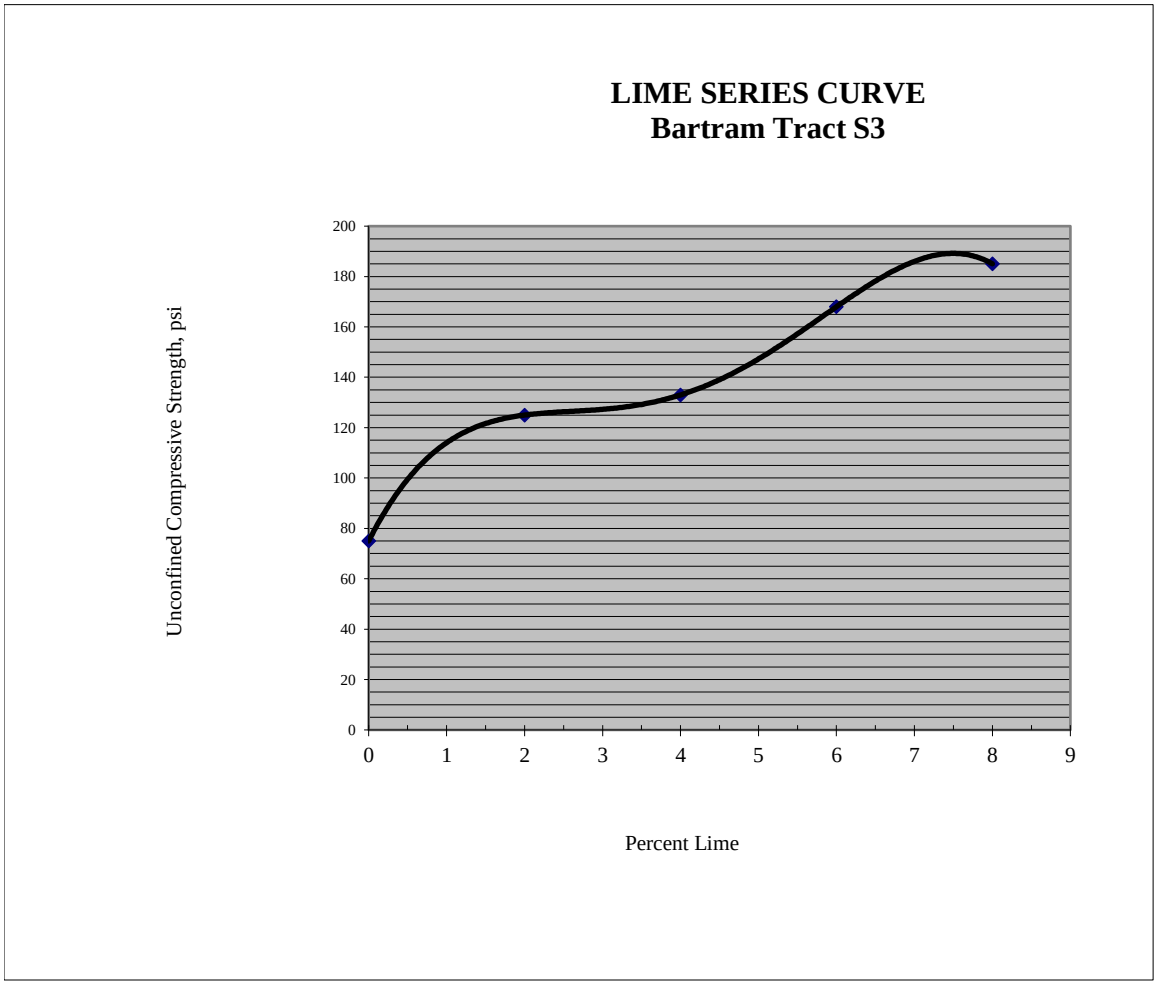
0	65
2	112
4	138
6	173
8	192



0	55
2	115
4	128
6	163
8	183



0	75
2	125
4	133
6	168
8	185



TENSAR PAVING DESIGN

FGS Project No.: FGS-G21116

Frost GeoSciences

ONE & TWO FAMILY RESIDENTIAL LOCAL

FGS Project No.: FGS-G21116

Asphalt Pavement
Design Analysis

Design	ONE & TWO FAMILY RESIDENTIAL (LOCAL).	**Reference**	
Project	CLEAR SPRING MEADOWS	**Location**	New Braunfels, TX, USA
Customer	PULTE GROUP	**Designer**	FLORENTINO CABALLERO, P. E.
Company	FROST GEOSCIENCES, Inc.	**Date**	February 5, 2024

Results

Stabilized

929,500 ESALs

	Thickness	Coeff.	SN
HMA layer 1	3 in	0.440	1.320
Aggregate base (NX750)	8 in	0.271	2.168
Structural number (SN)			3.488

Unstabilized

340,300 ESALs

	Thickness	Coeff.	SN
HMA layer 1	3 in	0.440	1.320
Aggregate base	12 in	0.140	1.680
Structural number (SN)			3.000

Parameters

Project Information

Target ESALs	Subgrade resilient modulus	Reliability	Standard deviation	Serviceability	
				Initial	Terminal
100,000	4,500 psi	70%	0.45	4.2	2

Frost GeoSciences

RESIDENTIAL COLLECTOR

FGS Project No.: FGS-G21116

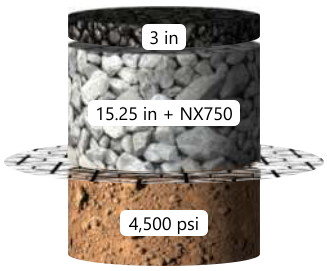
Asphalt Pavement
Design Analysis

Design	RESIDENTIAL COLLECTOR	**Reference**	
Project	CLEAR SPRING MEADOWS	**Location**	New Braunfels, TX, USA
Customer	PULTE GROUP	**Designer**	FLORENTINO CABALLERO, P. E.
Company	FROST GEOSCIENCES, Inc.	**Date**	February 5, 2024

Results

Stabilized

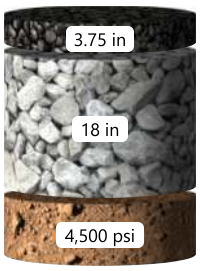
2,038,800 ESALs



	Thickness	Coeff.	SN
HMA layer 1	3 in	0.440	1.320
Aggregate base (NX750)	15.25 in	0.220	3.355
Structural number (SN)			4.675

Unstabilized

2,035,800 ESALs



	Thickness	Coeff.	SN
HMA layer 1	3.75 in	0.440	1.650
Aggregate base	18 in	0.140	3.024
Structural number (SN)			4.674

Parameters

Project Information

Target ESALs	Subgrade resilient modulus	Reliability	Standard deviation	Serviceability	
				Initial	Terminal
2,000,000	4,500 psi	90%	0.45	4.2	2.5