January 15, 2026

Lennar
100 North East Loop 410, Suite 1155
San Antonio, Texas 78216

Attn: Mr. Richard Mott, P.E.

RE: SUPPLEMENTAL GEOTECHNICAL ENGINEERING LETTER
Navarro Ranch Addition Phase 1 - Streets and Preliminary Foundation Recommendations
Harborth Road
Seguin Texas, Texas
PSI Project No. 0312-3224-S1

Dear Mr. Mott:

Professional Service Industries, Inc. (PSI) is pleased to submit these supplemental geotechnical engineering recommendations for the above-referenced project. These supplemental recommendations were requested by Mr. Adrian Todsen, representing Lennar, on January 13, 2026. This letter supplements the recommendations provided in PSI Geotechnical Report Project No. 0312-3224, dated June 28, 2024.

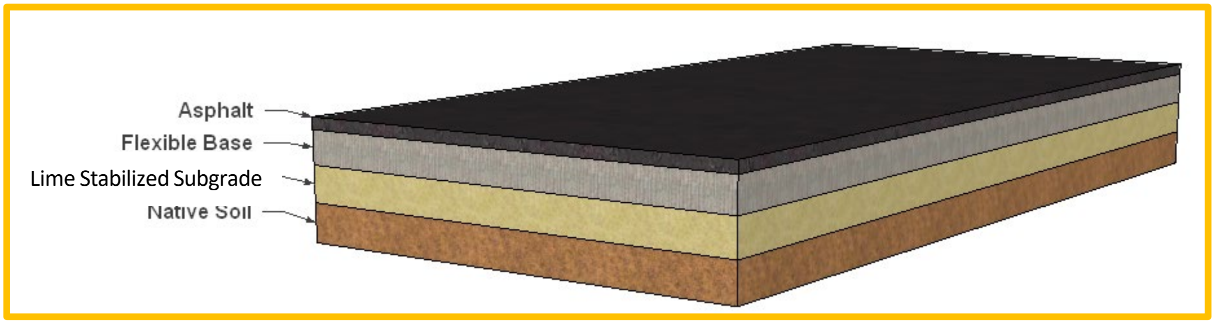
PAVEMENT SECTION RECOMMENDATIONS

PSI anticipated that the roadways will be used primarily by passenger vehicles and delivery vehicles. PSI is providing pavement sections based on the requirements of Guadalupe County.

FLEXIBLE PAVEMENT

Figure 1 is a graphic representation of pavement section.

FIGURE 1: OPTION 1 FLEXIBLE PAVEMENT TYPICAL SECTION



CLOSING

All other geotechnical findings and recommendations provided in the original geotechnical report not specifically changed by these supplemental findings still apply.

The findings and conclusions presented in this Supplemental Letter are based on the available subsurface information obtained by PSI and design details furnished by the Client and Design Team. Recommendations presented in PSI's referenced geotechnical reports not modified by this letter remain applicable. If there are any revisions to the plans for this project, or if deviations from the subsurface conditions noted in the original report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not notified of such changes, PSI will not be responsible for the impact of those changes on the project.

The geotechnical engineer warrants that the findings, recommendations, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

This Supplemental Letter has been prepared for the exclusive use of Lennar for specific application to the proposed Navarro Ranch Addition Phase 1 - Streets and Preliminary Foundation Recommendations to be constructed at Harborth Road in Seguin Texas, Texas. This letter may not be copied, except in the entirety, without the expressed written permission from PSI.

We appreciate the opportunity to provide Geotechnical Consulting Engineering services to you and your design team. If you have any questions regarding the information presented in this letter, please contact our office.

Respectfully submitted,
Professional Service Industries, Inc.

Louis Ratcliffe

Louis Ratcliffe, E.I.T.
Project Engineer
louis.ratcliffe@intertek.com

STATE OF TEXAS
SIMON P. GONZALES
97592
LICENSED PROFESSIONAL ENGINEER
1/15/2026

S. Peter Gonzales, P.E.
Department Manager
Peter.Gonzales@intertek.com

GEOTECHNICAL ENGINEERING REPORT

Navarro Ranch Addition Phase 1 - Streets and Preliminary Foundation Recommendations
Harborth Road
Seguin, Texas

PSI Project No. 0312-3224

PREPARED FOR:

Lennar
100 Northeast Loop 410, Suite 1155
San Antonio, Texas 78216

June 28, 2024

BY:

PROFESSIONAL SERVICE INDUSTRIES, INC.
3 Burwood Lane
San Antonio, Texas 78216
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Professional Service Industries, Inc.
3 Burwood Lane
San Antonio, Texas 78216
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June 28, 2024

Lennar
100 Northeast Loop 410, Suite 1155
San Antonio, Texas 78216

Attn: Mr. Richard Mott

RE: GEOTECHNICAL ENGINEERING REPORT
Navarro Ranch Addition Phase 1 - Streets and Preliminary Foundation Recommendations
Harborth Road
Seguin, Texas
PSI Project No. 0312-3209

Dear Mr. Mott:

Professional Service Industries, Inc. (PSI), an Intertek company, is pleased to submit this Geotechnical Engineering Report for the above-referenced project. This report includes the results from the field and laboratory investigation along with recommendations for use in preparation of the appropriate design and construction documents for this project.

PSI appreciates the opportunity to provide this Geotechnical Engineering Report and looks forward to continuing participation during the design and construction phases of this project. PSI also has great interest in providing materials testing and inspection services during the construction of this project and will be glad to meet with you to further discuss how we can be of assistance as the project advances.

If there are questions pertaining to this report, or if PSI may be of further service, please contact us at your convenience.

Respectfully submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC.
Texas Board of Professional Engineers Certificate of Registration # F003307

Louis Ratcliffe

SIMON P. GONZALES
97592
6/28/2024

Louis Ratcliffe, E.I.T.
Project Engineer

S. Peter Gonzales, P.E.
Geotechnical Department Manager

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1.0 PROJECT INFORMATION

1.1 PROJECT AUTHORIZATION

Professional Service Industries, Inc. (PSI), an Intertek company, has completed a field exploration and geotechnical evaluation for the proposed Navarro Ranch Addition Phase 1 - Streets and Preliminary Foundation Recommendations project. Mr. Richard Mott, representing Lennar, authorized PSI's services on May 13, 2024, by signing PSI Proposal No. 425059. PSI's proposal contained a proposed scope of work, lump sum fee, and PSI's General Conditions.

1.2 PROJECT DESCRIPTION

Based on information provided by the Client and PSI's review of a site plan entitled "Navarro Ranch Addition", prepared by HMT Engineering & Surveying, dated January 2024, and the results of this geotechnical investigation, a summary of our understanding of the proposed project is provided below in the following Project Description table.

TABLE 1.1: PROJECT DESCRIPTION

Project Items	Approximately 110 Acres of residential lots and approximately 14,000 lineal feet of subdivision streets
Anticipated Building Construction Types	Residences will be 1 or 2-story wood-framed
Existing Grade Change within Building	Varied
Finished Floor Elevations	Not available at this time
Anticipated Foundation Types	Monolithic Stiffened Beam and Slab-on-Grade
Anticipated Maximum Design Column Loads	75 kips
Anticipated Maximum Design Wall Loads	2.0 kips per Lineal Foot
Pavement for Parking and Drives	Flexible Asphalt (HMAC)
Design Traffic Load	Local Streets: 300,000 ESALs Collector Streets: 1,000,000 ESALs Primary and Secondary Arterial: 2,000,000 ESALs

The geotechnical recommendations presented in this report are based on the available project information, structure locations, and the subsurface materials encountered during the field investigation. If the information presented above is incorrect, please inform PSI so that the recommendations presented in this report can be amended, as necessary. PSI will not be responsible for the implementation of provided recommendations if not notified of changes in the project.

1.3 PURPOSE AND SCOPE OF SERVICES

The purpose of this study is to evaluate the subsurface conditions at the site and develop geotechnical engineering recommendations and guidelines for use in preparing the design and other related construction documents for the proposed project. The scope of services included drilling soil borings, performing laboratory testing, and preparing this geotechnical engineering report.

The results provided in this report are based on the information gained from the boring completed on the site in Area 1. The results for the borings located in Area 2 will be provided revision to this report at a later date. The extents of Area 1 and Area 2 are shown in the Boring Location Plan include in the appendix of this report.

This report briefly outlines the available project information, describes the site and subsurface conditions, and presents the following:

- General site development and subgrade preparation recommendations.
- Estimated potential soil movements associated with collapsing, shrinking and swelling soils and methods to reduce these movements.
- Recommendations for site excavation, fill compaction, and the use of on-site and imported fill material under pavements.
- Preliminary recommendations for building pad preparation for ground-supported slabs based on the existing conditions.
- Preliminary recommendations for the design of foundations for supporting the proposed structures, which may include Wire Reinforcing Institute (WRI) and Post-Tensioning Institute (PTI) design criteria for slab-on-grade foundations designed for the existing conditions.
- Seismic design site classification per the 2018 International Building Code.
- Recommendations for the design of flexible asphaltic pavement systems for the proposed residential streets per the City of Seguin Pavement Design Standards.

The scope of services for this geotechnical exploration did not include an environmental, mold nor detailed seismic/fault assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air on or below, or around this site. Statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes. The report also does not include a detailed settlement analysis or slope stability analysis.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 SITE DESCRIPTION

The following table provides a generalized description of the existing site conditions based on visual observations during the field activities, as well as other available information.

TABLE 2.1: SITE DESCRIPTION

Site Location	Latitude: 29.6912°; Longitude: -97.9823° Harboth Road in Seguin, Texas
Site History	Farmland
Existing Site Ground Cover	Grass
Existing Grade/Elevation Changes	Sloping down to the south
Site Geology (Geologic Atlas of Texas)	Leona Formation (Qle)
Site Boundaries/Neighboring Development	Undeveloped property surrounds the site
Ground Surface Soil Support Capability for Operational Stability and Site Access	Firm Enough for Field Equipment when Dry

2.2 FIELD EXPLORATION

Field exploration for the project consisted of drilling a total of **fourteen (14) borings**. The boring design element, approximate depths and drilling footage are provided in the following table. At the time of writing this report the borings for Area 2 have not been completed. Once completed the findings from the remaining borings will be provided in a revised report at a later date.

TABLE 2.2: FIELD EXPLORATION SUMMARY

Design Element	Number of Borings	Boring Depth (ft)	Drilling Footage (feet)
Streets – Area 1 (Completed 6/4/2024)	7	15	105
Streets – Area 2 (To be completed at a later date)	7	15	105
TOTAL:	**14**	**---**	**210**

The boring locations were selected by PSI personnel and located in the field using a recreational-grade GPS system. Elevations of the ground surface at the boring locations were not provided and should be surveyed by others prior to construction, if required. We have estimated ground surface elevations at the boring locations from the topographic survey provided (or from Google Earth) and estimate an approximate 1-foot accuracy. The references to elevations of various subsurface strata are based on depths below existing grade at the time of drilling. The approximate boring locations are depicted on the Boring Location Plan provided in the Appendix.

TABLE 2.3: FIELD EXPLORATION DESCRIPTION

Drilling Equipment	Truck-Mounted Drilling Equipment
Drilling Method	Continuous Flight-Auger, bulk sample for CBR testing
Field Testing	Standard Penetration Test (ASTM D1586)
Sampling Procedure	ASTM D1586
Sampling Frequency	Continuously to a Depth of 10 Feet and at 5-foot Intervals Thereafter
Frequency of Groundwater Level Measurements	During and After Drilling
Boring Backfill Procedures	Soil Cuttings
Sample Preservation and Transportation Procedure	General Accordance with ASTM D4220

During field activities, the encountered subsurface conditions were observed, logged, and visually classified (in general accordance with ASTM D2487). Field notes were maintained to summarize soil types and descriptions, water levels, changes in subsurface conditions, and drilling conditions.

2.3 LABORATORY TESTING PROGRAM

PSI supplemented the field exploration with a laboratory testing program to determine additional engineering characteristics of the subsurface soils encountered. The laboratory testing program included:

TABLE 2.4: LABORATORY TESTING PROGRAM

Laboratory Test	Procedure Specification
Visual Classification	ASTM D2488
Moisture Content	ASTM D2216
Atterberg Limits	ASTM D4318
Material Finer than No. 200 Sieve	ASTM D1140
California Bearing Ratio (CBR)	ASTM D1883
Sulfate Content in Soils	TEX-145-E
Soil-Lime Testing	TEX-121-E, Part III

The laboratory testing program was conducted in general accordance with applicable ASTM Test Methods. The results of the laboratory tests are provided on the Boring Logs in the Appendix. Portions of samples not altered or consumed by laboratory testing will be discarded 60 days from the date shown on this report.

2.4 SITE GEOLOGY

We reviewed the **Seguin Sheet of the Geologic Atlas of Texas** in an effort to determine the geologic setting of the project site and surrounding areas. The Geologic Atlas of Texas was developed by the Bureau of Economic Geology at The University of Texas using aerial photography, data from various oil and gas exploration companies, and very limited ground reconnaissance. Our review indicates that the project is located in the ***Leona Formation (Q_{le})*** of Quaternary Geologic Age. The San Antonio Sheet generally describes the Leona Formation as being limestone fine calcareous silt grading down into coarse gravel.

2.5 SUBSURFACE CONDITIONS

The results of the field and laboratory investigation have been used to develop a generalized subsurface profile at the project site. The following subsurface descriptions highlight the major subsurface stratification features and material characteristics.

TABLE 2.5: GENERALIZED SUBSURFACE PROFILE TABLE

Top (ft)	Bot. (ft)	Soil Type	ω (%)	LL (%)	PI	-200 Sieve (%)	N
0	4.5	Fat Clay	22 – 30	80 – 93	56 – 63	93	4 – 23
4.5	15	Lean Clay with Sand Lean Clay Fat Clay with Sand	8 – 21	29 – 60	15 – 37	75 – 91	15 – 74

Note:

1. *ω = Moisture Content (%)*
2. *LL= Liquid limit (%)*
3. *PI = Plasticity Index*
4. *-#200 Sieve = % Passing the #200 Sieve*
5. *N = Standard Penetration Test blow count (blows/foot)*

The boring logs included in the Appendix should be reviewed for specific information at the boring locations. The boring logs include soil descriptions, stratifications, locations of the samples, and field and laboratory test data. The descriptions provided on the logs only represent the conditions at the specific boring location. The stratifications represent the approximate boundaries between subsurface materials. The actual transitions between strata may be more gradual and less distinct. Variations will occur and should be expected across the site.

2.5.1 GROUNDWATER INFORMATION

Water level measurements were performed during drilling and after completion of drilling. Specific information concerning groundwater is noted on each boring log presented in the Appendix of this report. Groundwater **was not** encountered during the field investigation of this site.

Groundwater levels fluctuate seasonally as a function of rainfall, proximity to creeks, rivers and lakes, the infiltration rate of the soil, seasonal and climatic variations and land usage. In relatively pervious soils, such as sandy soils, the indicated depths are a relatively reliable indicator of groundwater levels. In relatively impervious soils, water levels observed in the borings may not provide a reliable indication of groundwater elevations, even after several days. If a detailed water level evaluation is required, observation wells or piezometers can be installed at the site to monitor water levels.

The groundwater levels presented in this report were measured at the time of PSI field activities. The contractor should be prepared to control groundwater, if encountered during construction activities.

3.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

3.1 GEOTECHNICAL DISCUSSION

Based upon the information gathered from the soil borings and laboratory testing, the clay soils encountered at this site within the seasonally active zone (estimated to extend to a depth of approximately 15 feet below the existing ground surface) have a **high to very high** potential for expansion. PSI recommends the expansive potential (i.e. Potential Vertical Movement (PVM)) of these soils be addressed in the design and construction of this project to reduce the potential for foundation movements.

An improved foundation pad must be constructed under soil-supported floor slab and foundation elements due to the presence of expansive foundation soils. Several methods are available to reduce the shrink/swell movement. PSI typically recommends excavating unacceptable soils and, after scarifying and moisture conditioning the exposed subgrade, replacement with some of the removed existing excavation soils used as compacted reconditioned fill and finally select fill materials are placed and compacted up to the bottom of the floor slab.

The following design recommendations have been developed based on the previously described project characteristics and subsurface conditions encountered. If there are changes in the project criteria, PSI should be retained to determine if modifications in the recommendations will be required. The findings of such a review would be presented in a supplemental report. Once final design plans and specifications are available, a general review by PSI is recommended to observe that the conditions assumed in the project description are correct and to verify that the earthwork and foundation recommendations are properly interpreted and implemented within the construction documents.

3.2 POTENTIAL VERTICAL MOVEMENT OF EXPANSIVE SOILS (PVM)

The soils encountered at the soil boring locations exhibit a **high to very high** potential for volumetric changes, due to fluctuations in soil moisture content. PSI has conducted laboratory testing on the soils to estimate the expansive soil potential with soil moisture variations. These soil moisture variations are based on historical climate change data for a particular site. Determining the soil potential for shrinking and swelling, combined with historical climate variation, aids the engineer in quantifying the soil movement potential of the soils supporting the floor slab and shallow foundations based on climate variations. Shrink/swell movement procedures using two soil modeling systems, the Post Tensioning Institute's (PTI) "Design of Post-Tensioned Slabs-on-Ground, 3rd Edition" and Texas Department of Transportation (TxDOT) method TEX-124-E, were utilized to approximate the Potential Vertical Movement (PVM) for this location.

The anticipated shrink/swell movement (PVM) is a soil movement estimated in consideration of soil properties and climatic moisture changes at a particular geographic location. Foundations on expansive soils are designed with sufficient stiffness to resist these soil movements to an acceptable magnitude.

3.2.1 SHRINK/SWELL MOVEMENT (PVM) ESTIMATE

Based on laboratory testing results and the TEX-124-E and the PTI methods, the potential vertical movement within the proposed project area was estimated to be approximately **3-¾ to 4-½ inches.**

It is not possible to accurately quantify actual soil moisture changes and resulting shrink/swell movements. The PVM and referenced structural movement values provided should be considered approximate values based on industry standard practice and experience. Extreme soil moisture variations could occur due to unusual drought severity, leaking water or sewer lines, perched groundwater infiltration, or seasonal springs. Also, soil transpiration from trees located adjacent to or previously underneath the building, downspouts directing roof discharge under the foundation, poor drainage or irrigation line breaks could lead to excessive movements.

Therefore, because of these unknown factors, the shrink/swell potential of soils can often be significantly underestimated using the previously mentioned methods of evaluating PVM.

The unknown factors previously mentioned cannot be determined at the time of the geotechnical study. Therefore, estimated shrink/swell movements are calculated only in consideration of historical climate data related to soil moisture variations from climate changes. Movements in excess of those estimated should be anticipated and regular maintenance should be provided to address these issues throughout the life of the structure.

3.3 PRELIMINARY FOUNDATION RECOMMENDATIONS DISCUSSION

Based on information provided to PSI, information obtained during the field operations, results of the laboratory testing, and PSI's experience with similar projects, recommendations for a monolithic stiffened Beam and slab-on-grade type foundation are presented in this report. If an alternative foundation type is desired, PSI can provide alternative recommendations in a supplemental letter upon request.

3.3.1 BUILDING PAD EARTHWORK RECOMMENDATIONS FOR EXISTING CONDITIONS

Building pad preparation should consist of proofrolling the exposed subgrade then placement of on-site soils in moisture conditioned compacted lifts to achieve finish floor grade, as needed. A minimal amount of site earthwork is expected at this site since the area is planned to be mass graded and fills will be placed in a controlled manner during mass grading operations. The following table provides general recommendations for the installation of a building pad based on the site's existing conditions.

TABLE 3.1: BUILDING PAD PREPARATION FOR EXISTING CONDITIONS

Application	Waffle Slab with Soil-Supported Floor Slab
Building pad preparation	The loose soils should be removed and stockpiled for use, provided the material properties meet the requirements listed.
Foundation Improvement Method	Remove and replace loose soils with moisture conditioned compacted on-site soils.
Minimum Over-Excavation	**As required to remove loose soils**
Horizontal Undercut Extent beyond foundation perimeter	5 feet
Subgrade Proof-Rolling	Proof-roll subgrade with rubber-tired, 20-ton (loaded) construction equipment; Alternate Equipment can be used with Geotechnical Engineer Approval. Remove rutting or excessively deflecting soils; Replace failing soils with moisture conditioned compacted on-site soils
Exposed Subgrade Treatment	Proof-roll

Building pad fill thickness	**As required to achieve the finished building pad elevation.**
Fill requirements	On-site soils or imported materials may be used as fill. Refer to Table 3.2 for compaction requirements. On-site or imported materials should meet the following specifications: Allowable PI from 12 to 40 Percent Passing No. 200 Sieve > 25% Max Particle Size < 3”
Vapor Retarder Material	Approved by Architect/Structural Engineer
Maximum Loose Lift Thickness	8 inches

3.3.2 COMPACTION AND TESTING RECOMMENDATIONS FOR FOUNDATION PAD AREAS

The following table outlines foundation pad compaction recommendations in consideration of appropriate vertical movement reduction method.

TABLE 3.2: COMPACTION RECOMMENDATIONS

Location	Material	Density Test Method	Plasticity Index	Percent Compaction	Optimum Moisture Content	Testing Frequency
Building Pad Areas	Subgrade, Fill	ASTM D698	PI ≥ 25	94% to 98%	≥ +2%	1 per 5,000 SF; min. 3 per lift
			PI < 25	≥ 95%	0 to +4%	

3.4 DESIGN MEASURES TO REDUCE CHANGES IN SOIL MOISTURE

The design and construction of a grade-supported foundation should include the following elements:

- Roof drainage should be controlled by gutters and carried well away from the structure.
- The ground surface adjacent to the building perimeter should be sloped and maintained a minimum of 5% grade away from the building for 10 feet to result in positive surface flow or drainage away from the building perimeter. In areas adjacent to the building controlled by ADA, concrete flatwork slopes should not be more than 2% within 10 feet of the building.
- Hose bibs, sprinkler heads, and other external water connections should be placed well away from the foundation perimeter such that surface leakage cannot readily infiltrate into the subsurface or compacted fills placed under the proposed foundations and slabs.
- No trees or other vegetation over 6 feet in height shall be planted within 15 feet of the structure unless specifically accounted for in the foundation design.
- Utility bedding should not include gravel near the perimeter of the foundation. Compacted clay or flowable fill trench backfill should be used in lieu of permeable bedding materials between 2 feet inside the building to 4 feet beyond the exterior of the building edge to reduce the potential for water to infiltrate within utility bedding and backfill material.

- Paved areas around the structure are helpful in maintaining soil moisture equilibrium. It will be very beneficial to have pavement, sidewalks or other flatwork located immediately adjacent to the building to both reduce intrusion of surface water into the more permeable select fill and to reduce soil moisture changes along the exterior portion of the floor due to soil moisture changes from drought, excessive rainfall or irrigation, etc.
- Flower beds and planter boxes should be piped or watertight to prevent water infiltration under the building.
- Experience indicates that landscape irrigation is a common source of foundation movement problems and pavement distress. Repairing irrigation lines as soon as possible after leakage commences will benefit foundation performance greatly.
- Building pad and pavement subgrade should be protected and covered within 48 hours to reduce changes in the natural moisture regime from rainfall events or excessive drying from heat and wind.

3.5 PRELIMINARY FOUNDATION DESIGN RECOMMENDATIONS

The following sections outline geotechnical design requirements for the recommended foundation options.

3.5.1 STIFFENED BEAM AND SLAB-ON-GROUND FOUNDATION (WAFFLE SLAB) RECOMMENDATIONS

A waffle slab type foundation is generally used to support relatively light structures where soil conditions are relatively uniform and where uplift and settlement can be tolerated. The intent of a stiffened beam and slab-on-grade foundation is to allow the structure and foundation to move with soil movements while providing sufficient stiffness to limit differential movements within the superstructure to an acceptable magnitude. The foundation may be designed using the Design of Slab-On-Ground Foundations published by the Wire Reinforcement Institute, Inc. (August 1981, updated March 1996). Alternately, the foundation may be designed using the 3rd Edition of the Design of Post-Tensioned Slabs-on-Ground published by the Post-Tensioning Institute (PTI DC10.1-08). The following table is applicable for a conventionally reinforced "Waffle Slab" with subgrade prepared in accordance with Section 3.3, which details foundation pad preparation and construction recommendations.

TABLE 3.3: PRELIMINARY WRI WAFFLE SLAB DESIGN PARAMETERS

Effective Plasticity Index	41
Soil/Climatic Rating Factor (1–C)	0.27
Allowable Bearing Pressure for Grade Beams	2,500 psf
Bearing Stratum at Bottom of Grade Beams	Compacted on-site soils
Penetration of Perimeter Beams Below Final Exterior Grade	At least 30 inches

PSI is providing PTI design values for the Structural Engineer's design. These design values are estimated from the "Volflo" computer program in consideration of the existing soil conditions in the building area and local experience. The following table is applicable for a conventionally reinforced or post-tensioned slab-on-grade with building prepared in accordance with Section 3.3, which details foundation pad preparation and construction recommendations.

TABLE 3.4: PRELIMINARY PTI WAFFLE SLAB DESIGN PARAMETERS

Edge Moisture Variation Distance Center Lift, e_m Edge Lift, e_m	 7.0 feet 3.6 feet
Differential Soil Movement Center Lift, y_m Edge Lift, y_m	 -1.8 inches 2.5 inches
Allowable Bearing Pressure for Grade Beams	2,500 psf
Bearing Stratum at Bottom of Grade Beams	Compacted on-site soils
Penetration of Perimeter Beams Below Final Exterior Grade	At least 30 inches

Utilities that project through slab and grade beam foundations should be designed either with some degree of flexibility or with sleeves in order to prevent damage to these lines as a result of vertical movement. Contraction, control or expansion joints should be designed and placed in interior wall partitions to minimize and control wall cracking as a result of foundation movements. Properly planned placement of these joints will assist in controlling the degree and location of material cracking which normally occurs due to material shrinkage, thermal affects, soil movements and other related factors.

3.6 SITE SEISMIC DESIGN RECOMMENDATIONS

For the purposes of seismic design, based on the encountered site conditions and local geology, PSI interpreted the subsurface conditions to satisfy the **Site Class D** criteria for use at this site as defined by the International Building Code (IBC). The site class is based on the subsurface conditions encountered at the soil borings, the results of field and laboratory testing, experience with similar projects in this area, and considering the site prepared as recommended herein. The table below provides recommended seismic parameters for the project based on IBC 2018/ASCE 7-16.

TABLE 3.5: RECOMMENDED DESIGN SEISMIC PARAMETERS

Project/Structure Centroid Coordinates (WGS84 - Decimal Degree)	**29.6912°; -97.9823°**
Seismic Parameter	**IBC 2018/ASCE 7-16**
Site Class	D
Risk Category	II
0.2 sec (S_S)	0.052
1.0 sec (S_1)	0.028
Site Coefficient 0.2sec, F_a	1.6
Site Coefficient 1.0 sec, F_v	2.4
0.2 sec (S_{DS})	0.055
1.0 sec (S_{D1})	0.044

4.0 PAVEMENT DESIGN RECOMMENDATIONS

4.1 PAVEMENT DESIGN PARAMETERS

PSI understands that flexible pavements are planned for the project. The following pavement design recommendations are based on the criteria presented in the *City of Seguin Road Adequacy & Access Technical Guidance* (revised January 2024).

An Average Daily Traffic (ADT) Volume of less than 1,000 (Approximately 300,000 18-kip Equivalent Single Axle Loads (ESALs)) for flexible pavement was estimated for streets with a classification of Local Streets. An ADT volume of less than 3,000 (1,000,000 18-kip ESALs for flexible pavement was estimated for streets with a classification of Collector Streets. An ADT volume of greater than 3,000 (2,000,000 18-kip ESALs) for flexible pavement was estimated for streets with a classification of Primary and Secondary Arterial Streets. PSI utilized the "AASHTO Guide for Design of Pavement Structures" published by the American Association of State Highway and Transportation Officials to evaluate the pavement thickness recommendations in this report. This method of design considers pavement performance, traffic, roadbed soil, pavement materials, environment, drainage, and reliability. Each of these items is incorporated into the design methodology. PSI is available to provide laboratory testing and engineering evaluation to refine the site-specific design parameters and sections, upon request.

PSI collected bulk soil samples of the native soils encountered at the site to conduct Atterberg Limits, Percent Finer than the No. 200 Sieve, California Bearing Ratio (CBR) test, and Lime Series Testing. The results for the Moisture Density Relationship and the CBR Tests are presented in the Appendix. The following table presents the results from our laboratory testing performed on the native soil.

TABLE 4.1: NATIVE SOIL TEST SUMMARY

Area	Material	Liquid Limit (ASTM D4318)	Plasticity Index (ASTM D4318)	Percent Passing No. 200 Sieve	Estimated CBR Value (ASTM D1883)
1	Fat Clay (CH)	63	31	92	4.0

Based on the results of the laboratory testing, PSI has provided recommended pavement sections for pavements constructed on an improved subgrade. Details regarding the basis for this design are presented in the table below.

TABLE 4.2: PAVEMENT DESIGN PARAMETERS AND ASSUMPTIONS (RIGID AND FLEXIBLE)

City of Seguin Local Streets	
Reliability, percent	70
Initial Serviceability Index, Flexible Pavement	4.2
Terminal Serviceability Index	2.0
ADT Volume	less than 1,000
Design Traffic Loading, Flexible Pavement, without bus	300,000 equivalent single axle loads (ESALs)
Standard Deviation, Flexible Pavement	0.45
Subgrade California Bearing Ratio (CBR)	4.0
Subgrade Modulus of Subgrade Reaction, k in pci	100

City of Seguin Collector Streets	
Reliability, percent	90
Initial Serviceability Index, Flexible Pavement	4.2
Terminal Serviceability Index	2.0
ADT Volume	less than 3,000
Design Traffic Loading, Flexible Pavement	1,000,000 equivalent single axle loads (ESALs)
Standard Deviation, Flexible Pavement	0.45
Subgrade California Bearing Ratio (CBR)	4.0
Subgrade Modulus of Subgrade Reaction, k in pci	100
City of Seguin Primary and Secondary Arterials	
Reliability, percent	95
Initial Serviceability Index, Flexible Pavement	4.2
Terminal Serviceability Index	2.0
ADT Volume	greater than 3,000
Design Traffic Loading, Flexible Pavement	2,000,000 equivalent single axle loads (ESALs)
Standard Deviation, Flexible Pavement	0.45
Subgrade California Bearing Ratio (CBR)	4.0
Subgrade Modulus of Subgrade Reaction, k in pci	100

Asphaltic concrete pavements founded on top of expansive soils will be subjected to PVM soil movements estimated and presented in this report. These potential soil movements are typically activated to some degree during the life of the pavement. Consequently, pavements can be expected to crack and require periodic maintenance to reduce damage to the pavement structure.

During the paving life, maintenance to seal surface cracks within asphalt paving should be undertaken to achieve the desired paving life. Perimeter drainage should be controlled to prevent or retard influx of surface water from areas surrounding the paving. Water penetration leads to paving degradation. Water penetration into base or subgrade materials, sometimes due to irrigation or surface water infiltration leads to pre-mature paving degradation. Curbs should be used in conjunction with asphalt paving to reduce potential for infiltration of moisture into the base course. Curbs should extend the full depth of the base course and should extend at least 3 inches into the underlying clayey subgrade. The base layer should be tied into the area inlets to drain water that may collect in the base.

Material specifications, construction considerations, and section requirements are presented in following sections.

The presented recommended pavement sections are based on the field and laboratory test results for the project, local pavement design practice, design assumptions presented herein and previous experience with similar projects. The project Civil Engineer should verify that the ESAL and other design values are appropriate for the expected traffic and design life of the project. PSI should be notified in writing if the assumptions or design parameters are incorrect or require modification.

4.2 PAVEMENT SECTION RECOMMENDATIONS

PSI anticipated that the roadways and parking areas will be used primarily by passenger vehicles and delivery vehicles. PSI is providing parking and drive area sections based on experience with similar facilities constructed on similar soil conditions for the design traffic loading anticipated.

4.2.1 FLEXIBLE PAVEMENT

Recommendations for flexible asphaltic concrete pavement for roadways and parking areas are provided below.

FIGURE 4.1: FLEXIBLE PAVEMENT TYPICAL SECTION

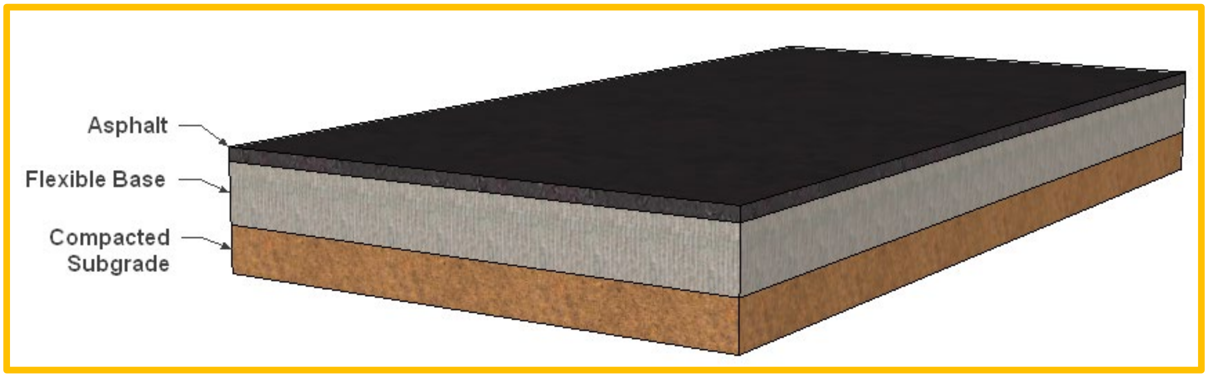


TABLE 4.3: FLEXIBLE PAVEMENT SECTION OPTIONS

Material	Thicknesses		
Traffic Type	Local	Collector	Arterial
Hot Mix Asphaltic Concrete	3”	4”	5”
Import Flexible Base	8”	12”	14”
Lime Stabilized Subgrade (min. 5% lime)	8”		

4.2.2 GENERAL PAVEMENT DESIGN AND CONSTRUCTION RECOMMENDATIONS

TABLE 4.4: PAVEMENT DESIGN AND CONSTRUCTION RECOMMENDATIONS

Minimum Undercut Depth	6 inches or as needed to remove roots
Low-Density Soil Treatment	After clearing and grubbing, remove/replace upper 12 inches of exposed soils in maximum 9-inch loose lifts. moisture-condition and compact as Subgrade in Table 4.5.
Reuse Excavated Soils	Must be free of roots and debris and meet material requirements of intended use
Exposed Subgrade Treatment	After moisture conditioning and recompacting the low-density subgrade soils, proof-roll with rubber-tired vehicle weighing at least 20 tons. A representative of the Geotechnical Engineer should be present during proof-roll.

Proof-Rolled Pumping and Rutting Areas	Excavate to firmer materials and replace with compacted general or select fill under direction of a representative of the Geotechnical Engineer
General Fill	Materials free of roots, debris, and other deleterious materials with a maximum rock size of 4 inches with a CBR greater than 3
Minimum General Fill Thickness	As required to achieve grade
Maximum General Fill Loose Lift Thickness	9 Inches
Lime Stabilized	Performed in general accordance with TxDOT Item 260. Subgrade stabilized with lime should achieve a pH of 12.4 or greater. Estimate 5% by dry weight or 28.5 lbs per square yard.
Flexible Base	TxDOT Item 247, Type A, Grade 1-2
Maximum Flexible Base Loose Lift Thickness	9 Inches
Hot Mix Asphaltic Concrete	TxDOT Item 340, Type D

Table 4.5: Compaction and Testing Recommendations for Pavement Areas

Location	Material	Density Test Method	Soil Type	Percent Compaction	Optimum Moisture Content	Testing Frequency
Pavement Areas	Subgrade, General Fill Soil, Low PI Material	Tex-114-E	PI ≥ 25	94% to 98%	0 to +4%	1 per 10,000 SF; min. 3 tests
			PI < 25	≥ 95%	0 to +4%	
	Flexible Base Material	TEX-113-E	COSA Item 200	≥ 95%	±3%	1 per 5,000 SF; min. 3 per lift

5.0 CONSTRUCTION CONSIDERATIONS

Geotechnical Engineer Involvement at the Time of Construction – Foundation pad preparation recommendations on expansive clay sites in this area depend on the soil moisture conditions that exist due to the prevailing climate at the time of construction as well as the expansive properties of the clay.

It is recommended that the foundation pad recommendations presented in this report be confirmed immediately prior to construction by the Geotechnical-Engineer-of Record (GER). Wetter climate conditions near the time of construction can lead to a significant reduction in pad preparation requirements which can often be a substantial percentage of site development cost.

Having a Geotechnical Engineer retained to review the earthwork recommendations in the Construction Documents and be an active participant in team meetings near the time of construction can often result in project cost savings. Therefore, PSI recommends that an AASHTO accredited 3rd party laboratory with qualified professional engineers who specialize in geotechnical engineering be retained to provide observation and testing of construction activities involved in the foundations, earthwork, pavements and related activities of this project. As the GER, PSI's services can be retained as the 3rd party laboratory. PSI's participation would be advantageous to the project flow and value engineering during construction since we are most familiar with the existing soil conditions at the site.

The geotechnical engineer often does not have available all design information at the time of writing the original report since the report is done very early in the design process. The GER can be of great benefit immediately prior to construction since definitive information regarding the location of the building, surrounding flatwork, pavements, planned landscaping, and drainage features is available at that time. The GER can then write Supplement letters to the original geotechnical report often resulting in less risk and significant project cost savings.

PSI cannot accept responsibility for conditions which deviate from those described in this report, nor for the performance of the foundations or pavements if not engaged to also provide construction observation and materials testing for this project. The PSI geotechnical engineer of record should also be engaged by the Design Team during construction, even if periodic on-call testing is contracted with PSI Construction Services.

5.1 INITIAL SITE PREPARATION CONSIDERATIONS

5.1.1 SUBGRADE PREPARATION FOR SITE WORK OUTSIDE BUILDING PAD AND PAVEMENT AREAS

Grade adjustments outside of the foundation pad and pavement areas can be made using select or general fill materials. The clean excavated onsite soils may also be reused in areas not sensitive to movement.

TABLE 5.1: SUBGRADE PREPARATION FOR NON-STRUCTURAL - GENERAL FILL

Minimum Undercut Depth	6 inches or as needed to remove roots, organic and/or deleterious materials
Exposed Subgrade Treatment	Proof-roll subgrade with rubber-tired 20-ton (loaded) construction equipment Alternate Equipment can be used with Geotechnical Engineer Approval
Proof-Rolled Pumping and Rutting Areas	Excavate to firmer materials and replace with compacted general or select fill under direction of a representative of the Geotechnical Engineer
General Fill Type	Any clean material free of roots, debris and other deleterious material with a maximum particle size of 4 inches
Maximum General Fill Loose Lift Thickness	8 inches

TABLE 5.2: FILL COMPACTION RECOMMENDATIONS OUTSIDE OF BUILDING AND PAVEMENT AREAS

Location	Material	Test Method for Density Determination	Plasticity Index	Percent Compaction	Optimum Moisture Content	Testing Frequency
Outside of Structure / Pavement Areas	General Fill	Tex-114-E	PI ≥ 25	94% to 98%	0 to +4%	1 per 10,000 SF; min. 3 per lift
			PI < 25	≥ 95%	0 to +4%	

5.1.2 EXISTING SITE CONDITIONS

The following table outlines construction considerations in consideration of demolition of existing paving and procedures for abandoning old utility lines.

TABLE 5.3: CONSIDERATIONS FOR DEMOLITION AND ABANDONING UTILITIES

Existing Pavement	
Former paving located within footing of proposed structures	Remove concrete and/or HMAC surface course and base entirely or review impact on case by case basis
Former paving located within footprint of proposed new paving	Remove concrete and/or HMAC surface course and evaluate if base can be reused
Abandoned Utilities	
Utilities of former structures located within new footprint of proposed structure	Remove pipe, bedding and backfill and then replace with select fill placed using controlled compaction
Utilities of former structures located outside of footprint of proposed structure	Abandon in place using a grout plug

5.2 MOISTURE SENSITIVE SOILS/WEATHER RELATED CONCERNS

Soils are sensitive to disturbances caused by construction traffic and changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils which become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork, foundation, and construction activities during dry weather. A relatively all-weather compacted crushed limestone cap having a thickness of at least 6 inches should be provided as a working surface.

5.3 EXCAVATION OBSERVATIONS

Excavations should be observed by a representative of PSI prior to continuing construction activities in those areas. PSI needs to assess the encountered materials and confirm that site conditions are consistent with those discussed in this report. This is especially important to identify the condition and acceptability of the exposed subgrades under foundations and other structures that are sensitive to movement. Soft or loose soil zones encountered at the bottom of the excavations should be removed to the level of competent soils as directed by the Geotechnical Engineer or their representative. Cavities formed as a result of excavation of soft or loose soil zones should be backfilled with compacted select fill or lean concrete.

After opening, excavations should be observed, and concrete should be placed as quickly as possible to avoid exposure to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond. Excavations left open for more than 48 hours should be protected to reduce evaporation or entry of moisture.

5.4 DRAINAGE CONSIDERATIONS

Water should not be allowed to collect in or adjacent to foundation excavations, on foundation surfaces, or on prepared subgrades within the construction area during or after construction. Proper drainage around grade-supported sidewalks and flatwork is important to reduce potential movements. Excavated areas should be sloped toward one corner to facilitate removal of collected rainwater, groundwater, or surface runoff. Providing rapid, positive drainage away from the building reduces moisture variations within the underlying soils and will aid in reducing the magnitude of potential movements.

5.5 EXCAVATIONS AND TRENCHES

Excavation equipment capabilities and field conditions may vary. Geologic processes are erratic and large variations can occur in small vertical and/or 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 comments contained in this report are based on small diameter borehole observations. The performance of large excavations may differ as a result of the differences in excavation sizes.

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. PSI understands that these regulations are being strictly enforced, and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

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 excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, State, and Federal safety regulations.

PSI is providing this information as a service to the client. PSI 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. A trench safety plan was beyond the scope of our services for this project.

6.0 REPORT LIMITATIONS

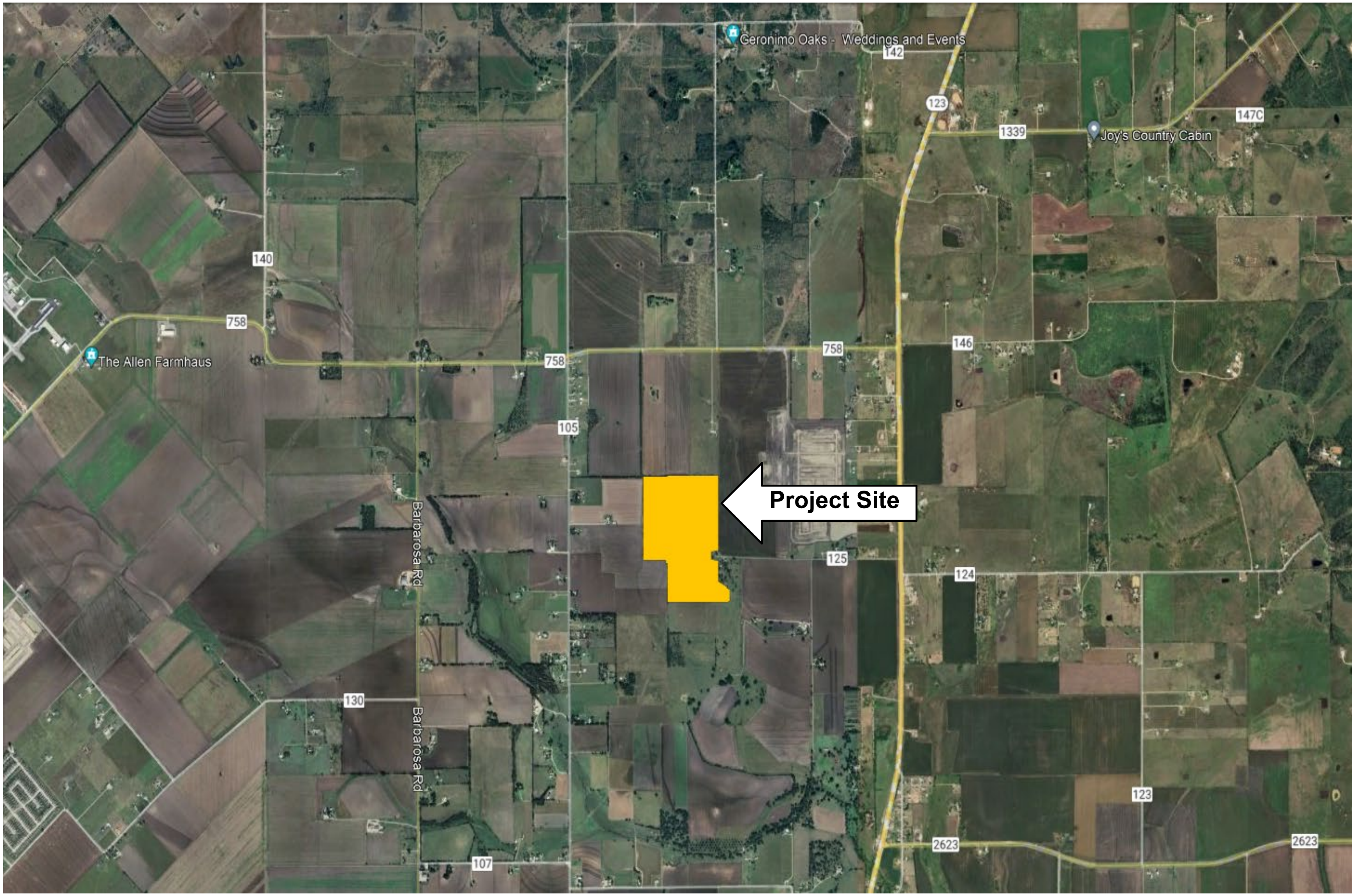
The recommendations submitted in this report are based on the available subsurface information obtained by PSI and design details furnished by the client for the proposed project. If there are revisions to the plans for this project, or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not notified of such changes, PSI will not be responsible for the impact of those changes on the project.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional Geotechnical Engineering practices in the local area. No other warranties are implied or expressed. This report may not be copied without the expressed written permission of PSI.

After the plans and specifications are more complete, the Geotechnical Engineer should be retained and provided the opportunity to review the final design plans and specifications to check that the engineering recommendations have been properly incorporated in the design documents. At this time, it may be necessary to submit supplementary recommendations. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project.

This report has been prepared for the exclusive use of Lennar for specific application to the proposed Navarro Ranch Addition Phase 1 - Streets and Preliminary Foundation Recommendations to be constructed at Harborth Road in Seguin, Texas.

APPENDIX



intertek psi

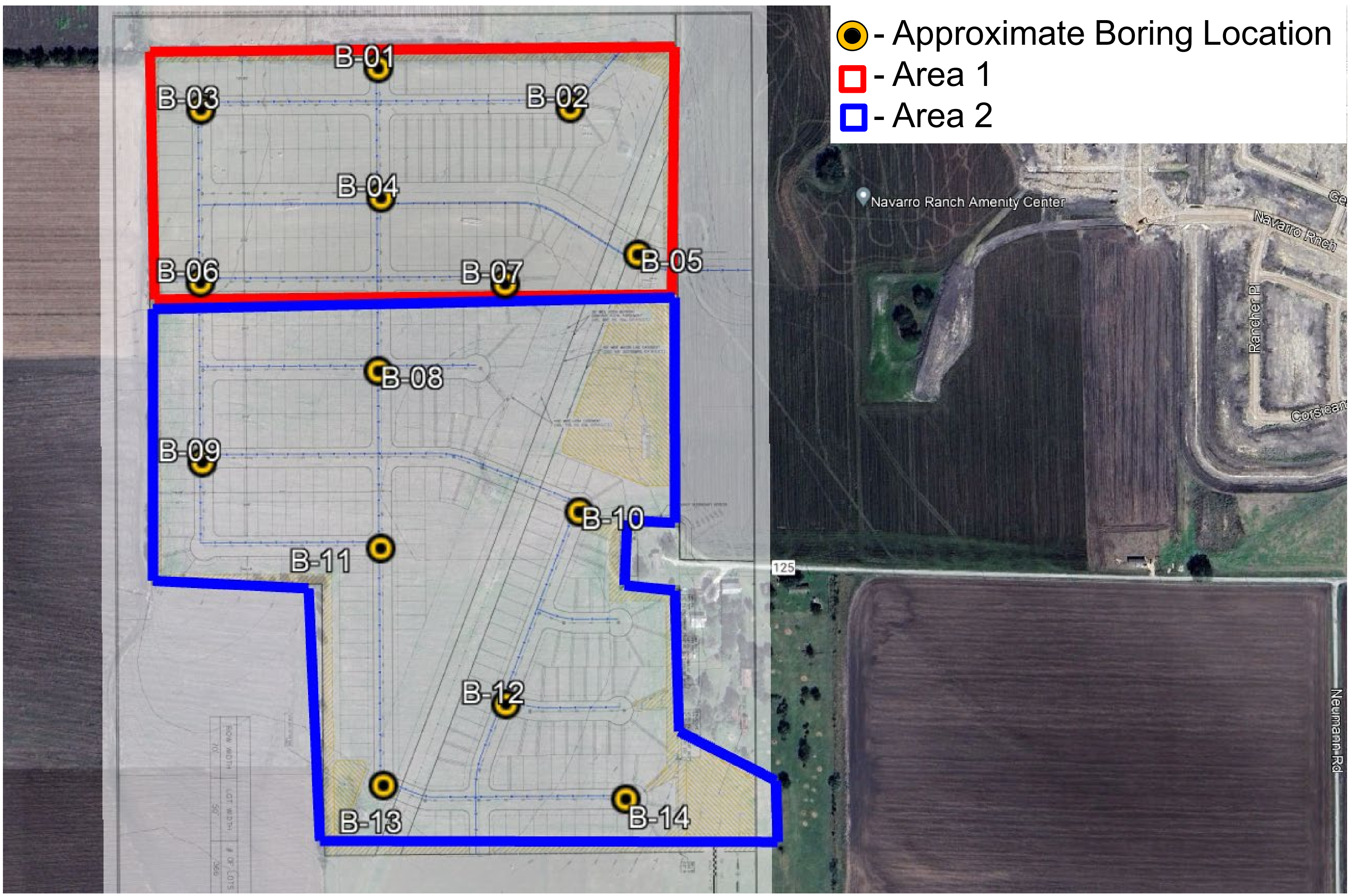
3 Burwood Lane, San Antonio, Texas
(210) 342-9377 FAX (210) 342-9401

Site Vicinity Map

Proposed Navarro Ranch Addition Phase 1
Harborth Road
Seguin, Texas
PSI Project No.: 0312-3224

NOT TO SCALE

N



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3 Burwood Lane, San Antonio, Texas
(210) 342-9377 FAX (210) 342-9401

Boring Location Plan

Proposed Navarro Ranch Addition Phase 1
Harborth Road
Seguin, Texas
PSI Project No.: 0312-3224

NOT TO SCALE

N

CBR Results

CALIFORNIA BEARING RATIO - ASTM D1883

Project Name:	Navarro Ranch Addition Phase 1	Date:	6/24/2024
Project Number:	0312-3224		
Material Description:	FAT CLAY (CH)		

Number of Blows/Lift:	30	Wt. Hammer (lbs):	5.5
Maximum Lab Dry Density (pcf):	91	Drop (in):	12
95% of Max Dry Density (pcf):	86.5	Opt. Moisture:	26.6
		Piston Area (in^2):	3.00
Equipment ID:	7CBR311	Moisture Added (%)	15.72

CBR Mold Information

Wt. of Mold (g):	7171
Weight of Mold & Soil (g):	10536.5
Weigh of Soil (g):	3365.5
Wet Density (pcf):	98.90
Dry Density (pcf):	**85.47**
Volume of Mold (ft^3):	0.075

Compaction Test Results

Penetration (in/mm)		Reading Data Ratio @ 1.3mm/0.05 in per minute		
		Load (lb)	Total psi	CBR
0.000	0.000	0.0	0.0	
0.025	0.635	22.8	7.6	
0.050	1.270	35.2	11.7	
0.075	1.910	43.0	14.3	
0.100	2.540	49.7	16.6	1.7
0.125	3.180	54.3	18.1	
0.150	3.810	58.4	19.5	
0.175	4.450	62.2	20.7	
0.200	5.080	65.6	21.9	1.5
0.250	6.350	70.5	23.5	
0.300	7.620	75.1	25.0	
0.350	8.890	80.3	26.8	
0.400	10.160	84.4	28.1	
0.450	11.430	86.6	28.9	
0.500	12.700	90.9	30.3	

Compaction and Moisture Data

Compaction		Molded Moisture		
			Before	After
Wt. of Mold:		Tare ID:	1	2
Mold Dia:		Wet + Tare:	87.12	90.19
Mold Height:		Dry + Tare:	76.91	79.27
Spacer Disc Height:		Tare:	31.8	31.69
		% Moist	22.634	22.951

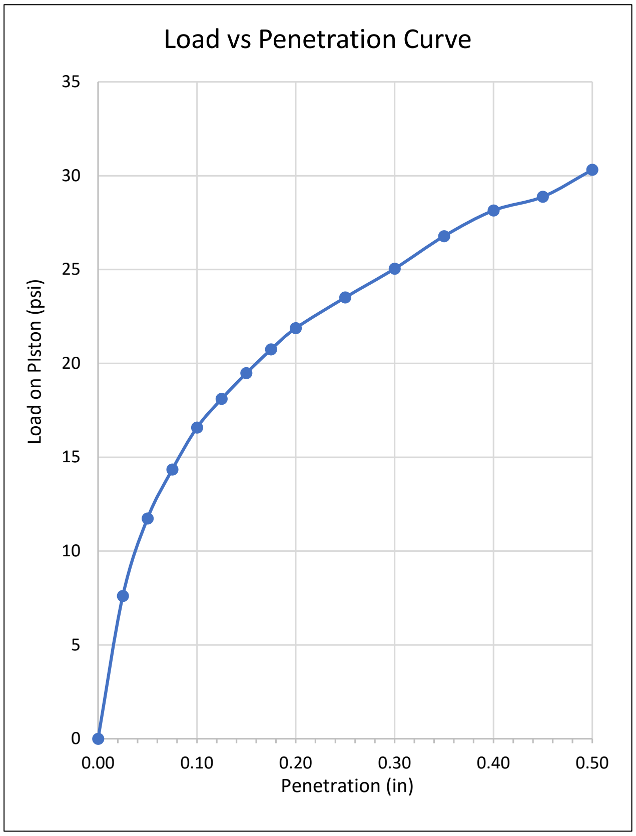
Soaking Data

Date	Time	Days	Reading	Swell (%)
6/11/2024	9:55 AM	0	0.0326	--
6/12/2024	10:50 AM	1	0.0496	52.15%
6/13/2024	1:18 PM	2	0.0521	59.82%
6/14/2024	9:53 AM	3	0.0531	62.88%
6/15/2024	7:32 AM	4	0.0535	64.11%

After Moisture Top 1"

Tare ID:	X107
Wet + Water:	266.96
Dry + Tare:	218.02
Tare:	89.08
% Moisture:	**38.0**

Actual Compaction:	**94%**



CALIFORNIA BEARING RATIO - ASTM D1883

Project Name:	Navarro Ranch Addition Phase 1	Date:	6/24/2024
Project Number:	0312-3224		
Material Description:	FAT CLAY (CH)		

Number of Blows/Lift:	45	Wt. Hammer (lbs):	5.5
Maximum Lab Dry Density (pcf):	91	Drop (in):	12
95% of Max Dry Density (pcf):	86.45	Opt. Moisture:	26.6
		Piston Area (in^2):	3.00
Equipment ID:	12CBR311	Moisture Added (%)	15.72

CBR Mold Information

Wt. of Mold (g):	7147
Weight of Mold & Soil (g):	10582
Weigh of Soil (g):	3435
Wet Density (pcf):	100.94
Dry Density (pcf):	**87.23**
Volume of Mold (ft^3):	0.075

Compaction and Moisture Data

Compaction		**Molded Moisture**		
			Before	After
Wt. of Mold:		Tare ID:	3	4
Mold Dia:		Wet + Tare:	75.4	77.99
Mold Height:		Dry + Tare:	67.16	69.19
Spacer Disc Height:		Tare:	31.54	31.86
		% Moist	23.133	23.574

Soaking Data

Date	Time	Days	Reading	Swell (%)
6/11/2024	10:35 AM	0	0.0341	--
6/12/2024	10:50 AM	1	0.0413	21.11%
6/13/2024	1:18 PM	2	0.0426	24.93%
6/14/2024	9:53 AM	3	0.0432	26.69%
6/15/2024	7:32 AM	4	0.0438	28.45%

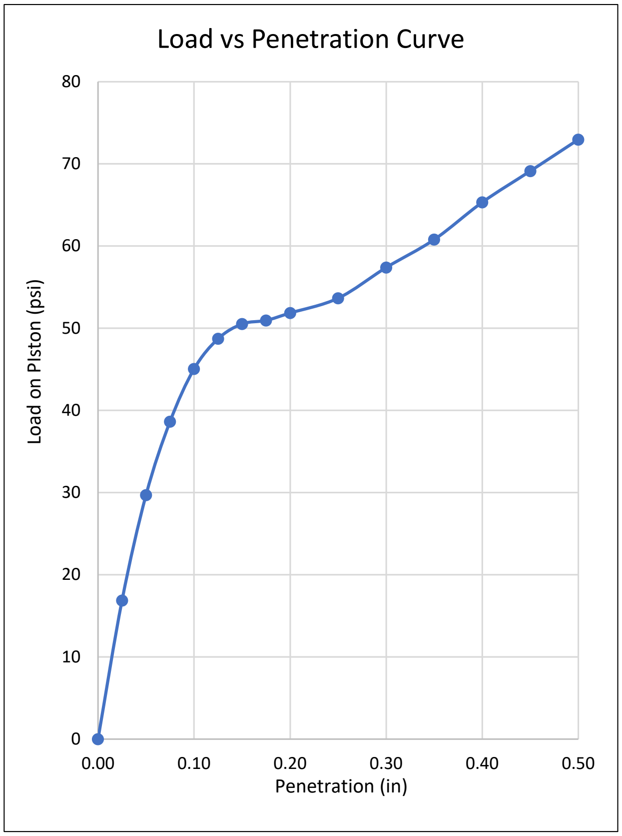
After Moisture Top 1"

Tare ID:	C101
Wet + Water:	233.78
Dry + Tare:	199.43
Tare:	88.23
% Moisture:	**30.890**

Actual Compaction:	**96%**

Compaction Test Results

Penetration (in/mm)		**Reading Data Ratio @ 1.3mm/0.05 in per minute**		
		Load (lb)	**Total psi**	**CBR**
0.000	0.000	0.0	0.0	
0.025	0.635	50.6	16.9	
0.050	1.270	89.1	29.7	
0.075	1.910	115.9	38.7	
0.100	2.540	135.1	45.1	4.5
0.125	3.180	146.1	48.7	
0.150	3.810	151.5	50.5	
0.175	4.450	152.8	51.0	
0.200	5.080	155.5	51.9	3.5
0.250	6.350	160.9	53.7	
0.300	7.620	172.1	57.4	
0.350	8.890	182.3	60.8	
0.400	10.160	195.9	65.3	
0.450	11.430	207.3	69.1	
0.500	12.700	218.8	73.0	



CALIFORNIA BEARING RATIO - ASTM D1883

Project Name:	Navarro Ranch Addition Phase 1	Date:	6/24/2024
Project Number:	0312-3224		
Material Description:	FAT CLAY (CH)		

Number of Blows/Lift:	55	Wt. Hammer (lbs):	5.5
Maximum Lab Dry Density (pcf):	91	Drop (in):	12
95% of Max Dry Density (pcf):	86.45	Opt. Moisture:	26.6
		Piston Area (in^2):	3.00
Equipment ID: 4CBR311		Moisture Added (%)	15.72

Compaction Test Results

Penetration (in/mm)		Reading Data Ratio @ 1.3mm/0.05 in per minute		
		Load (lb)	Total psi	CBR
0.000	0.000	0.0	0.0	
0.025	0.635	54.6	18.2	
0.050	1.270	90.3	30.1	
0.075	1.910	114.2	38.1	
0.100	2.540	128.4	42.8	4.3
0.125	3.180	138.6	46.2	
0.150	3.810	142.3	47.5	
0.175	4.450	142.6	47.6	
0.200	5.080	143.1	47.7	3.2
0.250	6.350	148.9	49.7	
0.300	7.620	156.1	52.1	
0.350	8.890	163.6	54.6	
0.400	10.160	172.7	57.6	
0.450	11.430	179.7	59.9	
0.500	12.700	189.1	63.1	

CBR Mold Information

Wt. of Mold (g):	7168
Weight of Mold & Soil (g):	10868
Weigh of Soil (g):	3700
Wet Density (pcf):	108.73
Dry Density (pcf):	**93.96**
Volume of Mold (ft^3):	0.075

Compaction and Moisture Data

Compaction		Molded Moisture		
			Before	After
Wt. of Mold:		Tare ID:	5	6
Mold Dia:		Wet + Tare:	75	78.18
Mold Height:		Dry + Tare:	66.97	69.92
Spacer Disc Height:		Tare:	31.62	31.81
		% Moist	22.716	21.674

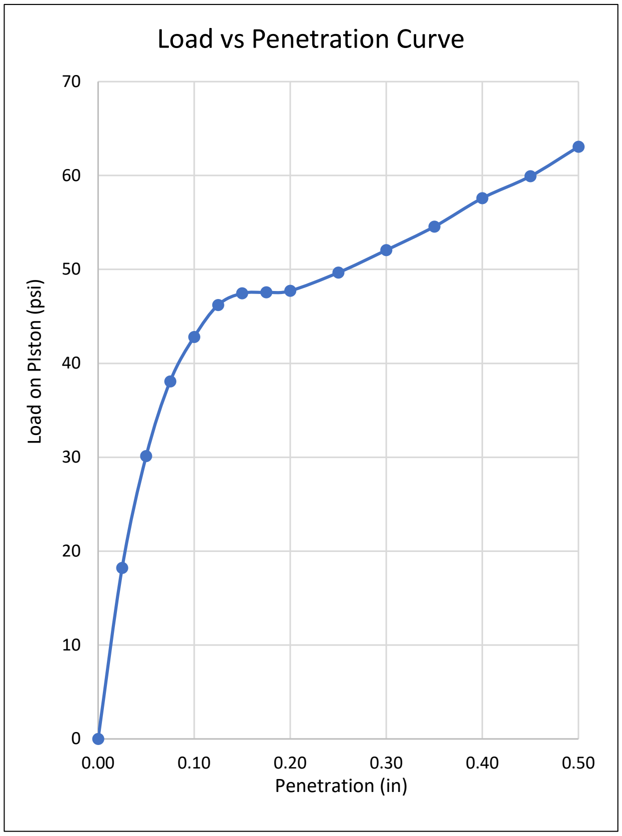
Soaking Data

Date	Time	Days	Reading	Swell (%)
6/11/2024	11:25 AM	0	0.0313	--
6/12/2024	10:50 AM	1	0.0406	29.71%
6/13/2024	1:18 PM	2	0.0421	34.50%
6/14/2024	9:53 AM	3	0.0428	36.74%
6/15/2024	7:32 AM	4	0.0434	38.66%

After Moisture Top 1"

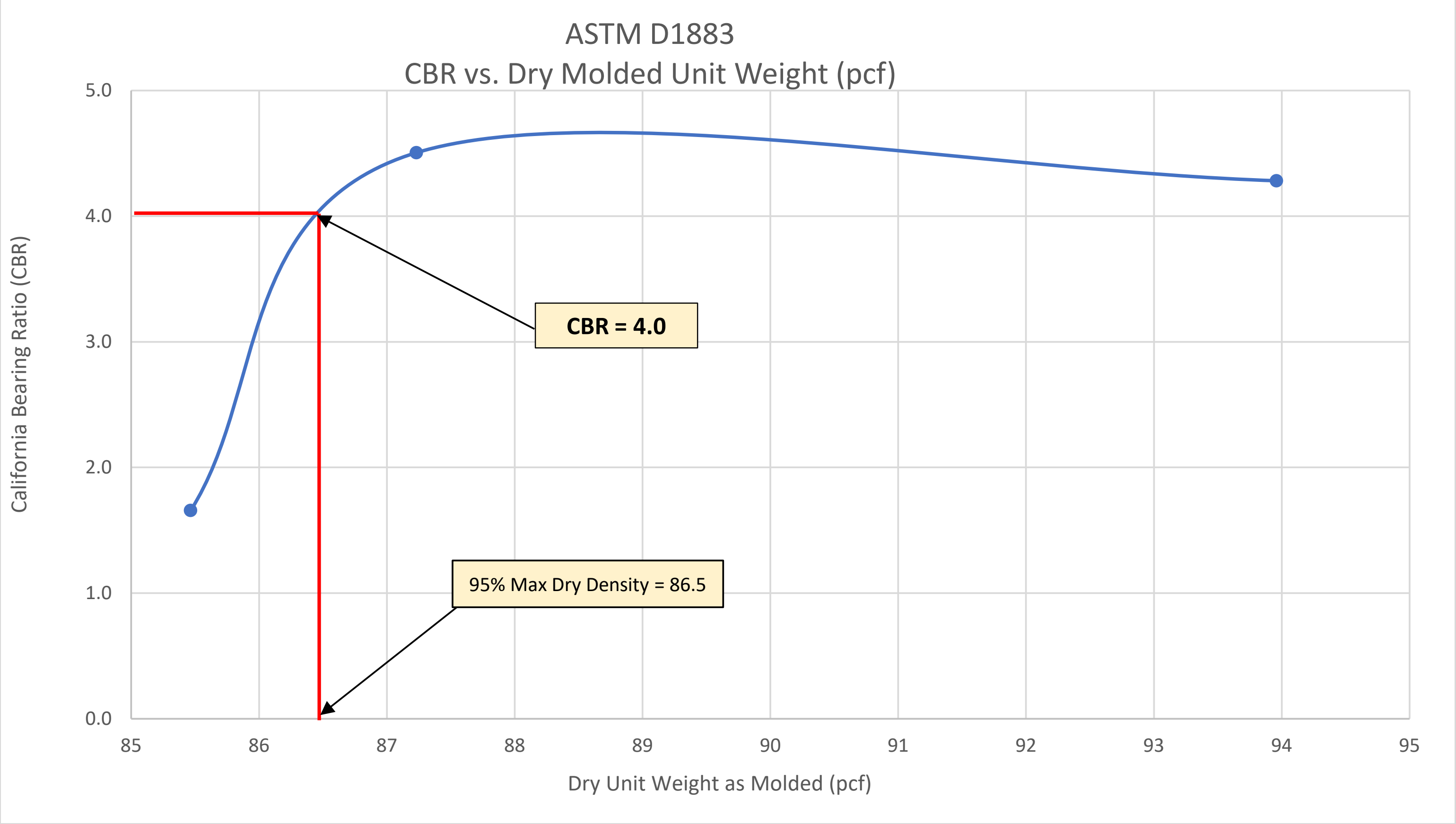
Tare ID:	X561
Wet + Water:	275.65
Dry + Tare:	228.45
Tare:	88.41
% Moisture:	**33.705**

Actual Compaction:	**103%**



Test No.	Blows/lift	Dry Unit Weight	% Compact.	Water Content %	CBR at 0.1 in	CBR at 0.2 in
1	30	85.47	94%	38.0	1.7	1.5
2	45	87.23	96%	30.9	4.5	3.5
3	55	93.96	103%	33.7	4.3	3.2

95% Max Dry Density (pcf)	**86.5**	**Selected CBR Value**	**4.0**	**FAT CLAY (CH)**



Navarro Ranch Addition Phase 1 (Area 1)
Seguin, Texas

PSI Project No. 0312-3224

Boring Logs

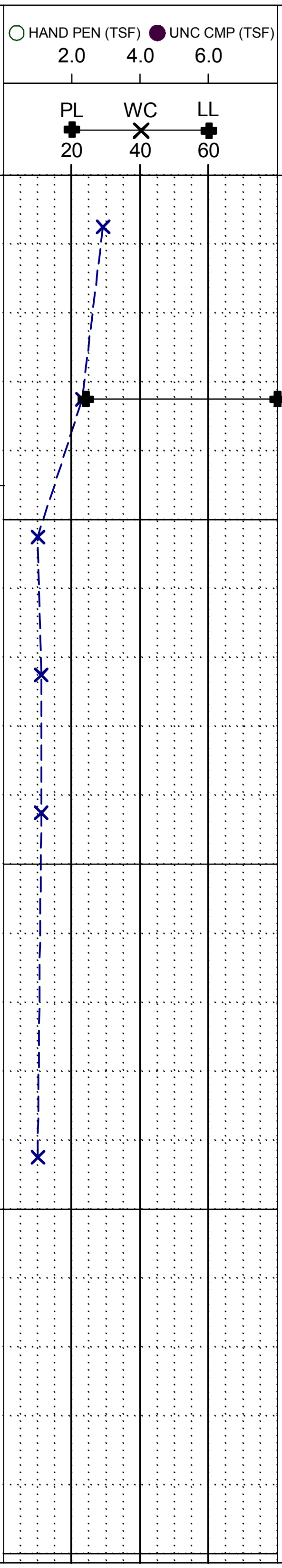
Navarro Ranch Addition Phase I - Streets and Preliminary
Harborth Road, Seguin, Texas
Project No. 0312-3224

BORING B-01

LOCATION: See Boring Location Plan

Elevation:

SOIL DESCRIPTION	MOISTURE CONTENT	% RETAINED #4	% PASSING #200	SPT (N) & TCP (T) VALUES	% REC	%RQD	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNCONF. COMP. (TSF)	UNIT DRY WT. (LB/CU FT)
FAT CLAY (CH), brown, firm	29			4							
	23	0	93	5			80	24	56		
LEAN CLAY (CL) with SAND, tan, hard	10			33							
	11			34							
	11			70							
	10			64							
Boring terminated at approximately 15 feet.											



COMPLETION DEPTH: 15.0 Feet
DATE: 6/4/24

DEPTH TO GROUND WATER
SEEPAGE (ft.): NONE ENCOUNTERED
END OF DRILLING (ft.): NONE ENCOUNTERED
DELAYED WATER LEVEL (FT): NONE ENCOUNTERED

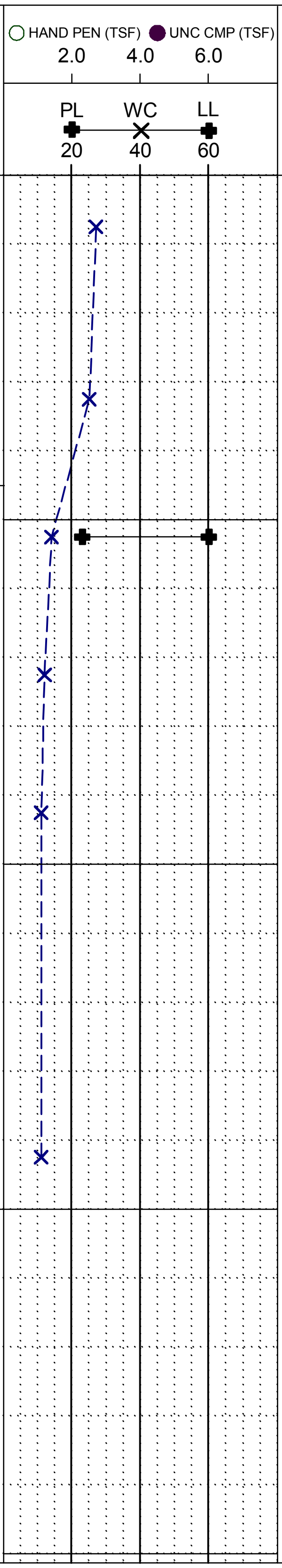
Navarro Ranch Addition Phase I - Streets and Preliminary
Harborth Road, Seguin, Texas
Project No. 0312-3224

BORING B-02

LOCATION: See Boring Location Plan

Elevation:

DEPTH, FT.	SYMBOL	SAMPLES	WATER	SOIL DESCRIPTION	MOISTURE CONTENT	% RETAINED #4	% PASSING #200	SPT (N) & TCP (T) VALUES	% REC	%RQD	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNCONF. COMP. (TSF)	UNIT DRY WT. (LB/CU FT)
	▨	☒		FAT CLAY (CH), brown, stiff	27			8							
	▨	☒			25			9							
5	▨	☒		FAT CLAY (CH) with SAND, tan, very stiff to hard	14	0	85	20			60	23	37		
	▨	☒			12			21							
	▨	☒			11			71							
10	▨														
	▨	☒			11			74							
15				Boring terminated at approximately 15 feet.											
20															



COMPLETION DEPTH: 15.0 Feet
DATE: 6/4/24

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DEPTH TO GROUND WATER
SEEPAGE (ft.): NONE ENCOUNTERED
END OF DRILLING (ft.): NONE ENCOUNTERED
DELAYED WATER LEVEL (FT): NONE ENCOUNTERED

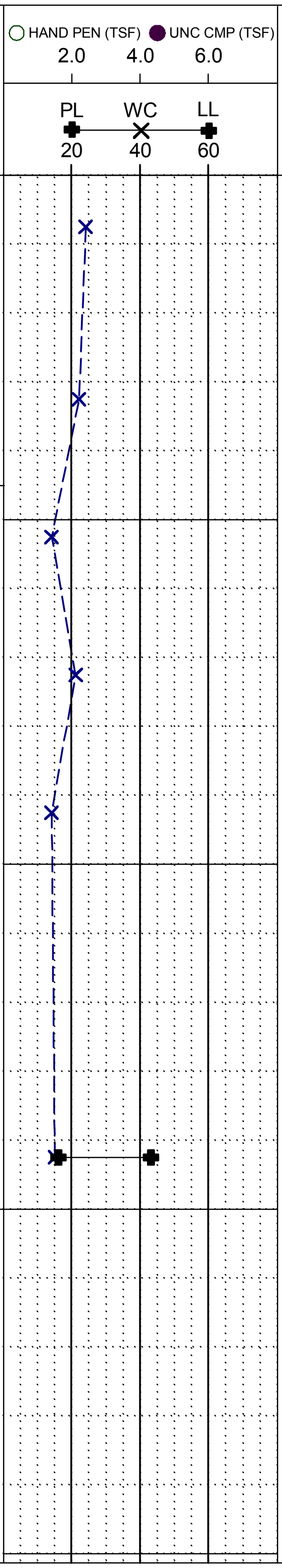
Navarro Ranch Addition Phase I - Streets and Preliminary
Harborth Road, Seguin, Texas
Project No. 0312-3224

BORING B-03

LOCATION: See Boring Location Plan

Elevation:

DEPTH, FT.	SYMBOL	SAMPLES	WATER	SOIL DESCRIPTION	MOISTURE CONTENT	% RETAINED #4	% PASSING #200	SPT (N) & TCP (T) VALUES	% REC	%RQD	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNCONF. COMP. (TSF)	UNIT DRY WT. (LB/CU FT)
				FAT CLAY (CH), brown, stiff to very stiff	24			10							
					22			22							
5				LEAN CLAY (CL) with SAND, tan, very stiff to hard	14			24							
					21			20							
10					14			27							
					15	0	79	30			43	16	27		
15				Boring terminated at approximately 15 feet.											
20															



COMPLETION DEPTH: 15.0 Feet
DATE: 6/4/24

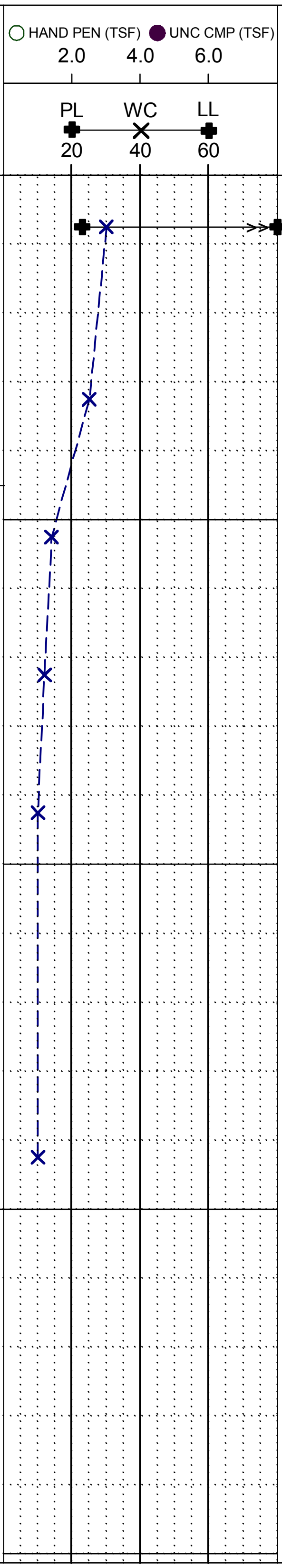
DEPTH TO GROUND WATER
SEEPAGE (ft.): NONE ENCOUNTERED
END OF DRILLING (ft.): NONE ENCOUNTERED
DELAYED WATER LEVEL (FT): NONE ENCOUNTERED

Navarro Ranch Addition Phase I - Streets and Preliminary
Harborth Road, Seguin, Texas
Project No. 0312-3224

BORING B-04

LOCATION: See Boring Location Plan

DEPTH, FT.	SYMBOL	SAMPLES	WATER	SOIL DESCRIPTION Elevation:	MOISTURE CONTENT	% RETAINED #4	% PASSING #200	SPT (N) & TCP (T) VALUES	% REC	%RQD	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNCONF. COMP. (TSF)	UNIT DRY WT. (LB/CU FT)
				FAT CLAY (CH), brown, stiff to very stiff	30	0	93	9			86	23	63		
					25			15							
5				LEAN CLAY (CL) with SAND, tan, very stiff to hard	14			27							
					12			37							
10					10			41							
15					10			53							
20				Boring terminated at approximately 15 feet.											



COMPLETION DEPTH: 15.0 Feet
DATE: 6/4/24

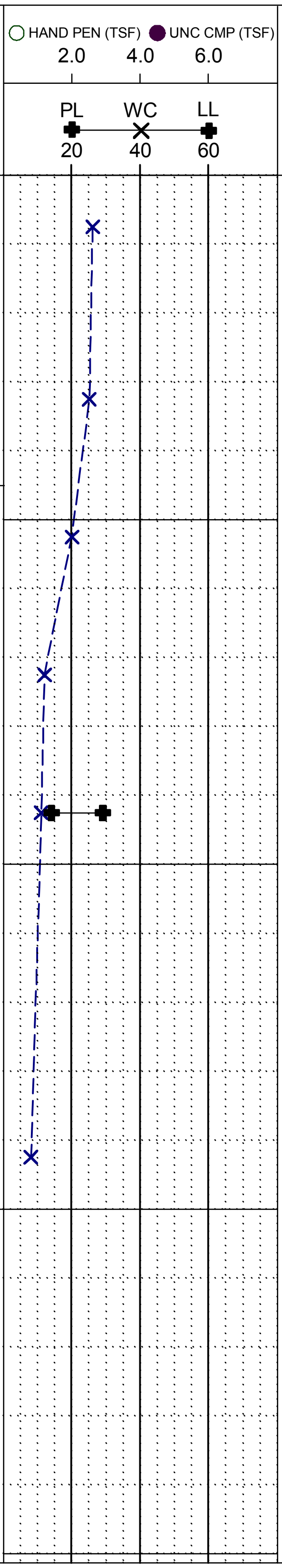
DEPTH TO GROUND WATER
SEEPAGE (ft.): NONE ENCOUNTERED
END OF DRILLING (ft.): NONE ENCOUNTERED
DELAYED WATER LEVEL (FT): NONE ENCOUNTERED

Navarro Ranch Addition Phase I - Streets and Preliminary
Harborth Road, Seguin, Texas
Project No. 0312-3224

BORING B-05

LOCATION: See Boring Location Plan

DEPTH, FT.	SYMBOL	SAMPLES	WATER	SOIL DESCRIPTION Elevation:	MOISTURE CONTENT	% RETAINED #4	% PASSING #200	SPT (N) & TCP (T) VALUES	% REC	%RQD	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNCONF. COMP. (TSF)	UNIT DRY WT. (LB/CU FT)
				FAT CLAY (CH), brown, firm to stiff	26			7							
					25			8							
5				LEAN CLAY (CL) with SAND, tan, very stiff to hard	20			15							
					12			29							
					11	0	75	51			29	14	15		
10															
					8			57							
15				Boring terminated at approximately 15 feet.											
20															



COMPLETION DEPTH: 15.0 Feet
DATE: 6/4/24

DEPTH TO GROUND WATER
SEEPAGE (ft.): NONE ENCOUNTERED
END OF DRILLING (ft.): NONE ENCOUNTERED
DELAYED WATER LEVEL (FT): NONE ENCOUNTERED

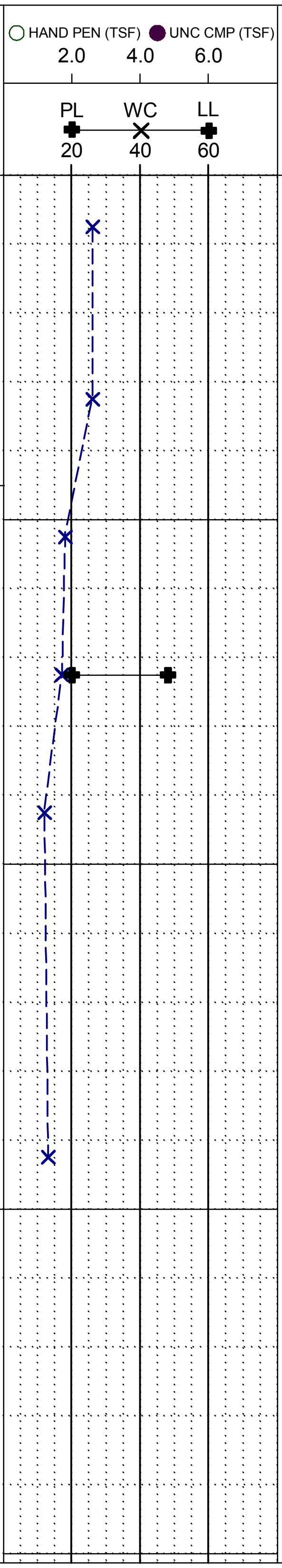
Navarro Ranch Addition Phase I - Streets and Preliminary
Harborth Road, Seguin, Texas
Project No. 0312-3224

BORING B-06

LOCATION: See Boring Location Plan

Elevation:

DEPTH, FT.	SYMBOL	SAMPLES	WATER	SOIL DESCRIPTION	MOISTURE CONTENT	% RETAINED #4	% PASSING #200	SPT (N) & TCP (T) VALUES	% REC	%RQD	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNCONF. COMP. (TSF)	UNIT DRY WT. (LB/CU FT)
	▨	☒		FAT CLAY (CH), brown, stiff to very stiff	26			8							
		☒			26			23							
5	▨	☒		LEAN CLAY (CL), tan, very stiff to hard	18			20							
		☒			17	0	91	22			48	20	28		
		☒			12			39							
10															
		☒			13			37							
15				Boring terminated at approximately 15 feet.											
20															



COMPLETION DEPTH: 15.0 Feet
DATE: 6/4/24

intertek psi

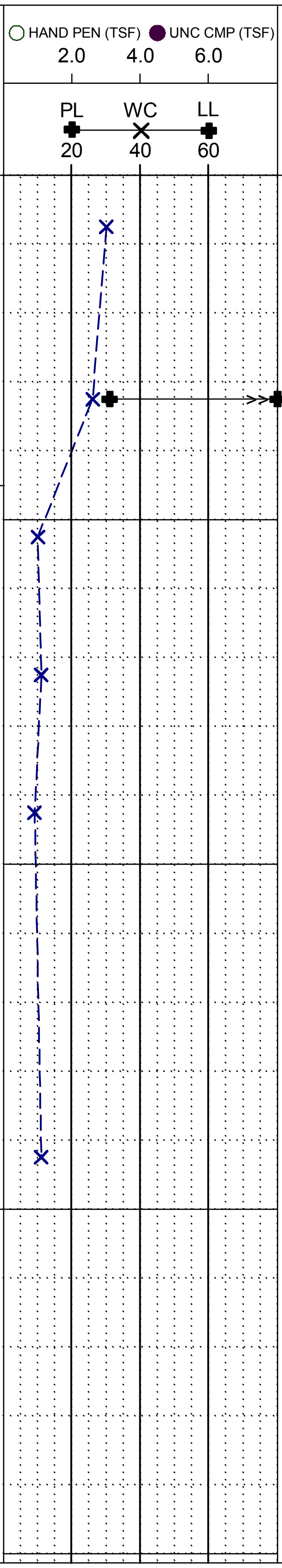
DEPTH TO GROUND WATER
SEEPAGE (ft.): NONE ENCOUNTERED
END OF DRILLING (ft.): NONE ENCOUNTERED
DELAYED WATER LEVEL (FT): NONE ENCOUNTERED

Navarro Ranch Addition Phase I - Streets and Preliminary
Harborth Road, Seguin, Texas
Project No. 0312-3224

BORING B-07

LOCATION: See Boring Location Plan

DEPTH, FT.	SYMBOL	SAMPLES	WATER	SOIL DESCRIPTION Elevation:	MOISTURE CONTENT	% RETAINED #4	% PASSING #200	SPT (N) & TCP (T) VALUES	% REC	%RQD	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNCONF. COMP. (TSF)	UNIT DRY WT. (LB/CU FT)
				FAT CLAY (CH), brown, firm to very stiff	30			6							
					26	0	93	15			93	31	62		
5				LEAN CLAY (CL) with SAND, tan, very stiff to hard	10			23							
					11			57							
					9			35							
10															
					11			40							
15				Boring terminated at approximately 15 feet.											
20															



COMPLETION DEPTH: 15.0 Feet
DATE: 6/4/24

DEPTH TO GROUND WATER
SEEPAGE (ft.): NONE ENCOUNTERED
END OF DRILLING (ft.): NONE ENCOUNTERED
DELAYED WATER LEVEL (FT): NONE ENCOUNTERED

KEY TO TERMS AND SYMBOLS USED ON LOGS

ROCK CLASSIFICATION

RECOVERY

DESCRIPTION OF RECOVERY	% CORE RECOVERY
Incompetent	< 40
Competent	40 TO 70
Fairly Continuous	70 TO 90
Continuous	90 TO 100

ROCK QUALITY DESIGNATION (RQD)

DESCRIPTION OF ROCK QUALITY	RQD
Very Poor (VPo)	0 TO 25
Poor (Po)	25 TO 50
Fair (F)	50 TO 75
Good (Gd)	75 TO 90
Excellent (Exlnt)	90 TO 100

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	N-VALUE (Blows/Foot)	SHEAR STRENGTH (tsf)	HAND PEN VALUE (tsf)
Very Soft	0 TO 2	0 TO 0.125	0 TO 0.25
Soft	2 TO 4	0.125 TO 0.25	0.25 TO 0.5
Firm	4 TO 8	0.25 TO 0.5	0.5 TO 1.0
Stiff	8 TO 15	0.5 TO 1.0	1.0 TO 2.0
Very Stiff	15 TO 30	1.0 TO 2.0	2.0 TO 4.0
Hard	>30	>2.0 OR 2.0+	>4.0 OR 4.0+

SOIL DENSITY OR CONSISTENCY

DENSITY (GRANULAR)	CONSISTENCY (COHESIVE)	THD (BLOWS/FT)	FIELD IDENTIFICATION
Very Loose (VLo)	Very Soft (VSo)	0 TO 8	Core (height twice diameter) sags under own weight
Loose (Lo)	Soft (So)	8 TO 20	Core can be pinched or imprinted easily with finger
Slightly Compact (SlCmpt)	Stiff (St)	20 TO 40	Core can be imprinted with considerable pressure
Compact (Cmpt)	Very Stiff (VSt)	40 TO 80	Core can only be imprinted slightly with fingers
Dense (De)	Hard (H)	80 TO 5"/100	Core cannot be imprinted with fingers but can be penetrated with pencil
Very Dense (VDe)	Very Hard (VH)	5"/100 to 0"/100	Core cannot be penetrated with pencil

DEGREE OF PLASTICITY OF COHESIVE SOILS

DEGREE OF PLASTICITY	PLASTICITY INDEX (PI)	SWELL POTENTIAL
None or Slight	0 to 4	None
Low	4 to 20	Low
Medium	20 to 30	Medium
High	30 to 40	High
Very High	>40	Very High

BEDROCK HARDNESS

MORHS' SCALE	CHARACTERISTICS	EXAMPLES	APPROXIMATE THD PEN TEST	
5.5 to 10	Rock will scratch knife	Sandstone, Chert, Schist, Granite, Gneiss, some Limestone	Very Hard (VH)	0" to 2"/100
3 to 5.5	Rock can be scratched with knife blade	Siltstone, Shale, Iron Deposits, most Limestone	Hard (H)	1" to 5"/100
1 to 3	Rock can be scratched with fingernail	Gypsum, Calcite, Evaporites, Chalk, some Shale	Soft (So)	4" to 6"/100

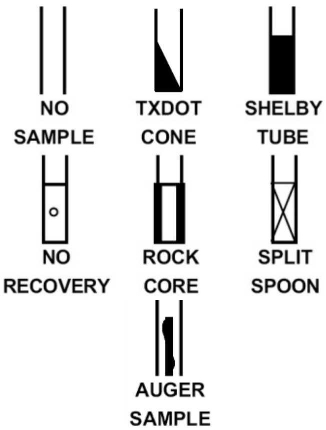
MOISTURE CONDITION OF COHESIVE SOILS

DESCRIPTION	CONDITION
Absence of moisture, dusty, dry to touch	DRY
Damp but no visible water	MOIST
Visible free water	WET

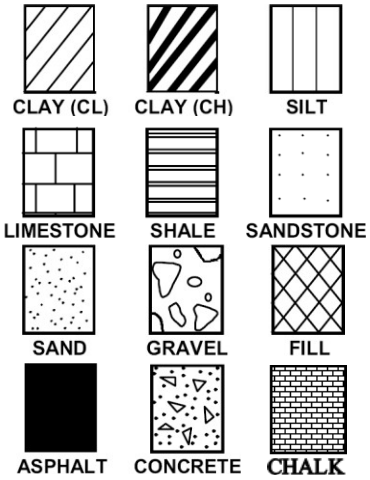
RELATIVE DENSITY FOR GRANULAR SOILS

APPARENT DESNITY	SPT (BLOWS/FT)	CALIFORNIA SAMPLER (BLOWS/FT)	MODIFIED CA. SMAPLER (BLOWS/FT)	RELATIVE DENSITY (%)
Very Loose	0 to 4	0 to 5	0 to 4	0 to 15
Loose	4 to 10	5 to 15	5 to 12	15 to 35
Medium Dense	10 to 30	15 to 40	12 to 35	35 to 65
Dense	30 to 50	40 to 70	35 to 60	65 to 85
Very Dense	>50	>70	>60	85 to 100

SAMPLER TYPES



SOIL TYPES



ABBREVIATIONS

PL – Plastic Limit	Q_P – Hand Penetrometer
LL – Liquid Limit	Q_U – Unconfined Compression Test
WC – Percent Moisture	UU – Unconsolidated Undrained Triaxial

Note: Plot Indicates Shear Strength as Obtained By Above Tests

▽ WATER SEEPAGE

▼ WATER LEVEL AT END OF DRILLING

CLASSIFICATION OF GRANULAR SOILS

U.S. STANDARD SIEVE SIZE(S)

6" 3" 3/4" 4 10 40 200

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		