

GEOTECHNICAL ENGINEERING REPORT

Mary Erskine Building Parking Lot Pavement Recommendations

216 E. College Street
Seguin, Texas

Prepared for:

Debra J. Dockery, Architect, P.C.
San Antonio, Texas

Prepared by:

TTL, Inc.
San Antonio, Texas

Project No. 00260900301.00
March 27, 2026



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RE: **Geotechnical Engineering Report**
Mary Erskine Building Parking Lot
Pavement Recommendations
216 E. College Street
Seguin, Texas
TTL Project No. 00260900301.00


Dear Ms. Dockery:

TTL, Inc. (TTL) is pleased to submit this Geotechnical Engineering Report (Report) for the above-referenced project. If you have any questions regarding our report, or if additional services are needed, please do not hesitate to contact us.


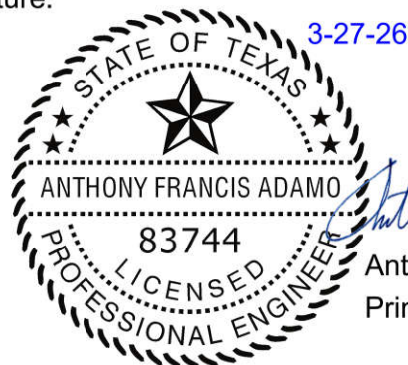
The enclosed report contains a brief description of the site conditions and our understanding of the project. The geotechnical recommendations contained within this report are based on our understanding of the proposed development, the results of our field exploration and laboratory tests, and our experience with similar projects.

We appreciate the opportunity to be of professional service during this phase of the project, and look forward to working with you in the future.

Respectfully submitted,
TTL, Inc.



June M. Potter, PE
Senior Project Engineer



Anthony F. Adamo, PE
Principal Engineer

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GBA Informational Document

APPENDIX A (ILLUSTRATIONS)

- Site Location Map
- Boring Location Plan
- Legend Sheet – Soil
- Boring Log
- Lab Summary

APPENDIX B (REFERENCE MATERIALS)

- Exploration Procedures
- Laboratory Procedures



1.0 PROJECT INFORMATION

Information for this project was provided to us by Ms. Debra Dockery with Dockery Architects. Based on that information, we understand the following.

Item	Description
Project Location	The project site is located at 216 E College Street in Seguin, Texas. (See Site Location Map in Appendix A).
Proposed Development	We understand the historic building at the site is being renovated for use as the Guadalupe Appraisal District's future headquarters. The overall project also includes the conversion of the existing basketball courts into a parking lot, as well as the addition of a new asphaltic concrete parking lot.
Proposed Construction	This geotechnical engineering report pertains to the design and construction of the parking lot only. This geotechnical engineering study is limited solely to the design and construction of the proposed asphaltic concrete parking lot located west of the existing basketball courts. No geotechnical evaluations, analyses, or recommendations are provided for the baseball field parking lot or any other site improvements, as those areas are outside the scope of this study.

If the above information is not correct, please contact us so that we can make the necessary modifications to this document and our evaluation and recommendations, if needed.

1.1 Authorization

This Project was authorized by Ms. Debra J. Dockery, with Debra J. Dockery, Architect, P.C. (Client) on February 3, 2026. Our scope of services was outlined in TTL Proposal No. P00260900301.00, dated February 2, 2026.

2.0 EXPLORATION FINDINGS

2.1 Site Conditions

Item	Description
Existing Conditions	The proposed asphaltic concrete parking lot is located in the southwest portion of the site and currently consists of manicured grass, a former playground area, scattered shrubs along the eastern sidewalk, and mature trees near the southwest and northeast corners.

2.2 Site Geology

We reviewed the Geologic Atlas of Texas to determine the geologic setting of the project site and surrounding area. Our review indicated the Project Site is located primarily over the Leona Formation (Qle) of Quaternary geologic age overlaying the Wilcox Group (Ewi) of Tertiary geologic age. The Leona Formation generally consists of sand, silt, and clay with increasing gravel with depth. The formation ranges in thickness from a few feet to several tens of feet. The Wilcox Group generally consists of mudstone, sandstone, sand, and clay, with varying amounts

of lignite. The formation is known to contain boulders in the project area. This formation is typically about 400 to 1,200 feet in thickness. Key geotechnical engineering considerations for development supported on these materials are the expansive nature of the clays and the granular sand materials that may be encountered at relatively shallow depths.

2.3 Subsurface Stratigraphy

Subsurface conditions within the limits of the project were evaluated by drilling one exploratory boring and collecting a bulk sample at the approximate locations shown on the Boring Location Plan included in Appendix A. Samples obtained during our field exploration were transported to our laboratory where they were reviewed by geotechnical engineering personnel. Representative samples were selected and tested to determine pertinent engineering properties and characteristics for use in our evaluation of the project site. Based on the information developed during our field exploration and laboratory testing, we have determined the stratigraphy of the site is generally as shown on the log of boring as shown in Appendix A.

The boring log presented in Appendix A represents our interpretation of the subsurface conditions at the individual boring location. Our interpretation is based on tests and observations performed during drilling operations, visual examination of the soil samples by a geotechnical engineer, and laboratory tests conducted on the retrieved soil samples. The Unified Soil Classification System (USCS) classifications shown on the boring log represents classifications based on either visual examination, laboratory testing, or both. The lines designating the interfaces between various strata on the boring log represents the approximate strata boundary. The transition between strata may be more gradual than shown, especially where indicated by a broken line. All data should only be considered accurate at the exact test boring location.

2.4 Subsurface Water Conditions

Subsurface water was not detected either during or upon completion of our exploratory boring. Upon completion of subsurface water observations, the borehole was backfilled with soil cuttings.

The presence or absence of subsurface water during a geotechnical exploration may not be indicative of long-term subsurface water conditions at the project site. Subsurface water may exist as ‘true’ or permanent water sources or as temporary ‘perched’ sources. Furthermore, these water sources may or may not be contiguous across a given project site. Subsurface water may exist year-round or may appear intermittently. The presence or absence of subsurface water and the elevations at which it may be encountered can be influenced by a wide range of factors that often include seasonal and climatic changes, vegetation, surface runoff, and the proximity of the site to nearby water bodies. While subsurface water was not encountered in these materials during our drilling operations, it is possible that subsurface water could be present at other times, especially after periods of heavy rainfall or prolonged wet weather.

3.0 GEOTECHNICAL CONSIDERATIONS

The following geotechnical considerations have been prepared based on the information developed during this Project, our experience with similar projects, and our knowledge of sites with similar surface and subsurface conditions.

The expansive potential of a given soil profile may be characterized using the Potential Vertical Rise (PVR) methodology as described in the Texas Department of Transportation (TxDOT) Method TEX-124-E. This methodology is used to estimate how much a given point located on the ground surface may move due to volumetric changes in the soil resulting from fluctuations in soil moisture content. **Based on our laboratory test results, the estimated PVR of this site is approximately 1 to 2 inches in its present condition.** The actual movement could be greater if inadequate drainage or other sources of water are allowed to infiltrate beneath the pavements after construction.

In pavement areas, volumetric changes in the clayey subgrade may cause vertical and horizontal movements that result in undulating surface effects. These movements may eventually lead to curb and pavement cracking (both transverse and longitudinal). Therefore, even with the pavements being properly designed and constructed, the pavement section may still not perform as intended due to the clayey movement. Remedial methods to address this issue include: a combination of moisture conditioning, lime or cement treatment, and installation of a vertical moisture barrier; other subgrade preparation methods are also available. If additional earthwork preparation methods are used or need to be evaluated, please contact us.

3.1 Corrosion Considerations

According to the 2024 IBC, concrete that is exposed to sulfate-containing solutions should be designed in accordance with ACI 318. To evaluate if sulfate exposure was a concern at this site, laboratory testing was conducted on soil samples recovered during the field exploration to assess the corrosivity risk of the soil at the boring and CBR locations. The soil samples were submitted to an analytical lab to determine the sulfate content. The results of the laboratory tests are presented in the following table.

Boring/CBR No.	Sample Depth (ft.)	% Sulfate by Mass	ACI 318-25 Exposure Class
B-01	4½ - 6	<0.02	S0
CBR-01	0 - 2	<0.02	S0

The sulfate test results indicate that the sulfate exposure level is Class S0. Therefore, Type I/II cement may be used. In addition, sulfate induced heave will not be an issue at this site.

4.0 EARTHWORK RECOMMENDATIONS

4.1 General Site Preparation

The intended performance of the pavement is contingent upon following the earthwork recommendations and guidelines outlined in this section. Earthwork activities on the Project should be observed and evaluated by *TTL* personnel. The evaluation of earthwork should include observation and testing of all fill and backfill soils placed at the Site, and subgrade preparation beneath the parking lot.

The following earthwork recommendations must be performed prior to pavement construction.

- Strip loose topsoil, vegetation, and any otherwise unsuitable materials from the pavement area. Undercut soft, weak, and unstable soils by excavating below subgrade level to expose stable soils. The pavement area is defined as the area that extends at least 3 feet (horizontal) beyond the perimeter of the proposed pavement and any adjacent flatwork (sidewalks).
- Perform cut and fill to accommodate at least a minimum of 6 inches of moisture-conditioned soil beneath the pavement structure.
- After achieving the required excavation depth, and before placing any fill, the exposed excavation subgrade should be proof-rolled with at least a 20-ton roller, or equivalent equipment, to evidence any weak yielding zones. A technical representative of our firm should be present to observe the proof-rolling operations. If any weak yielding zones are present, they should be over-excavated, both vertically and horizontally, until competent soils are exposed.
- The excavated soil can be used to restore the excavation subgrade if it is lime treated, provided that the soils are relatively free and clean of deleterious material or materials exceeding 3 inches in maximum dimension. The excavated soil, or imported fill soil, shall be placed in a maximum of 6-inch compacted lifts.
- Soil shall be moisture conditioned between -1 to +3 percentage points of the optimum moisture content and compacted to at least 95 percent of the maximum dry density determined in accordance with the Standard compaction effort (ASTM D 698).

4.2 Excavation Considerations

The near-surface soils (i.e., upper 5 feet) observed at the boring location is generally LEAN CLAY WITH SAND soil materials with a stiff to very stiff consistency. Generally, soils penetrated by geotechnical drilling equipment such as those encountered at this site can be removed with conventional earthmoving equipment.

Temporary construction excavations less than 20 feet deep should be sloped or shored by the contractor in accordance with OSHA requirement. The on-site soils appear to be OSHA Type B soils. OSHA requires temporary excavation slopes no steeper than 1-horizontal to 1-vertical (1H:1V). The contractors "competent person" should evaluate temporary excavations daily and

determine the specific soil types and temporary slope or shoring measures necessary according to OSHA requirements. Temporary excavations taller/deeper than 20 feet must be designed specifically by a registered engineer and cannot be made based on OSHA soil types. Design of temporary excavations was not part of our scope of services. TTL assumes no responsibility for excavations, shoring, or job site safety, which are the sole responsibility of the general contractor.

4.3 Compacted Fill

Compacted fill is new fill material (typically soil, but can also include crushed stone) placed as backfill in undercut excavations and utility excavations, or placed to raise final site grades above existing site grades below slopes, pavements, and structures. Fill that is placed outside of current or proposed development areas is sometimes called “common fill” or “general fill.” Materials that do not meet compacted fill requirements may sometimes be used in these “common” or “general” fill areas. In addition, materials that meet requirements for compacted fill may also be used in these areas. Junk, garbage, organic strippings, and other deleterious materials (which can decay, rot, or corrode over time) should not be used as fill in any site areas.

Criteria for fill characteristics, compaction procedures, and compaction control are listed in the table below. Fill placement and compaction should be observed by our representative on a full-time basis. The on-site clay materials should not be used as compacted fill unless they are treated to reduce their swell/shrink potential.

Fill operations should not begin until representative soil samples are collected from proposed borrow areas and tested for plasticity and moisture/density relationship (allow 3 to 4 days for sampling and testing soil). The test results will be used to determine whether the proposed borrow material meets project specifications.

Please note that using granular select fill for construction of the pavement can result in a “bathtub condition” in which water from precipitation and landscaping migrating and collecting beneath the pavement. This water is often confined by the less permeable clay soils that surround the bottom and perimeter sides of the pavement area. Since water has no way to drain out of the granular fill, its only escape is to be absorbed by the surrounding clay soils. Granular select fill should not be used to construct the pavement subgrade.

MATERIAL TYPE	CHARACTERISTICS	COMPACTION PROCEDURES	COMPACTION CONTROL ^{1, 2}
SOIL	Maximum particle size: 3 inches. Maximum gravel and oversize particle content: 15 percent retained on a ¾-inch sieve. Minimum fines content: 70 percent passing the No. 200 sieve Maximum allowable organic content: 3 percent by weight, but large roots are not allowed. Liquid Limit: Not more than 40. Plasticity Index: Not more than 20 (off-site materials) and not more than 25 (on-site materials).	Maximum loose lift thickness: 8 inches for full-sized compaction equipment. It may be necessary to reduce lift thickness when using smaller or hand-held equipment. Compaction requirement: Compaction should be to at least 95 percent of the standard Proctor (ASTM D 698) maximum dry density (MDD). Moisture content at time of compaction: within plus 3 percent to minus 1 percent of the material's optimum moisture content.	Pavement Areas and Slopes: One field density test every 10,000 square feet per lift, with a minimum of two tests per lift. Utility Trenches: One field density test per structure or one test per every 100 linear feet, per lift. Field density tests of compacted soil fill should be done using either the nuclear method (ASTM D6938), the sand cone method (ASTM D1556), or the drive-cylinder method (ASTM D2937), as appropriate for the fill materials. Proof-rolling lifts of fill SHALL NOT be permitted as a means of evaluating compaction of soil fill for compliance with these recommendations.
<p>¹ For planning only. Our technician/engineer should determine the actual test frequency. ² In addition, the fill must be stable under the influence of compaction equipment. Heavy construction traffic should not be allowed to travel on compacted fill areas, except on designated haul roads, to reduce the potential for damaging a previously compacted fill subgrade.</p>			

4.4 Drainage Considerations

4.4.1 Surface Water

Site development and excavations should not be performed during or immediately following periods of heavy precipitation. Positive surface drainage should be maintained during grading operations and construction to prevent water from ponding on the surface. Surface water run-off from off-site areas should be diverted around the site using berms or ditches. The soil surface can be rolled smooth to enhance drainage if precipitation is expected, but should then be scarified and moisture-conditioned, as needed, prior to resuming fill placement.

4.4.2 Drainage During Construction

Water should not be allowed to collect in excavations or on prepared subgrades within the construction area. Excavated areas should be sloped toward designated drainage points to facilitate the removal of collected rainwater, subsurface water, or surface runoff. Positive surface drainage should be provided to reduce infiltration of surface water into subgrades and fill bodies during construction and to promote prompt removal of water from the project site.

Clay soils can degrade after repeated passes of heavy, rubber-tired equipment, particularly in wet weather. If possible, site development should be performed during seasonably dry weather (typically May through October), and excavation and site preparation should not be performed during or immediately following periods of heavy precipitation or freezing temperatures. Positive surface drainage should be maintained during grading operations and construction to prevent water from ponding on the surface. When work activities are interrupted by heavy rainfall, fill



operations should not be resumed until the moisture content and density of the previously placed fill materials are as recommended in this report.

Groundwater was not encountered but perched water could still develop. The contractor should be ready to remove seepage, if seepage occurs.

4.4.3 Long-Term Drainage Considerations

Long-term drainage conditions can have a significant impact on the performance of pavements and utilities on a project site. We recommend site drainage be developed such that water flows rapidly off of pavement surfaces and away from pavement edges. Furthermore, site drainage should ensure that long-term ponding does not occur on or near pavements. When establishing final grades, the design team should be reminded that in expansive clay environments, it is common for ground surface movements to occur that could potentially cause reversal of site drainage patterns and unwanted ponding of surface water.

Groundwater was not encountered in the test boring, a permanent groundwater control system below the pavement is not anticipated.

5.0 INFRASTRUCTURE RECOMMENDATIONS

5.1 Landscape Considerations

We realize landscaping is vital to the aesthetics of any project and is generally typical for this type of facility. The owner and design team should be made aware that placing large bushes and trees adjacent to pavements may contribute to future distress. Vegetation placed in landscape beds adjacent to the pavements should be limited to plants and shrubs that will not exceed a mature height of about 3 to 4 feet. Large bushes and trees that will generally exceed these heights should be planted at a reasonable distance away from the pavements so their canopy or “drip line” does not extend over the pavements when the tree reaches maturity.

Watering of vegetation should be performed in a timely and controlled manner and in sufficient quantity to maintain healthy vegetative cover. Excessive watering should be avoided as excessive irrigation of landscaped areas adjacent to, near or up gradient from pavements can lead to water migration into the base sections. This migration could cause moisture fluctuations in the underlying clay subgrade which could result in excessive soil movements and loss of subgrade strength.

5.2 Parking Lot Pavement

TTL understands that flexible pavement will be considered for this project. Therefore, we have prepared the following recommendations for the design and construction of these pavements. The pavement sections provided below were designed in general accordance with the *American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures*. That guide considers pavement performance, traffic, roadbed soils, pavement materials, environment, drainage, and reliability.

One soil bulk sample was collected to determine the California Bearing Ratio (CBR) value to be used for our pavement design recommendations. The location at which the CBR bulk sample was taken is indicated on the Boring Location Plan in Appendix A. We performed the CBR test at three compaction levels (i.e., 90%, 95% and 100%). Based on laboratory test results, a CBR value of about 2.8 percent was obtained for the existing untreated subgrade compacted to at least 95 percent of the maximum dry density determined in accordance with ASTM D 698. In view of the laboratory results and to account for potential variability in subgrade performance, TTL recommends a design CBR value of 2.5 percent, consistent with our experience on similar projects in the vicinity and our professional engineering judgment. There are a number of published correlations relating CBR to the Resilient Modulus (MR). We used a Resilient Modulus (MR) = 1,500 times the CBR in psi, to convert CBR to MR. We have also assumed a reliability of 70 percent, an Initial Serviceability Index of 4.2, and a Terminal Serviceability Index of 2.0.

Based on the design parameters assumed above, we developed recommendations for light duty pavement sections. **As previously stated, the site PVR ranges from 1 to 2 inches in its current state. The flexible pavement sections are presented in the following table. Subgrade mitigation options, lime-treated subgrade and geogrid, are presented as alternative sections.**

FLEXIBLE PAVEMENT SYSTEM			
Hot Mix Asphaltic Concrete (HMAC)	2 inches	2 inches	2 inches
Prime Coat	Yes	Yes	Yes
Granular Base Material	10 inches	6 inches	6 inches
Geogrid, Tensar HX5.5 or equivalent	----	----	Yes
Moisture Conditioned Subgrade (On-Site Soils)	6 inches	----	6 inches
Lime Treated Subgrade	----	6 inches	----
Calculated Structural Number	2.28	2.20	2.54
Calculated 18kip ESALs	38,100	30,500	76,000
Note: If a heavy-duty pavement section is desired, the HMAC may be increased to 3 inches. Heavy duty pavements are intended for areas subject to channelized traffic, delivery areas, and areas with garbage vehicle traffic.			

5.2.1 General Guidelines for Pavement

All pavement design and construction shall conform to the latest edition of City of Seguin Design and Construction guidelines. Pavement design methods are intended to provide structural sections with adequate thickness over a particular subgrade such that wheel loads are reduced to a level the subgrade can support. **The support characteristics of the subgrade for pavement design do not account for the shrink/swell movements of an expansive clayey subgrade. Thus, the pavement may be adequate from a structural standpoint, yet still,**

experience cracking and deformation due to shrink/swell-related movement of the subgrade. It is, therefore, important to minimize moisture changes in the subgrade to reduce shrink/swell movements.

On most projects, rough site grading is accomplished relatively early in the construction phase. However, as construction proceeds, excavations are made into these areas; dry weather may desiccate some areas; rainfall and surface water saturates some areas; heavy traffic from concrete and other delivery vehicles disturbs the subgrade; and many surface irregularities are filled in with loose soils to improve trafficability temporarily. As a result, the pavement subgrade should be carefully evaluated as the time for pavement construction approaches. This is particularly important in and around utility trench cuts. Thorough proof-rolling of pavement areas using appropriate construction equipment weighing at least 20 tons should be performed no more than 24 hours prior to surface paving. Any problematic areas should be reworked and compacted at that time. Long-term pavement performance will be dependent upon several factors, including maintaining subgrade moisture levels and providing preventive maintenance.

The following recommendations should be considered at a minimum:

- Maintain and promote proper surface drainage away from pavement edges
- Consider appropriate edge drainage systems
- Install drainage in areas anticipated for frequent wetting (e.g., landscape beds, discharge area, collection areas, etc.)
- Seal all landscaped areas in, or adjacent to pavements, to minimize or prevent moisture migration to subgrade soils
- Placing compacted, low permeability backfill against the exterior side of the curb and gutter
- We recommend that the curbs extend vertically through the aggregate base course and at least 6 inches into the pavement subgrade.

Preventive maintenance should be planned and provided for through an ongoing pavement management program. These activities are intended to slow the rate of pavement deterioration and to preserve pavement investment. This consists of both localized maintenance (e.g. crack and joint sealing and patching) and global maintenance (e.g. surface sealing). Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventive maintenance.

5.2.2 Drainage Adjacent to Pavement

The performance of the pavement system will not only be dependent upon the quality of construction but also upon the stability of the moisture content of the soils and the base underlying the pavement surface. The moisture levels in the subgrade soils located near the edge of the pavement structure are more susceptible to changes in moisture that occur due to natural

seasonal moisture fluctuations. The edges will dry and shrink during drought conditions relative to the center of the structure. During wet climate periods, the edges will swell relative to the center of the structure. The shrinking and swelling of subgrade soils near the edge of pavements will result in longitudinal surface cracking that occurs parallel to the structure. To help reduce the chances for moisture content variations of the subgrade soils, backfill behind the curbs should consist of compacted, low-permeability clay. The use of landscape mulch or topsoil could provide an easy avenue for surface water to infiltrate behind and beneath curbs. This infiltration could adversely impact curb and pavement performance. Consideration should also be given to locating sidewalks immediately adjacent to the curbs as well.

Proper drainage along or adjacent to the pavement edge or curbs is ***very important*** and should be provided, so infiltration of surface water from unpaved areas surrounding the pavement is minimized. **The infiltration of water into the base and subgrade materials comprising the pavement can result in a substantially reduced pavement service life.** The Project Civil Engineer should design final grades so that there is rapid, positive drainage away from the pavement/curb edge. Also, surface slopes for asphaltic concrete pavement areas should be no flatter than 2 percent to reduce the potential for ponding of water on the asphaltic concrete surface. The importance of proper runoff and drainage cannot be overemphasized and should be thoroughly considered by the Project Civil Engineer.

5.2.3 Pavement Material Specifications

The following specifications have been prepared for use in the section and preparation of various materials that may be used to construct pavement sections for this project. Submittals should be made for each pavement material and reviewed by *TTL* and any appropriate members of the Project Team. The submittals should provide the test information necessary to verify full compliance with the recommended or specified material properties.

Hot Mix Asphaltic Concrete Surface – The asphaltic concrete surface course should be plant mixed, hot laid Type C or D Surface meeting all of the requirements of Item 340 as described in the Texas Department of Transportation (TxDOT) 2024 Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges. The asphaltic concrete surface course of the pavement section should be constructed in accordance with this Item.

Prime Coat – The prime coat should consist of sealing the base with an oil such as MC-30 or AE-P asphalt cement. The prime coat should be applied at a rate not to exceed 0.35 gallons per square yard with materials that meet TxDOT Item 300. The prime coat will help to minimize the penetration of rainfall and other moisture that penetrates the base.

Flexible Base Material – Base material may be composed of crushed limestone base meeting all of the requirements of 2024 TxDOT Item 247, Type A, Grade 1 or 2; and should have no more than 15 percent of the material passing the No. 200 sieve. The base should be compacted to at least 95 percent of the maximum dry density determined in accordance with test method TEX-113-E at moisture contents ranging between -2 and +3 percentage points of the optimum moisture content.

Geogrid – Tensar HX 5.5 triaxial geogrid, or equivalent, may be used to provide additional structural support to flexible base materials. The geogrid should be placed as per the manufacturer's recommendations at the interface between the flexible base and the subgrade.

Lime Treatment - Lime treatment shall be with hydrated lime in accordance with TxDOT Item 260. We anticipate that approximately 4 percent hydrated lime will be required (approximately 27 pounds per square yard). The optimum hydrated 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. The contractor should perform a lime series test of the specific subgrade conditions to reevaluate the appropriate amount of lime required.

The hydrated lime should initially be blended with a mixing device such as a pulvermixer. After sufficient moisture conditioning, the treated soil mixture shall be compacted to at least 95 percent of the maximum dry density as determined in accordance with test method TEX-114-E at moisture contents from optimum to +4 percentage points of the optimum moisture content. If the in-place gradation requirements can be achieved during initial mixing, the remixing after the curing period can be eliminated.

Details regarding subgrade preparation are presented in the General Site Preparation section 4.1.

6.0 LIMITATIONS

This geotechnical engineering report has been prepared for the exclusive use of our Client for specific application to this Project. This geotechnical engineering report has been prepared in accordance with generally accepted geotechnical engineering practices using that level of care and skill ordinarily exercised by licensed members of the engineering profession currently practicing under similar conditions in the same locale. No warranties, express or implied, are intended or made.

TTL understands that this geotechnical engineering report will be used by the Client and various individuals and firms' designers and contractors involved with the design and construction of the Project. TTL should be invited to attend Project meetings (in person or teleconferencing) or be contacted in writing to address applicable issues relating to the geotechnical engineering aspects of the Project. TTL should also be retained to review the final construction plans and specifications to evaluate if the information and recommendations in this geotechnical engineering report has have been properly interpreted and implemented in the design and specifications. This report has not been prepared as, and should not be used as, a design or specification document to be directly implemented by the contractor. The contractor and applicable subcontractors should familiarize themselves with this report prior to the start of their construction activities and contact TTL for any interpretation or clarification of the report.

This geotechnical engineering report is based upon the information provided to us by the Client and various other individuals and entities associated with the Project, along with the field exploration, laboratory testing, and engineering analyses and evaluations performed by TTL as

described in this report. The Client and readers of this geotechnical engineering report should realize that subsurface variations and anomalies may exist across the site which may not be revealed by our field exploration. Furthermore, the Client and readers should realize that site conditions can change due to the modifying effects of seasonal and climatic conditions and conditions at times after our exploration may be different than reported herein.

The nature and extent of such site or subsurface variations may not become evident until construction commences or is in progress. If site and subsurface anomalies or variations exist or develop, TTL should be contacted immediately so that the situation can be properly evaluated and, if necessary, addressed with provide applicable recommendations.

Unless stated otherwise in this report or in the contract documents between TTL and Client, our scope of services for this Project did not include, either specifically or by implication, any environmental or biological assessment of the site or buildings, or any identification or prevention of pollutants, hazardous materials or conditions at the site or within buildings. If the Client is concerned about the potential for such contamination or pollution, TTL should be contacted to provide a scope of additional services to address the environmental concerns. In addition, TTL is not responsible for permitting, site safety, excavation support, and dewatering requirements.

Should the nature, design, or location of the Project, as outlined in this geotechnical engineering report be modified, the geotechnical engineering recommendations and guidelines provided in this document will not be considered valid unless TTL is authorized to review the changes and either verifies or modifies the applicable Project changes in writing.

Additional information about the use and limitations of a geotechnical report is provided within the Geoprofessional Business Association document included at the end of this report.

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

conspicuously that you’ve included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

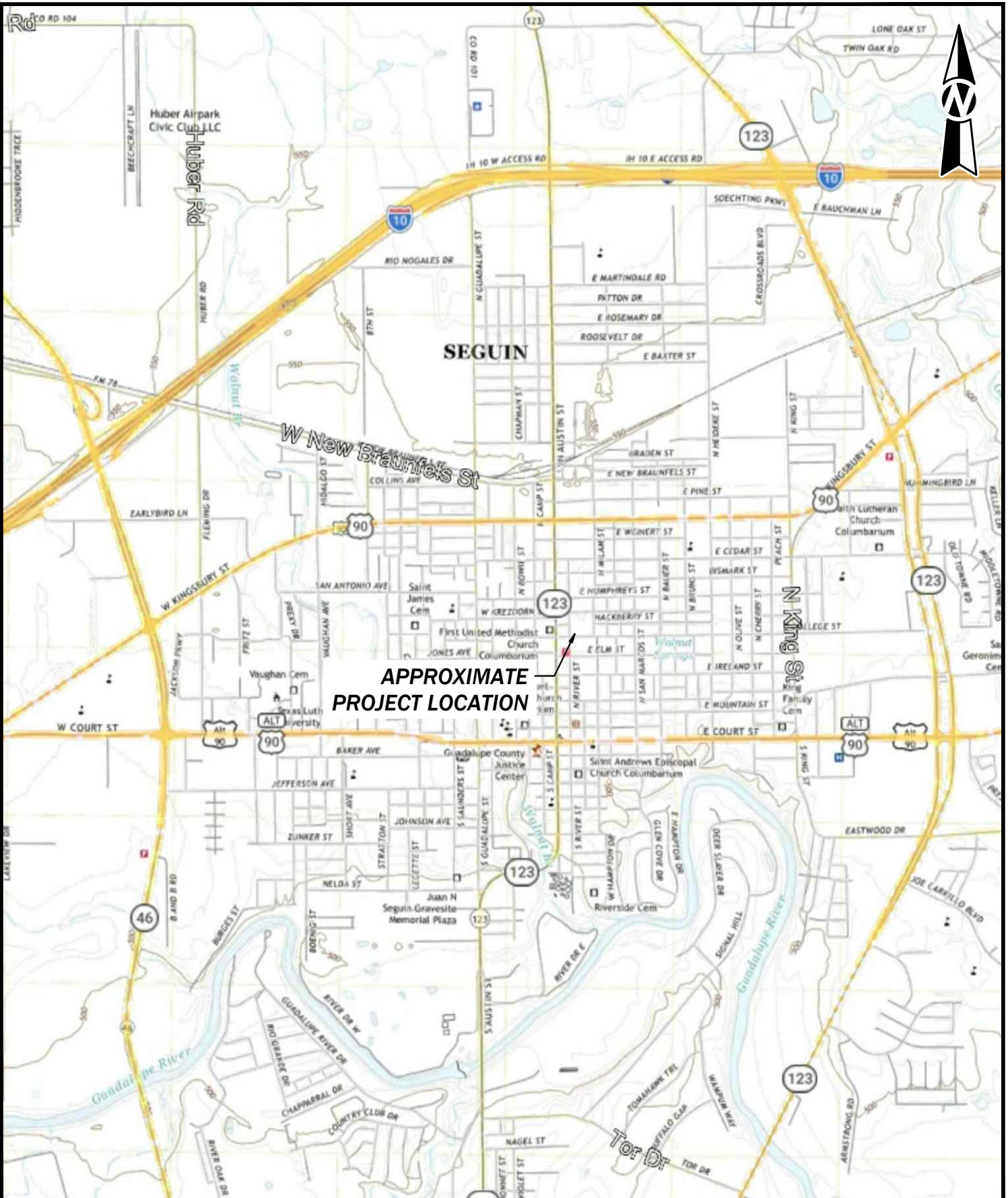
While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* **Confront the risk of moisture infiltration** by including building-envelope or mold specialists on the design team. **Geotechnical engineers are not building-envelope or mold specialists.**



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APPENDIX A ILLUSTRATIONS



**APPROXIMATE
PROJECT LOCATION**



17215 Jones Maltsberger, Suite 101 | San Antonio, TX 78247
 210.888.6100 | www.ttlusa.com
 TPELS ENGINEERING: F-12622 | TPELS SURVEYING: 10194612
 TBP Firm: 50456

MARY ERSKINE BUILDING PARKING LOT
 PAVEMENT RECOMMENDATIONS
 E. COLLEGE STREET
 SEGUIN, TEXAS

Drawn By: JMP
 Checked By: TA
 Date: 3/26/2026
 Scale: NOT TO SCALE
 Proj. No.: 00260900301.00
 File Name:
 Exhibits.dwg

**SITE LOCATION
MAP**

16th St



N RIVER STREET

NEW ASPHALT PAVED PARKING - 1 SCALE AND REPORT SHOULD BE SUFFICIENT

CBR-1



B-01



E COLLEGE STREET

LEGEND



B-X

SOIL BORING
LOCATION AND IDENTIFIER



CBR-X

CALIFORNIA BEARING RATIO
LOCATION AND IDENTIFIER



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**BORING
LOCATION PLAN**

SOIL LEGEND

FINE- AND COARSE-GRAINED SOIL INFORMATION

FINE-GRAINED SOILS (SILTS AND CLAYS)			COARSE-GRAINED SOILS (SANDS AND GRAVELS)		PARTICLE SIZE	
SPT N-Value	Consistency	Estimated Q_u (TSF)	SPT N-Value	Relative Density	Name	Size (US Std. Sieve)
0 - 1	Very Soft	0 - 0.25	0 - 4	Very Loose	Boulders	>300 mm (>12 in.)
2 - 4	Soft	0.25 - 0.5	5 - 10	Loose	Cobbles	75 mm to 300 mm (3 - 12 in.)
5 - 8	Firm	0.5 - 1.0	11 - 30	Medium Dense	Coarse Gravel	19 mm to 75 mm (3/4 - 3 in.)
9 - 15	Stiff	1.0 - 2.0	31 - 50	Dense	Fine Gravel	4.75 mm to 19 mm (#4 - 3/4 in.)
16 - 30	Very Stiff	2.0 - 4.0	51+	Very Dense	Coarse Sand	2 mm to 4.75 mm (#10 - #4)
31+	Hard	4.0+			Medium Sand	0.425 mm to 2 mm (#40 - #10)
					Fine Sand	0.075 mm to 0.425 mm (#200 - #40)
					Silts and Clays	< 0.075 mm (< #200)
















Q_u = Unconfined Compression Strength

RELATIVE PROPORTIONS OF SAND AND GRAVEL		RELATIVE PROPORTIONS OF CLAYS AND SILTS	
Descriptive Terms	Percent of Dry Weight	Descriptive Terms	Percent of Dry Weight
"Trace"	< 15	"Trace"	< 5
"With"	15 - 30	"With"	5 - 12
Modifier	> 30	Modifier	> 12

CRITERIA FOR DESCRIBING MOISTURE CONDITION		CRITERIA FOR DESCRIBING CEMENTATION	
Description	Criteria	Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch	Weak	Crumbles or breaks with handling or little finger pressure
Moist	Damp, but no visible water	Moderate	Crumbles or breaks with considerable finger pressure
Wet	Visible free water, usually soil is below water table	Strong	Will not crumble or break with finger pressure


























CRITERIA FOR DESCRIBING STRUCTURE	
Description	Criteria
Stratified	Alternating layers of varying material or color with layers at least 6 mm thick; note the thickness
Laminated	Alternating layers of varying material or color with the layers less than 6 mm thick; note thickness
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy, sometimes striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed	Inclusion of small pockets of different soils such as small lenses of sand scattered through a mass of clay; note thickness
Homogeneous	Same color and appearance throughout

ABBREVIATIONS AND ACRONYMS			
WOH	Weight of Hammer	N-Value	Sum of the blows for last two 6-in increments of SPT
WOR	Weight of Rod		
Ref.	Refusal	NA	Not Applicable or Not Available
ATD	At Time of Drilling	OD	Outside Diameter
DCP	Dynamic Cone Penetrometer	PPV	Pocket Penetrometer Value
Elev.	Elevation	SFA	Solid Flight Auger
ft.	feet	SH	Shelby Tube Sampler
HSA	Hollow Stem Auger	SS	Split-Spoon Sampler
ID	Inside Diameter	SPT	Standard Penetration Test
in.	inches	USCS	Unified Soil Classification System
lbs	pounds		

SAMPLERS AND DRILLING METHODS	
	AUGER CUTTINGS
	BAG/BULK SAMPLE
	GRAB SAMPLE
	CONTINUOUS SAMPLES
	SHELBY TUBE SAMPLE
	PITCHER SAMPLE
	STANDARD PENETRATION SPLIT-SPOON SAMPLE
	SPLIT-SPOON SAMPLE WITH NO RECOVERY
	DYNAMIC CONE PENETROMETER
	ROCK CORE
WATER LEVEL SYMBOLS	
	WATER LEVEL AT TIME OF DRILLING
	PERCHED WATER OBSERVED AT DRILLING
	DELAYED WATER LEVEL OBSERVATION
	CAVE-IN DEPTH
	OBSERVED SEEPAGE



UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

GRAVELS (>50% of coarse fraction is larger than the #4 sieve)		SANDS (>50% of coarse fraction is smaller than the #4 sieve)		FINE GRAINED SOILS (>50% of material is smaller than the #200 sieve)	
CLEAN GRAVEL WITH <5% FINES	$C_u > 4$ $C_c = 1-3$		GW	Well-graded gravels, gravel-sand mixtures with trace or no fines	
	$C_u \leq 4$ and/or $C_c < 1$ $C_c > 3$		GP	Poorly-graded gravels, gravel-sand mixtures with trace or no fines	
GRAVEL WITH 5% TO 12% FINES	$C_u > 4$ $C_c = 1-3$		GW-GM	Well-graded gravels, gravel-sand mixtures with silt fines	
			GW-GC	Well-graded gravels, gravel-sand mixtures with clay fines	
	$C_u \leq 4$ and/or $C_c < 1$ $C_c > 3$		GP-GM	Poorly-graded gravels, gravel-sand mixtures with silt fines	
			GP-GC	Poorly-graded gravels, gravel-sand mixtures with clay fines	
GRAVEL WITH MORE THAN 12% FINES			GM	Silty gravels, gravel-silt-sand mixtures	
			GC	Clayey gravels, gravel-sand-clay mixtures	
			GC-GM	Clayey gravels, gravel-sand-clay-silt mixtures	
CLEAN SAND WITH <5% FINES	$C_u > 6$ $C_c = 1-3$		SW	Well-graded sands, sand-gravel mixtures with trace or no fines	
	$C_u \leq 6$ and/or $C_c < 1$ $C_c > 3$		SP	Poorly-graded sands, sand-gravel mixtures with trace or no fines	
SAND WITH 5% TO 12% FINES	$C_u > 6$ $C_c = 1-3$		SW-SM	Well-graded sands, sand-gravel mixtures with silt fines	
			SW-SC	Well-graded sands, sand-gravel mixtures with clay fines	
	$C_u \leq 6$ and/or $C_c < 1$ $C_c > 3$		SP-SM	Poorly-graded sands, sand-gravel mixtures with silt fines	
			SP-SC	Poorly-graded sands, sand-gravel mixtures with clay fines	
SAND WITH MORE THAN 12% FINES			SM	Silty sands, sand-gravel-silt mixtures	
			SC	Clayey sands, sand-gravel-clay mixtures	
			SC-SM	Clayey sands, sand-gravel-clay-silt mixtures	
SILTS & CLAYS (Liquid Limit less than 50)			ML	Inorganic silts with low plasticity	
			CL	Inorganic clays of low plasticity, gravelly or sandy clays, silty clays, lean clays	
			CL-ML	Inorganic clay-silts of low plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
			MH	Inorganic silts of high plasticity, elastic silts	
SILTS & CLAYS (Liquid Limit more than 50)			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays and organic silts of high plasticity	

USCS - HIGHLY ORGANIC SOILS

Primarily organic matter, dark in color, organic odor



PT

Peat, humus, swamp soils with high organic contents

OTHER MATERIALS



BITUMINOUS CONCRETE (ASPHALT)



CONCRETE



CRUSHED STONE/AGGREGATE BASE



TOPSOIL



FILL



UNDIFFERENTIATED ALLUVIUM



UNDIFFERENTIATED OVERBURDEN



BOULDERS AND COBBLES

UNIFORMITY COEFFICIENT

$$C_u = D_{60}/D_{10}$$

COEFFICIENT OF CURVATURE

$$C_c = (D_{30})^2 / (D_{60} \times D_{10})$$

Where:

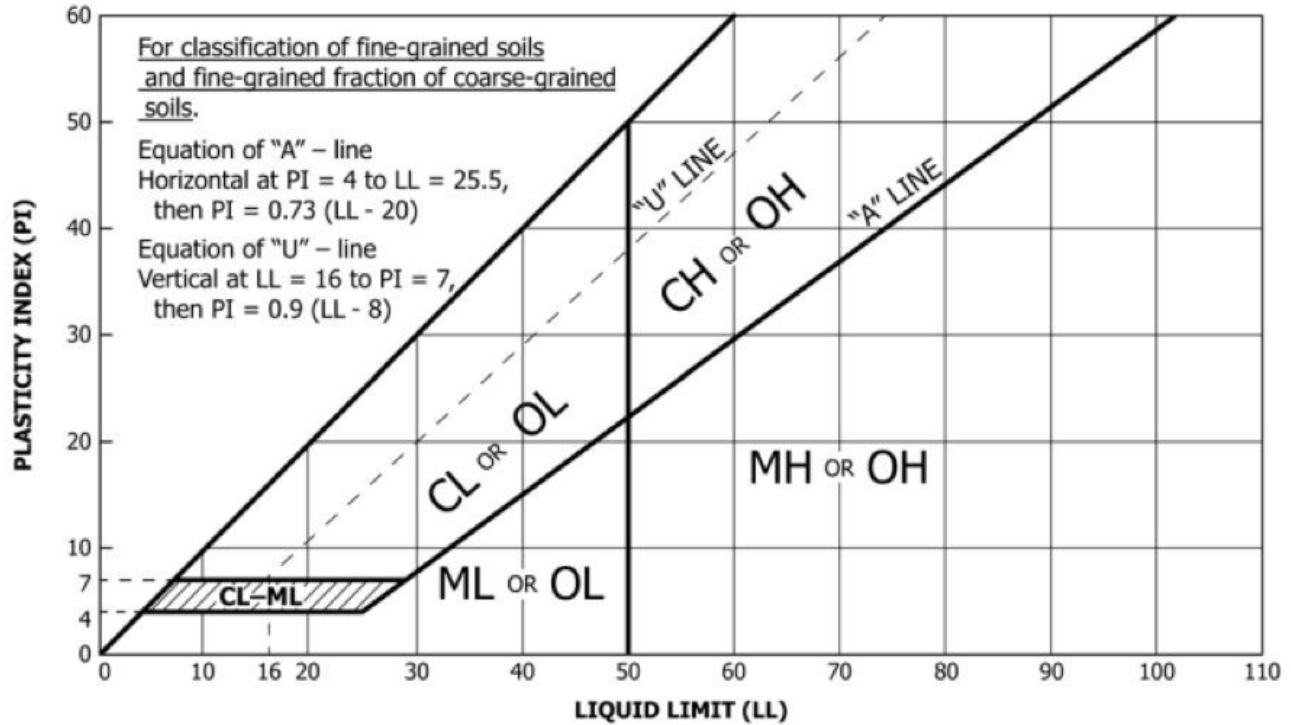
D_{60} = grain diameter at 60% passing

D_{30} = grain diameter at 30% passing

D_{10} = grain diameter at 10% passing

TTL

PLASTICITY CHART FOR USCS CLASSIFICATION OF FINE-GRAINED SOILS



IMPORTANT NOTES ON TEST BORING RECORDS

- 1) The report and graphics key are an integral part of these logs. All data and interpretations in this log are subject to the explanations and limitations stated in the report.
- 2) Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual or differ from those shown. Solid lines are used to indicate a change in the material type, particularly a change in the USCS classification. Dashed lines are used to separate two materials that have the same material type, but that differ with respect to two or more other characteristics (e.g. color, consistency).
- 3) No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
- 4) Logs represent general soil and rock conditions observed at the point of exploration on the date indicated.
- 5) In general, Unified Soil Classification System (USCS) designations presented on the logs were based on visual classification in the field and were modified where appropriate based on gradation and index property testing.
- 6) Fine-grained soils that plot within the hatched area on the Plasticity Chart, and coarse-grained soils with between 5% and 12% passing the #200 sieve require dual USCS symbols as presented on the previous page.
- 7) If the sampler is not able to be driven at least 6 inches, then 50/X" indicates that the sampler advanced X inches when struck 50 times with a 140-pound hammer falling 30 inches.
- 8) If the sampler is driven at least 6 inches, but cannot be driven either of the subsequent two 6-inch increments, then either 50/X" or the sum of the second 6-inch increment plus 50/X" for the third 6-inch increment will be indicated.
 Example 1: Recorded SPT blow counts are 16 - 50/4", the SPT N-value will be shown as N = 50/4"
 Example 2: Recorded SPT blow counts are 18 - 25 - 50/2", the SPT N-value will be shown as N = 75/8"

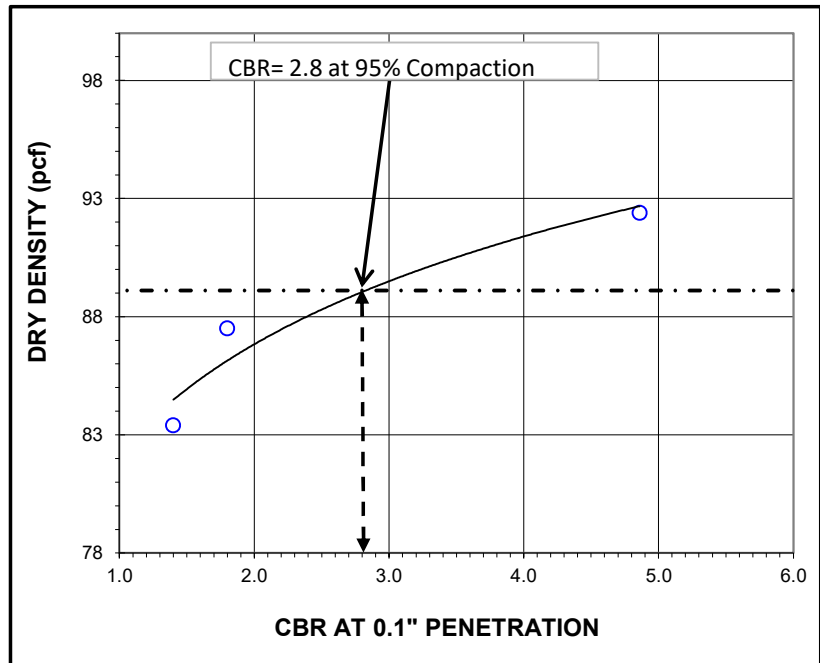
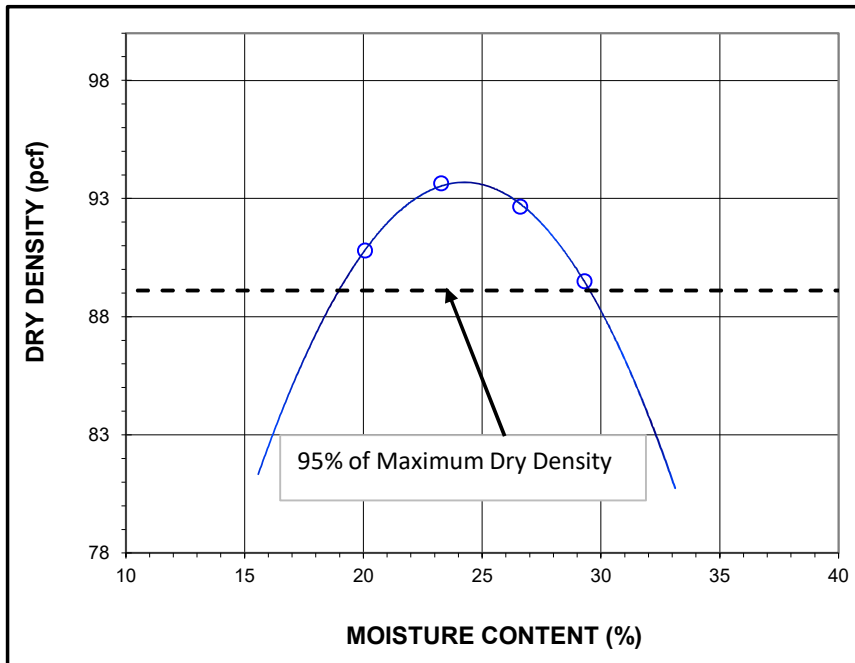
Boring	Depth	USCS	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Gravel	% Sand	Maximum Size (mm)	% Passing #200		D50 (mm)
										% Silt <small>(if hydrometer data available)</small>	% Clay	
B-01	0.5 - 2	---	15	---	---	---	5.4	23.9	38.1	70.8	---	---
B-01	4.5 - 6	---	16	49	17	32	---	---	---	---	---	---
B-01	6.5 - 8	---	14	---	---	---	3.4	16.5	38.1	80.0	---	---
B-01	8.5 - 10	CL	15	41	14	27	---	---	0.075	97.2	---	---

X:\2026\09\26-09-00301.00 - DOCKERY - MARY ERSKINE BLDG PARKING LOT PAVT\GEO\TECH\DATA\MARY ERSKINE BUILDING PARKING LOT.GPJ 3/18/26 Report:SOIL SUMMARY - GEOTECH

Summary of Laboratory Test Results



Client: Debra J. Dockery, Architect, P.C.
 Project: Mary Erskine Building Parking Lot - Pavement Recommendations
 Location: Seguin, Texas
 Project Number: 00260900301.00



Sample: **CBR Sample No. 1**
 Proctor Test Method: Standard Proctor (ASTM D-698)
 CBR Test Method: California Bearing Ratio (ASTM D-1883)
 Material: SANDY LEAN CLAY (CL), brown

CBR Sample Location: 29.5748°, -97.9635°
 Sample Depth: Between 0 and 5 feet below existing ground surface
 Optimum Moisture Content: 24.2 %
 Maximum Dry Unit Weight: 93.8 pcf
 % Passing # 200 Sieve: 70 %
 Atterberg Limits: LL = 45 , PL = 20 , PI = 25

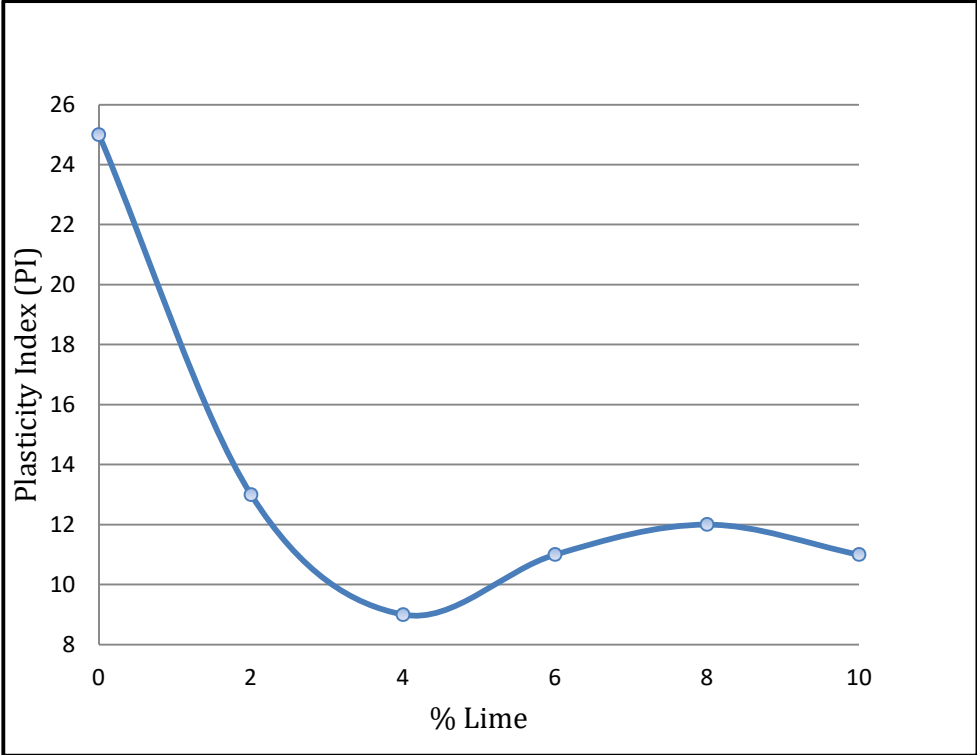


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PAVEMENT RECOMMENDATIONS
 216 E COLLEGE STREET
 SEGUIN, TEXAS

Drawn By: JMP
 Checked By: TA
 Proj No:00260900301.00

CBR PLOT



% Lime	Plasticity	pH	LL	PL
0	25	8.23	45	20
2	13	12.27	39	26
4	9	12.47	35	26
6	11	12.50	39	28
8	12	12.51	38	26
10	11	12.53	39	28

Test Location: **CBR Sample No. 1**
 Material: SANDY LEAN CLAY (CL), brown
 Test Method: TxDOT Item 260, Lime Treatment
 Test Method: ASTM C 977, Appendix XI; pH:Lime Saturation Content
 CBR Sample Location: 29.5748°, -97.9635°



17215 Jones Maltsberger Rd, Suite 101
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 T: 210-888-6100
 WWW.TTLUSA.COM

MARY ERSKINE BUILDING PARKING LOT
PAVEMENT RECOMMENDATIONS
216 E COLLEGE STREET
SEGUIN, TEXAS

Drawn By: JMP
 Checked By: TA
 Proj No:00260900301.00
 File Name

LIME SERIES

APPENDIX B
REFERENCE MATERIALS

EXPLORATION PROCEDURES

General

Various drill equipment and procedures are used to obtain soil or rock specimens during geotechnical engineering exploration activities. The drill equipment typically consists of fuel powered machinery that is mounted on a flat-bed truck or an all-terrain vehicle. The ground surface conditions at the site generally determine the type of vehicle to use.

Borings can be drilled either dry or wet. The drilling technique depends on the type of subsurface materials (clays, sands, silts, gravels, rock) encountered and whether or not subsurface water is present during the drilling operations. Sometimes a combination of both techniques is implemented.

The dry method can generally be employed when subsurface water or granular soils are not present. The dry method generally consists of advancing the augers without the use of water or drilling fluids. Air can be employed as necessary to remove cuttings from the borehole or cool the drilling bits during some drilling applications. The wet rotary process is generally used when subsurface water, rock or granular soils are present. The wet rotary process utilizes water or drilling fluids to advance the augers, remove cuttings from the borehole, and cool the drilling bits during drilling.

Sampling

Various sampling devices are available to recover soil or rock specimens during the geotechnical exploration program. The type of sampling apparatus to employ depends on the subsurface materials (clays, sands, silts, gravels, rock) encountered and on their consistency or strength. Most commonly used samplers are Shelby tubes, split-spoons or split-barrels, and NX core barrels. Depending on the subsurface conditions, sampling apparatus such as the Pitcher barrel, Osterberg sampler, Dennison barrel, or California sampler are sometimes used. The procedures for using and sampling subsurface materials with most of these samplers are described in detail by the American Society for Testing and Materials (ASTM). Sampling is generally performed on a 2-foot continuous interval to a depth of about 10 feet, followed by 5-foot intervals between the depths of about 10 to 50 feet, and on 10-foot intervals thereafter to the termination depth of the borings. However, sampling intervals may change depending on the project scope and actual subsurface conditions encountered.

If cohesive soils (clays and some silts) are present during drilling, samples are retrieved by using the Shelby tube sampler (ASTM D 1587) or the split-barrel sampler (ASTM D 1586). The Shelby tube is used to recover “virtually” undisturbed soil specimens that can be returned to the laboratory for strength and compressibility testing. The Shelby tube is a 3-inch nominal diameter, thin-walled tube that is advanced hydraulically into the soil by a single stroke of the drill equipment. The split-

barrel sampler is used when performing the Standard Penetration Test (SPT). The recovered sample is considered to be a “disturbed” specimen due to the SPT procedure. The split-barrel is advanced into the soil by driving the sampler with blows from a 140-pound hammer free falling 30 inches. The SPT procedure is performed to evaluate the strength or competency of the material being sampled. This evaluation is based on the material sampled, depth of the sample, and the number of blows required to obtain full penetration of the split-barrel sampler. This blow count or penetration resistance is referred to as the “N” value.

The split-barrel is typically used when cohesionless soils (sands, silts, gravels) are encountered or when good quality cohesive soils cannot be recovered with the Shelby tube sampler. The SPT procedure can be employed when rock or cemented zones are encountered. However, the split-barrel may not penetrate the rock or cemented zone if the layer is extremely hard, thus resulting in no sample recovery.

When rock or cemented zones are present and depending on the type of project and engineering testing required, rock coring may be implemented to recover specimens of the particular layer. Typically, an NX double tube core barrel (ASTM D 2113) is used.

Logging

During the drilling activities, one of our geologists or engineering technicians is present to make sure that the appropriate sampling techniques are employed and to extrude or remove all materials from the samplers. The samples are then visually classified by our field representative who records the information on a field boring log. Our field representative may perform pocket penetrometer, hand torvane, or field vane tests on the subsurface materials recovered from the Shelby tube samplers. If the SPT procedure is employed, our field representative will record the N values or blow counts that are germane to that particular field test. If rock coring is utilized, our field representative will calculate the percent recovery and Rock Quality Designation (RQD). The test data for all the field tests will be noted on the appropriate field boring log. Upon completion of the logging activities and field testing of the recovered soil or rock samples, representative portions of the specimens were placed in appropriately wrapped and sealed containers to preserve their natural moisture condition and to minimize disturbance during handling and transporting to our laboratory for additional testing.

When subsurface water is observed during the drilling and sampling operations, drilling will be temporarily delayed so the subsurface water level can be monitored for a period of at least 15 to 30 minutes. Depending on the rise of the subsurface water in the borehole and project requirements, subsurface water measurements may be monitored for periods of 24 hours or more. Generally, observation wells or piezometers are installed in the completed boreholes to monitor subsurface water levels for periods longer than 24 hours.

Following completion of drilling, sampling, and subsurface water monitoring, all boreholes are backfilled with soil cuttings from the completed borings unless the client requests or local

ordinance requires special backfilling requirements. If there are not enough soil cuttings available, clean sand will be used to backfill the completed boreholes.

Details concerning the subsurface conditions are provided on each individual boring log presented in Appendix A. The terms and symbols used on each boring log are defined in the Legend Sheet which is also presented in Appendix A.

LABORATORY TESTING PROCEDURES

Classification and Index Testing

The recovered soil samples were classified in the laboratory by a geoprofessional using the USCS as a guide. Samples were tested for the following properties in general accordance with the applicable ASTM standards:

- Moisture content (ASTM D2216)
- Atterberg Limits (ASTM D4318)
- Percent material passing the No. 200 sieve (ASTM D1140)
- Grain Size Analysis (ASTM D6913)
- California Bearing Ratio (ASTM D1883)
- Standard Proctor (ASTM D698)
- Lime Treatment of Clay Soil (TxDOT Item 260)
- Lime Saturation Content by pH (ASTM C977)
- Soluble Sulfates (ASTM C1580)

Results of tests for moisture content, Atterberg Limits, and percent material passing the No. 200 sieve are presented on individual boring logs in Appendix A. The results are also tabulated on the Summary of Laboratory Results sheet in Appendix A.