Stone Hill Town Center – Taroko Sports

Geotechnical Engineering Report

Pflugerville, Texas

March 21, 2025 | Terracon Project No. AC255008

Prepared for:

New Quest Properties
8827 W Sam Houston Pkwy. N. Ste. 200
Houston, TX 77040

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800 Paloma Drive, Suite 160
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P (512) 628-8600
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March 21, 2025

New Quest Properties
8827 W Sam Houston Pkwy. N. Ste. 200
Houston, TX 77040

Attn: Ben Keillor
P: 832-358-1270
E: bkeillor@newquest.com

Re: Geotechnical Engineering Report
Stone Hill Town Center – Taroko Sports
500 Limestone Commercial Drive
Pflugerville, Texas
Terracon Project No. AC255008

Dear Mr. Keillor:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. PAC255008 dated January 24, 2025. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork, foundations, floor slabs, and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.
TBPELS Firm Registration TX-F3272

Benchen Zhang, P.E.
Senior Staff Engineer

STATE OF TEXAS
BENCHEN ZHANG
152029
LICENSED
PROFESSIONAL ENGINEER
3/21/2025

Bryan S. Moulin, P.E.
Senior Principal, Geotechnical Services

Table of Contents

Figures

Attachments

Exploration and Testing Procedures
Site Location and Exploration Plans
Exploration and Laboratory Results
Supporting Information

Note: This report was also delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the Terracon logo will bring you back to this page. For more interactive features, please view your project online at **client.terracon.com**.

Refer to each individual Attachment for a listing of contents.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed Taroko Sports store in the Stone Hill Town Center located at 500 Limestone Commercial Drive in Pflugerville, Texas. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil and rock conditions
- Groundwater conditions
- Seismic site classification per IBC
- Site preparation and earthwork
- Foundation design and construction
- Floor slab design and construction
- Pavement design and construction

The geotechnical engineering Scope of Services for this project included the advancement of test borings, laboratory testing, engineering analysis, and preparation of this report.

Drawings showing the site and boring locations are shown on the **Site Location** and **Exploration Plan**, respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the **Exploration and Laboratory Results** section.

Project Description

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	The project information provided to us includes the following: ■ A site plan showing the layout of the planned development provided by the client in the initial Request for Proposal email on January 16, 2025 ■ A site topographic survey prepared by Conley Land Services, LLC dated February 10, 2025 and the Finished

Item	Description
	Floor Elevation of the proposed buildings provided by the client in an email on March 12, 2025
Project Description	The project includes an approximately 11,800 square foot single-story Taroko Sports building with an approximately 10,000 square foot indoor batting cage area. Additionally, an approximately 6,400 square foot single-story retail building is to be developed adjacent to the Taroko Sports building. Parking and driveway areas will also be constructed on a nearby parcel (currently unpaved) northeast of the buildings (referred to as Tract 8).
Building Construction	Not provided; we anticipate that the buildings will be wood framed or light gauge steel framed. We anticipate the batting cage area may have large spans between foundation supports.
Finished Floor Elevation	Based on the information provided by the client, the Finished Floor Elevation (FFE) of the proposed buildings will be around 733.5 to 734.0 feet.
Maximum Loads	Anticipated structural loads were not provided. In the absence of information provided by the design team, we will use the following loads in estimating settlement based on our experience with similar projects. ■ Columns: up to 300 kips ■ Walls: 2 to 4 kips per linear foot (klf) ■ Slabs: 150 pounds per square foot (psf)
Grading	Unknown at this time but anticipated to be ≤ 3 feet from existing grades.
Below-Grade Structures	None anticipated.
Free-Standing Retaining Walls	None anticipated.
Pavements	Since all of the surrounding pavements are reinforced concrete, we anticipate that the additional pavements will be concrete pavements as well. For concrete pavements (PCC), we assumed traffic would consist of the following American Concrete Institute (ACI) categories: ■ Category A: Car parking areas and access lanes, up to 1 truck per day ■ Category B: Entrance and truck service lanes, up to 10 trucks per day

Item	Description
	▪ Category E: Garbage or fire truck lanes A pavement analysis period of 20 years was used.
Building Code	2021 IBC

Terracon should be notified if any of the above information is inconsistent with the planned construction, especially the grading limits, as modifications to our recommendations may be necessary.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project site consists of 2 parcels of land in the Stone Hill Town Center located at 500 Limestone Commercial Drive in Pflugerville, Texas. Latitude/Longitude (approximate): 30.4653°N, 97.6008°W See **Site Location**.
Existing Improvements	Existing retail stores and associated reinforced concrete parking and driveways within the overall development.
Current Ground Cover	Earthen (soils, weeds, and grass) within the proposed areas of interest.
Existing Topography	Based on the site topographic survey provided to us, the ground surface of Tract 8 ranges from a high elevation of about 735.4 feet in the northwestern portion of the parcel to a low elevation of about 732.6 feet in the southeastern portion of the parcel. The ground surface within the proposed building footprint is relatively flat with elevations ranging from about 733.4 to 735.0 feet.

Geotechnical Characterization

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration and Laboratory Results** and the GeoModel can be found in the **Figures** attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel. Throughout this report, the terms GeoModel Layer and Stratum are synonymous and used interchangeably.

Model Layer	Layer Name	General Description
1	**Moderately Low Plasticity Soils**	Light brown lean clay (CL) with various amounts of sand and gravel to clayey sand with gravel (SC)
2	**Bedrock**	Light brown Austin Group limestone

Groundwater

The borings were advanced using solid-stem augering techniques that allow short-term groundwater observations to be made while drilling and at completion of drilling. Groundwater seepage was not encountered within the maximum drilling depth at the time of our field exploration.

Although not encountered, groundwater seepage is possible at this site, particularly in the form of seepage traveling along pervious seams/fissures in the soil, along the soil/limestone interface or in fissures/fractures in the limestone. A relatively long period may be necessary for a groundwater level to develop and stabilize in a borehole. Long term observations (which were outside the scope of services for this project) in piezometers sealed from the influence of surface water are often required to further define groundwater levels. Please contact us if this is desired.

Groundwater conditions may change because of seasonal variations in rainfall, construction activities, and other conditions not apparent at the time of drilling, therefore groundwater conditions may be different at the time of construction. The possibility of groundwater should be considered when developing the design and construction plans for the project.

Seismic Site Class

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC). Based on the soil/bedrock properties observed at the site and as described on the exploration logs and results, our professional opinion is that a **Seismic Site Classification of C** may be considered for the project. Subsurface explorations at this site were extended to a maximum depth of 20 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth.

Geotechnical Overview

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations provided in this report are implemented in the design and construction phases of this project.

The subsurface materials generally consisted of lean clay with varying amounts of sand and gravel underlain by Austin Group limestone extending to the maximum depth of the borings. Groundwater was not encountered within the maximum depths of exploration during or at the completion of drilling.

The near surface lean clay could become problematic with typical earthwork and construction traffic, especially after precipitation events. Thus, effective drainage should be completed early in the construction sequence and maintained after construction to avoid potential issues. Additional site preparation recommendations, including subgrade improvement and fill placement, are provided in the **Earthwork** section.

This report provides recommendations to help mitigate the effects of soil shrinkage and expansion. However, even if these procedures are followed, some movement and (at least minor) cracking in the structure should be anticipated. The severity of cracking and other damage such as uneven floor slabs will probably increase if modification of the site results in excessive wetting or drying of the expansive soils. Eliminating the risk of movement and distress may not be feasible, but it may be possible to further reduce the risk of movement if significantly more expensive measures are used during construction.

Based on the conditions encountered and estimated load-settlement relationships, the proposed structures can be supported on conventional continuous or spread footings. The **Shallow Foundations** section addresses support of the buildings on footings directly bearing on native soils. The **Floor Slabs** and **Earthwork** sections addresses slab-on-grade support of the structures using overexcavation techniques.

Deep foundations are generally not a preferred option for single-story retail buildings for economic reasons. However, given the potential need for large spans in the batting cage area, the design team may consider drilled piers to support the proposed Takoro Sports building. If drilled piers are considered at this site, we recommend that piers bear into Stratum 2 limestone, which is approximately 18.5 feet below the existing grades. This report does not include detailed recommendations for pier foundations. If such recommendations are desired by the design team, please contact us and we can address them in a supplemental letter.

Our opinion of pavement section thicknesses has been developed based on our understanding of the intended use, assumed traffic, and subgrade preparation recommended herein using methodology contained in ACI 330 "Guide to Design and Construction of Concrete Parking Lots" and adjusted with consideration to local practice. The **Pavements** section includes minimum pavement component thickness.

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the **Exploration and Laboratory Results**), engineering analyses, and our current understanding of the proposed project. The **General Comments** section provides an understanding of the report limitations.

Earthwork

Earthwork is anticipated to include clearing and grubbing, excavations, and engineered fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for construction of foundations, floor slabs, pavements, and general site improvements.

Site Preparation

Prior to placing fill, existing vegetation, topsoil, loose soil, and root mats should be removed. Complete stripping of these materials should be performed in the proposed building/structure and pavement areas.

Although no evidence of underground facilities was observed during the exploration and site reconnaissance, such features could be encountered during construction. If unexpected fills or underground facilities are encountered, such features should be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Excavation

We anticipate that excavations for the proposed construction can be accomplished with conventional earthmoving equipment. The bottom of excavations should be thoroughly cleaned of loose soils and disturbed materials prior to backfill placement and/or construction.

Please note that although Stratum 2 limestone was encountered at a consistent depth of about 18.5 feet below existing grades across the site. The weathering profile of limestone can be unpredictable. The Contractor should be prepared to encounter and properly excavate limestone (or cobbles/boulders from original construction of the overall development) anywhere on this site.

Subgrade Preparation

The exposed final subgrade (including the excavation required for the building pads) in all construction areas (can be omitted in landscaping areas) should be proof rolled with an adequately loaded vehicle as per TxDOT Item 216 (e.g., a 25-ton pneumatic roller, a fully loaded tandem-axle dump truck or similar vehicle). The proof rolling should be performed under the observation of the Geotechnical Engineer or representative. Areas excessively deflecting under the proof roll should be delineated and subsequently addressed. Such areas should be scarified a minimum depth of 6 inches, moisture conditioned as needed, and recompacted. Excessively wet or dry material should either be removed, or moisture conditioned and recompacted.

After achieving a passing proofroll, all exposed areas, which will receive fill, should be scarified to a minimum depth of 6 inches (building pad areas must be prepared to the minimum depths as mentioned in the paragraphs below), moisture conditioned as necessary, and compacted per the compaction requirements in this report. Compacted select/structural fill and pavement fill soils should then be placed to the proposed design grade and the moisture content and compaction of the soils should be maintained until foundation, floor slabs, and pavement construction.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable; however, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

Based on our test borings, moderately expansive soils that exhibit a potential for volumetric change during moisture variations are present at this site. These subgrade soils may experience expansion and contraction during the life of the structure. Based on existing grades and in-situ moisture conditions, the soils at this site could exhibit a

Potential Vertical Rise (PVR) of up to about 1¼ inches, as estimated by the TxDOT Method 124-E.

Based on the information provided to us, we understand that an FFE of about 733.5 to 734.0 feet is planned for the proposed buildings. Existing grades at the time of our report in the structural area range from about 733.4 feet to 735.0 feet. If the FFE changes, Terracon should be notified to review and modify or verify recommendations in writing.

In order to reduce PVR to about 1-inch, we recommend that the on-site soils be excavated to a depth of 1.5 feet (i.e., 18 inches) below the bottom of the floor slab. The excavated soils must then be replaced with properly compacted select fill, up to finished grades. A minimum of 18 inches of select fill must be provided underneath all the building areas.

The above subgrade preparation recommendations should be applied to an area extending a minimum of 5 feet outside of building areas including attached walkways and any other architectural members. We suggest the use of crushed limestone base in the upper 6 inches of the select fill pad from a standpoint of construction access during wet weather, as well as from a standpoint of floor slab support.

For any movement-sensitive flatwork (sidewalk, ramps, etc.) outside of the building areas, subgrade preparation as discussed above should be considered to reduce differential movements between the flatwork and the adjacent building. If subgrade preparation as given above for building areas is not implemented in the exterior flatwork areas, those areas may be susceptible to post-construction movements in excess of that given above.

The potential movement values indicated are based upon moisture variations in the subgrade due to circumstances such as moisture increases due to rainfall and loss due to evapotranspiration. In circumstances where significant water infiltration beneath the floor slab occurs (such as a leaking utility line or water seepage from outside the buildings resulting from poor drainage), movements in isolated floor slab areas could potentially be in excess of those indicated in this report.

The post-construction performance of the foundation will likely be influenced more by post-construction volumetric changes of the subgrade due to in-situ moisture variations than upon settlement due to foundation loads. Settlement response of select fill supported slabs will be influenced as much by the quality of construction and fill placements as by soil-structure interaction. Therefore, it is essential that the recommendations for foundation construction be strictly followed during the construction phases of the building pad and foundation.

Temporary Groundwater Control

Although not encountered during our drilling operations, groundwater seepage could be encountered during construction, especially after periods of wet weather. The volume of groundwater seeping/flowing into the excavation will vary based on rainfall patterns before and during construction. Temporary groundwater control during construction would typically consist of perimeter gravel-packed drains sloping toward common sump areas for groundwater collection and removal. Placement of drain laterals within the excavation could be required to remediate isolated water pockets.

Fill Material Types

Engineered fill required to achieve design grade should be classified as select/structural fill or paving/general fill depending on its application. Select/structural fill is material used below or within 5 feet of structures. Paving/general fill is material used to achieve grade in paving, landscaping, or other general (non-structural) areas.

Fill soil property requirements for use as paving/general fill and select/structural fill are noted in the table below:

Fill Type [1]	Typical USCS Classification	Acceptable Specifications
Select/Structural Fill [2,3]	CL, SC, GM, GC	▪ TxDOT Item 247, Type A, Grade 3 or better, OR ▪ Crushed concrete (TxDOT Item 247, Type D, Grade 3 or better), OR ▪ Soils with 5≤PI≤20, ≤40% retained on No. 4 sieve, and rocks ≤ 4 inches in maximum dimension
Paving/General Fill [4]	CH, CL, GM, GC, SC	▪ On-site soils; Rocks ≤ 4 inches in maximum dimension ▪ Imported soils; PI ≤ 25; and rocks ≤ 4 inches in maximum dimension

1. Select/structural and paving/general fill should consist of approved materials free of organic matter and debris. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site. We recommend that periodic testing be performed throughout the material excavation phase to check for conformance with the select/structural fill requirements given above.
2. As an alternative to the Acceptable Specifications above, a low plasticity granular material which does not meet the specifications above may be used only if approved by Terracon.

Fill Type [1]	Typical USCS Classification	Acceptable Specifications

3. Based on the laboratory testing performed during this exploration, the on-site soils are not suitable for re-use as select/structural fill. We do not recommend these soils be considered for re-use as select/structural fill when planning budgets. Select fill will need to be imported.
4. The on-site soils exhibit moderately low shrink/swell potential. For economic reasons, these types of expansive soils are often used in pavement and/or flatwork areas as fill. The owner should be made aware that some risk exists for future movements of the subgrade soils which may result in movement and/or cracking of pavement and/or flatwork.

Fill Placement and Compaction Requirements

Engineered fill should meet the following compaction requirements.

Material Type	Maximum Lift Thickness	Minimum Compaction Requirements (%) [1]	Water Content Range (%) [1]
Select/Structural Fill	≤ 8 inches in loose thickness when heavy, self-propelled compaction equipment is used	95	±3
Paving Fill, Paving Subgrade, and General Fill		95	±3
Crushed Limestone Base (if used beneath concrete pavements as fill) [2]	≤ 6 inches in loose thickness when hand-guided equipment (i.e., jumping jack or plate compactor) is used	100 [2]	±3 [2]

1. Maximum dry unit weight and optimum water content as determined by the standard Proctor test (ASTM D 698).
2. Per TEX-113-E.

Utility Trench Backfill

Any soft or unsuitable materials encountered at the bottom of utility trench excavations should be removed and replaced with select fill (in building/structural areas), general fill (in non-building/structural areas), or bedding material in accordance with public works specifications for the utility to be supported. This recommendation is particularly applicable to utility work requiring grade control and/or in areas where subsequent grade raising could cause settlement in the subgrade supporting the utility. Trench excavation should not be conducted below a downward 1(H):1(V) projection from foundations without engineering review of shoring requirements and geotechnical observation during construction.

On-site Stratum 1 materials are considered suitable for backfill of utility and pipe trenches in non-building/structural areas from 1 foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed in building/structural areas, the backfill should satisfy the engineered select fill requirements discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

Grading and Drainage

The performance of the proposed structures will not only be dependent upon the quality of construction, but also upon the stability of the moisture content of the near-surface soils. Therefore, we highly recommend that site drainage be developed so that ponding of surface runoff near the structures does not occur. Accumulation of water near the structures may cause significant moisture variations in soils adjacent to the structures, thus increasing the potential for structural distress.

All grades must provide effective drainage away from the buildings during and after construction and should be maintained throughout the life of the structures. Water retained next to the buildings can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from each building or discharged onto positively sloped pavements/flatwork.

Sprinkler mains and spray heads should preferably be located at least 5 feet away from the structures such that they cannot become a potential source of water directly adjacent to the structures. Placing large bushes and trees adjacent to the structures may cause significant moisture variations in the soils underlying the structures. Tree roots can adversely influence the subsurface soil moisture content. Watering of vegetation should be performed in a timely and controlled manner such that overwatering is avoided. Landscaped irrigation adjacent to the foundation units should be minimized or eliminated. Special care should be taken such that underground utilities do not develop leaks with time.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 10 feet beyond the perimeter of each building. Flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around each structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts each structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Shallow excavations for the proposed structures are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-supported improvements such as floor slabs and pavements. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

Surface runoff could affect overexcavation efforts, especially for overexcavation and replacement of soils. A temporary dewatering system consisting of sumps with pumps may be necessary to achieve the recommended depth of overexcavation depending on groundwater and precipitation conditions at the time of construction. Sump pits should preferably be excavated just outside the select fill pad limits.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety or the contractor's activities; such responsibility shall neither be implied nor inferred.

Excavations or other activities resulting in ground disturbance have the potential to affect adjoining properties and structures. Our scope of services does not include review of available final grading information or consider potential temporary grading performed by the contractor for potential effects such as ground movement beyond the project limits. A preconstruction/ precondition survey should be conducted to document nearby property/infrastructure prior to any site development activity. Excavation or ground disturbance activities adjacent or near property lines should be monitored or instrumented for potential ground movements that could negatively affect adjoining property and/or structures.

Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and pavements), as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas, with a minimum of three tests per lift. Where not specified by local ordinance, one density and water content test should be performed for every 100 linear feet of compacted utility trench backfill and a minimum of one test performed for every 12 vertical inches of compacted backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer (or others under their direction). If unanticipated conditions are observed, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the opportunity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Shallow Foundations

Footings

Principal column and wall loads for the proposed structures may be supported on isolated (spread) and/or continuous (strip) footings bearing on Stratum 1 soils or select/structural fill. If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing Pressure [1, 2]	2,000 psf - foundations bearing upon Stratum 1 soils
Required Bearing Stratum [3]	Stratum 1 soils
Minimum Foundation Dimensions	Per IBC 1809.7
Ultimate Passive Resistance [4] **(equivalent fluid pressures)**	310 pcf – Stratum 1 soils 360 pcf - Select/structural fill in upper 18 inches below slab
Ultimate Sliding Resistance [5]	250 psf cohesion – Stratum 1 soils
Minimum Embedment below Finished Grade [6]	24 inches
Estimated Total Settlement from Structural Loads [2,7]	≤ 1-inch
Estimated Differential Settlement [2,7,8]	About ½ to ¾ of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
2. Values provided are for maximum loads noted in **Project Description**. Additional geotechnical consultation will be necessary if higher loads are anticipated.
3. Unsuitable or soft soils should be overexcavated and replaced per the recommendations presented in **Earthwork**.

Item	Description

4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face. Assumes no hydrostatic pressure. Passive resistance should be neglected in the first 12 inches below finished grades. Ultimate values should be reduced by an appropriate factor of safety to compute allowable values.
5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. For fine-grained materials, lateral resistance using cohesion should not exceed ½ the dead load. Ultimate values should be reduced by an appropriate factor of safety to compute allowable values.
6. Embedment necessary to minimize the effects of seasonal water content variations and potential future disturbance around the perimeter. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
7. The estimated post-construction settlement of the shallow footings is assuming proper construction practices are followed. The settlement response of the footings will be more dependent upon the quality of construction than upon the response of the subgrade to the foundation loads.
8. Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet. Differential settlements may result from variances in subsurface conditions, loading conditions, and construction procedures.

Design Parameters – Overturning and Uplift Loads

Shallow foundations subjected to overturning loads should be proportioned such that the resultant eccentricity is maintained in the center-third of the foundation (e.g., $e < b/6$, where b is the foundation width). This requirement is intended to keep the entire foundation area in compression during the extreme lateral/overturning load event. Foundation oversizing may be required to satisfy this condition.

Uplift resistance of spread footings can be developed from the effective weight of the footing and the overlying soils with consideration to the IBC basic load combinations.

Item	Description
Foundation Unit Weight	As per Structural Engineer
Soil Total Unit Weight [1]	120 pcf

Item	Description

1. The nominal values should be reduced by an appropriate factor of safety to compute allowable values. Soil weight should be ignored in potential zones of disturbance and in areas where erosion control measures are not used, or soil might otherwise be removed.

Construction Adjacent to Existing Building

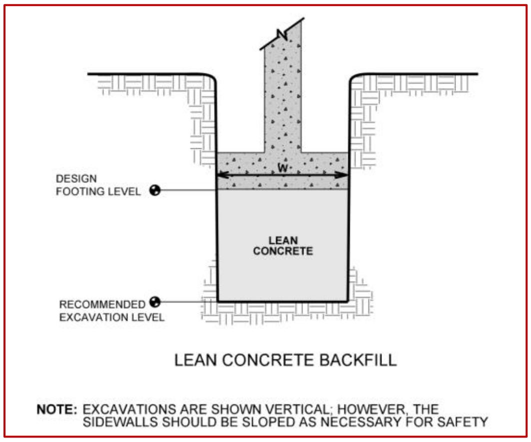
Based on the site plan provided to us, the proposed Taroko Sports building will be constructed immediately between the existing Cowboy Fit gym building and The Home Depot store. Differential settlement between the existing and proposed buildings is expected to approach the magnitude of the total settlement of the proposed building. Expansion joints should be provided between the existing and proposed buildings to accommodate differential movements between the structures. Underground piping between the structures, if any is planned, should be designed with flexible couplings and utility knockouts in foundation walls should be oversized so minor deflections in alignment do not result in breakage or distress. Care should be taken during excavation adjacent to existing foundations to avoid disturbing existing foundation bearing soils.

New footings should bear at or near the bearing elevation of immediately adjacent existing foundations. Depending upon their locations and current loads on the existing footings, footings for the new structure could cause settlement of adjacent walls. To reduce this concern and risk, clear distances at least equal to the new footing widths should be maintained between the proposed building footings and footings supporting the existing buildings.

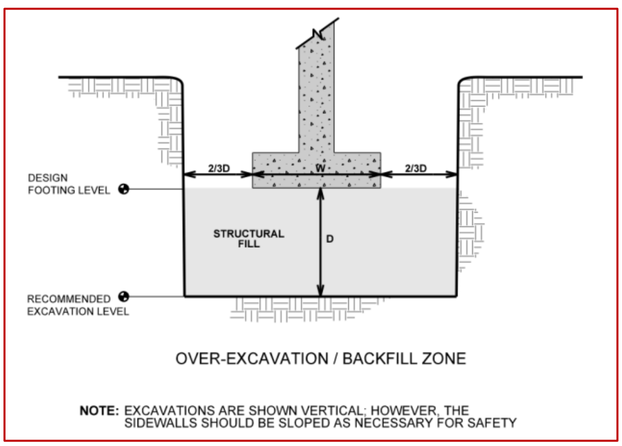
Shallow Foundation Construction Considerations

Footings should be neat excavated, if possible. If neat excavation is not possible, the foundation should be properly formed. If a toothed bucket is used, excavation with this bucket should be stopped approximately 6 inches above final grade of the foundation and the foundation excavation be completed with a smooth-mouthed bucket or by hand labor. As noted in **Earthwork**, the foundation excavations should be evaluated under the observation of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the foundation excavations should be removed/reconditioned before foundation concrete is placed.

If unsuitable bearing soils are observed at the base of the planned foundation excavation, the excavation should be extended deeper to suitable soils, and the foundations could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. The lean concrete replacement zone is illustrated on the sketch below.



Overexcavation for structural fill placement below foundations should be conducted as shown below. The overexcavation should be backfilled up to the foundation base elevation, with select fill placed, as recommended in the **Earthwork** section.



Floor Slabs

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

The subgrade soils are comprised of lean clays exhibiting the moderate potential to swell with increased water content. Construction of the floor slab and revising site drainage creates the potential for gradual increased water contents within the clays. Increases in water content could cause the lean clays to swell and damage the floor slab. To reduce the PVR to about 1 inch, the recommendations for building pad preparation provided in this report should be followed.

Floor Slab Design Parameters

Item	Description
Floor Slab Support	Select fill building pad compacted to recommendations in **Earthwork**
Estimated Modulus of Subgrade Reaction [1]	100 pounds per square inch per inch (psi/in)

1. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads. For large area loads, the modulus of subgrade reaction would be lower.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut contraction joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations, refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and structural/select fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

Pavements

General Pavement Comments

As mentioned previously, all of the surrounding pavements within this existing development are reinforced concrete; thus, we are only providing recommendations for the same type of paving. If asphalt paving is preferred, please contact us for further discussions. Recommended minimum pavement thicknesses are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Recommended minimum pavement thicknesses noted in this section must be applied to the site which has been prepared as recommended in the **Earthwork** section.

Recommended minimum pavement thicknesses 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. Support characteristics of subgrade for pavement design do not account for possible shrink/swell movements of clayey soils, such as the moderately low plasticity soils observed on this project. 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. Proper site perimeter drainage should be provided so that infiltration of surface water from unpaved areas surrounding the pavement is minimized.

Pavement Section Thicknesses

The following table provides our opinion of minimum thickness of reinforced PCC pavements.

Portland Cement Reinforced Concrete

Layer	Thickness (inches)		
	Traffic Category A [1]	Traffic Category B [1]	Traffic Category E [1,4]
Reinforced PCC [2]	5.0	6.0	7.0
Moisture Conditioned Subgrade [2]	6.0	6.0	6.0

1. See **Project Description** for more specifics regarding traffic classifications.
2. All materials should meet the specifications as outlined in **Pavement Materials** below.
3. For fire lanes to withstand the occasional HS-20 loading of 32,000 pounds per axle and up to 90,000-pound gross truck weight, use Traffic Category E pavements or thicker.

Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign material and doweled where necessary for load transfer. PCC pavement details for joint spacing, joint reinforcement, and joint sealing should be prepared in accordance with ACI 330 and ACI 325.

Where practical, we recommend early-entry cutting of crack-control joints in PCC pavements. Cutting of the concrete in its "green" state typically reduces the potential for micro-cracking of the pavements prior to the crack control joints being formed, compared to cutting the joints after the concrete has fully set. Micro-cracking of pavements may lead to crack formation in locations other than the sawed joints, and/or reduction of fatigue life of the pavement.

Pavement Materials

Presented below are our recommended material requirements for the various pavement sections.

Item	Value
Portland Cement Concrete (PCC)	28-day compressive strength ≥ 3,500 psi

Item	Value
Moisture Conditioned Subgrade [1]	As outlined in **Earthwork**.

1. Subgrade should not dry out or become saturated prior to pavement construction. The pavement subgrade should be thoroughly proof-rolled as outlined in **Earthwork**. Particular attention should be paid to areas along curbs, above utility trenches, and adjacent to landscape islands, manholes, and storm drain inlets.

Presented below are our recommendations for the construction of the reinforced concrete pavements.

Item	Value
Reinforcing Steel	Category A and B: #3 bars spaced at 18 inches on center in both directions. Category E: #4 bars spaced at 18 inches (or #3 bars spaced at 12 inches) on center in both directions. Rebar should be placed at midpoint of concrete section and supported on chairs prior to concrete placement.
Control (i.e., Contraction) Joint Spacing	In accordance with ACI 330R, control joints should be spaced no greater than 12.5 feet for 5-inch-thick concrete and 15 feet for 6-inch-thick or greater concrete. If sawcut, control joints should be cut within 6 to 12 hours of concrete placement. Sawcut joint should be at least ¼ of the slab thickness.
Expansion (i.e., Isolation) and Construction Joint Spacing	ACI 330R indicates that regularly spaced expansion joints may be deleted from concrete pavements, except adjacent to structures, manholes, inlets, light poles, etc., as well as at connections to adjacent previously existing pavements (i.e., construction joints). Expansion and construction joints, if not sealed and maintained, can allow infiltration of surface water into the subgrade.
Dowels at Expansion & Construction Joints	¾-inch smooth bars, 18 inches in length, with one end treated to slip, spaced at 12 inches on centers at each joint, and placed level at midpoint of concrete section.

Pavement Drainage

On most projects, rough site grading is accomplished relatively early in the construction phase. Fills are placed and compacted in a uniform manner. 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 temporarily improve subgrade conditions. 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. All pavement areas should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to paving. Thorough proof-rolling of pavement areas should be performed no more than 36 hours prior to surface paving. Proof-rolling should be repeated if the site received rainfall prior to paving. Any problematic areas should be reworked and compacted at that time.

Openings in pavements, such as landscaped islands, are sources for water infiltration into surrounding pavement systems. Water can collect in the islands and migrate into the surrounding subgrade soils thereby degrading support of the pavement. Islands with raised concrete curbs, irrigated foliage, and low permeability near-surface soils are particular areas of concern. The civil design for the pavements with these conditions should include features to restrict or to collect and discharge excess water from the islands. Examples of features are self-contained planters, edge drains connected to the storm water collection system, longitudinal subdrains, or other suitable outlet, and impermeable barriers preventing lateral migration of water such as a cutoff wall installed to a depth below the pavement structure.

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic upkeep should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Subgrade and pavement surfaces should have a minimum slope (i.e., not flat) to promote proper surface drainage.

- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

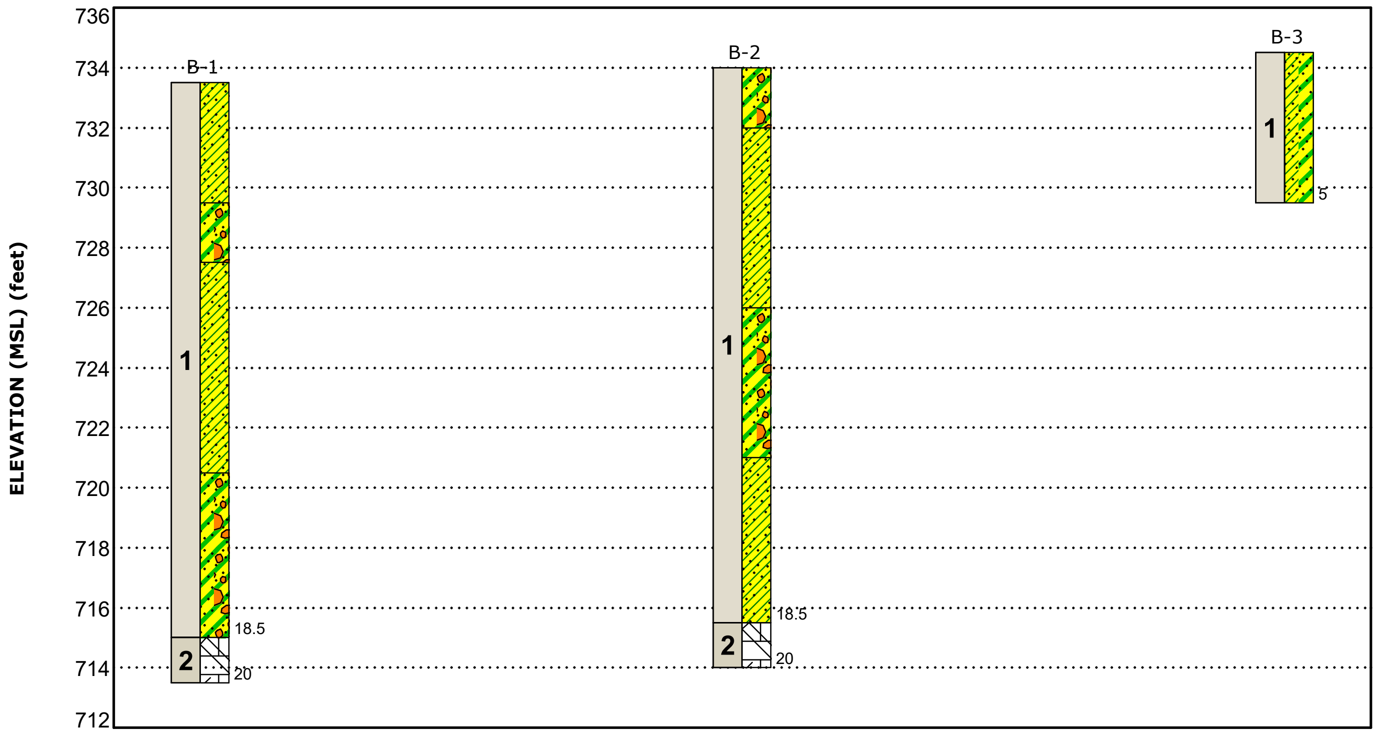
Figures

Contents:

Stone Hill Town Center - Taroko Sports
500 Limestone Commercial Dr | Pflugerville, TX
Terracon Project No. AC255008

800 Paloma Dr Ste 160
Round Rock, TX

GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	**Moderately Low Plasticity Soils**	Light brown lean clay (CL) with various amounts of sand and gravel to clayey sand with gravel (SC)
2	**Bedrock**	Light brown Austin Group limestone

Legend

- Sandy Lean Clay
- Clayey Sand with Gravel
- Weathered Limestone
- Sandy Lean Clay/Clayey Sand

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.
Numbers adjacent to soil column indicate depth below ground surface.

Attachments

Exploration and Testing Procedures

Field Exploration

Number of Borings	Approximate Boring Depth (feet)	Location
2	20	Building area
1	10	Parking/driveway area

Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ±10 feet) and referencing existing site features. Approximate ground surface elevations were obtained by interpolation from the site topographic survey provided to us. If more precise elevations and boring layout are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: Our drilling subcontractor advanced the borings with a truck-mounted rotary drill rig using solid-stem augering techniques. Samples were obtained at approximately two-foot intervals in the upper 10 feet of each boring and at intervals of 5 feet thereafter. Soil sampling was performed using shelby tube samplers and/or split-barrel sampling procedures. The split-barrel samplers were driven in accordance with the standard test method for standard penetration test (SPT) and split-barrel sampling of soils. Bedrock was sampled with split-barrel-sampling spoons. For safety purposes, all borings were backfilled with auger cuttings after their completion.

Our drilling subcontractor observed for possible groundwater levels during drilling and sampling. Groundwater was not observed during our field investigation.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- Moisture Content
- Dry Unit Weight
- Grain Size Distribution
- Atterberg Limits
- Unconfined Compression

The laboratory testing program included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Rock classification was conducted using locally accepted practices for engineering purposes; petrographic analysis may reveal other rock types. Rock core samples typically provide an improved specimen for this classification. Boring log rock classification was determined using the Description of Rock Properties.

Site Location and Exploration Plans

Contents:

Note: All attachments are one page unless noted above.

Site Location

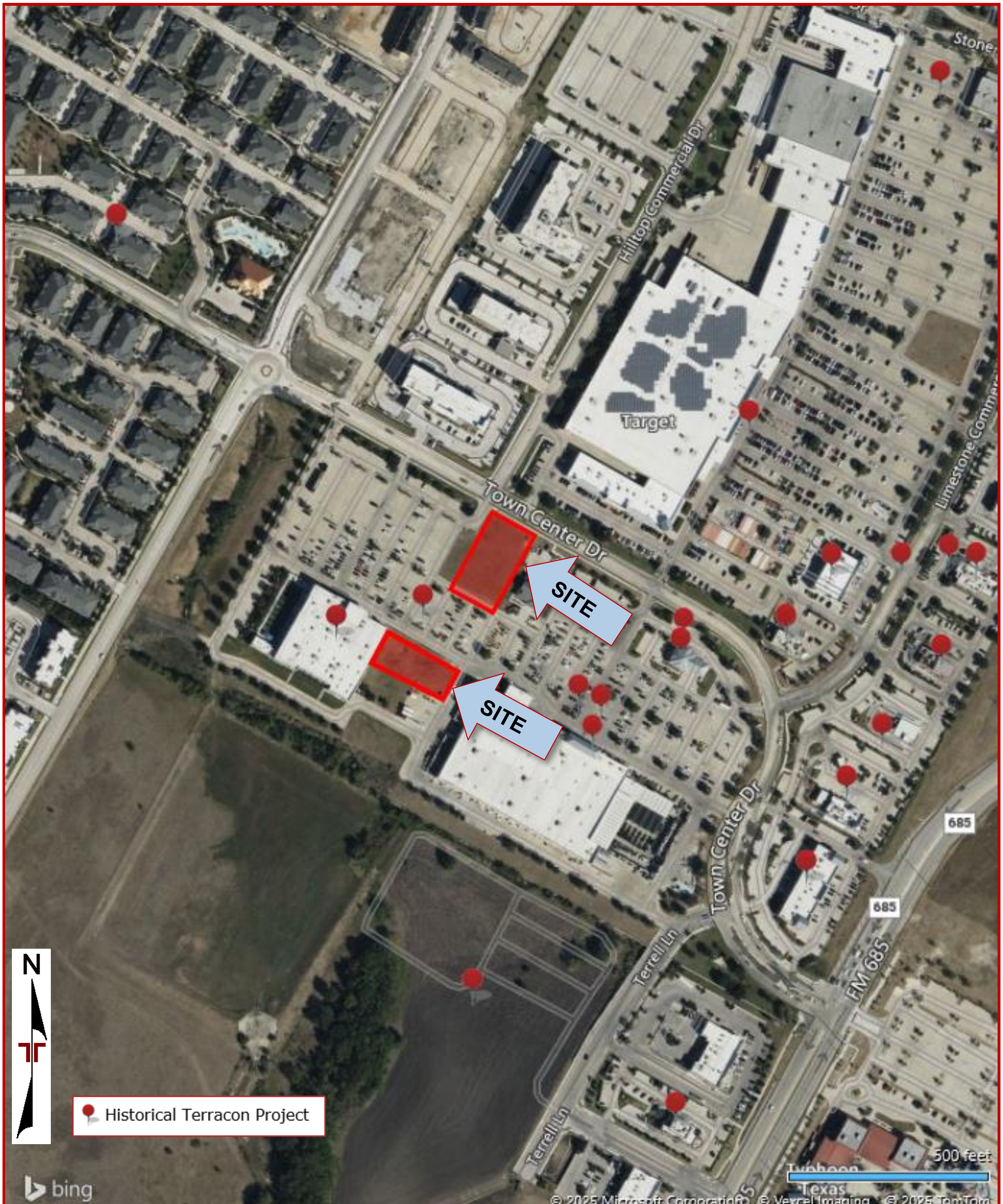


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES
MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Note: All attachments are one page unless noted above.

Terracon
800 Paloma Dr Ste 160
Round Rock, TX

Boring Log No. B-1

Location: See Exploration Plan

Latitude: 30.4654° Longitude: -97.6010°

Model Layer	Graphic Log	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Strength Test: Test Type	Strength Test: Compressive Strength (tsf)	Strength Test: Strain (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1			**SANDY LEAN CLAY (CL)**, light brown, stiff to hard, trace gravel				4.5+ tsf (HP)				13.4			
		4.0					4.5+ tsf (HP)	UC	1.94	4.3	12.1	116		
		6.0	**CLAYEY SAND WITH GRAVEL (SC)**, light brown, varies to sandy lean clay (CL)	5			4.5+ tsf (HP)				12.5		40-16-24	49.1
			SANDY LEAN CLAY (CL), light brown, stiff to hard				4.5+ tsf (HP)				12.2			
		13.0	- with limestone fragments below about 8 feet	10			4.5+ tsf (HP)	UC	1.90	4.7	13.3	116		
		18.5	**CLAYEY SAND WITH GRAVEL (SC)**, light brown, with limestone fragments	15			4.5+ tsf (HP)				12.9		39-16-23	41.9
2		20.0	**WEATHERED LIMESTONE**, tan, with clay layers and seams	20			50/3"				8.0			
			Boring Terminated at 20 Feet											

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.
Elevation Reference: Elevations were interpolated from a topographic site plan provided to us.

Water Level Observations
Groundwater not encountered

Drill Rig
CME 45

Hammer Type
Automatic

Driller
Austin Geo-Logic

Notes

Advancement Method
Dry Auger from 0 to 20 feet

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Logged by
Austin Geo-Logic

Boring Started
03-03-2025

Boring Completed
03-03-2025

Stone Hill Town Center - Taroko Sports
500 Limestone Commercial Dr | Pflugerville, TX
Terracon Project No. AC255008

Terracon
800 Paloma Dr Ste 160
Round Rock, TX

Boring Log No. B-2

Location: See Exploration Plan

Latitude: 30.4653° Longitude: -97.6007°

Model Layer	Graphic Log	Depth (Ft.) / Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Strength Test: Test Type	Strength Test: Compressive Strength (tsf)	Strength Test: Strain (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1		**CLAYEY SAND WITH GRAVEL (SC)**, light brown				4.5+ tsf (HP)				12.9		36-16-20	45.7
		2.0 **SANDY LEAN CLAY (CL)**, light brown, stiff to hard				4.5+ tsf (HP)	UC	1.35	7.6	17.4	110		
		- with sand seams from about 4 to 6 feet	5			3.0 tsf (HP)				14.5			
						4.5 tsf (HP)							
		8.0 **CLAYEY SAND WITH GRAVEL (SC)**, light brown, with limestone fragments, with iron stains	10			4.5+ tsf (HP)				12.7		38-16-22	37.5
		13.0 **SANDY LEAN CLAY (CL)**, light brown, very stiff to hard, with limestone fragments	15			4.5+ tsf (HP)	UC	3.63	3.7	12.9	121		
2		18.5 **WEATHERED LIMESTONE**, tan, with clay layers and seams				50/4"				10.9			
		20.0 ***Boring Terminated at 20 Feet***	20										

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.
Elevation Reference: Elevations were interpolated from a topographic site plan provided to us.

Notes

Water Level Observations
Groundwater not encountered

Advancement Method
Dry Auger from 0 to 20 feet

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Drill Rig
CME 45

Hammer Type
Automatic

Driller
Austin Geo-Logic

Logged by
Austin Geo-Logic

Boring Started
03-03-2025

Boring Completed
03-03-2025

Terracon
800 Paloma Dr Ste 160
Round Rock, TX

Boring Log No. B-3

Location: See Exploration Plan

Latitude: 30.4661° Longitude: -97.6004°

Model Layer	Graphic Log	Depth (Ft.)	Description	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Strength Test: Test Type	Strength Test: Compressive Strength (tsf)	Strength Test: Strain (%)	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits LL-PL-PI	Percent Fines
1			**SANDY LEAN CLAY (CL)**, light brown, hard, trace gravel				4.5+ tsf (HP)				12.9			
							4.5+ tsf (HP)				11.7		41-17-24	63.7
		5.0		5			4.5+ tsf (HP)				8.8			
			Boring Terminated at 5 Feet											

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.
Elevation Reference: Elevations were interpolated from a topographic site plan provided to us.

Water Level Observations
Groundwater not encountered

Drill Rig
CME 45

Hammer Type
Automatic

Driller
Austin Geo-Logic

Notes

Advancement Method
Dry Auger from 0 to 5 feet

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Logged by
Austin Geo-Logic

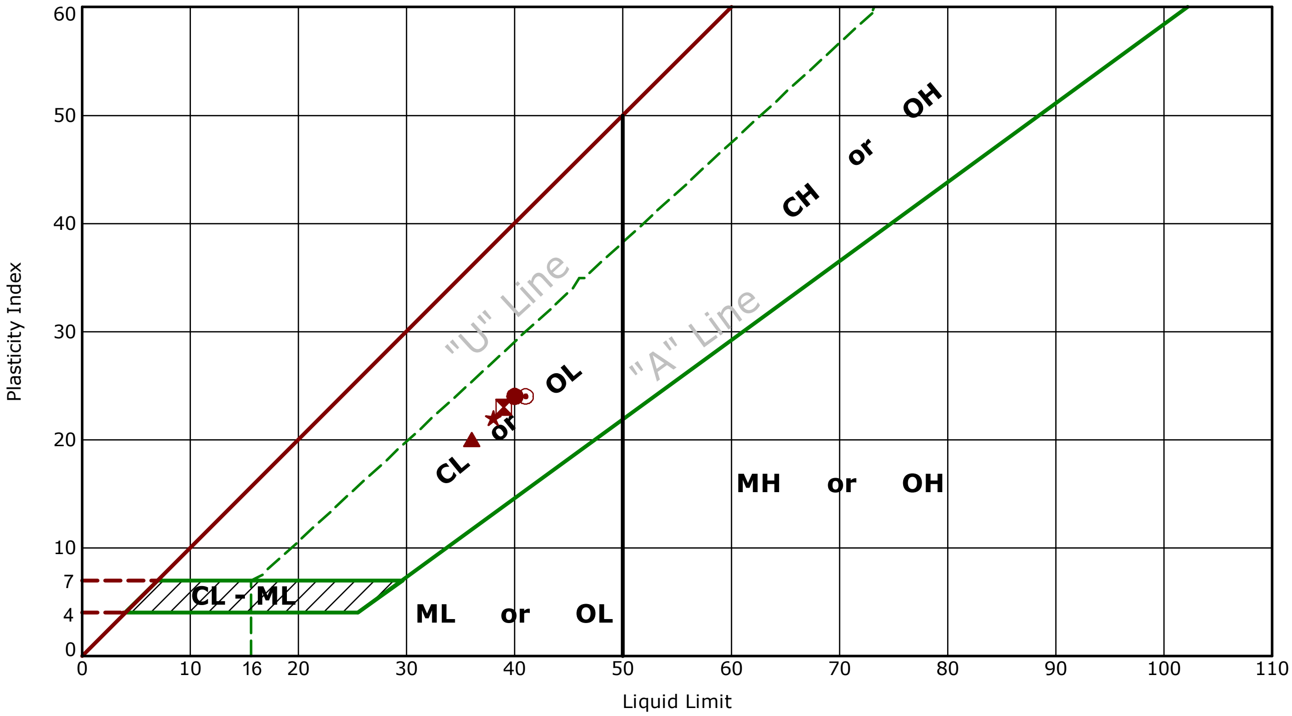
Boring Started
03-03-2025

Boring Completed
03-03-2025

800 Paloma Dr Ste 160
Round Rock, TX

Atterberg Limit Results

ASTM D4318

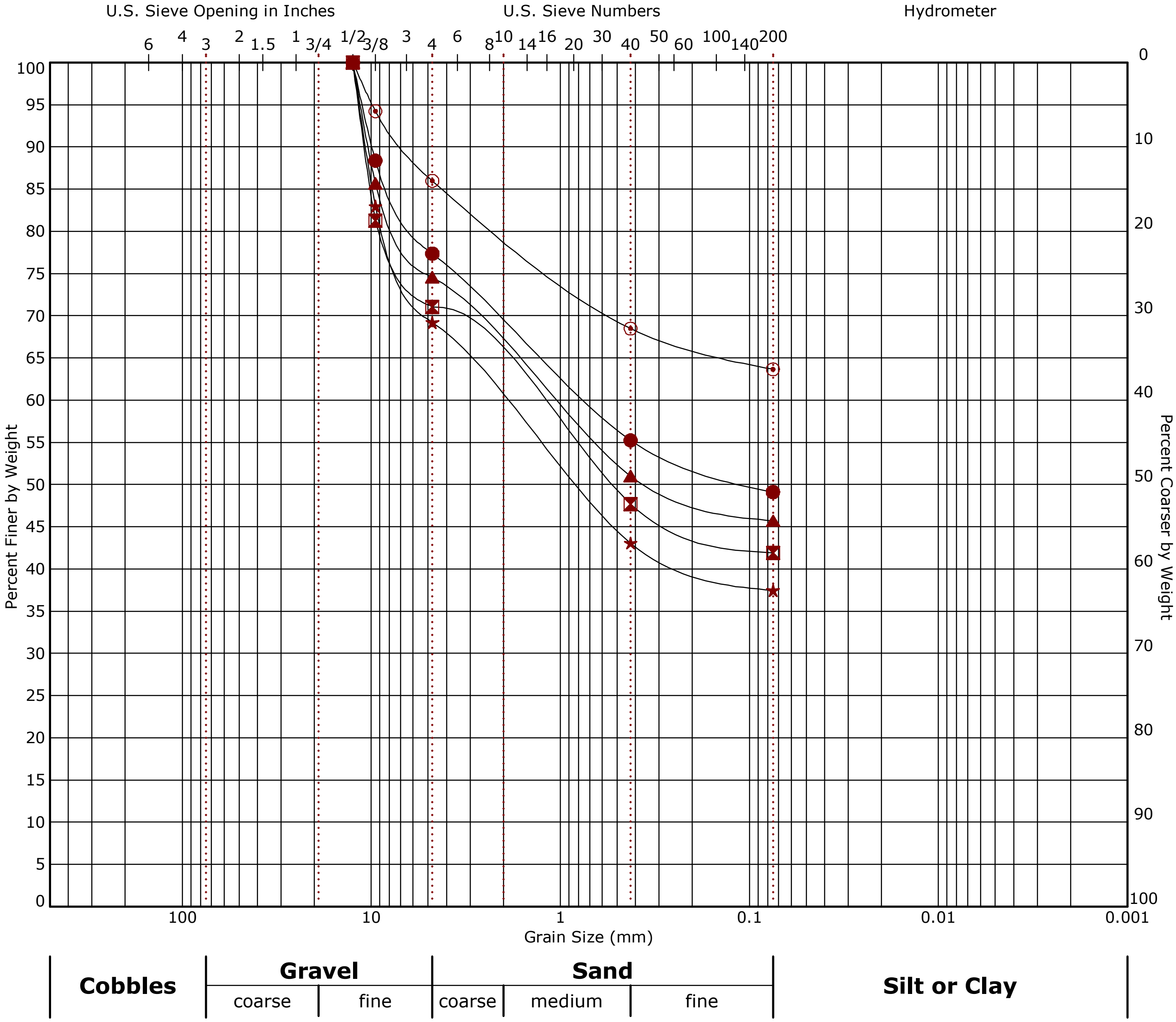


	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-1	4 - 6	40	16	24	49.1	SC	CLAYEY SAND with GRAVEL
⊠	B-1	13 - 15	39	16	23	41.9	SC	CLAYEY SAND with GRAVEL
▲	B-2	0 - 2	36	16	20	45.7	SC	CLAYEY SAND with GRAVEL
★	B-2	8 - 10	38	16	22	37.5	SC	CLAYEY SAND with GRAVEL
⊙	B-3	2 - 4	41	17	24	63.7	CL	SANDY LEAN CLAY

Terracon
800 Paloma Dr Ste 160
Round Rock, TX

Grain Size Distribution

ASTM D422 / ASTM C136 / AASHTO T27



Boring ID		Depth (Ft)	Description		LL	PL	PI	Cc	Cu
●	B-1	4 - 6	CLAYEY SAND with GRAVEL		40	16	24		
⊠	B-1	13 - 15	CLAYEY SAND with GRAVEL		39	16	23		
▲	B-2	0 - 2	CLAYEY SAND with GRAVEL		36	16	20		
★	B-2	8 - 10	CLAYEY SAND with GRAVEL		38	16	22		
⊙	B-3	2 - 4	SANDY LEAN CLAY		41	17	24		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay
●	B-1	4 - 6	12.5	0.715			0.0	22.6	28.2	49.1		
⊠	B-1	13 - 15	12.5	1.518			0.0	29.0	29.1	41.9		
▲	B-2	0 - 2	12.5	1.068			0.0	25.5	28.8	45.7		
★	B-2	8 - 10	12.5	2.028			0.0	30.8	31.7	37.5		
⊙	B-3	2 - 4	12.5				0.0	14.0	22.3	63.7		

Supporting Information

Contents:

Note: All attachments are one page unless noted above.

Terracon
800 Paloma Dr Ste 160
Round Rock, TX

General Notes

Sampling	Water Level	Field Tests
Shelby Tube; Standard Penetration Test	Water Initially Encountered Water Level After a Specified Period of Time Water Level After a Specified Period of Time Cave In Encountered Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N — Standard Penetration Test Resistance (Blows/Ft.) (HP) — Hand Penetrometer (T) — Torvane (DCP) — Dynamic Cone Penetrometer UC — Unconfined Compressive Strength (PID) — Photo-Ionization Detector (OVA) — Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		**Consistency of Fine-Grained Soils** (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Relative Density	**Standard Penetration or N-Value (Blows/Ft.)**	**Consistency**	**Unconfined Compressive Strength Qu (tsf)**	**Standard Penetration or N-Value (Blows/Ft.)**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried} < 0.75$	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.