

SUBSURFACE INVESTIGATION  
AND  
FOUNDATION RECOMMENDATIONS

FOR

CITY OF NEW BRAUNFELS: SPORTS FIELD COMPLEX (NB 18-032-0118-0001)  
WEST KLEIN ROAD AND F.M. 1044  
NEW BRAUNFELS, TEXAS

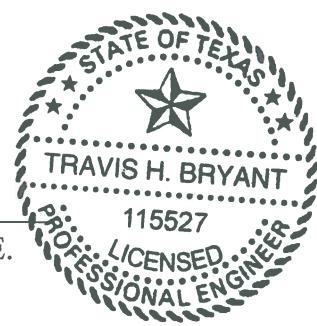
REPORT FOR:

NORRIS DESIGN  
2201 EAST 6<sup>TH</sup> STREET  
AUSTIN, TEXAS 78702

PREPARED BY:

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HOLT ENGINEERING, INC.  
TBPE FIRM REGISTRATION NO. F-430

FILE NO. 08-20219  
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**INTRODUCTION**

An exploration of subsurface soil conditions was performed for the proposed New Braunfels Sports Complex to be located at West Klein Road and F.M. 1044 in New Braunfels, Texas. The investigation was authorized by Mr. Joe Daly, PLA, Principal with Norris Design, in a Master agreement for subconsultant services, on 3 July 2019 in accordance with our proposal dated 21 May 2018. The purpose of this investigation was to determine subsurface conditions and materials on the site and to establish design and construction recommendations for the project's foundation system and pavement recommendations for the associated parking lot and drive areas.

**SCOPE**

Our investigation consisted of the following:

- A. Laying out and drilling 28 soil borings to depths of 6 feet to 25 feet below existing grades.
- B. Logging the borings in the field and a visual reconnaissance of the area's terrain.
- C. Taking samples of selected subsurface soils for laboratory tests.
- D. Performing field tests.
- E. Providing foundation and pavement thickness design recommendations based on engineering analysis of field notes and laboratory test results.

## SITE DESCRIPTION

The proposed New Braunfels Sports Complex is to be located at West Klein Road and F.M. 1044 in New Braunfels, Texas. The site consists of undeveloped property covered in native grasses with scattered small to large trees. The property is bordered by West Klein Road to the north, F.M. 1044 to the west, New Braunfels Middle School to the east, and undeveloped property to the south. The terrain generally slopes to the south east.

## LABORATORY TESTS

The following laboratory tests were run on selected samples:

1. Moisture content (ASTM D2216);
2. Minus 200-mesh sieve (ASTM D422);
3. Atterberg limits (ASTM D4318).

These tests were performed together with visually inspecting and classifying the soil in general accordance with ASTM D2487 and described as recommended in ASTM D2488. Results of these tests were used to determine the foundation design criteria such as bearing capacity and the potential for settlement or heave.

## SUBSURFACE CONDITIONS

The approximate locations of the borings are shown in the attached Generalized Boring Location Plan. A general description of the soil conditions is given below. A detailed depiction of the soil conditions is given in the Logs of Borings found in the Appendix.

In general, dark brown fat clay is found on the surface across most of the site and extends to depths ranging from 6 inches to 7 feet. Below the dark brown fat clay, tan and gray fat clays are present which extend to the termination of the borings at depths of 6 feet to 25 feet below the existing grades. It should be noted in borings P-01, P-04, and P-05, brown and tan lean clays are present and extend to termination of those parking borings at a depth of 6 feet below existing grades.

The surficial dark brown fat clay is highly plastic with plasticity indices (P.I.'s)

ranging from 30 to 45. The underlying tan and gray fat clays are highly plastic with P.I.'s ranging from 34 to 43 and contain varying amounts of gravel and calcareous layers. The brown and tan lean clays are moderately plastic with P.I.'s ranging from 24 to 27.

Groundwater was not encountered during the drilling operation. The fat clays on this site typically do not produce large amounts of groundwater; however, some perched water might be found in calcite layers and gravel layers within the jointed clays. The amount of seepage will be highly dependent on rainfall conditions in the weeks and months prior to construction.

#### POTENTIAL VERTICAL MOVEMENT

The potential vertical movement for the underlying clay soils at this site has been estimated using the general guidelines presented in the Texas Department of Transportation (TxDOT) test method TEX-124-E. The Texas Department of Transportation method utilizes the liquid limits and plasticity indices for soils in the seasonally active zone, estimated to be about 12 feet in the project area.

The estimated potential vertical movement value provided is based on the proposed floor system applying a sustained surcharge load of approximately 1.0 lb. per square inch on the subgrade materials. Potential vertical movement on the order of approximately 3.5 inches was estimated for dry soil moisture conditions.

The PVR value is based on the current site grades. Higher PVR values than the above-mentioned value will occur in areas where water is allowed to pond for extended periods.

#### DISCUSSION AND RECOMMENDATIONS

It is our understanding a new sports complex is planned for the site which will consist of multiple soccer fields, baseball fields, concession stand buildings, and restroom buildings. We expect the restroom and concession stand buildings will have CMU walls with metal roof. The terrain is sloping and cuts and fills will be made across the site and retaining walls are planned in these areas. Multiple parking lots and access roads are also planned as part of the project.

The primary concern for the new structures is the expansive surficial dark brown

fat clay and the underlying tan and gray fat clays found across the site. These fat clay soils are highly plastic and will undergo large volume changes with changes in soil moisture from seasonal rainfall conditions. As mentioned above, we anticipate movement on the order of 3.5 inches for a shallow foundation system. Therefore, we recommend a foundation consisting of drilled piers with a voided structural floor slab. With this system, all structural loads are supported on drilled under-reamed (belled) piers seated into the tan and gray fat clay and sized for an allowable bearing value of 6,500 PSF when seated at a minimum depth of 22 feet below existing grade. The bell of the piers should be a minimum of two times the shaft diameter. All piers should be inspected by the soils engineer or qualified technician during the drilling operation to verify seating depth, proper bearing strata, reinforcement, concrete placement, plumbness, proper bell size and cleanliness of hole.

The floor slab is suspended from grade a minimum of 8 inches on cardboard carton forms. Concrete perimeter beams must be hard formed. Perimeter beams should be voided of grade a minimum of 8 inches and soil retainers installed beside the beams to prevent encroachment of soil below the beams. Cardboard forms must be inspected to verify they not collapsed. Trapezoidal carton forms in lieu of retainers below the beams are not acceptable.

A deep foundation with voided structural floor system on drilled piers may not be economically feasible for the project. If the owner is willing to accept the risk of some movement in the foundation system and structure, as an alternative, we recommend a shallow foundation with a soil supported floor slab with the removal and replacement from Table 1 below. Perimeter beams should be seated 30 inches into the compacted select fill and sized for an allowable bearing value of 2,000 PSF. Sandy loam, screening, scalplings, and crusher fines are not acceptable for select fill. Heavy column loads, if needed, should be supported on widened grade beams. This may result in minor differential movement which will result in minor cracking of the drywall, floor slab and cracking in the exterior veneer, if used.

**Table 1**  
**Remove/Replacement of Clay and Resulting PVR**

Remove/Replace (Feet)	Resulting PVR (Inches)
3	2.0
4	1.5
6	1.0

Landscaping and drainage conditions must also be given careful consideration. The yard should be sloped for positive drainage away from the foundation. Sprinkler systems near the foundation should be avoided. Gutters and downspouts should be installed where necessary to prevent ponding near the foundation. Maintaining the soil moisture around the foundation to uniform moisture condition is essential for a stable foundation system.

The building pads should be prepared by removing the surficial dark brown fat clay to desired PVR above in Table 2 and any organic soils and replacing with a low P.I. (P.I. 3 to 18) Select Fill. The exposed subgrade and all fill should be compacted in 8-inch lifts to a minimum of 95% of the maximum dry density in accordance with TxDOT test method TEX-113-E. Soil moisture should be within 3% of optimum.

We are providing two recommendations for the foundations below: A) Drilled Piers with a Voided Structural Floor Slab and, B) Shallow Foundation System. In our opinion, recommendation "A" is the preferred system and is structurally superior. The drilled piers will provide more stable support of the structure and voiding of perimeter beams will prevent uplift from the underlying clay soils. The piers will also reduce the risk of the potential of cracking in CMU walls, masonry veneer, if used, drywall, and movement of the structure that may result from minor differential movement in a shallow slab-on-grade type foundation.

#### SPECIFIC FOUNDATION RECOMMENDATIONS

A. Drilled Piers with a Voided Structural Floor Slab:

This foundation system consists of all foundation loads carried on drilled under-reamed (belled) piers with a voided floor slab.

1. Allowable Bearing and Seating Depth – Drilled belled piers should be seated into the tan and gray fat clay at a minimum depth of 22 feet below existing grade and sized for an allowable bearing value of 6,500 PSF. The bell of the pier should be a minimum of two times the shaft diameter.
2. Pier Hole Inspection – All pier holes should be inspected during the drilling operation by a geotechnical engineer or qualified technician to verify proper bearing strata, seating depth, plumbness, reinforcement placement, concrete placement, cleanliness of hole, and proper bell.
3. Pier Construction – Piers should be poured the same day they are drilled and no piers left open overnight. Piers should have a minimum reinforcing steel of 1.5% of the shaft area.
4. Casing – Groundwater was not encountered in our borings; however, water may be encountered in the pier holes and pumping of pier holes should be expected. If excessive sloughing occurs, then casing of piers will be necessary.
5. Beams and Floor Slab – Floor slab and beams are voided of grade a minimum of 8 inches. Place a vapor barrier between foundation and carton forms. Immediately after placing reinforcing steel, pour beams and floor slab monolithically. Concrete perimeter beams must be hard formed. Perimeter beams should be voided of grade a minimum of 8 inches and soil retainers installed beside the beams to prevent encroachment of soil below the beams. Cardboard forms be must be inspected to verify they have not collapsed. Trapezoidal carton forms below the beams are not acceptable. Carton forms should not be placed on wet ground and if cardboard forms become wet they should be replaced.
6. Flexibility – Entities such as stairways, loading docks, porches, flatwork, etc. not supported by drilled piers should not be rigidly attached the building. Movement of approximately 3.5 inches should

be expected in flatwork or other ground supported entities.

7. Drainage – Slope grounds away from foundation to provide rapid drainage.

B. Shallow Foundation System:

This foundation consists of continuous reinforced concrete spread footings with a soil supported floor slab. Heavy column loads should be carried on widened grade beams. Stiffening beams in large slab sections are recommended. Some foundation movement should be expected in this system. Minor cracking in CMU walls, masonry veneer, and exposed slabs should be expected.

1. Building Pad – Remove a portion of the dark brown fat clay as per Table 1 above, any existing fill and any organic materials and replace with a low P.I. (P.I. 3 to 18) select fill (see attached Select Fill Specifications). Sandy loam, screening, scalpings, and crusher fines are not acceptable for select fill. Compact the exposed subgrade and all fill to a minimum of 95% of the optimum dry weight in accordance with TxDOT test method TEX-113-E. Compaction moisture should be within 3% of optimum. The building pad should be extended out beyond the edge of the building a minimum of 3 feet. The building pad should extend beyond any flatwork around the buildings a minimum of 2 feet.
2. Soil Bearing Pressure and Seating Depths – Perimeter beams should be seated 30 inches into the compacted select fill and sized for an allowable bearing value of 2,000 PSF. Heavy column loads should be supported on widened grade beams or drilled piers as described above.
3. Beams and Floor Slab – Trench for perimeter beams (wall footings) and stiffening beams. Place a vapor barrier (8 mil or thicker) between foundation and base material. Immediately after placing reinforcing steel, pour beams and floor slab monolithically. Building pad moisture should be maintained in a uniform condition.

4. Drainage – Slope grounds away from foundation to provide rapid drainage. A French drain is recommended (see page 6 above) on the west side of the site to prevent migration of water under the buildings.

### PAVEMENT DESIGN SECTION

It is our understanding multiple new parking lots and access roads will also be constructed as part of this project. The pavement section will consist of either asphalt or reinforced concrete paving. The designs are based on light passenger vehicular traffic and heavy vehicular traffic with the occasional 80,000-pound vehicle (fire/garbage truck). Below are the recommended paving thicknesses and construction considerations.

#### Access Roads and Parking Areas – Light Passenger Vehicle

##### A. Asphalt Option

<u>Material</u>	<u>Thickness</u>
Lime Stabilized Subgrade	10.0 inches
Crushed Limestone Base	8.0 inches
Hot Mix Asphaltic Concrete	1.5 inches

##### B. Reinforced Concrete Option

<u>Material</u>	<u>Thickness</u>
Lime Stabilized Subgrade	10.0 inches
Crushed Limestone Base	6.0 inches
Reinforced Concrete	5.0 inches

#### Access Roads and Parking Areas – Heavy Vehicular Traffic

##### A. Asphalt Option

<u>Material</u>	<u>Thickness</u>
Lime Stabilized Subgrade	10.0 inches
Crushed Limestone Base	10.0 inches
Hot Mix Asphaltic Concrete	2.0 inches

## PAVEMENT CONSTRUCTION CONSIDERATIONS

Pavement should be constructed and tested to meet the following requirements:

1. Reinforced Concrete – Concrete shall have a minimum compressive strength of 4,000 PSI at 28 days using 5 sacks of cement per cubic yard. Slump shall not exceed 6 inches. Control joints should be spaced a maximum of 12.5 feet on center for 5 inch thick concrete and 15 feet on center for 6 inch thick concrete or greater. Isolation joints should be used around lighting standards, area drains, and curb inlets, between pavement and sidewalks, and between buildings. Expansion (isolation) joints are not required except at fixed objects or structures and unsymmetrical areas where joint grids are difficult. Reinforcing steel should consist of No. 3 bars on 18-inch centers or an equivalent wire mesh. The reinforcing steel will help to hold edges of uncontrolled cracks together. Saw cut contraction joints should be at least  $\frac{1}{4}$  of the slab depth or 1 inch deep when using early entry saws and cut as soon as concrete is hardened. For unsealed joints the width is 1/10 inch to 1/8 inch. Joint sealant manufacturers' recommendations should be followed for the depth and width of sealed joints. For more information on concrete pavement and joint design please refer to ACI 330R-01 "Guide for Design and Construction of Concrete Parking Lots".
2. Hot Mix Asphaltic Concrete – All materials shall be subject to the approval of the engineer when tested in accordance with the specifications and test methods outlined in TxDOT Standard Specifications for Construction of Highways, Streets and Bridges – Item 340. HMAC should be compacted to an overall density of 91% to 96% of the maximum theoretical density per TEX-207-F/227-F.
3. Crushed Limestone Base – The base material should meet TxDOT Standard Specifications – Item 247, Type A, Grade 1-2 or 5. The crushed limestone base shall be obtained from an approved source

and shall be free of all deleterious materials. All base material shall be compacted in 8-inch loose lifts to a minimum density of 100% of the maximum dry density as determined by TxDOT test method TEX-113-E. The base material should extend 36 inches behind the curb line.

4. Compacted Subgrade (No Lime) – Any soft areas should be re-worked to pass proof-rolling or undercut and replaced with a minimum of 6 inches of additional base. The exposed subgrade should be compacted to at least 95% of the maximum dry density as determined by TxDOT test method TEX-113-E. Moisture content should be within 3% of optimum.
5. Lime Stabilized Subgrade – The lime treated subgrade should be prepared by removing a minimum of the top 10 inches of expansive brown fat clay, organic materials and soft clays. The upper 10 inches of exposed subgrade shall be lime stabilized with hydrated lime and thoroughly mixed with the clay soil. The hydrated lime should be thoroughly mixed into subgrade soils with a pulverizer/mixer to a minimum depth of 10 inches. In order to determine the exact amount of lime to be placed, a lime series curve should be developed in accordance with TEX-121-B, Part III – “Determining Stabilization Ability of Lime by Soil pH” prior to placement. For bid purposes, we recommend a minimum quantity of 7% hydrated lime by weight. All lime shall be placed and tested in accordance with City of Austin Standard Specifications – Items 202S and 203S. The lime-stabilized subgrade should extend a minimum of 36 inches behind the curb.
6. Sulfate Tests – Sulfate tests were not run on any samples of the dark brown clay. Sulfate tests should be run on the exposed subgrade. If high sulfates are found, then additional treatment and curing methods may be required. This may include additional mixing,

additional mixing water, blending with low sulfate soils and extending the curing time. The contractor should include sulfate testing as part of the subgrade preparation.

7. Testing – All subgrade preparation and base compaction should be inspected and tested by an Engineering/Testing Laboratory. The minimum testing frequency for subgrade and base densities is one test per 2,000 square feet or a minimum of 3 tests per site visit per lift. Slump tests, temperature measurement, air content and cylinders made for compressive strengths tests should be made during concrete placement. Grab samples of all asphalt laid shall be taken by the testing laboratory for extraction, gradation and mix compliance. Cores of the asphalt shall be taken as directed by the laboratory to determine the thickness and density.
8. Drainage – The parking lot shall be sloped or crowned for good drainage.

#### RETAINING WALLS

It is further our understanding multiple cuts will be made across the site and retaining walls are planned in these areas. We expect the proposed walls will vary in height and will range from approximately 4 feet to 6 feet tall and be a reinforced concrete cantilever type wall. Assuming the walls can tolerate some movement, the walls may be supported on shallow spread footings seated 24 inches into the undisturbed dark brown fat clay or underlying tan fat clay soil at a minimum depth of 30 inches below existing grade and sized for an allowable bearing value of 2,000 PSF. If needed, a key placed 12 inches (minimum) below the bottom of the footing may be used to prevent sliding. A passive pressure of 250 PSF may be used on the face of the key to prevent sliding. A friction factor of 0.3 on the bottom of the footing may also be used to resist sliding. The walls may be designed for an equivalent fluid pressure of 50 PCF for the active condition assuming the walls are backfilled with free draining one-inch diameter gravel (minimum 24 inches thick) up to within 12 inches of the top of the wall. Two-inch diameter weep holes should be placed at the base of the walls at about 6 feet on center. A filter fabric should be used

between the gravel envelope and the backfill soils. The final 12 inches of fill material should consist of on-site clay soils. It should be noted the clay soils encountered in our borings are highly expansive and several inches of differential movement should be anticipated. In order to control cracking, construction joints should be placed approximately 10 foot to 20 foot on-center.

### SEISMIC DESIGN

The buildings should be designed and constructed to resist the effects of earthquake motions in accordance with the International Building Code (IBC). Based on our test borings, we recommend seismic site soil classification "D". Based on this site classification and building risk category II, we recommend the following values for spectral response acceleration from Section 1613.3 "Seismic Ground Motion Values" from the 2015 Edition of the IBC. The values below were computed from the SEAOC and OSHPD Seismic Design Maps website. SEAOC and OSHPD developed this web interface that uses the USGS web services and retrieve the seismic design data and presents it in a report format. A summary of the calculations is presented below, and additional information is provided in the Appendix.

**Table 1 – Seismic Parameters**

$S_s =$	0.076 g	$S_{MS} =$	0.121 g	$S_{Ds} =$	0.081 g
$S_1 =$	0.031 g	$S_{M1} =$	0.075 g	$S_{D1} =$	0.050 g

**Seismic Design Category** - Based on the above response acceleration values the more severe design category was determined in accordance with Table 1613.3.5(1) or 1613.3.5(2). Therefore, the Seismic Design Category is "A". We are providing this soil design classification and the seismic design parameters as a courtesy to the design structural engineer based on the sources stated above. The structural engineer is ultimately responsible for verifying these values are consistent with the seismic data for the area in question and also for the adequacy of the spectral response calculations.

## QUALITY CONTROL PROGRAM

We recommend a Quality Control Program be implemented by the Owner or Architect to inspect the construction of the foundation and framing to verify all work is being performed in accordance with the approved engineered drawings and specifications. The inspections should include (but not limited to) preparation of the building pad subgrade and placement and compaction of all fill material to verify proper density and moisture content. Inspections should be conducted on all foundation beams, piers and footings to verify proper bearing and seating depth. Where drilled piers are used, or driven piles are installed then full-time inspection is recommended to verify proper bearing capacity is achieved. Pre-pour inspections should be conducted made to verify proper placement of the reinforcement. All concrete should be inspected during placement for proper slump, air-content and temperature. Test cylinders should be made to verify compressive strength. Welding and bolting on structural steel framing and connections should be inspected by a certified welding inspector. Reports of all inspections and tests should be forwarded to the Owner, Architect, Engineer, and Contractor. We can provide these services upon request.

## LIMITATIONS

This geotechnical report has been prepared for the exclusive use of our client and the client's authorized design team in preparing the appropriate design and construction documents for this project. It is not intended for any other person's benefit. This report is based on specific project information provided by the client and/or design team as described herein. Any changes in the structure, loadings, building footprint, configuration, finished floor elevations or grades should be brought to our attention so that we may determine what impact the change may have on our conclusions and recommendations. We expect to review the final grading plan and structural drawings to verify our recommendations are properly interpreted.

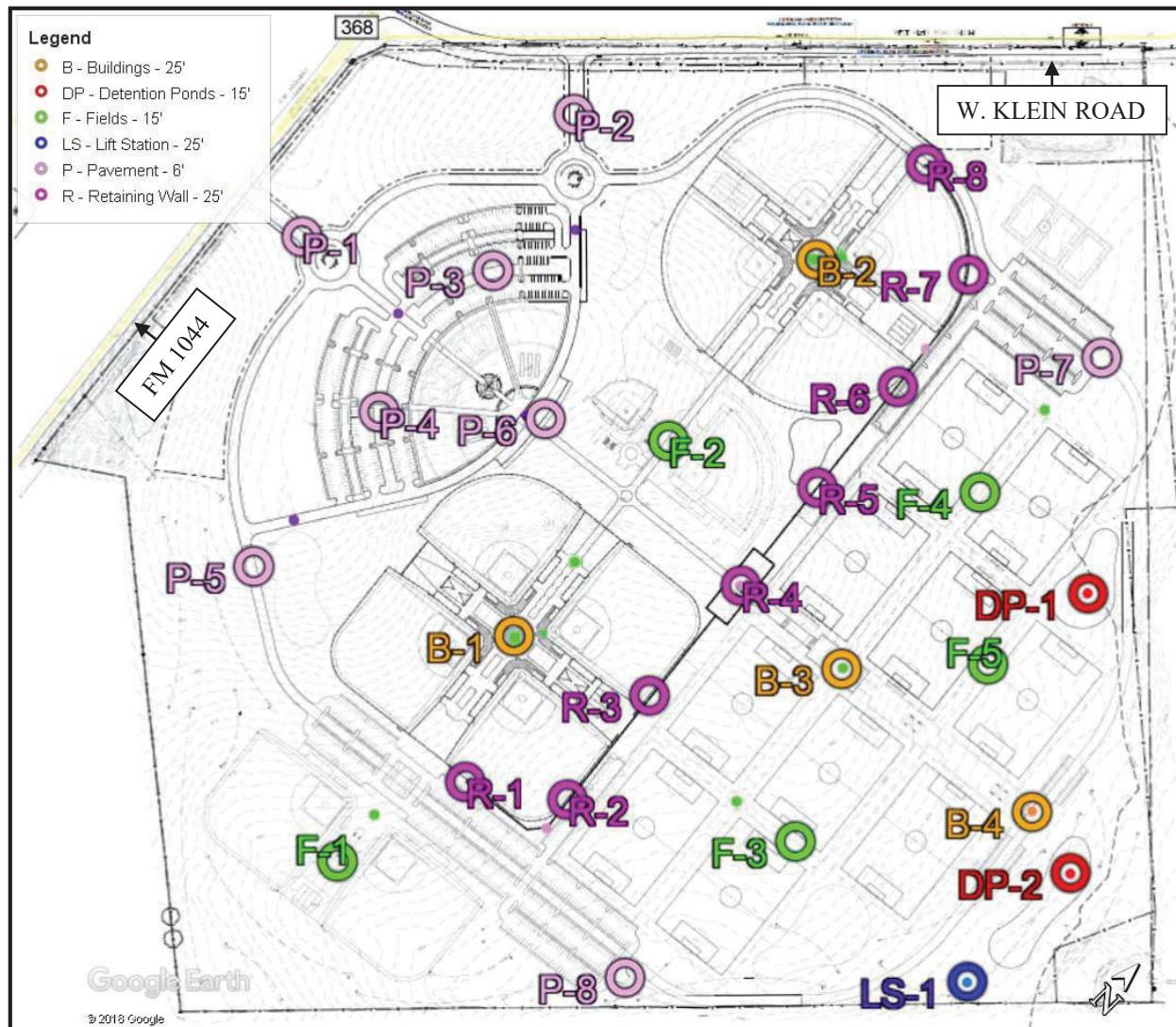
Our analyses and recommendations are based on subsurface conditions encountered in our borings. Variations in soil conditions may occur between borings. If during construction the soil strata are found to differ from that reported here, we should be notified immediately. This report contains soil-boring logs which are for the purpose of

arriving at foundation design criteria and are not to be used by the excavation and/or pile driving contractor in arriving at rock hardness or rock depth.

The presence or absence of water in our borings might not represent the groundwater conditions under all seasonal conditions. No long-term groundwater monitoring was performed in the preparation of this report.

This report is based on conditions that exist on the site at the time of our investigation. Changes to the project, the building site or adjacent properties may affect the reliability of our report. We expect the structures addressed in our report to be started or substantially completed within approximately 12 months of the issuance of our report. The geotechnical report and specific recommendations will need to be re-evaluated if building construction is delayed by more than 12 months from the time of our report. Our report should not be used if the elapsed time of substantial completion exceeds 3 years without review or written consent from Holt Engineering, Inc.

The procedures, tests and recommendations of this investigation and report have been conducted and furnished in accordance with generally accepted professional engineering practices in the field of foundations, engineering soil mechanics and engineering geology. No other warranty is either expressed or implied.



Not to Scale

File No. 08-20219

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING B-01</b>									
			NOTES : Hole dry upon completion of drilling operation									
DATE DRILLED : 08-13-19		BORING DEPTH : 25.0 FEET			ELEVATION :							
DRILLER : Will McGee		WATER LEVEL :										
DRILLING METHOD : 4" Flight Augers			LAT :			LONG. :						
DEPTH (feet)	GRAPHIC LOG	SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
5			FAT CLAY (CH), dark brown, firm to stiff			16		17.2	63	42	95.2	
10			FAT CLAY (CH), tan, w/ thin calcareous layers, stiff			17		14.2	54	35	94.4	
15			FAT CLAY (CH), tan & gray, stiff			30		15.3	53	34	98.7	
20						36						
25			Terminated @ 25 feet			32						
30						32						

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>				<b>LOG OF BORING B-02</b>											
DATE DRILLED : 08-14-19				NOTES : Hole dry upon completion of drilling operation											
DRILLER : Will McGee				ELEVATION :											
DRILLING METHOD : 4" Flight Augers				LAT : <span style="float: right;">LONG. :</span>											
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION							BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
0		FAT CLAY (CH), brown, silty, firm to stiff							15		11.7	64	43	98.2	
5		FAT CLAY (CH), tan, silty, stiff							30		16.1	57	37	98.5	
10		FAT CLAY (CH), tan & gray, stiff							26						
15									28						
20									28						
25		Terminated @ 25 feet							32						
30															

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>				<b>LOG OF BORING B-03</b>										
DATE DRILLED : 08-13-19				NOTES : Hole dry upon completion of drilling operation										
DRILLER : Will McGee				ELEVATION :										
DRILLING METHOD : 4" Flight Augers				LAT : <span style="float: right;">LONG. :</span>										
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION						BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
0														
4		FAT CLAY (CH), dark brown, silty, firm to stiff						11		10.0	50	31	98.2	
5		FAT CLAY (CH), tan, silty, firm to stiff						19		11.7	56	36	98.7	
7		FAT CLAY (CH), tan & gray, stiff -- 7.0' - 10.0' - firm to stiff						21		17.0	59	39	98.5	
10		-- 10.0' - 25.0' - stiff						32						
15								24						
20								26						
25		Terminated @ 25 feet												
30														

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING B-04</b>									
			NOTES : Hole dry upon completion of drilling operation									
DATE DRILLED : 08-12-19			BORING DEPTH : 25.0 FEET			ELEVATION :						
DRILLER : Will McGee			WATER LEVEL :									
DRILLING METHOD : 4" Flight Augers							LAT :	LONG. :				
DEPTH (feet)	GRAPHIC LOG	SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
5			FAT CLAY (CH), dark brown, firm to stiff			5		16.9	58	38	95.3	
10			FAT CLAY (CH), tan, w/ scattered small to medium gravel & calcareous layers, stiff			11		19.7	60	40	97.2	
15			FAT CLAY (CH), tan & gray, stiff			18						
20						20						
25			Terminated @ 25 feet			20						
30						28						



<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING DP-02</b>								
DATE DRILLED : 08-12-19	BORING DEPTH : 15.0 FEET						NOTES : Hole dry upon completion of drilling operation				
DRILLER : Will McGee	WATER LEVEL :						ELEVATION :				
DRILLING METHOD : 4" Flight Augers			LAT : _____ LONG. : _____								
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT (%)	PLASTICITY INDEX	% PASSING #200 SIEVE
0		FAT CLAY (CH), dark brown, firm to stiff									
4		-- Pocket penetrometer = 4.0 tsf									
5		FAT CLAY (CH), tan, w/ small to large gravel, firm to stiff									
5		-- Pocket penetrometer = 4.5+ tsf									
8		FAT CLAY (CH), tan & gray, firm to stiff									
10		-- Pocket penetrometer = 4.5+ tsf									
12		-- Pocket penetrometer = 4.5+ tsf									
15		Terminated @ 15 feet									
20											
25											
30											

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING F-01</b>								
			NOTES : Hole dry upon completion of drilling operation								
DATE DRILLED : 08-14-19		BORING DEPTH : 15.0 FEET			ELEVATION :						
DRILLER : Will McGee		WATER LEVEL :									
DRILLING METHOD : 4" Flight Augers			LAT :			LONG. :					
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
0		FAT CLAY (CH), dark brown, firm to stiff									
5		-- Pocket penetrometer = 4.5+ tsf									
5		-- Pocket penetrometer = 4.5+ tsf									
5		FAT CLAY (CH), tan & gray, stiff									
10		-- Pocket penetrometer = 4.5+ tsf									
15		Terminated @ 15 feet									
20											
25											
30											

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING F-02</b>					
			NOTES : Hole dry upon completion of drilling operation					
DATE DRILLED : 08-15-19		BORING DEPTH : 15.0 FEET			ELEVATION :			
DRILLER : Will McGee		WATER LEVEL :						
DRILLING METHOD : 4" Flight Augers							LAT :	LONG. :
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION				BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)
0		FAT CLAY (CH), dark brown, silty, firm to stiff						
5		FAT CLAY (CH), tan, silty, stiff						
10		FAT CLAY (CH), tan & gray, stiff						
15		Terminated @ 15 feet						
20								
25								
30								

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING F-03</b>									
			NOTES : Hole dry upon completion of drilling operation									
DATE DRILLED : 08-12-19			BORING DEPTH : 15.0 FEET			ELEVATION :						
DRILLER : Will McGee			WATER LEVEL :									
DRILLING METHOD : 4" Flight Augers			LAT :			LONG. :						
DEPTH (feet)	GRAPHIC LOG	SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
15			FAT CLAY (CH), dark brown, firm to stiff  -- Pocket penetrometer = 4.5+ tsf					15.4	60	40	95.8	
10			FAT CLAY (CH), tan & gray, stiff  -- Pocket penetrometer = 4.5+ tsf					14.8	55	36	96.8	
5			-- Pocket penetrometer = 4.5+ tsf									
0			Terminated @ 15 feet									

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING F-04</b>								
			NOTES : Hole dry upon completion of drilling operation								
DATE DRILLED : 08-14-19		BORING DEPTH : 15.0 FEET			ELEVATION :						
DRILLER : Will McGee		WATER LEVEL :									
DRILLING METHOD : 4" Flight Augers			LAT :			LONG. :					
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
5		FAT CLAY (CH), dark brown, firm to stiff  -- Pocket penetrometer = 4.5+ tsf				15.5		60	40	94.7	
10		FAT CLAY (CH), tan & gray, stiff  -- Pocket penetrometer = 4.5+ tsf				14.9		57	37	97.4	
15		Terminated @ 15 feet									
20											
25											
30											

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING F-05</b>					
			NOTES : Hole dry upon completion of drilling operation					
DATE DRILLED : 08-12-19		BORING DEPTH : 15.0 FEET			ELEVATION :			
DRILLER : Will McGee		WATER LEVEL :						
DRILLING METHOD : 4" Flight Augers			LAT :			LONG. :		
DEPTH (feet)	GRAPHIC LOG	SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)
0			FAT CLAY (CH), dark brown, firm to stiff					
5			FAT CLAY (CH), tan, w/ thin calcareous layers, stiff					
10			FAT CLAY (CH), tan & gray, stiff					
15			Terminated @ 15 feet					
20								
25								
30								

LOG OF BORING 08-20219 - NEW BRAUNFELS SPORTS COMPLEX - KLEIN RD., & FM 1044, NB, TX GPJ HOLT ENGINEERING, GDT 9/25/19

NEW BRAUNFELS SPORTS COMPLEX KLEIN ROAD & FM 1044 NEW BRAUNFELS, TEXAS			LOG OF BORING LS-01						
DATE DRILLED : 08-12-19	NOTES : Hole dry upon completion of drilling operation								
DRILLER : Will McGee	ELEVATION :								
DRILLING METHOD : 4" Flight Augers	LAT : LONG. :								
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION							% PASSING #200 SIEVE
5		FAT CLAY (CH), dark brown, firm to stiff							94.5
10		FAT CLAY (CH), tan, firm to stiff							98.6
15		FAT CLAY (CH), tan & gray, stiff							96.8
20									
25		Terminated @ 14 feet							
30		BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT (%)	PLASTICITY INDEX		
		8		16.3	61	40			
		16		14.6	58	38			
		22		16.2	53	34			
		30							
		28							
		30							

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>				<b>LOG OF BORING P-01</b>				
DATE DRILLED : 08-15-19				NOTES : Hole dry upon completion of drilling operation				
DRILLER : Will McGee				ELEVATION :				
DRILLING METHOD : 4" Flight Augers				LAT : LONG. :				
DEPTH (feet)	GRAPHIC LOG	SOIL DESCRIPTION				BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)
4.5		FAT CLAY (CH), dark brown, silty, firm to stiff LEAN CLAY (CL), brown, clayey, firm to stiff LEAN CLAY (CL), tan, clayey, firm to stiff				16		
5.0		Terminated @ 6 feet				28		
10.0								
15.0								
20.0								
25.0								
30.0								
				BLOWS PER FOOT	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
				16	41	24	97.9	
				28				

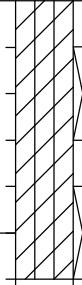
<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING P-02</b>									
			NOTES : Hole dry upon completion of drilling operation									
DATE DRILLED : 08-15-19		BORING DEPTH : 6.0 FEET			ELEVATION :							
DRILLER : Will McGee		WATER LEVEL :										
DRILLING METHOD : 4" Flight Augers							LAT :	LONG. :				
DEPTH (feet)	GRAPHIC LOG	SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT (%)	PLASTICITY INDEX	% PASSING #200 SIEVE
5			FAT CLAY (CH), dark brown, silty, firm to stiff -- Pocket penetrometer = 4.5+ tsf					18.7	99.1	65	43	94.3
5			FAT CLAY (CH), tan, w/ thin calcareous layers, firm to stiff -- Pocket penetrometer = 4.5+ tsf									
			Terminated @ 6 feet									
10												
15												
20												
25												
30												

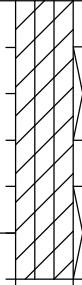
<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>				<b>LOG OF BORING P-03</b>			
DATE DRILLED : 08-15-19				NOTES : Hole dry upon completion of drilling operation			
DRILLER : Will McGee				ELEVATION :			
DRILLING METHOD : 4" Flight Augers				LAT : LONG. :			
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION				BLOWS PER FOOT	UCC STR. (TSF)
5		FAT CLAY (CH), dark brown, silty, firm to stiff				14	MOISTURE CONTENT (%)
5		FAT CLAY (CH), tan & gray, stiff				24	DRY DENSITY (PCF)
5		Terminated @ 6 feet					LIQUID LIMIT(%)
10							PLASTICITY INDEX
15							
20							
25							
30							

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING P-04</b>								
			NOTES : Hole dry upon completion of drilling operation								
DATE DRILLED : 08-15-19		BORING DEPTH : 6.0 FEET			ELEVATION :						
DRILLER : Will McGee		WATER LEVEL :									
DRILLING METHOD : 4" Flight Augers			LAT :			LONG. :					
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT (%)	PLASTICITY INDEX	% PASSING #200 SIEVE
0		LEAN CLAY (CL), brown, clayey, firm to stiff			22						
5		LEAN CLAY (CL), tan, clayey, stiff			44						
6		Terminated @ 6 feet									
10											
15											
20											
25											
30											

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>				<b>LOG OF BORING P-05</b>									
DATE DRILLED : 08-14-19				NOTES : Hole dry upon completion of drilling operation									
DRILLER : Will McGee				ELEVATION :									
DRILLING METHOD : 4" Flight Augers				LAT : LONG. :									
DEPTH (feet)	GRAPHIC LOG	SAMPLE	SOIL DESCRIPTION				BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
			FAT CLAY (CH), dark brown, very silty, firm to stiff				10		10.9	45	27	75.2	
			LEAN CLAY (CL), tan, silty, firm to stiff				11						
5			FAT CLAY (CH), tan & gray, stiff										
			Terminated @ 6 feet										
10													
15													
20													
25													
30													

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>				<b>LOG OF BORING P-06</b>						
DATE DRILLED : 08-15-19				NOTES : Hole dry upon completion of drilling operation						
DRILLER : Will McGee				ELEVATION :						
DRILLING METHOD : 4" Flight Augers				LAT : LONG. :						
DEPTH (feet)	GRAPHIC LOG	SOIL DESCRIPTION	SAMPLE	BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
0										
4		FAT CLAY (CH), dark brown, silty, firm to stiff								
5		FAT CLAY (CH), tan, silty w/ few thin calcareous layers, stiff								
6		Terminated @ 6 feet		18						
10				26						
15										
20										
25										
30										

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>				<b>LOG OF BORING P-07</b>				
DATE DRILLED : 08-14-19				NOTES : Hole dry upon completion of drilling operation				
DRILLER : Will McGee				ELEVATION :				
DRILLING METHOD : 4" Flight Augers				LAT : LONG. :				
DEPTH (feet)	GRAPHIC LOG	SOIL DESCRIPTION				BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)
5		FAT CLAY (CH), dark brown, silty, firm to stiff				6		18.8
10		Terminated @ 6 feet				16		
15								
20								
25								
30								
		BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
					66	45	96.5	

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>				<b>LOG OF BORING P-08</b>				
DATE DRILLED : 08-12-19				NOTES : Hole dry upon completion of drilling operation				
DRILLER : Will McGee				ELEVATION :				
DRILLING METHOD : 4" Flight Augers				LAT : LONG. :				
DEPTH (feet)	GRAPHIC LOG	SOIL DESCRIPTION				BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)
4		FAT CLAY (CH), dark brown, silty, firm to stiff				4	17.2	12
5		Terminated @ 6 feet						
10								
15								
20								
25								
30								
				DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE	

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>				<b>LOG OF BORING R-01</b>										
DATE DRILLED : 08-13-19				NOTES : Hole dry upon completion of drilling operation										
DRILLER : Will McGee				ELEVATION :										
DRILLING METHOD : 4" Flight Augers				LAT : <span style="float: right;">LONG. :</span>										
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION						BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT (%)	PLASTICITY INDEX	% PASSING #200 SIEVE
0		FAT CLAY (CH), dark brown, silty, firm to stiff						17		11.6	48	30	98.6	
5		FAT CLAY (CH), tan & gray, stiff						20		16.7	55	35	98.4	
10								21		17.6	59	39	98.7	
15														
20														
25		Terminated @ 25 feet												
30														

NEW BRAUNFELS SPORTS COMPLEX KLEIN ROAD & FM 1044 NEW BRAUNFELS, TEXAS			LOG OF BORING R-02					
DATE DRILLED : 08-13-19	BORING DEPTH : 25.0 FEET						NOTES : Hole dry upon completion of drilling operation	
DRILLER : Will McGee	WATER LEVEL :						ELEVATION :	
DRILLING METHOD : 4" Flight Augers			LAT : LONG. :					
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION	BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT (%)	PLASTICITY INDEX
4		FAT CLAY (CH), dark brown, firm to stiff	8					
5		FAT CLAY (CH) tan, firm to stiff	18					
10		FAT CLAY (CH), tan & gray, stiff	20					
15			22					
20			30					
25		Terminated @ 25 feet						
30								

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING R-03</b>									
			NOTES : Hole dry upon completion of drilling operation									
DATE DRILLED : 08-13-19			BORING DEPTH : 25.0 FEET			ELEVATION :						
DRILLER : Will McGee			WATER LEVEL :									
DRILLING METHOD : 4" Flight Augers							LAT :	LONG. :				
DEPTH (feet)	GRAPHIC LOG	SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
5			FAT CLAY (CH), dark brown, firm to stiff			8		19.7	66	45	96.9	
5			FAT CLAY (CH), tan, firm to stiff			16						
5			FAT CLAY (CH), tan & gray, stiff			26		17.2	55	35	98.0	
10						24						
15						26						
20												
25			Terminated @ 25 feet									
30												

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING R-04</b>					
DATE DRILLED : 08-13-19			NOTES : Hole dry upon completion of drilling operation					
DRILLER : Will McGee			ELEVATION :					
DRILLING METHOD : 4" Flight Augers			LAT : <span style="float: right;">LONG. :</span>					
DEPTH (feet)	GRAPHIC LOG	SAMPLE	SOIL DESCRIPTION					
5			FAT CLAY (CH), dark brown, firm to very stiff					
10			FAT CLAY (CH), tan, silty, stiff					
15			FAT CLAY (CH), tan & gray, stiff					
20								
25			Terminated @ 25 feet					
30								
			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX % PASSING #200 SIEVE
			28					
			24					
			24					
			34					

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>				<b>LOG OF BORING R-05</b>										
DATE DRILLED : 08-15-19				NOTES : Hole dry upon completion of drilling operation										
DRILLER : Will McGee				ELEVATION :										
DRILLING METHOD : 4" Flight Augers				LAT : LONG. :										
DEPTH (feet)	GRAPHIC LOG	SOIL DESCRIPTION						BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
4		FAT CLAY (CH), dark brown, silty, firm to stiff						7		16.2	57	37	98.1	
5		FAT CLAY (CH), tan, silty, stiff						20		13.9	55	35	98.6	
10								18						
15								26						
20								34						
25		Terminated @ 25 feet												
30														

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING R-06</b>								
			NOTES : Hole dry upon completion of drilling operation								
DATE DRILLED : 08-14-19		BORING DEPTH : 25.0 FEET			ELEVATION :						
DRILLER : Will McGee		WATER LEVEL :									
DRILLING METHOD : 4" Flight Augers			LAT :			LONG. :					
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT (%)	PLASTICITY INDEX	% PASSING #200 SIEVE
5		FAT CLAY (CH), dark brown, silty, firm to stiff			9						
10		FAT CLAY (CH), tan & gray, stiff			26						
15					22						
20					26						
25		Terminated @ 25 feet			28						
30					32						

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING R-07</b>								
			NOTES : Hole dry upon completion of drilling operation								
DATE DRILLED : 08-14-19		BORING DEPTH : 25.0 FEET			ELEVATION :						
DRILLER : Will McGee		WATER LEVEL :									
DRILLING METHOD : 4" Flight Augers			LAT :			LONG. :					
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION			BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT (%)	PLASTICITY INDEX	% PASSING #200 SIEVE
5		FAT CLAY (CH), dark brown, silty, firm to stiff			8						
10		FAT CLAY (CH), tan, silty, firm to stiff			18						
15		FAT CLAY (CH), tan & gray, stiff			24						
20					28						
25		Terminated @ 25 feet									
30											

<b>NEW BRAUNFELS SPORTS COMPLEX</b> <b>KLEIN ROAD &amp; FM 1044</b> <b>NEW BRAUNFELS, TEXAS</b>			<b>LOG OF BORING R-08</b>										
			NOTES : Hole dry upon completion of drilling operation										
DATE DRILLED : 08-14-19			BORING DEPTH : 25.0 FEET			ELEVATION :							
DRILLER : Will McGee			WATER LEVEL :										
DRILLING METHOD : 4" Flight Augers							LAT :	LONG. :					
DEPTH (feet)	GRAPHIC LOG SAMPLE	SOIL DESCRIPTION					BLOWS PER FOOT	UCC STR. (TSF)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT(%)	PLASTICITY INDEX	% PASSING #200 SIEVE
5		FAT CLAY (CH), dark brown, silty, firm to stiff					9		15.9	61	40	96.8	
10		FAT CLAY (CH), tan, w/ few calcareous layers, firm to stiff					18		15.6	58	38	98.9	
15		FAT CLAY (CH), tan & gray, stiff											
20													
25		Terminated @ 25 feet											
30													

## BORING LOGS – TERMS & SYMBOLS

### SOIL TYPES

	Silt		Clay		Sand		Silty Clay or Clayey Silt
	Silty Sand		Clayey Sand		Gravel		Shale
	Limestone		Rock/Fragments		Crushed limestone base		Tan Limestone w/Interbedded Silt Layers
	Silty clay w/Gravel		Asphalt		Sandstone		Concrete

### SAMPLER TYPES

	Standard Penetration Test		Rock Core		Seamless Push Shelby Tube		Grab Sample
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### PARTICLE SIZE (ASTM D2487)

Boulders	>12 in.	Coarse Sand	5 mm – 2 mm	Silt	0.075 mm – 0.005 mm
Cobbles	12 in. – 3 in.	Medium Sand	2 mm – 0.4 mm	Clay	< 0.005 mm
Gravel	3 in. – 5 mm	Fine Sand	0.4 mm – 0.075 mm		

### STRENGTH OF COHESIVE SOILS

CONSISTENCY	COMPRESSIVE STRENGTH (TSF)	NUMBER OF BLOWS PER FT., N	RELATIVE DENSITY
Very Soft	< 0.25	0 – 4	Very Loose
Soft	0.25 to 0.50	4 – 10	Loose
Firm	0.50 to 1.0	10 – 30	Medium Dense
Stiff	1.0 to 2.0	30 – 50	Dense
Very Stiff	2.0 to 4.0	Over 50	Very Dense
Hard	> 4.0		

### Structure Description (ASTM D2488)

Stratified	Alternating layers of varying material or color with layers at least 6 mm thick
Laminated	Alternating layers of varying material or color with the layers less than 6 mm thick
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
Homogeneous	Same color and appearance throughout

### DENSITY OF GRANULAR SOILS

Trace	< 5%
Few	5% to 10%
Little	15% to 25%
Some	30% to 45%
Mostly	50% to 100%

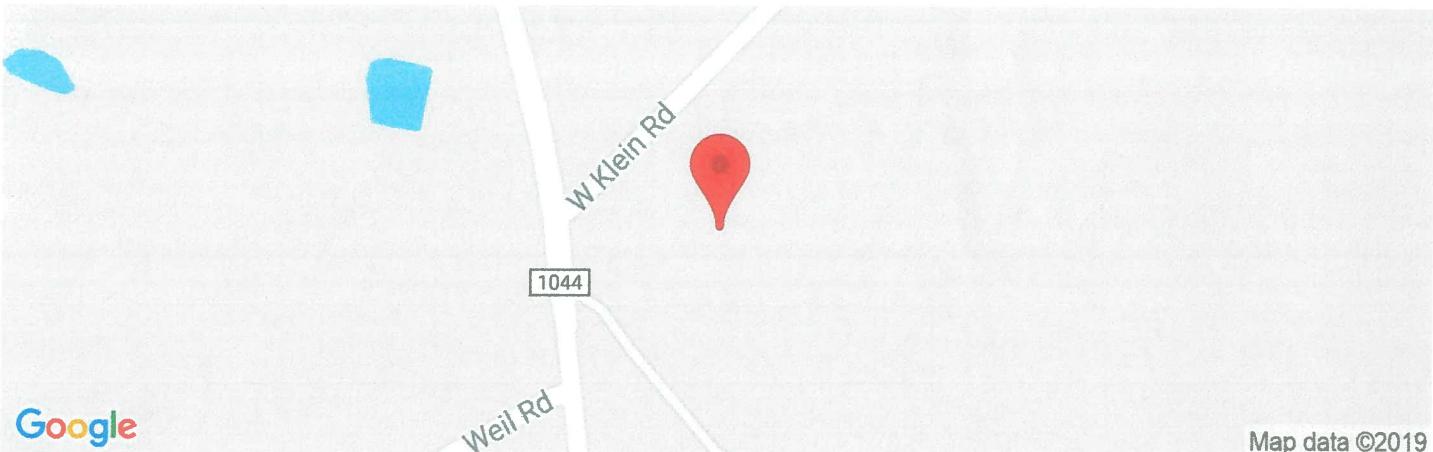
### Percentages of Sand & Gravel (ASTM D2488)

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table



# N.B. Sports Complex

Latitude, Longitude: 29.635411, -98.126743



Map data ©2019

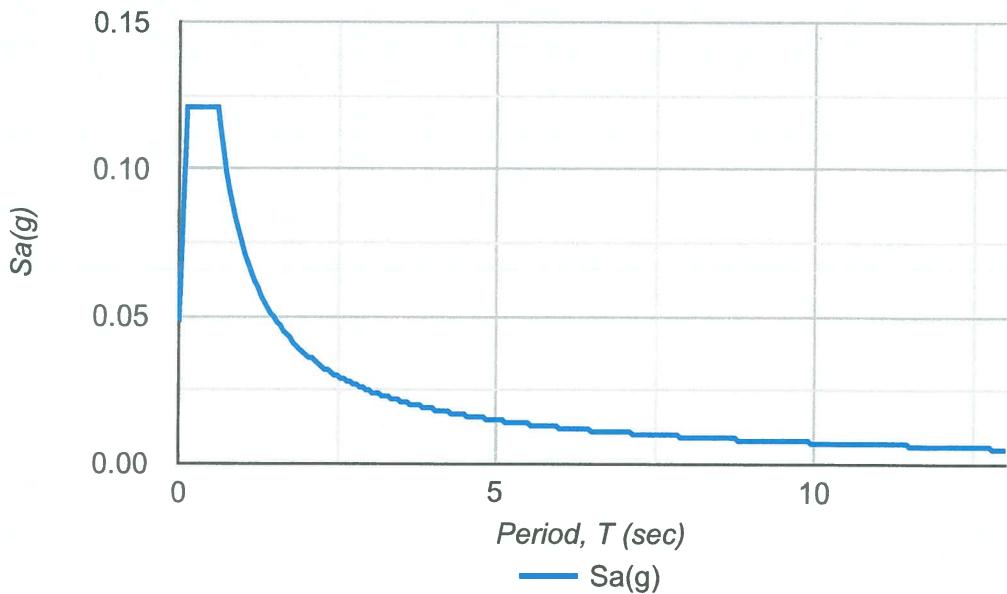
Date	9/24/2019, 1:38:45 PM
Design Code Reference Document	IBC-2015
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
$S_S$	0.076	MCE <sub>R</sub> ground motion. (for 0.2 second period)
$S_1$	0.031	MCE <sub>R</sub> ground motion. (for 1.0s period)
$S_{MS}$	0.121	Site-modified spectral acceleration value
$S_{M1}$	0.075	Site-modified spectral acceleration value
$S_{DS}$	0.081	Numeric seismic design value at 0.2 second SA
$S_{D1}$	0.05	Numeric seismic design value at 1.0 second SA

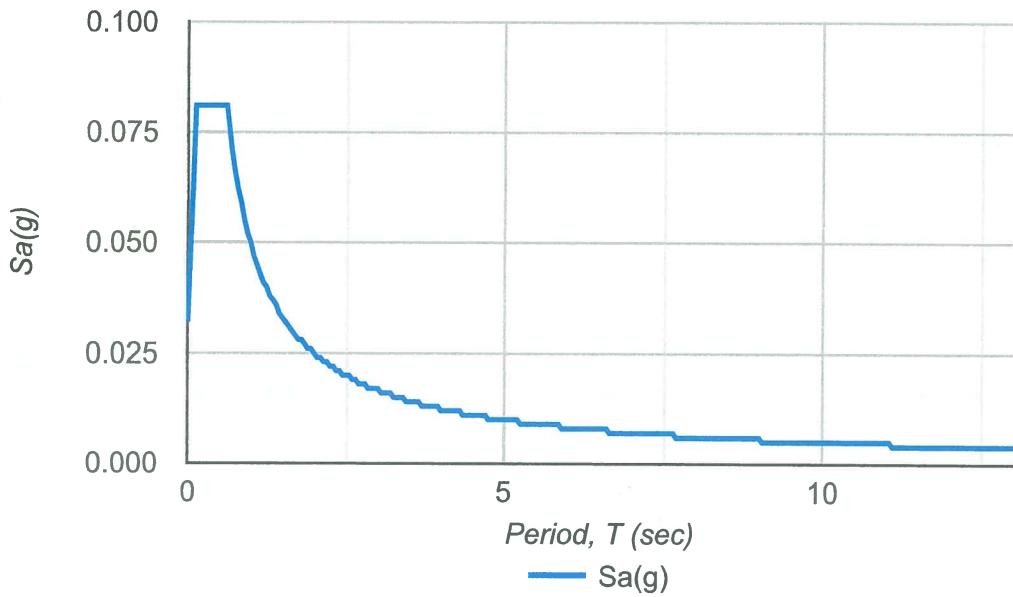
Type	Value	Description
SDC	A	Seismic design category
$F_a$	1.6	Site amplification factor at 0.2 second
$F_v$	2.4	Site amplification factor at 1.0 second
PGA	0.038	MCE <sub>G</sub> peak ground acceleration
$F_{PGA}$	1.6	Site amplification factor at PGA
$PGA_M$	0.06	Site modified peak ground acceleration
$T_L$	12	Long-period transition period in seconds
SsRT	0.076	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.086	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)

Type	Value	Description
S1RT	0.031	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.036	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.6	Factored deterministic acceleration value. (Peak Ground Acceleration)
$C_{RS}$	0.879	Mapped value of the risk coefficient at short periods
$C_{R1}$	0.875	Mapped value of the risk coefficient at a period of 1 s

### MCER Response Spectrum



### Design Response Spectrum



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