

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

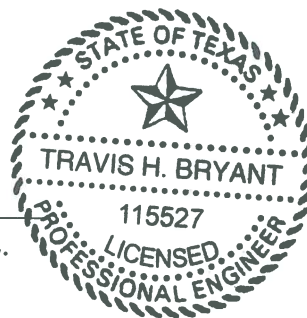
REPORT FOR:

NORRIS DESIGN
2201 EAST 6TH STREET
AUSTIN, TEXAS 78702

PREPARED BY:



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PROJECT ENGINEER



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

FILE NO. 08-20219
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NEW BRAUNFELS, TEXAS

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, scalpings, 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, scalplings, 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.

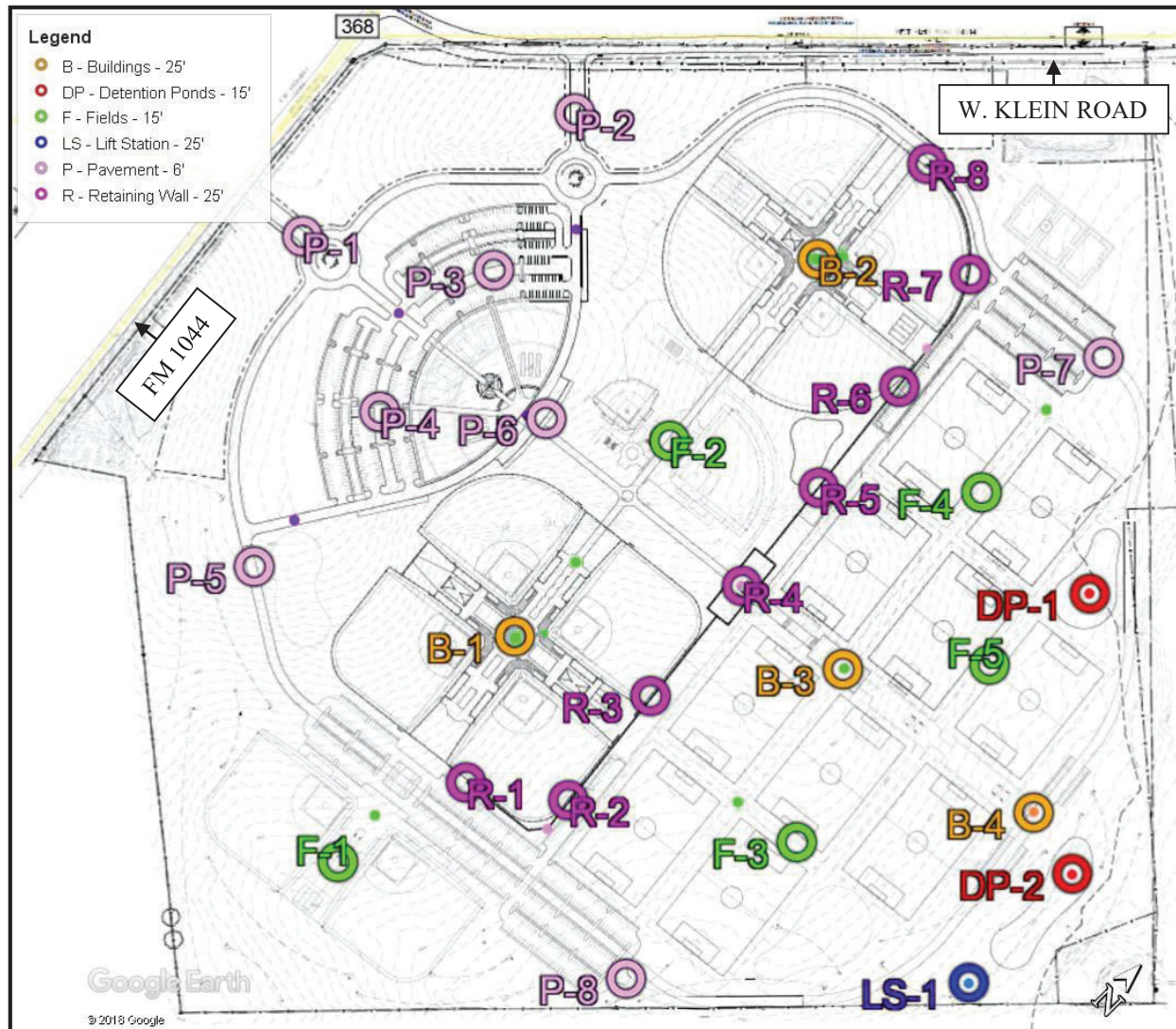
Our analyses and recommendations are based on subsurface conditions encountered in our borings. Variations in soil conditions may occur between borings. If during construction the soil strata are found to differ from that reported here, we should be notified immediately. This report contains soil-boring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











GENERALIZED BORING LOCATION PLAN
 NEW BRAUNFELS SPORTS COMPLEX
 W. KLEIN ROAD & FM 1044
 NEW BRAUNFELS, TEXAS

Not to Scale

File No. 08-20219

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 B-01						
DATE DRILLED : 08-13-19		BORING DEPTH : 25.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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
			FAT CLAY (CH), tan, w/ thin calcareous layers, stiff	17		14.2		54	35	94.4
			FAT CLAY (CH), tan & gray, stiff	30		15.3		53	34	98.7
15				36						
20				32						
25			Terminated @ 25 feet	32						
30										

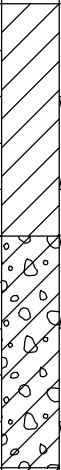

LOG OF BORING 08-20219 - NEW BRAUNFELS SPORTS COMPLEX - KLEIN RD., & FM 1044, NB, TX.GPJ HOLT ENGINEERING.GDT 9/25/19

NEW BRAUNFELS SPORTS COMPLEX KLEIN ROAD & FM 1044 NEW BRAUNFELS, TEXAS				LOG OF BORING B-02						
DATE DRILLED : 08-14-19		BORING DEPTH : 25.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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
			FAT CLAY (CH), brown, silty, firm to stiff							
			FAT CLAY (CH), tan, silty, stiff	15		11.7		64	43	98.2
5			FAT CLAY (CH), tan & gray, stiff	30		16.1		57	37	98.5
10				26						
15				28						
20				28						
25			Terminated @ 25 feet	32						
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 B-03						
DATE DRILLED : 08-13-19		BORING DEPTH : 25.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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
			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
10			FAT CLAY (CH), tan & gray, stiff -- 7.0' - 10.0' - firm to stiff	21		17.0		59	39	98.5
			-- 10.0' - 25.0' - stiff	32						
15				24						
20				26						
25			Terminated @ 25 feet							
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 B-04						
DATE DRILLED : 08-12-19		BORING DEPTH : 25.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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
			FAT CLAY (CH), tan, w/ scattered small to medium gravel & calcareous layers, stiff	11		19.7		60	40	97.2
			FAT CLAY (CH), tan & gray, stiff	18						
15				20						
20				20						
25			Terminated @ 25 feet	28						
30										

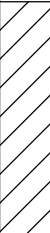





LOG OF BORING 08-20219 - NEW BRAUNFELS SPORTS COMPLEX - KLEIN RD., & FM 1044, NB, TX.GPJ HOLT ENGINEERING.GDT 9/25/19

NEW BRAUNFELS SPORTS COMPLEX KLEIN ROAD & FM 1044 NEW BRAUNFELS, TEXAS				LOG OF BORING DP-01						
DATE DRILLED : 08-12-19		BORING DEPTH : 15.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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							
			FAT CLAY (CH), tan, w/ thin calcareous layers, stiff							
			-- Pocket penetrometer = 4.5+ tsf							
10			FAT CLAY (CH), tan & gray, stiff							
			-- Pocket penetrometer = 4.5+ tsf							
15			-- Pocket penetrometer = 4.5+ tsf							
			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 DP-02						
DATE DRILLED : 08-12-19		BORING DEPTH : 15.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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							
4.0			-- Pocket penetrometer = 4.0 tsf							
4.5			FAT CLAY (CH), tan, w/ small to large gravel, firm to stiff							
10.0			-- Pocket penetrometer = 4.5+ tsf							
15.0			FAT CLAY (CH), tan & gray, firm to stiff							
15.5			-- Pocket penetrometer = 4.5+ tsf							
15.5			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 F-01						
DATE DRILLED : 08-14-19		BORING DEPTH : 15.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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			17.8		62	41	96.3
			-- Pocket penetrometer = 4.5+ tsf							
10			FAT CLAY (CH), tan & gray, stiff							
			-- Pocket penetrometer = 4.5+ tsf							
15			Terminated @ 15 feet							

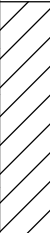




LOG OF BORING 08-20219 - NEW BRAUNFELS SPORTS COMPLEX - KLEIN RD., & FM 1044, NB, TX.GPJ HOLT ENGINEERING.GDT 9/25/19

NEW BRAUNFELS SPORTS COMPLEX KLEIN ROAD & FM 1044 NEW BRAUNFELS, TEXAS				LOG OF BORING F-02						
DATE DRILLED : 08-15-19		BORING DEPTH : 15.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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							
			FAT CLAY (CH), tan, silty, stiff							
			FAT CLAY (CH), tan & gray, stiff							
10										
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 F-03						
DATE DRILLED : 08-12-19		BORING DEPTH : 15.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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			15.4		60	40	95.8
			-- Pocket penetrometer = 4.5+ tsf							
			FAT CLAY (CH), tan & gray, stiff							
10			-- Pocket penetrometer = 4.5+ tsf			14.8		55	36	96.8
15			-- Pocket penetrometer = 4.5+ tsf							
20			Terminated @ 15 feet							
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 F-04						
DATE DRILLED : 08-14-19		BORING DEPTH : 15.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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			15.5		60	40	94.7
			-- Pocket penetrometer = 4.5+ tsf			14.9		57	37	97.4
			FAT CLAY (CH), tan & gray, stiff							
10			-- Pocket penetrometer = 4.5+ tsf							
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 F-05						
DATE DRILLED : 08-12-19		BORING DEPTH : 15.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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							
			FAT CLAY (CH), tan, w/ thin calcareous layers, stiff							
			FAT CLAY (CH), tan & gray, stiff							
10										
15			Terminated @ 15 feet							
20										
25										
30										

LOG OF BORING LS-01

ELEVATION :


LONG. :

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


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 P-01						
DATE DRILLED : 08-15-19		BORING DEPTH : 6.0 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
5			FAT CLAY (CH), dark brown, silty, firm to stiff	16		8.2		41	24	97.9
			LEAN CLAY (CL), brown, clayey, firm to stiff							
			LEAN CLAY (CL), tan, clayey, firm to stiff							
			Terminated @ 6 feet	28						
10										
15										
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 P-02						
DATE DRILLED : 08-15-19		BORING DEPTH : 6.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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			18.7	99.1	65	43	94.3
			-- Pocket penetrometer = 4.5+ tsf							
			FAT CLAY (CH), tan, w/ thin calcareous layers, firm to stiff							
			-- Pocket penetrometer = 4.5+ tsf							
			Terminated @ 6 feet							

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 P-03						
DATE DRILLED : 08-15-19		BORING DEPTH : 6.0 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
5			FAT CLAY (CH), dark brown, silty, firm to stiff	14						
			FAT CLAY (CH), tan & gray, stiff	24						
			Terminated @ 6 feet							
10										
15										
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 P-04						
DATE DRILLED : 08-15-19		BORING DEPTH : 6.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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			LEAN CLAY (CL), brown, clayey, firm to stiff	22						
			LEAN CLAY (CL), tan, clayey, stiff							
			Terminated @ 6 feet	44						
10										
15										
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 P-05						
DATE DRILLED : 08-14-19		BORING DEPTH : 6.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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, very silty, firm to stiff	10		10.9		45	27	75.2
			LEAN CLAY (CL), tan, silty, firm to stiff							
			FAT CLAY (CH), tan & gray, stiff	11						
			Terminated @ 6 feet							
10										
15										
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 P-06						
DATE DRILLED : 08-15-19		BORING DEPTH : 6.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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	18						
			FAT CLAY (CH), tan, silty w/ few thin calcareous layers, stiff							
			Terminated @ 6 feet	26						
10										
15										
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 P-07						
DATE DRILLED : 08-14-19		BORING DEPTH : 6.0 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
			FAT CLAY (CH), dark brown, silty, firm to stiff	6		18.8		66	45	96.5
5				16						
			Terminated @ 6 feet							
10										
15										
20										
25										
30										

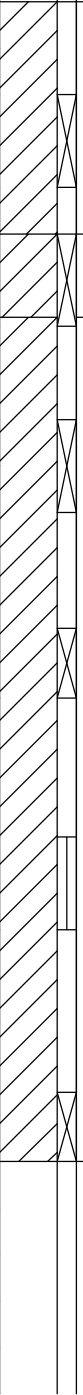

LOG OF BORING 08-20219 - NEW BRAUNFELS SPORTS COMPLEX - KLEIN RD., & FM 1044, NB, TX.GPJ HOLT ENGINEERING.GDT 9/25/19

NEW BRAUNFELS SPORTS COMPLEX KLEIN ROAD & FM 1044 NEW BRAUNFELS, TEXAS				LOG OF BORING P-08						
DATE DRILLED : 08-12-19		BORING DEPTH : 6.0 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
			FAT CLAY (CH), dark brown, silty, firm to stiff	4		17.2		64	43	91.8
5				12						
			Terminated @ 6 feet							
10										
15										
20										
25										
30										

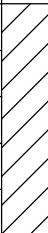









LOG OF BORING 08-20219 - NEW BRAUNFELS SPORTS COMPLEX - KLEIN RD., & FM 1044, NB, TX.GPJ HOLT ENGINEERING.GDT 9/25/19

NEW BRAUNFELS SPORTS COMPLEX KLEIN ROAD & FM 1044 NEW BRAUNFELS, TEXAS				LOG OF BORING R-01							
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	% PASSING #200 SIEVE	
			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				30							
20											
25			Terminated @ 25 feet								
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 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 :								
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						
			FAT CLAY (CH) tan, firm to stiff	18						
			FAT CLAY (CH), tan & gray, stiff	20						
				22						
25			Terminated @ 25 feet	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 R-03						
DATE DRILLED : 08-13-19		BORING DEPTH : 25.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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
			FAT CLAY (CH), tan, firm to stiff	16						
			FAT CLAY (CH), tan & gray, stiff							
10				26		17.2		55	35	98.0
15				24						
20				26						
25			Terminated @ 25 feet							
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 R-04						
DATE DRILLED : 08-13-19		BORING DEPTH : 25.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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 very stiff	28						
			FAT CLAY (CH), tan, silty, stiff							
10			FAT CLAY (CH), tan & gray, stiff	24						
15				24						
20										
25			Terminated @ 25 feet	34						
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 R-05						
DATE DRILLED : 08-15-19		BORING DEPTH : 25.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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	7		16.2		57	37	98.1
			FAT CLAY (CH), tan, silty, stiff	20		13.9		55	35	98.6
				18						
				26						
20				34						
25			Terminated @ 25 feet							
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 R-06						
DATE DRILLED : 08-14-19		BORING DEPTH : 25.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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
			FAT CLAY (CH), dark brown, silty, firm to stiff	9						
5			FAT CLAY (CH), tan & gray, stiff	26						
10				22						
15				26						
20				28						
25			Terminated @ 25 feet	32						
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 R-07						
DATE DRILLED : 08-14-19		BORING DEPTH : 25.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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
			FAT CLAY (CH), dark brown, silty, firm to stiff	8						
5			FAT CLAY (CH), tan, silty, firm to stiff	18						
			FAT CLAY (CH), tan & gray, stiff	26						
10				24						
15				24						
20				28						
25			Terminated @ 25 feet							
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 R-08						
DATE DRILLED : 08-14-19		BORING DEPTH : 25.0 FEET		NOTES : Hole dry upon completion of drilling operation						
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
			FAT CLAY (CH), tan, w/ few calcareous layers, firm to stiff	18		15.6		58	38	98.9
			FAT CLAY (CH), tan & gray, stiff							
10										
15				32						
20				30						
25			Terminated @ 25 feet	30						
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)
Very Soft	< 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	> 4.0

DENSITY OF GRANULAR SOILS

NUMBER OF BLOWS PER FT., N	RELATIVE DENSITY
0 – 4	Very Loose
4 – 10	Loose
10 – 30	Medium Dense
30 – 50	Dense
Over 50	Very Dense

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

Percentages of Sand & Gravel (ASTM D2488)

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

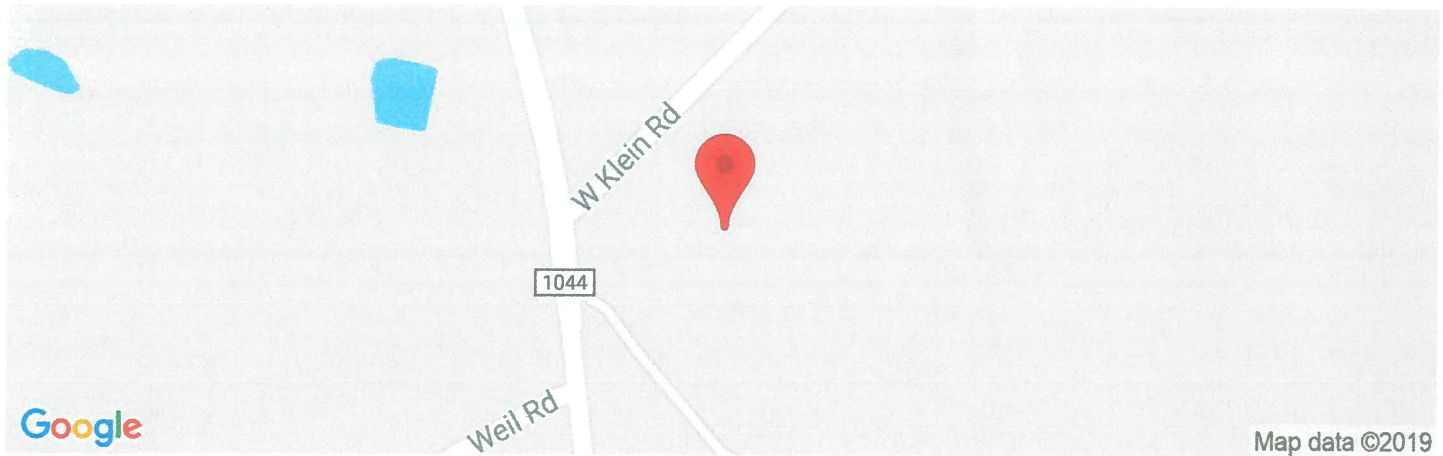
Criteria for Describing Moisture Conditions (ASTM D2488)

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



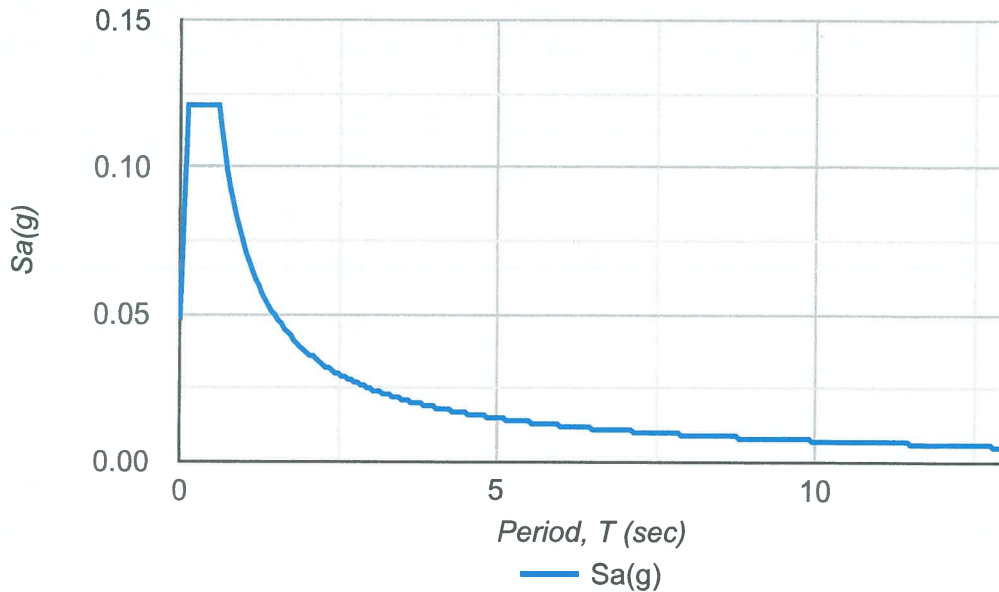
Date	9/24/2019, 1:38:45 PM
Design Code Reference Document	IBC-2015
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	0.076	MCE_R ground motion. (for 0.2 second period)
S_1	0.031	MCE_R 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

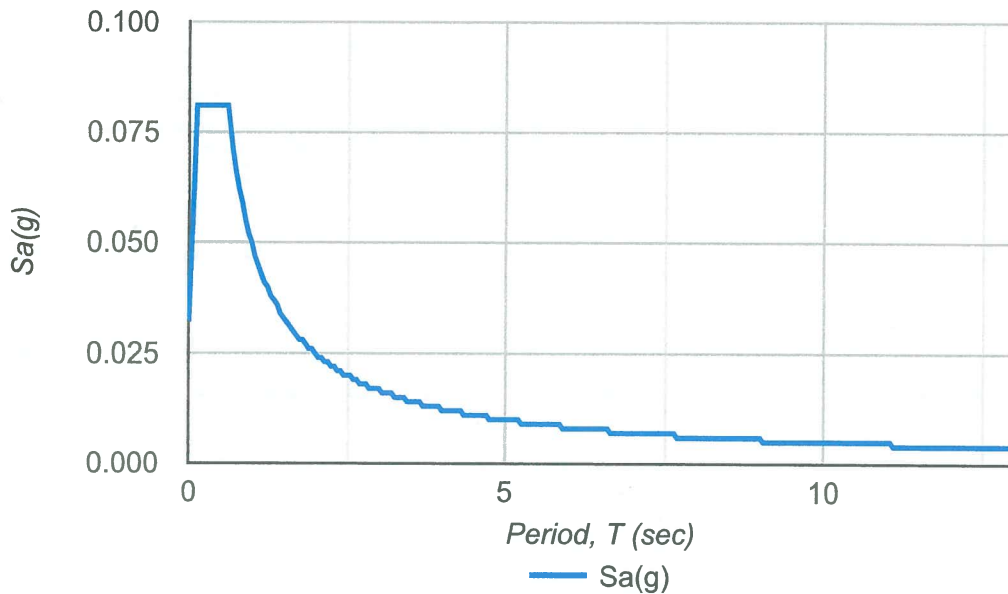
Type	Value	Description
SDC	A	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second
PGA	0.038	MCE_G peak ground acceleration
F_{PGA}	1.6	Site amplification factor at PGA
PGA_M	0.06	Site modified peak ground acceleration
T_L	12	Long-period 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



DISCLAIMER

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