VII. ATTACHMENTS

ATTACHMENT A

GEOTECHNICAL REPORT: PROPOSED SHADE STRUCTURE BEAVER FIT LOCKER

SKG ENGINEERING, LLC

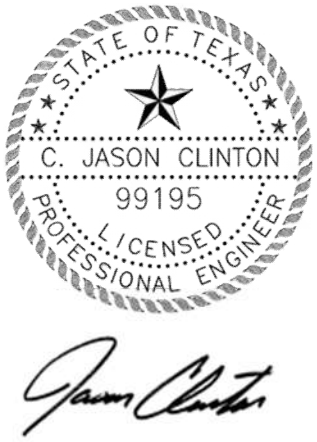
Geotechnical Report

Proposed Shade Structure

Beaver Fit Locker

Off of Mitchell Street

Goodfellow Air Force Base, Texas



2/19/2020
SKG Engineering, LLC
F-7608

PREPARED FOR:
Mr. Ron Trepanier, P.E.
17th Civil Engineer Squadron
460 East Kearney Boulevard
Goodfellow AFB, Texas 76908

February 2020

20-E-0109

SKG
ENGINEERING, LLC
FIRM REGISTRATION NUMBER F-7608
SURVEYING ♦ ENVIRONMENTAL ♦ LAB/CMT

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February 19, 2020 20-E-0109

Mr. Ron Trepanier, P.E.
17th Civil Engineer Squadron
460 East Kearney Boulevard
Goodfellow AFB, Texas

Subject: Geotechnical Report, Proposed Shade Structure, Beaver Fit Locker, Off of Mitchell Street, Goodfellow Air Force Base, San Angelo, Texas

Mr. Trepanier,

In accordance with your authorization, SKG Engineering has completed its geotechnical investigation at the referenced site. The work was done in accordance with the proposal dated the 9th day of January 2020. The data and results are included in the attached report.

If you have any questions or comments, or if we can be of any more service to you, please do not hesitate to contact us at (325) 655-1288.

Sincerely,
SKG Engineering, LLC

Caleb Miller, E.I.T. Jason Clinton, P.E.

SKG Engineering, LLC
F-7608

Attachments - Geotechnical Report

CC: File

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Table of Contents

Attachments

1.0 Introduction

1.1 Overview

The purpose of this exploration was to determine subsurface materials and conditions and to establish the characteristics of these materials in order to recommend the criteria by which to establish foundation recommendations for the proposed shade structure. A summary of field conditions is included in Attachment A.

2.0 Exploration

2.1 Soil Borings

The subsurface explorations were conducted on this site in February 2020. The site has been previously developed with fencing and multiple sporting court surfaces. The boreholes were drilled to a maximum depth of 20', and the logs of these boreholes are included in this report. The drilling was performed with a truck mounted air rotary drill rig. The drilling activities were performed in accordance with accepted methods and procedures. The boreholes were conducted within the limits of the proposed shade structure. A location map showing the approximate borehole locations is included in Attachment B.

Material samples were recovered at various depths for testing. The primary means of extracting subsurface soil samples was by the use of a 3" Shelby-tube and/or a 2" O.D. split barrel sampler. Split spoon sampling procedures were performed in accordance with ASTM D 1586 and Shelby tube samples were obtained in accordance with ASTM D 1587. The samples were extruded or removed in the field and placed in moisture tight bags and labeled. The samples were then transported to the laboratory for testing and visual evaluation by geotechnical personnel. The Unified Soil Classification System was utilized in accordance with ASTM D 2487 to verify field classifications. Refer to the logs of borings located in Attachment C for lithology, sample locations and quantities.

2.2 Laboratory Tests

Tests were performed to determine engineering characteristics of the subsurface materials encountered including, but not limited to, soil moisture content (ASTM D 2216), Atterberg Limits (ASTM D 4318) and sieve analysis. The test results can be found in Attachment D. Samples not tested in the laboratory will be retained for a maximum of 60 days and then discarded unless otherwise notified in writing prior to disposal of the samples.

3.0 Subsurface Investigation

3.1 Site Geology

Based on the location of the site on geological maps, it is our opinion that the predominate soil is the Angelo – Urban land complex, 0 – 3% Slopes (AuB). These particular soils are indicative of nearly level to gently sloping topography on smooth outwashed plains. These soils are well drained and have slow surface runoff. Shrink-swell potential and soil corrosivity to uncoated steel are moderate. Based on the location of the site and soil conditions we do not foresee any adverse issues related to elevated sulfate concentrations.

3.2 Subsurface Materials and Conditions

The specific subsurface stratum encountered in each borehole is described in the logs of boreholes included in Attachment C. The strata encountered at the boreholes conducted at the site can be divided into three major strata. The first stratum is a layer of fat clay with sand which extends from a depth of 0'

to 2'. The second soil stratum consists of lean clay with sand extending from a depth of 2' to 8'. The third stratum consists of fat clay which extends from 8' to the depth of the boreholes.

3.3 Subsurface Water

There was no groundwater noted in any of the boreholes at the time of the investigation. The absence of groundwater noted does not express or imply a groundwater study was performed, which is beyond the scope of this report. It should be noted that groundwater levels are subject to change based on seasonal and climatic conditions.

4.0 Site and Design Considerations

4.1 Basic Considerations

The properties of in-situ soils, site characteristics, and the level of tolerable deflection should be carefully considered during the design phase. A foundation should economically meet the functional requirements of the structure and minimize differential movement of the structure that could cause damage.

The site has been previously developed, and there are existing sporting court surfaces and fencing present at the site. Any of the previous developments which fall within the footprint of the proposed shade structure should be removed in their entirety and engineered fill should be used to fill the excavated areas. The fill should be placed and compacted in accordance with the Site Preparation section of this report.

The depth and hardness of the subsurface soil strata present varies across the site. The variations should be noted by the engineer and contractor for all aspects of design and construction.

The subsurface soils encountered at the site have moderate to high Potential for Vertical Rise (PVR). A soil modification plan to remove and replace the site soils would be costly, and the owner should determine the feasibility of soil modification in accordance with their tolerance for movement.

The structural engineer should ensure the foundation design for the proposed shade structure has adequate self-weight and reinforcement to withstand any overturning moment generated from expected wind forces.

Routing of drainage should be addressed in the design phase of the project to ensure drainage is routed away and around proposed and existing foundation systems.

4.2 Shrink/Swell Considerations

Shrink/swell movements of the in-situ soils with changes in the soil moisture content are anticipated to be moderately high at the site. The Potential Vertical Rise (PVR) was calculated to be on the order of 2" using the McDowell PVR Method. The PVR was approximated using the McDowell's initial dry soil condition and a potential active zone to fifteen feet below grade.

For a spread footing foundation system (with no slab or grade beams connecting footings), the PVR may be reduced to be on the order of 1-½" by bearing the spread footings at a depth of 2' below the existing grade. The PVR may be reduced to be on the order of 1-¼" by bearing the spread footings at a depth of 5' below the existing grade. The PVR may be reduced to be on the order of 1" by bearing the spread footings at a depth of 8' below the existing grade.

The PVR and moreover foundation movement is effected by many factors that influence its magnitude and rate of change. Factors include: seasonal variations in the moisture content between the interior and perimeter of the foundation, topographic relief, vegetative cover, confining pressures, fluctuating and

shallow water tables, and the composition of underlying soils. In-situ clays can expand with the introduction of moisture and shrink with decreases in moisture.

4.3 Spread Footings

Spread footings may be used where there is a suitable bearing stratum near the surface and where the potential for heave or settlement is within an acceptable range. Spread footings should be sized to support anticipated loads. We recommend bearing the spread footings a minimum of 2' below existing grade. The allowable bearing pressure exerted by the spread footings on the in-situ soils from a depth of 1' to 4' is 1,400 psf and from a depth of 4' to 8' is 1,900 psf.

4.4 Drilled Piers

Straight shaft or belled piers can be used for foundation support where column loads are less than 25 kips. The piers should bear at a depth to obtain adequate bearing capacity and lateral support when it cannot be obtained utilizing a shallow foundation. The piers should be located below the active zone and founded on a firm, stable stratum. We recommend foregoing utilizing side shear resistance for the allowable bearing capacity of the piers between 0 and 8 feet of depth. The piers can be designed with an allowable side shear resistance of 400 psf for the portion of shaft extending from a depth of 8’ to the depth of the borehole, in addition to the allowable end bearing pressure stated below. An allowable side shear resistance of 350 psf for the portion of shaft extending from a depth of 8’ to the depth of the borehole may be utilized for uplift resistance. Please refer to the following table for pier design parameters.

Depth (ft)	Allowable End Bearing (psf)	Cohesion (psf)	Modulus of Subgrade Reaction (kcf)
8 to 10	4,800	2,400	255
10 to 15	5,600	2,800	255
15 to 18	6,000	3,000	255

We recommend a minimum and maximum shaft diameter of 24" and 36", respectively for piers. The bell to shaft diameter ratio should not exceed 3.0. It should also be noted that bells in excess of 60" in diameter may become more difficult to construct due to the potential of caving or sloughing. The maximum slope angle of the underreamed bell should not exceed 45 degrees. Adjacent piers should maintain a minimum center to center spacing of 3 times the end bearing diameter. Piers spaced as specified do not require a reduction in the load carrying capacity of the individual piers due to group action. Refer to the LATERAL DESIGN CRITERIA of this report for lateral design considerations.

Settlement of properly constructed piers are estimated to be less than ½" for loads of 25 kips or less. Additional settlement may occur if the load exceeds 25 kips.

Piers should be inspected for proper size, depth and reinforcement placement prior to the placement of any concrete. It is essential that the bearing stratum of the piers be identified by the engineer or his representative. A representative from SKG Engineering should be present during drilling activities to approve the bearing strata. Each pier excavation should be completed, and concrete placed within one day. In no instance should any pier excavation be left open overnight. We recommend alternating the drilling and placement of concrete for shafts in groups. Foundation concrete should be placed in clean, dry holes. Bottoms of pier excavation should be cleared of loose debris prior to the placement of concrete.

We do not anticipate the need for temporary pier casing to prevent caving or sloughing of the hole during pier drilling operations, due to the subsurface stratum. However, should field conditions warrant the use of pier casings, they should be used.

4.5 Uplift Loads

The piers could experience tensile loads as a result of post construction heave of the clay soils. The shafts must contain sufficient reinforcing steel for the length of the shaft to accommodate the net tensile loads. There are several factors effecting the magnitude of the loads, such as; shaft diameter, soil parameters and in-situ moisture levels during and after construction.

4.6 Seismic Design Criteria

We have provided the seismic criteria for use in the structural design phase of the project. The seismic criteria is based on the 2015 International Building Code. The stratum referenced in this section refer to those described in the section SUBSURFACE MATERIALS AND CONDITIONS of this report. Please refer to the following table for seismic design parameters.

Mapped Spectral Response Acceleration					
Description	Site Class	Short Periods (S_s)	1 Second Period (S_1)	Site Coefficients	
				F_a	F_v
Stratum I	E	0.09g	0.04g	2.5	1.7
Stratum II & III	D	0.09g	0.04g	1.6	2.4

4.7 Lateral Design Criteria

Recommended Lateral Design Criteria per Soil Type				
Soil Type	Lateral Bearing Pressure, to a maximum value at 15 feet (psf/ft)	Angle of Internal Friction (degrees)	Friction Factor (Between Concrete and Native Soil)	Approximate Unit Weight (pcf)
Clay	50	28	--	105
Fat Clay	50	19	--	90

4.8 Backfill Material and Compaction

Retaining walls should be backfilled with a 12" width of pea gravel for the height of the wall. Backfill behind the pea gravel should be a non-expansive fill material with a maximum particle size of 4" nominal diameter three quarters of the wall height and a clay cap on the top quarter of the wall height. We recommend providing weep holes along the bottom of the retaining wall height at 10' on center maximum spacing for the length of the wall. We recommend placing fill in maximum 8" loose lifts and compacted to between 93% to 97% of the Standard Proctor Density. Compaction tests should be performed on each lift.

4.9 Drainage

Positive drainage away from the foundation must be provided and maintained to reduce subsurface moisture variations. The minimum recommended slope away from the foundation is 5% for the first 10 feet for areas not covered by a sidewalk or pavement. Water shall not be permitted to pond on the finished site.

Due to the presence of in-situ clays, we recommend through the design and construction phase an emphasis on maintaining a stable moisture content in the soils beneath and adjacent to the foundation be a major priority. Temporary and permanent control measures should be properly designed and installed to ensure positive drainage away from the foundation to maintain a quasi stable soil moisture content. The measures include, but are not limited to gutters, sprinkler systems, and a site grading plan.

4.10 Underground Utilities

The backfill material used for underground utility trenches should be on-site materials or imported clayey materials. We recommend not using a granular material to avoid the possibility of water migration through the trenches and possibly under foundation systems at the site.

4.11 Exterior Flatwork Considerations

Engineered fill shall be used as needed to bring the flatwork to grade. Control joints should be cut at a maximum spacing of 6' for the length of the flatwork and expansion joints at a maximum spacing of 50'. We recommend installing flatwork as not to impound water adjacent to structural foundations.

4.12 Trenching and Excavation Requirements

The guidelines specified by Occupational Safety and Health Administration (OSHA) should be followed for all excavation activities. The OSHA Standards (29 CFR Part 1926 revised, 1989) require all trenches that exceed 5' in depth to be shored or benched appropriately unless the soil stratum is “solid” rock.

The OSHA standards should be strictly adhered to for all excavation activities. The classification of the soils encountered at the site are Type B soils. The soil classifications are based on soils encountered in the boreholes conducted at the site. Refer to the following OSHA Table B-1 for slope requirements for

excavations that are less than 20 feet in depth. Trenches in excess of 20 feet in depth should be designed by a registered professional engineer.

Maximum Allowable Slopes		
Stratum	Horizontal	Vertical
Stable Rock	Vertical	1
Type A	3/4	1
Type B	1	1
Type C	1-1/2	1

The above information is provided for temporary excavations. We recommend that any permanent trenches proposed for the site should have a minimum of 4:1 side slopes. Any permanent trenches or channels should be lined with erosion control measures.

5.0 Site Preparation

5.1 Subgrade

Remove the top 6" of surface soils, any deleterious material, and in-situ soils as necessary to bring the finished floor elevation to design grade. The top 6" of material should then be scarified, moisture conditioned, and compacted to at least 95% of the Standard Proctor Density within 2% points of the optimum moisture content. Any soft or pumping areas are to be excavated and an engineered fill shall be used as backfill. Where existing slopes exceed ten horizontal to one vertical, the cross slope should be benched to provide a minimum of 6' bench width.

5.2 Engineered Fill

An approved select fill shall be used to bring the foundation system to grade. It shall be a non-granular, cohesive soil, free of deleterious material, have a liquid limit of less than 40, and a plasticity index between 6 and 14. The select fill shall meet the following percent retained on sieve requirements: 2-1/2": 0-5%, No. 4: 40-80%, and No. 40: 50-85% or obtain approval from the geotechnical engineer. The fill should be installed in maximum eight-inch loose lifts and compacted to at least 95% of the Standard Proctor Density within 3% points of the optimum moisture content. Base consisting of TxDOT Type A, Grade 2 limestone will be accepted as engineered fill. Blended materials utilized for engineered fill will have to meet the specifications herein and be approved by the geotechnical engineer. If a blended material is approved, the contractor shall blend the material and have one stockpile for the entire project. Continuous blending of material throughout the duration of the project is not acceptable.

5.3 Flexible Base Material

Provide compacted base consisting of Type A, Grade 2, limestone material below the foundation. Compact to 96% of the Standard Proctor Density within 2% points of the optimum moisture content. Material shall be placed in lifts not to exceed 8". Alternative flexible base materials provided by local suppliers which do not meet theses specifications shall be approved by the Engineer of record.

5.4 Testing

Test results of the engineered fill shall be submitted to the engineer of record for approval prior to incorporating into the work. Arrange for a testing agency to verify flexible base, engineered fill, and subgrade compaction and moisture content. To confirm the compaction of the subgrade, engineered fill, and base we recommend the more stringent of three density tests for each lift placed or one density test for every 2,000 square feet of foundation area for each lift placed. The Standard Proctor Density shall be determined in accordance with ASTM D698.

6.0 Limitations

The recommendations presented in this report are based upon the information obtained from the borings performed at the site and from other information discussed in this report. This report is based upon the findings from the borings made and may not identify all subsurface variations which exist across the site. The nature and extent of such variations may not become evident until construction. If significant variations appear, contact SKG Engineering to further access the design criteria and the recommendations contained within this report.

The scope of services for this project does not include either specifically or by implication any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such conditions, the appropriate investigations should be performed.

No warranties, either expressed or implied, are intended or made. In the event that changes in the nature, design, or location of the project as outlined in this report are made, the recommendations contained in this report shall not be considered valid unless SKG Engineering reviews the changes and either verifies or modifies the conclusions of this report in writing.

Attachment A

Field Conditions

Summary of Field Conditions

The following field conditions were observed during the field exploration activities.

1. The site is developed with multiple sport court surfaces and fencing. The accessibility of some types of equipment should be verified in some of the areas of the site where fencing and/or structures are in the area.

2. The surface at the site is currently developed as noted above. However, soil conditions below paved surfaces on the site are generally clay that is considered a soft soil material. Once previous pavement/surfacing is removed, the soil conditions will probably prove to hinder mobilization of some types of construction equipment during rain events that saturate the soils.

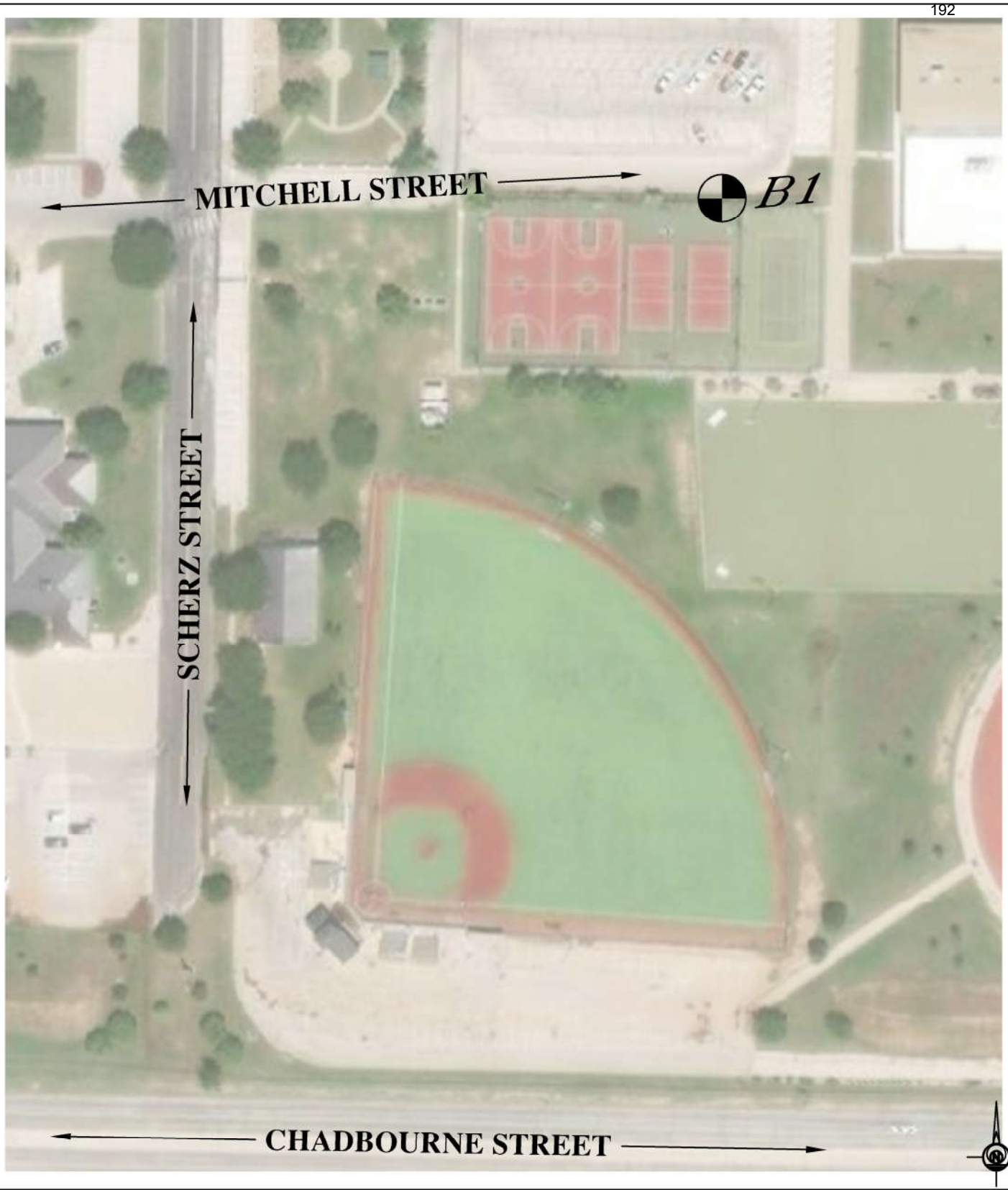
3. Groundwater was not present at the time of drilling activities in any of the boreholes.

4. No rock was encountered in any of the boreholes conducted at the site.

5. Site soils are not anticipated to be of quality to be used for fill material under the foundation systems. We anticipate the site soils may be used for nonstructural applications, such as; landscape fill.

Attachment B

Borehole Location Map



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PROPOSED SHADE STRUCTURE
BEAVER FIT LOCKER
OFF OF MITCHELL STREET
GFAFB, TEXAS

BOREHOLE LOCATION MAP

DWG BY: SKG	DWG. DATE: 2/13/2020
JOB NO. 20-E-0109	SHEET NO. BH1
SCALE: 1"=100'	

Attachment C

Logs of Boreholes

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISION			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE.	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL GRADED GRAVELS, GRAVEL–SAND MIXTURES, LITTLE OR NO FINES.
				GP	POORLY GRADED GRAVELS OR GRAVEL–SAND MIXTURES, LITTLE OR NO FINES.
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL–SAND–SILT MIXTURES.
				GC	CLAYEY GRAVELS, GRAVEL–SAND–SILT MIXTURES.
	SILTS AND CLAYS — MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
				SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND–SILT MIXTURES.
				SC	CLAYEY SANDS, SAND–CLAY MIXTURES.
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE.	SILTS AND CLAYS — LIQUID LIMIT LESS THAN 50.			ML	INORGANIC SILTS AND VERY FINE SANDS, FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS AND WITH SLIGHT PLASTICITY.
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY.
	SILTS AND CLAYS — LIQUID LIMIT GREATER THAN 50.			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS.
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS.

SAMPLER TYPE

SOIL TERMS	DESCRIPTION
BLOCKY	CONTAINS CRACKS OR FAILURE PLANES RESULTING IN ROUGH CUBES OF MATERIAL.
CALCAREOUS	CONTAINS APPRECIABLE QUANTITIES OF CALCIUM CARBONATE.
FISSURED	CONTAINS SHRINKAGE CRACKS, WHICH ARE FREQUENTLY FILLED WITH FINE SAND OR SILT. THE FISSURES ARE USUALLY NEAR VERTICAL IN ORIENTATION.
INTERBEDDED	COMPOSED OF ALTERNATING LAYERS OF DIFFERENT SOIL TYPES.
LAMINATED	COMPOSED OF THIN LAYERS OF VARYING COLOR AND TEXTURE.
NODULES	SECONDARY INCLUSIONS THAT APPEAR AS SMALL LUMPS ABOUT 0.1 TO 0.3 INCH IN DIAMETER.
PARTINGS	INCLUSION OF DIFFERENT MATERIAL LESS THAN ⅛ INCH THICK EXTENDING THROUGH THE SAMPLE.
POCKETS	INCLUSION OF DIFFERENT MATERIAL THAT IS SMALLER THAN THE DIAMETER OF THE SAMPLE.
SEAMS	INCLUSION OF DIFFERENT MATERIAL BETWEEN ⅛ AND 3 INCHES THICK, AND EXTENDS THROUGH THE SAMPLE.
SLICKENSIDED	HAS INCLINED PLANES OF WEAKNESS THAT ARE SLICK AND GLOSSY IN APPEARANCE. SLICKENSIDES ARE COMMONLY THOUGHT TO BE RANDOMLY ORIENTED.
STREAKS OR STAINS	STAINS OF LIMITED EXTENT THAT APPEAR AS SHORT STRIPES, SPOTS OR BLOTCHES.

ROCK TERMS	
BEDDING PLANE	A SURFACE PARALLEL TO THE SURFACE OF DEPOSITION, GENERALLY MARKED BY CHANGES IN COLOR OR GRAIN SIZE.
FRACTURE	A NATURAL BREAK IN ROCK ALONG WHICH NO DISPLACEMENT HAS OCCURED.
JOINT	A NATURAL BREAK ALONG WHICH NO DISPLACEMENT HAS OCCURED, WHICH GENERALLY INTERSECTS PRIMARY SURFACES.
% RECOVERY	THE RATIO OF TOTAL LENGTH OF RECOVERY TO THE TOTAL LENGTH OF CORE RUN, EXPRESSED AS A PERCENTAGE.
RQD - ROCK QUALITY DESIGNATION	THE RATIO OF TOTAL RECOVERED LENGTH OF FRAGMENTS LONGER THAN 4 INCHES TO THE TOTAL RUN LENGTH, EXPRESSED AS A PERCENTAGE.
WEATHERING	THE PROCESS BY WHICH ROCK IS BROKEN DOWN AND DECOMPOSED.

MOISTURE CONTENT

DRY	ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH.
DAMP	SOME PERCEPTIBLE MOISTURE; BELOW OPTIMUM.
MOIST	NO VISIBLE WATER; NEAR OPTIMUM MOISTURE CONTENT.
WET	VISIBLE FREE WATER, USUALLY SOIL IS BELOW WATER TABLE.

CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	POCKET PENETROMETER READING IN TONS/FT2	N-VALUE (BLOWS/FOOT)
VERY SOFT	0 TO 0.25	<2
SOFT	0.25 TO 0.5	2 TO 4
FIRM	0.5 TO 1.0	4 TO 8
STIFF	1.0 TO 2.0	8 TO 15
VERY STIFF	2.0 TO 4.0	15 TO 30
HARD	>4.0 OR 4.5+	>30

CLAY	SILT	SAND			GRAVEL		COBBLES	BOULDERS
		FINE	MEDIUM	COARSE	FINE	COARSE		
0.005mm	No.200	No.40	No.10	No.4	¾"	3"	12"	

U.S. STANDARD SIEVE SIZE

RELATIVE DENSITY-GRANULAR SOILS

CONSISTENCY	N-VALUE (BLOWS/FOOT)
VERY LOOSE	0 TO 4
LOOSE	5 TO 10
MEDIUM DENSE	11 TO 30
DENSE	31 TO 50
VERY DENSE	>50 OR 50+

REFERENCE: THE UNIFIED SOIL CLASSIFICATION SYSTEM, CORPS OF ENGINEERS, U.S. ARMY TECHNICAL MEMORANDUM NO. 3–357, VOL. 1 MARCH, 1953 (REVISED APRIL, 1960)

KEY
TO SYMBOLS AND TERMS

SKG
ENGINEERING

Project: Proposed Shade Structure - Beaver Fit Locker
Goodfellow AFB, Texas

B-1

Boring Location: Refer to the borehole location map

Date Started: February 6, 2020 | **Date Finished:** February 6, 2020

Drilling Method: Hollow Stem Auger

Hammer Weight: 140 lbs | **Drop:** 30 inches

Sampler: Shelby tube/2" split barrel sampler

Surface Elevation:

Depth (feet)	Lithology	Material Description	Samples: Number	Samples: Type	Samples: SPT	Laboratory: W%	Laboratory: PI	Laboratory: Pent. (tsf)
0		fat CLAY (CH); brown, with sand			2/2/3	21.1	29	
					3/7/9			
		lean CLAY (CL); light brown, with sand						
5					9/11/13	22.9	20	
		fat CLAY (CH); light brown						
10					14/21/20			
15					17/23/25	18.6	41	
20					18/26/24			
		Boring completed at a depth of 20'. Groundwater was not present at the time of drilling activities.						
25								
30								
35								

GWT not encountered

Attachment D

Laboratory Results

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ANALYSIS RESULTS

CLIENT:	Goodfellow AFB
PROJECT:	Shade Structure
PROJECT #:	20-E-0109
DATE:	2/13/2020

Lab No.	Description	Plastic Limit (%) *	Liquid Limit (%)*	Plasticity Index *	Moisture (%) *	Pass # 4 Sieve (%)*	Pass # 40 Sieve (%)*	Pass # 200 Sieve (%)*
0107	B1 0' 1.5'	23	52	29	21.1	98.0	86.7	73.0
0108	B1 3.5' 5'	20	41	20	22.9	97.0	83.7	74.2
0109	B1 13.5' 15'	29	70	41	18.6	99.9	96.4	91.1

Average PL	24
Average LL	54
Average PI	30
Average % Clay	79.4

Stephanie Cheatheam

Stephanie Cheatheam
Lab/CMT Manager