ARKANSAS DEPARTMENT OF TRANSPORTATION

SUBSURFACE INVESTIGATION

STATE JOB NO. 070480

FEDERAL AID PROJECT NO. STATE JOB

UNION CO. AREA HEADQUARTERS/R.E. OFFICE 76 (EL DORADO) (S)

STATE HIGHWAY 63 **SECTION** 18

IN UNION COUNTY

The information contained herein was obtained by the Department for design and estimating purposes only. It is being furnished with the express understanding that said information does not constitute a part of the Proposal or Contract and represents only the best knowledge of the Department as to the location, character and depth of the materials encountered. The information is only included and made available so that bidders may have access to subsurface information obtained by the Department and is not intended to be a substitute for personal investigation, interpretation and judgment of the bidder. The bidder should be cognizant of the possibility that conditions affecting the cost and/or quantities of work to be performed may differ from those indicated herein.

ARKANSAS DEPARTMENT OF TRANSPORTATION
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MATERIALS DIVISION
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July 3, 2018

TO: Mr. Joe Sartini, State Maintenance Engineer

SUBJECT: Job No. 070480
Union Co. Area Headquarters and R.E. Office 76, El Dorado
Union County

Transmitted herewith are summaries of the site geology and subsurface conditions, design recommendations, R-value test results, and the logs of the borings conducted for the structures of the above referenced project.

If you have any questions concerning these recommendations, please contact the Geotechnical Section.

Michael C. Benson
Materials Engineer

MCB:rpt:mlg
Attachment

cc: State Construction Engineer – Master File Copy
Roadway Design Engineer
District 7 Engineer
Facilities Management
G.C. File

GEOTECHNICAL REPORT FOR JOB NO. 070480
Union Co. Area Headquarters and R.E. Office 76, El Dorado

INTRODUCTION

The Arkansas Department of Transportation (ARDOT) is planning to construct a new Area Headquarters and Resident Engineer office in Union County. The new yard will be located on the west side of Industrial Road, approximately 0.1 miles south of the intersection of Highway 63 and Industrial Road, in El Dorado.

The primary purpose of this study is to obtain subsurface data at the site and to provide geotechnical recommendations for earthwork, foundations, and pavement design. The structures planned for this site are two, one-story buildings and a salt storage area. The sample locations and current site layout of the structures, parking areas, and access roads are included in Appendix A. This location has been investigated and the findings and subsequent recommendations are presented in this report.

FIELD INVESTIGATION AND LABORATORY PROCEDURES

Six Standard Penetration Test (SPT) borings were completed for the proposed structures. Borings 1 and 2 were completed at the proposed location of the Resident Engineer Office, borings 3 and 4 were completed at the proposed location of the Area Headquarters, and borings 5 and 6 were completed at the proposed location of the Salt Storage building. Approximately 126 total feet of SPT borings were drilled, 54 SPT test performed, and one R-value sample obtained within the limits of the parking area. No Shelby Tube samples were taken, due to the sandy and silty makeup of the soils. Preliminary descriptions of the materials encountered were recorded in the field and all recovered samples were brought to the laboratory and visually classified by experienced lab personnel to verify field identifications.

Eight additional auger soundings were also performed around this site to determine if it contains an abandoned landfill. No trash or evidence of a landfill was encountered in any borings.

SITE AND SUBSURFACE CONDITIONS

General Site Conditions

The proposed Union County Area Headquarters and Resident Engineer Office are to be located on Industrial Road, 500 feet south of the intersection of Highway 63 on Industrial Road, east of El Dorado. The proposed site is currently unoccupied but was previously used as a storage yard. It was believed that this site could contain an abandoned landfill. This site is generally level with a gravel driveway winding around the property.

Site Geology

The proposed project site is located over unconsolidated deposits of the Claiborne Group. In general, the Claiborne is composed of medium- to very fine-grained sands, silts, and silty clays. The sands tend to be light- to dark-gray, white, brown, or red, depending on the degree of weathering. The silts and clays are light- to dark-gray and sometimes variegated. Lignite beds are present in this group, but none were encountered during the investigation. In the subsurface, the Claiborne Group has been divided into the Carrizo Sand, Cane River Formation, Sparta Sand, Cook Mountain Formation, and Cockfield Formation. The thickness of the Claiborne ranges from a thin edge to 1,500 feet. Soils at the proposed project site vary from clay, silt, and sand.

Seismic Considerations

This project is located in the southern edge of the New Madrid Seismic Zone (NMSZ), which is the source for most of the seismic activity in the area. The 2014 International Building Code and the AASHTO Bridge Design Guide indicate a peak horizontal ground acceleration coefficient of approximately 0.096 for this location. According to the AASHTO Bridge Design Guide, this site is best characterized as Site Class D.

Description of Subsurface Stratigraphy

The materials comprising the foundation strata for the proposed structure and pavement areas, as determined by the geotechnical exploration, are shown on the Boring Logs in Appendix B. In general, the subsurface stratigraphy from 0 to 9.5 feet is composed of moist, loose to medium dense silt to sandy silt to stiff to very stiff, sandy clay. Below 9.5 feet, soils

consist primarily of moist, medium dense, silty sand. Groundwater was not encountered during the investigation.

RECOMMENDATIONS

Foundations

Due to the sandy and silty nature of the soils at the site, a wall footing foundation and slab-on-grade construction is recommended as the most economical foundation type. The boring logs indicate materials that are not highly susceptible to significant settlement for a one story building. A footing with a minimum width of 2 feet founded a minimum of 2 feet below the existing surface may be designed based on a factored bearing capacity of 1.5 ksf, if founded on stiff sandy clay. Unstable conditions are not anticipated at this site. Fill material should meet the material requirements of Section 302 in the Standard Specifications for Highway Construction, 2014 Edition for Selected Material (SM-1).

Pavement Design

Existing material is expected to provide a stable working platform with conventional drying and processing techniques. An R-Value of 7 is recommended for roadway and parking lot design. Fill material should meet the material requirements of Section 302 in the Standard Specifications for Highway Construction, 2014 Edition for Selected Material (SM-1).

CONSTRUCTION RECOMMENDATIONS

The foundation bearing area should be level and free of loose soil, ponded water, and debris prior to placement of concrete. Should the materials at bearing level become excessively dry or saturated, it is recommend that the affected materials be removed prior to placing concrete. Concrete should be placed as soon as possible after excavating the footing so that excessive drying of bearing materials does not occur.

Before filling operations begin, representative samples of each proposed fill material should be collected. The samples should be tested to determine the maximum dry density, optimum moisture content, natural moisture content, gradation, and plasticity of the soil. These tests are needed for quality control during compaction.

The fill surface must be adequately maintained during construction in order to achieve an acceptable compacted fill. It is recommended that the fill surface be sloped to achieve

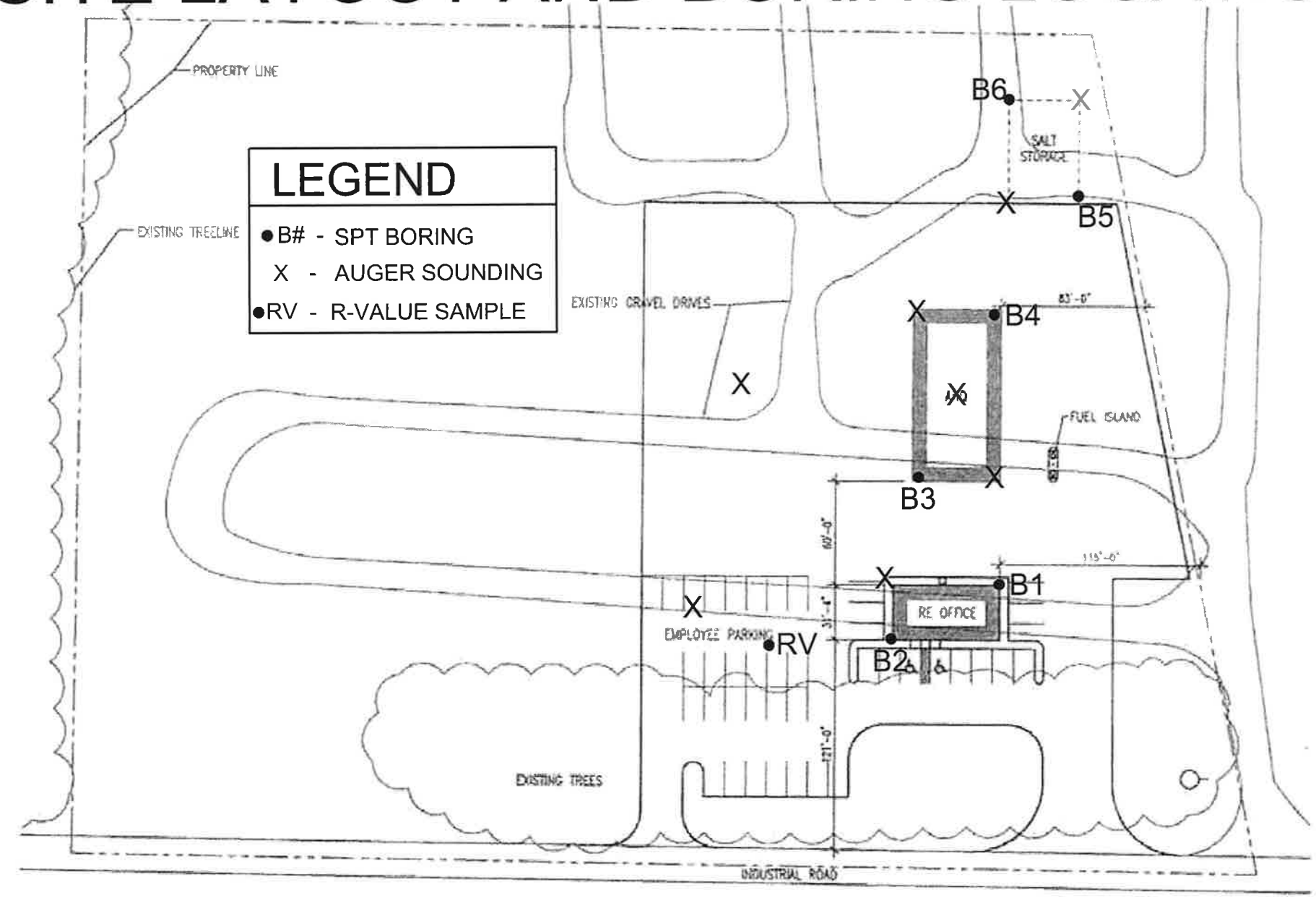
sufficient drainage and to prevent water from ponding on the fill. If the surface soils become excessively wet or frozen, fill operations should be halted, and the Resident Engineer should be consulted for guidance.

It is recommended that at least one field density test be performed for every 2,500 square feet of fill in each fill layer.

Appendix A

Site Layout

SITE LAYOUT AND BORING LOCATIONS



Appendix B

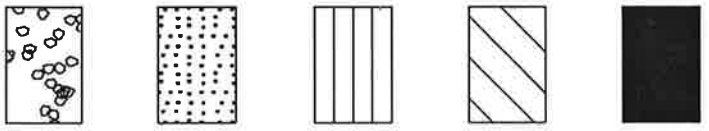
Boring Logs

LEGEND

SOIL TYPES

(SHOWN IN SYMBOL COLUMN)

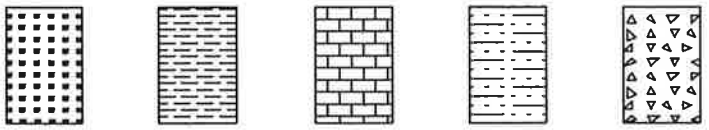
(PREDOMINANT TYPE SHOWN HEAVY)



GRAVEL | SAND | SILT | CLAY | ORGANIC MATTER

ROCK TYPES

(SHOWN IN SYMBOL COLUMN)



SANDSTONE | SHALE or SILTSTONE | LIMESTONE or DOLOMITE | ALTERNATING LAYERS of SHALE and SANDSTONE | OTHER

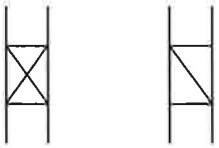
SAMPLER TYPES

(SHOWN IN SAMPLE COLUMN)

SHELBY TUBE

UNDISTURBED SAMPLE RECOVERY | DISTURBED SAMPLE RECOVERY | NO RECOVERY

SPLIT SPOON



SAMPLE RECOVERY | NO RECOVERY

ROCK CORING

% RECOVERY INDICATED ON LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANULAR SOIL		CLAY		CLAY-SHALE		SHALE	
"N" Value	Density	"N" Value	Consistency	"N" Value	Consistency	"N" Value	Consistency
0-4	Very Loose	0-1	Very Soft	0-1	Very Soft		
5-10	Loose	2-4	Soft	2-4	Soft	31-60	Soft
11-30	Medium Dense	5-8	Medium Stiff	5-8	Medium Stiff	Over 60	
31-50	Dense	9-15	Stiff	9-15	Stiff	More than 2'	
Over 50	Very Dense	16-30	Very Stiff	16-30	Very Stiff	Penetration	
		31-60	Hard	31-60	Hard	in 60 Blows:	Medium Hard
		Over 60	Very Hard	Over 60	Very Hard	Less than 2'	
						Penetration	
						in 60 Blows:	Hard

1. Ground water elevations indicated on boring logs represent ground water elevations at date or time shown on boring log. Absence of water surface implies that no ground water data is available but does not necessarily mean that ground water will not be encountered at locations or within the vertical reaches of these borings.
2. Borings represent subsurface conditions at their respective locations for their respective depths. Variations in conditions between or adjacent to boring locations may be encountered.
3. Terms used for describing soils according to their texture or grain size distribution are in accordance with the Unified Soil Classification System.

Standard Penetration Test – Driving a 2.0" O.D., 1-3/8" I.D. sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and performing the test are recorded for each 6 inches of penetration on the drill log. The field "N" Value (N_f) can be obtained by adding the bottom two numbers for example: $\frac{6}{8-9} \Rightarrow 8+9=17 blows/ft$. The "N" Value corrected to 60% efficiency (N_{60}) can be obtained by multiplying N_f by the hammer correction factor published on the boring log.

ARKANSAS HWY. & TRANS. DEPARTMENT
MATERIALS DIVISION - GEOTECHNICAL SEC.

BORING NO. 1
PAGE 1 OF 1

JOB NO. 070480 Union County
JOB NAME: Union Co. Area Headquarters and R.E Office #76
El Dorado
STATION:
LOCATION:
LOGGED BY: Troy Frazier

DATE: March 27, 2018
TYPE OF DRILLING:
Hollow Stem Auger
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 21

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION:	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
			Moist, Hard, Brown Sandy Clay with Gravel						15 18-13		
			Moist, Loose, Light Brown Silty Sand						3 4-4		
5			Moist, Stiff, Light Brown Sandy Clay						4 5-6		
			Moist, Medium Dense, Reddish Brown and Gray, Silty Sand						3 6-9		
10			Moist, Medium Dense, Light Gray, Silty Sand						4 9-11 9 13-13 7 10-13 5 12-15		
20			Moist, Dense, Light Gray, Silty Sand						9 14-20		
			Boring Terminated								
25											
30											
35											

REMARKS: Northwest corner of the proposed R.E. office.

ARKANSAS HWY. & TRANS. DEPARTMENT
MATERIALS DIVISION - GEOTECHNICAL SEC.

BORING NO. 2
PAGE 1 OF 1

JOB NO. 070480 Union County
JOB NAME: Union Co. Area Headquarters and R.E Office #76
El Dorado
STATION:
LOCATION:
LOGGED BY: Troy Frazier

DATE: March 27, 2018
TYPE OF DRILLING: Hollow Stem Auger
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 21

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION:	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
			Moist, Medium Dense, Brown, Silty Sand						3 6-5		
			Moist, Loose, Light Brown Sandy Silt						2 2-3		
5			Moist, Stiff, Light Brown Sandy Clay						3 6-9		
			Moist, Very Stiff, Light Gray, Sandy Clay						5 9-11		
10									4 7-9		
									4 8-9		
15			Moist, Medium Dense, Light Gray, Silty Sand						5 7-11		
									4 7-16		
20									4 8-12		
			Boring Terminated								
25											
30											
35											

REMARKS: Southeast corner of the proposed R.E. office.

ARKANSAS HWY. & TRANS. DEPARTMENT
MATERIALS DIVISION - GEOTECHNICAL SEC.

BORING NO. 3
PAGE 1 OF 1

JOB NO. 070480 Union County
JOB NAME: Union Co. Area Headquarters and R.E Office #76
El Dorado
STATION:
LOCATION:
LOGGED BY: Troy Frazier

DATE: March 27, 2018
TYPE OF DRILLING:
Hollow Stem Auger
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 21

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION:	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
			Moist, Loose, Brown Silty Sand						4 5-5		
			Moist, Loose, Light Brown Sandy Silt						2 2-4		
5			Moist, Stiff, Light Brown Sandy Clay						4 6-8		
			Moist, Stiff, Light Brown and Light Gray Sandy Clay						3 5-7		
10			Moist, Medium Dense, Light Gray Sand with Clay						5 8-10		
									7 9-10		
15									5 9-12		
			Moist, Medium Dense, Light Gray Silty Sand						7 10-12		
20									3 9-12		
			Boring Terminated								
25											
30											
35											

REMARKS: Southeast Corner of the proposed maintenance building.

ARKANSAS HWY. & TRANS. DEPARTMENT
MATERIALS DIVISION - GEOTECHNICAL SEC.

BORING NO. 4
PAGE 1 OF 1

JOB NO. 070480 Union County
JOB NAME: Union Co. Area Headquarters and R.E Office #76
El Dorado
STATION:
LOCATION:
LOGGED BY: Stanley Bates

DATE: April 2, 2018
TYPE OF DRILLING: Hollow Stem Auger
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 21

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION:	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
			Moist, Medium Dense, Brown Sand with Some Clay and Some Organic Matter						5 7-6		
			Moist, Medium Dense, Brown Clayey Sand with Trace Gravel						3 5-9		
5			Moist, Medium Dense, Reddish Brown Clayey Sand						5 7-9		
									4 7-8		
10									5 8-10		
									5 10-11		
15			Moist, Medium Dense, Light Gray Sandy Silt						6 8-12		
									7 9-16		
20									7 13-16		
			Boring Terminated								
25											
30											
35											

REMARKS: Northwest corner of the proposed maintenance building.

ARKANSAS HWY. & TRANS. DEPARTMENT
MATERIALS DIVISION - GEOTECHNICAL SEC.

BORING NO. 5
PAGE 1 OF 1

JOB NO. 070480 Union County
JOB NAME: Union Co. Area Headquarters and R.E Office #76
El Dorado
STATION:
LOCATION:
LOGGED BY: Stanley Bates

DATE: April 4, 2018
TYPE OF DRILLING:
Hollow Stem Auger
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 21

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION:	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
			Moist, Medium Dense, Brown Silty Sand with Some Organic Matter						2 5-6		
			Moist, Stiff, Brown Silty Clay with Trace Gravel						4 4-5		
5			Moist, Stiff, Reddish Brown Sandy Clay						2 5-8		
			Moist, Stiff, Reddish Brown and Light Gray Silty Clay						4 5-10		
10									5 10-12		
									8 12-14		
15			Moist, Medium Dense, Light Gray Sandy Silt						9 13-14		
									8 10-6		
20									8 12-16		
			Boring Terminated								
25											
30											
35											

REMARKS: Southeast corner of proposed salt storage building.

ARKANSAS HWY. & TRANS. DEPARTMENT
MATERIALS DIVISION - GEOTECHNICAL SEC.

BORING NO. 6
PAGE 1 OF 1

JOB NO. 070480 Union County
JOB NAME: Union Co. Area Headquarters and R.E Office #76
El Dorado
STATION:
LOCATION:
LOGGED BY: Stanley Bates

DATE: April 4, 2018
TYPE OF DRILLING: Hollow Stem Auger
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 21

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION:	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
			Moist, Loose, Brown Silty Sand with Trace Organic Matter						3 3-3		
			Wet, Loose, Brown Sandy Silt						2 2-3		
5			Moist, Stiff, Brown Sandy Clay						3 5-8		
			Moist, Medium Dense, Brown Silt						7 10-10		
10			Moist, Very Stiff, Brown and Light Gray Silty Clay with Limonite Seams.						4 10-11		
			Moist, Medium Dense, Light Gray Sandy Silt						4 7-10		
15									4 8-12		
									4 5-8		
20									5 7-19		
			Boring Terminated								
25											
30											
35											

REMARKS: Northwest corner of proposed salt storage building