ARKANSAS DEPARTMENT OF TRANSPORTATION

SUBSURFACE INVESTIGATION

STATE JOB NO. 020588

FEDERAL AID PROJECT NO. STPLC-9345(41)

11TH AVE. – HARDING AVE. (HWY. 190) (PINE BLUFF) (S)

STATE HIGHWAY 190 **SECTION** 5

IN JEFFERSON **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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October 14, 2019

TO: Mr. Rick Ellis, Bridge Engineer

SUBJECT: Job No. 020588
11th Ave. – Harding Ave. (Hwy. 190) (Pine Bluff) (S)
Jefferson County
Route 190 Section 5

Transmitted herewith are a brief summary of the geology and site conditions, D50 scour analysis, summary of percent material passing #200 sieve and Atterberg Limits test results (for liquefaction susceptibility analysis), and the logs of the borings conducted for the structure and approaches of the above referenced project. The samples obtained by the Standard Penetration Tests were brought to the laboratory and visually classified by experienced lab personnel to confirm the field identifications.

This project consists of replacing a bridge on Highway 190, Ohio Street, in Pine Bluff. The new bridge is to be constructed on the existing alignment. Due to steep slopes, only two borings were obtained. The obtained borings had to be offset due to the large volume of traffic on the roadway. The borings that were obtained are located at: 109+32 30' Lt. of Construction Centerline and 110+94 26' Lt. of Construction Centerline.

Based on plans provided by Bridge Division and the findings from this subsurface investigation, it is anticipated that all bents will be founded on concrete filled steel shell piling.

Embankment analyses included global stability with seismic design consideration utilizing a horizontal acceleration coefficient of 0.271, as provided by Bridge Design. One-half of this value was used in the design. The proposed embankment configuration provides for a satisfactory Factor of Safety for seismic and static conditions. However, the Geotechnical section should be notified if the embankment configuration is altered.

Michael C. Benson
Materials Engineer

MCB:rpt:mlg

cc: State Construction Engineer - Master File Copy
District 2 Engineer
G.C. File

GEOLOGY AND SITE CONDITIONS
Job No. 020588
11th Ave. – Harding Ave. (Hwy. 190) (Pine Bluff) (S)
Jefferson County
Route 190 Section 5

Site Conditions

The existing bridge is a three span structure located over an outlet canal. The bridge is composed of concrete deck supported by five steel beams and octagonal trestle pilings with concrete caps. The guardrail consists of steel with concrete posts.

Overhead power lines and street lights parallel the west side and a buried telecommunication line parallels the east side of the existing roadway. Commercial properties surround the project location. Grasses, brush, and small diameter trees are growing in the channel. There was very little water in the channel at the time of the site investigation. Riprap and concrete debris have been place on both the north and south banks adjacent to the bridge.

Site Geology

The project alignment is located on deposits mapped as point bar deposits of the Arkansas River (map symbol Hpa). These deposits include a complex sequence of unconsolidated gravels, sandy gravels, sands, silty sands, silts, clayey silts, and clays. Individual deposits are often lenticular and discontinuous.

Scour Potential

The banks of the channel (See Figures 1 & 2) consist of silt with sand (ML), based on the scour sample taken at the site. The D50 aggregate size of the sample is less than 0.0029 inches. The banks and channel are well vegetated and the stream at base-flow conditions is slow flowing. No scour was observed in the channel; however, concrete and riprap have been placed on both bridge end slopes to prevent erosion from storm runoff.

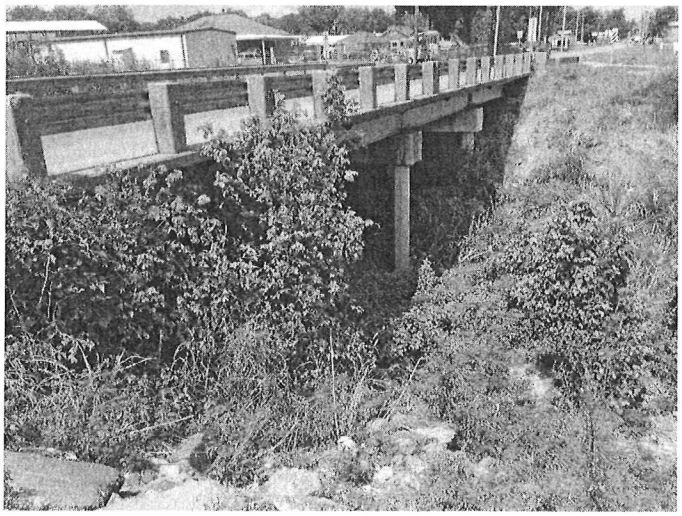


Figure 1. Bridge over outlet canal looking northwest.

Figure 2. Bridge over outlet canal looking northeast.

Subsurface Conditions

Based on the results of the borings, the subsurface stratigraphy may be generalized as follows:

0 to 25 Feet:	Varies from moist to wet, medium stiff, reddish brown to brown **clay** to very loose to loose, reddish brown **sandy silt**.
25 to 40 Feet:	Varies from moist to wet, medium stiff, reddish brown to brown **clay** to loose, reddish brown **sandy silt** to medium dense, brown to gray **silty sand**.
40 to 65 Feet:	Varies from wet, loose to medium dense, brown to gray **clayey sand** to medium dense to dense, brown to gray **silty sand** to **sand**. Some samples in this zone contain a trace of gravel to some gravel.
65 to 80 Feet:	Consists of wet, loose to dense, gray **sand with silt**. Some samples in this zone contain a trace of gravel to some gravel.
80 to 90 Feet:	Consists of wet, medium dense, gray **sand** to wet, medium dense to dense, brown and gray **silty sand** to **sand with silt and gravel**.
90 to 100 Feet:	Consists of wet, medium dense to very dense, brown and gray **sand with silt**. One sample in this interval had a loose consistency. Samples in this zone contain a trace of gravel to some gravel.
100 to 111.5 Feet:	Consists of wet, medium dense to dense, brown **sand with silt and gravel** to **gravel with silt and sand**.

D_{50} AGGREGATE ANALYSIS FOR SCOUR CALCULATIONS

Job No. 020588

Creek Name	Station	Sample Type	Location	Depth (ft.)	Plastic Limit	Liquid Limit	Soil Description	Aggregate Size (D50) (in.)
Outlet Canal	110+32	Creek Bank	30' LT Const. C.L.	N/A	23	27	ML Silt with Sand	Less than 0.0029

Lab Test Summary

Project Number: 020588
Project Name: 11th Ave. - Harding Ave. (Highway 190) (Pine Bluff) (S)

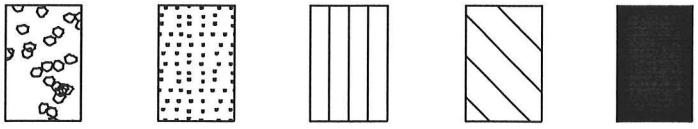
Station	Location	Depth (ft.)	Plastic Limit	Liquid Limit	Plasticity Index	% Passing No. 200	Unified Soil Classification
109+32	30' Lt Const. C.L.	4	17	26	9	92	CL
109+32	30' Lt Const. C.L.	9				61	ML
109+32	30' Lt Const. C.L.	15	NT			53	
109+32	30' Lt Const. C.L.	20	NT			99	
109+32	30' Lt Const. C.L.	25	31	74	43	99	CH
109+32	30' Lt Const. C.L.	30	19	45	26	99	CL
109+32	30' Lt Const. C.L.	35	NT				
109+32	30' Lt Const. C.L.	40	NP			82	ML
109+32	30' Lt Const. C.L.	45	NT			60	
109+32	30' Lt Const. C.L.	50	12	27	15	31	SC
109+32	30' Lt Const. C.L.	55	NT			19	
109+32	30' Lt Const. C.L.	60	NT			14	
109+32	30' Lt Const. C.L.	65	NP			12	SP-SM
109+32	30' Lt Const. C.L.	70	NP			6	SP-SM
109+32	30' Lt Const. C.L.	75	NP			7	SW-SM
109+32	30' Lt Const. C.L.	80	NP			11	SP-SM
109+32	30' Lt Const. C.L.	85	NP			21	SM
109+32	30' Lt Const. C.L.	90	NP			6	SP-SM
109+32	30' Lt Const. C.L.	95	NP			5	SP-SM
109+32	30' Lt Const. C.L.	100	NP			5	SP-SM
109+32	30' Lt Const. C.L.	105	NP			7	GP-GM
109+32	30' Lt Const. C.L.	110	NP			5	SP-SM

LEGEND

SOIL TYPES

(SHOWN IN SYMBOL COLUMN)

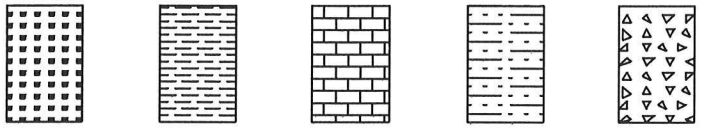
(PREDOMINANT TYPE SHOWN HEAVY)



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

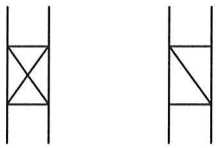
SAMPLER TYPES

(SHOWN IN SAMPLE COLUMN)

SHELBY TUBE

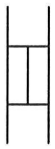
UNDISTURBED SAMPLE RECOVERY | DISTURBED SAMPLE RECOVERY | NO RECOVERY

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, and 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 DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.

BORING NO. 1
PAGE 1 OF 4

JOB NO. 020588 Jefferson County
JOB NAME: 11th Ave. - Harding Ave. (Hwy. 190) (Pine Bluff) (S)
Route 190 Section 5
STATION: 109+32
LOCATION: 30' Left of Construction Centerline
LOGGED BY: Troy Frazier

DATE: August 21, 2019
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 111.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
			SURFACE ELEVATION: 211.7								
				-							
5		X	Wet, Medium Stiff, Brown Lean Clay	CL	17		26		3 3-2		
				-							
10		X	Wet, Loose, Reddish Brown Sandy Silt	ML	NP				2 3-4		
				-							
15		X	Wet, Loose, Reddish Brown Sandy Silt	NT					4 5-5		
				-							
20		X	Moist, Medium Stiff, Reddish Brown Clay	NT					2 3-3		
				-							
25		X	Moist, Medium Stiff, Brown Fat Clay	CH	43		74		2 3-5		
				-							
30		X	Moist, Medium Stiff, Brown Lean Clay	CL	19		45		2 3-5		
				-							
35											

REMARKS:

ARKANSAS DEPARTMENT OF TRANSPORTATION
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BORING NO. 1
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40			Wet, Loose, Light Gray Sandy Silt	NT -					5 5-5		
45			Wet, Medium Dense, Light Gray Silt with Sand	ML -	NP				2 8-8		
50			Wet, Medium Dense, Light Gray Sandy Silt	NT -					2 5-7		
55			Wet, Loose, Light Gray Clayey Sand with Trace Gravel	SC -	12		27		2 3-4		
60			Wet, Medium Dense, Light Brown and Light Gray Clayey Sand with Trace Gravel	NT -					4 6-6		
65			Wet, Medium Dense, Gray Clayey Sand and Some Gravel	NT -					4 10-19		
70			Wet, Dense, Gray Poorly Graded Sand with Silt and Some Gravel	SP-SM -	NP				8 16-20		

REMARKS:

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75		X	Wet, Dense, Gray Poorly Graded Sand with Silt and Trace Gravel	SP-SM -	NP				12 16-18		
80		X	Wet, Dense, Gray Well Graded Sand with Silt	SW-SM -	NP				12 20-22		
85		X	Wet, Medium Dense, Reddish Brown and Gray Poorly Graded Sand with Silt and Gravel	SP-SM -	NP				4 9-16		
90		X	Wet, Medium Dense, Gray Silty Sand with Trace Gravel	SM -	NP				3 8-12		
95		X	Wet, Very Dense, Brown and Gray Poorly Graded Sand with Silt and Trace Gravel	SP-SM -	NP				13 21-31		
100		X	Wet, Dense, Brown and Gray Poorly Graded Sand with Silt and Some Gravel	SP-SM -	NP				8 20-27		
105		X	Wet, Dense, Brown Poorly Graded Sand with Silt and Gravel	SP-SM -	NP				7 17-17		

REMARKS:

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			SURFACE ELEVATION: 211.7								
110			Wet, Dense, Brown Poorly Graded Gravel with Silt and Sand	GP-GM -	NP				4 21-21		
			Wet, Medium Dense, Brown Poorly Graded Sand with Silt and Gravel	SP-SM	NP				4 10-19		
			Boring Terminated								
115											
120											
125											
130											
135											
140											

REMARKS:

ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.

BORING NO. 2
PAGE 1 OF 3

JOB NO. 020588 Jefferson County
JOB NAME: 11th Ave. - Harding Ave. (Hwy. 190) (Pine Bluff) (S)
Route 190 Section 5
STATION: 110+94
LOCATION: 26' Left of Construction Centerline
LOGGED BY: Troy Frazier

DATE: August 20, 2019
TYPE OF DRILLING: Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
			SURFACE ELEVATION: 213.7								
5			Moist, Very Loose, Reddish Brown Sandy Silt						4 2-2		
10			Moist, Loose, Reddish Brown Sandy Silt						1 4-4		
15											
20			Moist, Medium Stiff, Reddish Brown Clay						2 3-4		
25									3 2-4		
30			Wet, Medium Dense, Light Brown Silty Sand						4 7-8		
35									3 6-9		

REMARKS:

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40									8 11-13		
45			Wet, Medium Dense, Light Brown Silty Sand with Trace Gravel						5 5-17		
			Sandy Clay						3 8-15		
50			Wet, Medium Dense, Light Brown Silty Sand with Trace Gravel								
55			Wet, Medium Dense, Light Brown Silty Sand						6 7-10		
60			Wet, Dense, Reddish Brown and Gray Sand with Trace Gravel						11 16-16		
65			Wet, Medium Dense, Light Brown Sand with Trace Gravel						5 12-16		
70			Wet, Loose, Light Brown Silty Sand						5 3-3		

REMARKS:

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75			Wet, Dense, Brown Sand with Silt and Trace Gravel						9 11-20 11 15-21		
80			Wet, Medium Dense, Gray Sand with Trace Gravel						5 12-13		
85			Wet, Medium Dense, Gray Sand with Gravel with Occasional Clayey Sand Layers						4 13-12		
90			Wet, Medium Dense, Brown Sand with Silt and Trace Gravel						7 13-16		
95			Wet, Very Dense, Brown Sand with Trace Gravel						14 25-30		
100			Wet, Medium Dense, Brown Sand with Gravel						5 11-15		
105			Boring Terminated								

REMARKS: