

ARKANSAS DEPARTMENT OF TRANSPORTATION



SUBSURFACE INVESTIGATION

STATE JOB NO. 100841

FEDERAL AID PROJECT NO. NHPP-0028(45)

CACHE RIVER RELIEF STR. & APPRS. (S)

STATE HIGHWAY 228 SECTION 5

IN GREENE 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

ARDOT.gov | IDriveArkansas.com | Scott E. Bennett, P.E., Director

MATERIALS DIVISION

11301 West Baseline Road | P.O. Box 2261 | Little Rock, AR 72203-2261 | Phone: 501.569.2185 | Fax: 501.569.2368

November 29, 2018

TO: Mr. Rick Ellis, Bridge Engineer

SUBJECT: Job No. 100841
Cache River Relief Str. & Apprs. (S)
Greene County
Route 228 Section 5

Transmitted herewith are a brief summary of the geology and site conditions, summary of percent material passing #200 sieve and Atterberg Limits test results (for liquefaction susceptibility analysis), D50 scour 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 the Highway 228 Bridge, over the Cache River Relief, northeast of Sedgwick. The new bridge will be constructed on the existing alignment. A temporary detour bridge will be constructed upstream from the existing bridge. Two of the four requested borings, for the proposed bridge, were inaccessible due to steep slopes and high water levels. No borings were obtained in the vicinity of the temporary detour bridge due to conflicts with utilities and high water levels. The four borings that were not obtained were located at: 105+00 C.L. Const., 105+60 C.L. Const., 204+80 C.L. Temporary Bridge, and 205+70 C.L. Temporary Bridge. The two borings that were obtained were offset, due to traffic restrictions. The obtained borings are anticipated to represent uniform site conditions and should be adequate to design the proposed concrete filled shell pile foundations.

Embankment analyses included global stability with seismic design consideration utilizing a horizontal acceleration coefficient of 0.486, as provided by Bridge Design. FHWA publication NHI-10-025 Volume II indicates that a value of one-half the horizontal coefficient may be utilized in the design of reinforced embankments. Although this embankment will not be reinforced, only one-half of the horizontal acceleration coefficient, a value of 0.243, was utilized for this design. It is assumed that the operational classification for this bridge is "other", as defined in Section 3.10.5 of the AASHTO LRFD Bridge Design Specification, Seventh Edition, 2014. Since this is not a "critical" or "essential" bridge the large expense and additional time associated with removing existing embankments and reconstructing reinforced embankments, to satisfy full seismic consideration, is not recommended. The proposed embankment configuration provides for a satisfactory Factor of Safety for seismic and static conditions with the parameters discussed above. If you have any questions concerning these recommendations, please contact the Geotechnical Section.


Michael C. Benson
Materials Engineer

MCB:rpt:mlg
cc: State Construction Engineer - Master File Copy
District 10 Engineer
G.C. File

GEOLOGY AND SITE CONDITIONS

Job No. 100841

Cache River Relief Str. & Apprs. (S)

Greene County

Route 228 Section 5

Site Conditions

The existing Cache River Relief Bridge is a seven span structure constructed of a concrete deck supported by timber end walls, timber piling, timber caps, and 15 sets of timber beams. The guardrail is constructed of steel supported by timber posts. The remains of timber pilings from a previous structure are located under the existing bridge. Overhead power lines parallel the northwest side of the existing roadway.

Water flows under the bridge only during the flood stage of the Cache River, which is located approximately 0.34 miles southwest of the proposed job site. The area around the bridge consists of agricultural fields.

Site Geology

The project alignment is located over alluvial deposits (point bar deposits) (map symbol Hps) of the Cache River. Point bar deposits typically consist of gravels, sands, silts, clays, and mixtures of any and/or all of these. The alluvial deposits overlie valley train deposits. A valley train is a gently sloping plain underlain by glacial outwash and confined by valley walls. The valley train deposits are primarily composed of sand with some amount of gravel.

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, brown to gray sandy clay to loose to medium dense, clayey sand to very loose to loose, sand with silt . |
| 25 to 35 Feet: | Consists of wet, medium dense to dense, brown to gray sand with silt to sand with trace gravel . |
| 35 to 50 Feet: | Varies from wet, soft to medium stiff, gray sandy clay and silty clay to medium dense to dense, gray sand with clay . |
| 50 to 70 Feet: | Consists of wet, loose to dense, gray sandy silt , sand with clay , and sand with trace of gravel . |
| 70 to 120 Feet: | Consists of wet, medium dense to dense, gray sand and sand with silt . Many samples in this zone had a trace of gravel to some gravel. |
| 120 to 121.5 Feet: | Consists of wet, very dense, gray sand with gravel and sand with silt and some gravel . |

Lab Test Summary

Project Number: 100841
 Project Name: Cache River Relief Str. & Apprs. (S)

Station	Location	Depth (ft.)	Plastic Limit	Liquid Limit	Plasticity Index	% Passing No. 200
104+50	9' RT.	4.3	40	60	20	60
104+50	9' RT.	9.3	11	34	23	59
104+50	9' RT.	15	15	42	27	12
104+50	9' RT.	20	NP			41
104+50	9' RT.	25	NP			8
104+50	9' RT.	30	NP			6
104+50	9' RT.	35	NP			5
104+50	9' RT.	40	15	37	22	62
104+50	9' RT.	45	NP			11
104+50	9' RT.	50	NP			14
104+50	9' RT.	55	NP			11
104+50	9' RT.	60	NP			10
104+50	9' RT.	65	NP			53
104+50	9' RT.	70	NP			3
104+50	9' RT.	75	NP			3
104+50	9' RT.	80	NP			3
104+50	9' RT.	85	NP			5
104+50	9' RT.	90	NP			3
104+50	9' RT.	95	NP			4
104+50	9' RT.	100	NP			5
104+50	9' RT.	105	NP			3
104+50	9' RT.	110	NP			5
104+50	9' RT.	115	NP			4
104+50	9' RT.	120	NP			6

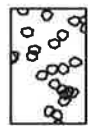
**D₅₀ AGGREGATE ANALYSIS
FOR SCOUR CALCULATIONS**

Job No. 100841					
Creek Name	Station	Sample Type	Location	Depth (FT)	Aggregate Size (D50) (IN)
Cache River Relief	106+10	Creek Bank	25' Rt. C.L. Construction	N/A	.0098

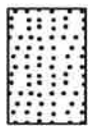
LEGEND

SOIL TYPES

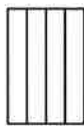
(SHOWN IN SYMBOL COLUMN)
(PREDOMINANT TYPE SHOWN HEAVY)



GRAVEL



SAND



SILT



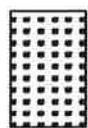
CLAY



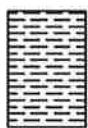
ORGANIC
MATTER

ROCK TYPES

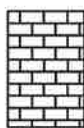
(SHOWN IN SYMBOL COLUMN)



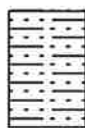
SANDSTONE



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 ^o Value	Density	*N ^o Value	Consistency	*N ^o Value	Consistency	*N ^o 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: $\frac{6}{8-9} \Rightarrow 8+9 = 17 \text{ blows/ft}$. The "N" Value corrected to 60% efficiency (N₆₀) 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. 100841 Greene County
JOB NAME: Cache River Relief Str. & Apprs. (S)
Route 228 Section 5
STATION: 104+50
LOCATION: 9' Right of Construction Centerline
LOGGED BY: Stanley Bates

DATE: February 27 and March 6, 2018
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 121.5

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.	% F C R	% R O D
			SURFACE ELEVATION: 257.0									
			Asphalt									
5			Moist, Medium Stiff, Gray Sandy Lean Clay	CL	14		20			$\frac{2}{3-3}$		
10				CL	11		34			$\frac{2}{3-5}$		
15			Wet, Medium Stiff, Gray Sandy Lean Clay	CL	15		27			$\frac{2}{4-4}$		
20				SC	NT					$\frac{1}{8-11}$		
25			Wet, Medium Dense, Brown Sand with Silt	SW-SM	NP					$\frac{8}{8-13}$		
30				SW-SM	NP					$\frac{7}{9-14}$		
35												

REMARKS:

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 1
PAGE 2 OF 4

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			SURFACE ELEVATION: 257.0									
40		X	Wet, Medium Dense, Brown Sand with Clay	SW-SC	NT					5 8-4		
45		X	Wet, Soft, Gray Sandy Lean Clay	CL	15		37			1 1-2		
50		X	Wet, Medium Dense, Gray Sand with Clay	SW-SC	NT					5 6-7		
55		X	Wet, Medium Dense, Gray Silty Sand	SM	NP					9 13-13		
60		X	Wet, Dense, Gray Sand with Silt	SW-SM	NP					10 18-20		
65		X	Wet, Loose, Gray Sand with Clay	SW-SC	NP					1 3-3		
70		X	Wet, Dense, Gray Sandy Silt	ML	NP					10 15-24		

REMARKS:

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 1
PAGE 3 OF 4

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			SURFACE ELEVATION: 257.0									
75			Wet, Medium Dense, Gray Sand	SW	NP					7 8-10		
80			Wet, Medium Dense, Gray Sand with Some Gravel	SW	NP					12 14-12		
85			Wet, Medium Dense, Gray Sand with Trace Gravel	SW	NP					6 9-16		
90			Wet, Dense, Gray Sand with Silt	SW-SM	NP					9 13-19		
95			Wet, Medium Dense, Gray Sand with Some Gravel	SW	NP					7 8-8		
100			Wet, Medium Dense, Gray Sand	SW	NP					7 9-13		
105			Wet, Dense, Gray Sand with Silt	SW-SM	NP					16 17-18		

REMARKS:

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 1
PAGE 4 OF 4

JOB NO. 100841 Greene County
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			SURFACE ELEVATION: 257.0									
110		X	Wet, Medium Dense, Gray Sand with Trace Organic Matter	SW	NP					8 13-14		
115		X	Wet, Medium Dense, Gray Sand with Silt with Trace Gravel	SW-SM	NP					9 10-13		
120		X	Wet, Medium Dense, Gray Sand with Gravel	SW	NP					12 12-13		
		X	Wet, Very Dense, Gray Sand with Silt and Some Gravel	SW-SM	NP					24 26-44		
125			Boring Terminated									
130												
135												
140												

REMARKS:

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 2
PAGE 1 OF 4

JOB NO. 100841 Greene County
JOB NAME: Cache River Relief Str. & Apprs. (S)
Route 228 Section 5
STATION: 106+10
LOCATION: 9' Right of Construction Centerline
LOGGED BY: Stanley Bates

DATE: March 6 and 7, 2018
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 121.5

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.	% T C R	% R O O D
			SURFACE ELEVATION: 257.1									
			Asphalt									
5			Moist, Very Loose, Brown Sand with Silt							2 2-2		
10			Moist, Medium Stiff, Gray Clay with Sand							1 2-3		
15			Wet, Loose, Gray Clayey Sand							2 3-6		
20			Wet, Loose, Gray Sand with Silt							3 4-4		
25			Wet, Dense, Gray Sand with Silt							9 17-18		
30			Wet, Dense, Gray Sand with Trace Gravel							7 12-21		
35												

REMARKS:

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 2
PAGE 2 OF 4

JOB NO. 100841 Greene County
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EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 121.5

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.	% T C R	% R Q D
			SURFACE ELEVATION: 257.1									
40			Wet, Soft, Gray Silty Clay							2 2-2		
45			Wet, Medium Stiff, Gray Sandy Clay							2 2-3		
50			Wet, Medium Stiff, Gray Silty Clay							1 2-3		
55			Wet, Medium Dense, Gray Sand with Silt							6 9-9		
60			Wet, Dense, Gray Sand with Silt							9 15-18		
65			Wet, Medium Dense, Gray Sand with Trace Gravel							10 12-17		
70			Wet, Dense, Sand with Trace Gravel							8 15-19		

REMARKS:

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 2
PAGE 3 OF 4

JOB NO. 100841 Greene County
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Route 228 Section 5
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EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 121.5

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			SURFACE ELEVATION: 257.1									
75		X	Wet, Medium Dense, Gray Sand							10 14-11		
80		X	Wet, Medium Dense, Gray Sand with Trace Gravel							5 10-15		
85		X	Wet, Medium Dense, Gray Sand							6 6-8		
90		X	Wet, Dense, Gray Sand							10 14-18		
95		X	Wet, Medium Dense, Gray Sand with Trace Gravel							12 10-14		
100		X	Wet, Medium Dense, Gray Sand with Silt and Some Gravel							12 11-10		
105		X	Wet, Medium Dense, Gray Sand with Trace Gravel							8 12-17		

REMARKS:

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 2
PAGE 4 OF 4

JOB NO. 100841 Greene County
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COMPLETION DEPTH: 121.5

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.	% T C R	% R Q D
			SURFACE ELEVATION: 257.1									
110		X	Wet, Medium Dense, Brown and Gray Sand with Some Gravel							11 14-12		
115		X	Wet, Medium Dense, Gray Sand with Silt and Trace Gravel							10 14-14		
120		X	Wet, Dense, Gray Silty Sand							10 17-20		
		X	Wet, Very Dense, Gray Sand with Gravel							18 24-43		
125			Boring Terminated									
130												
135												
140												

REMARKS:

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

May 11, 2017

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 100841
Cache River Relief Str. & Apprs. (S)
Route 228 Section 5
Greene County

Transmitted herewith is the requested Soil Survey, strength data and Resilient Modulus test results for the above referenced job. The project consists of replacing the bridge crossing the Cache River Relief on Highway 228. Samples were obtained in the existing travel lanes and ditch line. There were no paved shoulders within the project limits.

Based on laboratory results of samples obtained, the subgrade soils consist primarily of highly plastic clay with sand. Cross sections are not currently available, but it is assumed the construction grade line will closely match that of the existing roadway. The current detour alignment crosses the remnants of a silted-in oxbow lake. Embankment construction could be extremely difficult at this location. It is recommended that the detour be relocated to the South side of the existing bridge. There were no slide areas observed within the project limits.

Additional earthwork recommendations will be made upon request when plans are further developed and cross sections are available.

Listed below is the additional information requested for use in developing the plans:

1. The Qualified Products List (QPL) indicates that Aggregate Base Course (Class CL-7) is available from commercial producers located in the vicinity of Powhatton.
2. Asphalt Concrete Hot Mix

Type	Asphalt Cement %	Mineral Aggregate %
Surface Course	5.2	94.8
Binder Course	4.1	95.9
Base Course	3.9	96.1


Michael C. Benson
Materials Engineer

MCB:pt:bjj
Attachment

cc: State Constr. Eng. – Master File Copy
District 10 Engineer
System Information and Research Div.
G. C. File



Google earth

miles 200
km 300



ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION
MICHAEL BENSON, MATERIALS ENGINEER
*** SOIL SURVEY STRENGTH TEST REPORT ***

DATE = 05/04/2017
JOB NUMBER = 100841

SEQUENCE NO. - 1
MATERIAL CODE - SSRV
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 28
DISTRICT NO. - 10

JOB NAME - CACHE RIVER RELIEF STR. & APPRS.(S)

* STATION LIMITS R-VALUE AT 240 psi *

BEGIN JOB - END OB LESS THAN 5

RESILIENT MODULUS
STA. 101+20 5967

REMARKS -
-

AASHTO TESTS : T190

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION**

**AASHTO T 307-99 - RESILIENT MODULUS OF SUBGRADE SOILS
RECOMPACTED SAMPLES**

Job No.	100841	Material Code	SSRVPS
Date Sampled:	3/28/17	Station No.:	101+20
Date Tested:	May 3, 2017	Location:	18RT
Name of Project:	CACHE RIVER RELIEF STR. & APPRS. (S)		
County:	Code: 28	Name: GREENE	
Sampled By:	THORNTON/TAYLOR		
Lab No.:	20171239	Depth:	0-5
Sample ID:	RV338	AASHTO Class:	A-6(13)
LATITUDE:		Material Type (1 or 2):	2
		LONGITUDE:	

1. Testing Information:

Preconditioning - Permanent Strain > 5% (Y=Yes or N= No)	N
Testing - Permanent Strain > 5% (Y=Yes or N=No)	N
Number of Load Sequences Completed (0-15)	15

2. Specimen Information:

Specimen Diameter (in):	
Top	3.94
Middle	3.93
Bottom	3.93
Average	3.93
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.01
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.01
Initial Area, Ao (sq. in):	12.08
Initial Volume, AoLo (cu. in):	96.74

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	3077.40
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4. Soil Properties:

Optimum Moisture Content (%):	17.1
Maximum Dry Density (pcf):	105.8
95% of MDD (pcf):	100.5
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3077.40
Compaction Moisture content (%):	17.2
Compaction Wet Density (pcf):	121.21
Compaction Dry Density (pcf):	103.42
Moisture Content After Mr Test (%):	17.2

6. Quick Shear Test (Y=Yes, N=No, N/A=Not Applicable):

#VALUE!

7. Resilient Modulus, Mr:

10140(Sc)^{-0.27730(S3)}^{0.12161}

8. Comments

9. Tested By:

GW

Date: May 3, 2017

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION**

**AAASHTO T 307-99 - RESILIENT MODULUS OF SUBGRADE SOILS
RECOMPACTED SAMPLES**

Job No. 100841 **Material Code** SSRVPS
Date Sampled: 3/28/17 **Station No.:** 101+20
Date Tested: May 3, 2017 **Location:** 18RT

Name of Project: CACHE RIVER RELIEF STR. & APPRS. (S)
County: Code: 28 **Name:** GREENE

Sampled By: THORNTON/TAYLOR **Depth:** 0-5
Lab No.: 20171239 **AAASHTO Class:** A-6(13)
Sample ID: RV338 **Material Type (1 or 2):** 2
LATITUDE: **LONGITUDE:**

PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Actual Applied Max. Axial Load		Actual Applied Cyclic Load		Actual Applied Max. Axial Stress	Actual Applied Cyclic Stress	Actual Applied Contact Stress	Average Recov Def. LVDT 1 and 2	Resilient Strain	Resilient Modulus
			P _{max} lbs	P _{cyclic} lbs	P _{cyclic} lbs	P _{contact} lbs						
DESIGNATION	S ₃	S _{cyclic} psi	P _{max} lbs	P _{cyclic} lbs	P _{cyclic} lbs	P _{contact} lbs	S _{max} psi	S _{cyclic} psi	S _{contact} psi	H _{avg} in	ε _r in/in	M _r psi
Sequence 1	6.0	2.0	25.0	22.2	2.8	2.8	2.1	1.8	0.2	0.00140	0.00018	10,470
Sequence 2	6.0	4.0	46.8	44.0	2.8	2.8	3.9	3.6	0.2	0.00298	0.00037	9,794
Sequence 3	6.0	6.0	68.6	65.0	3.6	3.6	5.7	5.4	0.3	0.00508	0.00063	8,481
Sequence 4	6.0	8.0	90.7	84.7	6.0	6.0	7.5	7.0	0.5	0.00777	0.00097	7,237
Sequence 5	6.0	10.0	112.0	103.6	8.4	8.4	9.3	8.6	0.7	0.01094	0.00137	6,284
Sequence 6	4.0	2.0	24.9	22.1	2.8	2.8	2.1	1.8	0.2	0.00154	0.00019	9,521
Sequence 7	4.0	4.0	46.4	43.6	2.8	2.8	3.8	3.6	0.2	0.00333	0.00042	8,688
Sequence 8	4.0	6.0	67.2	64.4	2.8	2.8	5.6	5.3	0.2	0.00554	0.00069	7,709
Sequence 9	4.0	8.0	89.8	84.7	5.1	5.1	7.4	7.0	0.4	0.00806	0.00101	6,974
Sequence 10	4.0	10.0	111.7	104.3	7.5	7.5	9.3	8.6	0.6	0.01107	0.00138	6,245
Sequence 11	2.0	2.0	24.9	22.2	2.7	2.7	2.1	1.8	0.2	0.00167	0.00021	8,789
Sequence 12	2.0	4.0	46.4	43.7	2.8	2.8	3.8	3.6	0.2	0.00360	0.00045	8,034
Sequence 13	2.0	6.0	67.0	64.3	2.7	2.7	5.6	5.3	0.2	0.00591	0.00074	7,215
Sequence 14	2.0	8.0	88.6	84.5	4.1	4.1	7.3	7.0	0.3	0.00852	0.00106	6,584
Sequence 15	2.0	10.0	110.4	103.8	6.5	6.5	9.1	8.6	0.5	0.01154	0.00144	5,967

TESTED BY _____ DATE May 3, 2017
 REVIEWED BY _____ DATE _____

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION

AASHTO T 307-99 - RESILIENT MODULUS OF SUBGRADE SOILS
RECOMPACTED / THINWALL TUBE SAMPLES

Job No.	100841	Material Code	SSRVPS
Date Sampled:	3/28/17	Station No.:	101+20
Date Tested:	May 3, 2017	Location:	18RT
Name of Project:	CACHE RIVER RELIEF STR. & APPRS. (S)		
County:	Code: 28	Name:	GREENE
Sampled By:	THORNTON/TAYLOR		
Lab No.:	20171239	Depth:	0-5
Sample ID:	RV338	AASHTO Class:	A-6(13)
LATITUDE:		Material Type (1 or 2):	2
		LONGITUDE:	

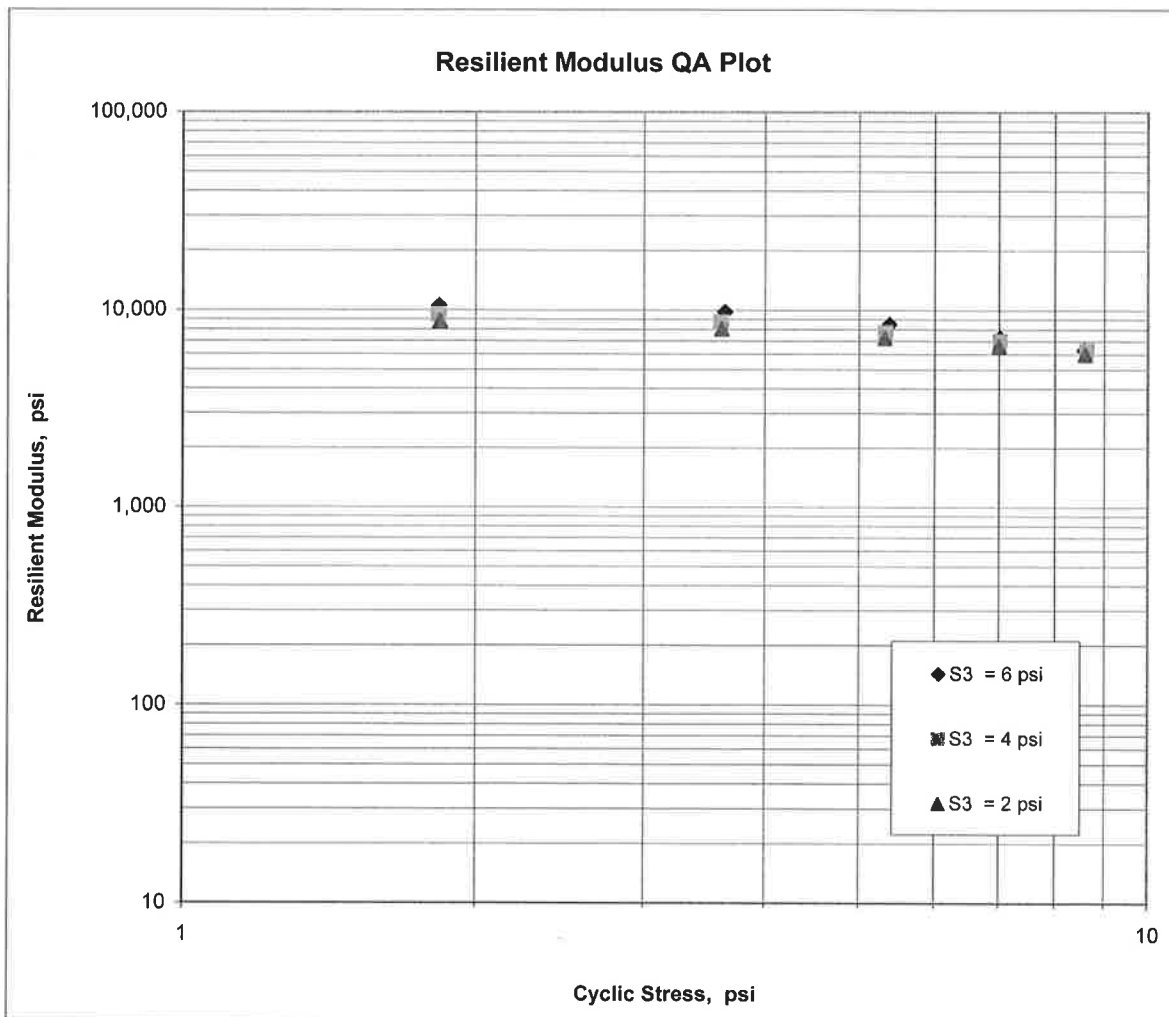
$$M_R = K_1 (S_c)^{K_2} (S_3)^{K_5}$$

$$K_1 = 10,140$$

$$K_2 = -0.27730$$

$$K_5 = 0.12161$$

$$R^2 = 0.90$$



ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

*** SOIL SURVEY / PAVEMENT SOUNDING TEST REPORT ***

DATE	-	05/01/17	SEQUENCE NO.	-	1
JOB NUMBER	-	100841	MATERIAL CODE	-	SSRVPS
FEDERAL AID NO.	-	TO BE ASSIGNED	SPEC. YEAR	-	2014
PURPOSE	-	SOIL SURVEY SAMPLE	SUPPLIER ID.	-	1
SPEC. REMARKS	-	NO SPECIFICATION CHECK	COUNTY/STATE	-	28
SUPPLIER NAME	-	STATE	DISTRICT NO.	-	10
NAME OF PROJECT	-	CACHE RIVER RELIEF STR. & APPRS. (S)			
PROJECT ENGINEER	-	NOT APPLICABLE			
PIT/QUARRY	-	ARKANSAS			
LOCATION	-	GREENE, COUNTY	DATE SAMPLED	-	03/28/17
SAMPLED BY	-	THORNTON/TAYLOR	DATE RECEIVED	-	03/31/17
SAMPLE FROM	-	TEST HOLE	DATE TESTED	-	05/01/17
MATERIAL DESC.	-	SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS			

LAB NUMBER	-	20171235	-	20171236	-	20171237	
SAMPLE ID	-	S334	-	S335	-	S336	
TEST STATUS	-	INFORMATION ONLY	-	INFORMATION ONLY	-	INFORMATION ONLY	
STATION	-	101+00	-	101+00	-	109+00	
LOCATION	-	06 RT	-	18 RT	-	06 LT	
DEPTH IN FEET	-	0-5	-	0-5	-	0-5	
MAT'L COLOR	-	GRAY	-	GRAY	-	GRAY	
MAT'L TYPE	-	-	-	-	-	-	
LATITUDE DEG-MIN-SEC	-	35 59 14.90	-	35 59 14.90	-	35 59 19.70	
LONGITUDE DEG-MIN-SEC	-	90 50 33.10	-	90 50 33.10	-	90 50 25.40	
% PASSING	2 IN.	-	-	-	-	-	
	1 1/2 IN.	-	-	-	-	-	
	3/4 IN.	-	-	-	-	-	
	3/8 IN.	-	100	-	100	-	100
	NO. 4	-	97	-	98	-	99
	NO. 10	-	96	-	97	-	98
	NO. 40	-	93	-	94	-	95
	NO. 80	-	84	-	86	-	87
	NO. 200	-	65	-	66	-	68
LIQUID LIMIT	-	44	-	38	-	40	
PLASTICITY INDEX	-	30	-	25	-	26	
AASHTO SOIL	-	A-7-6 (17)	-	A-6 (14)	-	A-6 (15)	
UNIFIED SOIL	-	-	-	-	-	-	
% MOISTURE CONTENT	-	21.8	-	25.9	-	23.9	
ACHMSC	(IN)	-	6.0W	-	--	-	5.5W
SAND ASPHALT	(IN)	-	1.5	-	--	-	1.5
BST	(IN)	-	1.0	-	--	-	.25
AGG.BASE CRS CL-7	(IN)	-	5.0	-	--	-	5.0
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-
	-	-	-	-	-	-	-

REMARKS - W=MULTIPLE LAYERS
-
-
-

AASHTO TESTS : T24 T88 T89 T90 T265
:

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

*** SOIL SURVEY / PAVEMENT SOUNDING TEST REPORT ***

DATE	- 05/01/17	SEQUENCE NO.	- 2
JOB NUMBER	- 100841	MATERIAL CODE	- SSRVPS
FEDERAL AID NO.	- TO BE ASSIGNED	SPEC. YEAR	- 2014
PURPOSE	- SOIL SURVEY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	- NO SPECIFICATION CHECK	COUNTY/STATE	- 28
SUPPLIER NAME	- STATE	DISTRICT NO.	- 10
NAME OF PROJECT	- CACHE RIVER RELIEF STR. & APPRS. (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- GREENE, COUNTY	DATE SAMPLED	- 03/28/17
SAMPLED BY	- THORNTON/TAYLOR	DATE RECEIVED	- 03/31/17
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 05/01/17
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAB NUMBER	- 20171238	-	-
SAMPLE ID	- S337	-	-
TEST STATUS	- INFORMATION ONLY	-	-
STATION	- 109+00	-	-
LOCATION	- 18 LT	-	-
DEPTH IN FEET	- 0-5	-	-
MAT'L COLOR	- GRAY	-	-
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 35 59 19.70	-	-
LONGITUDE DEG-MIN-SEC	- 90 50 25.50	-	-
% PASSING	2 IN.	-	-
	1 1/2 IN.	-	-
	3/4 IN.	-	-
	3/8 IN.	- 100	-
	NO. 4	- 99	-
	NO. 10	- 98	-
	NO. 40	- 96	-
	NO. 80	- 88	-
	NO. 200	- 68	-
LIQUID LIMIT	- 44	-	-
PLASTICITY INDEX	- 29	-	-
AASHTO SOIL	- A-7-6(17)	-	-
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 23.3	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-

REMARKS - W=MULTIPLE LAYERS

AASHTO TESTS : T24 T88 T89 T90 T265

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

*** SOIL SURVEY / PAVEMENT SOUNDING TEST REPORT ***

DATE	- 05/01/17	SEQUENCE NO.	- 1
JOB NUMBER	- 100841	MATERIAL CODE	- RV
FEDERAL AID NO.	- TO BE ASSIGNED	SPEC. YEAR	- 2014
PURPOSE	- SOIL SURVEY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	- NO SPECIFICATION CHECK	COUNTY/STATE	- 28
SUPPLIER NAME	- STATE	DISTRICT NO.	- 10
NAME OF PROJECT	- CACHE RIVER RELIEF STR. & APPRS. (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- GREENE, COUNTY	DATE SAMPLED	- 03/28/17
SAMPLED BY	- THORNTON/TAYLOR	DATE RECEIVED	- 03/31/17
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 05/01/17
MATERIAL DESC.	- SOIL SURVEY - RESISTANCE R-VALUE ACTUAL RESULTS		

LAB NUMBER	- 20171239	-	-
SAMPLE ID	- RV338	-	-
TEST STATUS	- INFORMATION ONLY	-	-
STATION	- 101+20	-	-
LOCATION	- 18 RT	-	-
DEPTH IN FEET	- 0-5	-	-
MAT'L COLOR	- GRAY	-	-
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 35 59 14.90	-	-
LONGITUDE DEG-MIN-SEC	- 90 50 33.00	-	-
% PASSING	2 IN.	-	-
	1 1/2 IN.	-	-
	3/4 IN.	- 100	-
	3/8 IN.	- 94	-
	NO. 4	- 92	-
	NO. 10	- 91	-
	NO. 40	- 88	-
	NO. 80	- 81	-
	NO. 200	- 65	-
LIQUID LIMIT	- 37	-	-
PLASTICITY INDEX	- 25	-	-
AASHTO SOIL	- A-6(13)	-	-
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-

REMARKS - W=MULTIPLE LAYERS

AASHTO TESTS : T24 T88 T89 T90 T265

JOB: 100841

Arkansas State Highway Transportation Department

JOB NAME: CACHE RIVER RELIEF STR. & APPRS.(S)

Materials Division

COUNTY NO. 28 DATE TESTED 5/1/2017

Michael Benson, Materials Engineer

STA.#	LOC.	DEPTH	COLOR	#4 #10 #40 #80 #200					L.L.	P.I.	SOIL CLASS	LAB #:	%MOISTURE
				S	I	E	V	E					
101+20	18 RT	0-5	GRAY	92	91	88	81	65	37	25	A-6(13)	RV338	
101+00	06 RT	0-5	GRAY	97	96	93	84	65	44	30	A-7-6(17)	S334	21.8
101+00	18 RT	0-5	GRAY	98	97	94	86	66	38	25	A-6(14)	S335	25.9
109+00	06 LT	0-5	GRAY	99	98	95	87	68	40	26	A-6(15)	S336	23.9
109+00	18 LT	0-5	GRAY	99	98	96	88	68	44	29	A-7-6(17)	S337	23.3

comments: W=MULTIPLE LAYERS

Wednesday, May 10, 2017

JOB: 100841

Arkansas State Highway Transportation Department

DATE TESTED

JOB NAME: CACHE RIVER RELIEF STR. & APPRS.(S)

Materials Division

5/1/2017

COUNTY NO. 28

Michael Benson, Materials Engineer

STA.# LOC.

PAVEMENT SOUNDINGS

101+00	06 RT	ACHMSC	SAND ASPHALT	BST	AGG.BASE CRS CL-7
		6.0W	1.5	1.0	5.0
101+00	18 RT	ACHMSC	SAND ASPHALT	BST	AGG.BASE CRS CL-7
		--	--	--	--
109+00	06 LT	ACHMSC	SAND ASPHALT	BST	AGG.BASE CRS CL-7
		5.5W	1.5	.25	5.0

comments: W=MULTIPLE LAYERS