

ARKANSAS DEPARTMENT OF TRANSPORTATION



**SUBSURFACE INVESTIGATION**

STATE JOB NO. 100842

FEDERAL AID PROJECT NO. NHPP-0011(44)

LITTLE CACHE RIVER DITCH STR. & APPRS. (S)

STATE HIGHWAY 141 SECTION 6

IN CLAY 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

December 12, 2018

**TO:** Mr. Rick Ellis, Bridge Engineer

**SUBJECT:** Job No. 100842  
Little Cache River Ditch Str. & Apprs. (S)  
Clay County  
Route 141 Section 6

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 141 Bridge, over the Little Cache River Ditch, around McDougal. The new bridge will be constructed on the existing alignment and a temporary detour bridge will be constructed to the east of the existing, to maintain traffic during construction. Two of the five requested borings for the proposed bridge were inaccessible due to steep slopes and high water levels in the channel. No borings were performed in the vicinity of the temporary detour bridge, due to conflicts with utilities and high water levels in the channel. The five borings that were not obtained were located at: 105+64 20' RT of C.L. Construction and 105+95 20' RT of C.L. Construction, 106+26 20' LT of C.L. Construction, 105+70 C.L. Temporary Bridge, and 106+70 C.L. Temporary Bridge. The two borings that were obtained had to be 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 0.487, as provided by Bridge 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 with significant ground improvement, to satisfy seismic consideration, is not recommended. Embankment displacement is expected to occur in a large seismic event. The proposed embankment configuration provides for a satisfactory Factor of Safety for static conditions. 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



ARKANSAS DEPARTMENT OF TRANSPORTATION

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MATERIALS DIVISION

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

September 20, 2017

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 100842
Little Cache River Ditch Strs. & Apprs. (S)
Route 141 Section 6
Clay 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 Little Cache River Ditch on Highway 141. Samples were obtained in the existing travel lanes and ditch line.

Based on laboratory results of samples obtained, the subgrade soils consist primarily of low plasticity clayey sands with varying amounts of gravel. The construction grade line is approximately four feet above the existing roadway; cross sections are not currently available. The subgrade soils are expected to provide a stable working platform with conventional processing, if the weather is favorable during construction. If embankment is to be placed within the existing ditch line the soft unstable organic material will need to be undercut prior to construction (anticipated to be no more than two feet). The undercut and embankment may be constructed with locally available unspecified material.

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 Pochahontas.
2. Asphalt Concrete Hot Mix

Table with 3 columns: Type, Asphalt Cement %, Mineral Aggregate %. Rows include Surface Course, Binder Course, and Base Course.

Handwritten signature of Michael C. Benson, Materials Engineer

MCB:pt:bjj
Attachment

cc: State Constr. Eng. - Master File Copy
District 9 Engineer
System Information and Research Div.
G. C. File

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

DATE - 09/05/2017  
JOB NUMBER - 100842

SEQUENCE NO. - 1  
MATERIAL CODE - SSRV  
SPEC. YEAR - 2014  
SUPPLIER ID. - 1  
COUNTY/STATE - 11  
DISTRICT NO. - 10

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

\*\*\*\*\*  
\* STATION LIMITS R-VALUE AT 240 psi \*  
\*\*\*\*\*

BEGIN JOB - END JOB 12

RESILIENT MODULUS  
STA. 104+30 6353

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REMARKS -

AASHTO TESTS : T190

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

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

<b>Job No.</b>	100842	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	8/2/2017	<b>Station No.:</b>	104+30
<b>Date Tested:</b>	August 31, 2017	<b>Location:</b>	23'RT
<b>Name of Project:</b>	Little Cache River Ditch STR. & APPR. (S)		
<b>County:</b>	<b>Code:</b> 11	<b>Name:</b>	CLAY
<b>Sampled By:</b>	Thornton/Bates	<b>Depth:</b>	0-5
<b>Lab No.:</b>	20172568	<b>AASHTO Class:</b>	A-6(3)
<b>Sample ID:</b>	RV529	<b>Material Type (1 or 2):</b>	2
<b>LATITUDE:</b>		<b>LONGITUDE:</b>	

**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	3.95
Middle	3.94
Bottom	3.94
Average	3.94
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.02
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.02
Initial Area, Ao (sq. in):	12.14
Initial Volume, AoLo (cu. in):	97.35

**3. Soil Specimen Weight:**

Weight of Wet Soil Used (g):	3255.20
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**4. Soil Properties:**

Optimum Moisture Content (%):	13.2
Maximum Dry Density (pcf):	115.4
95% of MDD (pcf):	109.6
In-Situ Moisture Content (%):	N/A

**5. Specimen Properties:**

Wet Weight (g):	3255.20
Compaction Moisture content (%):	13.3
Compaction Wet Density (pcf):	127.40
Compaction Dry Density (pcf):	112.45
Moisture Content After Mr Test (%):	13.2

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

#VALUE!

**7. Resilient Modulus, Mr:**

7532(S<sub>c</sub>)<sup>-0.21</sup>106(S<sub>3</sub>)<sup>0.37276</sup>

**8. Comments**

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**9. Tested By:**

B.H. \_\_\_\_\_

**Date:** August 31, 2017

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

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

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<b>County:</b>	Code: 11 CLAY	<b>AASHTO Class:</b>	A-6(3)
<b>Sampled By:</b>	Thornton/Bates	<b>Material Type (1 or 2):</b>	2
<b>Lab No.:</b>	20172568	<b>LONGITUDE:</b>	
<b>Sample ID:</b>	RV529		
<b>LATITUDE:</b>			

PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Actual Applied Max. Axial Load	Actual Applied Cyclic Load	Actual Applied Contact 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
	S <sub>3</sub> psi	S <sub>cyclic</sub> psi	P <sub>max</sub> lbs	P <sub>cyclic</sub> lbs	P <sub>contact</sub> lbs	S <sub>max</sub> psi	S <sub>cyclic</sub> psi	S <sub>contact</sub> psi	H <sub>avg</sub> in	ε <sub>r</sub> in/in	M <sub>r</sub> psi
Sequence 1	6.0	2.0	25.1	22.3	2.8	2.1	1.8	0.2	0.00114	0.00014	12,906
Sequence 2	6.0	4.0	47.3	44.5	2.8	3.9	3.7	0.2	0.00246	0.00031	11,975
Sequence 3	6.0	6.0	69.9	66.3	3.6	5.8	5.5	0.3	0.00403	0.00050	10,875
Sequence 4	6.0	8.0	93.4	87.4	6.0	7.7	7.2	0.5	0.00601	0.00075	9,598
Sequence 5	6.0	10.0	116.6	108.1	8.4	9.6	8.9	0.7	0.00810	0.00101	8,822
Sequence 6	4.0	2.0	24.9	22.2	2.8	2.1	1.8	0.2	0.00138	0.00017	10,632
Sequence 7	4.0	4.0	46.8	44.1	2.8	3.9	3.6	0.2	0.00305	0.00038	9,546
Sequence 8	4.0	6.0	68.0	65.3	2.7	5.6	5.4	0.2	0.00497	0.00062	8,680
Sequence 9	4.0	8.0	91.4	86.4	5.1	7.5	7.1	0.4	0.00700	0.00087	8,149
Sequence 10	4.0	10.0	115.2	107.8	7.4	9.5	8.9	0.6	0.00907	0.00113	7,853
Sequence 11	2.0	2.0	24.7	22.0	2.7	2.0	1.8	0.2	0.00169	0.00021	8,612
Sequence 12	2.0	4.0	45.8	43.0	2.7	3.8	3.5	0.2	0.00381	0.00047	7,468
Sequence 13	2.0	6.0	66.3	63.6	2.7	5.5	5.2	0.2	0.00611	0.00076	6,878
Sequence 14	2.0	8.0	88.4	84.3	4.2	7.3	6.9	0.3	0.00849	0.00106	6,558
Sequence 15	2.0	10.0	111.6	105.0	6.6	9.2	8.6	0.5	0.01092	0.00136	6,353

TESTED BY \_\_\_\_\_ DATE August 31, 2017  
 REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

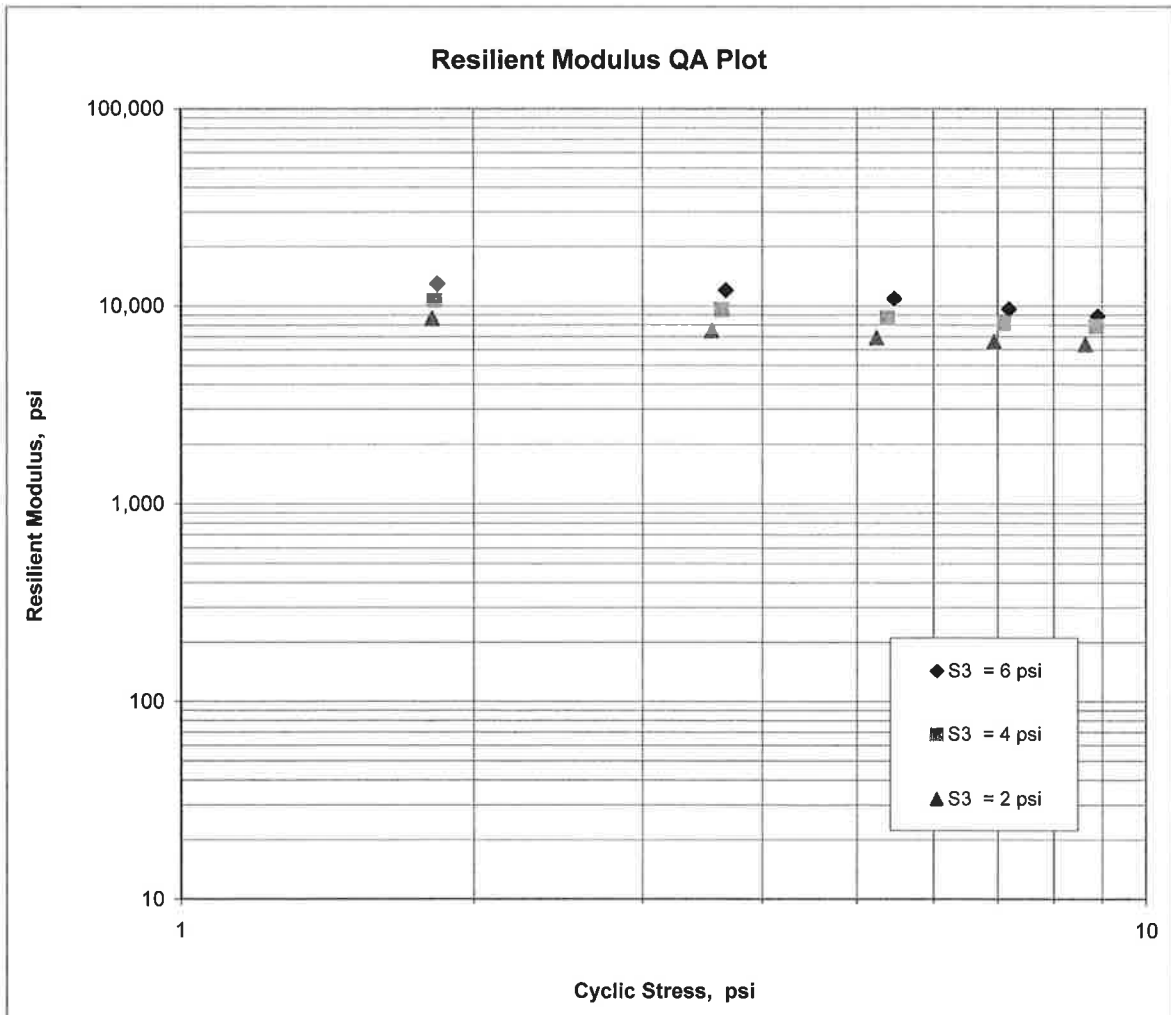
**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT  
MATERIALS DIVISION**

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

<b>Job No.</b>	100842	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	8/2/2017	<b>Station No.:</b>	104+30
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<b>County:</b>	<b>Code:</b> 11	<b>Name:</b>	CLAY
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<b>Sample ID:</b>	RV529	<b>Material Type (1 or 2):</b>	2
<b>LATITUDE:</b>		<b>LONGITUDE:</b>	

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

$K_1 = \underline{7,532}$   
 $K_2 = \underline{-0.21106}$   
 $K_5 = \underline{0.37276}$   
 $R^2 = \underline{0.98}$



**JOB: 100842**

**Arkansas State Highway Transportation Department**

**JOB NAME: LITTLE CACHE RIVER DITCH STR. & APPRS. (S)**

**Materials Division**

**COUNTY NO. 11 DATE TESTED 9/5/2017**

**Michael Benson, Materials Engineer**

STA.#	LOC.	DEPTH	COLOR						L.L.	P.I.	SOIL CLASS	LAB #:	%MOISTURE
				#4	#10	#40	#80	#200					
				S	I	E	V	E	S				
104+30	23 RT	0-5	BR/GR	84	77	67	54	42	30	17	A-6(3)	RV529	
102+00	06 RT	0-5	BROWN	92	89	86	69	56	22	09	A-4(2)	S525	13.6
102+00	18 RT	0-5	BROWN	99	99	98	67	45	ND	NP	A-4(0)	S526	17.3
110+00	06 LT	0-5	GRAY	97	93	88	81	64	28	15	A-6(7)	S527	15
110+00	18 LT	0-5	BR/GR	96	93	84	72	48	24	09	A-4(1)	S528	20.9



**JOB:** 100842  
**DATE TESTED**  
9/5/2017

**Arkansas State Highway Transportation Department**  
**Materials Division**

**Michael Benson, Materials Engineer**

**JOB NAME:** LITTLE CACHE RIVER DITCH STR. & APPRS. (S)

**COUNTY NO.** 11

**PAVEMENT SOUNDINGS**

STA.#	LOC.	ACHMSC	ACHMBC	AGG.BASE CRS CL-7
102+00	06 RT	3.0W	1.25	6.0
102+00	18 RT	---	ACHMBC	AGG.BASE CRS CL-7
110+00	06 LT	2.5W	1.25X	7.0

**comments:** W=MULTIPLE LAYERS, X=STRIPPED





