

ARKANSAS DEPARTMENT OF TRANSPORTATION



SUBSURFACE INVESTIGATION

STATE JOB NO. 090431

FEDERAL AID PROJECT NO. NHPP-0004(86)

LITTLE SUGAR CREEK STR. & APPRS. (S)

STATE HIGHWAY 94 SECTION 2

IN BENTON 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 STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

June 22, 2017

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 090431
Little Sugar Creek Str. & Apprs. (S)
Route 94 Section 2
Benton 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 Little Sugar Creek on Highway 94. Samples were obtained in the existing travel lanes, ditch line and along the new alignment. Locations were measured from centerline of the existing roadway. There were no paved shoulders within the project limits.

Based on laboratory results of samples obtained, the subgrade soils consist primarily of low plasticity cherty clay. Cross sections are not currently available, but it is assumed the construction grade line will closely match that of the existing roadway. The subgrade soils are expected to provide a stable working platform with conventional processing, if the weather is favorable during construction. Rock was encountered at stations 101+00 6 feet right of centerline at a depth of 3.5 feet, and 121+00 6 feet left of centerline at a depth of 0.6 feet.

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 Avoca.
2. Asphalt Concrete Hot Mix

<u>Type</u>	<u>Asphalt Cement %</u>	<u>Mineral Aggregate %</u>
Surface Course	5.5	94.5
Binder Course	4.5	95.5
Base Course	4.1	95.9


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 - 06/15/2017
JOB NUMBER - 090431

SEQUENCE NO. - 1
MATERIAL CODE - SSRV
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 04
DISTRICT NO. - 09

JOB NAME - LITTLE SUGAR CREEK STR. & APPRS. (S)

* STATION LIMITS R-VALUE AT 240 psi *

BEGIN JOB - END JOB 15

RESILIENT MODULUS
STA. 121+00 6789

REMARKS -

AASHTO TESTS : T190

JOB: 090431

Arkansas State Highway Transportation Department

JOB NAME: LITTLE SUGAR CREEK STR. & APPRS. (S)

Materials Division

COUNTY NO. 4 DATE TESTED 6/6/2017

Michael Benson, Materials Engineer

STA.#	LOC.	DEPTH	COLOR	#4 #10 #40 #80 #200					L.L.	P.I.	SOIL CLASS	LAB #:	%MOISTURE
				S	T	E	V	E					
121+00	06 LT	0-.62	BROWN										
121+00	21 LT	0-5	BROWN	80	73	65	60	54	34	13	A-6(8)	RV390	
101+00	06 RT	0-3.52	BROWN	91	79	72	69	65	23	6	A-4(1)	S385	19.6
101+00	18 RT	0-5	BROWN	89	80	68	61	57	29	9	A-4(3)	S386	24.1
108+00	18 LT	0-5	BROWN	95	91	87	84	80	28	11	A-6(7)	S387	24.3
117+00	18 LT	0-5	BROWN	92	87	80	73	63	29	8	A-4(3)	S388	17.2
121+00	18 LT	0-5	BROWN	90	78	61	56	50	31	10	A-4(2)	S389	18.6

comments: W=MULTIPLE LAYERS

Monday, June 19, 2017

JOB: 090431

**Arkansas State Highway Transportation Department
Materials Division**

DATE TESTED
6/6/2017

JOB NAME: LITTLE SUGAR CREEK STR. & APPRS. (S)

COUNTY NO. 4

Michael Benson, Materials Engineer

STA.# LOC.

PAVEMENT SOUNDINGS

101+00	06 RT	ACHMSC 5.25WX	ACHMBC 1.25	AGG BASE CRS CL-7 7.0
101+00	18 RT	ACHMSC	ACHMBC	AGG BASE CRS CL-7
108+00	18 LT	ACHMSC	ACHMBC	AGG BASE CRS CL-7
117+00	18 LT	ACHMSC	ACHMBC	AGG BASE CRS CL-7
121+00	06 LT	ACHMSC 4.5W	ACHMBC 2.0	AGG BASE CRS CL-7 6.0
121+00	18 LT	ACHMSC	ACHMBC	AGG BASE CRS CL-7

comments: W=MULTIPLE LAYERS

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

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE	- 06/19/17	SEQUENCE NO.	- 1
JOB NUMBER	- 090431	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	- 04
SUPPLIER NAME	- STATE	DISTRICT NO.	- 09
NAME OF PROJECT	- LITTLE SUGAR CREEK STR. & APPRS. (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- BENTON COUNTY	DATE SAMPLED	- 05/16/17
SAMPLED BY	- THORNTON/TAYLOR	DATE RECEIVED	- 05/22/17
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 06/06/17
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAB NUMBER	- 20171671	- 20171672	- 20171673
SAMPLE ID	- S385	- S386	- S387
TEST STATUS	- INFORMATION ONLY	- INFORMATION ONLY	- INFORMATION ONLY
STATION	- 101+00	- 101+00	- 108+00
LOCATION	- 06 RT	- 18 RT	- 18 LT
DEPTH IN FEET	- 0-3.52	- 0-5	- 0-5
MAT'L COLOR	- BROWN	- BROWN	- BROWN
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 36 25 1.80	- 36 25 1.90	- 36 25 8.60
LONGITUDE DEG-MIN-SEC	- 94 07 12.40	- 94 07 12.20	- 94 07 11.30
% PASSING			
2 IN.	-	-	-
1 1/2 IN.	-	-	-
3/4 IN.	- 100	- 100	-
3/8 IN.	- 97	- 98	- 100
NO. 4	- 91	- 89	- 95
NO. 10	- 79	- 80	- 91
NO. 40	- 72	- 68	- 87
NO. 80	- 69	- 61	- 84
NO. 200	- 65	- 57	- 80
LIQUID LIMIT	- 23	- 29	- 28
PLASTICITY INDEX	- 6	- 9	- 11
AASHTO SOIL	- A-4 (1)	- A-4 (3)	- A-6 (7)
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 19.6	- 24.1	- 24.3
ACHMSC (IN)	- 5.25WX	- ---	- ---
ACHMBC (IN)	- 1.25	- ---	- ---
AGG BASE CRS CL-7 (IN)	- 7.0	- ---	- ---
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-

REMARKS - W=MULTIPLE LAYERS, X=STRIPPED

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

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE	- 06/19/17	SEQUENCE NO.	- 2
JOB NUMBER	- 090431	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	- 04
SUPPLIER NAME	- STATE	DISTRICT NO.	- 09
NAME OF PROJECT	- LITTLE SUGAR CREEK STR. & APPRS. (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- BENTON COUNTY	DATE SAMPLED	- 05/16/17
SAMPLED BY	- THORNTON/TAYLOR	DATE RECEIVED	- 05/22/17
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 06/06/17
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAB NUMBER	- 20171674	- 20171675	- 20171676
SAMPLE ID	- S388	-	- S389
TEST STATUS	- INFORMATION ONLY	- INFORMATION ONLY	- INFORMATION ONLY
STATION	- 117+00	- 121+00	- 121+00
LOCATION	- 18 LT	- 06 LT	- 18 LT
DEPTH IN FEET	- 0-5	- 0-.62	- 0-5
MAT'L COLOR	- BROWN	- BROWN	- BROWN
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 36 25 17.30	- 36 25 20.90	- 36 25 20.80
LONGITUDE DEG-MIN-SEC	- 94 07 9.40	- 94 07 7.60	- 94 07 7.70
% PASSING			
2 IN.	-	-	-
1 1/2 IN.	-	-	-
3/4 IN.	- 100	-	-
3/8 IN.	- 98	-	- 100
NO. 4	- 92	-	- 90
NO. 10	- 87	-	- 78
NO. 40	- 80	-	- 61
NO. 80	- 73	-	- 56
NO. 200	- 63	-	- 50
LIQUID LIMIT	- 29	-	- 31
PLASTICITY INDEX	- 8	-	- 10
AASHTO SOIL	- A-4 (3)	-	- A-4 (2)
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 17.2	-	- 18.6
ACHMSC (IN)	- ---	- 4.5W	- ---
ACHMBC (IN)	- ---	- 2.0	- ---
AGG BASE CRS CL-7 (IN)	- ---	- 6.0	- ---
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

REMARKS - W=MULTIPLE LAYERS

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

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 06/06/17 SEQUENCE NO. - 1
JOB NUMBER - 090431 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 - 04
SUPPLIER NAME - STATE DISTRICT NO. - 09
NAME OF PROJECT - LITTLE SUGAR CREEK STR. & APPRS. (S)
PROJECT ENGINEER - NOT APPLICABLE
PIT/QUARRY - ARKANSAS
LOCATION - BENTON COUNTY DATE SAMPLED - 05/16/17
SAMPLED BY - THORNTON/TAYLOR DATE RECEIVED - 05/22/17
SAMPLE FROM - TEST HOLE DATE TESTED - 06/06/17
MATERIAL DESC. - SOIL SURVEY - RESISTANCE R-VALUE ACTUAL RESULTS

LAB NUMBER	-	20171677	-	-
SAMPLE ID	-	RV390	-	-
TEST STATUS	-	INFORMATION ONLY	-	-
STATION	-	121+00	-	-
LOCATION	-	21 LT	-	-
DEPTH IN FEET	-	0-5	-	-
MAT'L COLOR	-	BROWN	-	-
MAT'L TYPE	-		-	-
LATITUDE DEG-MIN-SEC	-	36 25 20.90	-	-
LONGITUDE DEG-MIN-SEC	-	94 07 7.70	-	-
% PASSING	2	IN.	-	-
	1 1/2	IN.	-	-
	3/4	IN.	-	-
	3/8	IN.	-	-
		100	-	-
	NO. 4	80	-	-
	NO. 10	73	-	-
	NO. 40	65	-	-
	NO. 80	60	-	-
	NO. 200	54	-	-
LIQUID LIMIT	-	34	-	-
PLASTICITY INDEX	-	13	-	-
AASHTO SOIL	-	A-6(8)	-	-
UNIFIED SOIL	-		-	-
% MOISTURE CONTENT	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-

REMARKS -

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

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

Job No.	090431	Material Code	SSRVPS
Date Sampled:	5/16/17	Station No.:	121+00
Date Tested:	June 12, 2017	Location:	21LT
Name of Project:	LITTLE SUGAR CREEK STR. & APPRS. (S)		
County:	Code: 4	Name:	BENTON
Sampled By:	THORNTON/TAYLOR		
Lab No.:	20171677	Depth:	0-5
Sample ID:	RV390	AASHTO Class:	A-6(8)
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	3.96
Middle	3.94
Bottom	3.95
Average	3.95
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.03
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.03
Initial Area, Ao (sq. in):	12.18
Initial Volume, AoLo (cu. in):	97.80

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	2954.00
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4. Soil Properties:

Optimum Moisture Content (%):	17.0
Maximum Dry Density (pcf):	103.4
95% of MDD (pcf):	98.2
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	2954.00
Compaction Moisture content (%):	16.9
Compaction Wet Density (pcf):	115.08
Compaction Dry Density (pcf):	98.44
Moisture Content After Mr Test (%):	16.6

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

#VALUE!

7. Resilient Modulus, Mr:

$6951(S_c)^{-0.13535}(S_3)^{0.35220}$

8. Comments

9. Tested By:

GW

Date: June 12, 2017

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

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

Job No. 090431 **Material Code** SSRVPS
Date Sampled: 5/16/17 **Station No.:** 121+00
Date Tested: June 12, 2017 **Location:** 21LT
Name of Project: LITTLE SUGAR CREEK STR. & APPRS. (S)
County: Code: 4 **Name:** BENTON
Sampled By: THORNTON/TAYLOR **Depth:** 0-5
Lab No.: 20171677 **AASHTO Class:** A-6(8)
Sample ID: RV390 **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 Contact Load	Actual Applied Max. Axial Stress	Actual Applied Cyclic Stress	Actual Applied Contact Stress	Average Recov Def. LVD1 and 2	Resilient Strain	Resilient Modulus
	S ₃ psi	S _{cyclic} psi	P _{max} 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	25.2	22.6	2.7	2.1	1.9	0.2	0.00123	0.00015	12,084
Sequence 2	6.0	4.0	47.4	44.8	2.7	3.9	3.7	0.2	0.00258	0.00032	11,459
Sequence 3	6.0	6.0	69.9	66.4	3.5	5.7	5.4	0.3	0.00408	0.00051	10,710
Sequence 4	6.0	8.0	93.6	87.6	6.0	7.7	7.2	0.5	0.00578	0.00072	9,991
Sequence 5	6.0	10.0	117.4	108.9	8.5	9.6	8.9	0.7	0.00753	0.00094	9,542
Sequence 6	4.0	2.0	25.1	22.3	2.8	2.1	1.8	0.2	0.00145	0.00018	10,160
Sequence 7	4.0	4.0	46.8	43.9	2.8	3.8	3.6	0.2	0.00307	0.00038	9,440
Sequence 8	4.0	6.0	68.2	65.4	2.9	5.6	5.4	0.2	0.00491	0.00061	8,772
Sequence 9	4.0	8.0	91.8	86.6	5.2	7.5	7.1	0.4	0.00674	0.00084	8,465
Sequence 10	4.0	10.0	115.8	108.1	7.7	9.5	8.9	0.6	0.00853	0.00106	8,354
Sequence 11	2.0	2.0	24.8	21.9	2.8	2.0	1.8	0.2	0.00176	0.00022	8,208
Sequence 12	2.0	4.0	46.0	43.2	2.8	3.8	3.5	0.2	0.00380	0.00047	7,500
Sequence 13	2.0	6.0	66.7	63.9	2.8	5.5	5.2	0.2	0.00596	0.00074	7,071
Sequence 14	2.0	8.0	89.1	84.8	4.3	7.3	7.0	0.4	0.00812	0.00101	6,885
Sequence 15	2.0	10.0	112.6	105.8	6.8	9.2	8.7	0.6	0.01027	0.00128	6,789

TESTED BY _____ DATE June 12, 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.	090431	Material Code	SSRVPS
Date Sampled:	5/16/17	Station No.:	121+00
Date Tested:	June 12, 2017	Location:	21LT
Name of Project:	LITTLE SUGAR CREEK STR. & APPRS. (S)		
County:	Code: 4	Name:	BENTON
Sampled By:	THORNTON/TAYLOR		
Lab No.:	20171677	Depth:	0-5
Sample ID:	RV390	AASHTO Class:	A-6(8)
LATITUDE:		Material Type (1 or 2):	2
		LONGITUDE:	

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

$K_1 = \underline{\underline{6,951}}$
 $K_2 = \underline{\underline{-0.13535}}$
 $K_5 = \underline{\underline{0.35220}}$
 $R^2 = \underline{\underline{0.99}}$

