

ARKANSAS DEPARTMENT OF TRANSPORTATION



**SUBSURFACE INVESTIGATION**

STATE JOB NO. 070378

FEDERAL AID PROJECT NO. NHPP-0014(34)

SPRING BRANCH STR. & APPRS. (S)

STATE HIGHWAY 98 SECTION 2

IN COLUMBIA 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

June 4, 2019

**TO:** Mr. Trinity Smith, Engineer of Roadway Design

**SUBJECT:** Job No. 070378  
Spring Branch Creek Str. & Apprs. (S)  
Route 98 Section 2  
Columbia County

Attached is the requested soil survey, strength data, and Resilient Modulus test results for the above referenced job. The project consists of replacing the bridge at Spring Branch with a box culvert. Samples were taken in the existing travel lanes and ditch line.

The subgrade soils consist primarily of non-plastic sands. The subgrade soils are expected to provide a stable working platform with conventional processing if the weather is favorable during construction.

Based on currently available cross sections the maximum embankment height is approximately 13 feet. Prior to embankment construction all soft unstable organic material in the ditch line should be undercut, anticipated to be no more than two feet. The embankment may be constructed with locally available unspecified material utilizing the 3:1 slope configuration shown.

The proposed 3:1 cut slopes are acceptable as shown.

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 Bismarck.

2. Asphalt Concrete Hot Mix

Type	Asphalt Cement %	Mineral Aggregate %
Surface Course	5.3	94.7
Binder Course	4.4	95.6
Base Course	4.0	96.0

  
Michael C. Benson  
Materials Engineer

MCB:pt:bjj  
Attachment

cc: State Constr. Eng. – Master File Copy  
District 7 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 - 05/15/2019  
JOB NUMBER - 070378

SEQUENCE NO. - 1  
MATERIAL CODE - SSRV  
SPEC. YEAR - 2014  
SUPPLIER ID. - 1  
COUNTY/STATE - 14  
DISTRICT NO. - 07

JOB NAME - SPRING BRANCH STR. & APPRS. (S)

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

BEGIN JOB - END JOB 10

RESILIENT MODULUS  
STA. 15 + 00 11586

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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>	070378	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	3/25/19	<b>Station No.:</b>	15+00
<b>Date Tested:</b>	April 17, 2019	<b>Location:</b>	15'RT
<b>Name of Project:</b>	SPRING BRANCH STR. & APPRS. (S)		
<b>County:</b>	<b>Code:</b> 35	<b>Name:</b> JEFFERSON	
<b>Sampled By:</b>	FRAZIER/BATES	<b>Depth:</b>	0-5
<b>Lab No.:</b>	20190847	<b>AASHTO Class:</b>	A-6(4)
<b>Sample ID:</b>	RV99	<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	3.95
Bottom	3.95
Average	3.95
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):	12.18
Initial Volume, AoLo (cu. in):	97.68

**3. Soil Specimen Weight:**

Weight of Wet Soil Used (g):	3171.40
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**4. Soil Properties:**

Optimum Moisture Content (%):	14.2
Maximum Dry Density (pcf):	113
95% of MDD (pcf):	107.4
In-Situ Moisture Content (%):	N/A

**5. Specimen Properties:**

Wet Weight (g):	3171.40
Compaction Moisture content (%):	14.5
Compaction Wet Density (pcf):	123.71
Compaction Dry Density (pcf):	108.04
Moisture Content After Mr Test (%):	14.5

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

#VALUE!

**7. Resilient Modulus, Mr:**

13292(Sc)<sup>-0.14945</sup>(S3)<sup>0.25407</sup>

**8. Comments**

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**9. Tested By:**

GW

**Date:** April 17, 2019

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

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

**Job No.** 070378 **Material Code** SSRVPS  
**Date Sampled:** 3/25/19 **Station No.:** 15+00  
**Date Tested:** April 17, 2019 **Location:** 15'RT  
**Name of Project:** SPRING BRANCH STR. & APPRS. (S)  
**County:** Code: 35 **Name:** JEFFERSON  
**Sampled By:** FRAZIER/BATES **Depth:** 0-5  
**Lab No.:** 20190847 **AASHTO Class:** A-6(4)  
**Sample ID:** RV99 **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. LVDT 1 and 2	Resilient Strain	Resilient Modulus
			P <sub>max</sub> lbs	P <sub>max</sub> lbs	P <sub>cyclic</sub> lbs	P <sub>cyclic</sub> lbs							
DESIGNATION	S <sub>3</sub> psi	S <sub>cyclic</sub> psi	P <sub>max</sub> lbs	P <sub>max</sub> lbs	P <sub>cyclic</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	25.2	22.7	22.7	22.7	2.6	2.1	1.9	0.2	0.00077	0.00010	19,275
Sequence 2	6.0	4.0	47.0	44.5	44.5	44.5	2.5	3.9	3.7	0.2	0.00161	0.00020	18,205
Sequence 3	6.0	6.0	69.5	66.0	66.0	66.0	3.4	5.7	5.4	0.3	0.00257	0.00032	16,912
Sequence 4	6.0	8.0	92.7	86.7	86.7	86.7	6.0	7.6	7.1	0.5	0.00373	0.00046	15,319
Sequence 5	6.0	10.0	115.2	106.8	106.8	106.8	8.5	9.5	8.8	0.7	0.00496	0.00062	14,170
Sequence 6	4.0	2.0	25.1	22.4	22.4	22.4	2.7	2.1	1.8	0.2	0.00087	0.00011	16,853
Sequence 7	4.0	4.0	46.7	44.0	44.0	44.0	2.7	3.8	3.6	0.2	0.00183	0.00023	15,804
Sequence 8	4.0	6.0	68.2	65.5	65.5	65.5	2.8	5.6	5.4	0.2	0.00288	0.00036	14,956
Sequence 9	4.0	8.0	91.5	86.3	86.3	86.3	5.2	7.5	7.1	0.4	0.00402	0.00050	14,129
Sequence 10	4.0	10.0	114.4	106.8	106.8	106.8	7.6	9.4	8.8	0.6	0.00530	0.00066	13,269
Sequence 11	2.0	2.0	24.7	22.0	22.0	22.0	2.7	2.0	1.8	0.2	0.00105	0.00013	13,821
Sequence 12	2.0	4.0	46.4	43.7	43.7	43.7	2.8	3.8	3.6	0.2	0.00219	0.00027	13,147
Sequence 13	2.0	6.0	67.5	64.8	64.8	64.8	2.7	5.5	5.3	0.2	0.00338	0.00042	12,610
Sequence 14	2.0	8.0	89.8	85.6	85.6	85.6	4.2	7.4	7.0	0.3	0.00465	0.00058	12,123
Sequence 15	2.0	10.0	111.9	105.2	105.2	105.2	6.7	9.2	8.6	0.5	0.00598	0.00075	11,586

TESTED BY \_\_\_\_\_ DATE April 17, 2019  
 REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 GW

**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>	070378	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	3/25/19	<b>Station No.:</b>	15+00
<b>Date Tested:</b>	April 17, 2019	<b>Location:</b>	15'RT
<b>Name of Project:</b>	SPRING BRANCH STR. & APPRS. (S)		
<b>County:</b>	<b>Code:</b> 35	<b>Name:</b>	JEFFERSON
<b>Sampled By:</b>	FRAZIER/BATES	<b>Depth:</b>	0-5
<b>Lab No.:</b>	20190847	<b>AASHTO Class:</b>	A-6(4)
<b>Sample ID:</b>	RV99	<b>Material Type (1 or 2):</b>	2
<b>LATITUDE:</b>		<b>LONGITUDE:</b>	

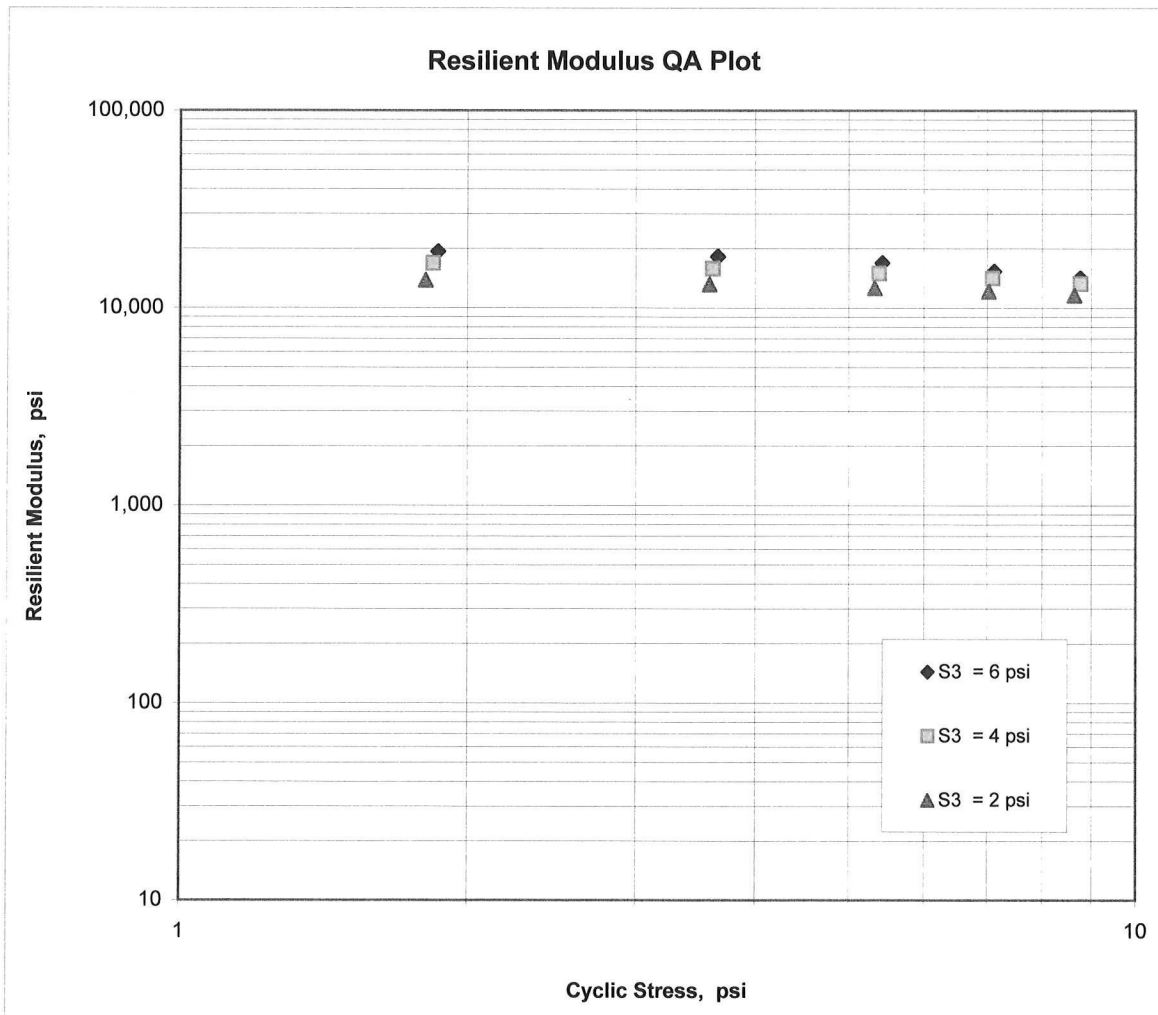
$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

$$K_1 = 13,292$$

$$K_2 = -0.14945$$

$$K_5 = 0.25407$$

$$R^2 = 0.95$$



**JOB:** 070378

**JOB NAME:** SPRING BRANCH STR. & APPRS. (S)

Arkansas State Highway Transportation Department

Materials Division

Michael Benson, Materials Engineer

**DATE TESTED**

5/15/2019

**COUNTY NO.** 14

**STA.# LOC.**

PAVEMENT SOUNDINGS

15+00 05 RT ACHM SC  
3.875W

15+00 15 RT ACHM SC  
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22+00 05 LT ACHM SC  
3.25W

**Comments:** W=MULTIPLE LAYERS

Friday, May 31, 2019

**JOB: 070378**

*Arkansas State Highway Transportation Department*

**JOB NAME: SPRING BRANCH STR. & APPRS. (S)**

*Materials Division*

**COUNTY NO. 14 DATE TESTED 5/15/2019**

*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					
15+00	15 RT	0-5	BROWN	83	80	75	62	48	30	15	A-6(4)	RV99	
15+00	05 RT	0-5	BROWN	94	91	84	52	29	ND	NP	A-2-4(0)	S95	16.9
15+00	15 RT	0-5	BROWN	94	91	88	64	39	ND	NP	A-4(0)	S96	18.2
22+00	05 LT	0-5	BROWN	77	71	68	58	42	ND	NP	A-4(0)	S97	24.9
22+00	15 LT	0-5	BROWN	98	96	93	87	67	36	18	A-6(10)	S98	16.3

*comments:* W=MULTIPLE LAYERS

*Friday, May 31, 2019*



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

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE	- 05/15/19	SEQUENCE NO.	- 1
JOB NUMBER	- 070378	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	- 14
SUPPLIER NAME	- STATE	DISTRICT NO.	- 07
NAME OF PROJECT	- SPRING BRANCH STR. & APPRS. (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- COLUMBIA, COUNTY	DATE SAMPLED	- 03/25/19
SAMPLED BY	- FRAZIER/BATES	DATE RECEIVED	- 03/26/19
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 05/15/19
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAB NUMBER	- 20190843	- 20190844	- 20190845
SAMPLE ID	- S95	- S96	- S97
TEST STATUS	- INFORMATION ONLY	- INFORMATION ONLY	- INFORMATION ONLY
STATION	- 15+00	- 15+00	- 22+00
LOCATION	- 05 RT	- 15 RT	- 05 LT
DEPTH IN FEET	- 0-5	- 0-5	- 0-5
MAT'L COLOR	- BROWN	- BROWN	- BROWN
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 33 21 57.00	- 33 21 56.90	- 33 21 51.20
LONGITUDE DEG-MIN-SEC	- 93 09 33.40	- 93 09 33.40	- 93 09 28.70
% PASSING	2 IN. -	-	-
	1 1/2 IN. -	-	-
	3/4 IN. - 100	- 100	- 100
	3/8 IN. - 98	- 98	- 94
	NO. 4 - 94	- 94	- 77
	NO. 10 - 91	- 91	- 71
	NO. 40 - 84	- 88	- 68
	NO. 80 - 52	- 64	- 58
	NO. 200 - 29	- 39	- 42
LIQUID LIMIT	- ND	- ND	- ND
PLASTICITY INDEX	- NP	- NP	- NP
AASHTO SOIL	- A-2-4 (0)	- A-4 (0)	- A-4 (0)
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 16.9	- 18.2	- 24.9
ACHM SC (IN)	- 3.875W	- ---	- 3.25W
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-

REMARKS - W=MULTIPLE LAYERS  
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ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS  
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 05/15/19 SEQUENCE NO. - 2  
JOB NUMBER - 070378 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 - 14  
SUPPLIER NAME - STATE DISTRICT NO. - 07  
NAME OF PROJECT - SPRING BRANCH STR. & APPRS. (S)  
PROJECT ENGINEER - NOT APPLICABLE  
PIT/QUARRY - ARKANSAS  
LOCATION - COLUMBIA, COUNTY DATE SAMPLED - 03/25/19  
SAMPLED BY - FRAZIER/BATES DATE RECEIVED - 03/26/19  
SAMPLE FROM - TEST HOLE DATE TESTED - 05/15/19  
MATERIAL DESC. - SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS

LAB NUMBER	-	20190846	-	-
SAMPLE ID	-	S98	-	-
TEST STATUS	-	INFORMATION ONLY	-	-
STATION	-	22+00	-	-
LOCATION	-	15 LT	-	-
DEPTH IN FEET	-	0-5	-	-
MAT'L COLOR	-	BROWN	-	-
MAT'L TYPE	-		-	-
LATITUDE DEG-MIN-SEC	-	33 21 51.30	-	-
LONGITUDE DEG-MIN-SEC	-	93 09 28.60	-	-
% PASSING	2	IN.	-	-
	1 1/2	IN.	-	-
	3/4	IN.	-	-
	3/8	IN.	-	-
	NO. 4	-	98	-
	NO. 10	-	96	-
	NO. 40	-	93	-
	NO. 80	-	87	-
	NO. 200	-	67	-
LIQUID LIMIT	-	36	-	-
PLASTICITY INDEX	-	18	-	-
AASHTO SOIL	-	A-6(10)	-	-
UNIFIED SOIL	-		-	-
% MOISTURE CONTENT	-	16.3	-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-

REMARKS - W=MULTIPLE LAYERS  
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ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS  
 MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 05/15/19 SEQUENCE NO. - 1  
 JOB NUMBER - 070378 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 - 14  
 SUPPLIER NAME - STATE DISTRICT NO. - 07  
 NAME OF PROJECT - SPRING BRANCH STR. & APPRS. (S)  
 PROJECT ENGINEER - NOT APPLICABLE  
 PIT/QUARRY - ARKANSAS  
 LOCATION - COLUMBIA, COUNTY DATE SAMPLED - 03/25/19  
 SAMPLED BY - FRAZIER/BATES DATE RECEIVED - 03/26/19  
 SAMPLE FROM - TEST HOLE DATE TESTED - 05/15/19  
 MATERIAL DESC. - SOIL SURVEY - RESISTANCE R-VALUE ACTUAL RESULTS

LAB NUMBER	-	20190847	-	-
SAMPLE ID	-	RV99	-	-
TEST STATUS	-	INFORMATION ONLY	-	-
STATION	-	15+00	-	-
LOCATION	-	15 RT	-	-
DEPTH IN FEET	-	0-5	-	-
MAT'L COLOR	-	BROWN	-	-
MAT'L TYPE	-		-	-
LATITUDE DEG-MIN-SEC	-	33 21 56.90	-	-
LONGITUDE DEG-MIN-SEC	-	93 09 33.40	-	-
% PASSING	2	IN.	-	-
	1 1/2	IN.	-	-
	3/4	IN.	100	-
	3/8	IN.	88	-
	NO. 4		83	-
	NO. 10		80	-
	NO. 40		75	-
	NO. 80		62	-
	NO. 200		48	-
LIQUID LIMIT	-	30	-	-
PLASTICITY INDEX	-	15	-	-
AASHTO SOIL	-	A-6(4)	-	-
UNIFIED SOIL	-		-	-
% MOISTURE CONTENT	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
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	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-

REMARKS -  
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