

ARKANSAS DEPARTMENT OF TRANSPORTATION



**SUBSURFACE INVESTIGATION**

STATE JOB NO. 110620

FEDERAL AID PROJECT NO. NHPP-0074(34)

DITCH AT L.M. 10.96 STR. & APPRS. (S)

STATE HIGHWAY 17 SECTION 4

IN WOODRUFF 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**

April 21, 2017

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

**SUBJECT:** Job No. 110620  
Ditch at L.M. 10.96 Str. & Apprs. (S)  
Route 17 Section 4  
Woodruff 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 a bridge on Highway 17 with a box culvert. Samples were obtained in the existing travel lanes and ditch line. There were no paved shoulders within the project.

Based on laboratory results of samples obtained, the subgrade soils consist primarily of low plasticity clays with some sand. The subgrade soils are expected to provide a stable working platform with normal drying and compactive efforts, if the weather is favorable during construction.

Based on currently available cross-sections the maximum embankment height is approximately 9 feet. The construction centerline encroaches on irrigation ditches for agricultural fields. Prior to embankment construction the ditch must be drained and the soft unstable material should be undercut to a maximum depth of three feet. The embankment may be constructed of locally available unspecified material. The box culvert should be constructed on a bed of stone backfill three feet thick. The stone backfill should exceed the length and width of the box culvert by four feet.

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 near Judsonia.
2. Asphalt Concrete Hot Mix

<b>PG 64-22</b>		
<b>Type</b>	<b>Asphalt Cement %</b>	<b>Mineral Aggregate %</b>
Surface Course	5.3	94.7
Binder Course	4.3	95.7
Base Course	4.0	96.0

<b>PG 70-22</b>		
<b>Type</b>	<b>Asphalt Cement %</b>	<b>Mineral Aggregate %</b>
Surface Course	5.3	94.7
Binder Course	4.3	95.7
Base Course	4.0	96.0

<b>PG 76-22</b>		
<b>Type</b>	<b>Asphalt Cement %</b>	<b>Mineral Aggregate %</b>
Surface Course	5.3	94.7
Binder Course	4.3	95.7
Base Course	3.8	96.2



Michael C. Benson  
Materials Engineer

MCB:pt:bjj

Attachment

cc: State Constr. Eng. – Master File Copy  
District 1 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 - 04/20/2017  
JOB NUMBER - 110620

SEQUENCE NO. - 1  
MATERIAL CODE - SSRV  
SPEC. YEAR - 2014  
SUPPLIER ID. - 1  
COUNTY/STATE - 74  
DISTRICT NO. - 01

JOB NAME - DITCH @ LM 1096 STR. & APPRS.(S)

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

BEGIN JOB - END JOB 8  
  
RESILIENT MODULUS  
STA. 118+10 10264

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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>	110620	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	3/7/17	<b>Station No.:</b>	118+10
<b>Date Tested:</b>	April 14, 2017	<b>Location:</b>	15LT
<b>Name of Project:</b>	DITCH @ LM 10.96 STR. & APPRS. (S)		
<b>County:</b>	<b>Code:</b> 74	<b>Name:</b>	WOODRUFF
<b>Sampled By:</b>	THORNTON/BATES	<b>Depth:</b>	0-5
<b>Lab No.:</b>	20170764	<b>AASHTO Class:</b>	A-4(4)
<b>Sample ID:</b>	RV245	<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	3.93
Average	3.94
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.04
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.04
Initial Area, Ao (sq. in):	12.12
Initial Volume, AoLo (cu. in):	97.43

**3. Soil Specimen Weight:**

Weight of Wet Soil Used (g):	3054.00
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**4. Soil Properties:**

Optimum Moisture Content (%):	13.7
Maximum Dry Density (pcf):	109.9
95% of MDD (pcf):	104.4
In-Situ Moisture Content (%):	N/A

**5. Specimen Properties:**

Wet Weight (g):	3054.00
Compaction Moisture content (%):	13.4
Compaction Wet Density (pcf):	119.44
Compaction Dry Density (pcf):	105.32
Moisture Content After Mr Test (%):	13.4

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

**7. Resilient Modulus, Mr:** 11454(Sc)<sup>-0.15208</sup>(S3)<sup>0.28939</sup>

**8. Comments**

\_\_\_\_\_

**9. Tested By:**

GW

**Date:** April 14, 2017

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

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

**Job No.** 110620 **Material Code** SSRVPS  
**Date Sampled:** 3/7/17 **Station No.:** 118+10  
**Date Tested:** April 14, 2017 **Location:** 15LT

**Name of Project:** DITCH @ LM 10.96 STR. & APPRS. (S)

**County:** Code: 74 **Name:** WOODRUFF

**Sampled By:** THORNTON/BATES  
**Lab No.:** 20170764

**Sample ID:** RV245

**LATTITUDE:**

**Depth:** 0-5

**AASHTO Class:** A-4(4)

**Material Type (1 or 2):** 2  
**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
DESIGNATION	psi	psi	lbs	lbs	lbs	psi	psi	psi	in	in/in	psi
Sequence 1	6.0	2.0	25.0	22.3	2.7	2.1	1.8	0.2	0.0084	0.0010	17,519
Sequence 2	6.0	4.0	47.2	44.4	2.8	3.9	3.7	0.2	0.00179	0.0022	16,461
Sequence 3	6.0	6.0	69.7	66.1	3.6	5.8	5.5	0.3	0.00285	0.0035	15,412
Sequence 4	6.0	8.0	93.4	87.4	6.0	7.7	7.2	0.5	0.00409	0.0051	14,197
Sequence 5	6.0	10.0	116.9	108.4	8.5	9.6	8.9	0.7	0.00538	0.0067	13,385
Sequence 6	4.0	2.0	24.9	22.1	2.8	2.1	1.8	0.2	0.00096	0.0012	15,286
Sequence 7	4.0	4.0	46.8	44.0	2.8	3.9	3.6	0.2	0.00209	0.0026	13,970
Sequence 8	4.0	6.0	68.4	65.6	2.8	5.6	5.4	0.2	0.00330	0.0041	13,190
Sequence 9	4.0	8.0	91.8	86.7	5.1	7.6	7.2	0.4	0.00462	0.0058	12,436
Sequence 10	4.0	10.0	115.2	107.6	7.5	9.5	8.9	0.6	0.00593	0.0074	12,039
Sequence 11	2.0	2.0	24.8	22.0	2.8	2.0	1.8	0.2	0.00115	0.0014	12,668
Sequence 12	2.0	4.0	46.2	43.4	2.8	3.8	3.6	0.2	0.00249	0.0031	11,560
Sequence 13	2.0	6.0	67.1	64.3	2.8	5.5	5.3	0.2	0.00391	0.0049	10,905
Sequence 14	2.0	8.0	89.2	84.9	4.2	7.4	7.0	0.3	0.00537	0.0067	10,502
Sequence 15	2.0	10.0	112.3	105.7	6.6	9.3	8.7	0.5	0.00683	0.0085	10,264

TESTED BY \_\_\_\_\_ DATE April 14, 2017  
 REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

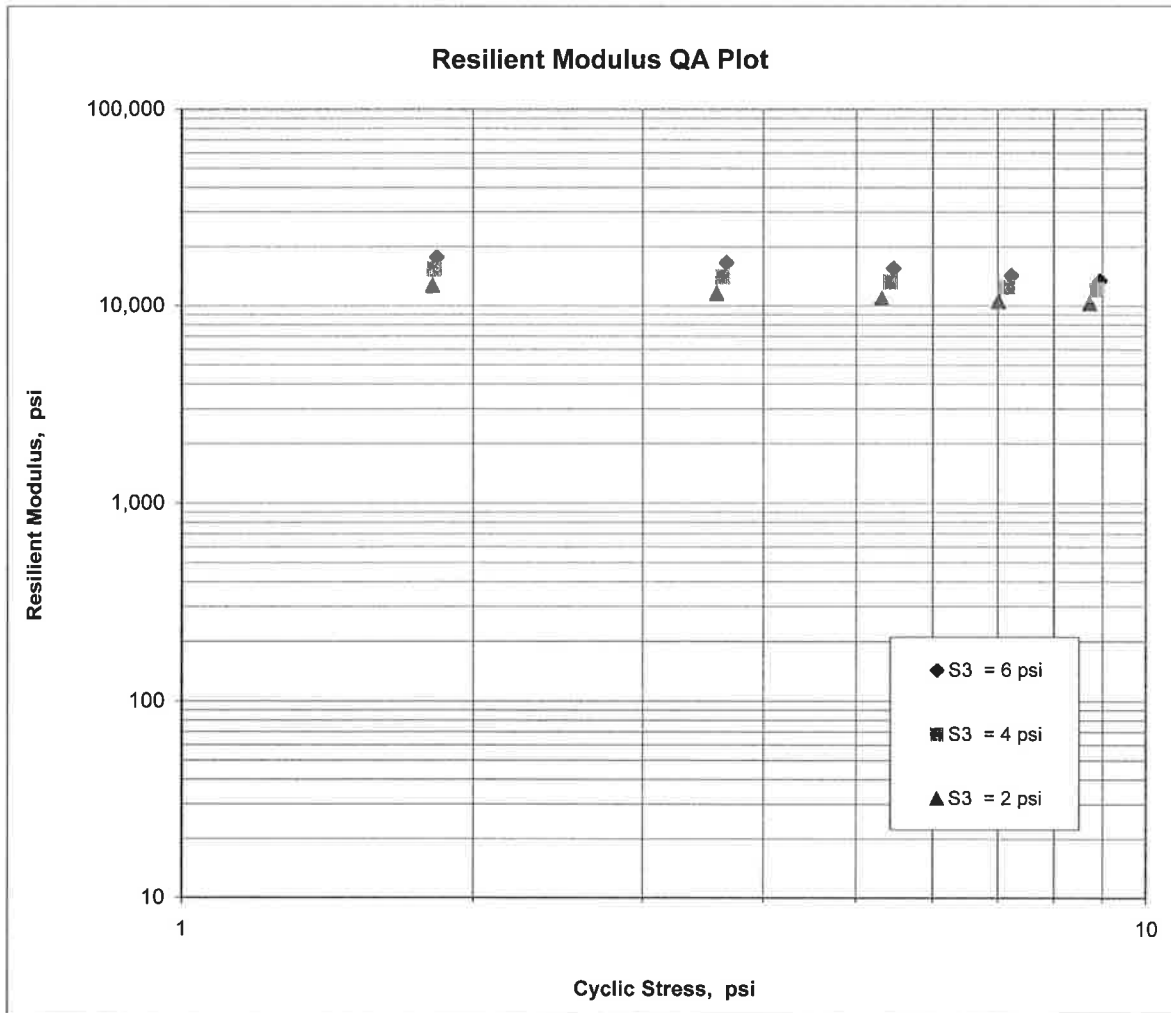
**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT  
MATERIALS DIVISION**

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

<b>Job No.</b>	110620	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	3/7/17	<b>Station No.:</b>	118+10
<b>Date Tested:</b>	April 14, 2017	<b>Location:</b>	15LT
<b>Name of Project:</b>	DITCH @ LM 10.96 STR. & APPRS. (S)		
<b>County:</b>	<b>Code:</b> 74	<b>Name:</b>	WOODRUFF
<b>Sampled By:</b>	THORNTON/BATES	<b>Depth:</b>	0-5
<b>Lab No.:</b>	20170764	<b>AASHTO Class:</b>	A-4(4)
<b>Sample ID:</b>	RV245	<b>Material Type (1 or 2):</b>	2
<b>LATITUDE:</b>		<b>LONGITUDE:</b>	

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

K1 =	11,454
K2 =	-0.15208
K5 =	0.28939
R <sup>2</sup> =	0.98



**JOB: 110620**

**Arkansas State Highway Transportation Department**

**JOB NAME: DITCH @ LM 1096 STR. & APPRS.(S)**

**Materials Division**

**COUNTY NO. 74 DATE TESTED 3/28/2017**

**Michael Benson, Materials Engineer**

STA.#	LOC.	DEPTH	COLOR	#4 #10 #40 #80 #200					L.L.	P.I.	SOIL CLASS	LAB #:	%MOISTURE
				S	I	F	V	E					
118+10	15 LT	0-5	GRAY	97	94	89	85	82	26	7	A-4(4)	RV245	
109+00	06 RT	0-5	GRAY	100				97	36	20	A-6(19)	S241	27.2
109+00	20 RT	0-5	GRAY	98	95	90	85	80	29	12	A-6(8)	S242	25.7
118+00	06 LT	0-5	GRAY	100				92	26	6	A-4(4)	S243	25.9
118+00	15 LT	0-5	GRAY	100				96	25	5	A-4(4)	S244	21.9

**comments:** W=MULTIPLE LAYERS

**Thursday, April 20, 2017**



**JOB:** 110620

**Arkansas State Highway Transportation Department**

**DATE TESTED**

**JOB NAME:** DITCH @ LM 1096 STR. & APPRS.(S)

**Materials Division**

3/28/2017

**COUNTY NO.** 74

**Michael Benson, Materials Engineer**

**STA.# LOC.**

**PAVEMENT SOUNDINGS**

109+00	20 RT	ACHMSC	BST	ACHMBC	BASE	AGG. BASE CRS. CL-
		---	---	---	---	---
109+00	06 RT	ACHMSC	BST	ACHMBC	BASE	AGG. BASE CRS. CL-
		4.0W	0.5	2.25	1.0	5.0
118+00	06 LT	ACHMSC	BST	ACHMBC	BASE	AGG. BASE CRS. CL-
		3.5	1.0	1.5	---	6.0

**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	- 03/28/17	SEQUENCE NO.	- 1
JOB NUMBER	- 110620	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	- 74
SUPPLIER NAME	- STATE	DISTRICT NO.	- 01
NAME OF PROJECT	- DITCH @ LM 10,96 STR. & APPRS.(S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- WOODRUFF COUNTY	DATE SAMPLED	- 03/07/17
SAMPLED BY	- THORNTON/BATES	DATE RECEIVED	- 03/09/17
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 03/28/17
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAB NUMBER	- 20170760	- 20170761	- 20170762
SAMPLE ID	- S241	- S242	- S243
TEST STATUS	- INFORMATION ONLY	- INFORMATION ONLY	- INFORMATION ONLY
STATION	- 109+00	- 109+00	- 118+00
LOCATION	- 06 RT	- 20 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 6 23.10	- 35 06 23.20	- 35 6 29.00
LONGITUDE DEG-MIN-SEC	- 91 14 40.30	- 91 14 40.30	- 91 14 46.90
% PASSING	2 IN. -	-	-
	1 1/2 IN. -	-	-
	3/4 IN. -	-	-
	3/8 IN. -	- 100	-
	NO. 4 - 100	- 98	- 100
	NO. 10 -	- 95	-
	NO. 40 -	- 90	-
	NO. 80 -	- 85	-
	NO. 200 - 97	- 80	- 92
LIQUID LIMIT	- 36	- 29	- 26
PLASTICITY INDEX	- 20	- 12	- 6
AASHTO SOIL	- A-6(19)	- A-6(8)	- A-4(4)
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 27.2	- 25.7	- 25.9
ACHMSC (IN)	- 4.0W	- ---	- 3.5
BST (IN)	- 0.5	- ---	- 1.0
ACHMBC (IN)	- 2.25	- ---	- 1.5
BASE (IN)	- 1.0	- ---	- ---
AGG. BASE CRS. CL-7 (IN)	- 5.0	- ---	- 6.0
	-	-	-
	-	-	-
	-	-	-
	-	-	-

REMARKS - W=MULTIPLE LAYERS

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-  
-

AASHTO TESTS : T24 T88 T89 T90 T265

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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 - 03/28/17 SEQUENCE NO. - 2  
JOB NUMBER - 110620 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 - 74  
SUPPLIER NAME - STATE DISTRICT NO. - 01  
NAME OF PROJECT - DITCH @ LM 10.96 STR. & APPRS.(S)  
PROJECT ENGINEER - NOT APPLICABLE  
PIT/QUARRY - ARKANSAS  
LOCATION - WOODRUFF COUNTY DATE SAMPLED - 03/07/17  
SAMPLED BY - THORNTON/BATES DATE RECEIVED - 03/09/17  
SAMPLE FROM - TEST HOLE DATE TESTED - 03/28/17  
MATERIAL DESC. - SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS

LAB NUMBER - 20170763 -  
SAMPLE ID - S244 -  
TEST STATUS - INFORMATION ONLY -  
STATION - 118+00 -  
LOCATION - 15 LT -  
DEPTH IN FEET - 0-5 -  
MAT'L COLOR - GRAY -  
MAT'L TYPE - -  
LATITUDE DEG-MIN-SEC - 35 6 29.00 -  
LONGITUDE DEG-MIN-SEC - 91 14 46.90 -  
% PASSING 2 IN. - -  
1 1/2 IN. - -  
3/4 IN. - -  
3/8 IN. - -  
NO. 4 - 100 -  
NO. 10 - -  
NO. 40 - -  
NO. 80 - -  
NO. 200 - 96 -  
LIQUID LIMIT - 25 -  
PLASTICITY INDEX - 5 -  
AASHTO SOIL - A-4(4) -  
UNIFIED SOIL - -  
% MOISTURE CONTENT - 21.9 -  
- -  
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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	- 03/28/17	SEQUENCE NO.	- 1
JOB NUMBER	- 110620	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	- 74
SUPPLIER NAME	- STATE	DISTRICT NO.	- 01
NAME OF PROJECT	- DITCH @ LM 1096 STR. & APPRS. (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- WOODRUFF COUNTY	DATE SAMPLED	- 03/07/17
SAMPLED BY	- THORNTON/BATES	DATE RECEIVED	- 03/09/17
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 03/28/17
MATERIAL DESC.	- SOIL SURVEY - RESISTANCE R-VALUE	ACTUAL RESULTS	

LAB NUMBER	-	20170764	-	-
SAMPLE ID	-	RV245	-	-
TEST STATUS	-	INFORMATION ONLY	-	-
STATION	-	118+10	-	-
LOCATION	-	15 LT	-	-
DEPTH IN FEET	-	0-5	-	-
MAT'L COLOR	-	GRAY	-	-
MAT'L TYPE	-		-	-
LATITUDE DEG-MIN-SEC	-	35 6 29.00	-	-
LONGITUDE DEG-MIN-SEC	-	91 14 47.00	-	-
% PASSING	2	IN.	-	-
	1 1/2	IN.	-	-
	3/4	IN.	-	-
	3/8	IN.	-	100
	NO. 4		-	97
	NO. 10		-	94
	NO. 40		-	89
	NO. 80		-	85
	NO. 200		-	82
LIQUID LIMIT	-	26	-	-
PLASTICITY INDEX	-	7	-	-
AASHTO SOIL	-	A-4 (4)	-	-
UNIFIED SOIL	-		-	-
% MOISTURE CONTENT	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-

REMARKS - W=MULTIPLE LAYERS

AASHTO TESTS : T24 T88 T89 T90 T265