

ARKANSAS DEPARTMENT OF TRANSPORTATION



SUBSURFACE INVESTIGATION

STATE JOB NO. 100833

FEDERAL AID PROJECT NO. NHPP-0016(73)

DITCH AT L.M. 0.25 STR. & APPRS. (S)

STATE HIGHWAY 163 SECTION 5

IN CRAIGHEAD 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

AR DOT.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

April 9, 2018

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 100833
Ditch at L.M. 0.25 Str. & Apprs. (S)
Route 163 Section 5
Craighead 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 existing box culvert on Highway 163. Samples were taken in the existing travel lane and ditch line. The shoulders were not paved within the project limits.

Based on laboratory results of samples obtained, the subgrade soils consist primarily of moderately plastic clayey sands. The subgrade soils are expected to provide a stable working platform with normal drying and compactive effort if the weather is favorable during construction.

Based on currently available cross-sections the maximum embankment height is approximately 8 feet. Prior to embankment construction the wet unstable organic material in the ditch line should be undercut, anticipated to be no more than 2 feet. The embankment may be constructed with locally available unspecified material utilizing a 3:1 slope configuration.

The proposed maximum cut depth is approximately 10 feet. The slopes should be constructed utilizing a 3:1 slope configuration.

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 Powhatan.

- 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

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

DATE - 04/02/2018
JOB NUMBER - 100833

SEQUENCE NO. - 1
MATERIAL CODE - SSRV
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 16
DISTRICT NO. - 10

JOB NAME - DITCH AT L.M. 0.25 STR. & APPRS.(S)

* STATION LIMITS R-VALUE AT 240 psi *

BEGIN JOB - END JOB LESS THAN 5
RESILIENT MODULUS
STA. 112 + 00 8122

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.	100833	Material Code	SSRVPS
Date Sampled:	2/13/18	Station No.:	112+00
Date Tested:	March 9, 2018	Location:	21RT
Name of Project:	DITCH AT L.M. 0.25 STR. & APPRS. (S)		
County:	Code: 16	Name:	CRAIGHEAD
Sampled By:	THORNTON/FRAZIER	Depth:	0-5
Lab No.:	20180308	AASHTO Class:	A-6 (10)
Sample ID:	RV68	Material Type (1 or 2):	2
LATITUDE:		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	3.95
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):	3167.40
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4. Soil Properties:

Optimum Moisture Content (%):	14.4
Maximum Dry Density (pcf):	111.5
95% of MDD (pcf):	105.9
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3167.40
Compaction Moisture content (%):	14.2
Compaction Wet Density (pcf):	123.55
Compaction Dry Density (pcf):	108.19
Moisture Content After Mr Test (%):	14.4

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

#VALUE!

7. Resilient Modulus, Mr:

7969(S_c)^{-0.11430}(S₃)^{0.32641}

8. Comments

9. Tested By:

GW

Date: March 9, 2018

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

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

Job No. 100833 **Material Code** SSRVPS
Date Sampled: 2/13/18 **Station No.:** 112+00
Date Tested: March 9, 2018 **Location:** 21'RT
Name of Project: DITCH AT L.M. 0.25 STR. & APPRS. (S)
County: Code: 16 **Name:** CRAIGHEAD
Sampled By: THORNTON/FRAZIER
Lab No.: 20180308
Sample ID: RV68
LATITUDE:
Depth: 0-5
AAASHTO Class: A-6 (10)
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
	S ₃ psi	S _{eyclic} psi	P _{max} lbs	P _{eyclic} lbs	P _{contact} lbs	S _{max} psi	S _{eyclic} psi	S _{contact} psi	H _{avg} in	ε _r in/in	M _r psi
Sequence 1	6.0	2.0	25.1	22.3	2.8	2.1	1.8	0.2	0.00110	0.00014	13,375
Sequence 2	6.0	4.0	47.2	44.4	2.8	3.9	3.6	0.2	0.00226	0.00028	12,908
Sequence 3	6.0	6.0	69.7	66.0	3.6	5.7	5.4	0.3	0.00361	0.00045	12,054
Sequence 4	6.0	8.0	93.3	87.3	6.1	7.7	7.2	0.5	0.00515	0.00064	11,155
Sequence 5	6.0	10.0	116.8	108.2	8.6	9.6	8.9	0.7	0.00674	0.00084	10,569
Sequence 6	4.0	2.0	25.1	22.2	2.8	2.1	1.8	0.2	0.00122	0.00015	12,021
Sequence 7	4.0	4.0	46.8	44.0	2.9	3.8	3.6	0.2	0.00264	0.00033	10,967
Sequence 8	4.0	6.0	68.1	65.2	2.9	5.6	5.4	0.2	0.00416	0.00052	10,330
Sequence 9	4.0	8.0	91.4	86.2	5.2	7.5	7.1	0.4	0.00573	0.00072	9,897
Sequence 10	4.0	10.0	115.1	107.5	7.6	9.5	8.8	0.6	0.00737	0.00092	9,600
Sequence 11	2.0	2.0	24.7	21.9	2.8	2.0	1.8	0.2	0.00165	0.00021	8,734
Sequence 12	2.0	4.0	46.1	43.3	2.8	3.8	3.6	0.2	0.00331	0.00041	8,611
Sequence 13	2.0	6.0	67.0	64.2	2.8	5.5	5.3	0.2	0.00508	0.00063	8,316
Sequence 14	2.0	8.0	89.2	84.8	4.4	7.3	7.0	0.4	0.00683	0.00085	8,178
Sequence 15	2.0	10.0	112.3	105.5	6.8	9.2	8.7	0.6	0.00856	0.00107	8,122

TESTED BY _____ **DATE** March 9, 2018
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.	100833	Material Code	SSRVPS
Date Sampled:	2/13/18	Station No.:	112+00
Date Tested:	March 9, 2018	Location:	21'RT
Name of Project:	DITCH AT L.M. 0.25 STR. & APPRS. (S)		
County:	Code: 16	Name:	CRAIGHEAD
Sampled By:	THORNTON/FRAZIER	Depth:	0-5
Lab No.:	20180308	AASHTO Class:	A-6 (10)
Sample ID:	RV68	Material Type (1 or 2):	2
LATITUDE:		LONGITUDE:	

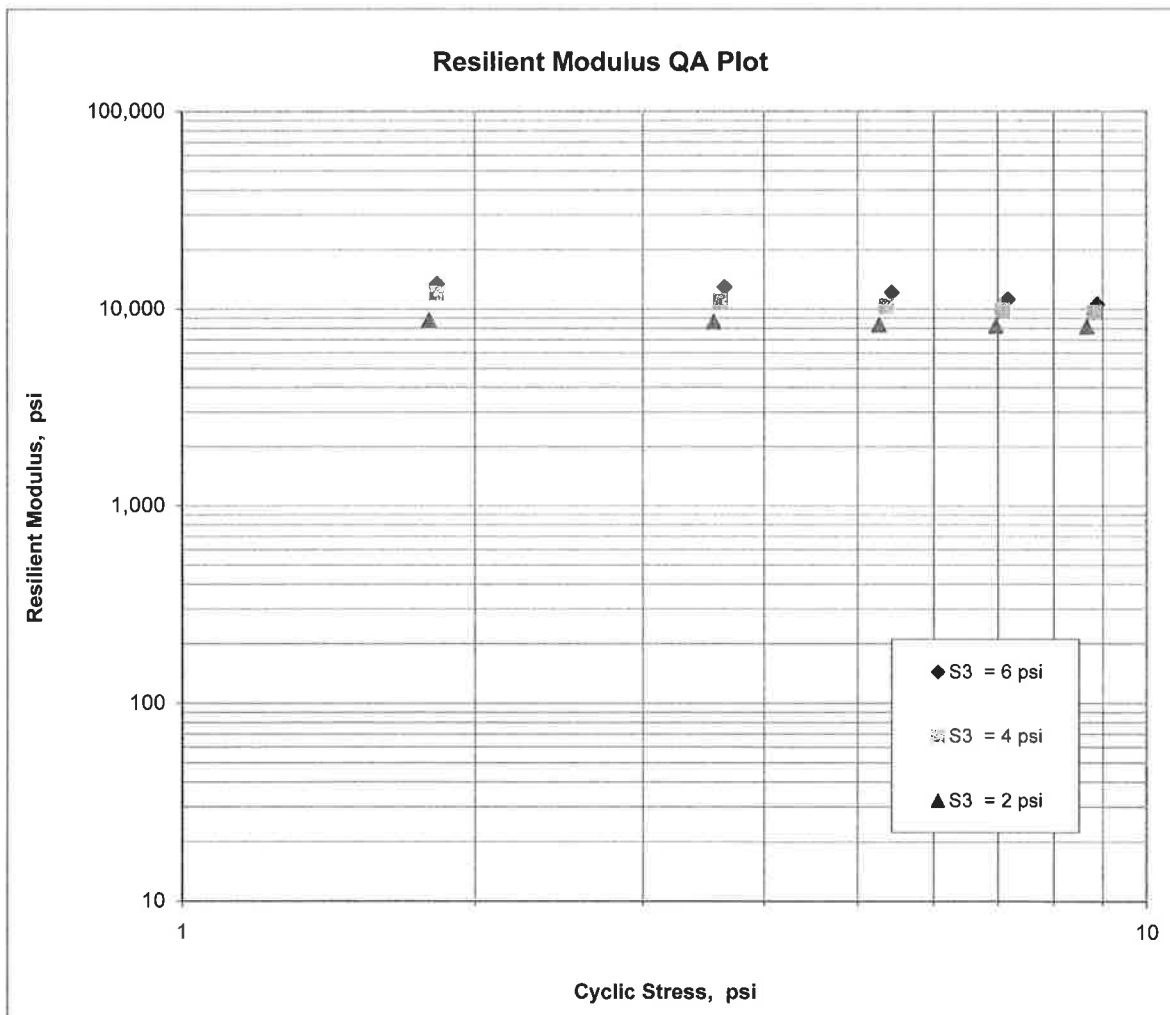
$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

$$K_1 = 7,969$$

$$K_2 = -0.11430$$

$$K_5 = 0.32641$$

$$R^2 = 0.97$$



JOB: 100833

Arkansas State Highway Transportation Department

JOB NAME: DITCH AT L.M. 0.25 STR. & APPRS.(S)

Materials Division

COUNTY NO. 16 DATE TESTED 3/29/2018

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					
112+00	21LT	0-5	GRAY	96	94	92	89	87	30	13	A-6(10)	RV68	
103+00	06 RT	0-5	GRAY	100				91	ND	NP	A-4(0)	S64	24.2
103+00	21 RT	0-5	GRAY	90	85	75	67	63	27	08	A-4(3)	S65	18
112+00	06 LT	0-5	GRAY	95	93	90	87	86	32	13	A-6(10)	S66	21
112+00	21LT	0-5	GRAY	98	94	83	73	68	29	13	A-6(6)	S67	16.4

comments: W=MULTIPLE LAYERS, X=STRIPPED

Monday, April 02, 2018

JOB: 100833

Arkansas State Highway Transportation Department

DATE TESTED

JOB NAME: DITCH AT L.M. 0.25 STR. & APPRS.(S)

3/29/2018

COUNTY NO. 16

Michael Benson, Materials Engineer

STA.# LOC.

PAVEMENT SOUNDINGS

103+00	06 RT	ACHMSC 3.0W	SAND ASPHALT 1.0	ACHMBC 2.0	AGG. BASE CRS CL-7 7.0
103+00	21 RT	ACHMSC	SAND ASPHALT	ACHMBC	AGG. BASE CRS CL-7
112+00	06 LT	ACHMSC 2.5WX	SAND ASPHALT 1.5	ACHMBC 1.5	AGG. BASE CRS CL-7 7.0

comments: 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	- 03/29/18	SEQUENCE NO.	- 1
JOB NUMBER	- 100833	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	- 16
SUPPLIER NAME	- STATE	DISTRICT NO.	- 10
NAME OF PROJECT	- DITCH AT L.M. 0.25 STR. & APPRS.(S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- CRAIGHEAD COUNTY	DATE SAMPLED	- 02/13/18
SAMPLED BY	- THORNTON/FRAZIER	DATE RECEIVED	- 02/14/18
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 03/29/18
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAB NUMBER	- 20180304	- 20180305	- 20180306
SAMPLE ID	- S64	- S65	- S66
TEST STATUS	- INFORMATION ONLY	- INFORMATION ONLY	- INFORMATION ONLY
STATION	- 103+00	- 103+00	- 112+00
LOCATION	- 06 RT	- 21 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 42 24.70	- 35 42 24.80	- 35 42 32.50
LONGITUDE DEG-MIN-SEC	- 90 39 38.00	- 90 39 37.70	- 90 39 42.20
% PASSING	2 IN. -	-	-
	1 1/2 IN. -	-	-
	3/4 IN. -	- 100	- 100
	3/8 IN. -	- 95	- 96
	NO. 4 - 100	- 90	- 95
	NO. 10 -	- 85	- 93
	NO. 40 -	- 75	- 90
	NO. 80 -	- 67	- 87
	NO. 200 - 91	- 63	- 86
LIQUID LIMIT	- ND	- 27	- 32
PLASTICITY INDEX	- NP	- 08	- 13
AASHTO SOIL	- A-4 (0)	- A-4 (3)	- A-6 (10)
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 24.2	- 18.0	- 21.0
ACHMSC (IN)	- 3.0W	- ---	- 2.5WX
SAND ASPHALT (IN)	- 1.0	- ---	- 1.5
ACHMBC (IN)	- 2.0	- ---	- 1.5
AGG. BASE CRS CL-7 (IN)	- 7.0	- ---	- 7.0
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-

REMARKS - W=MULTIPLE LAYERS, X=STRIPPED

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 - 03/29/18 SEQUENCE NO. - 2
JOB NUMBER - 100833 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 - 16
SUPPLIER NAME - STATE DISTRICT NO. - 10
NAME OF PROJECT - DITCH AT L.M. 0.25 STR. & APPRS.(S)
PROJECT ENGINEER - NOT APPLICABLE
PIT/QUARRY - ARKANSAS
LOCATION - CRAIGHEAD COUNTY DATE SAMPLED - 02/13/18
SAMPLED BY - THORNTON/FRAZIER DATE RECEIVED - 02/14/18
SAMPLE FROM - TEST HOLE DATE TESTED - 03/29/18
MATERIAL DESC. - SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS

LAB NUMBER	-	20180307	-	-
SAMPLE ID	-	S67	-	-
TEST STATUS	-	INFORMATION ONLY	-	-
STATION	-	112+00	-	-
LOCATION	-	21LT	-	-
DEPTH IN FEET	-	0-5	-	-
MAT'L COLOR	-	GRAY	-	-
MAT'L TYPE	-		-	-
LATITUDE DEG-MIN-SEC	-	35 42 32.50	-	-
LONGITUDE DEG-MIN-SEC	-	90 39 42.50	-	-
% PASSING	2	IN.	-	-
	1 1/2	IN.	-	-
	3/4	IN.	-	-
	3/8	IN.	-	-
	NO. 4	-	98	-
	NO. 10	-	94	-
	NO. 40	-	83	-
	NO. 80	-	73	-
	NO. 200	-	68	-
LIQUID LIMIT	-	29	-	-
PLASTICITY INDEX	-	13	-	-
AASHTO SOIL	-	A-6(6)	-	-
UNIFIED SOIL	-		-	-
% MOISTURE CONTENT	-	16.4	-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-
	-		-	-

REMARKS - W=MULTIPLE LAYERS, X=STRIPPED
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-
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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	- 03/29/18	SEQUENCE NO.	- 1
JOB NUMBER	- 100833	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	- 16
SUPPLIER NAME	- STATE	DISTRICT NO.	- 10
NAME OF PROJECT	- DITCH AT L.M. 0.25 STR. & APPRS.(S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- CRAIGHEAD COUNTY	DATE SAMPLED	- 02/13/18
SAMPLED BY	- THORNTON/FRAZIER	DATE RECEIVED	- 02/14/18
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 03/29/18
MATERIAL DESC.	- SOIL SURVEY - RESISTANCE R-VALUE	ACTUAL RESULTS	

LAB NUMBER	- 20180308	-
SAMPLE ID	- RV68	-
TEST STATUS	- INFORMATION ONLY	-
STATION	- 112+00	-
LOCATION	- 21LT	-
DEPTH IN FEET	- 0-5	-
MAT'L COLOR	- GRAY	-
MAT'L TYPE	-	-
LATITUDE DEG-MIN-SEC	- 35 42 32.50	-
LONGITUDE DEG-MIN-SEC	- 90 39 42.50	-
% PASSING		
2 IN.	-	-
1 1/2 IN.	-	-
3/4 IN.	- 100	-
3/8 IN.	- 99	-
NO. 4	- 96	-
NO. 10	- 94	-
NO. 40	- 92	-
NO. 80	- 89	-
NO. 200	- 87	-
LIQUID LIMIT	- 30	-
PLASTICITY INDEX	- 13	-
AASHTO SOIL	- A-6(10)	-
UNIFIED SOIL	-	-
% MOISTURE CONTENT	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-

REMARKS - W=MULTIPLE LAYERS, X=STRIPPED

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AASHTO TESTS : T24 T88 T89 T90 T265

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