

ARKANSAS DEPARTMENT OF TRANSPORTATION



SUBSURFACE INVESTIGATION

STATE JOB NO. 100839

FEDERAL AID PROJECT NO. NHPP-0047(54)

DITCH NO. 43 STR. & APPRS. (S)

STATE HIGHWAY 181 SECTION 2

IN MISSISSIPPI 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

May 24, 2017

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 100839
Drainage Ditch No. 43 Str. & Apprs. (S)
Route 181 Section 2
Mississippi 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 Ditch No. 43 on Highway 181 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 highly plastic clay with sand. 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 8 feet, and will be placed within an existing irrigation ditch. The ditch must be drained and all soft unstable organic material should be undercut prior to embankment construction, anticipated to be no more than two feet. The embankment may be constructed with locally available unspecified material utilizing the slope configuration shown in the cross-section.

The proposed 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 at the river ports in Osceola.
2. Asphalt Concrete Hot Mix

| Type | PG 64-22 | |
|----------------|-------------------------|----------------------------|
| | Asphalt Cement % | Mineral Aggregate % |
| Surface Course | 5.2 | 94.8 |
| Binder Course | 4.1 | 95.9 |
| Base Course | 3.9 | 96.1 |

| Type | PG 70-22 | |
|----------------|-------------------------|----------------------------|
| | Asphalt Cement % | Mineral Aggregate % |
| Surface Course | 5.1 | 94.9 |
| Binder Course | 4.1 | 95.9 |
| Base Course | 3.7 | 96.3 |

| <u>Type</u> | PG 76-22 | |
|----------------|-------------------------|----------------------------|
| | Asphalt Cement % | Mineral Aggregate % |
| Surface Course | 5.2 | 94.8 |
| Binder Course | 4.2 | 95.8 |
| Base Course | 3.8 | 96.2 |



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 - 05/01/2017
JOB NUMBER - 100839

SEQUENCE NO. - 3
MATERIAL CODE - SSRV
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 47
DISTRICT NO. - 10

JOB NAME - DITCH NO.43 STR.& APPRS.(S)

* STATION LIMITS R-VALUE AT 240 psi *

BEGIN JOB - END JOB LESS THAN 5

RESILIENT MODULUS
STA. 106+90 10218

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. | 100839 | Material Code | SSRVPS |
| Date Sampled: | 3/28/17 | Station No.: | 106+90 |
| Date Tested: | April 28, 2017 | Location: | 18LT |
| Name of Project: | DITCH NO. 43 STR. & APPRS. (S) | | |
| County: | Code: 47 | Name: MISSISSIPPI | |
| Sampled By: | THORNTON/TAYLOR | | |
| Lab No.: | 20171234 | Depth: | 0-5 |
| Sample ID: | RV333 | AASHTO Class: | A-7-6(9) |
| 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 | 3.93 |
| Middle | 3.94 |
| Bottom | 3.94 |
| Average | 3.94 |
| 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): | 12.10 |
| Initial Volume, AoLo (cu. in): | 97.14 |

3. Soil Specimen Weight:

| | |
|------------------------------|---------|
| Weight of Wet Soil Used (g): | 2999.50 |
|------------------------------|---------|

4. Soil Properties:

| | |
|-------------------------------|-------|
| Optimum Moisture Content (%): | 18.5 |
| Maximum Dry Density (pcf): | 100.9 |
| 95% of MDD (pcf): | 95.9 |
| In-Situ Moisture Content (%): | N/A |

5. Specimen Properties:

| | |
|-------------------------------------|---------|
| Wet Weight (g): | 2999.50 |
| Compaction Moisture content (%): | 19.0 |
| Compaction Wet Density (pcf): | 117.65 |
| Compaction Dry Density (pcf): | 98.87 |
| Moisture Content After Mr Test (%): | 19.0 |

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

7. Resilient Modulus, Mr: 12502(Sc)^{-0.134}I0(S3)^{0.12521}

8. Comments _____

9. Tested By: GW **Date:** April 28, 2017

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

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

Job No. 100839 **Material Code** SSRVPS
Date Sampled: 3/28/17 **Station No.:** 106+90
Date Tested: April 28, 2017 **Location:** 18LT
Name of Project: DITCH NO. 43 STR. & APPRS. (S)
County: Code: 47 **Name:** MISSISSIPPI
Sampled By: THORNTON/TAYLOR **Depth:** 0-5
Lab No.: 20171234 **AASHTO Class:** A-7-6(9)
Sample ID: RV333 **Material Type (1 or 2):** 2
LATTITUDE: 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 | 22.2 | 2.8 | 2.1 | 1.8 | 0.2 | 0.00101 | 0.00013 | 14,575 |
| Sequence 2 | 6.0 | 4.0 | 46.8 | 44.0 | 2.8 | 3.9 | 3.6 | 0.2 | 0.00214 | 0.00027 | 13,667 |
| Sequence 3 | 6.0 | 6.0 | 68.8 | 65.3 | 3.5 | 5.7 | 5.4 | 0.3 | 0.00336 | 0.00042 | 12,898 |
| Sequence 4 | 6.0 | 8.0 | 92.0 | 86.1 | 5.9 | 7.6 | 7.1 | 0.5 | 0.00486 | 0.00060 | 11,774 |
| Sequence 5 | 6.0 | 10.0 | 114.2 | 105.9 | 8.3 | 9.4 | 8.8 | 0.7 | 0.00650 | 0.00081 | 10,807 |
| Sequence 6 | 4.0 | 2.0 | 24.8 | 22.2 | 2.6 | 2.1 | 1.8 | 0.2 | 0.00110 | 0.00014 | 13,407 |
| Sequence 7 | 4.0 | 4.0 | 46.6 | 43.9 | 2.7 | 3.9 | 3.6 | 0.2 | 0.00224 | 0.00028 | 13,008 |
| Sequence 8 | 4.0 | 6.0 | 68.1 | 65.4 | 2.7 | 5.6 | 5.4 | 0.2 | 0.00355 | 0.00044 | 12,232 |
| Sequence 9 | 4.0 | 8.0 | 91.1 | 86.2 | 5.0 | 7.5 | 7.1 | 0.4 | 0.00494 | 0.00062 | 11,577 |
| Sequence 10 | 4.0 | 10.0 | 113.7 | 106.4 | 7.3 | 9.4 | 8.8 | 0.6 | 0.00655 | 0.00082 | 10,772 |
| Sequence 11 | 2.0 | 2.0 | 24.9 | 22.3 | 2.6 | 2.1 | 1.8 | 0.2 | 0.00125 | 0.00016 | 11,827 |
| Sequence 12 | 2.0 | 4.0 | 46.6 | 43.9 | 2.6 | 3.8 | 3.6 | 0.2 | 0.00255 | 0.00032 | 11,434 |
| Sequence 13 | 2.0 | 6.0 | 67.9 | 65.3 | 2.6 | 5.6 | 5.4 | 0.2 | 0.00387 | 0.00048 | 11,188 |
| Sequence 14 | 2.0 | 8.0 | 90.1 | 86.0 | 4.1 | 7.4 | 7.1 | 0.3 | 0.00533 | 0.00066 | 10,714 |
| Sequence 15 | 2.0 | 10.0 | 112.5 | 106.0 | 6.6 | 9.3 | 8.8 | 0.5 | 0.00689 | 0.00086 | 10,218 |

TESTED BY _____ DATE April 28, 2017
 REVIEWED BY _____ DATE _____

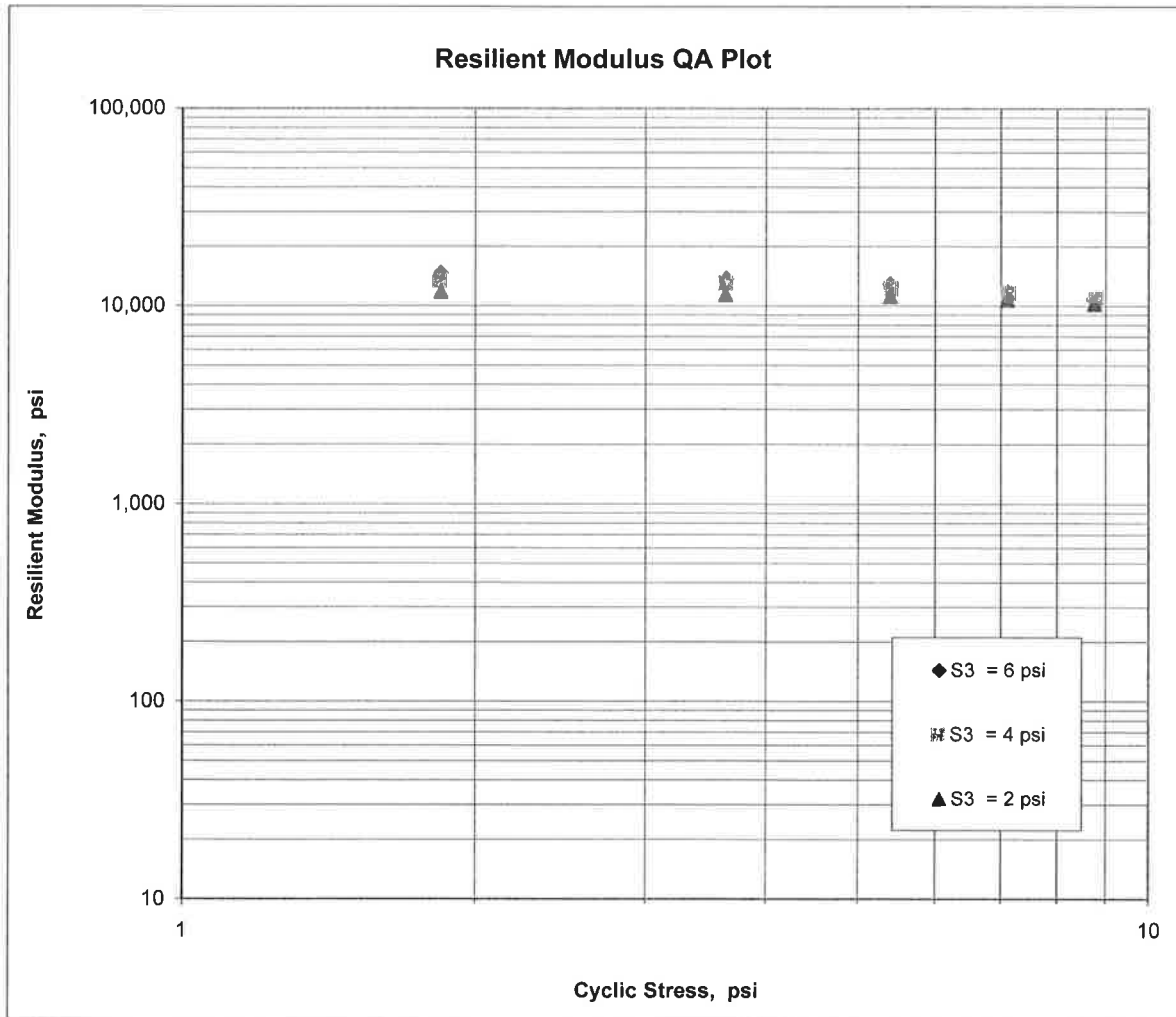
**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION**

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

| | | | |
|-------------------------|--------------------------------|--------------------------------|-------------------|
| Job No. | 100839 | Material Code | SSRVPS |
| Date Sampled: | 3/28/17 | Station No.: | 106+90 |
| Date Tested: | April 28, 2017 | Location: | 18LT |
| Name of Project: | DITCH NO. 43 STR. & APPRS. (S) | | |
| County: | Code: 47 | Name: | MISSISSIPPI |
| Sampled By: | THORNTON/TAYLOR | | Depth: 0-5 |
| Lab No.: | 20171234 | AASHTO Class: | A-7-6(9) |
| Sample ID: | RV333 | Material Type (1 or 2): | 2 |
| LATITUDE: | | LONGITUDE: | |

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

$K_1 = \underline{12,502}$
 $K_2 = \underline{-0.13410}$
 $K_5 = \underline{0.12521}$
 $R^2 = \underline{0.88}$



JOB: 100839

Arkansas State Highway Transportation Department

JOB NAME: DITCH NO.43 STR.& APPRS.(S)

Materials Division

COUNTY NO. 47 DATE TESTED 4/24/2017

Michael Benson, Materials Engineer

| STA.# | LOC. | DEPTH | COLOR | # | | | | | L.L. | P.I. | SOIL CLASS | LAB #: | %MOISTURE |
|--------|-------|-------|-------|----|-----|-----|-----|------|------|------|------------|--------|-----------|
| | | | | #4 | #10 | #40 | #80 | #200 | | | | | |
| 106+90 | 18 LT | 0-5 | GRAY | 86 | 82 | 77 | 62 | 51 | 41 | 26 | A-7-6(9) | RV333 | |
| 107+00 | 06 LT | 0-5 | GRAY | 99 | 99 | 94 | 83 | 76 | 49 | 33 | A-7-6(24) | S329 | 33.8 |
| 107+00 | 18 LT | 0-5 | GRAY | 98 | 96 | 92 | 78 | 66 | 26 | 13 | A-6(6) | S330 | 39.2 |
| 113+00 | 06 RT | 0-5 | GRAY | 99 | 98 | 92 | 75 | 62 | 35 | 23 | A-6(11) | S331 | 30.5 |
| 113+00 | 18 RT | 0-5 | GRAY | 99 | 97 | 91 | 75 | 64 | 44 | 30 | A-7-6(16) | S332 | 32.3 |

comments: W=MULTIPLE LAYERS, X=STRIPPED

Tuesday, May 02, 2017

JOB: 100839

JOB NAME: DITCH NO.43 STR.& APPRS.(S)

Arkansas State Highway Transportation Department

Materials Division

Michael Benson, Materials Engineer

DATE TESTED

4/24/2017

COUNTY NO. 47

STA.# LOC.

PAVEMENT SOUNDINGS

| | | | | |
|--------|-------|--------|--------|-------------------|
| 107+00 | 06 LT | ACHMSC | ACHMSC | AGG:BASE CRS CL-7 |
| | | 8.0W | 1.0 | 7.0 |
| 107+00 | 18 LT | ACHMSC | ACHMBC | AGG:BASE CRS CL-7 |
| | | -- | -- | -- |
| 113+00 | 06 RT | ACHMSC | ACHMBC | AGG:BASE CRS CL-7 |
| | | 4.5WX | -- | 8.0 |

Comments: W=MULTIPLE LAYERS, X=STRIPPED

Tuesday, May 02, 2017

