

ARKANSAS DEPARTMENT OF TRANSPORTATION



SUBSURFACE INVESTIGATION

STATE JOB NO. 070418

FEDERAL AID PROJECT NO. NHPP-0006(38)

HALFWAY CREEK STR. & APPRS. (S)

STATE HIGHWAY 160 SECTION 9

IN BRADLEY 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

September 12, 2019

TO: Mr. Rick Ellis, Bridge Engineer

SUBJECT: Job No. 070418
Halfway Creek Str. & Apprs. (S)
Bradley County
Route 160 Section 9

Transmitted herewith are a brief summary of the geology and site conditions, summary of percent material passing #200 sieve and Atterberg Limits test results (for liquefaction susceptibility analysis), D50 scour analysis, and the logs of the borings conducted for the structure and approaches of the above referenced project. The samples obtained by the Standard Penetration Tests were brought to the laboratory and visually classified by experienced lab personnel to confirm the field identifications.

This project consists of replacing the Highway 160 Bridge, over Halfway Creek, southeast of the town of Hermitage. The new bridge will be constructed to the north of the existing. Two of the four requested borings were inaccessible due to unfavorable field conditions. The two borings that were obtained were offset and drilled in the existing roadway. The obtained borings are anticipated to represent uniform site conditions and should be adequate to design the proposed pile foundations.

Embankment analyses included global stability with seismic design consideration utilizing a horizontal acceleration coefficient of 0.107, as provided by Bridge Design. The proposed embankment configuration provides for a satisfactory Factor of Safety for seismic and static conditions. If you have any questions concerning these recommendations, please contact the Geotechnical Section.



Michael C. Benson
Materials Engineer

MCB:rpt:mlg

cc: State Construction Engineer - Master File Copy
District 7 Engineer
G.C. File

GEOLOGY AND SITE CONDITIONS

Job No. 070418

Halfway Creek Str. & Apprs. (S)

Bradley County

Route 160 Section 9

Site Conditions

The existing bridge is a five span structure over Halfway Creek. The existing bridge is constructed of precast concrete deck with timber pilings and concrete caps supporting the deck. The guardrail is composed of steel with concrete posts. Concrete has been placed on the abutment slopes to reduce erosion. Overhead power lines parallel the north side of the roadway. Halfway Creek is a south flowing blackwater creek. Vegetation adjacent to the bridge consists of grasses. The area north and south of the bridge is moderately to heavily wooded. The area northeast of the bridge has been clear-cut and is heavily vegetated with brush.

Site Geology

The job site is located on alluvial deposits. Alluvial deposits at the job site are composed of sands and clays. The alluvial deposits are approximately 15 feet thick and are underlain by Paleogene age sediment.

The Paleogene deposits at the job site are represented by the Cockfield Formation, the uppermost formation of the Claiborne Group. The Cockfield is composed of unconsolidated, sand, silt, clay, lignite and some glauconite. The Claiborne is up to 1500 feet thick in Arkansas.

Scour Potential

The banks of the channel (See Figures 1 and 2) consists of silty sand (SM) based on the scour sample taken at the site. Silty Sand is a highly scourable grain size; however, the banks are well vegetated and the stream at base-flow conditions is slow flowing. Concrete has been placed under the bridge ends to prevent erosion.

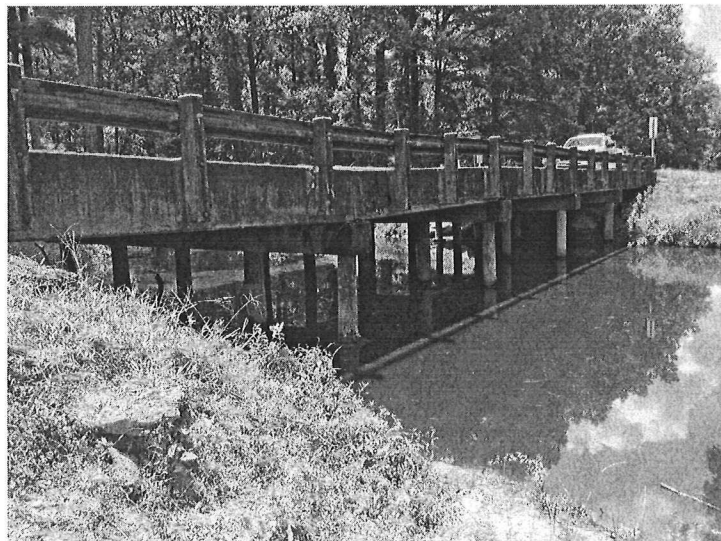


Figure 1. Bridge over Halfway Creek looking southwest.



Figure 2. Bridge over Halfway Creek looking north.

Subsurface Conditions

Based on the results of the borings, the subsurface stratigraphy may be generalized as follows:

- 0 to 9 Feet: Consists of moist, soft, brown **sandy clay**.
- 9 to 15 Feet: Consists of moist to wet, loose to medium dense, brown **silty sand**.
- 15 to 20 Feet: Consists of moist, stiff, dark gray **clay**. (Cockfield Formation)
- 20 to 75 Feet: Varies from moist, stiff to hard, dark gray **clay** to medium dense to very dense, gray **silt** to **silty sand**.
- 35 to 75 Feet: Varies from moist, very stiff to hard, gray **clay** to medium dense to very dense, gray **silt** to **silty sand**. Some samples in this zone contained a notable amount of lignite.
- 75 to 101.5 Feet: Varies from moist, very stiff to hard, gray **clay** to very dense, gray **sand**.

Lab Test Summary

Project Number: 070418
 Project Name: Halfway Creek Str. & Apprs. (S)

| Station | Location | Depth (ft.) | Plastic Limit | Liquid Limit | Plasticity Index | % Passing No. 200 | Unified Soil Classification |
|---------|--------------------|-------------|---------------|--------------|------------------|-------------------|-----------------------------|
| 210+35 | 30' Rt Const. C.L. | 4.5 | NT | | | 58 | |
| 210+35 | 30' Rt Const. C.L. | 9.5 | NT | | | 34 | |
| 210+35 | 30' Rt Const. C.L. | 15 | 22 | 55 | 33 | 99 | CH |
| 210+35 | 30' Rt Const. C.L. | 20 | 20 | 44 | 24 | 96 | CL |
| 210+35 | 30' Rt Const. C.L. | 25 | 25 | 47 | 22 | 99 | CL |
| 210+35 | 30' Rt Const. C.L. | 30 | 22 | 44 | 22 | 99 | CL |
| 210+35 | 30' Rt Const. C.L. | 35 | NP | | | 97 | ML |
| 210+35 | 30' Rt Const. C.L. | 40 | NP | | | 98 | ML |
| 210+35 | 30' Rt Const. C.L. | 45 | 24 | 31 | 7 | 99 | ML |
| 210+35 | 30' Rt Const. C.L. | 50 | NP | | | 85 | ML |
| 210+35 | 30' Rt Const. C.L. | 55 | 19 | 40 | 21 | 100 | CL |
| 210+35 | 30' Rt Const. C.L. | 60 | 29 | 77 | 48 | 93 | CH |
| 210+35 | 30' Rt Const. C.L. | 65 | 24 | 62 | 38 | 99 | CH |
| 210+35 | 30' Rt Const. C.L. | 70 | 23 | 58 | 35 | 98 | CH |
| 210+35 | 30' Rt Const. C.L. | 75 | 16 | 39 | 23 | 95 | CL |
| 210+35 | 30' Rt Const. C.L. | 80 | 18 | 47 | 29 | 96 | CL |
| 210+35 | 30' Rt Const. C.L. | 85 | 20 | 54 | 34 | 98 | CH |
| 210+35 | 30' Rt Const. C.L. | 90 | 18 | 56 | 38 | 97 | CH |
| 210+35 | 30' Rt Const. C.L. | 95 | 17 | 57 | 40 | 99 | CH |
| 210+35 | 30' Rt Const. C.L. | 100 | 17 | 55 | 38 | 95 | CH |

**D₅₀ AGGREGATE ANALYSIS
FOR SCOUR CALCULATIONS**

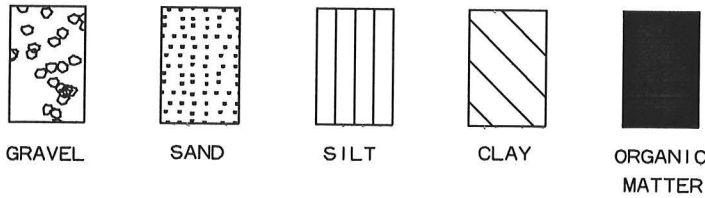
Job No. 070418

| Creek Name | Station | Sample Type | Location | Depth (ft.) | Plastic Limit | Liquid Limit | Soil Description | Aggregate Size (D50) (in.) |
|-------------------|----------------|--------------------|--------------------|--------------------|----------------------|---------------------|-------------------------|-----------------------------------|
| Halfway Creek | 209+80 | Creek Bank | 12' RT Const. C.L. | N/A | Non Plastic | N/A | SM Silty Sand | Less than 0.0029 |

LEGEND

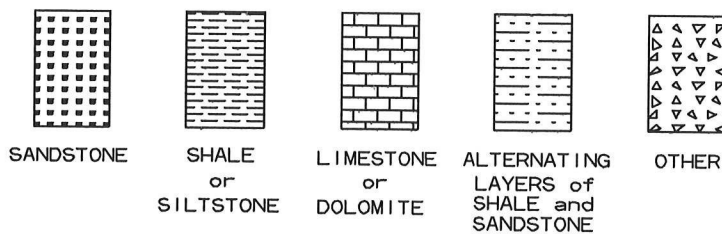
SOIL TYPES

(SHOWN IN SYMBOL COLUMN)
(PREDOMINANT TYPE SHOWN HEAVY)



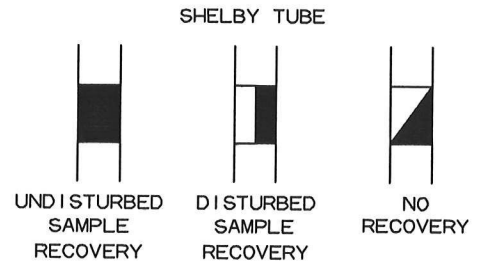
ROCK TYPES

(SHOWN IN SYMBOL COLUMN)

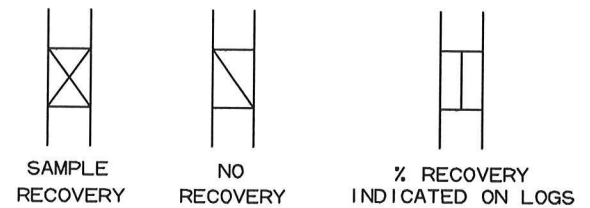


SAMPLER TYPES

(SHOWN IN SAMPLE COLUMN)



ROCK CORING



TERMS DESCRIBING CONSISTENCY OR CONDITION

| GRANULAR SOIL | | CLAY | | CLAY-SHALE | | SHALE | |
|---------------|--------------|-----------|--------------|------------|--------------|--------------------------|-------------|
| "N" Value | Density | "N" Value | Consistency | "N" Value | Consistency | "N" Value | Consistency |
| 0-4 | Very Loose | 0-1 | Very Soft | 0-1 | Very Soft | | |
| 5-10 | Loose | 2-4 | Soft | 2-4 | Soft | 31-60 | Soft |
| 11-30 | Medium Dense | 5-8 | Medium Stiff | 5-8 | Medium Stiff | Over 60 | |
| 31-50 | Dense | 9-15 | Stiff | 9-15 | Stiff | More than 2' | |
| Over 50 | Very Dense | 16-30 | Very Stiff | 16-30 | Very Stiff | Penetration | |
| | | 31-60 | Hard | 31-60 | Hard | in 60 Blows: Medium Hard | |
| | | Over 60 | Very Hard | Over 60 | Very Hard | Less than 2' | |
| | | | | | | Penetration | |
| | | | | | | in 60 Blows: Hard | |

1. Ground water elevations indicated on boring logs represent ground water elevations at date or time shown on boring log. Absence of water surface implies that no ground water data is available but does not necessarily mean that ground water will not be encountered at locations or within the vertical reaches of these borings.
2. Borings represent subsurface conditions at their respective locations for their respective depths. Variations in conditions between or adjacent to boring locations may be encountered.
3. Terms used for describing soils according to their texture or grain size distribution are in accordance with the Unified Soil Classification System.

Standard Penetration Test – Driving a 2.0" O.D., 1-3/8" I.D. sampler a distance of 1.0 foot into undisturbed soil with a 140-pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6.0 inches to seat into undisturbed soil, and then perform the test. The number of hammer blows for seating the spoon and performing the test are recorded for each 6 inches of penetration on the drill log. The field "N" Value (N_f) can be obtained by

adding the bottom two numbers for example: $\frac{6}{8-9} \Rightarrow 8+9 = 17 \text{ blows/ft}$. The "N" Value corrected to 60% efficiency (N_{60}) can be obtained by multiplying N_f by the hammer correction factor published on the boring log.

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 1
PAGE 1 OF 3

JOB NO. 070418 Bradley County
JOB NAME: Halfway Creek Str. & Apprs. (S)
Route 160 Sec. 9
STATION: 208+43
LOCATION: 32' Right of Construction Centerline
LOGGED BY: Troy Frazier

DATE: July 31, 2019
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 100.9

| DEPTH FT. | SYMBOL | SAMPLES | DESCRIPTION OF MATERIAL | SOIL GROUP | PLASTIC LIMIT | % MOIST. | LIQUID LIMIT | DRY WEIGHT | LBS PER CU.FT. | NO. OF BLOWS PER 6-IN. | % T C R | % R Q D |
|--------------|--------|---------|---|---------------|------------------|----------|-----------------|------------|----------------|---------------------------|---------|---------|
| | | | SURFACE ELEVATION: 114.7 | | | | | | | | | |
| 5 | | X | Moist, Soft, Brown Sandy Clay | | | | | | | 1 1-1 | | |
| 10 | | X | Wet, Medium Dense, Brown Sand with Silt and Trace Gravel | | | | | | | 2 4-7 | | |
| 15 | | X | Moist, Stiff, Dark Gray Clay (Claiborne Group, Cockfield Formation) | | | | | | | 2 3-7 | | |
| 20 | | X | Wet, Very Dense, Gray Silty Sand | | | | | | | 15 60 (5") | | |
| 25 | | X | Wet, Very Dense, Gray Sandy Silt with Trace Gravel | | | | | | | 25 35-40 (10") | | |
| 30 | | X | Wet, Dense, Gray Silt with Trace Gravel and Trace Lignite | | | | | | | 21 19-21 | | |
| 35 | | | | | | | | | | | | |

REMARKS: West Bridge End

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 1
PAGE 2 OF 3

JOB NO. 070418 Bradley County
JOB NAME: Halfway Creek Str. & Apprs. (S)
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STATION: 208+43
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| DEPTH FT. | SYMBOL | SAMPLES | DESCRIPTION OF MATERIAL | SOIL GROUP | PLASTIC LIMIT | % MOIST. | LIQUID LIMIT | DRY WEIGHT | LBS PER CU.FT. | NO. OF BLOWS PER 6-IN. | % T C R | % R Q D |
|--------------|--------|---------|---|---------------|------------------|----------|-----------------|------------|----------------|---------------------------|------------------|------------------|
| | | | SURFACE ELEVATION: 114.7 | | | | | | | | | |
| 40 | | X | Moist, Medium Dense, Gray Silt with Sand | | | | | | | 4 8-14 | | |
| 45 | | X | Moist, Very Stiff, Dark Gray Clay with Some Lignite | | | | | | | 10 13-15 | | |
| 50 | | X | Moist, Very Stiff, Light Gray Clay with Trace Lignite | | | | | | | 5 10-15 | | |
| 55 | | X | Moist, Very Stiff to Hard, Dark Gray Clay with Some Sand and Some Lignite | | | | | | | 4 9-16 | | |
| 60 | | X | Moist, Very Stiff to Hard, Dark Gray Clay with Some Sand and Some Lignite | | | | | | | 7 12-19 | | |
| 65 | | X | Moist, Very Stiff to Hard, Dark Gray Clay with Some Sand and Some Lignite | | | | | | | 7 10-16 | | |
| 70 | | X | Moist, Very Dense, Dark Brown and Dark Gray | | | | | | | 19 21-35 | | |

REMARKS: West Bridge End

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**


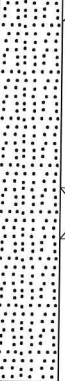


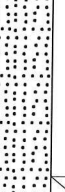

BORING NO. 1
PAGE 3 OF 3

JOB NO. 070418 Bradley County
JOB NAME: Halfway Creek Str. & Apprs. (S)
Route 160 Sec. 9
STATION: 208+43
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LOGGED BY: Troy Frazier

DATE: July 31, 2019
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Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 100.9

| DEPTH FT. | SYMBOL | SAMPLES | DESCRIPTION OF MATERIAL | SOIL GROUP | PLASTIC LIMIT | % MOIST. | LIQUID LIMIT | DRY WEIGHT | LBS PER CU.FT. | NO. OF BLOWS PER 6-IN. | % T C R | % R Q D |
|--------------|---|---------|--|---------------|------------------|----------|-----------------|------------|----------------|---------------------------|---------|---------|
| | | | SURFACE ELEVATION: 114.7 | | | | | | | | | |
| 75 |  | X | Sand with Layers of Clay | | | | | | | 13 52-35 (10") | | |
| 80 |  | X | Moist, Very Dense, Dark Brown and Dark Gray Sand with Some Clay Layers | | | | | | | 25 50-25 (2") | | |
| 85 |  | X | | | | | | | | 25 25-50 (10") | | |
| 90 |  | X | | | | | | | | 50 50 (2") | | |
| 95 |  | X | Moist, Very Dense, Gray Sand | | | | | | | 60 (5") | | |
| 100 |  | X | | | | | | | | 60 (5") | | |
| | | | Boring Terminated | | | | | | | 40 60 (5") | | |
| 105 | | | | | | | | | | | | |

REMARKS: West Bridge End

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 2
PAGE 1 OF 3

JOB NO. 070418 Bradley County
JOB NAME: Halfway Creek Str. & Apprs. (S)
Route 160 Sec. 9
STATION: 210+35
LOCATION: 30' Right of Construction Centerline
LOGGED BY: Troy Frazier

DATE: July 30, 2019
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 101.5

| DEPTH FT. | SYMBOL | SAMPLES | DESCRIPTION OF MATERIAL | SOIL GROUP | PLASTIC LIMIT | % MOIST. | LIQUID LIMIT | DRY WEIGHT | LBS PER CU.FT. | NO. OF BLOWS PER 6-IN. | % T C R | % R Q D |
|--------------|--------|---------|--|---------------|------------------|----------|-----------------|------------|----------------|---------------------------|------------------|------------------|
| | | | SURFACE ELEVATION: 115.1 | | | | | | | | | |
| | | | Asphalt | | | | | | | | | |
| 5 | | | Moist, Soft, Brown Sandy Clay with Some Gravel | NT* | | | | | | 2 2-2 | | |
| 10 | | | Moist, Loose, Light Brown Silty Sand | NT | | | | | | 3 4-5 | | |
| 15 | | | Moist, Stiff, Dark Gray Fat Clay with Trace Lignite (Claiborne Group, Cockfield Formation) | CH | 22 | | 55 | | | 3 4-5 | | |
| 20 | | | Moist, Stiff, Dark Gray Lean Clay | CL | 20 | | 44 | | | 3 6-7 | | |
| 25 | | | Moist, Stiff, Dark Gray Lean Clay with Some Sand | CL | 25 | | 47 | | | 5 5-8 | | |
| 30 | | | Moist, Stiff, Dark Gray Lean Clay | CL | 44 | | 22 | | | 5 6-9 | | |
| 35 | | | | | | | | | | | | |

REMARKS: * NT = not tested due to insufficient sample.

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 2
PAGE 2 OF 3

JOB NO. 070418 Bradley County
JOB NAME: Halfway Creek Str. & Apprs. (S)
Route 160 Sec. 9
STATION: 210+35
LOCATION: 30' Right of Construction Centerline
LOGGED BY: Troy Frazier

DATE: July 30, 2019
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 101.5

| DEPTH FT. | SYMBOL | SAMPLES | DESCRIPTION OF MATERIAL | SOIL GROUP | PLASTIC LIMIT | % MOIST. | LIQUID LIMIT | DRY WEIGHT | LBS PER CU.FT. | NO. OF BLOWS PER 6-IN. | % T C R | % R O D |
|--------------|--------|---------|---|---------------|------------------|----------|-----------------|------------|----------------|---------------------------|---------------|---------------|
| | | | SURFACE ELEVATION: 115.1 | | | | | | | | | |
| 40 | | X | Wet, Dense, Dark Brown Silt | ML | NP | | | | | 8 16-30 | | |
| | | X | | ML | NP | | | | | 11 16-20 | | |
| 45 | | X | Wet, Medium Dense, Dark Brown Silt | ML | 24 | | 31 | | | 6 14-16 | | |
| | | X | | - | | | | | | | | |
| 50 | | X | Moist, Medium Dense, Dark Gray Silt with Sand and Trace Lignite | ML | NP | | | | | 7 12-15 | | |
| | | X | | - | | | | | | | | |
| 55 | | X | Moist, Very Stiff, Dark Gray Lean Clay | | 19 | | 40 | | | 7 11-16 | | |
| | | X | | - | | | | | | | | |
| 60 | | X | Moist, Very Stiff, Dark Brown Fat Clay with Lignite Layers | CH | 29 | | 77 | | | 6 12-18 | | |
| | | X | | - | | | | | | | | |
| 65 | | X | Moist, Very Stiff, Dark Gray Fat Clay with Some | | 24 | | 62 | | | 4 9-16 | | |
| | | X | | CH | | | | | | | | |
| 70 | | X | | | | | | | | | | |

REMARKS: * NT = not tested due to insufficient sample.

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 2
PAGE 3 OF 3

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LOGGED BY: Troy Frazier

DATE: July 30, 2019
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 101.5

| DEPTH FT. | SYMBOL | SAMPLES | DESCRIPTION OF MATERIAL | SOIL GROUP | PLASTIC LIMIT | % MOIST. | LIQUID LIMIT | DRY WEIGHT | LBS PER CU.FT. | NO. OF BLOWS PER 6-IN. | % T C R | % R Q D |
|--------------|--------|---------|--|---------------|------------------|----------|-----------------|------------|----------------|---------------------------|---------------|---------------|
| | | | SURFACE ELEVATION: 115.1 | | | | | | | | | |
| | | X | Lignite | CH | 23 | | 58 | | | 6 11-16 | | |
| 75 | | | | - | | | | | | | | |
| | | X | Moist, Very Stiff, Dark Gray Lean Clay | CL | 16 | | 39 | | | 6 10-16 | | |
| 80 | | | | - | | | | | | | | |
| | | X | Moist, Hard, Dark Brown Lean Clay | CL | 18 | | 47 | | | 7 15-16 | | |
| 85 | | | | - | | | | | | | | |
| | | X | Moist, Very Stiff, Dark Brown Fat Clay | CH | 20 | | 54 | | | 7 14-16 | | |
| 90 | | | | - | | | | | | | | |
| | | X | Moist, Hard, Dark Brown Fat Clay | CH | 18 | | 56 | | | 7 13-19 | | |
| 95 | | | | - | | | | | | | | |
| | | X | Moist, Very Stiff to Hard, Dark Brown Fat Clay with Trace Lignite | CH | 17 | | 57 | | | 9 15-18 | | |
| 100 | | | | - | | | | | | | | |
| | | X | | CH | 17 | | 55 | | | 9 13-17 | | |
| 105 | | | Boring Terminated | | | | | | | | | |

REMARKS: * NT = not tested due to insufficient sample.



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

April 16, 2018

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 070418
Halfway Creek Str. & Apprs. (S)
Route 160 Section 9
Bradley 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 bridge crossing Halfway Creek on Highway 160. Samples were taken in the existing travel lanes and ditch line. The shoulders are not paved within the project limits.

Based on laboratory results of samples obtained, the subgrade soils consist primarily of moderately plastic sandy clay. The subgrade soils are expected to provide a stable working platform with conventional processing if the weather is favorable during construction. If embankment encroaches into the existing ditch line undercut will be required. Undercut may vary based on seasonal conditions but is anticipated to be no more than two feet. There were no slides observed within the project limits.

The detour alignment crosses land that has been logged and due to recent flooding there is debris from the logging activities and standing water within the project limits. The water should be drained and all soft unstable organic material should be undercut prior to detour construction. The undercut may be backfilled with locally available unspecified material.

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

Table with 3 columns: Type, Asphalt Cement %, Mineral Aggregate %. Rows include Surface Course, Binder Course, and Base Course.

Handwritten signature of 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 - 04/02/2018
JOB NUMBER - 070418

SEQUENCE NO. - 1
MATERIAL CODE - SSRV
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 06
DISTRICT NO. - 07

JOB NAME - HALFWAY CREEK STR. & APPRS. (S)

* STATION LIMITS R-VALUE AT 240 psi *

BEGIN JOB - END JOB 12

RESILIENT MODULUS
STA. 099 + 00 8514

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. | 070418 | Material Code | SSRVPS |
| Date Sampled: | 2/12/18 | Station No.: | 099+00 |
| Date Tested: | March 2, 2018 | Location: | 21'RT |
| Name of Project: | HALFWAY CREEK STR. & APPRS. (S) | | |
| County: | Code: 6 | Name: | BRADLEY |
| Sampled By: | THORNTON/FRAZIER | | |
| Lab No.: | 20180315 | Depth: | 0-5 |
| Sample ID: | RV63 | AASHTO Class: | A-4 (0) |
| 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 | 3.95 |
| Middle | 3.95 |
| Bottom | 3.95 |
| Average | 3.95 |
| Membrane Thickness (in): | 0.01 |
| Height of Specimen, Cap and Base (in): | 8.01 |
| Height of Cap and Base (in): | 0.00 |
| Initial Length, Lo (in): | 8.01 |
| Initial Area, Ao (sq. in): | 12.18 |
| Initial Volume, AoLo (cu. in): | 97.56 |

3. Soil Specimen Weight:

| | |
|------------------------------|---------|
| Weight of Wet Soil Used (g): | 3391.20 |
|------------------------------|---------|

4. Soil Properties:

| | |
|-------------------------------|-------|
| Optimum Moisture Content (%): | 9.9 |
| Maximum Dry Density (pcf): | 122.4 |
| 95% of MDD (pcf): | 116.3 |
| In-Situ Moisture Content (%): | N/A |

5. Specimen Properties:

| | |
|-------------------------------------|---------|
| Wet Weight (g): | 3391.20 |
| Compaction Moisture content (%): | 9.8 |
| Compaction Wet Density (pcf): | 132.44 |
| Compaction Dry Density (pcf): | 120.62 |
| Moisture Content After Mr Test (%): | 9.7 |

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

#VALUE!

7. Resilient Modulus, Mr:

6675(Sc)^-0.04992(S3)^0.50897

8. Comments

9. Tested By:

G.WENDLAND

Date: March 2, 2018

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

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

Job No. 070418 **Material Code** SSRVPS
Date Sampled: 2/12/18 **Station No.:** 099+00
Date Tested: March 2, 2018 **Location:** 21'RT

Name of Project: HALFWAY CREEK STR. & APPRS. (S)

County: Code: 6 **Name:** BRADLEY

Sampled By: THORNTON/FRAZIER

Lab No.: 20180315

Sample ID: RV63

LATITUDE:

Depth: 0-5

AASHTO Class: A-4 (0)

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. LVD T 1 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 | 25.0 | 22.4 | 2.5 | 2.0 | 1.8 | 0.2 | 0.00088 | 0.00011 | 16,778 |
| Sequence 2 | 6.0 | 4.0 | 47.1 | 44.5 | 2.5 | 3.9 | 3.7 | 0.2 | 0.00182 | 0.00023 | 16,098 |
| Sequence 3 | 6.0 | 6.0 | 69.6 | 66.3 | 3.3 | 5.7 | 5.4 | 0.3 | 0.00284 | 0.00035 | 15,368 |
| Sequence 4 | 6.0 | 8.0 | 93.3 | 87.6 | 5.7 | 7.7 | 7.2 | 0.5 | 0.00387 | 0.00048 | 14,884 |
| Sequence 5 | 6.0 | 10.0 | 116.7 | 108.5 | 8.2 | 9.6 | 8.9 | 0.7 | 0.00497 | 0.00062 | 14,359 |
| Sequence 6 | 4.0 | 2.0 | 24.6 | 22.1 | 2.5 | 2.0 | 1.8 | 0.2 | 0.00110 | 0.00014 | 13,179 |
| Sequence 7 | 4.0 | 4.0 | 46.0 | 43.3 | 2.7 | 3.8 | 3.6 | 0.2 | 0.00226 | 0.00028 | 12,606 |
| Sequence 8 | 4.0 | 6.0 | 67.1 | 64.4 | 2.8 | 5.5 | 5.3 | 0.2 | 0.00348 | 0.00043 | 12,161 |
| Sequence 9 | 4.0 | 8.0 | 90.8 | 85.6 | 5.1 | 7.5 | 7.0 | 0.4 | 0.00465 | 0.00058 | 12,101 |
| Sequence 10 | 4.0 | 10.0 | 114.4 | 106.8 | 7.7 | 9.4 | 8.8 | 0.6 | 0.00586 | 0.00073 | 11,985 |
| Sequence 11 | 2.0 | 2.0 | 23.7 | 20.9 | 2.8 | 1.9 | 1.7 | 0.2 | 0.00153 | 0.00019 | 8,964 |
| Sequence 12 | 2.0 | 4.0 | 44.2 | 41.3 | 2.8 | 3.6 | 3.4 | 0.2 | 0.00312 | 0.00039 | 8,711 |
| Sequence 13 | 2.0 | 6.0 | 64.2 | 61.3 | 2.9 | 5.3 | 5.0 | 0.2 | 0.00473 | 0.00059 | 8,514 |
| Sequence 14 | 2.0 | 8.0 | 86.7 | 82.3 | 4.4 | 7.1 | 6.8 | 0.4 | 0.00608 | 0.00076 | 8,902 |
| Sequence 15 | 2.0 | 10.0 | 109.1 | 102.3 | 6.8 | 9.0 | 8.4 | 0.6 | 0.00732 | 0.00091 | 9,192 |

TESTED BY i. WENDLAND

DATE March 2, 2018

REVIEWED BY _____

DATE _____

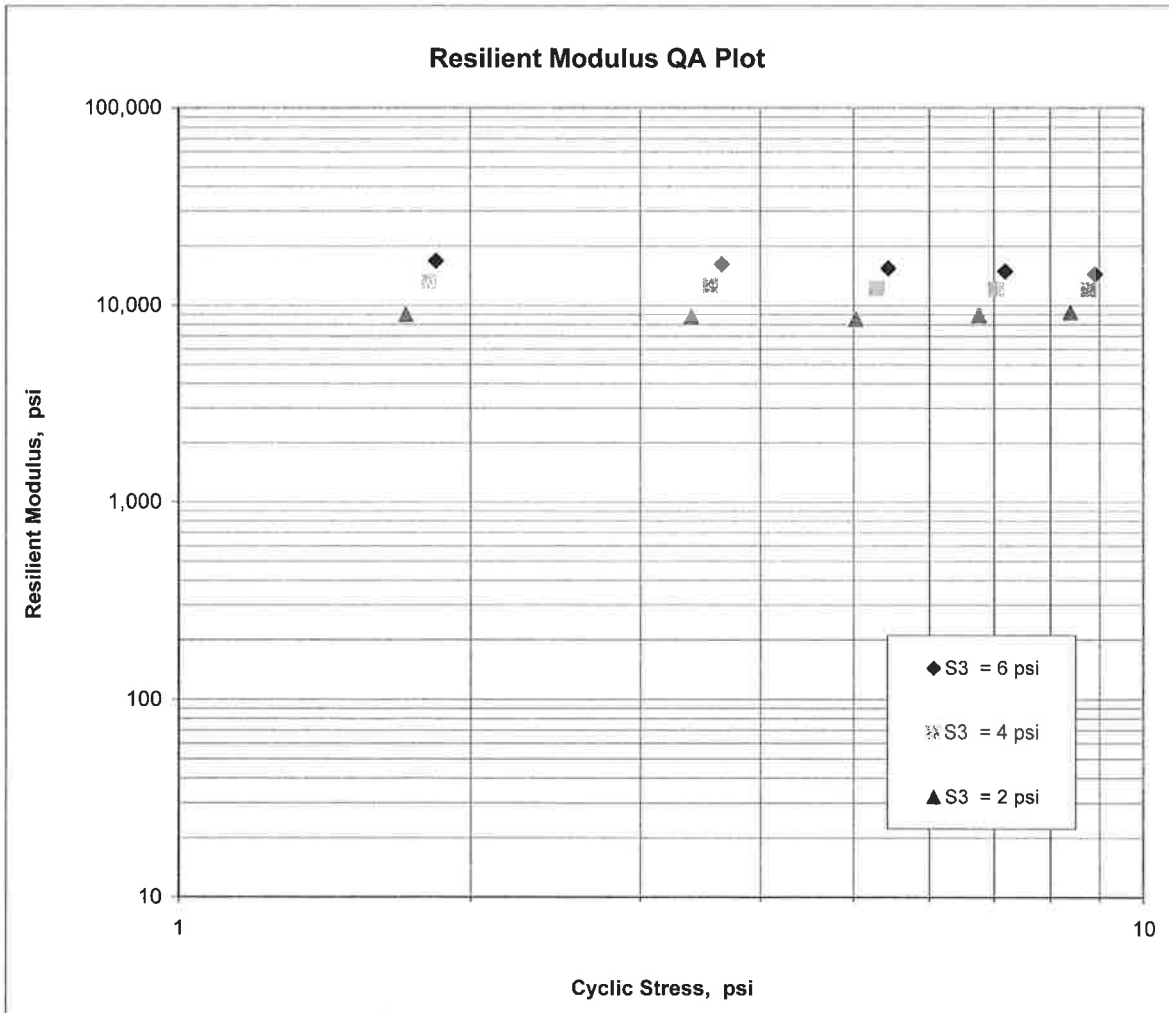
**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION**

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

| | | | |
|-------------------------|---------------------------------|--------------------------------|---------|
| Job No.: | 070418 | Material Code: | SSRVPS |
| Date Sampled: | 2/12/18 | Station No.: | 099+00 |
| Date Tested: | March 2, 2018 | Location: | 21'RT |
| Name of Project: | HALFWAY CREEK STR. & APPRS. (S) | | |
| County: | Code: 6 | Name: | BRADLEY |
| Sampled By: | THORNTON/FRAZIER | | |
| Lab No.: | 20180315 | Depth: | 0-5 |
| Sample ID: | RV63 | AASHTO Class: | A-4 (0) |
| LATITUDE: | | Material Type (1 or 2): | 2 |
| | | LONGITUDE: | |

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

$K_1 = \underline{6,675}$
 $K_2 = \underline{-0.04992}$
 $K_5 = \underline{0.50897}$
 $R^2 = \underline{0.98}$



JOB: 070418

Arkansas State Highway Transportation Department

JOB NAME: HALFWAY CREEK STR. & APPRS. (S)

Materials Division

COUNTY NO. 6 DATE TESTED 3/29/2018

Michael Benson, Materials Engineer

| STA.# | LOC. | DEPTH | COLOR | | | | | | L.L. | P.I. | SOIL CLASS | LAB #: | %MOISTURE |
|--------|-------|-------|-------|----|-----|-----|-----|------|------|------|------------|--------|-----------|
| | | | | #4 | #10 | #40 | #80 | #200 | | | | | |
| | | | | S | I | E | V | E | S | | | | |
| 099+00 | 21 RT | 0-5 | BROWN | 82 | 76 | 70 | 57 | 42 | ND | NP | A-4(0) | RV63 | |
| 099+00 | 05 RT | 0-5 | BR/GR | 95 | 89 | 79 | 62 | 48 | 20 | 7 | A-4(0) | S57 | 13 |
| 099+00 | 12 RT | 0-5 | BROWN | 94 | 82 | 68 | 51 | 38 | 19 | 7 | A-4(0) | S58 | 11.9 |
| 099+00 | 21 RT | 0-5 | BROWN | 61 | 54 | 48 | 36 | 26 | ND | NP | A-2-4(0) | S59 | 8.8 |
| 105+00 | 05 LT | 0-5 | BROWN | 91 | 83 | 73 | 57 | 44 | 27 | 14 | A-6(2) | S60 | 14.2 |
| 105+00 | 12 LT | 0-5 | BROWN | 95 | 91 | 83 | 63 | 49 | 25 | 12 | A-6(2) | S61 | 17.1 |
| 105+00 | 21 LT | 0-5 | BR/GR | 92 | 86 | 79 | 61 | 46 | 19 | 5 | A-4(0) | S62 | 15.4 |

comments: W=MULTIPLE LAYERS

Monday, April 02, 2018

JOB: 070418

Arkansas State Highway Transportation Department
Materials Division

DATE TESTED
3/29/2018

JOB NAME: HALFWAY CREEK STR. & APPRS. (S)

COUNTY NO. 6

Michael Benson, Materials Engineer

STA.# LOC.

PAVEMENT SOUNDINGS

| | | | | |
|--------|-------|-----------------|---------------|----------------------------|
| 099+00 | 05 RT | ACHMSC 4.0W | ACHMBC 1.5 | AGG. BASE CRS. CL-7 6.0 |
| 099+00 | 12 RT | ACHMSC 3.0W | ACHMBC --- | AGG. BASE CRS. CL-7 5.0 |
| 099+00 | 21 RT | ACHMSC --- | ACHMBC --- | AGG. BASE CRS. CL-7 --- |
| 105+00 | 05 LT | ACHMSC 5.0W | ACHMBC 1.0 | AGG. BASE CRS. CL-7 7.0 |
| 105+00 | 12 LT | ACHMSC 4.25W | ACHMBC --- | AGG. BASE CRS. CL-7 6.0 |
| 105+00 | 21 LT | ACHMSC --- | ACHMBC --- | AGG. BASE CRS. CL-7 --- |

comments: W=MULTIPLE LAYERS

