

ARKANSAS DEPARTMENT OF TRANSPORTATION



**SUBSURFACE INVESTIGATION**

STATE JOB NO. 040622

FEDERAL AID PROJECT NO. NHPP-0072(46)

WASHINGTON CO. LINE - SOUTH STRS. & APPRS. (S)

STATE HIGHWAY 59 SECTION 5

IN CRAWFORD 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.



August 21, 2017

**TO:** Mr. Rick Ellis, Bridge Engineer

**SUBJECT:** Job No. 040622  
Washington Co. Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
Crawford County

Transmitted herewith are a brief summary of the geology and site conditions, D50 analysis test results, unconfined compressive strength results, RMR, and the logs of the borings conducted for the structures and approaches of the above referenced project. The samples obtained by Standard Penetration Tests were brought to the laboratory and visually classified by experienced lab personnel to confirm the field identifications. The rock cores are available for inspection at the Materials Division.

**Site 1 – Mountain Fork Tributary Creek**

Based on the depth at which bedrock was encountered, it is anticipated that both end bents will be founded on piling. Preboring may be necessary to achieve minimum penetration requirements. No borings were obtained at intermediate bents 2 or 3, station 68+40 and 68+80, due to inaccessibility caused by low bridge clearance and high water in the channel. Correlating the elevation of bedrock between the bridge end boring logs, competent bedrock should be encountered less than 15 feet below ground level. Based on this information and plans provided by Bridge Division, it is anticipated that both intermediate bents will be founded on spread footings. Spread Footings founded in competent Limestone should be sized based on the values provided in Table 1.

TABLE 1 – Bearing Capacity Recommendations for Spread Footings

Foundation Description	Nominal Bearing Resistance (ksf)	Factored Bearing Resistance (ksf)	Bearing Resistance at Service Limit State (ksf)
Spread Footings	296	133	40

**Site 2 – Mountain Fork Creek**

Based on the depth at which bedrock was encountered, it is anticipated that both end bents will be founded on piling and both intermediate bents will be founded on spread footings. Spread footings founded in competent shale should be sized based on the values provided in Table 2. The AASHTO Bridge Design Specification, 7<sup>th</sup> edition, specifies that bearing resistance for spread footings on rock can be designed utilizing the RMR system to determine the bearing resistance or “other visual systems that have proven to yield accurate results may be used in lieu of the specified method.” The RMR system yields unreasonably low bearing resistances for the encountered shale material. Table C10.6.2.6.1-1 for “Compaction shale or other highly argillaceous rock in sound condition” and previous experience in similar conditions were used to determine the recommended bearing resistance.

TABLE 2 – Bearing Capacity Recommendations for Spread Footings

Foundation Description	Factored Bearing Resistance (ksf)
Spread Footings	20

**Site 3 – Whitzen Hollow Creek**

Based on the depth at which bedrock was encountered, it is anticipated that both end bents will be founded on piling. No borings were obtained at intermediate bents 2 or 3, station 181+32 and 181+82, due to inaccessibility caused by low bridge clearance and conflict with overhead utilities. Correlating the elevation of bedrock between the bridge end boring logs, it is anticipated that competent bedrock should be shallower than 15 feet below ground level. Based on this information and correspondence from Bridge Design, it is anticipated that both intermediate bents will be founded on spread footings. Spread footings founded in competent shale should be sized based on the values provided in Table 3. The AASHTO Bridge Design Specification, 7<sup>th</sup> edition, specifies that bearing resistance for spread footings on rock can be designed utilizing the RMR system to determine the bearing resistance or “other visual systems that have proven to yield accurate results may be used in lieu of the specified method.” The RMR system yields unreasonably low bearing resistances for the encountered shale material. Table C10.6.2.6.1-1 for “Compaction shale or other highly argillaceous rock in sound condition” and previous experience in similar conditions were used to determine the recommended bearing resistance.

TABLE 3 – Bearing Capacity Recommendations for Spread Footings

Foundation Description	Factored Bearing Resistance (ksf)
Spread Footings	20

**Site 4 – Huey Creek**

Based on the depth at which bedrock was encountered, it is anticipated that both end bents will be founded on piling. Preboring may be necessary to achieve minimum penetration requirements. An unmapped fault was discovered between stations 286+49 and 287+29. No boring was obtained at bent 2, station 286+89, due to inaccessibility caused by low bridge clearance and steep banks. Utilizing the data obtained from adjacent borings and assuming competent rock will be encountered at a depth shallower than 15 feet below ground level, it is anticipated that bent 2 will be founded on a spread footing. Based on plans provided by Bridge Division and the depth to competent rock, it is anticipated that bent 3 will also be founded on a spread footing. Spread Footings founded in competent Limestone should be sized based on the values provided in Table 4.

TABLE 4 – Bearing Capacity Recommendations for Spread Footings

Foundation Description	Nominal Bearing Resistance (ksf)	Factored Bearing Resistance (ksf)	Bearing Resistance at Service Limit State (ksf)
Spread Footings	358	161	40

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 4 Engineer  
G.C. File

## GEOLOGY AND SITE CONDITIONS

Job No. 040622

Washington County Line – South Strs. & Apprs. (S)

Route 59 Section 5

Crawford County

### **Site Conditions**

There are four bridges associated with this job. **Bridge 1** is the northernmost bridge and crosses over Mountain Fork Tributary Creek. The existing bridge is a five span bridge constructed of concrete deck supported by spread footings and concrete end walls. The guardrail is composed of steel with concrete posts. Riprap has been placed on the abutment slopes. A telecommunication line parallels the west side of the roadway, buried north and south of the bridge and overhead over the channel. Limestone is exposed in the channel. A cave is located in a bluff a short distance east of the bridge. The channel was dry at the time of the subsurface investigation. The area around the bridge is primarily wooded with a residence located upstation and downstation of the bridge, on the right side of the roadway.

**Bridge 2** crosses over Mountain Fork Creek. The existing bridge is a six span bridge constructed of cast-in-place concrete deck supported by spread footings. The guardrail is composed of steel with concrete posts. Overhead power lines cross the roadway a short distance upstation from the bridge. The upstation side of the channel is moderately wooded. The downstation side of the channel is lined with trees with pasture beyond. The stream flows to the southwest.

**Bridge 3** crosses over Whitzon Hollow Creek. The existing bridge is a six span bridge constructed of cast-in-place concrete deck supported by spread footings. The guardrail is composed of steel with concrete posts. Overhead power lines parallel the east side of the bridge then cross the roadway north of the bridge. The area around the bridge is moderately to heavily wooded. The stream flows to the south-southwest.

**Bridge 4** is the southernmost bridge and crosses over Huey Creek. The existing bridge is a four span bridge constructed of concrete deck supported by spread footings. The deck is supported by nine sets of steel beams. The guardrail is composed of steel with concrete posts. A buried telecommunication line parallels the west side of the roadway. The area around the bridge is moderately to heavily wooded. A residence is located downstation from the bridge on the right side of the roadway. The stream flows to the southwest.

### **Site Geology**

**Bridge 1** is located on the Pitkin Formation. The Pitkin Formation is usually a fine- to coarse-grained, oolitic, bioclastic limestone. Minor sandstone has been reported near the top of the unit in the northwest. The unit becomes shalier to the south. The thickness of the Pitkin Limestone ranges from a thin edge to over 400 feet. The average thickness is about 50 feet in the west and about 200 feet in the east. The Pitkin Formation occasionally has dissolutional features, such as sinkholes, caves, and enlarged fissures. Only one boring encountered a soil-filled cavity at 14.2 to 14.3 feet below ground level. Bedrock was encountered at depths of 11.0 to 16.0 feet below ground level.

**Bridge 2** is located on the Fayetteville Shale. The Fayetteville is a black, fissile, concretionary, clay shale. Dark-gray, fine-grained limestones commonly are interbedded with the shales in north-central Arkansas. Septarian concretions are common in lower beds of the Fayetteville, but may be found throughout the formation. The Fayetteville Shale ranges in thickness from 10 to 400 feet. Bedrock was encountered at depths of 4.1 to 9.5 feet below ground level. There are east-west trending normal faults mapped to the south of Bridge 2. No faults were encountered during the subsurface investigation of this job site.

**Bridge 3** is located on the Bloyd Formation. In western Arkansas, the Bloyd Formation consists of five members (in ascending order): the Brentwood Limestone, Woolsey, Dye shale, Kessler Limestone, and the Trace Creek. The Brentwood limestone is a sequence of limestones separated by thick intervals of dark shale. The Woolsey member is composed of terrestrial sediments comprised of dark-gray, fissile shale, often interbedded with thin siltstones. A thin coal bed, called the Baldwin coal, occurs at or near the top of the Woolsey member. The marine deposited Dye shale is predominantly a dark-gray shale with scattered calcareous concretions. Where underlain by the Woolsey Member, the Dye Shale frequently has a bed of calcareous sandstone with scattered clay pebbles and quartz granules, called the caprock, at its base. The Kessler member is either a single unit of limestone or a sequence of limestone and shale interbedded. The limestones are bioclastic, oolitic, traces of clay-pebble conglomerate, and minor amounts of calcareous sandstone. The Trace Creek Shale member is composed of dark-gray shales with some thin beds of sandstone. Typical thicknesses for the Bloyd Formation range from 175 to 200 feet.

At **Bridge 3**, the section of the Bloyd Formation encountered consists primarily of shales with some beds of sandy limestone (possibly part of the Brentwood limestone). Bedrock was encountered at depths of 19.0 to 20.0 feet below ground level. There are numerous east-west trending normal faults in the area. No faults were encountered during the subsurface investigation of this job site.

During the subsurface investigation of **Bridge 4**, an unmapped fault was discovered between stations 286+49 and 287+29. Borings at 287+29 and 287+69 encountered shales, limestones, and a coal seam of the Bloyd Formation. Boring at Station 286+49 encountered calcareous sandstone, most likely part of the Prairie Grove member of the Hale Formation. The Hale Formation is made up of two members: a lower Cane Hill member and an upper Prairie Grove member. The Prairie Grove member is composed of thin to massive, often crossbedded, light-gray to dark-brown, limy sandstone or variously sandy limestone with lenses of relatively pure, highly fossiliferous limestone and oolitic limestone. The reported thickness of the Hale Formation ranges from a few feet to more than 300 feet. The Bloyd Formation stratigraphically overlies the Hale Formation. Bedrock was encountered in borings at depths ranging from 14.0 to 17.0 feet below ground level.

## Subsurface Conditions

Based on the results of the borings at stations 68+00 to 69+20 (**Bridge 1**-Mountain Fork Tributary Creek), the subsurface stratigraphy may be generalized as follows:

- 0 to 11.0 Feet: Consists of moist, stiff to hard, brown **sandy clay with gravel to sandy clay with gravel and cobbles**.
- 11.0 to 16.0 Feet\*: Varies from moist hard to very hard, brown **sandy clay with gravel to sandy clay with gravel and cobbles** to unweathered to slightly weathered, moderately hard, gray **limestone**.
- 16.0 to 18.8 Feet: Consists of unweathered to weathered, moderately hard, gray **limestone**.
- 18.8 to 20.5 Feet: Consists of highly weathered to weathered, soft to medium hard, dark gray **shale**.
- 20.5 to 27.0 Feet: Consists of unweathered to slightly weathered, moderately hard, gray **limestone**.
- 27.0 to 35.0 Feet: Consists of unweathered to slightly weathered, moderately hard, gray **limestone with occasional to frequent shale seams and layers**.
- 35.0 to 42.0 Feet: Consists of weathered, medium hard, dark gray **shale**.

\* A soil-filled cavity was encountered at 14.2 to 14.3 feet below ground level.

Based on the results of the borings at stations 111+80 to 113+13 (**Bridge 2**-Mountain Fork Creek), the subsurface stratigraphy may be generalized as follows:

- 0 to 4.1 Feet: Varies from moist, very hard, brown **sandy clay with gravel and cobbles** to medium dense, brown **sand with gravel and cobbles**.
- 4.1 to 9.5 Feet: Varies from moist, medium dense, brown **sand with gravel and cobbles** to slightly weathered, medium hard, dark gray **shale**.
- 9.5 to 28.7 Feet: Consists of slightly weathered to unweathered, medium hard, dark gray **shale** with occasional fractures.
- 28.7 to 43.7 Feet: Consists of slightly weathered to unweathered, medium hard, dark gray **shale** with occasional fractures. Some occasional limestone seams and layers are encountered in this zone.

Based on the results of the borings at 180+92 to 182+22 (**Bridge 3**-Whitzen Hollow Creek), the subsurface stratigraphy may be generalized as follows:

- 0 to 17.5 Feet: Varies from moist, medium dense to very dense, brown **sand with clay**

**and gravel to gravel with sand to very stiff to very hard, brown sandy clay with gravel.**

- 17.5 to 19.5 Feet: Varies from moist, very dense, brown **sand with clay and gravel to cobbles and boulders.**
- 19.5 to 32.1 Feet: Consists of highly weathered to weathered, soft to medium hard, dark gray **shale.**
- 32.1 to 41.9 Feet: Consists of weathered to slightly weathered, medium hard, dark gray **shale with occasional limestone layers.**

Based on the results of the boring at 286+49 (**Bridge 4-Huey Creek**), the subsurface stratigraphy may be generalized as follows:

- 0 to 9.0 Feet: Consists of moist, stiff, brown **sandy clay with gravel.**
- 9.0 to 15.2 Feet: Varies from moist, medium dense to very dense, brown **sand with gravel to wet, very dense, brown gravel with clay and sand.**
- 15.2 to 35.7 Feet: Consists of unweathered, well cemented, calcareous, gray **sandstone.**

Based on the results of the borings at 287+29 to 287+69 (**Bridge 4-Huey Creek**), the subsurface stratigraphy may be generalized as follows:

- 0 to 9.0 Feet: Consists of moist, stiff to very stiff, brown **sandy clay.**
- 9.0 to 14.0 Feet: Varies from moist, stiff, brown **sandy clay with gravel** to medium dense, brown **gravel with clay and sand.**
- 14.0 to 17.0 Feet: Varies from wet, dense, brown **gravel with clay and sand** to highly weathered, medium hard, dark gray **shale.**
- 17.0 to 20.8 Feet: Varies from slightly weathered, medium hard, dark gray **shale** to slightly weathered to unweathered, moderately hard, gray **limestone.**
- 20.8 to 24.8 Feet: Varies from slightly weathered, medium hard, dark gray **shale** to unweathered, moderately hard, gray **limestone.** A 0.3 foot coal seam was encountered in this zone.
- 24.8.0 to 27.9 Feet: Varies from weathered, medium hard, dark gray **shale** to unweathered, moderately hard, gray **limestone.**
- 27.9 to 40.0 Feet: Consists of unweathered, moderately hard, gray **limestone.**



**D<sub>50</sub> AGGREGATE ANALYSIS  
FOR SCOUR CALCULATIONS**

<b>Job No. 040622</b>					
<b>Creek Name</b>	<b>Station</b>	<b>Sample Type</b>	<b>Location</b>	<b>Depth (FT)</b>	<b>Aggregate Size (D50) (IN)</b>
Mountain Fork Tributary Creek	68+66	Creek Bank	20' Rt. C.L. Construction	N/A	0.132
Mountain Fork Creek	112+25	Creek Bank	32' Lt. C.L. Construction	N/A	0.110
Whitzen Hollow Creek	181+77	Creek Bank	22' Lt. C.L. Construction	N/A	0.0070
Huey Creek	286+89	Creek Bank	25' Lt. C.L. Construction	N/A	0.0469

# Rock Core Unconfined Compression Test Summary

Project Number: 040622  
 Project Name: Washington Co. Line - South Strs. & Apprs. (S)  
 Date Tested: 7/3/2017

Station	Location	Sample No.	Depth (ft.)	Diameter (in)	Height (in)	Total Load (lbs.)	Correction Factor	Stress (psi)	Remarks
68+00	6' Rt	1	16.0	1.75	3.55	21,410	1.00	8,901	MFTC
68+00	6' Rt	2	18.0	1.75	3.50	34,470	1.00	14,331	MFTC
69+20	6' Lt	3	16.0	1.75	3.50	6,920	1.00	2,877	MFTC
69+20	6' Lt	4	18.0	1.75	3.50	21,310	1.00	8,860	MFTC
69+20	6' Lt	5	20.5	1.75	3.50	19,710	1.00	8,194	MFTC
180+92	5' Rt	6	22.7	1.75	X	X	X	Broken	WHC - Shale
180+92	5' Rt	7	23.2	1.75	4.40	5,740	1.00	2,386	WHC - Shale
182+22	5' Lt	8	35.5	1.75	3.60	4,580	1.00	1,904	WHC - Shale
286+49	6' Rt	9	15.2	1.75	4.00	10,620	1.00	4,415	Huey - SS
286+49	6' Rt	10	17.5	1.75	3.80	29,800	1.00	12,389	Huey - SS
287+69	6' Lt	11	17.0	1.75	3.80	37,800	1.00	15,715	Huey - LS
287+69	6' Lt	12	28.4	1.75	5.50	38,590	1.00	16,043	Huey - LS
287+69	6' Lt	13	20.6	1.75	5.40	23,880	1.00	9,928	Huey - LS
287+29	5' Lt	14	16.5	1.75	3.50	19,130	1.00	7,953	Huey - LS
287+29	5' Lt	15	23.5	1.75	3.80	15,470	1.00	6,431	Huey - LS
112+13	C.L.	16	7.5	1.75	3.90	4,710	1.00	1,958	MFC - Shale
112+13	C.L.	17	12.0	X	X	X	X	Broken	MFC - Shale
111+80	3' Rt	18	13.5	1.75	4.50	2,880	1.00	1,197	MFC - Shale
111+80	3' Rt	19	15.0	1.75	3.75	3,870	1.00	1,609	MFC - Shale
113+13	53' Lt	20	11.0	1.75	4.00	2,200	1.00	914	MFC - Shale
113+13	53' Lt	21	14.0	X	X	X	X	Broken	MFC - Shale
112+66	C.L.	22	4.9	X	X	X	X	Broken	MFC - Shale
112+66	C.L.	23	10.0	1.75	3.50	3,850	1.00	1,601	MFC - Shale
112+66	C.L.	24	12.3	1.75	3.50	3,430	1.00	1,426	MFC - Shale

\* Please note any broken samples, fractures or other characteristics of sample in Remarks.

## ROCK MASS RATING SUMMARY

JOB # 040622

**SAMPLE #1**

Station/Location	68+00/ 6' RT
Depth (ft)	16
<b>Relative Rating</b>	
Uniaxial Compressive Strength	7
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	67
Class Number	II
Description	<b>GOOD ROCK</b>

**SAMPLE #2**

Station/Location	68+00/ 6' RT
Depth (ft)	18
<b>Relative Rating</b>	
Uniaxial Compressive Strength	7
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	71
Class Number	II
Description	<b>GOOD ROCK</b>

**SAMPLE #3**

Station/Location	69+20/ 6' LT
Depth (ft)	16
<b>Relative Rating</b>	
Uniaxial Compressive Strength	2
RQD	13
Spacing of Joints	10
Condition of Joints	12
Groundwater Conditions	7
Sum	44
Class Number	III
Description	<b>FAIR ROCK</b>

**SAMPLE #4**

Station/Location	69+20/ 6' LT
Depth (ft)	18
<b>Relative Rating</b>	
Uniaxial Compressive Strength	7
RQD	17
Spacing of Joints	20
Condition of Joints	12
Groundwater Conditions	7
Sum	63
Class Number	II
Description	<b>GOOD ROCK</b>

**SAMPLE #5**

Station/Location	69+20/ 6' LT
Depth (ft)	20.5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	7
RQD	13
Spacing of Joints	25
Condition of Joints	20
Groundwater Conditions	7
Sum	72
Class Number	II
Description	<b>GOOD ROCK</b>

**SAMPLE #6**

Station/Location	180+92/ 5' RT
Depth (ft)	22.5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	0
RQD	8
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	55
Class Number	III
Description	<b>FAIR ROCK</b>

**SAMPLE #7**

Station/Location	180+92/ 5' RT
Depth (ft)	23
<b>Relative Rating</b>	
Uniaxial Compressive Strength	2
RQD	8
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	57
Class Number	III
Description	<b>FAIR ROCK</b>

**SAMPLE #8**

Station/Location	182+22/ 5' RT
Depth (ft)	35.5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	2
RQD	8
Spacing of Joints	25
Condition of Joints	20
Groundwater Conditions	7
Sum	62
Class Number	II
Description	<b>GOOD ROCK</b>

**SAMPLE #9**

Station/Location	286+49/ 6' RT
Depth (ft)	15
<b>Relative Rating</b>	
Uniaxial Compressive Strength	4
RQD	20
Spacing of Joints	20
Condition of Joints	25
Groundwater Conditions	7
Sum	76
Class Number	II
Description	<b>GOOD ROCK</b>

**SAMPLE #10**

Station/Location	286+49/ 6' RT
Depth (ft)	17.5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	7
RQD	20
Spacing of Joints	25
Condition of Joints	20
Groundwater Conditions	7
Sum	79
Class Number	II
Description	<b>GOOD ROCK</b>

**SAMPLE #11**

Station/Location	287+69/ 6' LT
Depth (ft)	17
<b>Relative Rating</b>	
Uniaxial Compressive Strength	12
RQD	13
Spacing of Joints	20
Condition of Joints	12
Groundwater Conditions	7
Sum	64
Class Number	II
Description	<b>GOOD ROCK</b>

**SAMPLE #12**

Station/Location	287+69/ 6' LT
Depth (ft)	28.5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	12
RQD	17
Spacing of Joints	20
Condition of Joints	25
Groundwater Conditions	7
Sum	81
Class Number	I
Description	<b>VERY GOOD ROCK</b>

**SAMPLE #13**

Station/Location	287+69/ 6' LT
Depth (ft)	20.5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	7
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	67
Class Number	II
Description	<b>GOOD ROCK</b>

**SAMPLE #14**

Station/Location	287+29/ 5' LT
Depth (ft)	16.5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	7
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	67
Class Number	II
Description	<b>GOOD ROCK</b>

**SAMPLE #15**

Station/Location	287+29/ 5' LT
Depth (ft)	23.5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	4
RQD	20
Spacing of Joints	25
Condition of Joints	20
Groundwater Conditions	7
Sum	76
Class Number	II
Description	<b>GOOD ROCK</b>

**SAMPLE #16**

Station/Location	112+13/ CL
Depth (ft)	7.5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	2
RQD	3
Spacing of Joints	20
Condition of Joints	12
Groundwater Conditions	7
Sum	44
Class Number	III
Description	<b>FAIR ROCK</b>

**SAMPLE #17**

Station/Location	112+13/ CL
Depth (ft)	12
<b>Relative Rating</b>	
Uniaxial Compressive Strength	0
RQD	3
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	50
Class Number	III
Description	FAIR ROCK

**SAMPLE #18**

Station/Location	111+80/ 3' RT
Depth (ft)	13.5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	1
RQD	13
Spacing of Joints	20
Condition of Joints	12
Groundwater Conditions	7
Sum	53
Class Number	III
Description	FAIR ROCK

**SAMPLE #19**

Station/Location	111+80/ 3' RT
Depth (ft)	15
<b>Relative Rating</b>	
Uniaxial Compressive Strength	2
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	62
Class Number	II
Description	GOOD ROCK

**SAMPLE #20**

Station/Location	113+13/ 53' LT
Depth (ft)	11
<b>Relative Rating</b>	
Uniaxial Compressive Strength	1
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	61
Class Number	II
Description	GOOD ROCK

**SAMPLE #21**

Station/Location	113+13/ 53' LT
Depth (ft)	14
<b>Relative Rating</b>	
Uniaxial Compressive Strength	0
RQD	8
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	55
Class Number	III
Description	FAIR ROCK

**SAMPLE #22**

Station/Location	112+66/CL
Depth (ft)	5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	0
RQD	3
Spacing of Joints	20
Condition of Joints	12
Groundwater Conditions	7
Sum	42
Class Number	III
Description	FAIR ROCK

**SAMPLE #23**

Station/Location	112+66/CL
Depth (ft)	10
<b>Relative Rating</b>	
Uniaxial Compressive Strength	2
RQD	8
Spacing of Joints	20
Condition of Joints	12
Groundwater Conditions	7
Sum	49
Class Number	III
Description	FAIR ROCK

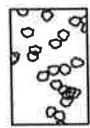
**SAMPLE #24**

Station/Location	112+66/CL
Depth (ft)	12.5
<b>Relative Rating</b>	
Uniaxial Compressive Strength	1
RQD	8
Spacing of Joints	20
Condition of Joints	12
Groundwater Conditions	7
Sum	48
Class Number	III
Description	FAIR ROCK

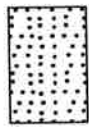
# LEGEND

## SOIL TYPES

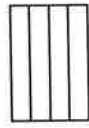
( SHOWN IN SYMBOL COLUMN)  
( PREDOMINANT TYPE SHOWN HEAVY)



GRAVEL



SAND



SILT



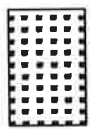
CLAY



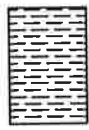
ORGANIC  
MATTER

## ROCK TYPES

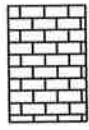
( SHOWN IN SYMBOL COLUMN)



SANDSTONE



SHALE  
or  
SILTSTONE



LIMESTONE  
or  
DOLOMITE



ALTERNATING  
LAYERS of  
SHALE and  
SANDSTONE



OTHER

## SAMPLER TYPES

( SHOWN IN SAMPLE COLUMN)

### SHELBY TUBE



UNDISTURBED  
SAMPLE  
RECOVERY



DISTURBED  
SAMPLE  
RECOVERY



NO  
RECOVERY

### SPLIT SPOON



SAMPLE  
RECOVERY



NO  
RECOVERY

### ROCK CORING



% RECOVERY  
INDICATED ON LOGS

## TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANULAR SOIL		CLAY		CLAY-SHALE		SHALE	
*N <sup>o</sup> Value	Density	*N <sup>o</sup> Value	Consistency	*N <sup>o</sup> Value	Consistency	*N <sup>o</sup> 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, 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<sub>f</sub>) 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<sub>60</sub>) can be obtained by multiplying N<sub>f</sub> by the hammer correction factor published on the boring log.

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 1  
PAGE 1 OF 1

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 68+00  
LOCATION: 6' Right of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: March 22, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 75  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 32

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: 1096.3									
5		X	Moist, Very Stiff, Brown Sandy Clay with Gravel							17 16-10		
10		X	Moist, Very Stiff, Brown Sandy Clay with Moist, Stiff, Brown Sandy Clay with Gravel and Cobbles							2 5-6	70	35
15			LIMESTONE - Slightly Weathered, Moderately Hard, Gray								97	56
			Soil-Filled Cavity (14.2'-14.3')									
			LIMESTONE - Unweathered, Moderately Hard, Gray									
20			SHALE - Weathered, Medium Hard, Dark Gray								93	70
25			LIMESTONE - Unweathered, Moderately Hard, Gray								95	95
30			LIMESTONE WITH OCCASIONAL SHALE LAYERS - Unweathered, Moderately Hard, Gray								95	80
			Boring Terminated									
35												

REMARKS: Mountain Fork Tributary Creek

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 2  
PAGE 1 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 69+20  
LOCATION: 6' Left of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: March 22, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 75  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 42

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: 1096.3									
5		X	Moist, Stiff, Brown, Sandy Clay with Gravel							2 4-6		
10		X	Moist, Hard, Brown Clay with Gravel and Cobbles							5 30-14		
15		X	Moist, Very Hard, Brown Clay with Gravel							7 30-40		
			LIMESTONE - Unweathered, Moderately Hard, Gray								85	65
			LIMESTONE - Weathered, Moderately Hard, Occasional Fractures, Gray									
20			SHALE - Highly Weathered to Weathered, Soft to Medium Hard, Dark Gray								91	50
			LIMESTONE - Unweathered, Hard, Dark Gray									
25			LIMESTONE - Unweathered, Hard, Occasional Fractures, Dark Gray								92	83
			SHALE - Weathered, Moderately Hard, Dark Gray								85	19
			LIMESTONE - Unweathered, Hard, Gray									
35			LIMESTONE WITH FREQUENT SHALE SEAMS AND LAYERS - Unweathered, Hard, Gray								80	30

REMARKS: Mountain Fork Tributary Creek



**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 2  
PAGE 2 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 69+20  
LOCATION: 6' Left of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: March 22, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 75  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 42

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.	% TCR	% RQD
			SURFACE ELEVATION: 1096.3									
			SHALE - Weathered, Medium Hard, Dark Gray									
40			SHALE - Weathered, Medium Hard, Occasional Fractures, Dark Gray								92	44
45			Boring Terminated									
50												
55												
60												
65												
70												

REMARKS: Mountain Fork Tributary Creek

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 3  
PAGE 1 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 111+80  
LOCATION: 3' Right of Construction Centerline  
LOGGED BY: Stanley Bates

DATE: May 23, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 850  
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 43.2

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: 873.5									
5		X	Moist, Medium Dense, Brown Sand with Gravel and Cobbles							13 10-6		
10		X	SHALE - Weathered, Medium Hard, Dark Gray							60 (5")	54	9
15			SHALE - Weathered, Medium Hard, Dark Gray								92	73
20			SHALE - Weathered, Medium Hard, Dark Gray								94	56
25			SHALE - Slightly Weathered, Medium Hard, Occasional Fractures, Dark Gray								98	55
30			SHALE - Slightly Weathered, Medium Hard, Occasional Fractures, Dark Gray								100	81
35			SHALE - Unweathered, Medium Hard, Occasional Fractures, Dark Gray									

REMARKS: Mountain Fork Creek

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 3  
PAGE 2 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 111+80  
LOCATION: 3' Right of Construction Centerline  
LOGGED BY: Stanley Bates

DATE: May 23, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 850  
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 43.2

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: 873.5									
											97	60
40			SHALE WITH OCCASIONAL LIMESTONE SEAMS AND LAYERS - Unweathered, Medium Hard, Dark Gray								97	82
45			Boring Terminated									
50												
55												
60												
65												
70												

REMARKS: Mountain Fork Creek


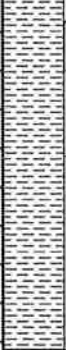
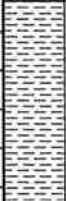
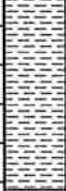



**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 4  
PAGE 1 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 112+13  
LOCATION: Construction Centerline  
LOGGED BY: Stanley Bates

DATE: May 17, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 850  
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 38.2

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.	% TCR	% RQD
			SURFACE ELEVATION: 868.5									
5			Moist, Very Hard, Brown Sandy Clay with Gravel and Cobbles							27 60 (3")		
10			SHALE - Weathered, Medium Hard, Dark Gray								91	18
15			SHALE - Slightly Weathered, Medium Hard, Occasional Fractures, Dark Gray								78	20
20			SHALE - Slightly Weathered, Medium Hard, Occasional Fractures, Dark Gray								100	14
25			SHALE - Slightly Weathered, Medium Hard, Frequent Fractures, Dark Gray								92	56
30			SHALE - Slightly Weathered, Medium Hard, Occasional Fractures, Dark Gray								100	36
35			LIMESTONE WITH OCCASIONAL SHALE LAYERS - Slightly Weathered, Moderately Hard, Gray								88	43

REMARKS: Mountain Fork Creek

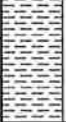
**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 4  
PAGE 2 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 112+13  
LOCATION: Construction Centerline  
LOGGED BY: Stanley Bates

DATE: May 17, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 850  
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 38.2

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.	% TCR	% RQD
			SURFACE ELEVATION: 868.5									
			SHALE WITH OCCASIONAL LIMESTONE SEAMS AND LAYERS - Slightly Weathered, Medium Hard, Frequent Fractures, Dark Gray								100	62
40			Boring Terminated									
45												
50												
55												
60												
65												
70												

REMARKS: Mountain Fork Creek


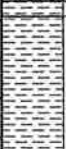
**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 5  
PAGE 1 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 112+66  
LOCATION: Construction Centerline  
LOGGED BY: Stanley Bates

DATE: June 13, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 850  
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 38.4

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.	% TCR	% RQD
			SURFACE ELEVATION: 867.7									
5			Moist, Medium Dense, Brown Gravel, Cobbles, and Boulders with Sandy Clay									
			SHALE - Highly Weathered, Soft, Gray							60 (5")	94	15
10			SHALE - Weathered, Medium Hard, Gray								76	32
15											98	44
20			SHALE - Slightly Weathered, Medium Hard, Frequent Fractures, Occasional Calcite Seams, Gray								100	60
25			SHALE WITH OCCASIONAL LIMESTONE PARTINGS AND SEAMS - Slightly Weathered, Medium Hard, Gray								100	40
30			SHALE WITH OCCASIONAL LIMESTONE LAYERS AND SEAMS - Unweathered, Medium Hard, Gray								94	34
35												

REMARKS: Mountain Fork Creek

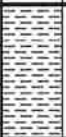
**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 5  
PAGE 2 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 112+66  
LOCATION: Construction Centerline  
LOGGED BY: Stanley Bates

DATE: June 13, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 850  
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 38.4

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.	% TCR	% RQD
			SURFACE ELEVATION: 867.7									
			SHALE WITH OCCASIONAL LIMESTONE PARTINGS AND SEAMS - Unweathered, Frequent Fractures, Gray								100	20
40			Boring Terminated									
45												
50												
55												
60												
65												
70												

REMARKS: Mountain Fork Creek

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 6  
PAGE 1 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 113+13  
LOCATION: Construction Centerline  
LOGGED BY: Stanley Bates

DATE: June 6, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 850  
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 43.7

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: 873.1									
5			Moist, Medium Dense, Brown Gravel, Cobbles, and Boulders with Sandy Clay							11 11-13		
10			SHALE - Weathered, Medium Hard, Dark Gray							54 60 (2")	100	70
15			SHALE - Slightly Weathered, Medium Hard, Occasional Fractures, Dark Gray								90	44
20			SHALE - Slightly Weathered, Medium Hard, Occasional Fractures, Occasional Iron Concretions, Dark Gray								100	76
25			SHALE - Slightly Weathered, Medium Hard, Occasional Fractures, Dark Gray								97	90
30			SHALE WITH OCCASIONAL LIMESTONE SEAMS - Slightly Weathered, Hard, Occasional Fractures, Dark Gray								99	62
35												

REMARKS: Mountain Fork Creek



**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 6  
PAGE 2 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 113+13  
LOCATION: Construction Centerline  
LOGGED BY: Stanley Bates

DATE: June 6, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 850  
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 43.7

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: 873.1									
			SHALE WITH OCCASIONAL LIMESTONE SEAMS - Unweathered, Hard, Occasional Fractures, Dark Gray								95	78
40			SHALE WITH OCCASIONAL LIMESTONE SEAMS AND LAYERS - Unweathered, Hard, Occasional Fractures, Dark Gray								97	80
45			Boring Terminated									
50												
55												
60												
65												
70												

REMARKS: Mountain Fork Creek

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 7  
PAGE 1 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 180+92  
LOCATION: 5' Right of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: March 28, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 75  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 38.5

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.	% TCR	% RQD
			SURFACE ELEVATION: 829.7									
5			Moist, Very Stiff, Brown Sandy Clay with Gravel							3 8-12		
10			Moist, Very Hard, Brown Sandy Clay with Gravel							15 19-50		
15			Moist, Very Hard, Brown Sandy Clay with Gravel							13 17-60 (8")		
20			Boulder									
20			Cobbles									
25			SHALE - Weathered, Medium Hard, Dark Gray								75	26
30			SHALE - Weathered with Highly Weathered Layers, Medium Hard with Soft Layers, Dark Gray								85	47
30			SANDY LIMESTONE - Slightly Weathered, Moderately Hard, Gray								75	18
35			SHALE - Weathered, Medium Hard,									

REMARKS: Whitzen Hollow Creek



**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 7  
PAGE 2 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 180+92  
LOCATION: 5' Right of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: March 28, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 75  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 38.5

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.	% TCR	% RQD
			SURFACE ELEVATION: 829.7									
			Occasional Concretions, Dark Gray								96	75
			SANDY LIMESTONE WITH FREQUENT SHALE LAYERS - Weathered, Moderately Hard, Gray									
40			SHALE - Slightly Weathered, Medium Hard, Dark Gray									
			Boring Terminated									
45												
50												
55												
60												
65												
70												

REMARKS: Whitzen Hollow Creek

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 8  
PAGE 1 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 182+22  
LOCATION: 5' Left of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: March 29, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 75  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 41.9

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: 829.5									
5			Dry, Medium Dense, Brown Gravel with Sand							11 13-15		
10			Moist, Dense, Sand with Clay and Gravel							8 12-20		
15			Moist, Very Dense, Sand with Clay and Gravel							11 30-27		
20			SHALE - Highly Weathered, Medium Hard, Dark Gray							60 (5")	84	0
25			SHALE - Weathered, Medium Hard, Dark Gray								98	16
30											80	34
35											80	36

REMARKS: Whitzen Hollow Creek

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 8  
PAGE 2 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 182+22  
LOCATION: 5' Left of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: March 29, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 75  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 41.9

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: 829.5									
			SHALE - Weathered, Medium Hard, Occasional Concretions and Pyrite Nodules, Dark Gray									
40			SANDY LIMESTONE WITH FREQUENT SHALE LAYERS - Slightly Weathered, Moderately Hard, Gray								98	82
			SHALE - Slightly Weathered, Medium Hard, Occasional Concretions, Dark Gray									
			Boring Terminated									
45												
50												
55												
60												
65												
70												

REMARKS: Whitzen Hollow Creek






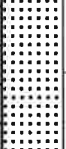

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 9  
PAGE 1 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 286+49  
LOCATION: 6' Right of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: April 12, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 75  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 35.7

DEPTH FT.	S Y M B O L	S A M P L E S	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: 777.7									
5		X	Moist, Stiff, Brown Sandy Clay with Gravel							5 5-5		
10		X	Moist, Medium Dense, Brown Sand with Gravel							8 9-8		
15		X	Wet, Very Dense, Brown Gravel with Clay and Sand							12 18-60 (8")	100	100
20											100	100
25											100	100
30											100	100
35			SANDSTONE - Unweathered, Well Cemented, Calcareous, Gray								98	98

REMARKS: Huey Creek

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 9  
PAGE 2 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 286+49  
LOCATION: 6' Right of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: April 12, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 75  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 35.7

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: 777.7									
			Boring Terminated									
40												
45												
50												
55												
60												
65												
70												

REMARKS: Huey Creek

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 10  
PAGE 1 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 287+29  
LOCATION: 5' Left of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: April 11, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 75  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 36.5

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: 777.8									
5		X	Moist, Stiff, Brown Sandy Clay							4 7-6		
10		X	Moist, Stiff, Brown Sandy Clay with Gravel							4 6-7		
15		X	SHALE - Highly Weathered, Medium Hard, Dark Gray							27 60 (2")		
20			LIMESTONE - Slightly Weathered, Moderately Hard, Gray								94	72
			SHALE - Slightly Weathered, Medium Hard, Calcareous, Dark Gray									
			COAL									
25			SHALE WITH OCCASIONAL LIMESTONE LAYERS - Slightly Weathered, Medium Hard, Calcareous, Dark Gray								100	96
			LIMESTONE - Unweathered, Moderately Hard, Gray									
30			LIMESTONE WITH OCCASIONAL SHALE LAYERS - Unweathered, Moderately Hard, Gray								100	85
35			LIMESTONE - Unweathered, Moderatly Hard, Occasional Fractures, Gray								100	89

REMARKS: Huey Creek




**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 10  
PAGE 2 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 287+29  
LOCATION: 5' Left of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: April 11, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Core  
EQUIPMENT: CME 75  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 36.5

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: 777.8									
												
			Boring Terminated									
40												
45												
50												
55												
60												
65												
70												

REMARKS: Huey Creek

**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 11  
PAGE 1 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 287+69  
LOCATION: 6' Left of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: April 11, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Croe  
EQUIPMENT: CME 7  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 40

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: 778.2									
5			Moist, Very Stiff, Brown Sandy Clay							7 8-9		
10			Moist, Medium Dense, Gravel with Clay and Sand							14 17-10		
15			Wet, Dense, Gravel with Clay and Sand							13 15-16		
20			LIMESTONE - Unweathered, Moderately Hard, Gray SHALE - Slightly Weathered, Medium Hard, Calcareous, Dark Gray								99	27
25			LIMESTONE WITH OCCASIONAL SHALE SEAMS - Unweathered, Moderately Hard, Gray COAL WITH OCCASIONAL SHALE LAYERS LIMESTONE - Unweathered, Moderately Hard, Gray SHALE - Weathered, Medium Hard, Dark Gray								95	74
30			LIMESTONE - Unweathered, Moderately Hard, Gray								100	78
35			LIMESTONE WITH FREQUENT SHALE								100	76

REMARKS: Huey Creek

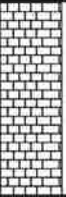
**ARKANSAS HWY. & TRANS. DEPARTMENT  
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 11  
PAGE 2 OF 2

JOB NO. 040622 Crawford County  
JOB NAME: Washington County Line - South Strs. & Apprs. (S)  
Route 59 Section 5  
STATION: 287+69  
LOCATION: 6' Left of Construction Centerline  
LOGGED BY: Coty Campbell

DATE: April 11, 2017  
TYPE OF DRILLING:  
Hollow Stem Auger - Diamond Croe  
EQUIPMENT: CME 7  
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 40

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: 778.2									
			PARTINGS AND SEAMS - Unweathered, Moderately Hard, Gray LIMESTONE - Unweathered, Moderately Hard, Gray								100	92
40			Boring Terminated									
45												
50												
55												
60												
65												
70												

REMARKS: Huey Creek

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT**

May 19, 2016

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

**SUBJECT:** Job No. 040622  
Washington Co. Line – South Strs. & Apprs. (S)  
Route 59 Section 5  
Crawford County

Transmitted herewith are the requested Soil Survey, strength data and Resilient Modulus test results for the above referenced job. The project consists of replacing four bridges on Highway 59. Samples were obtained in the existing travel lanes, shoulder and ditch line.

Based on laboratory results of samples obtained, the subgrade soils primarily consist of low plasticity sandy clays with varying amounts of gravel. Isolated locations of highly plastic clay were encountered within the project limits. Cross-sections are not currently available, but it is assumed that the construction grade line will closely match that of the existing roadway. The subgrade soils are expected to provide a stable working platform with conventional processing if the weather is favorable during construction. Rock was encountered at station 178+00, 5 feet right of centerline at a depth of 1.5 feet, and at station 185+00, 12 feet left of centerline at a depth of 0.5 feet.

If embankment is to be placed in the existing ditch line all soft unstable organic material should be undercut prior to embankment construction. The undercut is anticipated to be no more than two feet and may be backfilled with locally available unspecified material. Further recommendations will be made when plans are further developed and cross-sections become available.

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 Van Buren.
2. Asphalt Concrete Hot Mix

<b>PG 64-22</b>		
<b>Type</b>	<b>Asphalt Cement %</b>	<b>Mineral Aggregate %</b>
Surface Course	5.6	94.4
Binder Course	5.4	94.6
Base Course	4.5	95.5

<b>PG 70-22</b>		
<b>Type</b>	<b>Asphalt Cement %</b>	<b>Mineral Aggregate %</b>
Surface Course	5.6	94.4
Binder Course	5.5	94.5
Base Course	4.5	95.5

**PG 76-22**

<b>Type</b>	<b>Asphalt Cement %</b>	<b>Mineral Aggregate %</b>
Surface Course	5.6	94.4
Binder Course	5.5	94.5
Base Course	4.7	95.3



Michael C. Benson  
Materials Engineer

MCB:pt:bjj  
Attachment  
cc: State Constr. Eng. – Master File Copy  
District 4 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	- 05/19/2016	SEQUENCE NO.	- 1
JOB NUMBER	- 040622	MATERIAL CODE	- SSRVPS
		SPEC. YEAR	- 2014
		SUPPLIER ID.	- 1
		COUNTY/STATE	- 17
		DISTRICT NO.	- 04

JOB NAME - WASHINGTON CO.LINE-SOUTH STRS.& APPRS.(S)

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

BEGIN JOB - END JOB	10
RESILIENT MODULEUS	
017+00	6,174
071+00	6,118
178+00	6,010
290+00	7,938

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>	040622	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	5/11/16	<b>Station No.:</b>	017+00
<b>Date Tested:</b>	May 11, 2016	<b>Location:</b>	15'RT
<b>Name of Project:</b>	WASHINGTON CO.LINE - SOUTH STR. + APPRS (S)		
<b>County:</b>	<b>Code:</b> 17	<b>Name:</b> CRAWFORD	
<b>Sampled By:</b>	GW	<b>Depth:</b>	0-5
<b>Lab No.:</b>	20161159	<b>AASHTO Class:</b>	A-2-4 (0)
<b>Sample ID:</b>	RV210	<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	3.97
Middle	3.96
Bottom	3.94
Average	3.96
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):	12.22
Initial Volume, AoLo (cu. in):	98.01

**3. Soil Specimen Weight:**

Weight of Wet Soil Used (g):	3259.80
------------------------------	---------

**4. Soil Properties:**

Optimum Moisture Content (%):	13.8
Maximum Dry Density (pcf):	114.9
95% of MDD (pcf):	109.2
In-Situ Moisture Content (%):	N/A

**5. Specimen Properties:**

Wet Weight (g):	3259.80
Compaction Moisture content (%):	13.8
Compaction Wet Density (pcf):	126.72
Compaction Dry Density (pcf):	111.36
Moisture Content After Mr Test (%):	13.9

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

#VALUE!

**7. Resilient Modulus, Mr:**

$9055(S_c)^{-0.32147}(S_3)^{0.39045}$

**8. Comments**

\_\_\_\_\_

\_\_\_\_\_

**9. Tested By:**

G. WENDLAND

**Date:** May 11, 2016

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

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

**Job No.** 040622      **Material Code** SSRVPS  
**Date Sampled:** 5/11/16      **Station No.:** 017+00  
**Date Tested:** May 11, 2016      **Location:** 15'RT

**Name of Project:** WASHINGTON CO.LINE - SOUTH STR. + APPRS (S)  
**County:** Code: 17      **Name:** CRAWFORD

**Sampled By:** GW      **Depth:** 0-5  
**Lab No.:** 20161159      **AAASHTO Class:** A-2-4 (0)  
**Sample ID:** RV210      **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
	S <sub>3</sub> psi	S <sub>cyclic</sub> psi	P <sub>max</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	25.0	22.2	2.8	2.0	1.8	0.2	0.00099	0.00012	14,700
Sequence 2	6.0	4.0	46.9	44.1	2.8	3.8	3.6	0.2	0.00226	0.00028	12,824
Sequence 3	6.0	6.0	68.9	65.2	3.7	5.6	5.3	0.3	0.00375	0.00047	11,397
Sequence 4	6.0	8.0	91.3	85.2	6.1	7.5	7.0	0.5	0.00568	0.00071	9,846
Sequence 5	6.0	10.0	113.4	104.8	8.6	9.3	8.6	0.7	0.00776	0.00097	8,867
Sequence 6	4.0	2.0	24.7	22.0	2.7	2.0	1.8	0.2	0.00116	0.00014	12,473
Sequence 7	4.0	4.0	45.9	43.1	2.8	3.8	3.5	0.2	0.00275	0.00034	10,276
Sequence 8	4.0	6.0	66.0	63.2	2.9	5.4	5.2	0.2	0.00465	0.00058	8,922
Sequence 9	4.0	8.0	88.3	82.9	5.4	7.2	6.8	0.4	0.00672	0.00084	8,098
Sequence 10	4.0	10.0	110.5	102.6	7.9	9.0	8.4	0.6	0.00880	0.00110	7,645
Sequence 11	2.0	2.0	24.5	21.6	2.8	2.0	1.8	0.2	0.00143	0.00018	9,958
Sequence 12	2.0	4.0	44.8	41.9	2.9	3.7	3.4	0.2	0.00338	0.00042	8,138
Sequence 13	2.0	6.0	63.9	60.9	3.0	5.2	5.0	0.2	0.00565	0.00070	7,083
Sequence 14	2.0	8.0	84.5	80.1	4.5	6.9	6.6	0.4	0.00807	0.00101	6,515
Sequence 15	2.0	10.0	105.9	98.9	7.0	8.7	8.1	0.6	0.01051	0.00131	6,174

TESTED BY \_\_\_\_\_ DATE \_\_\_\_\_  
 REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

WENDLAND

May 11, 2016



ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT  
MATERIALS DIVISION

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

Job No. 040622 Material Code SSRVPS  
Date Sampled: 5/11/16 Station No.: 017+00  
Date Tested: May 11, 2016 Location: 15'RT  
Name of Project: WASHINGTON CO.LINE - SOUTH STR. + APPRS (S)  
County: Code: 17 Name: CRAWFORD  
Sampled By: GW Depth: 0-5  
Lab No.: 20161159 AASHTO Class: A-2-4 (0)  
Sample ID: RV210 Material Type (1 or 2): 2  
LATITUDE: LONGITUDE:

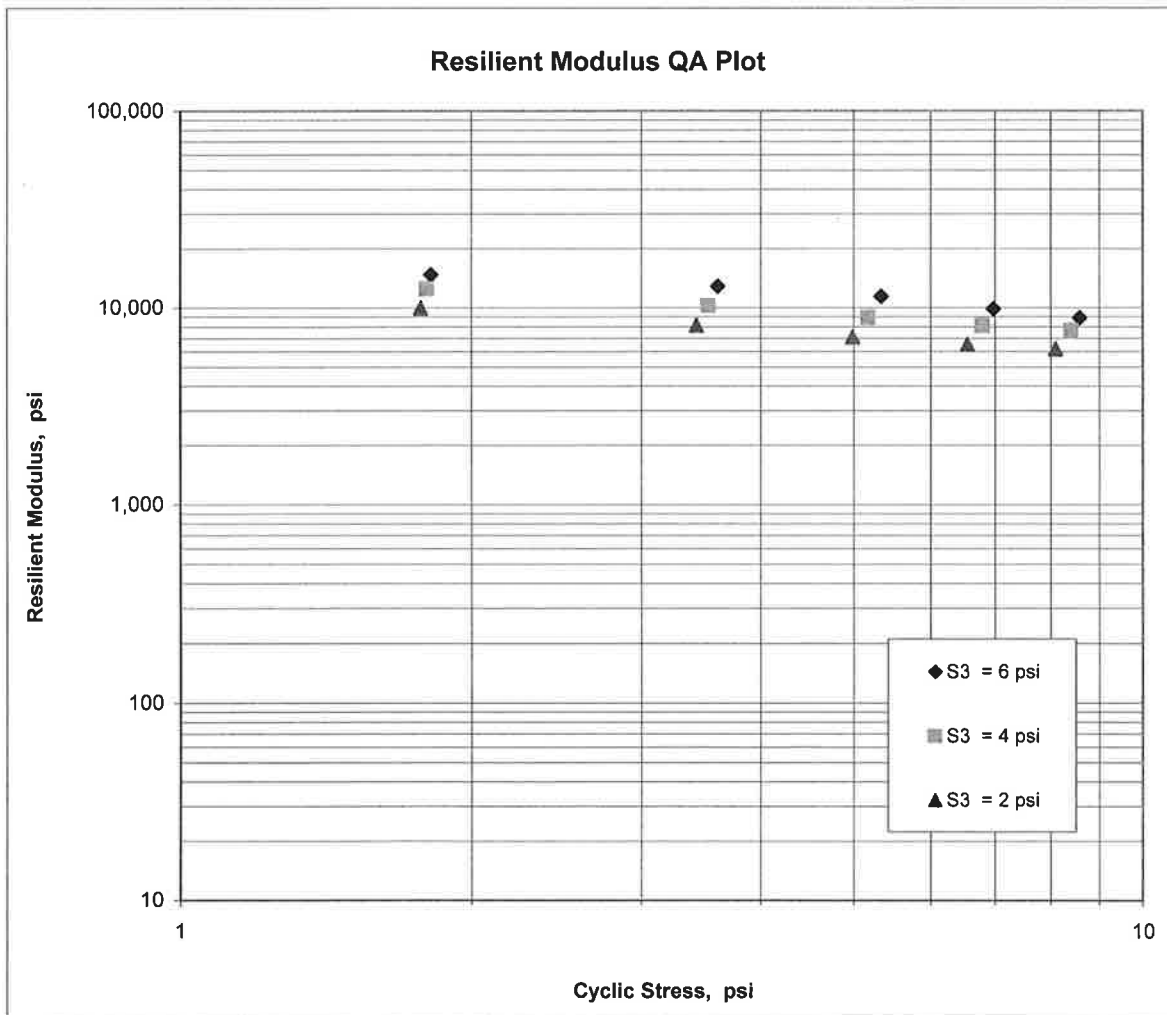
$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

$$K_1 = \underline{9,055}$$

$$K_2 = \underline{-0.32147}$$

$$K_5 = \underline{0.39045}$$

$$R^2 = \underline{0.98}$$



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

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

<b>Job No.</b>	040622	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	5/11/16	<b>Station No.:</b>	071+00
<b>Date Tested:</b>	May 11, 2016	<b>Location:</b>	15'LT
<b>Name of Project:</b>	WASHINGTON CO.LINE - SOUTH STR. + APPRS (S)		
<b>County:</b>	<b>Code:</b> 17	<b>Name:</b> CRAWFORD	
<b>Sampled By:</b>	D. DICKERSON	<b>Depth:</b>	0-5
<b>Lab No.:</b>	20161160	<b>AASHTO Class:</b>	A-4 (0)
<b>Sample ID:</b>	RV211	<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	3.97
Middle	3.94
Bottom	3.96
Average	3.96
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):	12.22
Initial Volume, AoLo (cu. in):	98.01

**3. Soil Specimen Weight:**

Weight of Wet Soil Used (g):	3161.20
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**4. Soil Properties:**

Optimum Moisture Content (%):	15.8
Maximum Dry Density (pcf):	111.4
95% of MDD (pcf):	105.8
In-Situ Moisture Content (%):	N/A

**5. Specimen Properties:**

Wet Weight (g):	3161.20
Compaction Moisture content (%):	15.6
Compaction Wet Density (pcf):	122.89
Compaction Dry Density (pcf):	106.31
Moisture Content After Mr Test (%):	15.9

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

#VALUE!

**7. Resilient Modulus, Mr:**

12157(Sc)^-0.40566(S3)^0.27538

**8. Comments**

\_\_\_\_\_

\_\_\_\_\_

**9. Tested By:**

G. WENDLAND

**Date:** May 11, 2016

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

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

**Job No.** 040622      **Material Code** SSRVPS  
**Date Sampled:** 5/11/16      **Station No.:** 071+00  
**Date Tested:** May 11, 2016      **Location:** 15'LT  
**Name of Project:** WASHINGTON CO.LINE - SOUTH STR. + APPRS (S)  
**County:** Code: 17      **Name:** CRAWFORD  
**Sampled By:** D. DICKERSON      **Depth:** 0-5  
**Lab No.:** 20161160      **AASHTO Class:** A-4 (0)  
**Sample ID:** RV211      **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
	S <sub>3</sub> psi	S <sub>cyclic</sub> psi	P <sub>max</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	25.0	22.2	2.8	2.0	1.8	0.2	0.00100	0.00012	14,617
Sequence 2	6.0	4.0	47.0	44.2	2.8	3.8	3.6	0.2	0.00223	0.00028	13,045
Sequence 3	6.0	6.0	69.2	65.5	3.7	5.7	5.4	0.3	0.00382	0.00048	11,251
Sequence 4	6.0	8.0	90.4	84.2	6.2	7.4	6.9	0.5	0.00611	0.00076	9,040
Sequence 5	6.0	10.0	110.7	102.0	8.7	9.1	8.3	0.7	0.00862	0.00107	7,769
Sequence 6	4.0	2.0	25.0	22.2	2.8	2.0	1.8	0.2	0.00111	0.00014	13,122
Sequence 7	4.0	4.0	46.4	43.6	2.8	3.8	3.6	0.2	0.00260	0.00032	11,003
Sequence 8	4.0	6.0	66.7	63.8	2.8	5.5	5.2	0.2	0.00448	0.00056	9,340
Sequence 9	4.0	8.0	88.1	82.9	5.2	7.2	6.8	0.4	0.00678	0.00084	8,027
Sequence 10	4.0	10.0	109.3	101.5	7.8	8.9	8.3	0.6	0.00942	0.00117	7,076
Sequence 11	2.0	2.0	24.8	22.1	2.7	2.0	1.8	0.2	0.00128	0.00016	11,323
Sequence 12	2.0	4.0	45.9	43.2	2.7	3.8	3.5	0.2	0.00303	0.00038	9,342
Sequence 13	2.0	6.0	65.2	62.4	2.8	5.3	5.1	0.2	0.00521	0.00065	7,851
Sequence 14	2.0	8.0	84.9	80.5	4.4	6.9	6.6	0.4	0.00776	0.00097	6,807
Sequence 15	2.0	10.0	105.4	98.5	6.9	8.6	8.1	0.6	0.01056	0.00132	6,118

TESTED BY \_\_\_\_\_ DATE May 11, 2016  
 REVIEWED BY \_\_\_\_\_ DATE \_\_\_\_\_

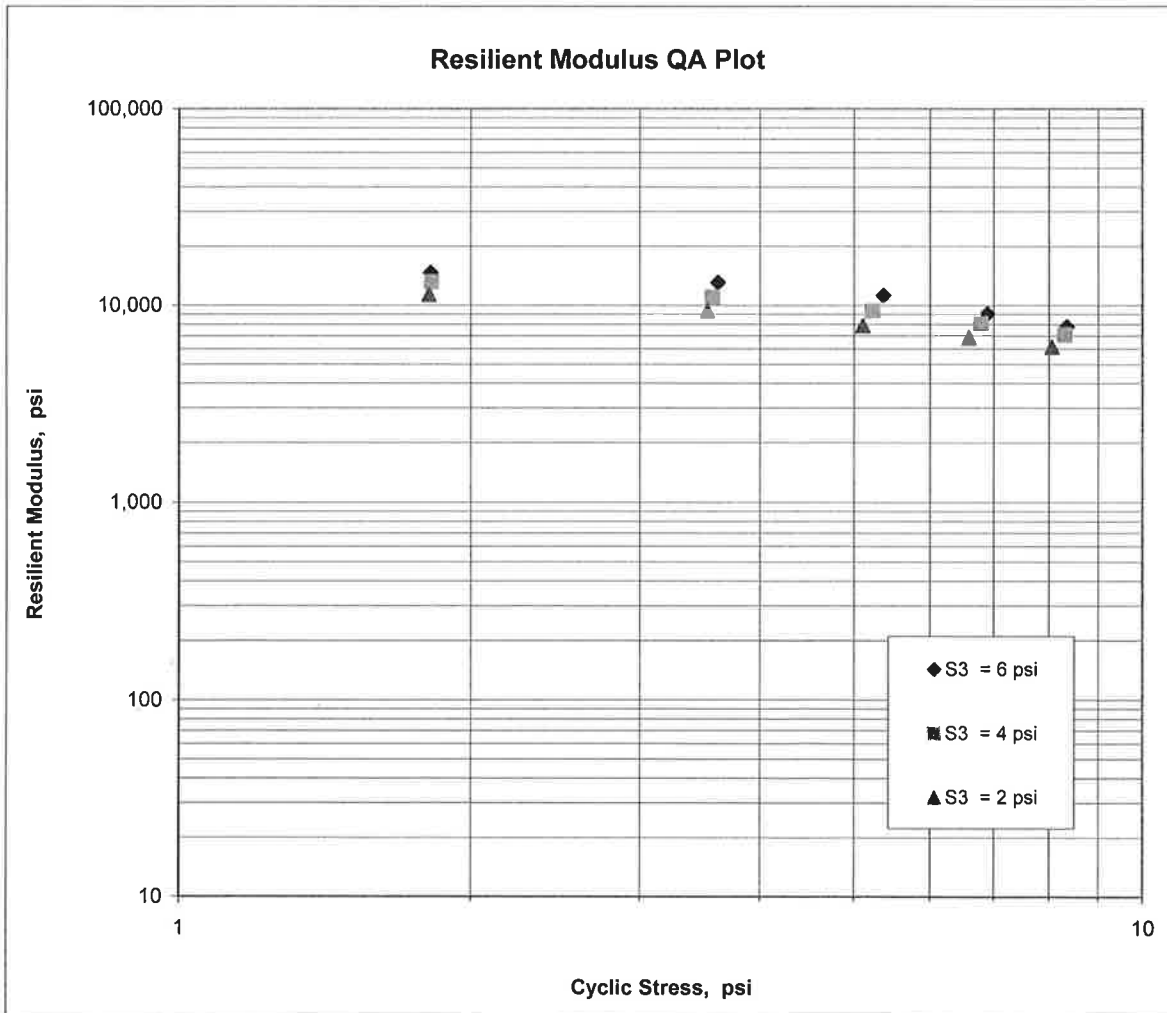
**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT  
MATERIALS DIVISION**

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

<b>Job No.</b>	040622	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	5/11/16	<b>Station No.:</b>	071+00
<b>Date Tested:</b>	May 11, 2016	<b>Location:</b>	15'LT
<b>Name of Project:</b>	WASHINGTON CO.LINE - SOUTH STR. + APPRS (S)		
<b>County:</b>	<b>Code:</b> 17	<b>Name:</b>	CRAWFORD
<b>Sampled By:</b>	D. DICKERSON		<b>Depth:</b> 0-5
<b>Lab No.:</b>	20161160	<b>AASHTO Class:</b>	A-4 (0)
<b>Sample ID:</b>	RV211	<b>Material Type (1 or 2):</b>	2
<b>LATITUDE:</b>		<b>LONGITUDE:</b>	

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

$K_1 = \underline{\underline{12,157}}$   
 $K_2 = \underline{\underline{-0.40566}}$   
 $K_5 = \underline{\underline{0.27538}}$   
 $R^2 = \underline{\underline{0.95}}$



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

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

<b>Job No.</b>	040622	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	4/19/16	<b>Station No.:</b>	178+00
<b>Date Tested:</b>	May 12, 2016	<b>Location:</b>	15'RT
<b>Name of Project:</b>	WASHINGTON CO. LINE-SOUTH STRS. & APPRS.(S)		
<b>County:</b>	<b>Code:</b> 17	<b>Name:</b> CRAWFORD	
<b>Sampled By:</b>	CHRISENBERRY	<b>Depth:</b>	0-5'
<b>Lab No.:</b>	20161161	<b>AASHTO Class:</b>	A-6(1)
<b>Sample ID:</b>	RV212	<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	3.97
Middle	3.95
Bottom	3.95
Average	3.96
Membrane Thickness (in):	0.00
Height of Specimen, Cap and Base (in):	8
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8
Initial Area, Ao (sq. in):	12.30
Initial Volume, AoLo (cu. in):	98.36

**3. Soil Specimen Weight:**

Weight of Wet Soil Used (g):	3213.10
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**4. Soil Properties:**

Optimum Moisture Content (%):	15.2
Maximum Dry Density (pcf):	112.5
95% of MDD (pcf):	106.9
In-Situ Moisture Content (%):	N/A

**5. Specimen Properties:**

Wet Weight (g):	3213.10
Compaction Moisture content (%):	15.4
Compaction Wet Density (pcf):	124.46
Compaction Dry Density (pcf):	107.85
Moisture Content After Mr Test (%):	15.4

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

#VALUE!

**7. Resilient Modulus, Mr:**

12580(Sc)^-0.41736(S3)^0.21690

**8. Comments**

\_\_\_\_\_

\_\_\_\_\_

**9. Tested By:**

C.GARRETT

**Date:** May 12, 2016

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

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

**Job No.** 040622      **Material Code** SSRVPS  
**Date Sampled:** 4/19/16      **Station No.:** 178+00  
**Date Tested:** May 12, 2016      **Location:** 15'RT

**Name of Project:** WASHINGTON CO. LINE-SOUTH STRS. & APPRS.(S)

**County:** Code: 17      **Name:** CRAWFORD

**Sampled By:** CHRISENBERRY

**Lab No.:** 20161161

**Sample ID:** RV212

**LATITUDE:**

**Depth:** 0-5'

**AASHTO Class:** A-6(1)

**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 <sub>3</sub> psi	S <sub>cyclic</sub> psi	P <sub>max</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	22.4	2.8	2.0	1.8	0.2	0.00106	0.00013	13,705
Sequence 2	6.0	4.0	47.2	44.4	2.8	3.8	3.6	0.2	0.00247	0.00031	11,699
Sequence 3	6.0	6.0	69.4	65.7	3.7	5.6	5.3	0.3	0.00424	0.00053	10,082
Sequence 4	6.0	8.0	91.4	85.2	6.2	7.4	6.9	0.5	0.00676	0.00084	8,205
Sequence 5	6.0	10.0	113.1	104.4	8.7	9.2	8.5	0.7	0.00934	0.00117	7,270
Sequence 6	4.0	2.0	25.1	22.3	2.8	2.0	1.8	0.2	0.00115	0.00014	12,623
Sequence 7	4.0	4.0	46.7	43.9	2.8	3.8	3.6	0.2	0.00277	0.00035	10,306
Sequence 8	4.0	6.0	67.0	64.2	2.9	5.5	5.2	0.2	0.00486	0.00061	8,586
Sequence 9	4.0	8.0	89.4	84.0	5.3	7.3	6.8	0.4	0.00742	0.00093	7,364
Sequence 10	4.0	10.0	111.4	103.6	7.9	9.1	8.4	0.6	0.01012	0.00126	6,661
Sequence 11	2.0	2.0	25.1	22.3	2.7	2.0	1.8	0.2	0.00129	0.00016	11,292
Sequence 12	2.0	4.0	46.3	43.5	2.8	3.8	3.5	0.2	0.00313	0.00039	9,041
Sequence 13	2.0	6.0	66.1	63.2	2.8	5.4	5.1	0.2	0.00548	0.00069	7,503
Sequence 14	2.0	8.0	86.8	82.4	4.4	7.1	6.7	0.4	0.00821	0.00103	6,530
Sequence 15	2.0	10.0	108.7	101.7	7.0	8.8	8.3	0.6	0.01101	0.00138	6,010

TESTED BY \_\_\_\_\_  
 REVIEWED BY \_\_\_\_\_

C.GARRETT \_\_\_\_\_  
 DATE \_\_\_\_\_

May 12, 2016 \_\_\_\_\_  
 DATE \_\_\_\_\_

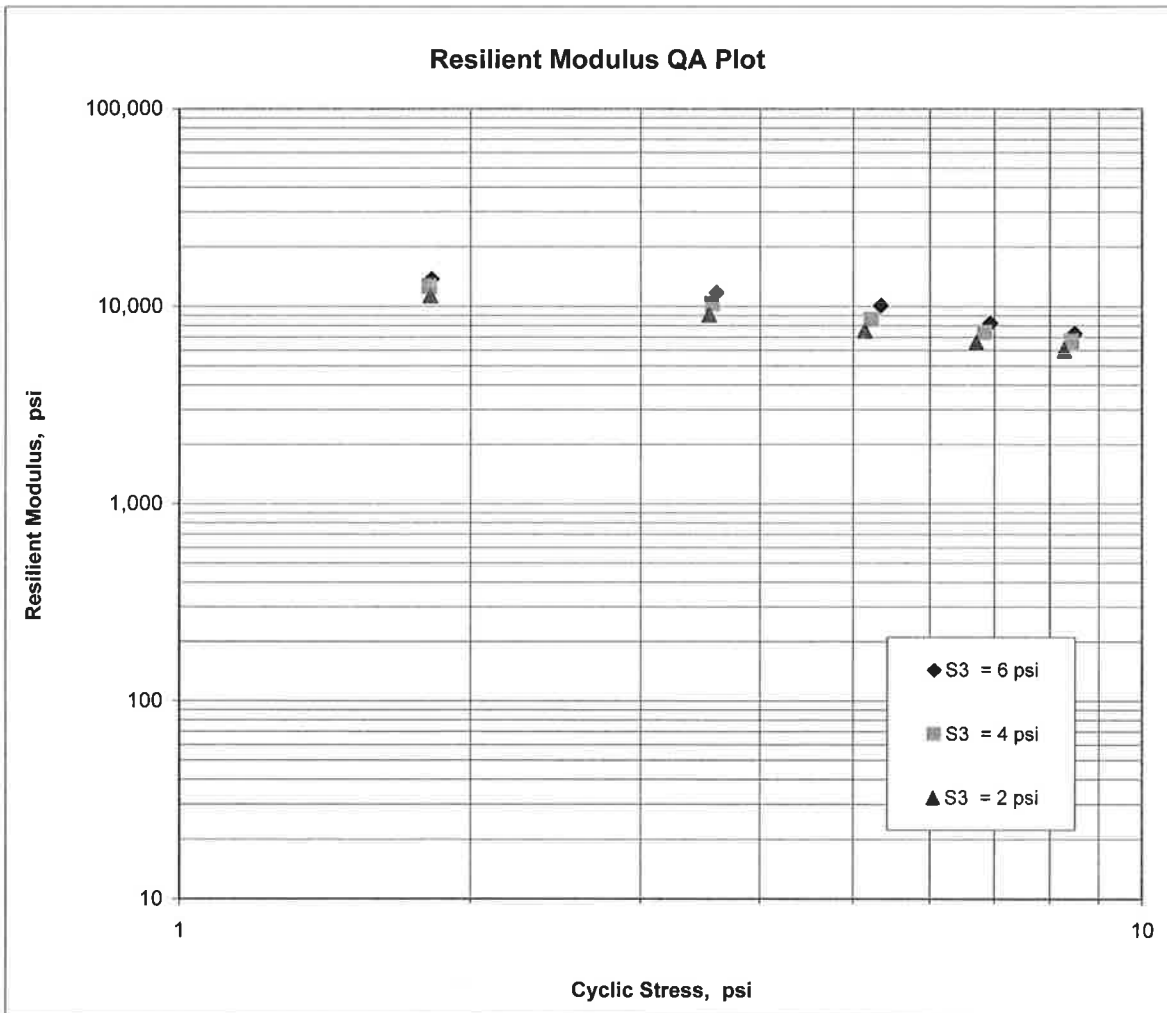
**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT  
MATERIALS DIVISION**

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

<b>Job No.</b>	040622	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	4/19/16	<b>Station No.:</b>	178+00
<b>Date Tested:</b>	May 12, 2016	<b>Location:</b>	15'RT
<b>Name of Project:</b>	WASHINGTON CO. LINE-SOUTH STRS. & APPRS.(S)		
<b>County:</b>	<b>Code:</b> 17	<b>Name:</b>	CRAWFORD
<b>Sampled By:</b>	CHRISENBERRY	<b>Depth:</b>	0-5'
<b>Lab No.:</b>	20161161	<b>AASHTO Class:</b>	A-6(1)
<b>Sample ID:</b>	RV212	<b>Material Type (1 or 2):</b>	2
<b>LATITUDE:</b>		<b>LONGITUDE:</b>	

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

$K_1 =$	<u>12,580</u>
$K_2 =$	<u>-0.41736</u>
$K_5 =$	<u>0.21690</u>
$R^2 =$	<u>0.97</u>



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

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

<b>Job No.</b>	040622	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	5/11/16	<b>Station No.:</b>	290+00
<b>Date Tested:</b>	May 11, 2016	<b>Location:</b>	15'LT
<b>Name of Project:</b>	WASHINGTON CO.LINE - SOUTH STR. + APPRS (S)		
<b>County:</b>	<b>Code:</b> 17	<b>Name:</b> CRAWFORD	
<b>Sampled By:</b>	D. DICKERSON	<b>Depth:</b>	0-5
<b>Lab No.:</b>	20161162	<b>AASHTO Class:</b>	A-2-4 (0)
<b>Sample ID:</b>	RV213	<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	3.95
Average	3.95
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8
Initial Area, Ao (sq. in):	12.16
Initial Volume, AoLo (cu. in):	97.27

**3. Soil Specimen Weight:**

Weight of Wet Soil Used (g):	3171.90
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**4. Soil Properties:**

Optimum Moisture Content (%):	13.8
Maximum Dry Density (pcf):	113.6
95% of MDD (pcf):	107.9
In-Situ Moisture Content (%):	N/A

**5. Specimen Properties:**

Wet Weight (g):	3171.90
Compaction Moisture content (%):	13.7
Compaction Wet Density (pcf):	124.24
Compaction Dry Density (pcf):	109.27
Moisture Content After Mr Test (%):	13.3

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

#VALUE!

**7. Resilient Modulus, Mr:**

12679(Sc)^-0.30387(S3)^0.28324

**8. Comments**

\_\_\_\_\_

\_\_\_\_\_

**9. Tested By:**

C.GARRETT

**Date:** May 11, 2016



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

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

**Job No.** 040622      **Material Code** SSRVPS  
**Date Sampled:** 5/11/16      **Station No.:** 290+00  
**Date Tested:** May 11, 2016      **Location:** 15'LT

**Name of Project:** WASHINGTON CO.LINE - SOUTH STR. + APPRS (S)  
**County:** Code: 17      **Name:** CRAWFORD

**Sampled By:** D. DICKERSON      **Depth:** 0-5  
**Lab No.:** 20161162      **AAASHTO Class:** A-2-4 (0)  
**Sample ID:** RV213      **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. LVD1 and 2	Resilient Strain	Resilient Modulus
	S <sub>3</sub> psi	S <sub>cyclic</sub> psi	P <sub>max</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	25.0	22.3	2.8	2.1	1.8	0.2	0.00088	0.00011	16,745
Sequence 2	6.0	4.0	47.0	44.2	2.8	3.9	3.6	0.2	0.00192	0.00024	15,107
Sequence 3	6.0	6.0	69.3	65.7	3.6	5.7	5.4	0.3	0.00316	0.00039	13,697
Sequence 4	6.0	8.0	92.0	85.9	6.1	7.6	7.1	0.5	0.00482	0.00060	11,732
Sequence 5	6.0	10.0	113.8	105.2	8.5	9.4	8.7	0.7	0.00669	0.00084	10,347
Sequence 6	4.0	2.0	25.0	22.3	2.7	2.1	1.8	0.2	0.00098	0.00012	14,918
Sequence 7	4.0	4.0	46.5	43.8	2.7	3.8	3.6	0.2	0.00223	0.00028	12,887
Sequence 8	4.0	6.0	67.4	64.7	2.8	5.5	5.3	0.2	0.00371	0.00046	11,461
Sequence 9	4.0	8.0	89.8	84.7	5.2	7.4	7.0	0.4	0.00544	0.00068	10,246
Sequence 10	4.0	10.0	111.8	104.2	7.6	9.2	8.6	0.6	0.00735	0.00092	9,331
Sequence 11	2.0	2.0	24.7	22.0	2.7	2.0	1.8	0.2	0.00113	0.00014	12,799
Sequence 12	2.0	4.0	45.9	43.2	2.7	3.8	3.5	0.2	0.00260	0.00032	10,936
Sequence 13	2.0	6.0	66.0	63.3	2.7	5.4	5.2	0.2	0.00438	0.00055	9,516
Sequence 14	2.0	8.0	86.8	82.6	4.1	7.1	6.8	0.3	0.00633	0.00079	8,587
Sequence 15	2.0	10.0	108.5	101.8	6.7	8.9	8.4	0.6	0.00844	0.00105	7,938

TESTED BY C.GARRETT      DATE May 11, 2016  
 REVIEWED BY \_\_\_\_\_      DATE \_\_\_\_\_

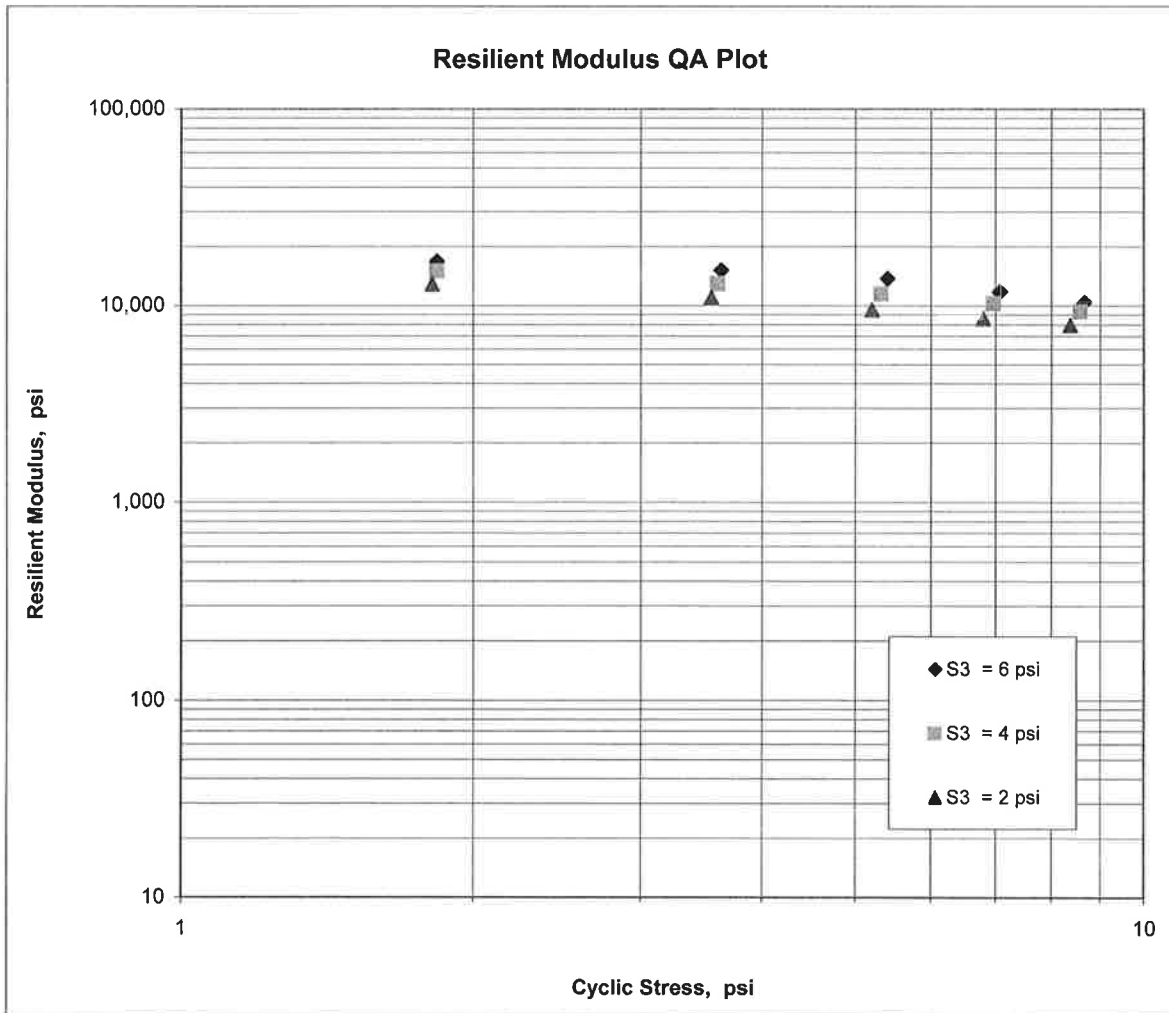
**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT  
MATERIALS DIVISION**

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

<b>Job No.</b>	040622	<b>Material Code</b>	SSRVPS
<b>Date Sampled:</b>	5/11/16	<b>Station No.:</b>	290+00
<b>Date Tested:</b>	May 11, 2016	<b>Location:</b>	15'LT
<b>Name of Project:</b>	WASHINGTON CO.LINE - SOUTH STR. + APPRS (S)		
<b>County:</b>	<b>Code:</b> 17	<b>Name:</b>	CRAWFORD
<b>Sampled By:</b>	D. DICKERSON	<b>Depth:</b>	0-5
<b>Lab No.:</b>	20161162	<b>AASHTO Class:</b>	A-2-4 (0)
<b>Sample ID:</b>	RV213	<b>Material Type (1 or 2):</b>	2
<b>LATITUDE:</b>		<b>LONGITUDE:</b>	

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

$K_1 =$	<u>12,679</u>
$K_2 =$	<u>-0.30387</u>
$K_5 =$	<u>0.28324</u>
$R^2 =$	<u>0.97</u>



JOB: 040622

Arkansas State Highway Transportation Department

JOB NAME: WASHINGTON CO.LINE-SOUTH STRS.& APPRS.(S)

Materials Division

COUNTY NO. 17 DATE TESTED 5/2/2016

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					
017+00	15RT	0-5	BROWN	60	52	45	36	26	24	06	A-2-4(0)	RV210	
071+00	15LT	0-5	BROWN	77	72	67	59	48	25	03	A-4(0)	RV211	
178+00	15RT	0-5	BROWN	65	56	47	43	38	32	13	A-6(1)	RV212	
290+00	15LT	0-5	BROWN	57	49	44	41	34	25	09	A-2-4(0)	RV213	
017+00	05RT	0-5	BROWN	95	86	77	67	40	21	06	A-4(0)	S191	16.8
017+00	15RT	0-5	BROWN	99	94	86	70	50	29	13	A-6(3)	S192	18.1
031+00	05LT	0-5	GRAY	99	95	86	81	76	40	23	A-6(16)	S193	12.5
031+00	15LT	0-5	GRAY	98	93	80	75	71	37	19	A-6(12)	S194	11.5
063+00	05RT	0-5	RD/BR	98	94	90	79	60	23	09	A-4(2)	S195	15.3
063+00	15RT	0-5	BROWN	86	77	67	58	44	23	07	A-4(0)	S196	16.2
071+00	05LT	0-5	BROWN	96	89	83	74	55	22	07	A-4(1)	S197	11.9
071+00	15LT	0-5	BROWN	95	85	76	71	59	23	08	A-4(2)	S198	15.9
178+00	05RT	1-1.5Z	RD/BR	93	85	79	69	52	28	14	A-6(4)	S199	14.2
178+00	12RT	0-5	RED	89	75	66	62	49	22	07	A-4(1)	S200	12.4
178+00	15RT	0-5	BROWN	77	64	56	52	43	24	02	A-4(0)	S201	9.8
185+00	05LT	0-5	BROWN	86	69	58	52	32	ND	NP	A-2-4(0)	S202	11.4
185+00	12LT	0-.5Z	BROWN	78	61	47	39	25	21	03	A-1-B(0)	S203	
185+00	14LT	0-5	BROWN	88	80	71	62	41	25	06	A-4(0)	S204	15.3
284+00	05RT	0-5	RD/BR	96	90	84	76	60	25	10	A-4(3)	S205	15.5
284+00	11RT	0-5	RED	94	85	77	70	52	23	09	A-4(2)	S206	13
284+00	15RT	0-5	RD/BR	91	82	74	66	47	22	06	A-4(0)	S207	12
290+00	05LT	0-1.5Z	RD/BR	97	86	76	71	50	23	07	A-4(1)	S208	16.4
290+00	15LT	0-5	BROWN	97	95	90	86	81	37	16	A-6(12)	S209	13.3

comments: Z=AUGER REFUSAL

Monday, May 16, 2016

**JOB:** 040622

**Arkansas State Highway Transportation Department**

**DATE TESTED**

**JOB NAME:** WASHINGTON CO.LINE-SOUTH STRS. & APPRS.(S)

**Materials Division**

5/3/2016

**COUNTY NO.** 17

**Michael Benson, Materials Engineer**

**STA.# LOC.**

**PAVEMENT SOUNDINGS**

017+00	15RT	ACHMSC	ACHMBC	CHIP SEAL	AGG.BASE CRS CL-7
		--	--	--	--
017+00	05RT	ACHMSC	ACHMBC	CHIP SEAL	AGG.BASE CRS CL-7
		5.5	1.0	--	3.0
031+00	05LT	ACHMSC	ACHMBC	CHIP SEAL	AGG.BASE CRS CL-7
		7.0	--	1.5	4.0
031+00	15LT	ACHMSC	ACHMBC	AGG.BASE CRS CL-5	
		--	--	--	
063+00	05RT	ACHMSC	ACHMBC	AGG.BASE CRS CL-5	
		6.5	1.5	5.0	
063+00	15RT	ACHMSC	ACHMBC	AGG.BASE CRS CL-5	
		--	--	--	
071+00	15LT	ACHMSC	ACHMBC	AGG.BASE CRS CL-7	
		--	--	--	
071+00	05LT	ACHMSC	ACHMBC	AGG.BASE CRS CL-7	
		7.75	2.0	7.0	
178+00	12RT	ACHMSC	AGG.BASE CRS CL-7		
		3.5	7.0		
178+00	15RT	ACHMSC	AGG.BASE CRS CL-7		
		--	--		
178+00	05RT	ACHMSC	ACHMBC	AGG.BASE CRS CL-7	
		4.0	1.5	6.0	
185+00	05LT	ACHMSC	AGG.BASE CRS CL-7		
		6.0	6.0		
185+00	12LT	ACHMSC	ACHMBC	AGG.BASE CRS CL-7	
		2.75	.75	7.0	
185+00	14LT	ACHMSC	ACHMBC	AGG.BASE CRS CL-7	
		--	--	--	
284+00	05RT	ACHMSC	ACHMBC	AGG.BASE CRS CL-7	
		4.5	--	8.0	
284+00	11RT	ACHMSC	ACHMBC	AGG.BASE CRS CL-5	AGG.BASE CRS CL-7
		2.5	2.0	--	7.0
284+00	15RT	ACHMSC	ACHMBC	AGG.BASE CRS CL-5	AGG.BASE CRS CL-7
		--	--	--	--

**comments:** Z=AUGER REFUSAL

STA.# LOC.

PAVEMENT SOUNDINGS

290+00	05LT	ACHMSC	ACHMBC	AGG.BASE CRS CL-5	AGG.BASE CRS CL-7
		3.5	--	6.0	--

comments: Z=AUGER REFUSAL

Monday, May 16, 2016

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

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 05/09/16 SEQUENCE NO. - 1  
 JOB NUMBER - 040622 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 - 17  
 SUPPLIER NAME - STATE DISTRICT NO. - 04  
 NAME OF PROJECT - WASHINGTON CO.LINE-SOUTH STRS.& APPRS.(S)  
 PROJECT ENGINEER - NOT APPLICABLE  
 PIT/QUARRY - ARKANSAS  
 LOCATION - CRAWFORD, COUNTY DATE SAMPLED - 04/19/16  
 SAMPLED BY - CHRISTENBERRY DATE RECEIVED - 04/25/16  
 SAMPLE FROM - TEST HOLE DATE TESTED - 05/03/16  
 MATERIAL DESC. - SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS

LAB NUMBER	-	20161140	-	20161141	-	20161142
SAMPLE ID	-	S191	-	S192	-	S193
TEST STATUS	-	INFORMATION ONLY	-	INFORMATION ONLY	-	INFORMATION ONLY
STATION	-	017+00	-	017+00	-	031+00
LOCATION	-	05RT	-	15RT	-	05LT
DEPTH IN FEET	-	0-5	-	0-5	-	0-5
MAT'L COLOR	-	BROWN	-	BROWN	-	GRAY
MAT'L TYPE	-		-		-	
LATITUDE DEG-MIN-SEC	-	35 42 27.40	-	35 42 27.40	-	35 42 16.00
LONGITUDE DEG-MIN-SEC	-	94 29 .60	-	94 29 .70	-	94 28 53.80
% PASSING	2	IN.	-		-	
	1 1/2	IN.	-		-	
	3/4	IN.	-	100	-	
	3/8	IN.	-	98	-	100
	NO. 4		-	95	-	99
	NO. 10		-	86	-	95
	NO. 40		-	77	-	86
	NO. 80		-	67	-	81
	NO. 200		-	40	-	76
LIQUID LIMIT	-	21	-	29	-	40
PLASTICITY INDEX	-	06	-	13	-	23
AASHTO SOIL	-	A-4(0)	-	A-6(3)	-	A-6(16)
UNIFIED SOIL	-		-		-	
% MOISTURE CONTENT	-	16.8	-	18.1	-	12.5
ACHMSC	(IN)	5.5	-	--	-	7.0
ACHMBC	(IN)	1.0	-	--	-	--
CHIP SEAL	(IN)	--	-	--	-	1.5
AGG.BASE CRS CL-7	(IN)	3.0	-	--	-	4.0

REMARKS - Z=AUGER REFUSAL

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	- 05/09/16	SEQUENCE NO.	- 5
JOB NUMBER	- 040622	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	- 17
SUPPLIER NAME	- STATE	DISTRICT NO.	- 04
NAME OF PROJECT	- WASHINGTON CO.LINE-SOUTH STRS.& APPRS.(S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- CRAWFORD, COUNTY	DATE SAMPLED	- 04/19/16
SAMPLED BY	- CHRISTENBERRY	DATE RECEIVED	- 04/25/16
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 05/02/16
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAB NUMBER	- 20161152	- 20161153	- 20161154
SAMPLE ID	- S203	- S204	- S205
TEST STATUS	- INFORMATION ONLY	- INFORMATION ONLY	- INFORMATION ONLY
STATION	- 185+00	- 185+00	- 284+00
LOCATION	- 12LT	- 14LT	- 05RT
DEPTH IN FEET	- 0-.5Z	- 0-5	- 0-5
MAT'L COLOR	- BROWN	- BROWN	- RD/BR
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 35 41 33.60	- 35 41 33.60	- 35 40 46.30
LONGITUDE DEG-MIN-SEC	- 94 27 59.50	- 94 27 59.50	- 94 26 34.10
% PASSING	2 IN.	-	-
	1 1/2 IN.	-	-
	3/4 IN.	- 100	-
	3/8 IN.	- 96	- 100
	NO. 4	- 78	- 96
	NO. 10	- 61	- 90
	NO. 40	- 47	- 84
	NO. 80	- 39	- 76
	NO. 200	- 25	- 60
LIQUID LIMIT	- 21	- 25	- 25
PLASTICITY INDEX	- 03	- 06	- 10
AASHTO SOIL	- A-1-B(0)	- A-4(0)	- A-4(3)
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	-	- 15.3	- 15.5
ACHMSC (IN)	- 2.75	- --	- 4.5
ACHMBC (IN)	- .75	- --	- --
AGG.BASE CRS CL-7 (IN)	- 7.0	- --	- 8.0
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-

REMARKS - Z=AUGER REFUSAL

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 - 05/09/16 SEQUENCE NO. - 6  
JOB NUMBER - 040622 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 - 17  
SUPPLIER NAME - STATE DISTRICT NO. - 04  
NAME OF PROJECT - WASHINGTON CO.LINE-SOUTH STRS.& APPRS.(S)  
PROJECT ENGINEER - NOT APPLICABLE  
PIT/QUARRY - ARKANSAS  
LOCATION - CRAWFORD, COUNTY DATE SAMPLED - 04/19/16  
SAMPLED BY - CHRISTENBERRY DATE RECEIVED - 04/25/16  
SAMPLE FROM - TEST HOLE DATE TESTED - 05/02/16  
MATERIAL DESC. - SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS

LAB NUMBER	20161155	20161156	20161157
SAMPLE ID	S206	S207	S208
TEST STATUS	INFORMATION ONLY	INFORMATION ONLY	INFORMATION ONLY
STATION	284+00	284+00	290+00
LOCATION	11RT	15RT	05LT
DEPTH IN FEET	0-5	0-5	0-1.5Z
MAT'L COLOR	RED	RD/BR	RD/BR
MAT'L TYPE			
LATITUDE DEG-MIN-SEC	35 40 46.20	35 40 46.10	35 40 43.00
LONGITUDE DEG-MIN-SEC	94 26 34.20	94 26 34.20	94 26 27.40
% PASSING			
2 IN.			
1 1/2 IN.			
3/4 IN.		100	
3/8 IN.	100	99	100
NO. 4	94	91	97
NO. 10	85	82	86
NO. 40	77	74	76
NO. 80	70	66	71
NO. 200	52	47	50
LIQUID LIMIT	23	22	23
PLASTICITY INDEX	09	06	07
AASHTO SOIL	A-4(2)	A-4(0)	A-4(1)
UNIFIED SOIL			
% MOISTURE CONTENT	13.0	12.0	16.4
ACHMSC (IN)	2.5	--	3.5
ACHMBC (IN)	2.0	--	--
AGG.BASE CRS CL-5 (IN)	--	--	6.0
AGG.BASE CRS CL-7 (IN)	7.0	--	--

REMARKS - Z=AUGER REFUSAL





