ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

SUBSURFACE INVESTIGATION

STATE JOB NO. 090406

FEDERAL AID PROJECT NO. HSIP-9394(13)

HWY. 43 KCS RAILROAD OVERPASS (SILOAM SPRINGS) (S)

STATE HIGHWAY 43 SECTION 0

IN BENTON COUNTY

LETTING OF NOVEMBER 2, 2016

The information contained herein was obtained by the Department for design and estimating purposes only. It is being furnished with the express understanding that said information does not constitute a part of the Proposal or Contract and represents only the best knowledge of the Department as to the location, character and depth of the materials encountered. The information is only included and made available so that bidders may have access to subsurface information obtained by the Department and is not intended to be a substitute for personal investigation, interpretation and judgment of the bidder. The bidder should be cognizant of the possibility that conditions affecting the cost and/or quantities of work to be performed may differ from those indicated herein.

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

March 9, 2016

TO: Mr. Rick Ellis, Bridge Engineer

SUBJECT: Job No. 090406
Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
Benton County

Transmitted herewith are summaries of the site geology and subsurface conditions, unconfined compressive strength test results, RMR, 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. The rock cores are available for inspection at the Materials Division.

Based on the depth at which bedrock was encountered, it is anticipated that end bents will be founded on piling and interior bents will be founded on drilled shafts. Piling should be tipped into the competent limestone interbedded with chert and preboring may be necessary to achieve minimum penetration requirements. Drilled Shafts should be sized based on the values provided in Table 1.

TABLE 1 – Bearing Capacity Recommendations for Drilled Shafts

Nominal Shaft Side Resistance (ksf)	Factored Shaft Side Resistance (ksf)	Nominal Shaft Tip Resistance (ksf)	Factored Shaft Tip Resistance (ksf)
32.4	17.8	369	184.5

A Mechanically Stabilized Earthen (MSE) wall will be constructed on the south side of Highway 43 from station 27+50 to 31+80. This MSE wall should be designed based on the values provided in Table 2.

TABLE 2 – Recommended MSE Wall Design Parameters

Factored Bearing Resistance (ksf)
4.5

An embankment was also modeled for each bridge end using slope stability software (PCStabl). The embankments were analyzed using 2H:1V end slopes and a maximum fill height of 30 feet. The properties of the existing material and estimated fill properties yielded a factor of safety greater than 1.3.

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 9 Engineer
G.C. File

GEOLOGY AND SITE CONDITIONS
Job 090406
Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
Benton County

Site Conditions

At the job site, the existing Highway 43 crosses Sager Creek and the Kansas City Southern railroad tracks. The proposed overpass is to span over the railroad tracks, a city street (N Country Club Road), and Sager Creek. The proposed overpass is to be located to the north of the existing roadway.

Overhead power lines parallel both sides of Hwy 43 and the west side of N Country Club Road, crossing over Hwy 43. A buried 12-inch water line and telecommunication line parallels the north side of the roadway. At the west end of the proposed overpass, there is a baseball field located to the north of the roadway and residences located to the south. At the east end of the proposed overpass, there is an open field with scattered trees to the north and a residence just to the east. And to the south, there is a golf course with scattered trees.

Site Geology

The project alignment is located in the Boone Formation (mapped as Mb). The Boone is composed of gray, fine- to coarse-grained, fossiliferous limestone interbedded with chert. Some sections may be predominantly limestone or chert. The quantity of chert varies considerably both vertically and horizontally. The total thickness of the Boone Formation is 300 to 350 feet in most of northern Arkansas, but as much as 390 feet has been reported. The Boone Formation is known for dissolutional features; however, none were discovered during the subsurface investigation.

A regolith of unconsolidated rock material of variable thickness forms a mantle over the Boone at the job site. This regolith is comprised of a sequence of thin to thick intervals of chert and cherty beds of clay. The clay is typically red to red-orange in color, while the chert is predominately white. The regolith is a result of the dissolution of the limestone leaving behind the insoluble part of the rock. Most of the weathered clay of the regolith exhibits relict bedding interbedded with white chert and cherty fragments. Regionally, this regolith layer varies in thickness. At the job site, depth to bedrock ranges from 8.6 to 17.0 feet below ground level (bgl) with the elevation of the top of bedrock ranging from 1,121.1 to 1,125.9 ft. above msl.

There are northeast-southwest trending faults located in the general area of the job site; however, no evidence of faulting was encountered in the borings. There is a potential for more unmapped faults in this area.

Subsurface Conditions

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

0 to 8.6 Feet:	Varies from moist, medium stiff to hard, brown **clay** to **gravelly clay with sand** to loose to very dense, brown **clayey sand with gravel** to **gravel with clay and sand**. There are boulders and bedded chert layers in this zone.
8.6 to 17.0 Feet:	Varies from moist, medium stiff to very hard, brown **sandy clay with gravel** (chert fragments) to loose to very dense, brown **clayey sand with gravel** to **gravel with clay and sand** to slightly weathered, hard, gray **limestone and chert interbedded**.
17.0 to 37.6 Feet:	Consists of slightly weathered to unweathered, hard, gray **limestone and chert interbedded**. Some borings encountered fractures in this zone.

Rock Core Unconfined Compression Test Summary

Project Number: 090406
Project Name: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Date Tested: 3/4/2016

Station	Location	Sample No.	Depth (ft)	Diameter (in)	Height (in)	Total Load (lbs)	Correction Factor	Stress (psi)	Remarks
31+85	3' Left	1	16.0	1.75	3.84	36,880		15,332	End Bent
31+85	3' Left	2	33.0	1.75	3.74	41,450		17,232	End Bent
32+88	C.L.	3	10.5	1.75	3.82	12,910		5,367	
32+88	C.L.	4	20.5	1.75	3.90	18,490		7,687	
33+93	C.L.	5	10.5	1.75	3.82	21,330		8,868	
33+93	C.L.	6	27.5	1.75	3.81	26,930		11,196	
34+98	C.L.	7	12.5	1.75	3.64	39,880		16,580	
34+98	C.L.	8	26.0	1.75	3.61	22,060		9,171	
35+85	C.L.	9	14.0	1.75	3.67	43,960		18,276	
35+85	C.L.	10	24.5	1.75	3.66	37,990		15,794	
36+68	C.L.	11	9.0	1.75	3.82	22,010		9,150	
36+68	C.L.	12	27.0	1.75	3.85	12,880		5,355	
37+50	C.L.	13	13.0	1.75	3.87	48,680		20,239	End Bent
37+50	C.L.	14	26.0	1.75	3.85	38,210		15,886	End Bent

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

ROCK MASS RATING SUMMARY

JOB # 90406

SAMPLE #1

Station/Location	31+85 3' LT
Depth (ft)	16
	Relative Rating
Uniaxial Compressive Strength	12
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	*76*
Class Number	II
Description	GOOD ROCK

SAMPLE #2

Station/Location	31+85 3' LT
Depth (ft)	33
	Relative Rating
Uniaxial Compressive Strength	12
RQD	20
Spacing of Joints	30
Condition of Joints	25
Groundwater Conditions	7
Sum	*94*
Class Number	I
Description	VERY GOOD ROCK

SAMPLE #3

Station/Location	32+88 C.L.
Depth (ft)	10.5
	Relative Rating
Uniaxial Compressive Strength	4
RQD	8
Spacing of Joints	20
Condition of Joints	25
Groundwater Conditions	7
Sum	*64*
Class Number	II
Description	GOOD ROCK

SAMPLE #4

Station/Location	32+88 C.L.
Depth (ft)	20.5
	Relative Rating
Uniaxial Compressive Strength	7
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	*67*
Class Number	II
Description	GOOD ROCK

SAMPLE #5

Station/Location	33+93 C.L.
Depth (ft)	10.5
	Relative Rating
Uniaxial Compressive Strength	7
RQD	8
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	*62*
Class Number	II
Description	GOOD ROCK

SAMPLE #6

Station/Location	33+93 C.L.
Depth (ft)	27.5
	Relative Rating
Uniaxial Compressive Strength	7
RQD	17
Spacing of Joints	20
Condition of Joints	25
Groundwater Conditions	7
Sum	*76*
Class Number	II
Description	GOOD ROCK

SAMPLE #7

Station/Location	34+98 C.L.
Depth (ft)	12.5
	Relative Rating
Uniaxial Compressive Strength	12
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	*76*
Class Number	II
Description	GOOD ROCK

SAMPLE #8

Station/Location	34+98 C.L.
Depth (ft)	26
	Relative Rating
Uniaxial Compressive Strength	7
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	*71*
Class Number	II
Description	GOOD ROCK

SAMPLE #9

Station/Location	35+85 C.L.
Depth (ft)	14
	Relative Rating
Uniaxial Compressive Strength	12
RQD	13
Spacing of Joints	25
Condition of Joints	25
Groundwater Conditions	7
Sum	82
Class Number	I
Description	VERY GOOD ROCK

SAMPLE #10

Station/Location	35+85 C.L.
Depth (ft)	24.5
	Relative Rating
Uniaxial Compressive Strength	12
RQD	17
Spacing of Joints	25
Condition of Joints	25
Groundwater Conditions	7
Sum	86
Class Number	I
Description	VERY GOOD ROCK

SAMPLE #11

Station/Location	36+68 C.L.
Depth (ft)	9
	Relative Rating
Uniaxial Compressive Strength	7
RQD	8
Spacing of Joints	25
Condition of Joints	25
Groundwater Conditions	7
Sum	72
Class Number	II
Description	GOOD ROCK

SAMPLE #12

Station/Location	36+68 C.L.
Depth (ft)	27
	Relative Rating
Uniaxial Compressive Strength	4
RQD	17
Spacing of Joints	25
Condition of Joints	25
Groundwater Conditions	7
Sum	78
Class Number	II
Description	GOOD ROCK

SAMPLE #13

Station/Location	37+50 C.L.
Depth (ft)	13
	Relative Rating
Uniaxial Compressive Strength	12
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	72
Class Number	II
Description	GOOD ROCK

SAMPLE #14

Station/Location	37+50 C.L.
Depth (ft)	26
	Relative Rating
Uniaxial Compressive Strength	12
RQD	17
Spacing of Joints	25
Condition of Joints	25
Groundwater Conditions	7
Sum	86
Class Number	I
Description	VERY GOOD ROCK

SAMPLE #15

Station/Location	
Depth (ft)	
	Relative Rating
Uniaxial Compressive Strength	
RQD	
Spacing of Joints	
Condition of Joints	
Groundwater Conditions	
Sum	0
Class Number	V
Description	VERY POOR ROCK

SAMPLE #16

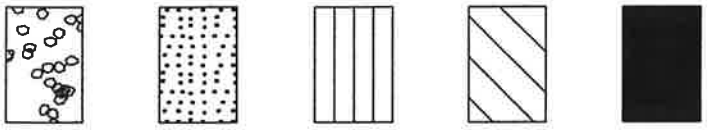
Station/Location	
Depth (ft)	
	Relative Rating
Uniaxial Compressive Strength	
RQD	
Spacing of Joints	
Condition of Joints	
Groundwater Conditions	
Sum	0
Class Number	V
Description	VERY POOR ROCK

LEGEND

SOIL TYPES

(SHOWN IN SYMBOL COLUMN)

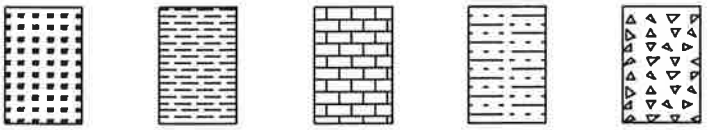
(PREDOMINANT TYPE SHOWN HEAVY)



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

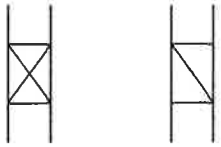
SAMPLER TYPES

(SHOWN IN SAMPLE COLUMN)

SHELBY TUBE

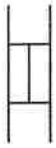
UNDISTURBED SAMPLE RECOVERY | DISTURBED SAMPLE RECOVERY | NO RECOVERY

SPLIT SPOON



SAMPLE RECOVERY | NO RECOVERY

ROCK CORING



% RECOVERY INDICATED ON LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANULAR SOIL		CLAY		CLAY-SHALE		SHALE	
'N' 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, 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: $\frac{6}{8-9} \Rightarrow 8+9=17 blows/ft$. 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.

MATERIALS DIVISION - GEOTECHNICAL SEC.

PAGE 1 OF 2

JOB NO.	090406 Benton County	DATE:	February 9 and 10, 2016
JOB NAME:	Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S) Route 43 Section 0	TYPE OF DRILLING:	Hollow Stem Auger - Diamond Core
STATION:	31+85	EQUIPMENT:	CME 75
LOCATION:	3' Left of Construction Centerline		
LOGGED BY:	Stanley Bates	HAMMER CORRECTION FACTOR:	1.37

COMPLETION DEPTH: 37.6

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: 1136.4								
5			Moist, Very Stiff, Brown Sandy Clay with Gravel (Chert Fragments)						10 12-18		
10			Moist, Medium Stiff, Brown Sandy Clay with Gravel (Chert Fragments)						4 5-3		
15			LIMESTONE AND CHERT INTERBEDDED - Weathered, Hard, Occasional Fractures, Gray							94	82
20										100	86
25			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Gray							100	77
30										100	86
35											

REMARKS:

MATERIALS DIVISION - GEOTECHNICAL SEC.

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 31+85
LOCATION: 3' Left of Construction Centerline
LOGGED BY: Stanley Bates

DATE: February 9 and 10, 2016
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 37.6

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: 1136.4							100	98
			Boring Terminated								
40											
45											
50											
55											
60											
65											
70											

REMARKS:

MATERIALS DIVISION - GEOTECHNICAL SEC. PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 32+88
LOCATION: Construction Centerline
LOGGED BY: Stanley Bates

DATE: January 27, 2016
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 30.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 1136.4	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
5			Moist, Medium Stiff, Brown Clay with Gravel (Chert Fragments)						3 4-3		
10			Moist, Medium Dense, Brown Clayey Sand with Gravel (Chert Fragments)						4 2-23		
15			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Light Gray							96	30
20			LIMESTONE AND CHERT INTERBEDDED WITH OCCASIONAL SHALE SEAMS- Slightly Weathered, Hard, Light Gray							100	68
25			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Light Gray							98	48
30										100	74
35			Boring Terminated								

REMARKS:

MATERIALS DIVISION - GEOTECHNICAL SEC. PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 33+93
LOCATION: Construction Centerline
LOGGED BY: Stanley Bates

DATE: January 26, 2016
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 31.5

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: 1134.4								
5			Dry, Dense, Brown Clayey Sand With Gravel (Chert Fragments)						17 25-16		
10			Dry, Very Dense, Brown Clayey Sand With Gravel (Chert Fragments)						47 (3")	86	33
15			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Light Gray *							100	40
20										100	80
25										98	60
30										100	78
35			Boring Terminated								

REMARKS: * Complete Water Loss at 10.1'

MATERIALS DIVISION - GEOTECHNICAL SEC.

PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 34+98
LOCATION: Construction Centerline
LOGGED BY: Stanley Bates

DATE: March 2, 2016
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 31.5

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: 1135.0								
5			Moist, Very Stiff, Brown Sandy Clay with Some Gravel (Chert Fragments)						6 6-13		
10			Moist, Dense, Brown Sand with Gravel (Chert Fragments)						5 9-20 (9")	100	0
15			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Light Gray							98	66
20										100	80
25			LIMESTONE AND CHERT INTERBEDDED - Unweathered, Hard, Light Gray							100	73
30										100	88
35			Boring Terminated								

REMARKS:

MATERIALS DIVISION - GEOTECHNICAL SEC. | PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 35+85
LOCATION: Construction Centerline
LOGGED BY: Stanley Bates

DATE: March 1, 2016
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 31.1

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: 1133.9								
5			Moist, Very Stiff, Brown Gravelly Clay with Sand						8 14-10		
10			Moist, Very Dense, Brown Gravel with Clay and Sand						13 9-30 (9")		
										100	25
15			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Occasional Fractures, Light Gray							100	64
20										96	70
25			LIMESTONE AND CHERT INTERBEDDED - Unweathered, Hard, Occasional Fractures, Light Gray							100	84
30										100	80
35			Boring Terminated								

REMARKS:

MATERIALS DIVISION - GEOTECHNICAL SEC. | PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 36+68
LOCATION: Construction Centerline
LOGGED BY: Stanley Bates

DATE: February 24, 2016
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 29.8

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: 1133.9								
5			Moist, Very Dense, Brown Clayey Sand with Gravel						18 / 49-51		
10			LIMESTONE AND CHERT INTERBEDDED - Weathered, Hard, Occasional Shale Parting, Light Gray							100	37
15										100	68
20										100	94
25			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Light Gray							100	84
30										88	88
35			Boring Terminated								

REMARKS:

MATERIALS DIVISION - GEOTECHNICAL SEC. | PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 37+50
LOCATION: Construction Centerline
LOGGED BY: Stanley Bates

DATE: February 23, 2016
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 32.6

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 1138.4	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
5			Moist, Very Dense, Brown Clayey Sand with Gravel						60 (4")		
			Boulder (Limestone/Chert Rock Fragment) (5.1' to 6.8')								
10			Moist, Loose, Brown Clayey Sand with Gravel						12 3-4		
15			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Occasional Fractures, Light Gray						10 (0")	100	58
20			LIMESTONE AND CHERT INTERBEDDED - Slightly weaathered , Hard, Occasional Fracture, Light Gray							98	78
25			LIMESTONE - Slightly Weathered, Hard, Occasional Calcite Seam, Light Gray							100	94
30										98	68
35			Boring Terminated								

REMARKS:

MATERIALS DIVISION - GEOTECHNICAL SEC. | PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 30+93
LOCATION: 44' Right of Construction Centerline
LOGGED BY: Stanley Bates

DATE: February 9, 2016
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 16.5

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: 1136.7								
5			Moist, Very Dense, Brown Clayey Sand with Gravel (Chert Fragments)						18 37-47		
10			Moist, Medium Dense, Brown Clayey Gravel with Sand						42 21-3		
15			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Frequent Fractures, Gray							100	54
20			Boring Terminated								
25											
30											
35											

REMARKS:

MATERIALS DIVISION - GEOTECHNICAL SEC.

PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 32+25
LOCATION: 45' Right of Construction Centerline
LOGGED BY: Stanley Bates

DATE: February 10, 2016
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 22.2

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: 1138.9								
5		X	Moist, Medium Stiff, Brown Clay with Some Organic Matter						3 3-4		
10		X	Moist, Very Stiff, Sandy Clay with Gravel (Chert Fragments)						11 11-9		
15		X	Wet, Medium Dense, Clayey Gravel with Sand						7 7-5		
20			LIMESTONE AND CHERT INTERBEDDED - Weathered, Hard, Frequent Fractures, Gray							90	52
25			Boring Terminated								
30											
35											

REMARKS:

MATERIALS DIVISION - GEOTECHNICAL SEC. | PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 36+74
LOCATION: 45' Right of Costruction Centerline
LOGGED BY: Stanley Bates

DATE: February 17, 2016
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 18.5

SURFACE ELEVATION: 1138.6

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
5			Moist, Medium Stiff, Brown Clay with Some Gravel and Organic Matter						4 2-3		
10			Moist, Dense, Brown Clayey Sand with Gravel (Chert Fragments)						16 19-30		
15			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Occasional Clay Partings, Gray							100	60
20			Boring Terminated								
25											
30											
35											

REMARKS:

MATERIALS DIVISION - GEOTECHNICAL SEC.

BORING NO. TRW-1

PAGE 1 OF 1

JOB NO. 090406 Benton County

JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0

STATION: 37+50

LOCATION: 41' Right of Construction Centerline

LOGGED BY: Stanley Bates

DATE: February 17, 2016

TYPE OF DRILLING: Hollow Stem Auger - Diamond Core

EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 19.4

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: 1140.2								
5			Moist, Medium Dense, Clayey Sand with Gravel (Rock Fragments)						13 9-11		
10									6 12-14		
15			LIMESTONE AND CHERT INTERBEDDED - Slightley Weathered, Hard, Occasional Fractures, Gray						10 (0")	100	88
20			Boring Terminated								
25											
30											
35											

REMARKS:

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

BORING NO. MSE-1
PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 27+52
LOCATION: 65' Right of Construction Centerline
LOGGED BY: Stanley Bates

DATE: February 9, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 19.5

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: 1136.6								
5			Moist, Medium Stiff, Brown Clay with Some Sand, Gravel, and Organic Matter						1 2-3		
10			Moist, Hard, Brown Gravelly Clay with Sand						8 14-21		
15			LIMESTONE AND CHERT INTERBEDDED - Weathered, Hard, Frequent Fractures, Gray						10 (0")	86	22
20			Boring Terminated								
25											
30											
35											

REMARKS:

MATERIALS DIVISION - GEOTECHNICAL SEC. | PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 28+46
LOCATION: 40' Right of Construction Centerline
LOGGED BY: Stanley Bates

DATE: February 2, 2016
TYPE OF DRILLING: Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 27

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: 1136.3								
5			Moist, Medium Stiff, Brown Clay with Some Gravel						2 4-4		
10			Moist, Very Hard, Brown Sandy Clay with Gravel (Chert Fragments)						12 37-39		
15			Moist, Very Dense, Gray Sand with Gravel (Chert Fragments)						60 (5")	17	0
20			LIMESTONE AND CHERT INTERBEDDED - Weathered, Hard, Light Gray							28	22
25										100	80
			Boring Terminated								
30											
35											

REMARKS:

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

BORING NO. MSE-3
PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 29+48
LOCATION: 51' Right of Construction Centerline
LOGGED BY: Stanley Bates - Paul Campbell - Carson Sloan

DATE: February 2, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 19.3

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: 1136.0								
5		X	Moist, Hard, Brown Sandy Clay with Gravel (Chert Fragments)						11 / 19-30		
10		X	Moist, Very Dense, Clayey Sand with Gravel (Chert Fragments)						22 / 30-31		
15			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Light Gray							100	60
20			Boring Terminated								
25											
30											
35											

REMARKS:

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

BORING NO. MSE-4
PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 30+51
LOCATION: 57' Right of Construction Centerline
LOGGED BY: Stanley Bates

DATE: February 2, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 18.3

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: 1136.3								
5		X	Wet, Dense, Red Brown Clayey Sand with Gravel (Chert Fragments)						15 19-21		
10		X	Wet, Medium Dense, Red Brown Clayey Sand with Gravel (Chert Fragments)						29 8-13		
15			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Light Gray*							98	64
20			Boring Terminated								
25											
30											
35											

REMARKS: * Auger Refusal at 13.3'

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

BORING NO. MSE-5
PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 31+16
LOCATION: 87' Right of Construction Centerline
LOGGED BY: Stanley Bates

DATE: February 3, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 19

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: 1137.0								
5			Moist, Very Stiff, Brown Clay With Sand and Gravel						9 6-14		
10			Moist, Very Dense, Brown Clayey Sand With Gravel (Chert Fragments)						16 18-60 (9")		
15			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Gray							100	52
20			Boring Terminated								
25											
30											
35											

REMARKS: * Auger Refusal at 14.0'

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

BORING NO. MSE-6
PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S) Route 43 Section 0
STATION: 31+80
LOCATION: 100' Right of Construction Centerline
LOGGED BY: Stanley Bates

DATE: January 28, 2016
TYPE OF DRILLING: Hollow Stem Auger
EQUIPMENT: CME 75
HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 17.05

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 1138.1	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
5			Moist, Very Stiff, Brown Clay with Some Gravel						6 11-9		
10			Moist, Medium Dense, Brown Clayey Sand with Gravel						22 15-5		
15			Wet, Dense, Brown Gravel with Clay (Chert Fragments)						9 3-37		
20			LIMESTONE* Boring Terminated								
25											
30											
35											

REMARKS: * Hole MSE-6 Abandoned do to Auger Malfunction. See boring MSE-6A for Corresponding Core.

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

BORING NO. MSE-6A
PAGE 1 OF 1

JOB NO. 090406 Benton County
JOB NAME: Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Section 0
STATION: 31+79
LOCATION: 100' Right of Construction Centerline
LOGGED BY: Stanley Bates

DATE: February 3, 2016
TYPE OF DRILLING:
Hollow Stem Auger, Diamond Core
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 22

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: 1138.1								
5			Depth 0.0 to 17.0 Not Sampled. See Boring MSE-4 for Corresponding SPT Samples*								
10											
15											
20			LIMESTONE AND CHERT INTERBEDDED - Slightly Weathered, Hard, Gray							100	50
25			Boring Terminated								
30											
35											

REMARKS: *Hole MSE-6 Was Abandoned After SPT Sampling do to Auger Malfunction.

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

September 17, 2014

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 090406
Hwy. 43 KCS Railroad Overpass (Siloam Springs) (S)
Route 43 Sections 0
Benton County

Transmitted herewith is the requested Soil Survey, Strength Data and Resilient Modulus test results for the above referenced job. The project consists of constructing an overpass for the KCS railroad on new location. Samples were taken in the existing travel lanes and ditch line. There were no paved shoulders within the project limits.

Based on laboratory results of samples obtained, the subgrade soils consist primarily of moderately plastic cherty clay. The subgrade soils are expected to provide a stable working platform with conventional processing if the weather is favorable during construction.

Based on the current construction grade line the maximum embankment height is approximately 26 feet. Embankment and undercut 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 in the vicinity of Gravette.

2. Asphalt Concrete Hot Mix

Type	Asphalt Cement %	Mineral Aggregate %
Surface Course	5.3	94.7
Binder Course	4.3	95.7
Base Course	4.0	96.0

Michael C. Benson
Materials Engineer

MCB:pt:bjj
Attachment
cc: State Constr. Eng. – Master File Copy
District 9 Engineer
Transportation Planning and Policy 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 - 09/11/2014
JOB NUMBER - 090406

SEQUENCE NO. - 1
MATERIAL CODE - SSRVPS
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 04
DISTRICT NO. - 09

JOB NAME - HWY.43 KCS RAILROAD OVERPASS (SILOAM SPRINGS) (S)

STATION LIMITS	R-VALUE AT 240 psi
BEGIN JOB - END JOB	12
RESILIENT MODULUS STA.12+17	10807

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.	090406	**Material Code**	SSRVPS
Date Sampled:	9/9/14	**Station No.:**	12+17
Date Tested:	September 9, 2014	**Location:**	CL
Name of Project:	HWY.43 KCS RAILROAD OVERPASS (SILOA		
County:	**Code:** 4 **Name:** BENTON		
Sampled By:	FAULKNER	**Depth:**	0-5
Lab No.:	20142824	**AASHTO Class:**	A-2-4(0)
Sample ID:	RV821	**Material Type (1 or 2):**	2
LATITUDE:		**LONGITUDE:**	

1. Testing Information:

Preconditioning - Permanent Strain > 5% (Y=Yes or N= No)	N
Testing - Permanent Strain > 5% (Y=Yes or N=No)	N
Number of Load Sequences Completed (0-15)	15

2. Specimen Information:

Specimen Diameter (in):	
Top	3.95
Middle	3.96
Bottom	3.95
Average	3.95
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.05
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.05
Initial Area, Ao (sq. in):	12.19
Initial Volume, AoLo (cu. in):	98.16

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	3297.50

4. Soil Properties:

Optimum Moisture Content (%):	13.7
Maximum Dry Density (pcf):	116.1
95% of MDD (pcf):	110.3
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3297.50
Compaction Moisture content (%):	13.5
Compaction Wet Density (pcf):	127.99
Compaction Dry Density (pcf):	112.77
Moisture Content After Mr Test (%):	13.3

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

7. Resilient Modulus, Mr: 11623(Sc)^-0.15917(S3)^0.36908

8. Comments _____

9. Tested By: M.W./ D.T. **Date:** September 9, 2014

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION

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

Job No.	090406	**Material Code**	SSRVPS
Date Sampled:	9/9/14	**Station No.:**	12+17
Date Tested:	September 9, 2014	**Location:**	CL
Name of Project:	HWY.43 KCS RAILROAD OVERPASS (SILOA		
County:	**Code:** 4 **Name:** BENTON		
Sampled By:	FAULKNER	**Depth:**	0-5
Lab No.:	20142824	**AASHTO Class:**	A-2-4(0)
Sample ID:	RV821	**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*
DESIGNATION	S_3	S_{cyclic}	P_{max}	P_{cyclic}	$P_{contact}$	S_{max}	S_{cyclic}	$S_{contact}$	H_{avg}	ε_r	M_r
UNIT	psi	psi	lbs	lbs	lbs	psi	psi	psi	in	in/in	psi
Sequence 1	6.0	2.0	25.0	22.4	2.6	2.0	1.8	0.2	0.00073	0.00009	20,191
Sequence 2	6.0	4.0	46.9	44.3	2.7	3.8	3.6	0.2	0.00151	0.00019	19,391
Sequence 3	6.0	6.0	69.3	65.7	3.5	5.7	5.4	0.3	0.00237	0.00029	18,279
Sequence 4	6.0	8.0	92.7	86.8	5.9	7.6	7.1	0.5	0.00346	0.00043	16,533
Sequence 5	6.0	10.0	115.6	107.2	8.4	9.5	8.8	0.7	0.00462	0.00057	15,304
Sequence 6	4.0	2.0	24.9	22.3	2.6	2.0	1.8	0.2	0.00087	0.00011	16,939
Sequence 7	4.0	4.0	46.3	43.6	2.6	3.8	3.6	0.2	0.00184	0.00023	15,650
Sequence 8	4.0	6.0	67.4	64.7	2.7	5.5	5.3	0.2	0.00292	0.00036	14,659
Sequence 9	4.0	8.0	90.6	85.5	5.1	7.4	7.0	0.4	0.00403	0.00050	14,005
Sequence 10	4.0	10.0	113.6	106.0	7.6	9.3	8.7	0.6	0.00523	0.00065	13,388
Sequence 11	2.0	2.0	24.4	21.8	2.6	2.0	1.8	0.2	0.00105	0.00013	13,723
Sequence 12	2.0	4.0	45.3	42.5	2.7	3.7	3.5	0.2	0.00225	0.00028	12,506
Sequence 13	2.0	6.0	65.5	62.7	2.8	5.4	5.1	0.2	0.00358	0.00044	11,573
Sequence 14	2.0	8.0	87.3	82.9	4.4	7.2	6.8	0.4	0.00490	0.00061	11,157
Sequence 15	2.0	10.0	109.9	102.9	6.9	9.0	8.4	0.6	0.00629	0.00078	10,807

TESTED BY M.W./ D.T. DATE September 9. 2014

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.	090406	**Material Code**	SSRVPS
Date Sampled:	9/9/14	**Station No.:**	12+17
Date Tested:	September 9, 2014	**Location:**	CL
Name of Project:	HWY.43 KCS RAILROAD OVERPASS (SILOA		
County:	**Code:** 4 **Name:** BENTON		
Sampled By:	FAULKNER	**Depth:**	0-5
Lab No.:	20142824	**AASHTO Class:**	A-2-4(0)
Sample ID:	RV821	**Material Type (1 or 2):**	2
LATITUDE:		**LONGITUDE:**	

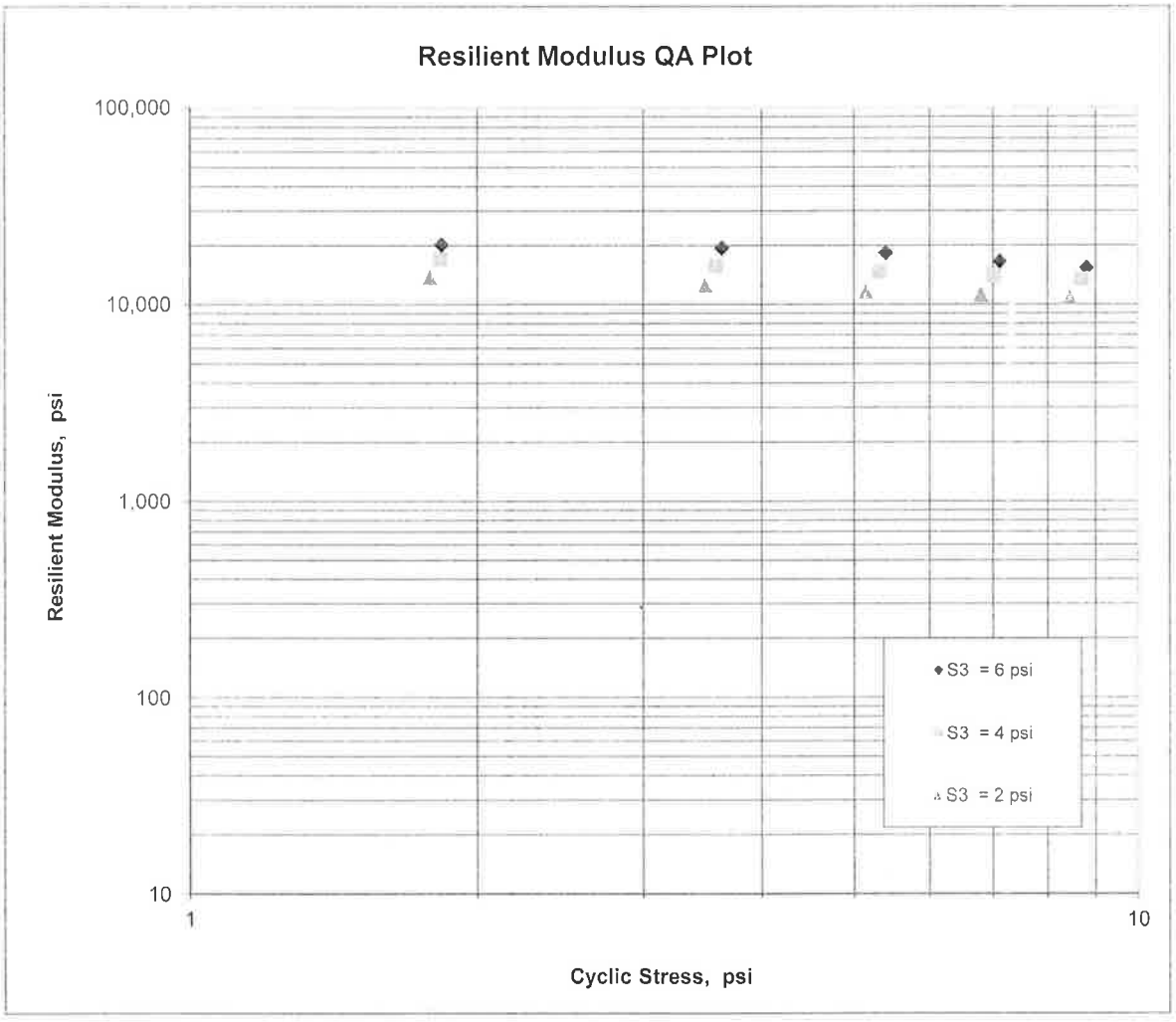
$$M_R = K1\ (S_C)^{K2}\ (S_3)^{K5}$$

K1 = 11,623

K2 = -0.15917

K5 = 0.36908

R^2 = 0.98



JOB: 090406

JOB NAME: HWY.43 KCS RAILROAD OVERPASS (SILOAM SPRINGS) (S)

COUNTY NO. 4 **DATE TESTED** 9/11/2014

Arkansas State Highway Transporation Department

Materials Division

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 S					
12+17	CL	0-5	RED						28	10	A-2-4(0)	RV821	
12+17	CL	0-5	RED						17	01	A-1-B(2)	S815	12.2
12+35	CL	0-5	RED						27	10	A-4(1)	S816	12.3
24+00	12RT	0-5	RED						34	15	A-6(9)	S817	17.2
24+00	27RT	0-5	RED						35	15	A-6(6)	S818	21.4
48+00	12LT	0-5	RED						35	18	A-6(12)	S819	20.7
48+00	24LT	0-5	RED						40	22	A-6(11)	S820	20.1

comments:

Wednesday, September 17, 2014

JOB: 090406

JOB NAME: HWY.43 KCS RAILROAD OVERPASS (SILOAM SPRINGS) (S)

COUNTY NO. 4

Arkansas State Highway Transporation Department

Materials Division

Michael Benson, Materials Engineer

DATE TESTED
9/8/2014

PAVEMENT SOUNDINGS

STA.#	LOC.			
12+17	CL	ACHMSC	ACHMBC	AGG.BASE CRS CL-7
		--	--	--
12+35	CL	ACHMSC	ACHMBC	AGG.BASE CRS CL-7
		6.25	--	**3.0**
24+00	12RT	ACHMSC	ACHMBC	AGG.BASE CRS CL-7
		1.5	**10.25**	**5.0**
24+00	27RT	ACHMSC	ACHMBC	AGG.BASE CRS CL-7
		--	--	--
48+00	12LT	ACHMSC	ACHMBC	AGG.BASE CRS CL-7
		3.75	**7.5**	**3.0**
48+00	24LT	ACHMSC	ACHMBC	AGG.BASE CRS CL-7
		--	--	--

comments:

Wednesday, September 17, 2014

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

DATE - 09/15/14
JOB NUMBER - 090406
FEDERAL AID NO.- TO BE ASSIGNED
PURPOSE - SOIL SURVEY SAMPLE
SPEC. REMARKS - NO SPECIFICATION CHECK
SUPPLIER NAME - STATE

SEQUENCE NO. - 1
MATERIAL CODE - SSRVPS
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 04
DISTRICT NO. - 09

NAME OF PROJECT - HWY.43 KCS RAILROAD OVERPASS (SILOAM SPRINGS) (S)
PROJECT ENGINEER - NOT APPLICABLE
PIT/QUARRY - ARKANSAS
LOCATION - BENTON COUNTY
SAMPLED BY - S.FAULKNER
SAMPLE FROM - TEST HOLE

DATE SAMPLED - 08/27/14
DATE RECEIVED - 08/28/14
DATE TESTED - 09/08/14

MATERIAL DESC. - SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS

LAB NUMBER	20142818	20142819	20142820
SAMPLE ID	S815	S816	S817
TEST STATUS	INFORMATION ONLY	INFORMATION ONLY	INFORMATION ONLY
STATION	12+17	12+35	24+00
LOCATION	CL	CL	12RT
DEPTH IN FEET	0-5	0-5	0-5
MAT'L COLOR	RED	RED	RED
MAT'L TYPE			
LATITUDE DEG-MIN-SEC	36 11 48.60	36 11 48.60	36 11 44.60
LONGITUDE DEG-MIN-SEC	94 31 10.70	94 31 10.80	94 31 28.30
% PASSING 2 IN.			
1 1/2 IN.			
3/4 IN.	100		100
3/8 IN.	89	100	94
NO. 4	65	89	92
NO. 10	43	72	87
NO. 40	30	54	74
NO. 80	28	50	72
NO. 200	25	45	70
LIQUID LIMIT	17	27	34
PLASTICITY INDEX	01	10	15
AASHTO SOIL	A-1-B(2)	A-4(1)	A-6(9)
UNIFIED SOIL			
% MOISTURE CONTENT	12.2	12.3	17.2
ACHMSC (IN)	--	6.25	1.5
ACHMBC (IN)	--	--	10.25
AGG.BASE CRS CL-7 (IN)	--	3.0	5.0

REMARKS -

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 - 09/11/14
JOB NUMBER - 090406
FEDERAL AID NO.- TO BE ASSIGNED
PURPOSE - SOIL SURVEY SAMPLE
SPEC. REMARKS - NO SPECIFICATION CHECK
SUPPLIER NAME - STATE
SEQUENCE NO. - 2
MATERIAL CODE - SSRVPS
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 04
DISTRICT NO. - 09
NAME OF PROJECT - HWY.43 KCS RAILROAD OVERPASS (SILOAM SPRINGS) (S)
PROJECT ENGINEER - NOT APPLICABLE
PIT/QUARRY - ARKANSAS
LOCATION - BENTON COUNTY
SAMPLED BY - S.FAULKNER
SAMPLE FROM - TEST HOLE
DATE SAMPLED - 08/27/14
DATE RECEIVED - 08/28/14
DATE TESTED - 09/08/14
MATERIAL DESC. - SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS

LAB NUMBER	20142821	20142822	20142823
SAMPLE ID	S818	S819	S820
TEST STATUS	INFORMATION ONLY	INFORMATION ONLY	INFORMATION ONLY
STATION	24+00	48+00	48+00
LOCATION	27RT	12LT	24LT
DEPTH IN FEET	0-5	0-5	0-5
MAT'L COLOR	RED	RED	RED
MAT'L TYPE			
LATITUDE DEG-MIN-SEC	36 11 44.50	36 11 44.20	36 11 44.30
LONGITUDE DEG-MIN-SEC	94 31 28.30	94 30 59.90	94 30 60.00
% PASSING 2 IN.			
1 1/2 IN.			
3/4 IN.			
3/8 IN.	100	100	100
NO. 4	81	94	90
NO. 10	71	87	78
NO. 40	64	82	68
NO. 80	61	79	65
NO. 200	59	77	62
LIQUID LIMIT	35	35	40
PLASTICITY INDEX	15	18	22
AASHTO SOIL	A-6(6)	A-6(12)	A-6(11)
UNIFIED SOIL			
% MOISTURE CONTENT	21.4	20.7	20.1
ACHMSC (IN)	--	3.75	--
ACHMBC (IN)	--	7.5	--
AGG.BASE CRS CL-7 (IN)	--	3.0	--

REMARKS -

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 - 09/11/14
JOB NUMBER - 090406
FEDERAL AID NO.- TO BE ASSIGNED
PURPOSE - SOIL SURVEY SAMPLE
SPEC. REMARKS - NO SPECIFICATION CHECK
SUPPLIER NAME - STATE
SEQUENCE NO. - 1
MATERIAL CODE - RV
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 04
DISTRICT NO. - 09
NAME OF PROJECT - HWY.43 KCS RAILROAD OVERPASS (SILOAM SPRINGS) (S)
PROJECT ENGINEER - NOT APPLICABLE
PIT/QUARRY - ARKANSAS
LOCATION - BENTON COUNTY
SAMPLED BY - S.FAULKNER
SAMPLE FROM - TEST HOLE
DATE SAMPLED - 08/27/14
DATE RECEIVED - 08/28/14
DATE TESTED - 09/11/14
MATERIAL DESC. - SOIL SURVEY - RESISTANCE R-VALUE ACTUAL RESULTS

LAB NUMBER	20142824
SAMPLE ID	RV821
TEST STATUS	INFORMATION ONLY
STATION	12+17
LOCATION	CL
DEPTH IN FEET	0-5
MAT'L COLOR	RED
MAT'L TYPE	
LATITUDE DEG-MIN-SEC	36 11 48.60
LONGITUDE DEG-MIN-SEC	94 31 10.70
% PASSING 2 IN.	
1 1/2 IN.	
3/4 IN.	100
3/8 IN.	79
NO. 4	59
NO. 10	41
NO. 40	31
NO. 80	29
NO. 200	27
LIQUID LIMIT	28
PLASTICITY INDEX	10
AASHTO SOIL	A-2-4(0)
UNIFIED SOIL	
% MOISTURE CONTENT	

REMARKS -

AASHTO TESTS : T24 T88 T89 T90 T265