#### ARKANSAS DEPARTMENT OF TRANSPORTATION



#### SUBSURFACE INVESTIGATION

STATE JOB NO.	JOB NO. <u>090402</u>					
FEDERAL AID PROJE	AID PROJECT NO. NHPP-0004(50)					
	LITTLE OSAG	E CREEK STR. & APPRS	S. (S)			
STATE HIGHWAY	264	SECTION	3			
IN		BENTON	COUNTY			

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

#### ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

October 2, 2014

TO:

Mr. Rick Ellis, Bridge Engineer

SUBJECT:

Job No. 090402

Little Osage Creek Str. & Apprs. (S)

Route 264 Section 3
Benton County

Transmitted herewith are a brief summary of the geology and site conditions, unconfined compressive strength test results, D50 analysis test results, 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 the interior bents will be founded on spread footings. Spread footings should be sized based on the values provided in Table 1.

TABLE 1 – Bearing Capacity Recommendations for Interior bents

Foundation Description	Nominal Bearing Resistance (ksf)	Resistance Factor	Factored Bearing Resistance (ksf)
Spread Footings	81	0.45	36.5

If you have any questions concerning these recommendations, please contact the Geotechnical Section.

Michael C. Benson Materials Engineer

MCB:rpt

cc: State Construction Engineer - Master File Copy

District 9 Engineer

G.C. File

# GEOLOGY AND SITE CONDITIONS Job No. 090402

Little Osage Creek Str. & Apprs. (S)
Route 264 Section 3

#### **Benton County**

#### **Site Conditions**

The existing bridge is an eleven span structure over the Little Osage Creek. The bridge is constructed of precast concrete deck, except spans 6 and 7 which are composed of concrete deck supported by 5 steel beams with concrete bents and end walls. The guardrail is constructed of steel with concrete posts. Overhead power lines parallel the north side of the roadway. Trees line the channel with pasture surrounding the bridge. Located southwest of the bridge is a gated subdivision. The stream flows to the south, at the job location.

#### **Site Geology**

The project alignment is located on rocks mapped as the Boone Formation (map symbol Mb). The Boone Formation consists of gray, fine- to coarse-grained fossiliferous limestone interbedded with chert. Some sections may be predominantly limestone or chert. The chert is dark in color in the lower part of the sequence and light in the upper part. The quantity of chert varies considerably both vertically and horizontally. The Boone Formation is well known for dissolutional features, such as sinkholes, caves, and enlarged fissures. Only one small vug (less than one inch in diameter) was observed in the cores.

The thickness of the Boone Formation is 300 to 350 feet in most of northern Arkansas, but as much as 390 feet has been reported. Depth to bedrock varied in borings from 3.7 to 10.2 feet below ground level. The elevation of the top of bedrock varied from 1084.2 to 1085.0 feet above MSL.

#### **Subsurface Conditions**

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

0 to 3.7 Feet:

Consists of wet, loose to very dense, brown sand with gravel (chert fragments) to

gravel and cobbles (chert fragments).

3.7 to 10.2 Feet:

Varies from moist, soft to stiff, brown clay with some gravel (chert fragments to wet, very dense, white gravel (chert fragments) with sand to moderately hard, gray limestone with chert layers to hard, gray limestone with chert layers. There

are some vertical fractures in this zone.

10.2 to 33.3 Feet:

Consists of hard gray limestone with chert layers. There are some vertical

fractures in this zone.

## Rock Core Unconfined Compression Test Summary

Project Number:

090402

Project Name:

Little Osage Creek Str. & Apprs.

Date Tested:

9/24/2014

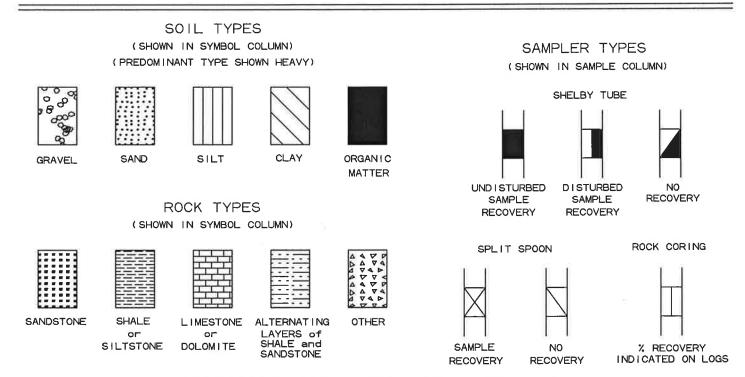
Station	Location	Sample No.	Depth (ft)	Diameter (in)	Height (in)	Total Load (lbs)	Correction Factor	Stress (psi)	Remarks
112+78	15.5' RT	1	5.0	1.75	3.60	36,190	1.00	15,016	
112+78	15.5' RT	2	7.5	1.75	3.60	42,940	1.00	17,817	
113+93	11' RT	3	10.0	1.75	3.60	16,820	1.00	6,979	
113+93	11' RT	4	14.5	1.75	3.60	23,000	1.00	9,543	
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<sup>\*</sup> Please note any broken samples, fractures or other characteristics of sample in Remarks.

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

		Job No.	090402		
Creek Name	Station	Sample Type	Location	Depth (FT)	Aggregate Size (D50) (IN)
Little Osage Creek	113+09	Creek Bank	15' Rt. C.L. Construction	N/A	0.75

# LEGEND



#### TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANU	LAR SOIL		CLAY	CL	AY-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	0ver 60
31-50	Dense	9-15	Stiff	9-15	Stiff	More than 2'
0ver 50	Very Dense	16-30	Very Stiff	16-30	Very Stiff	Penetration
		31-60	Hard	31-60	Hard	in 60 Blowsı Medium Ha
		0ver 60	Very Hard	0ver 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<sub>60</sub>) can be obtained by multiplying N<sub>f</sub> by the hammer correction factor published on the boring log.

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(Cherty Limestone Fragments) and some Organic Matter  Gravel (Cherty Limestone Fragments) and Cobbles  Gravel (Cherty Limestone Fragments) and Cobbles  Gravel (Cherty Limestone Fragments) and Cobbles  Limestone Fragments) and Geo (5")  15  Limestone With Chert Layers - Gray, Thin Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  Limestone With Chert Layers - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  Limestone With Chert Layers - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  Limestone With Chert Layers - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  35  Remarks: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.		8 9 8												
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Organic Matter  Organic Matter		000 €	X											
Cobbles  Cobbles  Cobbles  Cobbles  Cobbles  Cobbles  Cobbles  LIMESTONE WITH CHERT LAYERS - Gray, Thin Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  LIMESTONE WITH CHERT LAYERS - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  LIMESTONE WITH CHERT LAYERS - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  LIMESTONE WITH CHERT LAYERS - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  35  REMARKS: * Poor core recovery due to core barrel malfunction. *** Total water loss was encountered from 12.	Ĭ		/	Organic Matter								•		
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LIMESTONE WITH CHERT LAYERS - Gray, Thin Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  20  LIMESTONE WITH CHERT LAYERS - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  100 30  LIMESTONE WITH CHERT LAYERS - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  100 30  LIMESTONE WITH CHERT LAYERS - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  35  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.		斑											91	36
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Thin Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  20  LIMESTONE WITH CHERT LAYERS - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  30  LIMESTONE WITH CHERT LAYERS - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  30  LIMESTONE WITH CHERT LAYERS - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  35  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.	15			LIMESTONE WITH CHERT LAVERS Grov									30*	0
Slight Dip and Fractured Layers **  20  LIMESTONE WITH CHERT LAYERS - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  LIMESTONE WITH CHERT LAYERS - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  35  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.		斑												
LIMESTONE WITH CHERT LAYERS - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  LIMESTONE WITH CHERT LAYERS - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  Boring Terminated  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.		部												
LIMESTONE WITH CHERT LAYERS - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  LIMESTONE WITH CHERT LAYERS - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  Boring Terminated  35  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.		斑												
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Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  LIMESTONE WITH CHERT LAYERS - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.	20												18*	0
Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  LIMESTONE WITH CHERT LAYERS - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.	<u> </u>													
Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  LIMESTONE WITH CHERT LAYERS - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.		斑岩												
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Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers **  LIMESTONE WITH CHERT LAYERS - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.		斑		LIMESTONE WITH CHERT LAYERS - Grav.										
LIMESTONE WITH CHERT LAYERS - Gray, Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  Beautiful State of the	25	斑斑											100	30
Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  Beautiful Boring Terminated		斑		Slight Dip and Fractured Layers **										
Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  Beautiful Boring Terminated				a.'										
Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  Beautiful Boring Terminated		辯												
Thick Bedded, Slightly Weathered, Hard, with Slight Dip  Boring Terminated  Beautiful Boring Terminated		莊		LIMESTONE WITH CHERT LAVERS - Grav				1						
Slight Dip  Boring Terminated  35  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.	30	斑											100	52
35  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.		躃												
35  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.	L -	毲												
35  REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.	L -			Boring Terminated										
REMARKS: * Poor core recovery due to core barrel malfunction. ** Total water loss was encountered from 12.				-										
	REM	ARK			** Tota	l wate	r lo	ss wa	s en	cou	nter	ed fr	om 1	12.

### ARKANSAS DEPARTMENT OF TRANSPORTATION

August 3, 2017

TO:

Mr. Rick Ellis, Bridge Engineer

SUBJECT:

Job No. 090402

Little Osage Creek Str. & Apprs. (S)

Route 264 Section 3 Benton County

This is to provide supplementary information to the Geotechnical report submitted October 2, 2014. Transmitted herewith are the boring logs conducted for the intermediate bents and the corresponding unconfined compressive strength test results and RMR. 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 correspondence with Bridge Division, it is anticipated that all intermediate bents will be founded using drilled shafts. These shafts should be socketed into the competent limestone with interbedded chert or chert with interbedded limestone and should be designed based on the values provided in Table 1.

TABLE 1 - Bearing Resistance Recommendation for Drilled Shafts

Foundation	Nominal Tip	Factor Tip	Nominal Side	Factored Side
Description	Resistance (ksf)	Resistance(ksf)	Resistance (ksf)	Resistance (ksf)
Drilled Shafts	58	29	19.9	10.0

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

# Rock Core Unconfined Compression Test Summary

Project Number:

090402

Project Name:

Little Osage Creek Str. & Apprs.

Date Tested:

7/5/2017 & 7/25/2017

Station	Location	Sample No.	Depth (ft)	Diameter (in)	Height (in)	Total Load (lbs)	Correction Factor	Stress (psi)	Remarks
114+22	10' Rt	1	9.4	1.75	3.50	38,940	1.00	16,189	Vertical Seam
114+22	10' Rt	2	10.4	1.75	3.50	34,780	1.00	14,460	vortical Coalii
114+22	10' Rt	3	16.1	1.75	3.50	17,810	1.00	7,404	
114+22	10' Rt	4	17.6	1.75	3.50	19,680	1.00	8,182	
114+31	22' Lt	5	10.5	1.75	3.50	16,730	1.00	6,956	
114+31	22' Lt	6	14.0	1.75	3.50	8,100	1.00	3,368	
114+31	22' Lt	7	15.0	1.75	3.50	13,340	1.00	5,546	
114+31	22' Lt	8	18.0	1.75	4.00	9,000	1.00	3,742	
113+67	12' Rt	9	6.8	1.75	4.00	30,490	1.00	12,676	
113+67	12' Rt	10	12.2	1.75	4.50	24,670	1.00	10,257	
113+67	12' Rt	11	15.1	1.75	4.00	22,980	1.00	9,554	
113+67	12' Rt	12	20.7	1.75	3.50	21,180	1.00	8,806	
113+76	20' Lt	13	18.8	1.75	4.50	23,570	1.00	9,799	
113+76	20' Lt	14	21.0	1.75	4.00	26,730	1.00	11,113	
113+11	30' Lt	15	7.0	1.75	3.75	21,250	1.00	8,834	
113+11	30' Lt	16	14.4	1.75	3.50	19,610	1.00	8,153	
113+11	30' Lt	17	22.6	1.75	3.50	28,120	1.00	11,691	
112+56	17' Lt	18	11.2	1.75	3.50	31,900	1.00	13,262	
112+56	17' Lt	19	18.1	1.75	3.50	15,870	1.00	6,598	
112+56	17' Lt	20	23.5	1.75	3.50	14,690	1.00	6,107	
112+47	10' Rt	21	6.8	1.75	4.00	30,160	1.00	12,539	
112+47	10' Rt	22	12.2	1.75	3.75	15,970	1.00	6,640	
112+47	10' Rt	23	18.8	1.75	3.75	28,270	1.00	11,753	
113+02	12' Rt	24	5.8	1.75	3.75	17,120	1.00	7,118	
113+02	12' Rt	25	13.6	1.75	3.75	12,300	1.00	5,114	
113+02	12' Rt	26	22.2	1.75	3.75	13,240	1.00	5,505	

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

#### ROCK MASS RATING SUMMARY JOB# 090402

#### SAMPLE #1 Station/Location 113+67/ 12' RT Depth (ft) 6.8 Relative Rating Uniaxial Compressive Strength RQD 8 Spacing of Joints 10 Condition of Joints 25 Groundwater Conditions 7 Sum Class Number Ш FAIR ROCK Description

SAMPL	.E #2
Station/Location	113+67/ 12' RT
Depth (ft)	12.2
10	Relative Rating
Uniaxial Compressive Strength	7
RQD	13
Spacing of Joints	10
Condition of Joints	25
Groundwater Conditions	7 ////////
Sum	62
Class Number	II .
Description	GOOD ROCK

SAMP	LE #3
Station/Location	113+67/ 12' RT
Depth (ft)	15.1
	Relative Rating
Uniaxial Compressive Strength	7
RQD	13
Spacing of Joints	10
Condition of Joints	25
Groundwater Conditions	7
Sum	62
Class Number	11
Description	GOOD ROCK

LE #4
113+67/ 12' RT 20.7
Relative Rating
7
13
10
25
7
62
II I
GOOD ROCK

Station/Location	113+76/ 20' LT
Depth (ft)	16
2	Relative Rating
Uniaxial Compressive Strength [	12
RQD 🐰	8
Spacing of Joints	10
Condition of Joints	20
Groundwater Conditions	7
Sum	57
Class Number	111
Description	FAIR ROCK

Station/Location	113+76/ 20' LT
Depth (ft)	18.8
The state of the s	Relative Rating
Uniaxial Compressive Strength	7
RQD [	8
Spacing of Joints	10
Condition of Joints	25
Groundwater Conditions	7
Sum	57
Class Number	Ш
Description	FAIR ROCK

Station/Location	442 - 70/ 201 LT
	113+76/ 20' LT
Depth (ft)	21
2	Relative Rating
Jniaxial Compressive Strength 📗	7
RQD	8
Spacing of Joints	10
Condition of Joints	25
Groundwater Conditions	7
Sum	57
Class Number	III
Description	FAIR ROCK

-	
Station/Location	114+22/ 10' RT
Depth (ft)	9.4
	Relative Rating
Uniaxial Compressive Strength	12
RQD	8
Spacing of Joints	10
Condition of Joints	20
Groundwater Conditions	7
Sum	57
Class Number	111
Description	FAIR ROCK

#### SAMPLE #9

Station/Location	114+22/ 10' RT
Depth (ft)	10.4
	Relative Rating
Uniaxial Compressive Strength	7
RQD	8
Spacing of Joints	10
Condition of Joints	20
Groundwater Conditions	7
Sum	52
Class Number	III .
Description	FAIR ROCK

#### SAMPLE #10

Station/Location Depth (ft)	114+22/ 10' RT 16.1	
	Relative Rating	
Uniaxial Compressive Strength	4	
RQD	8	
Spacing of Joints	10	- 1
Condition of Joints	25	
Groundwater Conditions	7	
Sum	54	
Class Number	iii 1	
Description	FAIR ROCK	

#### SAMPLE #11

114+22/ 10' RT	
17.6	
Relative Rating	
7	
8	
10	
25	
7	
57	
III	
FAIR ROCK	
	17.6  Relative Rating 7 8 10 25 7 57

#### SAMPLE #12

Station/Location Depth (ft)	114+31/ 22' LT 10.5
1	Relative Rating
Uniaxial Compressive Strength	4
RQD	8
Spacing of Joints	10
Condition of Joints	25
Groundwater Conditions	7
Sum	54
Class Number	
Description	FAIR ROCK

#### SAMPLE #13

OAIIII EI	
Station/Location Depth (ft)	114+31/22 LT 14
	Relative Rating
Uniaxial Compressive Strength	4
RQD	13
Spacing of Joints	10
Condition of Joints	25
Groundwater Conditions	7
Sum	59
Class Number	III
Description	FAIR ROCK

#### SAMPLE #14

Station/Location	114+31/ 22' LT
Depth (ft)	15
The state of the s	Relative Rating
Jniaxial Compressive Strength	4
RQD	13
Spacing of Joints	10
Condition of Joints	25
Groundwater Conditions	7
Sum	59
Class Number	III
Description	FAIR ROCK

#### SAMPLE #15

Station/Location	114+31/ 22' LT
Depth (ft)	18
146_	Relative Rating
Uniaxial Compressive Strength	4
RQD	8
Spacing of Joints	10
Condition of Joints	25
Groundwater Conditions	7
Sum	54
Class Number	W I
Description	FAIR ROCK

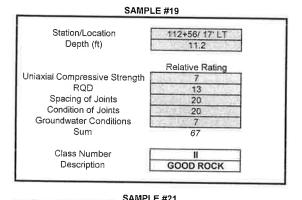
#### SAMPLE #16

Station/Location Depth (ft)	113+11/ 30' LT 7
	Relative Rating
niaxial Compressive Strength	7
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	67
Class Number	11
Description	GOOD ROCK

SAMPLE #17 Station/Location 113+11/30 LT Depth (ft) 14.4 Relative Rating Uniaxial Compressive Strength RQD 8 Spacing of Joints Condition of Joints 20 20 Groundwater Conditions Sum 62 Class Number Description GOOD ROCK

#### Station/Location 113+11/30' LT Depth (ft) 22.6 Relative Rating Uniaxial Compressive Strength RQD Spacing of Joints 20 Condition of Joints 20 Groundwater Conditions Sum 62 Class Number 11 Description GOOD ROCK SAMPLE #20

SAMPLE #18



Station/Location	112+56/ 17' LT
Depth (ft)	18.1
_	Relative Rating
niaxial Compressive Strength	4
RQD	3
Spacing of Joints	10
Condition of Joints	20
Groundwater Conditions	7
Sum	44
Class Number	
Description	FAIR ROCK

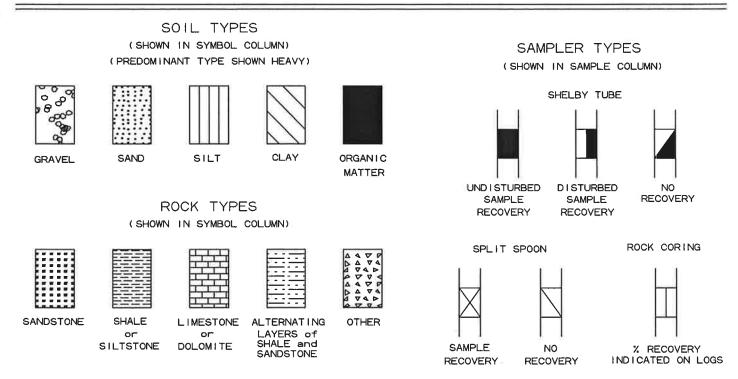
Station/Location	112+56/ 17' LT
Depth (ft)	23.5
-	Relative Rating
Jniaxial Compressive Strength 📗	4
RQD	8
Spacing of Joints	10
Condition of Joints	20
Groundwater Conditions	7
Sum	49
Class Number	III .
Description	FAIR ROCK

SAMPL	.E #22
Station/Location	112+47/ 10' RT
Depth (ft)	6.8
	Relative Rating
Jniaxial Compressive Strength 🛭	7
RQD	8
Spacing of Joints	10
Condition of Joints	20
Groundwater Conditions	7
Sum	52
Class Number	Ш
Description	FAIR ROCK

Station/Location [	112+47/ 10' RT
Depth (ft)	12.2
	Relative Rating
Uniaxial Compressive Strength	4
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	64
Class Number	11
Description	GOOD ROCK

Station/Location	112+47/ 10' RT
Depth (ft)	18.8
-	Relative Rating
Uniaxial Compressive Strength	7
RQD	13
Spacing of Joints	25
Condition of Joints	20
Groundwater Conditions	7
Sum	72
Class Number	Ш
Description	GOOD ROCK

# LEGEND



#### TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANU	LAR SOIL		CLAY	CLA	Y-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	0ver 60	
91-50	Dense	9-15	Stiff	9-15	Stiff	More than	2'
0ver 50	Very Dense	16-30	Very Stiff	16-30	Very Stiff	Penetrati	on
		31-60	Hard	31-60	Hard	in 60 Blow	vs: Medium Haro
		0ver 60	Very Hard	0ver 60	Very Hard	Less than	2'
						Penetrati	on
						in 60 Blow	vs• 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<sub>60</sub>) can be obtained by multiplying N<sub>f</sub> by the hammer correction factor published on the boring log.

			HWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORIN PAGE			· 2					
JOB N			090402 Benton County		DATE:				v 11	201	7		
						ollov	v Ste	em					
STATI		EQUIPN	-		Diai		1E 8:						
LOCA			112+47 10' Right of Construction Centerline		LQUIT	VALCI V I			O1	IL O.	0		
			teve Faulkner		HAMM	ER C	ORREC'	TION	FACT	TOR:		1.23	
COM	PLET	ION	I DEPTH: 38.8										
D		s											
E	S	Α							۵,				
P	М	М	DESCRIPTION OF MATERIAL	SOIL				븊	U.F.	) W.		% T	% R
T H	В	P		GROUP	ပ	Ë		EIG	R C	BL(	ż	C	Q
	0	E			STI	OIS		🗟	PE	OF	(F-1)	R	D
FT.	L		SURFACE ELEVATION: 1089.0		PLASTIC LIMIT	% MOIST	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		
	;865;				1				_		_		
	8.0.0												
	89		Wat Vary Dance Brown and Gray Sand with										- 1
-	300 A		Wet, Very Dense, Brown and Gray Sand with Gravel (Chert Fragments)										
	000		Graver (Grieft Fragments)										
_5	.v.g.	V								2		Ш	
	ara y	$\Leftrightarrow$	CHERT WITH INTERBEDDED LIMESTONE							1 <b>-</b>   (10	42 .8")		
<u> </u>			GILLIT WITH INTERSESSES EIMESTOTIE							,	,		
												104	30
_ =		+	CHERT WITH INTERBEDDED LIMESTONE -										
10	200		Unweathered, Hard, Frequent Fractures, Light										
			Gray										00
												livq	62
	3547												
15													
												por	59
			CHERT WITH INTERPEDED LIMESTONE										
			CHERT WITH INTERBEDDED LIMESTONE - Unweathered, Hard, Occasional Fractures, Light										
20			Gray		1								
			,										
												tod	60
25													
25			CHERT WITH INTERBEDDED LIMESTONE -										
			Unweathered, Hard, Frequent Fractures, Light									100	50
			Gray									"	
		+											
30													
			LIMESTONE WITH INTERBEDDED CHERT -									100	م ا
			Unweathered, Hard, Frequent Fractures, Light Gray									100	60
			Gray										
		4											
35	1974												
REM	ARKS	3:											

ARKANSAS HWY. & TRANS. DEPARTMENT						IG NO	D. 1					
			DIVISION - GEOTECHNICAL SEC.		PAGE	2	OI	₹ 2				
JOB N			090402 Benton County		DATE:			July 1				
JOB N	AME:		Little Osage Creek Str. & Apprs. (S)		TYPE C					low St	em	
						-		Diamo				
STATION: 112+47					EQUIPN	MENT	:	(	ME	850		
LOCA'			10' Right of Construction Centerline									
			teve Faulkner		HAMM	ER CO	ORREC'	ΓΙΟΝ FA	CTO	R:	1.23	
	PLET.	_	DEPTH: 38.8		_		_		_		_	
D	s	S										
E P	Υ	A M						. F	- 2	2	%	%
7	М	P	DESCRIPTION OF MATERIAL	SOIL				HE H	:	Ş	Т	R
ΙĤΙ	В	L		GROUP	12 1	ST.		/EIC	<u>ال</u> ا	d Z	C R	Q D
	O L	Е			PLASTIC LIMIT	% MOIST	       	DRY WEIGHT	NO OF BLOWS	PER 6-IN.	^	D
FT;	_	S	SURFACE ELEVATION: 1089.0		PL/ LIN	1%	LIQUID LIMIT	DR	3 5	PEI		
			LIMESTONE WITH INTERBEDDED CHERT -						$\top$			
			Unweathered, Hard, Occasional Fractures, Light								100	88
			Gray									
40			Boring Terminated						Т			
_ =								,				
45												
-10												
<b>—</b> –												
50												
_50_												
_55_												
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60												
65												
70												
REM/	ARKS	:										

			HWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORI PAGE		10. <b>2</b>	)F 2					
JOB N			090402 Benton County		DATE:		, (			8, 20	17		
JOB N			Little Osage Creek Str. & Apprs. (S)  TYPE OF DRILLING: Hollow Stem At Rotary Wash - Diamond Core							Auge	er -		
	STATION: 112+56							97		ME			
LOCATION: 17' Left of Construction Centerline LOGGED BY: Steve Faulkner						ΛER (	CORRE	CTIO	N FAC	CTOR	:	1.23	
COM	PLET		DEPTH: 43.5										
D E P	S Y	S A M							ET.	S/		%	%
T H	М В О	≅С⊓Ш	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	OIL DE	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.	T C R	R Q D
FT,	L		SURFACE ELEVATION: 1093.9		PLA	W %	LIQUID	DRY	LBS	NO.	PER		
5		X	Moist, Medium Dense, Brown and Gray Clayey Sand with Gravel (Chert and Limestone Fragments)							10	1)-8		
10	0 00 0	X	Wet, Very Dense, Brown and Gray Sand and Gravel (Limestone and Chert Fragments)							-	9 0 3")		
			CHERT WITH INTERBEDDED LIMESTONE - Unweathered, Hard, Occasional Fractures, Gray								,	96	68
15												40	14*
			LIMESTONE WITH INTERBEDDED CHERT - Unweathered, Hard, Occasional to Frequent Fractures, Gray									40	0*
25												92	47*
30			CHERT WITH INTERBEDDED LIMESTONE - Unweathered, Hard, Frequent Fractures, Gray									100	28
35													
	ARKS		Poor core recovery due to core barrel malfuction f	rom 13.	5 to 2	3.5 f	eet b	elow	gro	und	leve	el (bg	l).
			Cleaned out hole with tricone bit.										

MATERIALS DIVISION - GEOTECHNICAL SEC.							NO. 2 2 (	OF 2						
JOB N			090402 Benton County		DATE: June 28, 2017									
JOB N.			Little Osage Creek Str. & Apprs. (S)		TYPE OF DRILLING: Hollow Stem Auger -									
					Rotary Wash - Diamond Core									
STATI	ON:		112+56		EQUIPMENT: CME 850									
LOCATION: 17' Left of Construction Centerline														
			teve Faulkner		HAMN	MER (	CORRE	CTION	۱ FAC	CTOR:		1.23		
COMPLETION DEPTH: 43.5														
D	s	S												
E P	Υ	A M							E	SA		%	%	
<del>-</del>	M	P	DESCRIPTION OF MATERIAL	SOIL		1.85		E E	5	0		T	R	
Н	В	L		GROUP	LIC	IST.	اما	VEI	ER (	F BI	Ż	C R	Q D	
	Ĺ	E			PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		_	
FT.	212.6%	S	SURFACE ELEVATION: 1093.9		<u> </u>	%	1212			ž	PE			
	级											99	72	
			LIMESTONE WITH INTERBEDDED CHERT -											
		$\vdash$	Unweathered, Hard, Occasional Fractures,											
40			Gray											
												98	88	
	統													
	A F AUS		Boring Terminated											
45														
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65									1					
70														
REM	ARK9	<u> </u>	I Poor core recovery due to core barrel malfuction f	rom 13 /	to 2	3 5 f	eet h		arc	und	leve	l (ba	<u> </u>	
```_'`'	11 11 10		Cleaned out hole with tricone bit.	1011110.4	, .O Z.	J.J 1	ogi Di	21044	gro	unu	1000	, (ng	'J:	

			HWY. & TRANS. DEPARTMENT		BORIN								
			DIVISION - GEOTECHNICAL SEC.		PAGE	1	OI	F 2		201	_		_
JOB N			090402 Benton County		DATE:			-		, 201			_
JOB N	AME:		Little Osage Creek Str. & Apprs. (S)		TYPE C					ow S		Aug	er
STATI	ONI		113+02		EQUIPN	-	Vash -	Diai		1E 8:			
LOCA			12' Right of Construction Centerline		EQUIP	ATC1A I	;		CIV	TE O.	50		- 1
			teve Faulkner		НАММ	ER CO	ORREC'	TION	FAC7	ΓOR:		1.23	- 1
			J DEPTH: 38.1										_
D		s			Т								
E	S Y	Ā											- 1
P	M	М	DESCRIPTION OF MATERIAL	SOIL				Ħ	J.F	W.S		% T	% R
T H	В	Р		GROUP	၂၁	E.		EIG	C	BL	z l	C R	Q
"	0	E			STI	SIOI	<u>@</u>	W	PE	OF	[-9	R	D
FT,	L	s	SURFACE ELEVATION: 1087.6		PLASTIC LIMIT	% MOIST	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		
	9,00											П	
	0.00		Wet Very Dence Brown and Cray Sand with										
	99. 9		Wet, Very Dense, Brown and Gray Sand with Gravel (Chert Fragments)										
	6. bal		Graver (Griefit Fagillerite)										
5	00 5 <sup>0</sup>	$\approx$	CHERT WITH INTERBEDDED LIMESTONE							-	6		
Ť		Т	CHERT WITH INTERBEDDED ENVIESTABLE							(F	) 5")		
										,	′	99	35
10													
-10-												100	46
												"	10
15													1
-10												100	66
													00
	7.55	-	CHERT WITH INTERBEDDED LIMESTONE -										
20			Unweathered, Hard, Frequent Fractures, Light										
_20_			Gray		1							100	45
													73
		+									Ī		
25													
_20_												100	62
													02
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30													
												98	68
												"	00
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25													
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			HWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORIN PAGE	IG NO		· 2					
JOB N			090402 Benton County		DATE:		- Oi		11.	201	7		
JOB N			Little Osage Creek Str. & Apprs. (S)		TYPE C	F DR	ILLING	-		ow S		Aug	er
							/ash -						,
STAT	ION:		113+02		EQUIPN					1E 8			
LOCA			12' Right of Construction Centerline										
			teve Faulkner		HAMM	ER C	ORREC'	TION I	FACT	OR:		1.23	
	PLET	$\overline{}$	DEPTH: 38.1					_				_	
D	s	S											
E P	Υ	A M	DECODIDETION OF MATERIAL					_	H.	ΝS		%	%
ΙT	M B	Р	DESCRIPTION OF MATERIAL	SOIL GROUP		¥(*/		EGH	CO.	TO		T C	R Q
Н	ő	Ŀ	*	GROOT	T	TSIC		WE	PER	)FB	NI-S	R	Ď
FT.	L	E S	SURFACE ELEVATION: 1087.6		PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		
<u> </u>	270		CHERT WITH INTERBEDDED LIMESTONE -			0/		Д		2		100	00
			Unweathered, Hard, Occasional Fractures, Light									100	96
			Gray										
	JAK.	H	Boring Terminated		-				_			_	
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REM	ARKS	3:											

			HWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORI PAGE			)F 2					
JOB N	O.	-	090402 Benton County Little Osage Creek Str. & Apprs. (S)	-	DATE: TYPE	OF D	RILLIN Stem	Ju: G:	ne 27			Core	5
STATI LOCA	TION:	;	113+11 30' Left of Construction Centerline teve Faulkner		EQUIF	MEN			C	ME 8	350	1.23	
-		_	DEPTH: 38.5		HAIVIN	ALK (	OKKE	CHO	YFAC	TOK:		1.23	$\neg$
D E P T H FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 1089.4	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
5	5. 92. 94. 94. 93. 93. 93. 93. 93. 93. 93. 93. 93. 93	X	Moist, Medium Dense, Brown and Gray Sand with Gravel (Limestone and Chert Fragments)							6-			
			LIMESTONE WITH INTERBEDDED CHERT - Slightly Weathered, Hard, Frequent Fractures, Gray									99	55
10												99	70
15 — –			LIMESTONE WITH INTERBEDDED CHERT - Unweathered, Hard, Occasional to Frequent Fractures, Gray				٠					99	54
20												100	22
25 			CHERT WITH INTERBEDDED LIMESTONE - Unweathered, Hard, Frequent Fractures, Gray									100	17
30			LIMESTONE WITH INTERBEDDED CHERT - Unweathered, Hard, Occasional To Frequent Fractures, Gray									99	35
35 REM	ARKS	}:											

			HWY. & TRANS. DEPARTMENT				10. 4						
-			DIVISION - GEOTECHNICAL SEC.		PAGE		2 0	)F 2	_				
JOB N			090402 Benton County		DATE:				e 27	7, 20	17		
JOB N.	AME:		Little Osage Creek Str. & Apprs. (S)				RILLIN			`	1	<b>~</b>	
OTD A TOT	OM		113+11				Stem	Auge				Core	
STATI LOCA			30' Left of Construction Centerline		EQUIF	MEN	Т:		C.	ME 8	550		
			teve Faulkner		מאא דו	AED C	CORREC	TION	EAC	т∩р.		1.23	
-			DEPTH: 38.5		TIMIVII	ILIC	ORRE	TION	IAC	/IOK.		1.23	
D		S	DEI III Joil										
E	S	A											
P	Y M	М	DESCRIPTION OF MATERIAL	SOIL				II.	Ę.	M.S		% T	% D
II	В	Р	BESSIAI FISIV SI III ATEMA	GROUP	()	L		ISI	2	31.0	, <u>,</u> ;	C	R Q
Н	Ō	L			STIC	OIS	E L	W	PEF	0F.	6-IN	R	D
FT.	L		SURFACE ELEVATION: 1089.4		PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS	PER 6-IN.		
1.7/2	1272	Ť	OOK AGE ELEVATION. 1009.4		HI	· ·		Н	-				
												99	32
40			Boring Terminated										
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			IWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORIN PAGE			₹ 2					
JOB N		_	090402 Benton County		DATE:	·			e 20.	201	7		
JOB N			Little Osage Creek Str. & Apprs. (S)		TYPE C	F DR	ILLING				$\leq$		
			,		Holl	ow S	Stem A	Luge	r - D	iamo	ond (	Core	
STATI	ON:	•	113+67		EQUIPN			_		1E 8:			
LOCA	TION:		12' Right of Construction Centerline										
LOGG	ED BY	: S	tanley Bates		HAMM	ER CO	ORREC"	TION	FACT	OR:		1.23	
COM	PLET:	ION	DEPTH: 38.1										
D	s	S											
E	3   Y	Α							Н	S		%	%
P T	м	M P	DESCRIPTION OF MATERIAL	SOIL				HH	U.F	0		T	R
Ι'nΙ	В	L		GROUP	ွ	T.		EIG	R C	BL	ż	C	Q
1 ''	0	Ē			STI	101		🕺	PE.	OF	PER 6-IN.	R	D
FT.		s	SURFACE ELEVATION: 1089.5		PLASTIC LIMIT	% MOIST	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER		
	,865 0												
	St. 9 G												
-	%:a		Wet, Medium Dense, Brown and Gray Gravel										
	300 A		with Sand (Chert and Limestone Fragments)*										
— - 5	0 C									1	1		
_5_	V 49	X								14-	15		
	122		LIMESTONE WITH INTERBEDDED CHERT -									$\dashv$	
			Slightly Weathered, Moderately Hard, Frequent									95	52
		-	Fractures, White and Gray										
<b>-</b> -													
10			CHERT WITH INTERBEDDED LIMESTONE -										
			Unweathered, Hard, Frequent Fractures, White	l)								10d	50
L -			and Gray	b									
L =													
15													
												10Q	50
L _													
20			LIMESTONE WITH INTERBEDDED CHERT -	0									
			Unweathered, Hard, Frequent Fractures, White									10d	52
			and Gray										
25	150												
												100	60
	14												
		-											
30													
30												100	70
												100	10
			LIMESTONE WITH INTERBEDDED CHERT -										
		-	Unweathered, Hard, Occasional Fractures,									-	
			White and Gray										
35				0 = 1	1			<u>.                                    </u>					
I KEM	AKKS	o:	A water stratum was encountered at approximately	y 3.5 te	et belo	w gi	round	ieve	ei (b	gı).			

			IWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORIN PAGE	IG NO		2					
JOB NO			090402 Benton County		DATE:		OI	June 2	20.	2017	7		
JOB N			Little Osage Creek Str. & Apprs. (S)		TYPE O	F DRI	ILLING:		~, .				
JUD 147	TIVIL.	٠						uger -	Dia	amoi	nd C	ore	
STATI	ON:		113+67		EQUIPN					E 85			
LOCA			12' Right of Construction Centerline										
			tanley Bates		HAMM	ER CO	ORREC'I	ION FA	СТС	OR:	1	.23	
			DEPTH: 38.1										
D	_	s											
E	S Y	Α								S	- 1	%	%
P	м	М	DESCRIPTION OF MATERIAL	SOIL				HT	7.	ΜO		T	R
T H	В	P L		GROUI	<u>`</u>   ∪	ST		EIC	۲ <u>۱</u>	BI	z	C R	Q D
'''	0	E			PLASTIC LIMIT	% MOIST	H	DRY WEIGHT	LBS PER CU.F1	NO. OF BLOWS	PER 6-IN.	K	ע
FT,	L		SURFACE ELEVATION: 1089.5		PL/ LIN	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	LIQUID	DR	Ä E	0 <u>N</u>	PE		
											1	100	90
	7//4/		Boring Terminated										
40													
	8								1				
									1				
45			.:						-				
					1								
50													
L -			E						- 1				
			(37)										
					1								
55													
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REM	ARK	S: '	A water stratum was encountered at approximatel	y 3.5 fe	eet bel	ow g	round	level	(b	gl).			

			HWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORIN PAGE			₹ 2					
JOB N			090402 Benton County		DATE:				e 21.	, 201	7		
JOB N			Little Osage Creek Str. & Apprs. (S)		TYPE C	F DR	ILLING		:	,			
		,					Stem A		r - D	iamo	nd C	ore	
STATI	ON:		113+76		EQUIP			ر کی		лЕ 8:		-	
LOCA'			20' Left of Construction Centerline										
			tanley Bates		HAMM	ER C	ORREC'	TION	FACT	ror:	1	.23	
			DEPTH: 38.5										
D		s											
E	S	Ā							, Va				
Р	M	М	DESCRIPTION OF MATERIAL	SOIL				≒	J.FT	§		% T	% R
T	B	P	DEGGIAN FIGHT OF MIXTERIAL	GROUP				ĪĒ	CC	) M		c	Q
Н	o	Ľ			PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.	R	Ď
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	9000												
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-	7177		LIMESTONE WITH INTERBEDDED CHERT										
	7755		CIMES TOTAL WITH INTERDED STERN									70	0
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			LIMESTONE WITH INTERBEDDED CHERT -										
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$\vdash$			Hard, Frequent Fractures, White and Gray										
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			LIMESTONE WITH INTERBEDDED CHERT - Unweathered, Hard, Frequent Fractures, White										
<u> </u>			and Gray										
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			HWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORIN PAGE			· 2					
JOB N		_	090402 Benton County		DATE:		O1	June	21,	201	7		
JOB N.	AME:		Little Osage Creek Str. & Apprs. (S)		TYPE C			:					
			440.70					Auger -				Core	
STATI-			113+76 20' Left of Construction Centerline		EQUIPN	MENT	:	(	CIV	1E 8:	50		
			tanley Bates		HAMM	ER CO	ORRECT	TION FA	ACT	OR:		1.23	
		_	DEPTH: 38.5										
D	S	S											
E P	Υ	A M							E	SA		%	%
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JOB N		_	090402 Benton County		PAGE DATE:	1		· 2	sh 21	1, 20	17		
JOB N			Little Osage Creek Str. & Apprs. (S)		TYPE C	F DR			J11 Z I	1, 20	1 /		- 1
	1 1111231						Stem A		r - D	iamo	nd C	Core	
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			teve Faulkner		HAMM	ER C	ORREC"	TION	FAC7	OR:		1.23	
	PLET		DEPTH: 43.8		T		_						_
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JOB N			Little Osage Creek Str. & Apprs. (S)		TYPE C	F DR			ĺ			
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JOB N			090402 Benton County		DATE:			Marc	h 29	8 20	17		
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STATI	ON:		114+31	- 1	EQUIPN					1E 8			
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REMA	ARKS	: *	A water stratum was encountered at approximately	/ 3.9 fee	t belo	w gr	ound	leve	el (b	gI).			

#### ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

May 9, 2014

TO:

Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT:

Job No. 090402

Little Osage Creek Strs. & Apprs. (S)

Route 264 Section 3 **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 replacing the bridge crossing Osage Creek on Highway 264. Samples were obtained in the existing travel lanes, shoulders, ditch line and along the new alignment. Sample locations were measured from centerline of construction and should be noted as such on the logs.

Based on laboratory results of samples obtained, the subgrade soils consist primarily of moderately plastic cherty clay. Cross-sections are not currently available, but it is anticipated 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 stations 109+00 20 feet right of centerline at a depth of 4.0 feet, and at 117+00 10 feet right of centerline at a depth of 3.5 feet. Undercut requirements along the new alignment may vary based on seasonal conditions but are anticipated to be no more Further embankment 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 Lowell.

2. Asphalt Concrete Hot Mix

Type	Asphalt Cement %	Mineral Aggregate %
Surface Course	5.5	94.5
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

#### MICHAEL BENSON, MATERIALS ENGINEER

\*\*\* SOIL SURVEY STRENGTH TEST REPORT \*\*\*

DATE - 05/09/2014

SEQUENCE NO. - 1

MATERIAL CODE - SSRVPS JOB NUMBER - 090402 SPEC. YEAR - 2003

> SUPPLIER ID. - 1 COUNTY/STATE - 04

> DISTRICT NO. - 09

JOB NAME - LITTLE OSAGE CREEK STR. & APPRS. (S)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

R-VALUE AT 240 psi STATION LIMITS

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

10 BEGIN JOB - END JOB

RESILIENT MODULUS

8593 STA.101+10

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.	090402	Material Code	SSRVPS
Date Sampled:	5/8/14	Station No.:	101+10
Date Tested:	May 8, 2014	Location:	25'RT
Name of Project:	LITTLE OSAGE CREEK STR. & APPRS.(S)		
County:	Code: 4 Name: BENTON		0.7
Sampled By:	FAULKNER	Depth:	0-5
Lab No.:	20141203	AASHTO Class:	A-6(2)
Sample ID: LATITUDE:	RV371	Material Type (1 or LONGITUDE:	<b>· 2):</b> 2
LATITODE.		LONGITUDE.	
1. Testing Inform	nation:		•
	Preconditioning - Permanent Strain > 5% (Y=		N
	Testing - Permanent Strain > 5% (Y=Yes or N=		N
	Number of Load Sequences Completed (0-15)		15
2. Specimen Info	ormation:		
z. opcomien mic	Specimen Diameter (in):		
	Тор		3.97
	Middle		3.96
	Bottom		3.95
	Average		3.96
	Membrane Thickness (in):		0.01
	Height of Specimen, Cap and Base (in):		8.04
	Height of Cap and Base (in):		0.00
	Initial Length, Lo (in):		8.04
	Initial Area, Ao (sq. in):		12.24
	Initial Volume, AoLo (cu. in):		98.42
	,		
3. Soil Specimer	n Weight:		
	Weight of Wet Soil Used (g):		2989.60
4. Soil Properties	s:		
	Optimum Moisture Content (%):		17.0
	Maximum Dry Density (pcf):		104.6
	95% of MDD (pcf):		99.4
	In-Situ Moisture Content (%):		N/A
5. Specimen Pro	•		0000.00
	Wet Weight (g):	#	2989.60
	Compaction Moisture content (%):		16.4
	Compaction Wet Density (pcf):		115.74
	Compaction Dry Density (pcf):		99.43
	Moisture Content After Mr Test (%):		16.1
6. Quick Shear T	est (Y=Yes, N=No, N/A=Not Applicable):		#VALUE!
7. Resilient Mod	ulus, Mr:	870	0(Sc)^-0.13202(S3)^0.36023
8. Comments			
O Tracks I Down	2414	oto: May 9, 0044	
9. Tested By:	_M.W	ate: <u>May 8, 2014</u>	

# ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT MATERIALS DIVISION

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

SSRVPS 101 + 10

25'RT

Material Code Station No.: Location: May 8, 2014 090402 5/8/14 Date Sampled: Date Tested: Job No.

BENTON LITTLE OSAGE CREEK STR. & APPRS.(S) Name: Code: 4 FAULKNER Name of Project: Sampled By: Lab No.: County:

20141203 RV371 LATITUDE: Sample ID:

Material Type (1 or 2): 2

LONGITUDE:

0-5

Depth:

	Confining	Nominal	Actual	Actual	Actual	Actual	Actual	Actual	Average Recoy Def	Resilient	Resilient
PARAMETER	Pressure	Axial	a	Cyclic Load	Contact	Max.	Cyclic	Contact	LVDT 1		Spinos
		Stress	Load		Load	Axial	Stress	Stress	and 2		
						Stress					
DESIGNATION	ၓၲ	Scyclic	P <sub>max</sub>	Peyelle	Pcontact	S <sub>max</sub>	Scyclic	Scontact	Havg	చ్	Ā
	psi	psi	lbs	sql	sql	psi	psi	psi	ņ	in/in	psi
Sequence 1	6.0	2.0	25.2	22.5	2.7	2.1	1.8	0.2	0.00095	0.00012	15,576
Sequence 2	6.0	4.0	47.0	44.4	2.7	3.8	3.6	0.2	0.00198	0.00025	14,684
Sequence 3	0.9	0.9	69.5	62.9	3.6	5.7	5.4	0.3	0.00314	0.00039	13,805
Sequence 4	0.9	8.0	93.0	86.9	0.9	7.6	7.1	0.5	0.00452	0.00056	12,638
Sequence 5	0.9	10.0	116.1	107.5	9.8	9.5	8.8	0.7	0.00598	0.00074	11,813
Sequence 6	4.0	2.0	25.0	22.3	2.7	2.0	1.8	0.2	0.00115	0.00014	12,694
Sequence 7	4.0	4.0	46.5	43.8	2.7	3.8	3.6	0.2	0.00236	0.00029	12,168
Sequence 8	4.0	6.0	0.89	65.2	2.8	5.6	5.3	0.2	0.00369	0.00046	11,607
Sequence 9	4.0	8.0	91.2	86.0	5.2	7.5	7.0	0.4	0.00513	0.00064	11,000
Sequence 10	4.0	10.0	114.8	107.1	7.7	9.4	8.7	9.0	0.00669	0.00083	10,516
Sequence 11	2.0	2.0	24.6	21.9	2.7	2.0	1.8	0.2	0.00141	0.00018	10,176
Sequence 12	2.0	4.0	45.9	43.1	2.8	3.7	3.5	0.2	0.00302	0.00038	9,364
Sequence 13	2.0	6.0	6.99	64.1	2.9	5.5	5.2	0.2	0.00464	0.00058	9,062
Sequence 14	2.0	8.0	88.9	84.6	4.4	7.3	6.9	0.4	0.00631	0.00078	8,804
Sequence 15	2.0	10.0	111.9	105.0	6.9	9.1	9.8	9.0	0.00803	0.00100	8,593

May 8, 2014	
DATE	DATE
M.W.	
TESTED BY	REVIEWED BY

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

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

Job No.

090402

Material Code SSRVPS

Date Sampled:

5/8/14

**Station No.:** 101+10

Date Tested:

May 8, 2014

Location: 25'RT

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

County:

Code: 4

Name: BENTON

Sampled By:

**FAULKNER** 

**Depth:** 0-5

Lab No.:

20141203

AASHTO Class: A-6(2)

Sample ID:

Material Type (1 or 2): 2

RV371

LONGITUDE:

LATITUDE:

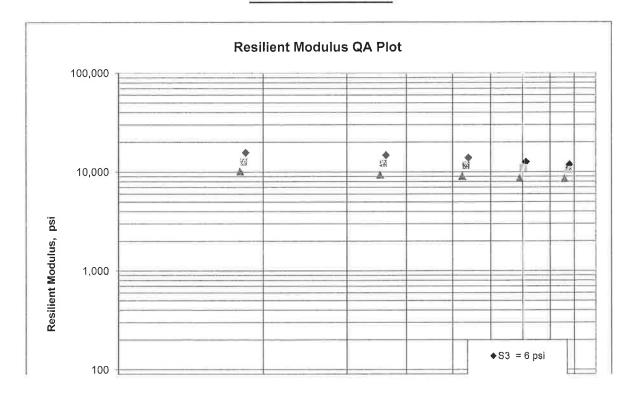
$$M_R = K1 (S_C)^{K2} (S_3)^{K5}$$

$$K1 = 8,700$$

$$K2 = -0.13202$$

$$K5 = 0.36023$$

$$R^2 = 0.98$$



#### MICHAEL BENSON, MATERIALS ENGINEER

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

5	011	DOKVET	/ 1	AARIGENT	50	ONDING IEL	, I KHI OKI		
DATE - 04/23/ JOB NUMBER - 090402 FEDERAL AID NO TO BE PURPOSE - SOIL S SPEC. REMARKS - NO SPE SUPPLIER NAME - STATE NAME OF PROJECT - LITT PROJECT ENGINEER - NOT PIT/QUARRY - ARKANSAS LOCATION - BENTON C SAMPLED BY - S.FAULKNE SAMPLE FROM - TEST HOL MATERIAL DESC SOIL S LAB NUMBER	ASSI URVE CIFI LE C APPI OUNT	GNED Y SAMPI CATION SAGE C: LICABLE Y EY - R	LE CHI REEI	ECK K STR. &	AP EME	PRS. (S)	SEQUENCE MATERIAL SPEC. YE. SUPPLIER COUNTY/S' DISTRICT  DATE SAM DATE REC DATE TES	CODE - AR - ID IATE - NO IPLED - EIVED -	SSRVPS 2003 1 04 09 04/09/14 04/11/14 04/22/14
								S365	<i>5</i> /
			דידי עווע	V.TMO MO		S364	ON ONLY		V.INO NOTTA
		101+1		TON ONLI		101+10	ON ONLI	101+10	
LOCATION		06RT	,			16RT	=	25RT	
DEPTH IN FEET		0-5				0-5	- T	0-5	
MAT'L COLOR		BR/GR			-	BR/GR	=	BR/GR	
MAT'L TYPE	-	,			_	,	-		
LATITUDE DEG-MIN-SEC	-	36	15	16.60	: <del>-</del>	36 15	16.50 -	36	15 16.40
LONGITUDE DEG-MIN-SEC	-	94	16	29.20		94 16	29.20	94	16 29.20
1 1/2 IN 3/4 IN 3/8 IN NO. 4 NO. 10 NO. 40	 - - -	89 75 61 57				100 92 82 71 65 60	- - - - -	100 99 89 79 65 59	
LIQUID LIMIT	_	26			_	28	_	33	
	_				-	10	-	15	
AASHTO SOIL			1)		-	A-4(4)	-	A-6(5	)
UNIFIED SOIL	-	(	_,		-	, ,	-		52
% MOISTURE CONTENT	_	17	.1		-	27.4	-	21.	9
ACHMSC (II	1) –	7.7	5W		_	7.25W	_		
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REMARKS - LOCATIONS MEASURED FROM C.L. OF CONSTRUCTION, W=MULTIPLE LAYERS - Z=AUGER REFUSAL

AASHTO TESTS : T24 T88 T89 T90 T265

1

## MICHAEL BENSON, MATERIALS ENGINEER \*\*\* SOIL SURVEY / PAVEMENT SOUNDING TEST REPORT \*\*\*

DATE - 04/23/14 SEQUENCE NO. - 2

JOB NUMBER - 090402 MATERIAL CODE - SSRVPS

FEDERAL AID NO. - TO BE ASSIGNED SPEC. YEAR - 2003

PURPOSE - SOIL SURVEY SAMPLE SUPPLIER ID. - 1
SPEC. REMARKS - NO SPECIFICATION CHECK COUNTY/STATE - 04
SUPPLIER NAME - STATE DISTRICT NO. - 09

NAME OF PROJECT - LITTLE OSAGE CREEK STR. & APPRS. (S)

PROJECT ENGINEER - NOT APPLICABLE

PIT/QUARRY - ARKANSAS

 LOCATION
 BENTON COUNTY
 DATE SAMPLED - 04/09/14

 SAMPLED BY
 S.FAULKNER
 DATE RECEIVED - 04/11/14

 SAMPLE FROM TEST HOLE
 DATE TESTED - 04/22/14

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

- 20141199 LAB NUMBER - 20141198 20141200 - S366 \_ S367 = S368 SAMPLE ID - INFORMATION ONLY - INFORMATION ONLY - INFORMATION ONLY TEST STATUS - 109+00 - 117+00 **-** 127+00 STATION 10RT 0-3.5z - 06LT - 20RT LOCATION 06L' 0-5 - 0-4.0z DEPTH IN FEET \_ BR/GR \_ BR/GR - BR/GR MAT'L COLOR MAT'L TYPE LATITUDE DEG-MIN-SEC - 36 15 15.20 - 36 15 13.10 - 36 15 12.40 LONGITUDE DEG-MIN-SEC - 94 16 19.80 94 16 10.20 94 15 58.30 % PASSING 2 IN. -1 1/2 IN. -100 100 3/4 IN. - 100 3/8 IN. - 84 97 92 78 NO 4 -77 90 87 64 NO 10 - 70 NO. 40 - 63 83 51 = 80 NO. 80 -59 45 NO. 200 - 55 77 39 - 26 - 30 LIQUID LIMIT - 29 PLASTICITY INDEX - 09 = 13 A-4(0) AASHTO SOIL - A-4(3) A-6(8) UNIFIED SOIL % MOISTURE CONTENT -20.8 19.0 26.7 (IN) -8.5W ACHMSC AGG.BASE CRS CL-7 (IN) -4.0

REMARKS - LOCATIONS MEASURED FROM C.L. OF CONSTRUCTION, W=MULTIPLE LAYERS - Z=AUGER REFUSAL

-AASHTO TESTS : T24 T88 T89 T90 T265

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# MICHAEL BENSON, MATERIALS ENGINEER \*\*\* SOIL SURVEY / PAVEMENT SOUNDING TEST REPORT \*\*\*

*	** SOIL	SURVEY	/ F	AAEMENT	50	UNDING TES	I REPOR	CT. XXX		
DATE - 04 JOB NUMBER - 09 FEDERAL AID NO TO PURPOSE - SO SPEC. REMARKS - NO SUPPLIER NAME - ST NAME OF PROJECT - PROJECT ENGINEER - PIT/QUARRY - ARKE	0402  BE ASSI  L SURVE  SPECIFI  ATE  LITTLE C	Y SAMPLICATION  SAGE CR	CHE	ECK	AP	PRS. (S)	MATER SPEC. SUPPL COUNT	NCE NO. IAL CODE YEAR IER ID. Y/STATE ICT NO.	-	SSRVPS 2003 1 04
LOCATION - BENT SAMPLED BY - S.FAU SAMPLE FROM - TEST MATERIAL DESC SO	ON COUNT JLKNER HOLE		VA1	VAG - SILI	EME	NT SOUNDIN	DATE DATE	SAMPLED RECEIVED TESTED	-	04/11/14
LAB NUMBER	-	201412	01		-	20141202		<u> ~</u>		
SAMPLE ID TEST STATUS STATION				ON ONLY			ON ONL	÷ 7 ÷ =		
STATION LOCATION DEPTH IN FEET	_	13LT			=	127+00 18LT 0-5		=		
MAT'L COLOR MAT'L TYPE	-	BR/GR			-	BR/GR		# 2 2		
LATITUDE DEG-MIN LONGITUDE DEG-MIN										
3/ 3/ NO. NO. NO.	IN 2 IN 4 IN 8 IN 4 - 10 - 40 - 80 - 200 -	96 86 75 61 53				54 51		-		
PLASTICITY INDEX AASHTO SOIL UNIFIED SOIL	-	08 A-4(1			5 9 3 6	27 08 A-4(1)				
% MOISTURE CONTEN	(IN) -	22. 8.0W				20.9		_		
AGG.BASE CRS CL-7		4.0	•		- - -	n eri		- - - -		
	-				-			-		

REMARKS - LOCATIONS MEASURED FROM C.L. OF CONSTRUCTION, W=MULTIPLE LAYERS - Z=AUGER REFUSAL

AASHTO TESTS : T24 T88 T89 T90 T265

#### MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 04/28/14 SEQUENCE NO 1 JOB NUMBER - 090402 MATERIAL CODE - RV FEDERAL AID NO TO BE ASSIGNED SPEC. YEAR - 2003 PURPOSE - SOIL SURVEY SAMPLE SUPPLIER ID 1 SPEC. REMARKS - NO SPECIFICATION CHECK COUNTY/STATE - 04 SUPPLIER NAME - STATE DISTRICT NO 09 NAME OF PROJECT - LITTLE OSAGE CREEK STR. & APPRS. (S) PROJECT ENGINEER - NOT APPLICABLE PIT/QUARRY - ARKANSAS LOCATION - BENTON COUNTY DATE SAMPLED - 04/09											
	JNTY										
SAMPLED BY - S.FAULKNER				DATE RECEIVED -							
SAMPLE FROM - TEST HOLE MATERIAL DESC SOIL SU	י אים ער	> PCTCTANCE D _ 177	אדוום אפייוואד.		- 04/22/14						
	KVEI - I	KESISIANCE R-VP	TOE ACTUAL	KESULIS							
LAB NUMBER		1203	-	-							
SAMPLE ID	- RV37		-	-							
TEST STATUS		RMATION ONLY -	-	-							
STATION	- 101+		-	-							
LOCATION	25RT	'	_	-							
DEPTH IN FEET	= 0-5		-	-							
MAT'L COLOR MAT'L TYPE	= BR/G	rK _	-	-							
LATITUDE DEG-MIN-SEC	= 36	15 16.40	-	-							
LONGITUDE DEG-MIN-SEC		16 29.20	-								
	= 100		•	_							
1 1/2 IN. 3/4 IN.			= 	_							
3/4 IN. 3/8 IN.				-							
NO. 4			•	-							
NO. 10			•	-							
NO. 40			€; ≥>	-							
NO. 80			•	_							
	- 40										
LIQUID LIMIT	= 31			2							
PLASTICITY INDEX	= 13			<u></u>							
AASHTO SOIL		5(2)	55 25	#							
UNIFIED SOIL	=	:-		<b>=</b>							
% MOISTURE CONTENT	4		=1	<u>=</u>							
				247							
	<u> </u>		-								
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REMARKS - LOCATIONS MEASURED FROM C.L. OF CONSTRUCTION, W=MULTIPLE LAYERS - Z=AUGER REFUSAL

AASHTO TESTS : T24 T88 T89 T90 T265

JOB NAME: LITTLE OSAGE CREEK STR. & APPRS. (S)

Materials Division

COUNTY	NO.	4	DATE	TESTED	4/22/2014
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#### Michael Benson, Materials Engineer

Sulfacilities A. 3	2 2 100	-	STEEL TENTER		41 E E 1								
TA.#	LOC. DI	PTH	COLOR	#4	#10	#40 E	#80	#200 E S	LaLa	P.I.	SOIL CLASS	<i>LAB</i> #:	%MOISTURE
01+10	25RT 0	)-5	BR/GR	61	(615)	* A\$7	(E)	/4(6)	31	13	A-6(2)	RV371	
01+10	OGRT C	)-5	BR/GR	( <b>\$</b> [8])	(f3)	(8)(	(2)/(	[5 <u>7</u> 5]	26	:06:	A-4(1)	\$363	17.1
01+10	16RT 0	)-5	BR/GR	(9p)	(847).	<i>#</i> 0.	(36)	( <b>3</b> (0)	28	10	A-4(4)	S364	27.4
01+10	25RT 0	)-5	BR/GR	89	79	(e <sup>ls</sup> )	[ ]s(6) ]	(18/1)	33:	15	A-6(5)	S365	21.9
09+00	20RT 0	)-4.0z	BR/GR	77	70	63	59	55	29	:09	A-4(3)	S366	26.7
17+00	10RT 0	)-3.5z	BR/GR	( (T));	: (\$// ;;	83	(80)	77	30	13	A-6(8)	S367	20.8
27+00	06LT 0	)-5	BR/GR	78	64	51	737	39	26	80	A-4(0)	S368	19
27+00	13LT 0	)-5	BR/GR	(66)		61	(5)6}	46	26	98	A-4(1)	S369	22.3
27+00	18LT 0	)-5	BR/GR	7/12	(66)	58	(s)/	54,	27	08	A-4(1)	\$370	20.9
01+10 09+00 17+00 27+00	25RT 0 20RT 0 10RT 0 06LT 0 13LT 0	)-5 )-4.0z )-3.5z )-5	BR/GR BR/GR BR/GR BR/GR	89 77 78 868	79 70 (8// 1 64	63 83 51 61	59 86 40 2	55 77 39 46	33: 29: 30: 26: 26:	15 09 13 08	A-6(5) A-4(3) A-6(8) A-4(0) A-4(1)	35	\$365 \$366 \$367 \$368 \$369

DATE TESTED

4/22/2014

Arkansas State Highway Transporation Department

Materials Division

 $JOB\ NAME$ : LITTLE OSAGE CREEK STR. & APPRS. (S)

090402

JOB:

Michael Benson, Materials Engineer

PAVEMENT SOUNDINGS AGG.BASE CRS CL-7 4.0 ACHMSC ACHIMSC ACHMSC ACHIMSC ACHIMSC **ACHIMSC** ACHIMSC ACHMSC 7.25W 7.75W 8.5W 8.0W COUNTY NO. 06RT 20RT 16RT 25RT 10RT 06LT 13LT 18LT STA.# LOC. 101+10 117+00 127+00 127+00 101+10 101+10 109+00 127+00

Friday, May 09, 2014

Page 1 of 1

LOCATIONS MEASURED FROM C.L. OF CONSTRUCTION, W=MULTIPLE LAY

Z=AUGER REFUSAL

comments: