ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

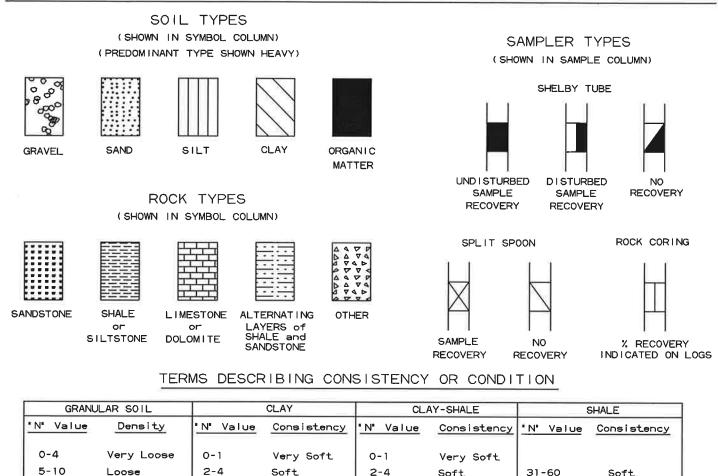


### SUBSURFACE INVESTIGATION

STATE JOB NO		080439	
FEDERAL AID PROJEC	CT NO	NHPP-0053(29)	
BEAR CREE	K & SO. FOUF	RCHE LA FAVE RIVER STR	RS. & APPRS. (S)
STATE HIGHWAY	7		11
IN		PERRY	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.

# \_EGEND



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.

Medium Stiff

Very Stiff

Very Hard

Stiff

Hard

5-8

9-15

16-30

31-60

0ver 60

Over 60

More than 2

Penetration

Less than 2' Penetration in 60 Blows Hard

in 60 Blows Medium Hard

Medium Stif

Very Stiff

Very Hard

Stiff

Hard

11-30

31-50

Over 50

Medium Dense

Very Dense

Dense

5-8

9-15

16-30

31-60

Over 60

- 2. Borings represent subsurface conditions at their respective locations for their respective depths. Variations in conditions between or adjacent to boring locations may be encountered.
- 3. Terms used for describing soils according to their texture or grain size distribution are in accordance with the Unified Soil Classification System.

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

adding the bottom two numbers for example:  $\frac{6}{8-9} \Rightarrow 8+9 = 17b lows / ft$ . The "N" Value corrected to 60%

efficiency ( $N_{60}$ ) can be obtained by multiplying  $N_f$  by the hammer correction factor published on the boring log.

#### ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

#### July 22, 2014

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

Job No. 080439 SUBJECT: Bear Creek and So. Fourche La Fave River Strs. & Apprs. (S) Route 7 Section 11 Perry County

Transmitted herewith is the requested Soil Survey, Strength Data and Resilient Modulus test results for the above referenced job. The project consists of replacing the existing bridges crossing Bear Creek and Fourche La Fave on Highway 7. Samples were taken in the existing travel lanes, ditch line and along the new location. There were no paved shoulders within the project limits.

Based on laboratory results of samples obtained, the subgrade soils consist primarily of low to moderately plastic clay with some sand containing varying amounts of sandstone and shale fragments. 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 several locations within the project limits. Table 1 below shows the location and depth to rock.

Table 4 Death to Dook

	lable 1 Depth to Rock	۲
Station	Location from centerline (ft.)	Depth (ft.)
101+00	20 Rt	5.0
113+00	20 Rt	4.0
116+00	26 Lt	4.0
305+00	CL	2.0
315+00	CL	1.0

Embankment and cut slope 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 Russellville.
- 2. Asphalt Concrete Hot Mix

Туре	Asphalt Cement %	Mineral Aggregate %
Surface Course	5.2	94.8
Binder Course	4.5	95.5
Base Course	3.9	96.1
	Michael C Materials	Benson Engineer

Materials Engineer

MCB:pt:bjj

Attachment

State Constr. Eng. - Master File Copy CC: District 8 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	- 07/17/2014	SEQUENCE	NO.	-	1
JOB NUMBER	- 080439	MATERIAL	CODE		SSRVPS
		SPEC. YEA	AR	-	2014
		SUPPLIER	ID.	-	1
		COUNTY/S'	FATE	æ	24
		DISTRICT	NO.	-	04
JOB NAME -	BEAR CREEK & SO.FOUCHE LA FAVE RIVER				
******	*****	******	****	**:	* * * * * * * * * *
*	STATION LIMITS R-VALU	E AT 240	psi		*
* * * * * * * * * *	***************************************	******	****	**	******
	BEGIN JOB - END JOB 14				
	RESILTENT MODULUS				

RESILIENT MODULUS	
STA.113+00	14501
STA.208+00	9974

REMARKS -

AASHTO TESTS : T190

0.55

- -

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

Job No. Date Sampled: Date Tested:	080439 7/16/14 July 16, 2014	Material Code Station No.: Location:	SSRVPS 113+00 20'RT
Name of Project: County:	BEAR CREEK & S.FOURCHE LA FAVE RIVE Code: 53 Name: PERRY	K STKS,&APPRS.	
Sampled By: Lab No.: Sample ID: LATITUDE:	FAULKNER 20142431 RV766	Depth: AASHTO Class: Material Type (1 or LONGITUDE:	0-5 A-6(8) 2): 2
1. Testing Inform	nation:		
	Preconditioning - Permanent Strain > 5% (Y Testing - Permanent Strain > 5% (Y=Yes or I Number of Load Sequences Completed (0-1	N=No)	N N 15
2. Specimen Info	ormation:		
	Specimen Diameter (in):		
	Top Middle		3.92 3.92
	Bottom		3.92
	Average		3.92
	Membrane Thickness (in):		0.11
	Height of Specimen, Cap and Base (in):		8.04
	Height of Cap and Base (in):		0.00 8.04
	Initial Length, Lo (in): Initial Area, Ao (sq. in):		0.04 11.42
	Initial Volume, AoLo (cu. in):		91.82
3. Soil Specimer	n Weight:		
·	Weight of Wet Soil Used (g):		3134.20
4. Soil Propertie	s:		
	Optimum Moisture Content (%):		14.2
	Maximum Dry Density (pcf):		112
	95% of MDD (pcf): In-Situ Moisture Content (%):		106.4 N/A
5. Specimen Pro	nortios		
e. opeenien ne	Wet Weight (g):		3134.20
	Compaction Moisture content (%):		13.8
	Compaction Wet Density (pcf):		130.05
	Compaction Dry Density (pcf): Moisture Content After Mr Test (%):		114.28 13.8
6 Ouick Shear T	est (Y=Yes, N=No, N/A=Not Applicable):		#VALUE!
o. Quick Shear i	est (1–1es, N–NO, N/A–NOt Applicable).		
7. Resilient Mod	ulus, Mr:	19248	(Sc)^-0.18146(S3)^0.18077
8. Comments	3		
9. Tested By:	DT/MW	Date: July 16, 2014	

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

Job No.	080439		Material Code	SSRVPS
Date Sampled:	7/16/14		Station No.:	113 + 00
Date Tested:	July 16, 2014		Location:	20'RT
Name of Project:	BEAR CREEK & S.F(	OURCHE L/	BEAR CREEK & S.FOURCHE LA FAVE RIVER STRS.&APPRS.	
County:	Code: 53	<b>Name:</b>	PERRY	
Sampled By:	FAULKNER		Depth:	0-5
Lab No.:	20142431		AASHTO Class:	A-6(8)
Sample ID:	RV766		Material Type (1 or 2): 2	r 2): 2
LATITUDE:			LONGITUDE:	

	Chamber Confining	Nominal Maximum	Actual Applied	Actual Applied	Actual Applied	Actual Applied	Actual Applied	Actual Applied	Average Recov Def.	Resilient Strain	Resilient Modulus
PARAMETER	Pressure	Axial Stress	Max. Axial Load	Max. Axial Cyclic Load Load	Contact Load	Max. Axial	Cyclic Stress	Contact Stress	and 2		
						Stress					
DESIGNATION	လိ	Scyclic	Р	Peydic	Pcontact	S <sub>max</sub>	S <sub>cyclic</sub>	Scontact	Havg	٣	M
UNIT	psi	psi	lbs	lbs	lbs	psi	psi	psi	ļ	in/in	psi
Sequence 1	6.0	2.0	23.7	21.0	2.7	2.1	1.8	0.2	0.00064	0.00008	23,065
Sequence 2	6.0	4.0	44.4	41.6	2.8	3.9	3.6	0.2	0.00132	0.00016	22,151
Sequence 3	6.0	6.0	65.1	62.0	3.1	5.7	5.4	0.3	0.00210	0.00026	20,773
Sequence 4	6.0	8.0	86.8	81.4	5.4	7.6	7.1	0.5	0.00309	0.00038	18,516
Sequence 5	6.0	10.0	107.5	99.8	7.7	9.4	8.7	0.7	0.00420	0.00052	16,722
Sequence 6	4.0	2.0	23.7	21.1	2.6	2.1	1.8	0.2	0.00069	0.00009	21,423
Sequence 7	4.0	4.0	44.1	41.5	2.6	3.9	3.6	0.2	0.00143	0.00018	20,355
Sequence 8	4.0	6.0	64.1	61.5	2.6	5.6	5.4	0.2	0.00230	0.00029	18,785
Sequence 9	4.0	8.0	85.2	80.8	4.5	7.5	7.1	0.4	0.00327	0.00041	17,399
Sequence 10	4.0	10.0	106.1	99.5	6.7	9.3	8.7	0.6	0.00437	0.00054	16,014
Sequence 11	2.0	2.0	23.5	21.0	2.6	2.1	1.8	0.2	0.00078	0.00010	18,872
Sequence 12	2.0	4.0	43.7	41.1	2.7	3.8	3.6	0.2	0.00163	0.00020	17,703
Sequence 13	2.0	6.0	63.4	60.8	2.7	5.6	5.3	0.2	0.00259	0.00032	16,537
Sequence 14	2.0	8.0	83.3	79.7	3.6	7.3	2.0	0.3	0.00364	0.00045	15,392
Sequence 15	2.0	10.0	104.1	98.2	5.9	9.1	8.6	0.5	0.00477	0.00059	14,501

DATE July 16, 2014 DATE \_\_\_\_\_\_

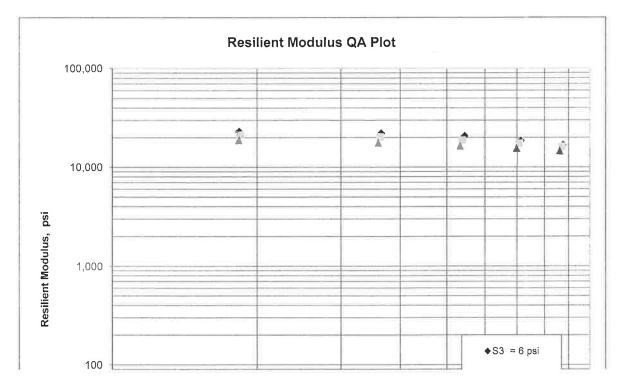
DT/MW

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

Job No.	080439			Material Code SSRVPS
Date Sampled:	7/16/14			Station No.: 113+00
Date Tested:	July 16, 2014			Location: 20'RT
Name of Project:	BEAR CREEK & S.F	FOURCH	IE LA FAVE R	VER STRS.&APPRS.
County:	Code: 53	Name:	PERRY	
Sampled By:	FAULKNER			<b>Depth:</b> 0-5
Lab No.:	20142431			AASHTO Class: A-6(8)
Sample ID:	RV766		Ma	terial Type (1 or 2): 2
LATITUDE:				LONGITUDE:

 $M_{R} = K1 (S_{C})^{K2} (S_{3})^{K5}$ 

K1 =	19,248	
K2 =	-0.18146	
K5 =	0.18077	
$R^2 =$	0.92	



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

Job No. Date Sampled: Date Tested: Name of Project:		Material Code Station No.: Location: 'ER STRS.&APPRS.	SSRVPS 208+00 24'LT
County: Sampled By: Lab No.: Sample ID: LATITUDE:	Code: 53 Name: PERRY FAULKNER 20142432 RV767	Depth: AASHTO Class: Material Type (1 LONGITUDE:	0-5 A-6(6) 2
1. Testing Inform			
	Preconditioning - Permanent Strain > 5% ( Testing - Permanent Strain > 5% (Y=Yes or Number of Load Sequences Completed (0-	N=No)	N N 15
2. Specimen Info	ormation:		
	Specimen Diameter (in):		
	Top		3.97
	Middle Bottom		3.97 3.97
	Average		3.97
	Membrane Thickness (in):		0,11
	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): Initial Volume, AoLo (cu. in):		11.70 94.09
	initial volume, AOEO (cu. in).		54.08
3. Soil Specimer	ו Weight:		
	Weight of Wet Soil Used (g):		3243.90
4. Soil Propertie	e'		
4. Joh Propertie	Optimum Moisture Content (%):		13.8
	Maximum Dry Density (pcf):		112.9
	95% of MDD (pcf):		107.3
	In-Situ Moisture Content (%):		N/A
5. Specimen Pro	nortios		
5. Specimen Pro	Wet Weight (g):		3243.90
	Compaction Moisture content (%):		14.2
	Compaction Wet Density (pcf):		131.37
	Compaction Dry Density (pcf):		115.04
	Moisture Content After Mr Test (%):		14.1
6. Quick Shear 1	fest (Y=Yes, N=No, N/A=Not Applicable):		#VALUE!
7. Resilient Mod	ulus, Mr:	163	386(Sc)^-0.29383(S3)^0.22551
8. Comments			
9. Tested By:	DT/MW	Date: July 16, 2014	

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

Job No.	080439		Material Code	Code	SSRVPS
Date Sampled:	7/16/14		Station No.:	0.:	208+00
Date Tested:	July 16, 2014		Location:		24'LT
Name of Project:	BEAR CREEK & S.F	OURCHE LA	3EAR CREEK & S.FOURCHE LA FAVE RIVER STRS.&APPRS.		
County:	Code: 53	Name:	PERRY		
Sampled By:	FAULKNER		Depth:		0-5
Lab No.:	20142432		AASHTO Class:	Class:	A-6(6)
Sample ID:	RV767		Material	Material Type (1 or 2): 2	2
LATITUDE:			LONGITUDE:	UDE:	

Resilient Resilient Strain Modulus	ε <sub>r</sub> Mr	in/in psi	0.00009 19,697	0.00020 17,878	0.00033 16,186	0.00052 13,611	0.00071 12,103	0.00010 17,937	0.00022 16,191	0.00037 14,305	0.00055 12,585	0.00076 11,249	0.00012 15,278	0.00026 13,739	0.00043 12,247	0.00063 10,914	0.00084 9.974
Average Re: Recov Def. St LVDT 1 and 2	H <sub>avg</sub>		0.00075 0.0	0.00163 0.0	0.00268 0.0	0.00415 0.0	0.00571 0.0	0.00082 0.0	0.00179 0.0	0.00299 0.0	0.00444 0.0	0.00608 0.0		0.00208 0.0	0.00345 0.0	0.00503 0.0	0.00677 0.0
Actual Applied Contact Stress	Scontact	psi	0.2	0.2	0.3	0.5	0.7	0.2	0.2	0.2	0.4	0.6	0.2	0.2	0.2	0.3	0.5
Actual Applied Cyclic Stress	Scyclic	psi	1.8	3.6	5.4	7.0	8.6	1.8	3.6	5.3	6.9	8.5	1.8	3.6	5.3	6.8	8.4
Actual Applied Max. Axial Stress	S <sub>max</sub>	psi	2.1	3.9	5.7	7.5	9.3	2.1	3.8	5.6	7.3	9.1	2.1	3.8	5.5	7.2	8.9
Actual Applied Contact Load	Pcontact	lbs	2.6	2.7	3.1	5.6	7.9	2.6	2.7	2.7	4.7	7.1	2.7	2.7	2.7	3.9	6.3
Actual Applied Cyclic Load	P <sub>cyclic</sub>	lbs	21.6	42.5	63.2	82.2	100.6	21.4	42.2	62.3	81.3	93.6	21.4	41.7	61.5	79.9	98.2
Actual Applied Max. Axial Load	Р <sub>тах</sub>	lbs	24.2	45.2	66.4	87.7	108.5	24.0	44.8	65.0	86.0	106.7	24.1	44.4	64.2	83.8	104.5
Nominal Maximum Axial Stress	S <sub>cyclic</sub>	psi	2.0	4.0	6.0	8.0	10.0	2.0	4.0	6.0	8.0	10.0	2.0	4.0	6.0	8.0	10.0
Chamber Confining Pressure	S33	psi	6.0	6.0	6.0	6.0	6.0	4.0	4.0	4.0	4.0	4.0	2.0	2.0	2.0	2.0	2.0
PARAMETER	DESIGNATION	UNIT	Sequence 1	Sequence 2	Sequence 3	Sequence 4	Sequence 5	Sequence 6	Sequence 7	Sequence 8	Sequence 9	Sequence 10	Sequence 11	Sequence 12	Sequence 13	Sequence 14	Sequence 15

July 16, 2014

DATE DATE

TESTED BY REVIEWED BY

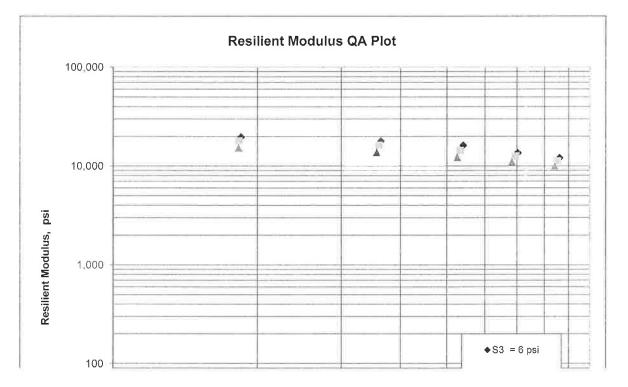
DT/MW

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

Job No.	080439			Material Code SSRVPS
Date Sampled:	7/16/14			Station No.: 208+00
Date Tested:	July 16, 2014			Location: 24'LT
Name of Project:	BEAR CREEK & S.	FOURCH	ie la fa'	VE RIVER STRS,&APPRS.
County:	Code: 53	Name:	PERRY	
Sampled By:	FAULKNER			<b>Depth:</b> 0-5
Lab No.:	20142432			AASHTO Class: A-6(6)
Sample ID:	RV767			Material Type (1 or 2): 2
LATITUDE:				LONGITUDE:

 $M_{R} = K1 (S_{C})^{K2} (S_{3})^{K5}$ 

K1 ≃	16,386	
K2 =	-0.29383	
K5 =	0.22551	
$R^2 =$	0.94	



#### *JOB:* 080439

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#### Arkansas State Highway Transporation Department RIVER Materials Division

JOB NAME: BEAR CREEK & SO.FOUCHE LA FAVE RIVER

COUNTY NO. 53 DATE TESTED

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Michael Benson, Materials Engineer

STA.#	LOC.	DEPTH	COLOR	#4	#10	#40	#80	#200	<i>L.L</i> .	<i>P.I</i> .	SOIL CLASS	LAB #:	%MOISTURE
113+00	20RT	0-5	BROWN	100	94	E 86	80	<u>67</u>	29	17	A-6(8)	RV766	
208+00	24LT	0-5	RD/BR	100	91	72	64	56	34	15	A-6(6)	RV767	
101+00	05RT	0-5	BROWN	93	87	82	74	60	26	09	A-4(3)	S753	15
101+00	20RT	0-5	BR/RD	93	86	80	74	60	31	11	A-6(4)	S754	17.6
113+00	20RT	0-4Z	BROWN	87	80	72	66	56	29	11	A-6(3)	S755	8.3
116+00	06LT	0-5	GRAY	92	-84	72	65	53	32	17	A-6(3)	S756	10.7
116+00	26LT	0-4Z	GRAY	94	85	75	68	55	32	17	A-6(6)	S757	9.1
202+00	06RT	0-5	BROWN	99	97	90	88	85	48	26	A-7-6(23)	S758	18.1
202+00	23RT	0-5	BROWN	99	94	89	74	65	44	24	A-7-6(14)	S759	16.4
208+00	05LT	0-5	GRAY	91	84	68	61	55	34	15	A-6(5)	S760	10.1
208+00	24LT	0-5	RD/BR	97	92	80	74	69	38	17	A-6(10)	S761	13.1
217+00	05RT	0-5	BROWN	96	95	91	84	63	30	15	A-6(7)	S762	13.6
217+00	18RT	0-5	BROWN	96	93	87	80	65	28	12	A-6(5)	S763	15.8
305+00	CL	0-2Z	BROWN	87	75	60	55	52	34	13	A-6(4)	S764	12.9
315+00	CL	0-1Z	BROWN	98	89	78	48	42	34	14	A-6(2)	S765	11.1

7/15/2014

JOB: JOB NAME:	080439 BEAR CREEK & S	JOB: 080439 JOB NAME: BEAR CREEK & SO.FOUCHE LA FAVE RIVER		Arkansas State Highway Transporation Department Muterials Division	DATE TESTED 7/15/2014
COUNTY NO.	, 53			Michael Benson, Materials Engineer	
STA.# LOC.				PAVEMENT SOUNDINGS	
101+00 05RT	ACHMSC 6.0	ACHMBC 2.0	AGG.BASE CRS CL-7 3.0		
101+00 20RT		ACHMBC	AGG BASE CRS CL-7		
		ı	ľ		
113+00 20RT	ACHMSC	ACHMBC	AGG.BASE CRS CL-7		
116+00 06LT	ACHMSC	CHIP SEAL	ACHMBC	AGG.BASE CRS CL-7	
		I	6.0	4.0	
116+00 26LT	ACHMSC	CHIP SEAL	ACHMBC	AGG.BASE CRS CL-7	
	1	1	1	1	
202+00 06RT	ACHMSC 5.0	CHIP SEAL .25	ACHMBC 1.50	AGG.BASE CRS CL-7 6.0	
202+00 23RT		CHIP SEAL	ACHMBC	AGG.BASE CRS CL-7	
		1	1	Ĩ	
208+00 05LT		CHIP SEAL	ACHMBC	AGG.BASE CRS CL-7	
	6.25W	.25	1.50	4.0	
208+00 24LT	ACHMSC	CHIP SEAL	ACHMBC	AGG.BASE CRS CL-7	
		1	ľ	1	
217+00 05RT	- ACHMSC 9.0W	ACHMBC 2.0	AGG.BASE CRS CL-7 4.0		
217+00 18RT		ACHMBC	AGG BASE CRS CI -7		
		1			
305+00 CL	ACHMSC	ACHMBC	AGG.BASE CRS CL-7		
	1	ı			
comments:	W=MULTIPLE LAYERS	YERS		Thursday, July 17, 2014	
				Page 1 of 1	

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#### MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 07/17/ JOB NUMBER - 080439 FEDERAL AID NO TO BE PURPOSE - SOIL S SPEC. REMARKS - NO SPE SUPPLIER NAME - STATE NAME OF PROJECT - BEAR PROJECT ENGINEER - NOT PIT/QUARRY - ARKANSAS LOCATION - PERRY, C SAMPLED BY - S.FAULKNE SAMPLE FROM - TEST HOL MATERIAL DESC SOIL S	ASSI URVE CIFI CRE APPE OUNT R E	Y SAMPLE CATION CHECK EEK & SO.FOUCH ICABLE			MATERIAL SPEC. YEZ SUPPLIER COUNTY/S' DISTRICT DATE SAM DATE SAM DATE REC DATE TES		SRVPS 014 3 8 7/01/14 7/07/14
	URV.						
LAB NUMBER		20142418		20142419		20142420	
SAMPLE ID	-	5.00		S754		S755	
TEST STATUS	-	INFORMATION C 101+00		101+00		113+00	TON ONLY
STATION LOCATION	_	05RT	-	20RT	<b>#</b> 3	20RT	
DEPTH IN FEET	-	0-5	-	0-5	8	0-4Z	
MAT'L COLOR		BROWN	-	BR/RD	<u>i</u>	BROWN	
MAT'L TYPE	-	Ditonit	-				
LATITUDE DEG-MIN-SEC	<u>a</u> .	34 50 53.	70 –	34 50	53.60 -	34 51	5.10
LONGITUDE DEG-MIN-SEC		93 06 5.	90	93 06	5.80	93 06	2,00
% PASSING 2 IN			-		<u></u>		
1 1/2 IN	-		-		-		
3/4 IN			-	100		100	
3/8 IN		100	-	99	=	93	
NO. 4		93	-	93	<u>,                                    </u>	87	
NO. 10		87	-	86		80	
NO. 40		82		80		72	
NO. 80	<u>ند</u>	74	-	74	=	66	
NO. 200	+	60		60		56	
LIQUID LIMIT	-	26		31	-	29	
PLASTICITY INDEX				11	÷	11	
AASHTO SOIL	-		( <del>-</del>	A-6(4)	-	A-6(3)	
UNIFIED SOIL	-		9 <del>9</del>		-		
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AGG.BASE CRS CL-7 (II		3.0	4			-	
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REMARKS - W=MULTIPLE LAYERS

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#### MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 07/2 JOB NUMBER - 0800 FEDERAL AID NO TO 2 PURPOSE - SOID SPEC. REMARKS - NO 2 SUPPLIER NAME - STA2 NAME OF PROJECT - B2 PROJECT ENGINEER - NO PIT/QUARRY - ARKAN LOCATION - PERRY SAMPLED BY - S.FAUL SAMPLE FROM - TEST 2 MATERIAL DESC SOI	439 BE ASSI L SURVE SPECIFI TE EAR CRE OT APPL SAS , COUNT KNER HOLE	Y SAMPL CATION EEK & SO JCABLE	CHECK			MATERIAL SPEC. YE SUPPLIER COUNTY/S DISTRICT DATE SAN DATE REC DATE TES	TATE - 53 NO 08 MPLED - 07/01/14 CEIVED - 07/07/14
	L DORVI						
LAB NUMBER	-	201424	21		20142422		20142423
SAMPLE ID	-	S756			S757		S758
TEST STATUS	-		ATION ONLY	-		ON ONLY -	INFORMATION ONLY
STATION	-			_	116+00		202+00
LOCATION	-	00111		_	26LT		06RT
DEPTH IN FEET	-			_	0-4Z	-	0-5
MAT'L COLOR	-	GRAY		-	GRAY	-	BROWN
MAT'L TYPE	-	2.4	F1 C 00	-	24 77	-	24 50 0 40
LATITUDE DEG-MIN-S			51 6.80		34 51		34 52 8.40
LONGITUDE DEG-MIN-;	SEC -	93	05 59.80		93 05	59.90	93 06 33.80
% PASSING 2	IN			_		-	
1 1/2	IN			-		-	
3/4	IN	100		-	100	-	
3/8	IN	99		-	99	-	100
NO.	4 -	92		_	94	-	99
NO.	10 -	84		-	85	-	97
NO.	40 -	72		-	75	-	90
NO.		65		-	68	-	88
NO.	200 -	53			55		85
LIQUID LIMIT	_	32		_	32	_	48
PLASTICITY INDEX	_	17		_	17	-	26
AASHTO SOIL	_	A-6(3	)	-	A-6(6)	-	A-7-6(23)
UNIFIED SOIL	-			-		-	
% MOISTURE CONTENT	-	10.	7	-	9.1	-	18.1
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ACHMSC CHIP SEAL	(IN) - (IN) -	4.5		2		15	5.0 .25
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REMARKS - W=MULTIPLE LAYERS

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AASHTO TESTS : T24 T88 T89 T90 T265

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#### MICHAEL BENSON, MATERIALS ENGINEER

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

JOB NUMBER - 080 FEDERAL AID NO TO PURPOSE - SOI SPEC. REMARKS - NO SUPPLIER NAME - STA NAME OF PROJECT - F PROJECT ENGINEER - M PIT/QUARRY - ARKAM LOCATION - PERRY SAMPLED BY - S.FAU	BE ASSI SPECIFI ATE BEAR CRE NOT APPI ISAS (, COUNT LKNER HOLE	Y SAMPLE CATION CHE EEK & SO.FC JICABLE Y	CK DUCHE LA			DATE REC DATE TES	CODE - AR - ID TATE - NO NO NO	SSRVPS 2014 1
MATERIAL DESC SO	LL SURVI	sy - r vai	JUE- PAV.	EME	INT SOUNDIN	165		
LAB NUMBER	-	20142424		-	20142425	-	201424	426
SAMPLE ID	-	S759		2	S760	-	S761	
TEST STATUS	-	INFORMATI	ON ONLY	-	INFORMATI	ON ONLY -	INFOR	MATION ONLY
STATION	-	202+00			208+00		208+00	
LOCATION	-	23RT		-	05LT	-	24LT	
DEPTH IN FEET	-	0-5		1	0-5	-	0-5	
MAT'L COLOR	-	BROWN		-	GRAY	-	RD/BR	
MAT'L TYPE	-			2		-		
LATITUDE DEG-MIN-	SEC -	34 52	8.60	-	34 52	13.10 -	34	52 13.10
LONGITUDE DEG-MIN-		93 06				38.00	93	06 38.10
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	IN			4	100		100	
		100		-	94	-	99	
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NO.					84	-	92	
	40 -	89		-	68	-	80	
NO.		74			61	-	74	
	200 -	65			55		69	
LIQUID LIMIT	-	44		-	34	· · · · · · · · · · · · · · · · · · ·	38	
PLASTICITY INDEX		24			15	-	17	
AASHTO SOIL	-	A-7-6(14	:)	-	A-6(5)	-	A-6 (	10)
UNIFIED SOIL	-				70.1	-	1.0	_
% MOISTURE CONTENT	-	16.4			10.1		13	.⊥
ACHMSC	(IN) -			-	6.25W	2		
CHIP SEAL	(IN) -			-	.25	2		
ACHMBC	(IN) <sup>-</sup>			-	1.50	7		
AGG.BASE CRS CL-7	(IN) [			- 53 - 53	4.0			
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	_			-		-		
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	-			-				
	-			2		-		

REMARKS - W=MULTIPLE LAYERS

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AASHTO TESTS : T24 T88 T89 T90 T265

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#### MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 07/1 JOB NUMBER - 0804 FEDERAL AID NO TO B PURPOSE - SOIL SPEC. REMARKS - NO S SUPPLIER NAME - STAT NAME OF PROJECT - BE PROJECT ENGINEER - NC PIT/QUARRY - ARKANS LOCATION - PERRY, SAMPLED BY - S.FAULK SAMPLE FROM - TEST H MATERIAL DESC SOIL	39 E ASSI FECIFI E AR CRE T APPI AS COUNT NER COLE	Y SAMP CATION EEK & S JICABLE	CHI	ECK DUCHE LA				MATER SPEC. SUPPL COUNT DISTR DISTR DATE DATE DATE	IAL YEZ IER Y/ST ICT SAM REC	PLED	- SS - 20 - 1 - 53 - 08 - 07 - 07	)14 3
LAB NUMBER	-	00140	407		121	20142	120		-	20142	400	
SAMPLE ID		20142 S762	427			20142 S763	420			20142 S764	429	
TEST STATUS	-		רידי איז א	ON ONT V			ר די איזא	ONT ONT V			יייי אוזא	ONI ONI V
STATION	-					217+0		ON UNLY	_	305+0		ION ONLY
LOCATION			0		-	18RT	0		-	CL	0	
DEPTH IN FEET		0-5			्रम	0-5			-	0-2Z		
MAT'L COLOR		BROWN				BROWN	T		-	BROWN		
MAT'L TYPE	-				1				-			
LATITUDE DEG-MIN-S	EC -	34	52	22.20	-	34	52	22.20	_	34	52	11.90
LONGITUDE DEG-MIN-S	EC -	93	06	38.40		93	06	38.20		93	06	36.80
% PASSING 2	IN				-				-			
1 1/2					-				-			
	IN	100			1	100			20	100		
	IN	97			-	99			(m)	96		
NO.	4 -	96			-	96				87		
	10 -	95			157/ 1112	93			ज	75		
	40 -	91			-	87				60		
NO.	80 -	84			-	80			3	55		
NO. 2	- 00	63				65				52		
LIQUID LIMIT	-	30			-	28				34		
PLASTICITY INDEX					12	12			÷	13		
AASHTO SOIL		A-6 (	7)		-	A-6 (	(5)		-	A-6 (	4)	
UNIFIED SOIL					-				-			
% MOISTURE CONTENT	-	13	.6			15	5.8		-	12	.9	
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	(IN) -	2.0			-				÷			
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REMARKS - W=MULTIPLE LAYERS

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AASHTO TESTS : T24 T88 T89 T90 T265

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#### MICHAEL BENSON, MATERIALS ENGINEER

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

PROJECT ENGINEER - NOT A PIT/QUARRY - ARKANSAS LOCATION - PERRY, CO SAMPLED BY - S.FAULKNER SAMPLE FROM - TEST HOLE	ASSIGNED IRVEY SAMPLE CIFICATION CHECK CREEK & SO.FOUCHE LA FAVE RI APPLICABLE DUNTY R	DATE SAMPLED - 07/01/14 DATE RECEIVED - 07/07/14 DATE TESTED - 07/15/14
LAB NUMBER	- 20142430 -	-
SAMPLE ID	- 20142430 - - S765 -	
TEST STATUS	- INFORMATION ONLY -	
STATION	- 315+00	-
LOCATION	- CL	æ
DEPTH IN FEET	- 0-1Z	-
MAT'L COLOR	- BROWN	-
MAT'L COLOR MAT'L TYPE	-	-
LATITUDE DEG-MIN-SEC	- 34 52 22.30 -	
LONGITUDE DEG-MIN-SEC		
* PASSING 2 IN.		-
1 1/2 IN.		-
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NO. 4		-
NO. 10		-
NO. 40		-
NO. 80		-
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LIQUID LIMIT	- 34 -	(元)
PLASTICITY INDEX	- 14 -	
AASHTO SOIL	- A-6(2) -	120 1
UNIFIED SOIL	-	-
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MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 07/17/14 JOB NUMBER - 080439 FEDERAL AID NO TO BE ASS PURPOSE - SOIL SURV SPEC. REMARKS - NO SPECIF SUPPLIER NAME - STATE NAME OF PROJECT - BEAR CR PROJECT ENGINEER - NOT APP PIT/QUARRY - ARKANSAS LOCATION - PERRY, COUN SAMPLED BY - S.FAULKNER SAMPLE FROM - TEST HOLE MATERIAL DESC SOIL SURV	EY SAMPLE TCATION CHECK EEEK & SO.FOUCHE LA F PLICABLE TY	DATE SAMPLED - 07/01/14 DATE RECEIVED - 07/07/14 DATE TESTED - 07/15/14
LAB NUMBER - SAMPLE ID - TEST STATUS - STATION - LOCATION - DEPTH IN FEET -	20142431 RV766 INFORMATION ONLY 113+00 20RT 0-5 BROWN 34 51 5.10 93 06 2.00	- 20142432 - RV767 - 208+00 - 24LT - 0-5 - RD/BR - - 34 52 13.10 - 93 06 38.10 - - 100 - 91 - 72 - 64 - 56 -
LIQUID LIMIT - PLASTICITY INDEX - AASHTO SOIL - UNIFIED SOIL - % MOISTURE CONTENT - - - - - - - - - - - - - - - - - - -		- 34 - 15 - A-6(6) - - - - - - - - - - - - - -

REMARKS - W=MULTIPLE LAYERS

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#### ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

#### May 25, 2016

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

SUBJECT: Job No. 080439 Bear Creek & So. Fourche La Fave River Strs. & Apprs. (S) Route 7 Section 11 Perry County

Transmitted herewith are summaries of the site geology and subsurface conditions, unconfined compressive strength test results, RMR, 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.

This project contains two structures. The first spans Bear Creek and the second the South Fourche La Fave River. Although these bridges are located less than two miles apart their subsurface stratigraphies vary greatly. Based on the depth at which bedrock was encountered, at both bridge locations, it is anticipated that the end bents will be founded on piling and interior bents will be founded on drilled shafts. Piling should be tipped into the competent sandstone at Bear Creek and competent shale to sandstone with shale at the South Fourche La Fave River. Preboring may be necessary to achieve minimum penetration requirements. Drilled shafts should be sized based on the values provided in Table 1.

Bridges	Nominal Tip Resistance (ksf)	Factored Tip Resistance (ksf)	Nominal Side Resistance (ksf)	Factored Side Resistance (ksf)
Bear Creek	44	22	14.2	7.8
So. Fourche La Fave River	30	15	9.7	5.3

The Geotechnical Section has reviewed the proposed cross-sections for the above referenced project and has the following recommendations:

- 1. From station 200+00 to 204+00, left of centerline, it is acceptable to utilize 2H:1V cut slopes.
- 2. Embankments located in the flood plain should be constructed on a 2H:1V out of Rock Fill, meeting the minimum requirements of the attached Special Provision. The Rock Fill should extend a minimum of two feet above the high water mark and the remaining 2H:1V slope should be plated with filter fabric covered with dumped riprap. Figure 1 illustrates the recommended cross-sectional configuration.

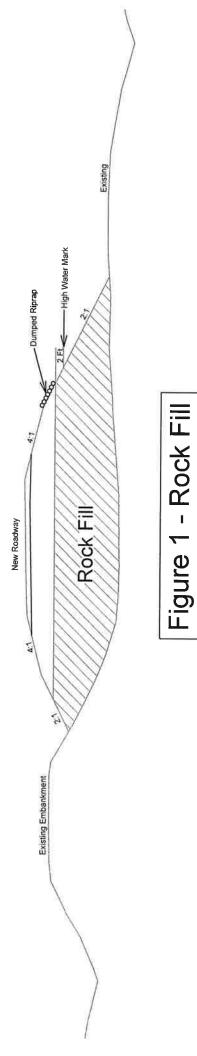
If you have any questions concerning these recommendations, please contact the Geotechnical Section.

Michael C. Benson

Materials Engineer

MCB:rpt:mlg

cc: State Construction Engineer - Master File Copy District 8 Engineer G.C. File



#### ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

#### **SPECIAL PROVISION**

#### **JOB NO. 080439**

#### **ROCK FILL**

**Description:** This item shall consist of the construction of embankments at the locations shown on the plans or as directed by the Engineer as Rock Fill. Embankments designated as Rock Fill shall comply with Section 210, Excavation and Embankment, of the Standard Specifications, Edition of 2014. Where there is a conflict between these Special Provisions and Section 210, these Special Provisions shall govern.

**Materials and Construction Requirements:** Embankments requiring Rock Fill shall be constructed of materials meeting the following requirements:

- (1) Material for Rock Fill shall include stone obtained from an approved source and shall consist of hard and durable limestone, sandstone, dolomite, or rock-like shale. Shale shall have a minimum slake durability index (SDI) of 95% as tested according to AHTD Test Method 399. The SDI shall be determined by the Engineer using the above method at least once per 3000 cubic yards. The stone shall be greater than 1½" and less than 30" reasonably well-graded and angular, with fractured faces on at least 75% of the surface and shall not contain more than 10% overburden or fines less than 1½" in maximum cross-section. The stone shall weigh not less than 150 pounds per solid cubic foot and shall have a percent of wear not greater than 45 by Los Angeles Test (AASHTO T 96).
- (2) The following shall be added to the third paragraph of Section 801.08 of the Standard Specifications. Material placed immediately adjacent to Pipe Culverts or Box Culverts including a minimum of 6 inches on top of the culvert, shall meet the material requirements of Aggregate Base Course (Class 7).
- (3) Material Placed in the vicinity of piling shall be constructed in accordance with Sections 303.02, 303.03, and 303.04 of the Standard Specifications, Edition of 2014. It shall meet the material requirements of Aggregate Base Course (Class 7).
- (4) The top layer of Rock Fill shall be in accordance with Section 303 of the Standard Specifications for Aggregate Base Course (Class 7). It shall be placed to provide a barrier for preventing the migration of fines from the overlaying embankment material into the rock fill embankment. The layer shall be at least 6 inches in thickness. The layer will not be required on the exterior side slopes (the exterior surface that daylights and is not covered with fill). The Engineer will inspect the completed surface of the rock fill embankment prior to allowing placement of additional embankment material. Density testing will not be required for the Aggregate Base Course (Class 7) material used to cap Rock Fill. The stone shall be spread, shaped, and consolidated to provide a firm and unyielding foundation for the subgrade and/or base course. The Contractor shall not place overlaying embankment material without approval of the Engineer.

#### ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

#### SPECIAL PROVISION

#### **JOB NO. 080439**

#### **ROCK FILL**

**Method of Measurement:** Rock Fill, which includes all embankment material types described above, including Aggregate Base Course (Class 7), will be measured by the cubic yard in place as provided for in Section 210, Excavation and Embankment, Subsection 210.12(c) of the Standard Specifications.

**Basis of Payment:** Placement and compaction of Rock Fill embankment material shall be paid for under the item "Rock Fill", which price shall be full compensation for all costs involved in furnishing all materials for constructing the embankments in accordance with Section 210 and this Special Provision; and for all labor, tools, equipment, quality control sampling and testing, and incidentals necessary to complete the work.

Payment will be made under:

Pay Item

Pay Unit

Rock Fill

Cubic Yard

#### GEOLOGY AND SITE CONDITIONS Job No. 080439

## Bear Creek & So. Fourche La Fave River STRS. & APPRS. (S) Perry County Route 7 Section 11

#### **Site Conditions**

There are 2 bridges on this project:

#### Bridge 1:

The existing Bear Creek Bridge is located on Route 7 in Perry County. The existing structure is a 6 span bridge approximately 270 feet in length. The superstructure is supported by 5 wall piers on spread footings with concrete end bents. Decking is cast-in-place reinforced concrete over spans 2 through 5 with steel guardrails leading up to stone and mortar guardrails. There are arched steel trusses over spans 3 and 4. Stream flow under the bridge runs west to east and is capable of maintaining a large sediment load as indicated by large rounded cobbles and boulders in the channel and surrounding the project location. Observed outcrops are primarily massive sandstone beds. Both sides of the bridge are heavily wooded and no utilities were observed at the jobsite.

#### Bridge 2:

Bridge 2 crosses the South Fourche La Fave River and is located on Route 7, south of Hollis in Perry County. This bridge is approximately 2 miles north of bridge 1. It is a 9 span bridge approximately 500 feet in length, crossing a broad flood plain of the South Fork Fourche La Fave River. The 8 intermediate bents consist of concrete and are constructed at an angle with the bridge to parallel river flow. The superstructure consists of cast in place reinforced concrete decking with steel guardrails leading up to the bridge. The bridge end walls are concrete with stone and mortar guardrails leading up to steel I-beam guardrails with steel trusses over spans 3 and 4. Buried telecommunication lines run under span 7 of the bridge and parallel the right side of the bridge, running overhead when crossing the river. Overhead power lines parallel the left side of the bridge. The river flows from the west to the east and has massive vertically dipping sandstone beds exposed in the channel. Downstation and to the left of the existing bridge there is a steeply sloped hill with massive sandstone beds outcropping that correlate with beds observed in the channel. South Fourche Campground is located downstation on the right side of the bridge and Cemetery Road, an unimproved gravel road, is approximately one tenth of a mile upstation on the right. Both sides of the existing bridge are moderately to heavily vegetated.

#### Site Geology

Both proposed bridges are located in Pennsylvanian Aged rocks of the Ouachita Mountain Orogeny. These rocks are primarily sandstones and shales of the Jackfork Formation. Surrounding geology consists primarily of extensively faulted and folded rocks with a general east to west trend of ridges and valleys. Observed outcrops consist primarily of steeply dipping, highly deformed, massively bedded sandstones and shales. **Bridge 1** lies south of the Fourche La Fave Syncline. At this location, Pennsylvanian Aged rock of the Jackfork Formation lies conformable on top of older Mississippian age Stanley Shale. **Bridge 2** is located in the Fourche La Fave Syncline and is also constructed on top of Pennsylvanian rock; however, at this location older rocks of the Jackfork Formation overlie younger Pennsylvanian aged rocks of the Johns Valley Shale. This is due to thrust faulting that occurred as a result of Late Paleozoic tectonism.

The Jackfork Formation encountered at both job sites can be described as thin to massively bedded, fine to coarse, brown, tan, or bluish-gray quarzitic sandstones and gray black shales. These units often occur as chaotic masses from 3,500 to 6,000 feet thick. The Johns Valley Shale can be described as gray-black clay shale with numerous silty thin to massive sandstone intervals. The Stanley Shale can be summarized as dark-gray shale with interbedded fine grained sandstone and varies in thickness from 3,500 feet up to 10,000 feet thick in some areas. Core samples extracted from both job site locations show evidence of high levels of deformation; including numerous slickensides, fractures, and quartz filled veins. Mapped thrust faults are abundant along the project alignment and there may be multiple unmapped faults in the area. Overall, the lithology for both bridges changes dramatically from borehole to borehole due to vertical bedding and faulting and therefore makes any generalization of the sampled rock difficult and impractical.

#### Subsurface Conditions

Based on boring results for Stations 107+91 to 112+11, the subsurface stratigraphy for **Bridge 1** may be generalized as follows:

0-10.0 Feet: Consists primarily of sandy clay and gravel with occasional sandstone and shale layers at approximately 5 feet.
10.0 - 41.0 Feet: Varies from sandstone to shale, to sandstone with interbedded shale. Cores from this depth range contain abundant fractures, slickensides, and quartz filled partings and seams.

Based on the boring results for **Bridge 2**, subsurface stratigraphy for Stations 211+72 to 216+70 varies significantly from the north side to the south side of the bridge due to the steep dip of the beds and may be generalized as follows:

Stations 211+72 to 215+03

- 0 to 10.5 Feet: Moist, reddish brown, sand and clay with gravel (rock fragments)
- 3.1 to 35.0 Feet: Steeply dipping sandstone with interbedded shale layers, fractures, slickensides, and quartz filled veins.

Stations 215+93 to 216+70

- 0 to 9.3 Feet: Moist, brown, sandy clay with gravel to clayey gravel with sand
- 9.3 to 49.0 Feet: Consists primarily of medium hard, dark gray, steeply dipping, highly weathered to unweathered shale with frequent slickensides, fractures, and quartz veins.

## Rock Core Unconfined Compression Test Summary

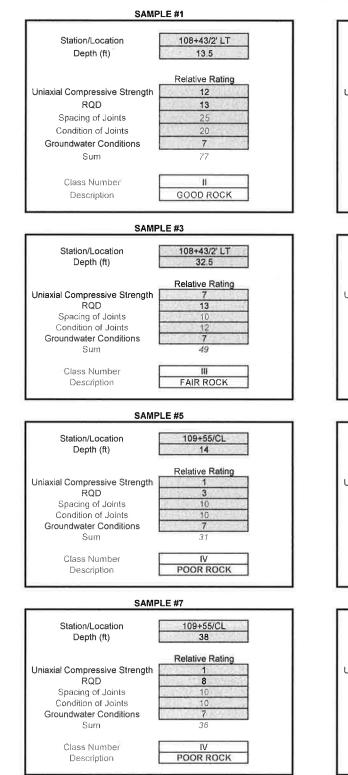
Project Number: Project Name: Date Tested:

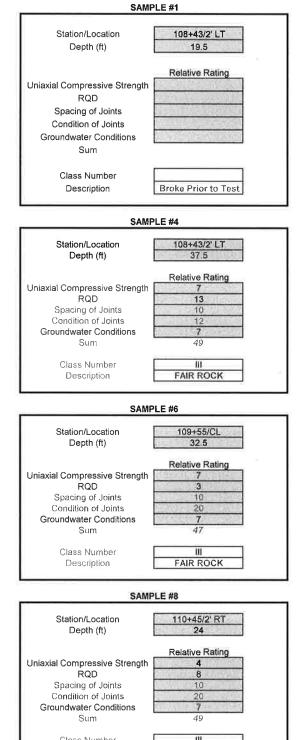
080439 Bear Creek & So. Fourche La Fave River Strs. & Apprs. (S)

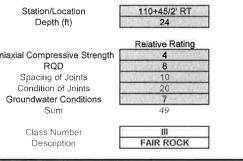
Station	Location	Sample No.	Depth (ft.)	Diameter (in.)	Height (in.)	Total Load (lbs.)	Correction Factor	Stress (psi)	Remarks
108+43	2' LT	1	13.5	1.75	3.80	36,420	1.000	15,142	SS
108+43	2' LT	2	19.5			NT		Broken	Shale
108+43	2' LT	3	32.5	1.75	4.10	29,800	1.000	12,389	SS
108+43	2' LT	4	37.5	1.75	3.95	25,180	1.000	10,469	SS w/ Shale
109+55	C.L.	5	14.0	1.75	4.05	3,170	1.000	1,318	SS
109+55	C.L.	6	32.5	1.75	4.00	27,760	1.000	11,541	SS
109+55	C.L.	7	38.0	1.75	2.76	3,670	0.966	1,474	Shale
110+45	2' RT	8	24.0	1.75	4.18	8,840	1.000	3,675	SS w/ Shale & quartz seams
110+45	2' RT	9	36.0	1.75	3.61	500	1.000	208	Shale
110+45	2' RT	10	40.0	1.75	4.25	2,500	1.000	1,039	SS
111+35	C.L,	11	30.0			NT		Broken	Shale
111+35	C.L.	12	35.0	1.75	3.00	4,090	0.977	1,661	Shale
212+38	C.L.	13	13.0	1.75	3.85	14,680	1.000	6,103	SS
212+38	C.L.	14	28.0	1.75	3.91	22,280	1.000	9,263	SS
213+75	C.L.	15	13.5	1.75	3.86	9,100	1.000	3,783	SS w/ Shale
213+75	C.L.	16	21.0	1.75	3.88	48,440	1.000	20,139	SS w/ Shale
213+75	C.L.	17	35.0			NT		Broken	SS w/ Shale
214+28	C.L.	18	28.0			NT		Broken	Shale
214+28	C.L.	19	35.0			NT		Broken	SS w/ Shale
214+28	C.L.	20	38.0			NT		Broken	Shale
215+03	C.L.	21	13.0	1.75	5.20	26,640	1.000	11,076	SS
215+03	C.L.	22	35.0	1.75	3.95	29,780	1.000		SS
215+93	C.L.	23	29.0			NT		Broken	Shale
215+93	C.L.	_24	36.5			NT		Broken	
215+93	C.L.	25	47.0			NT		Broken	

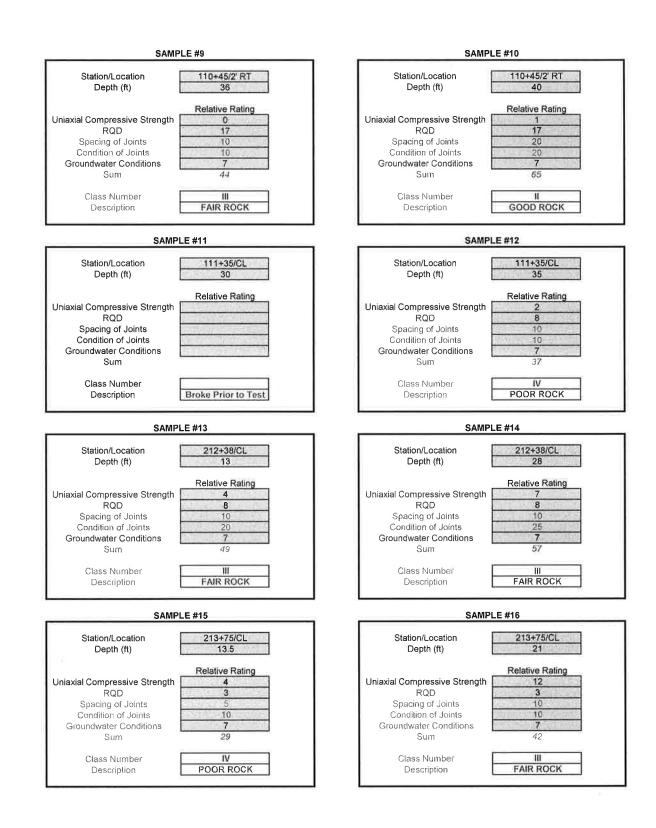
\* Please note any broken samples, fractures or other characteristics of sample in Remarks.

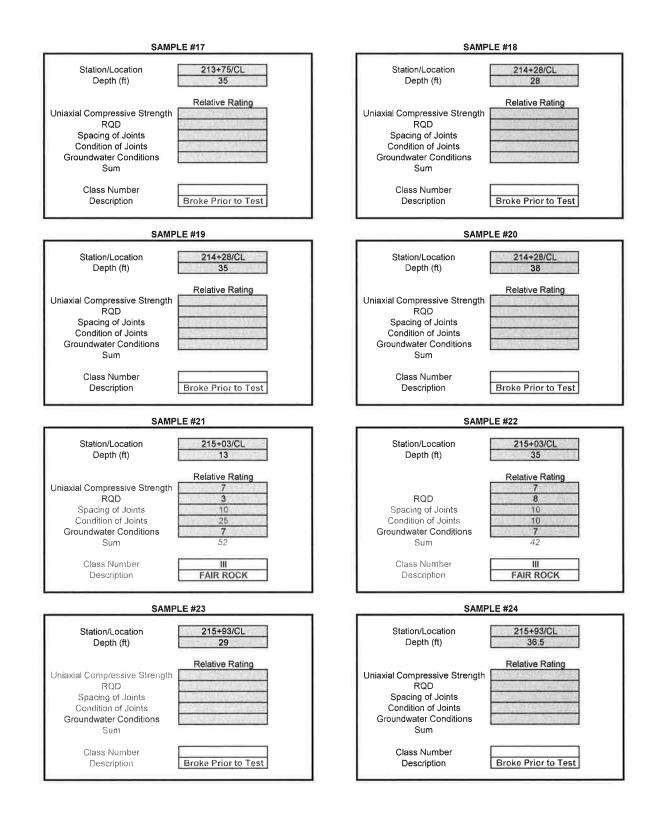
#### **ROCK MASS RATING SUMMARY** JOB # 080439

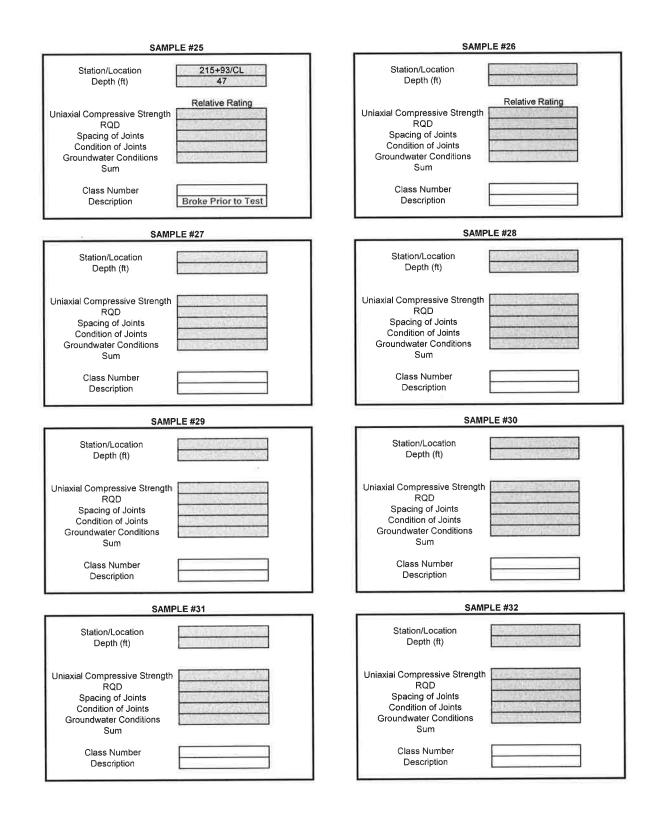








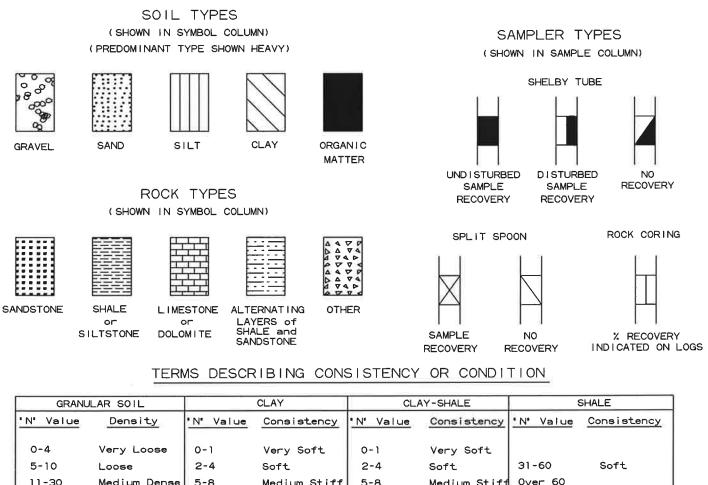




#### **D**<sub>50</sub> AGGREGATE ANALYSIS FOR SCOUR CALCULATIONS

		Job No.	080439		
Creek Name	Station	Sample Type	Location	Depth (FT)	Aggregate Size (D50) (IN)
South Fourche River	214+05	River Bank	20' Left of Existing Bridge C.L.	N/A	0.0059
Bear Creek	109+25	Creek Bank	C.L. Construction	N/A	0.0035

# \_EGEND



	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	
	Over 50	Very Dense	16-30	Very Stiff	16-30	Very Stiff	Penetration	
			31-60	Hard	31-60	Hard	in 60 Blows	Medium Harc
			Over 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<sub>f</sub>) can be obtained by

adding the bottom two numbers for example:  $\frac{6}{8-9} \Rightarrow 8+9 = 17blows / ft$ . 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.

			IWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORI PAGE		vo. 1 1 c	DF 1					
JOB N	_	_	080439 Perry County		DATE		. (	_	_	23, 2	016		
JOB N			Bear Creek & So Fourche La Fave River Strs & A	pprs (S)			RILLIN					Aug	er -
			Route 7 Section 11	,								U	
STATI	ION:		107+91		EQUI	MEN	T:		С	ME	850		
LOCA			3' Left of Construction Centerline										
		_	teve Faulkner		HAMN	AER (	CORRE	CTIO	N FAC	CTOR:		1.23	
COM	PLET		DEPTH: 32.4		r		<u> </u>	<del></del>					
D E	s	S											
P	Y	A M							FT.	WS		%	%
T	M B	Ρ	DESCRIPTION OF MATERIAL	SOIL GROUP		a		IGH	CU	FO		T C	R Q
н	0	L		GROOT	LIC L	ISI	la L	ME	PER	)F B	NI-S	R	D
FT.	L	E S			PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		
1.15	20 1	3	SURFACE ELEVATION: 536.6			%			L	z	P]		
			Brown and Gray Clay with Gravel and Cobbles										
<u> </u>	X C	- 0	(Sandstone Fragments)										
	<u>~~~</u> ~~	T				I				1) (0	0		_
5			SANDSTONE - Weathered, Cemented,							(0	'		
5			Frequent Fractures, Moderately Dipping, Light									98	0
			Gray										
10			SANDSTONE - Unweathered, Well Cemented,										
			Moderately Dipping, Light Gray									92	76
			SHALE INTERBEDDED WITH SANDSTONE -										
			Slightly Weathered, Medium Hard, Moderately										
			Dipping, Dark Gray										
15												~~	25
			SANDSTONE WITH OCCASIONAL SHALE									90	35
			SEAMS AND LAYERS - Unweathered, Well										
		_	Cemented, Moderately Dipping, Light Gray										
20												88	26
	ΞΞ		SHALE INTERBEDDED WITH SANDSTONE -									00	20
			Unweathered, Medium Hard, Moderately Dipping, Dark Gray										
	<u> </u>	+	Dipping, Dark Oray										
25			SANDSTONE WITH OCCASIONAL SHALE SEAMS - Unweathered, Well Cemented,									98	95
			Moderately Dipping, Light Gray									50	50
			, , , , , , , , , , , , , , , , , , , ,										
30			SANDSTONE - Unweathered, Weil Cemented,									100	100
			Moderately Dipping, Light Gray										
		_	Boring Terminated										
			J A A A A A A A A A A A A A A A A A A A										
35													
REMA	ARKS	: B	ear Creek										
											_		

			WY. & TRANS. DEPARTMENT				10. 2								
MATERIALS DIVISION - GEOTECHNICAL SEC.         JOB NO.       080439       Perry County						PAGE         1         OF         2           DATE:         March 22, 2016         1000 <td< td=""></td<>									
			080439 Perry County Bear Creek & So Fourche La Fave River Strs & A	anra (S)	DATE				rch 2	22, 2	016				
JOB N	AME:		Route 7 Section 11	pprs (3)			Stem		er - 1	Dian	ond	Core			
STATI	ION		108+43		EQUI			Aug		ME		COIC	'		
LOCA			2' Left of Construction Centerline			IVILI	1.		C		0.00				
			teve Faulkner		HAMN	MER (	CORRE	CTIO	N FAC	CTOR		1.23			
COM	PLET	ION	DEPTH: 37.5												
D		S													
Ē	S Y	Ā		(	l.				020						
Р	M	М	DESCRIPTION OF MATERIAL	SOIL	0			HT	J.FT	SWC		% T	% R		
T	B	P		GROUP	0	ц.		EIG	s Cl	BLC	7	Ċ	Q		
н	0	L E			UIIS LI	OIS	le E	M	PEF	OF	6-IJ	R	D		
FT.	L	S	SURFACE ELEVATION: 535.4		PLASTIC LIMIT	% MOIST	LIQUID	DRY WEIGHI	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.				
12	1900	-	CONTACE ELEVATION: 000.4			<u>``</u>			I	4	<u> </u>				
	S.S.														
			Brown and Gray Clayey Cobbles and Boulders												
	200														
 		X	SHALE - Weathered, Medium Hard, Dark Gray							1					
5			SHALE INTERBEDDED WITH SANDSTONE -							(7	")				
	ΞH		Weathered, Medium Hard, Cemented, Steeply									40	0		
×	EE		Dipping, Gray												
			SHALE WITH OCCASIONAL SANDSTONE	1											
10			LAYERS - Slightly Weathered, Medium Hard, Steeply Dipping, Dark Gray									88	14		
			Steeping, Bark Sidy												
			SANDSTONE WITH OCCASIONAL SHALE												
15			SEAMS - Unweathered, Well Cemented,									95	60		
			Steeply Dipping, Occasional Fractures, Light Gray										00		
			Citay												
												-			
			SHALE - Slightly Weathered, Medium Hard,						0						
20			Steeply Dipping, Frequent Fractures, Dark												
			Gray									76	10		
			SANDSTONE - Unweathered, Well Cemented, Steeply Dipping, Frequent Fractures, Light												
			Gray										_		
			SHALE - Slightly Weathered, Medium Hard,												
			Steeply Dipping, Frequent Fractures, Dark												
25			Gray SANDSTONE WITH OCCASIONAL SHALE									93	24		
			LAYERS - Unweathered, Well Cemented,												
			Steeply Dipping, Occasional Fractures, Light						- 0						
			Gray												
			SHALE - Slightly Weathered, Medium Hard,												
30	C D C		Steeply Dipping, Occasional Fractures, Dark									93	39		
			SANDSTONE WITH FREQUENT SHALE												
			SEAMS AND LAYERS - Unweathered, Well												
			Cemented, Steeply Dipping, Frequent												
			Fractures, Gray SANDSTONE - Unweathered, Well Cemented,												
35			SANDSTONE - Unweathered, Weil Cemented,												
	ARKS	5: B	ear Creek												
	_	-					_					_			

			IWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORI PAGE		io. 2 2 c	)F 2				
JOB NO	_		080439 Perry County		DATE:			Mai	rch 2	22, 201	6	
JOB NA	AME:		Bear Creek & So Fourche La Fave River Strs & Ap Route 7 Section 11	prs (S)						Diamo	nd Co	*0
STATI	ON:		108+43		EQUIP			Auge		ME 85		IC
LOCAT	FION:	:	2' Left of Construction Centerline									
			teve Faulkner		HAMN	/IER C	CORREC	CTION	FAC	CTOR:	1.2	23
D		S	DEPTH: 37.5									
E P T H	S Y M B O	AMPLE		SOIL GROUP	PLASTIC LIMIT	% MOIST.	UID IT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS	PER 6-IN. B	R Q
FT.	L	S	SURFACE ELEVATION: 535.4		PLA LIM	% M	LIQUID	DRY	LBS	NO.		
			Steeply Dipping, Frequent Fractures, Light Gray								98	3 62
			Boring Terminated									
40			2									
45												
50												
55												
60												
65												
70												
REMA	RKS	5: B	ear Creek									

			IWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORI PAGE		10. <b>3</b>	)F 3					
IOB N		_	080439 Perry County		DATE: April 14, 2016								
JOB NAME: Bear Creek & So Fourche La Fave River Strs & Apprs (S)					- ·								
			Route 7 Section 11				Stem	Aug				Core	
STATI			109+55		EQUIF	MEN	T:		С	ME 8	850		
	TION:		Construction Centerline aul Christenberry							TOD		1.23	
		_	DEPTH: 72.6		HAMN	AER C	CORRE	UTION	FAC	TOR:		1.23	-
D		S			<u> </u>		ĺ –				-		
Ē	S	A							- 45				
P	Y M	М	DESCRIPTION OF MATERIAL	SOIL				H	LBS PER CU.FT	NO. OF BLOWS		% T	% R
Т   Н	В	P L		GROUP	U	T.		EIG	R CI	BL(	ż	C	Q
	0	E			IT TI	% MOIST	LIQUID	DRY WEIGHT	PE.	OF	PER 6-IN.	R	D
FΤ.	L	S	SURFACE ELEVATION: 531.6		PLASTIC LIMIT	% N	LIQUII	DR	LBS	NO.	PER		
- 7													
		$\bigtriangledown$	Wet, Medium Dense, Brown Sand and Gravel							7			
5		$\bigtriangleup$	with Organic Matter							10	-8		
						ļ.							
		1000											
	111	$\bigtriangledown$								1			
10	£££		SHALE - Highly Weathered, Soft, Gray							27-	24		
	11)		SHALE WITH OCCASIONAL SANDSTONE										
			LAYERS - Highly Weathered, Soft to Medium									48	0
	775		Hard, Steeply Dipping, Gray	i.								_	
	111		SHALE - Highly Weathered, Soft, Steeply										
15	117		Dipping, Gray									68	16
			SANDSTONE - Slightly Weathered, Cemented,									_	
			Frequent Fractures and Quartz Filled Veins,										
20			Steeply Dipping, Gray									62	16
-													
25												18	0
			SANDSTONE WITH OCCASSIONAL SHALE									8	
			LAYERS - Slightly Weathered, Well Cemented										
			with Occasional Soft Layers (Shale), Frequent										
			Fractures, Steeply Dipping, Gray *										
30												96	34
35 E													

		HWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORI PAGE		vo. 3 2 (	DF 3					
JOB NO.		080439 Perry County		DATE		2 (	_	_	4, 20	)16		
JOB NAME	:	Bear Creek & So Fourche La Fave River Strs & Ap	oprs (S)	TYPE	OF D	RILLIN	-					
		Route 7 Section 11				Stem	Aug				Core	;
STATION: LOCATION		109+55 Construction Centerline		EQUI	PMEN	T:		C	ME	850		
		Paul Christenberry		HAMN	AER (	CORRE	CTIO	N FAG	CTOR		1.23	
COMPLE	TION	N DEPTH: 72.6										
D S	S											
E Y P M H O	A M P L E	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS	PER 6-IN.	% T C R	% R Q D
FT, L	s	SURFACE ELEVATION: 531.6		PLA LIM	% N	LIQ	DR	LBS	NO.	PER		
		SANDSTONE WITH FREQUENT SHALE LAYERS - Slightly Weathered, Well Cemented with Occasional Soft Layers (Shale), Frequent									56	22
40 		Fractures, Steeply Dipping, Gray									88	36
		SHALE - Highly Weathered, Soft, Steeply Dipping, Steeply Dipping, Dark Gray									26	0
 50 	עמאמאמאמאנאנא	SHALE - Highly Weathered, Soft with Occasional Medium Hard Layers, Steeply Dipping, Dark Gray									88	0
	TONIA ON LA ON	SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray **									64	0
— — — — <u>60</u> — —		SANDSTONE - Slightly Weathered, Well Cemented, Frequent Fractures, Steeply Dipping, Gray									18	0
		SHALE INTERBEDDED WITH SANDSTONE - Slightly Weathered to Highly Weathered, Soft to Medium Hard, Frequent Fractures, Steeply Dipping, Gray									94	3(

<b>IATE</b>	ERIA	S DIVISI	ON - GEOTECHNICAL SEC.			PAGE	NG N		)F 3					
OB N		08043				DATE					4, 20	016		
	AME:		Creek & So Fourche La Fave River	Strs & App	ors (S)			RILLIN	-		,			
			7 Section 11		` í			Stem		er - 1	Diam	iond	Core	
TATI	ON:	109+5			6	EQUIF			0		ME			
			uction Centerline			2401				÷.				
			nristenberry			HAMN	/IER C	ORREO	CTION	J FAC	TOR:		1.23	
_		ION DEPT						UTIL						_
D		S		1	_				-	_			1	
Ē	S	A												
P	Y	M							E E	FT.	VS		%	%
т	М	P	DESCRIPTION OF MATERIAL	10	OIL				EH	CC.	2		T	R
н	B	L		6	ROUP	IC	ST		VEI	ER	E B	Z	C R	Q D
	0 L	E				PLASTIC LIMIT	% MOIST	15 T	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		Ľ
-т.	L	S SURF	ACE ELEVATION: 531.6			PL.	1 %	LIQUID LIMIT	DR	LB	NON	PEJ		
	H H												70	0
	ΞΞ													
	E			2										_
			Boring Terminated											
	-													
75														
80														
	-													
	2											- 1		
85														
_														
90														
50														
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95														
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			WY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		PAGE		vo. 4 1 (	DF 1				
JOB N		_	180439 Perry County		DATE	_	<u>, (</u>	_	_	5, 201	16	
	AME:		Bear Creek & So Fourche La Fave River Strs & A	pprs (S)			RILLIN		P	•, -•		
			Route 7 Section 11				Stem		er -	Diam	ond (	Сс
STAT	ION:	1	10+45		EQUI	PMEN	IT:		C	CME 8	350	
	TION:		Construction Centerline		<u> </u>							
			aul Christenberry		HAMN	MER	CORRE	CTIO	N FA	CTOR:		1.
	<b></b> _	<u> </u>	DEPTH: 24.5	r	r	r—	r	r				_
D E	0	s										
P	1	A   M				1			FT.	NS N		%
T		P	DESCRIPTION OF MATERIAL	SOIL GROUP				[GH	CU	[O		T (
н	B 0	L			PLASTIC LIMIT	% MOIST	AL.	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.	F
FT	l i li	E			PLAST LIMIT	MC	LIQUID	RY	BS F	0.0	ER	
FI	000	S	SURFACE ELEVATION: 531.6			%				Z		_
	0.0		Orevel, Ochklas, and Devilders									
	806		Gravel, Cobbles, and Boulders									
	000	+								1	o F	
	0000									(0	")	
5	9000 9000 9000 9000 9000 9000 9000 900		Moist, Cemented, Gray Sandstone Cobbles and Boulders									7
	66000											
		+						1			-	_
	800 000 800 000 800 00 00											
	6 6 G		No Decovery									(
10	Do o o		No Recovery							1		Ċ
	no f											
-	2223	+									ł	-
_	177											
15	112		SHALE - Highly Weathered, Soft to Medium									8
15	22		Hard, Steeply Dipping, Gray									`
	£17											
	777			-								
-	7773											
20	14	H	No Recovery									(
	112											
	111	+	SHALE - Highly Weathered, Soft, Steeply									
	111		Dipping, Gray									4
25		╧	SANDSTONE - Slightly Weathered, Cemented,	<b></b>			<u> </u>	-	-		_	
		1	Frequent Fractures, Steeply Dipping, Gray *									
			Boring Terminated									
30												
35												
	ARKS	Be	ear Creek * Hole abandoned due to poor core re	covery.	Relo	cate	d to 1	10+	45 2	?' left	of	

DB NO.       DB0439       Perry County       DATE:       March 6, 2016         DB NO.       DB0439       Perry County       DATE:       March 6, 2016         COB NAME       Bear Creek & So Fourche La Fave River Strs & Apprs (S)       TYPE OF DRULING:         ROULT 7 Section 11       TYPE OF DRULING:       TOTAL OF CORRECTION CHARGE, Diamond Core         COCKTOR:       2.16f of Construction Centerline       DESCRIPTION OF MATERIAL       SOIL:         DE Y       X       M       DESCRIPTION OF MATERIAL       SOIL:       GROUP       UP to B to MARGE, CORRECTION FACTOR:       1.23         T       B       L       SURFACE ELEVATION:       Image: Diamond Core       SOIL:       GROUP       Image: Diamond Core         Gravel, Cobbles, and Boulders with Clay and Organic Matter       Gravel, Cobbles, and Boulders with Clay and Organic Matter       SHALE - Highly Weathered, Nedium Hard, Gray       SHALE - Highly Weathered, Nedium Hard, Gray       5       SHALE - Highly Weathered, Soft, Steeply       50       28       0         SANDSTONE - Slightly Weathered, Soft, Steeply       SANDSTONE - Slightly Weathered, Well       Gray       30       0         SANDSTONE - Slightly Weathered, Vell       SANDSTONE - Slightly Weathered, Well       Gray       30       0         SANDSTONE - Slightly Weathered, Velin       Stachas, Steeply Dipping,								NO. 4						
IOB NAME:       Bear Creek & So Fourche La Fave River Strs & Apprs (S) Route 7       Type or perturbation         STATION:       110+45         SCATTON:       21 Left of Construction Centerline         COGED BY:       Paul Christenberry         D       S         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       S         S       S         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         P       M         SURFACE ELEVATION:       M         SHALE - Highly		_	_			PAGE	_	1 (	_	_	6 20	)16		
Route 7 Section 11       Final Christenberry       CME 850       COME EXTON DETH: 57.7       Description OF MATERIAL       SOUL TETHON DETH: 57.7       DESCRIPTION OF MATERIAL       SOUL Construction Centerline       CME 850       COMPLETION DETH: 57.7       D     DESCRIPTION OF MATERIAL     SOUL       B     L     S     S       FT.     L     S     SURFACE ELEVATION:     L       Gravel, Cobbles, and Boulders with Clay and Organic Matter     Gravel, Cobbles, and Boulders with Clay and Organic Matter     7       SHALE - Highly Weathered, Soft, Gray     SHALE - Highly Weathered (No Recovery)*     50       Grav     SHALE - Highly Weathered, Soft, Steeply     50       Dipping, Dark Gray     SANDSTONE - Slightly Weathered, Well     84       SANDSTONE - Slightly Weathered, Occasional     Fractures, Steeply Dipping, Gray       SANDSTONE - Slightly Weathered, Occasional     Fractures, Steeply Dipping, Gray       SANDSTONE - Slightly Weathered, Occasional     92       Care - States, Steeply Dipping, Gray     92					onre (S)					arcn	0, 20	10		
STATION: 110+45 CCATION: 2'Left of Construction Centerline CCGED BY: Paul Christenberry L.23 COMPLETION DEPTH: 57.7 D S S P T H H H D ESCRIPTION OF MATERIAL SOIL GROUP T S SURFACE ELEVATION: Gravel, Cobbles, and Boulders with Clay and Organic Matter Gravel, Cobbles, and Boulders with Clay and Organic Matter S SHALE - Highly Weathered, Soft, Gray SHALE - Highly Weathered, Medium Hard, SHALE - Highly Weathered, Medium Hard, SHALE - Highly Weathered, Medium Hard, SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SHALE - Highly Weathered, Cocasional Fractures, Stoeply Dipping, Gray SHALE - Highly Weathered, Cocasional Fractures, Stoeply Dipping, Gray SHALE - Kighthy Weathered, Cocasional Fractures, Stoeply Dipping, Gray SINDSTONE WITH OCCASIONAL SHALE SANDSTONE WITH OCCASIONAL SHALE SEAMS - Sitchensides, Steeply Dipping, Gray 	JOB N.	AWE:			phis (3)					er T	Diam	ond	Core	
DCATION:       2' Left of Construction Centerline       ItamAtter CORRECTION FACTOR:       1.23         Description       0       0       0       0         Description       STALE       SOIL       SOIL       0       0         FT.       B       SURFACE ELEVATION:       SOIL       SOIL       0       0         FT.       L       SURFACE ELEVATION:       SOIL       SOIL       0       0       0         FT.       L       SURFACE ELEVATION:       SOIL       SOIL       0       0       0       0         FT.       L       SURFACE ELEVATION:       SOIL       SOIL       0	OT A TL								лид				COIC	
LOGGED BY: Paul Christenberry       Image: Construction of the state interval of the state i						EQUI		1.		C	14112	0.00		
COMPLETION DEPTH: 57.7         D         S       S         P       Y         M       P         H       B         O       E         FT.       L         S       SURFACE ELEVATION:						HAM	AEB (	TORRE	CTIO	ΝΕΔΙ	CTOR		1.23	
Description of MATERIAL       SOIL       SOIL       SOIL       BUILING         FT.       L       S       SURFACE ELEVATION:       SOIL       SOIL         FT.       L       S       SURFACE ELEVATION:       SOIL       SOIL         Gravel, Cobbles, and Boulders with Clay and Organic Matter       Gravel, Cobbles, and Boulders with Clay and Organic Matter       7       22:34         SHALE - Highly Weathered, Soft, Gray       SHALE - Highly Weathered, Medium Hard, Gray       SHALE - Highly Weathered, No Recovery)*       0       0         SHALE - Highly Weathered, No Recovery)*       SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray       30       0         SHALE - Highly Weathered, Soft, Steeply       SHALE - Highly Weathered, Soft, Steeply       84       30         SANDSTONE - Slightly Weathered, Cocasional Fractures, Steeply Dipping, Gray       30       0         SANDSTONE with OCCASIONAL SHALE       SANDSTONE WITH OCCASIONAL SHALE       84       30         Sand Streeply Dipping, Gray       Stackers, Steeply Dipping, Gray       32       28         Sand Stokensides, Steeply Dipping, Gray       Stackers, Steeply Dipping, Gray       32       28         Stackers, Steeply Dipping, Gray       33       34       34       34	_						VIL/IC C	Jonut	ento		CIOR		1.200	
F       Y       A         T       H       DESCRIPTION OF MATERIAL       SOIL GROUP       SOIL GROUP       I	· · · · · ·		_	DEI III. 57.7		r	r—		1		<u> </u>			
P       M       M       DESCRIPTION OF MATERIAL       SOLL GROUP       S				ô.										
Gravel, Cobbles, and Boulders with Clay and Organic Matter SHALE - Highly Weathered, Soft, Gray SHALE - Highly Weathered, Medium Hard, Gray SHALE - Highly Weathered (No Recovery)* SHALE - Highly Weathered (No Recovery)* SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SANDSTONE - Slightly Weathered, Well Cemented, Frequent Quartz Veins, Frequent Fractures, Steeply Dipping, Gray SANDSTONE WITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Fractures, Frequent Quartz Veins, Crassional Sitckensides, Steeply Dipping, Gray SEMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.									H	FT.	WS			
Gravel, Cobbles, and Boulders with Clay and Organic Matter SHALE - Highly Weathered, Soft, Gray SHALE - Highly Weathered, Medium Hard, Gray SHALE - Highly Weathered (No Recovery)* SHALE - Highly Weathered (No Recovery)* SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SANDSTONE - Slightly Weathered, Well Cemented, Frequent Quartz Veins, Frequent Fractures, Steeply Dipping, Gray SANDSTONE WITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Fractures, Frequent Quartz Veins, Crassional Sitckensides, Steeply Dipping, Gray SEMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.	т			DESCRIPTION OF MATERIAL			. :		EB	CU	2			
Gravel, Cobbles, and Boulders with Clay and Organic Matter SHALE - Highly Weathered, Soft, Gray SHALE - Highly Weathered, Medium Hard, Gray SHALE - Highly Weathered (No Recovery)* SHALE - Highly Weathered (No Recovery)* SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SANDSTONE - Slightly Weathered, Well Cemented, Frequent Quartz Veins, Frequent Fractures, Steeply Dipping, Gray SANDSTONE WITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Fractures, Frequent Quartz Veins, Crassional Sitckensides, Steeply Dipping, Gray SEMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.	н		L		UKUUI	E.	ISI		WE	ER	F B	Ą		
Gravel, Cobbles, and Boulders with Clay and Organic Matter SHALE - Highly Weathered, Soft, Gray SHALE - Highly Weathered, Medium Hard, Gray SHALE - Highly Weathered (No Recovery)* SHALE - Highly Weathered (No Recovery)* SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SANDSTONE - Slightly Weathered, Well Cemented, Frequent Quartz Veins, Frequent Fractures, Steeply Dipping, Gray SANDSTONE WITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Fractures, Frequent Quartz Veins, Crassional Sitckensides, Steeply Dipping, Gray SEMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.		Ľ				AS LIN	MC	DO LIN	2	3S F	0.0	ER 6		
Organic Matter         5          5     <	F1.	South St	S	SURFACE ELEVATION:		E E	%	22	Ā	E	Ž	PI		<u> </u>
Organic Matter         5          5     <														
5       -         5       SHALE - Highly Weathered, Soft, Gray         10       SHALE - Highly Weathered, Medium Hard, Gray         10       Gray         SHALE - Highly Weathered (No Recovery)*         15       SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray         15       SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray         20       SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray         20       SANDSTONE - Slightly Weathered, Well Cemented, Frequent Gray         20       SANDSTONE - Slightly Weathered, Well Cemented, Frequent Gray         20       SANDSTONE - Slightly Weathered, Well Cemented, Frequent Quartz Veins, Frequent Fractures, Steeply Dipping, Gray         30       SANDSTONE WITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Slickensides, Steeply Dipping, Gray         30       Sander Steeply Dipping, Gray         30       Sander Steeply Dipping, Gray         30       Sander Steeply Dipping, Gray         30       Stickensides, Steeply Dipping, Gray														
5       SHALE - Highly Weathered, Soft, Gray         10       Gray         10       Gray         10       Gray         11       SHALE - Highly Weathered, Medium Hard, Gray         10       Gray         11       SHALE - Highly Weathered (No Recovery)*         12       SHALE - Highly Weathered, Soft, Steeply         15       SHALE - Highly Weathered, Soft, Steeply         16       SHALE - Highly Weathered, Soft, Steeply         17       SHALE - Highly Weathered, Soft, Steeply         18       SANDSTONE - Slightly Weathered, Well         Cemented, Frequent Quartz Veins, Frequent         Fractures, Steeply Dipping, Gray         18       SANDSTONE WITH OCCASIONAL SHALE         19       Stickensides, Steeply Dipping, Gray         10       Stickensides, Steeply Dipping, Gray         10       Stickensides, Steeply Dipping, Gray         10       Stickensides, Steeply Dipping, Gray         11       Stickensides, Steeply Dipping, Gray         12       Stickensides, Steeply Dipping, Gray         130       Stickensides,		8.23		Organic Matter				0						
5       SHALE - Highly Weathered, Soft, Gray         10       Gray         10       Gray         10       Gray         11       SHALE - Highly Weathered, Medium Hard, Gray         10       Gray         11       SHALE - Highly Weathered (No Recovery)*         12       SHALE - Highly Weathered, Soft, Steeply         15       SHALE - Highly Weathered, Soft, Steeply         16       SHALE - Highly Weathered, Soft, Steeply         17       SHALE - Highly Weathered, Soft, Steeply         18       SANDSTONE - Slightly Weathered, Well         Cemented, Frequent Quartz Veins, Frequent         Fractures, Steeply Dipping, Gray         18       SANDSTONE WITH OCCASIONAL SHALE         19       Stickensides, Steeply Dipping, Gray         10       Stickensides, Steeply Dipping, Gray         10       Stickensides, Steeply Dipping, Gray         10       Stickensides, Steeply Dipping, Gray         11       Stickensides, Steeply Dipping, Gray         12       Stickensides, Steeply Dipping, Gray         130       Stickensides,												7		
SHALE - Highly Weathered, Medium Hard,         10       Gray         SHALE - Highly Weathered (No Recovery)*         15         15         16         17         18         19         SHALE - Highly Weathered (No Recovery)*         10         11         12         13         14         15         15         16         17         18         19         10         10         11         12         15         16         17         18         19         20         20         20         21         225         SANDSTONE - Slightly Weathered, Well         Cemented, Frequent Quartz Veins, Frequent         Fractures, Steeply Dipping, Gray         22         23         24         25         SANDSTONE WITH OCCASIONAL SHALE         30         22         23         24         25     <	5	744	Х											
SHALE - Highly Weathered, Medium Hard,         10       Gray         SHALE - Highly Weathered (No Recovery)*         15         15         16         17         18         19         SHALE - Highly Weathered (No Recovery)*         10         11         12         13         14         15         15         16         17         18         19         10         10         11         12         15         16         17         18         19         20         20         20         21         225         SANDSTONE - Slightly Weathered, Well         Cemented, Frequent Quartz Veins, Frequent         Fractures, Steeply Dipping, Gray         22         23         24         25         SANDSTONE WITH OCCASIONAL SHALE         30         22         23         24         25     <		777	$\rightarrow$											
10       Gray       Gray       60         SHALE - Highly Weathered (No Recovery)*       0       0         15       SHALE - Highly Weathered, Soft, Steeply       28       0         15       SHALE - Highly Weathered, Soft, Steeply       30       0         20       SHALE - Highly Weathered, Soft, Steeply       30       0         20       SANDSTONE - Slightly Weathered, Well       30       0         25       SANDSTONE - Slightly Weathered, Well       84       30         26       SANDSTONE - Slightly Weathered, Well       92       28         25       SANDSTONE Slightly Weathered, Occasional       92       28         30       Fractures, Steeply Dipping, Gray       92       28         30       Sickensides, Steeply Dipping, Gray       92       28         35       Steeply Dipping, Gray       92       28         35       Steeply Dipping, Gray       92       28         35       Steeply Dipping, Gray       92       28		14		SHALE - Highly Weathered, Soft, Gray				1						
10       Gray       Gray       60         SHALE - Highly Weathered (No Recovery)*       0       0         15       SHALE - Highly Weathered, Soft, Steeply       28       0         15       SHALE - Highly Weathered, Soft, Steeply       30       0         20       SHALE - Highly Weathered, Soft, Steeply       30       0         20       SANDSTONE - Slightly Weathered, Well       30       0         25       SANDSTONE - Slightly Weathered, Well       84       30         26       SANDSTONE - Slightly Weathered, Well       92       28         25       SANDSTONE Slightly Weathered, Occasional       92       28         30       Fractures, Steeply Dipping, Gray       92       28         30       Sickensides, Steeply Dipping, Gray       92       28         35       Steeply Dipping, Gray       92       28         35       Steeply Dipping, Gray       92       28         35       Steeply Dipping, Gray       92       28		111												
10       Gray       Gray       60         SHALE - Highly Weathered (No Recovery)*       0       0         15       SHALE - Highly Weathered, Soft, Steeply       28       0         15       SHALE - Highly Weathered, Soft, Steeply       30       0         20       SHALE - Highly Weathered, Soft, Steeply       30       0         20       SANDSTONE - Slightly Weathered, Well       30       0         25       SANDSTONE - Slightly Weathered, Well       84       30         26       SANDSTONE - Slightly Weathered, Well       92       28         25       SANDSTONE Slightly Weathered, Occasional       92       28         30       Fractures, Steeply Dipping, Gray       92       28         30       Sickensides, Steeply Dipping, Gray       92       28         35       Steeply Dipping, Gray       92       28         35       Steeply Dipping, Gray       92       28         35       Steeply Dipping, Gray       92       28		5775												
SHALE - Highly Weathered (No Recovery)* SHALE - Highly Weathered (No Recovery)* SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray SANDSTONE - Slightly Weathered, Well Cemented, Frequent Quartz Veins, Frequent Fractures, Steeply Dipping, Gray SANDSTONE WITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Fractures, Frequent Quartz Veins, Occasional Slickensides, Steeply Dipping, Gray SANDSTONE WITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Fractures, Frequent Quartz Veins, Occasional Slickensides, Steeply Dipping, Gray SANDSTONE WITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Slickensides, Steeply Dipping, Gray SANDSTONE WITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Slickensides, Steeply Dipping, Gray	10		X											
SHALE - Highly Weathered (No Recovery)* SHALE - Highly Weathered, Noft, Steeply Dipping, Dark Gray SANDSTONE - Slightly Weathered, Well Cemented, Frequent Quartz Veins, Frequent Fractures, Steeply Dipping, Gray SANDSTONE WITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Fractures, Frequent Quartz Veins, Ceassional Slickensides, Steeply Dipping, Gray SAMDSTONE VITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Fractures, Frequent Quartz Veins, Ceassional Slickensides, Steeply Dipping, Gray SAMDSTONE VITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Slickensides, Steeply Dipping, Gray SAMDSTONE VITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Slickensides, Steeply Dipping, Gray	10	444		Gray							(5	0 5")		
SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray 30 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		111		SHALE - Highly Weathered (No Recovery)*									0	0
20       SHALE - Highly Weathered, Soft, Steeply         20       Dipping, Dark Gray         20       SANDSTONE Area         25       SANDSTONE - Slightly Weathered, Well         Cemented, Frequent Quartz Veins, Frequent         Fractures, Steeply Dipping, Gray         30         SANDSTONE WITH OCCASIONAL SHALE         30         SANDSTONE WITH OCCASIONAL SHALE         SEAMS - Slightly Weathered, Occasional         Fractures, Frequent Quartz Veins, Cassional         Sickensides, Steeply Dipping, Gray         35         REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.		777												
20       SHALE - Highly Weathered, Soft, Steeply         20       Dipping, Dark Gray         20       SANDSTONE Area         25       SANDSTONE - Slightly Weathered, Well         Cemented, Frequent Quartz Veins, Frequent         Fractures, Steeply Dipping, Gray         30         SANDSTONE WITH OCCASIONAL SHALE         30         SANDSTONE WITH OCCASIONAL SHALE         SEAMS - Slightly Weathered, Occasional         Fractures, Frequent Quartz Veins, Cassional         Sickensides, Steeply Dipping, Gray         35         REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.		11												
20       SHALE - Highly Weathered, Soft, Steeply         20       Dipping, Dark Gray         20       SANDSTONE Area         25       SANDSTONE - Slightly Weathered, Well         Cemented, Frequent Quartz Veins, Frequent         Fractures, Steeply Dipping, Gray         30         SANDSTONE WITH OCCASIONAL SHALE         30         SANDSTONE WITH OCCASIONAL SHALE         SEAMS - Slightly Weathered, Occasional         Fractures, Frequent Quartz Veins, Cassional         Sickensides, Steeply Dipping, Gray         35         REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.		777.							5					9
SHALE - Highly Weathered, Soft, Steeply Dipping, Dark Gray 30 25 25 25 26 25 26 27 26 27 27 27 28 27 28 29 29 20 20 20 20 20 20 20 20 20 20 20 20 20	15	111											28	0
Dipping, Dark Gray       30       0         20       30       0         20       SANDSTONE - Slightly Weathered, Well       84         25       SANDSTONE - Slightly Weathered, Well       84         26       SANDSTONE - Slightly Weathered, Well       84         27       SANDSTONE VITH OCCASIONAL SHALE       92         28       SANDSTONE WITH OCCASIONAL SHALE       92         28       Fractures, Frequent Quartz Veins, Occasional       92         28       Sickensides, Steeply Dipping, Gray       92         28       Steeply Dipping, Gray       92         28       92       28         29       28       92         30       Slickensides, Steeply Dipping, Gray       1         35       Steeply Dipping, Gray       1		11												ľ
Dipping, Dark Gray       30       0         20       30       0         20       SANDSTONE - Slightly Weathered, Well       84         25       SANDSTONE - Slightly Weathered, Well       84         26       SANDSTONE - Slightly Weathered, Well       84         27       SANDSTONE VITH OCCASIONAL SHALE       92         28       SANDSTONE WITH OCCASIONAL SHALE       92         28       Fractures, Frequent Quartz Veins, Occasional       92         28       Sickensides, Steeply Dipping, Gray       92         28       Steeply Dipping, Gray       92         28       92       28         29       28       92         30       Slickensides, Steeply Dipping, Gray       1         35       Steeply Dipping, Gray       1		112	1.000					1						
Dipping, Dark Gray       30       0         20       30       0         20       SANDSTONE - Slightly Weathered, Well       84         25       SANDSTONE - Slightly Weathered, Well       84         26       SANDSTONE - Slightly Weathered, Well       84         27       SANDSTONE VITH OCCASIONAL SHALE       92         28       SANDSTONE WITH OCCASIONAL SHALE       92         28       Fractures, Frequent Quartz Veins, Occasional       92         28       Sickensides, Steeply Dipping, Gray       92         28       Steeply Dipping, Gray       92         28       92       28         29       28       92         30       Slickensides, Steeply Dipping, Gray       1         35       Steeply Dipping, Gray       1		£77;	-	SHALE - Highly Weathered, Soft, Steeply									-	
25       SANDSTONE - Slightly Weathered, Well         25       SANDSTONE - Slightly Weathered, Well         Cemented, Frequent Quartz Veins, Frequent         Fractures, Steeply Dipping, Gray         30         SANDSTONE WITH OCCASIONAL SHALE         30         SANDSTONE WITH OCCASIONAL SHALE         SIGKENS - Slightly Weathered, Occasional         Fractures, Frequent Quartz Veins, Occasional         Sickensides, Steeply Dipping, Gray         31         32         33         34         35         35		£££												
25       SANDSTONE - Slightly Weathered, Well         25       SANDSTONE - Slightly Weathered, Well         Cemented, Frequent Quartz Veins, Frequent         Fractures, Steeply Dipping, Gray         30         SANDSTONE WITH OCCASIONAL SHALE         SEAMS - Slightly Weathered, Occasional         Fractures, Frequent Quartz Veins, Occasional         Sickensides, Steeply Dipping, Gray         32         33         34         35         35         36	20	£77												
SANDS FOND - Slightly Weathered, Weit       84       30         Cemented, Frequent Quartz Veins, Frequent       Fractures, Steeply Dipping, Gray       92       28         SANDSTONE WITH OCCASIONAL SHALE       SEAMS - Slightly Weathered, Occasional       92       28         Fractures, Frequent Quartz Veins, Ocassional       Sickensides, Steeply Dipping, Gray       92       28         35       REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.       91       92       28		£77;											30	0
SANDS FOND - Slightly Weathered, Weit       84       30         Cemented, Frequent Quartz Veins, Frequent       Fractures, Steeply Dipping, Gray       92       28         SANDSTONE WITH OCCASIONAL SHALE       SEAMS - Slightly Weathered, Occasional       92       28         Fractures, Frequent Quartz Veins, Ocassional       Sickensides, Steeply Dipping, Gray       92       28         35       REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.       91       92       28		777												
SANDS FOND - Slightly Weathered, Weit       84       30         Cemented, Frequent Quartz Veins, Frequent       Fractures, Steeply Dipping, Gray       92       28         SANDSTONE WITH OCCASIONAL SHALE       SEAMS - Slightly Weathered, Occasional       92       28         Fractures, Frequent Quartz Veins, Ocassional       Sickensides, Steeply Dipping, Gray       92       28         35       REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.       91       92       28		777												
SANDS FOND - Slightly Weathered, Weit       84       30         Cemented, Frequent Quartz Veins, Frequent       Fractures, Steeply Dipping, Gray       92       28         SANDSTONE WITH OCCASIONAL SHALE       SEAMS - Slightly Weathered, Occasional       92       28         Fractures, Frequent Quartz Veins, Ocassional       Sickensides, Steeply Dipping, Gray       92       28         35       REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.       91       92       28		£773												
SANDS FOND - Slightly Weathered, Weit       84       30         Cemented, Frequent Quartz Veins, Frequent       Fractures, Steeply Dipping, Gray       92       28         SANDSTONE WITH OCCASIONAL SHALE       SEAMS - Slightly Weathered, Occasional       92       28         Fractures, Frequent Quartz Veins, Ocassional       Sickensides, Steeply Dipping, Gray       92       28         35       REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.       91       92       28	25													5
Fractures, Steeply Dipping, Gray         SANDSTONE WITH OCCASIONAL SHALE         30         SEAMS - Slightly Weathered, Occasional         Fractures, Frequent Quartz Veins, Ocassional         Slickensides, Steeply Dipping, Gray         35         REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.	25												84	30
SANDSTONE WITH OCCASIONAL SHALE SEAMS - Slightly Weathered, Occasional Fractures, Frequent Quartz Veins, Ocassional Slickensides, Steeply Dipping, Gray 35 REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.														
30       SEAMS - Slightly Weathered, Occasional         Fractures, Frequent Quartz Veins, Ocassional       92         Slickensides, Steeply Dipping, Gray       92         35       35         REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.				Fractures, Steeply Dippling, Gray										
30       SEAMS - Slightly Weathered, Occasional         Fractures, Frequent Quartz Veins, Ocassional       92         Slickensides, Steeply Dipping, Gray       92         35       35         REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.														
Fractures, Frequent Quartz Veins, Ocassional Slickensides, Steeply Dipping, Gray     35     REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.				SANDSTONE WITH OCCASIONAL SHALE										
Fractures, Frequent Quartz Veins, Ocassional     Slickensides, Steeply Dipping, Gray     35     REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.	30			SEAMS - Slightly Weathered, Occasional									92	28
35     Image: State of the stat														
REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.				Slickensides, Steeply Dipping, Gray					1					
REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.			_											-
REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.														
REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.	35		10.00											
		ARKS	. P	ear Creek * No recovery from 9 6' to 12 7' below	around	level				-			·	
**Limited recovery from 52.7' to 57.7' below ground level due to core barrel malfunction.							core	barre	el ma	alfur	nctio	n.		

Frequent Slickensides, Occasional Talc Veins, Steeply Dipping, Dark Gray	% R Q D
JOB NAME:       Bear Creek & So Fourche La Fave River Strs & Apprs (S) Route 7 Section 11       TYPE OF DRILLING: Hollow Stem Auger, Diamond Core         STATION:       110+45       EQUIPMENT:       CME 850         LOCATION:       2' Left of Construction Centerline       HAMMER CORRECTION FACTOR:       1.23         COMPLETION:       S       A       N       N       N       N         T       B       C       E       S       S       N	R Q D
Route 7 Section 11Hollow Stem Auger, Diamond Core EQUIPMENT: CME 850STATION:110+45EQUIPMENT: CME 850LOCATION:2' Left of Construction Centerline LOGGED BY: Paul ChristenberryHAMMER CORRECTION FACTOR: 1.23COMPLETION OF MATERIALD F T H O O FT.S S S SURFACE ELEVATION:SOIL S SURFACE ELEVATION:SOIL SOIL GROUPIIJ L S SURFACE ELEVATION:SOIL S SURFACE Slightly Weathered, Medium Hard, Frequent Slickensides, Occasional Talc Veins, Steeply Dipping, Dark GraySoil SIII40IIIIIII	R Q D
STATION:       110+45         LOCATION:       2' Left of Construction Centerline         LOGGED BY:       Paul Christenberry         COMPLETION:       2' Left of Construction Centerline         LOGGED BY:       Paul Christenberry         D       S         A       A         P       M         P       M         P       M         P       N         P       N         P       N         P       N         P       N         P       N         P       N         P       N         P       N         P       N         P       DESCRIPTION OF MATERIAL         SOIL       SOIL         GROUP       1         I       1         NO       1         SURFACE ELEVATION:       1         I       Steeply Dipping, Dark Gray         I       I         I       I         I       I         I       I         I       I         I       I         I       I      I	R Q D
LOCATION:       2' Left of Construction Centerline       HAMMER CORRECTION FACTOR:       1.23         COMPLETION DEPTH:       57.7         D       S       S         P       M       M         P       M       M         P       M       M         P       M       M         P       M       P         DESCRIPTION OF MATERIAL       SOIL         GROUP       1.11         H       B       L         FT.       L       S         SURFACE ELEVATION:       SURFACE ELEVATION:         L       SHALE - Slightly Weathered, Medium Hard,         Frequent Slickensides, Occasional Talc Veins,         Steeply Dipping, Dark Gray	R Q D
LOGGED BY:       Paul Christenberry       1.23         COMPLETION OF MATERIAL         D       S       A         P       Y       M         M       Y       Y         S       SURFACE EL	R Q D
COMPLETION DEPTH: 57.7         D       S       S         P       Y         M       P         T       B         L       S         SURFACE ELEVATION:         FT.       SURFACE ELEVATION:         SURFACE ELEVATION:         SHALE - Slightly Weathered, Medium Hard,         Frequent Slickensides, Occasional Talc Veins,         Steeply Dipping, Dark Gray	R Q D
D       S       S       A       S	R Q D
E       P       A       M       DESCRIPTION OF MATERIAL       SOIL       SOIL       U       U       SMOTB 40 '0''       % T C R         FT.       L       S       SURFACE ELEVATION:       SURFACE EL	R Q D
E       Y       A         P       M       P         T       B       L         B       L       SOIL         GROUP       UH91a         FT.       L         S       SURFACE ELEVATION:         FT.       S         SURFACE ELEVATION:       UHW17         UHW17       UHW17         UHW17       UHW17         S       SURFACE ELEVATION:         SHALE - Slightly Weathered, Medium Hard,         Frequent Slickensides, Occasional Talc Veins,         Steeply Dipping, Dark Gray         40	R Q D
SHALE - Slightly Weathered, Medium Hard,       96         Frequent Slickensides, Occasional Talc Veins,       Steeply Dipping, Dark Gray         40       40	Q D
SHALE - Slightly Weathered, Medium Hard,       96         Frequent Slickensides, Occasional Talc Veins,       Steeply Dipping, Dark Gray         40       40	D
SHALE - Slightly Weathered, Medium Hard,       96         Frequent Slickensides, Occasional Talc Veins,       Steeply Dipping, Dark Gray         40       40	
SHALE - Slightly Weathered, Medium Hard,       96         Frequent Slickensides, Occasional Talc Veins,       Steeply Dipping, Dark Gray         40       40	60
Frequent Slickensides, Occasional Talc Veins, Steeply Dipping, Dark Gray	60
40	
	94
SANDSTONE - Slightly Weathered, Cemented,	
45 Occasional Fractures, Steeply Dipping, Gray 94	82
98	64
- SHALE - Highly Weathered, Soft to Medium	04
Hard, Steeply Dipping, Dark Gray	
SANDSTONE WITH OCCASIONAL SHALE	
55 SEAMS AND LAYERS - Slightly Weathered,	~~
Cemented, Occasional Quartz Veins and 78 Quartz-Lined Voids, Steeply Dipping, Gray	22
Boring Terminated	
60	
<u>65</u>	
70	_
REMARKS: Bear Creek * No recovery from 9.6' to 12.7' below ground level.	
**Limited recovery from 52.7' to 57.7' below ground level due to core barrel malfunction.	

ARKAN	SAS	S H	WY. & TRANS. DEPARTMENT		BORI	NG N	10. <b>5</b>		_				
			DIVISION - GEOTECHNICAL SEC.		PAGE	8	1 0	DF 2	_		_		
JOB NO.			980439 Perry County		DATE:				arch	4, 20	16		
JOB NAM	1E:		Bear Creek & So Fourche La Fave River Strs & Ap	prs (S)					1	D:	1	Corre	
STATION	т.		Route 7 Section 11		EQUII		Stem	Aug		ME 8		Core	
LOCATIC			Construction Centerline		EQUI	WEIN	1;		C		550		
			aul Christenberry		HAMN	AER (	ORRE	CTIO	N FAC	CTOR:		1.23	
	_		DEPTH: 42.6										
D		s											
E S P Y	r l'	А   И						L	FT	SN		%	%
Ι№	/	P		SOIL GROUP		. 6		IGH	CU.	TO		T C	R Q
H C	5 U			QROOT	T	ISIC	E F	WE	PER	DF B	9-IN	R	D
FT.	I I	E   S	SURFACE ELEVATION: 535.1		PLASTIC LIMIT	% MOIST	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		
29		+	SON AGE ELEVATION. 333.1		нн	0				4	H		
8			Crovel Cabbles and Paulders with Sand										
82	$\mathcal{O}_{\mathcal{C}}$		Gravel, Cobbles, and Boulders with Sand										
	30									1(	)		
5	000									(0	")		
	98					6 3						45	0
	8												
	0.0	Η	Very Dense, Sandstone Cobbles and Boulders										_
0e	200												
10 8	S Bod											18	0
8	8					6 - E							
— –ജ	SS BS												
	Ę.												
15	22 22												
10	17											70	0
- 3	22		SHALE - Highly Weathered to Weathered, Soft										
	22	Н	to Medium Hard, Occasional Slickensides,										
Ę.	Ę		Occasional Quartz Veins, Moderately to Steeply Dipping, Gray										
20	£2											98	0
	25											90	U
	1												
		H									i I		
									- 8				
25												98	46
30													
50	÷.											99	66
			SHALE - Weathered, Medium Hard, Frequent							÷			
			Fractures, Moderately to Steeply Dipping,										
			Occasional Slickensides, Dark Gray										
35													
	KS:	В	ear Creek										

			IWY. & TRANS. DEPARTMENT DIVISION - GEOTECHNICAL SEC.		BORI PAGE		10.5 20	)f 2					
JOB N	_		080439 Perry County		DATE				rch	4, 20	)16		
JOB N	AME:		Bear Creek & So Fourche La Fave River Strs & A	pprs (S)								~	
STATI	ON		Route 7 Section 11 111+35				Stem	Auge		Dian ME :		Core	
LOCA			Construction Centerline		EQUI	MEN	1:		C		050		
			aul Christenberry		HAMN	AER C	ORRE	CTION	FAC	CTOR	:	1.23	
COM	PLET	ION	DEPTH: 42.6		r				_		_		
D E P T H	S Y M B O	S A M P L E	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS	PER 6-IN.	% T C R	% R Q D
FT.	L		SURFACE ELEVATION: 535.1		PLA LIN	% N	LIQ	DR	LBS	NO	PEF		
												97	50
40												96	28
			Device: Towningtod						_				
			Boring Terminated										
45													
50													
55													a.
60													
65													
00													
70													
REMA	ARKS	6: E	Bear Creek										
							_	_	_	_	_		

			WY. & TRANS. DEPARTMENT				10. 6	- 4					
		_	DIVISION - GEOTECHNICAL SEC.		PAGE		1 0	DF 1	roh '	28, 2	016		_
JOB NO			080439 Perry County Bear Creek & So Fourche La Fave River Strs & Ap	onrs (S)	DATE TYPE				i cn 2	20, 2	010		
JOD 14/			Route 7 Section 11	5013 (0)			Stem		er - I	Diam	ond	Core	
STATI	ON:		112+11		EQUIE			0		ME			
LOCA		(	Construction Centerline										
LOGG	ED BY	: S	teve Faulkner		HAMN	AER C	CORREC	CTION	N FAG	CTOR		1.23	_
COMI	PLET	ION	DEPTH: 18.5						_				
D	s	s											
E	Y	A							Ę	s		%	%
P T	м	M P	DESCRIPTION OF MATERIAL	SOIL				THE	U.F	NO.		Т	R
н́	B	Ľ		GROUP	IC	ST.		VEIC	ER (	F BI	Ľ.	C R	Q D
	O L	Е			PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.	I.	D
FT.	_	S	SURFACE ELEVATION: 539.6		E E	%	ĒĒ	DR	ΓB	ž	PE		
	0000												
	0.03 8 9 9 9												
	9		Moist, Medium Dense, Brown Sand with Gravel										
	809 6 6		(Rock Fragments)										
5	0.000 0.000	$\bigtriangledown$									5		
	9-8- 50: <sup>18-</sup>	$ rac{1}{2} $								7.	.y		
	. <del>С. Д</del> . :									1	0	_	
										(Ò	")	63	0
		+											
10													
			SANDSTONE - Weathered, Well Cemented,									56	0
			Occasional Quartz Veins, Steeply Dipping, Gray										
		-				8							
15													
												32	0
			SHALE - Weathered, Medium Hard, Moderate Dip, Frequent Slickensides, Steeply Dipping,										
			Dip, Frequent Sickensides, Steeply Dippling, Dark Gray *										
			Boring Terminated										
20													
25											8		
30													
35			lear Crack										
KEMA	AKKS		ear Creek Hole abandoned at 18.5' below ground level due t	to hit fail	lure								
	_	_	The abundance at 10.0 below ground level due							_		_	

			WY. & TRANS. DEPARTMENT				10. 6						
			DIVISION - GEOTECHNICAL SEC.		PAGE		1_0	OF 2	_	20.0	017		
JOB N JOB N			080439 Perry County Bear Creek & So Fourche La Fave River Strs & A	nore (S)	DATE				rch	29, 2	016		
JODIN	AIVIE.		Route 7 Section 11	phis (O)			Stem		er -	Dian	rond	Core	•
STATI	ON:		112+11		EQUI			1146		'ME		0010	
LOCA	TION:	:	3' Left of Construction Centerline										
LOGG	ED BY	': S	teve Faulkner		HAM	MER (	CORRE	CTIO	N FAG	CTOR	:	1.23	
COMI	PLET	ION	DEPTH: 48.3		-			r					
D	s	s											0
E P	Y	A M							FT.	NS N		%	%
T	M	P	DESCRIPTION OF MATERIAL	SOIL GROUP				IGH	cu.	FO		T C	R Q
н	B O	L				ISIC	a L	WE:	PER	OF B	NI-S	R	D
FT.	Ĺ	E S	SURFACE ELEVATION: 539.6		PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		
	1.000		SURFACE ELEVATION. 559.0			6			Ţ	2		<u> </u>	
	2.8.8												
			Moist, Very Dense, Brown and Gray Gravel										
			with Clay and Sand										
5	9. S.	$\overline{}$								9	9		
	69.96	$\mathcal{A}$	······································	- -						49	-60 )")		
			SANDSTONE - Weathered, Well Cemented,							(*	,,	28	ō
			Frequent Quartz Veins, Steeply Dipping, Gray *	1								20	
10													
												60	12
			SANDSTONE - Weathered, Well Cemented, Frequent Quartz Veins, Frequent Fractures,										
			Steeply Dipping, Gray										
15													
												34	0
			, SHALE - Unweathered, Hard, Frequent	÷.				1					
			Slickensides, Steeply Dipping, Gray										
20													
												90	42
			SHALE - Unweathered, Hard, Frequent										
			Slickensides, Frequent Quartz Veins, Steeply										
25			Dipping, Gray										
20												82	16
												02	
	117											_	
30	177)			8									
	144											86	26
	775												
	117		SHALE - Weathered with Highly Weathered Layers, Medium Hard with Soft Layers,										
	112		Frequent Slickensides, Frequent Quartz Veins,										
35	112		Steeply Dipping, Gray										
REMA	ARKS		ear Creek										
		л <b>т</b> .	Total water loss throughout coring due to auger no	ot prope	ny sea	ated	and f	ract	urec		к.		

			WY. & TRANS. DEPARTMENT				10. <b>6</b> /			_			
		_	DIVISION - GEOTECHNICAL SEC.		PAGE	_	2 (	OF 2	_	20.0	015		_
JOB N			080439 Perry County	anno (8)	DATE:				rch 2	29, 20	016		
JOB N.	AME:		Bear Creek & So Fourche La Fave River Strs & Ap Route 7 Section 11	pris (S)			Stem			Diam	ond	Core	
STATI	ION ·		112+11		EQUI			лид		ME 8		COIC	
LOCA			3' Left of Construction Centerline		LQUI	IVILLI			U		000		
			teve Faulkner		HAMN	AER (	ORREG	CTION	N FAC	CTOR:		1.23	
COM	PLET	ION	I DEPTH: 48.3										
D		s		j	1.								
E	S Y	Α							ੁ	6		0/	0/
P	м	M	DESCRIPTION OF MATERIAL	SOIL				HT	U.F	MO		% T	% R
Т	В	P L		GROUP	U	Ľ		EIG	R C	BL	ż	C	Q
	0	E			LT TI	% MOIST.		DRY WEIGHT	LBS PER CU.FT	OF	PER 6-IN.	R	D
FT.	L		SURFACE ELEVATION: 539.6		PLASTIC LIMIT	% N	LIMIT	DR	LBS	NO. OF BLOWS	PER		
	777,	T										74	10
	177											/4	10
	111												
	111	-									1		
40	117												
	777											74	18
	744 S												
	111		SHALE - Weathered with Highly Weathered										
	111		Layers, Medium Hard with Soft Layers, Occasional Slickensides, Steeply Dipping,									_	
45	111		Gray				6						
	777		-									66	6
	£17.												Ŭ
	111												
	27.7.7	_	Boring Terminated										
50	ĺ.												
55													
60													
	i.												
65													
70													
REMA	ARKS		ear Creek										
		*	Total water loss throughout coring due to auger no	t prope	ly sea	ated	and f	racti	urec	l roc	k.		

			WY. & TRANS. DEPARTMENT				10. 7						
	_	_	DIVISION - GEOTECHNICAL SEC.		PAGE	_		)F 2		0.0	015		
JOB N			080439 Perry County Reast Creak & So Fourshall a Four Biver Stra & An		DATE:				embe	er 8, 2	015		
JOB N	AME:		Bear Creek & So Fourche La Fave River Strs & Ap Route 7 Section 11	prs (S)			Stem		or 1	Diam	ond (	Core	
STATI			211+72		EQUIE			Aug		ME 8		COLC	
LOCA			Centerline of Construction		LQUII	IVILLIN	1.		C	IVIL U	50		
			aul Christenberry		HAMN	AER O	ORREO	CTION	N FAC	CTOR:		1.23	
			I DEPTH: 51.8									_	
D		S									T		
Ē	S Y	A			l i				æ				
Р	M	М	DESCRIPTION OF MATERIAL	SOIL				HT	U.FJ	M N		% T	% R
Т	B	P		GROUP	U	Ľ.		EIG	SCI	BL(	۶	C	Q
н	0	L E			STI	OIS	18E	IM	PEI	OF	0-II	R	D
ETa	L		SURFACE ELEVATION: 485.9		PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		
	100	-				<u><u></u>,</u>		-			-		_
	SS												
	2 to												
	800												
	300	$\mathbf{N}$	Moist, Very Stiff, Reddish Brown Clay with							6 9-1			
5	6	>	Gravel (Shale Fragments)							9-1	-		
	X				0								
	18 C		14				0						
	80 × 80												
	11	$\bigtriangledown$								3			
10	$\backslash \rangle$	$\bigtriangleup$								4-!	5		
	$\mathbb{N}$		Moist, Stiff, Reddish Brown Sandy Clay										
	$\mathbb{N}$		moloc, exil, reducer brown early elay										
	$\backslash \rangle$									(			
	1%		Moist, Very Hard, Gray and Reddish Brown							17	r		
15	8%	$\bigtriangleup$	Sandy Clay with Gravel (Sandstone							36-3	30		
	\$\$. Do		- Fragments)							(9'	)	_	
												11	0
												_	
			SANDSTONE - Weathered, Cemented,			· .							
20			Frequent Quartz Veins, Steeply Dipping, Gray										
_20			and White									44	0
							i.						
	HINH												
	9.24												
25	6.53											79	0
	a da		SANDSTONE WITH FREQUENT SHALE							l			
			LAYERS - Weathered, Cemented with										
			Frequent Soft Layers (Shale), Occasional Quartz Veins, Steeply Dipping, Gray								ł		
30	CEG											82	0
	6.24											02	U
	111												
	44	4											
	111												
35	777		SHALE - Highly Weathered, Soft, Frequent										
	ARKS	S: S	South Fourche La Fave River										

ARKANSAS HWY. & TRANS. DEPARTMENT					JO. 7						
MATERIALS DIVISION - GEOTECHNICAL SEC.			PAGE	_		)F 2	_	0.1	015	_	
JOB NO. 080439 Perry County JOB NAME: Bear Creek & So Fourche La Fave F	Divor Otro 9 A-		DATE				embe	er 8, 2	2015		
JOB NAME: Bear Creek & So Fourche La Fave F Route 7 Section 11	diver Strs & Ap	prs (S)			Stem		or 1	Diam	ond	Core	
STATION: 211+72			EQUIE			Aug		ME 8		COIC	
LOCATION: Centerline of Construction			LQUII				U				
LOGGED BY: Paul Christenberry			HAMN	/IER C	ORRE	CTION	I FAC	CTOR:		1.23	
COMPLETION DEPTH: 51.8											
							L.	s		%	%
		SOIL				HT	U.F	MO		Т	R
		GROUP	Ŋ	ST.		EIG	R C	BL	z	C	Q
			PLASTIC LIMIT	% MOIST	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.	R	D
FT. L S SURFACE ELEVATION: 485.9			PL/ LIN	% N	E EI	DR	LB	NO	PEI		
Quartz Veins, Steeply Dipping, Da	irk Gray									25	0
											_
40											
										100	0
SHALE - Highly Weathered, Soft t											
Hard, Occasional Quartz Veins, S	teeply										
Dipping, Dark Gray											
45											
										100	12
SANDSTONE - Slightly Weathere	d Well										
Cemented, Steeply Dipping, Light											_
50 SANDSTONE - Unweathered, We	Il Cemented,									100	100
Steeply Dipping, Gray											100
Boring Terminated											
55											
60											
	÷-										
65											
70											
REMARKS: South Fourche La Fave River											

			WY. & TRANS. DEPARTMENT	-	BORI PAGE		10. 8	of 1					
JOB N	_	-	080439 Perry County		DATE:				mbe	r 15,	2014	5	
JOB N			Bear Creek & So Fourche La Fave River Strs & Ap	prs (S)						· 1J,	<i></i> 1.	,	
00010			Route 7 Section 11	F (-)			Stem		er - l	Diam	ond	Core	
STATI	ON:		212+38		EQUIF			U		ME 8			
LOCA	TION:	(	Centerline of Construction										
LOGG	ED BY	: P	aul Christenberry		HAMN	AER (	ORRE	CTION	I FAC	CTOR:		1.23	
COM	PLET	ION	DEPTH: 33.4										
D	s	s											
E	Y	Α							Ë	S		%	%
P T	M	M P		SOIL				THE	U.F	NO.		Т	R
H H	в	Ē		GROUP	2	ST.		'EIC	LR C	BL	ż	C R	Q D
	0	Ē			PLASTIC LIMIT	% MOIST	LIMIT	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.	ĸ	D
FT.	L		SURFACE ELEVATION: 472.5		PL/	% N	LIN LIN	DR	LB	ON	PEI		
	320												
	888												
		ŝ.	Wet, Very Stiff, Gray and Reddish Brown										
			Sandy Clay with Gravel (Shale and Sandstone							5			
5	75	Х	Fragments)							10-	18		
	No.												
	20 . A												
			SANDSTONE WITH OCCASIONAL SHALE SEAMS- Slightly Weathered, Well Cemented,							1(   (0	, ")	94	8
			Trequent Fractures, Steeply Dipping, Light									_	
	5 D G		Gray										
10			SANDSTONE WITH FREQUENT SHALE										
	100		SEAMS - Slightly Weathered with Highly									41	24
			Weathered Seams, Well Cemented with Soft Seams, Steeply Dipping, Gray										
_			Searris, Steepiy Dipping, Shay										
15													
	9.29											100	31
	-Da												
	5.DG		SANDSTONE WITH FREQUENT SHALE										
	n n d		SEAMS AND LAYERS - Slightly Weathered,										
20			Well Cemented, Steeply Dipping, Gray										
												100	44
	9-12-94 - 144 H												
	989												
	nina	-											_
25													
			SANDSTONE WITH OCCASIONAL SHALE									100	86
			PARTINGS - Unweathered, Well Cemented, Steeply Dipping, Dark Gray										00
			Steepiy Dippling, Dark Gray										
													_
30	ΞĒ		SANDSTONE WITH FREQUENT SHALE										
30			PARTINGS - Slightly Weathered, Well										
			Cemented, Frequent Fractures, Steeply				2					96	45
			Dipping, Gray				6						
	0:DG					_		_					
			Boring Terminated										
35			Levith Fauraha La Faura Diver					I		L		I	
KEM/	ARKS	s: S	South Fourche La Fave River										
	_	_			_			_			_	_	

			WY. & TRANS. DEPARTMENT				NO. 9						
	_	_	DIVISION - GEOTECHNICAL SEC.		PAGE			OF 2	_	. 10	2017		
JOB N			080439 Perry County	opro (S)	DATE:				mbe	r 19,	2015	)	
JOB N	AME:		Bear Creek & So Fourche La Fave River Strs & Ap Route 7 Section 11	pprs (S)			Stem		or 1	Diam	ond	Core	
STAT	ION		213+75		EQUIE			Aug		ME 8		COIC	
LOCA			Centerline of Construction		LQUI	WILL	1.		U	14112 (	550		
			aul Christenberry		НАММ	AER (	CORRE	CTIO	N FAC	CTOR:		1.23	
			I DEPTH: 47.8										
D		S			r – –						T		
Ē	S	A							a				
Р	Y M	M	DESCRIPTION OF MATERIAL	SOIL				Ę	J.FT	SMO		% T	% R
Т	B	P		GROUP		H		EB I	C	BLC		C	Q
Н	ō				Ĕг	DIS	le H	WE	PER	DF ]	5	R	D
FT.	L	E S	SURFACE ELEVATION: 473.1		PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHI	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		
9.52	N: N	5	SURFACE ELEVATION: 473.1			~	177		۲ ۲	Z	<u>~</u>		
	$\mathbb{N}$		21.										
	$\sim$												
	$\langle \rangle$												
	$\langle \rangle$	k	Moist, Medium Stiff, Gray Sandy Clay with							1			
5	$\mathbf{N}$	М	Some Organic Matter							2-	4		
_	$\mathbb{N}$		-										
	$\mathbb{N}$												
	$\mathbb{N}$												
_	$\sum$									8			
10	R So	IX								4-8			
	Ser 1	$ \rightarrow$	Moist, Hard, Gray Clay with Gravel (Shale and										
	200		Sandstone Fragments)										
	8 90												
	× X								- 8				
45										10 (0			
15										(0	΄		-
			-									49	8
											-		-
	EE												
20			SANDSTONE AND SHALE INTERBEDDED -									~ 7	00
	ΞΞ		Slightly to Highly Weathered, Well Cemented									97	20
			(Sandstone) to Soft (Shale), Steeply Dipping, Frequent Slickensides, Gray										
	E												
25													
	EE											100	14
	<u> ipg</u>		SANDSTONE WITH FREQUENT SHALE										
30	G D G		LAYERS - Slightly Weathered, Well Cemented,					1				97	20
	e de		Steeply Dipping, Frequent Slickensides,			Ê							
			Frequent Fractures, Gray										
				2							-		_
35	Ē												
REM	ARKS	S: S	South Fourche La Fave River										
													- 2

ARKA	ANSA	SF	WY. & TRANS. DEPARTMENT		BORI		10. <b>9</b>						
		_	DIVISION - GEOTECHNICAL SEC.		PAGE			DF 2					
JOB NO			080439 Perry County		DATE:				mbe	r 19,	2015	5	
JOB NA	AME:		Bear Creek & So Fourche La Fave River Strs & Ap	pprs (S)								a	
			Route 7 Section 11				Stem	Aug				Core	
STATI			213+75		EQUIF	MEN	T:		С	ME 8	\$50		
LOCA			Centerline of Construction									1.00	
			aul Christenberry		HAMN	AER (	ORREC	CTION	√ FAC	CTOR:		1.23	
COMI	PLET	-	DEPTH: 47.8							_			_
D	s	S											
E P	Ŷ	A M							E	VS		%	%
T	М	P	DESCRIPTION OF MATERIAL	SOIL				HE	CU.)	NO		Т	R
ΙήΙ	В	Ľ		GROUP		ST.		VEI	ER (	BI	z	C R	Q D
	0	E			PLASTIC LIMIT	% MOIST	LIQUID	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS	PER 6-IN.	ĸ	D
FT.	L		SURFACE ELEVATION: 473.1		LLN L	% N	EE	DR	LB	NO	PEI		
	ΞŦ		SANDSTONE AND SHALE INTERBEDDED -									96	10
			Unweathered, Well Cemented (Sandstone) and										
	HE		Medium Hard (Shale), Steeply Dipping,										
			Frequent Slickensides, Gray								1		
40												57	12
	ann											01	
			SHALE WITH FREQUENT SANDSTONE										
		_	SEAMS AND LAYERS - Unweathered,		0								
			Medium Hard, Steeply Dipping, Frequent										
45			Slickensides, Dark Gray										
												96	26
			Boring Terminated										
50													
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		2. 0	I South Fourche La Fave River										
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			WY. & TRANS. DEPARTMENT				NO. 10						
	_		DIVISION - GEOTECHNICAL SEC.	_	PAGE	_		F 2	_		201	5	-
JOB N			080439 Perry County	opro (S)	DATE:				mbe	r 23,	201:	0	
JOR N	IAME:		Bear Creek & So Fourche La Fave River Strs & Ap Route 7 Section 11	prs (S)			Stem		er - I	Dian	brou	Core	
STAT			214+28		EQUI			Aug		ME		COIC	
	TION:		Centerline of Construction		LQUI	IVILIA	1.		0		000		
			tanley Bates		HAMN	MER (	CORREC	CTION	I FAC	TOR		1.23	
			I DEPTH: 43.5				-						
D		S											
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Р	M	М	DESCRIPTION OF MATERIAL	SOIL				HT	U.F.	MC		% T	% R
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н	0	L E			IT I	OIS		M N	PEJ	OF	[-9]	R	D
FT.	L	S	SURFACE ELEVATION: 476.6		PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		
	$\mathbb{N}$												
	$\mathbb{N}$		Moist, Hard, Sandy Clay with Some Gravel and										
	$\mathbb{N}$		Organic Matter										
	$\backslash \backslash$												
5	$\nabla Z$	$\mathbf{N}$								19-			
	177	$ \land$								19	-41		
	777												
	777												
	177		SHALE - Highly Weathered, Soft, Gray										
10	12												
	177 1									3	9		
	7777	$\square$								6	0		
			SANDSTONE WITH OCCASSIONAL CLAY							(6	<sup>5"</sup> )		
			LAYERS - Weathered, Well Cemented, Steeply									50	0
15			Dipping, Gray					2					
													_
			SANDSTONE WITH OCCASSIONAL SHALE										
			LAYERS - Slightly Weathered, Well Cemented,									40	0
20			Steeply Dipping, Gray										
			SANDSTONE - Slightly Weathered, Well									34	0
25			Cemented, Steeply Dipping, Gray										
25													
	uuu												
	dibt												
	888											78	14
												10	14
30													
			SANDSTONE WITH FREQUENT SHALE										_
			LAYERS - Slightly Weathered, Well Cemented, Steeply Dipping, Gray										
	diti ti		Steeply Dipping, Gray										_
	888 8											66	7
35													
	ARKS	S: S	South Fourche La Fave River										
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JOB N			Bear Creek & So Fourche La Fave River Strs & Ap	oprs (S)			RILLIN	G:					
			Route 7 Section 11		- 11 - 11 - 11 - 11 - 11		Stem	Aug				Core	
STATI			214+28		EQUIF	MEN	T:		С	ME	350		
LOCA			Centerline of Construction		12.21.212/22/2							1 22	
		_	tanley Bates		HAMN	AER C	ORREG	TION	FAC	TOR		1.23	
	PLEI	-	DEPTH: 43.5								_		
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FT.	L	S	SURFACE ELEVATION: 476.6		PLASTIC LIMIT	% MOIST.	LIQUID	DRY	LBS PER CU.FT	NO.	PER 6-IN.		
_		Т											
			CHALE WITH ERECHENT CANDOTONE									88	8
40			SHALE WITH FREQUENT SANDSTONE SEAMS AND LAYERS - Slightly Weathered,	l									
			Medium Hard, Steeply Dipping, Frequent										
			Slickensides, Dark Gray										
												99	0
	hnru	-	Boring Terminated					-					
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REM	ARKS	S: S	South Fourche La Fave River										

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JOB NO		_	080439 Perry County		PAGE		_	Dece		er 1, 2	0015		_
JOB N			Bear Creek & So Fourche La Fave River Strs & A	nnrs (S)									•r -
JOD IV			Route 7 Section 11	pp13 (O)		OF D.	KILLIN	u	11011	0 10 0	tonn	Tug	1
STATI	ON:		215+03		EQUI	PMEN	T:		С	ME 8	350		
LOCA			Centerline of Construction						-				
			aul Christenberry		HAMN	AER (	CORREC	CTION	N FAC	CTOR:		1.23	
			DEPTH: 37.9										
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	198N.	-	OUR ADE ELEVATION. 470.0			<u>°`</u>				~	H		
- 4	$\gtrsim$												
	82		Gray and Brown Clayey Gravel with Sand										
	$\chi_{\mathcal{S}}$												
	12	$\times$	SHALE - Highly Weathered, Medium Hard,							1			
5	777	$\frown$	Dark Gray							60 (6)	) "\		
	111		SHALE WITH OCCASIONAL SANDSTONE	C.						,0	'		
	111		LAYERS - Highly Weathered, Medium Hard									85	0
	177		with Soft Layers, Steeply Dipping, Dark Gray										
10			SANDSTONE WITH OCCASIONAL SHALE										
			LAYERS - Weathered with Occasional Highly									44	0
			Weathered Layers, Well Cemented, Steeply Dipping, Dark Gray										
			Dipping, Dark Oray										
									1				
15												61	8
												0.	Ŭ
			SANDSTONE - Slightly Weathered, Well										
			Cemented, Occasional Fractures, Occasional										
			Quartz Veins, Steeply Dipping, Dark Gray										
20													
												68	48
		i li		1									
25			SANDSTONE WITH OCCASIONAL SHALE										
20			LAYERS - Weathered with Occasional Highly									22	0
			Weathered Layers, Well Cemented, Steeply										Ŭ
			Dipping, Gray										
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			SHALE INTERBEDDED WITH SANDSTONE -										
30	田田田		Slightly Weathered to Unweathered, Medium										
	営田		Hard, Well Cemented, Highly Fractured,									66	22
	E		Steeply Dipping, Dark Gray	×									
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35			outh Fourche La Fave River		L								
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		_	DIVISION - GEOTECHNICAL SEC.		PAGE	-		OF 2	_		017	_	-
JOB N			080439 Perry County Bear Creek & So Fourche La Fave River Strs & Ap	ore (0)	DATE:					er 1, 2			ar.
JOB N	ANE:		Bear Creek & So Fourche La Fave River Strs & Ap Route 7 Section 11	မ၊ ၁ (၁)	TALE	of D	RILLIN	u: I	11011	ow 9	(CIII	Auge	<i>.</i>
STATI	ION ·		215+03		EQUIF	MEN	T:		С	ME 8	350		
LOCA			Centerline of Construction		DQ01								
			aul Christenberry		HAM	/IER (	CORREC	CTION	N FAC	CTOR:		1.23	
COM	PLET	ION	DEPTH: 37.9										
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	0   L	Е			PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.	A	2
FT,	_	S	SURFACE ELEVATION: 476.3		PL	%	EE	DI	ĽE	ž	PE		
			SANDSTONE WITH FREQUENT SHALE LAYERS AND SEAMS - Unweathered, Well									99	43
			Cemented, Occasional Fractures, Steeply										
	9:8:9 9:8:9		Dipping, Gray						_				
			Boring Terminated										
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REM/	ARKS	s: s	outh Fourche La Fave River										
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			WY. & TRANS. DEPARTMENT				NO. 12						
JOB N		_	DIVISION - GEOTECHNICAL SEC. 080439 Perry County		PAGE DATE			DF 2		er 2, 2	2015		
JOB N			Bear Creek & So Fourche La Fave River Strs & A	oprs (S)									er -
JODIN			Route 7 Section 11	pp.0 (0)				0.		0112		8-	-
STATI	ON:		215+93		EQUI	MEN	T:		С	ME	850		
LOCA	TION:	(	Centerline of Construction										
LOGG	ED BY	: R	aymond Taylor, Paul Campbell		HAM	AER (	CORRE	CTION	N FAC	CTOR		1.23	
COM	PLET	ION	I DEPTH: 48.7										
D	s	S	1										
E	Y	А							Ľ	s		%	%
Р Т	М	М	DESCRIPTION OF MATERIAL	SOIL				THT	U.F	MO		70 T	R
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	$\backslash \backslash$												
	$\mathbf{N}$		Wet, Soft, Brown Sandy Clay with Some										
	$\backslash \backslash$	į –	Organic Matter										
		ç											
5	No V	$\mathbf{X}$								2 51-			
	$\mathbb{R}$		Wet, Very Hard, Light Brown to Gray Sandy							51-	-23		
	88		Clay with Gravel (Shale and Sandstone										
	N'a		Fragments)										
	200												
10	777	$\bigtriangledown$	SHALE - Highly Weathered, Medium Hard,								5		
	£££	$\wedge$	Dark Gray							33-	-55		
	777	T									Ì		
												22	0
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		1000										28	0
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												80	14
			SHALE - Weathered, Medium Hard, Steeply										
			Dipping, Frequent Slickensides, Dark Gray										
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REMA	ARKS	5: S	South Fourche La Fave River										
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OB NO.		080439 Perry County		DATE:		]	Dece	embe	,	2015		
OB NAME	:	Bear Creek & So Fourche La Fave River Strs & A	pprs (S)	TYPE	OF DI	RILLIN	G: ]	Holl	ow S	stem	Auge	er -
STATION:		Route 7 Section 11 215+93		EQUIF	MENI	т.		C	ME	850		
LOCATION		Centerline of Construction		EQUI	IVILIN	1.		C		050		
		Raymond Taylor, Paul Campbell		HAMN	AER C	ORREO	CTION	N FAC	CTOR		1.23	
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D E P T H O L	S A P L E		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
FT, L	S	SURFACE ELEVATION: 477.8		LII	%	ΞΞ	Ď	LB	ž	PE		
											80	15
40		SHALE - Unweathered, Medium Hard, Steeply Dipping, Frequent Slickensides, Dark Gray									94	8
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	14 FE FE											
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70		I South Fourche La Fave River	I									

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		_	DIVISION - GEOTECHNICAL SEC.		PAGE			DF 2	_	er 3,	2014		-
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JOB 11	, civite.		Route 7 Section 11	pp.e (e)		01 D		<b>G</b> .				B	
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LOCA			Centerline of Construction										
			aul Christenberry, Paul Campbell		HAM	MER (	CORRE	CTIO	N FA	CTOR	:	1.23	
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FT.	L		SURFACE ELEVATION: 478.6		PLASTIC LIMIT	% MOIST	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.		
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5			Moist, Hard, Brown Sandy Clay with Gravel								9		
	$\mathbf{\hat{x}}$	Х	(Rock Fragments)							30	-23		
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10	27	$\bigtriangledown$	SHALE - Highly Weathered, Medium Hard,								31		
		$ \bigtriangleup $	Dark Gray*							56	-44 0")		
	777						-				- ,		
			SHALE - Weathered, Medium Hard, Gray									50	0
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15	LL L		QUIAL E. Linkh, Marshand As Marshand										
			SHALE - Highly Weathered to Weathered, Medium Hard with Soft Layers, Steeply									100	34
	111		Dipping, Gray										
	777												
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			SHALE - Westbergd Madium Hard Steenly										
			SHALE - Weathered, Medium Hard, Steeply Dipping, Frequent Slickensides, Dark Gray **									100	66
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35							<u> </u>	<u> </u>				<u> </u>	
REM	ARKS		South Fourche La Fave River * Groundwater enco evel. ** Partial water loss from 28.9' to 33.9' below				kimate	ely 1	1'b	elow	' gro	und	
		ie	evel. ** Partial water loss from 28.9' to 33.9' below	w groun		•		_	_		_	_	_

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		_	DIVISION - GEOTECHNICAL SEC.				_		mha	er 3, 2	2015	_
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STATI	ON		216+70		EQUIF	MEN	T:		С	ME 8	850	
LOCA			Centerline of Construction		200				-			
			aul Christenberry, Paul Campbell		HAMN	1ER C	ORRE	CTION	FAC	CTOR:		1.23
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		Т	SHALE - Weathered, Medium Hard,								_	
			Occasional Fractures, Frequent Slickensides,									90
			Dark Gray									
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