

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT



SUBSURFACE INVESTIGATION

STATE JOB NO. 009814

FEDERAL AID PROJECT NO. NHPP-0003(50)

E. PIGEON CREEK STR. & APPRS. (S)

STATE HIGHWAY 201 SECTION 1

IN BAXTER COUNTY

LETTING OF SEPTEMBER 21, 2016

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

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

May 15, 2014

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 009814
E. Pigeon Creek Str. & Apprs. (S)
Route 201 Section 1
Baxter County

Transmitted herewith is the requested Soil Survey, Strength Data and Resilient Modulus test results for the above referenced job. The project consists of replacing the bridge crossing Pigeon Creek on Highway 201. Samples were obtained in the existing travel lanes, and ditch line. There were no paved shoulders within the project limits.

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

Based on currently available cross-sections the maximum embankment height is approximately 12 feet. All soft unstable organic material should be undercut prior to embankment construction, anticipated to be no more than two feet. The embankment may be constructed using locally available unspecified material utilizing a 3:1 slope configuration.

The maximum cut depth is approximately 17 feet. The 3:1 cut slope configuration is acceptable as shown in the currently available cross-sections.

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 Mountain Home.
2. Asphalt Concrete Hot Mix

<u>Type</u>	<u>Asphalt Cement %</u>	<u>Mineral Aggregate %</u>
Surface Course	5.3	94.7
Binder Course	4.3	95.7
Base Course	4.1	95.9


Michael C. Benson
Materials Engineer

MCB:pt:bjj
Attachment

cc: State Constr. Eng. – Master File Copy
District 9 Engineer
Transportation Planning and Policy Div.
G. C. File

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

DATE - 05/14/2014
JOB NUMBER - 009814

SEQUENCE NO. - 1
MATERIAL CODE - SSRVPS
SPEC. YEAR - 2003
SUPPLIER ID. - 1
COUNTY/STATE - 03
DISTRICT NO. - 09

JOB NAME - E. PIGEON CREEK STRS. & APPRS. (S)

* STATION LIMITS R-VALUE AT 240 psi *

BEGIN OB - END JOB LESS THAN 5

RESILIENT MODULUS
STA.112+00 7758

REMARKS -
-

AASHTO TESTS : T190

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

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

Job No.	009814	Material Code	SSRVPS
Date Sampled:	04/30/14	Station No.:	112+00
Date Tested:	April 30, 2014	Location:	17'LT
Name of Project:	E.PIGEON CREEK STRS. & APPRS.(S)		
County:	Code: 3	Name:	BAXTER
Sampled By:	FAULKNER	Depth:	0-5
Lab No.:	20141194	AASHTO Class:	A-6(13)
Sample ID:	RV362	Material Type (1 or 2):	2
LATITUDE:		LONGITUDE:	

1. Testing Information:

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

2. Specimen Information:

Specimen Diameter (in):	
Top	3.96
Middle	3.94
Bottom	3.95
Average	3.95
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.03
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.03
Initial Area, Ao (sq. in):	12.18
Initial Volume, AoLo (cu. in):	97.80

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	3230.00
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4. Soil Properties:

Optimum Moisture Content (%):	15.9
Maximum Dry Density (pcf):	110.4
95% of MDD (pcf):	104.9
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3230.00
Compaction Moisture content (%):	16.6
Compaction Wet Density (pcf):	125.83
Compaction Dry Density (pcf):	107.92
Moisture Content After Mr Test (%):	16.6

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

#VALUE!

7. Resilient Modulus, Mr:

10241(S_c)^{-0.22815}(S₃)^{0.29219}

8. Comments

9. Tested By:

MW/DT

Date: April 30, 2014

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

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

Job No. 009814 Material Code SSRVPS
 Date Sampled: 04/30/14 Station No.: 112+00
 Date Tested: April 30, 2014 Location: 17'LT
 Name of Project: E.PIGEON CREEK STRS. & APPRS.(S)
 County: Code: 3 Name: BAXTER
 Sampled By: FAULKNER Depth: 0-5
 Lab No.: 20141194 AASHTO Class: A-6(13)
 Sample ID: RV362 Material Type (1 or 2): 2
 LATITUDE: LONGITUDE:

PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Actual Applied Max. Axial Load	Actual Applied Cyclic Load	Actual Applied Contact Load	Actual Applied Max. Axial Stress	Actual Applied Cyclic Stress	Actual Applied Contact Stress	Average Recov Def. LVDT 1 and 2	Resilient Strain	Resilient Modulus
	S ₃ psi	S _{eyclic} psi	P _{max} lbs	P _{eyclic} lbs	P _{contact} lbs	S _{max} psi	S _{eyclic} psi	S _{contact} psi	H _{avg} in	ε _r in/in	M _r psi
Sequence 1	6.0	2.0	25.0	22.3	2.7	2.1	1.8	0.2	0.00096	0.00012	15,228
Sequence 2	6.0	4.0	46.7	43.9	2.8	3.8	3.6	0.2	0.00203	0.00025	14,220
Sequence 3	6.0	6.0	68.7	65.0	3.7	5.6	5.3	0.3	0.00335	0.00042	12,814
Sequence 4	6.0	8.0	90.8	84.7	6.1	7.5	7.0	0.5	0.00510	0.00064	10,942
Sequence 5	6.0	10.0	111.7	103.1	8.6	9.2	8.5	0.7	0.00713	0.00089	9,531
Sequence 6	4.0	2.0	24.9	22.1	2.7	2.0	1.8	0.2	0.00118	0.00015	12,392
Sequence 7	4.0	4.0	46.2	43.4	2.8	3.8	3.6	0.2	0.00247	0.00031	11,559
Sequence 8	4.0	6.0	67.1	64.2	2.8	5.5	5.3	0.2	0.00393	0.00049	10,766
Sequence 9	4.0	8.0	89.3	84.0	5.2	7.3	6.9	0.4	0.00563	0.00070	9,841
Sequence 10	4.0	10.0	110.4	102.8	7.6	9.1	8.4	0.6	0.00758	0.00094	8,936
Sequence 11	2.0	2.0	24.7	22.0	2.7	2.0	1.8	0.2	0.00138	0.00017	10,492
Sequence 12	2.0	4.0	45.6	42.8	2.8	3.7	3.5	0.2	0.00295	0.00037	9,562
Sequence 13	2.0	6.0	66.0	63.1	2.8	5.4	5.2	0.2	0.00466	0.00058	8,929
Sequence 14	2.0	8.0	87.1	82.8	4.3	7.2	6.8	0.4	0.00655	0.00082	8,334
Sequence 15	2.0	10.0	108.1	101.2	6.9	8.9	8.3	0.6	0.00860	0.00107	7,758

TESTED BY _____ DATE April 30, 2014
 REVIEWED BY _____ DATE _____

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

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

Job No.	009814	Material Code	SSRVPS
Date Sampled:	04/30/14	Station No.:	112+00
Date Tested:	April 30, 2014	Location:	17'LT
Name of Project:	E.PIGEON CREEK STRS. & APPRS.(S)		
County:	Code: 3	Name:	BAXTER
Sampled By:	FAULKNER	Depth:	0-5
Lab No.:	20141194	AASHTO Class:	A-6(13)
Sample ID:	RV362	Material Type (1 or 2):	2
LATITUDE:		LONGITUDE:	

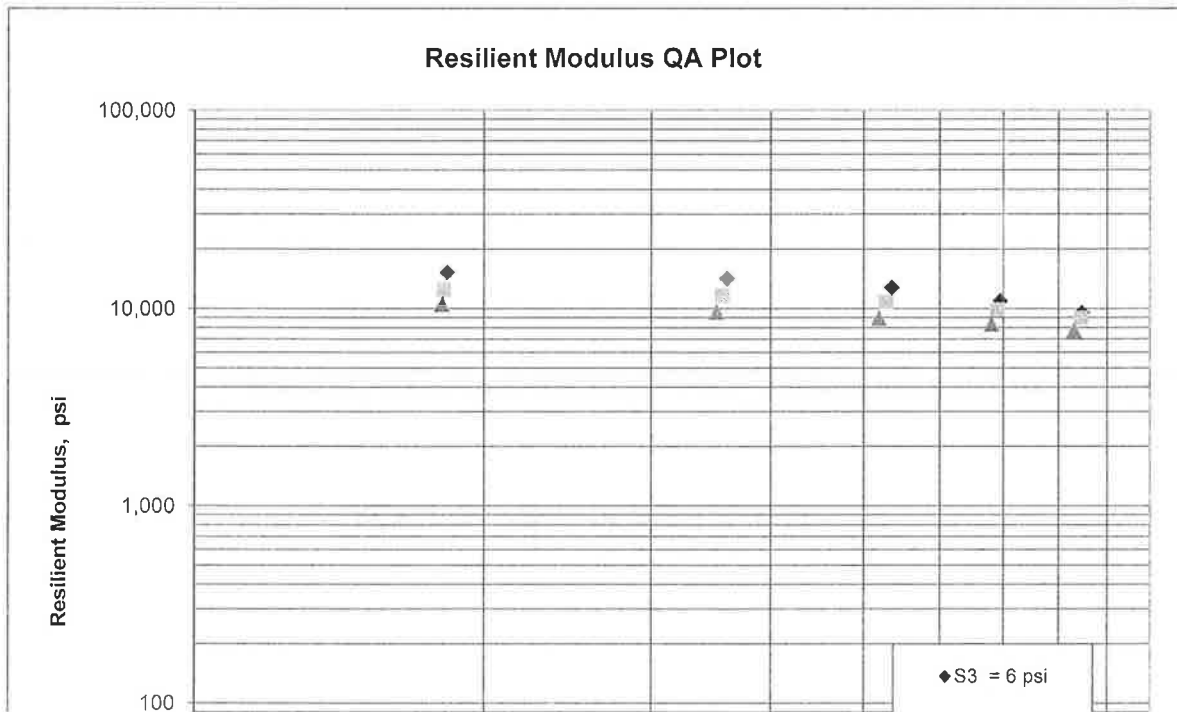
$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

$$K_1 = 10,241$$

$$K_2 = -0.22815$$

$$K_5 = 0.29219$$

$$R^2 = 0.92$$



JOB: 009814

Arkansas State Highway Transportation Department

JOB NAME: E. PIGEON CREEK STRS. & APPRS. (S)

Materials Division

COUNTY NO. 3 DATE TESTED 4/23/2014

Michael Benson, Materials Engineer

STA.#	LOC.	DEPTH	COLOR						L.L.	P.I.	SOIL CLASS	LAB #:	%MOISTURE
				#4	#10	#40	#80	#200					
				S	I	E	V	E	S				
112+00	17LT	0-5	BR/GR	90	96	89	75	65	36	25	A-6(13)	RV362	
103+00	05RT	0-5	BR/GR	100	99	91	89	86	35	22	A-6(17)	S358	25.4
103+00	17RT	0-5	BR/GR	98	88	83	72	57	34	21	A-6(8)	S359	22.2
112+00	05LT	0-5	BR/GR	97	84	76	66	57	37	24	A-6(10)	S360	20.5
112+00	17LT	0-5	BR/GR	82	78	73	63	56	40	27	A-6(11)	S361	19.9

comments:

Friday, May 02, 2014

JOB: 009814

Arkansas State Highway Transportation Department

DATE TESTED

JOB NAME: E. PIGEON CREEK STRS. & APPRS. (S)

Materials Division

4/23/2014

COUNTY NO. 3

Michael Benson, Materials Engineer

STA.# LOC.

PAVEMENT SOUNDINGS

103+00	05RT	CHIP SEAL	ACHMSC	AGG.BASE CRS CL-7
		.25	3.5	5.0
103+00	17RT	CHIP SEAL	ACHMSC	AGG.BASE CRS CL-7
		--	--	--
112+00	05LT	CHIP SEAL	ACHMSC	AGG.BASE CRS CL-7
		.25	3.0	5.0
112+00	17LT	CHIP SEAL	ACHMSC	AGG.BASE CRS CL-7
		--	--	--

Comments:

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

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 04/24/14 SEQUENCE NO. - 1
JOB NUMBER - 009814 MATERIAL CODE - SSRVPS
FEDERAL AID NO. - TO BE ASSIGNED SPEC. YEAR - 2003
PURPOSE - SOIL SURVEY SAMPLE SUPPLIER ID. - 1
SPEC. REMARKS - NO SPECIFICATION CHECK COUNTY/STATE - 03
SUPPLIER NAME - STATE DISTRICT NO. - 09
NAME OF PROJECT - E. PIGEON CREEK STRS. & APPRS. (S)
PROJECT ENGINEER - NOT APPLICABLE
PIT/QUARRY - ARKANSAS
LOCATION - BAXTER, COUNTY DATE SAMPLED - 04/10/14
SAMPLED BY - S.FAULKNER DATE RECEIVED - 04/11/14
SAMPLE FROM - TEST HOLE DATE TESTED - 04/23/14
MATERIAL DESC. - SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS

LAB NUMBER	-	20141190	-	20141191	-	20141192
SAMPLE ID	-	S358	-	S359	-	S360
TEST STATUS	-	INFORMATION ONLY	-	INFORMATION ONLY	-	INFORMATION ONLY
STATION	-	103+00	-	103+00	-	112+00
LOCATION	-	05RT	-	17RT	-	05LT
DEPTH IN FEET	-	0-5	-	0-5	-	0-5
MAT'L COLOR	-	BR/GR	-	BR/GR	-	BR/GR
MAT'L TYPE	-		-		-	
LATITUDE DEG-MIN-SEC	-	36 27 43.10	-	36 27 43.00	-	36 27 46.20
LONGITUDE DEG-MIN-SEC	-	92 21 44.70	-	92 21 44.70	-	92 21 34.50
% PASSING	2	IN.	-		-	
	1 1/2	IN.	-		-	
	3/4	IN.	-	100	-	100
	3/8	IN.	-	97	-	99
	NO. 4	-	100	93	-	97
	NO. 10	-	99	88	-	84
	NO. 40	-	91	83	-	76
	NO. 80	-	89	72	-	66
	NO. 200	-	86	57	-	57
LIQUID LIMIT	-	35	-	34	-	37
PLASTICITY INDEX	-	22	-	21	-	24
AASHTO SOIL	-	A-6(17)	-	A-6(8)	-	A-6(10)
UNIFIED SOIL	-		-		-	
% MOISTURE CONTENT	-	25.4	-	22.2	-	20.5
CHIP SEAL	(IN)	-	.25		-	.25
ACHMSC	(IN)	-	3.5		-	3.0
AGG.BASE CRS CL-7	(IN)	-	5.0		-	5.0

REMARKS -

AASHTO TESTS : T24 T88 T89 T90 T265

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

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE	- 04/24/14	SEQUENCE NO.	- 2
JOB NUMBER	- 009814	MATERIAL CODE	- SSRVPS
FEDERAL AID NO.	- TO BE ASSIGNED	SPEC. YEAR	- 2003
PURPOSE	- SOIL SURVEY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	- NO SPECIFICATION CHECK	COUNTY/STATE	- 03
SUPPLIER NAME	- STATE	DISTRICT NO.	- 09
NAME OF PROJECT	- E. PIGEON CREEK STRS. & APPRS. (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- BAXTER, COUNTY	DATE SAMPLED	- 04/10/14
SAMPLED BY	- S.FAULKNER	DATE RECEIVED	- 04/11/14
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 04/23/14
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAB NUMBER	- 20141193	-	-
SAMPLE ID	- S361	-	-
TEST STATUS	- INFORMATION ONLY	-	-
STATION	- 112+00	-	-
LOCATION	- 17LT	-	-
DEPTH IN FEET	- 0-5	-	-
MAT'L COLOR	- BR/GR	-	-
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 36 27 46.30	-	-
LONGITUDE DEG-MIN-SEC	- 92 21 34.60	-	-

% PASSING	2	IN.	-	-
	1 1/2	IN.	-	-
	3/4	IN.	- 100	-
	3/8	IN.	- 90	-
	NO. 4	-	- 82	-
	NO. 10	-	- 78	-
	NO. 40	-	- 73	-
	NO. 80	-	- 63	-
	NO. 200	-	- 56	-

LIQUID LIMIT	- 40	-	-
PLASTICITY INDEX	- 27	-	-
AASHTO SOIL	- A-6(11)	-	-
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 19.9	-	-

CHIP SEAL	(IN)	-	--	-
ACHMSC	(IN)	-	--	-
AGG.BASE CRS CL-7	(IN)	-	--	-
		-		-
		-		-
		-		-
		-		-
		-		-
		-		-
		-		-

REMARKS -
-
-
-
-

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

August 12, 2014

TO: Mr. Rick Ellis, Bridge Engineer

SUBJECT: Job No. 009814
E. Pigeon Creek Strs. & Apprs. (S)
Route 201 Section 1
Baxter County

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

Based on the depth at which bedrock was encountered, it is anticipated that the interior bents will be founded on spread footings. Spread footings should be sized based on the values provided in Table 1.

TABLE 1 – Bearing Capacity Recommendations for Interior bents

Foundation Description	Nominal Bearing Resistance (ksf)	Resistance Factor	Factored Bearing Resistance (ksf)	Presumptive Bearing Resistance at the Service Limit State (ksf)
Spread Footings	155	0.45	70	40

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



Michael C. Benson
Materials Engineer

MCB:rpt

cc: State Construction Engineer - Master File Copy
District 9 Engineer
G.C. File

GEOLOGY AND SITE CONDITIONS

Job No. 009814

E. Pigeon Creek Str. & Apprs. (S)

Baxter County

Route 201 Section 1

Site Conditions

There are two existing bridges at the jobsite: one over Pigeon Creek, and one over a relief for Pigeon Creek. These bridges are to be replaced by a single bridge. The relief bridge (**Bridge 1**) is constructed of concrete deck with rock and mortar bents. The guardrail is constructed of concrete on the bridge and steel leading up to the bridge.

The Pigeon Creek Bridge (**Bridge 2**) is a 4 span bridge and is constructed similarly to Bridge 1. The end bents and the middle bent are constructed of rock and mortar. The second and fourth bents are constructed of steel beams with spread footings. The bridge has a concrete deck supported by seven steel beams with concrete guardrail on the bridge with steel guardrail leading up to the bridge.

Pigeon Creek flows to the southeast into Norfolk Lake approximately two miles downstream from the existing bridge. Rock is exposed in the channel and consists of dolostone. Overhead power lines cross the roadway at the jobsite at a diagonal. A gravel road intersects the highway upstation from the bridges on the right side of the highway. The area on the downstation side of the creek channel is moderately to heavily wooded. The area on the upstation side of the creek is tree-lined with pastureland beyond.

Site Geology

The project alignment is located in the mapped outcrop of the Ordovician Jefferson City and Cotter Dolostone (map symbols Ojc and Oc, respectively). The Jefferson City consists of light- to dark-tan, fine-grained, crystalline dolostone and considerable chert with some rare thin beds of sandstone, shale, and oolite. The Jefferson City Dolomite unconformably overlies the Roubidoux Formation. This lower contact is not exposed in Arkansas. The Cotter Dolostone is composed of dolostone of predominantly two types: a fine-grained, argillaceous, earthy textured, relatively soft, white to buff or gray dolostone called "cotton rock", and a more massive, medium-grained, gray dolostone that weathers to a somewhat hackly surface texture and becomes dark on exposure. The formation contains chert, some minor beds of greenish shale, and occasional thin interbedded sandstone. The chert nodules associated with the Cotter frequently have concentric light and dark bands. To date, there has been no success in differentiating the Cotter Formation from the underlying Jefferson City Formation in Arkansas, due to the Jefferson City having a similar composition. The thickness is about 340 feet in the vicinity of Cotter, but the interval may range up to 500 feet thick in places.

Subsurface Conditions

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

- 0 to 9.0 Feet: Varies from dry to moist, medium to very dense, brown **sand** to **sand with clay, gravel (dolostone fragments) and some organic matter** to hard, slightly weathered, gray and brown **dolostone**. Some dolostone in this zone is fractured.
- 9.0 to 32.6 Feet: Consists of hard, slightly weathered, gray and brown **dolostone**. Some dolostone in this zone is fractured. Some rock in this zone contains vugs.

**D₅₀ AGGREGATE ANALYSIS
FOR SCOUR CALCULATIONS**

Job No. 009814					
Creek Name	Station	Sample Type	Location	Depth (FT)	Aggregate Size (D50) (IN)
E. Pigeon Creek	108+15	Creek Bank	5' Rt. C.L. Construction	NA	0.0083

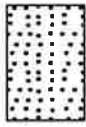
LEGEND

SOIL TYPES

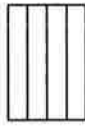
(SHOWN IN SYMBOL COLUMN)
(PREDOMINANT TYPE SHOWN HEAVY)



GRAVEL



SAND



SILT



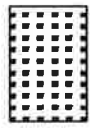
CLAY



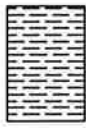
ORGANIC
MATTER

ROCK TYPES

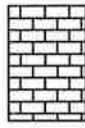
(SHOWN IN SYMBOL COLUMN)



SANDSTONE



SHALE
or
SILTSTONE



LIMESTONE
or
DOLOMITE



ALTERNATING
LAYERS of
SHALE and
SANDSTONE



OTHER

SAMPLER TYPES

(SHOWN IN SAMPLE COLUMN)

SHELBY TUBE



UNDISTURBED
SAMPLE
RECOVERY



DISTURBED
SAMPLE
RECOVERY

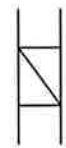


NO
RECOVERY

SPLIT SPOON



SAMPLE
RECOVERY



NO
RECOVERY

ROCK CORING



% RECOVERY
INDICATED ON LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

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

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

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

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

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

BORING NO. 1
PAGE 1 OF 1

JOB NO. 009814 Baxter County
JOB NAME: E. Pigeon Creek Strs. & Apprs.
S.H. 201
STATION: 107+22
LOCATION: 23' Right of Center Line of Construction
LOGGED BY: Stanley Bates

DATE: July 29, 2014
TYPE OF DRILLING: Hollow Stem Auger &
Diamond Coring
EQUIPMENT: CME 850 w/ CME
Automatic Hammer
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 32.6

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			SURFACE ELEVATION: 613.8									
5			Dry, Very Dense, Brown Sand with Clay, Gravel (Dolostone Fragments) and some Organic Matter							9 26-36		
10			DOLOSTONE - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip							60 (1")	100	74
15			DOLOSTONE WITH DARK GRAY SHALE PARTINGS - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip								98	88
20			DOLOSTONE - Gray and Brown, Medium Bedded, Slightly Weathered, Vuggy, Hard, with Slight Dip								100	80
25			DOLOSTONE - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip								96	88
30			DOLOSTONE - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip								100	100
			Boring Terminated									
35												

REMARKS:

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

BORING NO. 2
PAGE 1 OF 1

JOB NO. 009814 Baxter County
JOB NAME: E. Pigeon Creek Strs. & Apprs.
S.H. 201
STATION: 107+63
LOCATION: 18' Right of Center Line of Construction
LOGGED BY: Stanley Bates

DATE: July 29, 2014
TYPE OF DRILLING: Hollow Stem Auger &
Diamond Coring
EQUIPMENT: CME 850 w/ CME
Automatic Hammer
HAMMER CORRECTION FACTOR: 1.23

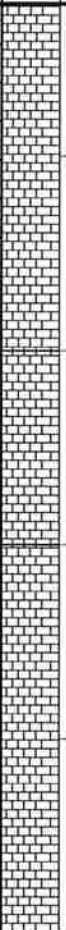
COMPLETION DEPTH: 28.3

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CUL.FT.	NO. OF BLOWS PER 6-IN.	% C R	% R O D
			SURFACE ELEVATION: 611.8									
5			Dry, Very Dense, Brown Sand with Gravel (Dolostone Fragments) and some Organic Matter							60 (1")		
			DOLOSTONE - Gray and Brown, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and some Fractured Layers								91	48
10			DOLOSTONE - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip								98	86
15			DOLOSTONE - Gray and Brown, Medium Bedded, Slightly Weathered, Vuggy, Hard, with Slight Dip								100	74
20											100	98
25			DOLOSTONE - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip								98	86
30			Boring Terminated									
35												

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT		BORING NO. 3
MATERIALS DIVISION - GEOTECHNICAL SEC.		PAGE 1 OF 1
JOB NO. 009814	Baxter County	DATE: July 28, 2014
JOB NAME: E. Pigeon Creek Strs. & Apprs.	S.H. 201	TYPE OF DRILLING: Hollow Stem Auger & Diamond Coring
STATION: 108+10		EQUIPMENT: CME 850 w/ CME Automatic Hammer
LOCATION: Center Line of Construction		HAMMER CORRECTION FACTOR: 1.23
LOGGED BY: Stanley Bates		

COMPLETION DEPTH: 23.9

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R O D
			SURFACE ELEVATION: 607.1									
5			DOLOSTONE - Brown and Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip								100	53
10			DOLOSTONE - Brown and Gray, Medium Bedded, Slightly Weathered, Vuggy, Hard, with Slight Dip and some Fractured Layers								94	90
15			DOLOSTONE - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip								96	64
20			DOLOSTONE - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip								98	94
25			Boring Terminated								100	98
30												
35												

REMARKS:

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

BORING NO. 4
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JOB NO. 009814 Baxter County
JOB NAME: E. Pigeon Creek Strs. & Apprs.
S.H. 201
STATION: 108+64
LOCATION: 20' Right of Center Line of Construction
LOGGED BY: Stanley Bates

DATE: July 22, 2014
TYPE OF DRILLING: Hollow Stem Auger &
Diamond Coring
EQUIPMENT: CME 850 w/ CME
Automatic Hammer
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 22.9

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	%	%
											S	R
			SURFACE ELEVATION: 614.8									
			Moist, Medium Dense, Brown Sand									
5			DOLOSTONE - Gray, Weathered, Moderately Hard							60 (3")		
			DOLOSTONE - Gray and Brown, Medium Bedded, Slightly Weathered, Hard, with Slight Dip and Fractured Layers								100	18
10											90	56
15			DOLOSTONE - Gray, Medium Bedded, Slightly Weathered, Hard, with Slight Dip								96	88
20											96	54
25			Boring Terminated									
30												
35												

REMARKS: