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



## SUBSURFACE INVESTIGATION

STATE JOB NO.	BR6507	_
FEDERAL AID PROJECT NO.	STPB-0065(49)	
BRANCH	OF VINEYARD CREEK STR. & APPRS.	(S)
COUNTY ROAD NO.	42	
IN	SEBASTIAN	COUNTY

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

#### ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

February 12, 2016

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

SUBJECT: Job No. BR6507 Branch of Vineyard Creek Str. & Apprs. (S) County Road 42 Sebastian 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.

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.

Foundation Description	Nominal Bearing Resistance (ksf)	Resistance Factor	Factored Bearing Resistance (ksf)	Presumptive Bearing Resistance at Service Limit State (ksf)
Spread Footing	56	0.45	25	20

TABLE 1 – Bearing Capacity Recommendations for Interior bents

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

Michael C. Benson

Materials Engineer

MCB:rpt:mlg

cc: State Construction Engineer - Master File Copy District 4 Engineer State Aid G.C. File

## GEOLOGY AND SITE CONDITIONS Job No. BR6507

## Branch of Vineyard Creek Str. & Apprs. (S) Sebastian County County Road 42

### **Site Conditions**

The proposed bridge is to be located over a Branch of Vineyard Creek on County Road 42 approximately 0.25 miles east of the intersection with Highway 71 in Sebastian County. The existing bridge is a single span structure with five steel beams supporting a concrete deck. The bridge ends are constructed of rock and mortar and the guardrail is constructed of steel pipes supported by concrete posts. Channel flow is to the north and riprap has been placed on the banks of both sides of the bridge. Outcropping rocks in the creek bed are dipping towards the northwest. Underground telecommunication lines run east to west on the north side of the existing structure. Overhead power lines parallel the road for a short distance on the north side of the bridge and cross the road to the east of the bridge. Both sides of the channel are lined with scattered trees to the north and to the south. Residences exist to the northwest of the bridge above sloping bluffs and also to the southeast among pastures and sparsely treed farmland.

### Site Geology

The project alignment is located on the mapped outcrop of the upper part of the Atoka Formation (Pau). The site is located on the northern flank of the Washburn Anticline in the Arkansas Valley region. Rocks dipping on the north flank range from 3 to 90 degrees and are overturned in a few places. Multiple thrust faults exist to the north of the project alignment with the potential for nearby unmapped faults. The Atoka Formation is a sequence of marine, mostly tan to gray silty sandstones and grayish-black shales. Some rare calcareous beds and siliceous shales are known. In this region of the state, the Atoka Formation has been subdivided into upper, middle, and lower lithic parts based on regionally mappable shale or sandstone intervals. The unit locally contains discontinuous streaks of coal and coaly shale. The formation is conformable with the underlying Bloyd Shale in the Boston Mountains and with the underlying Johns Valley Shale in the Ouachita Mountains. Bedrock was encountered in borings at the job site at an average depth of 9.4 feet below ground level.

#### Subsurface Conditions

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

0 to 9.4 Feet:	Consists of moist, loose, brown and gray sand with gravel to sandy clay.
9.4 to 10.4 Feet:	Consists of highly weathered, medium hard, moderately dipping dark gray <b>shale</b> .
10.4 to 28.0 Feet:	Consists of slightly weathered to unweathered, hard, moderately dipping dark gray <b>shale</b> .

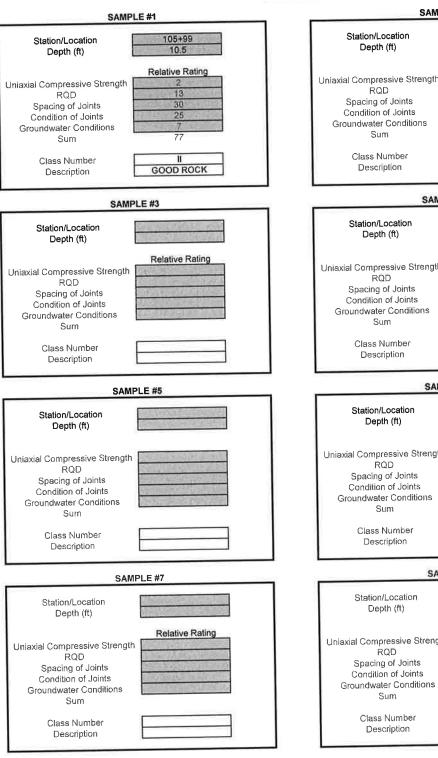
## Rock Core Unconfined Compression Test Summary

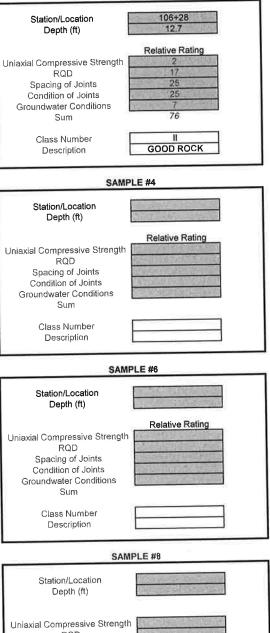
Project Number:BR6507Project Name:Branch of Vineyard Creek Str. & Apprs. (S)Date Tested:2/4/2016

Station	Location	Sample No.	Depth (ft)	Diameter (in)	Height (in)	Total Load (lbs)	Correction Factor	Stress (psi)	Remarks
105+99	8' Lt	1	10.5	1.75	3.71	3,610	1.00	1,500	Shale
106+28	6' Rt	2	12.7	1.75	3.70	3,280	1.00	1,365	Shale
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\* Please note any broken samples, fractures or other characteristics of sample in Remarks.

#### ROCK MASS RATING SUMMARY JOB # BR6507



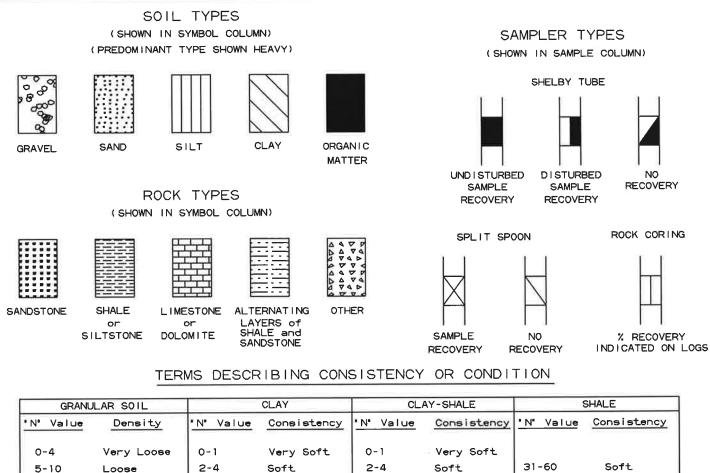


SAMPLE #2

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

<b>Job No.</b> BR6507												
Creek Name	Station	Sample Type	Location	Depth (FT)	Aggregate Size (D50) (IN)							
Branch of Vineyard Creek	106+34	Creek Bank	15' Rt. C.L. Existing	Ň/Á	0.187							

# \_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	Hard
		0ver 60	Very Hard	Over 60	Very Hard	Less than 2'	
						Penetration	
						in 60 Blows: Hard	
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- 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:  $\frac{6}{8-9} \Rightarrow 8+9 = 17b lows / ft$ . 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.

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		_	DIVISION - GEOTECHNICAL SEC.		PAGE	1		F 1		0.00	16		_
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JOB N		_	DIVISION - GEOTECHNICAL SEC. BR6507 Sebastian County		PAGE	1		F 1		2, 20	16		
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## Rock Core Unconfined Compression Test Summary

Project Number:BR6507Project Name:Branch of Vineyard Creek Str. & Apprs. (S)Date Tested:2/4/2016

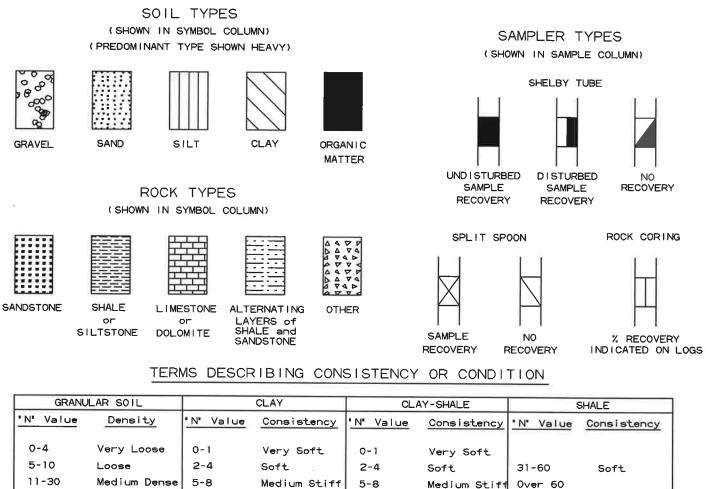
Station	Location	Sample No.	Depth (ft)	Diameter (in)	Height (in)	Total Load (lbs)	Correction Factor	Stress (psi)	Remarks
105+99	21' Lt	1	10.5	1.75	3.71	3,610	1.00	1,500	Shale
106+28	12' Rt	2	12.7	1.75	3.70	3,280	1.00	1,365	Shale

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

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

Job No. BR6507												
Creek Name	Station	Sample Type	Location	Depth (FT)	Aggregate Size (D50) (IN)							
Branch of Vineyard Creek	106+34	Creek Bank	25' Rt. C.L. of Const.	N/A	0.187							

# \_EGEND



1 5-10	Loose	2-4	Soft	2-4	Soft	31-60	Soft
11-30	Medium Dense	5-8	Medium Stiff	5-8	Medium Stiff	0ver 60	
31-50	Dense	9-15	Stiff	9-15	Stiff	More than 2	.
0ver 50	Very Dense	16-30	Very Stiff	16-30	Very Stiff	Penetration	
		31-60	Hard	31-60	Hard	in 60 Blows	Medium Hard
		0ver 60	Very Hard	0ver 60	Very Hard	Less than 2	· [
						Penetration	
						in 60 Blows	Hard

- 1. Ground water elevations indicated on boring logs represent ground water elevations at date or time shown on boring log. Absence of water surface implies that no ground water data is available but does not necessarily mean that ground water will not be encountered at locations or within the vertical reaches of these borings.
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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.

			HWY. & TRANS. DEPARTMENT				NO. 1									
MATERIALS DIVISION - GEOTECHNICAL SEC.JOB NO.BR6507Sebastian County							PAGE 1 OF 1									
	DATE: January 20, 2016 TYPE OF DRILLING:															
JOB NAME: Branch of Vineyard Creek Str. & Apprs. Co. Rd. 42									er - l	Diam	ond	Core				
STATI	Hollow Stem Auger - Diamond Core EQUIPMENT: CME 75															
LOCA			105+70 2' Left of Centerline Construction		Leon	I.I.L.I.I					15					
			tanley Bates		HAMN	AER (	CORRE	CTIO	N FAC	TOR		1.37				
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ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.					BORING NO. 2 PAGE 1 OF 1									
IOB NO.		DATE: January 13, 2016												
IOB NAM	IE:	BR6507 Sebastian County Branch of Vineyard Creek Str. & Apprs.		TYPE OF DRILLING:										
		Co. Rd. 42		Ho	llow	Stem	Aug	er -	Diam	ond	Core	;		
STATION: 105+99						Hollow Stem Auger - Diamond Core EQUIPMENT: CME 75								
LOCATIO	N:	21' Left of Centerline Construction												
LOGGED	BY: S	Stanley Bates		HAMN	MER (	CORRE	CTIO	N FAG	CTOR:		1.37	'		
COMPLE	ETION	N DEPTH: 28.3										_		
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• • • • • • • • • • • • • • • • • • • •	200	Moist, Medium Dense, Brown Sand with Gravel												
	5.90	(Shale Fragments)												
	-g													
10	9.9									。				
10 27	철수	SHALE - Highly Weathered, Medium Hard, \Dark Gray							2		-			
😳	33	SHALE - Weathered, Medium Hard,						i i	(4	.")				
23		Moderately Dipping, Dark Gray									83	4		
22	3	······································		1										
22	3													
15														
53	3	SHALE - Slightly Weathered, Hard, Moderately									100	8		
	3	Dipping, Dark Gray												
	<u> </u>													
												-		
20	3													
	3													
	3										99			
	<u> </u>	SHALE - Unweathered, Hard, Moderately												
	3	Dipping, Dark Gray												
25														
											99	ļ		
	3													
		Boring Terminated			-			-		-				
30		Bonny reminated												
35		,												

	ARKANSAS HWY. & TRANS. DEPARTMENT						BORING NO. 3 PAGE 1 OF 1											
MATERIALS DIVISION - GEOTECHNICAL SEC.JOB NO.BR6507Sebastian County						PAGE 1 OF 1   DATE: January 13, 2016 13												
JOB N			Branch of Vineyard Creek Str. & Apprs.		TYPE OF DRILLING:													
102.1	Co. Rd. 42								Hollow Stem Auger - Diamond Core									
STATI	ION:		106+28		EQUIPMENT: CME 75													
LOCA			12' Right of Centerline Construction															
		_	tanley Bates		HAMN	AER (	CORREC	CTION	N FAC	CTOR:		1.37						
D		S	I DEPTH: 28.7	1	r			1					-					
E	S Y	A																
P	M	M	DESCRIPTION OF MATERIAL	SOIL				HT	U.FT	SWC		% T	% R					
Т   Н	В	P L		GROUP	<u> </u>	ST.		EIG	R CI	BL(	z	C	Q					
	O L	Е			PLASTIC LIMIT	% MOIST	LIQUID	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS	PER 6-IN.	R	D					
FT <sub>20</sub>		S	SURFACE ELEVATION: 575.5		E F	1%	EE	DR	LB	z	PE							
	0.00 0.00 0.00																	
	800 B																	
	90 Q	i I																
	.00 A		Dry, Loose, Brown and Gray Sand with Gravel															
5	B	Х	(Shale Fragments)							2								
	000																	
	0.0°.00	8																
	40.00																	
10	11	$\bigtriangledown$	SHALE - Highly Weathered, Medium Hard,							24	1							
	111	4	Gray SHALE - Highly Weathered, Soft, Moderately							24-6 (10	60 ")							
	£113										- 1	100	28					
			Dipping, Dark Gray SHALE - Slightly Weathered, Hard, Moderately									100	20					
			_ Dipping, Dark Gray								ł							
15																		
												100	92					
20																		
			SHALE - Unweathered, Hard, Moderately															
			Dipping, Dark Gray	1								100	76					
											ł							
25																		
					l) I							96	90					
30			Boring Terminated								T							
35										_								
REMA	ARKS	1																
									_									

			HWY. & TRANS. DEPARTMENT				10. 4									
MATERIALS DIVISION - GEOTECHNICAL SEC.JOB NO.BR6507Sebastian County							PAGE 1 OF 1									
JOB NAME: Branch of Vineyard Creek Str. & Apprs.							DATE: January 12, 2016 TYPE OF DRILLING:									
Co. Rd. 42							TYPE OF DRILLING: Hollow Stem Auger - Diamond Core									
STATION: 106+76							EQUIPMENT: CME 75									
LOCA			26' Right of Centerline Construction		EQUIPMENT. CIVIE 75											
			tanley Bates		HAMN	AER C	CORRE	стю	N FAC	CTOR:		1.37				
COM	PLET	ION	DEPTH: 27.3													
D		S														
E	S Y	Α							L.							
Р	м	М	DESCRIPTION OF MATERIAL	SOIL				Ħ	J.FJ	N S		% T	% R			
T H	В	P		GROUP	U	Ë		00	S CI	BL(	÷	C	Q			
	0	L E			STIC	OIS		×	PEI	OF	6-I}	R	D			
FT.	L		SURFACE ELEVATION: 575.1		PLASTIC LIMIT	% MOIST.	LIQUID	DRY WEIGHT	LBS PER CU.FT	NO. OF BLOWS	PER 6-IN.					
112/	2414 A					0` 152				~	-	-				
<u> </u>																
			Moist, Loose, Brown and Gray Sand with Some							2						
5		Х	Clay							2						
											-					
10	147	$\bigtriangledown$	SHALE - Highly Weathered, Medium Hard,						-	9						
	777	4	Brown and Gray		ŝ.					33- (8	42					
			SHALE - Highly Weathered, Medium Hard, Gray							(0	<b>'</b>	100	90			
			SHALE - Weathered, Medium Hard,													
			Moderately Dipping, Dark Gray													
45		( h	SHALE - Slightly Weathered, Medium Hard,													
15			Moderately Dipping, Dark Gray									100	80			
20				u								94	54			
			SHALE - Unweathered, Hard, Moderately													
			Dipping, Dark Gray													
25												~	~~			
												94	92			
							ř.									
			Boring Terminated													
30																
35																
REMA	ARKS	1														