

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT



SUBSURFACE INVESTIGATION

STATE JOB NO. BR7208

FEDERAL AID PROJECT NO. BRO-STPB-0072(44)

WEST FORK WHITE RIVER (WOOLSEY) STR. & APPRS. (S)

COUNTY ROAD NO. 35

IN WASHINGTON COUNTY

LETTING OF AUGUST 10, 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

September 2, 2015

TO: Mr. Rick Ellis, Bridge Engineer

SUBJECT: Job No. BR7208
West Fork White River (Woolsey) Str. & Apprs. (S)
County Road 35
Washington County

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

The geologic formation present in this area is known to contain cavities and caves. Several cavities were encountered on this project and were noted on the boring logs. However, there is potential for unmapped cavities of varying size to be encountered at the project location.

It is recommended that all intermediate bents be supported by drilled shafts. Shafts should be design based on tip resistance and permanent casing should be utilized to minimize the impacts of cavities present at this location. Drilled shafts should be terminated in material shown on the boring logs as Gray Limestone or Gray, Well Cemented, Calcareous Sandstone and should be sized based on the values provided in Table 1. It is anticipated that both bridge ends will be founded on piling.

TABLE 1 – Bearing Capacity Recommendations for Drilled Shafts

Foundation Description	Nominal Bearing Resistance (ksf)	Resistance Factor	Factored Bearing Resistance (ksf)
Spread Footings	400	0.5	200

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
G.C. File

GEOLOGY AND SITE CONDITIONS
Job No. BR7208
West Fork White River (Woolsey) Str. & Apprs. (S)
County Road 35
Washington County

Site Conditions

The existing bridge is a two span structure over the West Fork of the White River and is currently closed to traffic. The bridge deck is constructed of concrete with a steel truss support. The middle bent is constructed of a concrete wall pier founded on a spread footing.

The river flows to the north at the bridge site. The County Road 35 is oriented east-west and makes a sharp turn to the south at the east end of the bridge, and intersects Highway 71 approximately 570 feet southeast of the bridge. However, the bridge is located less than 100 feet due west of Highway 71. Highway 71 parallels the east side of the river. Overhead power lines cross the river on the right side of the roadway. A buried telecommunication line parallels the right side of the bridge. Both banks of the river are lined with trees. The area at the west end of the bridge, on both sides of the roadway, consists of pastureland. At the east end of the bridge both sides of the roadway are moderately wooded.

Site Geology

The area of the proposed job site has been mapped as Bloyd Formation and Prairie Grove member of the Hale Formation (map symbol Pbh). Based on lithologies present at the job site, these rocks are part of the Hale Formation. The reported thickness of the Hale Formation ranges from a few feet to more than 300 feet.

The Hale is made up of two members: an upper Prairie Grove Member and a lower Cane Hill Member. The Prairie Grove Member is composed of thin to massive, often crossbedded, frequently pitted ("honeycomb weathering"), light-gray to dark-brown, calcareous sandstone or variously sandy limestone with lenses of relatively pure, crinoidal, highly fossiliferous limestone and oolitic limestone. Prairie Grove member outcrops frequently have a mottled appearance when fresh. The lower contact of the Prairie Grove is considered unconformable.

Four borings encountered what may be the Cane Hill member. The Cane Hill is typically composed of dark gray silty shale interbedded with siltstone and thin-bedded fine-grained sandstone. Bedrock was encountered in these borings ranging in depth from 2.8 to 7.0 feet below ground level, except for the westernmost boring, Station 105+68; in which bedrock was encountered at 21.7 feet bgl.

The general geology of the site includes **limestone**, with some thin beds of shale/claystone higher in the section, **overlying calcareous sandstone** which in turn is **overlying shale**. Numerous cavities occur in the limestone at the job site. Nine of the thirteen borings drilled encountered cavities. Three borings encountered multiple cavities. Eight of the borings had cavities ranging in thickness from 1.9 feet to 8.1 feet. Borings drilled on both sides of the bridge encountered these cavities. The thickness of the cavities, in addition to the wide spacing of the borings, is evidence of the interconnectedness of these cavities. No cavities were observed in the calcareous sandstone underlying the limestone.

Subsurface Conditions

Based on the results of the boring at **Station 105+68**, the subsurface stratigraphy may be generalized as follows:

- 0 to 9.3 Feet: Consists of moist, loose, brown **sand with gravel (rock fragments)**.
- 9.3 to 19.3 Feet: Consists of moist to wet, medium stiff to very stiff, dark brown **sandy clay to sandy clay with gravel**.
- 19.3 to 21.7 Feet: Consists of medium hard, dark gray **shale with limestone seams and layers** and moderately hard, gray **limestone**. Some concretions were encountered in this zone.
- 21.7 to 26.0 Feet: Consists of hard, slightly weathered, gray **limestone** with occasional **vugs**.
- 26.0 to 40.0 Feet: Consists of well cemented, slightly weathered, light gray **calcareous sandstone**.
- 40.0 to 44.2 Feet: Consists of medium hard, slightly weathered, dark gray **shale**.

Based on the results of the borings at **Stations 106+45 to 108+35**, the subsurface stratigraphy may be generalized as follows:

- 0 to 3.0 Feet: Consists of moist to wet, very stiff, brown **clay with gravel to gravel**.
- 3.0 to 7.0 Feet: Varies from moist to wet, very stiff, brown **clay with gravel to gravel to hard, gray limestone** to well cemented, weathered light gray, **calcareous sandstone**. One boring had a 0.4 foot cavity in this zone, and one boring encountered the top of a cavity in this zone.
- 7.0 to 15.6 Feet*: Consists of hard, slightly dipping, gray **limestone**. Numerous **cavities** occur in this zone.
- 15.6.0 to 25.5 Feet: Consists of cemented to well cemented, light gray, **calcareous sandstone**.
- 25.5 to 28.8 Feet: Varies from cemented to well cemented, light gray, **calcareous sandstone** to medium hard, slightly weathered, dark gray **shale**.

* The two largest cavities in this zone range from 6.4 to 14.5 feet bgl and 7.6 to 15.0 feet bgl.

Based on the results of the borings at **Stations 109+10 to 109+37**, the subsurface stratigraphy may be generalized as follows:

- 0 to 3.9 Feet: Consists of moist, very hard, brown **clay with gravel** (sandstone fragments).
- 3.9 to 19.5 Feet*: Consists of slightly weathered to unweathered, hard, gray **limestone** with **some layers** of highly weathered to slightly weathered, soft to medium hard, dark gray **shale**. Two borings contained cavities in this zone.
- 19.5 to 21.5 Feet: Consists of weathered to slightly weathered, cemented, light gray, **calcareous sandstone with occasional clay layers**.
- 21.5 to 28.3 Feet: Consists of slightly weathered, hard, gray **limestone** to **limestone with occasional shale seams**.
- 28.3 to 28.4 Feet: Consists of slightly weathered, medium hard, dark gray **shale**.

* The two cavities in this zone range from 5.0 to 8.7 feet bgl and 5.2 to 9.2 feet bgl.

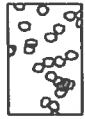
**D₅₀ AGGREGATE ANALYSIS
FOR SCOUR CALCULATIONS**

Job No. BR7208					
Creek Name	Station	Sample Type	Location	Depth (FT)	Aggregate Size (D50) (IN)
West Fork of White River	106+85	Surface Creek Bank	C.L.	N/A	0.0049

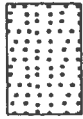
LEGEND

SOIL TYPES

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



GRAVEL



SAND



SILT



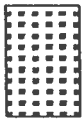
CLAY



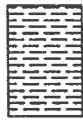
ORGANIC
MATTER

ROCK TYPES

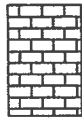
(SHOWN IN SYMBOL COLUMN)



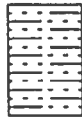
SANDSTONE



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 2
JOB NO. BR7208 Washington	JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)	DATE: June 29, 2015 TYPE OF DRILLING: Hollow Stem Auger -
STATION: 105+68	LOCATION: 9' Right of Centerline of Existing Bridge	EQUIPMENT: CME 850 w/ CME Automatic
LOGGED BY: Raymond Taylor		HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 44.2

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			SURFACE ELEVATION: 1374.1									
5		X	Moist, Loose, Brown Sand with Gravel (Sandstone Fragments)							4 5-5		
10		X	Moist, Medium Stiff, Dark Brown Sandy Clay							2 3-5		
15		X	Wet, Very Stiff, Dark Brown Sandy Clay with Gravel							5 8-10		
20		X	Wet, Dense, Gravel with Clay and Sand							12 18-17		
25			LIMESTONE - Hard, Slightly Weathered, Occasional Vug, Slight Dip, Gray								100	64
30			SANDSTONE - Calcareous, Well Cemented, Slightly Weathered, Slight Dip, Light Gray								99	82
35			SANDSTONE - Calcareous, Well Cemented, Slightly Weathered, Slight Dip, Light Gray								99	96

REMARKS:

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

BORING NO. 1
PAGE 2 OF 2

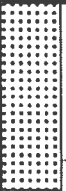
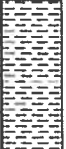
JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)

DATE: June 29, 2015
TYPE OF DRILLING: Hollow Stem Auger -

STATION: 105+68
LOCATION: 9' Right of Centerline of Existing Bridge
LOGGED BY: Raymond Taylor

EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 44.2

DEPTH FT.	S Y M B O L	S A M P L E S	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: 1374.1									
40											97	97
			SHALE - Medium Hard, Slightly Weathered, Slight Dip, Dark Gray								88	44
45			Boring Terminated									
50												
55												
60												
65												
70												

REMARKS:

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

BORING NO. 2
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)
STATION: 106+45
LOCATION: 15' Right of Centerline of Existing Bridge
LOGGED BY: Raymond Taylor

DATE: June 30, 2015
TYPE OF DRILLING: Hollow Stem Auger -
EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 28.8

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			SURFACE ELEVATION: 1362.6									
5			Moist, Very Stiff, Brown Clay with Gravel (Sandstone Fragments)									
			SANDSTONE - Calcareous, Well Cemented, Weathered, Slight Dip, Light Gray								85	21
			LIMESTONE - Hard, Weathered, Slight Dip, Gray									
10			Soil Filled Cavity (10.1' to 12.4')								61	53
			LIMESTONE - Hard, Weathered, Slight Dip, Gray									
15			LIMESTONE - Hard, Slight Dip, Gray								89	81
			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								100	100
20												
25											99	99
30			Boring Terminated									
35												

REMARKS:

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

BORING NO. 3
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)

DATE: July 1, 2015
TYPE OF DRILLING: Hollow Stem Auger -

STATION: 106+45
LOCATION: 17' Left of Existing Centerline
LOGGED BY: Raymond Taylor

EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 28.2

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			SURFACE ELEVATION: 1361.5									
			Moist, Very Stiff, Brown Clay with Gravel									
5			Wet, Medium Dense, Brown Gravel (Rock Fragments) with Sand and Clay							2 12-12		
			SANDSTONE INTERBEDDED WITH LIMESTONE - Well Cemented, Weathered, Slight Dip, Gray								58	0
10			LIMESTONE - Hard, Weathered, Slight Dip, Gray								10	0
			Soil Filled Cavity (9.3' to 11.3')									
			LIMESTONE - Hard, Weathered, Slight Dip, Gray									
			Soil Filled Cavity (12.4'-12.9')									
15			LIMESTONE - Hard, Weathered, Slight Dip, Gray									
			SANDSTONE WITH OCCASSIONAL LIMESTONE LAYERS - Calcareous, Well Cemented, Slight Dip, Light Gray								100	96
20			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								100	100
25			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								93	68
			SHALE - Medium Hard, Slightly Weathered, Slight Dip, Dark Gray									
30			Boring Terminated									
35												

REMARKS:

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

BORING NO. 4
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)

DATE: July 14, 2015
TYPE OF DRILLING: Hollow Stem Auger -

STATION: 107+40
LOCATION: 33' Right of Existing Centerline
LOGGED BY: Tracy Henderson

EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 28.3

DEPTH FT.	S Y M B O L	S A M P L E S	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: 1359.8									
			Gravel									
5			LIMESTONE LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray Soil Filled Cavity (4.3' to 4.5') LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray								75	19
10			Soil Filled Void (8.1' to 10.7')								48	10
15			LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray Soil Filled Void (13.5' to 13.7') LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray Soil Filled Void (14.1' to 15.0') LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray								93	63
20			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								98	92
25			SANDSTONE - Calcareous, Well Cemented, Occasional Fractures, Slight Dip, Light Gray								100	79
30			Boring Terminated									
35												

REMARKS:

JOB NO. BR7208 Washington	DATE: July 13, 2015
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)	TYPE OF DRILLING: Hollow Stem Auger -
STATION: 107+44	EQUIPMENT: CME 850 w/ CME Automatic
LOCATION: 26' Left of Existing Centerline	HAMMER CORRECTION FACTOR: 1.23
LOGGED BY: Tracy Henderson	

COMPLETION DEPTH: 26.2

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			SURFACE ELEVATION: 1360.6									
5			Gravel									
			LIMESTONE									
10			LIMESTONE - Hard, Slight Dip, Gray								77	54
			Soil Filled Cavity (10.8'-12.7')									
15			LIMESTONE - Hard, Slight Dip, Gray								71	64
20			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								100	97
25			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								96	84
			SHALE - Medium Hard, Slight Dip, Dark Gray									
			Boring Terminated									
30												
35												

REMARKS:

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

BORING NO. 6
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)
STATION: 108+21
LOCATION: 13' Left of Existing Centerline
LOGGED BY: Raymond Taylor

DATE: July 28, 2015
TYPE OF DRILLING: Hollow Stem Auger -
EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR:

COMPLETION DEPTH: 13

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: 1359.8									
0			Gravel									
5			Limestone - Hard									
10												
15			Boring Terminated									
20												
25												
30												
35												

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.		BORING NO. 7 PAGE 1 OF 1
JOB NO. BR7208 Washington	JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)	DATE: July 28, 2015 TYPE OF DRILLING: Hollow Stem Auger - EQUIPMENT: CME 850 w/ CME Automatic HAMMER CORRECTION FACTOR:
STATION: 108+27	LOCATION: 13' Left of Existing Centerline	
LOGGED BY: Raymond Taylor		

COMPLETION DEPTH: 13.1

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R O D
			SURFACE ELEVATION: 1360.0									
0			Gravel									
5			LIMESTONE - Hard									
10												
15			Boring Terminated									
20												
25												
30												
35												

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.		BORING NO. 8 PAGE 1 OF 1
JOB NO. BR7208 Washington	JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)	DATE: July 14, 2015 TYPE OF DRILLING: Hollow Stem Auger -
STATION: 108+30	LOCATION: 15' Right of Existing Centerline	EQUIPMENT: CME 850 w/ CME Automatic
LOGGED BY: Tracy Henderson		HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 22.8

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			SURFACE ELEVATION: 1360.7									
			Gravel									
5			LIMESTONE - Fractured LIMESTONE WITH FREQUENT SHALE SEAMS AND LAYERS - Hard, Slightly Weathered, Occasional Fractures, Occasional Slickensides, Slight Dip, Gray Soil Filled Cavity (4.4' to 4.8')								84	60
10			LIMESTONE WITH FREQUENT SHALE SEAMS AND LAYERS - Hard, Slightly Weathered, Occasional Fractures, Occasional Slickensides, Slight Dip, Gray LIMESTONE - Hard, Slightly Weathered, Occasional Fractures, Slight Dip, Gray Soil Filled Cavity (10.7' - 11.1')								98	50
15			LIMESTONE - Hard, Slightly Weathered, Occasional Fractures, Slight Dip, Gray LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray Soil Filled Cavity (15.8' to 16.0')								98	84
20			LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray SANDSTONE - Well Cemented, Slight Dip, Light Gray								96	95
25			Boring Terminated									
30												
35												

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT		BORING NO. 9	
MATERIALS DIVISION - GEOTECHNICAL SEC.		PAGE 1 OF 1	
JOB NO. BR7208	Washington	DATE: July 14, 2015	
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)		TYPE OF DRILLING: Hollow Stem Auger -	
STATION: 108+32		EQUIPMENT: CME 850 w/ CME Automatic	
LOCATION: 13' Left of Existing Centerline		HAMMER CORRECTION FACTOR: 1.23	
LOGGED BY: Tracy Henderson			

COMPLETION DEPTH: 28

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
			Gravel									
5			LIMESTONE - Fractured									
			LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray								85	49
10			Soil Filled Cavity (7.6' to 15.0')								0	0
15			LIMESTONE - Hard, Slightly Weathered, Occasional Fractures, Slight Dip, Dark Gray								56	54
20			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								100	96
25											96	80
			SHALE - Medium Hard, Slight Dip, Dark Gray									
30			Boring Terminated									
35												

REMARKS:

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

BORING NO. 10
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)
STATION: 108+35
LOCATION: 13' Left of Existing Centerline
LOGGED BY: Raymond Taylor

DATE: July 28, 2015
TYPE OF DRILLING: Hollow Stem Auger -
EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR:

COMPLETION DEPTH: 16.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R O D
			SURFACE ELEVATION: 1360.1									
			Gravel									
5			LIMESTONE									
10			Soil Filled Cavity (6.4' to 14.5')									
15			LIMESTONE									
20			Boring Terminated									
25												
30												
35												

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.		BORING NO. 11 PAGE 1 OF 1
JOB NO. BR7208 Washington	JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)	DATE: June 22, 2015 TYPE OF DRILLING: Hollow Stem Auger -
STATION: 109+10	LOCATION: 15' Left of Centerline of Existing Bridge	EQUIPMENT: CME 850 w/ CME Automatic
LOGGED BY: Tracy Henderson		HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 28.4

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			SURFACE ELEVATION: 1376.2									
5			Moist, Very Hard, Brown Clay with Gravel (Sandstone Fragments)							30 (6)		
			LIMESTONE - Hard, Slightly Weathered, Gray								32	32
			Soil Filled Cavity (5.2' to 9.2')									
10			LIMESTONE - Hard, Slightly Weathered, Gray								84	73
15			LIMESTONE - Hard, Slightly Weathered, Gray								88	78
20			Claystone - Weathered, Soft, Dark Gray SANDSTONE - Calcareous, Weathered to Slightly Weathered, Cemented, Gray								80	56
25			LIMESTONE WITH OCCASSIONAL SHALE SEAMS- Hard, Gray								96	78
30			SHALE - Slightly Weathered, Medium Hard, Dark Gray Boring Terminated									
35												







REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.		BORING NO. 12 PAGE 1 OF 1
JOB NO. BR7208 Washington	JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)	DATE: June 23, 2015 TYPE OF DRILLING: Hollow Stem Auger - EQUIPMENT: CME 850 w/ CME Automatic
STATION: 109+27	LOCATION: 32' Right of Existing Centerline	HAMMER CORRECTION FACTOR: 1.23
LOGGED BY: Tracy Henderson		

COMPLETION DEPTH: 22.3

DEPTH FT.	S Y M B O L S	S A M P L E S	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: 1376.5									
			Clay with Gravel									
5			LIMESTONE - Hard, Slightly Weathered, Gray								84	60
			SHALE WITH OCCASIONAL LIMESTONE LAYERS - Soft to Medium Hard, Highly Weathered to Weathered, Dark Gray									
10			LIMESTONE - Hard, Slightly Weathered, Gray								90	76
15			LIMESTONE - Hard, Slightly Weathered, Gray								96	86
20			SANDSTONE WITH OCCASIONAL CLAY LAYERS - Cemented, Slightly Weathered, Gray								100	80
			Boring Terminated									
25												
30												
35												

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.					BORING NO. 13 PAGE 1 OF 1							
JOB NO. BR7208		Washington			DATE: June 24, 2015							
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)					TYPE OF DRILLING: Hollow Stem Auger -							
STATION: 109+37					EQUIPMENT: CME 850 w/ CME Automatic							
LOCATION: 32' Right of Existing Centerline					HAMMER CORRECTION FACTOR: 1.23							
LOGGED BY: Tracy Henderson												
COMPLETION DEPTH: 27.1												
DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			SURFACE ELEVATION: 1377.2									
			Clay with Gravel									
5			LIMESTONE - Hard, Slightly Weathered, Gray								13	0
			Soil Filled Cavity (5.0' to 8.7')									
10			LIMESTONE - Hard, Slight Dip, Gray								66	62
15			LIMESTONE - Hard, Slight Dip, Gray								98	87
20			SANDSTONE WITH OCCASIONAL CLAY LAYERS - Calcareous, Cemented, Weathered, Gray								94	68
25			LIMESTONE - Hard, Slightly Weathered, Gray								88	62*
			Boring Terminated									
30												
35												

REMARKS: *Poor recovery due to catcher wearing out

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

October 1, 2015

TO: Mr. Rick Ellis, Bridge Engineer

SUBJECT: Job No. BR7208
West Fork White River (Woolsey) Str. & Apprs. (S)
County Road 35
Washington County

Transmitted herewith are revised boring logs to correct mistakes found in the boring logs submitted by memo September 2, 2015. Please discard the original logs and replace them with the attached. The .INS file for this project has been revised.

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 4 Engineer
G.C. File

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

BORING NO. 1
PAGE 1 OF 2

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)

DATE: June 29, 2015
TYPE OF DRILLING: Hollow Stem Auger -

STATION: 105+68
LOCATION: 9' Right of Centerline
LOGGED BY: Raymond Taylor

EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 44.2

DEPTH FT.	S Y M B O L	S A M P L E S	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: 1374.1									
5		X	Moist, Loose, Brown Sand with Gravel (Sandstone Fragments)							4 5-5		
10		X	Moist, Medium Stiff, Dark Brown Sandy Clay							2 3-5		
15		X	Wet, Very Stiff, Dark Brown Sandy Clay with Gravel							5 8-10		
20		X	Wet, Dense, Gravel with Clay and Sand							12 18-17		
25			LIMESTONE - Hard, Slightly Weathered, Occasional Vug, Slight Dip, Gray								100	64
30			SANDSTONE - Calcareous, Well Cemented, Slightly Weathered, Slight Dip, Light Gray								99	82
35			SANDSTONE - Calcareous, Well Cemented, Slightly Weathered, Slight Dip, Light Gray								99	96

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.						BORING NO. 1 PAGE 2 OF 2						
JOB NO. BR7208 Washington JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)						DATE: June 29, 2015 TYPE OF DRILLING: Hollow Stem Auger -						
STATION: 105+68 LOCATION: 9' Right of Centerline LOGGED BY: Raymond Taylor						EQUIPMENT: CME 850 w/ CME Automatic HAMMER CORRECTION FACTOR: 1.23						
COMPLETION DEPTH: 44.2												
D E P T H	S Y M B O L	S A M P L E S	DESCRIPTION OF MATERIAL	SOIL GROUP	P L A S T I C L I M I T	% M O I S T.	L I Q U I D L I M I T	D R Y W E I G H T	L B S P E R C U. F T.	N O. O F B L O W S P E R 6- I N.	% S C R	% R Q D
			SURFACE ELEVATION: 1374.1									
40											97	97
45			SHALE - Medium Hard, Slightly Weathered, Slight Dip, Dark Gray								88	44
50			Boring Terminated									
55												
60												
65												
70												
REMARKS:												

ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.						BORING NO. 2 PAGE 1 OF 1						
JOB NO. BR7208 Washington			DATE: June 30, 2015			TYPE OF DRILLING: Hollow Stem Auger -						
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)			EQUIPMENT: CME 850 w/ CME Automatic			HAMMER CORRECTION FACTOR: 1.23						
STATION: 106+45			COMPLETION DEPTH: 28.8									
LOCATION: 15' Right of Centerline												
LOGGED BY: Raymond Taylor												
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: 1362.6									
5			Moist, Very Stiff, Brown Clay with Gravel (Sandstone Fragments)									
			SANDSTONE - Calcareous, Well Cemented, Weathered, Slight Dip, Light Gray								85	21
			LIMESTONE - Hard, Weathered, Slight Dip, Gray									
10			Soil Filled Cavity (10.1' to 12.4')								61	53
			LIMESTONE - Hard, Weathered, Slight Dip, Gray									
15			LIMESTONE - Hard, Slight Dip, Gray								89	81
			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								100	100
25											99	99
30			Boring Terminated									
35												
REMARKS:												

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

BORING NO. 3
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)

DATE: July 1, 2015
TYPE OF DRILLING: Hollow Stem Auger -

STATION: 106+45
LOCATION: 17' Left of Centerline
LOGGED BY: Raymond Taylor

EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 28.2

DEPTH FT.	S Y M B O L	S A M P L E S	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: 1361.5									
			Moist, Very Stiff, Brown Clay with Gravel									
5			Wet, Medium Dense, Brown Gravel (Rock Fragments) with Sand and Clay							2 12-12		
			SANDSTONE INTERBEDDED WITH LIMESTONE - Well Cemented, Weathered, Slight Dip, Gray								58	0
10			LIMESTONE - Hard, Weathered, Slight Dip, Gray								10	0
			Soil Filled Cavity (9.3' to 11.3')									
			LIMESTONE - Hard, Weathered, Slight Dip, Gray									
			Soil Filled Cavity (12.4'-12.9')									
15			LIMESTONE - Hard, Weathered, Slight Dip, Gray									
			SANDSTONE WITH OCCASIONAL LIMESTONE LAYERS - Calcareous, Well Cemented, Slight Dip, Light Gray								100	96
20			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								100	100
25			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								93	68
			SHALE - Medium Hard, Slightly Weathered, Slight Dip, Dark Gray									
30			Boring Terminated									
35												

REMARKS:

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

BORING NO. 4
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)

DATE: July 14, 2015
TYPE OF DRILLING: Hollow Stem Auger -

STATION: 107+40
LOCATION: 33' Right of Centerline
LOGGED BY: Tracy Henderson

EQUIPMENT: CME 850 w/ CME Automatic
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 CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R O D
			SURFACE ELEVATION: 1359.8									
			Gravel									
5			LIMESTONE LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray Soil Filled Cavity (4.3' to 4.5') LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray								75	19
10			Soil Filled Void (8.1' to 10.7') LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray								48	10
15			Soil Filled Void (13.5' to 13.7') LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray Soil Filled Void (14.1' to 15.0') LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray								93	63
20			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								98	92
25			SANDSTONE - Calcareous, Well Cemented, Occasional Fractures, Slight Dip, Light Gray								100	79
30			Boring Terminated									
35												

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.					BORING NO. 5 PAGE 1 OF 1							
JOB NO. BR7208 Washington					DATE: July 13, 2015							
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)					TYPE OF DRILLING: Hollow Stem Auger -							
STATION: 107+44					EQUIPMENT: CME 850 w/ CME Automatic							
LOCATION: 26' Left of Centerline					HAMMER CORRECTION FACTOR: 1.23							
LOGGED BY: Tracy Henderson												
COMPLETION DEPTH: 26.2												
DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			SURFACE ELEVATION: 1360.6									
5			Gravel									
			LIMESTONE									
10			LIMESTONE - Hard, Slight Dip, Gray								77	54
			Soil Filled Cavity (10.8'-12.7')									
15			LIMESTONE - Hard, Slight Dip, Gray								71	64
20			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								100	97
25			SHALE - Medium Hard, Slight Dip, Dark Gray								96	84
			Boring Terminated									
30												
35												
REMARKS:												

ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.		BORING NO. 6 PAGE 1 OF 1
JOB NO. BR7208 Washington	JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)	DATE: July 28, 2015 TYPE OF DRILLING: Hollow Stem Auger -
STATION: 108+21	LOCATION: 13' Left of Centerline	EQUIPMENT: CME 850 w/ CME Automatic
LOGGED BY: Raymond Taylor		HAMMER CORRECTION FACTOR:

COMPLETION DEPTH: 13

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	% R Q D
			SURFACE ELEVATION: 1359.8									
0			Gravel									
5			LIMESTONE - Hard									
10												
15			Boring Terminated									
20												
25												
30												
35												

REMARKS:

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

BORING NO. 7
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)

STATION: 108+27
LOCATION: 13' Left of Centerline
LOGGED BY: Raymond Taylor

DATE: July 28, 2015
TYPE OF DRILLING: Hollow Stem Auger -

EQUIPMENT: CME 850 w/ CME Automatic

HAMMER CORRECTION FACTOR:

COMPLETION DEPTH: 13.1

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
0			Gravel									
5			LIMESTONE - Hard									
10												
15			Boring Terminated									
20												
25												
30												
35												

REMARKS:

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

BORING NO. 8
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)

DATE: July 14, 2015
TYPE OF DRILLING: Hollow Stem Auger -

STATION: 108+30
LOCATION: 15' Right of Centerline
LOGGED BY: Tracy Henderson

EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 22.8

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			Gravel									
5			LIMESTONE - Fractured LIMESTONE WITH FREQUENT SHALE SEAMS AND LAYERS - Hard, Slightly Weathered, Occasional Fractures, Occasional Slickensides, Slight Dip, Gray Soil Filled Cavity (4.4' to 4.8')								84	60
10			LIMESTONE WITH FREQUENT SHALE SEAMS AND LAYERS - Hard, Slightly Weathered, Occasional Fractures, Occasional Slickensides, Slight Dip, Gray								98	50
15			LIMESTONE - Hard, Slightly Weathered, Occasional Fractures, Slight Dip, Gray Soil Filled Cavity (10.7' - 11.1')								98	84
			LIMESTONE - Hard, Slightly Weathered, Occasional Fractures, Slight Dip, Gray								98	84
			Soil Filled Cavity (15.8' to 16.0')									
			LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray								98	84
20			SANDSTONE - Well Cemented, Slight Dip, Light Gray								96	95
25			Boring Terminated									
30												
35												

REMARKS:

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

BORING NO. 9
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)

DATE: July 14, 2015
TYPE OF DRILLING: Hollow Stem Auger -

STATION: 108+32
LOCATION: 13' Left of Centerline
LOGGED BY: Tracy Henderson

EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 28

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: 1359.8									
			Gravel									
5			LIMESTONE - Fractured									
			LIMESTONE - Hard, Slightly Weathered, Slight Dip, Gray								85	49
10			Soil Filled Cavity (7.6' to 15.0')								0	0
15			LIMESTONE - Hard, Slightly Weathered, Occasional Fractures, Slight Dip, Dark Gray								56	54
20			SANDSTONE - Calcareous, Well Cemented, Slight Dip, Light Gray								100	96
25											96	80
			SHALE - Medium Hard, Slight Dip, Dark Gray									
30			Boring Terminated									
35												

REMARKS:

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

BORING NO. 10
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)

DATE: July 28, 2015
TYPE OF DRILLING: Hollow Stem Auger -

STATION: 108+35
LOCATION: 13' Left of Centerline
LOGGED BY: Raymond Taylor

EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR:

COMPLETION DEPTH: 16.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S R	% R Q D
			SURFACE ELEVATION: 1360.1									
			Gravel									
5			LIMESTONE									
10			Soil Filled Cavity (6.4' to 14.5')									
15			LIMESTONE									
20			Boring Terminated									
25												
30												
35												

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.		BORING NO. 11 PAGE 1 OF 1
JOB NO. BR7208 Washington	JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)	DATE: June 22, 2015
STATION: 109+10	LOCATION: 15' Left of Centerline	TYPE OF DRILLING: Hollow Stem Auger -
LOGGED BY: Tracy Henderson		EQUIPMENT: CME 850 w/ CME Automatic
COMPLETION DEPTH: 28.4		HAMMER CORRECTION FACTOR: 1.23

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: 1376.2									
5			Moist, Very Hard, Brown Clay with Gravel (Sandstone Fragments)							30 (6)		
			LIMESTONE - Hard, Slightly Weathered, Gray								32	32
			Soil Filled Cavity (5.9' to 9.2')									
10			LIMESTONE - Hard, Slightly Weathered, Gray								84	73
15			LIMESTONE - Hard, Slightly Weathered, Gray								88	78
20			Claystone - Weathered, Soft, Dark Gray SANDSTONE - Calcareous, Weathered to Slightly Weathered, Cemented, Gray								80	56
25			LIMESTONE WITH OCCASIONAL SHALE SEAMS- Hard, Gray								96	78
30			SHALE - Slightly Weathered, Medium Hard, Dark Gray Boring Terminated									
35												

REMARKS:

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

BORING NO. 12
PAGE 1 OF 1

JOB NO. BR7208 Washington
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)

DATE: June 23, 2015
TYPE OF DRILLING: Hollow Stem Auger -



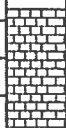
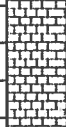


STATION: 109+27
LOCATION: 32' Right of Centerline
LOGGED BY: Tracy Henderson

EQUIPMENT: CME 850 w/ CME Automatic
HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 22.3

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			SURFACE ELEVATION: 1376.5									
			Clay with Gravel									
5			LIMESTONE - Hard, Slightly Weathered, Gray								84	60
			SHALE WITH OCCASIONAL LIMESTONE LAYERS - Soft to Medium Hard, Highly Weathered to Weathered, Dark Gray									
10			LIMESTONE - Hard, Slightly Weathered, Gray								90	76
15			LIMESTONE - Hard, Slightly Weathered, Gray								96	86
20			SANDSTONE WITH OCCASIONAL CLAY LAYERS - Cemented, Slightly Weathered, Gray								100	80
25			Boring Terminated									
30												
35												

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT MATERIALS DIVISION - GEOTECHNICAL SEC.					BORING NO. 13 PAGE 1 OF 1							
JOB NO. BR7208 Washington			DATE: June 24, 2015									
JOB NAME: West Fork White River (Woolsey) Str. & Apprs. (S)			TYPE OF DRILLING: Hollow Stem Auger -									
STATION: 109+37			EQUIPMENT: CME 850 w/ CME Automatic									
LOCATION: 32' Right of Centerline			HAMMER CORRECTION FACTOR: 1.23									
LOGGED BY: Tracy Henderson												
COMPLETION DEPTH: 27.1												
DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT	LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% S C R	% R Q D
			SURFACE ELEVATION: 1377.2									
			Clay with Gravel									
5			LIMESTONE - Hard, Slightly Weathered, Gray								13	0
			Soil Filled Cavity (5.0' to 8.7')									
10			LIMESTONE - Hard, Slight Dip, Gray								66	62
15			LIMESTONE - Hard, Slight Dip, Gray								98	87
20			SANDSTONE WITH OCCASIONAL CLAY LAYERS - Calcareous, Cemented, Weathered, Gray								94	68
25			LIMESTONE - Hard, Slightly Weathered, Gray								88	62*
			Boring Terminated									
30												
35												

REMARKS: *Poor recovery due to catcher wearing out