ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

SUBSURFACE INVESTIGATION

STATE JOB NO. BR3714

FEDERAL AID PROJECT NO. STPB-0037(33)

LITTLE BODCAU CREEK STR. & APPRS. (S)

COUNTY ROAD NO. CR 25

IN LAFAYETTE **COUNTY**

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

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT

October 6, 2016

TO: Mr. Rick Ellis, Bridge Engineer

SUBJECT: Job No. BR3714
Little Bodcaw Creek Str. & Apprs. (S)
County Road 25
Lafayette County

Transmitted herewith are a brief summary of the geology and site conditions, 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.

It is anticipated that concrete piling will be utilized at all 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 3 Engineer
G.C. File

GEOLOGY AND SITE CONDITIONS
Job No. BR3714
Little Bodcaw Creek Str. & Apprs. (S)
Lafayette County
County Road 25

Site Conditions

The existing bridge is a single span bridge that crosses over Little Bodcaw Creek. The main structure of the bridge consists of two rail cars covered by dirt and gravel. At the time of inspection the bridge contained both patched and unpatched holes in the decking. The bridge embankments are supported by concrete and rusted sheet metal held in place by timber pilings. There are timber pilings from a previous bridge under the existing bridge in the channel. There are no guardrails leading up to the bridge and the guardrails over the bridge consist of steel piping. Little Bodcaw is a black water creek that flows west to east under the bridge and is part of the Bodcaw Bottoms Watershed. This particular section of the creek runs through a recently harvested pine plantation and multiple oil well pads exist to the north. Overhead powerlines and an underground telecommunication line parallel the east side of the bridge.

Site Geology

The project is located over Quaternary alluvial deposits (map symbol Qal). These are typically river deposits composed of gravels, sands, silts, clays, and mixtures of any and all of these. These alluvial deposits are located over the Cane River member of the Claiborne Group (map symbol Tc). Cane River Claiborne deposits are Tertiary in age and consist of locally lignitic sand, silt ,and clay with occasional glauconitic sand, ironstone layers, and interbedded sand in updip areas. The contact between the Quaternary alluvial deposits and the underlying Claiborne Group is an erosional surface and was encountered in borings at approximately 40' below ground level (bgl) during the subsurface investigation. The thickness of the Claiborne ranges from a thin edge to as much as 1,500 feet. At the project location, a cemented sandstone layer was encountered in two of the borings at approximately 50 feet bgl.

Subsurface Conditions

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

0 to 40 Feet:*	Varies from moist to wet, very loose to medium dense, brown to gray **sand** to **clayey sand with occasional gravel**.
40 to 75 Feet:**	Varies from moist, dense to very dense, dark brown **silty** and **clayey sand** to moist, very hard **sandy clay with lignite and some gravel.**
75 to 94 Feet:	Consists of moist, very dense, dark brown to gray **silty to clayey sand with some cemented seams** to moist, hard to very hard, **sandy clay with lignite.**
94 to 101.2 Feet:	Varies from moist, very dense, dark brown to gray **sand** to moist, very hard, dark brown **sandy lignitic clay**.

* Cemented sandstone was encountered in borings 1 and 4 at approximately 50 feet (bgl).
** Sampler advanced by the static weight of the hammer 1.5 feet.

D_{50} AGGREGATE ANALYSIS FOR SCOUR CALCULATIONS

Job No. BR3714

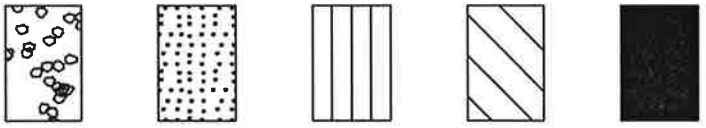
Creek Name	Station	Sample Type	Location	Depth (FT)	Aggregate Size (D50) (IN)
Little Bodcaw Creek	101+58	Creek Bank	9' Lt. C.L. Construction	N/A	0.0041

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

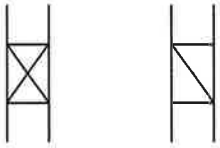
SAMPLER TYPES

(SHOWN IN SAMPLE COLUMN)

SHELBY TUBE

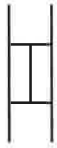
UNDISTURBED SAMPLE RECOVERY | DISTURBED SAMPLE RECOVERY | NO RECOVERY

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: $\frac{6}{8-9} \Rightarrow 8+9=17 blows/ft$. 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 3

JOB NO. BR3714 Lafayette County
JOB NAME: Little Bodcaw Creek Str. & Apprs. (S)
Co. Rd. No. 25
STATION: 102+97
LOCATION: 9' Left of Construction Centerline
LOGGED BY: Coty Campbell

DATE: August 30, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 750

HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 101.3

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 260.4	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
5		X	Moist, Loose, Light Gray Sand						3 3-2		
10		X							3 3-3		
15											
20		X	Wet, Medium Dense, Light Gray Sand						5 5-6		
25		X	Wet, Loose, Light Gray Sand						3 3-4		
30		X	Wet, Very Loose, Light Gray Silty Sand						1 2-2		
35		X	Wet, Medium Dense, Light Gray Sand with Some Gravel						5 8-17		

REMARKS: *Encountered cemented sand at approximately 75.5 feet

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

BORING NO. 1
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JOB NO. BR3714 Lafayette County
JOB NAME: Little Bodcaw Creek Str. & Apprs. (S)
Co. Rd. No. 25
STATION: 102+97
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LOGGED BY: Coty Campbell

DATE: August 30, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 750

HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 101.3

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.	% TCR	% RQD
			SURFACE ELEVATION: 260.4								
40			Moist, Dense, Dark Brown Sand with Lignitic Clay						10 16-22		
45			Moist, Very Dense, Dark Brown Silty Sand with Some Lignite						20 21-37 9 25-48		
50			Cemented Sand						25 50 (0")		
55			Moist, Very Dense, Dark Brown Lignitic Sand with Clay								
60			Moist, Very Dense, Dark Brown Silty Sand						25 31-41		
65			Moist, Very Dense, Dark Brown Silty Clay with Lignite						30 29-36 21 36-38		
70											

REMARKS: *Encountered cemented sand at approximately 75.5 feet

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

BORING NO. 1
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JOB NO. BR3714 Lafayette County
JOB NAME: Little Bodcaw Creek Str. & Apprs. (S)
Co. Rd. No. 25
STATION: 102+97
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LOGGED BY: Coty Campbell

DATE: August 30, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 750

HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 101.3

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 260.4	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
75			Moist, Very Dense, Dark Brown Lignitic Sand with Clay						30 34-43		
80			Moist, Very Dense, Dark Brown Sand*						15 50 (0")		
85			Moist, Very Dense, Dark Brown Sand						29 48-50 (11")		
90			Moist, Very Dense, Dark Brown Sand with Some Clay						15 21-39		
95			Moist, Very Dense, Dark Brown Sand						30 48-50 (6")		
100			Moist, Very Hard, Dark Brown Lignitic Clay						16 31-40		
105			Boring Terminated						25 39-50 (10")		

REMARKS: *Encountered cemented sand at approximately 75.5 feet

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

BORING NO. 2
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JOB NO. BR3714 Lafayette County
JOB NAME: Little Bodcaw Creek Str. & Apprs. (S)
Co. Rd. No. 25
STATION: 104+53
LOCATION: 9' Left of Construction Centerline
LOGGED BY: Coty Campbell and Troy Frazier

DATE: August 31 and September 7, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 750

HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 101.5

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.	% TCR	% RQD
			SURFACE ELEVATION: 263.4								
5		X	Moist, Loose, Light Brown Sand						5 3-2		
10		X	Wet, Very Loose, Light Gray Clayey Sand						1 1-1		
15											
20		X	Wet, Loose, Light Gray Sand						3 4-6		
25		X	Wet, Medium Dense, Dark Brown Sand with Some Organic Matter						2 4-7		
30		X	Wet, Very Soft, Gray Silty Clay						0 0-0		
35		X	Wet, Medium Dense, Gray Sand						7 11-9		

REMARKS:

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

BORING NO. 2
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JOB NO. BR3714 Lafayette County
JOB NAME: Little Bodcaw Creek Str. & Apprs. (S)
Co. Rd. No. 25
STATION: 104+53
LOCATION: 9' Left of Construction Centerline
LOGGED BY: Coty Campbell and Troy Frazier

DATE: August 31 and September 7, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 750

HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 263.4	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
40			Wet, Very Loose, Gray Sand						1 2-2		
45			Moist, Dense, Dark Brown Silty Sand with Lignite						9 15-24		
50			Moist, Very Dense, Dark Brown Sand with Some Lignite						18 23-36		
55			Moist, Very Dense, Brown Sand						33 33-60 (11")		
60									11 20-33		
65			Moist, Very Hard, Brown Silty Clay with Lignite						17 27-50		
70									15 30-50		

REMARKS:

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

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JOB NO. BR3714 Lafayette County
JOB NAME: Little Bodcaw Creek Str. & Apprs. (S)
Co. Rd. No. 25
STATION: 104+53
LOCATION: 9' Left of Construction Centerline
LOGGED BY: Coty Campbell and Troy Frazier

DATE: August 31 and September 7, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 750

HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 263.4	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
75			Moist, Very Dense, Brown Sand with Some Clay						20 33-50 15 25-50		
80			Moist, Very Dense, Brown Sand						20 40-60 (10")		
85			Moist, Very Dense, Brown Sand with Some Clay						15 30-50		
90			Moist, Very Dense, Brown Clayey Sand						15 30-60 (11")		
95			Moist, Very Hard, Dark Brown Sandy Clay						18 38-58		
100			Boring Terminated						20 30-59		
105											

REMARKS:

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

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JOB NO. BR3714 Lafayette County
JOB NAME: Little Bodcaw Creek Str. & Apprs. (S)
Co. Rd. No. 25
STATION: 106+08
LOCATION: 10' Left of Construction Centerline
LOGGED BY: Troy Frazier

DATE: September 27, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME

HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 100.4

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.	% TCR	% RQD
			SURFACE ELEVATION: 262.8								
5		X	Moist, Medium Dense, Brown Sand with Clay						5 6-6		
10		X	Moist, Soft, Brown and Gray Clay with Sand						2 2-2		
15											
20		X	Wet, Medium Dense, Gray Sand						5 8-7		
25		X							7 8-9		
30		X	Wet, Loose, Gray Sand with Clay						4 2-7		
35									0 1-5		

REMARKS:

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

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JOB NO. BR3714 Lafayette County
JOB NAME: Little Bodcaw Creek Str. & Apprs. (S)
Co. Rd. No. 25
STATION: 106+08
LOCATION: 10' Left of Construction Centerline
LOGGED BY: Troy Frazier

DATE: September 27, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME

HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 100.4

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.	% TCR	% RQD
			SURFACE ELEVATION: 262.8								
40			Wet, Medium Dense, Gray Sand						4 7-12		
			Moist, Hard, Dark Brown Sandy Clay with Some Gravel						6 16-29		
45			Moist, Dense, Dark Brown Silty Sand						6 18-32		
50			Moist, Very Dense, Dark Brown Silty Sand						8 21-37		
55			Moist, Very Dense, Dark Brown Silty Sand with Some Gravel						13 23-46		
60			Moist, Very Hard, Dark Gray Sandy Clay						13 30-40		
65									16 25-40		
70											

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT
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DATE: September 27, 2016
TYPE OF DRILLING:
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EQUIPMENT: CME

HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 100.4

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 262.8	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
75			Moist, Very Hard, Dark Gray Sandy Clay with Trace Gravel						10 24-48		
80			Moist, Very Dense, Gray Silty Sand with Cemented Seams						40 60 (5")		
85			Moist, Very Dense, Dark Brown Silty Sand						15 37-60 (10")		
90			Moist, Very Dense, Dark Brown Clayey Sand						19 27-60 (11")		
95			Moist, Very Hard, Dark Brown Sandy Clay						18 26-45		
100									17 30-56		
			Moist, Very Dense, Dark Brown Sand						60 (5")		
105			Boring Terminated								

REMARKS:

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

BORING NO. 4
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JOB NO. BR3714 Lafayette County
JOB NAME: Little Bodcaw Creek Str. & Apprs. (S)
Co. Rd. No. 25
STATION: 107+63
LOCATION: 8' Left of Construction Centerline
LOGGED BY: Raymond Taylor

DATE: September 13 and 14, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 750

HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 101.5

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.	% TCR	% RQD
			SURFACE ELEVATION: 260.8								
5		X	Wet, Very Loose, Brown Clayey Sand with Some Gravel						3 2-2		
10		X	Wet, Loose, Brown Sand						3 4-6		
15		X							2 3-3		
20		X	Wet, Medium Dense, Gray Sand						6 6-6		
25		X	Wet, Very Loose, Gray Sand						1 1-2		
30		X	Wet, Dense, Brown Sand						16 24-22		
35											

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT
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JOB NO. BR3714 Lafayette County
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Co. Rd. No. 25
STATION: 107+63
LOCATION: 8' Left of Construction Centerline
LOGGED BY: Raymond Taylor

DATE: September 13 and 14, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: CME 750

HAMMER CORRECTION FACTOR: 1.23

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 260.8	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
40			Moist, Dense, Dark Brown Silty Sand with Gravel						6 13-18		
45			Moist, Dense, Silty Sand with Some Gravel						12 23-23		
50			Moist, Very Dense, Silty Sand with Some Lignite						29 48-60		
			Cemented Sand								
55			Moist, Very Dense, Dark Brown Sand with Lignite						22 38-54		
60			Moist, Very Dense, Dark Brown Sand with Lignite and Some Clay						23 28-33		
65			Moist, Very Dense, Dark Brown Sand with Clay and Lignite						20 33-52		
70									21 28-41		

REMARKS:

ARKANSAS HWY. & TRANS. DEPARTMENT
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JOB NO. BR3714 Lafayette County
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COMPLETION DEPTH: 101.5

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75			Moist, Very Dense, Dark Brown Silty Sand						20 60 (5")		
80			Moist, Very Dense, Dark Brown Sand with Clay and Lignite						17 41-60 (8")		
85			Moist, Hard, Dark Brown Sandy Clay						21 27-30		
90			Moist, Very Hard, Dark Brown Sandy Clay with Lignite						20 49-58		
95									22 26-38		
100			Moist, Very Dense, Dark Brown Sand						60 (2")		
105			Boring Terminated						17 17-50		

REMARKS: