

ARKANSAS DEPARTMENT OF TRANSPORTATION



SUBSURFACE INVESTIGATION

STATE JOB NO. 080504

FEDERAL AID PROJECT NO. NHPP-0049(16)

DEER CREEK STR. & APPRS. (S)

STATE HIGHWAY 27 SECTION 7

IN MONTGOMERY 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 DEPARTMENT OF TRANSPORTATION

ARDOT.gov | IDriveArkansas.com | Scott E. Bennett, P.E., Director

MATERIALS DIVISION

11301 West Baseline Road | P.O. Box 2261 | Little Rock, AR 72203-2261 | Phone: 501.569.2185 | Fax: 501.569.2368

January 17, 2019

TO: Mr. Rick Ellis, Bridge Engineer

SUBJECT: Job No. 080504
Deer Creek Str. & Apprs. (S)
Route 27 Section 7
Montgomery County

Transmitted herewith are a brief summary of the geology and site conditions, rock core unconfined compression test summary, RMR, and the logs of 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.

This project consists of replacing the bridge crossing Deer Creek, on Highway 27, at Washita. The new bridge alignment will be to the west, upstream, of the existing. Two of the five requested borings were inaccessible due to steep slopes and high water levels in the channel. The borings that were not obtained are located at: 110+18 C.L. Construction and 110+88 C.L. Construction.

The subsurface investigation revealed that bedrock is less than 5 feet deep at the obtained borings and exposed in channel. Utilizing this site information and correlating the elevation of bedrock between the obtained bridge boring logs, competent bedrock should be encountered less than 15 feet below ground level. Based on this information and correspondence with Bridge Division, it is anticipated that all intermediate bents will be founded on drilled shafts and end bents will be founded on piling. Preboring may be necessary in order to achieve minimum piling penetration requirements. Drilled shafts socketed into competent slightly weathered to unweathered Shale should be designed based on the values provided in Table 1.

TABLE 1 – Bearing Capacity Recommendations for Drilled Shafts

Nominal Shaft Side Resistance (ksf)	Factored Shaft Side Resistance (ksf)	Nominal Shaft Tip Resistance (ksf)	Factored Shaft Tip Resistance (ksf)
32.7	18	137	68.5

The Bigfork Chert formation is exposed in a road cut just south of the existing bridge. Although all obtained borings consisted primarily of shale, it is anticipated that Bigfork Chert will be encountered in the channel and/or to the south, based on geologic maps and visual geologic investigations. Geologic maps show the presence of a contact between the Polk Creek Shale and Bigfork Chert within the limits of this project. Drilling shafts into Bigfork Chert will require considerably more effort than Polk Creek Shale.

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



Michael C. Benson
Materials Engineer

MCB:rpt:mlg

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

GEOLOGY AND SITE CONDITIONS

Job No. 080504

Deer Creek Str. & Apprs. (S)

Montgomery County

Route 27 Section 7

Site Conditions

The existing Deer Creek Bridge, on Highway 27, is a five span bridge. It is constructed of concrete decking, end walls, and spread footings with four steel I-beams supporting the deck. The guardrail is composed of steel, supported by concrete posts on the bridge and steel posts leading up to the bridge. Overhead power lines parallel the roadway on the east. Highway 88 intersects Highway 27 on the west, approximately 400 feet north of the existing bridge. On the opposite side of the intersection, a gravel road, with a paved intersection, leads to a lake recreation area.

Deer Creek flows to the east at the bridge and turns sharply south a short distance east of the bridge. Water level in the creek is strongly influenced by the water elevation of Lake Ouachita. The location of the bridge is within the detention basin for Lake Ouachita. Bedrock is exposed extensively along the channel. The rock exposed consists of moderately to steeply dipping shale with chert lenses along the north side of the channel and chert along the south side of the channel. Rock is exposed in the road cut on both sides of the roadway, south of the bridge, and consists of near vertical beds of chert. The area around the bridge is moderately to heavily wooded except to the southeast, which consists of a gravel bar with grasses. There is a residence on the hill immediately above the proposed bridge site on the southwest.

Site Geology

The rocks at the proposed job site are moderately to steeply dipping to the north-northwest. The units exposed consist of the Bigfork Chert on the south and the Polk Creek Shale on the north. Deer Creek flows along the contact between these two formations. The Bigfork Chert consists of thin-bedded, dark-gray, cryptocrystalline chert interbedded with varying amounts of black siliceous shale, calcareous siltstone, and dense, bluish-gray limestone. The cherts normally occur in thin to medium beds and are usually highly fractured. The interbedded siliceous shales occur in thin to thick sequences and are often pyritic. Limestones occur mostly as interbeds in the chert and typically weather to soft brown layers. The limestones are more common in the northwestern exposures. The Bigfork Chert in Arkansas ranges in thickness from about 450 feet in the northern Ouachitas to about 750 feet in the southern Ouachitas.

The Bigfork Chert is overlain by the Polk Creek Shale. The Polk Creek rocks are black, sooty, fissile shale with minor black chert and traces of gray sandstone and limestone. The Polk Creek Shale rests conformably on the Bigfork Chert. Its thickness ranges from about 50 to 225 feet.

Subsurface Conditions

Based on the results of the borings made from Station 111+58 to 112+98, the subsurface stratigraphy may be generalized as follows:

- 0 to 4.5 Feet: Varies from **clay** with **gravel (shale fragments)** to highly weathered to slightly weathered, soft to hard, dark gray **shale**.
- 4.5 to 33.9 Feet: Consists of weathered to unweathered, medium hard to hard with very hard layers, occasionally to frequently fractured and slickensided, steeply dipping dark gray **shale** with frequent to occasional seams of quartz and calcite.
- 33.9 to 38.9 Feet: Varies from unweathered, hard to very hard, steeply dipping, frequently slickensided, dark gray **shale** with frequent to occasional layers and seams of calcite and quartz to unweathered, hard, steeply dipping gray **chert**.

*No borings were made down-station of 111+55 due to high water levels. Based on current Geologic maps and visual geologic analysis it is likely that the Bigfork Chert, as described in the Site Geology, will be encountered on the south bank of Deer Creek.

Rock Core Unconfined Compression Test Summary

Project Number: 080504
Project Name: Deer Creek Str. & Apprs. (S)
Date Tested: 7/31/2018

Station	Location	Sample No.	Depth (ft)	Diameter (in)	Height (in)	Total Load (lbs)	Correction Factor	Stress (psi)	Remarks
111+58	C.L.	1	3.1	1.75	3.60	13,550	1.00	5,633	
111+58	C.L.	2	11.3	1.75	2.85	4,380	1.00	1,821	Not a 2:1 ratio
111+58	C.L.	3	16.0	1.75	4.05	14,110	1.00	5,866	
111+58	C.L.	4	20.3	1.75	4.00	10,230	1.00	4,253	
111+58	C.L.	5	26.3	1.75	3.75	6,390	1.00	2,656	
111+58	C.L.	6	29.3	1.75	3.35	17,050	1.00	7,089	
112+28	C.L.	7	14.3	1.75	3.85	5,560	1.00	2,311	
112+28	C.L.	8	17.0	1.75	3.65	8,090	1.00	3,363	
112+28	C.L.	9	22.6	-	-	-	-	-	Dropped & Broke
112+28	C.L.	10	24.9	1.75	3.85	11,940	1.00	4,964	
112+28	C.L.	11	28.3	1.75	3.55	7,270	1.00	3,022	
112+28	C.L.	12	32.6	1.75	3.60	4,000	1.00	1,663	

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

ROCK MASS RATING SUMMARY

JOB # 080504

SAMPLE #1

Station/Location	111+58 C.L.
Depth (ft)	3
Relative Rating	
Uniaxial Compressive Strength	4
RQD	3
Spacing of Joints	20
Condition of Joints	25
Groundwater Conditions	7
Sum	59
Class Number	III
Description	FAIR ROCK

SAMPLE #1

Station/Location	111+58 C.L.
Depth (ft)	16
Relative Rating	
Uniaxial Compressive Strength	4
RQD	13
Spacing of Joints	10
Condition of Joints	20
Groundwater Conditions	7
Sum	54
Class Number	III
Description	FAIR ROCK

SAMPLE #3

Station/Location	111+58 C.L.
Depth (ft)	20.5
Relative Rating	
Uniaxial Compressive Strength	4
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	68
Class Number	II
Description	GOOD ROCK

SAMPLE #4

Station/Location	111+58 C.L.
Depth (ft)	26.5
Relative Rating	
Uniaxial Compressive Strength	2
RQD	17
Spacing of Joints	20
Condition of Joints	25
Groundwater Conditions	7
Sum	71
Class Number	II
Description	GOOD ROCK

SAMPLE #5

Station/Location	111+58 C.L.
Depth (ft)	29.5
Relative Rating	
Uniaxial Compressive Strength	4
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	68
Class Number	II
Description	GOOD ROCK

SAMPLE #6

Station/Location	112+28 C.L.
Depth (ft)	14.5
Relative Rating	
Uniaxial Compressive Strength	2
RQD	13
Spacing of Joints	25
Condition of Joints	20
Groundwater Conditions	7
Sum	67
Class Number	II
Description	GOOD ROCK

SAMPLE #7

Station/Location	112+28 C.L.
Depth (ft)	17
Relative Rating	
Uniaxial Compressive Strength	2
RQD	13
Spacing of Joints	25
Condition of Joints	20
Groundwater Conditions	7
Sum	67
Class Number	II
Description	GOOD ROCK

SAMPLE #8

Station/Location	112+28 C.L.
Depth (ft)	25
Relative Rating	
Uniaxial Compressive Strength	4
RQD	13
Spacing of Joints	25
Condition of Joints	20
Groundwater Conditions	7
Sum	69
Class Number	II
Description	GOOD ROCK

SAMPLE #9

Station/Location	112+28 C.L.
Depth (ft)	28.5
	Relative Rating
Uniaxial Compressive Strength	2
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	62
Class Number	II
Description	GOOD ROCK

SAMPLE #10

Station/Location	112+28 C.L.
Depth (ft)	32.5
	Relative Rating
Uniaxial Compressive Strength	2
RQD	13
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	62
Class Number	II
Description	GOOD ROCK

SAMPLE #11

Station/Location	
Depth (ft)	
	Relative Rating
Uniaxial Compressive Strength	
RQD	
Spacing of Joints	
Condition of Joints	
Groundwater Conditions	
Sum	
Class Number	
Description	

SAMPLE #12

Station/Location	
Depth (ft)	
	Relative Rating
Uniaxial Compressive Strength	
RQD	
Spacing of Joints	
Condition of Joints	
Groundwater Conditions	
Sum	
Class Number	
Description	

SAMPLE #13

Station/Location	
Depth (ft)	
	Relative Rating
Uniaxial Compressive Strength	
RQD	
Spacing of Joints	
Condition of Joints	
Groundwater Conditions	
Sum	
Class Number	
Description	

SAMPLE #14

Station/Location	
Depth (ft)	
	Relative Rating
Uniaxial Compressive Strength	
RQD	
Spacing of Joints	
Condition of Joints	
Groundwater Conditions	
Sum	
Class Number	
Description	

SAMPLE #15

Station/Location	
Depth (ft)	
	Relative Rating
Uniaxial Compressive Strength	
RQD	
Spacing of Joints	
Condition of Joints	
Groundwater Conditions	
Sum	
Class Number	
Description	

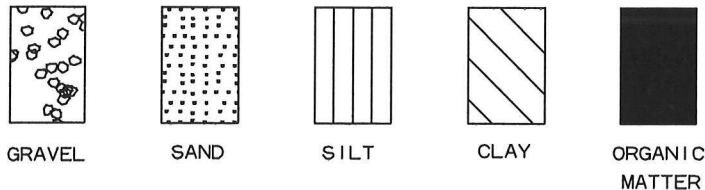
SAMPLE #16

Station/Location	
Depth (ft)	
	Relative Rating
Uniaxial Compressive Strength	
RQD	
Spacing of Joints	
Condition of Joints	
Groundwater Conditions	
Sum	
Class Number	
Description	

LEGEND

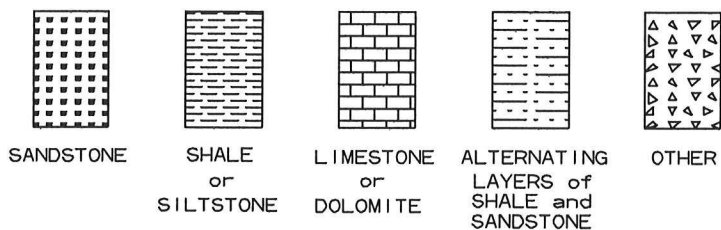
SOIL TYPES

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



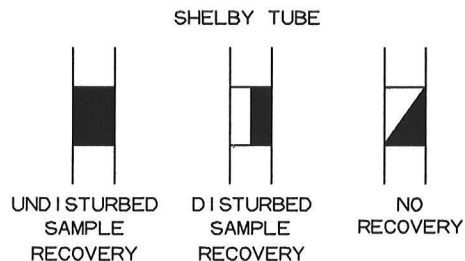
ROCK TYPES

(SHOWN IN SYMBOL COLUMN)



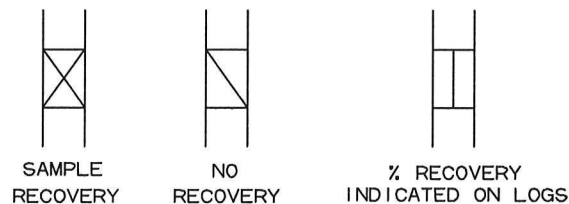
SAMPLER TYPES

(SHOWN IN SAMPLE COLUMN)



SPLIT SPOON

ROCK CORING



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 DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 1
PAGE 1 OF 2

JOB NO. 080504 Montgomery County
JOB NAME: Deer Creek Str. & Apprs. (S)
Route 27 Section 7
STATION: 111+58
LOCATION: C.L. Construction
LOGGED BY: Steve Faulkner

DATE: January 31, 2018
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 1779
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 34.3

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.	% T C R	% R Q D
			SURFACE ELEVATION: 572.8									
			SHALE - Weathered, Soft, Brown and Gray (No Recovery)									
			SHALE - Slightly Weathered, Hard, Steeply Dipping, Dark Gray								72	16
5			SHALE - Unweathered, Hard, Steeply Dipping, Frequent Fractures, Frequent Quartz Seams, Dark Gray								84	14
10			SHALE - Unweathered, Hard with Very Hard Layers, Steeply Dipping, Frequent Fractures, Frequent Slickensides, Frequent Calcite and Quartz Seams, Dark Gray								90	50
15											94	56
20											98	92
25			SHALE - Unweathered, Hard with Very Hard Layers, Steeply Dipping, Frequent Slickensides, Frequent Calcite and Quartz Seams and Layers, Dark Gray								98	72
30			SHALE - Unweathered, Very Hard, Steeply Dipping, Frequent Slickensides, Dark Gray								90	80
35			CHERT - Unweathered, Hard, Steeply Dipping,									

REMARKS: Lat/Long: 34.651239, -93.533181

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 1
PAGE 2 OF 2

JOB NO. 080504 Montgomery County
JOB NAME: Deer Creek Str. & Apprs. (S)
Route 27 Section 7
STATION: 111+58
LOCATION: C.L. Construction
LOGGED BY: Steve Faulkner

DATE: January 31, 2018
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 1779
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 34.3

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.	% T C R	% R Q D
			SURFACE ELEVATION: 572.8									
			Gray									
			Boring Terminated									
40												
45												
50												
55												
60												
65												
70												

REMARKS: Lat/Long: 34.651239, -93.533181

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 2
PAGE 1 OF 2

JOB NO. 080504 Montgomery County
JOB NAME: Deer Creek Str. & Apprs. (S)
Route 27 Section 7
STATION: 112+28
LOCATION: C.L. Construction
LOGGED BY: Steve Faulkner

DATE: January 30, 2018
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 1779
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 38.9

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.	% T C R	% R Q D
			SURFACE ELEVATION: 572.9									
			Clay with Gravel (Rock Fragments)									
5			SHALE - Highly Weathered, Soft, Dark Gray							20 32-23		
			SHALE - Weathered, Medium Hard, Dark Gray*								7	0
10			SHALE - Slightly Weathered, Hard, Steeply Dipping, Occasional Fractures, Frequent Calcite and Quartz Seams, Dark Gray								90	28
15			SHALE - Unweathered, Hard, Steeply Dipping, Frequent Fractures, Frequent Quartz Seams, Dark Gray								100	64
20			SHALE - Unweathered, Hard, Steeply Dipping, Frequent Fractures, Frequent Quartz Seams, Dark Gray								98	56
25			SHALE - Unweathered, Hard, Steeply Dipping, Frequent Fractures, Frequent Quartz Seams, Dark Gray								99	62
30			SHALE - Unweathered, Hard, Steeply Dipping, Occasional Fractures, Frequent Quartz Seams, Dark Gray								90	62
35												

REMARKS: Water encountered at 4.5' below ground level. Lat/Long: 34.651644, -93.533241

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 2
PAGE 2 OF 2

JOB NO. 080504 Montgomery County
JOB NAME: Deer Creek Str. & Apprs. (S)
Route 27 Section 7
STATION: 112+28
LOCATION: C.L. Construction
LOGGED BY: Steve Faulkner

DATE: January 30, 2018
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 1779
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 38.9

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.	% T C R	% R Q D
			SURFACE ELEVATION: 572.9									
											94	64
40			Boring Terminated									
45												
50												
55												
60												
65												
70												

REMARKS: Water encountered at 4.5' below ground level. Lat/Long: 34.651644, -93.533241

**ARKANSAS DEPARTMENT OF TRANSPORTATION
MATERIALS DIVISION - GEOTECHNICAL SEC.**

BORING NO. 3
PAGE 1 OF 1

JOB NO. 080504 Montgomery County
JOB NAME: Deer Creek Str. & Apprs. (S)
Route 27 Section 7
STATION: 112+98
LOCATION: 3' Left of C.L. Construction
LOGGED BY: Stanley Bates

DATE: January 24, 2018
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 1779
HAMMER CORRECTION FACTOR: N/A

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.	% T C R	% R Q D
			SURFACE ELEVATION: 576.7									
			Ne Recovery*									
5			SHALE - Weathered, Medium Hard, Dark Gray							51 60 (3")		
			Shale - Weathered, Medium Hard, Steeply Dipping, Dark Gray								67	0
10			Shale - Unweathered, Hard, Frequent Fractures, Steeply Dipping, Dark Gray								48	0
15			Shale - Unweathered, Hard, Frequent Fractures, Steeply Dipping, Occasional Quartz Seams, Dark Gray								82	15
20			Shale - Unweathered, Hard, Steeply Dipping, Occasional Fractures, Frequent Calcite and Quartz Seams and Layers, Dark Gray								92	0
25			Shale - Unweathered, Hard, Steeply Dipping, Occasional Fractures, Frequent Calcite and Quartz Seams and Layers, Dark Gray								96	66
30			Boring Terminated									
35												

REMARKS: * Water was encountered at 3.9' below ground level. Lat/Long: 34.651644, -93.533241



ARKANSAS DEPARTMENT OF TRANSPORTATION

ARDOT.gov | IDriveArkansas.com | Scott E. Bennett, P.E., Director

MATERIALS DIVISION

11301 West Baseline Road | P.O. Box 2261 | Little Rock, AR 72203-2261 | Phone: 501.569.2185 | Fax: 501.569.2368

August 24, 2017

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 080504
Deer Creek Str. & Apprs. (S)
Route 27 Section 7
Montgomery 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 Deer Creek on new location. 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 clayey sands with varying amounts of shale. Cross-sections are not currently available, but it is assumed the construction grade line will closely match that of the existing roadway. The subgrade soils are expected to provide a stable working platform with normal drying and compactive effort, if the weather is favorable during construction. Rock was encountered at station 102+00, 6 feet right of centerline at a depth of 3.0 feet.

Additional earthwork recommendations will be made upon request when plans are further developed and cross sections are available.

Listed below is the additional information requested for use in developing the plans:

1. The Qualified Products List (QPL) indicates that Aggregate Base Course (Class CL-7) is available from commercial producers located in the vicinity Bismarck.
2. Asphalt Concrete Hot Mix

PG 64-22		
Type	Asphalt Cement %	Mineral Aggregate %
Surface Course	5.5	94.5
Binder Course	4.4	95.6
Base Course	4.0	96.0

PG 70-22		
Type	Asphalt Cement %	Mineral Aggregate %
Surface Course	5.5	94.5
Binder Course	4.5	95.5
Base Course	4.0	96.0

Job 080504
August 25, 2017

PG 76-22		
Type	Asphalt Cement %	Mineral Aggregate %
Surface Course	5.4	94.6
Binder Course	4.3	95.7
Base Course	3.8	96.2



Michael C. Benson
Materials Engineer

MCB:pt:bjj
Attachment

cc: State Constr. Eng. – Master File Copy
District 8 Engineer
System Information and Research 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 - 08/18/2017
JOB NUMBER - 080504

SEQUENCE NO. - 1
MATERIAL CODE - SSRV
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 49
DISTRICT NO. - 06

JOB NAME - DEER CREEK STR. & APPRS. (S)

* STATION LIMITS R-VALUE AT 240 psi *

BEGIN JOB - END JOB 14

RESILIENT MODULUS
STA. 102+00 11281

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.	080504	Material Code	SSRVPS
Date Sampled:	7/18/17	Station No.:	102+00
Date Tested:	August 11, 2017	Location:	30'RT
Name of Project:	DEER CREEK STR. & APPRS. (S)		
County:	Code: 49	Name:	MONTGOMERY
Sampled By:	BATES/JORDAN	Depth:	0-5
Lab No.:	20172450	AASHTO Class:	A-6(32)
Sample ID:	RV486	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	3.95
Middle	3.95
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):	3203.30
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4. Soil Properties:

Optimum Moisture Content (%):	16.3
Maximum Dry Density (pcf):	111.3
95% of MDD (pcf):	105.7
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3203.30
Compaction Moisture content (%):	16.6
Compaction Wet Density (pcf):	124.79
Compaction Dry Density (pcf):	107.03
Moisture Content After Mr Test (%):	16.4

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

#VALUE!

7. Resilient Modulus, Mr:

17790(Sc)^{-0.27240}(S3)^{0.21340}

8. Comments

9. Tested By:

GW

Date: August 11, 2017

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

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

Job No. 080504 **Material Code** SSRVPS
Date Sampled: 7/18/17 **Station No.:** 102+00
Date Tested: August 11, 2017 **Location:** 30'RT
Name of Project: DEER CREEK STR. & APPRS. (S)
County: Code: 49 **Name:** MONTGOMERY
Sampled By: BATES/JORDAN **Depth:** 0-5
Lab No.: 20172450 **AASHTO Class:** A-6(32)
Sample ID: RV486 **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 _{cyclic} psi	P _{max} lbs	P _{cyclic} lbs	P _{contact} lbs	S _{max} psi	S _{cyclic} psi	S _{contact} psi	H _{avg} in	ε _r in/in	M _r psi
Sequence 1	6.0	2.0	25.3	22.5	2.8	2.1	1.9	0.2	0.00070	0.00009	21,314
Sequence 2	6.0	4.0	47.6	44.8	2.8	3.9	3.7	0.2	0.00152	0.00019	19,413
Sequence 3	6.0	6.0	70.4	66.8	3.6	5.8	5.5	0.3	0.00254	0.00032	17,355
Sequence 4	6.0	8.0	94.0	87.9	6.0	7.7	7.2	0.5	0.00384	0.00048	15,115
Sequence 5	6.0	10.0	116.7	108.3	8.5	9.6	8.9	0.7	0.00524	0.00065	13,617
Sequence 6	4.0	2.0	25.3	22.5	2.8	2.1	1.8	0.2	0.00076	0.00010	19,433
Sequence 7	4.0	4.0	47.4	44.6	2.8	3.9	3.7	0.2	0.00169	0.00021	17,408
Sequence 8	4.0	6.0	69.0	66.3	2.8	5.7	5.4	0.2	0.00282	0.00035	15,481
Sequence 9	4.0	8.0	92.2	87.0	5.1	7.6	7.1	0.4	0.00417	0.00052	13,770
Sequence 10	4.0	10.0	115.6	108.0	7.6	9.5	8.9	0.6	0.00562	0.00070	12,680
Sequence 11	2.0	2.0	25.2	22.4	2.7	2.1	1.8	0.2	0.00087	0.00011	17,028
Sequence 12	2.0	4.0	47.0	44.3	2.8	3.9	3.6	0.2	0.00196	0.00024	14,921
Sequence 13	2.0	6.0	68.3	65.5	2.8	5.6	5.4	0.2	0.00324	0.00040	13,330
Sequence 14	2.0	8.0	90.4	86.2	4.2	7.4	7.1	0.3	0.00469	0.00058	12,117
Sequence 15	2.0	10.0	112.9	106.3	6.6	9.3	8.7	0.5	0.00621	0.00077	11,281

TESTED BY _____ **DATE** August 11, 2017
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. 080504 Material Code SSRVPS
Date Sampled: 7/18/17 Station No.: 102+00
Date Tested: August 11, 2017 Location: 30'RT
Name of Project: DEER CREEK STR. & APPRS. (S)
County: Code: 49 Name: MONTGOMERY
Sampled By: BATES/JORDAN Depth: 0-5
Lab No.: 20172450 AASHTO Class: A-6(32)
Sample ID: RV486 Material Type (1 or 2): 2
LATITUDE: LONGITUDE:

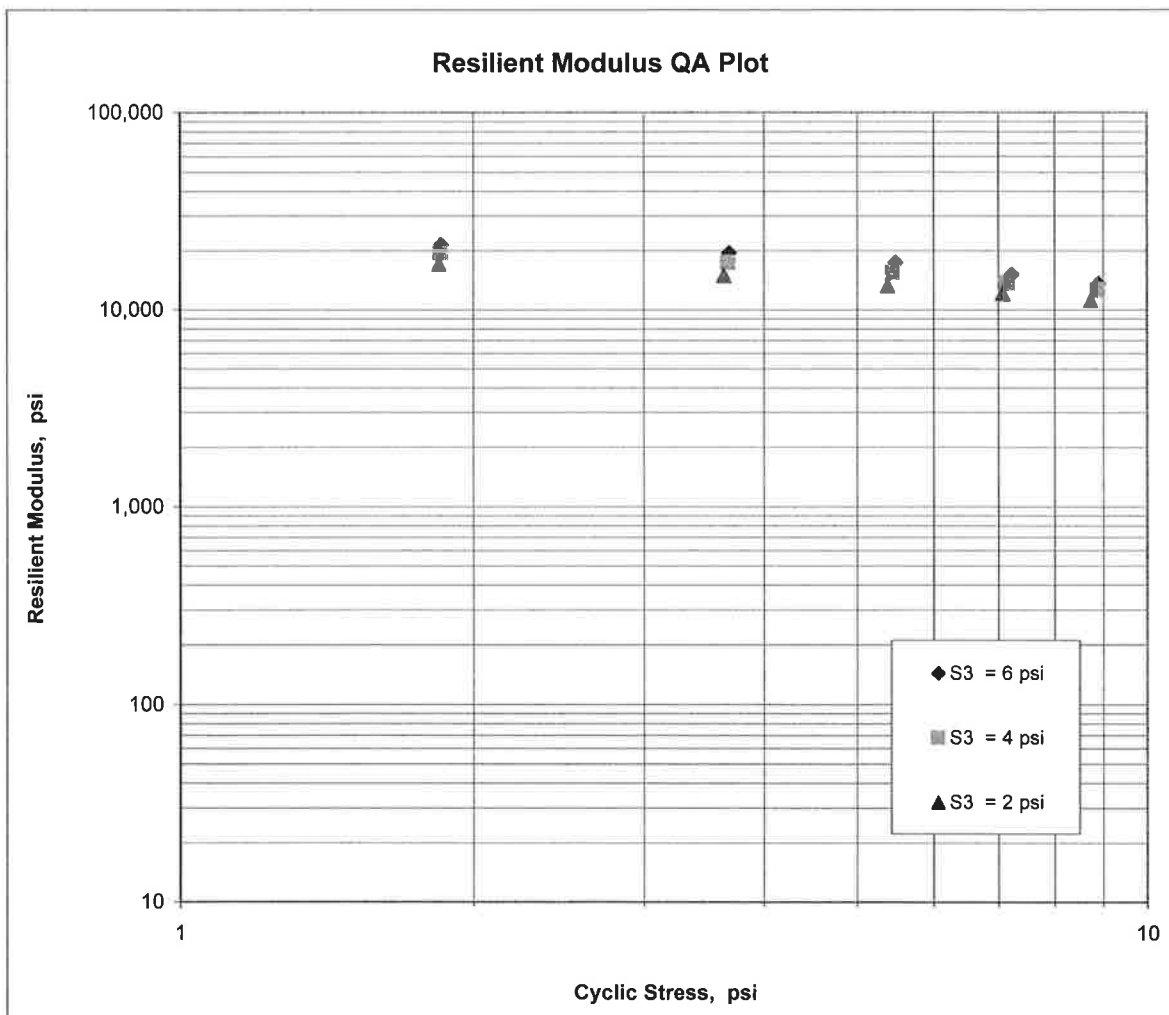
$$M_R = K_1 (S_c)^{K_2} (S_3)^{K_5}$$

$$K_1 = \frac{17,790}{\quad}$$

$$K_2 = \frac{-0.27240}{\quad}$$

$$K_5 = \frac{0.21340}{\quad}$$

$$R^2 = \frac{0.96}{\quad}$$



JOB: 080504

Arkansas State Highway Transportation Department

JOB NAME: DEER CREEK STR. & APPRS.(S)

Materials Division

COUNTY NO. 49 DATE TESTED 8/1/2017

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				
102+00	30 RT	0-5	RD/BR	83	71	56	49	43	38	16	A-6(32)	RV486	
102+00	06 RT	0-3Z	RD/BR	82	66	54	48	40	32	10	A-4(0)	S482	13.1
102+00	21 RT	0-5	RD/BR	78	68	54	48	44	33	14	A-6(2)	S483	12.1
119+00	06 LT	0-5	BR/GR	91	81	64	59	55	30	10	A-4(3)	S484	22.8
119+00	19 LT	0-5	BROWN	83	69	53	47	43	31	12	A-6(2)	S485	12.9

comments: W=MULTIPLE LAYERS, X=STRIPPED, Z=AUGER REFUSAL

Monday, August 21, 2017

JOB: 080504

Arkansas State Highway Transportation Department

DATE TESTED

JOB NAME: DEER CREEK STR. & APPRS.(S)

Materials Division

8/1/2017

COUNTY NO. 49

Michael Benson, Materials Engineer

STA.# LOC.

PAVEMENT SOUNDINGS

STA.#	LOC.	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	TEST 6	TEST 7	TEST 8
102+00	06 RT	ACHMSC 3.0W	ACHMSC 1.0X	ACHMSC 2.0	ACHMSC 1.0X	ACHMSC 1.5	ACHMBC --	AGG.BASE CRS C 7.0	
102+00	21 RT	ACHMSC --	ACHMSC --	ACHMSC --	ACHMSC --	ACHMSC --	ACHMBC --	AGG.BASE CRS C --	
119+00	06 LT	ACHMSC 2.5	ACHMSC 0.5X	ACHMSC 4.0W	ACHMSC --	ACHMSC --	ACHMBC 3.0W	AGG.BASE CRS C 6.0	

Comments: W=MULTIPLE LAYERS, X=STRIPPED, Z=AUGER REFUSAL

Monday, August 21, 2017

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

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE	- 08/21/17	SEQUENCE NO.	- 1
JOB NUMBER	- 080504	MATERIAL CODE	- SSRVPS
FEDERAL AID NO.	- TO BE ASSIGNED	SPEC. YEAR	- 2014
PURPOSE	- SOIL SURVEY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	- NO SPECIFICATION CHECK	COUNTY/STATE	- 49
SUPPLIER NAME	- STATE	DISTRICT NO.	- 06
NAME OF PROJECT	- DEER CREEK STR. & APPRS. (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- MONTGOMERY, COUNTY	DATE SAMPLED	- 07/18/17
SAMPLED BY	- BATES/JORDAN	DATE RECEIVED	- 07/25/17
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 08/01/17
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAB NUMBER	- 20172446	- 20172447	- 20172448
SAMPLE ID	- S482	- S483	- S484
TEST STATUS	- INFORMATION ONLY	- INFORMATION ONLY	- INFORMATION ONLY
STATION	- 102+00	- 102+00	- 119+00
LOCATION	- 06 RT	- 21 RT	- 06 LT
DEPTH IN FEET	- 0-3Z	- 0-5	- 0-5
MAT'L COLOR	- RD/BR	- RD/BR	- BR/GR
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 34 38 55.20	- 34 38 55.20	- 34 39 11.70
LONGITUDE DEG-MIN-SEC	- 93 32 1.30	- 93 32 1.20	- 93 32 1.30
% PASSING			
2 IN.	-	-	-
1 1/2 IN.	-	-	-
3/4 IN.	- 100	- 100	- 100
3/8 IN.	- 98	- 90	- 96
NO. 4	- 82	- 78	- 91
NO. 10	- 66	- 68	- 81
NO. 40	- 54	- 54	- 64
NO. 80	- 48	- 48	- 59
NO. 200	- 40	- 44	- 55
LIQUID LIMIT	- 32	- 33	- 30
PLASTICITY INDEX	- 10	- 14	- 10
AASHTO SOIL	- A-4 (0)	- A-6 (2)	- A-4 (3)
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 13.1	- 12.1	- 22.8
ACHMSC (IN)	- 3.0W	- --	- 2.5
ACHMSC (IN)	- 1.0X	- --	- 0.5X
ACHMSC (IN)	- 2.0	- --	- 4.0W
ACHMSC (IN)	- 1.0X	- --	- --
ACHMSC (IN)	- 1.5	- --	- --
ACHMBC (IN)	- --	- --	- 3.0W
AGG.BASE CRS CL-7 (IN)	- 7.0	- --	- 6.0
	-	-	-
	-	-	-

REMARKS - W=MULTIPLE LAYERS, X=STRIPPED, Z=AUGER REFUSAL

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

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE	- 08/15/17	SEQUENCE NO.	- 2
JOB NUMBER	- 080504	MATERIAL CODE	- SSRVPS
FEDERAL AID NO.	- TO BE ASSIGNED	SPEC. YEAR	- 2014
PURPOSE	- SOIL SURVEY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	- NO SPECIFICATION CHECK	COUNTY/STATE	- 49
SUPPLIER NAME	- STATE	DISTRICT NO.	- 06
NAME OF PROJECT	- DEER CREEK STR. & APPRS.(S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- MONTGOMERY, COUNTY	DATE SAMPLED	- 07/18/17
SAMPLED BY	- BATES/JORDAN	DATE RECEIVED	- 07/25/17
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 08/01/17
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAD NUMBER	- 20172449	-	-
SAMPLE ID	- S485	-	-
TEST STATUS	- INFORMATION ONLY	-	-
STATION	- 119+00	-	-
LOCATION	- 19 LT	-	-
DEPTH IN FEET	- 0-5	-	-
MAT'L COLOR	- BROWN	-	-
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 34 39 11.60	-	-
LONGITUDE DEG-MIN-SEC	- 93 32 1.30	-	-
% PASSING	2 IN.	-	-
	1 1/2 IN.	-	-
	3/4 IN.	- 100	-
	3/8 IN.	- 97	-
	NO. 4	- 83	-
	NO. 10	- 69	-
	NO. 40	- 53	-
	NO. 80	- 47	-
	NO. 200	- 43	-
LIQUID LIMIT	- 31	-	-
PLASTICITY INDEX	- 12	-	-
AASHTO SOIL	- A-6(2)	-	-
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 12.9	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-

REMARKS - W=MULTIPLE LAYERS, X=STRIPPED, Z=AUGER REFUSAL
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ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE	- 08/15/17	SEQUENCE NO.	- 1
JOB NUMBER	- 080504	MATERIAL CODE	- RV
FEDERAL AID NO.	- TO BE ASSIGNED	SPEC. YEAR	- 2014
PURPOSE	- SOIL SURVEY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	- NO SPECIFICATION CHECK	COUNTY/STATE	- 49
SUPPLIER NAME	- STATE	DISTRICT NO.	- 06
NAME OF PROJECT	- DEER CREEK STR. & APPRS. (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS	DATE SAMPLED	- 07/18/17
LOCATION	- MONTGOMERY, COUNTY	DATE RECEIVED	- 07/25/17
SAMPLED BY	- BATES/JORDAN	DATE TESTED	- 08/01/17
SAMPLE FROM	- TEST HOLE		
MATERIAL DESC.	- SOIL SURVEY - RESISTANCE R-VALUE	ACTUAL RESULTS	

LAB NUMBER	- 20172450	-	-
SAMPLE ID	- RV486	-	-
TEST STATUS	- INFORMATION ONLY	-	-
STATION	- 102+00	-	-
LOCATION	- 30 RT	-	-
DEPTH IN FEET	- 0-5	-	-
MAT'L COLOR	- RD/BR	-	-
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 34 38 55.10	-	-
LONGITUDE DEG-MIN-SEC	- 93 32 1.10	-	-
% PASSING			
	2 IN.	-	-
	1 1/2 IN.	-	-
	3/4 IN.	- 100	-
	3/8 IN.	- 94	-
	NO. 4	- 83	-
	NO. 10	- 71	-
	NO. 40	- 56	-
	NO. 80	- 49	-
	NO. 200	- 43	-
LIQUID LIMIT	- 38	-	-
PLASTICITY INDEX	- 16	-	-
AASHTO SOIL	- A-6 (32)	-	-
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-

REMARKS - W=MULTIPLE LAYERS, X=STRIPPED, Z=AUGER REFUSAL

AASHTO TESTS : T24 T88 T89 T90 T265