ARKANSAS DEPARTMENT OF TRANSPORTATION

SUBSURFACE INVESTIGATION

STATE JOB NO. 090623

FEDERAL AID PROJECT NO. ER-0044(37)

HWY. 295 SLIDE REPAIRS (MADISON CO.) (S)

STATE HIGHWAY 295 **SECTION** 0

IN MADISON **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

May 10, 2016

TO: Mr. Steve Lawrence, District 9 Engineer

SUBJECT: Internal Job No. D09220
Highway 295 Slide
Route 295, Section 0, L.M. 1.20
Madison County

The Geotechnical Section conducted a subsurface investigation for the embankment failure south of Elkins on Highway 295, Section 0, Log Mile 1.20. Due to heavy rain events the slope on the south side of the roadway has moved, causing the southbound lane to drop several inches and large tension cracks to develop in the roadway. This resulted in the southbound lane being closed to traffic.

Two borings were completed in southbound travel lane to determine the existing soil conditions and depth to bedrock. The boring logs have been attached and all stationing was based on cross-sections provided by District 9 personnel.

It is recommended that a rock buttress be constructed to support the existing roadway. The repair should be made to establish the original driving lane configuration. All failed material should be excavated for the total width of the failure, approximately 110 feet, on a 1H:1V slope from the centerline of the existing highway down to competent Shale at approximate elevation 1781, based on the cross-sections provided. The embankment should be reconstructed with Rock Fill.

The recommended configuration of the buttress should consist of a minimum top width of 14 feet to provide adequate stability to the remaining roadway segment and a width to re-establish the southbound travel lane and shoulder. The front face of the buttress should be constructed on a maximum 1.5H:1V slope. The buttress design is based on a drained condition for the full depth of the rock buttress. Therefore, positive drainage must be established at the base of the buttress either by leaving rock exposed or installing pipe drains. Figure 1 illustrates the proposed cross-section.

In addition to the slide repair construction, cross drains should be inspected and replaced if required to provide positive drainage without leakage.

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

Michael C. Benson
Materials Engineer

MCB:rpt:mlg
cc: State Maintenance Engineer
G.C. File

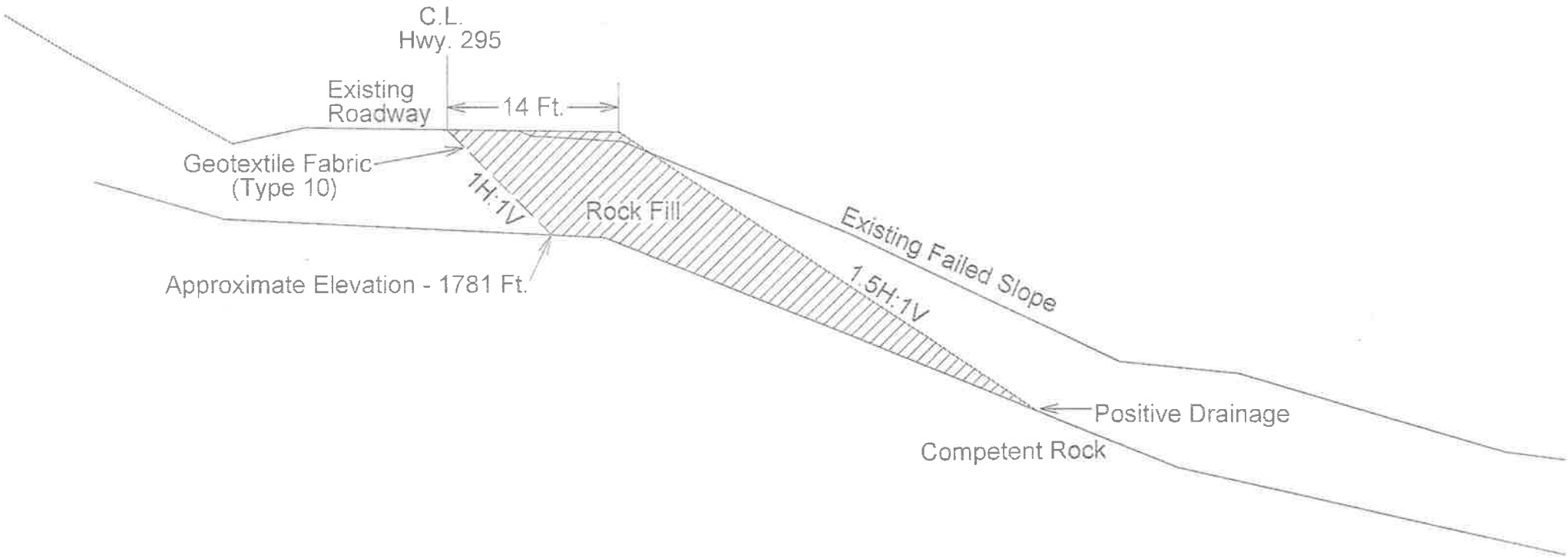


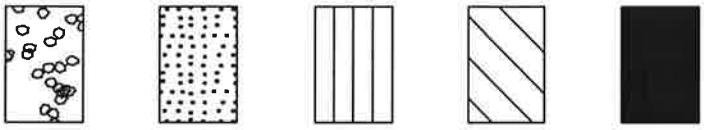
Figure 1 - Rock Buttress

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

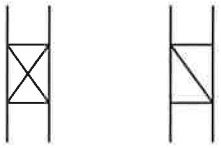
SAMPLER TYPES

(SHOWN IN SAMPLE COLUMN)

SHELBY TUBE

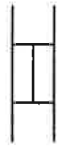
UNDISTURBED SAMPLE RECOVERY | DISTURBED SAMPLE RECOVERY | NO RECOVERY

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 1

JOB NO. D09220 Madison County
JOB NAME: HWY 295 Slide
L.M. 1.20
STATION: 19+68
LOCATION: 7' Right of Centerline
LOGGED BY: Troy Frazier

DATE: March 22, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 31.8

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 1797.3	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	DRY WEIGHT LBS PER CU.FT.	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
			Asphalt								
5		X	Moist, Medium Stiff, Brown Sandy Clay with Some Gravel (Rock Fragments)						4 4-3		
10		X	Moist, Very Stiff, Brown Sandy Clay with Some Gravel (Shale Fragments)						5 8-10		
15		X	SHALE - Weathered, Medium Hard, Dark Gray						35 12 (1")	92	92
20			SHALE - Slightly Weathered, Medium Hard, Dark Gray							96	83
25										80	60
30			SHALE - Unweathered, Medium Hard, Dark Gray							98	98
35			Boring Terminated								

REMARKS:

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

BORING NO. 2
PAGE 1 OF 1

JOB NO. D09220 Madison County
JOB NAME: HWY 295 Slide
L.M. 1.20
STATION: 20+57
LOCATION: 9' Right of Centerline
LOGGED BY: Troy Frazier

DATE: March 22, 2016
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: CME 75

HAMMER CORRECTION FACTOR: 1.37

COMPLETION DEPTH: 32.7

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: 1798.2								
			Asphalt								
5			Moist, Medium Stiff, Brown Clay with Sand and Trace Gravel (Rock Fragments)*						2 3-3		
10			SHALE - Highly Weathered, Soft, Dark Gray						13 20-30		
15									13 20-30		
			SHALE - Highly Weathered, Soft, Dark Gray							33	0
			SHALE - Weathered, Medium Hard, Dark Gray								
20										74	68
25			SHALE - Unweathered, Medium Hard, Dark Gray							100	80
30										99	88
35			Boring Terminated								

REMARKS: * Wet stratum encountered from 6.2 to 6.4 feet below ground level.