

SUBSURFACE INVESTIGATION

STATE JOB NO		040861	
FEDERAL AID PROJEC	CT NO.	STPF-91177(10)	
Н	WY. 10 – HWY.	. 96 (GREENWOOD BYPA	SS) (S)
STATE HIGHWAY	10	SECTION	0 & 1
IN		SEBASTIAN	COUNTY

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



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MATERIALS DIVISION

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August 9, 2023

TO: Mr. Rick Ellis, Bridge Engineer

SUBJECT: Job No. 040861

Sites 1, 4 and 5

Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S)

Sebastian County Route 10, Sections 0 & 1

Introduction

Submitted herein are the results of the subsurface investigation and geotechnical recommendations for the proposed bridges at Site 1, Site 4 and Site 5 planned on Arkansas Highway 10 in Sebastian County. Recommendations for Site 2 and Site 3 have been provided in a separate report dated August 1, 2023. The three (3) bridges included in this submittal are comprised of:

- Site 1 (Highway 10 Replacement Bridge over Heartsill Creek): five (5)-span, continuous W-beam unit with a structure length of 391 feet and out-to-out width of 73.5 feet; 2H:1V fill end slopes and 3H:1V fill side slopes (maximum 13 feet tall) at both bridge abutments.
- Site 4 (Highway 10 Replacement Bridge over Heartsill Creek): five (5)-span, continuous W-beam unit with a structure length of 345 feet and out-to-out width of 63 feet; 2H:1V cut end and side slopes (maximum 17 feet tall) at both bridge abutments.
- Site 5 (Highway 10 Bridge over Vache Grasse Creek): three (3)-span, continuous plate girder unit with a structure length of 260 feet and out-to-out width of 63 feet; 2H:1V fill end slopes and 3H:1V fill side slopes (maximum 16 feet tall) at both bridge abutments.

It is understood steel HP14x117 are tentatively planned at the abutment bents of each bridge and HP16x121 piles are planned at the intermediate bents of the bridges.

Field Investigation

Request for Subsurface Investigation was received on January 27, 2023 to develop recommendations for bridge foundations and to verify suitability of bridge abutment slope configurations. Borings were drilled at accessible locations based on the Request for Subsurface Investigation memo. The approximate locations of the borings are presented in the Plan of Borings included in Attachments A1, A4 and A5 for Sites 1, 4 and 5, respectively.

The borings were advanced with a track-mounted Acker Renegade rotary drill rig using a combination of hollow-stem auger and diamond core method. The boring logs, showing the subsurface conditions encountered in the borings and the results of field and laboratory tests, are also included in Attachments A1, A4 and A5, immediately following the corresponding Plans of Borings. A Legend is included with the boring logs to interpret / explain the symbols, terms, and



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conventions used on logs. Standard Penetration Tests (SPT) were conducted in accordance with ASTM D1586 for field testing and soil sampling. Liners were not used inside the standard split-barrel samplers. Drill rig hammer correction factor is shown on the logs.

The number of blows required to drive the standard split-barrel sampler for each 6-inch penetration of the total 18-inch drive are shown on the logs. SPT N-values are defined as the number of blows required to advance the split barrel the final 12 inches. The SPT N-values indicated on the logs are raw (uncorrected) blow counts as measured in the field.

Core samples of bedrock were retrieved by using NQ3-size triple-tube core barrels (rock core diameter of 1-3/4 in. and hole diameter of 3 in.). For each core run, Rock Quality Designation (RQD) was determined in the field by a logger and further evaluated by a licensed Professional Geologist (PG). RQD, expressed in percent, is defined as the sum of the intact core pieces that are longer than 4 inches divided by the total length of the core run. The RQD of each core run is indicated on each corresponding log. Core pictures for Sites 1, 4 and 5 are also included in Attachments A1, A4 and A5, respectively, following the corresponding boring logs. Groundwater observations were noted on the logs.

Lab Investigation

All samples were brought to the Materials Division laboratory for further evaluation and testing. Soil samples were tested to evaluate index and engineering properties and to verify soil type and classification. Lab tests were performed on representative soil samples to determine moisture content, Atterberg limits, and gradation. Tested soils were classified by licensed PG in accordance with both USCS and AASHTO soil classification systems. Laboratory pH and soil electrical resistivity tests were also performed on representative soil samples to evaluate the corrosion potential of the subsurface soils on steel piles.

Rock cores were first examined by a licensed PG to verify Total Core Recovery (TCR) and Rock Quality Designation (RQD) measured in field and to obtain parameters for determination of Geological Strength Index (GSI) and Rock Mass Rating (RMR). Compressive strength of rock cores was then determined by laboratory uniaxial compressive test on intact rock cores in accordance with ASTM D7012, Method C.

The results of laboratory tests are either shown on corresponding logs or presented in Attachments B1, B4 and B5 for Sites 1, 4 and 5, respectively. The laboratory tests and their corresponding ASTM and/or AASHTO test methods are listed in Tables 1a and 1b for soil index property tests and other tests, respectively.

Table 1a: Summary of Laboratory Tests and Methods – Soil Index Properties

Laboratory Test	ASTM	AASHTO	Denotation on Logs
Moisture Content	D2216	T 265	Solid Circle Symbol (●)
Grain Size Analysis by Sieving	D6913	T 88	Whole Number in the "- No. 200 %" Column (e.g., 12)
A 11 - 1 1 - 1 1 - 1	D4040	T 89	Plus Sign (+) on the Right for Liquid Limit
Atterberg Limits	D4318	T 90	Plus Sign (+) on the Left for Plastic Limit



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Table 1b: Summary of Laboratory Tests and Methods - Corrosion Potential and Rock Strength

Laboratory Test	ASTM	AASHTO	Presentation
pH of Soil	D4972	T 289	
Soil Electrical Resistivity	G57	T 288	Presented in Attachment B1, B4, and B5
Uniaxial	D7012,		for Sites 1, 4 and 5, respectively
Compression of	Method		
Rock Cores	С		

The particle size through which 50% of particles by weight passing, D_{50} , is summarized below in Table 2.

Table 2: Summary of D₅₀ for Scour Analysis

Site No.	Hydraulic Feature Name	Station	Sample Type	Location	D ₅₀ , mm
1, 2, 4	Heartsill Creek	505+72, 16 Lt.	Bulk	Creek Bank	< 0.075
3, 5	Vache Grasse Creek	522+14, 92 Rt.	Bulk	Creek Bank	< 0.075

Site Conditions and Site Geology

Site conditions and site geology for all five (5) sites have been discussed in the prior report for Sites 2 and 3 dated August 1, 2023. Site pictures are included in Attachments C1, C4 and C5 for Sites 1, 4 and 5 respectively.

Generalized Subsurface Conditions

To aid in visualizing subsurface conditions and stratigraphy, Generalized Subsurface Profiles are included in Attachments D1, D4 and D5 for Sites 1, 4 and 5, respectively. The horizontal axis represents stationing in feet while the vertical axis denotes elevation in feet. To fit borings, the drawings are not to scale though they are proportional in both horizontal direction and vertical direction.

The Generalized Subsurface Profiles divide the subsurface geotechnical materials into three (3) generalized strata: I. Overburden Soils; II. Incompetent Rock (highly weathered to weathered rock); and III. Competent Rock (slightly weathered to unweathered rock). The estimated elevation of the competent rock, as revealed by the borings, are indicated on the subsurface profiles. These elevations are also summarized below in Tables 3a, 3b and 3c, respectively. In light of the natural variations in stratigraphy and subsurface conditions, deviation from those illustrated on the profiles must be anticipated.



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Table 3a: Estimated Elevation of Competent Rock - Site 1

Boring No.	Boring Location	Ground Surf. Elev.@ Boring Location, ft.	Depth to Competent Rock, ft.	Estimated Elev. of Competent Rock, ft.
1	Sta. 207+68, 34 Rt.	485.9	15.9	470.0
2	Sta. 207+86, 34 Lt.	487.2	20.0	467.2
3	Sta.208+41, 27 Rt.	486.7	20.0	466.7
4	Sta. 208+41, 34 Lt.	487.0	15.9	471.1
5	Sta. 209+50, 23 Rt.	483.7	13.2	470.5
6	Sta. 209+62, 34 Lt.	485.2	13.6	471.6
7	Sta. 210+23, 34 Rt.	486.8	15.7	471.1
8	Sta. 210+41, 34 Lt.	487.2	15.4	471.8
9	Sta. 210+92, 34 Rt.	486.8	15.4	471.4
10	Sta. 211+10, 36 Lt.	486.7	13.6	473.1

Table 3b: Estimated Elevation of Competent Rock - Site 4

Boring No.	Boring Location	Ground Surf. Elev.@ Boring Location, ft.	Depth to Competent Rock, ft.	Estimated Elev. of Competent Rock, ft.
1	Sta. 503+96, 45 Rt.	485.0	20.1	464.9
2	Sta. 504+14, 44 Lt.	485.8	20.6	465.2
3	Sta. 504+72, 29 Rt.	483.1	15.8	467.3
4	Sta. 504+73, 29 Lt.	483.3	15.9	467.4
5	Sta. 505+26, 29 Rt.	480.8	19.2	461.6
6	Sta. 505+32, 36 Lt.	481.6	15.4	466.2
7	Sta. 506+07, 30 Rt.	477.8	15.3	462.5
8	Sta. 506+82, 51 Rt.	482.8	20.0	462.8
9	Sta. 507+42, 19 Rt.	490.4	30.0	460.4
10	Sta. 507+58, 20 Lt.	490.2	30.0	460.2



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Table 3c: Estimated Elevation of Competent Rock - Site 5

Boring No.	Boring Location	Ground Surf. Elev.@ Boring Location, ft.	Depth to Competent Rock, ft.	Estimated Elev. of Competent Rock, ft.
1	Sta. 521+23, 50 Rt.	493.0	26.5	466.5
2	Sta. 521+26, 7 Rt.	483.5	20.1	463.4
3	Sta. 521+72, 19 Rt.	484.7	20.0	464.7
4	Sta. 522+98, 33 Lt.	487.4	16.3	471.1
5	Sta. 523+36, 49 Rt.	492.6	18.6	474.0
6	Sta. 523+65, 33 Lt.	488.7	15.0	473.7
7	Sta. 523+80, 49 Rt.	491.4	16.8	474.6

Seismic Conditions

In light of the average subsurface conditions as revealed by the borings, a Seismic Site Class D (Stiff Soil Profile) is calculated for the five (5) project sites. Utilizing the Seismic Site Class D and the mid-point GPS coordinates of the project, the following design peak ground acceleration coefficient (A_S), design short-period spectral acceleration coefficient (A_S), as well as design long-period spectral acceleration coefficient (A_S), are determined. These seismic coefficients are summarized in Table 4. Design Response Spectrum is presented in Attachment E.

Table 4: Summary of Design Ground Motion Acceleration Response Coefficients

Acceleration Coefficient	Value (g)
, toocicration occincion	All Sites (Sites 1 through 5)
A _S (Site PGA)	0.089
S _{DS} (0.2 sec)	0.210
S _{D1} (1 sec)	0.127

For the design long-period spectral acceleration coefficient (S_{D1}) of 0.127, a Seismic Performance Zone 1 is considered applicable to the five (5) bridge sites.

Approach Embankments

<u>Settlement Potential and Ground Improvements</u> Design drawings provided by Bridge Division indicate up to 13 feet of fill will be placed at the bridge abutments of Site 1 and up to 16 feet of fill will be placed at Site 5 bridge abutments. Up to 17 feet of cut will be performed at the bridge abutments of Site 4. Based on the results of the borings performed at these bridge abutments, the subsurface soils are either granular soils or low-plasticity lean clay or silty clay. Consequently, settlement is expected to be predominantly immediate, elastic deformation that will be completed during the embankment construction phase.

The surface and near-surface soils at the planned fill slope abutments are weak and unstable. To provide a stable construction platform and to improve embankment stability, it is recommended the subgrade at the bridge abutments where fill slopes are planned (i.e., Bents 1



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and 6 of Site 1 and Bents 1 and 4 of Site 5) be undercut at least 5 feet below the existing ground surface. For each fill slope abutment, undercut should extend at least 5 feet in front of the toe of the end slope, 5 feet beyond the toes of the side slopes, and 100 feet behind the crest of the end slope.

Bent 1 of Site 1 is planned in a pond / swampy area. In addition to the aforementioned undercut requirements, the entire embankment footprint within the pond area and the zone 5 feet outside the embankment footprint should be undercut at least 5 feet below the existing ground surface.

Undercut should be backfilled with Rock Fill. A project Special Provision for Rock Fill is included in Attachment F. Aggregate Base Coarse (Class 7), in accordance with ARDOT Standard Specifications Section 303, should be utilized in areas where piling is planned.

Embankment Stability Stability analyses have been performed to evaluate the design abutment configuration. Slope stability analyses were performed utilizing a commercial computer program Slide2 (Version 2021) developed by RocScience. Spencer analysis method was utilized to analyze the more critical 2H:1V end slopes at the abutments. Three (3) general loading conditions were analyzed with respect to slope stability: Short Term/End of Construction Condition, Long Term Condition, and Seismic/Pseudo-Static Condition. A horizontal acceleration coefficient (K_h) of 0.045 (0.5 A_s /g) was utilized for analysis of the Seismic/Pseudo-Static Condition. A surcharge of 250 psf is included to model the live load under long term conditions.

The results of the analyses are presented in Tables 5a, 5b and 5c for Sites 1, 4 and 5, respectively. The graphic results of slope stability analyses are shown in Attachments G1, G2 and G5 for Sites 1, 4 and 5, respectively.

Undercut and Rock Fill were modeled in stability analyses of Bent 1 of Site 1 where embankment is planned in a lake area. Except for that bent, undercut and Rock Fill were not included in modeling and the analyses of the other embankments are considered conservative. These results of stability analyses indicate the plan abutment configurations are acceptable.

Table 5a: Results of Slope Stability Analyses - Site 1

Slope	Loading Condition	Calculated Minimum Factor of Safety	Recommended Minimum Factor of Safety
2H:1V End Slope -	Short Term	3.9	1.3
Bent 1	Long Term	1.6	1.4
(Embankment)	Seismic $(k_h = 0.045)$	3.4	1.1
2H:1V End Slope -	Short Term	4.4	1.3
Bent 6	Long Term	1.6	1.4
(Embankment)	Seismic (k _h = 0.045)	3.9	1.1



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Table 5b: Results of Slope Stability Analyses - Site 4

Slope	Loading Condition	Calculated Minimum Factor of Safety	Recommended Minimum Factor of Safety
011.47.451.01	Short Term	4.7	1.3
2H:1V End Slope –	Long Term	1.6	1.4
Bent 1 (Cut Slope)	Seismic $(k_h = 0.045)$	3.8	1.1
011 41/5 101	Short Term	3.4	1.3
2H:1V End Slope – Bent 6 (Cut Slope)	Long Term	1.7	1.4
	Seismic (k _h = 0.045)	2.9	1.1

Table 5c: Results of Slope Stability Analyses - Site 5

Slope	Loading Condition	Calculated Minimum Factor of Safety	Recommended Minimum Factor of Safety
2H:1V End Slope –	Short Term	3.2	1.3
Bent 1	Long Term	2.0	1.4
(Embankment)	Seismic $(k_h = 0.045)$	2.8	1.1
2H:1V End Slope -	Short Term	3.5	1.3
Bent 4	Long Term	1.6	1.4
(Embankment)	Seismic $(k_h = 0.045)$	3.1	1.1

Foundation Recommendations

Design and Construction Considerations Based on the most recent plans and discussions with Bridge Division, steel H piles will be utilized to support the foundation loads at all the end and intermediate bents of the bridges. Steel HP14x117 are tentatively planned at the abutment bents while HP16x121 piles are planned at the intermediate bents of the bridges.

Steel H-piles should be driven to practical refusal and should penetrate through embankment fill in the abutment areas, the overburden soils, highly weathered rock (if any) and weathered rock (if any), to bear in the competent slightly weathered to unweathered shale. Preboring is recommended to facilitate socketing the steel H piles into the competent shale as planned by the Structural Engineer. It is recommended prebores extend at least 1 foot below the competent rock surface.

Practical refusal is defined as a maximum penetration of 1.0 inch for 20 blows by a pile hammer. For the purpose of estimating prebore depth and pile length, an additional pile penetration of 6 inches, below the prebored depth, is expected. This estimated additional penetration below the prebored depth is based on the results of the borings and experience with similar foundation rock. The results of the borings indicate moderate to severe driving conditions are to be expected. Consequently, rock points are recommended for all H-piles driven to refusal.

A minimum pile penetration of 10 feet, measured below natural ground surface, is recommended. Based on the results of the borings and the above assumed penetration into the resistant rock, the recommended shallowest prebore elevation and estimated shallowest pile tip



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elevation are summarized in Tables 6a, 6b and 6c for Sites 1, 4 and 5, respectively. Additional pile penetration may be required by lateral resistance as determined by the Structural Engineer.

The elevations summarized in Tables 6a, 6b and 6c are recommended shallowest prebore elevations utilizing boring results and engineering judgement. Actual subsurface conditions can vary from those encountered in the borings. As-constructed prebore elevation and pile tip elevation can vary and must be field verified. Greater pile length/penetration may be warranted by lateral resistance demand and/or by scour requirements.

Table 6a: Recommended Shallowest Prebore Elevation and Pile Tip Elevation – Site 1

Boring No.	Boring Location	Estimated Elev. of Competent Rock, ft.	Recommended Shallowest Prebore Elev., ft.	Expected Additional Penetration below Prebored Elev., ft.
1	Sta. 207+68, 34 Rt.	470.0	469.0	
2	Sta. 207+86, 34 Lt.	467.2	466.2	
3	Sta.208+41, 27 Rt.	466.7	465.7	
4	Sta. 208+41, 34 Lt.	471.1	470.1	
5	Sta. 209+50, 23 Rt.	470.5	469.5	0.5
6	Sta. 209+62, 34 Lt.	471.6	470.6	0.5
7	Sta. 210+23, 34 Rt.	471.1	470.1	
8	Sta. 210+41, 34 Lt.	471.8	470.8	
9	Sta. 210+92, 34 Rt.	471.4	470.4	
10	Sta. 211+10, 36 Lt.	473.1	472.1	

Table 6b: Recommended Shallowest Prebore Elevation and Pile Tip Elevation - Site 4

Boring No.	Boring Location	Estimated Elev. of Competent Rock, ft.	Recommended Shallowest Prebore Elev., ft.	Expected Additional Penetration below Prebored Elev., ft.
1	Sta. 503+96, 45 Rt.	464.9	463.9	
2	Sta. 504+14, 44 Lt.	465.2	464.2	
3	Sta. 504+72, 29 Rt.	467.3	466.3	
4	Sta. 504+73, 29 Lt.	467.4	Shallowest Prebore Elev., ft. Prebored Elev., ft 463.9 464.2	
5	Sta. 505+26, 29 Rt.	461.6	Shallowest Prebore Elev., ft. Penetration below Prebored Elev., ft. Prebored Elev., ft	0.5
6	Sta. 505+32, 36 Lt.	466.2	Shallowest Prebore Elev., ft. Penetration below Prebored Elev., ft. Prebored Elev., ft	0.5
7	Sta. 506+07, 30 Rt.	462.5	Shallowest Prebore Elev., ft. Penetration below Prebored Elev., ft Pre	
8	Sta. 506+82, 51 Rt.	462.8	Shallowest Prebore Elev., ft. Penetration below Prebored Elev., ft. 463.9 464.2 466.3 466.4 460.6 465.2 461.5 461.8 459.4	
9	Sta. 507+42, 19 Rt.	460.4	Prebore Elev., ft. 463.9 464.2 466.3 466.4 460.6 465.2 461.5 461.8 459.4	
10	Sta. 507+58, 20 Lt.	460.2	459.2	



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Table 6c: Recommended Shallowest Prebore Elevation and Pile Tip Elevation - Site 5

Boring No.	Boring Location	Estimated Elev. of Competent Rock, ft.	Recommended Shallowest Prebore Elev., ft.	Expected Additional Penetration below Prebored Elev., ft.
1	Sta. 521+23, 50 Rt.	466.5	465.5	
2	Sta. 521+26, 7 Rt.	463.4	462.4	
3	Sta. 521+72, 19 Rt.	464.7	463.7	
4	Sta. 522+98, 33 Lt.	471.1	Shallowest Prebore Elev., ft. Shallowest Prebore Elev., ft. Prebored Elev., ft. Prebored Elev., ft. Shallowest Prebore Elev., ft. Shallowest Prebored Elev., ft. Shallowest Prebored Elev., ft. Shallowest Prebore Elev., ft. Shallowest Prebore Elev., ft. Shallowest Prebore Elev., ft. Shallowest Prebored Elev., f	0.5
5	Sta. 523+36, 49 Rt.	474.0	Shallowest Prebore Elev., ft. Penetration below Prebored Elev., ft. Prebored Elev., ft	
6	Sta. 523+65, 33 Lt.	473.7	Shallowest Prebore Elev., ft. 465.5 462.4 463.7 470.1 473.0 472.7	
7	Sta. 523+80, 49 Rt.	474.6	473.6	

For steel piling driven to refusal in competent rock, long-term, post-construction settlement is expected to be negligible. It is recommended that wave equation analyses of piles (WEAP) be performed to evaluate suitable hammer system(s) to drive the piles to refusal. The hammer system should be adequately powerful to drive piles to refusal into rock as recommended but without overstressing the piles. At a minimum, two (2) analyses should be performed for each of the bridges included in the project, with a minimum of one (1) analysis performed on the shortest pile and the other on the longest pile.

Coal deposits and existing coal mines were not encountered in the borings. However, multiple abandoned coal mines are mapped surrounding the project location, including a strip mine and two small pits approximately 800 feet south of Site 1. There is a possibility of encountering coal deposits and abandoned coal mines within the project limits. If coal deposits or abandoned coal mines are encountered at the time of construction, preboring should penetrate through the coal deposits or coal mines and should extend at least 1 foot into the competent slightly weathered to unweathered shale.

<u>Axial Pile Capacities</u> Nominal axial resistance of steel H piles driven to refusal in competent rock is governed by the structural capacity of the piles. Therefore, the nominal resistance should be determined by the Structural Engineer utilizing applicable AASHTO LRFD design procedures. It is recommended nominal (ultimate) resistance of steel piles be determined based on the yield strength of steel piles (f_y) and the net cross-sectional area of the steel section (A_s). Selection of structural resistance factor for calculating factored structural bearing resistance of h-piles should be based on the expectation of moderate to severe driving conditions.



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For steel H piles with f_y of 50 ksi, the following allowable structural compression pile capacities are recommended for preliminary design. These allowable capacities include a factor of safety (load factor divided by resistance factor) of 4.0. Use of these allowable capacities as factored structural compression pile capacities are considered conservatively reasonable.

Table 7: Recommended Allowable Structural Compression Pile Capacities - f_y = 50 ksi

	Pile Section	Net Cross-Sectional Area of Steel Section (A _s), in ²	Allowable Structural Compression Pile Capacity (P _{na}), ton
Γ	HP14x117	34.4	215
	HP16x121	35.8	224

Geotechnical Input Parameters for Lateral Load Analysis It is understood lateral load analysis will be performed by the Structural Engineer using commercial computer program LPile/Group. Recommended geotechnical input parameters are included in Attachments H1, H4 and H5 for Sites 1, 4 and 5, respectively.

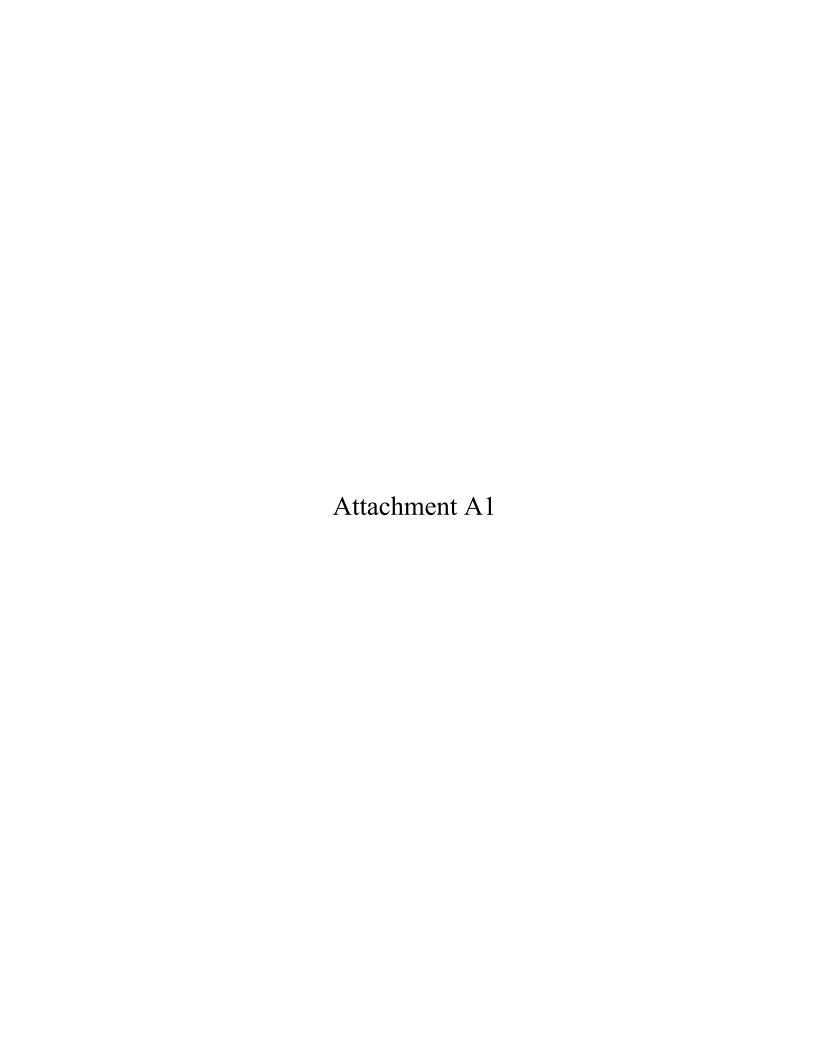
Paul Tinsley

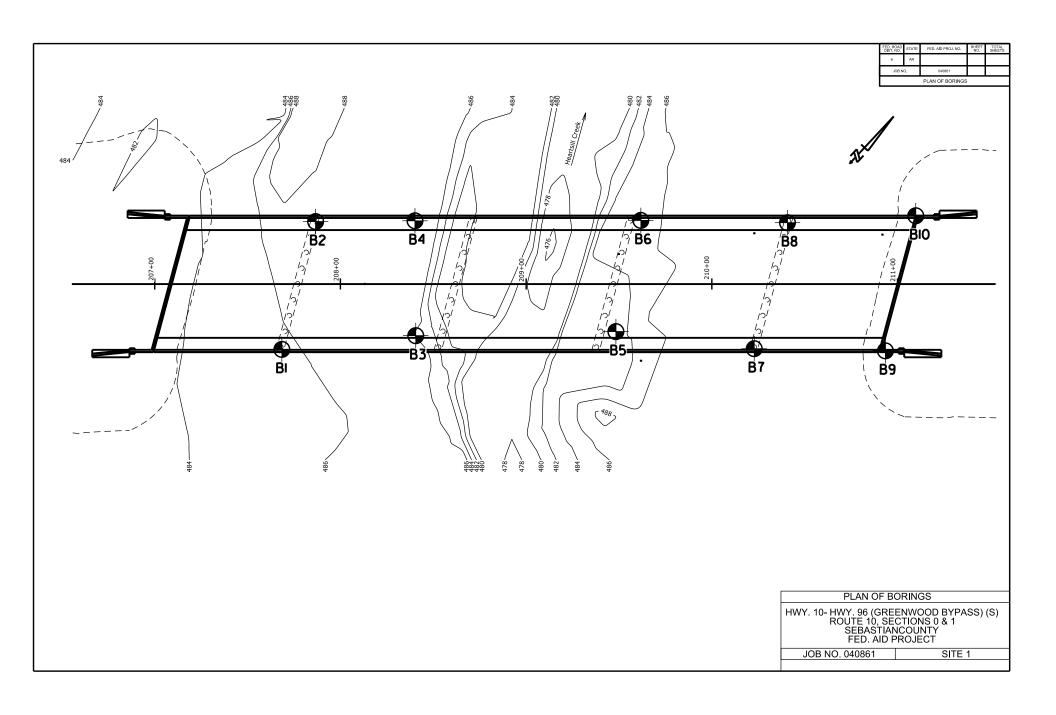
Materials Engineer

PT:dc:yz:mlg:mbb:pwc

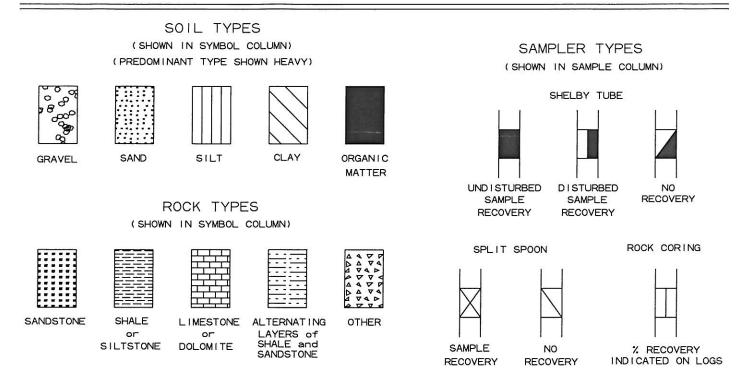
cc: State Construction Engineer

District 4 Engineer





IFGFND



TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANU	LAR SOIL		CLAY	CLA	Y-SHALE		SHALE
'N' Value	Density	'N' Value	Consistency	'N' Value	Consistency	'N' Value	Consistency
0-4 5-10 11-30 31-50 Over 50	Very Loose Loose Medium Dense Dense Very Dense	0-1 2-4 5-8 9-15	Very Soft Soft Medium Stiff Stiff Very Stiff	0-1 2-4 5-8 9-15	Very Soft Soft Medium Stiff Stiff Very Stiff	31-60 Over 60 More than Penetrati	
3751 33	very believe	31-60 Over 60	Hard Very Hard	31-60 Over 60	Hard Very Hard		vs: Medium Hard 2' on

- 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.
- 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 (N₆₀) can be obtained by multiplying N_f by the hammer correction factor published on the boring log.

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 1-B1 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 2 PAGE 1 Sebastian County July 12, 2023 JOB NO. 040861 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 207+68 STATION: EQUIPMENT: Acker 1 LOCATION: 34' Right of Construction Centerline LOGGED BY: Guy King HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 39.9** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. S Е Α Υ % Р M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ GROUP \mathbf{C} В Q Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. S SURFACE ELEVATION: 485.9 30 40 50 Moist, Very Loose, Brown Sandy Silt 2 50 ML2-1 5 41 0 SM 0-0 Wet, Very Loose, Brown Silty Sand* 25 SM3-4 Wet, Loose, Brown Silty Sand 10 15 3 SM 5-7 Wet, Medium Dense, Silty Sand with Gravel (Sandstone Fragments)** 15 SHALE - Highly Weathered, Medium 50 (4")Hard, Gray SHALE - Weathered, Medium Hard, 93 86 \Gray 20 SHALE - Unweathered, Medium Hard, Gray 88 88 25 SHALE - Unweathered with Weathered Layers, Medium Hard, Gray 80 54 SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweatherd, Medium Hard 30 with Hard Layers, Frequent Fractures, Gray 100 62 SHALE - Unweathered, Medium Hard, Frequent Fractues, Gray 35 REMARKS: *A water stratum was encountered at approximately 7.2 feet below ground level (BGL). **Running sand was encountered at approximately 14.1 (BGL)

			DEPARTMENT OF TRANSPORTATI DIVISION - GEOTECHNICAL SEC.	ON				BOF PAC		NO. 2		e 1-E ₹ 2	31			
JOB			040861 Sebastian County					DAT			01		y 12, 2	2023		_
JOB 1		E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)				TYP:	E OF	DRIL	LING		,			
			Route 10, Section 0					Н	ollov	v Ste	em A	uger	- Dia	mond Co	re	
STAT			207+68					EQU	IPME	NT:			Acl	ker 1		
LOC			34' Right of Construction Centerline													
			Guy King ON DEPTH: 39.9					HAN	1MER	COR	REC1	TION I	FACTO	₹: 1.	54	_
	IPLE		DN DEFTH: 39.9										rh			
D E	S	S A											PERCENT PASSING NO. 200 SIEVE	NS.		
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			SHALE INTERBEDDED WITH SANDSTONE - Unweathered,													
			Medium Hard with Hard Layers,												98	98
			Gray													
40			Device Township to 1													
			Boring Terminated													
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45																
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 55																
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60																
 65																
05																
70																
REN	1AR	KS:	*A water stratum was encountered at a sand was encountered at approximate				2 fee	et be	low	grou	ınd l	level	(BGL	.). **Run	ning)

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 1-B2 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 2 PAGE JOB NO. 040861 Sebastian County July 18 and 19, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 207+86 STATION: EQUIPMENT: Acker 1 34' Left of Construction Centerline LOCATION: LOGGED BY: Guy King HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 35** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М T SOIL R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) 0 Ε L PL | FT. SURFACE ELEVATION: 487.2 30 40 50 Moist, Very Stiff, Brown Silty Clay 84 with Sand CL-ML 10-7 5 3 84 CL-ML Wet, Medium Stiff, Brown Silty Clay 3-3 with Sand* 64 CL 5-5 Moist, Stiff, Sandy Lean Clay 10 43 6 SC 8-7 Moist, Medium Dense, Brown Clayey Sand with Some Gravel (Sandstone Fragments) 15 SHALE - Highly Weathered, Medium 50 (10")\Hard, Gray SHALE - Weathered, Medium Hard, Frequent Vertical Fractures, 84 70 Occasional Slickensides, Gray 20 SHALE - Unweathered with Weathered Layers, Medium Hard, 88 66 Gray 25 SHALE INTERBEDDED WITH SANDSTONE - Unweathered with 100 78 Weathered Layers, Medium Hard with Hard Layers, Gray 30 SHALE WITH INTERBEDDED SANDSTONE - Unweathered with Weathered Layers, Medium Hard 100 98 with Hard Layers, Occasional Fractures, Gray** 35 *The water level at a 168 hour reading was 5.4 feet below ground level. **Partial water loss at REMARKS: approximately 33.8 feet below ground level.

			DEPARTMENT OF TRANSPORTATI DIVISION - GEOTECHNICAL SEC.	ON								32			
JOB 1			040861 Sebastian County									8 and 1	9, 2023		-
JOB 1	NAM	E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)						LING	:				
			Route 10, Section 0	AL SEC. PAGE 2 OF 2 July 18 and 19, 2023 TYPE OF DRILLING: Hollow Stem Auger - Diamond Core EQUIPMENT: Acker 1 HAMMER CORRECTION FACTOR: 1.54 ERIAL SOIL GROUP MOISTURE CONTENT (%) MOISTURE CONTENT (%) MOISTURE CONTENT (%) ATE: July 18 and 19, 2023 TYPE OF DRILLING: Hollow Stem Auger - Diamond Core EQUIPMENT: Acker 1 T. T. R. C. Q. R. D.											
STAT			207+86 34' Left of Construction Centerline					EQUIPN	MENT:			Acl	ter 1		
LOCA			Guy King					намм	ER COF	RRECT	ΓΙΟΝ Ί	FACTOR	2∙ 1.	54	
			ON DEPTH: 35												_
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- T	M	P	DESCRIPTION OF MATERIAL									T P4	F BL	T	R
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ΓΕΙV	IAKI	NO.	*The water level at a 168 hour reading approximately 33.8 feet below ground		166	bel	ow g	jiouria	ievei	. Р	ai lia	ıı wale	ii 1088 at		

			DEPARTMENT OF TRANSPORTATI	ON							Site		33			
		IAL:	S DIVISION - GEOTECHNICAL SEC.					PAC		1	OF		25.0	.000		_
JOB :		т.	040861 Sebastian County Hwy. 10 - Hwy. 96 (Greenwood Bypa:	cc) (S)				DAT		DDII	LING		y 25, 2	2023		
JOB	NAM	E:	Route 10, Section 0	55) (3)							LING:		· - Diat	nond Co	re	
STA	ΓΙΟΝ	:	208+41						ЛРМЕ		J111 7 1	ugu		ter 1	10	
LOC			27' Right of Construction Centerline													
LOG	GED	BY:	Guy King					HAN	имер	COR	RECT	ION I	FACTO	k: 1	.54	_
CON	/IPLI	ETIC	ON DEPTH: 35	ı												
D E P T H	S Y M B O L	S A M P L E	DESCRIPTION OF MATERIAL	SOIL GROUP	N PL	_	TUR	E CO	NTE	NT (9		• LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
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 _ 5		X	No sample											0-0		
		X	Moist, Very Loose, Brown Silty Sand											0-0		
 10		X	Wet, Very Loose, Brown Silty Sand			•								0-0		
 		X	Wet, Very Loose, Brown Silty Sand with Some Gravel*				•							2-2		
15	777	X	SHALE - Highly Weathered, Medium			•								35 40		
			\Hard, Gray SHALE - Weathered with Highly Weathered Layers, Medium Hard with Soft Layers, Frequent Fractures and Slickensides, Gray**											(4")	88	12
 _ 25			SHALE - Slightly Weathered with Weathered Layers, Medium Hard, Frequent Fractures, Gray*												100	24
 30			SHALE - Unweathered, Medium Hard, Occasional Fractures, Gray												100	78
			SANDSTONE INTERBEDDED WITH SHALE - Unweathered, Well Cemented, Gray SHALE INTERBEDDED WITH SANDSTONE - Unweathered, Medium Hard with Hard Layers,												96	88
	/IAR	KS:	*A water stratum was encountered at a												1.8 f	eet
			thick slickensided vertical fractures wa	s encou	ntere	ed a	t app	orox	ımat	ely	16.8	teet	:(BGL).		

			S DEPARTMENT OF TRANSPORTATI S DIVISION - GEOTECHNICAL SEC.	ON				BOR PAG		NO. 2	Site		33			
JOB N		<u> </u>	040861 Sebastian County					DATI			OI		y 25, 2	2023		-
JOB N		E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)						ORILI	LING:		•			
			Route 10, Section 0								m A	uger		nond Co	re	
STAT			208+41					EQU	IPME	NT:			Ack	ter 1		
LOCA			27' Right of Construction Centerline Guy King					нам	IMER	COR	RFCT	ION I	FACTOR	· 1	54	
			ON DEPTH: 35					112111	UVILIA	con	KLCI	10111	петог	. 1	<i>.</i>	-
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FT.	Ĺ	E S	SURFACE ELEVATION: 486.7		PL	—					\dashv	LL	PERCENT PASSING NO. 200 SIEVE	Z		
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			Boring Terminated													
40																
 45																
50																
-																
55																
 60																
65																
-																
70	445		*A water stratum was encountered at										. /= -			

REMARKS: *A water stratum was encountered at approximately 12.5 feet below ground level (BGL). **A 1.8 feet thick slickensided vertical fractures was encountered at approximately 16.8 feet (BGL).

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 1-B4 MATERIALS DIVISION - GEOTECHNICAL SEC. PAGE 1 OF 1 Sebastian County July 24, 2023 JOB NO. 040861 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core STATION: 208+41 EQUIPMENT: Acker 1 LOCATION: 34' Left of Construction Centerline LOGGED BY: Guy King HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 34.1** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Е Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} В Q Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. S SURFACE ELEVATION: 487.0 40 50 Moist, Loose, Brown Silty Sand 49 3 SM 3-3 5 69 2 CL-ML 2-2 Moist, Soft, Brown Sandy Silty Clay* 77 CL Moist, Very Soft, Brown Lean Clay 0-0 with Sand 10 7 3 SP-SM $H | \bullet$ 9-7 Wet, Medium Dense, Brown Poorly Graded Sand with Silt and Gravel (Sandstone Fragments) 15 SHALE - Highly Weathered, Medium 15 35 (5") Hard, Gray SHALE - Slightly Weathered, Medium Hard, Occasional Fractures, 100 90 20 SHALE - Unweathered, Medium Hard, Gray 100 88 25 SHALE - Unweathered with Occasional Weathered Layers, 88 | 68 Medium Hard, Gray SHALE INTERBEDDED WITH 30 SANDSTONE - Unweathered, Medium Hard with Hard Layers, Gray 100 80 SANDSTONE WITH FREQUENT SHALE PARTINGS AND SEAMS -Unweathered, Well Cemented, Gray **Boring Terminated** 35 REMARKS: *The water level at a 18 hour reading was 7.2 feet below ground level.

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 1-B5 MATERIALS DIVISION - GEOTECHNICAL SEC. of 1 PAGE 1 040861 Sebastian County June 21, 2023 JOB NO. Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 209+50 STATION: EQUIPMENT: Acker 1 LOCATION: 23' Right of Construction Centerline LOGGED BY: Tracy Henderson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 28.2** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Ε Α Υ Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. SURFACE ELEVATION: 483.7 30 40 50 Moist, Loose, Brown Sand 2-3 5 2 2-3 Wet, Loose, Brown Silty Sand Wet, Medium Dense, Brown Silty 6-10 Sand* Wet, Very Stiff, Brown Clay 10 SHALE - Highly Weathered, Medium 11 Hard, Gray 16-45 (9")SHALE - Weathered, Medium Hard, 95 0 Gray 15 SHALE - Slightly Weathered, Medium Hard, Occasional Fractures, 98 | 66 Gray 20 SHALE - Slightly Weathered, Medium Hard, Frequent Fractures, 98 | 56 Gray 25 SHALE - Slightly Weathered, Medium Hard, Frequent Fractures 100 26 and Slickensides, Gray **Boring Terminated** 30 REMARKS: *The water level at a 100 hour reading was 7.7 feet below ground level.

			DEPARTMENT OF TRANSPORTATION O	ON				1		NO.	Site		36			
JOB		AL.		ty d Bypass) (S) IAL SOIL GROUP MOISTURE CON PL HOW 10 20 30 40 ML - ML - Silty SC-SM HH Group Soft, Hard, - Mark The soft of the soft		ı	OI.		ne 21, 2	2023		-				
JOB I		E.		Sebastian County Hwy. 96 (Greenwood Bypass) (S) Section 0 Construction Centerline lerson 88.6 IPTION OF MATERIAL SOIL GROUP L L L L L L L L L L L L L L L L L L L				ן וואט	ING		IC 21, 2	2023				
302	1 1/ 11/1	止.	Route 10, Section 0			1					· - Diaı	mond Co	re,			
STAT	ΓΙΟN:		209+62					1			/112 -			ker 1	10	
LOC			34' Left of Construction Centerline							•						
			Tracy Henderson					HAN	1MER	COR	RECT	ION I	FACTO	R: 1	.54	_
CON	ЛРLЕ	ETIC	ON DEPTH: 28.6													
D	S	S		Sebastian County 0 - Hwy. 96 (Greenwood Bypass) (S) 10, Section 0 2 t of Construction Centerline enderson H: 28.6 CCRIPTION OF MATERIAL GROUP CE ELEVATION: 485.2 Loose, Brown Sandy Silt ML - Medium Dense, Brown Silty / Sand E - Highly Weathered, Soft, E - Weathered, Medium Hard, ent Fractures, Gray E - Slightly Weathered, m Hard, Frequent Fractures,								NG.				
ΙE	S Y	Α											SSIN	WS I.		۵/
P	М	M P	DESCRIPTION OF MATERIAL	SOIL									PA!	BLC 6-IN	% T	% R
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 5			Willian, Loude, Drown Canay Can	-												
		\bigvee		MI		•							62	2		
		/ \												2-3		
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		X	Wet, Medium Dense, Brown Silty	SC-SM		Þ⊢							40	4-11		
10			Clayey Sand													
			SHALE - Highly Weathered, Soft,	1										11		
	1111	4	Gray											28-56		
			SHALE - Weathered, Medium Hard,												95	0
			Frequent Fractures, Gray	1												
15																
			SHALE - Slightly Weathered,													
\vdash			Medium Hard, Frequent Fractures,												98	50
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\vdash			SHALE - Unweathered, Medium													
25			Hard, Occasional Fractures, Gray													
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30			Boring Terminated													
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 35																
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ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 1-B7 MATERIALS DIVISION - GEOTECHNICAL SEC. of 1 PAGE 1 Sebastian County June 27, 2023 JOB NO. 040861 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 210+23 STATION: EQUIPMENT: Acker 1 LOCATION: 34' Right of Construction Centerline LOGGED BY: Tracy Henderson HAMMER CORRECTION FACTOR: 1.54 COMPLETION DEPTH: 34.1 D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. S Е Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. S SURFACE ELEVATION: 486.8 40 50 Moist, Loose, Brown Silt with Sand 74 3 ML 5-4 5 5 60 ML 5-8 Moist, Medium Dense, Brown Sandy 50 5 ML 7-8 10 40 5 SM 7-7 Moist, Medium Dense, Brown Silty Sand 15 Wet, Dense, Brown Sand 26 SHÁLE - Wéathered, Medium Hard, 40 (2") Grav 100 85 SHÁLE - Slightly Weathered, Medium Hard, Gray 20 96 92 SHALE - Unweathered, Medium Hard, Gray 25 92 92 30 SHALE - Unweathered with Weathered Layers, Medium Hard 98 46 with Soft Layers, Frequent Fractures and Slickensides, Gray* **Boring Terminated** 35 REMARKS: A 2.0 feet slickensided vertical fracture was encountered at 29.4 to 31.4 feet below ground level.

		DEPARTMENT OF TRANSPORTATION O	ON			BO PA		NO.	Site 1				
JOB NO.	~ _ \	040861 Sebastian County				DA		'		uly 11,	2023		-
JOB NAMI	∃:	Hwy. 10 - Hwy. 96 (Greenwood Bypas Route 10, Section 0	ss) (S)			TYI	E OF		LING:	•	mond Co	ore	
STATION: LOCATION		210+41 34' Left of Construction Centerline				EQU	JIPME	NT:		Ac	ker 1		
		Guy King				HA	MMER	COR	RECTIO	N FACTO	R: 1	.54	
		ON DEPTH: 34.4											_
П	S									Ü			
E Y M B O I	AMPLE	DESCRIPTION OF MATERIAL	SOIL GROUP	M(DISTUI	RE CO)NTE	NT (%	5) • — Ll	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
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		Moist, Medium Dense, Light Brown Sandy Silt									6 8-7 6 8-9		
 10	X	Moist, Medium Dense, Brown Sandy Silt									6-8		
— — 11 — — 11	X	Moist, Very Stiff, Brown Sandy Silty Clay with Sandstone Fragments									8-16		
		Sandy Clay											
15		SHALE - Highly Weathered, Soft,											
		Gray SHALE - Highly Weathered, Medium Hard, Gray SHALE - Slightly Weathered, Medium Hard, Gray SHALE - Unweathered, Medium Hard, Gray									50 (4")	95	90
		SHALE - Unweathered, Medium Hard, Occasional Fractures, Gray										100	88
25 30		SHALE - Unweathered with Weathered Layers, Medium Hard, Frequent to Occasional Fractures,										94	56
— — — — — — — — — — — — — — — — — — —		Gray										100	64
35 REMAR	(S:					T							

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		ALS	S DIVISION - GEOTECHNICAL SEC.			PA	GE	2	OF	2				_
JOB 1 JOB 1 STAT	NAM ΓΙΟΝ:	:	040861 Sebastian County Hwy. 10 - Hwy. 96 (Greenwood Bypa Route 10, Section 0 210+41 34' Left of Construction Centerline	ss) (S)		I	PE OF	w Ste				2023 mond Cox xer 1	re	
LOG	GED I	BY:	Guy King			НА	MMER	COR	RECT	ION I	FACTOR	R: 1.	54	_
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	S Y M B O L	SAMPLE	DESCRIPTION OF MATERIAL	SOIL GROUP	N. PL	TURE CO	ONTE	NT (%		• LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
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40 45 50 55 60 65 65			Borning Terminated											
70 REM	/ARI	KS:												
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			DEPARTMENT OF TRANSPORTATION O	ON				BORIN				39			
		ALS	S DIVISION - GEOTECHNICAL SEC.				-	PAGE	1	С	F 1	20.	1000		_
JOB 1			040861 Sebastian County	١ (٥)				DATE:				ne 28, 2	2023		
JOB 1	NAM	E:	Hwy. 10 - Hwy. 96 (Greenwood Bypas	ss) (S)			[TYPE (.			
			Route 10, Section 0								Auge		nond Co	ore	
STAT			210+92					EQUIP	MENT	`:		Ack	er 1		
LOCA			34' Right of Construction Centerline												
LOG	GED	BY:	Tracy Henderson					HAMM	ER C	ORREC	CTION	FACTOR	t: 1	.54	_
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- 🗕															
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			with Sand and Organic Matter									73	5		
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		$\ \ $	Weathered Layers, Medium Hard,											100	6
		$\ \ \ $	Gray												
		$\ \ $													
30		H													
, , , , , , , , , , , , , , , , , , ,		$\ \ \ $						+	+	+					
		$\ \ $	SHALE - Unweathered with												
- 🗐		$\ \ $	Weathered Layers, Medium Hard,											100	6
		$\ \ \ $	Frequent Fractures, Gray												
_ [$\ \ $													
			Boring Terminated					\dashv	+	+				T	H
35				i			1	- 1		1	1			1	1



Job No.: 040861 Site 1





Job No.: 040861 Site 1





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Job No.: 040861 Site 1





Job No.: 040861 Site 1





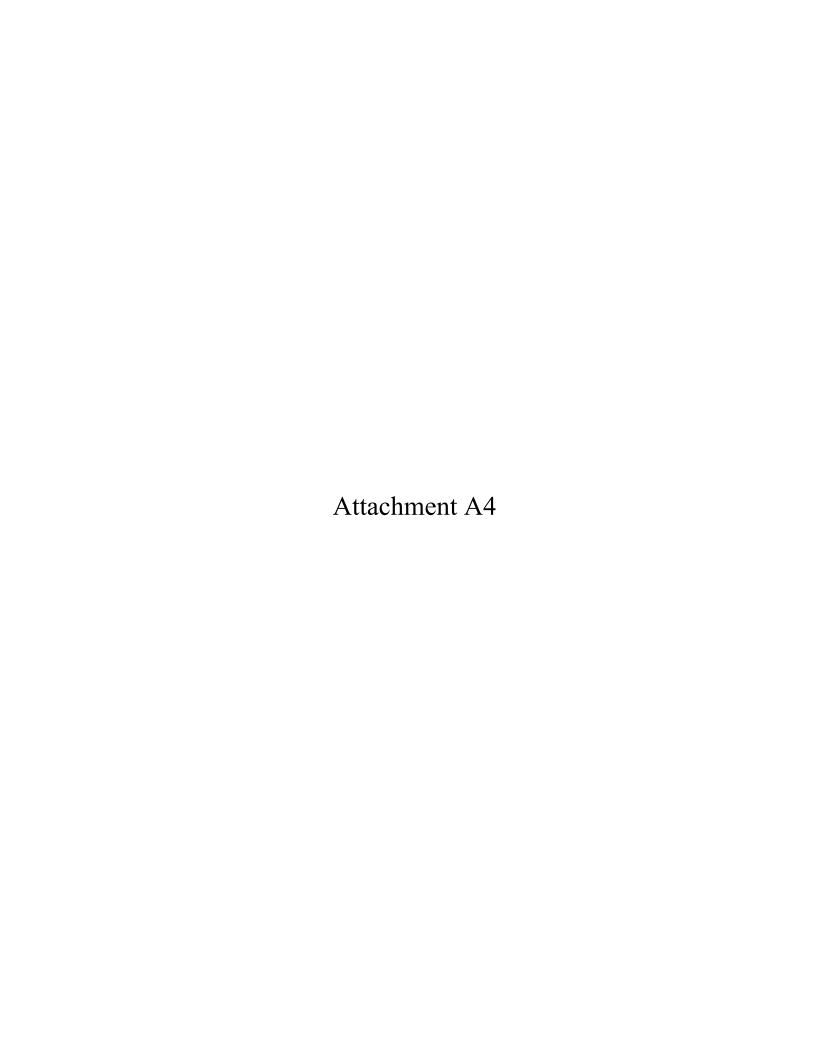
Job No.: 040861 Site 1

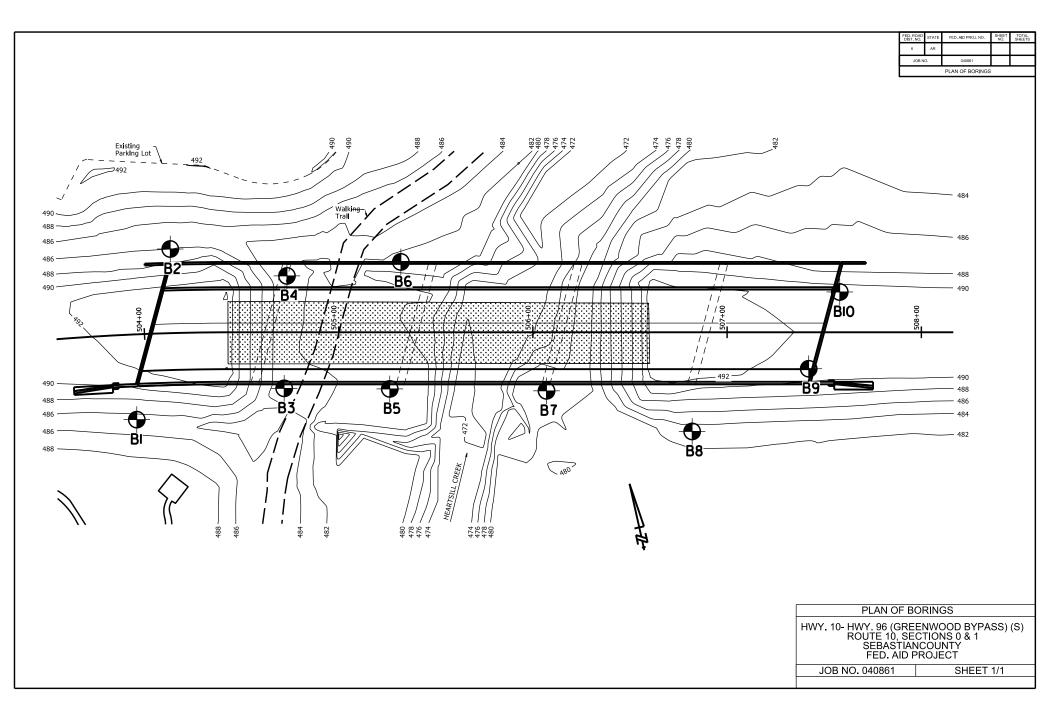




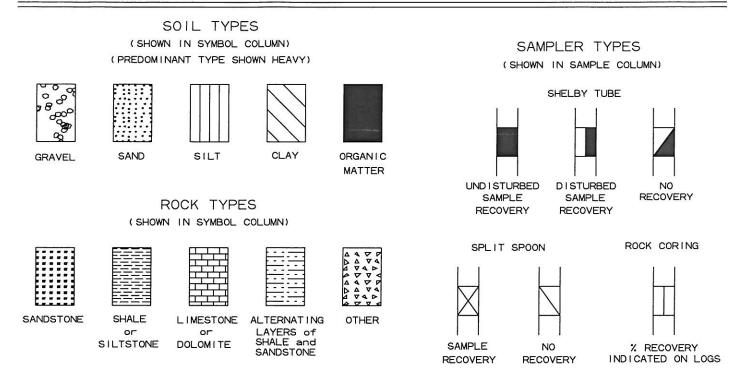
Job No.: 040861 Site 1







LEGEND



TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANU	LAR SOIL		CLAY	CLA	Y-SHALE		SHALE
'N' Value	Density	'N' Value	Consistency	'N' Value	Consistency	'N' Value	Consistency
0-4 5-10 11-30 31-50 Over 50	Very Loose Loose Medium Dense Dense Very Dense	0-1 2-4 5-8 9-15	Very Soft Soft Medium Stiff Stiff Very Stiff	0-1 2-4 5-8 9-15	Very Soft Soft Medium Stiff Stiff Very Stiff	31-60 Over 60 More than Penetrati	
3751 33	very believe	31-60 Over 60	Hard Very Hard	31-60 Over 60	Hard Very Hard		vs: Medium Hard 2' on

- 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.
- 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 (N₆₀) can be obtained by multiplying N_f by the hammer correction factor published on the boring log.

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 4-B1 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 2 PAGE 1 JOB NO. 040861 Sebastian County May 31, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 503+96 STATION: EQUIPMENT: Acker 1 45' Right of Construction Centerline LOCATION: LOGGED BY: Anthony Nicholson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 39.6** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) 0 Ε L FT. SURFACE ELEVATION: 485.0 40 50 Moist, Very Soft, Brown Silty Clay 0 0-0 5 1 2-4 Moist, Medium Stiff, Brown Silty Clay 1-4 10 5-7 Moist, Stiff, Brown Silty Clay 3 Wet, Stiff, Sandy Silty Clay with 4-8 Trace Gravel (Shale Fragments)* SHALE - Weathered, Medium Hard, Gray 20 12 (1")SHALE - Slightly Weathered, Medium Hard with Soft Layers, 100 71 Gray** 25 SHALE - Unweathered, Medium 92 80 Hard, Gray 30 100 68 SHALE - Unweathered, Medium 35 *A water stratum was encountered at approximately 15.0 feet below ground level (BGL). **A core **REMARKS:** inner barrel malfuction occured between 20.1 and 24.6 feet (BGL).

			DEPARTMENT OF TRANSPORTATI DIVISION - GEOTECHNICAL SEC.	ON				BOI PAC		NO. 2	Site	e 4-E ∈ 2	31			
JOB 1			040861 Sebastian County					DAT			01		y 31, 2	2023		-
JOB 1	NAM	E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa Route 10, Section 0	ss) (S)					E OF I				Dia	mond Co	ro	
STAT	TION:	:	503+96						OHOV IPME		ш А	ugei		nona Co ker 1	re	
LOCA			45' Right of Construction Centerline												5 4	
			Anthony Nicholson ON DEPTH: 39.6				!	HAN	1MER	COR	RECT	TION I	FACTO	R: 1.	54	-
D	s	S											Z m	70		
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70	1 A DI		*Δ water stratum was encountered at a	nnrovim	otol	v 15	O fo	ot b	ماميد	, ara		Llove	al /DC	Ι\ **Λ .		

REMARKS: *A water stratum was encountered at approximately 15.0 feet below ground level (BGL). **A core inner barrel malfuction occured between 20.1 and 24.6 feet (BGL).

	DEPARTMENT OF TRANSPORTATI	ON						Site		2			
	S DIVISION - GEOTECHNICAL SEC.				_	AGE	1	OF					_
JOB NO.	040861 Sebastian County	\				ATE:			May	24, 2	023		
JOB NAME:	Hwy. 10 - Hwy. 96 (Greenwood Bypas	ss) (S)				PE OF					. ~		
	Route 10, Section 0							m Au	ger -		nond Co	ore	
STATION:	504+14				EC	QUIPMI	ENT:			Ack	er l		
LOCATION:	44' Left of Construction Centerline												
	Anthony Nicholson				H	AMMEI	R COR	RECTIO	ON FA	ACTOR	: 1	.54	_
	ON DEPTH: 39.3	T										1	
D S A P M P L B C L	DESCRIPTION OF MATERIAL	SOIL GROUP	M(URE C	ONTE	NT (%		LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
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	Moist, Medium Stiff, Brown Lean Clay	CL -		+	4					91	3-2		
	Moist, Soft, Brown Lean Clay	CL		+	4					93	0-3		
10		-				-				78	0		
	Moist, Medium Stiff, Brown Silty Clay with Sand	CL-ML		++1							2-3		
15				.		+				57	3		
\ \ \ 20	Moist, Stiff, Brown Sandy Lean Clay	CL									5-8		
_ 	∖SHALE - Weathered, Medium Hard,	1									11		
— — — — — — — — — — — — — — — — — — —	Gray SHALE - Unweathered, Medium Hard, Gray										(1")	100	10
25	SHALE - Unweathered, Medium Hard, Frequent Fractures and Slickensides, Gray	-										70	42
30	SHALE - Unweathered with Weathered Layers, Medium Hard with Soft Layers, Frequent Fractures											94	0

MATERIALS DIVISION - GEOTECHNICAL SEC. PAGE 2 oF 2				DEPARTMENT OF TRANSPORTATI	ON							e 4-E	32			
Nob Name			ALS							2	OF		24 /	2022		_
Route 10, Section 0 Sold+14 Location Sold+14 Sol			E·		ss) (S)					DRII	LING		ıy 24, î	2023		
STATION: 504+14 LOCATION: 44* Left of Construction Centerline LOCATION: 45*	JOD .	1 17 1111	ш.		33) (3)								- Dia	mond Co	re	
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DESCRIPTION OF MATERIAL SOIL GROUP Hold SURFACE ELEVATION: 485.8				•				HAM	1MER	COR	RECT	TION I	FACTO	R: 1	.54	_
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and Slickensides, Gray Boring Terminated 45 50 66 66 66 70	E												SINC	WS		
and Slickensides, Gray Boring Terminated 45 50 66 66 66 70	Р		М	DESCRIPTION OF MATERIAL	SOII								PAS SIE	3LO,		
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and Slickensides, Gray Boring Terminated 45 50 66 66 66 70	l ''	Ι.					TURI	E CO	NTE	NT (9		•	RCE NO.	, O Z	R	D
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REMARKS:																
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ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 4-B3 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 2 PAGE 1 JOB NO. 040861 Sebastian County May 31, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 504+72 STATION: EQUIPMENT: Acker 1 29' Right of Construction Centerline LOCATION: LOGGED BY: Anthony Nicholson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 34.4** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Ε Α Υ Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. SURFACE ELEVATION: 483.1 40 50 Moist, Medium Stiff, Brown Sandy 2 Silty Clay 3-3 5 2 3-2 Moist, Medium Stiff, Brown Silty Clay 0-3 Moist, Soft, Brown Sandy Silty Clay 10 0-4 Wet, Soft, Brown Sandy Silty Clay SHALE - Weathered, Medium Hard, 36 22 (1") ∖Gray SHALE - Slightly Weathered, 68 42 Medium Hard, Gray 20 SHALE - Unweathered, Medium 96 72 Hard, Occasional Fractures and Slickensides, Gray 25 100 58 SHALE - Unweathered with Highly Weathered Layers, Medium Hard 30 with Soft Layers, Frequent Fractures and Slickensides, Gray 98 50 35 REMARKS: *Drill bit blocked off during the 19.4 to 24.4 feet core run.

			DEPARTMENT OF TRANSPORTATI DIVISION - GEOTECHNICAL SEC.	ON				BOR PAG		NO. 2		e 4-E	33			
JOB I			040861 Sebastian County					DATI					y 31, 2	2023		-
JOB 1		E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa Route 10, Section 0	ss) (S)				TYPE	E OF I			:		nond Co	re	
STAT			504+72 29' Right of Construction Centerline					EQU				Ü		xer 1		
			Anthony Nicholson					HAM	IMER	COR	RECT	ION I	FACTOI	R: 1.	54	
COM	1PLE	ETIC	ON DEPTH: 34.4													
DEPHH	S Y M B	SAMPL	DESCRIPTION OF MATERIAL	SOIL GROUP									PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C	% R Q
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KEN	IAKI	\ 5:	*Drill bit blocked off during the 19.4 to	∠4.4 fee	core	e rui	1.									

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 4-B4 MATERIALS DIVISION - GEOTECHNICAL SEC. of 1 PAGE 1 JOB NO. 040861 Sebastian County May 24, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 504+73 STATION: EQUIPMENT: Acker 1 29' Left of Construction Centerline LOCATION: LOGGED BY: Anthony Nicholson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 34** D S PERCENT PASSING NO. 200 SIEVE S NO. OF BLOWS PER 6-IN. Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. SURFACE ELEVATION: 483.3 30 40 50 Moist, Medium Stiff, Brown Silty Clay 77 0 with Sand CL-ML ₩ 3-5 5 80 2 CL-ML 1 Moist, Stiff, Brown Silty Clay with 5-5 Sand 79 ML Moist, Medium Loose, Brown Silt 3-4 with Sand 10 70 0 CL 0-3 Wet, Soft, Brown Sandy Lean Clay 15 70 Wet, Hard, Brown Sandy Lean Clay* CL +14-20 SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Slightly Weathered, 80 | 50 Medium Hard with Hard Layers, Gray 20 SHALE - Slightly Weathered, Medium Hard, Occasional Fractures, 100 50 Gray 25 98 84 SHALE WITH OCCASIONAL SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium 30 Hard, Gray 100 82 **Boring Terminated** 35 REMARKS: *A water stratum was enountered at approximately 15.0 feet below ground level.

	S DEPARTMENT OF TRANSPORTATION	ON				3 NO. 1	Site 4-	·B5			
JOB NO.	040861 Sebastian County				PAGE DATE:	ı	OF 1	ıne 6, 2	2023		_
JOB NAME: STATION: LOCATION: LOGGED BY:	Hwy. 10 - Hwy. 96 (Greenwood Bypas Route 10, Section 0 505+26 29' Right of Construction Centerline Anthony Nicholson	ss) (S)		1	TYPE OF Hollo EQUIPM	w Ste	LING:	er - Dia Ac	mond Co ker 1	ore .54	_
COMPLETIC	ON DEPTH: 34.2	ı							ı		
D S A A P M P B L E FT.	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 480.8	SOIL GROUP	PL 📙	ISTURE			— ІІ	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
			10	20 30	40 .	0	70				
5	Moist, Very Loose, Brown Silt			•					1 2-2		
	Moist, Very Loose, Brown Sandy Silt			•					0-0		
10	Wet, Very Soft, Brown Sandy Silty Clay			•					0-0		
- - - - 	Wet, Very Loose, Brown Sandy Silt			•					0-0		
15	SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Weathered with Highly Weathered Layers, Medium Hard with Soft Layers, Frequent Fractures, Gray								40 (5")	37	C
20	SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Slightly Weathered with Weathered Layers, Medium Hard, Frequent Fractures, Gray									76	2:
25	SHALE WITH FREQUENT TO OCCASIONAL SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard,									84	6
	Occasional Fractures and Slickensides, Trace Pyrite, Gray									98	8
35	Boring Terminated					1				1	

			DEPARTMENT OF TRANSPORTATION O	ON				BOI PAC		NO. 1	Site		36			
JOB		<u> </u>	040861 Sebastian County					DAT		<u> </u>	OF		y 23, 2	023		-
	NAM	E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)				1	E. EOF	DRILI	ING:	ivia	.y 23, 2	.023		
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LOC	ATIO	N:	36' Left of Construction Centerline					`								
LOG	GED	BY:	Tracy Henderson					HAN	ИMER	COR	RECTI	ION I	FACTOR	: 1	.54	_
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	W		Moist, Soft, Brown Sandy Silty Clay										68	0		
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		\sim	Moist, Very Loose, Brown Sandy Silt											1-2		
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		X	Wet, Very Loose, Brown Sandy Silt	ML			•						03	0-0		
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		\nearrow	SHALE - Weathered, Medium Hard,											38		
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<u> </u>															100	80
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			SEAMS - Unweathered, Medium													
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			DEPARTMENT OF TRANSPORTATION	ON						o. Sit		36			
		AL	S DIVISION - GEOTECHNICAL SEC.					PAGI		O	F 2	22. (2022		-
JOB I		г.	040861 Sebastian County Hwy. 10 - Hwy. 96 (Greenwood Bypa	20) (5)				DATE		** * ** **		ıy 23, 2	2023		
JOB 1	NAM	E:	Route 10, Section 0	ss) (S)						ILLING		. Dia	mond Co		
STAT	TION.		505+32								Augei		ker 1	re	
			36' Left of Construction Centerline					EQUI	PMENT	:		ACI	ker i		
			Tracy Henderson					LIAM	MED C	ODDEC	TION	FACTO	o. 1	.54	
			ON DEPTH: 34.4				!	HAWI	WIEK C	JKKEC	TION	PACTO	X. 1.	.J .T	-
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FT.	L	E S	SUDDACE ELEVATION: 404 6		PL	—					LL	PERCENT PASSING NO. 200 SIEVE	ž		
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ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 4-B7 MATERIALS DIVISION - GEOTECHNICAL SEC. of 1 PAGE 1 JOB NO. 040861 Sebastian County May 17, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 506+07 STATION: EQUIPMENT: Acker 1 30' Right of Construction Centerline LOCATION: LOGGED BY: Tracy Henderson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 33.9** D S PERCENT PASSING NO. 200 SIEVE S NO. OF BLOWS PER 6-IN. Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. S SURFACE ELEVATION: 477.8 30 40 50 Moist, Very Soft, Brown Sandy Silty 66 1 Clay with Organic Matter* CL-ML 0-1 5 0 Wet, Very Soft, Brown Sandy Silty 1-0 Clay 55 CL Wet, Medium Stiff, Gray Sandy Lean 4-4 Clay with Gravel 10 Wet, Very Stiff, Gray Sandy Lean 56 CL 3-14 Clay SHALE - Highly Weathered, Very Soft, Gray 15 SHALE - Weathered, Medium Hard, 38 (4")Gray SHÁLE - Slightly Weathered, 100 56 Medium Hard, Occasional Fractures, Gray <u>2</u>0 98 88 25 SHALE WITH FREQUENT SANDSTONE PARTINGS AND 100 92 SEAMS - Unweathered, Medium Hard with Hard Layers, Gray 30 98 88 **Boring Terminated** 35 REMARKS: *24 hour water level reading was 3.8 feet below ground level.

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 4-B8 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 2 PAGE 1 JOB NO. 040861 Sebastian County May 17, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 506+82 STATION: EQUIPMENT: Acker 1 51' Right of Construction Centerline LOCATION: LOGGED BY: Tracy Henderson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 38.7** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. S SURFACE ELEVATION: 482.8 40 50 Moist, Loose, Brown Silty Sand 2-3 5 1 6-3 Moist, Loose, Brown Sandy Silt 0-0 Wet, Very Loose, Brown Sandy Silt 10 2-1 Wet, Very Loose, Brown Silty Sand Wet, Very Stiff, Brown Sandy Silty 8-18 Clay* SHALE - Highly Weathered, Very Soft, Gray 20 20 (0") SHALE - Slightly Weathered, 97 48 Medium Hard, Gray 25 98 82 SHALE - Unweathered, Medium Hard, Gray 30 100 58 REMARKS: *A water stratum was encountered at approximately 15.5 feet below water ground level.

			DEPARTMENT OF TRANSPORTATI DIVISION - GEOTECHNICAL SEC.	ON				BOF PAC		NO. 2	Site		38			
JOB 1		AL	040861 Sebastian County				\dashv	DAT			OF		ıy 17, 2	2023		-
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JOB	17 1171	L .	Route 10, Section 0	00) (0)									· - Diaı	nond Co	re	
STAT	ION:	:	506+82						IPME			U		cer 1		
LOC	ATIO	N:	51' Right of Construction Centerline													
			Tracy Henderson					HAM	1MER	COR	RECT	TION I	FACTOI	≀: 1.	54	_
COM	1PLE		ON DEPTH: 38.7	ı												
D	S	S											NG E	S		
E P	Υ	A M											SSI IEV	Ø Z	%	%
T	M	P	DESCRIPTION OF MATERIAL	SOIL									Γ P.⁄	; BL	T	R
Н	B O	L		GROUP	,	AOIS'	TURI	F CO	NTFI	VT (9	6) (•	RCENT PASSIN NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	C R	Q D
	L	E			PL		1010			. ()		LL	PERCENT PASSING NO. 200 SIEVE	NO		
FT.		S	SURFACE ELEVATION: 482.8 SHALE WITH INTERBEDDED		1	0 2	0 3	0 4	0 5	0 6	0 7	0	Ъ			
			SANDSTONE - Unweathered,												100	84
			Medium Hard with Hard Layers,												100	07
			Gray													
			Boring Terminated													
40																
 45																
-10																
50																
55																
60																
65																
70																
REM	1ARI	KS:	*A water stratum was encountered at a	approxim	atel	y 15	.5 fe	et b	elov	v wa	ter g	grou	nd lev	el.		

	DEPARTMENT OF TRANSPORTATION O	ION		BORING NO. PAGE 1	Site 4-B	9			
JOB NO.	040861 Sebastian County			DATE:		y 3, 20	023		_
JOB NAME:	Hwy. 10 - Hwy. 96 (Greenwood Bypa Route 10, Section 0	iss) (S)		TYPE OF DRILL	ING:	- Dian	nond Co	ore	
STATION: LOCATION:	507+42 19' Right of Construction Centerline			EQUIPMENT:		Ack	er 1		
LOGGED BY:	Tracy Henderson			HAMMER CORR	ECTION F	ACTOR	: 1	.54	_
COMPLETIC	ON DEPTH: 48.8								
D S S A A M P B L E FT. S	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 490.4	SOIL GROUP	PL —	RE CONTENT (% 30 40 50 60) • LL 70	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
5	Moist, Medium Stiff, Brown Sandy Lean Clay	CL	⊢• -1			63	3 4-4		
	. Wet, Loose, Brown Sandy Silt	ML -	Þ			61	2-3		
10	Wet, Medium Stiff, Brown Silty Clay with Sand	CL-ML				82	3-3		
	Wet, Soft, Brown Silty Clay	CL-ML	•⊢I			70	<u>3</u> 2-2		
20	Wet, Very Loose, Brown Silt	ML -		•		90	0-0		
	Wet, Loose, Light Gray Sandy Silt	ML	•			67	1 2-3		
30	SHALE - Highly Weathered, Soft, Gray						16 18-18		
		-					30 (0")	47	1
35	SHALE - Unweathered, Medium								

			DEPARTMENT OF TRANSPORTATION	ON								e 4-E	B9			
		AL	S DIVISION - GEOTECHNICAL SEC.					PAC		2	OF	2	2.0	000		-
JOB I	NO. NAM	E.	040861 Sebastian County Hwy. 10 - Hwy. 96 (Greenwood Bypa	ee) (Q)				DAT	E: E OF l	י זים	LING		ay 3, 2	.023		
JOB	INAIVI.	E:	Route 10, Section 0	55) (3)									r - Dia	mond Co	re	
STAT	ΓΙΟN:		507+42						IPME		J111 7 :	luge		ker 1		
	ATIO		19' Right of Construction Centerline													
LOG	GED :	BY:	Tracy Henderson					HAN	/MER	COR	RECT	ΓION	FACTO	R: 1.	.54	_
CON	/IPLE	ETIC	ON DEPTH: 48.8													
D	s	S											D W	5 0		
E P	Y	A											SSI	O W.	%	%
T	М	M P	DESCRIPTION OF MATERIAL	SOIL									PA O SI	BL 6-11	Т	R
H	В	L		GROUP	Ι,	4∩IS	TUR	E CO	NTE	NT (0	/ <u>/</u>	•	EN]	OF. PER	C R	Q D
	ľ	E			PL		TUK	L CO	INIL	111 (7		LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	1	
FT.		S					0 3	0 4	0 5	0 6		0	<u> </u>			
L_			Hard, Occasional Slickensides, Gray	-												
L _															96	84
L_			SANDSTONE WITH	-												
40			\\ INTERBEDDED SHALE -													
			Unweathered, Cemented, Gray													00
L _															98	82
L_			SHALE WITH FREQUENT													
L _			SANDSTONE PARTINGS AND													
45			SEAMS - Unweathered, Medium													
L _			Hard with Hard Layers, Gray												400	
L															100	86
L _																
L			Boring Terminated													
50			Doming rommatou													
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ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 4-B10 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 2 PAGE 1 JOB NO. 040861 Sebastian County May 23, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 507+58 STATION: EQUIPMENT: Acker 1 20' Left of Construction Centerline LOCATION: LOGGED BY: Tracy Henderson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 48.8** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Ε Α Υ Ρ M **DESCRIPTION OF MATERIAL** М SOIL T R Т Ρ **GROUP** C Q В Н R D MOISTURE CONTENT (%) 0 L PL | FT. SURFACE ELEVATION: 490.2 40 50 Moist, Medium Stiff, Brown Silty Clay 5 with Sand 3-3 10 0-2 Moist, Soft, Brown Silty Clay 0 1-2 Wet, Soft, Light Gray Silty Clay 0-0 Wet, Very Soft, Light Gray Silty Clay 9-18 SHALE - Highly Weathered, Very Soft, Gray 30 20 (0") 76 37 SHALE - Unweathered, Medium 35 REMARKS: *Poor TCR and RQD between 30.0 and 33.8 feet below ground level are likely due to a core barrel malfunction.

			DEPARTMENT OF TRANSPORTATI DIVISION - GEOTECHNICAL SEC.	ON				BOR PAC		NO. 2		e 4-E ∈ 2	310			
JOB 1	NO.		040861 Sebastian County	> (0)				DAT	E:			Ma	ıy 23, 2	2023		-
JOB 1	NAM	E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa Route 10, Section 0	ss) (S)						DRILI v Ste			- Dia	nond Co	re	
STAT			507+58 20' Left of Construction Centerline					EQU	IPME	NT:			Acl	xer 1		
LOG	GED I	BY:	Tracy Henderson					HAM	1MER	COR	RECT	TION I	FACTO	R: 1	.54	_
	1PLE		ON DEPTH: 48.8										rh			
D E P	S Y	S A M											PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	%	%
T H	M B	Р	DESCRIPTION OF MATERIAL	SOIL GROUP									NT PA 200 SI	OF BL ER 6-I	T C	R Q
	0 L	L			N PL	AOIS'	ΓURI	E CO	NTE	NT (9		• LL	ERCE NO.	NO. (R	D
FT.		S	SURFACE ELEVATION: 490.2 Hard, Gray*			0 2	0 3	0 4	0 5	0 6			P			
			, - ,												100	58
40																
															100	78
			SHALE WITH INTERBEDDED													
 45			SANDSTONE - Unweathered, Medium Hard with Hard Layers,													
			Gray												400	00
															100	96
			Boring Terminated													
50			Boiling Terminated													
 55																
 60																
65																
 70																
REN	1ARI	KS:	*Poor TCR and RQD between 30.0 an	d 33 8 fe	et b	elow	/ arc	und	leve	el ar	e lik	elv d	tue to	a core l	arre	اد

malfunction.



Job No.: 040861 Site 4





Job No.: 040861 Site 4





Job No.: 040861 Site 4





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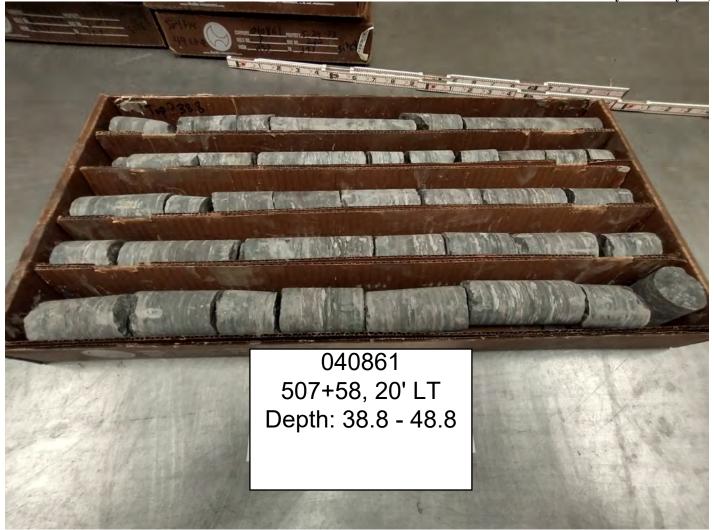


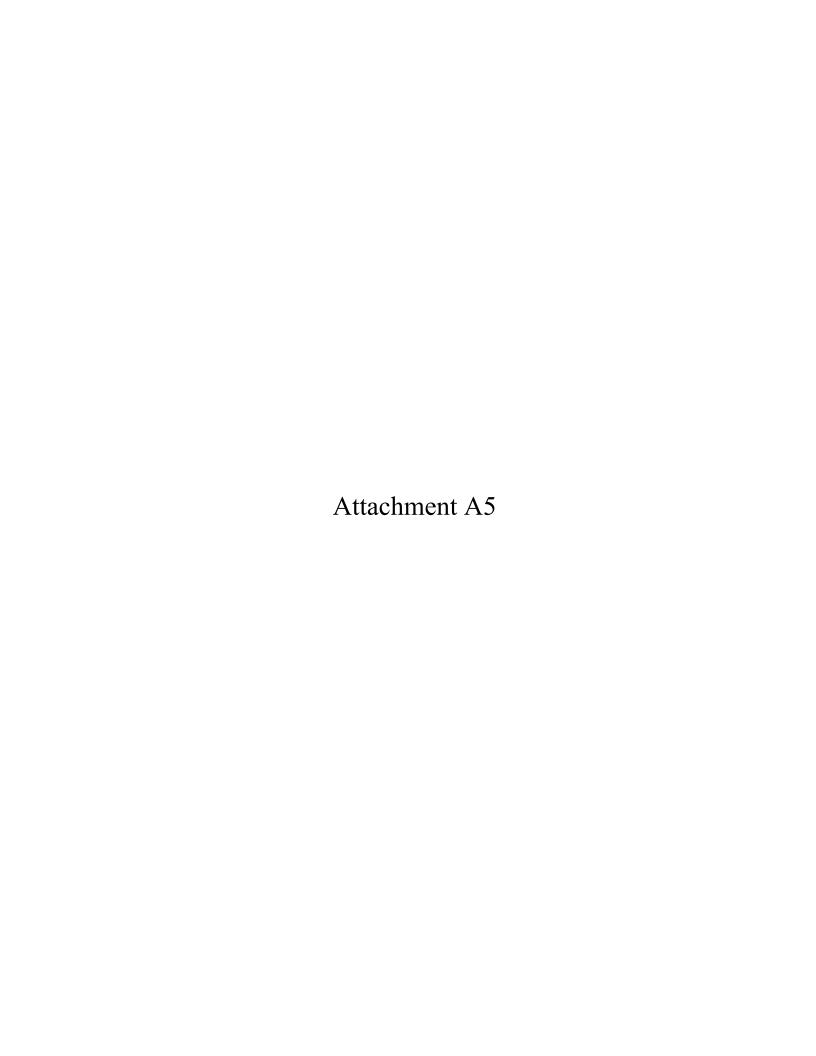
Job No.: 040861 Site 4

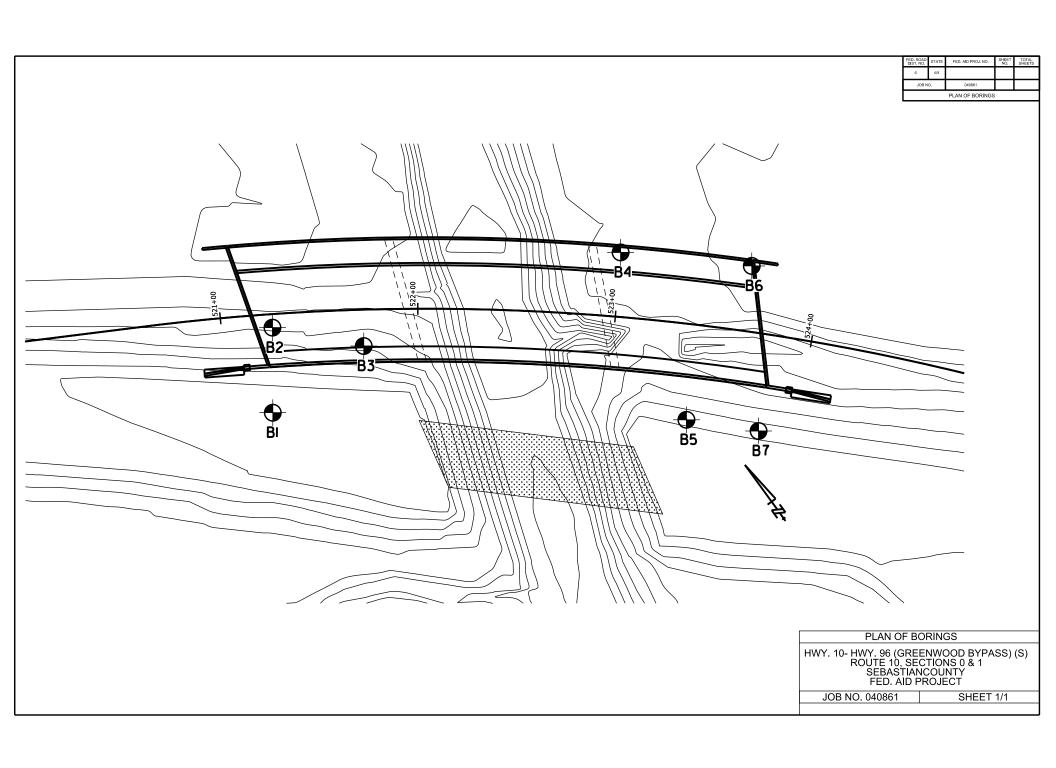




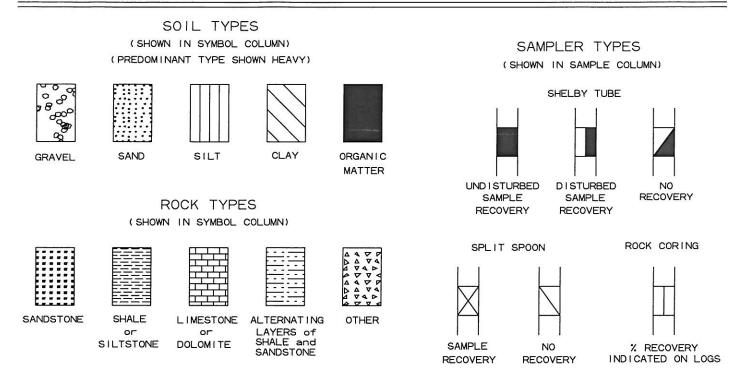
Job No.: 040861 Site 4







LEGEND



TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANU	LAR SOIL		CLAY	CLA	Y-SHALE		SHALE
'N' Value	Density	'N' Value	Consistency	'N' Value	Consistency	'N' Value	Consistency
0-4 5-10 11-30 31-50 Over 50	Very Loose Loose Medium Dense Dense	0-1 2-4 5-8 9-15	Very Soft Soft Medium Stiff Stiff	0-1 2-4 5-8 9-15	Very Soft Soft Medium Stiff Stiff	More than	
over 50	Very Dense	16-30 31-60 Over 60	Very Stiff Hard Very Hard	16-30 31-60 Over 60	Very Stiff Hard Very Hard	Penetration 60 Blow Less than Penetration 60 Blow	vs: Medium Hard 2' on

- 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.
- 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 (N₆₀) can be obtained by multiplying N_f by the hammer correction factor published on the boring log.

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 5-B1 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 2 PAGE 1 JOB NO. 040861 Sebastian County April 4, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 521+23 STATION: EQUIPMENT: Acker 1 50' Right of Construction Centerline LOCATION: LOGGED BY: Anthony Nicholson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 39.1** D S PERCENT PASSING NO. 200 SIEVE S NO. OF BLOWS PER 6-IN. Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} В Q Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. SURFACE ELEVATION: 493.0 40 50 Gravel and Cobbles* 5 64 1 CL-ML 2-2 Moist, Soft, Brown Sandy Silty Clay 80 CL-ML Moist, Medium Stiff, Brown Silty Clay 2-4 with Sand 10 87 CL-ML H♦ 3-5 Moist, Medium Stiff, Brown Silty Clay 53 0 CL-ML H ightharpoonup2-2 Moist, Soft, Wet Sandy Silty Clay 20 47 SM 1-3 Wet, Very Loose, Brown Silty Sand 25 60 (5") SHALE - Weathered, Medium Hard, Gray 100 96 SHALE WITH FREQUENT SANDSTONE PARTINGS AND 30 SEAMS - Unweathered, Medium Hard, Occasional Fractures and 100 66 Slickensides, Gray REMARKS: *No sample could be taken above 5.0 feet below ground level due to auger movement.

			DEPARTMENT OF TRANSPORTATI DIVISION - GEOTECHNICAL SEC.	ON						NO. 2	Site		31			
JOB 1		AL	040861 Sebastian County					PAC DAT			OF		ril 4, 2	2023		-
JOB 1		E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa:	ss) (S)						DRILI	LING:	-	/III -1 , 2	.023		
	11 1111		Route 10, Section 0	, (-,									- Dia	nond Co	re	
STAT	ION:	:	521+23						IPME			Ü		ker 1		
LOCA			50' Right of Construction Centerline													
			Anthony Nicholson					HAM	1MER	COR	RECT	TION I	FACTO	R: 1.	54	_
COM	1PLE		ON DEPTH: 39.1	·												
D	s	S											NG	S		
E P	Υ	A M											ASSI IEV	ο΄ Χ. W	%	%
T	М	P	DESCRIPTION OF MATERIAL	SOIL									T P4	F BI 8 6-1	T	R
Н	B O	L		GROUP	N	AOIS'	TURI	E CO	NTEI	NT (9	6)	•	RCENT PASSIN NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	C R	Q D
FT.	Ĺ	E S	OUDEAGE ELEVATION 400.0		PL	—					\dashv	LL	PERCENT PASSING NO. 200 SIEVE	NC		
			SURFACE ELEVATION: 493.0 SHALE WITH FREQUENT		1	0 2	0 3	0 4	0 5	0 6	0 7	0	Н			
			SANDSTONE PARTINGS AND													
	60 0 0 0 9 0 9 0 1		SEAMS - Unweathered, Medium												100	86
			Hard, Gray													
			Boring Terminated													
40			Boiling Terminated													
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70																
REM	1ARI	S:	*No sample could be taken above 5.0	feet belo	w g	roun	d le	vel d	lue t	o au	iger	mov	emen	t.		

		DEPARTMENT OF TRANSPORTATION O		- 1	BORIN				32					
JOB NO.	AL	6 DIVISION - GEOTECHNICAL SEC. 040861 Sebastian County					PAGE	1	OF	7 2 M	ay 2, 2	022		_
JOB NO. JOB NAMI	□.	Hwy. 10 - Hwy. 96 (Greenwood Bypas	se) (S)			- 1	DATE: TYPE (DDI	LLING		ay 2, 2	023		
JOB NAMI	₽.	Route 10, Section 0	55) (5)								r Dia	mond Co	ra	
STATION:		521+26					EQUIP			rugei		ker 1	nc .	
LOCATION.		7' Right of Construction Centerline					EQUIF	VIEN I.			ACI	CI I		
		Tracy Henderson					цамм	ED CO	DDEC	LION .	FACTOI	o. 1	.54	
		ON DEPTH: 39.1				!	TIAWW	EK CC	KKEC	IION .	PACTO	λ. 1	.57	-
		ON DEF 111. 39.1		l							75			
D E P M B O L FT.	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 483.5	SOIL GROUP	PL	—		E CONT		$\overline{}$	• LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
	5	SURFACE ELEVATION: 463.5		1	0 20) 30	40	50	60 7	0				_
5	X	Moist, Very Loose, Light Brown Silty Sand			•							1 2-2 0 0-3		
												0		
	X				•							0-0		
10														
	X	Wet, Very Loose, Light Brown Silty Sand			•)						<u>0</u> 0-1		
15		_Moist, Very Hard, Light Gray Clay						+	+			2		
— — []	\times	_ IVIOIST, VETY HAITH, LIGHT Gray Clay				•						30-30		
		SHALE - Highly Weathered, Medium Hard with Soft Layers, Gray										(7")		
20	$\overline{\top}$	∖SHALE - Weathered, Medium Hard, ∖Gray										30 (1")		
		Ciay											88	88
25													100	84
		SHALE WITH OCCASIONAL SANDSTONE PARTINGS -												
30		Unweathered, Medium Hard, Occasional Fractures, Gray											100	78
35 REMARK	S:													

			S DEPARTMENT OF TRANSPORTATI S DIVISION - GEOTECHNICAL SEC.	ON					RING				32			
JOB		AL	040861 Sebastian County					PAC DAT		2	OF		ay 2, 2	003		_
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JOB	I NAIVI	Ŀ.	Route 10, Section 0	33) (0)									· - Dia	mond Co	re	
STAT	rion.		521+26						IPME		/111 / 1	ugei		ker 1	10	
			7' Right of Construction Centerline					EQU	II WIL	ANI.			ACI	CCI I		
			Tracy Henderson					HAN	1MER	COR	RECT	ION I	FACTOI	R· 1	.54	
			ON DEPTH: 39.1					117 114	IIIIIII	COR	rene i	1011	петог	. 1.		-
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JOB NO.	040861 Sebastian County				PAG		I		Iay 2, 2	023		_
JOB NO. JOB NAME: STATION: LOCATION:	Hwy. 10 - Hwy. 96 (Greenwood Bypass Route 10, Section 0 521+72 19' Right of Construction Centerline	s) (S)			ТҮРІ	E OF I		ING:	er - Diai	mond Co	ore	
	Tracy Henderson				HAM	IMER	CORE	RECTION	FACTO	R: 1	.54	
	ON DEPTH: 39											_
D S A A P M P B L C E FT. S	DESCRIPTION OF MATERIAL (SURFACE ELEVATION: 484.7	SOIL GROUP	PL 📙						PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
	CONTACE ELEVATION: 404.7		10	20 3	30 40) 50) 60	70				$\overline{}$
5	Moist, Very Loose, Light Brown Silty Sand			•						1 1-3 1 2-2		
10	Wet, Very Loose, Light Brown Silty Sand			•						0 0-0 0 0-0		
20	Wet, Medium Stiff, Light Brown Silty Clay with Sand			•						3 4-4		
25	SHALE WITH FREQUENT SANDSTONE PARTINGS AND									30 (0")	100	7
30	SEAMS - Unweathered, Medium Hard, Gray										96	9
	SHALE - Unweathered, Medium										100	8

			DEPARTMENT OF TRANSPORTATION	ON					RING				33			
		AL	Soboation County					PAC		2	OF	· 2	or: 2 2	022		_
JOB :	no. Nam	E٠	040861 Sebastian County Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)				DAT	E: E OF l	י זוקח	LING		ay 2, 2	023		
JOB	1 17 1111	L.	Route 10, Section 0	33) (3)									r - Dia	mond Co	re	
STA	ΓΙΟN:	:	521+72						IPME					ker 1		
LOC	ATIO	N:	19' Right of Construction Centerline													
LOG	GED :	BY:	Tracy Henderson					HAN	1MER	COR	RECT	TION :	FACTO	R: 1.	.54	_
CON	/IPLE	ETIC	ON DEPTH: 39													
D	s	S											N M	80		
E P	Y	A											SSI	O N.	%	%
T	M	M P	DESCRIPTION OF MATERIAL	SOIL									r PA 0 Si	, BL	Т	R
Ĥ	В	L		GROUP MOISTUI								•	EN. 20	OF PER	C R	Q D
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FT.		S	SURFACE ELEVATION: 484.7		1	0 2	0 3	0 4	0 5	0 6	0 7	0	Ъ			
L _			Hard, Gray													
L -															98	86
L –																
<u> </u>			Davis v Tavasia stad													
40			Boring Terminated													
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ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 5-B4 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 2 PAGE 1 040861 Sebastian County March 15, 2023 JOB NO. Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 522+98 STATION: EQUIPMENT: Acker 1 33' Left of Construction Centerline LOCATION: LOGGED BY: Anthony Nicholson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 34.3** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. S Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} В Q Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. S SURFACE ELEVATION: 487.4 30 40 50 Moist, Very Loose, Reddish Brown 72 1 Silt with Sand ML 1-2 5 80 0 CL-ML Moist, Soft, Reddish Brown Silty 1-3 Clay with Sand 64 3 NT Moist, Loose, Reddish Brown Clayey 3-4 Sand with Gravel (Rock Fragments) 10 14 SHALE - Highly Weathered, Soft, 40-47 Dark Brown SHALE WITH INTERBEDDED 34 0 SANDSTONE - Highly Weathered, Medium Hard, Frequent Fractures, 15 Gray 72 36 SHALE WITH FREQUENT 20 SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard, Gray 100 88 25 96 80 SHALE WITH FREQUENT SANDSTONE PARTINGS AND 30 SEAMS - Unweathered, Medium Hard, Occasional Fractures, Gray* 100 54 35 REMARKS: *Vertical Fracture from 33.2' to 34.3' Below ground level.

			DEPARTMENT OF TRANSPORTATI DIVISION - GEOTECHNICAL SEC.	ON				BOR PAG		NO. 2		e 5-E	34			
JOB I			040861 Sebastian County					DAT			01		arch 1	5, 2023		-
JOB 1		E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa Route 10, Section 0	ss) (S)				TYPI	E OF I			:		nond Co	re	
STAT LOCA			522+98 33' Left of Construction Centerline					EQU	IPME	NT:			Ack	ker 1		
			Anthony Nicholson					HAM	IMER	COR	RECT	ΓΙΟΝ	FACTOF	R: 1.	54	_
COM	1PLE		ON DEPTH: 34.3													
D E P T H	S Y M B O	SAMPLE	DESCRIPTION OF MATERIAL	SOIL GROUP			TURI	E CO	NTEI	NT (9		•	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
FT.	L	s	SURFACE ELEVATION: 487.4		PL 1		0 3	0 40	0 50	0 6		LL 0	PER N	Z		
			Boring Terminated		1	0 2	0 3	0 4		0 0	0 /					
Γ																
40																
45																
 50																
55																
 60																
65																
<u> </u>																
 70																
REM	1ARI	KS:	*Vertical Fracture from 33.2' to 34.3' B	elow gro	und	leve	el.									

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 5-B5 MATERIALS DIVISION - GEOTECHNICAL SEC. of 1 PAGE JOB NO. 040861 Sebastian County March 13 and 14, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 523+36 STATION: EQUIPMENT: Acker 1 49' Right of Construction Centerline LOCATION: LOGGED BY: Anthony Nicholson 1.54 HAMMER CORRECTION FACTOR: **COMPLETION DEPTH: 27.1** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) 0 Ε L PL | FT. SURFACE ELEVATION: 492.6 30 40 50 Moist, Medium Stiff, Brown Sandy 56 0 Silty Clay CL-ML • ||| 4-4 5 2 53 CL Moist, Medium Stiff, Brown Sandy 3-4 Lean Clay 63 þ ML 5-2 Moist, Loose, Brown Sandy Silt 10 44 SC-SM 5-6 Wet, Medium Dense, Brown Silty Clayey Sand with Some Gravel 15 40 20 SHALE - Highly Weathered, Soft, $(\overline{1}")$ Gray 20 88 80 SHALE WITH INTERBEDDED SANDSTONE - Unweathered, Medium Hard, Gray* 25 96 36 **Boring Terminated** 30 35 REMARKS: *Poor core recovery on final core run due to drill rig malfunction.

		DEPARTMENT OF TRANSPORTATION O	ON				BOI PAC		NO. 1	Site OF		36			
JOB NO.	IAL	040861 Sebastian County					DAT		<u>I</u>	UF		arch 1	5, 2023		-
JOB NAN	ΊE:	Hwy. 10 - Hwy. 96 (Greenwood Bypas Route 10, Section 0	ss) (S)				TYP	E OF		LING: em Au		- Diai	mond Co	ore	
STATION LOCATION		523+65 33' Left of Construction Centerline					EQU	IPME	NT:			Ack	ter 1		
LOGGED	BY:	Don McCollom and Donnie Thornton					HAN	/MER	COR	RECTI	ION I	FACTOR	R: 1	.54	
COMPL	ETIC	ON DEPTH: 34.6													
D E P T H B O L	L E	DESCRIPTION OF MATERIAL	SOIL GROUP	PL	<u> — </u>				NT (%	\dashv	LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
FT.	5	SURFACE ELEVATION: 488.7		10	0 20	0 3	0 4	0 5	0 6	0 70)	Ь			
		Moist, Medium Stiff, Brown Silty Clay with Traces of Gravel			•								2-3		
		Moist, Very Soft, Brown Silty Clay			•								0-1		
 10	X	Moist, Dense, Brown Silty Sand		•									9 13-20		
— — — —	\times	Moist, Very Dense, Brown Sand											16 25-34		
 15		SHALE - Weathered, Medium Hard, Gray											10		
	המשובושובושובושובושובושובושובושובושו המשובושובושובושובושובושובושובושובושובושוב	SHALE WITH FREQUENT SANDSTONE PARTINGS - Unweathered, Medium Hard, Gray											(0")	98	78
		SHALE WITH INTERBEDDED SANDSTONE - Unweathered, Medium Hard, Occasional Fractures, Gray												96	75
25		SHALE WITH INTERBEDDED SANDSTONE - Unweathered, Medium Hard, Gray												100	82
30 5555 - 6555 - 655	HOROKORO	SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard, Occasional Fractures, Gray												100	78
REMAR	RKS:														

			DEPARTMENT OF TRANSPORTATION	ON				BORING				36			
JOB 1		AL	S DIVISION - GEOTECHNICAL SEC. 040861 Sebastian County				_	PAGE	2	OF		orch 1	5, 2023		-
JOB 1		E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)				DATE: TYPE OF	DRILI	ING·		ai CII I	5, 2025		
			Route 10, Section 0	/(-/								- Dia	mond Co	re	
STAT	ΓΙΟN	:	523+65				1	EQUIPME	NT:			Acl	ker 1		
LOC			33' Left of Construction Centerline												
			Don McCollom and Donnie Thornton ON DEPTH: 34.6					HAMMER	CORI	RECT	ION I	FACTO	R: 1.	.54	-
D		S	JN DEP1H: 54.0									לט			
E	S	A							SIN(VE	WS					
Р	Y M	М	DESCRIPTION OF MATERIAL	SOIL								PAS SIE	3LO -IN.	% T	% R
T H	В	P L		GROUP								NT 200	OF I ER 6	C	Q
''	0	E					URE	CONTE	NT (%		• , ,	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	R	D
FT.	L		SURFACE ELEVATION: 488.7		PL 1		30	40 5	0 60		LL 0	PE	-		
			Boring Terminated												
40															
 45															
50															
<u> </u>															
 55															
55															
60															
L _															
65															
70															
REN	/ARI	KS:													

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 5-B7 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 2 PAGE 1 Sebastian County March 14, 2023 JOB NO. 040861 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 523+80 STATION: EQUIPMENT: Acker 1 49' Right of Construction Centerline LOCATION: LOGGED BY: Anthony Nicholson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 35.6** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} В Q Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. SURFACE ELEVATION: 491.4 40 50 Moist, Medium Stiff, Brown Silty Clay 2 3-5 5 2 2-1 Moist, Very Loose, Brown Silty Sand 3-4 Moist, Medium Stiff, Brown Silty Clay 10 5-8 Moist, Medium Dense, Brown Sand with Silt and Traces of Gravel (Shale Fragments) 15 60 SHALE - Weathered, Medium Hard, (6")Gray 67 l 61 20 SHALE WITH FREQUENT TO OCCASIONAL SANDSTONE PARTINGS AND SEAMS -Unweathered, Medium Hard, Occasional Fractures, Gray 96 | 66 25 SHALE WITH INTERBEDDED 100 84 SANDSTONE - Unweathered, Medium Hard, Gray 30 SHALE WITH INTERBEDDED SANDSTONE - Unweathered, 100 62 Medium Hard, Frequent Fractures, Gray* 35 REMARKS: *Vertical Fracture from 31.9' to 32.6' Below ground level.

			DEPARTMENT OF TRANSPORTATI DIVISION - GEOTECHNICAL SEC.	ON				BOF PAC	RING E	NO. 2		e 5-E	37			
JOB I			040861 Sebastian County					DAT			01		arch 14	1, 2023		-
JOB 1		E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)					E OF I	DRIL	LING			., 2020		
			Route 10, Section 0	, ()									- Dia	nond Co	re	
STAT	ION:		523+80						IPME					ker 1		
LOCA			49' Right of Construction Centerline													
			Anthony Nicholson					HAN	1MER	COR	RECT	ION I	FACTOI	R: 1.	54	_
	1PLE		ON DEPTH: 35.6													
D	s	S											PERCENT PASSING NO. 200 SIEVE	S		
E P	Υ	A M	DECODIDATION OF MATERIAL										ASS!	ος Ν. N.	%	%
T	M	Р	DESCRIPTION OF MATERIAL	SOIL GROUP									T P/	F BI	T	R
Н	B O	L		GROUP	N	AOIS'	TURI	E CO	NTEI	NT (9	6) (•	EN.	NO. OF BLOWS PER 6-IN.	C R	Q D
FT.	L	E S	OUDEAGE ELEVATION 404.4		PL	—					\dashv	LL	ERC N(NC		
		0	SURFACE ELEVATION: 491.4		1	0 2	0 3	0 4	0 5	0 6	0 7	0	Д			
			Boring Terminated													
			٥													
40																
 45																
45																
50																
55																
60																
 65																
-00																
70																
REM	1AR	S:	*Vertical Fracture from 31.9' to 32.6' B	elow gro	und	leve	el.									



Job No.: 040861





Job No.: 040861





Job No.: 040861





Job No.: 040861





Job No.: 040861





Job No.: 040861





Job No.: 040861





Job No.: 040861





Job No.: 040861





Job No.: 040861





Job No.: 040861





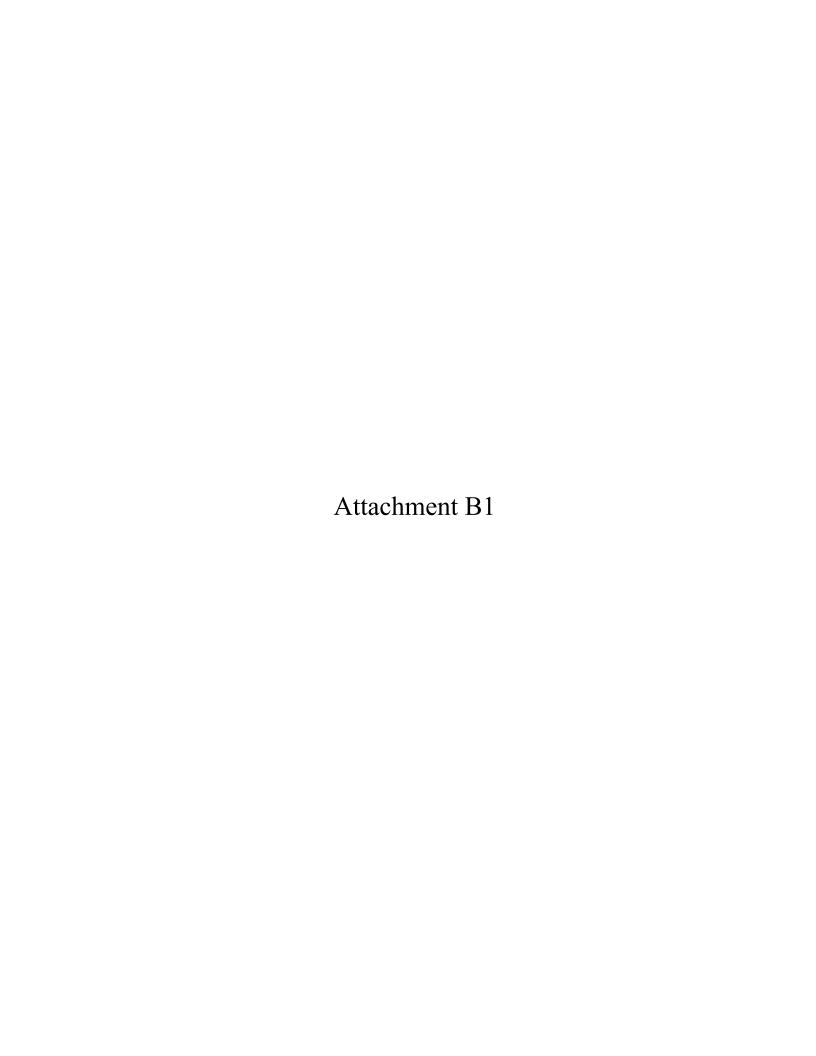
Job No.: 040861





Job No.: 040861





PAUL TINSLEY, MATERIALS ENGINEER *** SOIL ANALYSIS TEST REPORT ***

DATE	- 07/20/2023	SEQUENCE NO.	- 8
JOB NUMBER	- 040861	MATERIAL CODE	- 14620L
	NO TO BE ASSIGNED	SPEC. YEAR	- 2014
PURPOSE	- INFORMATION ONLY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	* - 1000 000 000 000 000 000 000 000 000	COUNTY/STATE	- 65
SUPPLIER NAME	[10] [2] [2] 회사하다 등 교육 이번 이번 이번 이번 이번 대한 사람들이 되었다.	DISTRICT NO.	- 04
NAME OF PROJE	ECT - HWY.10-HWY.96 (GREENWOOD BYPASS)	(S)	
PROJECT ENGI	NEER - NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS	- 55 str a 22	55/61/0000
LOCATION	- SEBASTIAN, COUNTY	SAMPLEI	
SAMPLED BY	- T. HENDERSON	RECEIVE	D - 06/26/2023
SAMPLE FROM	- AUGER CUTTINGS	TESTED	- 06/29/2023

MATERIAL DESC. - SOIL FOR SEEDING - LIME/REQ.

DESCRIPTIONS	- SAMPLE 1	- SAMPLE 2	- SAMPLE 3
LAB NUMBER	- 20230987	2 ()	
SAMPLE ID		-	-
	- INFORMATION ONLY	G-1	-
	- 209+50	-	-
~	- 23'RT	_	-
DEPTH IN FEET	_	e	-
COLOR	÷ 1	=	
% PASS 2 IN.	_	-	-
1 1/2 IN.		-	-
3/4 IN.			G
3/8 IN.		<u></u>	-
NO. 4			8
NO. 10		-	-
NO. 40		8	-
NO. 80		(=)	_
NO. 200		=	~
LIQUID LIMIT		=	-
PLASTICITY INDEX		9	-
AASHTO SOIL CLS.		ė.	-
UNIFIED SOIL CLS.		8	-
	(N) 6.0	()	()
LIME (TONS/ACRE)		é	-
SPECIFIC GRAVITY		20	_
% ABSORPTION	_	2	÷
MAX. DEN. #/CF	-	÷ :	_
% OPT. MOISTURE		-	2
% MOISTURE CONT.	-	-	(H)

REMARKS - SOIL RESISTIVITY 3.31 Ohm*cm

⁻ CC: GEOTECH, CHEMISTRY, SOILS

AASHTO TESTS : AASHTO T11, T27, T85, T88, T89, T90, T90, T100, T134, T180, T265, M145, AHTD357

Summary of Rock Core Uniaxial Compression Test Results

Project Number: Project Name:

040861 Site 1

Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) 7/28/2023

Date Tested:

Station	Location	Sample No.	Depth (ft.)	Diameter (in.)	Height (in.)	Weight g	Unit Weight pcf	Total Load (lbs.)	Correction Factor	Stress (psi)	Remarks
207+68	34' RT	1	15.8	1.68	3.50	322.62	158	5,600		2,328	
207+68	34' RT	2	20.1	1.75	3.45	347.19	159	5,270		2,191	
207+86	34' LT	3	19.8	1.75	3.39	334.59	156	6,070		2,523	
207+86	34' LT	4	26.5	1.75	3.48	359.52	164	8,470		3,521	
208+41	34' LT	5	16.6	1.75	3.21	326.98	161	4,700	0.955	1,866	
208+41	34' LT	6	21.2	1.75	3.52	356.75	161	6,110		2,540	
208+41	34' LT	7	30.3	1.75	3.57	371.35	165	19,000		7,899	Sandstone
208+41	27' RT	8	23.7	1.73	3.29	328.16	162	10,980	0.965	4,508	Sandstone
208+41	27' RT	9	25.7	1.74							Broke in Saw
209+50	23' RT	10	14.9	1.75	3.54	354.02	158	5,610		2,332	
209+50	23' RT	11	17.0	1.75	3.42	346.4	160	6,730		2,798	
209+50	23' RT	12	20.4	1.75	3.51	359.39	162	6,840		2,843	
209+62	34' LT	13	15.6								Broke in Saw
210+23	34' RT	14	17.5	1.74	3.63	373.54	165	8,860		3,683	
210+41	34' LT	15	16.3								Broke in Saw
210+92	34' RT	16	16.1	1.74	3.62	360.42	160	8,830		3,671	
211+10	36' LT	17	17.2	1.74	3.48	343.97	158	7,900		3,284	
			age, μ:				161			3,285	
	<u> </u>	Standard [,	/0		3			1513	
	Averag	<mark>e - Standar</mark>	d Deviati	on/2, μ-s/	2:					2528	

ROCK MASS RATING SUMMARY JOB # 040861 Site 1

SAMPLE #1

207+68, 34' RT 15.8 Station/Location Depth (ft) Relative Rating Uniaxial Compressive Strength RQD 17 Spacing of Joints Condition of Joints Groundwater Conditions 20 20 7 Sum 66 Class Number II Description GOOD ROCK

SAMPLE #2

GSI 55

Station/Location Depth (ft)	207+68, 34' RT 20.1	
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum	2 17 20 20 7 66	
Class Number Description	II GOOD ROCK	

SAMPLE #3

Station/Location Depth (ft)	207+86, 34' LT 19.8	
	Relative Rating	
Uniaxial Compressive Strength	2	
RQD	13	
Spacing of Joints	20	
Condition of Joints	6	
Groundwater Conditions	7	
Sum	48	
Class Number	III	
Description	FAIR ROCK	

SAMPLE #4

Station/Location Depth (ft)	207+86, 34' LT 26.5	
United at Comments of the month	Relative Rating	
Uniaxial Compressive Strength RQD	2 17	
Spacing of Joints	20	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	66	
Class Number	II	
Description	GOOD ROCK	

SAMPLE #5

Station/Location Depth (ft)	208+41, 34" LT 16.6	
	Relative Rating	
Uniaxial Compressive Strength	2	
RQD	20	
Spacing of Joints	20	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	69	
Class Number		
Description	GOOD ROCK	

SAMPLE #6

Station/Location Depth (ft)	208+41, 34" LT 21.2	
	Relative Rating	
Uniaxial Compressive Strength	4	
RQD	20	
Spacing of Joints	20	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	71	•
Class Number	II	
Description	GOOD ROCK	
·		

SAMPLE #7

Station/Location Depth (ft)	208+41, 27" RT 23.7	
	Relative Rating	
Uniaxial Compressive Strength	4	
RQD	8	
Spacing of Joints	10	
Condition of Joints	12	
Groundwater Conditions	7	
Sum	41	
	_	
Class Number	III	
Description	FAIR ROCK	

SAMDIE #9

SAMPLE #8			
Station/Location Depth (ft)	208+41, 27" RT 25.7		
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum	Relative Rating Broke in saw 17 20 25 7 69		
Class Number Description	II GOOD ROCK		

SAMPLE #9

Station/Location Depth (ft)	208+41, 34" LT 30.3	
	Relative Rating	
Uniaxial Compressive Strength	7	
RQD	17	
Spacing of Joints	25	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	76	<u>.</u> '
Class Number	II	
Description	GOOD ROCK	

SAMPLE #10

Station/Location Depth (ft)	209+50, 23' RT 14.9	
	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

ive Rating
13 20 20 7 62
0

SAMPLE #12

Station/Location Depth (ft)	209+50, 23' RT 20.4	
	Relative Rating	
Uniaxial Compressive Strength	4	
RQD	8	
Spacing of Joints	10	
Condition of Joints	6	
Groundwater Conditions	7	
Sum	35	
Class Number	IV	
Description	POOR ROCK	

SAMPLE #13

Station/Location Depth (ft)	209+62, 34' LT 15.6	
2 5 μ (()	Relative Rating	
Uniaxial Compressive Strength	Broke in saw	
RQD	13	
Spacing of Joints	10	
Condition of Joints	6	
Groundwater Conditions	7	
Sum	36	
Class Number	IV	
Description	POOR ROCK	

SAMPLE #14

Station/Location Depth (ft)	210+23, 34' RT 17.5	
	Relative Rating	
Uniaxial Compressive Strength	4	
RQD	17	
Spacing of Joints	25	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	73	
<u> </u>		ì
Class Number	ll l	
Description	GOOD ROCK	

SAMPLE #15

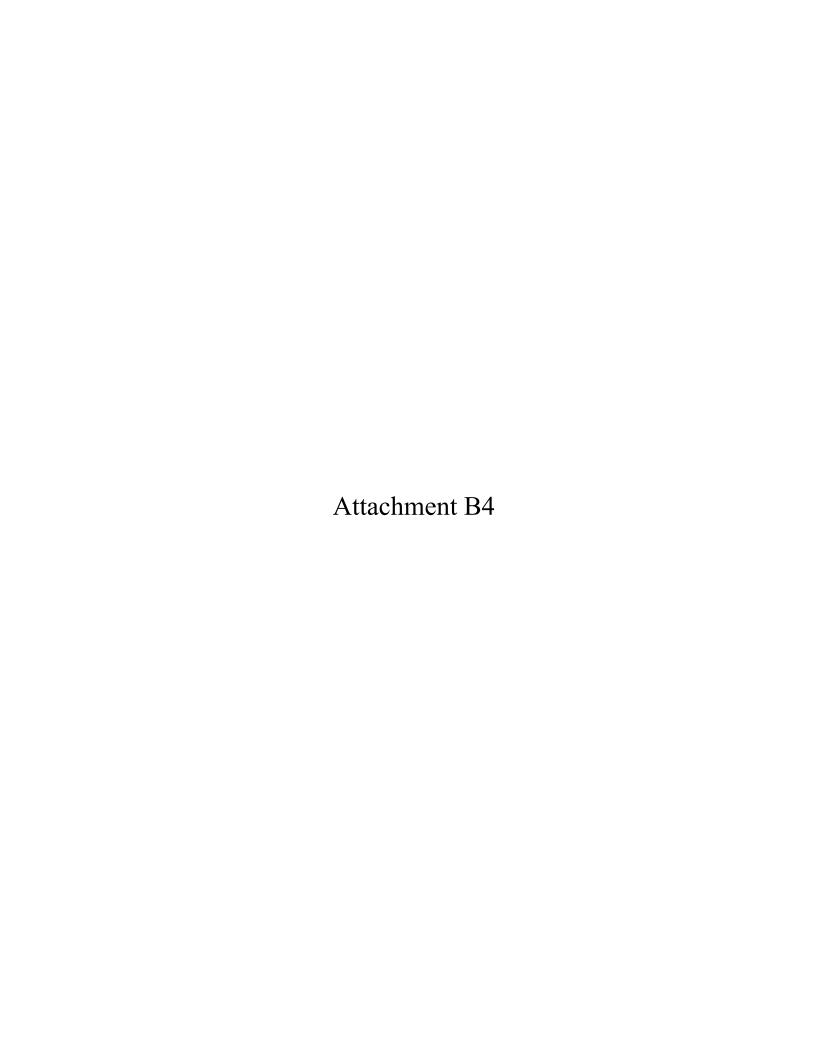
Station/Location Depth (ft)	210+41, 34' LT 16.3	
	Relative Rating	
Uniaxial Compressive Strength	Broke in saw	
RQD	17	
Spacing of Joints	10	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	54	
Class Number	III	
Description	FAIR ROCK	

SAMPLE #16

Station/Location Depth (ft)	210+92, 34' RT 16.1	
Linianial Community Steam with	Relative Rating	
Uniaxial Compressive Strength RQD	8	
Spacing of Joints	20	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	59	
Class Number	III	
Description	FAIR ROCK	

SAMPLE #17

57 tim 22 # 11		
Station/Location Depth (ft)	211+10, 36' LT 17.2	
	Relative Rating	
Uniaxial Compressive Strength	4	
RQD	13	
Spacing of Joints	20	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	64	
Class Number	II	
Description	GOOD ROCK	



PAUL TINSLEY, MATERIALS ENGINEER *** SOIL ANALYSIS TEST REPORT ***

DATE - 06/27/2023	SEQUENCE NO 6
JOB NUMBER - 040861	MATERIAL CODE - 14620L
FEDERAL AID NO TO BE ASSIGNED	SPEC. YEAR - 2014
PURPOSE - INFORMATION ONLY SAMPLE	SUPPLIER ID 1
SPEC. REMARKS - NO SPECIFICATION CHECK	COUNTY/STATE - 65
SUPPLIER NAME - STATE	DISTRICT NO 04
NAME OF PROJECT - HWY.10-HWY.96 (GREENWOOD BYPAS	S) (S)
PROJECT ENGINEER - NOT APPLICABLE PIT/QUARRY - ARKANSAS	
LOCATION - SEBASTIAN, COUNTY	SAMPLED - 06/06/2023
SAMPLED BY - T. HENDERSON	RECEIVED - 06/14/2023
SAMPLE FROM - JOBSITE	TESTED - 06/19/2023

MATERIAL DESC. - SOIL FOR SEEDING - LIME/REQ.

MAIBRIAD DESC.	BOTH TON BEHAVIOR		
DESCRIPTIONS	- SAMPLE 1	- SAMPLE 2	- SAMPLE 3
LAB NUMBER	- 20230867	2	~
SAMPLE ID	- SM8	2	-
TEST STATUS	- INFORMATION ONLY	-	-
	- 505+26	-	-
LOCATION	- 29'RT	-	-
DEPTH IN FEET	-	-	_
COLOR	÷	-	1 2 1
% PASS 2 IN.	-	-	-
1 1/2 IN.	-	-	_
3/4 IN.	-	2,	-
3/8 IN.	=	-	-
NO. 4	-	O# I	-
NO. 10	- 100	a a	-
NO. 40		-	-
NO. 80		-	-
NO. 200	- 71	-	-
LIQUID LIMIT	- 23	-	-
PLASTICITY INDEX	- 6	-	-
AASHTO SOIL CLS.	5		7
UNIFIED SOIL CLS		-	-
SOIL PH	(N) 6.1	()	()
LIME (TONS/ACRE)	- 0.0	÷	-
SPECIFIC GRAVITY	-		-
% ABSORPTION	7	5	
MAX. DEN. #/CF	14	-	21
% OPT. MOISTURE	8	Le.	[5]
% MOISTURE CONT.	4		

REMARKS - SOIL RESISTIVITY 3.9K Ohm*cm

⁻ CC: GEOTECH, CHEMISTRY, SOILS

PAUL TINSLEY, MATERIALS ENGINEER *** SOIL ANALYSIS TEST REPORT ***

SEQUENCE NO. - 5 DATE - 06/20/2023 MATERIAL CODE - 14620L JOB NUMBER - 040861 SPEC. YEAR - 2014 FEDERAL AID NO. - TO BE ASSIGNED SUPPLIER ID. - 1 - INFORMATION ONLY SAMPLE COUNTY/STATE - 65 SPEC. REMARKS - NO SPECIFICATION CHECK DISTRICT NO. - 04 SUPPLIER NAME - STATE NAME OF PROJECT - HWY.10-HWY.96 (GREENWOOD BYPASS) (S) PROJECT ENGINEER - NOT APPLICABLE PIT/QUARRY - ARKANSAS SAMPLED - 05/24/2023 - SEBASTIAN, COUNTY LOCATION RECEIVED - 05/30/2023 SAMPLED BY - ANTHONY NICHOLSON TESTED - 06/01/2023 SAMPLE FROM - 505+72 16' LT OF CL

- SAMPLE 3 - SAMPLE 2 DESCRIPTIONS - SAMPLE 1 LAB NUMBER - 20230761 - SM-4 SAMPLE ID - INFORMATION ONLY TEST STATUS - 505+72 STATION LOCATION - 16'LT DEPTH IN FEET COLOR % PASS 2 IN. -1 1/2 IN. -3/4 IN. -3/8 IN. - 100 NO. 4 -99 99 NO. 10 -NO. 40 -99 95 NO. 80 -NO. 200 -75 LIQUID LIMIT -PLASTICITY INDEX -7 AASHTO SOIL CLS. - A-4(3) UNIFIED SOIL CLS .-SOIL PH (N) 7.3 LIME (TONS/ACRE) -0.0 SPECIFIC GRAVITY -% ABSORPTION -MAX. DEN. #/CF -% OPT. MOISTURE -% MOISTURE CONT. -

REMARKS - SOIL RESISTIVITY 3.80K Ohm*cm

MATERIAL DESC. - SOIL FOR SEEDING - LIME/REQ.

⁻ CC: RE 99, CHEMISTRY, SOILS

PAUL TINSLEY, MATERIALS ENGINEER *** SOIL ANALYSIS TEST REPORT ***

DATE - 06/20/2023	3	SEQUENCE NO.	- 4
JOB NUMBER - 040861		MATERIAL CODE	- 14620L
FEDERAL AID NO TO BE ASSI	IGNED	SPEC. YEAR	- 2014
[기업생활] 하십시 : [기급] - [시 기급 : [기급] - [1] -	ON ONLY SAMPLE	SUPPLIER ID.	- 1
			- 65
	ICATION CHECK		- 04
SUPPLIER NAME - STATE			0.4
NAME OF PROJECT - HWY.10-	HWY.96 (GREENWOOD BYPAS	SS) (S)	
PROJECT ENGINEER - NOT APP	LICABLE		
PIT/QUARRY - ARKANSAS			- 10 m 18 6 8 8
LOCATION - SEBASTIAN, C	COUNTY	SAMPLED	- 05/17/2023
SAMPLED BY - T HENDERSON		RECEIVE	05/19/2023
SAMPLE FROM - AUGER CUTTIN	NGS	TESTED	- 05/23/2023

DESCRIPTIONS	- SAMPLE 1	- SAMPLE 2	- SAMPLE 3
LAB NUMBER	- 20230677	=	-
SAMPLE ID	- S141	(2)	4
TEST STATUS	- INFORMATION ONLY	T (=3)	-
STATION	- 506+07	=	-
LOCATION	- 30'RT	-	-
DEPTH IN FEET	2	6	-
COLOR	100	-	
% PASS 2 IN.		E)	-
1 1/2 IN	-	-	=
3/4 IN		-	-
3/8 IN	. =	-	-
NO.	4 -	-	-
NO. 10	0 -	-	-
NO. 40	0 -	-	-
NO. 8	0 -	*	.=-
NO. 200	0 -	-	-
LIQUID LIMIT	-	-	-
PLASTICITY INDE	X -	-	-
AASHTO SOIL CLS		Cer III	-
UNIFIED SOIL CL	S	-	-
SOIL PH	(B) 6.4	()	()
LIME (TONS/ACRE) - 3.0	-	-
SPECIFIC GRAVIT	Y -	15	_
% ABSORPTION	-	=	
MAX. DEN. #/CF	-	·	
% OPT. MOISTURE	Soft .	-	-
% MOISTURE CONT	. =	i-	

REMARKS - SOIL RESISTIVITY 5.01K Ohm*cm

⁻ MAE BUFFER PH: 7.5, MAE LIME ADDITION: 1.95 TONS

⁻ CC: RE 99, CHEMISTRY, SOILS

PAUL TINSLEY, MATERIALS ENGINEER *** SOIL ANALYSIS TEST REPORT ***

DATE -	06/27/2023	SEQUENCE NO.	- 4
	040861	MATERIAL CODE	- 14620L
FEDERAL AID NO		SPEC. YEAR	- 2014
	INFORMATION ONLY SAMPLE	SUPPLIER ID.	- 1
	NO SPECIFICATION CHECK	COUNTY/STATE	- 65
SUPPLIER NAME -	STATE	DISTRICT NO.	- 04
NAME OF PROJECT	- HWY.10-HWY.96 (GREENWOOD BYPASS)	S)	
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY - A	RKANSAS		10 T A 10 TO 10 TO 10
LOCATION - S	EBASTIAN, COUNTY	SAMPLED	
SAMPLED BY - T	HENDERSON	RECEIVE	D - 05/19/2023
SAMPLE FROM - A	UGER CUTTINGS	TESTED	- 05/23/2023

MATERIAL DESC. - SOIL FOR SEEDING - LIME/REQ.

DESCRIPTIONS	- SAMPLE 1	- SAMPLE 2	- SAMPLE 3
LAB NUMBER	- 20230677	-	-
SAMPLE ID	- S141	2	-
	- INFORMATION ONLY	(-)	\simeq
	- 506+07	=	-
LOCATION	- 30'RT	·	
DEPTH IN FEET	2		-
COLOR	9	-	-
% PASS 2 IN.	4	i—i	-
1 1/2 IN.	-	-	-
3/4 IN.	_	3-3	-
3/8 IN.	-	5	-
NO. 4	<u></u>	12	9
NO. 10	-	-	-
NO. 40		(-	-
NO. 80	-	3	-
NO. 200	-	14	3-5
LIQUID LIMIT	er .	-	-
PLASTICITY INDEX	=	-	-
AASHTO SOIL CLS.	9	€	-
UNIFIED SOIL CLS	. -	-	-
SOIL PH	(N) 5.7	()	()
LIME (TONS/ACRE)		A	-
SPECIFIC GRAVITY	-	÷.	-
% ABSORPTION		-	
MAX. DEN. #/CF	6	÷ 1	_
% OPT. MOISTURE		()	-
% MOISTURE CONT.		e	_

REMARKS - SOIL RESISTIVITY 5.01K Ohm*cm

⁻ CC: GEOTECH, CHEMISTRY, SOILS

Summary of Rock Core Uniaxial Compression Test Results

Project Number:

040861 Site 4

Project Name:

Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S)

Date Tested:

Station	Location	Sample No.	Depth (ft.)	Diameter (in.)	Height (in.)	Weight g	Unit Weight pcf	Total Load (lbs.)	Correction Factor	Stress (psi)	Remarks
503+96	45' RT	1	22.3	1.74	3.48						sample broke after cutting
503+96	45' RT	2	28.6	1.74	3.48						sample broke
504+14	44' LT	3	28.4	1.74	3.48	350.64	161	6,730		2,830	
504+72	29' RT	4	20.0	1.75	3.50	345.04	156	8,410		3,496	
504+73	29' LT	5	20.4	1.75	3.50						sample broke
504+73	29' LT	6	28.8	1.75	3.50	369.97	167	13,050		5,426	
505+32	36' LT	7	18.2	1.75	3.50	353.43	160	8,530		3,546	
505+32	36' LT	8	30.2	1.75	3.50	361.28	163	13,200		5,488	
506+07	30' RT	9	17.1	1.7	3.55	331.15	157	8,170		3,599	
506+07	30' RT	10	20.7	1.75	3.77	378.30	159	6,900		2,869	sandstone
506+82	51' RT	11	21.3	1.74	3.54	359.38	163	10,650		4,479	
506+82	51' RT	12	35.3	1.75	3.44	354.54	163	13,310		5,534	
507+42	19' RT	13	33.9	1.75	3.21	329.01	162	8,070		3,355	
507+42	19' RT	14	37.5	1.74	3.40						sample broke
507+58	20' LT	15	35.0	1.75	3.39	350.53	164	11,820		4,914	
			rage, μ:				161			4,140	
		Standard			0/2:		3			1055	
Average - Standard Deviation/2, μ-s/2:								3612			

ROCK MASS RATING SUMMARY JOB # 040861 Site 4

GSI 90

SAMPLE #1

Station/Location 503+96, 45' RT Depth (ft) 22.3 Relative Rating Uniaxial Compressive Strength RQD 13 Spacing of Joints 20 Condition of Joints 20 **Groundwater Conditions** 60 Sum Class Number Ш FAIR ROCK Description

SAMPLE #2

Station/Location Depth (ft)	503+96, 45' RT 28.6	
	Relative Rating	
Uniaxial Compressive Strength		
RQD	17	
Spacing of Joints	20	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	64	
Class Number	II	
Description	GOOD ROCK	

SAMPLE #3

Station/Location Depth (ft)	504+14, 44' LT 28.4
	Relative Rating
Uniaxial Compressive Strength	
RQD	3
Spacing of Joints	10
Condition of Joints	20
Groundwater Conditions	7
Sum	40
Class Number Description	IV POOR ROCK

SAMPLE #4

JAIVII	LL // -	
Station/Location Depth (ft)	504+72, 29' RT 20	
	Relative Rating	•
Uniaxial Compressive Strength		
RQD	13	
Spacing of Joints	20	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	60	
		i.
Class Number	III	
Description	FAIR ROCK	
		<u>-</u> '

SAMPLE #5

JAIVII	LL #0	
Station/Location Depth (ft)	504+73, 29' LT 20.3	
	Relative Rating	
Uniaxial Compressive Strength		
RQD	13	
Spacing of Joints	10	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	50	
Class Number	III	
Description	FAIR ROCK	

SAMPLE #6

SAMI LL #0			
Station/Location Depth (ft)	504+73, 29' LT 28.8		
	Relative Rating		
Uniaxial Compressive Strength			
RQD	17		
Spacing of Joints	20		
Condition of Joints	20		
Groundwater Conditions	7		
Sum	64	,	
Class Number	II		
Description	GOOD ROCK		
	•		

SAMPLE #7			
Station/Location Depth (ft)	505+32, 36' LT 18.2		
	Relative Rating		
Uniaxial Compressive Strength			
RQD	17		
Spacing of Joints	20		
Condition of Joints	20		
Groundwater Conditions	7		
Sum	64		
Class Number	II		
Description	GOOD ROCK		

SAMPLE #8

SAWI LL #0			
Station/Location Depth (ft)	505+32, 36' LT 30.2		
	Relative Rating		
Uniaxial Compressive Strength	_		
RQD	20		
Spacing of Joints	25		
Condition of Joints	20		
Groundwater Conditions	7		
Sum	72		
Class Number	II		
Description	GOOD ROCK		

SAMPLE #9

Station/Location Depth (ft)	506+07, 30' RT 17.1	
	Relative Rating	
Uniaxial Compressive Strength		
RQD	13	
Spacing of Joints	10	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	50	
Class Number	III	
Description	FAIR ROCK	
	<u> </u>	

SAMPLE #10

Station/Location Depth (ft)	506+07, 30' RT 20.7	
	Relative Rating	
Uniaxial Compressive Strength		
RQD	17	
Spacing of Joints	10	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	54	
Class Number	III	
Description	FAIR ROCK	

SAMPLE #11

Station/Location Depth (ft)	506+82, 51' RT 21.3	
	Relative Rating	
Uniaxial Compressive Strength		
RQD	13	
Spacing of Joints	20	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	60	
Class Number	III	
Description	FAIR ROCK	

SAMPLE #12

Station/Location Depth (ft)	506+82, 51' RT 35.3	
	Relative Rating	
Uniaxial Compressive Strength		
RQD	17	
Spacing of Joints	10	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	54	
Class Number	III	
Description	FAIR ROCK	

SAMPLE #13

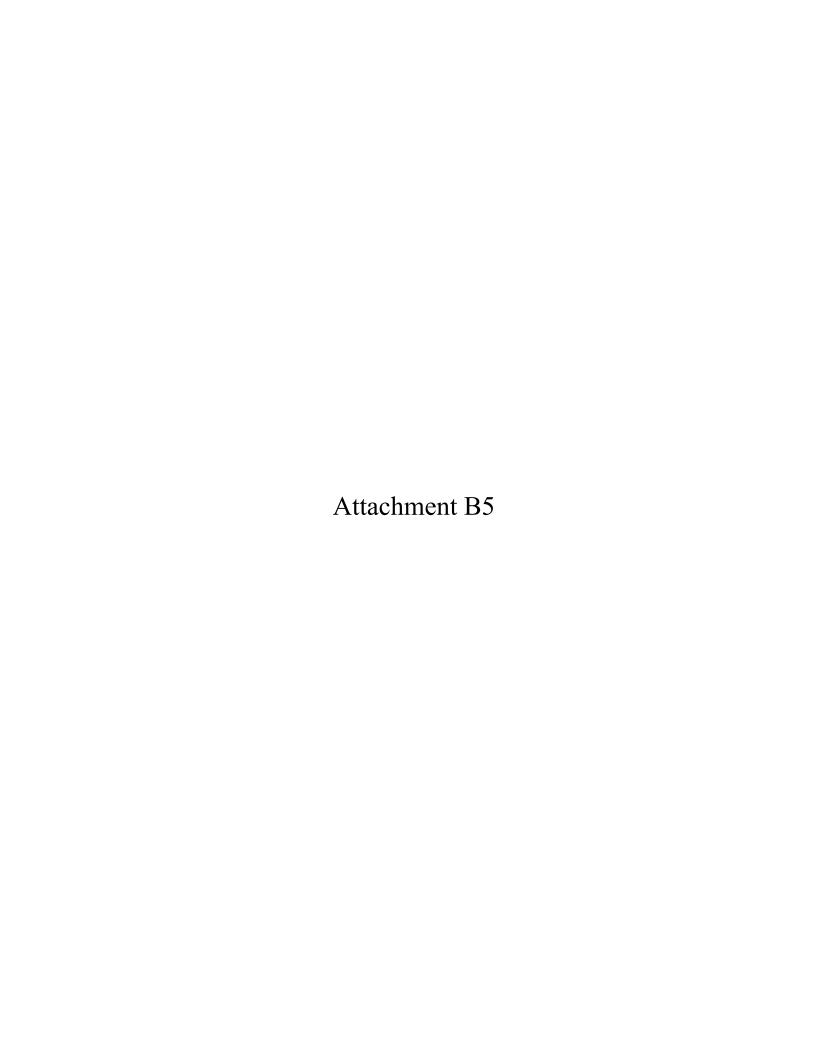
SAWFLE #13				
Station/Location	507+42, 19' RT			
Depth (ft)	33.9			
	Relative Rating			
Uniaxial Compressive Strength				
RQD	17			
Spacing of Joints	20			
Condition of Joints	20			
Groundwater Conditions	7			
Sum	64			
Class Number	II			
Description	GOOD ROCK			

SAMPLE #14

SAMPLE #14				
Station/Location Depth (ft)	507+42, 19' RT 37.5			
	Relative Rating			
Uniaxial Compressive Strength				
RQD	17			
Spacing of Joints	20			
Condition of Joints	20			
Groundwater Conditions	7			
Sum	64			
Class Number	II			
Description	GOOD ROCK			

SAMPLE #15

O/tim	LE #13	
Station/Location Depth (ft)	507+58, 20' LT 35	
	Relative Rating	
Uniaxial Compressive Strength		
RQD	13	
Spacing of Joints	10	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	50	
Class Number	III	
Description	FAIR ROCK	



PAUL TINSLEY, MATERIALS ENGINEER
*** SOIL ANALYSIS TEST REPORT ***

JOB NUMBER - FEDERAL AID NO PURPOSE - SPEC. REMARKS - SUPPLIER NAME - NAME OF PROJECT	INFORMATION ONLY SAMPLE NO SPECIFICATION CHECK	SPEC. YEAR SUPPLIER ID. COUNTY/STATE DISTRICT NO.	- 3 - 14620L - 2014 - 1 - 65 - 04
LOCATION - S SAMPLED BY - T	RKANSAS EBASTIAN, COUNTY RACEY HENDERSON UGER CULTINGS	SAMPLED RECEIVE TESTED	A STATE OF THE STA

DESCRIPTIONS	-	SAMPLE 1	-	SAMPLE 2	-	SAMPLE 3
LAB NUMBER	-	20230615	_		-	
SAMPLE ID			-		-	
TEST STATUS	_	INFORMATION ONLY	-			
STATION		521+26	-		-	
LOCATION		7'RT	-		-	
DEPTH IN FEET	4		-		-	
COLOR	-		_			
% PASS 2 IN.	ė,		_		-	
1 1/2 IN.			-		-	
3/4 IN.			-		-	
3/8 IN.			-		-	
NO. 4			-		-	
NO. 10			-		-	
NO. 40			-		- 12	
NO. 80			-		-	
NO. 200	-		-		-	
LIQUID LIMIT	-		-		0	
PLASTICITY INDEX	-		-			
AASHTO SOIL CLS.			-			
UNIFIED SOIL CLS						
SOIL PH			()		()
LIME (TONS/ACRE)			-		100	
SPECIFIC GRAVITY					1,5	-
% ABSORPTION			-			
MAX. DEN. #/CF	-		-			- 1
% OPT. MOISTURE			-			
% MOISTURE CONT.			-		19	-

REMARKS - SOIL RESISTIVITY 18.3K Ohm*cm

- MAE BUFFER: 7.73 PH, MAE LIME ADDITION: 1.7 TONS

- CC: RE 99, CHEMISTRY, SOILS

Summary of Rock Core Uniaxial Compression Test Results

Project Number:

040861 Site 5

Project Name:

Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S)

Date Tested:

Station	Location	Sample No.	Depth (ft.)	Diameter (in.)	Height (in.)	Weight g	Unit Weight pcf	Total Load (lbs.)	Correction Factor	Stress (psi)	Remarks
521+23	50' RT	1	27.5	1.74	3.48	358.64	165	14,740		6,199	
521+23	50' RT	2	32.1	1.74	3.48	367.15	169	12,070		5,076	
521+26	7' RT	3	20.3	1.74	3.48	347.41	160	12,930		5,438	
521+26	7' RT	4	22.9	1.75	3.50	360.44	163	7,880		3,276	
521+72	19' RT	5	20.3	1.74	3.48	380.15	175	14,968		6,295	
521+72	19' RT	6	27.8	1.74	3.48	355.21	164	19,450		8,180	
522+98	33' LT	7	20.6	1.74	3.48	345.15	159	14,990		6,304	
523+36	49' RT	8	19.2	1.75	3.50	348.84	158	21,670		9,009	
523+36	49' RT	9	22.7	1.75	3.50	364.80	165	18,290		7,604	
523+65	33' LT	10	15.2	1.75	3.50	362.93	164	14,930		6,207	
523+65	33' LT	11	23.5	1.74	3.48	323.40	149	13,220		5,560	
523+80	49' RT	12	17.0	1.74	3.48	361.65	166				
			rage, μ:				163			6,286	
	Standard Deviation, s:						6			1566	
	Average - Standard Deviation/2, μ-s/2:									5503	

ROCK MASS RATING SUMMARY JOB # 040861 Site 5

GSI 90

SAMPLE #1

Station/Location 521+23, 50' RT Depth (ft) 27.5 Relative Rating Uniaxial Compressive Strength RQD 17 Spacing of Joints 20 Condition of Joints 20 **Groundwater Conditions** 64 Sum Class Number II GOOD ROCK Description

SAMPLE #2

Station/Location Depth (ft)	521+23, 50' RT 32.1	
	Relative Rating	
Uniaxial Compressive Strength		
RQD	17	
Spacing of Joints	20	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	64	
Class Number	II	
Description	GOOD ROCK	

SAMPLE #3

Station/Location Depth (ft)	521+26, 7' RT 20.3
	Relative Rating
Uniaxial Compressive Strength	
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	64
Class Number Description	II GOOD ROCK

SAMPLE #4

- Ortini	
Station/Location Depth (ft)	521+26, 7' RT 22.9
	Relative Rating
Uniaxial Compressive Strength	
RQD	17
Spacing of Joints	20
Condition of Joints	20
Groundwater Conditions	7
Sum	64
Class Number	II
Description	GOOD ROCK

SAMPLE #5

Station/Location	521+72, 19' RT	
Depth (ft)	20.3	
,		.!!
	Relative Rating	
Uniaxial Compressive Strength		
RQD	17	
Spacing of Joints	20	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	64	
Class Number	II	
Description	GOOD ROCK	
-		•

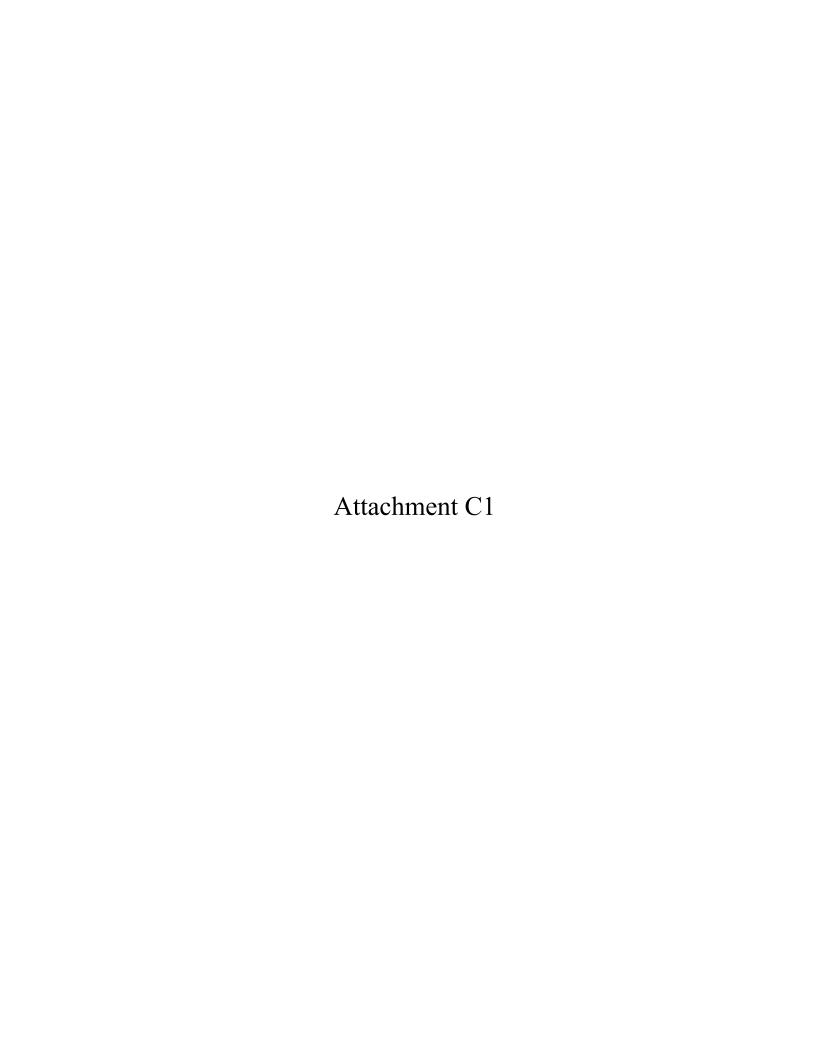
SAMPLE #6

SAIVIF	*LE #6
Station/Location Depth (ft)	521+72, 19' RT 27.8
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum	17 20 20 7 64
Class Number Description	II GOOD ROCK

SAMPLE #7			
Station/Location Depth (ft)	522+98, 33' LT 20.6		
	Relative Rating		
Uniaxial Compressive Strength RQD	17		
Spacing of Joints	20		
Condition of Joints	20		
Groundwater Conditions Sum	64		
Sum	04		
Class Number	II		
Description	GOOD ROCK		

SAMPLE #8

OAMI EL #0		
Station/Location Depth (ft)	523+36, 49' RT 19.2	
	Relative Rating	
Uniaxial Compressive Strength	_	
RQD	13	
Spacing of Joints	10	
Condition of Joints	20	
Groundwater Conditions	7	
Sum	50	
Class Number	III	
Description	FAIR ROCK	





Job No.: 040861 Site 1



Heartsill Creek channel looking downstream to the southwest where the bridge is to be located (June 2023).



Job No.: 040861 Site 1



Proposed northeast bridge end location looking east (June 2023).



Job No.: 040861 Site 1



Northeast bridge end location looking towards the channel (June 2023).



Job No.: 040861 Site 1



Looking south at the field where the proposed southwest bridge end is to be located (June 2023).



Job No.: 040861 Site 1



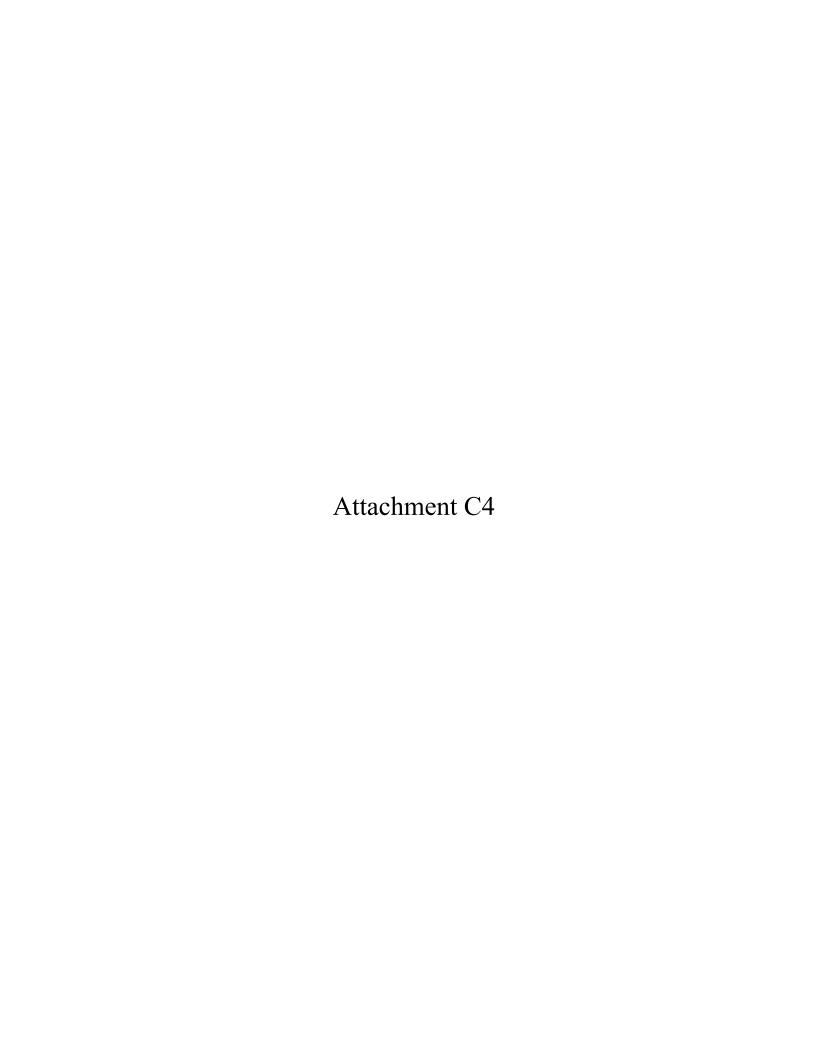
Looking north towards the pond located east of the proposed bridge end (June 2023).



Job No.: 040861 Site 1



Looking south at sandstone exposed at the surface of the west bridge end (June 2023).





Job No.: 040861 Site 4



Looking east at existing bridge end embankment.



Job No.: 040861 Site 4



Looking north at downstream Heartsill Creek.



Job No.: 040861 Site 4





Job No.: 040861 Site 4



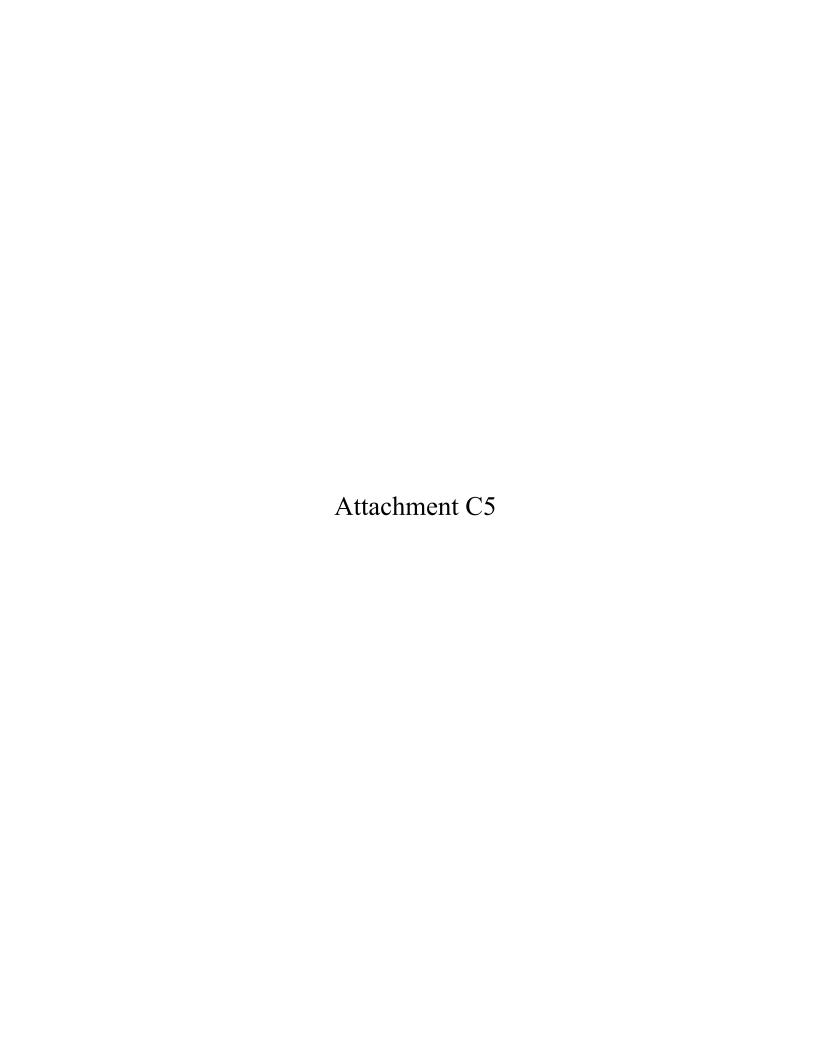
Looking north at scour on the northwest Heartsill Creek bank.



Job No.: 040861 Site 4



Looking east at the existing bridge.





Job No.: 040861 Site 5



Existing bridge looking west.



Job No.: 040861 Site 5



Looking west at bridge end embankment.



Job No.: 040861 Site 5



Looking east at bridge end embankment.



Job No.: 040861 Site 5



Looking southeast at downstream Vache Grasse Creek.



Job No.: 040861 Site 5

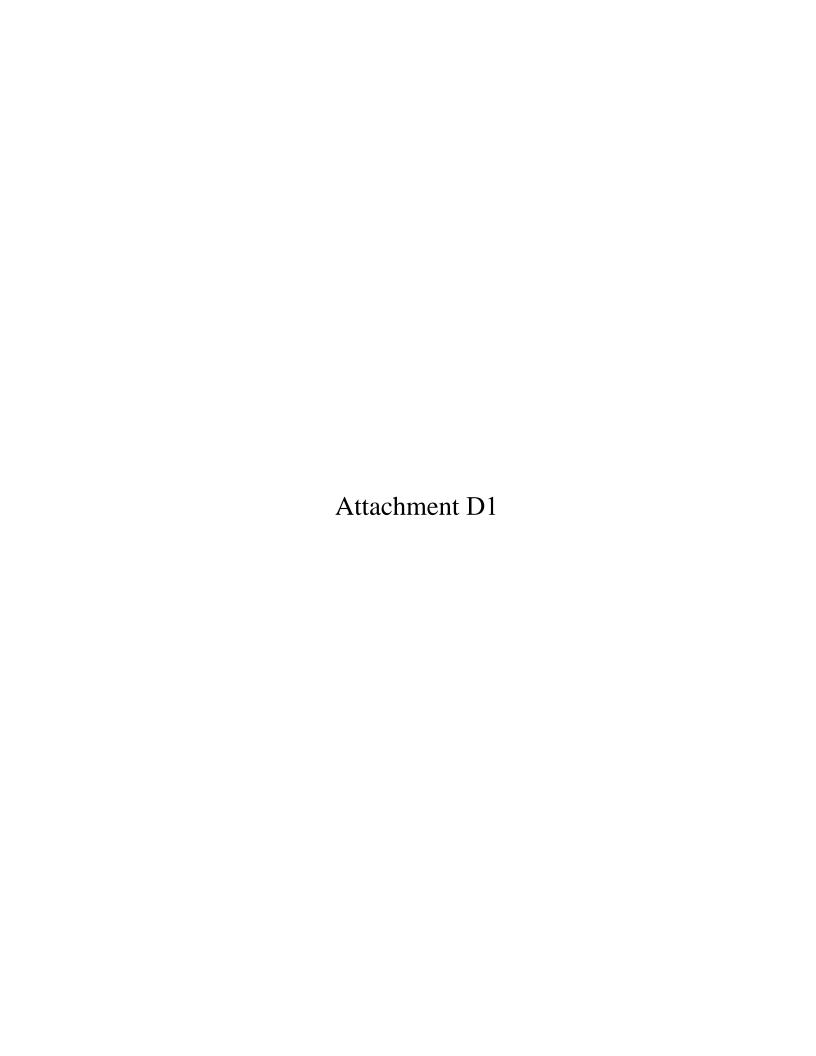


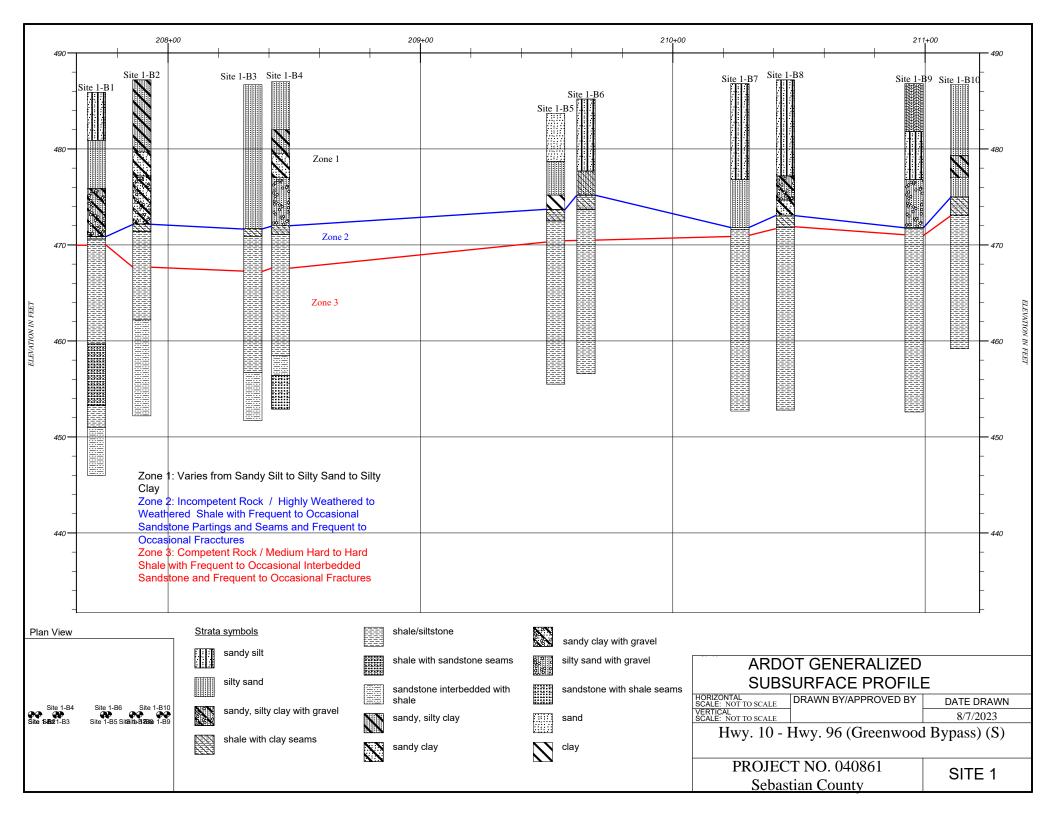


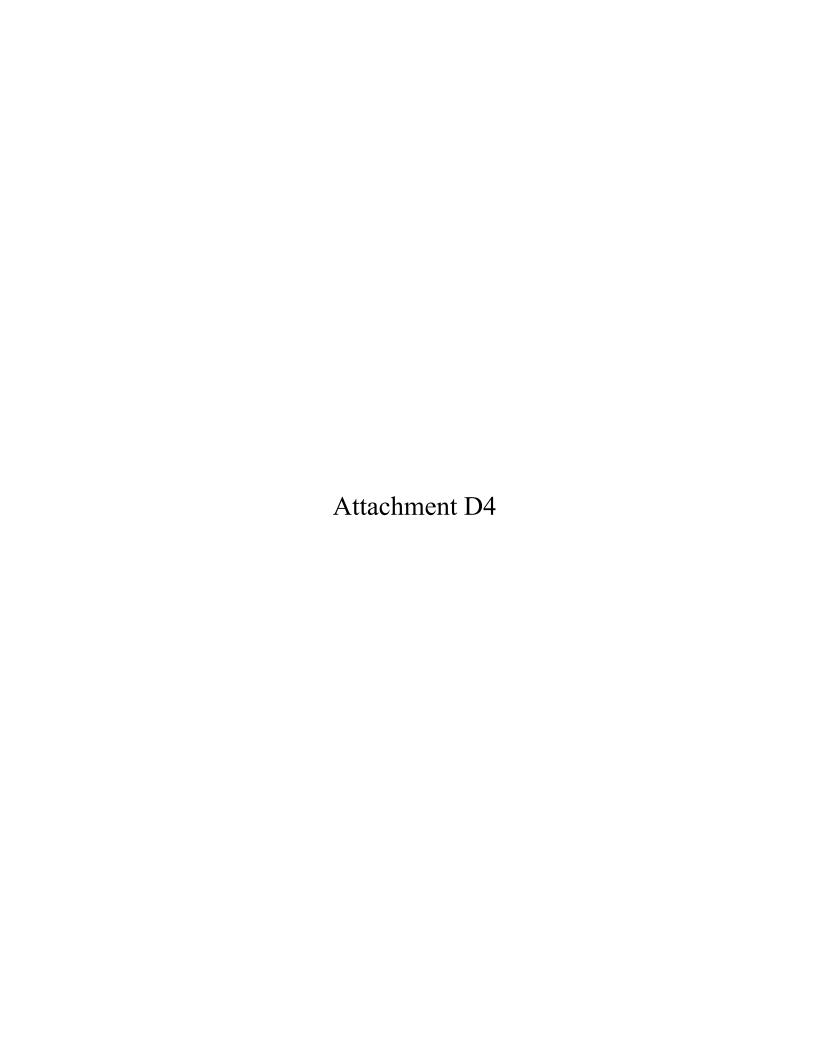
Job No.: 040861 Site 5

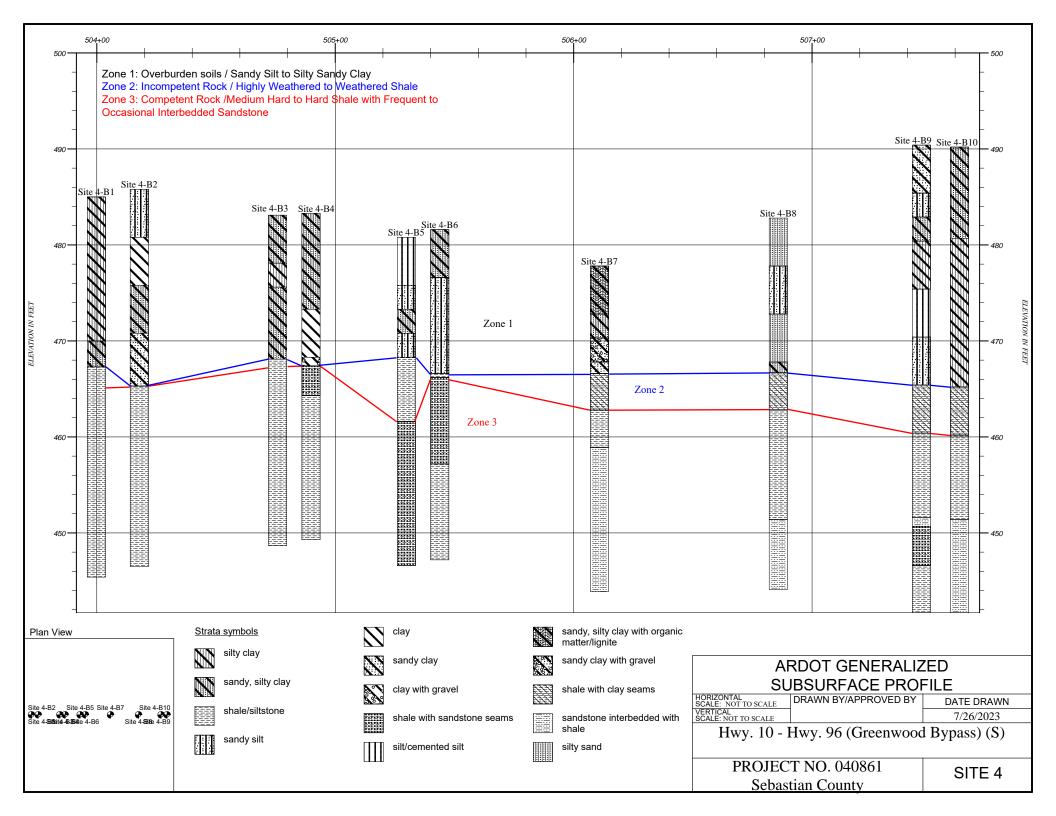


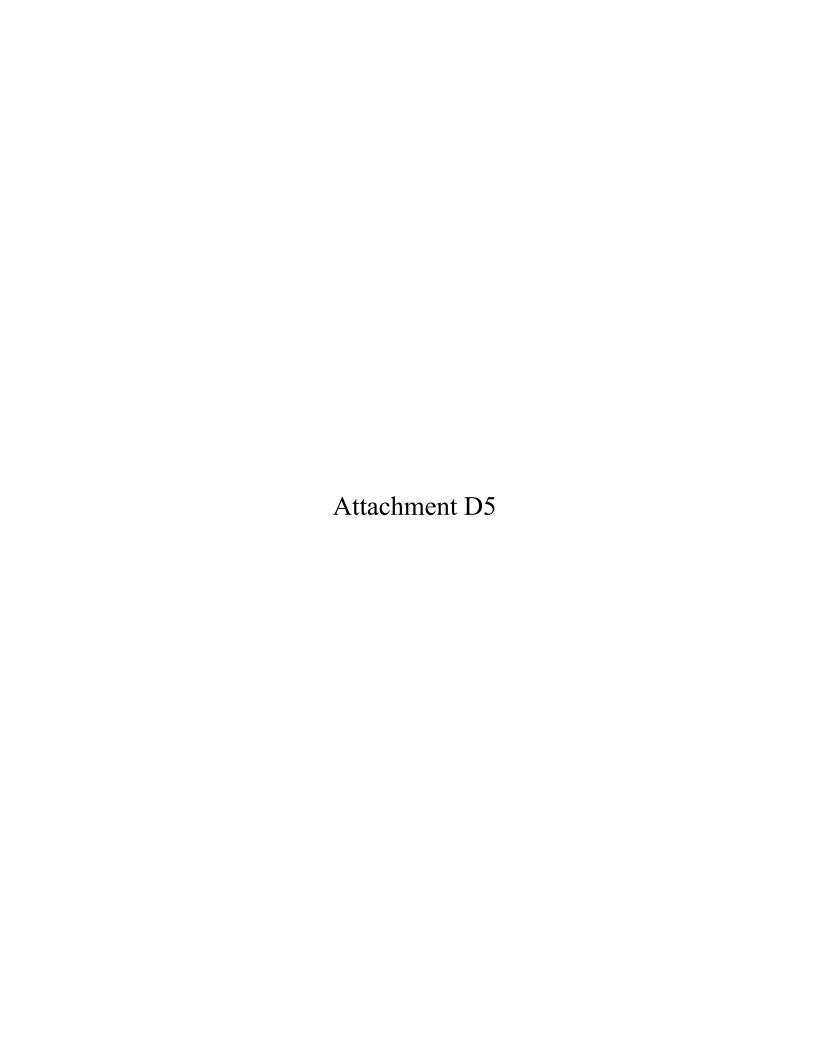
Looking south at shale exposed under southeast bridge end.

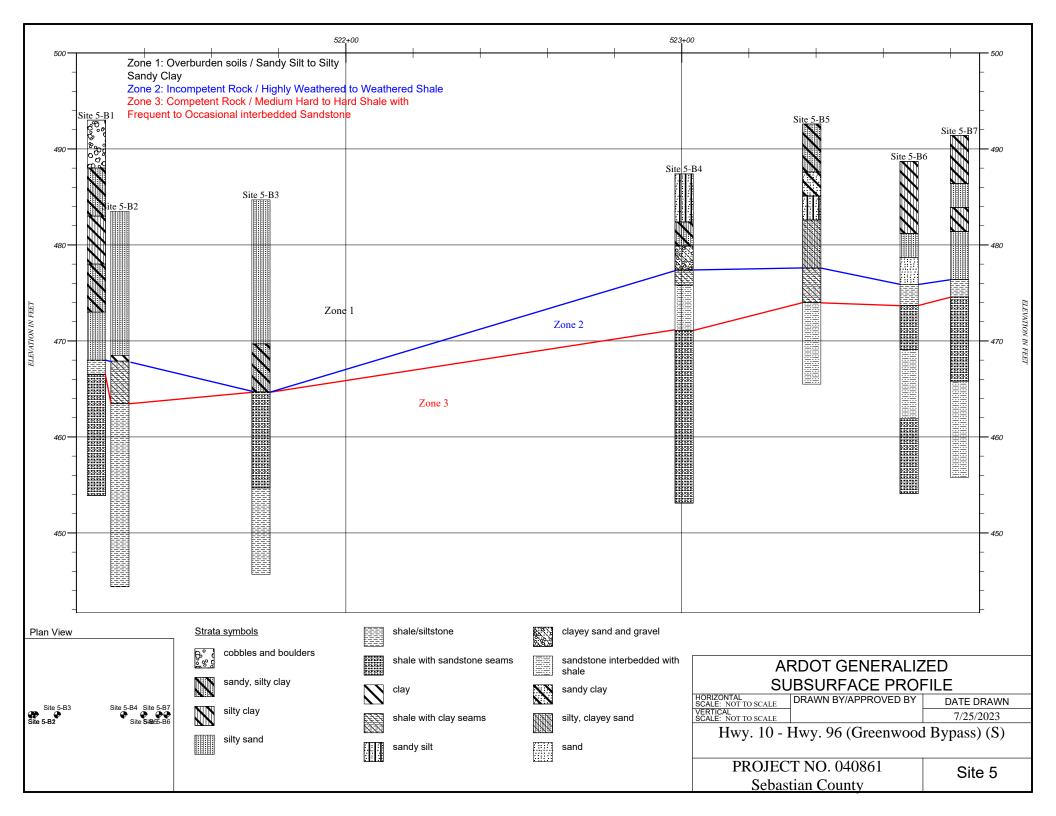


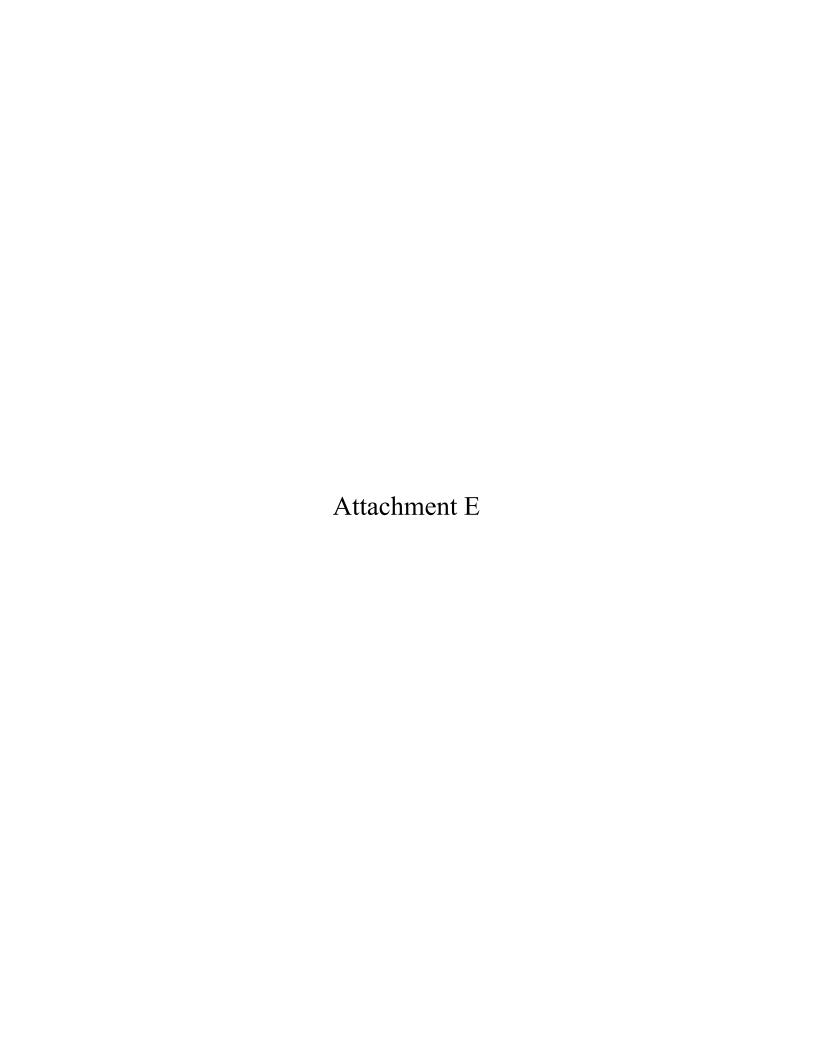








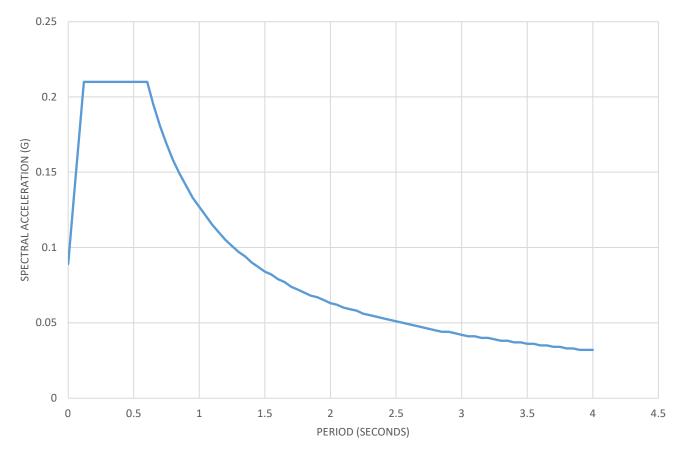


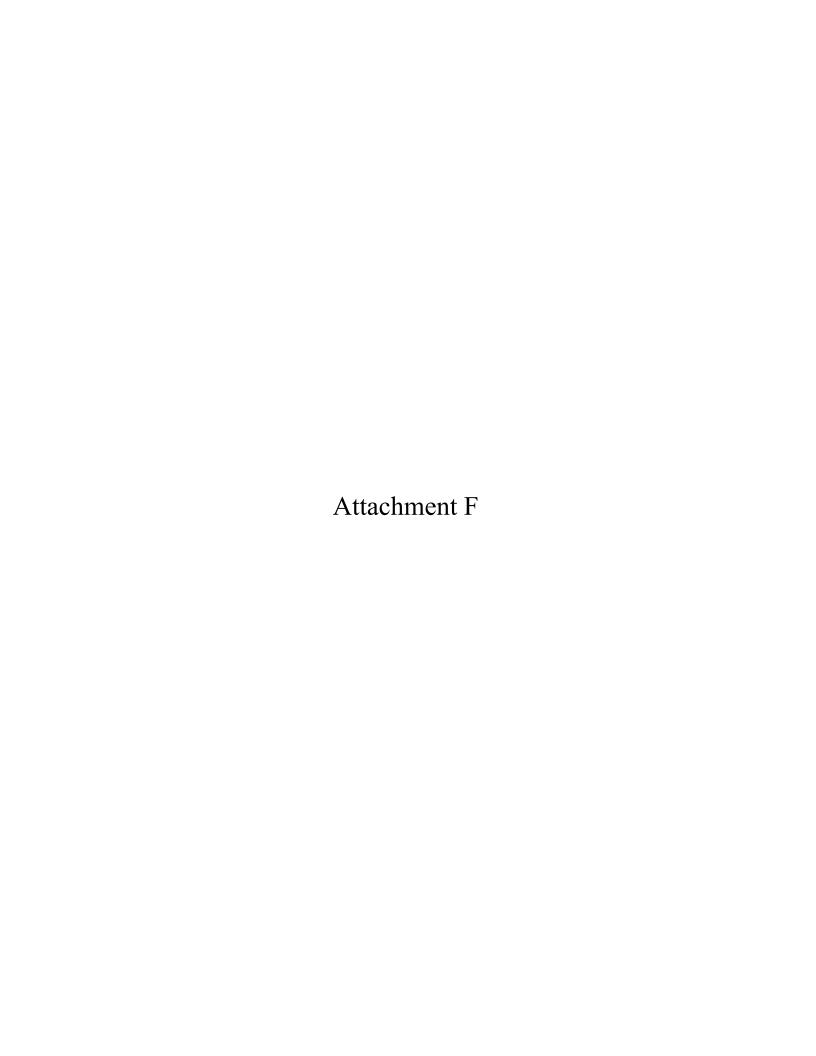




PGA:	0.056
F _{PGA} :	1.6
A _s :	0.089
S _s :	0.131
F _A :	1.6
S _{DS} :	0.21
S ₁ :	0.053
F _V :	2.4
S _{D1} :	0.127
S _{Dc} :	Α
T _S :	0.603
T ₀ :	0.121

040861 DESIGN RESPONSE SPECTRUM





05/12/2022 Page 1 of 2

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO. 040861

ROCK FILL

Description. This item shall consist of constructing embankments at the locations shown on the Plans or as directed by the Engineer as Rock Fill. Rock Fill shall comply with Section 210, Excavation and Embankment, of the Standard Specifications, Edition of 2014. Where there is a conflict between this Special Provision and Section 210, this Special Provision shall govern.

Materials. Rock Fill shall comply with the following requirements:

(1) Material for Rock Fill shall include stone obtained from an approved source and shall consist of hard and durable limestone, sandstone, dolomite, or rock-like shale. Shale shall have a minimum slake durability index (SDI) of 95% as tested according to ARDOT Test Method 399. The SDI shall be determined by the Engineer using the above method at a minimum frequency of once per 3000 cubic yards. The stone shall be greater than 1½" and less than 30", reasonably well-graded and angular, with fractured faces on at least 75% of the surface and shall not contain more than 10% overburden or fines less than 1½" in maximum cross-section. The stone shall weigh not less than 140 pounds per solid cubic foot and shall have a percent of wear not greater than 45 by Los Angeles Abrasion Test (AASHTO T 96).

The top layer of Rock Fill shall be reduced in size to meet the gradation requirements of SubSection 802.02(c) for Class B Concrete. The minimum thickness of this layer shall be 1 foot.

- (2) The following shall be added to the third paragraph of Section 801.08 of the Standard Specifications. Rock Fill placed immediately adjacent to Pipe Culverts or Box Culverts including a minimum of 6 inches on top of the culverts, shall meet the gradation requirements of 802.02(c) of the Standard Specifications for Class S concrete coarse aggregate.
- (3) Material placed in the vicinity of piling shall be constructed in accordance with SubSections 303.02, 303.03, and 303.04 of the Standard Specifications, Edition of 2014. It shall meet the material and construction requirements of Aggregate Base Course (Class 7).
- (4) Geotextile Fabric (Type 9) complying with SubSection 625.02 of the Standard Specifications shall be used between Rock Fill and overlying embankment material.

Construction Requirements. Embankments requiring Rock Fill to be placed in water or extremely soft areas shall be placed by end dumping and advancing rock placement. All displaced material as it accumulates ahead of the advancing embankment toe shall be removed by excavation. Removal and disposal of displaced material will not be measured and shall be considered subsidiary to the item Rock Fill.

05/12/2022 Page 2 of 2

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO. 040861

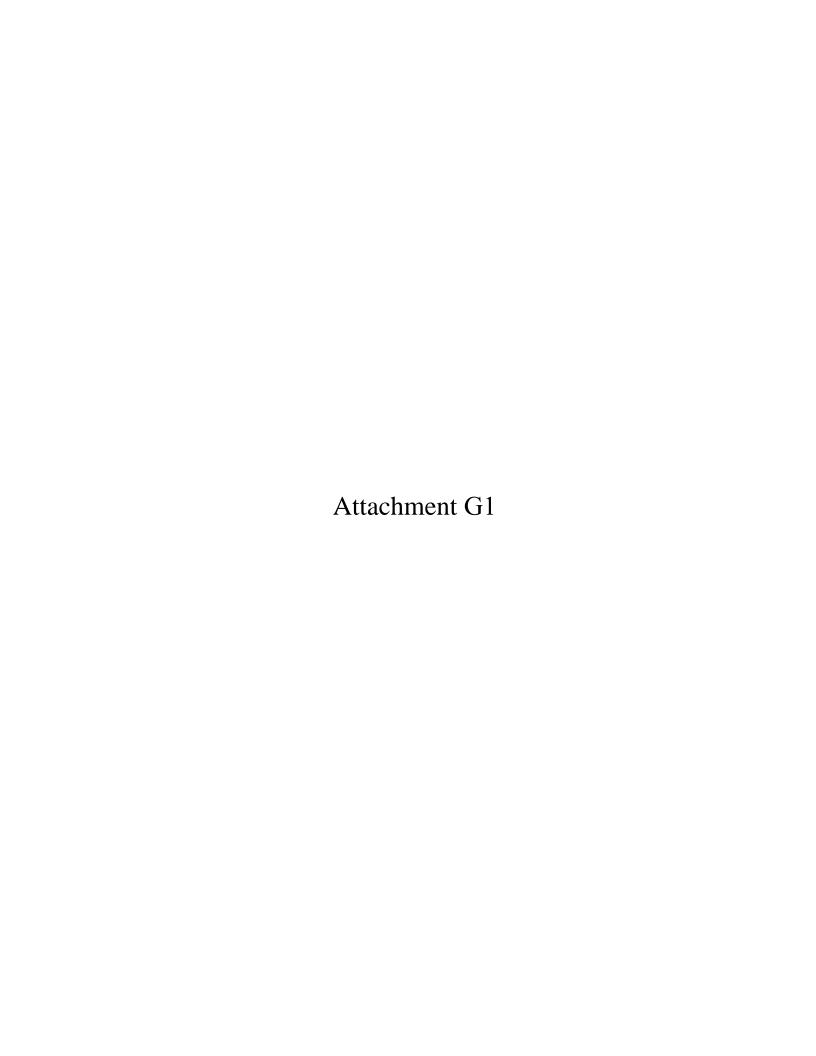
ROCK FILL

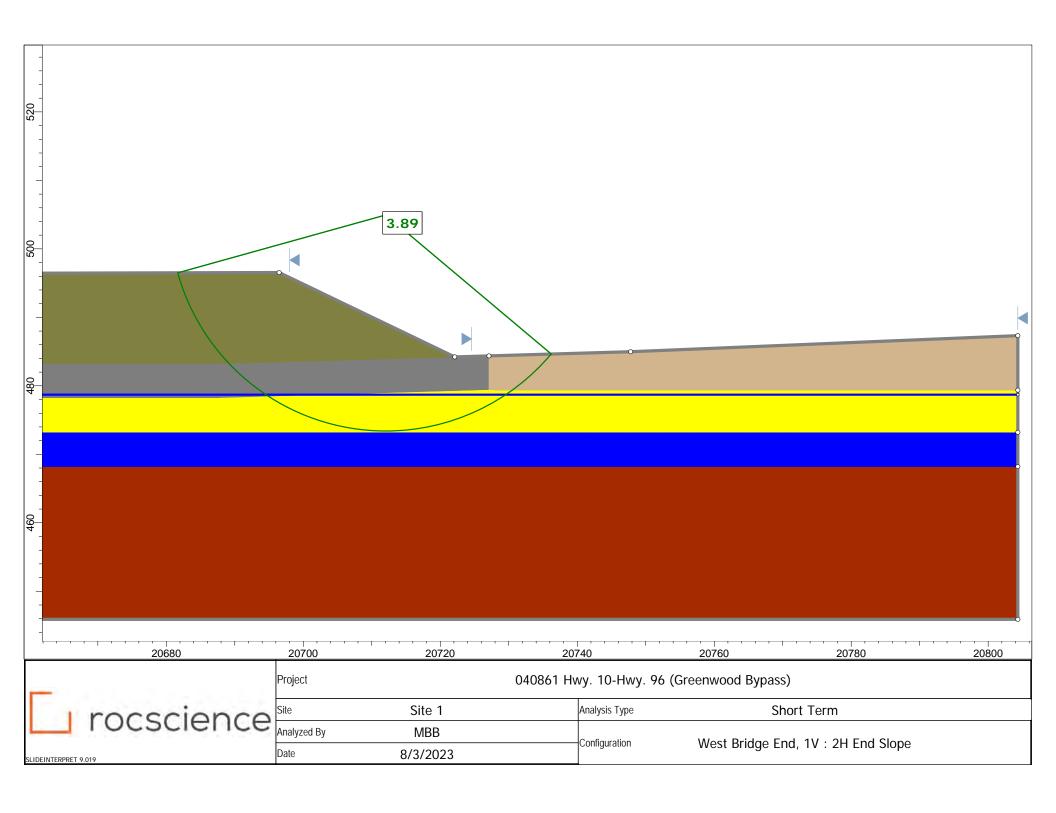
Method of Measurement. Rock Fill, which includes all aggregate material types described above, including concrete coarse aggregate and/or Aggregate Base Course (Class 7), will be measured in vehicles by the Ton and paid as Rock Fill. Displaced material removal and disposal will not be measured and shall be considered subsidiary to the item Rock Fill.

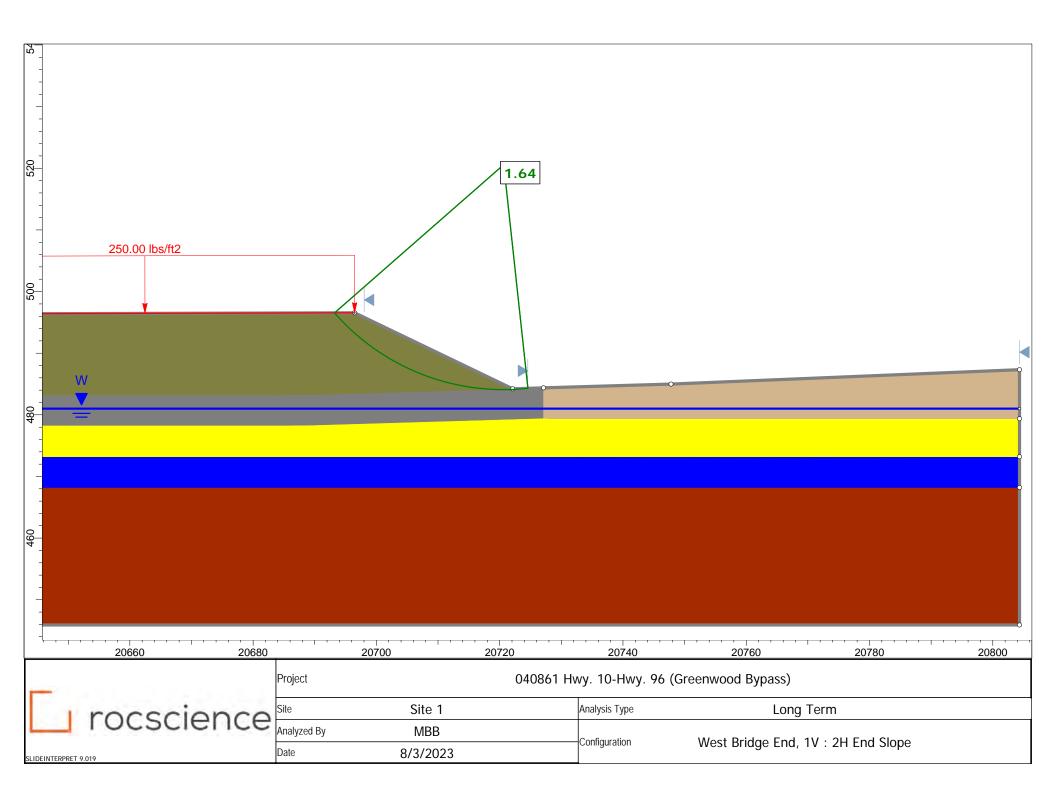
Basis of Payment. Placement and construction of Rock Fill embankment material shall be paid for under the item "Rock Fill", which price shall be full compensation for all costs involved in furnishing all materials for constructing the embankments in accordance with Section 210 and this Special Provision; and for all labor, tools, equipment, quality control sampling and testing, and for incidentals necessary to complete the work.

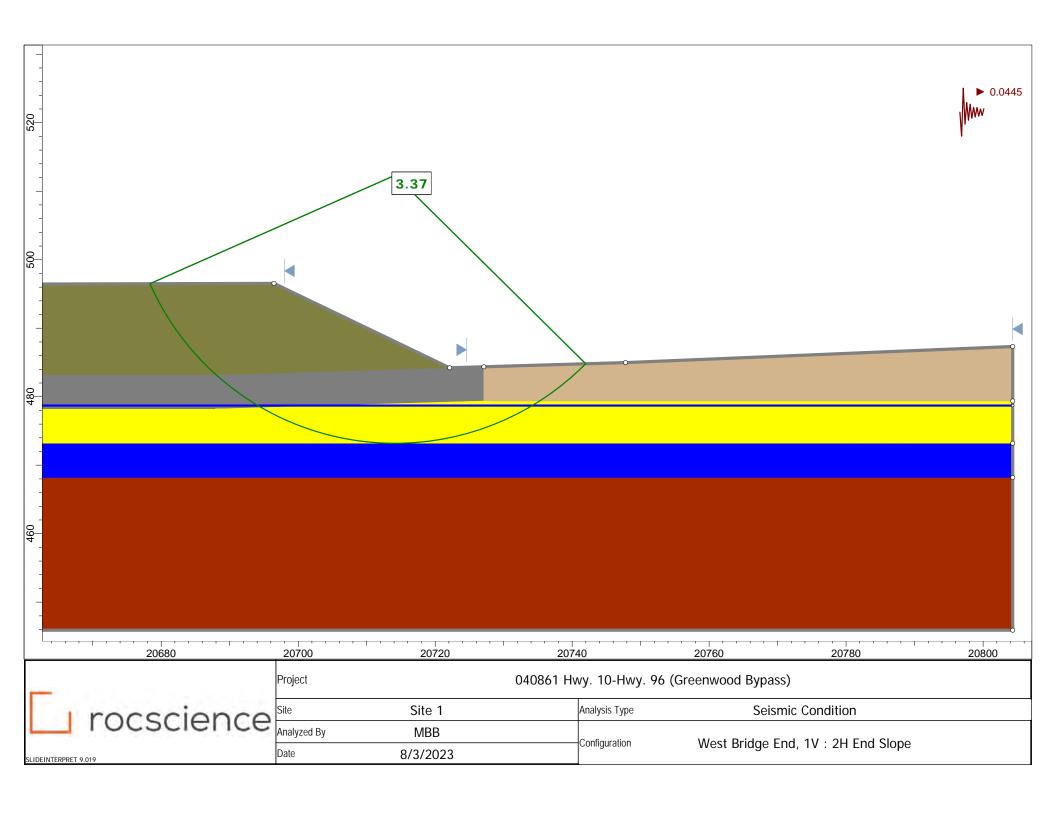
Payment will be made under:

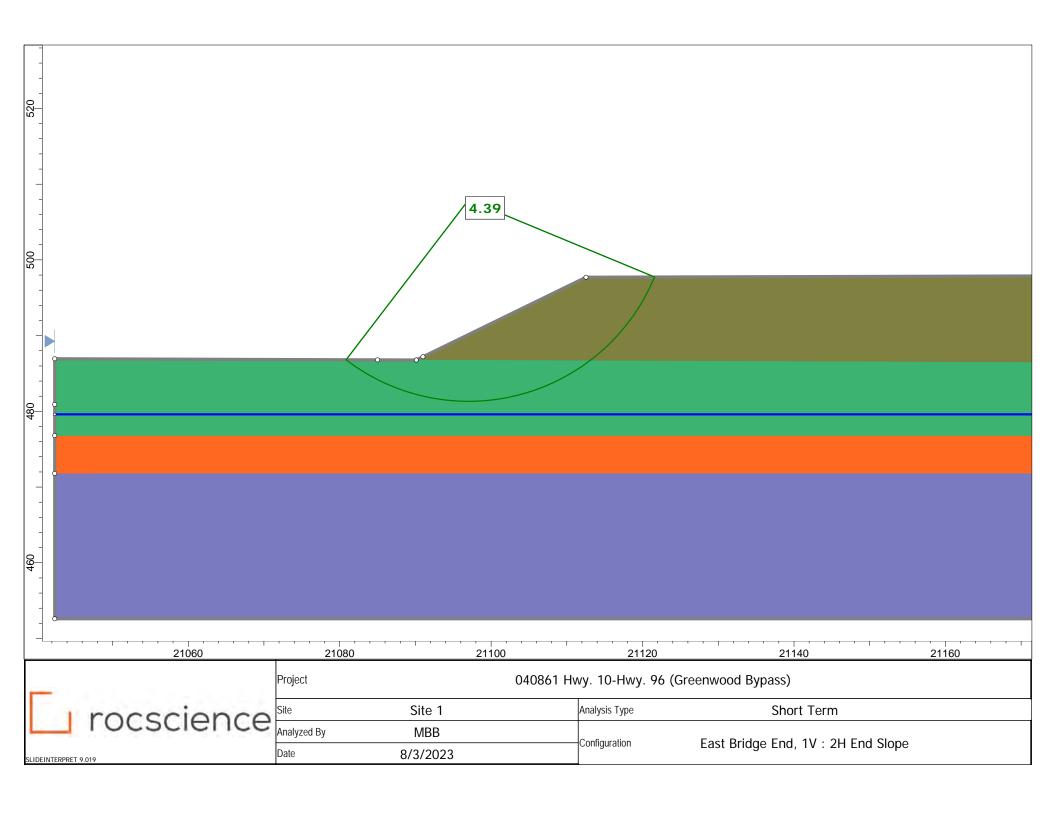
Pay ItemPay UnitRock FillTonGeotextile Fabric (Type 9)Square Yard

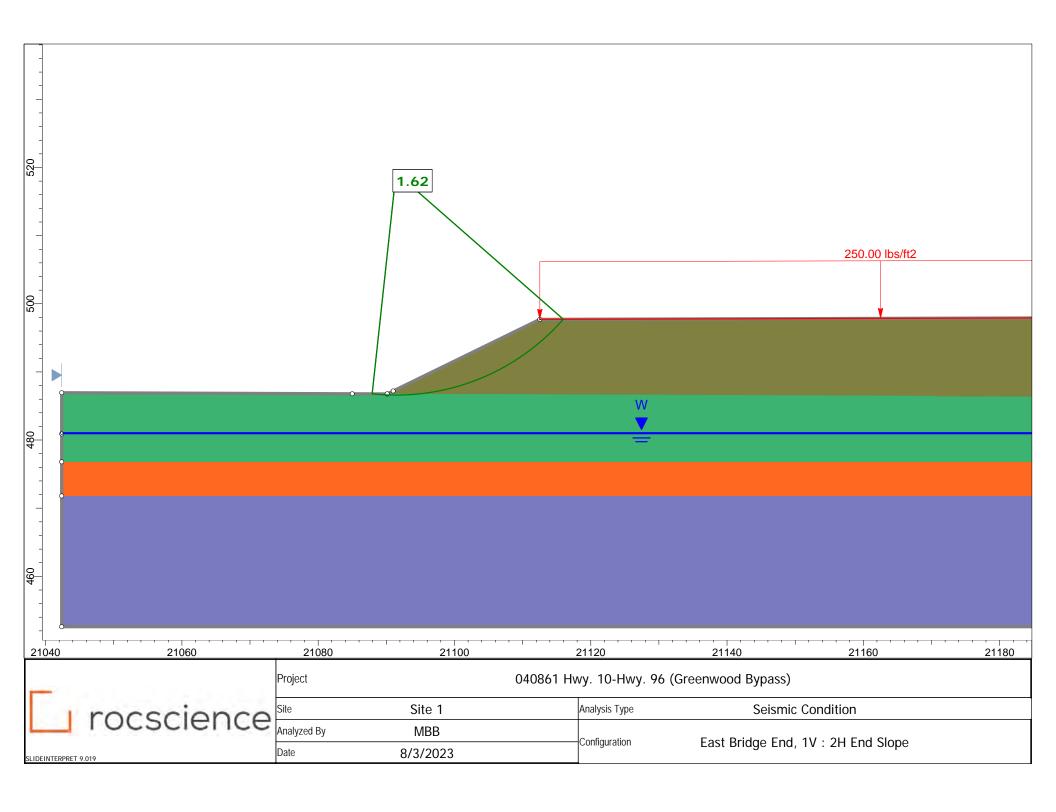


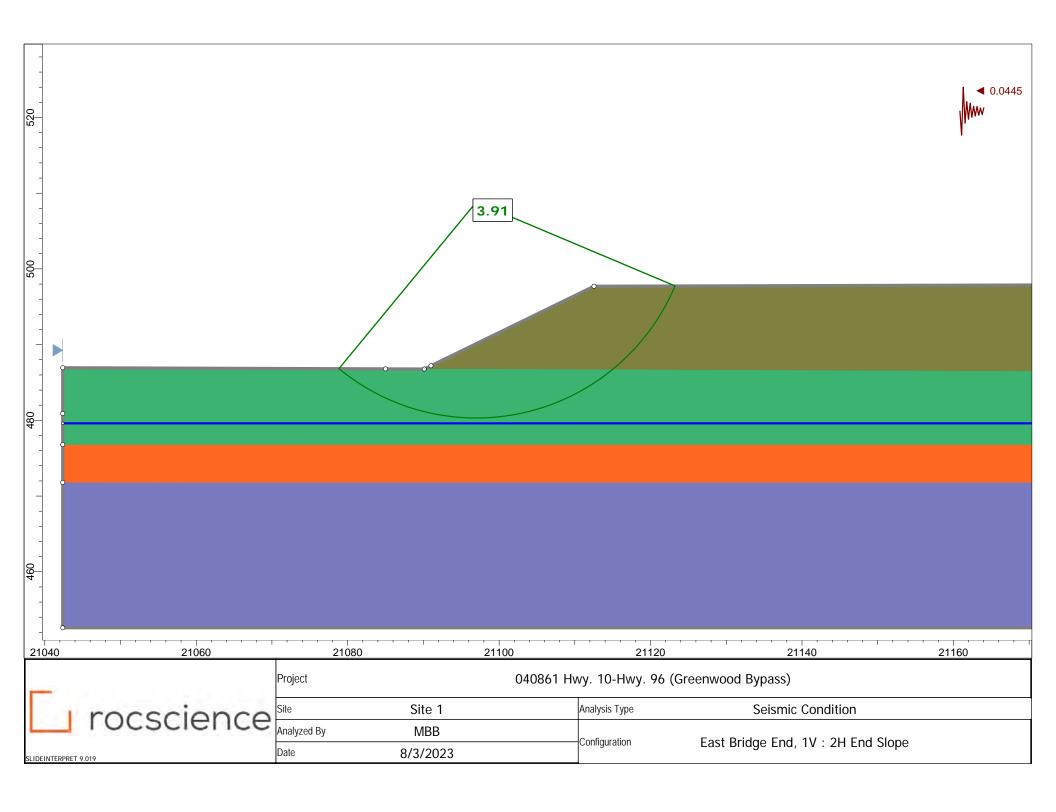


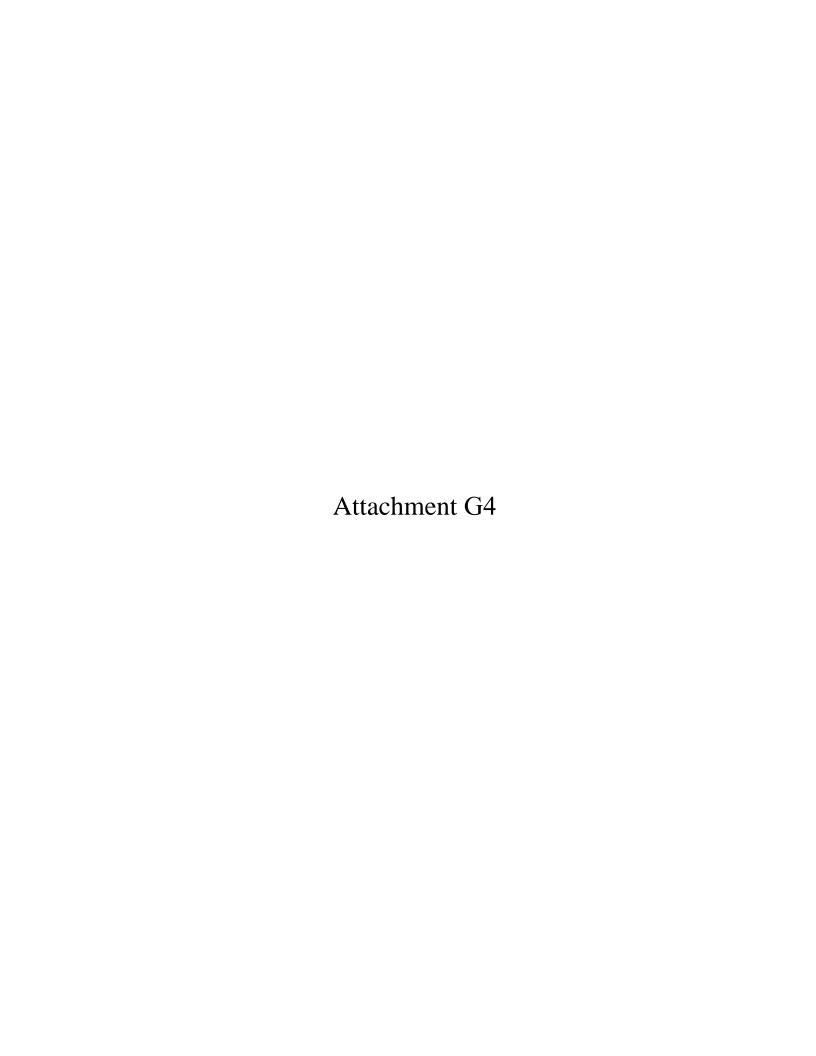


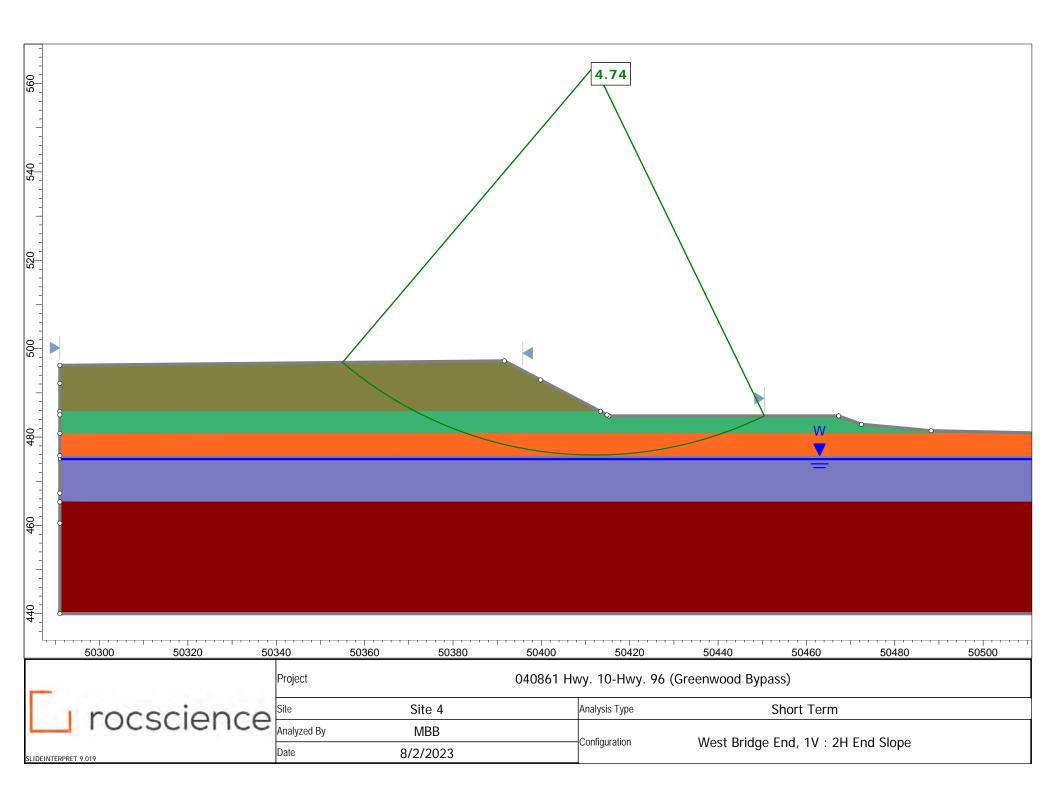


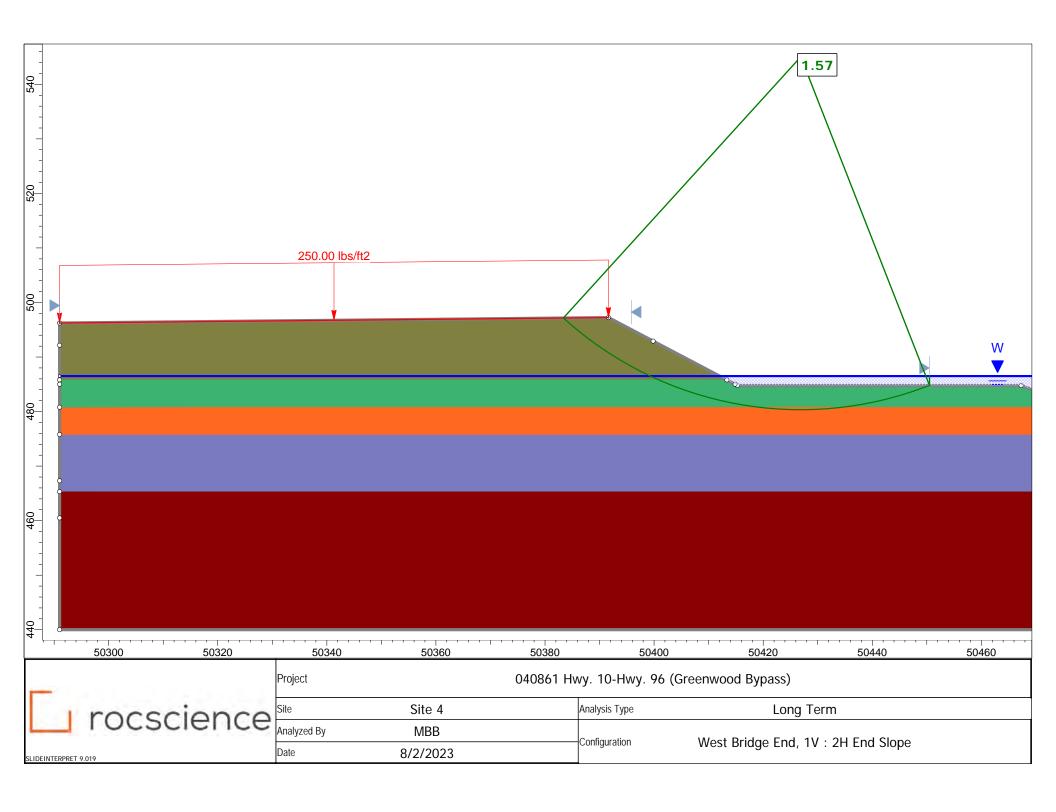


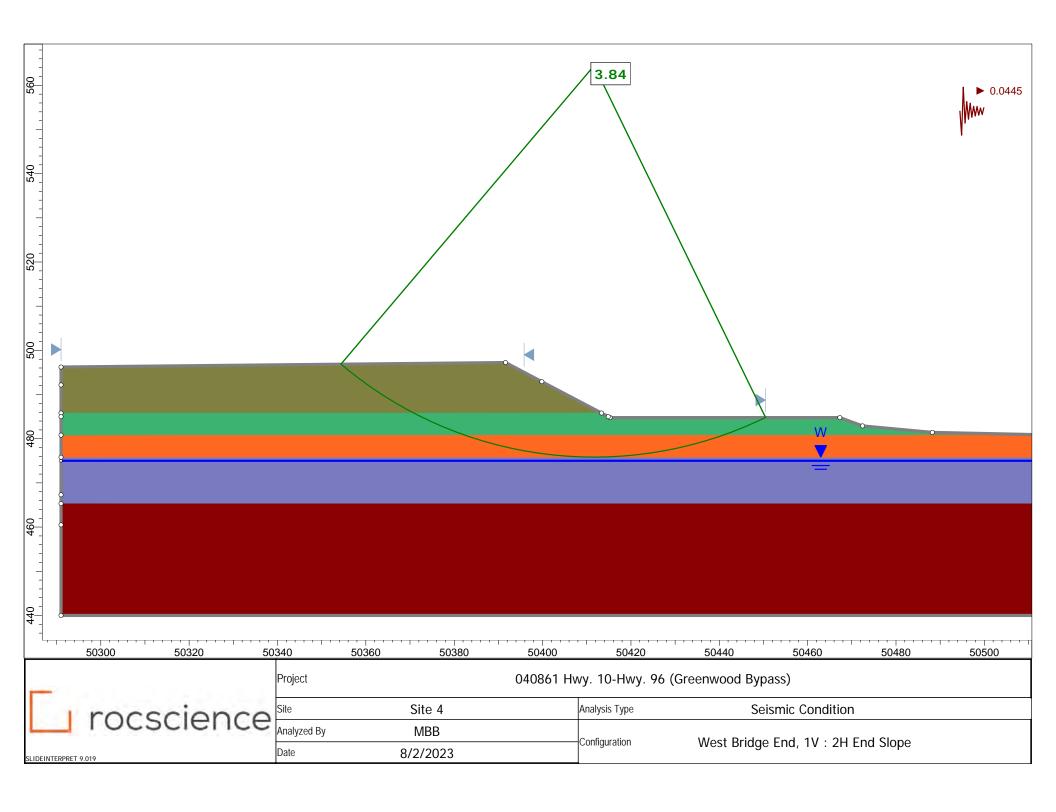


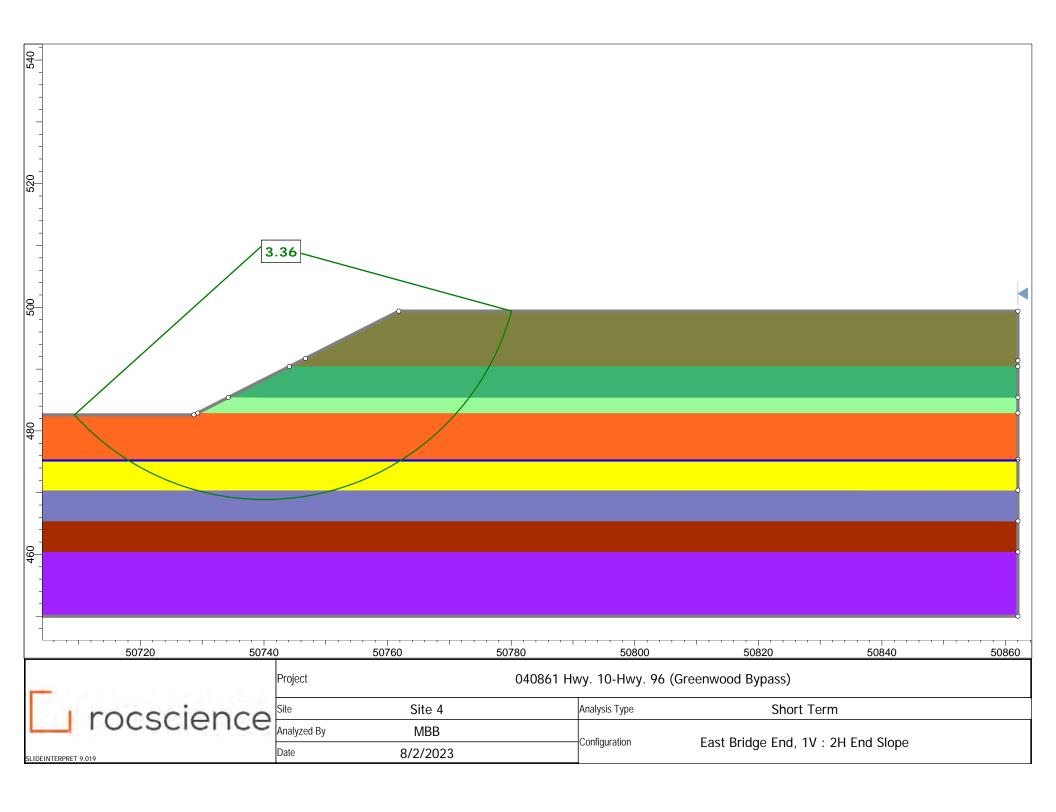


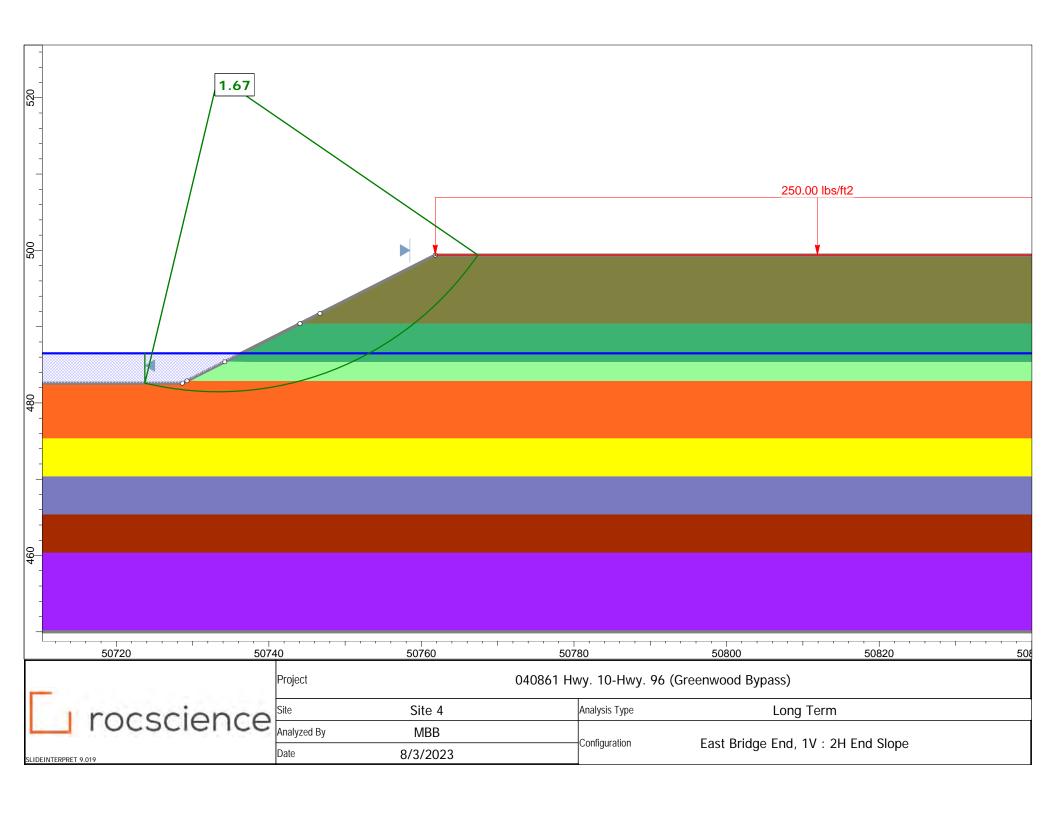


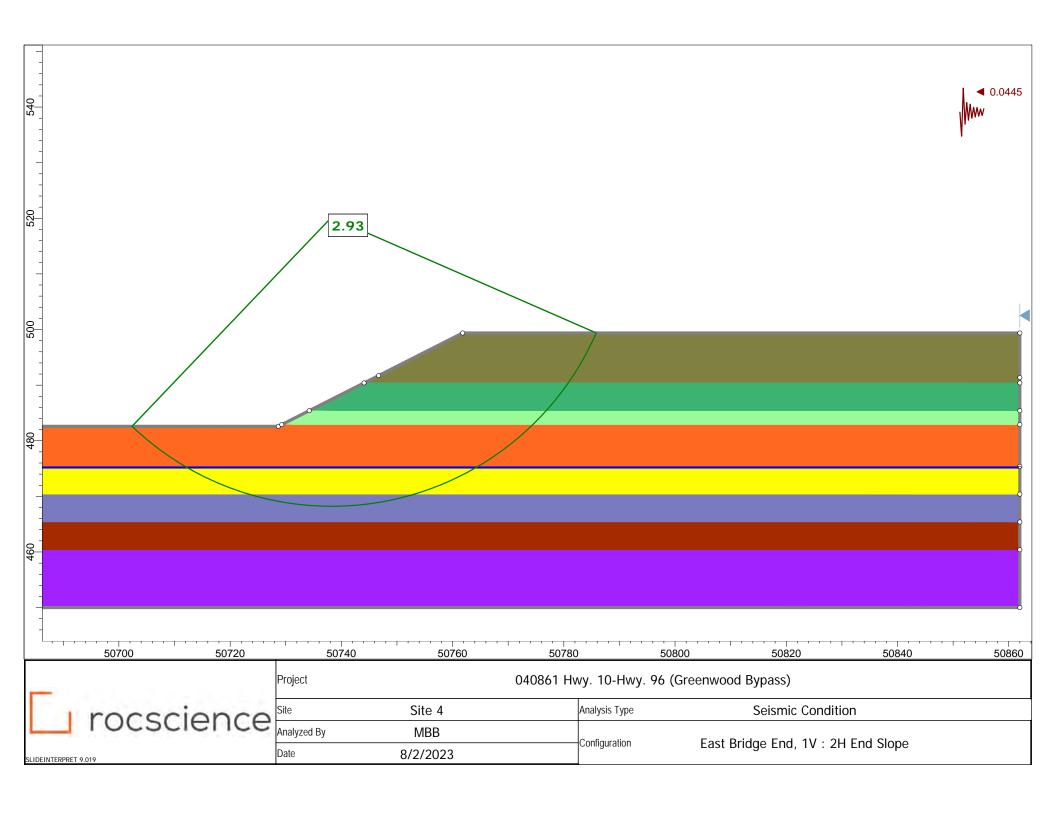


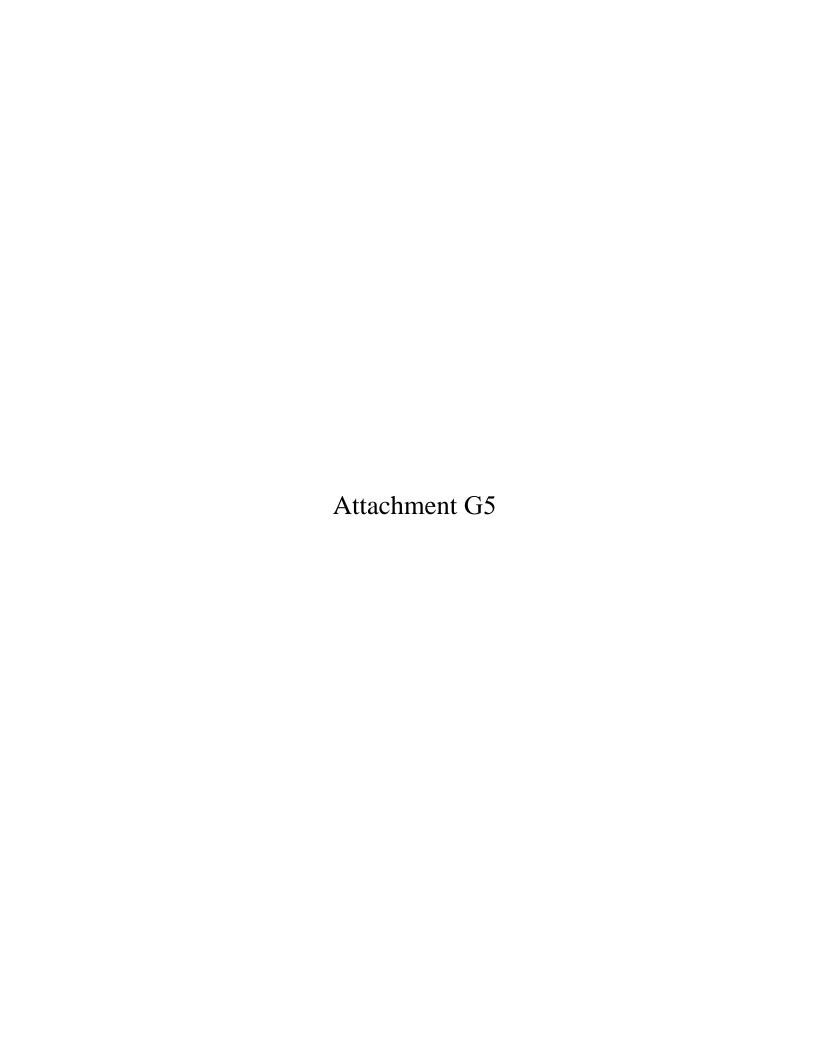


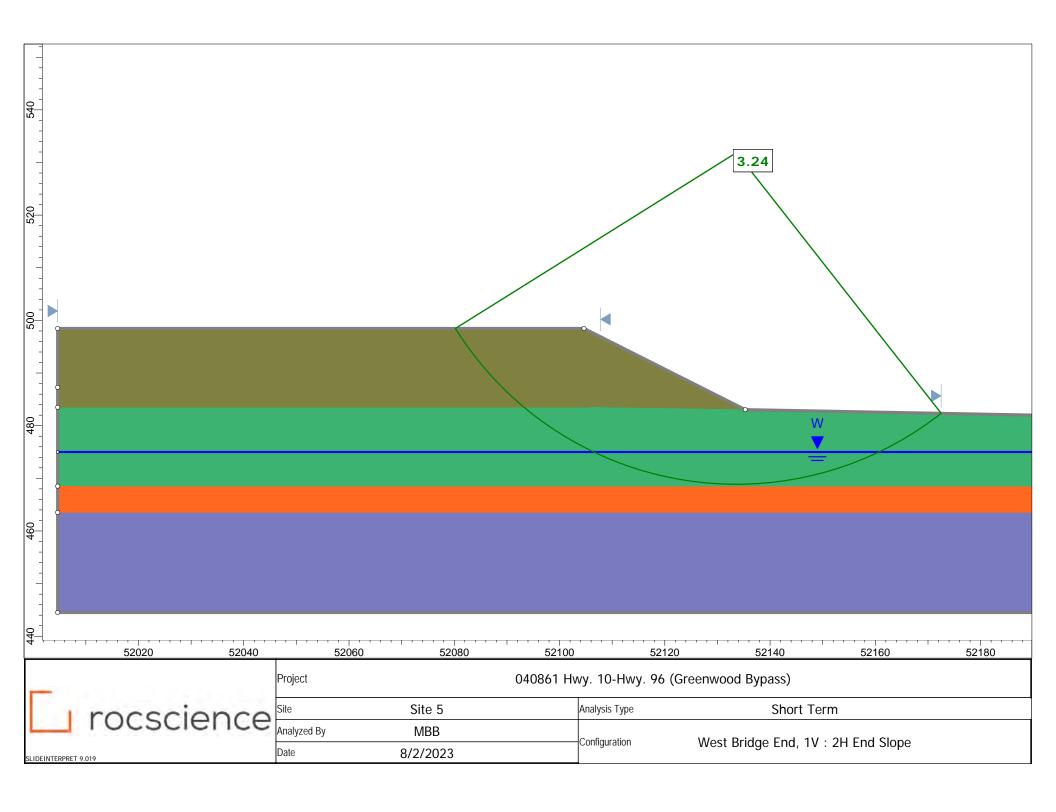


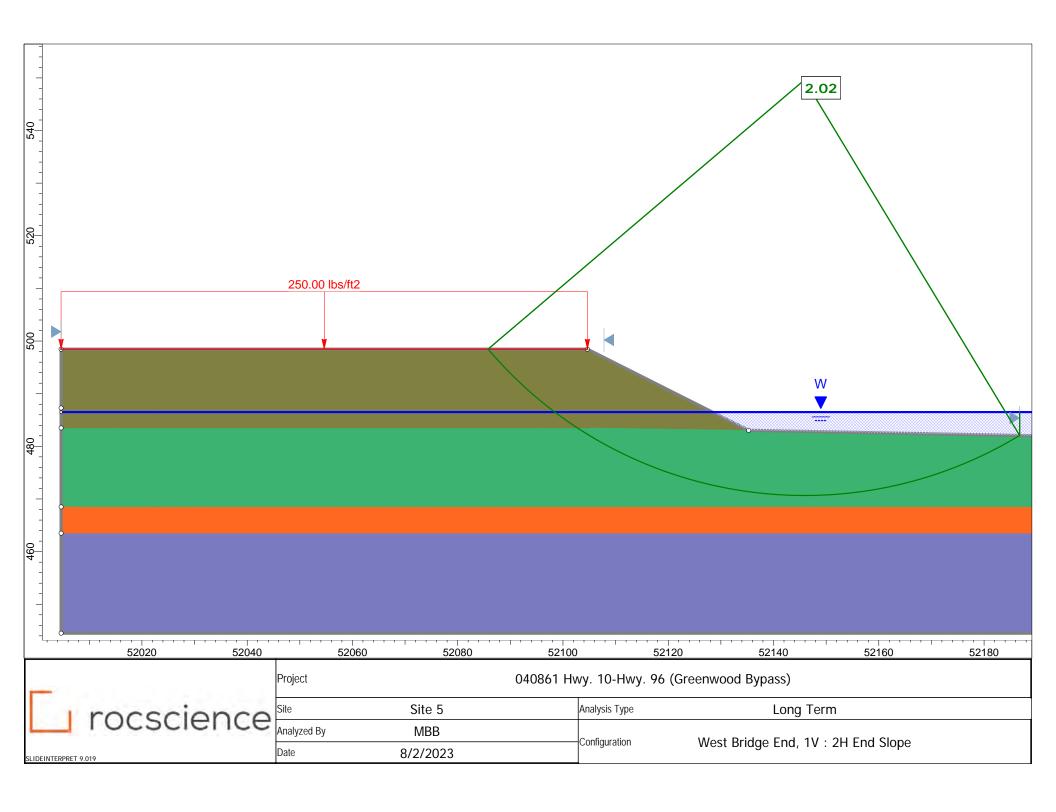


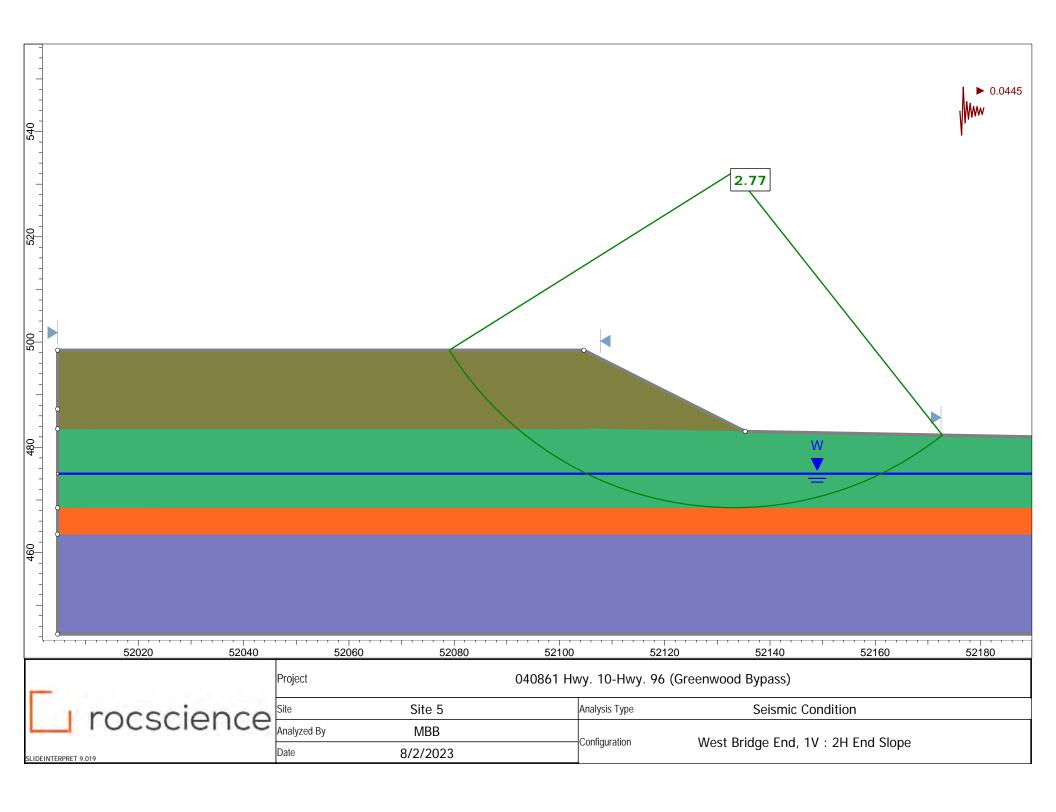


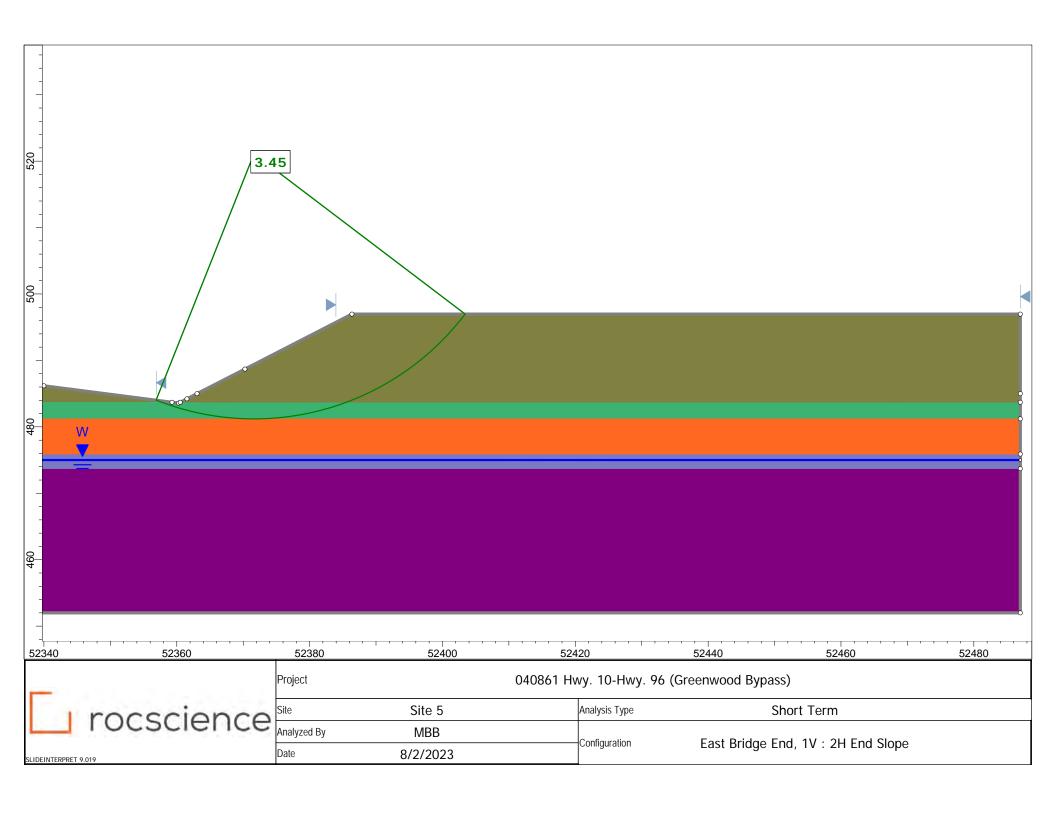


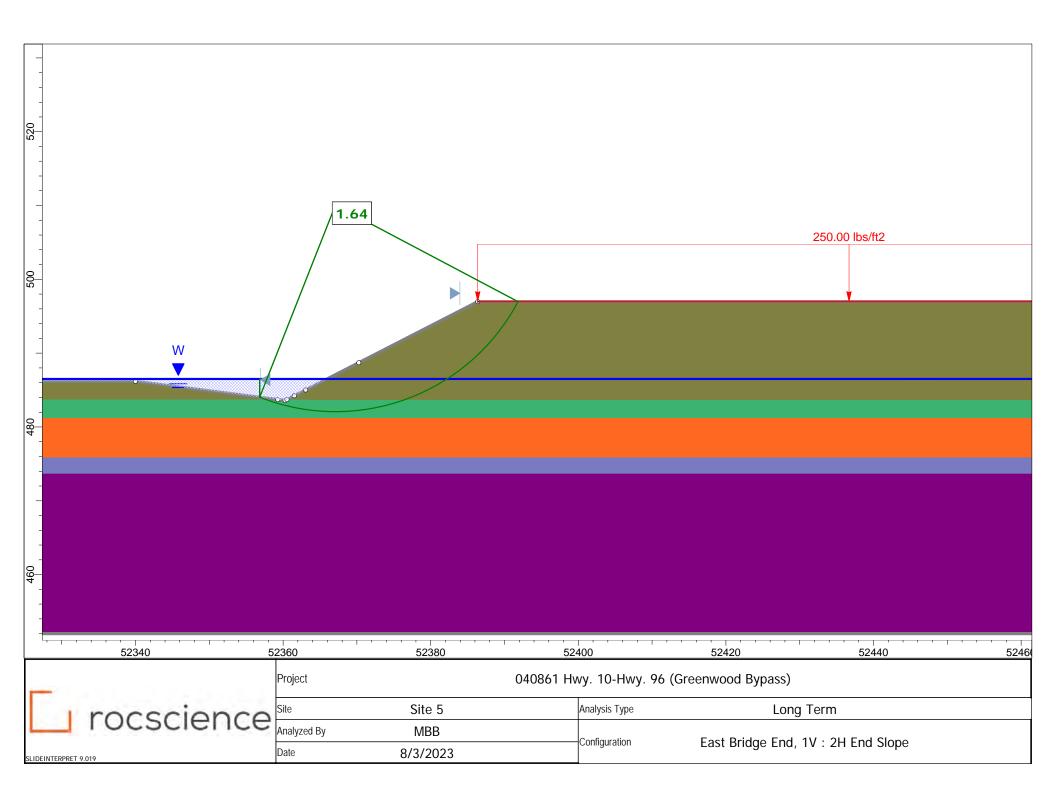


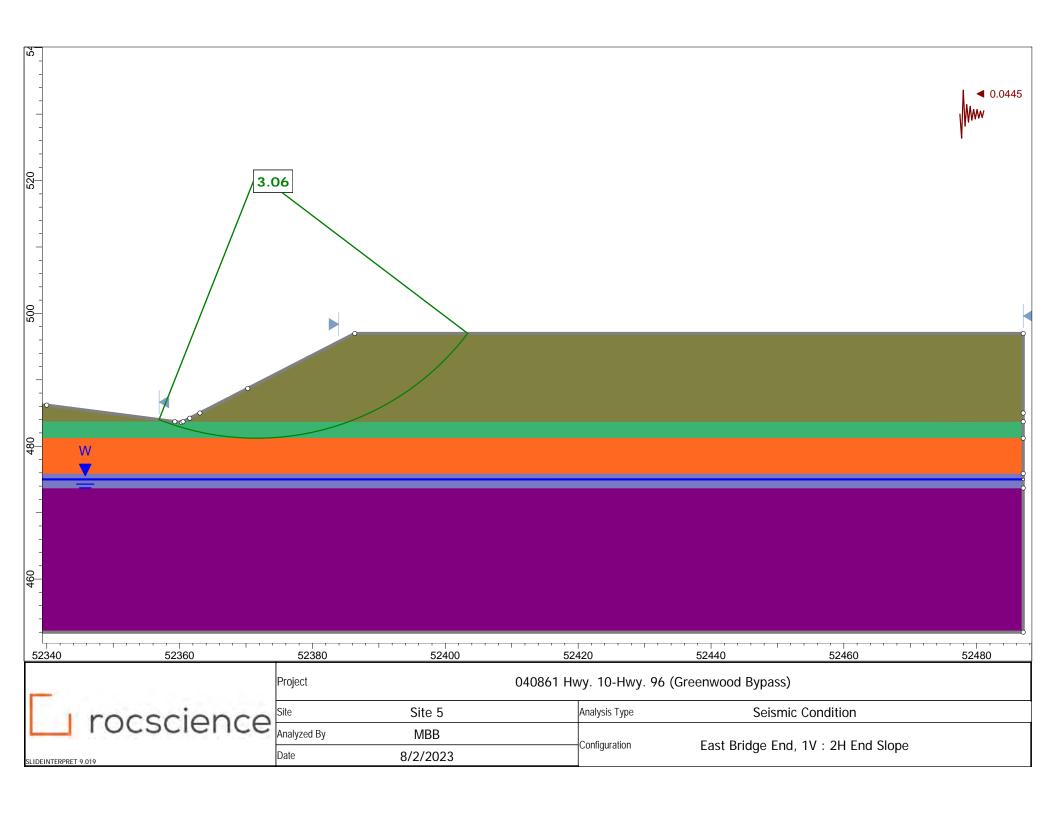
















Job No.:	040861
Site No.:	1

Input by:	YZ	8/7/2023
Checked by:	MBB	8/8/2023
Back-checked by:	YZ	8/8/2023

Bent 1 - Borings 1

Eleva	ation, ft	Material	Model	Effective Unit	Undrained Shear Strength of Soil	Strain Factor (850 for Soil) / km for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Тор	Bottom	1		Weight, γ',pcf	(Cu) (psf)	Rock)		_	Strength, qu, psi	psi	
Above Gro	ound Surface	Fill	Soft Clay (Matlock)	120	750	0.0100	NA	NA	NA	NA	NA
Ground	471	Overburden Soil	Sand (Reese)	55	NA	NA	29.0	20	NA	NA	NA
471	470	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
belo	w 470	Competent Slightly Weathered to	Weak Rock	95	NA	0.0005	NA	NA	2500	1.5	70

Bent 1 - Boring 2

				20111							
Flore	ition, ft			Effective Unit		Strain Factor (850			Uniaxial	Rock Mass	
Licva	ition, it	Material	Model	Weight, γ',pcf	Strength of Soil	for Soil) / k _m for	Friction Angle, o, °	Soil Modulus, k, pci	Compressive	Modulus, E _{rm} , 10 ⁶	RQD, %
Тор	Bottom			weight, y ,per	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
Above Gro	ound Surface	Fill	Soft Clay (Matlock)	120	750	0.010	NA	NA	NA	NA	NA
Ground	472	Overburden Soil	Stiff Clay with Free Water (Reese)	55	1500	0.007	NA	500	NA	NA	NA
472	467	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
belo	w 467	Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	2500	1.5	70

Bent 2 - Boring 1

Eleva	ation, ft	Material	Model	Effective Unit Weight, γ',pcf	Undrained Shear Strength of Soil	Strain Factor (\$\varepsilon_{50}\$ for Soil) / k _m for		Soil Modulus, k, pci		Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom			weight, 7 ,per	(C _u) (psf)	Rock)			Strength, qu, psi	psi	
Ground	471	Overburden Soil	Sand (Reese)	55	NA	NA	29.0	20	NA	NA	NA
471	470	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
belo	w 470	Competent Slightly Weathered to	Weak Rock	95	NA	0.0005	NA	NA	2500	1.5	70

Bent 2 - Boring 2

Eleva	ntion, ft	Material	Model	Effective Unit Weight, y',pcf	Undrained Shear Strength of Soil	Strain Factor (850 for Soil) / k _m for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Тор	Bottom			weight, y ,pci	(C _u) (psf)	Rock)			Strength, qu, psi	psi	
Ground	472	Overburden Soil	Stiff Clay with Free Water (Reese)	55	1500	0.007	NA	500	NA	NA	NA
472	467	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
belo	w 467	Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	2500	1.5	70

Bent 3 - Boring 3

Eleva	ation, ft			Effective Unit	Undrained Shear	Strain Factor (850			Uniaxial	Rock Mass	
Top	Bottom	Material	Model	Weight, γ',pcf	Strength of Soil	/	Friction Angle, ø, °	Soil Modulus, k, pci	•	Modulus, E _{rm} , 10 ⁶	RQD, %
тор	Dottom			eight, 7 sper	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
Ground	476.5	Overburden Soil - Weaker	Sand (Reese)	55	NA	NA	27.0	20	NA	NA	NA
476.5	471.5	Overburden Soil - Stiffer	Sand (Reese)	55	NA	NA	30.0	20	NA	NA	NA
471.5	466.5	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
belov	w 466.5	Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	2500	1.5	60

Bent 3 - Boring 4

Elev	ation, ft	Material	Model	Effective Unit Weight, γ',pcf	Undrained Shear Strength of Soil	Strain Factor (850 for Soil) / km for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom			weight, y,pci	(C _u) (psf)	Rock)			Strength, qu, psi	psi	
Ground	472	Overburden Soil - Sand	Sand (Reese)	55	NA	NA	30.0	20	NA	NA	NA
472	471	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
belo	ow 471	Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	2500	1.5	60

Bent 4 - Borings 5 and 6

Eleva	tion, ft	Material	Model	Effective Unit	Undrained Shear Strength of Soil	(-50		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Тор	Bottom			Weight, γ',pcf	(C _u) (psf)	Rock)			Strength, qu, psi	psi	
Ground	474	Overburden Soil - Sand	Sand (Reese)	60	NA	NA	32.0	40	NA	NA	NA
474	470.5	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
below	470.5	Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	2500	1.5	50

Bent 5 - Borings 7 and 8

Eleva	ation, ft	Material	Model	Effective Unit Weight, γ',pcf		Undrained Shear Strength of Soil	(-30		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom			weight, y,per	(C _u) (psf)	Rock)			Strength, qu, psi	psi		
Ground	471.5	Overburden Soil - Sand	Sand (Reese)	65	NA	NA	36.0	92	NA	NA	NA	
471.5	471	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA	
belo	w 471	Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	2500	1.5	65	

Bent 6 - Borings 9 and 10

El	evation, ft	Material	Model	Effective Unit	Undrained Shear Strength of Soil	Strain Factor (850 for Soil) / km for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom	1		Weight, γ',pcf	(C _u) (psf)	Rock)			Strength, qu, psi	psi	
Above	Fround Surface	Fill	Soft Clay (Matlock)	120	750	0.0100	NA	NA	NA	NA	NA
Ground	471.5	Overburden Soil	Sand (Reese)	65	NA	NA	37.0	105	NA	NA	NA
be	low 471.5	Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	2500	1.5	40





Job No.:	040861
Site No.:	4

Input by:	YZ	7/31/2023
Checked by:	PT	08/02/223
Back-checked by:	YZ	8/2/2023

Bent 1 - Borings 1 and 2

	tion, ft	Material	Model	Effective Unit Weight, γ',pcf	Undrained Shear Strength of Soil (C _u) (psf)	for Soil) / k _m for		Soil Modulus, k, pci		Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Тор	Bottom			- , -	(C _u) (psi)	Rock)			Strength, q _u , psi	psi	
Above Gro	und Surface	Fill	Soft Clay (Matlock)	120	750	0.0100	NA	NA	NA	NA	NA
Ground	465	Overburden Soil	Soft Clay (Matlock)	50	750	0.0100	NA	NA	NA	NA	NA
below 465		Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	3500	3.0	40

Bent 2 - Borings 3 and 4

Elevat	tion, ft			Effective Unit	Undrained Shear	Strain Factor (ε ₅₀			Uniaxial	Rock Mass	
Top Bottom	Material	Model	Weight, γ',pcf	Strength of Soil	for Soil) / k _m for	Friction Angle, φ, *	Soil Modulus, k, pci	Compressive	Modulus, E _{rm} , 10 ⁶	RQD, %	
1 op	вонош			weight, y ,pci	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
Ground	467	Overburden Soil	Soft Clay (Matlock)	50	750	0.0100	NA	NA	NA	NA	NA
below	v 467	Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	3500	3.0	50

Bent 3 - Borings 5 and 6

Eleva	ntion, ft			Effective Unit	Undrained Shear	Strain Factor (ε ₅₀			Uniaxial	Rock Mass	
Ton	Top Bottom	Material	Model	Weight, γ',pcf	Strength of Soil	for Soil) / k _m for	Friction Angle, φ, *	Soil Modulus, k, pci	Compressive	Modulus, E _{rm} , 10 ⁶	RQD, %
10p				weight, y,per	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
Ground	466.5	Overburden Soil	Sand (Reese)	55	NA	NA	27.0	20	NA	NA	NA
466.5	461.5	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
halov	v 461.5	Competent Slightly Weathered to	Weak Rock	05	NA	0.0005	NA	NA	2500	2.0	15
belov	V 401.J	Unweathered Shale	WEAK ROCK	93	INA	0.0003	NA	IVA	3300	3.0	43

Bent 4 - Boring 7

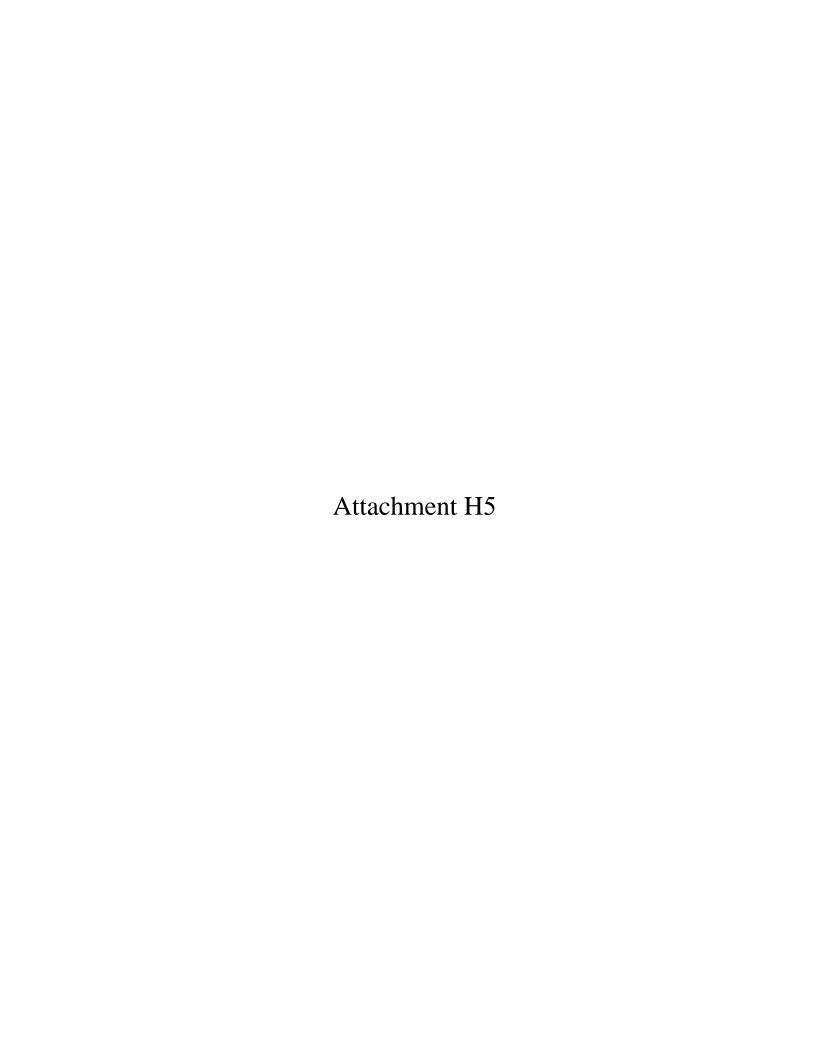
Eleva	tion, ft			Effective Unit	Undrained Shear	Strain Factor (ε ₅₀			Uniaxial	Rock Mass	-
Тор	Bottom	Material	Model	Weight, γ',pcf	Strength of Soil (C _u) (psf)	for Soil) / k _m for Rock)	Friction Angle, φ, *	Soil Modulus, k, pci	Compressive Strength, q _u , psi	Modulus, E _{rm} , 10 ⁶ psi	RQD, %
Ground	466.5	Overburden Soils	Soft Clay (Matlock)	45	550	0.0100	NA	NA	NA	NA	NA
466.5	462	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.001	NA	2000	NA	NA	NA
belo	w 462	Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	3500	3.0	85

Bent 5 - Boring 8

Eleva	ition, ft			Effective Unit	Undrained Shear	Strain Factor (ε ₅₀			Uniaxial	Rock Mass	
Тор	Bottom	Material	Model	Weight, γ',pcf	Strength of Soil (C _u) (psf)	for Soil) / k _m for Rock)	Friction Angle, φ, *	Soil Modulus, k, pci	Compressive Strength, q _u , psi	Modulus, E _{rm} , 10 ⁶ psi	RQD, %
Ground	466.5	Overburden Soil	Sand (Reese)	55	NA	NA	30.0	20	NA	NA	NA
466.5	462.5	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.001	NA	2000	NA	NA	NA
below 462.5		Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	3500	3.0	55

Bent 6 - Borings 9 and 10

				Dent o Do	ings / unu io						
Elev	vation, ft			Effective Unit	Undrained Shear	Strain Factor (ε ₅₀			Uniaxial	Rock Mass	
Ton	Bottom	Material	Model		Strength of Soil	for Soil) / k _m for	Friction Angle, \	Soil Modulus, k, pci	Compressive	Modulus, E _{rm} , 10 ⁶	RQD, %
Тор	Вошот			Weight, γ',pcf	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
Above Ground Surface		Fill	Soft Clay (Matlock)	120	750	0.010	NA	NA	NA	NA	NA
Ground	465	Overburden Soils	Soft Clay (Matlock)	45	500	0.0200	NA	NA	NA	NA	NA
465	460	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.001	NA	2000	NA	NA	NA
below 460		Competent Slightly Weathered to Unweathered Shale	Weak Rock	95	NA	0.0005	NA	NA	3500	3.0	50





Job No.:	040861
Site No.:	5

Input by:	YZ	7/31/2023
Checked by:	MBB	8/3/2023
Back-checked by:	YZ	8/8/2023

Bent 1 - Boring 1

	Elevation, ft		Material	Model	Effective Unit	Undrained Shear Strength of Soil	Strain Factor (ε ₅₀ for Soil) / k _m for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
1	Гор	Bottom	7		Weight, γ',pcf	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
	Above Grou	und Surface	Fill	Soft Clay (Matlock)	120	750	0.0100	NA	NA	NA	NA	NA
Gr	ound	473	Overburden Soil - Clay	Soft Clay (Matlock)	50	900	0.0100	NA	NA	NA	NA	NA
4	473 468		Overburden Soil - Sand	Sand (Reese)	55	NA	NA	29.0	20	NA	NA	NA
4	468	466.5	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
	below 466.5		Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	5500	3.5	80

Bent 1 - Boring 2

Elev	Elevation, ft			Effective Unit	Undrained Shear	Strain Factor (ε ₅₀			Uniaxial	Rock Mass	
Тор	Bottom	Material	Model	Weight, γ',pcf	Strength of Soil (C _u) (psf)	for Soil) / k _m for Rock)	Friction Angle, φ, °	Soil Modulus, k, pci	Compressive Strength, q _u , psi	Modulus, E _{rm} , 10 ⁶ psi	RQD, %
Ground	468	Overburden Soil - Sand	Sand (Reese)	55	NA	NA	27.0	20	NA	NA	NA
468	463	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
bel	low 463	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	5500	3.5	80

Bent 2 - Borings 3

Delit 2 Dorings C												
	Elevat	tion, ft			Effective Unit	Undrained Shear	Strain Factor (ε ₅₀			Uniaxial	Rock Mass	
	Ton	Pottom	Material	Model	Weight, γ',pcf	Strength of Soil	for Soil) / k _m for	Friction Angle, ø, °	Soil Modulus, k, pci	Compressive	Modulus, E _{rm} , 10 ⁶	RQD, %
	Top Bottom				weight, y,pci	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
	Ground	469.5	Overburden Soil - Sand	Sand (Reese)	55	NA	NA	27.0	20	NA	NA	NA
	469.5	464.5	Overburden Soil - Clay	Stiff Clay with Free Water (Reese)	55	1500	0.0070	NA	500	NA	NA	NA
	below 464.5		Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	5500	3.5	80

Bent 3 - Borings 4 and 5

Elev	ation, ft			Effective Unit	Undrained Shear	Strain Factor (ε ₅₀			Uniaxial	Rock Mass	
Тор	Bottom	Material	Model	Weight, γ',pcf	Strength of Soil (C _u) (psf)	for Soil) / k _m for Rock)	Friction Angle, φ, °	Soil Modulus, k, pci	Compressive Strength, q _u , psi	Modulus, E _{rm} , 10 ⁶ psi	RQD, %
Ground	477.5	Overburden Soil	Sand (Reese)	55	NA	NA	32.0	40	NA	NA	NA
477.5	471	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
belo	ow 471	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	5500	3.5	50

Bent 4 - Borings 6 and 7

Eleva	ation, ft			Effective Unit	Undrained Shear	Strain Factor (ε ₅₀			Uniaxial	Rock Mass	
Тор	Bottom	Material	Model	Weight, γ',pcf	Strength of Soil (C _u) (psf)	for Soil) / k _m for Rock)	Friction Angle, φ, °	Soil Modulus, k, pci	Compressive Strength, q _u , psi	Modulus, E _{rm} , 10 ⁶ psi	RQD, %
Above Gro	ound Surface	Fill	Soft Clay (Matlock)	120	750	0.010	NA	NA	NA	NA	NA
Ground	481	Overburden Soils - Clay	Soft Clay (Matlock)	45	650	0.0100	NA	NA	NA	NA	NA
481	476	Overburden Soil - Sand	Sand (Reese)	70	NA	NA	38.0	119	NA	NA	NA
476	474	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
belo	ow 474	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	5500	3.5	70



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MATERIALS DIVISION

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

August 1, 2023

TO:

Mr. Rick Ellis, Bridge Engineer

SUBJECT:

Job No. 040861 Sites 2 and 3

Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S)

Sebastian County
Route 10, Sections 0 & 1

Introduction

Submitted herein are the results of the subsurface investigation and geotechnical recommendations for the proposed replacement bridges at Site 2 and Site 3 planned on Arkansas Highway 10 in Sebastian County. Recommendations for the other three (3) sites (Sites 1, 4, and 5) will be provided in a separate report. The two (2) bridges included in this submittal are comprised of:

- Site 2 (Highway 10 Replacement Bridge over Heartsill Creek): five (5)-span, continuous plate girder unit with a structure length of 420 feet and out-to-out width of 73.5 feet; 2H:1V fill slopes (maximum 16 feet tall) at both bridge ends.
- Site 3 (Highway 10 Replacement Bridge over Vache Grasse Creek): three (3)-span, continuous plate girder unit with a structure length of 273 feet and out-to-out width of 73.5 feet; 2H:1V fill slopes (maximum 23 feet tall) at both bridge ends.

It is understood steel HP14x117 are tentatively planned at the abutment bents of each bridge and HP16x121 piles planned at the intermediate bents of the bridges.

Field Investigation

Request for Subsurface Investigation was received on January 27, 2023 to develop recommendations for bridge foundations and to verify suitability of bridge abutment slope configurations. Borings were drilled at accessible locations based on the Request for Subsurface Investigation memo. The approximate locations of the borings are presented in the Plan of Borings included in Attachments A2 and A3 for Sites 2 and 3, respectively.

The borings were advanced with a track-mounted Acker Renegade rotary drill rig using a combination of hollow-stem auger and diamond core method. The boring logs, showing the subsurface conditions encountered in the borings and the results of field and laboratory tests, are also included in Attachments A2 and A3, immediately following the corresponding Plans of Borings. A Legend is included with the boring logs to interpret / explain the symbols, terms, and conventions used on logs. Standard Penetration Tests (SPT) were conducted in accordance with ASTM D1586 for field testing and soil sampling. Liners were not used inside the standard split-barrel samplers. Drill rig hammer correction factor is shown on the logs.

The number of blows required to drive the standard split-barrel sampler for each 6-inch penetration of the total 18-inch drive are shown on the logs. SPT N-values are defined as the



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number of blows required to advance the split barrel the final 12 inches. The SPT N-values indicated on the logs are raw (uncorrected) blow counts as measured in field.

Core samples of bedrock were retrieved by using NQ3-size triple-tube core barrels (rock core diameter of 1-3/4 in. and hole diameter of 3 in.). For each core run, Rock Quality Designation (RQD) was determined in the field by a logger and further evaluated by a licensed Professional Geologist (PG). RQD, expressed in percent, is defined as the sum of the intact core pieces that are longer than 4 inches divided by the total length of the core run. The RQD of each core run is indicated on corresponding log. Core pictures for Sites 2 and 3 are also included in Attachments A2 and A3, respectively, following the corresponding boring logs. Groundwater was also observed during the drilling process. Groundwater observations were noted on the logs.

Lab Investigation

All samples were brought to the Materials Division laboratory for further evaluation and testing. Soil samples were tested to evaluate index and engineering properties and to verify soil type and classification. Lab tests were performed on representative soil samples to determine moisture content, Atterberg limits, and gradation. Tested soils are classified by licensed Geologists in accordance with both USCS and AASHTO soil classification systems. To evaluate the corrosion potential of the subsurface soils to steel piles, laboratory pH and soil electrical resistivity tests were also performed on representative soil samples.

Rock cores were first examined by a licensed Professional Geologist to verify Total Core Recovery (TCR) and Rock Quality Designation (RQD) measured in field and to obtain parameters for determination of Geological Strength Index (GSI) and Rock Mass Rating (RMR). Compressive strength of rock cores was then determined by laboratory uniaxial compressive test on intact rock cores in accordance with ASTM D7012, Method C.

The results of laboratory tests are either shown on corresponding logs or presented in Attachment B. The laboratory tests and their corresponding ASTM and/or AASHTO test methods are listed in Table 1.

Table 1: Summary of Laboratory Tests and Methods

Laboratory Test	ASTM	AASHTO	Denotation on Logs
Moisture Content	D2216	T 265	Solid Circle Symbol (●)
Grain Size Analysis by Sieving	D6913	T 88	Whole Number in the "- No. 200 %" Column (e.g., 12)
A (D4040	T 89	Plus Sign (+) on the Right for Liquid Limit
Atterberg Limits	D4318	T 90	Plus Sign (+) on the Left for Plastic Limit
pH of Soil	D4972	T 289	Presented in Attachment B2 for Site 2
Soil Resistivity	G57	T 288	(samples not obtained for Site 3)
Uniaxial	D7012,		Presented in Attachment B2 and B3 for
Compression of	Method		Site 2 and Site 3, respectively
Rock Cores	C		One Z and One of respectively



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The particle size through which 50% of particles by weight passing, D_{50} , is summarized below in Table 2.

Table 2: Summary of D50 for Scour Analysis

Site No.	Hydraulic Feature Name	Station	Sample Type	Location	D ₅₀ , mm
1, 2, 4	Heartsill Creek	505+72, 16 Lt.	Bulk	Creek Bank	< 0.075
3, 5	Vache Grasse Creek	522+14, 92 Rt.	Bulk	Creek Bank	< 0.075

Site Conditions

There are five (5) sites for the proposed Greenwood Bypass. Sites 1, 2, and 4 will span Heartsill Creek, which flows from the southwest to the northeast through the project alignment. Sites 3 and 5 will span the Vache Grasse Creek, which flows from the south to north and may receive discharge from a water treatment facility that is located approximately 600 feet to the south of Site 3. Some of the embankments along both creeks show signs of scour. The embankment end slopes under the existing Route 10 bridge have been plated with riprap in the past to reduce erosion. Selected pictures for Site 2 are included in Attachment C2.

Site Geology

The project sites overlie Pennsylvanian aged McAlester Formation, which consists primarily of shale with thin interbedded sandstone and coal layers. This formation rests conformably over the Hartshorne Sandstone. Coal is common in this formation and has been locally mined in the past. Multiple abandoned coal mines are mapped near the project location, including a strip mine and two (2) small pits approximately 800 feet south of site 1. Coal was not observed in any of the core retrieved for this project, but encountering unmapped coal and or abandoned mines around the project site is possible. There are numerous faults mapped to the northwest and to the south of the project location and unmapped faults are possible.

The geology across all five (5) sites is consistent with only slight variations in overburden soils and rock type. Weak soil is common in the top 11.5 feet of some of the borings. At Site 4, weak soils were encountered at depths of up to 21.5 feet. Shale at all (5) sites is consistent with varying amounts of interbedded sandstone, fractures, and slickensides. Core samples of shale with interbedded sandstone had higher compressive strengths than samples of shale with no sandstone. In some of the borings, the fractures and slickensides increased in frequency with depth. Slickensided vertical fractures were encountered during drilling in several of the borings for Sites 1 and 5. At Site 5, the fractures varied from 0.6 to 1.1 feet thick and were located between 31.9 to 33.2 feet below ground level. At Site 1, the fractures varied from 1.8 to 2.5 feet thick and were located between 16.8 and 29.4 feet below ground level.

Generalized Subsurface Conditions

To aid in visualizing subsurface conditions and stratigraphy, Generalized Subsurface Profiles are included in Attachments D2 and D3 for Sites 2 and 3, respectively. The horizontal axis represents stationing in feet while the vertical axis denotes elevation in feet. To fit borings,



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the drawings are not to scale though they are proportional in both horizontal direction and vertical direction.

The Generalized Subsurface Profiles divide the subsurface geotechnical materials into three (3) generalized strata: I. Overburden Soils; II. Incompetent Rock (highly weathered to weathered rock); and III. Competent Rock (slightly weathered to unweathered rock). The estimated elevation of the competent rock, as revealed by the borings, are indicated on the subsurface profiles. These elevations are also summarized below in Tables 3a and 3b, respectively. In light of the natural variations in stratigraphy and subsurface conditions, deviation from those illustrated on the profiles must be anticipated.

Table 3a: Estimated Elevation of Competent Rock - Site 2

Boring No.	Boring Location	Ground Surf. Elev.@ Boring Location, ft.	Depth to Competent Rock, ft.	Estimated Elev. of Competent Rock, ft.
1	Sta. 219+36, 34 Rt.	484.4	25.1	459.3
2	Sta. 219+90, 34 Lt.	483.9	16.5	467.4
3	Sta. 219+93, 34 Rt.	484.5	16.5	468.0
4	Sta. 220+45, 34 Lt.	485.1	19.4	465.7
5	Sta. 221+08, 34 Rt.	482.2	16.0	466.2
6	Sta. 221+59, 19 Lt.	482.9	17.0	465.9
7	Sta. 222+01, 34 Rt.	483.5	20.1	463.4
8	Sta. 222+38, 34 Lt.	482.7	20.1	462.6
9	Sta. 222+94, 10 Rt.	482.5	20.2	462.3
10	Sta. 223+25, 34 Lt.	482.9	20.1	462.8
11	Sta. 223+72, 34 Rt.	483.6	24.0	459.6
12	Sta. 223+99, 34 Lt.	483.6	20.4	463.2

Table 3b: Estimated Elevation of Competent Rock – Site 3

Boring No.	Boring Location	Ground Surf. Elev.@ Boring Location, ft.	Depth to Competent Rock, ft.	Estimated Elev. of Competent Rock, ft.
1	Sta. 236+64, 34 Lt.	484.6	17.0	467.6
2	Sta. 237+36, 38 Lt.	485.3	20.7	464.5
3	Sta. 238+35, 25 Rt.	487.4	12.0	475.4
4	Sta. 238+54, 34 Lt.	486.7	12.5	474.2
5	Sta. 239+14, 34 Lt.	484.6	12.5	472.1
6	Sta. 239+20, 34 Rt.	485.3	12.0	473.3



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Seismic Conditions

In light of the average subsurface conditions as revealed by the borings, a **Seismic Site Class D (Stiff Soil Profile)** is calculated for the five (5) project sites. Utilizing the Seismic Site Class D and the mid-point GPS coordinates of the project, the following design peak ground acceleration coefficient (A_S), design short-period spectral acceleration coefficient (S_{DS}), as well as design long-period spectral acceleration coefficient (S_{D1}), are determined. These seismic coefficients are summarized in Table 4. Design Response Spectrum is presented in Attachment E.

Table 4: Summary of Design Ground Motion Acceleration Response Coefficients

	Value (g)	
Acceleration Coefficient	All Sites (Sites 1 through 5)	
A _s (Site PGA)	0.089	
S _{DS} (0.2 sec)	0.210	
S _{D1} (1 sec)	0.127	

For the design long-period spectral acceleration coefficient (S_{D1}) of 0.127, a **Seismic Performance Zone 1** is considered applicable to the five (5) bridge sites.

Approach Embankments

<u>Settlement Potential and Ground Improvements</u> Design drawings provided by Bridge Division indicate up to 16 feet of fill will be placed at the bridge abutments of Site 2 and up to 23 feet of fill will be placed at Site 3 bridge abutments. Based on the results of the borings performed at these bridge abutments, the subsurface soils are primarily granular soils with some areas / zones of low-plasticity lean clay or silty clay. Consequently, settlement is expected to be predominantly immediate, elastic deformation that will be completed during the embankment construction phase.

The surface and near-surface soils at the planned bridge abutments are weak and unstable. To provide a stable construction platform and to stabilize the embankments, it is recommended the subgrade at the bridge abutments be undercut at least 5 feet below the existing ground surface. For each abutment, undercut should extend at least 5 feet in front of the toe of the end slope, 5 feet beyond the toes of the side slopes, and 100 feet behind the crest of the end slope.

Undercut should be backfilled with Rock Fill. A project Special Provision for Rock Fill is included in Attachment F. Aggregate Base Coarse (Class 7), in accordance with ARDOT Standard Specifications Section 303, should be utilized in areas where piling is planned.

Embankment Stability Stability analyses have been performed to evaluate the design abutment configuration. Slope stability analyses were performed utilizing a commercial computer program Slide2 (Version 2021) developed by RocScience. Spencer analysis method was utilized to analyze the more critical 2H:1V end slopes at the abutments. Three (3) general loading conditions were analyzed with respect to slope stability: Short Term/End of Construction Condition, Long Term Condition, and Seismic/Pseudo-Static Condition. A horizontal acceleration



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coefficient (K_h) of 0.045 (0.5 A_s /g) was utilized for analysis of the Seismic/Pseudo-Static Condition. A surcharge of 250 psf is included to model the live load under long term conditions.

The results of the analyses are presented in Tables 5a and 5b for Sites 2 and 3, respectively. The graphic results of slope stability analyses are shown in Attachments G2 and G3 for Sites 2 and 3, respectively. Undercut and Rock Fill were not included in modeling and the analyses are considered conservative. These results of stability analyses indicate the plan abutment configurations are acceptable.

Table 5a: Results of Slope Stability Analyses - Site 2

Slope	Loading Condition	Calculated Minimum Factor of Safety	Recommended Minimum Factor of Safety
0114145 101	Short Term	5.81	1.3
2H:1V End Slope –	Long Term	1.73	1.4
Bent 1	Seismic $(k_h = 0.045)$	4.92	1.1
0114045 101	Short Term	2.14	1.3
2H:1V End Slope –	Long Term	1.43	1.4
Bent 6	Seismic (k _h = 0.045)	1.88	1.1

Table 5b: Results of Slope Stability Analyses - Site 3

Slope	Loading Condition	Calculated Minimum Factor of Safety	Recommended Minimum Factor of Safety
0114)/ = -101	Short Term	2.37	1.3
2H:1V End Slope –	Long Term	2.52	1.4
Bent 1	Seismic $(k_h = 0.045)$	2.13	1.1
011.47.45	Short Term	8.33	1.3
2H:1V End Slope –	Long Term	1.83	1.4
Bent 4	Seismic $(k_h = 0.045)$	7.27	1.1

Foundation Recommendations

<u>Design and Construction Considerations</u> Based on the most recent plans and discussions with Bridge Division, steel H piles will be utilized to support the foundation loads at all the end and intermediate bents of the bridges. Steel HP14x117 are tentatively planned at the abutment bents while HP16x121 piles are planned at the intermediate bents of the bridges.

Steel H-piles should be driven to practical refusal and should penetrate through embankment fill in the abutment areas, the overburden soils, highly weathered rock (if any) and weathered rock (if any), to bear in the competent slightly weathered to unweathered shale. Preboring is recommended to facilitate socketing the steel H piles into the competent shale as planned by the Structural Engineer. It is recommended prebores extend at least 1 foot below the competent rock surface.



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Practical refusal is defined as a maximum penetration of 1.0 inch for 20 blows by a pile hammer. For the purpose of estimating prebore depth and pile length, an additional pile penetration of 6 inches, below the prebored depth, is expected. This estimated additional penetration below the prebored depth is based on the results of the borings and our experience with similar foundation rock. The results of the borings indicate moderate to severe driving conditions are to be expected. Consequently, rock points are recommended for all H-piles driven to refusal.

A minimum pile penetration of 10 feet, measured below natural ground surface, is recommended. Based on the results of the borings and the above assumed penetration into the resistant rock, the recommended shallowest prebore elevation and estimated shallowest pile tip elevation are summarized below in Tables 6a and 6b for Sites 2 and 3, respectively. Additional pile penetration may be required by lateral resistance as determined by the Structural Engineer.

The elevations summarized in Tables 6a and 6b are recommended shallowest prebore elevation utilizing borings results and our engineering judgement. Actual subsurface conditions can vary from those encountered in the borings. As-constructed prebore elevation and pile tip elevation can vary and must be field verified. Greater pile length/penetration may be warranted by lateral resistance demand and/or by scour requirements.

Table 6a: Recommended Shallowest Prebore Elevation and Pile Tip Elevation - Site 2

Boring No.	Boring Location	Estimated Elev. of Competent Rock, ft.	Recommended Shallowest Prebore Elev., ft.	Expected Additional Penetration below Prebored Elev., ft.
1	Sta. 219+36, 34 Rt.	459.3	458.3	
2	Sta. 219+90, 34 Lt.	467.4	466.4	
3	Sta. 219+93, 34 Rt.	468.0	467.0	
4	Sta. 220+45, 34 Lt.	465.7	464.7	
5	Sta. 221+08, 34 Rt.	466.2	465.2	
6	Sta. 221+59, 19 Lt.	465.9	464.9	0.5
7	Sta. 222+01, 34 Rt.	463.4	462.4	0.0
8	Sta. 222+38, 34 Lt.	462.6	461.6	
9	Sta. 222+94, 10 Rt.	462.3	461.3	
10	Sta. 223+25, 34 Lt.	462.8	461.8	
11	Sta. 223+72, 34 Rt.	459.6	458.6	
12	Sta. 223+99, 34 Lt.	463.2	462.2	



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Table 6b: Recommended Shallowest Prebore Elevation and Pile Tip Elevation – Site 3

		Estimated	Recommended	Estimated
D		Elev. of	Shallowest	Elev. of
Boring No.	Boring Location	Competent	Prebore Elev.,	Competent
		Rock, ft.	ft.	Rock, ft.
1	Sta. 236+64, 34 Lt.	467.6	466.6	
2	Sta. 237+36, 38 Lt.	464.5	463.6	
3	Sta. 238+35, 25 Rt.	475.4	474.4	0.5
4	Sta. 238+54, 34 Lt.	474.2	473.2	0.5
5	Sta. 239+14, 34 Lt.	472.1	471.1	
6	Sta. 239+20, 34 Rt.	473.3	472.3	

For steel piling driven to refusal in competent rock, long-term, post-construction settlement is expected to be negligible. It is recommended that wave equation analyses of piles (WEAP) be performed to evaluate suitable hammer system(s) to drive the piles to refusal. The hammer system should be adequately powerful to drive piles to refusal into rock as recommended but without overstressing the piles. As a minimum, two (2) analyses should be performed for each of the bridges included in the project, with minimum one (1) analysis performed on the shortest pile and the other on the longest pile.

Coal deposits and existing coal mines were not encountered in the borings. However, multiple abandoned coal mines are mapped surrounding the project location, including a strip mine and two small pits approximately 800 feet south of Site 1. **There is a possibility of encountering coal deposits and abandoned coal mines within the project limits.** If coal deposits or abandoned coal mines are encountered at the time of construction, preboring should penetrate through the coal deposits or coal mines and should extend at least 1 foot into the competent slightly weathered to unweathered shale.

Axial Pile Capacities Nominal axial resistance of steel H piles driven to refusal in competent rock is governed by the structural capacity of the piles. Therefore, the nominal resistance should be determined by the Structural Engineer utilizing applicable AASHTO LRFD design procedures. It is recommended nominal (ultimate) resistance of steel piles be determined based on the yield strength of steel piles (f_y) and the net cross-sectional area of the steel section (A_s). Selection of the structural resistance factor for calculating factored structural bearing resistance of H-piles should be based on the expectation of moderate to severe driving conditions.

For steel H piles with f_y of 50 ksi, the following allowable structural compression pile capacities are recommended for preliminary design (Table 7). These allowable capacities include a factor of safety (load factor divided by resistance factor) of 4.0. Use of these allowable capacities as factored structural compression pile capacities are considered conservatively reasonable.



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Table 7: Recommended Allowable Structural Compression Pile Capacities - f_y = 50 ksi

Pile Section	Net Cross-Sectional Area of Steel Section (A _s), in ²	Allowable Structural Compression Pile Capacity (P _{na}), ton
HP14x117	34.4	215
HP16x121	35.8	224

Geotechnical Input Parameters for Lateral Load Analysis It is understood lateral load analysis will be performed by the Structural Engineer using commercial computer program LPile/Group. Recommended geotechnical input parameters are included in Attachments H2 and H3 for Sites 2 and 3, respectively.

Paul Tinsley

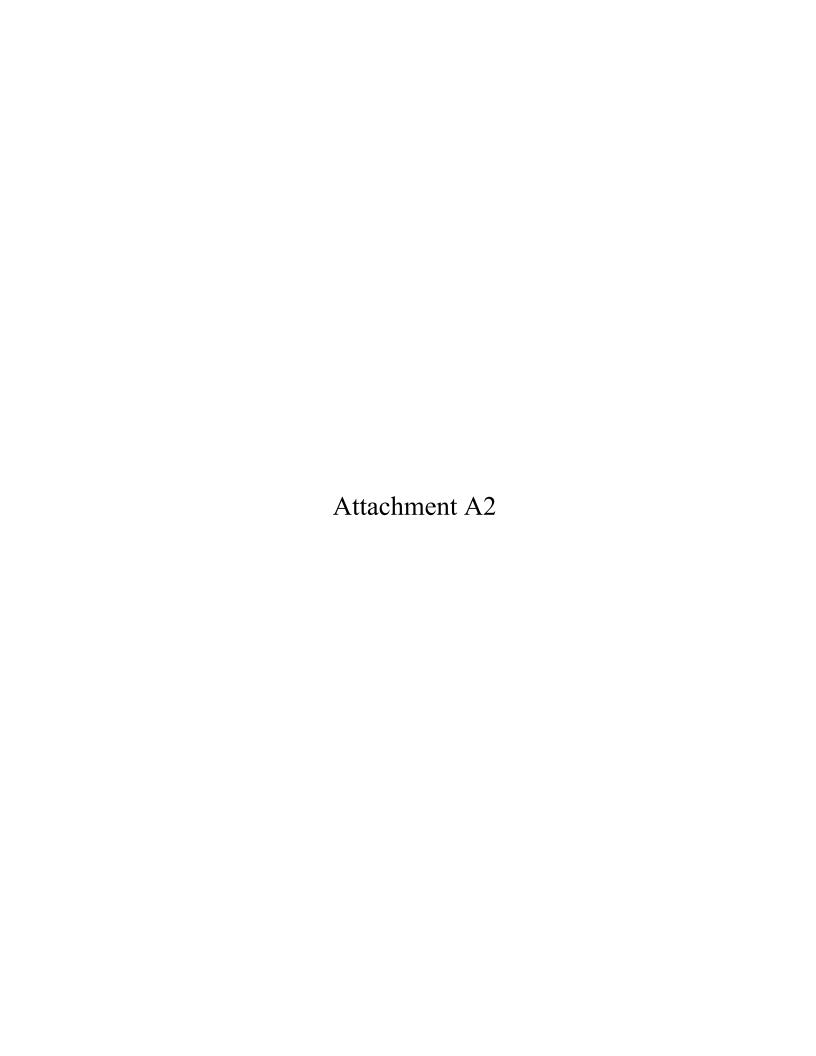
Materials Engineer

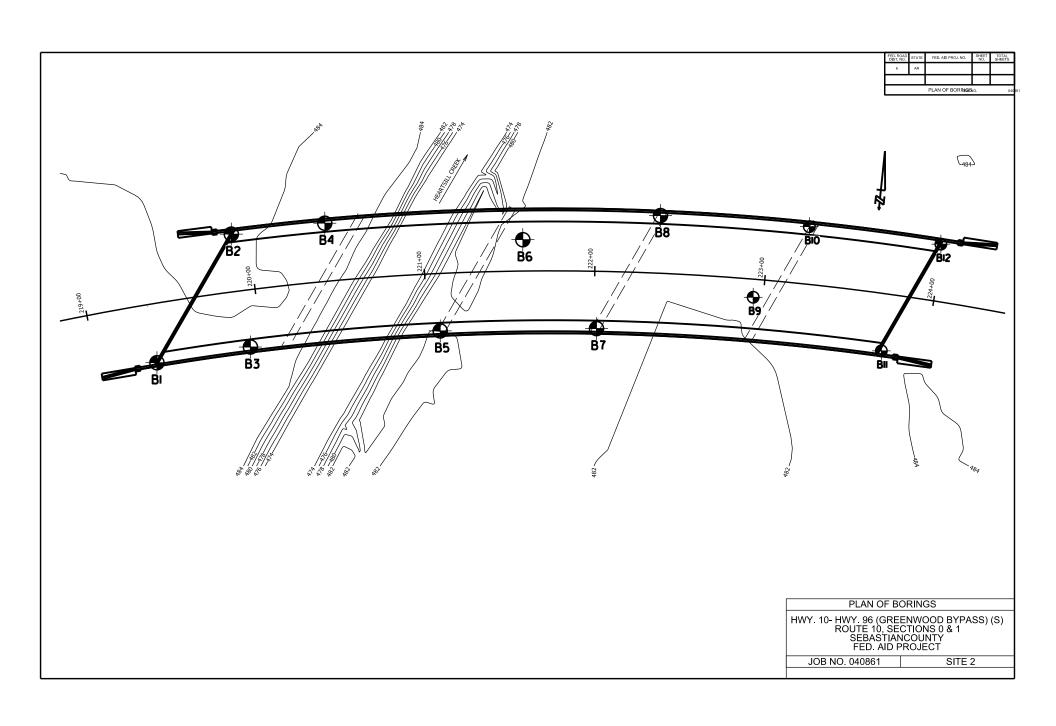
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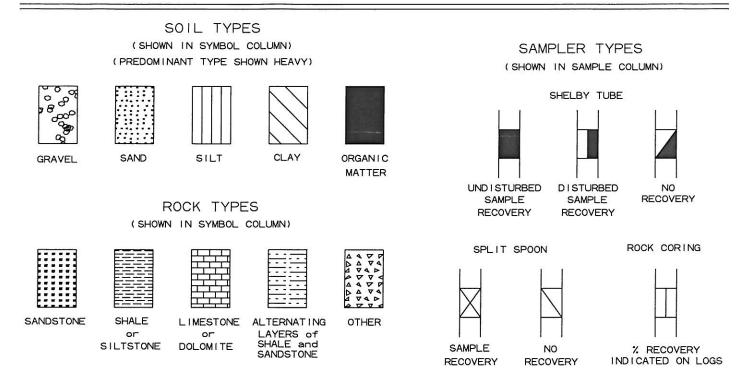
State Construction Engineer

District 4 Engineer





IFGFND



TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANU	LAR SOIL		CLAY	CLA	AY-SHALE	S	HALE
'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	0ver 60	
31-50	Dense	9-15	Stiff	9-15	Stiff	More than	2'
0ver 50	Very Dense	16-30	Very Stiff	16-30	Very Stiff	Penetratio	on
		31-60	Hard	31-60	Hard	in 60 Blow	sı Medium Hard
		0ver 60	Very Hard	0ver 60	Very Hard	Less than	2'
						Penetratio	on.
						in 60 Blow	s: 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.
- 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 (N₆₀) can be obtained by multiplying N_f by the hammer correction factor published on the boring log.

		DEPARTMENT OF TRANSPORTATI DIVISION - GEOTECHNICAL SEC.	ON		BORING NO. Site PAGE 1 OF				
JOB NO.	AL	040861 Sebastian County				Z June 13, 2	2023		_
JOB NAM		Hwy. 10 - Hwy. 96 (Greenwood Bypa- Route 10, Section 0	ss) (S)		TYPE OF DRILLING: Hollow Stem Au	ger - Dia	mond Co	ore	
STATION: LOCATION	N:	219+36 34' Right of Construction Centerline Anthony Nicholson			EQUIPMENT: HAMMER CORRECTION		xer 1	.54	
		ON DEPTH: 35.1			HAWWER CORRECTION	SIVIACIO	X. I	.54	-
S Y M B O L	SAMPLE	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTUR PL	E CONTENT (%)	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
FT.	S	SURFACE ELEVATION: 484.4		10 20 3	30 40 50 60 70	- I			
	X	Moist, Stiff, Brown Lean Clay	- CL - CL -	 	1	95	3 5-7 4 6-8		
10	X	Moist, Medium Stiff, Bown Lean Clay	CL -			89	2-4		
	X	Wet, Stiff, Brown Sandy Silty Clay SHALE - Highly Weathered, Medium	CL-ML	 • 		70	3 5-4 4 13-35		
		Hard with Soft Layers, Brown SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Highly Weathered, Medium Hard with Soft Layers, Frequent					(10")	77	0
		Fractures, Gray SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Weathered, Medium Hard with Hard Layers, Frequent Fractures, Gray	-					100	60
		SHALE WITH FREQUENT SANDSTONE PARTINGS AND						100	82
		SEAMS - Unweathered, Medium Hard with Hard Layers, Gray						94	86
REMAR	KS:								

			DEPARTMENT OF TRANSPORTATION	ON								e 2-E	31			
	TERIALS DIVISION - GEOTECHNICAL SEC. NO. 040861 Sebastian County NAME: Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) Route 10, Section 0 ATION: 219+36 CATION: 34' Right of Construction Centerline GGED BY: Anthony Nicholson MPLETION DEPTH: 35.1							PAC		2	OF	2	12.0	2022		-
	NAME: Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) Route 10, Section 0 TION: 219+36 ATION: 34' Right of Construction Centerline GED BY: Anthony Nicholson MPLETION DEPTH: 35.1 S S							DAT		DDII I	, DIC		ne 13, 2	2023		
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	DIVISION - GEOTECHNICAL SEC.				PAGE	1	OF 1	. 10 0	2022		_
	040861 Sebastian County) (C)			DATE:			ne 13, 2	2023		
	Hwy. 10 - Hwy. 96 (Greenwood Bypas	ss) (S)			TYPE OF			D:-	10		
	Route 10, Section 0						n Auge		nond Co	ore	
	219+90				EQUIPM	ENT:		Ack	ker 1		
	34' Left of Construction Centerline Anthony Nicholson					n conn	- COTTON	T. CTOT	. 1	<i>E</i> 1	
	·				HAMME	R CORR	ECTION	FACTOR	R: 1	.54	_
	N DEPTH: 34.2										
D S A P M P L O E	DESCRIPTION OF MATERIAL	SOIL GROUP	MO PL ⊢	ISTUF	RE CONTI	ENT (%)) • → LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
FT. S	SURFACE ELEVATION: 483.9			20	30 40	50 60	•	BE			
5	Moist, Loose, Brown Silt								<u>1</u> 3-6		
	Moist, Medium Dense, Brown Silt								5-6		
10	Wet, Medium Stiff, Brown Sandy Silty Clay								3-4		
	Moist, Medium Stiff, Brown Silty Clay								5-3		
13 1111	SHALE - Highly Weathered, Medium								8		
	Hard, Gray								60		
20 20000	SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Slightly Weathered, Medium Hard with Hard Layers,								(6")	85	55
	Gray SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard with Hard Layers, Gray									100	76
25	SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered Medium									94	76
30 EXECUTE	SEAMS - Unweathered, Medium Hard with Hard Layers, Occasional Fractures, Gray									100	72
35	Boring Terminated					+					
REMARKS:		ı			1 1						

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 2-B3 MATERIALS DIVISION - GEOTECHNICAL SEC. of 1 PAGE 040861 Sebastian County June 14 and 20, 2023 JOB NO. Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 219+93 STATION: EQUIPMENT: Acker 1 34' Right of Construction Centerline LOCATION: LOGGED BY: Anthony Nicholson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 33.7** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} В Q Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. SURFACE ELEVATION: 484.5 40 50 Moist, Stiff, Brown Lean Clay with 81 6 Sand CL 7-7 5 93 CL 7-8 Moist, Stiff, Brown Lean Clay 94 CL $\vdash \vdash \vdash$ Moist, Medium Stiff, Brown Lean 3-4 Clay 10 86 CL-ML \bullet 5-8 Moist, Stiff, Brown Silty Clay* 15 Moist, Medium Dense, Brown Clayey 30 3 SC 11-14 Sand SHALE - Highly Weathered, Very Soft, Brown 100 66 SHALE WITH FREQUENT SANDSTONE PARTINGS AND 20 SEAMS - Slightly Weathered, Medium Hard with Hard Layers, 98 80 Gray 25 SHALE WITH FREQUENT SANDSTONE PARTINGS AND 98 90 SEAMS - Unweathered, Medium Hard with Hard Layers, Gray 30 94 78 **Boring Terminated** 35 REMARKS: *The water level at a 102 hour reading was 13.4 feet below ground level.

	DEPARTMENT OF TRANSPORTATION	ION					RING				34			
	S DIVISION - GEOTECHNICAL SEC.					PA	GE	1	OF	2				_
OB NO.	040861 Sebastian County					DAT					ne 14, 2	2023		
OB NAME:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)					PE OF							
	Route 10, Section 0								em A	uger		nond Co	ore	
STATION:	220+45					EQU	ЛРМЕ	ENT:			Ack	ter 1		
LOCATION:	34' Left of Construction Centerline													
	Anthony Nicholson					HA	MMER	COR	RECT	TION I	FACTOF	R: 1	.54	_
	ON DEPTH: 34.4	T												
S A M P L E	DESCRIPTION OF MATERIAL	SOIL GROUP	l		ΓUR	E CC)NTE	NT (%	%) <u>(</u>	•	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	9 F C
	SURFACE ELEVATION: 485.1		PL 10	•	0 3	0 4	10 5	0 6		LL 0	PEI	Z		
		-												
	Moist, Stiff, Brown Silty Clay										92	2		
- - 1000 X		CL-ML		•	\dashv						92	5-8		
5		_												
		01									93	5		
-	Moist, Stiff, Brown Lean Clay	CL		•								6-8		
		-												
	Moist, Stiff, Brown Lean Clay with	CL		•	\dashv						90	3		
	Some Sand				·							5-6		
10		-									69	4		
- - NN X		CL-ML		M							09	4-5		
- 100												. 0		
	Moist, Stiff, Brown Sandy Silty Clay													
15														
	Moist, Stiff, Brown Sandy Silty Clay											11		
- —	_ with Gravel (Shale Fragments) _ SHALE - Highly Weathered, Very	1										5-10		
	Soft, Brown and Gray													
- — (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	SHALE - Weathered, Medium Hard,	1											83	4
- 111	_ Gray													
20														
- - 20001 - - 414141 - 20001													100	7
		-												
25														
00004 00004	SHALE WITH FREQUENT													
99998 88888	SANDSTONE PARTINGS AND												100	c
**************************************	SEAMS - Unweathered, Medium													٦
	Hard with Hard Layers, Gray													
30														
30 EHRH														
- — KIKKKI 22224 KKKKI														
													100	9
- Here		<u> </u>						<u> </u>						
35														
REMARKS:														

ARK	(AN	SAS	S DEPARTMENT OF TRANSPORTATI			ВО	RING	NO.	Site	e 2-E	34				
		ALS	S DIVISION - GEOTECHNICAL SEC.		PA		2	OF					_		
JOB I	NAM ΓΙΟΝ:	:	040861 Sebastian County Hwy. 10 - Hwy. 96 (Greenwood Bypa Route 10, Section 0 220+45 34' Left of Construction Centerline	ss) (S)			Н	E OF I	v Ste				2023 mond Cor ker 1	re	
LOG	GED I	BY:	Anthony Nicholson		HAI	MMER	CORI	RECT	ION I	FACTOR	≀: 1.	54	_		
	1PLE		ON DEPTH: 34.4	T											
DEPTH F.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 485.1	TURE CO			\dashv	LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D			
Г1.			Boring Terminated		10	20	30 4	10 50	0 60) 7	0				
40 45 50 55 60 60 60															
65 															
70															
REM	1ARI	KS:													

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 2-B5 MATERIALS DIVISION - GEOTECHNICAL SEC. of 1 PAGE 1 040861 Sebastian County April 11, 2023 JOB NO. Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 221+08 STATION: EQUIPMENT: Acker 1 34' Right of Construction Centerline LOCATION: LOGGED BY: Tracey Henderson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 33.2** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Ε Α Υ Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) • 0 Ε L FT. SURFACE ELEVATION: 482.2 30 40 50 Moist, Medium Stiff, Brown Silty Clay 0 96 CL-ML 3-5 5 90 3 CL-ML 4-5 Moist, Stiff, Brown Silty Clay 87 CL-ML 5-8 10 85 3 CL-ML 3-4 Wet, Medium Stiff, Brown Silty Clay with Sand SHALE - Weathered, Medium Hard, 17 48 Dark Gray (2")SHALE WITH FREQUENT 86 36 SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard with Hard Layers, Occasional 20 Fractures, Gray 100 78 SHALE WITH FREQUENT 25 SANDSTONE PARTINGS AND 100 76 SEAMS - Unweathered, Medium Hard with Hard Layers, Gray 30 100 98 **Boring Terminated** 35 **REMARKS:**

			DEPARTMENT OF TRANSPORTATION O	ON					. Site 2				
		ALS	S DIVISION - GEOTECHNICAL SEC.				PAGE		OF 1		2025		_
JOB N			040861 Sebastian County	\			DATE:			pril 11,	2023		
JOB N	AMI	Ξ:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)				OF DRII					
			Route 10, Section 0				Ho	llow St	em Aug	ger - Dia		ore	
STATI	ION:		221+59				EQUIF	MENT:		Acl	ker 1		
LOCA	TIOI	N:	19' Left of Construction Centerline										
LOGG	ED I	3Y:	Tracy Henderson				HAMN	MER CO	RRECTIO	N FACTO	R: 1	1.54	_
COM	PLE	TIC	N DEPTH: 34										
D		s								1G			
	S Y M B	A M P L	DESCRIPTION OF MATERIAL	SOIL GROUP		40 JOHN J	DE GOV		۵٬)	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
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FT.	INIIN	<u> </u>	SURFACE ELEVATION: 482.9		10	0 20	30 40	50	60 70	<u> Д</u>		-	
		X	Moist, Stiff, Brown and Gray Silty Clay	- CL-ML		l o -l				89	5 6-9		
5			M : 1 0 1 1 1 1 1 1 1 1 1	-		1 - 1				99	5		
		\triangle	Moist, Stiff, Light Brown Silty Clay	CL-ML		1					7-5		
			Wet, Stiff, Light Brown Silty Clay	-						93	2		
 10		$\stackrel{\times}{\rightarrow}$	Wet, Medium Stiff, Light Brown Silty Clay	CL-ML -		H•					2-3		
 _ 15			Wet, Very Loose, Light Brown Lean Clay	CL		 				92	0-0		
		\times	SHALE - Highly Weathered, Medium	•							58		
20			Hard, Dark Gray SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard, Frequent Fractures, Gray								38 (1")	90	40
	2224 HHHH 2224 HHHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHHH 2224 HHH 2 HH 2 HHH 2 HHH 2 HHH 2 HHH 2 HHH 2 HHH 2 HH 2 HHH 2 HHH 2 HHH 2 HHH 2 HH 2 HHH 2 HH 2 HHH 2 HHH 2 HHH 2 H 2 HH 2 H 2 HH 2 HH 2 H 2 HH 2 H 2 H 2 H 2 H 2 H 2 H 2 H 2 H 2 H 2 H 2 H 2 H 2 H 2 H 2 H 2 H 2 H		SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard, Gray	-								98	7
			SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard, Occasional Fractures, Gray									100	78
			SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard, Gray									100	10
		\dashv	Boring Terminated									1	
35			g	1	1	1		- 1	1 1	1		1	L

	AS DEPARTMENT OF TRANSPORTAT	ION			NO. Site 2-	B7			
	LS DIVISION - GEOTECHNICAL SEC.			1	1 OF 2	mil 10 /	2022		_
	r: Tracy Henderson	ass) (S)		EQUIPMEN	PRILLING: Stem Auge	Ack	mond Co cer 1	ore	_
COMPLET	ION DEPTH: 39								
H O I	DESCRIPTION OF MATERIAL	SOIL GROUP	PL —	RE CONTEN	—— LL	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% F C E
9999			10 20	30 40 50	00 70			1	
- — — — — — — — — — — — — — — — — — — —	Wet, Very Loose, Light Brown Silty, Clayey Sand	SC-SM	H	•		41	0-0		
	Wet, Very Soft, Light Brown Silty Clay with Sand and Some Organic Matter (Wood)	CL-ML		•		80	0-0		
10	Wet, Very Soft, Light Brown Lean Clay with Some Organic Matter (Wood)	CL -	 			95	0-1		
- — — — — — — — — — — — — — — — — — — —	Wet, Loose, Light Brown Silt with Sand	ML	•			72	4-6		
15	Wet, Medium Dense, Light Brown and Gray Clayey Sand with Rock Fragments		•				6 9-17		
- — — — — — — — — — — — — — — — — — — —	SHALE - Highly Weathered, Soft, Gray						00		
- ————————————————————————————————————	SHALE - Unweathered, Medium Hard with Hard Layers, Gray						30 (1")	94	6
30	SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard with Hard Layers, Frequent Fractures, Trace Slickensides, Gray	-						100	7
35	SHALE WITH FREQUENT SANDSTONE PARTINGS AND							100	8

			S DEPARTMENT OF TRANSPORTATI	ON								e 2-E	37			
JOB 1		AL	S DIVISION - GEOTECHNICAL SEC. 040861 Sebastian County				PAC		2	OF	2	ril 10,	2022	—	-	
JOB I		E.	•	ss) (S)				DAT		DRIL	LING	_	111 10,	2023		
JOB	N/AIVI	Ŀ.	Route 10, Section 0	33) (0)									r - Diai	mond Co	re	
STAT	ΓΙΟN:	:	222+01					ı	IPME					ker 1		
LOCA								-(-								
			Tracy Henderson					HAN	/MER	COR	RECT	ΓΙΟΝ	FACTO	R: 1	.54	
CON	1PLF	ETIC	ON DEPTH: 39													
D	s	S											Ď .			
E	Y	Α											SSII	W.S	%	%
P T	M	M P	DESCRIPTION OF MATERIAL	SOIL									PA SII	BL(6-II\	T 70	R
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FT.	L		SURFACE ELEVATION: 483.5				0 3	0 4	0 5	0 6			PE			
			SEAMS - Unweathered, Medium													
			Hard with Hard Layers, Gray												100	96
40			Boring Terminated													
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70																
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			DEPARTMENT OF TRANSPORTATI DIVISION - GEOTECHNICAL SEC.	ON			BORING PAGE	G NO. 3	Site 2-E	38			
JOB			040861 Sebastian County				DATE:			2 and	13, 2023		-
JOB		E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa:	ss) (S)			TYPE OF	DRILLI	-	2 una	13, 2023		
			Route 10, Section 0	/(-/						r - Diai	nond Co	re	
STAT	ΓΙΟN:		222+38				EQUIPM		Ü		er 1		
LOC	ATIO	N:	34' Left of Construction Centerline										
LOG	GED :	BY:	Tracy Henderson				HAMME	R CORR	ECTION	FACTO	R: 1.	54	_
CON	1PLE	ETIC	ON DEPTH: 39										
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P T	M	M P	DESCRIPTION OF MATERIAL	SOIL						PA(BLC 5-IN	% T	% R
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			Wet, Very Soft, Brown Silty Clay with							82	0		
	X	X	Some Manganese Nodules	CL-ML						02	0-0		
— — 5				-									
				CL		H				97	0		
		\triangle	Wet, Very Soft, Brown Lean Clay	CL							0-0		
				-						00	0		
		X	Wet, Very Loose, Light Brown and	ML		•				69	0-0		
 10			Gray Silt with Manganese Nodules	_							0-0		
10										55	0		
		\triangle		CL-ML		□ •					0-1		
			Wet, Very Soft, Light Brown and										
			Gray Silty Clay	_									
<u> </u>													
15			Wet, Medium Dense, Brown Silty							64	1		
		X	Clay with Rock Fragments	CL-ML		+				•	5-14		
			SHALE - Highly Weathered, Soft,										
			Dark Gray										
20											30		
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		$ \ \ $										98	98
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L _		Ш	SHALE WITH FREQUENT										
30			SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium										
			Hard with Hard Layers, Gray										
												100	88
		$ \ \ $											
 35													
REN		KS:				•			-				

			DEPARTMENT OF TRANSPORTATION	ON					RING				38			
MATERIALS DIVISION - GEOTECHNICAL SEC.PAJOB NO.040861Sebastian CountyDA										2	OF		2 and	13, 2023		_
JOB I		E:	•	ss) (S)					e: E OF l	DRIL	_		2 and	13, 2023		
			Route 10, Section 0	, ()				Hollow Stem Auger - Diamond Core								
STAT	ΓΙΟN:	:	222+38					EQUIPMENT: Acker 1								
	CATION: 34' Left of Construction Centerline															
	OGGED BY: Tracy Henderson HAMMER CORRECTION FACTOR: OMPLETION DEPTH: 39									R: 1.	.54	_				
	/IPLE	s	JN DEPTH: 39		l								77			
D E	S	A											PERCENT PASSING NO. 200 SIEVE	NS		
E P	Y M	М	DESCRIPTION OF MATERIAL	SOIL									SAS	LO.	% T	% R
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ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 2-B9 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 2 PAGE 1 Sebastian County April 18, 2023 JOB NO. 040861 DATE: Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 222+94 STATION: EQUIPMENT: Acker 1 LOCATION: 10' Right of Construction Centerline LOGGED BY: Tracy Henderson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 39.2** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. S Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) 0 Ε L PL | FT. SURFACE ELEVATION: 482.5 40 50 Wet, Very Soft, Brown Silty Clay 0 88 CL-ML ₩• 0-0 5 92 0 CL ₩• 0-0 Wet, Very Soft, Brown Lean Clay 75 ML Wet, Medium Dense, Brown Silt with 6-5 Sand 10 83 ML 4-6 Wet, Loose, Brown Silt with Sand 15 SHALE - Highly Weathered, Soft, \Gray 16-60 (11")SHALE - Weathered, Medium Hard, 20 60 (2") 86 33 SHALE - Slightly Weathered, 25 Medium Hard, Slickensided, Gray 100 58 30 98 90 SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Slightly Weathered, 35 REMARKS: Water stratum encountered at approximately 13.8 feet below ground level.

ARKANSAS DEPARTMENT OF TRANSPORTATION MATERIALS DIVISION - GEOTECHNICAL SEC.									BORING NO. Site 2-B9 PAGE 2 OF 2								
JOB NO. 040861 Sebastian County D									01		ril 18, 1	2023		-			
JOB NAME:	Hwy. 10 - Hwy. 96 (Greenwood Bypa: Route 10, Section 0	ss) (S)				TYP	E OF I			:		nond Co	re				
STATION: LOCATION:	222+94 10' Right of Construction Centerline						IPME					ker 1					
	Tracy Henderson					HAM	1MER	COR	RECT	ION I	FACTO	R: 1.	54				
COMPLETIC	ON DEPTH: 39.2																
D S A M P L B O E	DESCRIPTION OF MATERIAL	SOIL GROUP	N PL		TURI	URE CONTENT (%) ●					PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D			
FT.	SURFACE ELEVATION: 482.5			•	0 3	0 4	0 5	0 6	•	LL 0	PE						
######################################	Medium Hard with Hard Layers, Slickensided, Gray												100	92			
40	Boring Terminated																
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70																	
	Water stratum encountered at approxi	mately 1	3.8 f	eet	belo	w gr	oun	d lev	/el.								

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 2-B10 MATERIALS DIVISION - GEOTECHNICAL SEC. of 2 PAGE 1 Sebastian County April 18, 2023 JOB NO. 040861 DATE: Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core STATION: 223+25 EQUIPMENT: Acker 1 LOCATION: 34' Left of Construction Centerline LOGGED BY: Tracy Henderson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 39.1** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. S Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. S SURFACE ELEVATION: 482.9 40 50 Moist, Very Loose, Light Brown Silt 0 with Sand 0-0 5 0 88 CL-ML Moist, Very Soft, Light Brown Silty 0-0 Clay 85 ML Wet, Very Loose, Brown Silt with 1-3 Sand 10 71 2 ML 6-7 Wet, Medium Dense, Brown Silt with Sand* 15 6 13-13 SHALE - Highly Weathered, Very Soft, Gray 20 SHALE - Weathered, Medium Hard, 30 (1")\Gray 100 83 SHALE - Unweathered, Medium Hard, Gray 25 100 92 SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium 30 \Hard with Hard Layers, Gray 100 86 SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium 35 REMARKS: *A water stratum was encountered at approximately 15.7 feet below ground level.

									BORING NO. Site 2-B10 PAGE 2 OF 2								
JOB NO. 040861 Sebastian County									E:		01		ril 18, 1	2023		-	
		E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)					E OF	DRILI	LING:	_	,				
			Route 10, Section 0					Hollow Stem Auger - Diamond Core									
STAT			223+25					EQUIPMENT: Acker 1									
LOCA										~~~				. 1	<i>-</i> 1		
			Tracy Henderson ON DEPTH: 39.1					HAN	1MER	COR	RECT	TON I	FACTO	<u>t: 1.</u>	.54	-	
D		s	AVDEL 111. 39.1										Ü				
E P	S Y	Ā											PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.			
P	M	M	DESCRIPTION OF MATERIAL	SOIL									PAS SIE	BLO 5-IN	% T	% R	
T H	В	P L		GROUP									NT 200	OF 1 ER (C	Q	
''	0	<u>E</u>			PL		TURI	E CO	NTE	NT (9	_	• , ,	RCE NO.	NO.	R	D	
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			Hard with Hard Layers, Occasional Slickensides, Gray														
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	IARI	 {S:	*A water stratum was encountered at	approxim	natel	v 15	.7 fe	et b	elov	/ arc	ound	leve	 el.				

	S DEPARTMENT OF TRANSPORTATI S DIVISION - GEOTECHNICAL SEC.	ON			BOR:		O. Site 2 OF 2				
OB NO.	040861 Sebastian County				DATE			<u>.</u> April 19,	2023		_
OB NAME: STATION: LOCATION:	Hwy. 10 - Hwy. 96 (Greenwood Bypa Route 10, Section 0 223+72 34' Right of Construction Centerline Tracy Henderson	ss) (S)			TYPE Ho EQUI	OF DR llow S	ILLING: Stem Auş	ger - Dia Ac	mond Co ker 1	ore .54	
COMPLETIC	ON DEPTH: 39										_
D S A A P M P H B L E S	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 483.6	SOIL GROUP	MC PL ├ 10	DISTUR 20 3			— І	PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	9 H C I
- — III - — III - — III	Moist, Loose, Brown Silt with Sand	ML -		•				83	0 0-5		
- —	Moist, Medium Dense, Brown Silt	ML -		•				88	7-8		
10	Moist, Loose, Brown Silt with Sand	ML		•				77	3 4-5		
- — I I I I I I I I I I I I I I I I I I	Wet, Medium Dense, Brown Silt with Sand			•					3 7-8 2 10-16		
20	SHALE - Highly Weathered, Very Soft, Gray										
	SHALE - Weathered, Medium Hard with Soft Layers, Slickensided, Gray								62 40 (1")	47	
25	SHALE - Slightly Weathered, Medium Hard with Soft Layers, Slickensided, Gray	-								92	3
	SHALE - Unweathered, Medium Hard, Slickensided, Gray									94	Ó

									BORING NO. Site 2-B11								
MATERIALS DIVISION - GEOTECHNICAL SEC.										2		2				_	
JOB 1	NAM TION:	:	040861 Sebastian County Hwy. 10 - Hwy. 96 (Greenwood Bypa Route 10, Section 0 223+72	ss) (S)				DATE: April 19, 2023 TYPE OF DRILLING: Hollow Stem Auger - Diamond Core EQUIPMENT: Acker 1									
LOCA LOGO			34' Right of Construction Centerline Tracy Henderson					HAM	1MER	COR	RECT	ION I	FACTOI	R: 1.	54	_	
	1PLE		ON DEPTH: 39	ı													
оветт Е	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL SURFACE ELEVATION: 483.6	SOIL GROUP	PL	—	PERCENT PASSING PERCENT PASSING NO. 200 90 40 20 60 40 20 60 40 81 EVEN PERCENT PASSING NO. 200 40 20 60 40 40 40 40 40 40 40 40 40 40 40 40 40						NO. OF BLOWS PER 6-IN.	% T C R	% R Q D		
					-	_											
	4444 6666 4444 6666 4444		SHALE WITH FREQUENT SANDSTONE PARTINGS AND												100	78	
40			SEAMS - Unweathered, Medium Hard with Hard Layers, Gray														
			Boring Terminated														
45																	
 50																	
 55																	
 60																	
00																	
65																	
70 REM	(ARI	KS:															
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ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 2-B12 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 2 PAGE 1 JOB NO. 040861 Sebastian County April 24, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 223+99 STATION: EQUIPMENT: Acker 1 34' Left of Construction Centerline LOCATION: LOGGED BY: Tracy Henderson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 39.4** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. Ε Α Υ Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} В Q Н L R D MOISTURE CONTENT (%) 0 Ε PL | L FT. S SURFACE ELEVATION: 483.6 30 40 50 Moist, Very Loose, Brown Silt with 82 0 Sand ML 0-0 5 0 96 CL ullet0-0 Moist, Very Soft, Brown Lean Clay 89 CL-ML $\bullet H$ 0-1 Moist, Very Soft, Brown Silty Clay 10 66 ML 2-4 Moist, Loose, Brown Sandy Silt 15 58 +Wet, Loose, Brown Sandy Lean Clay CL 0-8 SHALE - Weathered with Highly Weathered Layers, Medium Hard with Soft Layers, Gray 20 48 (5") 100 45 SHALE - Unweathered, Medium 25 Hard with Soft Layers, Occasional Fractures, Slickensided, Gray* 48 28 30 SHALE - Unweathered, Medium 100 84 Hard, Occasional Fractures, Gray REMARKS: *Low TCR and RQD partially due to inner barrel malfunctions from 24.4 to 29.4 feet below ground level.

ARKANSAS DEPARTMENT OF TRANSPORTATION MATERIALS DIVISION - GEOTECHNICAL SEC.									BORING NO. Site 2-B12 PAGE 2 OF 2								
JOB I			040861 Sebastian County					DAT					il 24,	2023		-	
JOB 1		E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)				TYPE OF DRILLING:									
			Route 10, Section 0	, ()				Hollow Stem Auger - Diamond Core									
STAT	ION:	:	223+99					EQUIPMENT: Acker 1									
LOCA	ATIO	N:	34' Left of Construction Centerline														
			Tracy Henderson				HAMMER CORRECTION FACTOR: 1.54									_	
COM	1PLE	ETIC	ON DEPTH: 39.4														
D	s	s											Ď m	7.0			
E P	Y	Α											PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	%	%	
P	M	M	DESCRIPTION OF MATERIAL	SOIL									PA.	BLC 5-IN	70 T	R R	
T H	В	P L		GROUP									NT 200	OF ER	C	Q	
''	0	Ē				MOIS	TUR	E CO	NTE	NT (9		•	RCE NO.	P	R	D	
FT.	L	s	SURFACE ELEVATION: 483.6		PL 1	•	0 3	0 4	0 5	0 6		LL 0	PE	2			
			SHALE WITH FREQUENT							0 0	0 /						
			SANDSTONE PARTINGS AND														
			SEAMS - Unweathered, Medium												100	96	
			Hard with Hard Layers, Gray														
40			Boring Terminated														
 45																	
50																	
55																	
60																	
65																	
70															L		
REM	1ARI	KS:	*Low TCR and RQD partially due to in	ner barre	el ma	alfur	octio	ns fr	om :	24.4	to 2	29.4	feet b	elow gro	ounc	1	
			level.														



Job No.: 040861 Site 2





Job No.: 040861 Site 2





Job No.: 040861 Site 2



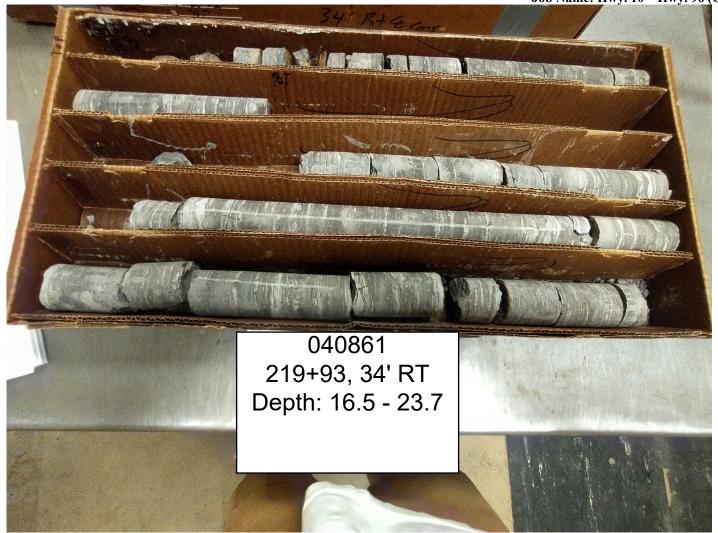


Job No.: 040861 Site 2





Job No.: 040861 Site 2





Job No.: 040861 Site 2





Job No.: 040861 Site 2





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Job No.: 040861 Site 2





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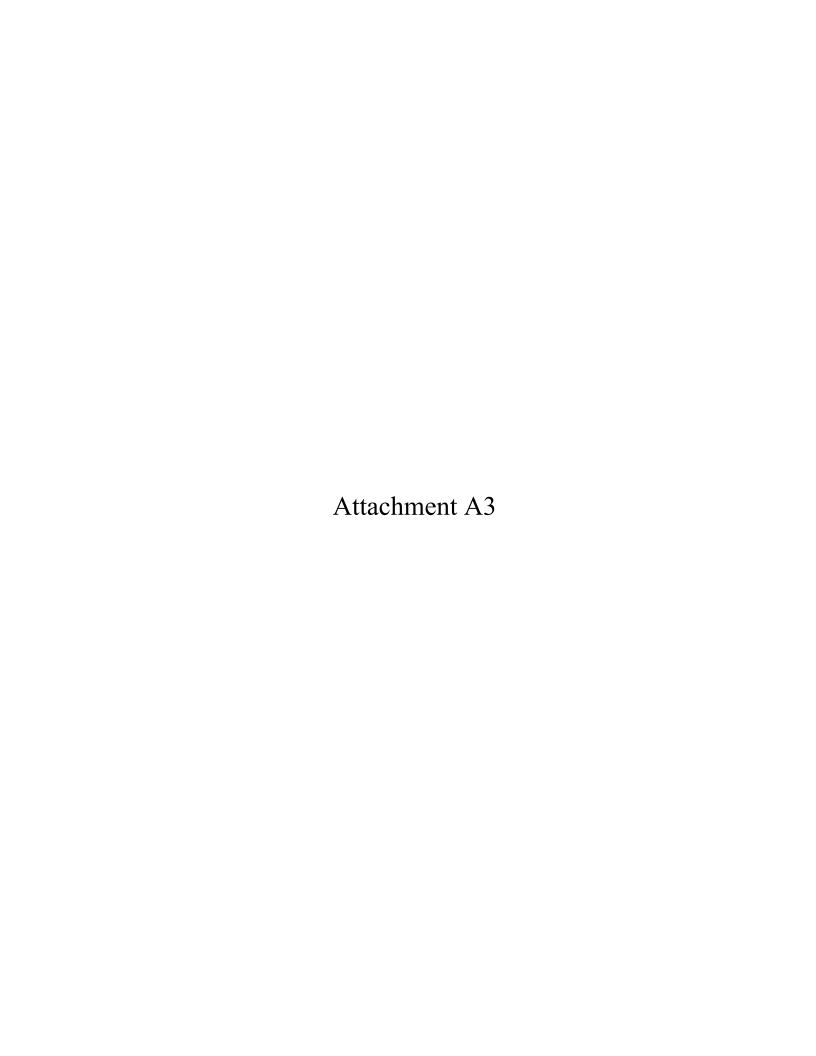
Job No.: 040861 Site 2

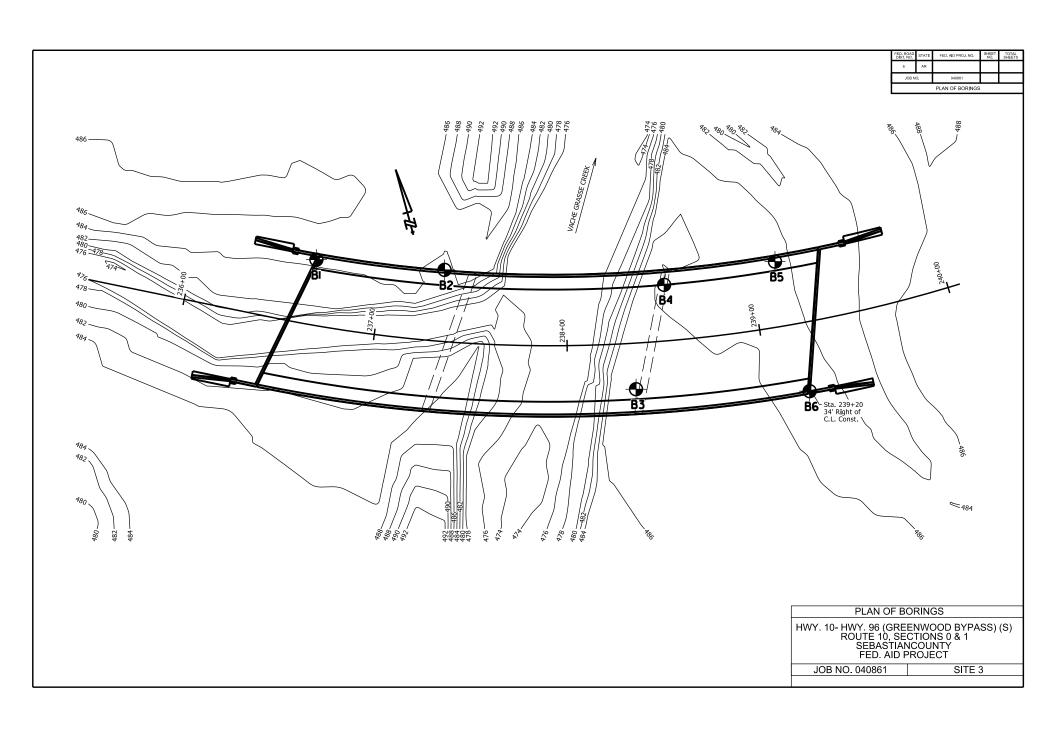




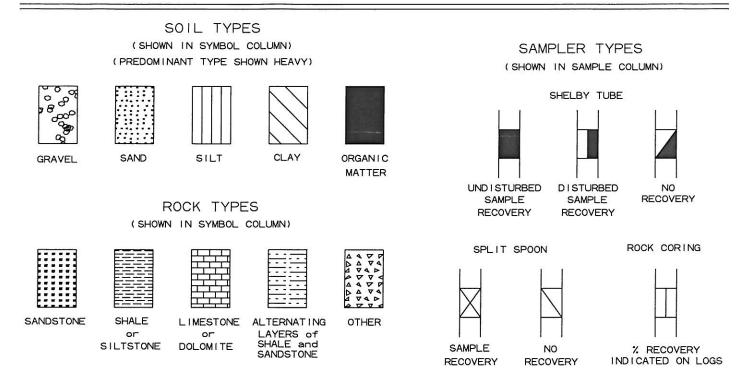
Job No.: 040861 Site 2







IFGFND



TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANU	LAR SOIL		CLAY	CLA	Y-SHALE		SHALE
'N' Value	Density	'N' Value	Consistency	'N' Value	Consistency	'N' Value	Consistency
0-4 5-10 11-30 31-50 Over 50	Very Loose Loose Medium Dense Dense	0-1 2-4 5-8 9-15	Very Soft Soft Medium Stiff Stiff	0-1 2-4 5-8 9-15	Very Soft Soft Medium Stiff Stiff	More than	
over 50	Very Dense	16-30 31-60 Over 60	Very Stiff Hard Very Hard	16-30 31-60 Over 60	Very Stiff Hard Very Hard	Penetration 60 Blow Less than Penetration 60 Blow	vs: Medium Hard 2' on

- 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.
- 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 (N₆₀) can be obtained by multiplying N_f by the hammer correction factor published on the boring log.

ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 3-B1 MATERIALS DIVISION - GEOTECHNICAL SEC. 1 OF 1 PAGE Sebastian County April 3, 2023 JOB NO. 040861 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 236+64 STATION: EQUIPMENT: Acker 1 LOCATION: 34' Left of Construction Centerline LOGGED BY: Anthony Nicholson HAMMER CORRECTION FACTOR: 1.54 **COMPLETION DEPTH: 34.2** D S PERCENT PASSING NO. 200 SIEVE NO. OF BLOWS PER 6-IN. S Е Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} В 0 Н L R D MOISTURE CONTENT (%) 0 Ε PL | **-** LL L FT. S SURFACE ELEVATION: 484.6 40 50 Wet, Very Loose, Brown Sandy Silt 0 64 ML0-0 5 0 77 Wet, Very Loose, Brown Silt with ML 0-0 Sand 69 ML 0-0 Wet, Very Loose, Brown Sandy Silt 10 0 55 CL-ML $H \bullet$ 1-2 Wet, Very Soft, Brown Sandy Silty Clay 15 35 SHALE - Weathered, Medium Hard, 40 Gray (1")SHALE WITH FREQUENT SANDSTONE PARTINGS AND 86 54 SEAMS - Unweathered, Medium 20 \Hard with Hard Layers, Gray 100 92 SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium 25 Hard with Hard Layers, Occasional Fractures, Gray 100 80 30 SHALE WITH FREQUENT SANDSTONE PARTINGS AND 74 70 SEAMS - Unweathered, Medium Hard with Hard Layers, Gray* 35 **Boring Terminated** REMARKS: *Poor core recovery at 29.2 feet below ground level due to inner barrel malfunction.

	ARKANSAS DEPARTMENT OF TRANSPORTATION MATERIALS DIVISION - GEOTECHNICAL SEC.								BORING NO. Site 3-B2 PAGE 1 OF 2							
-		<u> </u>	040861 Sebastian County				+	DATE: March 29, 2023								
	JOB NO. 040861 Sebastian County JOB NAME: Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S)							TYPE OF DRILLING:								
JOB .	INAIVI	E.	Route 10, Section 0	55) (5)							cer -	Diar	nond Co	re		
STAT	ΓΙΟN:		237+36					UIPME		III Au	gcı -		ter 1	10		
1	ATIO		38' Left of Construction Centerline				LEQ	UIPME	IN I:			ACN	CI I			
			Don McCollum				НΔ	MMFR	CORE	RECTIO	ON FA	CTOR	· 1	.54		
			ON DEPTH: 39.6				ш	IVIIVILI	CORI	CECTIC	JIVIA	CTON	t. I		-	
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D E	S	S											S.			
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<u>L</u> _	XX		Wat Vary Saft Prown Silty Clay with													
L	M	/	Wet, Very Soft, Brown Silty Clay with Sand	-								84	0			
	XX	X	Gariu			H						•	0-0			
5	M															
			Wat Vary Lagge Boddish Brown	ML							□ ;	52	0			
		\triangle	Wet, Very Loose, Reddish Brown Sandy Silt	IVIL									0-1			
<u> </u>			Odnity Ont	-								.	0			
<u> </u>		\mathbb{X}	Wet, Very Loose, Reddish Brown	SM		•					4	49	1-3			
<u> </u>		\sim	Silty Sand	_									1-0			
10		/	-								؛ 🗕	50	0			
<u> </u>		X		ML		•							0-1			
<u> </u>			Wet, Very Loose, Reddish Brown													
<u> </u>			Sandy Silt	_												
<u> </u>				_												
15	ЩЦ										ᆜ ,	63	0			
<u> </u>	N	X		CL		1	+				_ '	03	3-7			
L _			Moist, Medium Stiff, Brown and Gray										0.			
L _	W		Sandy Lean Clay with Trace Rock													
L _	\mathcal{N}		Fragments													
20	\mathbb{N}															
		$\stackrel{\sim}{}$	SHALE - Weathered, Medium Hard,										40 (2")			
			Gray SHALE WITH FREQUENT										(~)			
			SANDSTONE PARTINGS -											100	58	
			Unweathered, Medium, Occasional													
25			Fractures, Gray													
23											\dashv					
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\vdash														100	88	
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<u> </u>			SHALE WITH EDECHEAT													
<u> </u>			SHALE WITH FREQUENT SANDSTONE PARTINGS -											100	92	
<u>L</u> _			Unweathered, Medium Hard, Gray											00	52	
<u>L</u> _																
35																
REN	//ARI	KS:														
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	ARKANSAS DEPARTMENT OF TRANSPORTATION MATERIALS DIVISION - GEOTECHNICAL SEC.								BORING NO. Site 3-B2 PAGE 2 OF 2							
_																
	JOB NO. 040861 Sebastian County JOB NAME: Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S)							DATE: March 29, 2023								
JOB I	NAM.	E:	, ,	ss) (S)				TYPE OF DRILLING: Hollow Stem Auger - Diamond Core								
am			Route 10, Section 0								em A	ugei			re	
STAT			237+36					EQU	IPME	NT:			Acl	ker 1		
LOCA															- 1	
			Don McCollum					HAN	1MER	COR	RECT	TION I	FACTO	R: 1	.54	_
	1PLE		ON DEPTH: 39.6	Ι	1											
D	s	S											PERCENT PASSING NO. 200 SIEVE	S		
E	Y	A											SSI EV]		%	%
P	М	M	DESCRIPTION OF MATERIAL	SOIL									PA SI	BL(T	R
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FT.	L	s	SURFACE ELEVATION: 485.3		PL 1		0 2	0 4	0 5	0 6		LL	PEF	Z		
H			GON AGE ELEVATION: 400.0		1	0 2	0 3	0 4	0 5	0 6	0 7	<u>0</u>				
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			Boring Terminated													
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ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 3-B3 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 1 PAGE 1 JOB NO. 040861 Sebastian County March 7, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 238+35 STATION: EQUIPMENT: Acker 1 25' Right of Construction Centerline LOCATION: LOGGED BY: Anthony Nicholson HAMMER CORRECTION FACTOR: 1.54 COMPLETION DEPTH: 29.5 D S PERCENT PASSING NO. 200 SIEVE S NO. OF BLOWS PER 6-IN. Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** М **SOIL** T R Т Ρ **GROUP** \mathbf{C} Q В Н L R D MOISTURE CONTENT (%) • 0 Ε L PL | FT. SURFACE ELEVATION: 487.4 30 40 50 Moist, Stiff, Reddish Brown Sandy 50 1 Silty Clay with Some Gravel CL-ML 4-5 5 45 2 Moist, Medium Dense, Reddish SM 4-8 Brown Silty Sand with Some Rock Fragments Moist, Very Dense, Reddish Brown Ш 18 Sandy Silt with Some Rock 38-40 (8")Fragments 10 SHĂLE - Highly Weathered, Medium 50 Hard, Gray 40 (1")100 100 SHALE WITH INTERBEDDED 15 SANDSTONE - Unweathered, Hard, Gray 100 100 20 100 100 SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium 25 Hard with Hard Layers, Gray 100 100 30 **Boring Terminated** 35 **REMARKS:**

			DEPARTMENT OF TRANSPORTATION	ON							Site		34			
MATERIALS DIVISION - GEOTECHNICAL SEC.						PAGE 1 OF 1										
JOB N	O.		040861 Sebastian County					DAT	Œ:]	Mar	ch 7, 2	2023		
JOB N	[AM]	E:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)				TYF	E OF	DRILI	LING:					
			Route 10, Section 0					Н	ollol	w Ste	m Au	iger	- Diar	nond Co	ore	
STAT	ION:		238+54						ЛРМЕ			Ū	Ack			
LOCA			34' Left of Construction Centerline					`								
			Anthony Nicholson					LIAN	AME	COD	DECTI	ON E	ACTOR	o. 1	.54	
			ON DEPTH: 30					пА	VIIVIEF	COK	KECTI	ON F	ACTOR	i. 1		-
СОМ	PLE	_	JN DEPTH: 30										1			
D E P T H	S Y M B	S A M P L	DESCRIPTION OF MATERIAL	SOIL GROUP		4016		F 00	N/EF	NIT (0	<i>(</i>)		PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
FT.	O L	E S	CUREAGE ELEVATION. 400.7		PL	—				NT (%	<u> </u>	LL	YERC NO	NO		D
F1.	JEIANEIRN	<u> </u>	SURFACE ELEVATION: 486.7		1	0 2	20 3	80 4	10 5	0 6	0 70		Д			
 5		X	Moist, Medium Stiff, Reddish Brown Sandy Silty Clay	- CL-ML		•	+						53	1 3-4		
		X	Moist, Medium Dense, Reddish Brown Silty Clayey Sand with Gravel (Rock Fragments)	SC-SM	•	•	H						21	6 10-11		
		X	Moist, Medium Dense, Reddish Brown Sandy Silt with Gravel (Rock											21 36-45		
10		\times	∖Fragments) ¬ SHALE - Highly Weathered, Medium ∖Hard, Gray SHALE - Highly Weathered, Medium											60 (6")		
			Hard, Gray SHALE WITH INTERBEDDED SANDSTONE - Unweathered,												100	72
15			∖Medium Hard with Hard Layers, ∖Gray SHALE WITH FREQUENT	•												
			SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard with Hard Layers, Occasional Fractures, Gray	-											100	86
			Tractares, Gray												100	
 25			SHALE WITH FREQUENT SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium												100	96
			Hard with Hard Layers, Gray												100	94
30	HOHO															
			Boring Terminated													
$\neg \neg$																
-+																
35																
REM.	ΔΡΙ	(5.		ı			1	1								
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ARKANSAS DEPARTMENT OF TRANSPORTATION BORING NO. Site 3-B5 MATERIALS DIVISION - GEOTECHNICAL SEC. OF 1 PAGE 1 JOB NO. 040861 Sebastian County March 8, 2023 Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S) JOB NAME: TYPE OF DRILLING: Route 10, Section 0 Hollow Stem Auger - Diamond Core 239+14 STATION: EQUIPMENT: Acker 1 34' Left of Construction Centerline LOCATION: LOGGED BY: Don McCollum 1.54 HAMMER CORRECTION FACTOR: **COMPLETION DEPTH: 29.7** D S PERCENT PASSING NO. 200 SIEVE S NO. OF BLOWS PER 6-IN. Ε Α Υ % Ρ M **DESCRIPTION OF MATERIAL** SOIL М T R Т Р **GROUP** C Q В Н L R D MOISTURE CONTENT (%) • 0 Ε L PL | FT. SURFACE ELEVATION: 484.6 30 40 50 Moist, Stiff, Brown Lean Clay with 79 0 Sand CL 3-8 5 50 11 CL Moist, Very Stiff, Reddish Brown 13-9 Sandy Lean Clay with Some Gravel 30 40-54 10 SHALE - Highly Weathered, Medium 45 (6") Hard, Gray 100 54 15 SHALE WITH INTERBEDDED SANDSTONE - Unweathered, Medium Hard with Hard Layers, 100 72 Gray 20 100 94 SHALE WITH FREQUENT 25 SANDSTONE PARTINGS AND SEAMS - Unweathered, Medium Hard with Hard Layers, Gray 100 98 30 **Boring Terminated** 35 **REMARKS:**

	DEPARTMENT OF TRANSPORTATION	ON				ı	RING				36			
MATERIALS	MATERIALS DIVISION - GEOTECHNICAL SEC.						PAGE 1 OF 1							
JOB NO.	040861 Sebastian County					DAT	ΓE:			Ma	rch 8, 2	2023		
JOB NAME:	Hwy. 10 - Hwy. 96 (Greenwood Bypa	ss) (S)				TYF	E OF	DRILI	LING:					
	Route 10, Section 0					Н	ollol	v Ste	m A	uger	- Diar	nond Co	ore	
STATION:	239+20					ı	ЛРМЕ			_	Ack			
LOCATION:	34' Right of Construction Centerline					`								
	Don McCollum					HAN	MMER	COR	RECT	ION I	FACTOR	· 1	.54	
	ON DEPTH: 29.3					11211	· III · III II	COR	ICE I	10111	710101			_
	N DEI III. 27.3		l								7.7		1	
D S A											PERCENT PASSING NO. 200 SIEVE	S		
D Y M											SSY IEV	Ö Z	%	9
T M D	DESCRIPTION OF MATERIAL	SOIL									0 S	BI 6-I	T	I
		GROUP									20 20	. OF BLOV PER 6-IN.	C R	(
					TUR	E CC	NTE	NT (%		•	RCENT PASSIN NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	K	Ι
1 1 1 1	SURFACE ELEVATION: 485.3		PL 1	•	0 3	i0 4	10 5	0 6	•		PE.	4		
		-												
- —	Moist, Medium Dense, Brown Silty										47	4		
- - 	Sand with Trace Rock Fragments	SM		•							47	5-7		
												5-7		
5		-				_					32	7		
_ X X	Moist, Dense, Reddish Brown Silty	GC-GM		●⊢	Н						32	14-27		
	Clayey Gravel with Sand											14-21		
												14		
	SHALE - Highly Weathered, Medium											65		
- - [Hard, Brown and Gray											(6")		
10	· · · · · · · · · · · · · · · · · · ·											30		
	No Sample Recovered											(1")		
	·													
	SHALE WITH FREQUENT SANDSTONE PARTINGS -												400	۱.,
#####	Unweathered, Medium Hard with												100	10
15	\Hard Layers, Gray													
	riara Edyoro, Ordy													
													94	8
	CANDOTONE WITH	-												
	SANDSTONE WITH													
20	INTERBEDDED SHALE - Unweathered, Medium Hard with													
	Hard Layers, Gray													
	riaid Layers, Gray												400	_
													100	9
- 🗕 🚟 📗														
25		1												
	SHALE WITH FREQUENT													
K X X X X	SANDSTONE PARTINGS AND												100	۱
	SEAMS - Unweathered, Medium												100	=
	Hard with Hard Layers, Gray													
													<u> </u>	
30	Boring Terminated													
		1	1										1	
											1			
35 REMARKS:														



Job No.: 040861 Site 3





Job No.: 040861 Site 3





Job No.: 040861 Site 3





Job No.: 040861 Site 3





Job No.: 040861 Site 3





Job No.: 040861 Site 3





Job No.: 040861 Site 3





Job No.: 040861 Site 3





Job No.: 040861 Site 3





Job No.: 040861 Site 3





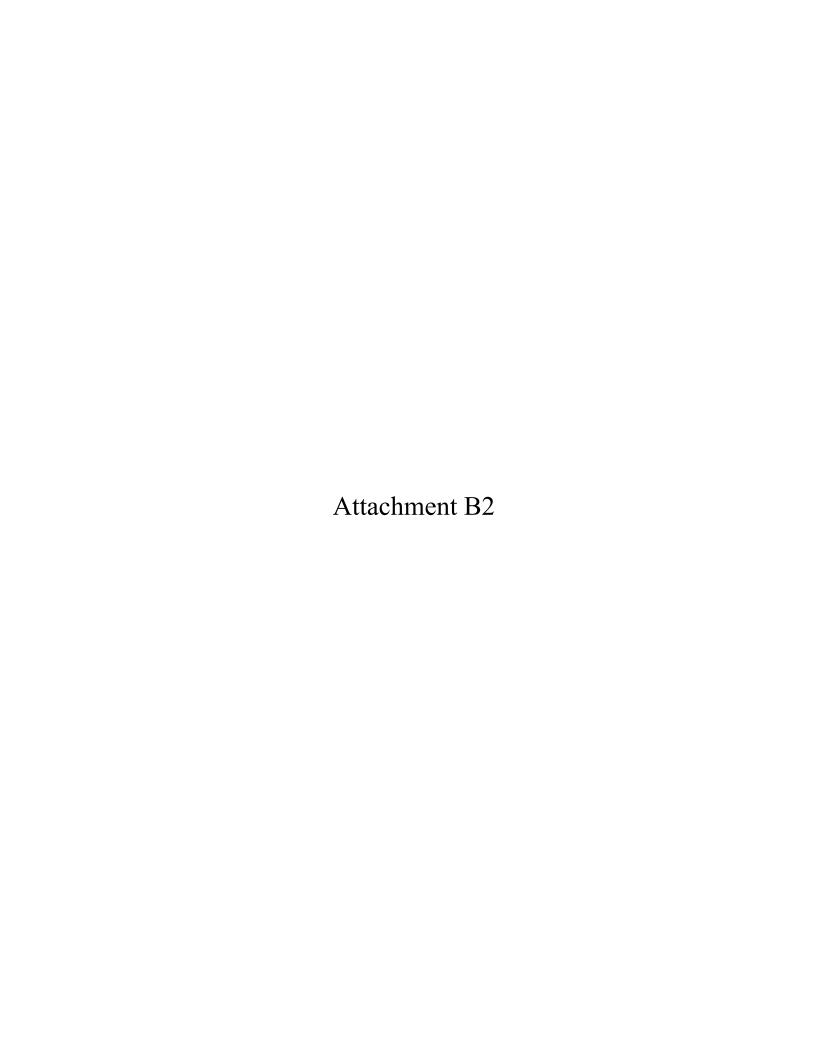
Job No.: 040861 Site 3





Job No.: 040861 Site 3





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

PAUL TINSLEY, MATERIALS ENGINEER *** SOIL ANALYSIS TEST REPORT ***

SEQUENCE NO. - 7 - 07/06/2023 DATE MATERIAL CODE - 14620L JOB NUMBER - 040861 SPEC. YEAR - 2014 FEDERAL AID NO.- TO BE ASSIGNED SUPPLIER ID. - 1 - INFORMATION ONLY SAMPLE COUNTY/STATE - 65 SPEC. REMARKS - NO SPECIFICATION CHECK DISTRICT NO. - 04 SUPPLIER NAME - STATE NAME OF PROJECT - HWY.10-HWY.96 (GREENWOOD BYPASS) (S)

PROJECT ENGINEER - NOT APPLICABLE

PIT/QUARRY - ARKANSAS

SAMPLED - 06/16/2023 LOCATION - SEBASTIAN, COUNTY RECEIVED - 06/19/2023

SAMPLED BY - T HENDERSON TESTED - 06/21/2023 SAMPLE FROM - JOBSITE

MATERIAL DESC. - SOIL FOR SEEDING - LIME/REQ.

DESCRIPTIONS	- SAMPLE 1	- SAMPLE 2	- SAMPLE 3
LAB NUMBER SAMPLE ID	- 20230892 - SM9	- -	-
TEST STATUS	- INFORMATION ONLY	_	-
STATION	- 219+93	_	-
LOCATION	- 34'RT	_	-
DEPTH IN FEET	_	_	_
COLOR	_	_	_
% PASS 2 IN.		_	
1 1/2 IN.		_	_
3/4 IN.		_	_
3/8 IN.		_	_
	_	_	_
NO. 10		_	_
NO. 40		_	_
NO. 80		_	_
NO. 200		_	_
LIQUID LIMIT	- 33		_
PLASTICITY INDEX			_
AASHTO SOIL CLS. UNIFIED SOIL CLS	50000 000 00 20	_	_
SOIL PH		()	()
LIME (TONS/ACRE)		_	_
SPECIFIC GRAVITY		_	_
% ABSORPTION	_	_	_
MAX. DEN. #/CF	_	_	_
% OPT. MOISTURE	_	_	-
% MOISTURE CONT.	_	_	-
0 1101010111 30111			

REMARKS - SOIL RESISTIVITY 1.75 K OHMS

AASHTO TESTS : AASHTO T11, T27, T85, T88, T89, T90, T99, T100, T134, T180, T265, M145, AHTD357

⁻ CC: GEOTECH, CHEMISTRY, SOILS

Rock Core Unconfined Compression Test Summary

Project Number: 040861 - Site 2

Project Name: Hwy. 10 - Hwy. 96 (Greenwood Bypass)(S)

Date Tested:

Station	Location	Sample No.	Depth (ft.)	Diameter (in)	Height (in)	Total Load (lbs.)	Correction Factor	Stress (psi)	Remarks
221+59	19' LT	4	19.7	1.75	3.50	8,960		3,725	
221+59	19' LT	5	23.5	1.75	3.50	12,820		5,329	
221+59	19' LT	6	28.7	1.75	3.50	12,750		5,300	
222+01	34' RT	1	21.6	1.73	3.46				BROKE
222+01	34' RT	2	26.2	1.74	3.48	15,790		6,564	
222+01	34' RT	3	31.3	1.75	3.50	13,770		5,724	
223+25	34' LT	7	21.3	1.75	3.50	11,800		4,905	
223+25	34' LT	8	27.7	1.74	3.48	8,530		3,546	
223+72	34' RT	9	26.3	1.75	3.50				BROKE
223+72	34' RT	10	28.7	1.75	3.50	8,160		3,392	
223+72	34' RT	11	31.3	1.74	3.48				BROKE
223+72	34' RT	12	38.5	1.75	3.50	9,030		3,754	

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

ROCK MASS RATING SUMMARY

JOB # 40861 Site 2

SAMPLE #1

Station/Location 222+01, 34' RT Depth (ft) 21.6 Relative Rating Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions 20 25 7 Sum 65 Class Number Ш Description **GOOD ROCK**

SAMPLE #2

GSI: 90

Station/Location	222+01, 34' RT
Depth (ft)	26.2
Uniaxial Compressive Strength	4
RQD	13
Spacing of Joints	25
Condition of Joints	25
Groundwater Conditions	7
Sum	7
Class Number	II
Description	GOOD ROCK

SAMPLE #3

222+01, 34' RT 31.3
Relative Rating
4
17
20
25
7
73
II GOOD ROCK

SAMPLE #4

Station/Location Depth (ft)	221+59, 19' LT 19.7	
	Relative Rating	
Uniaxial Compressive Strength	4	
RQD	13	
Spacing of Joints	20	
Condition of Joints	25	
Groundwater Conditions	7	
Sum	69	
Class Number Description	II GOOD ROCK	

SAMPLE #5

Station/Location Depth (ft)	221+59, 19' LT 23.5	
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum	Relative Rating 4 13 20 25 7 69	
Class Number Description	II GOOD ROCK	

SAMPLE #6

Station/Location Depth (ft)	221+59, 19' LT 28.7	
	Relative Rating	
Uniaxial Compressive Strength	4	
RQD	17	
Spacing of Joints	25	
Condition of Joints	25	
Groundwater Conditions	7	
Sum	78	
Class Number	II	
Description	GOOD ROCK	

SAMPLE #7

SAIVIF	LE #1
Station/Location	223+25, 34' LT
Depth (ft)	21.3
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum	Relative Rating 4 17 20 25 7
Class Number	II
Description	GOOD ROCK

SAMPLE #8

Station/Location Depth (ft)	223+25, 34' LT 27.7
	Relative Rating
Uniaxial Compressive Strength	2
RQD	17
Spacing of Joints	20
Condition of Joints	25
Groundwater Conditions	7
Sum	71
Class Number Description	II GOOD ROCK

ROCK MASS RATING SUMMARY JOB # 40792

SAMPLE #9

Station/Location 223+72, 34' RT Depth (ft) 26.3 Relative Rating Uniaxial Compressive Strength RQD 13 Spacing of Joints Condition of Joints Groundwater Conditions 10 12 Sum 42 Class Number Ш FAIR ROCK Description

SAMPLE #10

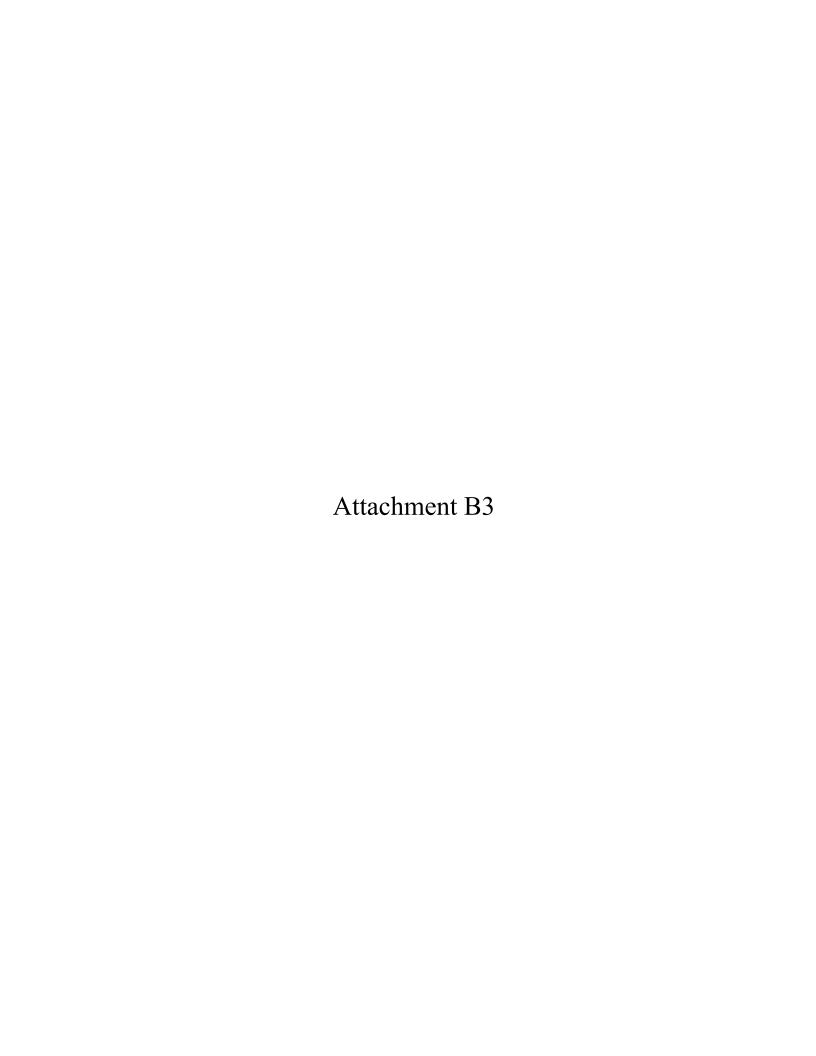
223+72, 34' RT 28.7	
Relative Rating	
2	
13	
10	
12	
7	
44	
III	
FAIR ROCK	
	28.7 Relative Rating 2 13 10 12 7 44

SAMPLE #11

Station/Location Depth (ft)	223+72, 34' RT 31.3	
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum Class Number Description	Relative Rating Broke 17 25 20 7 69 II GOOD ROCK	

SAMPLE #12

Station/Location Depth (ft)	223+72, 34' RT 38.5
	Relative Rating
Uniaxial Compressive Strength	4
RQD	17
Spacing of Joints	25
Condition of Joints	25
Groundwater Conditions	7
Sum	78
Class Number Description	II GOOD ROCK



Rock Core Unconfined Compression Test Summary

Project Number: 040861 - Site 3

Project Name: Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S)

Date Tested:

Station	Location	Sample	Depth	Diameter	Height	Total Load	Correction	Stress	Remarks
		No.	(ft.)	(in)	(in)	(lbs.)	Factor	(psi)	
236+64	34' LT	11	17.6	1.74	3.48	19,370		8,053	
236+64	34' LT	12	21.0	1.74	3.48	19,720		8,198	
236+64	34' LT	13	28.9	1.75	3.50	10,420		4,332	
237+36	38' LT	8	23.0	1.75	3.50	10,190		4,236	
237+36	38' LT	9	28.7	1.75	3.50	13,660		5,679	
237+36	38' LT	10	31.9	1.75	3.50	18,210		7,570	
238+54	34' LT	1	14.0	1.75	3.50	16,450		6,839	
238+54	34' LT	2	16.7	1.75	3.50	16,470		6,847	
238+54	34' LT	3	21.6	1.75	3.50	16,590		6,897	
239+20	34' RT	4	20.5	1.75	3.50	15,370		6,390	
239+20	34' RT	5	25.9	1.75	3.50	15,560		6,469	
239+20	34' RT	6	12.3	1.75	3.50	18,850		7,836	
239+20	34' RT	7	15.8	1.75	3.50	13,360		5,554	

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

ROCK MASS RATING SUMMARY JOB # 040861 Site 3

GSI: 90

SAMPLE #1

Station/Location 238+54, 34' LT Depth (ft) 14 Uniaxial Compressive Strength RQD 4 17 Spacing of Joints Condition of Joints Groundwater Conditions 20 25 7 Sum 73 Class Number II Description **GOOD ROCK**

SAMPLE #2

Station/Location	238+54, 34' LT
Depth (ft)	16.7
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum	4 17 20 25 7
Class Number	II
Description	GOOD ROCK

SAMPLE #3

Station/Location Depth (ft)	238+54, 34' LT 21.6
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum	4 20 25 25 25 7 81
Class Number Description	I VERY GOOD ROCK

SAMPLE #4

Station/Location	239+20, 34' RT
Depth (ft)	20.5
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum	4 20 25 25 25 7 81
Class Number	I
Description	VERY GOOD ROCK

SAMPLE #5

Station/Location Depth (ft)	239+20, 34' RT 25.9	
	Relative Rating	
Uniaxial Compressive Strength	4	
RQD	20	
Spacing of Joints	25	
Condition of Joints	25	
Groundwater Conditions	7	
Sum	81	
Class Number Description	I VERY GOOD ROCK	

SAMPLE #6

	LL #U	
Station/Location Depth (ft)	239+20, 34' RT 12.3	
	Relative Rating	
Uniaxial Compressive Strength	7	
RQD	20	
Spacing of Joints	20	
Condition of Joints	25	
Groundwater Conditions	7	
Sum	79	
Class Number	II	
Description	GOOD ROCK	

SAMPLE #7

SAMPLE #7					
Station/Location Depth (ft)	239+20, 34' RT 15.8				
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum	Relative Rating 4 17 20 25 7 73				
Sum Class Number Description	73 II GOOD ROCK				
·					

SAMPLE #8

SAMPLE #8					
Station/Location Depth (ft)	237+36, 38' LT 23				
	Relative Rating				
Uniaxial Compressive Strength	4				
RQD	17				
Spacing of Joints	20				
Condition of Joints	20				
Groundwater Conditions	7				
Sum	68				
Class Number	ll ll				
Description	GOOD ROCK				

ROCK MASS RATING SUMMARY JOB # 040861 Site 3

GSI: 90

SAMPLE #9

237+36, 38' LT Station/Location Depth (ft) 28.7 Relative Rating Uniaxial Compressive Strength RQD 4 17 Spacing of Joints Condition of Joints 20 20 Groundwater Conditions Sum 68 Class Number Ш GOOD ROCK Description

SAMPLE #10

Station/Location Depth (ft)	237+36, 38' LT 31.9	
	Relative Rating	
Uniaxial Compressive Strength	7	
RQD	17	
Spacing of Joints	25	
Condition of Joints	25	
Groundwater Conditions	7	
Sum	81	
Class Number	I	
Description	VERY GOOD ROCK	

SAMPLE #11

Station/Location Depth (ft)	236+64, 34' LT 17.6	
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum Class Number	Relative Rating 7 13 20 25 7 72	

SAMPLE #12

Station/Location Depth (ft)	236+64, 34' LT 21	
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum Class Number Description	Relative Rating 7 17 20 20 7 71 II GOOD ROCK	

SAMPLE #13

Station/Location Depth (ft)	236+64, 34' LT 28.9	
Uniaxial Compressive Strength RQD Spacing of Joints Condition of Joints Groundwater Conditions Sum	4 13 20 25 7	
Class Number Description	II GOOD ROCK	



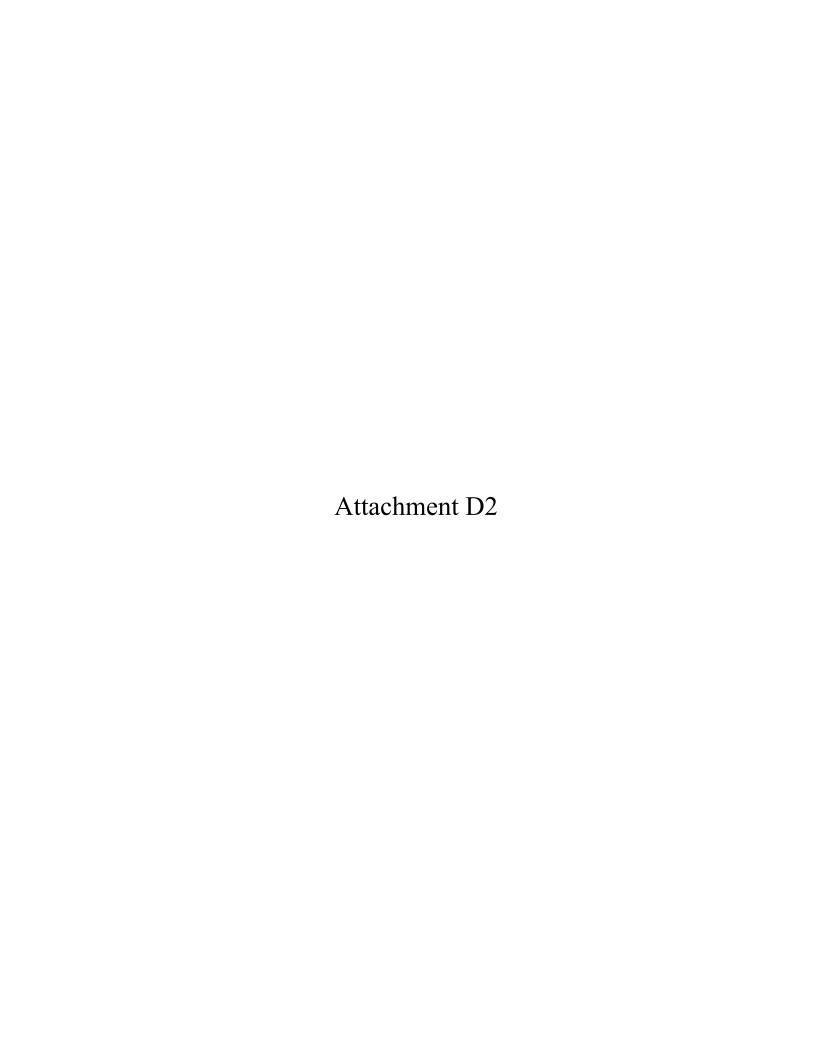


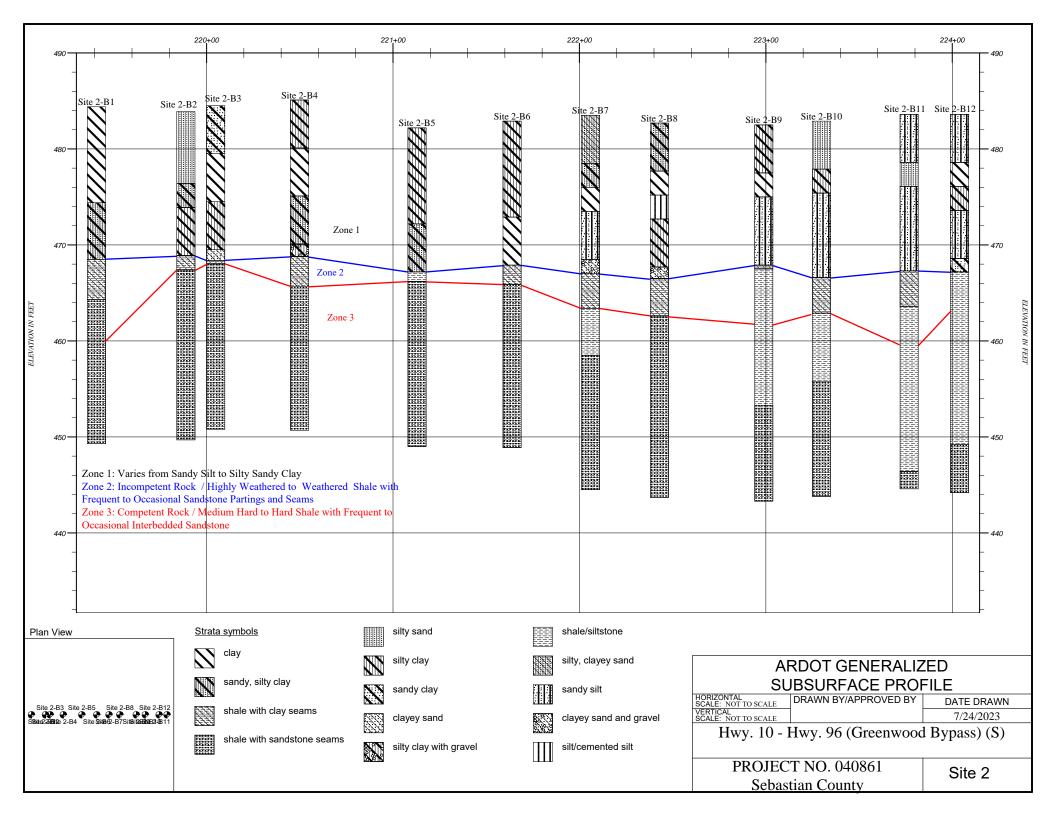
SITE PICTURES

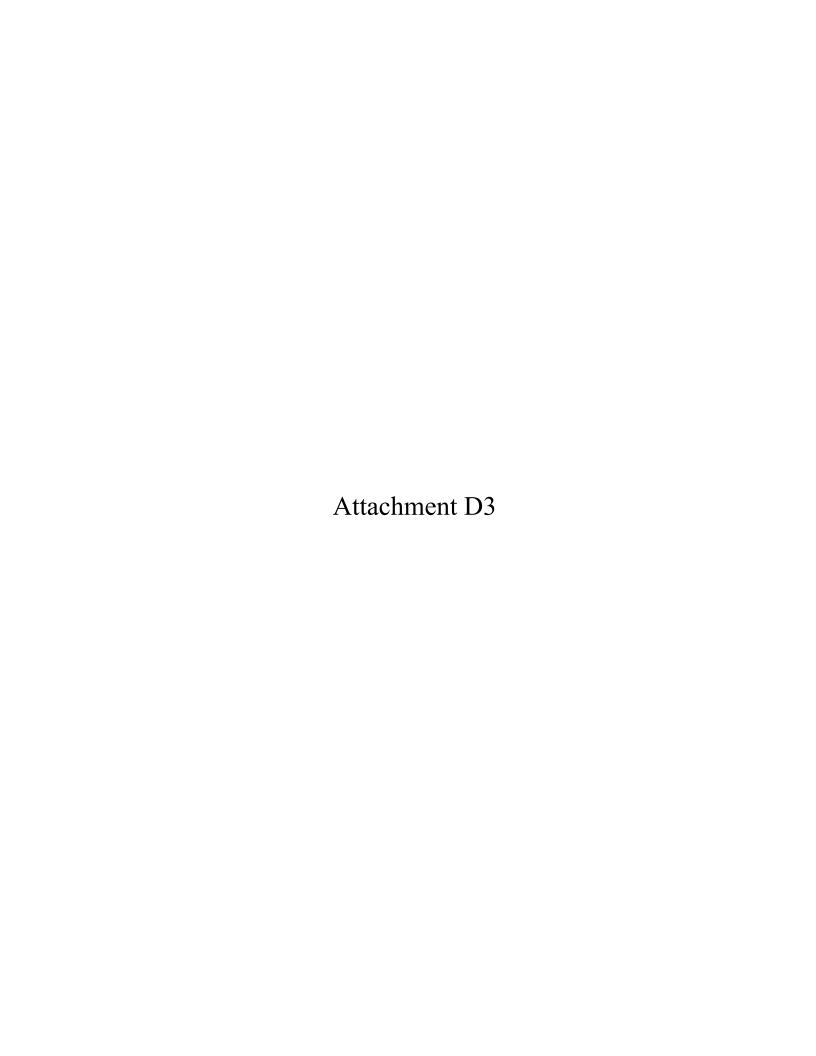
Job No.: 040861 Site 2

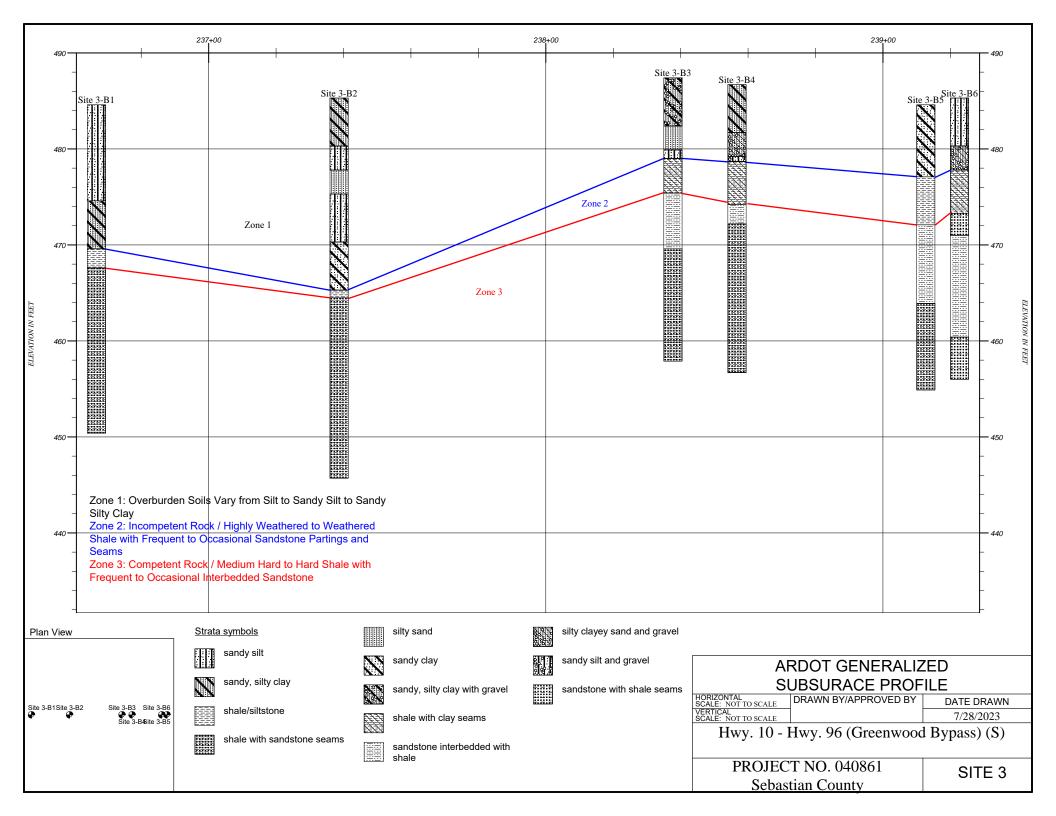


Looking northeast at proposed west bridge end.







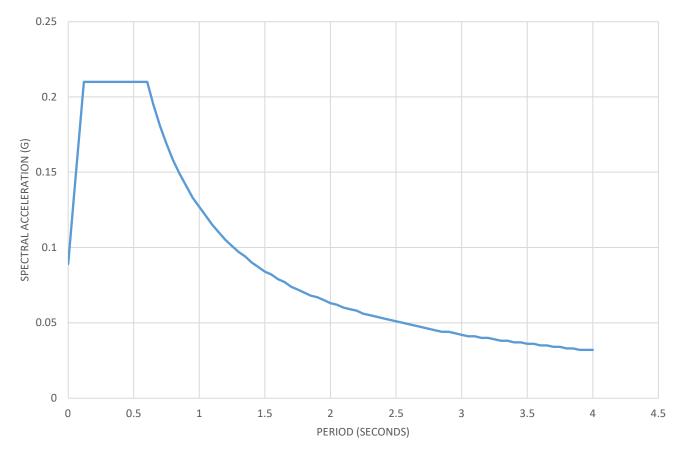


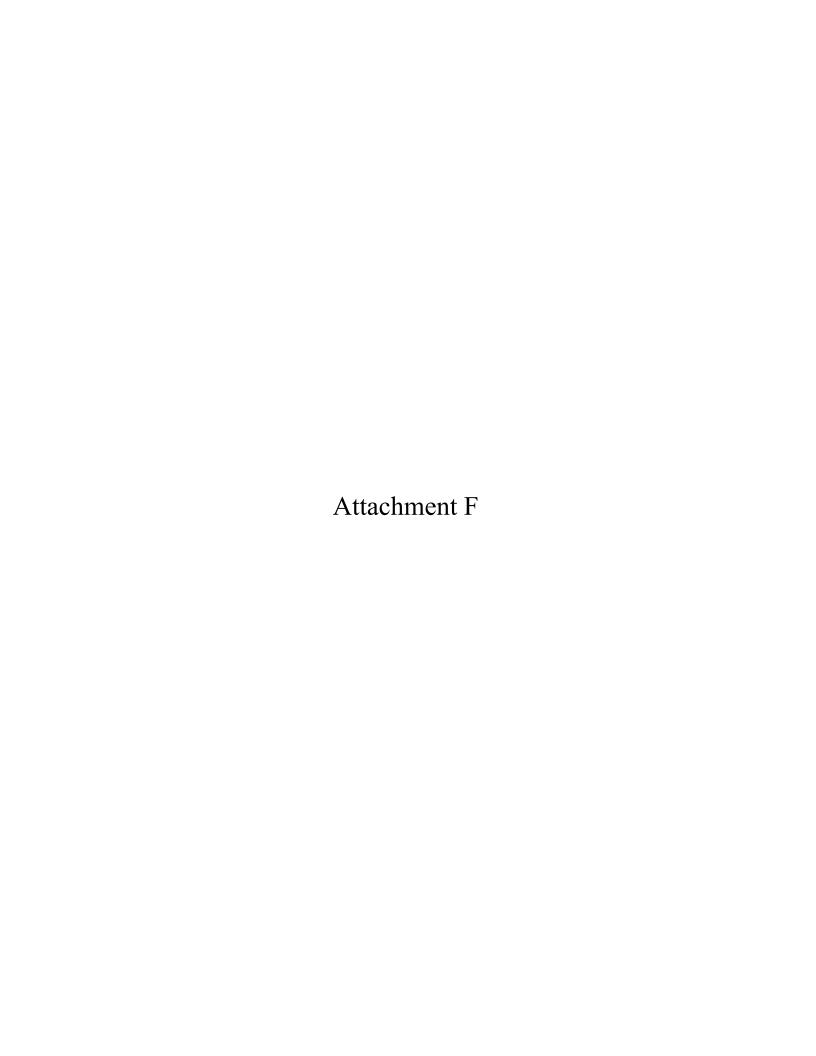




PGA:	0.056
F _{PGA} :	1.6
A _s :	0.089
S _s :	0.131
F _A :	1.6
S _{DS} :	0.21
S ₁ :	0.053
F _V :	2.4
S _{D1} :	0.127
S _{Dc} :	Α
T _S :	0.603
T ₀ :	0.121

040861 DESIGN RESPONSE SPECTRUM





05/12/2022 Page 1 of 2

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO. 040861

ROCK FILL

Description. This item shall consist of constructing embankments at the locations shown on the Plans or as directed by the Engineer as Rock Fill. Rock Fill shall comply with Section 210, Excavation and Embankment, of the Standard Specifications, Edition of 2014. Where there is a conflict between this Special Provision and Section 210, this Special Provision shall govern.

Materials. Rock Fill shall comply with the following requirements:

(1) Material for Rock Fill shall include stone obtained from an approved source and shall consist of hard and durable limestone, sandstone, dolomite, or rock-like shale. Shale shall have a minimum slake durability index (SDI) of 95% as tested according to ARDOT Test Method 399. The SDI shall be determined by the Engineer using the above method at a minimum frequency of once per 3000 cubic yards. The stone shall be greater than 1½" and less than 30", reasonably well-graded and angular, with fractured faces on at least 75% of the surface and shall not contain more than 10% overburden or fines less than 1½" in maximum cross-section. The stone shall weigh not less than 140 pounds per solid cubic foot and shall have a percent of wear not greater than 45 by Los Angeles Abrasion Test (AASHTO T 96).

The top layer of Rock Fill shall be reduced in size to meet the gradation requirements of SubSection 802.02(c) for Class B Concrete. The minimum thickness of this layer shall be 1 foot.

- (2) The following shall be added to the third paragraph of Section 801.08 of the Standard Specifications. Rock Fill placed immediately adjacent to Pipe Culverts or Box Culverts including a minimum of 6 inches on top of the culverts, shall meet the gradation requirements of 802.02(c) of the Standard Specifications for Class S concrete coarse aggregate.
- (3) Material placed in the vicinity of piling shall be constructed in accordance with SubSections 303.02, 303.03, and 303.04 of the Standard Specifications, Edition of 2014. It shall meet the material and construction requirements of Aggregate Base Course (Class 7).
- (4) Geotextile Fabric (Type 9) complying with SubSection 625.02 of the Standard Specifications shall be used between Rock Fill and overlying embankment material.

Construction Requirements. Embankments requiring Rock Fill to be placed in water or extremely soft areas shall be placed by end dumping and advancing rock placement. All displaced material as it accumulates ahead of the advancing embankment toe shall be removed by excavation. Removal and disposal of displaced material will not be measured and shall be considered subsidiary to the item Rock Fill.

05/12/2022 Page 2 of 2

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO. 040861

ROCK FILL

Method of Measurement. Rock Fill, which includes all aggregate material types described above, including concrete coarse aggregate and/or Aggregate Base Course (Class 7), will be measured in vehicles by the Ton and paid as Rock Fill. Displaced material removal and disposal will not be measured and shall be considered subsidiary to the item Rock Fill.

Basis of Payment. Placement and construction of Rock Fill embankment material shall be paid for under the item "Rock Fill", which price shall be full compensation for all costs involved in furnishing all materials for constructing the embankments in accordance with Section 210 and this Special Provision; and for all labor, tools, equipment, quality control sampling and testing, and for incidentals necessary to complete the work.

Payment will be made under:

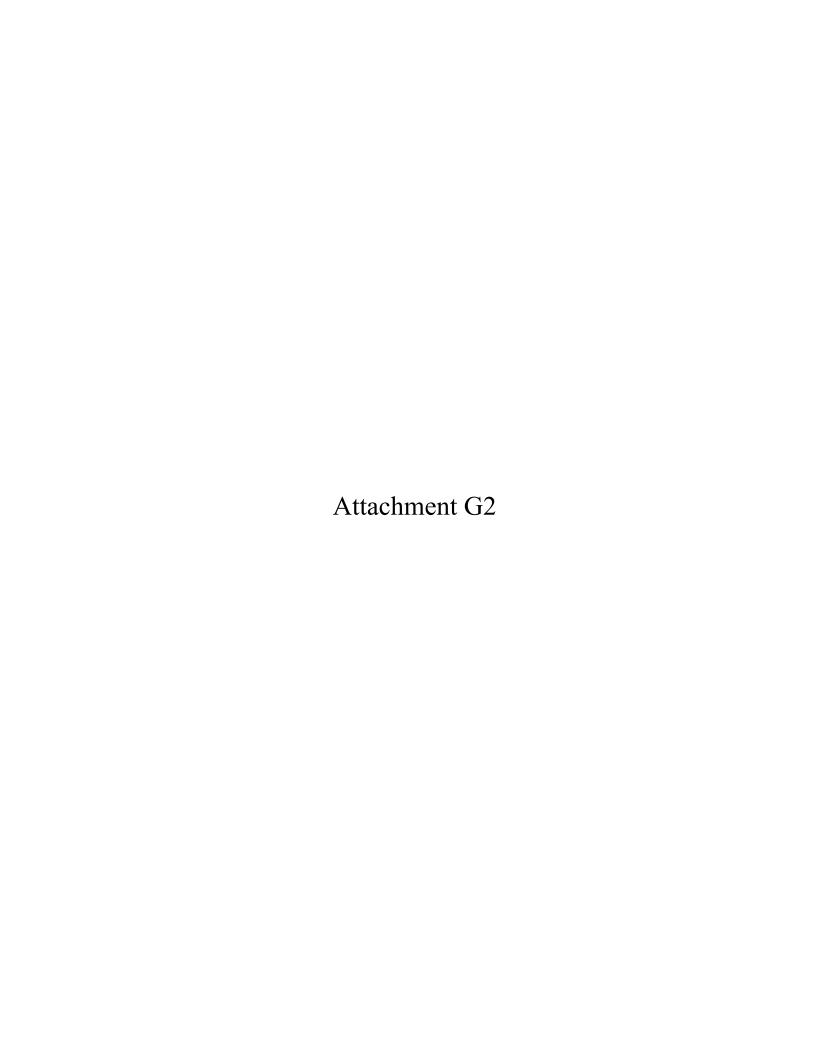
Pay Item

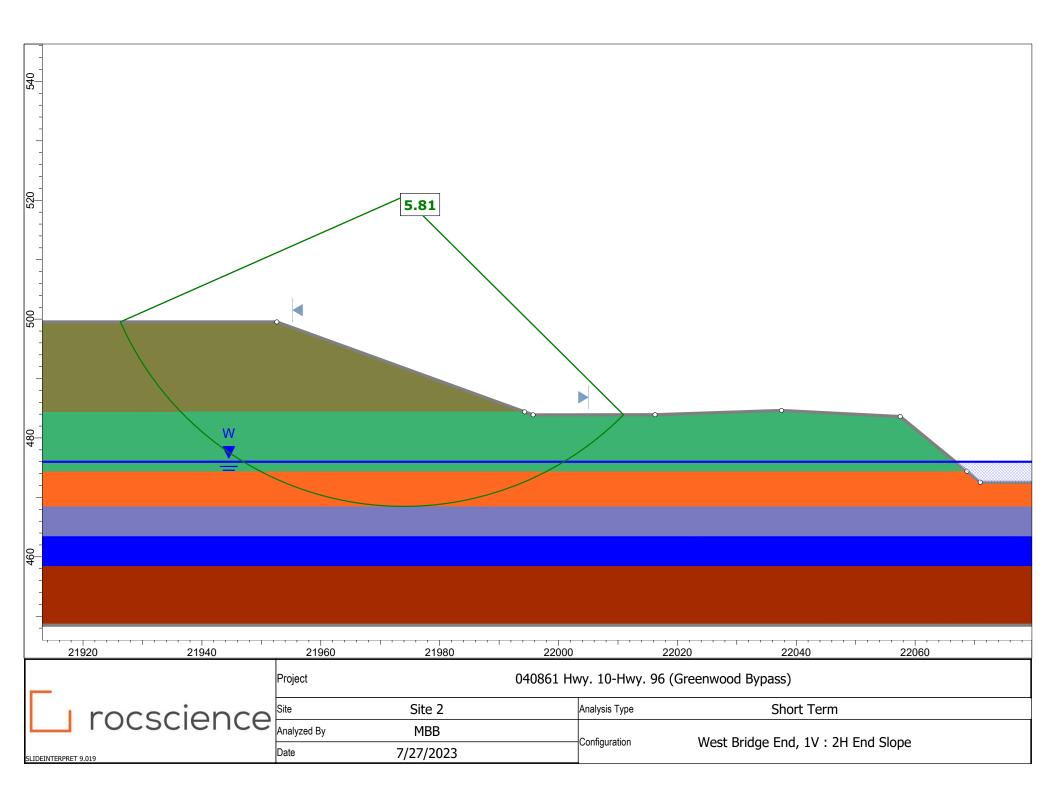
Rock Fill

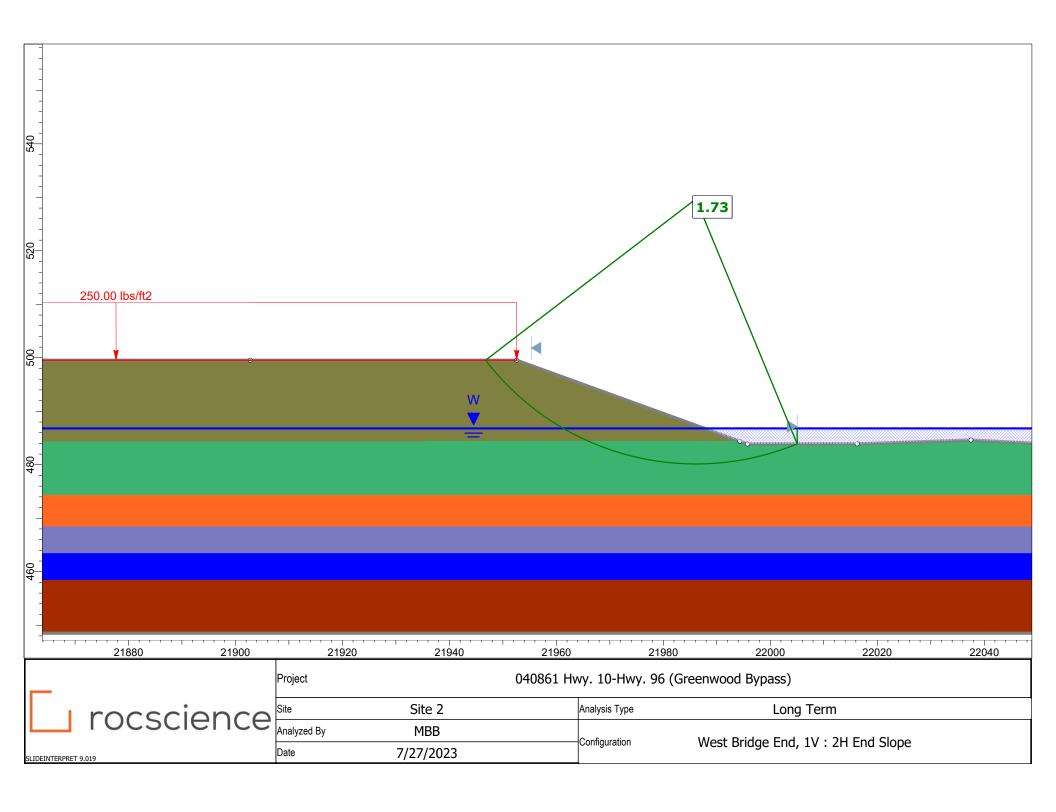
Geotextile Fabric (Type 9)

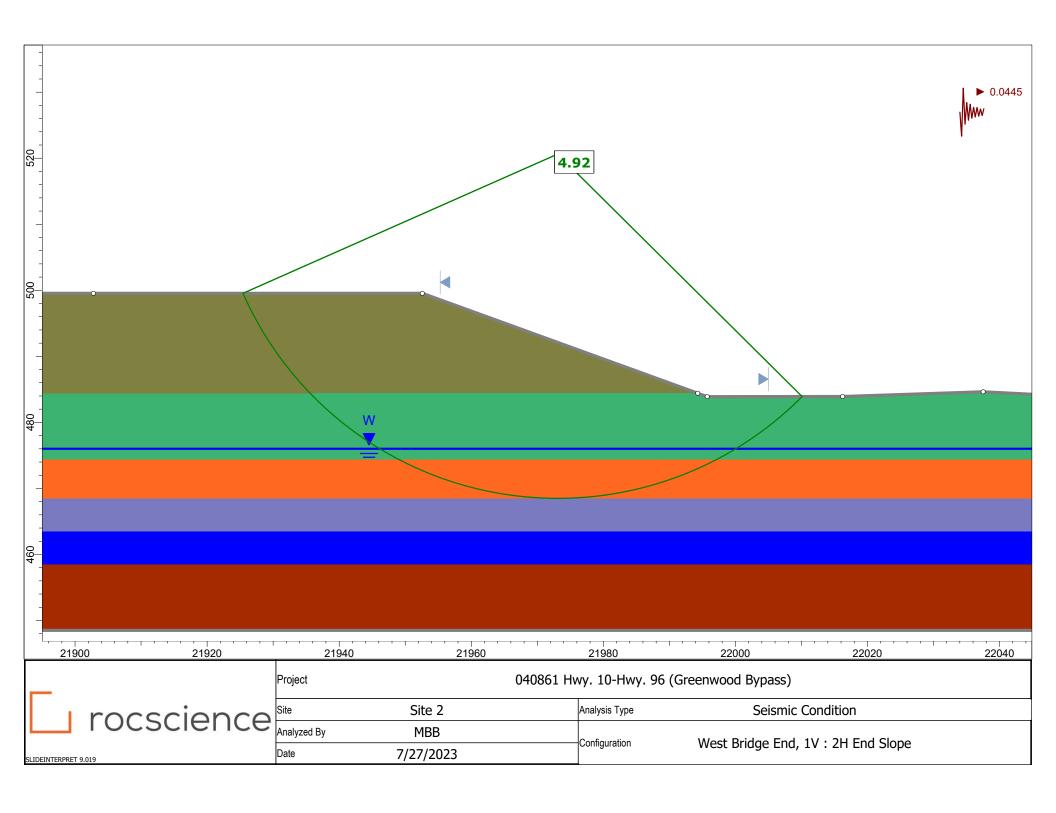
Ton

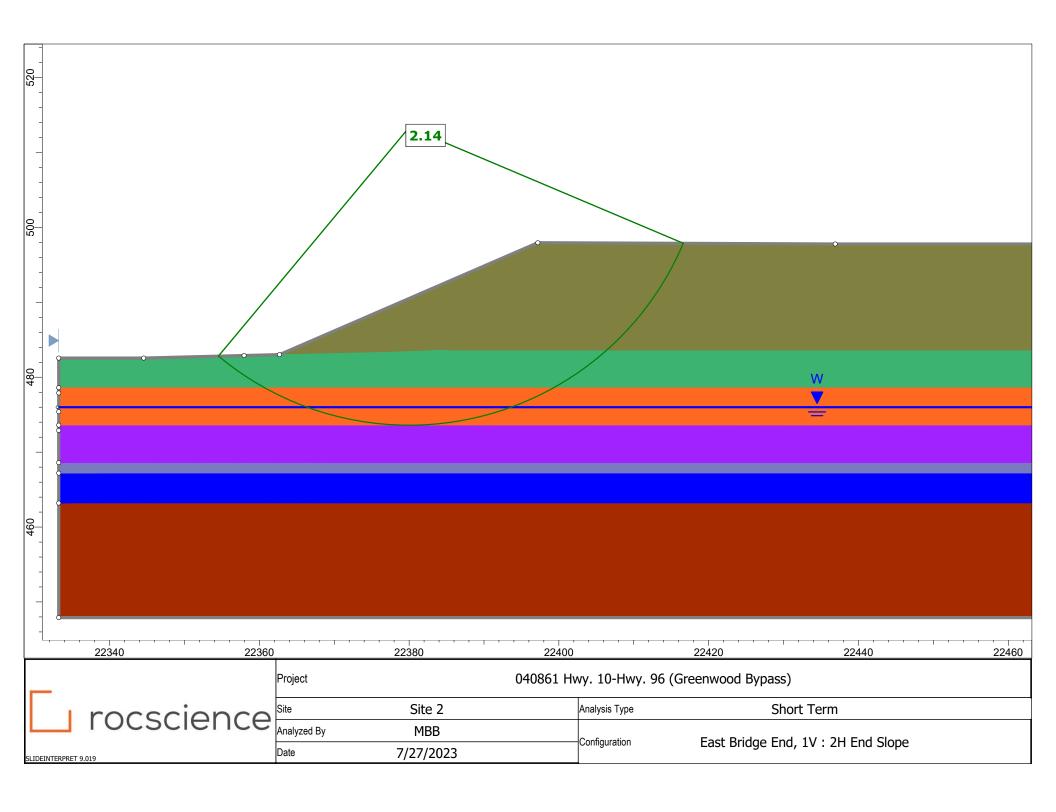
Square Yard

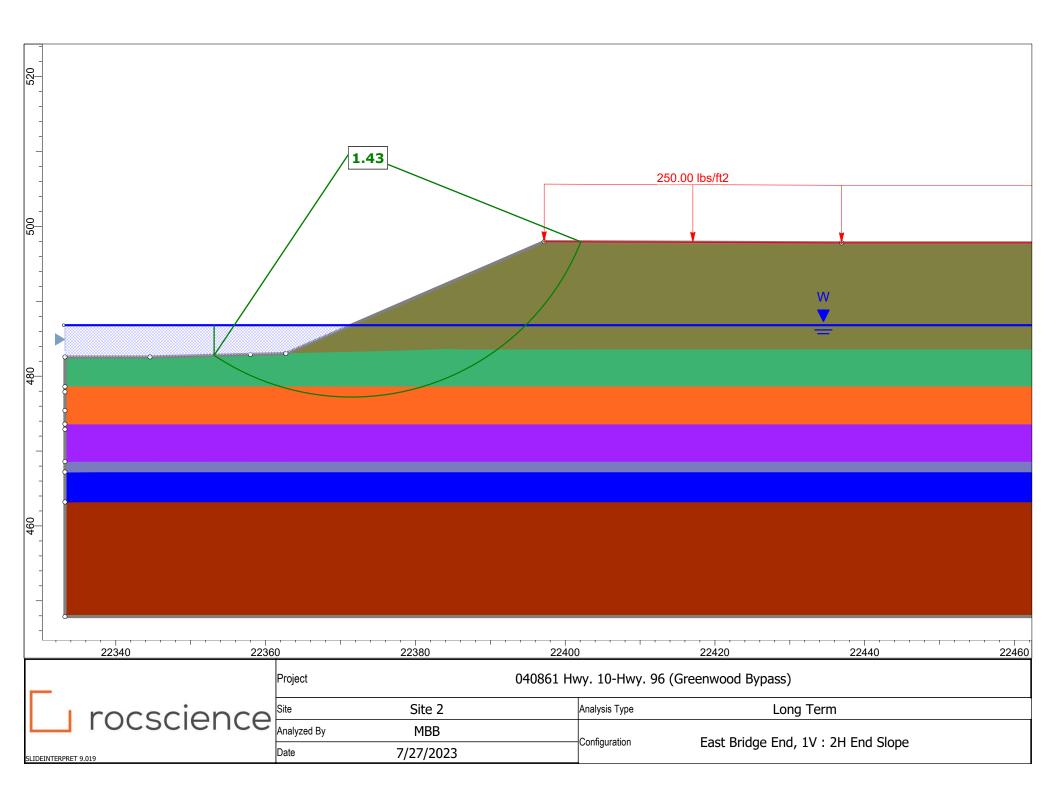


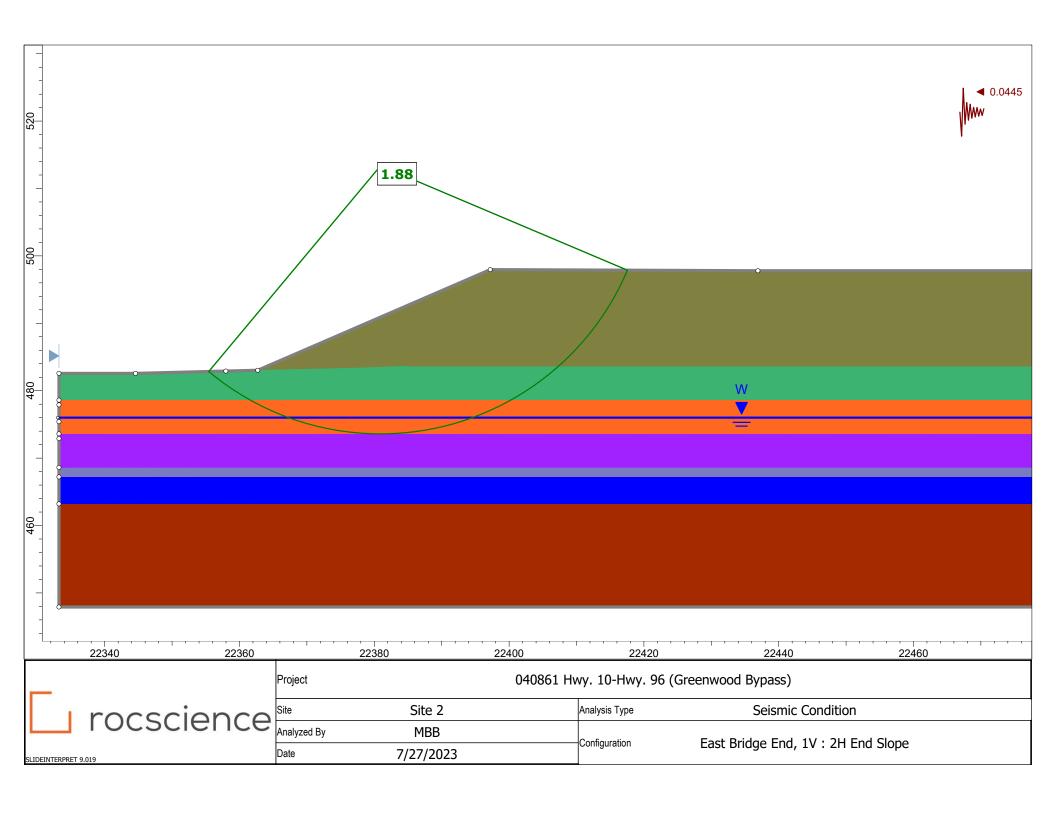


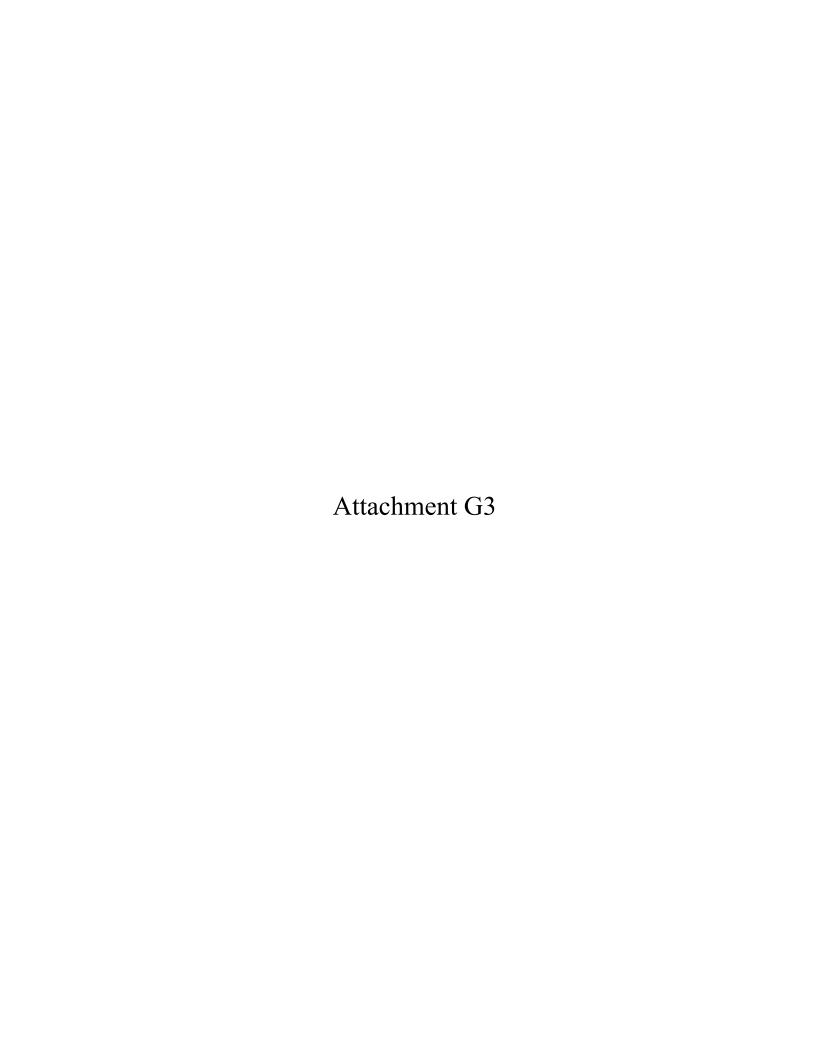


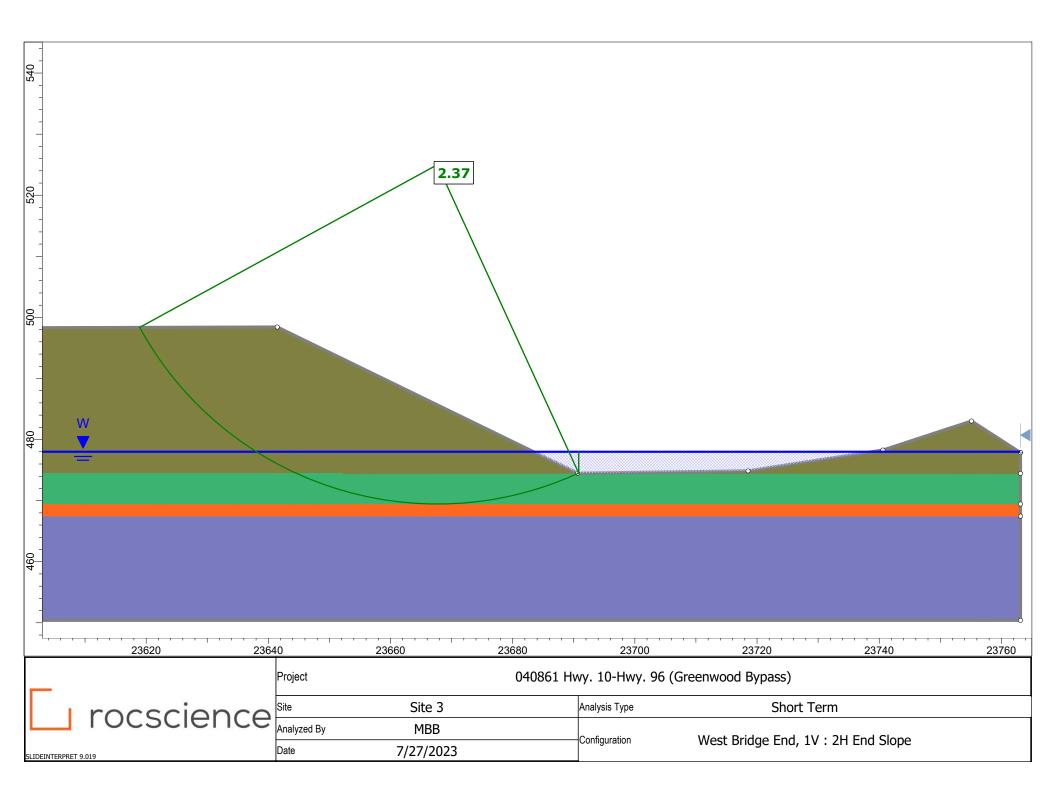


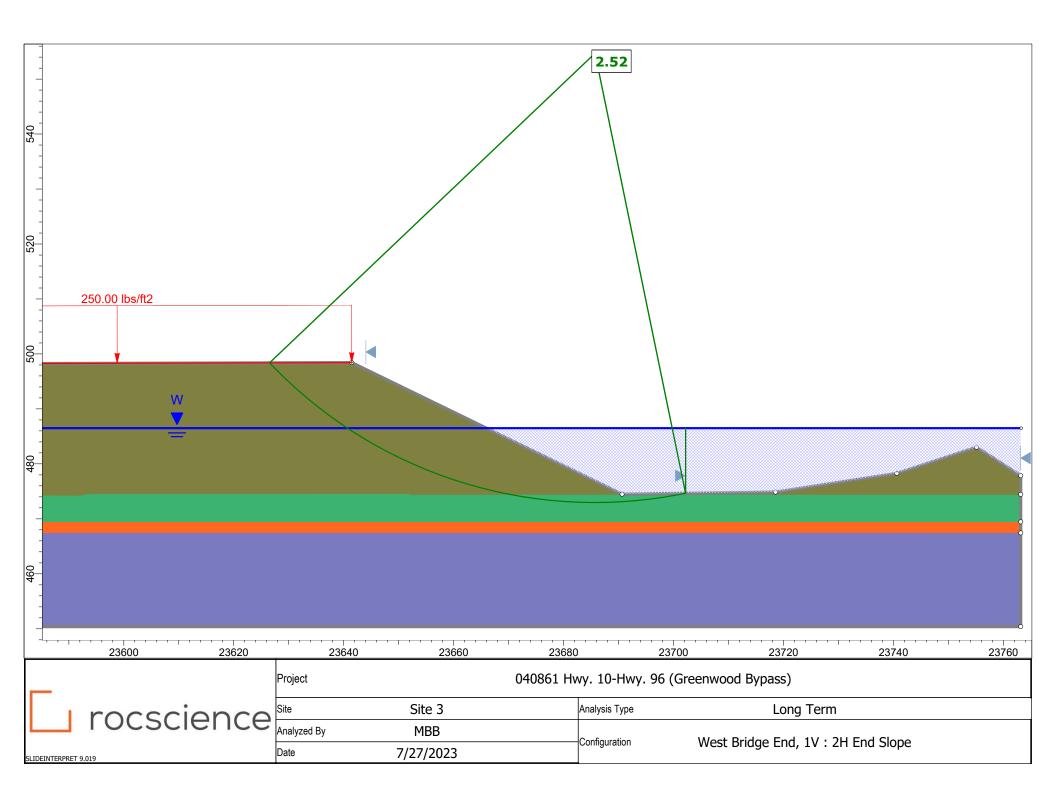


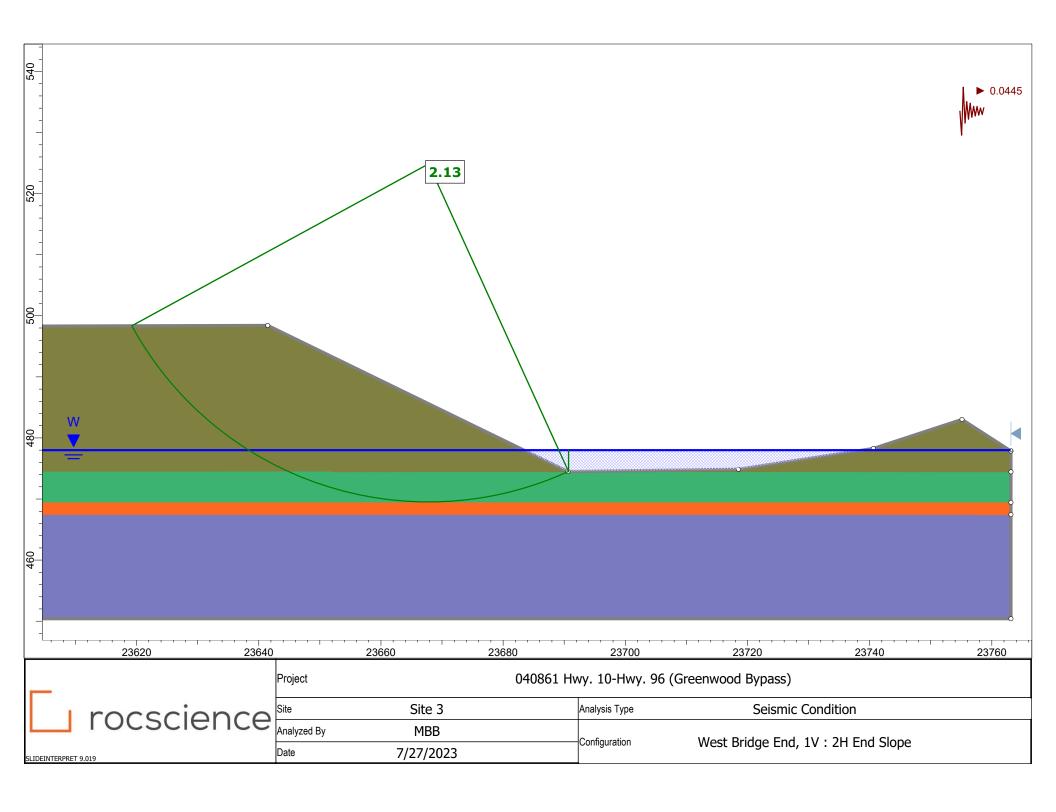


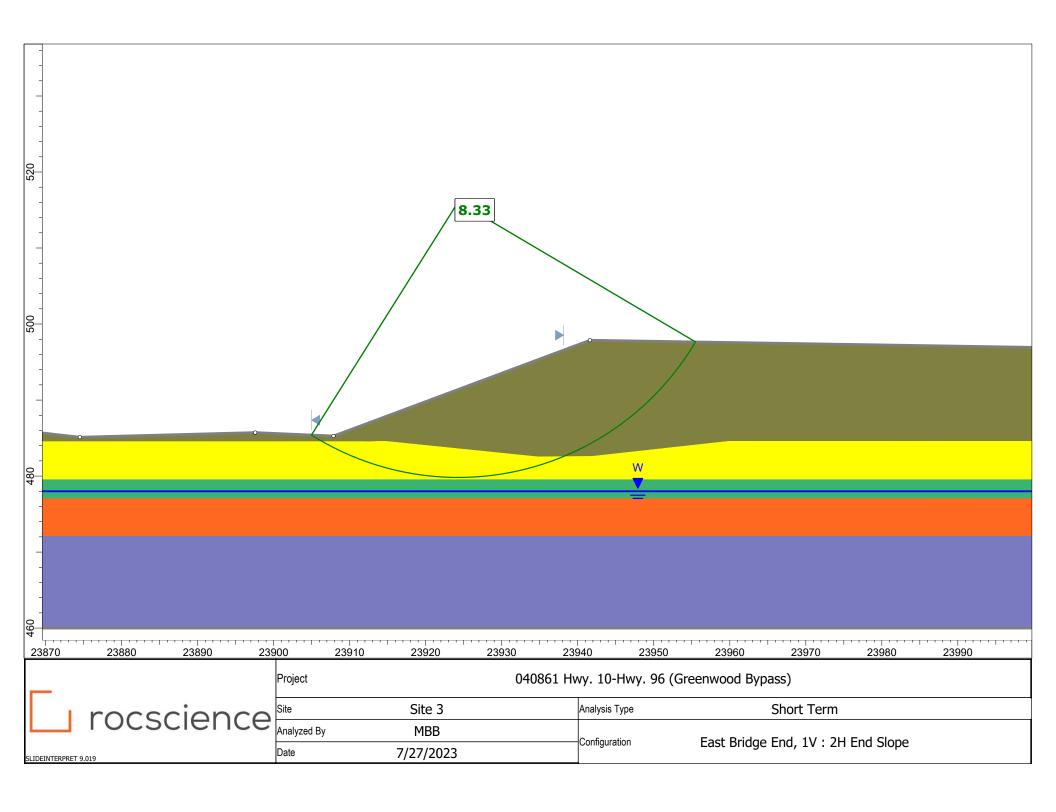


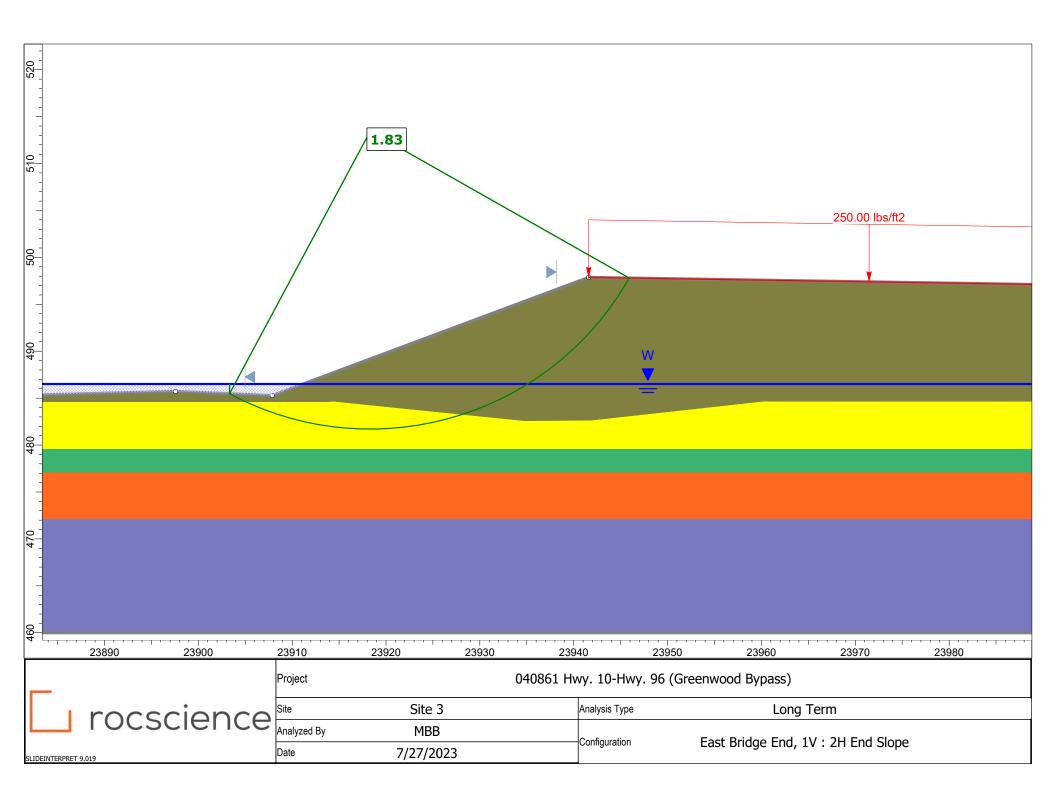


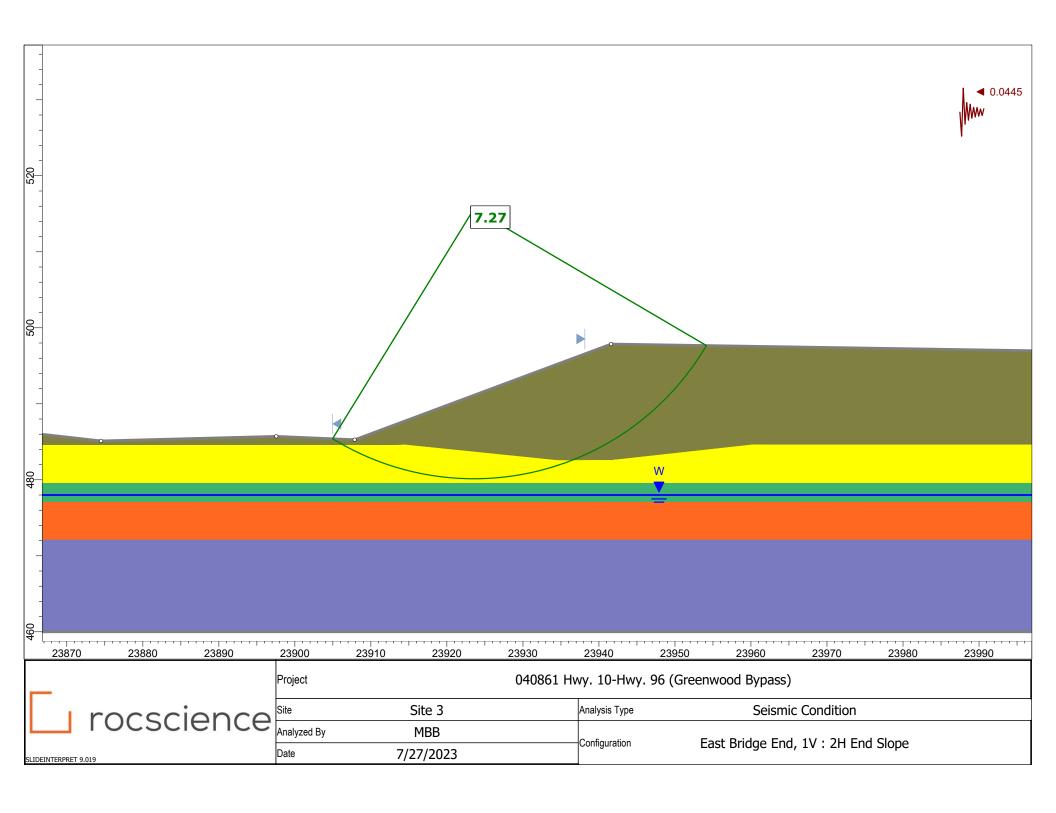


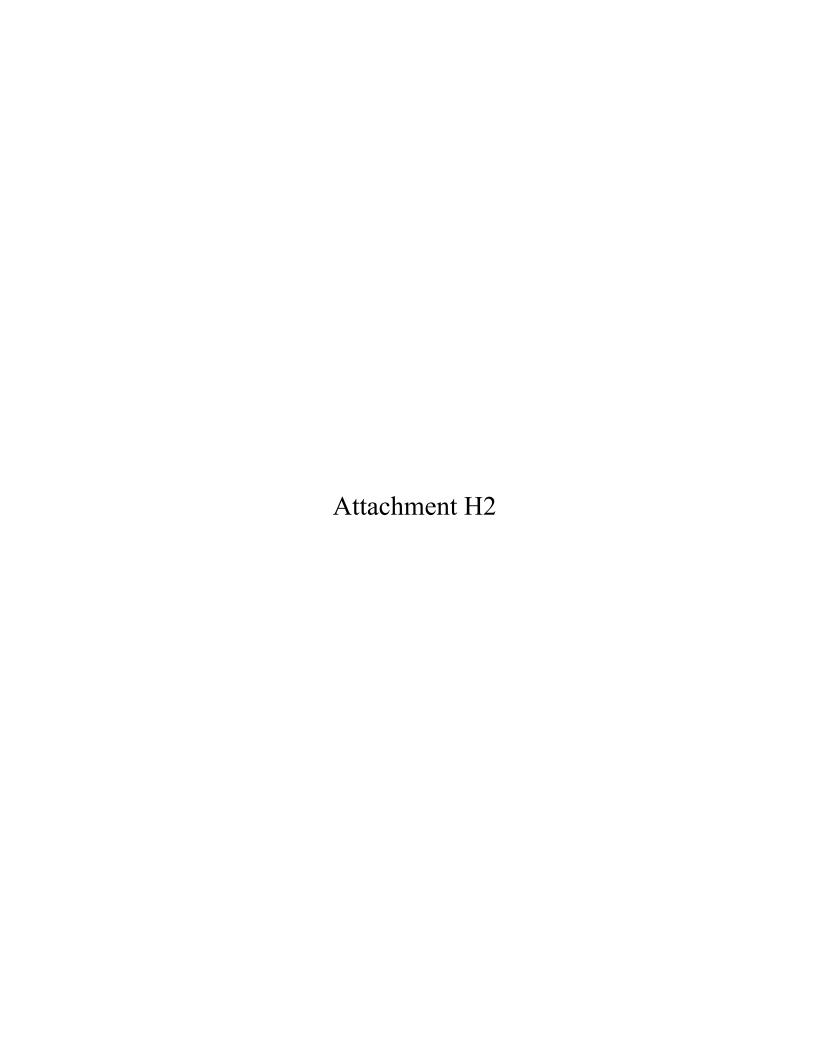














Job No.:	040861
Site No.:	2

Input by:	YZ	7/21/2023
Checked by:	MB	7/27/2023
Back-checked by:	YZ	7/27/2023

Bent 1

Ele	Elevation, ft Material Model		Model	Effective Unit	Undrained Shear Strength of Soil	Strain Factor (\$\epsilon_{50}\$ for Soil) / k _m for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom			Weight, γ',pcf	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
Above G	round Surface	Fill	Soft Clay (Matlock)	120	750	0.010	NA	NA	NA	NA	NA
Ground	468.5	Overburden Soil	Stiff Clay with Free Water (Reese)	55	1500	0.007	NA	500	NA	NA	NA
468.5	459	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.001	NA	2000	NA	NA	NA
be	low 459	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.001	NA	NA	4000	3.0	70

Bent 2

Eleva	evation, ft Material		Effective Unit	Undrained Shear Strength of Soil	Strain Factor (ϵ_{50} for Soil) / k_m for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %	
Top	Bottom			weight, y ,pci	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
Ground	468.5	Overburden Soil	Stiff Clay with Free Water (Reese)	60	2000	0.0050	NA	1000	NA	NA	NA
468.5	465.5	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
belov	w 465.5	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	4000	3.0	70

Bent 3

Elev	ation, ft	Material	Model	Model	Model	Effective Unit Weight, γ',pcf	Strength of Soil	Strain Factor (\$\epsilon_{50}\$ for Soil) / k _m for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom			weight, y ,pci	(C _u) (psf)	Rock)			Strength, q _u , psi	psi			
Ground	467	Overburden Soil	Stiff Clay with Free Water (Reese)	55	1500	0.0070	NA	500	NA	NA	NA		
467	466	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA		
belo	ow 466	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	4000	3.0	70		

Bent 4

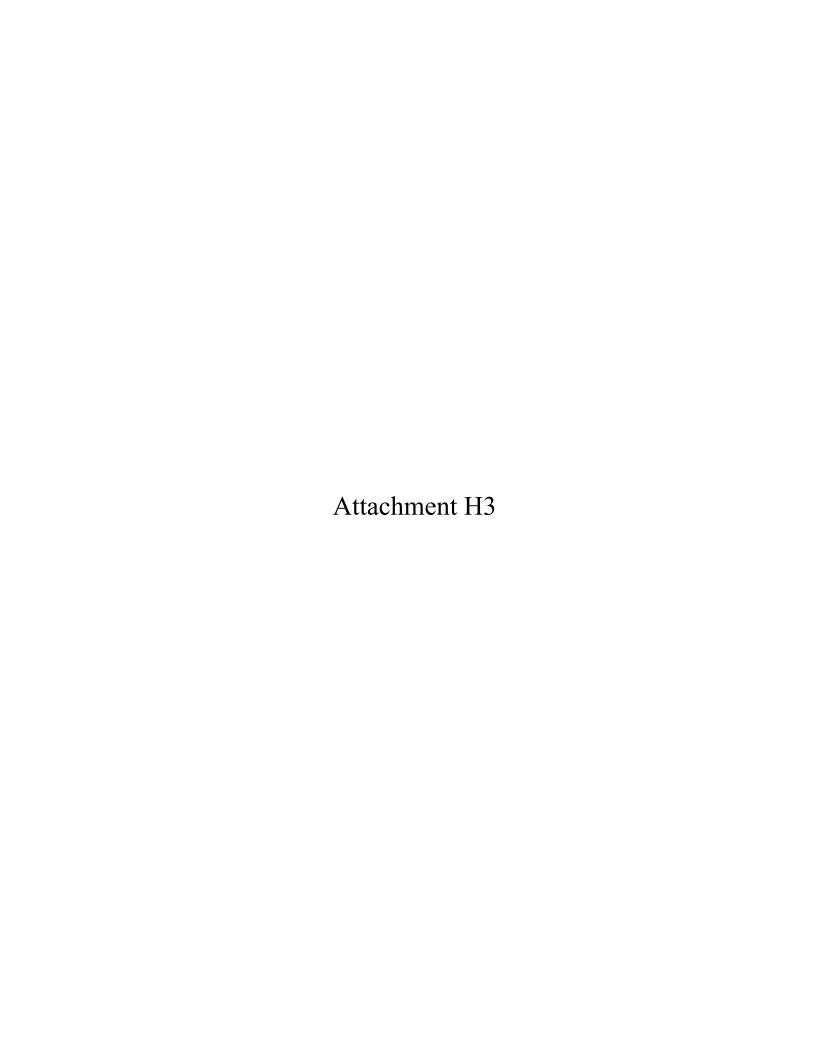
Elevat	tion, ft	Material	Model	Effective Unit	Undrained Shear Strength of Soil	Strain Factor (\$\epsilon_{50}\$ for Soil) / k _m for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Тор	Bottom			Weight, γ',pcf	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
Ground	468	Overburden Soil - Weaker	Soft Clay (Matlock)	45	200	0.0500	NA	NA	NA	NA	NA
468	466.5	Overburden Soil - Stiffer	Stiff Clay with Free Water (Reese)	70	3000	0.0050	NA	1000	NA	NA	NA
466.5	462.5	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
below	462.5	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	4000	3.0	70

Bent 5

Elevat	Elevation, ft Ma		Model	Model Effective Unit		Undrained Shear Strength of Soil	Strain Factor (ε ₅₀ for Soil) / k _m for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom	7		Weight, γ',pcf	(C _u) (psf)	Rock)			Strength, q _u , psi	psi		
Ground	475	Overburden Soil - Weaker	Soft Clay (Matlock)	45	200	0.05	NA	NA	NA	NA	NA	
475	466.5	Overburden Soil - Stiffer	Stiff Clay with Free Water (Reese)	55	1500	0.007	NA	500	NA	NA	NA	
466.5	462	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.001	NA	2000	NA	NA	NA	
belov	v 462	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	4000	3.0	70	

Bent 6

Elevation, ft		Material	erial Model	Effective Unit Weight, γ',pcf	Undrained Shear Strength of Soil	Strain Factor (\$\epsilon_{50}\$ for Soil) / k _m for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom			weight, y, per	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
Above Gro	ound Surface	Fill	Soft Clay (Matlock)	120	750	0.010	NA	NA	NA	NA	NA
Ground	473.5	Overburden Soil - Weaker	Soft Clay (Matlock)	45	200	0.0500	NA	NA	NA	NA	NA
473.5	467.0	Overburden Soil - Stiffer	Stiff Clay with Free Water (Reese)	55	1500	0.007	NA	500	NA	NA	NA
467	459.5	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.001	NA	2000	NA	NA	NA
belov	w 459.5	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	4000	3.0	70





Job No.:	040861
Site No.:	3

Input by:	YZ	7/26/2023
Checked by:	pt	7/27/2023
Back-checked by:	YZ	7/27/2023

Bent 1 - Boring 1

Eleva	Elevation, ft Material		Model	Effective Unit	Undrained Shear Strength of Soil	Strain Factor (ε ₅₀ for Soil) / k _m for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom			Weight, γ',pcf	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	
Above Gro	ound Surface	Fill	Soft Clay (Matlock)	120	750	0.010	NA	NA	NA	NA	NA
Ground	474.5	Overburden Soil - Weaker	Sand (Reese)	55	NA	NA	26.0	20	NA	NA	NA
474.5	469.5	Overburden Soil - Stiffer	Soft Clay (Matlock)	45	500	0.0100	NA	NA	NA	NA	NA
469.5	467.5	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.001	NA	2000	NA	NA	NA
belov	w 467.5	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	5500	5.0	65

Bent 2 - Boring 2

Elevation, ft		Material	Effective Unit		Undrained Shear Strength of Soil	Strain Factor (ε ₅₀ for Soil) / k _m for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom			weight, γ,pci	(C _u) (psf)	Rock)			Strength, q _u , psi	psi	ļ
Ground	470	Overburden Soil - Weaker	Sand (Reese)	55	NA	NA	27.0	20	NA	NA	NA
470	465	Overburden Soil - Stiffer	Stiff Clay with Free Water (Reese)	55	1900	0.0070	NA	500	NA	NA	NA
465	464.5	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
belov	w 464.5	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	5500	5.0	70

Bent 3 - Borings 3 and 4

Elevation, ft Material		Material	Model	Effective Unit Weight, γ',pcf	Undrained Shear Strength of Soil	Strain Factor (ϵ_{50} for Soil) / k_m for		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom			weight, 7, per	(C_u) (psf)	Rock)			Strength, q _u , psi	psi	
Ground	481.5	Overburden Soil - Clay	Stiff Clay with Free Water (Reese)	50	1300	0.0070	NA	500	NA	NA	NA
481.5	478.5	Overburden Soil - Sand	Sand (Reese)	65	NA	NA	36.0	92	NA	NA	NA
478.5	474	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.0010	NA	2000	NA	NA	NA
belov	w 474	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	5500	5.0	85

Bent 4 - Borings 5 and 6

Elevation, ft		Material	Model	Model Effective Unit Weight, γ',pcf		$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Soil Modulus, k, pci	Uniaxial Compressive	Rock Mass Modulus, E _{rm} , 10 ⁶	RQD, %
Top	Bottom			weight, y, per	(C_u) (psf)	Rock)			Strength, q _u , psi	psi	
Above Ground Surface		Fill	Soft Clay (Matlock)	120	750	0.010	NA	NA	NA	NA	NA
Ground	477.0	Overburden Soil - Stiffer	Stiff Clay with Free Water (Reese)	65	2750	0.005	NA	1000	NA	NA	NA
477	472	Highly Weathered to Weathered Shale	Stiff Clay with Free Water (Reese)	85	10000	0.001	NA	2000	NA	NA	NA
belo	ow 472	Competent Slightly Weathered to Unweathered Shale	Weak Rock	100	NA	0.0005	NA	NA	5500	5.0	75



ARKANSAS DEPARTMENT OF TRANSPORTATION

ARDOT.gov | IDriveArkansas.com | Lorie H. Tudor, 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 12, 2022

TO:

Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT:

Job No. 040861

Hwy. 10 - Hwy. 96 (Greenwood Bypass) (S)

Route 10 Section 0 Sebastian County

Attached is the requested soil survey, and strength data test results. The project consists of constructing a new section for Highway 10 in Greenwood and improving Coker, Main and Center Streets. Samples we obtained along the new alignment, the existing travel lanes, and ditch line.

The subgrade soils consist primarily of low plasticity silty sands and may require stabilization to provide a stable working platform. The locations, type and amount of additive will be discussed later in the report.

Highway 10 Alignment

From Stations 185+00 - 196+00 the grade line closely matches the existing roadway. The embankments will be constructed in the existing ditches. All soft unstable organic material should be undercut to a maximum depth of 3 feet prior to construction. The embankments may be constructed with locally available unspecified material utilizing a 3:1 slope configuration.

The new location for Highway 10 traverses wooded areas and pasture land that floods in the fall and spring. Between stations 205+50 to 207+20 is a pond at the centerline of construction, and should be drained prior to construction. The maximum embankment height is approximately 24 feet for this alignment. Prior to construction the soft organic material should be undercut to a maximum depth of 3 feet. The embankment may be constructed with locally available unspecified material utilizing a 3:1 slope configuration, shown in the attached figure.

Center Street

The grade line of the existing road is being raised between stations 500+25 to 504+00 and 508+00 to 521+00. The embankment is being placed in the existing ditch line and has a maximum height of 19 feet. The soft unstable organic material should be undercut to a maximum depth of 3 feet. The embankment may be constructed with locally available material utilizing a 3:1 slope configuration.

The embankment between stations 524+00 to 526+00 is on new location in an area that is seasonably wet. Prior to construction, the soils should be stabilized with 4% Portland cement (by dry wt.) mixed to a depth of 16 inches to provide a stable working platform. The embankment may be constructed with locally available unspecified material utilizing a 3:1 slope configuration.

The construction grade line between stations 526+00 to 532+00 closely matches the existing grade line. Prior to fill being placed in the ditch line, all soft unstable organic material should be undercut to a maximum depth of 3 feet. The embankment may be constructed with locally available unspecified material using a 3:1 slope configuration.



ARKANSAS DEPARTMENT OF TRANSPORTATION

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Coker Street

The construction grade line closely matches that of the existing roadway. Embankment is being placed in the ditch line with a maximum height of 5 feet. The soft unstable organic material should be undercut to a maximum depth of 3 feet. The embankments may be constructed with locally available unspecified material utilizing a 3:1 slope configuration.

Main Street

Between stations 601+00 to 606+00 the maximum embankment height is approximately 14 feet. The alignment traverses a wooded area that is seasonably wet. After clearing and prior to embankment construction the subgrade soils should be stabilized with 4% Portland cement (by dry wt.) mixed to a depth of 16 inches to provide a stable working platform. The embankment may be constructed with locally available unspecified material utilizing a 3:1 slope configuration.

Below is a table to summarize the locations of undercut and soil stabilization.

Stabilization/Undercut Locations

	OCCIN	mzacion/onacicat Loc	ations
Station	Action	Amount	Description
185+00 – 196+00	Undercut	3 feet	Existing ditches
201+00 – 240+00	Undercut	3 feet	Full width, new location
500+24 - 504+00	Undercut	3 feet	Existing ditches
508+00 - 521+00	Undercut	3 feet	Existing ditches
524+00 - 526+00	Stabilize	4% Portland Cement	Full width, new location
526+00 - 532+00	Undercut	3 feet	Existing ditches
601+00 - 606+00	Stabilize	4% Portland Cement	Full width, new location

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 of Jenny Lind.
- 2. Asphalt Concrete Hot Mix for PG 64-22

Туре	Asphalt Cemen	ıt %	Mine	ral Aggrega	ite %
Surface Course	5.8			94.2	
Binder Course	4.6			95.4	
Base Course	4.3	1	1	95.7	

Paul Tinsley

Materials Engineer

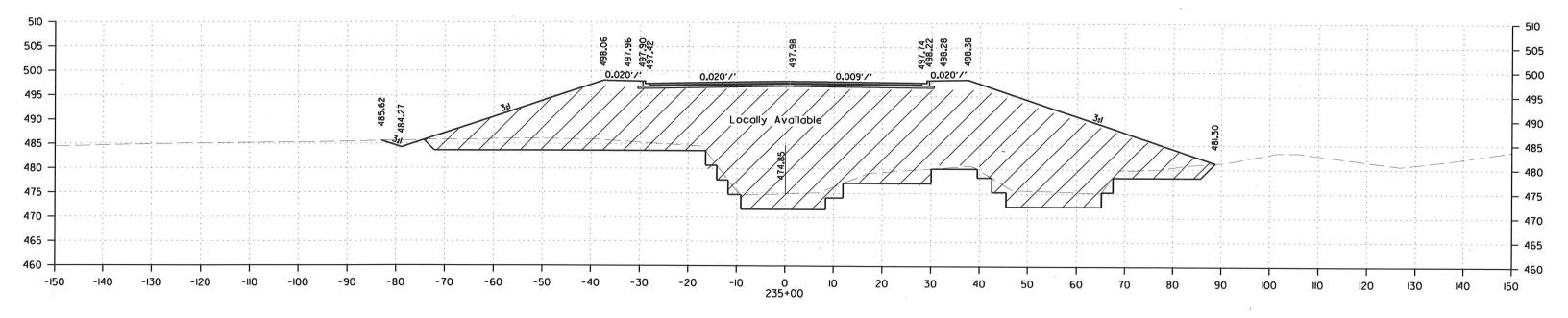
RPT:yz:bjj Attachment

cc: State Constr. Eng. – Master File Copy

District 4 Engineer

System Information and Research

G. C. File



JOB: 040861

Arkansas State Highway Transporation Department

JOB NAME: HWY.10-HWY.96(GREENWOOD BYPASS)(S)

Materials Division

COUNTY NO. 65 DATE TESTED

Michael Benson, Materials Engineer

STA.#	LOC.	DEPTH	COLOR	#4	#10	#40	#80	#200	L.L.	P.I.	SOIL CLASS	LAB#:	%MOISTURE
245+00	25 RT	0-5	GRAY	S	1	E	<u> </u>	E S					
207+00	100 lt	0-5	GRAY										
207+00	100'LT	0-5	GRAY	68	55	47	45	39	25	8	A-4(1)	RV80	
245+00	25'RT	0-5	GAY	93	87	82	79	56	24	7	A-4(1)	RV81	
191+00	05 RT	0-5	BROWN	99	98	97	86	63	20	6	A-4(1)	S59	17.6
191+00	24 RT	0-5	GRAY	99	97	95	83	58	18	3	A-4(0)	S60	21
199+00	CL	0-5	BROWN	99	97	94	89	81	24	10	A-4(6)	S61	28.4
206+00	CL	0-5	GRAY	84	79	68	64	55	25	8	A-4(2)	S62	14
214+00	CL	0-5	BROWN	98	96	95	94	86	22	3	A-4(1)	S63	26.8
222+00	CL	0-5	BROWN		100	99	95	89	24	17	A-6(12)	S64	27.9
230+00	CL	0-5	BROWN				100	94	26	7	A-4(6)	S65	29
237+00	CL	0-5	BROWN				100	92	24	6	A-4(4)	S66	23.3
245+00	06 RT	0-5	BROWN	99	97	95	91	73	22	8	A-4(3)	S67	15.9
245+00	16 RT	0-5	BROWN	99	96	94	89	68	22	7	A-4(2)	S68	17.6
245+00	25 RT	0-5	BROWN	96	94	91	86	67	20	6	A-4(1)	S69	19.3
402+00	21 LT	0-5	BROWN	99	97	92	80	58	18	3	A-4(1)	S70	26.5
408+00	05 RT	0-5	BR/GR		100	96	85	62	24	10	A-4(3)	S71	18.1
408+00	15 RT	0-5	BR/GR	96	92	89	80	55	ND	NP	A-4(1)	S72	17.3
503+00	06 RT	0-5	BR/GR	98	95	91	86	74	32	12	A-6(7)	S73	20.7
511+00	05 LT	0-5	GRAY	97	92	88	86	77	21	5	A-4(1)	S74	19.5
511+00	18 LT	0-5	GRAY	99	98	97	96	88	22	6	A-4(3)	S75	19.1
511+00	30 LT	0-5	GRAY	86	74	72	68	59	28	11	A-6(4)	S76	16.4
519+00	06 RT	0-5	GRAY			1-1-071	100	90	22	5	A-4(3)	S77	32.1
519+00	16 RT	0-5	BR/GR	97	95	94	92	81	23	5	A-4(2)	S78	17.8
519+00	25 RT	0-5	BR/GR	94	87	81	77	68	30	8	A-4(4)	S79	20.9

PAUL TINSLEY, MATERIALS ENGINEER *** SOIL SURVEY STRENGTH TEST REPORT ***

DATE - 07/13/2022

SEQUENCE NO. - 1

JOB NUMBER - 040861

MATERIAL CODE - SSRV

SPEC. YEAR - 2014

SUPPLIER ID. - 1

COUNTY/STATE - 65

DISTRICT NO. - 04

JOB NAME - HWY.10-HWY.96 (GREENWOOD BYPASS) (S)

STATION LIMITS R-VALUE AT 240 psi *****************************

> 32 BEGINJOB-END JOB

REMARKS -

AASHTO TESTS : T190

PAUL TINSLEY, MATERIALS ENGINEER

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

DATE - 07/12/2 JOB NUMBER - 040861 FEDERAL AID NO TO BE A PURPOSE - SOIL SU SPEC. REMARKS - NO SPEC SUPPLIER NAME - STATE NAME OF PROJECT - HWY.1 PROJECT ENGINEER - NOT A PIT/QUARRY - ARKANSAS LOCATION - SEBASTIAN SAMPLED BY - d.thornton SAMPLE FROM - TEST HOLE MATERIAL DESC SOIL SU	ASSIGNED PRVEY SAMPLE CIFICATION CHECK O-HWY.96(GREENWOOD BY APPLICABLE O, COUNTY		SEQUENCE NO 2 MATERIAL CODE - SSRVPS SPEC. YEAR - 2014 SUPPLIER ID 1 COUNTY/STATE - 65 DISTRICT NO 04 DATE SAMPLED - 04/07/22 DATE RECEIVED - 04/07/22 DATE TESTED - 05/10/22 GS
LAB NUMBER	- 20220535	- 20220536	- 20220537
SAMPLE ID	- S62	- S63	- S64
TEST STATUS	- INFORMATION ONLY	- INFORMATIC	N ONLY - INFORMATION ONLY
STATION	- 206+00	- 214+00	- 222+00
LOCATION	- CL	_ CL	_ CL
DEPTH IN FEET	- 0-5	0-5	0-5
MAT'L COLOR	- GRAY	_ BROWN	_ BROWN
MAT'L TYPE	- - 35 12 30.60	- - 35 12 3	- 36.10 - 35 12 39.00
LATITUDE DEG-MIN-SEC LONGITUDE DEG-MIN-SEC			36.10 - 35 12 39.00 17.50 94 15 8.70
		94 13	17.30 94 13 0.70
% PASSING 2 IN.		-	-
1 1/2 IN.		- 100	_
3/4 IN.		100	_
3/8 IN. NO. 4	- 95 - 84	- 100 - 98	-
	- 79	96	_ 100
	- 68	_ 95	_ 99
	- 64	- 94	- 95
	- 55	86	89
LIQUID LIMIT	- 25	- 22	- 24
PLASTICITY INDEX	- 8	- 3	- 17
AASHTO SOIL	- A-4(2)	- A-4(1)	- A-6(12)
UNIFIED SOIL	_	_	
% MOISTURE CONTENT	- 14.0	- 26.8	27.9
	_	_	_
	_	_	=
	_	_	_
	-	-	-
	_	_	_
	_	_	_
	-	_	-
	-	_	-
	-	_	-

REMARKS - X:STRIPPED W=MULTIPLE LAYERS

AASHTO TESTS : T24 T88 T89 T90 T265

:

PAUL TINSLEY, MATERIALS ENGINEER

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

SPEC. REMARKS - NO SUPPLIER NAME - STA NAME OF PROJECT - H PROJECT ENGINEER - N PIT/QUARRY - ARKAN LOCATION - SEBAS SAMPLED BY - d.thor SAMPLE FROM - TEST	861 BE ASSIGNE L SURVEY S SPECIFICAT TE WY.10-HWY. OT APPLICA SAS TIAN, COUNT TON TON HOLE	AMPLE TION CHECK 96(GREENWOOD BY ABLE		MATERI SPEC. SUPPLI COUNTY DISTRI DATE S DATE I DATE S	YEAR EER ID. Y/STATE CCT NO. SAMPLED RECEIVED	- 1 - 65
MATERIAL DESC SOI	L SURVEY	- R VALUE- PAVI	EMENT SO	DUNDINGS		
LAB NUMBER SAMPLE ID TEST STATUS STATION LOCATION DEPTH IN FEET MAT'L COLOR MAT'L TYPE	- S5 - IN - 19 - 05 - 0-	FORMATION ONLY 1+00 RT	_ S60	Т	- 20220 - S61 - INFOE - 199+0 - CL - 0-5 - BROWN	RMATION ONLY
LATITUDE DEG-MIN-		35 12 24.80	- 35		- 35	
LONGITUDE DEG-MIN-	SEC -	94 15 40.70	94	15 40.70	94	15 31.20
3/4	4 - 10 - 40 - 80 -	00 99 98 97 86 63	- - - 100 - 99 - 97 - 95 - 83		- - 100 - 99 - 97 - 94 - 89	
LIQUID LIMIT		20	- 18		- 24	
PLASTICITY INDEX AASHTO SOIL UNIFIED SOIL		5 4–4 (1)	- 3 - A-4	1(0)	- 10 - A-4	(6)
% MOISTURE CONTENT	=	17.6	_ 2	21.0	28	3.4
BST ACHMSC AGG BASE CRS CL5	(IN) - (IN) - (IN) - - - - -	.5 3.75W 12.0				

REMARKS - X:STRIPPED W=MULTIPLE LAYERS

-

PAUL TINSLEY, MATERIALS ENGINEER

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

DATE - 07/12/ JOB NUMBER - 040861 FEDERAL AID NO TO BE PURPOSE - SOIL S SPEC. REMARKS - NO SPE SUPPLIER NAME - STATE NAME OF PROJECT - HWY. PROJECT ENGINEER - NOT PIT/QUARRY - ARKANSAS LOCATION - SEBASTIA SAMPLED BY - d.thornto SAMPLE FROM - TEST HOL MATERIAL DESC SOIL S	ASSIGNED URVEY SAMPLE CIFICATION CHE 10-HWY.96(GREE APPLICABLE N, COUNTY on E	ECK ENWOOD BYPA	M S S C D SS)(S)	PEC. YEAR SUPPLIER ID. COUNTY/STATE DISTRICT NO. DATE SAMPLES DATE RECEIVED	DE - SSRVPS - 2014 - 1 C - 65
LAB NUMBER	- 20220538	-	20220539	- 20	220540
SAMPLE ID	- S65	-	S66	- S6	7
TEST STATUS		ON ONLY -			FORMATION ONLY
STATION	- 230+00	_	237+00	- 24	
LOCATION DEPTH IN FEET	- CL - 0-5	_	CL 0-5	- 0-	RT 5
MAT'L COLOR	- BROWN	-	BROWN	_	OWN
MAT'L TYPE	-	_			·
LATITUDE DEG-MIN-SEC	- 35 12	37.70 -	35 12 35	.10 -	35 12 35.90
LONGITUDE DEG-MIN-SEC	- 94 14	59.30	94 14 51	.60	94 14 42.50
% PASSING 2 IN		_		_	
1 1/2 IN		-		-	
3/4 IN		_		-	
3/8 IN		_		_	00
NO. 4		_		_	99
NO. 10 NO. 40		-		_	97 95
NO. 80		_	100		91
NO. 200			92		73
LIQUID LIMIT	- 26		24	- 2	2
PLASTICITY INDEX	- 7		6	- 8	
AASHTO SOIL	- A-4(6)	_	A-4 (4)		-4(3)
UNIFIED SOIL	-			_	
% MOISTURE CONTENT	- 29.0	_	23.3	-	15.9
ACHM SC (IN	1)	_		_	5.5W
SOIL CEMENT (IN	1)	_		-	1.5
	_	_		_	
	_	_		=	
	-	_		_	
	_	s s		_	
	_	_		_	
	-	_		_	

REMARKS - X:STRIPPED W=MULTIPLE LAYERS

-

PAUL TINSLEY, MATERIALS ENGINEER *** SOIL SURVEY / PAVEMENT SOUNDING TEST REPORT ***

JOB NUMBER - 040 FEDERAL AID NO TO	BE ASSIL SURVE SPECIFI TE WY.10-H HOT APPI	Y SAMPLE CATION CHI WY.96(GREICABLE	ECK	ΥPΑ	SS) (S)	MATERIAL SPEC. YE. SUPPLIER COUNTY/S DISTRICT	NO 4 CODE - SSRVPS AR - 2014 ID 1 TATE - 65 NO 04
SAMPLED BY - d.thor SAMPLE FROM - TEST MATERIAL DESC SO	HOLE	7V – R VA	IJIE- DAV	FMF	'NT SOUNDIN	DATE TES	EIVED - 04/07/22 TED - 05/10/22
	LL SUKVI	LI – R VA	LUE- PAV.	CME	'NI 200NDIN	GS	
LAB NUMBER		20220541			20220542		20220543
SAMPLE ID	_	S68			S69		S70
TEST STATUS	-		ION ONLY	-			INFORMATION ONLY
STATION		245+00		_	245+00	_	402+00
LOCATION		16 RT		-	25 RT	_	21 LT
DEPTH IN FEET		0-5		-	0-5	-	0-5
MAT'L COLOR MAT'L TYPE	_	BROWN		_	BROWN	-	BROWN
LATITUDE DEG-MIN-	SEC -	35 12	35.80	_	35 12	35.80 -	35 12 22.20
LONGITUDE DEG-MIN-	SEC -	94 14	42.40		94 14	42.40	94 15 35.10
3/4 3/8	IN IN IN 4 - 10 - 40 - 80 -	100 99 96 94 89 68			100 98 96 94 91 86	- - - - - -	100 99 97 92 80 58
LIQUID LIMIT PLASTICITY INDEX	_	22 7		_	20 6	_	18 3
AASHTO SOIL	_	A-4(2)		_	A-4(1)	_	A-4(1)
UNIFIED SOIL	-	11 4(2)		-	11 1(1)	-	11 4 (1)
% MOISTURE CONTENT	_	17.6		-	19.3	-	26.5
ACHMSC	(IN) -	2.0		_		_	
ACHMSC	(IN) -	.25X		_		-	
ACHMSC	(IN) -	1.0		-		_	
AGG BASE CRS CL5	(IN) _	6.0		_		_	tion tool
	_			_		_	
	_			-		_	
	_			-		-	
	_			_			
	_			_		_	

REMARKS - X:STRIPPED W=MULTIPLE LAYERS

-

PAUL TINSLEY, MATERIALS ENGINEER

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

			-	~		
DATE - 07/ JOB NUMBER - 040 FEDERAL AID NO TO PURPOSE - SOI SPEC. REMARKS - NO SUPPLIER NAME - STA NAME OF PROJECT - H PROJECT ENGINEER - N PIT/QUARRY - ARKAN LOCATION - SEBAS SAMPLED BY - d.thor SAMPLE FROM - TEST MATERIAL DESC SOI	861 BE ASSI L SURVE SPECIFI TE WY.10-H OT APPI ISAS STIAN, Conton HOLE	CY SAMPLE CATION CHECK WY.96 (GREENWOOD LICABLE COUNTY		MATER SPEC. SUPPL COUNT DISTR (S) DATE DATE DATE DATE	YEAR IER ID. Y/STATE ICT NO. SAMPLE RECEIV	DE - SSRVPS - 2014 1 E - 65
LAB NUMBER	_	20220544	- 20	220545	- 20	220546
SAMPLE ID	_	S71	- S72		- S7	
TEST STATUS	_					FORMATION ONLY
STATION	-			8+00	- 50	
LOCATION	_			RT		RT
DEPTH IN FEET	_	0-5	- 0-		- 0-	
				/GR	_	/GR
MAT'L COLOR MAT'L TYPE	_	BR/GR	_ DK	/ GR	_ DK	/ GR
	- ana	3E 10 00 E0	_	25 10 20 50	-	25 12 44 50
LATITUDE DEG-MIN-				35 12 28.50		35 12 44.50
LONGITUDE DEG-MIN-	SEC -	94 15 34.60		94 15 34.50		94 15 11.70
% PASSING 2	IN		_		-	
1 1/2	IN		-		-	
3/4	IN		- 10	0.0	- 1	00
	IN		-	99		99
	4 -		-	96	1000	98
	10 -	100	-	92	_	95
	40 -	96		89	-	91
NO.		85		30		86
NO.		62		55		74
110.	200	02	`	33		7 1
LIQUID LIMIT	_	24	– N	D	- 3	
PLASTICITY INDEX	-	10	- N	P	- 1	2
AASHTO SOIL	_	A-4(3)	- A	-4(1)	- A	-6(7)
UNIFIED SOIL	_		-		_	
% MOISTURE CONTENT	_	18.1	-	17.3	_	20.7
ACHMSC	(IN) -	4.75W	-	2.0	-	12.0W
ACHMBC	(IN) -		-	2.0	-	
PCCP	(IN) -	6.0			-	8.0
AGG BASE CRS CL5	(IN) -		_	8.0	-	
			_		_	
	_		_		_	
	_		_		_	
	_		_		_	
	-		_		_	

REMARKS - X:STRIPPED W=MULTIPLE LAYERS

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PAUL TINSLEY, MATERIALS ENGINEER *** SOIL SURVEY / PAVEMENT SOUNDING TEST REPORT ***

	0011	,	1111 211211		ONDING IDD.	I KELOKI			
DATE - 06/ JOB NUMBER - 040 FEDERAL AID NO TO PURPOSE - SOI SPEC. REMARKS - NO SUPPLIER NAME - STA NAME OF PROJECT - H PROJECT ENGINEER - N PIT/QUARRY - ARKAN LOCATION - SEBAS SAMPLED BY - d.tho: SAMPLE FROM - TEST MATERIAL DESC SOI	BE ASSI IL SURVE SPECIFI ATE HWY.10-E NOT APPI NSAS STIAN, Cornton HOLE	Y SAMPLE CATION CH WY.96(GRE ICABLE	EENWOOD B			SEQUENC MATERIA SPEC. Y SUPPLIE COUNTY/ DISTRIC DATE SA DATE RE DATE TE	L CODE EAR R ID. STATE T NO.	- SSRV - 2014 - 1 - 65 - 04 - 04/0° - 04/0°	7/22 7/22
LAB NUMBER	_	20220547		_	20220548		20220)549	
SAMPLE ID	_	S74			S75		- S76	7545	
TEST STATUS	_		ION ONLY		INFORMATIO			RMATTON	ONLY
STATION	_	511+00		_	511+00		511+0		
LOCATION	_	05 LT		-	18 LT		- 30 L:		
DEPTH IN FEET	i — i	0-5		-	0-5		0-5		
MAT'L COLOR	h 	GRAY		_	GRAY		GRAY		
MAT'L TYPE	_			_					
LATITUDE DEG-MIN-	·SEC -	35 12	43.60	_	35 12	43.70	- 35	12 43	.80
LONGITUDE DEG-MIN-	SEC -	94 15	3.10		94 15	3.10	94	15 3	.10
3/4 3/8	IN IN IN 4 - 10 - 40 - 80 -	100 99 97 92 88 86 77			100 99 98 97 96 88		100 - 90 - 86 - 74 - 72 - 68 59		
PLASTICITY INDEX	_	5		-	6		- 11		
AASHTO SOIL	_	A-4(1)		-	A-4(3)		A-6	(4)	
UNIFIED SOIL	-			_			_		
% MOISTURE CONTENT	_	19.5		-	19.1		16	5.4	
ACHM SC	(IN) -	1.25		_	3.0W				
AGG BASE CRS CL7	(IN) -	2.0		-					
AGG BASE CRS CL5	(IN) -			_	6.0				
	_			_			-		
	_			_					
	_			_			_		
	-			-			_		
				_					
	_			_			_		

REMARKS - X:STRIPPED W=MULTIPLE LAYERS

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PAUL TINSLEY, MATERIALS ENGINEER

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

JOB NUMBER - 040 FEDERAL AID NO TO PURPOSE - SOI SPEC. REMARKS - NO SUPPLIER NAME - STA NAME OF PROJECT - H PROJECT ENGINEER - N PIT/QUARRY - ARKAN	BE ASSIGNED BE ASSIGNED BY ATE HWY.10-HWY.10	SAMPLE ATION CHECK Y.96(GREENWOOD B' CABLE JNTY		SPEC. YE SUPPLIER COUNTY/S DISTRICT DATE SAN DATE REC DATE TES	CODE - SSRVPS AR - 2014 ID 1 TATE - 65	22
LAB NUMBER SAMPLE ID TEST STATUS STATION LOCATION DEPTH IN FEET MAT'L COLOR MAT'L TYPE LATITUDE DEG-MIN-	- S - I - S - C - C	20220550 377 ENFORMATION ONLY 319+00 06 RT 0-5 GRAY 35 12 40.40	- 519+00 - 16 RT - 0-5 - BR/GR	- ATION ONLY -	20220552 S79 INFORMATION ON 519+00 25 RT 0-5 BR/GR	
LONGITUDE DEG-MIN- % PASSING 2 1 1/2 3/4	IN IN IN IN 10 - 40 - 80 -	94 14 54.10 100 90		12 40.40 - 14 54.10 - - - - - - -	100 99 94 87 81 77 68	
LIQUID LIMIT PLASTICITY INDEX AASHTO SOIL UNIFIED SOIL % MOISTURE CONTENT ACHM SC ACHM BC ACHM BC AGG BASE CRS CL5	(IN) - (IN) - (IN) - (IN) -	22 5 A-4(3) 32.1 9.5W 1.5 4.0 6.0	- 23 - 5 - A-4(2 - 17. - 4.0W - 6.0	_	30 8 A-4(4) 20.9 	

REMARKS - X:STRIPPED W=MULTIPLE LAYERS

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PAUL TINSLEY, MATERIALS ENGINEER

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

DATE - 06/23/22 JOB NUMBER - 040861 FEDERAL AID NO TO BE AS PURPOSE - SOIL SUR SPEC. REMARKS - NO SPECI SUPPLIER NAME - STATE NAME OF PROJECT - HWY.10 PROJECT ENGINEER - NOT AF PIT/QUARRY - ARKANSAS	SIGNED VEY SAMPLE FICATION CHECK -HWY.96(GREENWOOD BYPASS)(S)	SEQUENCE NO 8 MATERIAL CODE - SSRVPS SPEC. YEAR - 2014 SUPPLIER ID 1 COUNTY/STATE - 65 DISTRICT NO 04
LOCATION - SEBASTIAN, COUNTY SAMPLED BY - d.thornton SAMPLE FROM - TEST HOLE		DATE SAMPLED - 04/07/22 DATE RECEIVED - 04/07/22 DATE TESTED - 05/10/22
LAB NUMBER SAMPLE ID TEST STATUS STATION LOCATION DEPTH IN FEET MAT'L COLOR	RVEY - R VALUE- PAVEMENT SOUNDIN - 20220553 - 20220554 - RV80 - RV81 - INFORMATION ONLY - INFORMATI - 207+00 - 245+00 - 100'LT - 25'RT - 0-5 - 0-5 - GRAY - GAY - 35 12 31.30 - 35 12	-
LONGITUDE DEG-MIN-SEC % PASSING 2 IN.	- 94 15 25.50 94 14	42.40
NO. 80	- 92 - 100 - 85 - 100 - 68 - 93 - 55 - 87 - 47 - 82	- - - - - -
	- 25 - 24 - 8 - 7 - A-4(1) - A-4(1)	- - - -
V NOTOTONE CONTENT	- - - -	- - -
		- - - -
	- - -	-

REMARKS -

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