

ARKANSAS DEPARTMENT OF TRANSPORTATION



SUBSURFACE INVESTIGATION

STATE JOB NO. 020678

FEDERAL AID PROJECT NO. NCIP-2221(2)

HWY. 278 – HWY. 293 (S)

STATE HIGHWAY 569 SECTION 7

IN DREW 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.



December 15, 2021

TO: Mr. Rick Ellis, Bridge Engineer
SUBJECT: Job No. 020678
Interstate 69 over Cutoff Creek (Site 1) and Cutoff Creek Relief (Site 2)
Hwy. 278 – Hwy. 65 (S)
Drew County
Route 69, Section TBD

Introduction

Submitted herein are results of subsurface investigation and geotechnical recommendations for the proposed bridges planned on Interstate 69 (I-69) over Cutoff Creek (Site 1) and over Cutoff Creek Relief (Site 2) in Drew County. Recommendations for the bridge over US65 / UPRR (Site 4) have been provided in the report dated November 10, 2021. Access to Site 3 (Bayou Bartholomew) has not been obtained due to lack of consent from property owners. A geotechnical report for Site 3 will be provided utilizing information interpolated from adjacent prior projects performed in the Bayou area. Site specific exploration should be conducted to verify assumptions made in the aforementioned report.

This project includes constructing two (2) new bridges over Cutoff Creek and Cutoff Creek Relief for the proposed north bound lanes of I-69. The bridge over the Cutoff Creek consists of two (2) 300-ft. prestressed concrete girder unit (Type IV) with a total length of approximately 600 ft. and an out-to-out width of 45 feet. This bridge is comprised of six (6) 100-ft. equal spans. The bridge over the Cutoff Creek Relief also consists of Type IV prestressed concrete girder unit with an out-to-out width of 45 feet. The proposed Cutoff Creek Relief bridge has three (3) 85-ft. equal spans and a total length of approximately 255 feet.

2-Horizontal to 1-vertical (2H:1V) end slopes are planned for the abutments of both bridges while 3H:1V configuration is designed for the side slopes. Embankment height at the bridge abutments ranges from 11 to 12 feet. Dumped riprap will be utilized to protect the exterior abutment slopes of the bridges.

Field Investigation

A subsurface investigation was requested on October 9, 2020 by Bridge Division personnel to develop recommendations for bridge foundations and to verify suitability of bridge abutment embankment configuration. A total of eleven (11) borings were requested and eight (8) borings were drilled for the two (2) bridges. Three (3) requested borings were not performed due to site inaccessibility and relatively uniform subsurface conditions.

The approximate locations of the borings are presented in the Plans of Borings included in Attachment A. The borings were advanced with two (2) track-mounted Acker Renegade rotary drill rigs using a combination of hollow-stem auger and rotary wash methods. The boring logs, showing the subsurface conditions encountered in the borings and the results of field and laboratory tests, are also included in Attachment A, immediately following respective Plan of Borings. A Legend is attached after 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. Correction factors for the hammers are indicated on the boring logs. Liners were not used inside the standard split-barrel samplers.

The number of blows required to drive the standard split-barrel sampler for each 6-inch penetration of the total 18-inch drive were counted and 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 count measured in field.

Undisturbed samples of cohesive soils were obtained for laboratory determination of engineering properties using thin-wall tube samplers (Shelby tubes) hydraulically inserted into the subsurface soils. 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. These 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. Strength of cohesive soils was evaluated by unconsolidated-undrained (UU) triaxial compression tests on undisturbed Shelby tube samples.

The laboratory test results are presented in Attachment B. The laboratory test and their corresponding ASTM and AASHTO test methods are listed in Table 1.

Table 1: Summary of Laboratory Tests and Methods

Laboratory Test	ASTM	AASHTO
Moisture Content	D2216	T 265
Grain Size Analysis by Sieving	D6913	T 88
Atterberg Limits	D4318	T 89 and T 90
UU Triaxial Compression	D2850	T 296

Site Conditions

The proposed structures are to be constructed over Cutoff Creek and Cutoff Creek Relief. The areas for the proposed job sites are moderately wooded and occupy a flat-bottomed valley that is approximately 20 feet deep. The valley was most likely formed by a water way much larger than what currently exists. Water in the creek and relief was shallow and nearly stagnant (September 2021). Selected pictures of the Cutoff Creek site are included as Attachment C.

Site Geology and General Subsurface Conditions

The valley is located on a Pleistocene terrace deposits mapped as the Prairie Complex. The alluvial deposits range in thickness from 20 to 30 ft. and grade upwards from sand with silt and gravel to lean clay and silt near the surface.



The alluvial deposits are underlain by brown to greenish gray silt, silty clay, and lean clay. This layer may represent a layer of loess. The loess is underlain by sands and gravels of the valley train deposits. These deposits were encountered from 40 to 50 ft. below ground level. The valley train deposits consist primarily of sand with silt. Many samples in this zone contain some amount of gravel.

The valley train deposits are underlain by Paleogene-aged White Bluff Formation of the Jackson Group. The White Bluff Formation has three dominate facies: an argillaceous sand containing glauconite (Pastoria Sand Member), a calcareous glauconitic clay (Caney Point Marl Member), and a blocky clay with some silt and a trace of sand (Rison Clay Member). A minor disconformity occurs at the base of the Jackson Group sequence. The thickness of the Jackson Group may be 300 feet. Paleogene deposits of the Jackson Group were encountered in two (2) borings during the subsurface investigation at approximately 100 and 110 ft. below ground level and are composed primarily of clay that may represent the Caney Point Marl Member. Six (6) other borings were drilled to 101.5 feet below ground level without encountering the Paleogene deposits.

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 project site. Utilizing the Seismic Site Class D and the approximate GPS coordinates of the project site, 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 2. Design Response Spectrum is presented in Attachment D.

Table 2: Summary of Design Ground Motion Acceleration Response Coefficients

Acceleration Coefficient	Value (g)
A_S (Site PGA)	0.145
S_{DS} (0.2 sec)	0.338
S_{D1} (1 sec)	0.177

For the design long-period spectral acceleration coefficient (S_{D1}) of 0.177, a **Seismic Performance Zone 2** is considered applicable to the project site.

Liquefaction potential of the subsurface soils were evaluated based on the results of the borings and utilizing the current Microsoft Excel[®] spreadsheet developed by University of Arkansas for ARDOT. An earthquake Moment Magnitude (M_w) of 7.5 and the design peak ground acceleration coefficient (A_S) of 0.145g were modelled in the analysis. The results of the Boring 7 were chosen for liquefaction analyses. This boring was advanced in excess of 100 ft. in the approximate middle of the bridge alignments. The results of liquefaction analyses are presented in Attachment D as a plot of calculated factor of safety against liquefaction versus depth below existing ground surface at the boring location. The analyses indicate overall low liquefaction potential for the project sites with a localized liquefiable zone.



Approach Embankments

Subgrade Preparation / Ground Improvements. As noted, 2H:1V end slopes are planned for the abutments of both bridges while 3H:1V configuration is designed for the side slopes. Maximum abutment embankment height ranges from 11 to 12 feet.

To provide a stable construction platform and to reduce potential of consolidation settlement, it is recommended the subgrade in the bridge abutments be undercut at least 3 ft. below the existing ground surface. Undercut at each abutment should extend at least 5 ft. in front of the toe of the end slope, 5 ft. beyond the toes of the side slopes, and 50 ft. behind the crest of the end slope.

Undercut backfill should be comprised of a well-graded clean sand layer to facilitate drainage of the excess pore water pressure generated by embankment loading. The drainage sand layer should extend up from the undercut bottom to at least 2 ft. above the ground surface. Fine Aggregate for concrete, as specified in Subsection 802.02(b) of the Standard Specification (2014), is suitable for this use.

With recommended minimum 3 ft. of undercut and backfill, it is expected settlement induced by embankment fill will be primarily immediate / elastic at the west abutment (Bent 1) of the Cutoff Creek structure and both abutments of the Cutoff Creek Relief structure (Site 2). This immediate / elastic settlement is anticipated to occur shortly after fill placement. At the east abutment (Bent 7) of the Cutoff Creek structure, some consolidation settlement, estimated to be up to 2 inches, is also expected in addition to immediate / elastic settlement. The consolidation settlement is expected to complete essentially within 4 to 6 weeks. It is recommended embankment fill placement be started as soon as possible to allow for consolidation settlement to occur.

The entire embankment, regardless of the embankment at the bridge abutments or general roadway embankment, should be constructed of fill materials complying with the job Special Provision (Attachment E).

Settlement Monitoring at Bent 7 of Site 1. It is recommended a settlement monitoring program using settlement plates or other suitable methods be implemented at Bent 7 (east abutment) of Site 1 to monitor settlement. Recorded settlement measurements should be forwarded to the Geotechnical Engineer to evaluate if the required consolidation has completed and whether it is ready for piling to commence. Detailed setup of the settlement plate system can be found in the geotechnical report dated November 10, 2021 for Site 4. A minimum of one (1) settlement plate should be installed in area of the deepest fill.

Abutment Configuration. Stability analyses have been performed to evaluate the design abutment embankment configuration of both bridges. The slope stability analyses were performed utilizing a commercial computer program Slide2 (Version 2021) developed by RocScience. Spencer analysis method was chosen in the analyses. 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



0.073 ($0.5A_S/g$), was utilized for analysis of the Seismic / Pseudo-Static Condition. A surcharge of 250 psf is included to model the live load.

Slope stability analyses were performed on the 12-ft.-tall, 2H:1V end slope at the east abutment (Bent 7) of Site 1 to evaluate suitability of the plan configuration. This end slope is considered the most critical case with regard to slope stability. Subgrade soils in the abutment embankment footprint are assumed to be the onsite soils conservatively, without considering ground improvements.

The results of these analyses are summarized below in Table 3. These results are presented graphically in Attachment F.

Table 3: Slope Stability at East Abutment (Bent 7) of Site 1

Slope	Loading Condition	Calculated Min. F.S.	Recommended Min. F.S.
2H:1V End Slope at Bent 7 of Site 1	Short Term	4.00	1.3
	Long Term	1.54	1.5
	Seismic ($k_n = 0.073$)	1.30	1.1

The results of stability analyses indicate the planned 2H:1V end slopes are stable. Analyses were not performed on the planned 3H:1V side slopes because the side slopes are flatter and are therefore expected to be stable.

Deep Foundations

Based on the conversations with Bridge designers, it is understood that 18-in.-diameter, close-ended, steel shell piles are to be utilized to support the foundation loads at the abutments. Nominal axial compression capacity of 225 tons is required for the 18-in.-diameter piles. Foundation loads of the intermediate bents will be supported on 24-in.-diameter, close-ended, steel shell piles. For the 24-in.-diameter piles planned at the intermediate bents, nominal axial compression capacity of 350 to 400 tons is required.

Nominal axial capacities (compression and uplift) vs. pile tip penetration / elevation curves for single, 18-in.-diameter and 24-in.-diameter steel shell piles are provided in Attachment G and Attachment H for Site 1 and Site 2, respectively. These nominal axial capacities have been calculated using static analysis method. For single, isolated foundations, a resistance factor (ϕ_{stat}) of 0.45 is recommended for calculating factored compression resistance and a resistance factor (ϕ_{up}) of 0.35 is recommended for determining factored uplift resistance.

Based on the axial pile capacity curves, it is determined the following shallowest pile tip elevation will be required to obtain the nominal compression capacity of 225 tons for the 18-in.-diameter piles at the bridge abutments.



Table 4: Summary of Estimated Shallowest Pile Tip Elevation – Abutment Piles

Structure	Bent No.	Boring No.	Estimated Shallowest Pile Tip Elevation, ft.	Comments
Site 1 (Cutoff Creek)	1	1	95	52 ft. below ground surf.
	7	7	100	49 ft. below ground surf.
Site 2 (Cutoff Creek Relief)	1	8	88	60 ft. below ground surf.
	4	11	93	55 ft. below ground surf.

For the 24-in.-diameter piles at the intermediate bents, the following shortest pile length will be required to achieve the nominal compression capacity of 350 tons and 400 tons, respectively.

Table 5: Summary of Estimated Shortest Pile Tip Penetration – Intermediate Bent Piles

Structure	Bent No.	Boring No.	Required Nominal Compression Capacity, tons	Estimated Shortest Pile Length, ft.
Site 1 (Cutoff Creek)	2 and 3	2*	350	47
			400	51
	4, 5 and 6	5*	350	66
			400	68
Site 2 (Cutoff Creek Relief)	2	8	350	62
			400	64
	3	11	350	54
			400	56

*. A mechanical problem was found to occur with the hammer used to perform Borings 3 and 4 and hammer efficiency was not reliable. Results of Borings 3 and 4 should be used for information only.

The nominal axial pile capacity curves are developed based on the assumption that downdrag is negligible. Piling should be commenced after the required consolidation settlement is determined to be complete. Settlement plate recordings should be provided to Materials Division to evaluate if the required consolidation is complete. If piles are to be driven before the required consolidation is complete, the axial pile capacities provided in Attachment G and Attachment H should be re-evaluated. In addition, these capacities are determined for piles driven to the required penetration / elevation. If jetting or other methods are used to assist in advancing the piles, re-evaluation of these pile capacities will be warranted.

The nominal capacities are based on single, isolated foundations. Group effect on pile resistance should be evaluated in accordance with AASHTO LRFD Sections 10.7.3.9 and 10.7.3.10 for compression resistance and uplift resistance respectively. For evaluation of pile group settlement, Sections 10.7.2.3 applies. Materials Division is available to assist in evaluating group effect upon request when detailed pile group configuration is provided.



To verify in field the calculated nominal axial pile compression capacity, it is recommended a minimum of one (1) static load test be performed at an abutment bent (e.g., Bent 7 of Site 1) and at an intermediate bent (e.g., Bent 5 of Site 1). The pile load tests should be performed in accordance with ASTM D1143 Quick Load Test Procedure as specified in AASHTO LRFD Section 10.7.3.8.2. Piles subjected to static load tests, if loaded well before the ultimate structural capacity of the piles is reached, can be used as production piles. Bridge Division should make the decision whether these piles are suitable to be incorporated into the foundation system or not, depending on the magnitude of test load versus ultimate structure capacity of the piles.

Dynamic testing can be performed as an alternative to static load tests. Dynamic testing, if selected to be performed, should be conducted in accordance with ASTM D4945 as specified in AASHTO LRFD Section 10.7.3.8.3. Materials Division recommends a minimum of 2 percent of the production piles be subject to dynamic testing. Piles from each bent should be tested. Dynamic testing should be performed on the test piles at the end of initial drive as well as after a restrike. Due to the high plasticity of the clay, Materials Division recommends a restrike test be performed at least seven (7) days after the initial drive. Test piles subjected to dynamic testing are suitable for use as production piles to support foundation loads.

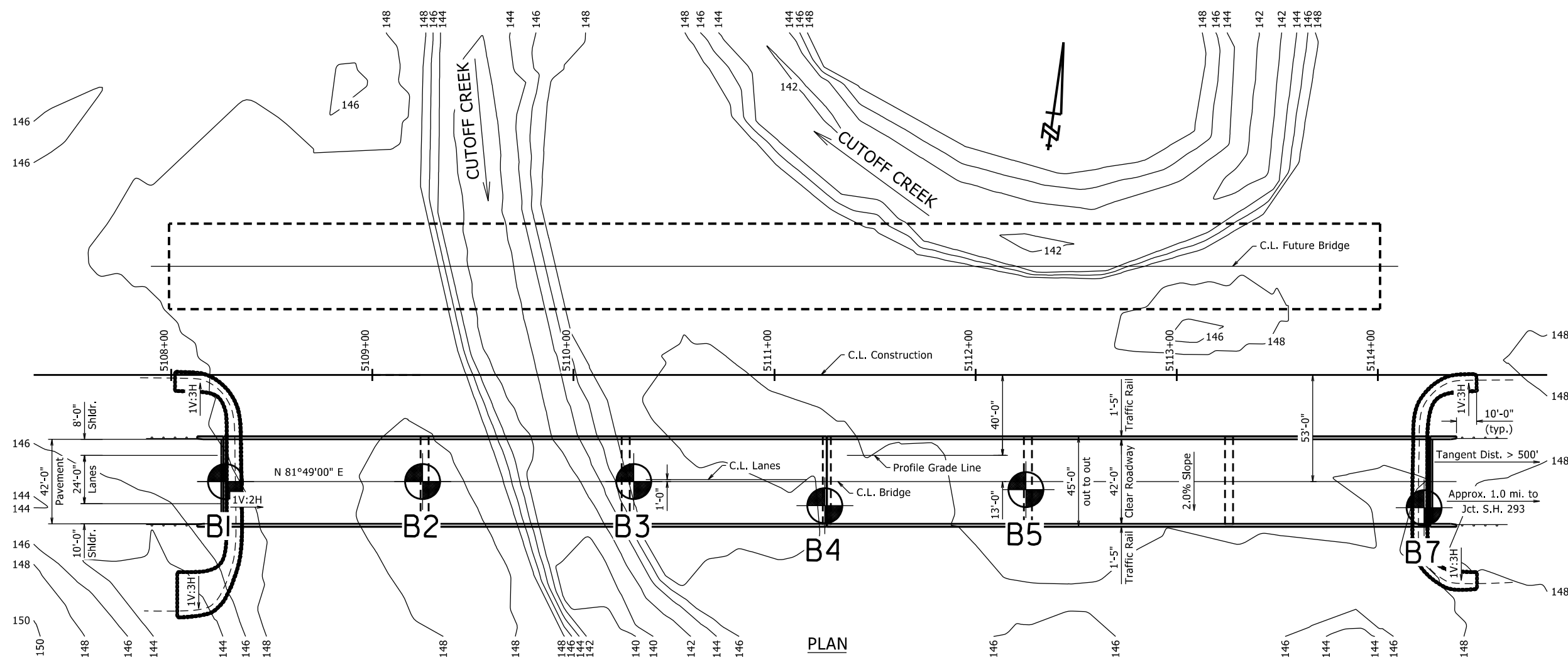
It is understood driveability analysis and lateral load analysis will be performed by Bridge Division. Materials Division is available to provide geotechnical input parameters upon request.


Jonathan A. Annable
Materials Engineer

JAA:yz:mlg:pjt:jcs:pwc
cc: State Construction Engineer
District 2 Engineer
Roadway Design Engineer
G. C. File

Attachment A

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
6	AR			
JOB NO.		020678		
PLAN OF BORINGS				



PLAN

CUTOFF CREEK			
BORING	STATION	OFFSET	ELEVATION
B1	5108+27	53' RT	147.10
B2	5109+25	53' RT	146.40
B3	5110+30	53' RT	148.80
B4	5111+25	65' RT	148.20
B5	5112+25	57' RT	148.50
B7	5114+23	66' RT	148.50

PLAN OF BORINGS	
HWY. 278 - HWY. 65 (S) ROUTE 69, SECTION X DREW & DESHA COUNTIES FED. AID PROJECT	
JOB NO. 020678	SHEET 1/1
SCALE: 1"=60'	

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

BORING NO. 1
PAGE 1 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5108+27
LOCATION: 53' Right of Construction Centerlie
LOGGED BY: Coty Campbell

DATE: October 11 and 12, 2021
TYPE OF DRILLING: Shelby -
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%)										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
					PL	+-----+ LL												
			SURFACE ELEVATION: 147.1															
			Brown Silt with Some Organic Matter (Wood)	ML														
			Light Brown Silt	ML														
			Moist, Loose, Brown Sandy Silt	-										2	4-3			
5			Brown Lean Clay with Sand	CL										83				
			Moist, Medium Dense, Brown Silt															
10			Moist, Medium Dense, Brown Sandy Silt															
			Moist, Medium Dense, Brown Sandy Silt															
15			Wet, Medium Dense, Light Brown Silty Fine Sand															
			Wet, Medium Dense, Light Brown Silty Fine Sand															
20			Wet, Very Loose, Silty Sand with Some Gravel															
			Wet, Very Loose, Silty Sand with Some Gravel															
25			Wet, Very Loose, Brown Silt															
			Wet, Very Loose, Brown Silt															
30			Moist, Stiff, Greenish Gray Silty Clay															
			Moist, Stiff, Greenish Gray Silty Clay															
35																		

REMARKS: Cutoff Creek

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

BORING NO. 1
PAGE 2 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5108+27
LOCATION: 53' Right of Construction Centerlie
LOGGED BY: Coty Campbell

DATE: October 11 and 12, 2021
TYPE OF DRILLING: Shelby -
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 147.1															
40			Moist, Very Stiff, Greenish Gray Silty Clay with Trace Poorly Cemented Nodules													4 8-8		
45			Moist, Very Stiff, Greenish Gray Silty Clay													10 11-14		
50			Moist, Medium Dense, Greenish Gray Silt													7 13-11		
55			Wet, Dense, Light Brown Silty Sand													15 19-20		
60			Wet, Dense, Brown Sand with Silt													8 14-21		
65			Wet, Dense, Brown Sand with Silt and Trace Gravel													13 23-29		
70			Wet, Dense, Light Brown Sand with Silt and Some Gravel													5 15-30		

REMARKS: Cutoff Creek

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

BORING NO. 1
PAGE 3 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5108+27
LOCATION: 53' Right of Construction Centerlie
LOGGED BY: Coty Campbell

DATE: October 11 and 12, 2021
TYPE OF DRILLING: Shelby -
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 147.1															
75		X	Wet, Dense, Light Brown Sand with Silt and Trace Gravel													9 18-24		
80		X	Wet, Dense, Light Brown Sand with Silt and Gravel													8 11-16		
85		X	Wet, Dense, Light Brown Sand with Silt and Gravel													11 16-18		
90		X	Wet, Dense, Brown Sand with Silt and Trace Gravel													9 18-30		
95		X	Wet, Very Dense, Brown Sand with Silt and Trace Gravel													15 39-50		
100		X	Wet, Dense, Brown Sand with Silt and Some Gravel													9 20-25		
		X	Wet, Very Dense, Brown Sand with Silt and Trace Gravel													14 22-32		
			Boring Terminated															
105																		

REMARKS: Cutoff Creek

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

BORING NO. 2
PAGE 1 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5109+25
LOCATION: 53' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: October 13, 2021
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%)										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 146.4															
5			Moist, Stiff, Brown Clay	CL										87	3			5-8
10			Moist, Medium Dense, Light Brown Silty Fine Sand	SM										27	7			12-16
15			Wet, Loose, Light Brown Silty Fine Sand												4			5-4
20			Wet, Very Loose, Light Brown Silty Fine Sand with Some Gravel												2			1-2
25			Wet, Very Loose, Gray Silt												0			0-0
30			Moist, Very Stiff, Greenish Gray Silty Clay with Some Poorly Cemented Nodules												5			8-9
35																		

REMARKS:

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

BORING NO. 2
PAGE 2 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5109+25
LOCATION: 53' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: October 13, 2021
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●											PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 146.4																
40			Moist, Very Stiff, Greenish Gray Silty Clay														6 10-15		
45			Wet, Medium Dense, Dark Gray Silty Sand														7 10-11		
50			Wet, Medium Dense, Reddish Brown Sand with Silt and Trace Gravel														11 14-15		
55			Wet, Medium Dense, Reddish Brown Sand with Silt and Trace Gravel														9 13-16		
60			Wet, Dense, Light Brown Sand with Silt														8 20-25		
65			Wet, Medium Dense, Light Brown Sand with Silt and Trace Gravel														6 9-12		
70			Wet, Dense, Brown Sand with Silt and Trace Gravel														10 17-25		

REMARKS:

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

BORING NO. 2
PAGE 3 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5109+25
LOCATION: 53' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: October 13, 2021
TYPE OF DRILLING:
Hollow Stem Auger - Diamond Core
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 146.4															
75		X	Wet, Medium Dense, Brown Sand with Silt and Some Gravel													6 10-15		
80		X	Wet, Very Dense, Brown Sand with Silt and Trace Gravel													9 23-30		
85		X	Wet, Medium Dense, Brown Sand with Silt and Gravel													13 15-15		
90		X	Wet, Dense, Brown Sand with Silt and Gravel													10 12-15		
95		X	Wet, Medium Dense, Brown Sand with Silt and Some Gravel													6 11-18		
100		X	Wet, Dense, Brown Sand with Silt and Gravel													10 20-25		
		X	Wet, Dense, Gray Sand with Silt and Gravel													10 15-19		
			Boring Terminated															
105																		

REMARKS:

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

BORING NO. 3
PAGE 1 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5110+30
LOCATION: 53' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: September 14, 2021
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: 0.62

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 148.8															
5		⊗	Dry, Very Loose, Brown Fine Sand with Silt	-														
				-														
				-														
10		⊗	Moist, Loose, Gray Silt with Fine Sand	ML										71	3			
				-														
15		⊗	Moist, Medium Dense, Brown Poorly Graded Fine Sand with Silt	SP-SM														
				-														
20		⊗	Wet, Medium Dense, Light Brown Poorly Graded Sand with Silt and Some Gravel	SP-SM														
				-														
25		⊗	Wet, Very Loose, Brown Silt	ML														
				-														
30		⊗	Moist, Medium Dense, Greenish Gray Silt	ML														
				-														
35																		

REMARKS: A mechanical problem was found to occur with the hammer used to perform this boring and hammer efficiency was not reliable. Results of this boring should be used for information only

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

BORING NO. 3
PAGE 2 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5110+30
LOCATION: 53' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: September 14, 2021
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: 0.62

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%)										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 148.8															
40			Moist, Very Stiff, Greenish Gray Lean Clay	CL											98	8 15-20		
45			Wet, Dense, Dark Brown Silty Fine Sand with Some Poorly Cemented Sand Nodules	SM											13	15 28-35		
50			Wet, Medium Dense, Dark Brown Silty Fine Sand with Some Poorly Cemented Sand Nodules	SM											46	12 25-22		
55			Wet, Medium Dense, Light Brown Poorly Graded Fine Sand with Silt and Trace Gravel	SP-SM											6	10 19-10		
60			Wet, Medium Dense, Light Brown Poorly Graded Fine Sand with Silt and Trace Gravel and Cobbles	SP-SM											5	10 19-23		
65			Wet, Medium Dense, Light Brown Poorly Graded Sand with Silt and Gravel	SP-SM											5	12 19-20		
70			Wet, Medium Dense, Light Brown Poorly Graded Sand with Some Gravel	SP											4	26 24-24		

REMARKS: Cutoff Creek

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

BORING NO. 3
PAGE 3 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5110+30
LOCATION: 53' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: September 14, 2021
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: 0.62

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●											PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 148.8																
75		X	Wet, Very Dense, Light Brown Poorly Graded Sand with Silt and Gravel	SP-SM											5	25 38-58			
80		X	Wet, Very Dense, Light Brown Poorly Graded Sand with Silt	SP-SM											5	12 32-50			
85		X	Wet, Dense, Light Brown Poorly Graded Sand with Silt and Some Gravel	SP-SM											5	15 27-40			
90		X	Wet, Dense, Light Brown Poorly Graded Sand with Silt and Some Gravel	SP-SM											6	20 30-36			
95		X	Wet, Very Dense, Poorly Graded Sand with Silt and Gravel	SP-SM											6	35 36-96			
100		X	Wet, Very Dense, Brown Poorly Graded Fine Sand with Silt and Some Gravel	SP-SM											8	44 85-97			
		X	Wet, Very Dense, Poorly Graded Sand with Silt and Gravel	SP-SM											6	42 48-63			
			Boring Terminated																
105																			

REMARKS: Cutoff Creek

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

BORING NO. 4
PAGE 1 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5111+25
LOCATION: 65' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: September 20, 2021
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%)											PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-	-				
SURFACE ELEVATION: 148.2																			
5																			
			Wet, Medium Dense Brown Sandy Silt														5	6-7	
10																	4	5-7	
15																	3	10-11	
20			Wet, Medium Dense, Brown Silty Fine Sand														7	7-10	
25			Wet, Medium Dense, Brown Fine Sand with Silt and Gravel														1	1-1	
30			Wet, Very Loose, Brown Silt														3	5-8	
35																			

REMARKS: A mechanical problem was found to occur with the hammer used to perform this boring and hammer efficiency was not reliable. Results of this boring should be used for information only

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

BORING NO. 4
PAGE 2 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5111+25
LOCATION: 65' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: September 20, 2021
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 148.2															
40			Wet, Stiff, Greenish Gray Silty Clay													4	5-6	
45			Wet, Very Stiff, Greenish Gray Silty Clay													5	7-9	
50			Wet, Medium Dense, Dark Brown Silty Fine Sand													7	12-14	
55			Wet, Medium Dense, Light Brown Fine Sand with Silt													9	14-11	
60			Wet, Medium Dense, Light Brown Fine Sand with Silt and Some Gravel													7	13-13	
65			Wet, Dense, Light Brown Fine Sand with Silt and Some Gravel													14	23-23	
70																		

REMARKS: Cutoff Creek

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

BORING NO. 4
PAGE 3 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5111+25
LOCATION: 65' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: September 20, 2021
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 148.2															
75		X	Wet, Medium Dense, Light Brown Fine Sand with Silt and Trace Gravel													11 12-12		
80		X	Wet, Dense, Light Brown Fine Sand with Silt and Trace Gravel													10 23-26		
85		X	Wet, Dense, Light Brown Sand with Silt													14 18-20		
90		X	Wet, Very Dense, Light Brown Sand with Silt and Some Gravel													17 33-42		
95		X	Wet, Dense, Light Brown Sand with Silt and Trace Gravel													9 16-22		
100		X	Wet, Very Dense, Light Brown Sand with Silt and Trace Gravel													11 19-32		
		X														14 26-31		
			Boring Terminated															
105																		

REMARKS: Cutoff Creek

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

BORING NO. 5

PAGE 1 OF 4

JOB NO. 020678 Desha and Drew Counties
 JOB NAME: Hwy. 278 - Hwy. 65 (S)
 Route 69, Section X
 STATION: 5112+25
 LOCATION: 57' Right of Construction Centerline
 LOGGED BY: Anthony Nicholson

DATE: September 14, 20, and 21, 2021
 TYPE OF DRILLING:
 Hollow Stem Auger - Rotary Wash
 EQUIPMENT: Acker 1
 HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 121.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 148.5															
			Moist, Loose, Brown Silty Fine Sand													3		
																3-2		
																2		
			Moist, Medium Dense, Brown Silty Fine Sand													3-4		
5																3		
																6-6		
																4		
																5-5		
																0		
																4-5		
																3		
10			Moist, Loose, Brown Silty Fine Sand													3-5		
																1		
																5-5		
15																		
			Wet, Medium Dense, Silty Fine Sand													3		
																8-11		
20																		
			Wet, Medium Dense, Brown Fine Sand with Silt													5		
																8-7		
25																		
			Wet, Very Loose, Gray Gravel with Sand													1		
																2-1		
30																		
35																4		
																7-10		

REMARKS: Cutoff Creek

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

BORING NO. 5

PAGE 2 OF 4

JOB NO. 020678 Desha and Drew Counties
 JOB NAME: Hwy. 278 - Hwy. 65 (S)
 Route 69, Section X
 STATION: 5112+25
 LOCATION: 57' Right of Construction Centerline
 LOGGED BY: Anthony Nicholson

DATE: September 14, 20, and 21, 2021
 TYPE OF DRILLING:
 Hollow Stem Auger - Rotary Wash
 EQUIPMENT: Acker 1
 HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 121.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●											PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 148.5																
40			Moist, Very Stiff, Greenish Gray Silty Clay														4		
																	7-9		
45																	7		
																	10-16		
50			Wet, Medium Dense, Dark Brown Silty Fine Sand														7		
																	15-9		
55																	5		
																	6-8		
60			Wet, Medium Dense, Light Reddish Brown Fine Sand with Silt and Trace Gravel														5		
																	8-7		
65			Wet, Medium Dense, Light Brown Fine Sand with Silt														6		
																	8-10		
70			Wet, Very Dense, Light Brown Fine Sand with Silt														13		
																	29-32		

REMARKS: Cutoff Creek

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

BORING NO. 5
PAGE 3 OF 4

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5112+25
LOCATION: 57' Right of Construction Centerline
LOGGED BY: Anthony Nicholson

DATE: September 14, 20, and 21, 2021
TYPE OF DRILLING:
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 1
HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 121.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 148.5															
75		X	Wet, Dense, Light Brown Fine Sand with Silt and Trace Gravel													10 16-20		
80		X	Wet, Dense, Light Brown Sand with Silt and Trace Gravel													10 15-17		
85		X	Wet, Very Dense, Light Brown Fine Sand with Silt and Trace Gravel													18 29-36		
90		X	Wet, Loose, Light Brown Fine Sand with Silt and Some Gravel													3 5-5		
95		X	Wet, Medium Dense, Light Brown Fine Sand with Silt and Some Gravel													8 13-16		
100		X	Wet, Medium Dense, Brown Fine Sand with Silt and Gravel													6 11-10		
105		X	Wet, Dense, Brown Fine Sand with													8 20-26		

REMARKS: Cutoff Creek

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

BORING NO. 5

PAGE 4 OF 4

JOB NO. 020678 Desha and Drew Counties
 JOB NAME: Hwy. 278 - Hwy. 65 (S)
 Route 69, Section X
 STATION: 5112+25
 LOCATION: 57' Right of Construction Centerline
 LOGGED BY: Anthony Nicholson

DATE: September 14, 20, and 21, 2021
 TYPE OF DRILLING:
 Hollow Stem Auger - Rotary Wash
 EQUIPMENT: Acker 1
 HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 121.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 148.5															
110		X	Silt and Gravel												15			
															18-16			
115		X	Moist, Very Stiff, Gray Clay (Jackson Group)												8			
															13-17			
120		X													5			
															9-15			
125			Boring Terminated												9			
															11-16			
130																		
135																		
140																		

REMARKS: Cutoff Creek

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

BORING NO. 7

PAGE 1 OF 3

JOB NO. 020678 Desha and Drew Counties
 JOB NAME: Hwy. 278 - Hwy. 65 (S)
 Route 69, Section X
 STATION: 5114+23
 LOCATION: 66' Right of Construction Centerline
 LOGGED BY: Anthony Nicholson

DATE: September 22 and 27, 2021
 TYPE OF DRILLING: Shelby -
 Hollow Stem Auger - Rotary Wash
 EQUIPMENT: Acker 1
 HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●						PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	+	LL				
			SURFACE ELEVATION: 148.5											
			Moist, Brown Lean Clay with Some Manganese Nodules	CL	●	+	-	-	+		94			
			Moist, Stiff, Brown Lean Clay	CL		+	+				93	1		
			Moist, Brown Lean Clay with Sand Some Manganese Nodules	CL	●	+	+				82	5-4		
5			Wet, Medium Stiff, Brown Lean Clay with Sand and Some Manganese Nodules	CL		+	-	+			81	1		
			Wet, Medium Stiff, Brown Clay with Sand and Some Manganese Nodules	CL		+	+				80	4-3		
			Wet, Medium Stiff, Brown Clay with Sand and Some Manganese Nodules	SM							41	3		
10			Wet, Medium Dense, Brown Silty Fine Sand with Some Manganese Nodules	-								5-4		
			Wet, Medium Dense, Brown Silty Fine Sand with Some Manganese Nodules	-								3		
15			Wet, Very Loose, Dark Brown Sandy Silt with Trace Organic Matter (Wood)	ML							50	5-7		
			Wet, Very Loose, Dark Brown Sandy Silt with Trace Organic Matter (Wood)	-								2		
20			Wet, Soft, Brown and Gray Lean Clay with Sand	CL		+	-	-	+		77	2-2		
			Wet, Soft, Brown and Gray Lean Clay with Sand	-								3		
25			Wet, Very Loose, Brown Silty Sand with Some Gravel (No recovery)*	-								2-2		
			Wet, Very Loose, Brown Silty Sand with Some Gravel (No recovery)*	-								0		
30			Moist, Medium Dense, Greenish Gray Silt	ML			+	-	+		99	1-1		
			Moist, Medium Dense, Greenish Gray Silt	-								3		
35												6-8		

REMARKS: Cutoff Creek
 * Split spoon blocked off by gravel.

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

BORING NO. 7
PAGE 2 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5114+23
LOCATION: 66' Right of Construction Centerline
LOGGED BY: Anthony Nicholson

DATE: September 22 and 27, 2021
TYPE OF DRILLING: Shelby -
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 1
HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
					PL	-----+-----												
			SURFACE ELEVATION: 148.5															
40		⊗	Moist, Medium Dense, Greenish Gray Silt	ML			+	-	+					98	3			
				-											5-8			
45		⊗	Moist, Very Hard, Greenish Gray Silty Clay with Sand (Poorly Cemented Nodules)	CL-ML			+	+						77	9			
				-											17-44			
50		⊗	Wet, Medium Dense, Brown Silt with Fine Sand and Trace Gravel	ML										83	7			
				-											14-16			
55		⊗	Wet, Medium Dense, Brown Silty Fine Sand	SM										16	9			
				-											12-14			
60		⊗	Wet, Medium Dense, Brown Poorly Graded Fine Sand with Silt and Trace Gravel	SP-SM										5	10			
				-											11-18			
65		⊗	Wet, Medium Dense, Light Brown Poorly Graded Sand with Silt and Trace Gravel	SP-SM										5	6			
				-											12-15			
70		⊗	Wet, Medium Dense, Light Brown Sand with Gravel	SP										3	6			
				-											9-10			

REMARKS: Cutoff Creek
* Split spoon blocked off by gravel.

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

BORING NO. 7

PAGE 3 OF 3

JOB NO. 020678 Desha and Drew Counties
 JOB NAME: Hwy. 278 - Hwy. 65 (S)
 Route 69, Section X
 STATION: 5114+23
 LOCATION: 66' Right of Construction Centerline
 LOGGED BY: Anthony Nicholson

DATE: September 22 and 27, 2021
 TYPE OF DRILLING: Shelby -
 Hollow Stem Auger - Rotary Wash
 EQUIPMENT: Acker 1
 HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D	
					PL	+	-	-	-	-	-	-	-	-					-
			SURFACE ELEVATION: 148.5																
75		X	Wet, Very Dense, Light Brown Poorly Graded Sand with Silt and Some Gravel	SP-SM												6	9 20-31		
				-															
80		X	Wet, Medium Dense, Light Brown Sand with Silt and Gravel	SP-SM												6	8 14-15		
				-															
85		X	Wet, Medium Dense, Light Brown Sand with Gravel	SP												4	8 12-14		
				-															
90		X	Wet, Dense, Light Brown Well Graded Sand with Gravel	SW												4	9 13-20		
				-															
95		X	Wet, Medium Dense, Brown Sand with Gravel	SP												3	2 7-7		
				-															
100		X	Wet, Medium Dense, Brown Fine Sand with Some Gravel	SP												4	6 10-15		
				-															
		X	Wet, Dense, Gray Poorly Graded Sand with Silt and Gravel	SP-SM												5	14 23-26		
			Boring Terminated																
105																			

REMARKS: Cutoff Creek
 * Split spoon blocked off by gravel.

LEGEND

SOIL TYPES

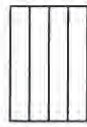
(SHOWN IN SYMBOL COLUMN)
(PREDOMINANT TYPE SHOWN HEAVY)



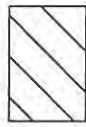
GRAVEL



SAND



SILT



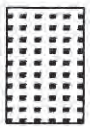
CLAY



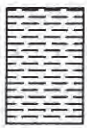
ORGANIC
MATTER

ROCK TYPES

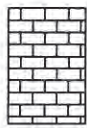
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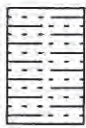
SANDSTONE



SHALE
or
SILTSTONE



LIMESTONE
or
DOLOMITE



ALTERNATING
LAYERS of
SHALE and
SANDSTONE



OTHER

SAMPLER TYPES

(SHOWN IN SAMPLE COLUMN)

SHELBY TUBE



UNDISTURBED
SAMPLE
RECOVERY



DISTURBED
SAMPLE
RECOVERY

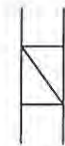


NO
RECOVERY

SPLIT SPOON

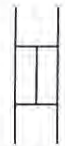


SAMPLE
RECOVERY



NO
RECOVERY

ROCK CORING



% RECOVERY
INDICATED ON LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

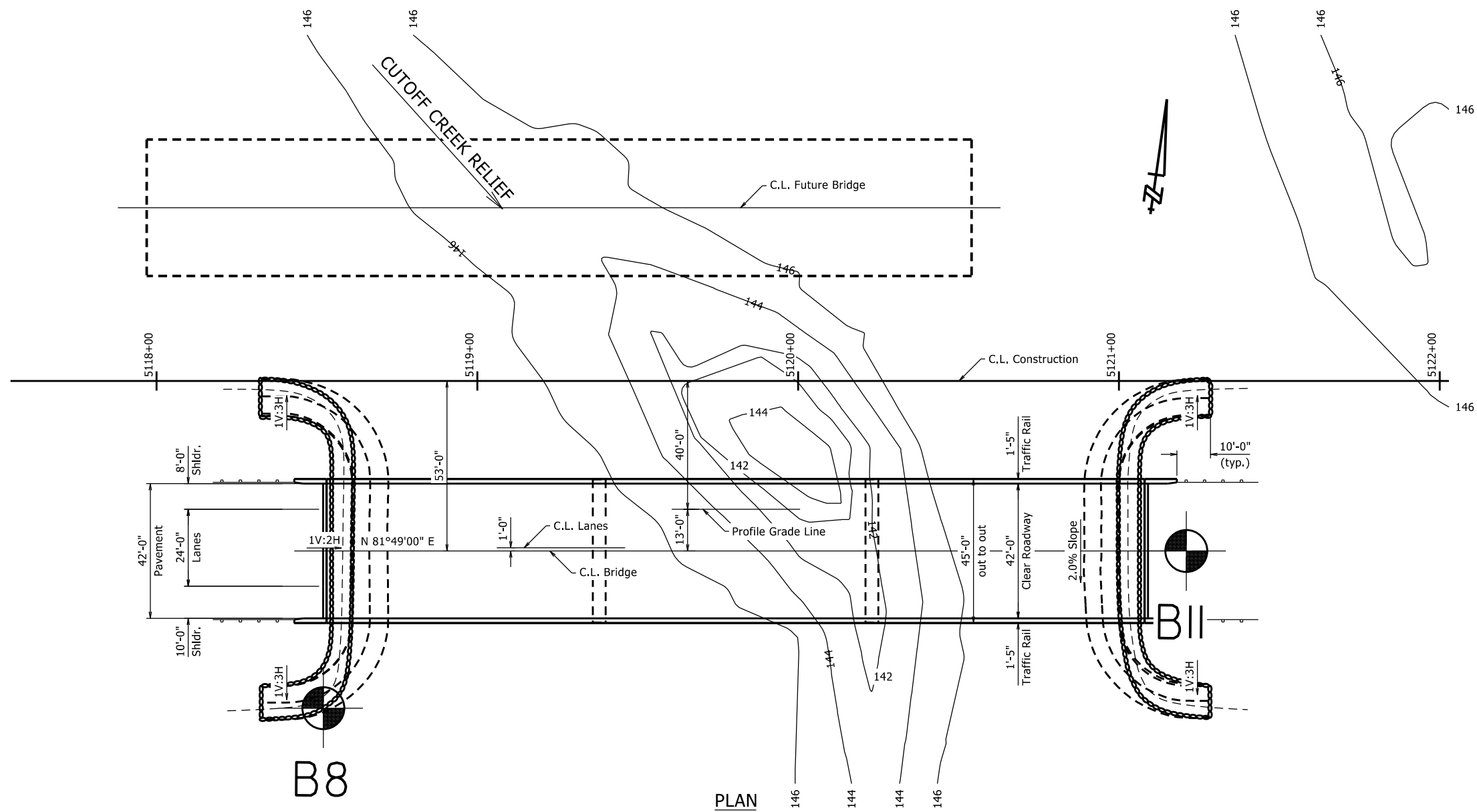
GRANULAR SOIL		CLAY		CLAY-SHALE		SHALE	
*N' Value	Density	*N' Value	Consistency	*N' Value	Consistency	*N' Value	Consistency
0-4	Very Loose	0-1	Very Soft	0-1	Very Soft		
5-10	Loose	2-4	Soft	2-4	Soft	31-60	Soft
11-30	Medium Dense	5-8	Medium Stiff	5-8	Medium Stiff	Over 60	
31-50	Dense	9-15	Stiff	9-15	Stiff	More than 2'	
Over 50	Very Dense	16-30	Very Stiff	16-30	Very Stiff	Penetration	
		31-60	Hard	31-60	Hard	in 60 Blows	Medium Hard
		Over 60	Very Hard	Over 60	Very Hard	Less than 2'	
						Penetration	
						in 60 Blows	Hard

1. Ground water elevations indicated on boring logs represent ground water elevations at date or time shown on boring log. Absence of water surface implies that no ground water data is available but does not necessarily mean that ground water will not be encountered at locations or within the vertical reaches of these borings.
2. Borings represent subsurface conditions at their respective locations for their respective depths. Variations in conditions between or adjacent to boring locations may be encountered.
3. Terms used for describing soils according to their texture or grain size distribution are in accordance with the Unified Soil Classification System.

Standard Penetration Test – Driving a 2.0" O.D., 1-3/8" I.D. sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and performing the test are recorded for each 6 inches of penetration on the drill log. The field "N" Value (N_f) can be obtained by

adding the bottom two numbers for example: $\frac{6}{8-9} \Rightarrow 8+9 = 17 \text{ blows/ft}$. The "N" Value corrected to 60% efficiency (N_{60}) can be obtained by multiplying N_f by the hammer correction factor published on the boring log.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
6	AR			
JOB NO.		020678		
PLAN OF BORINGS				



CUTOFF CREEK RELIEF			
BORING	STATION	OFFSET	ELEVATION
B8	5118+52	102' RT	147.80
B11	5121+21	53' RT	147.50

PLAN OF BORINGS	
HWY. 278 - HWY. 65 (S) ROUTE 69, SECTION X DREW & DESHA COUNTIES FED. AID PROJECT	
JOB NO. 020678	SHEET 1/1
SCALE: 1"=40'	

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

BORING NO. 8
PAGE 1 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5118+52
LOCATION: 102' Right of Construction
LOGGED BY: Anthony Nicholson

DATE: September 28, 2021
TYPE OF DRILLING: Shelby -
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 1
HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%)		PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	LL				
			SURFACE ELEVATION: 147.8							
			Moist, Brown Silt	ML	●	●	92			
			Moist, Loose, Brown Silt	ML			91	4		
5				-				3-3		
			Brown Clayey Sand	SC	+	●	46			
			Wet, Medium Stiff, Brown Lean Clay with Sand	CL	+	●	72	1		
10				-				4-3		
			Wet, Very Loose, Brown Silty, Clayey Sand	SC-SM	●	+	35	0		
				-				0-4		
15										
			Wet, Loose, Brown Silty Fine Sand with Some Organic Matter (Wood)	SM			44	2		
				-				3-3		
20										
			Wet, Soft, Greenish Gray Lean Clay	CL	+	- - - +		1		
				-				1-2		
25										
			Wet, Soft, Greenish Gray Lean Clay	CL	- - - +			0		
				-				2-2		
30										
			Wet, Medium Dense, Greenish Gray Silt	ML	+	- - +	96	3		
				-				5-7		
35										

REMARKS: Cutoff Creek Relief

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

BORING NO. 8
PAGE 2 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5118+52
LOCATION: 102' Right of Construction
LOGGED BY: Anthony Nicholson

DATE: September 28, 2021
TYPE OF DRILLING: Shelby -
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 1
HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 147.8															
40		X	Wet, Medium Dense, Greenish Gray Silt	ML											96	4 6-9		
45		X	Wet, Dense, Greenish Gray Silt with Sand (Poorly Cemented Nodules)	ML											79	9 13-18		
50		X	Wet, Medium Dense, Greenish Gray Silt	ML											99	5 7-8		
55		X	Wet, Medium Dense, Dark Brown Poorly Graded Fine Sand with Silt and Trace Gravel	SP-SM											7	2 7-7		
60		X	Wet, Medium Dense, Light Brown Poorly Graded Fine Sand with Silt and Trace Gravel	SP-SM											9	8 13-14		
65		X	Wet, Medium Dense, Light Brown Fine Sand with Trace Gravel	SP											3	1 6-12		
70		X	Wet, Medium Dense, Light Brown Fine Poorly Graded Sand with Silt and Trace Gravel	SP-SM											5	6 12-16		

REMARKS: Cutoff Creek Relief

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

BORING NO. 8
PAGE 3 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5118+52
LOCATION: 102' Right of Construction
LOGGED BY: Anthony Nicholson

DATE: September 28, 2021
TYPE OF DRILLING: Shelby -
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 1
HAMMER CORRECTION FACTOR: 1.54

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●											PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	-	-	-	-	-	-	-	-				
			SURFACE ELEVATION: 147.8																
75		X	Wet, Medium Dense, Light Brown Sand with Gravel	SP												2	5 8-10		
80		X	Wet, Medium Dense, Light Brown Poorly Graded Sand with Silt and Gravel	SP-SM												6	5 10-18		
85		X	Wet, Medium Dense, Light Brown Poorly Graded Fine Sand with Silt Trace Gravel	SP-SM												9	7 13-12		
90		X	Wet, Medium Dense, Light Brown Sand with Gravel	SP												2	5 12-13		
95		X	Wet, Medium Dense, Brown Fine Sand with Silt and Gravel	SP												2	5 12-14		
100		X	Wet, Medium Dense, Brown Poorly Graded Gravel with Sand	GP												2	3 6-20		
		X	Wet, Dense, Brown Gravel with Sand														4 8-27		
			Boring Terminated																
105																			

REMARKS: Cutoff Creek Relief

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

BORING NO. 11
PAGE 1 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5121+21
LOCATION: 53' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: September 27 and 28, 2021
TYPE OF DRILLING: Shelby -
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%)		PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% TCR	% RQD
					PL	LL				
			SURFACE ELEVATION: 147.5							
			Moist, Brown Silt with Some Organic Matter (Wood)	ML	●	●	93			
			Moist, Medium Dense, Brown Sandy Silt	-				3 6-8		
5			Moist, Light Brown Silty Clay	CL	●	●	73			
			Wet, Loose, Brown Sandy Silt					2 2-3		
10			Silty Sand (No Recovery)					0 2-3		
			Wet, Loose, Gray Silty Sand					1 3-4		
15			Wet, Very Loose, Greenish Gray Silt					0 1-3		
20			Wet, Medium Stiff, Greenish Gray Silty Clay					1 2-5		
25								5 6-8		
30										
35										

REMARKS: Cutoff Creek Relief

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

BORING NO. 11
PAGE 2 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5121+21
LOCATION: 53' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: September 27 and 28, 2021
TYPE OF DRILLING: Shelby -
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D
					PL	+	-	+	-	+	-	+	-	+				
			SURFACE ELEVATION: 147.5															
			Wet, Stiff, Greenish Gray Silty Clay												4	4-9		
40															9	16-19		
			Wet, Dense, Greenish Gray Silt												5	11-12		
45															2	6-7		
			Wet, Medium Dense, Greenish Gray Silt												8	13-16		
50															8	18-20		
			Wet, Medium Dense, Brown Silty Fine Sand												5	12-16		
55																		
			Wet, Medium Dense, Brown Sand with Silt and Some Gravel															
60																		
			Wet, Dense, Brown Fine Sand with Silt and Some Gravel															
65																		
			Wet, Medium Dense, Light Brown Fine Sand with Silt and Some Gravel															
70																		

REMARKS: Cutoff Creek Relief

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

BORING NO. 11
PAGE 3 OF 3

JOB NO. 020678 Desha and Drew Counties
JOB NAME: Hwy. 278 - Hwy. 65 (S)
Route 69, Section X
STATION: 5121+21
LOCATION: 53' Right of Construction Centerline
LOGGED BY: Coty Campbell

DATE: September 27 and 28, 2021
TYPE OF DRILLING: Shelby -
Hollow Stem Auger - Rotary Wash
EQUIPMENT: Acker 2
HAMMER CORRECTION FACTOR: N/A

COMPLETION DEPTH: 101.5

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	MOISTURE CONTENT (%) ●										PERCENT PASSING NO. 200 SIEVE	NO. OF BLOWS PER 6-IN.	% T C R	% R Q D	
					PL	+	-	-	-	-	-	-	-	-					-
			SURFACE ELEVATION: 147.5																
75		X	Wet, Dense, Light Brown Fine Sand with Silt and Trace Gravel													8	14-18		
80		X	Wet, Dense, Light Brown Fine Sand with Silt and Some Gravel													8	20-27		
85		X	Wet, Medium Dense, Brown Fine Sand with Silt and Trace Gravel													4	12-15		
90		X	Wet, Dense, Brown Fine Sand with Silt and Some Gravel													6	15-16		
95		X	Wet, Very Dense, Brown Fine Sand with Silt and Trace Gravel													15	16-40		
100		X	Wet, Dense, Brown Fine Sand with Silt and Trace Gravel													10	20-25		
		X	Moist, Hard, Gray Clay (Jackson Group)													10	15-20		
			Boring Terminated																
105																			

REMARKS: Cutoff Creek Relief

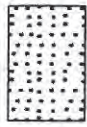
LEGEND

SOIL TYPES

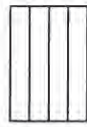
(SHOWN IN SYMBOL COLUMN)
(PREDOMINANT TYPE SHOWN HEAVY)



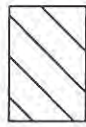
GRAVEL



SAND



SILT



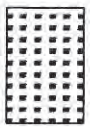
CLAY



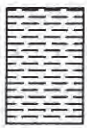
ORGANIC
MATTER

ROCK TYPES

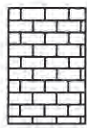
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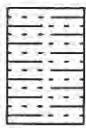
SANDSTONE



SHALE
or
SILTSTONE



LIMESTONE
or
DOLOMITE



ALTERNATING
LAYERS of
SHALE and
SANDSTONE



OTHER

SAMPLER TYPES

(SHOWN IN SAMPLE COLUMN)

SHELBY TUBE



UNDISTURBED
SAMPLE
RECOVERY

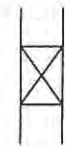


DISTURBED
SAMPLE
RECOVERY

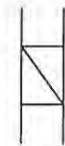


NO
RECOVERY

SPLIT SPOON

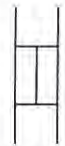


SAMPLE
RECOVERY



NO
RECOVERY

ROCK CORING



% RECOVERY
INDICATED ON LOGS

TERMS DESCRIBING CONSISTENCY OR CONDITION

GRANULAR SOIL		CLAY		CLAY-SHALE		SHALE	
*N' Value	Density	*N' Value	Consistency	*N' Value	Consistency	*N' Value	Consistency
0-4	Very Loose	0-1	Very Soft	0-1	Very Soft		
5-10	Loose	2-4	Soft	2-4	Soft	31-60	Soft
11-30	Medium Dense	5-8	Medium Stiff	5-8	Medium Stiff	Over 60	
31-50	Dense	9-15	Stiff	9-15	Stiff	More than 2'	
Over 50	Very Dense	16-30	Very Stiff	16-30	Very Stiff	Penetration	
		31-60	Hard	31-60	Hard	in 60 Blows	Medium Hard
		Over 60	Very Hard	Over 60	Very Hard	Less than 2'	
						Penetration	
						in 60 Blows	Hard

1. Ground water elevations indicated on boring logs represent ground water elevations at date or time shown on boring log. Absence of water surface implies that no ground water data is available but does not necessarily mean that ground water will not be encountered at locations or within the vertical reaches of these borings.
2. Borings represent subsurface conditions at their respective locations for their respective depths. Variations in conditions between or adjacent to boring locations may be encountered.
3. Terms used for describing soils according to their texture or grain size distribution are in accordance with the Unified Soil Classification System.

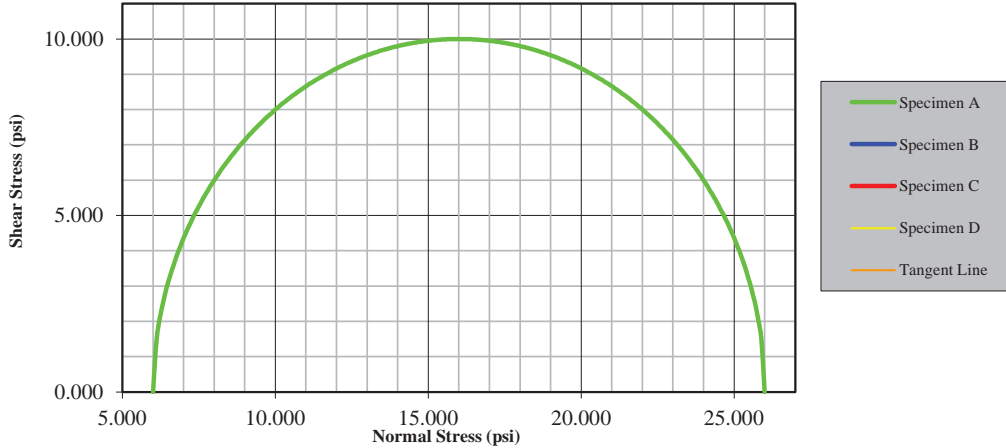
Standard Penetration Test – Driving a 2.0" O.D., 1-3/8" I.D. sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and performing the test are recorded for each 6 inches of penetration on the drill log. The field "N" Value (N_f) can be obtained by adding the bottom two numbers for example: $\frac{6}{8-9} \Rightarrow 8+9 = 17 \text{blows/ft}$. The "N" Value corrected to 60% efficiency (N_{60}) can be obtained by multiplying N_f by the hammer correction factor published on the boring log.

Attachment B

Arkansas Department of Transportation
Unconsolidated Undrained Triaxial Test (ASTM D2850)



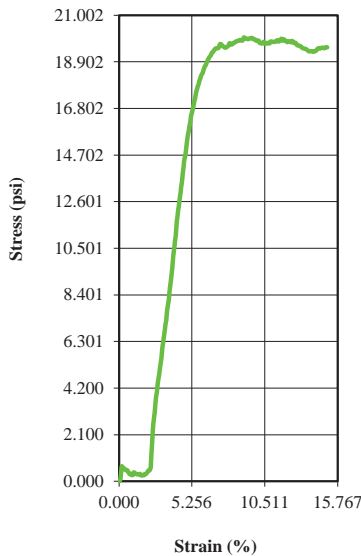
Mohr Circles



Date:

Checked By:

Stress-Strain Curve



Date:

Before Test	Specimen			
	A	B	C	D
Water Content (%)	18.76	0.00	0.00	0.00
Dry Density (pcf)	105.30	0.00	0.00	0.00
Saturation (%)	84.40	0.00	0.00	0.00
Void Ratio	0.60	0.00	0.00	0.00
Diameter (in)	2.875	0.000	0.000	0.000
Height (in)	6.020	0.000	0.000	0.000
Liquid Limit	26.0			
Plastic Limit	17.0			
Specific Gravity	2.700			
After Test	A	B	C	D
Water Content (%)	21.46	0.00	0.00	0.00
Test Data	A	B	C	D
Strain Rate (in/min)	0.03	0.00	0.00	0.00
Peak Deviator Stress (psi)	20.002	0.000	0.000	0.000
Axial Strain @ Failure (%)	9.002	0.000	0.000	0.000
Cell Pressure				
Cell (psi)	6.0	0.0	0.0	0.0
Back (psi)	n/a	n/a	n/a	n/a
Principle Stresses at Failure				
σ_1 (psi)	26.0	0.0	0.0	0.0
σ_3 (psi)	6.0	0.0	0.0	0.0

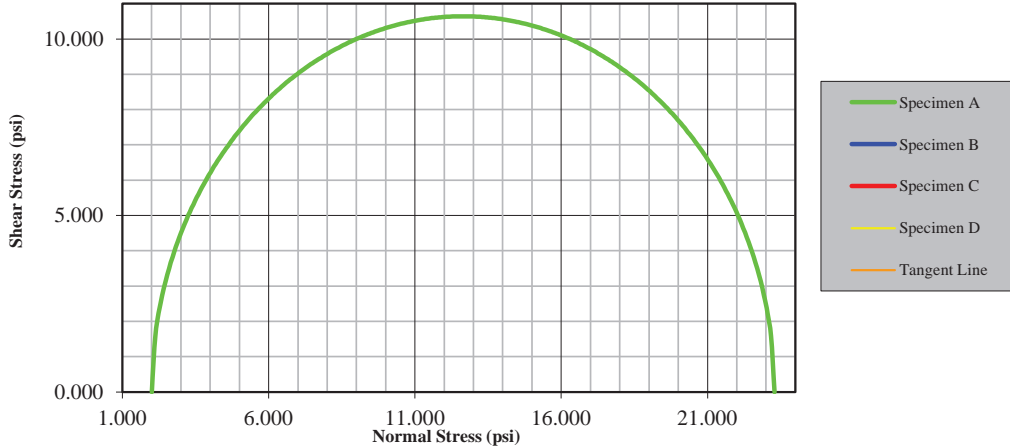
Mohr-Coulomb Strength Parameters		Sample Description	
C (psi)	10.0	Depth: 4.5-6.5 / Lean Clay with Sand / 83% Passing #200	
Friction Angle ϕ	0.00		
Project Information			
Project Name:	Hwy. 278 - Hwy. 65 (S)		
Project Number:	Cutoff Creek and Relief	Job Number:	020678
Location:	5108+27/53' Rt	Boring Number:	1
Client:	ARDOT	Sample Number:	2
Remarks:	SF 256		

Tested By:

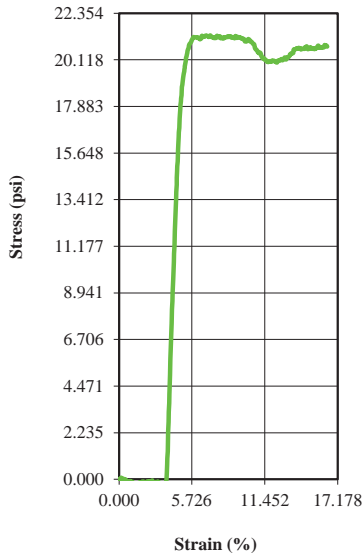
Arkansas Department of Transportation
Unconsolidated Undrained Triaxial Test (ASTM D2850)



Mohr Circles



Stress-Strain Curve



Before Test	Specimen			
	A	B	C	D
Water Content (%)	16.16	0.00	0.00	0.00
Dry Density (pcf)	82.33	0.00	0.00	0.00
Saturation (%)	41.37	0.00	0.00	0.00
Void Ratio	1.06	0.00	0.00	0.00
Diameter (in)	2.875	0.000	0.000	0.000
Height (in)	5.600	0.000	0.000	0.000
Liquid Limit	37.0			
Plastic Limit	23.0			
Specific Gravity	2.720			
After Test	A	B	C	D
Water Content (%)	15.40	0.00	0.00	0.00
Test Data	A	B	C	D
Strain Rate (in/min)	0.02	0.00	0.00	0.00
Peak Deviator Stress (psi)	21.289	0.000	0.000	0.000
Axial Strain @ Failure (%)	7.172	0.000	0.000	0.000
Cell Pressure				
Cell (psi)	2.0	0.0	0.0	0.0
Back (psi)	n/a	n/a	n/a	n/a
Principle Stresses at Failure				
σ_1 (psi)	23.3	0.0	0.0	0.0
σ_3 (psi)	2.0	0.0	0.0	0.0

Mohr-Coulomb Strength Parameters		Sample Description	
C (psi)	10.6	Depth: 0.0-2.0 / Lean Clay / 94% Passing #200 Sieve	
Friction Angle ϕ	0.00		
Project Information			
Project Name:	Hwy. 278 - Hwy. 65 (S)		
Project Number:	Cutoff Creek and Relief Bridges	Job Number:	020678
Location:	5114+23 66' Rt	Boring Number:	7
Client:	ARDOT	Sample Number:	1
Remarks:	SF 205		

Date:

Checked By:

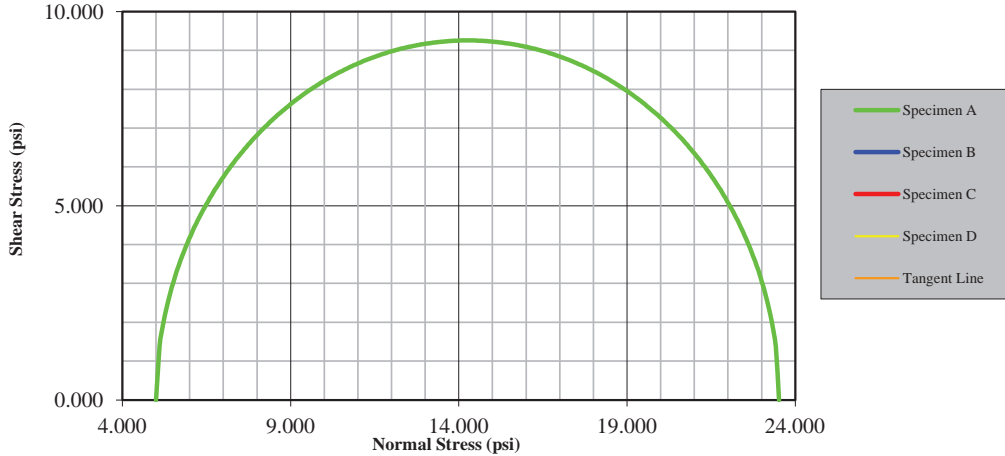
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Tested By:

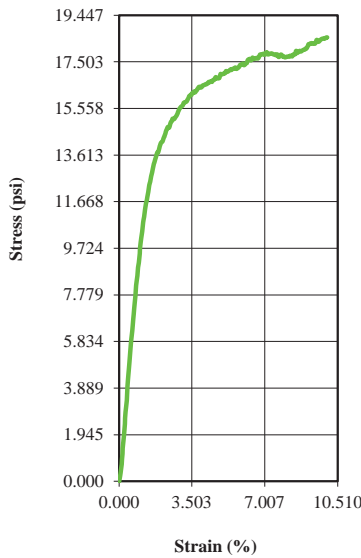
Arkansas Department of Transportation
Unconsolidated Undrained Triaxial Test (ASTM D2850)



Mohr Circles



Stress-Strain Curve



Before Test	Specimen			
	A	B	C	D
Water Content (%)	16.21	0.00	0.00	0.00
Dry Density (pcf)	99.50	0.00	0.00	0.00
Saturation (%)	63.06	0.00	0.00	0.00
Void Ratio	0.69	0.00	0.00	0.00
Diameter (in)	2.875	0.000	0.000	0.000
Height (in)	5.600	0.000	0.000	0.000
Liquid Limit	27.0			
Plastic Limit	19.0			
Specific Gravity	2.700			
After Test	A	B	C	D
Water Content (%)	21.79	0.00	0.00	0.00
Test Data	A	B	C	D
Strain Rate (in/min)	0.02	0.00	0.00	0.00
Peak Deviator Stress (psi)	18.521	0.000	0.000	0.000
Axial Strain @ Failure (%)	9.978	0.000	0.000	0.000
Cell Pressure				
Cell (psi)	5.0	0.0	0.0	0.0
Back (psi)	n/a	n/a	n/a	n/a
Principle Stresses at Failure				
σ_1 (psi)	23.5	0.0	0.0	0.0
σ_3 (psi)	5.0	0.0	0.0	0.0

Mohr-Coulomb Strength Parameters		Sample Description	
C (psi)	9.3	Depth 3.5-5.5 / Lean Clay with Sand / 82% Passing #200 Sieve	
Friction Angle ϕ	0.00		
Project Information			
Project Name:	Hwy. 278 - Hwy. 65 (S)		
Project Number:	Cutoff Creek & Relief	Job Number:	020678
Location:	5114+23 66' Rt	Boring Number:	7
Client:		Sample Number:	2
Remarks:	SF 206		

Date:

Checked By:

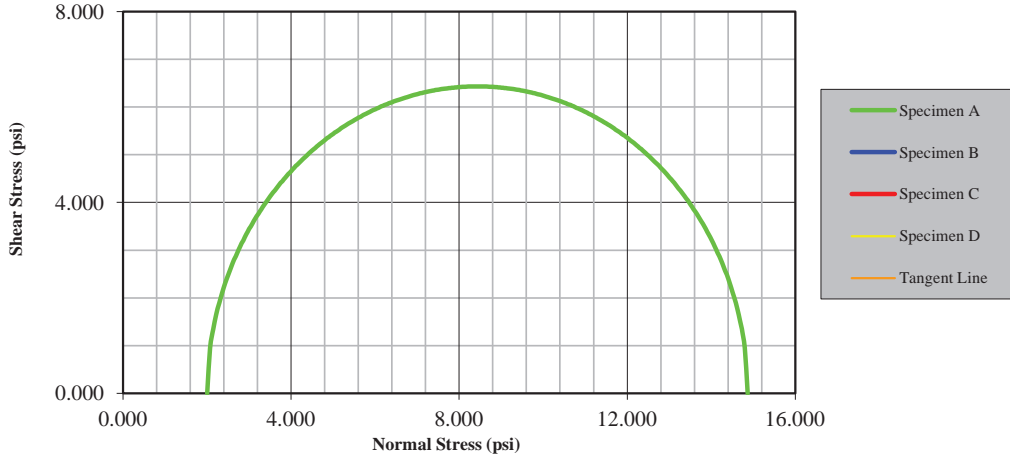
Date:

Tested By:

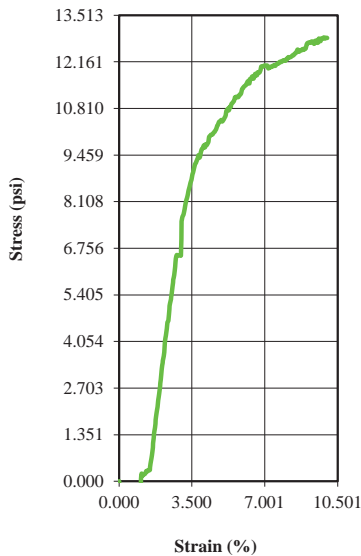
Arkansas Department of Transportation
Unconsolidated Undrained Triaxial Test (ASTM D2850)



Mohr Circles



Stress-Strain Curve



Before Test	Specimen			
	A	B	C	D
Water Content (%)	21.30	0.00	0.00	0.00
Dry Density (pcf)	80.18	0.00	0.00	0.00
Saturation (%)	52.18	0.00	0.00	0.00
Void Ratio	1.10	0.00	0.00	0.00
Diameter (in)	2.875	0.000	0.000	0.000
Height (in)	6.257	0.000	0.000	0.000
Liquid Limit	NP			
Plastic Limit				
Specific Gravity	2.700			
After Test	A	B	C	D
Water Content (%)	20.61	0.00	0.00	0.00
Test Data	A	B	C	D
Strain Rate (in/min)	0.02	0.00	0.00	0.00
Peak Deviator Stress (psi)	12.869	0.000	0.000	0.000
Axial Strain @ Failure (%)	9.843	0.000	0.000	0.000
Cell Pressure				
Cell (psi)	2.0	0.0	0.0	0.0
Back (psi)	n/a	n/a	n/a	n/a
Principle Stresses at Failure				
σ_1 (psi)	14.9	0.0	0.0	0.0
σ_3 (psi)	2.0	0.0	0.0	0.0

Mohr-Coulomb Strength Parameters		Sample Description	
C (psi)	6.4	Depth: 0.0-2.0 / Silt / 92% Passing #200 Sieve	
Friction Angle ϕ	0.00		
Project Information			
Project Name:	Hwy. 278 - Hwy. 65 (S)		
Project Number:	Cutoff Creek and Relief	Job Number:	020678
Location:	5118+52 52' Rt	Boring Number:	8
Client:	ARDOT	Sample Number:	1
Remarks:			

Date:

Checked By:

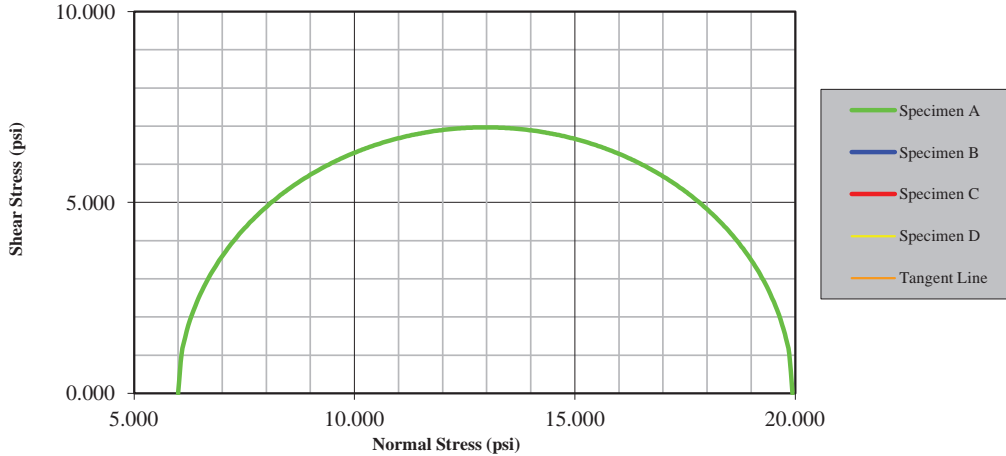
Date:

Tested By:

Arkansas Department of Transportation
Unconsolidated Undrained Triaxial Test (ASTM D2850)



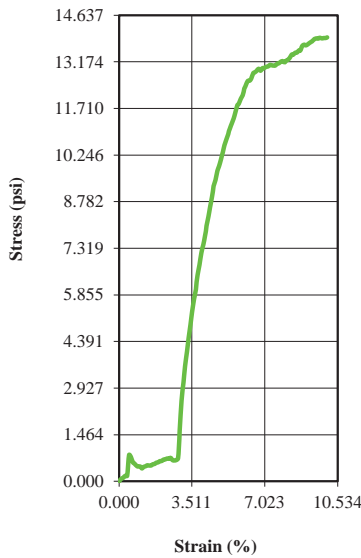
Mohr Circles



Date:

Checked By:

Stress-Strain Curve



Date:

Tested By:

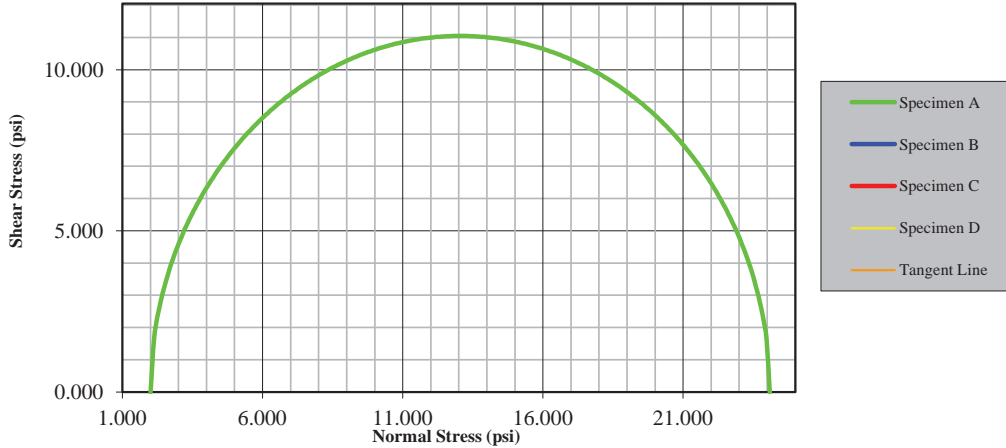
Before Test	Specimen			
	A	B	C	D
Water Content (%)	23.96	0.00	0.00	0.00
Dry Density (pcf)	99.79	0.00	0.00	0.00
Saturation (%)	93.88	0.00	0.00	0.00
Void Ratio	0.69	0.00	0.00	0.00
Diameter (in)	2.875	0.000	0.000	0.000
Height (in)	6.017	0.000	0.000	0.000
Liquid Limit	23.0			
Plastic Limit	8.0			
Specific Gravity	2.700			
After Test	A	B	C	D
Water Content (%)	21.40	0.00	0.00	0.00
Test Data	A	B	C	D
Strain Rate (in/min)	0.03	0.00	0.00	0.00
Peak Deviator Stress (psi)	13.940	0.000	0.000	0.000
Axial Strain @ Failure (%)	10.032	0.000	0.000	0.000
Cell Pressure				
Cell (psi)	6.0	0.0	0.0	0.0
Back (psi)	n/a	n/a	n/a	n/a
Principle Stresses at Failure				
σ_1 (psi)	19.9	0.0	0.0	0.0
σ_3 (psi)	6.0	0.0	0.0	0.0

Mohr-Coulomb Strength Parameters		Sample Description	
C (psi)	7.0	Depth: 5.0-7.0 / Clayey Sand / 46% Passing #200	
Friction Angle ϕ	0.00		
Project Information			
Project Name:	Hwy. 278 - Hwy. 65 (S)		
Project Number:	Cutoff Creek and Relief	Job Number:	020678
Location:	5118+52 102' Rt	Boring Number:	8
Client:	ARDOT	Sample Number:	
Remarks:	SF 251		

Arkansas Department of Transportation
Unconsolidated Undrained Triaxial Test (ASTM D2850)



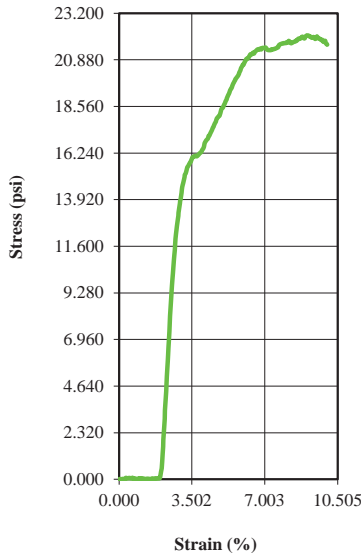
Mohr Circles



Date:

Checked By:

Stress-Strain Curve



Date:

Before Test	Specimen			
	A	B	C	D
Water Content (%)	19.84	0.00	0.00	0.00
Dry Density (pcf)	80.85	0.00	0.00	0.00
Saturation (%)	49.38	0.00	0.00	0.00
Void Ratio	1.08	0.00	0.00	0.00
Diameter (in)	2.875	0.000	0.000	0.000
Height (in)	5.987	0.000	0.000	0.000
Liquid Limit	NP			
Plastic Limit				
Specific Gravity	2.700			
After Test	A	B	C	D
Water Content (%)	19.55	0.00	0.00	0.00
Test Data	A	B	C	D
Strain Rate (in/min)	0.02	0.00	0.00	0.00
Peak Deviator Stress (psi)	22.095	0.000	0.000	0.000
Axial Strain @ Failure (%)	9.052	0.000	0.000	0.000
Cell Pressure				
Cell (psi)	2.0	0.0	0.0	0.0
Back (psi)	n/a	n/a	n/a	n/a
Principle Stresses at Failure				
σ_1 (psi)	24.1	0.0	0.0	0.0
σ_3 (psi)	2.0	0.0	0.0	0.0

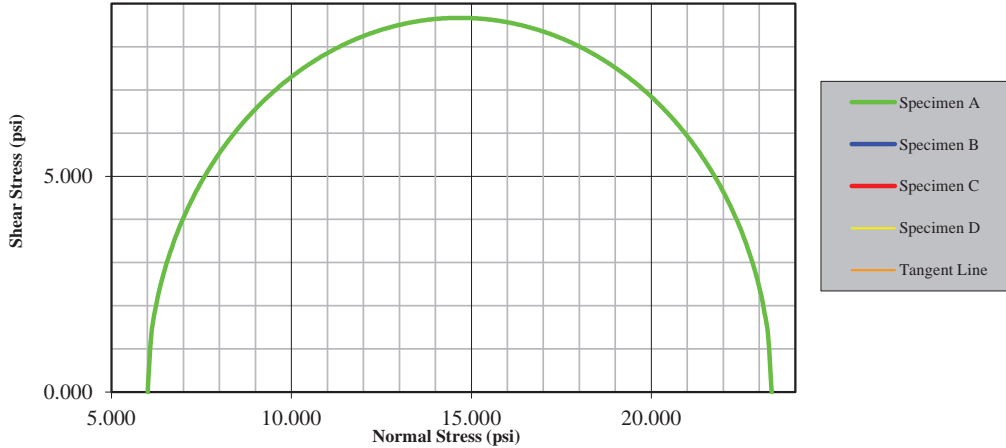
Mohr-Coulomb Strength Parameters		Sample Description	
C (psi)	11.0	Depth; 0.0-2.0 / Silt / 93% Passing #200	
Friction Angle ϕ	0.00		
Project Information			
Project Name:	Hwy. 278 - Hwy. 65 (S)		
Project Number:	Cutoff Creek and Relief	Job Number:	020678
Location:	5121+21 53' Rt	Boring Number:	11
Client:	ARDOT	Sample Number:	1
Remarks:	SF- 252		

Tested By:

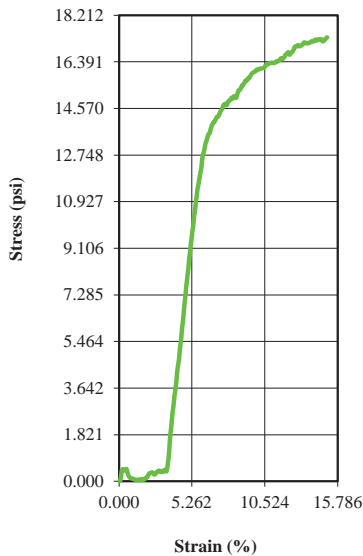
Arkansas Department of Transportation
Unconsolidated Undrained Triaxial Test (ASTM D2850)



Mohr Circles



Stress-Strain Curve



Before Test	Specimen			
	A	B	C	D
Water Content (%)	18.28	0.00	0.00	0.00
Dry Density (pcf)	107.55	0.00	0.00	0.00
Saturation (%)	87.02	0.00	0.00	0.00
Void Ratio	0.57	0.00	0.00	0.00
Diameter (in)	2.875	0.000	0.000	0.000
Height (in)	5.993	0.000	0.000	0.000
Liquid Limit	23.0			
Plastic Limit	15.0			
Specific Gravity	2.700			
After Test	A	B	C	D
Water Content (%)	19.62	0.00	0.00	0.00
Test Data	A	B	C	D
Strain Rate (in/min)	0.03	0.00	0.00	0.00
Peak Deviator Stress (psi)	17.345	0.000	0.000	0.000
Axial Strain @ Failure (%)	15.025	0.000	0.000	0.000
Cell Pressure				
Cell (psi)	6.0	0.0	0.0	0.0
Back (psi)	n/a	n/a	n/a	n/a
Principle Stresses at Failure				
σ_1 (psi)	23.3	0.0	0.0	0.0
σ_3 (psi)	6.0	0.0	0.0	0.0

Mohr-Coulomb Strength Parameters		Sample Description	
C (psi)	8.7	Depth: 4.6-6.6 / Lean Clay with Sand/ 73% Passing #200	
Friction Angle ϕ	0.00		
Project Information			
Project Name:	Hwy. 278 -Hwy. 65 (S)		
Project Number:	Cutoff Creek and Relief	Job Number:	020678
Location:	5121+21 53' Rt	Boring Number:	11
Client:	ARDOT	Sample Number:	2
Remarks:	SF 253		

Date:

Checked By:

Date:

Tested By:

Attachment C



SITE PICTURES

Job No.: 020678

Job Name: I-69 over Cutoff Creek / Cutoff Creek Relief



**Cutoff Creek Channel Over Which Proposed Bridge Will Cross (September 2021)
Looking West from the East (Standing near Boring 3)**



**Cutoff Creek Channel to the North of the Proposed Bridge Alignment (September 2021)
Looking North from the South (Standing near Boring 5)**

Attachment D

Title: 020678 - Cutoff Creek and Relief

Latitude: 33.6822222

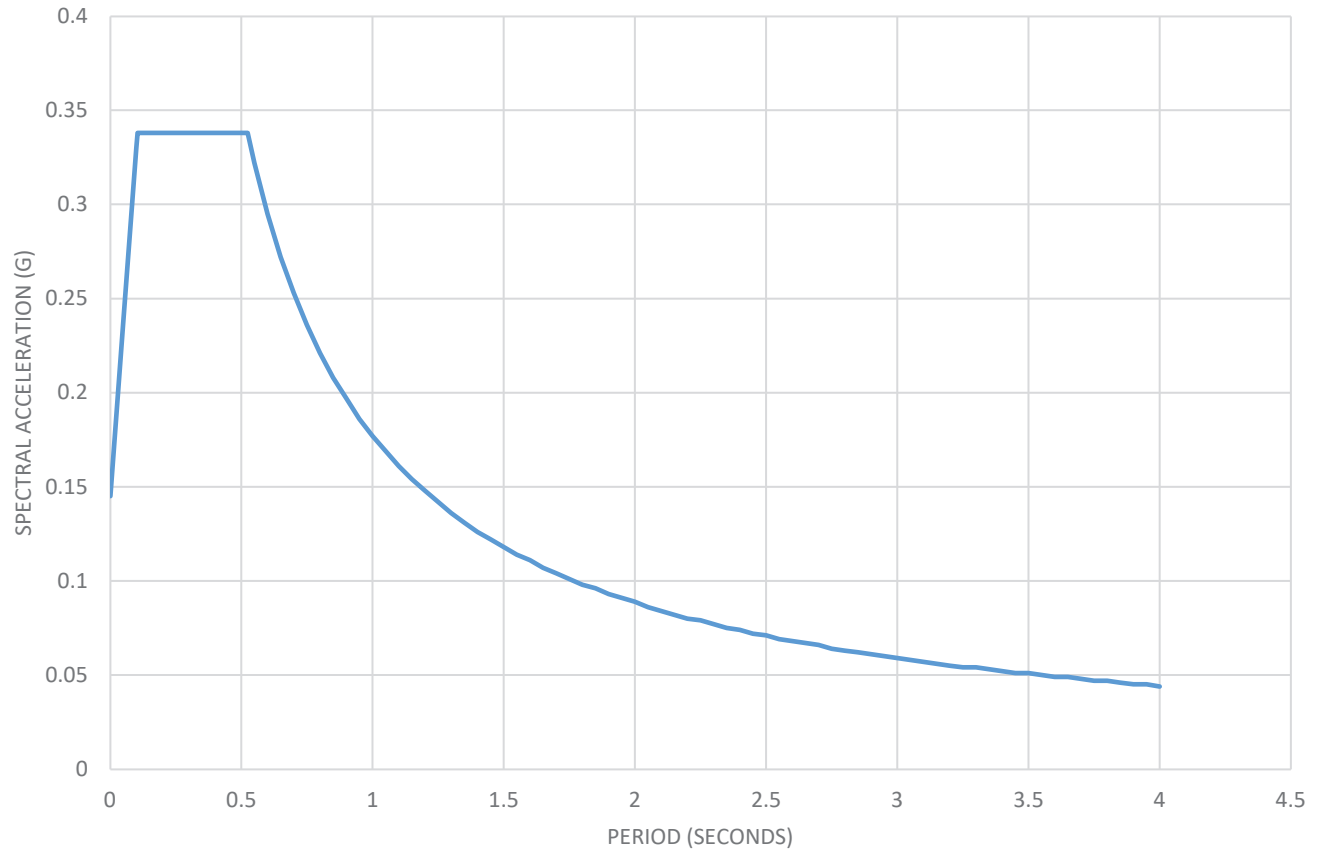
Longitude: -91.58611

Site Class: D

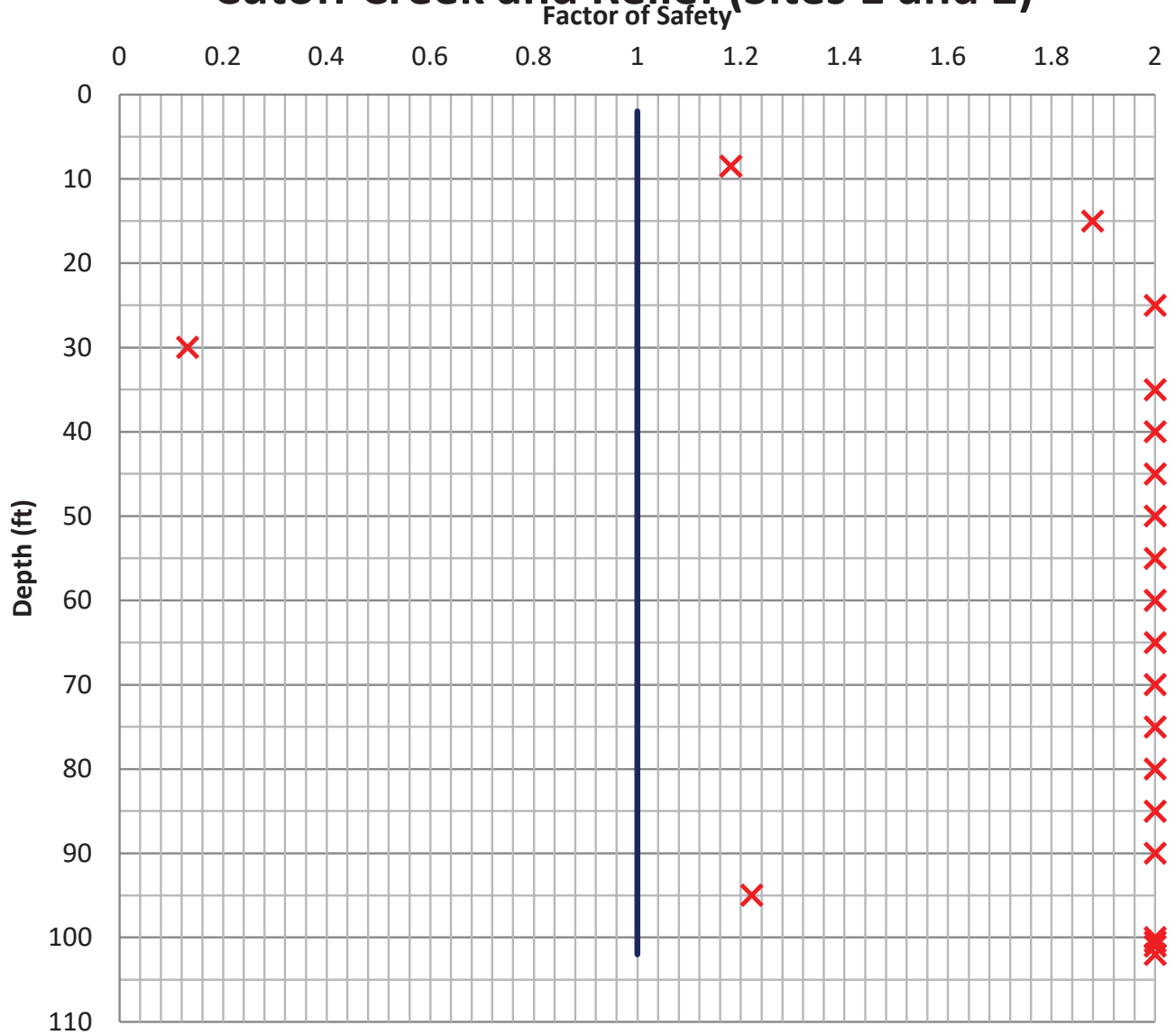
Get USGS Data

PGA:	0.091
F _{PGA} :	1.6
A _S :	0.145
S _S :	0.211
F _A :	1.6
S _{DS} :	0.338
S ₁ :	0.074
F _V :	2.4
S _{D1} :	0.177
S _{DC} :	B
T _S :	0.524
T ₀ :	0.105

020678 - CUTOFF CREEK AND RELIEF DESIGN RESPONSE SPECTRUM



Factor of Safety Cetin et al. (2004) Cutoff Creek and Relief (Sites 1 and 2)



Attachment E

ARKANSAS DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION

JOB NO. 020678

COMPACTED EMBANKMENT

Description. This Special Provision shall be supplementary to Section 210, Excavation and Embankment, of the Standard Specifications, Edition of 2014.

Materials. Soils with AASHTO M 145 general classification “Granular Materials” are acceptable for use in embankment construction. Soils with AASHTO M 145 general classification “Silt-Clay” are acceptable for use in embankment construction if they have a plasticity index of 20 or less and a maximum 65% passing the #200 sieve. Soils not meeting these requirements shall not be utilized for compacted embankment regardless of the source.

Construction Requirements. Prior to embankment construction, all sod and vegetable matter shall be completely removed from the natural ground surface upon which the embankment is to be constructed, regardless of embankment height. In addition, the natural ground surface on which an embankment is to be constructed, shall be adequately compacted in accordance with the compaction requirements specified in Subsection 210.10, regardless of embankment height. These requirements may be modified by the Engineer as conditions justify.

Quality Control and Acceptance Testing. Quality control and acceptance sampling and testing shall be performed in accordance with Subsection 210.02 and 210.10 of the Standard Specifications. Tests for plasticity index and gradation shall be performed in accordance with Section 306 of the Standard Specifications, except that the size of the standard lots will be 3000 cubic yards. In addition to the required test, the Engineer may require the Contractor to test any location that, by visual inspection appears different from previously approved material.

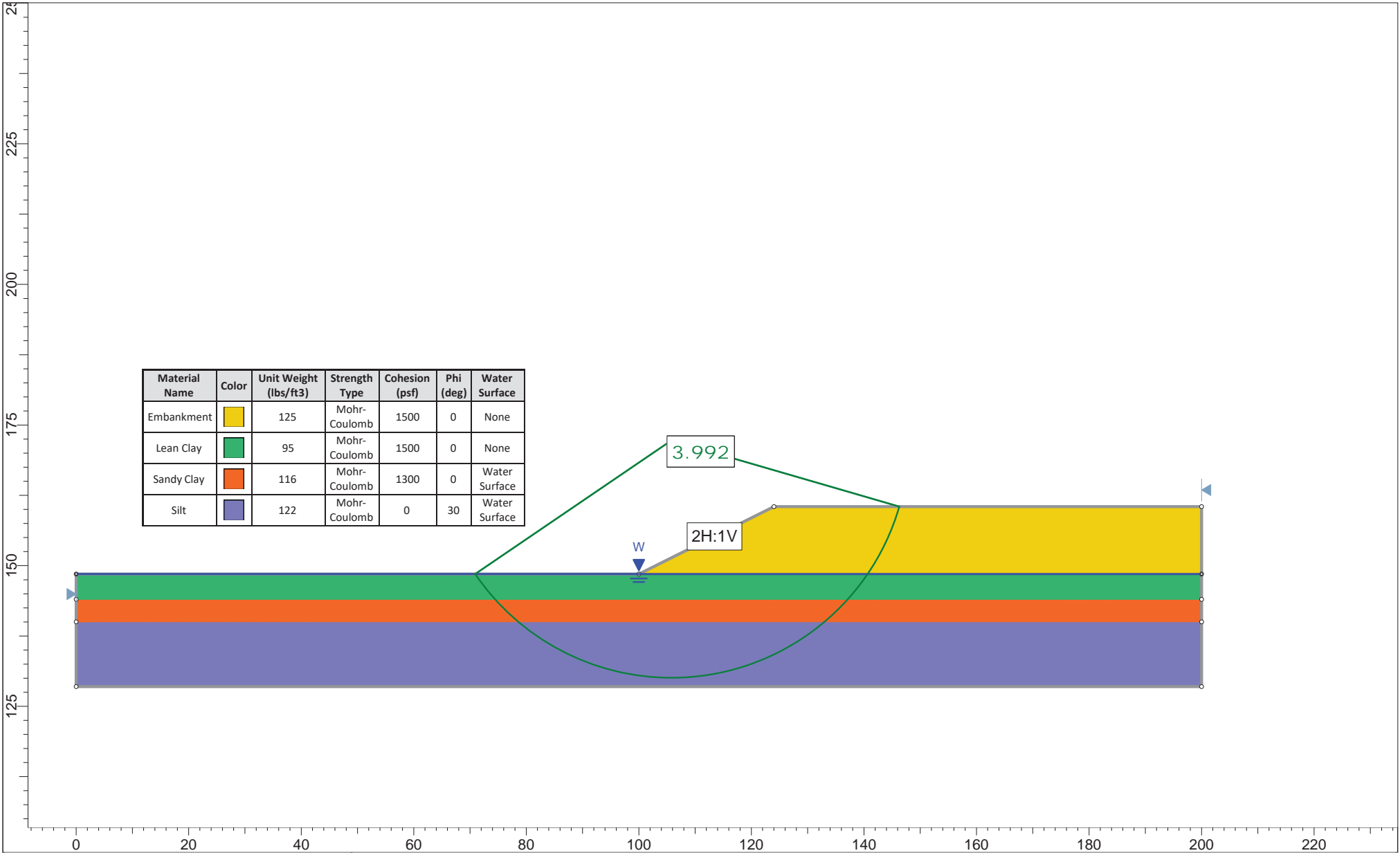
Method of Measurement. All embankments constructed as described above will be measured as Compacted Embankment in accordance with Section 210 of the Standard Specifications.

Basis of Payment. All embankments constructed as described above shall be paid in accordance with Subsection 210.13 of the Standard Specifications and shall also include all labor, material, and equipment necessary to achieve the Compacted Embankment requirements as specified herein.


Payment will be made under:

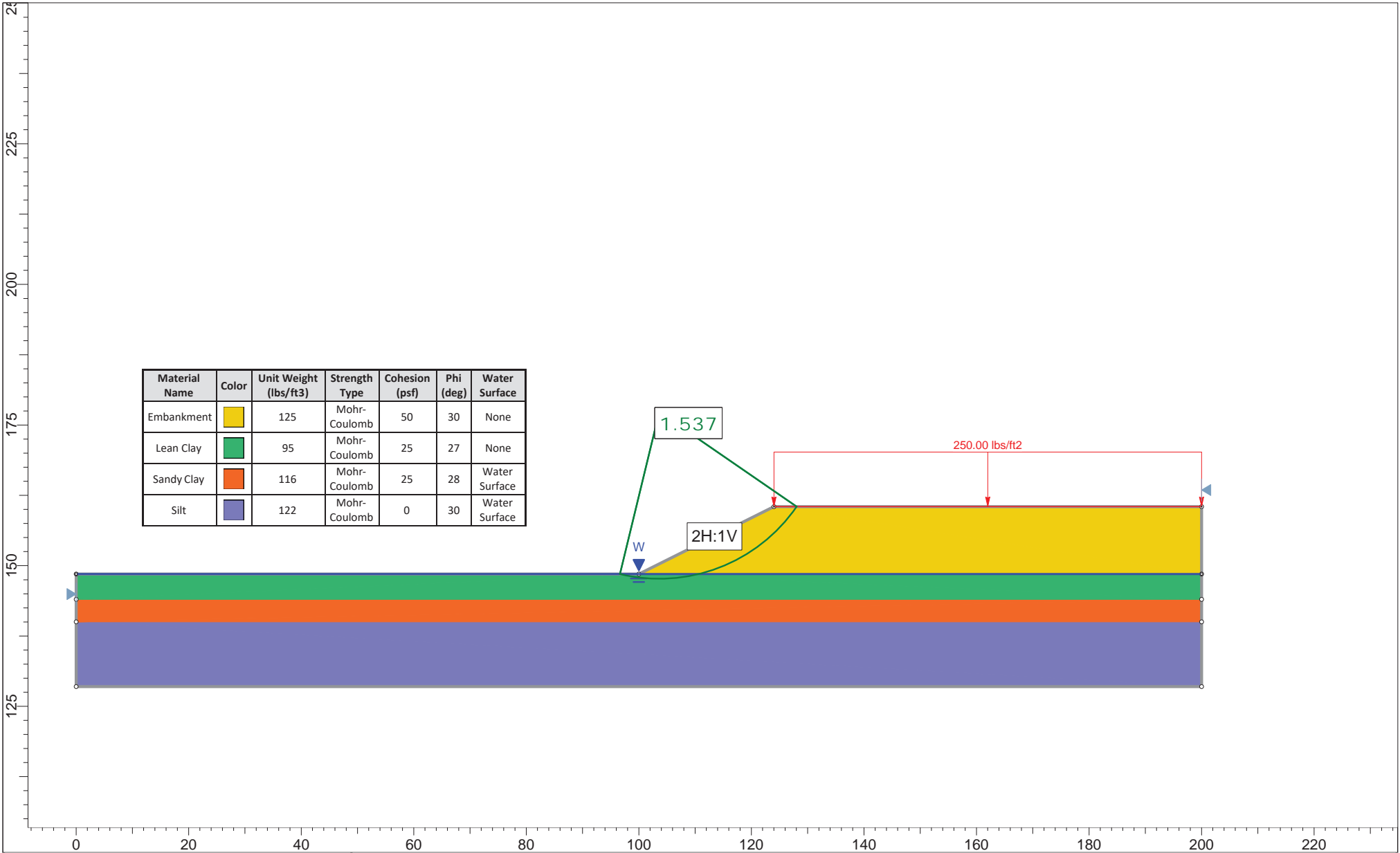
Pay Item	Pay Unit
Compacted Embankment	Cubic Yard

Attachment F




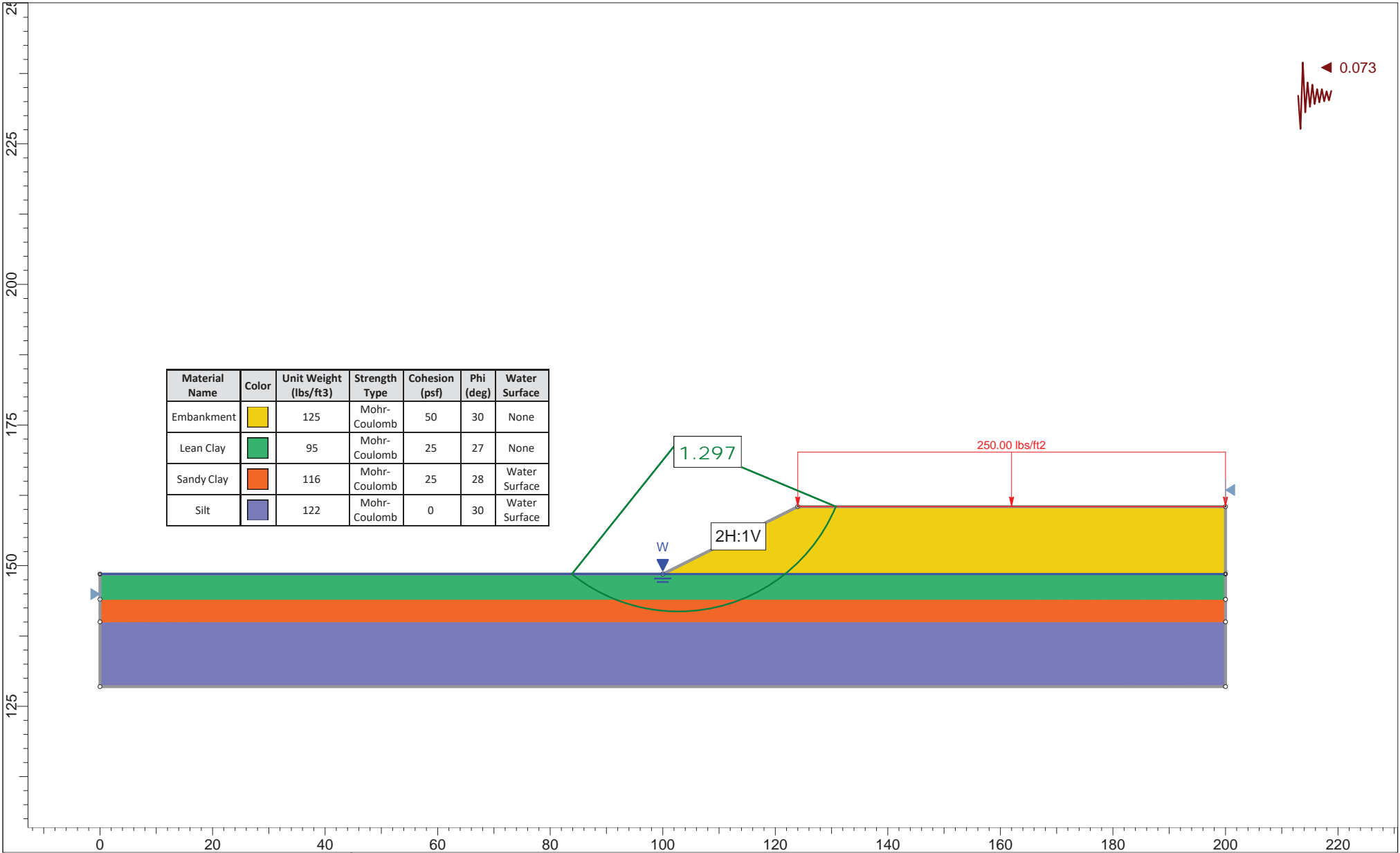
Material Name	Color	Unit Weight (lbs/ft ³)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Embankment	Yellow	125	Mohr-Coulomb	1500	0	None
Lean Clay	Green	95	Mohr-Coulomb	1500	0	None
Sandy Clay	Orange	116	Mohr-Coulomb	1300	0	Water Surface
Silt	Purple	122	Mohr-Coulomb	0	30	Water Surface

	<i>Project</i> 020678 - Interstate 69 over Cutoof Creek - Sites 1 and 2	
	<i>Group</i> Materials Division	<i>Scenario</i> Site 1 : East Abutment : 2H:1V End : Short Term
	<i>Drawn By</i> YZ	<i>Company</i> ARDOT
	<i>Date</i> 12/10/2021	<i>File Name</i> 020678_Site 1_East Abutment_End Of Construction.slm




Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Embankment	Yellow	125	Mohr-Coulomb	50	30	None
Lean Clay	Green	95	Mohr-Coulomb	25	27	None
Sandy Clay	Orange	116	Mohr-Coulomb	25	28	Water Surface
Silt	Purple	122	Mohr-Coulomb	0	30	Water Surface

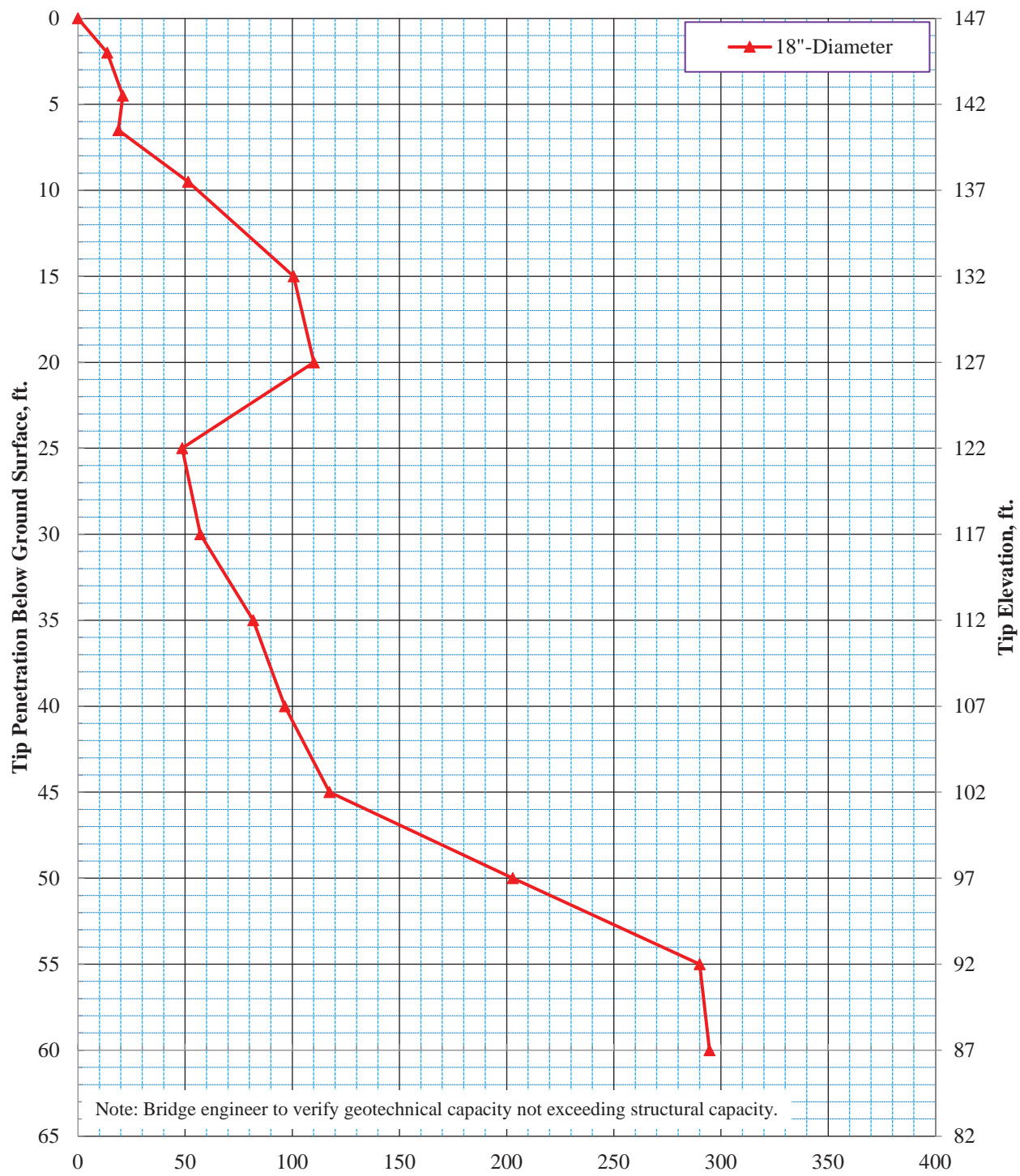
	<i>Project</i> 020678 - Interstate 69 over Cutoof Creek - Sites 1 and 2	
	<i>Group</i> Materials Division	<i>Scenario</i> Site 1 : East Abutment : 2H:1V End : Long Term
	<i>Drawn By</i> YZ	<i>Company</i> ARDOT
	<i>Date</i> 12/10/2021	<i>File Name</i> 020678_Site 1_East Abutment_Long Term.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface
Embankment	Yellow	125	Mohr-Coulomb	50	30	None
Lean Clay	Green	95	Mohr-Coulomb	25	27	None
Sandy Clay	Orange	116	Mohr-Coulomb	25	28	Water Surface
Silt	Purple	122	Mohr-Coulomb	0	30	Water Surface

	Project		020678 - Interstate 69 over Cutoof Creek - Sites 1 and 2	
	Group		Materials Division	Scenario Site 1 : East Abutment : 2H:1V End : Seismic
	Drawn By		YZ	Company ARDOT
	Date		12/10/2021	File Name 020678_Site 1_East Abutment_Seismic.slmd
	SLIDEINTERPRET 9.019			

Attachment G

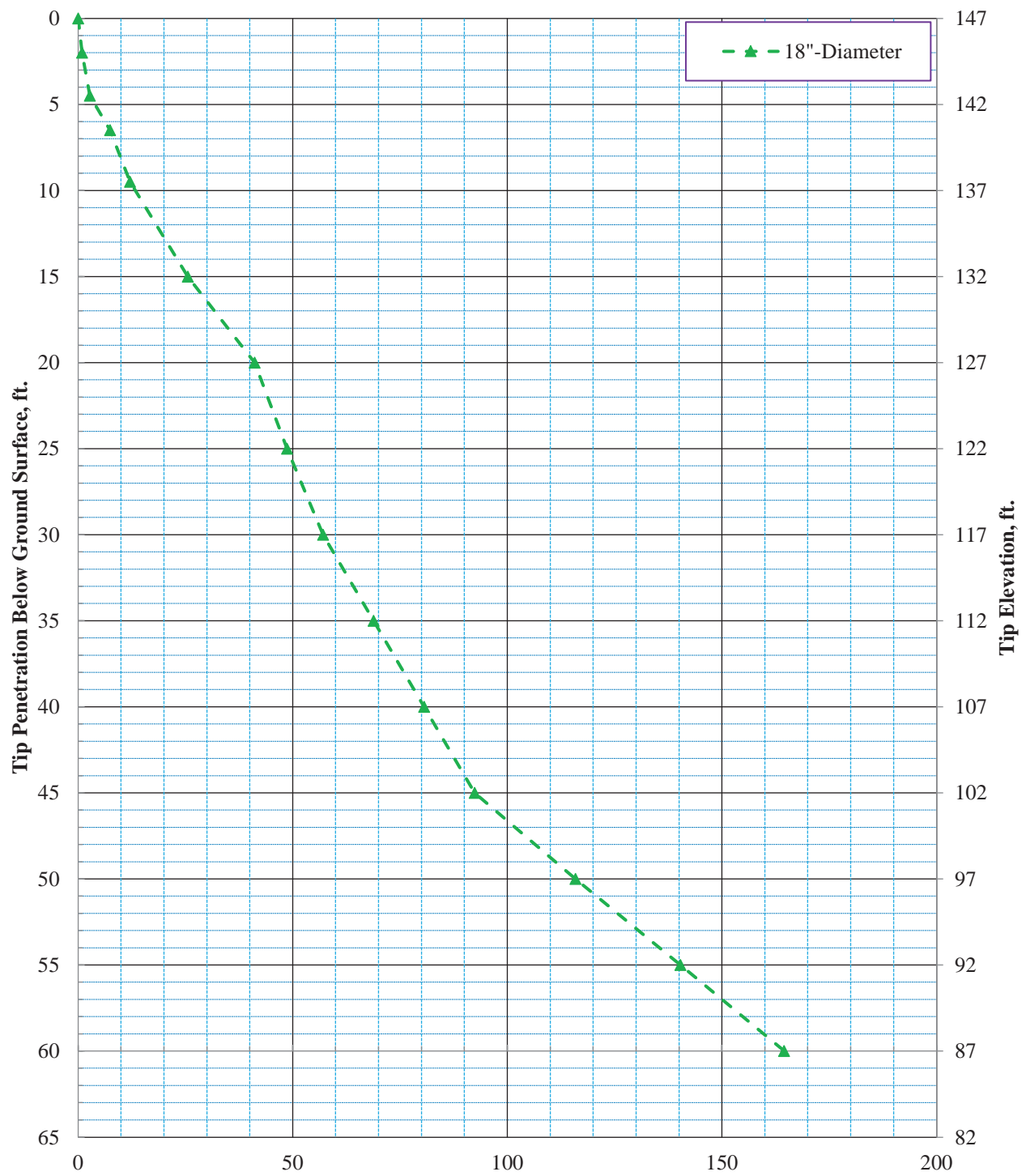


Note: Bridge engineer to verify geotechnical capacity not exceeding structural capacity.

Nominal Single Pile Axial Compression Capacity, tons
CLOSED-END STEEL SHELL PILE



Bent No. 1 - Sta. 5108+27.00, 53 Rt.
 Site No. 1 - I-69 over Cutoff Creek
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County



Nominal Single Pile Axial Uplift Capacity, tons

CLOSED-END STEEL SHELL PILE

Bent No. 1 - Sta. 5108+27.00, 53 Rt.

Site No. 1 - I-69 over Cutoff Creek

Project No.: 020678

Project Name: Hwy. 278 – Hwy. 65 (S)

Location: Drew County



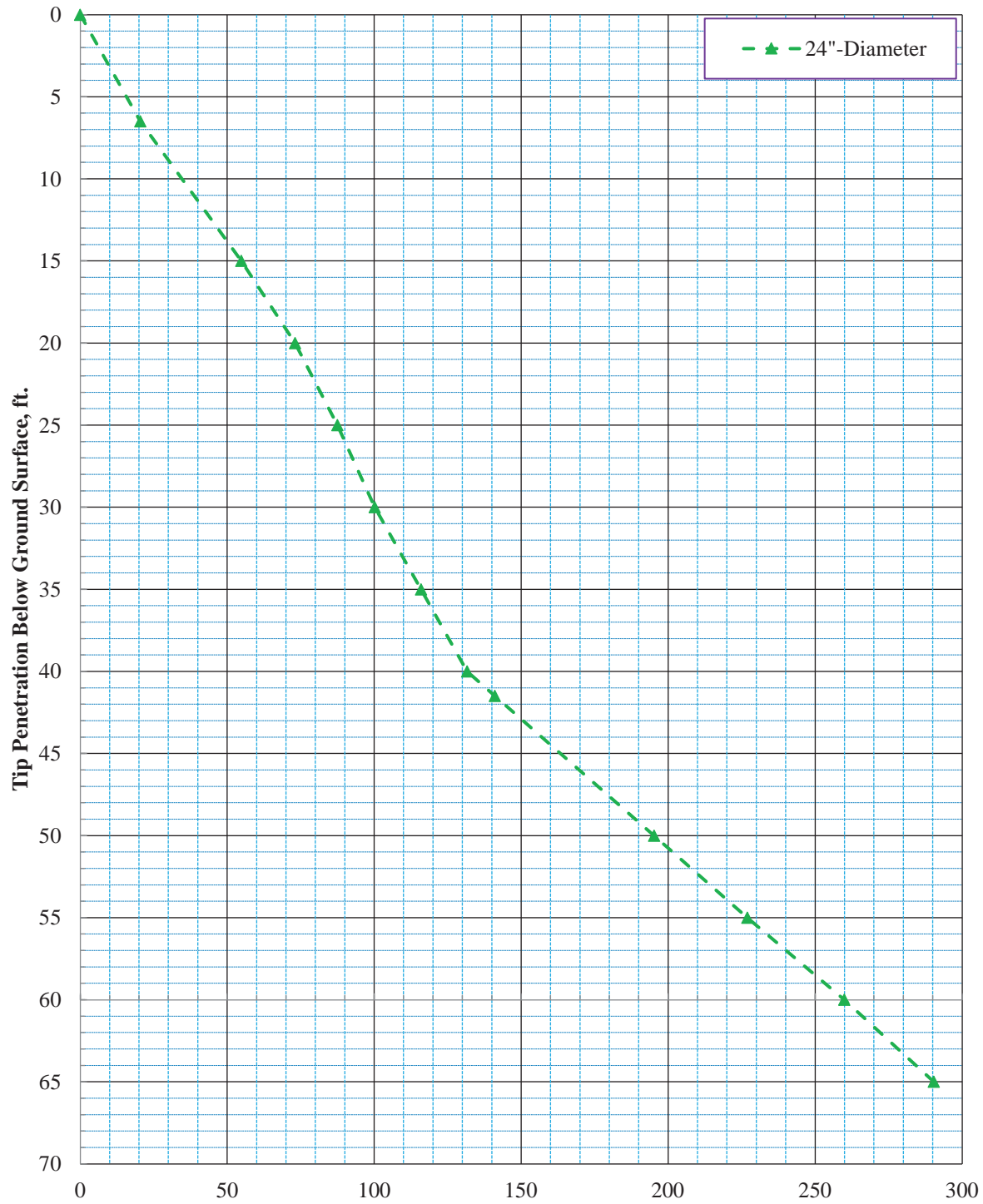


Nominal Single Pile Axial Compression Capacity, tons

CLOSED-END STEEL SHELL PILE



Bent Nos. 2 and 3
 Site No. 1 - I-69 over Cutoff Creek
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County

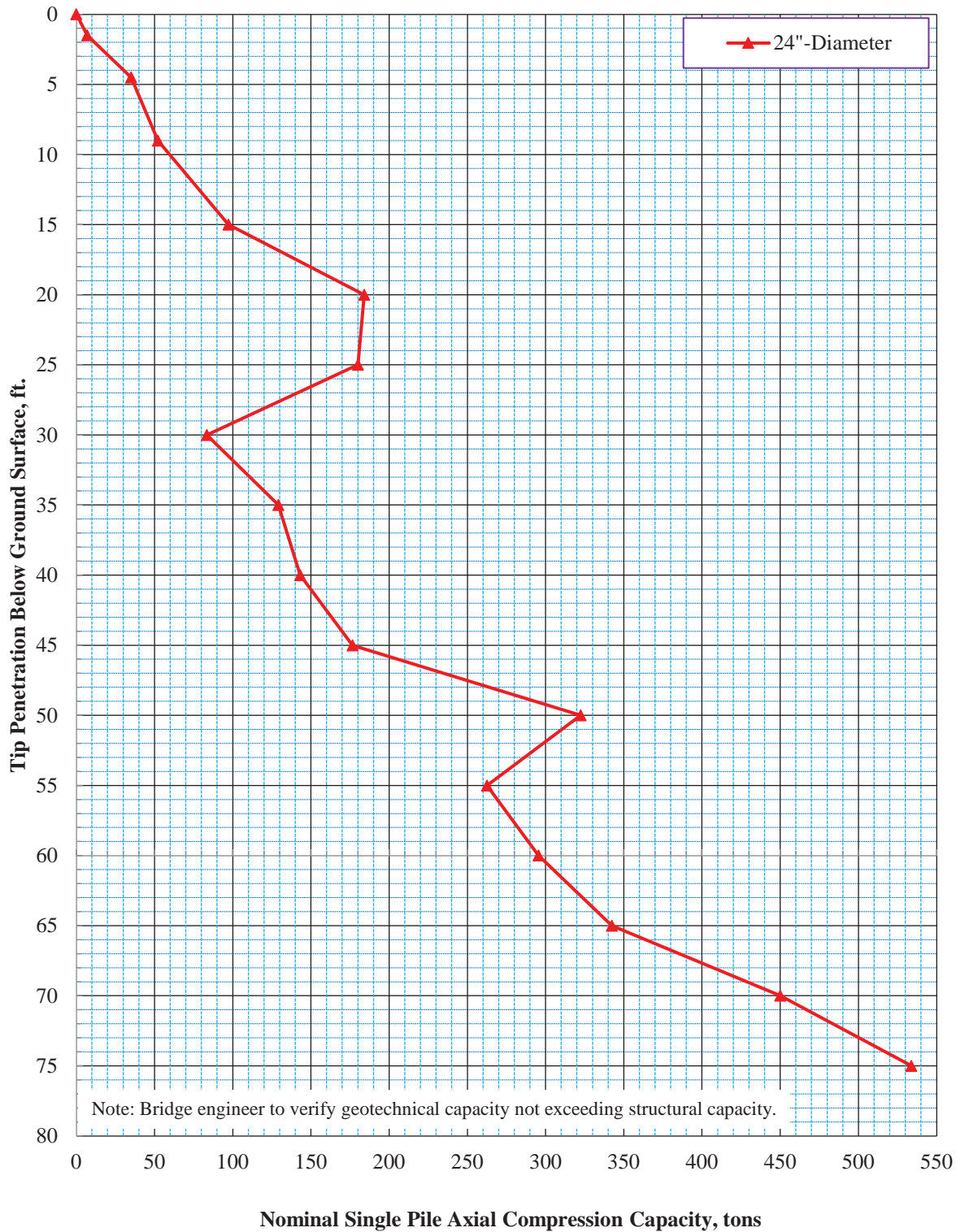


Nominal Single Pile Axial Uplift Capacity, tons

CLOSED-END STEEL SHELL PILE



Bent Nos. 2 and 3
 Site No. 1 - I-69 over Cutoff Creek
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County



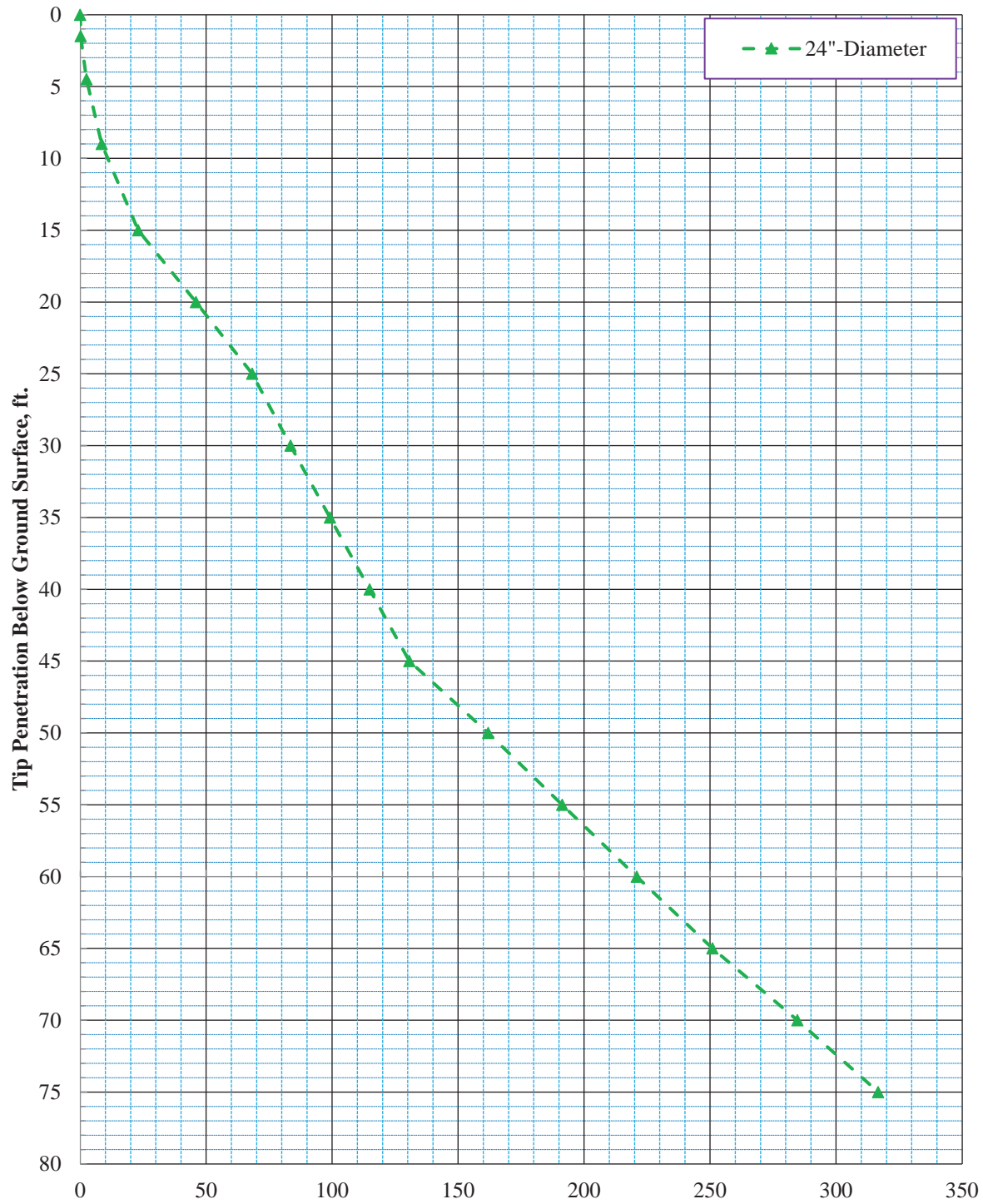
Note: Bridge engineer to verify geotechnical capacity not exceeding structural capacity.

Nominal Single Pile Axial Compression Capacity, tons

CLOSED-END STEEL SHELL PILE



Bent Nos. 4, 5, and 6
 Site No. 1 - I-69 over Cutoff Creek
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County

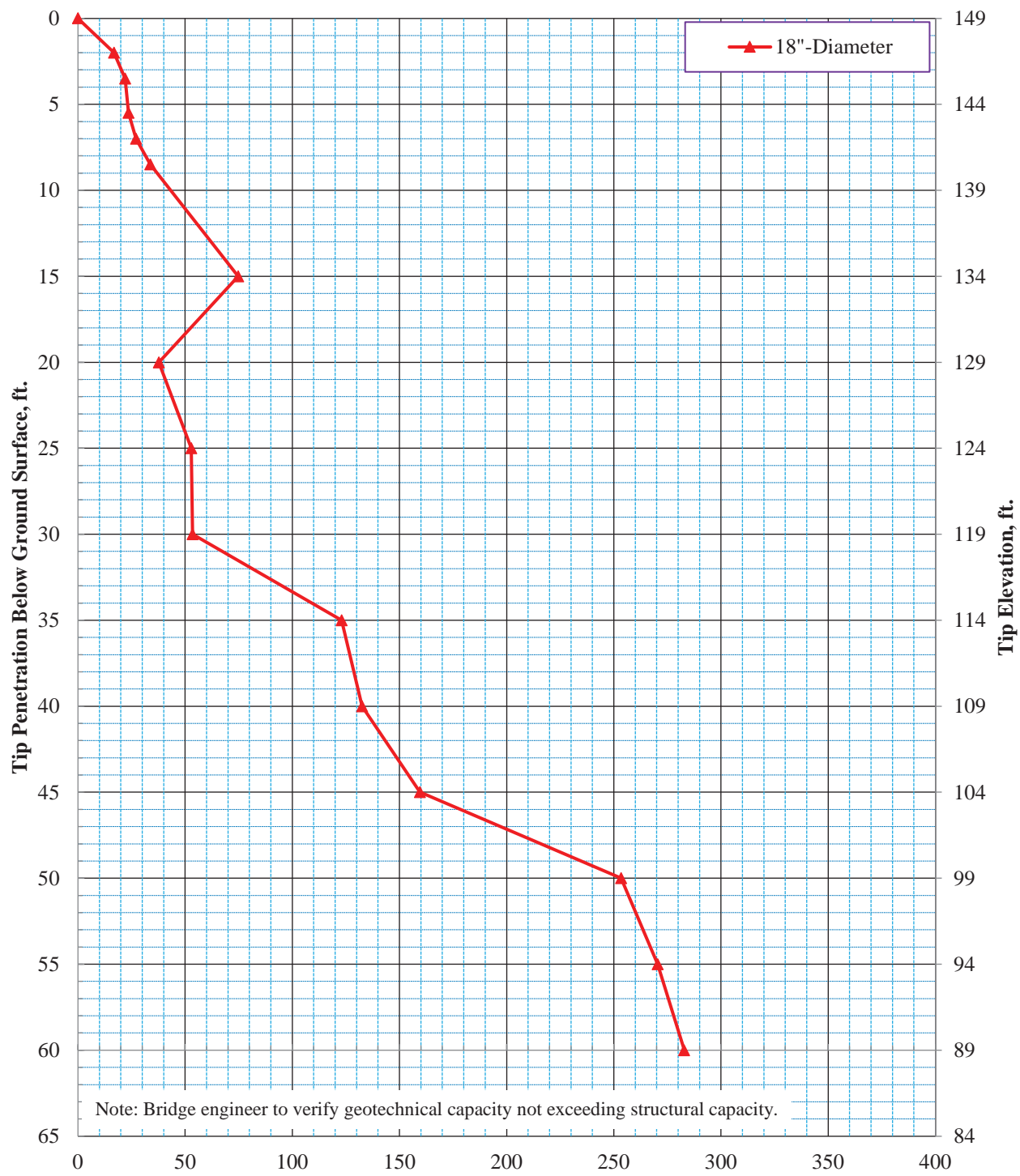


Nominal Single Pile Axial Uplift Capacity, tons

CLOSED-END STEEL SHELL PILE



Bent Nos. 4, 5 and 6
 Site No. 1 - I-69 over Cutoff Creek
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County



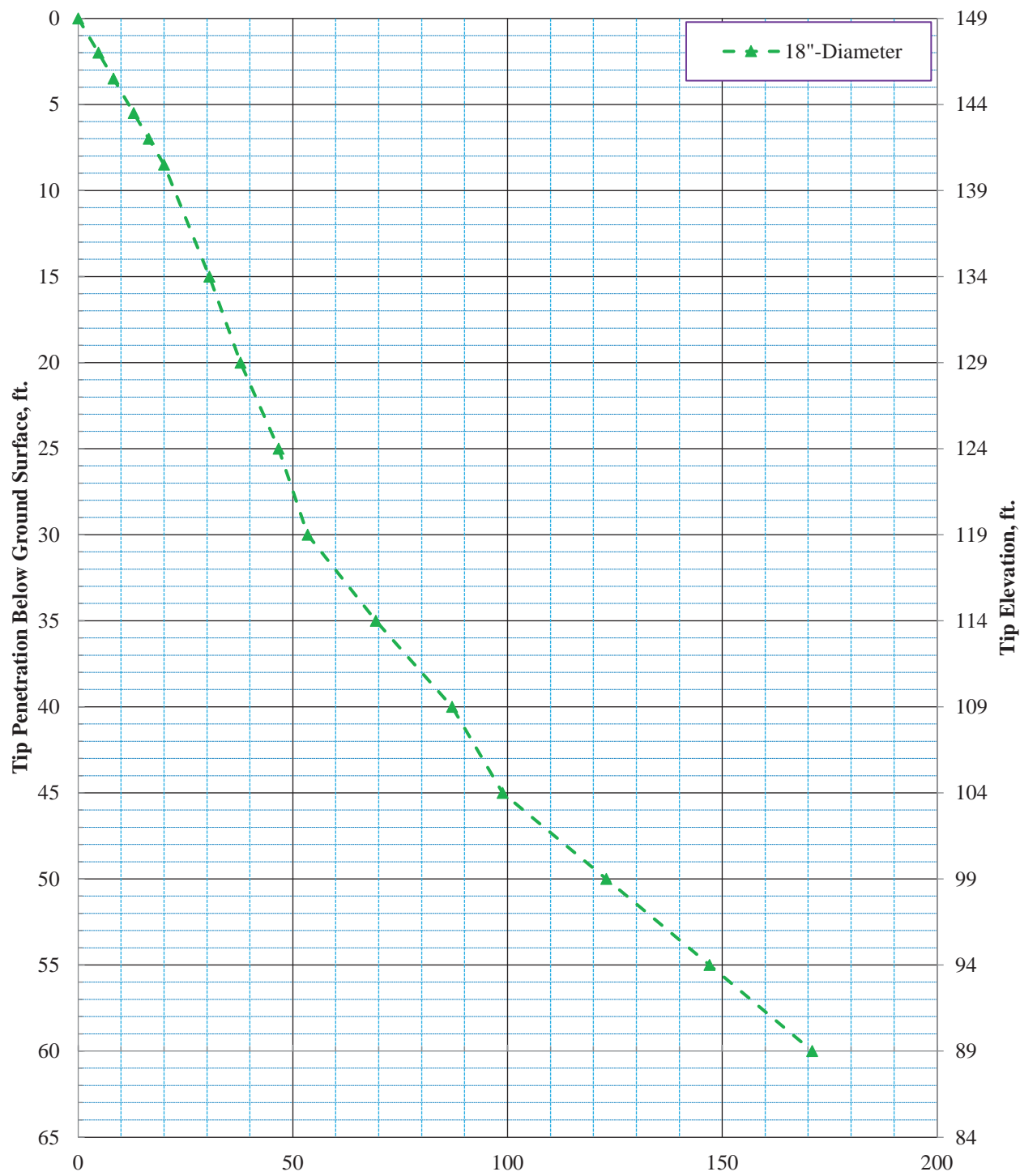
Note: Bridge engineer to verify geotechnical capacity not exceeding structural capacity.

Nominal Single Pile Axial Compression Capacity, tons

CLOSED-END STEEL SHELL PILE



Bent No. 7 - Sta. 5114+23.00, 53 Rt.
 Site No. 1 - I-69 over Cutoff Creek
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County



Nominal Single Pile Axial Uplift Capacity, tons

CLOSED-END STEEL SHELL PILE

Bent No. 7 - Sta. 5114+23.00, 53 Rt.

Site No. 1 - I-69 over Cutoff Creek

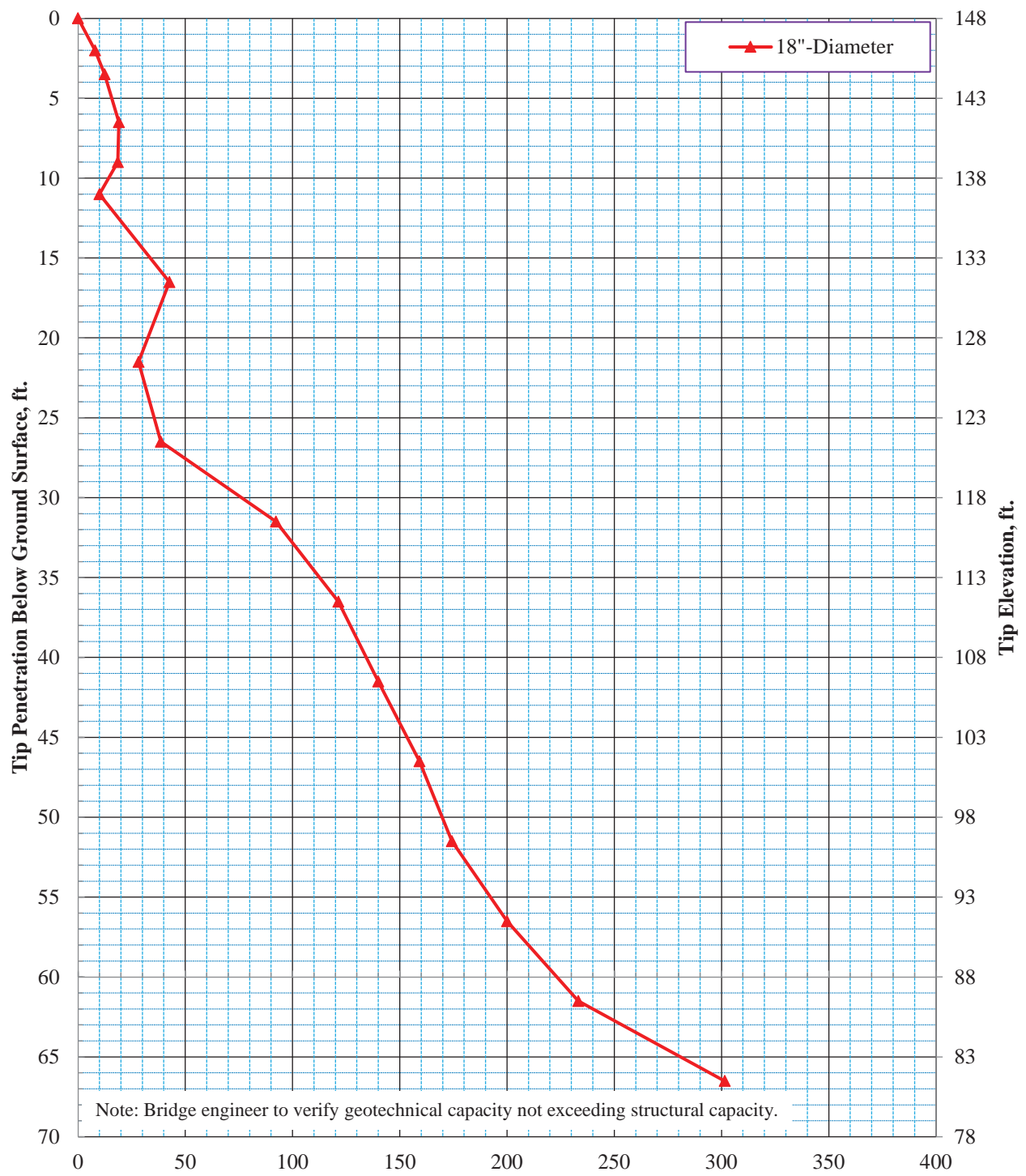
Project No.: 020678

Project Name: Hwy. 278 – Hwy. 65 (S)

Location: Drew County



Attachment H

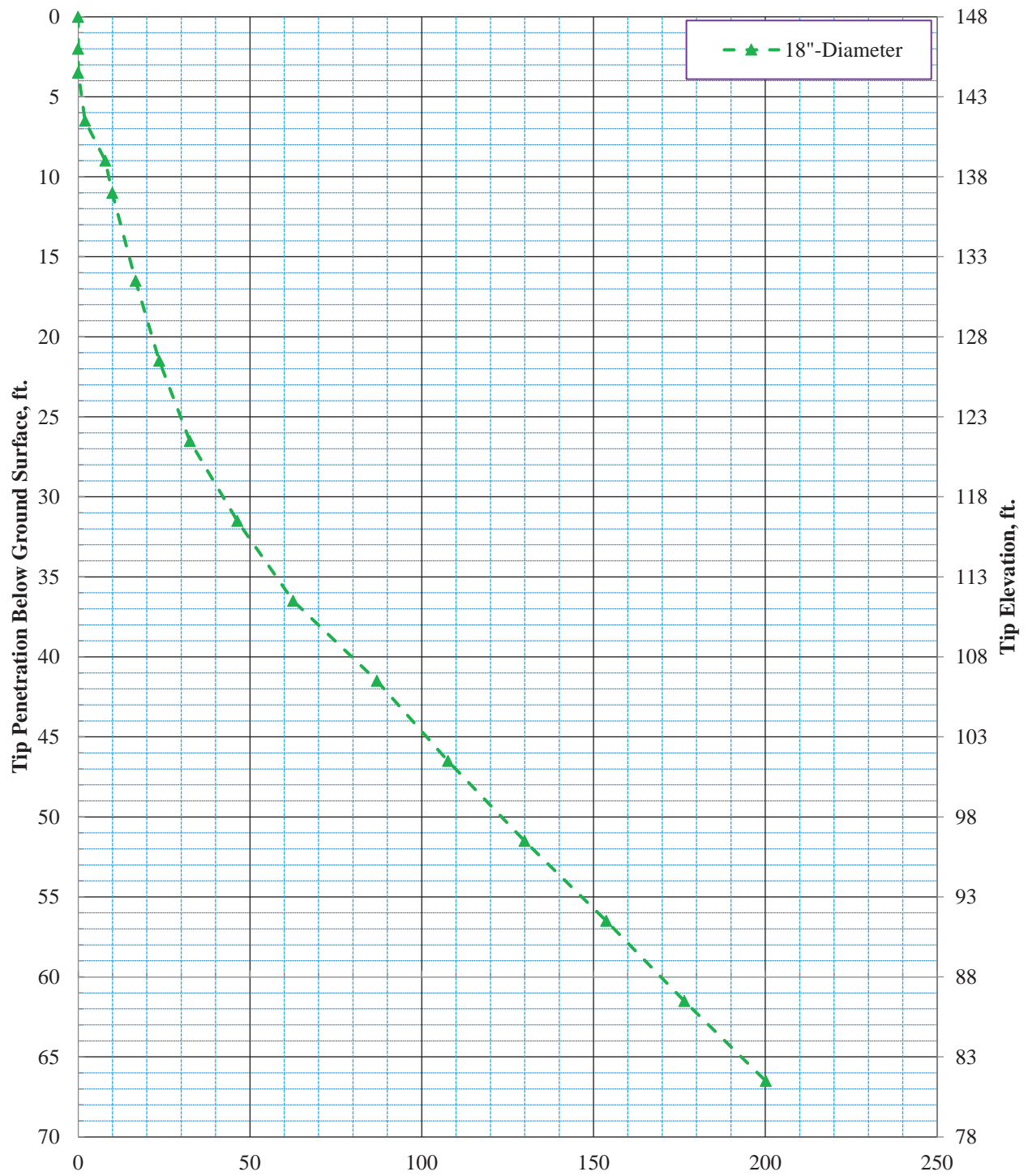


Note: Bridge engineer to verify geotechnical capacity not exceeding structural capacity.

Nominal Single Pile Axial Compression Capacity, tons
CLOSED-END STEEL SHELL PILE



Bent No. 1 - Sta. 5118+52.00, 53 Rt.
 Site No. 2 - I-69 over Cutoff Creek Relief
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County

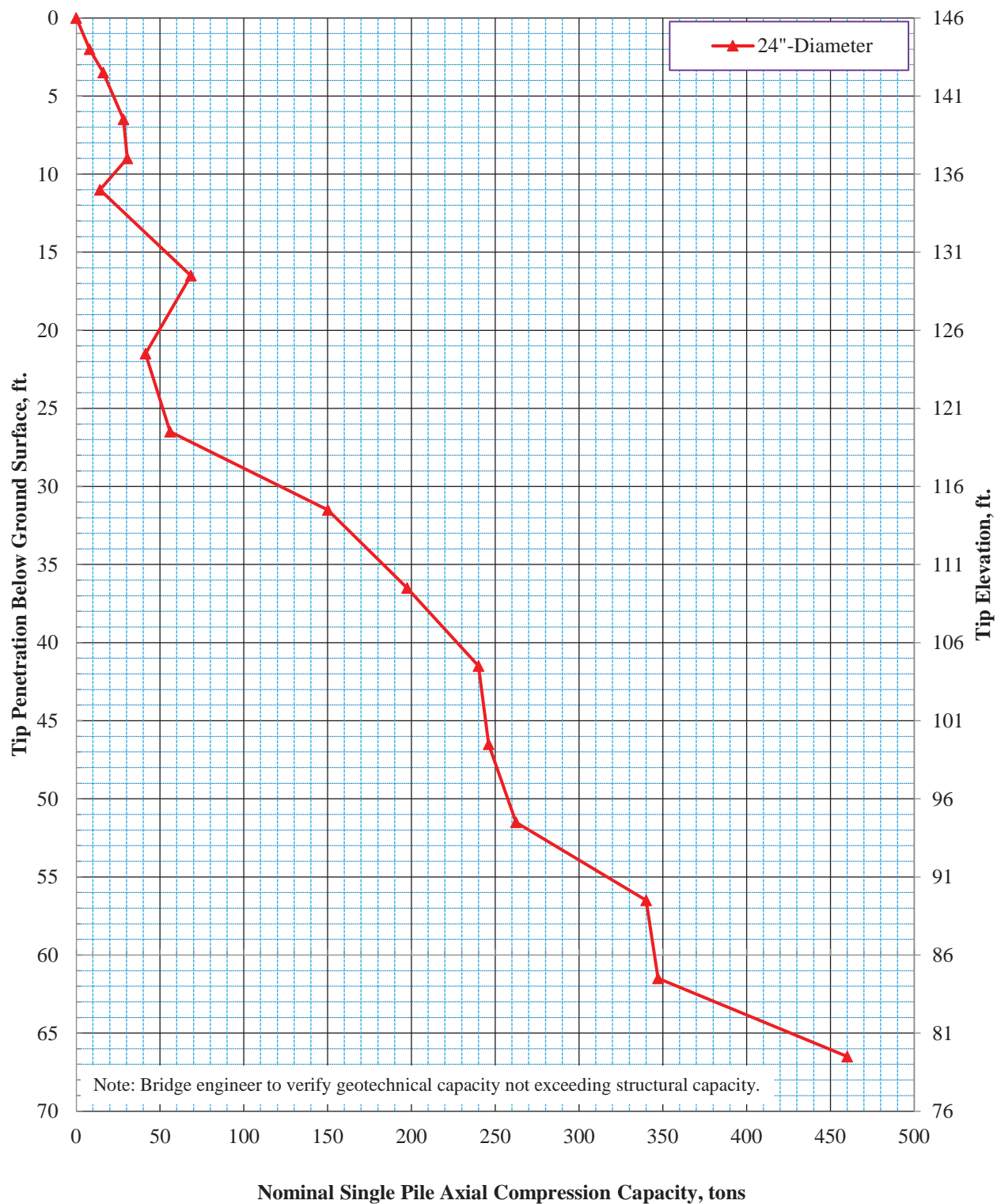


Nominal Single Pile Axial Uplift Capacity, tons

CLOSED-END STEEL SHELL PILE

Bent No. 1 - Sta. 5118+52.00, 53 Rt.
 Site No. 2 - I-69 over Cutoff Creek Relief
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County





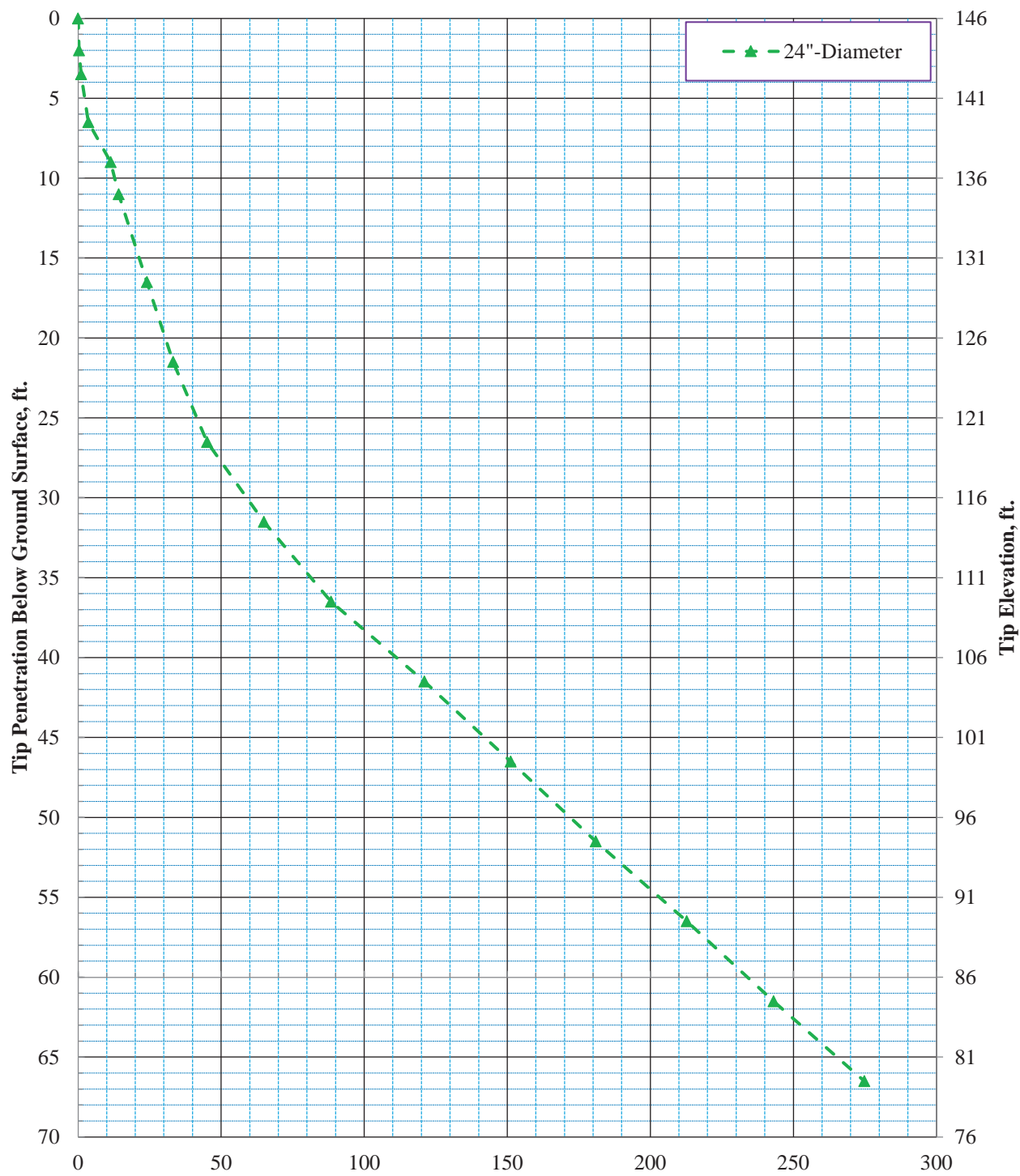
Note: Bridge engineer to verify geotechnical capacity not exceeding structural capacity.

Nominal Single Pile Axial Compression Capacity, tons

CLOSED-END STEEL SHELL PILE



Bent No. 2 - Sta. 5119+35.00, 53 Rt.
 Site No. 2 - I-69 over Cutoff Creek Relief
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County

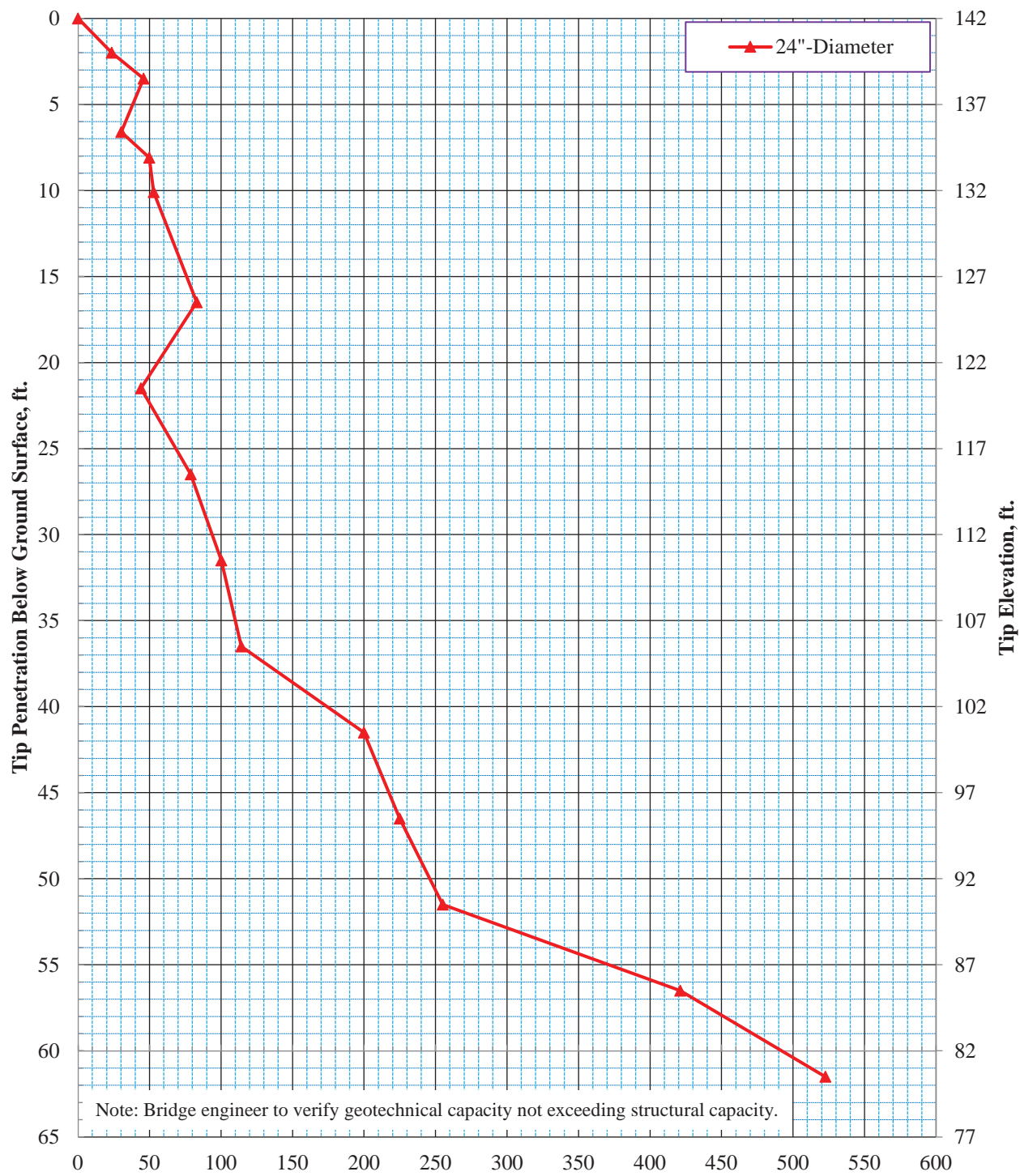


Nominal Single Pile Axial Uplift Capacity, tons

CLOSED-END STEEL SHELL PILE

Bent No. 2 - Sta. 5119+35.00, 53 Rt.
 Site No. 2 - I-69 over Cutoff Creek Relief
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County





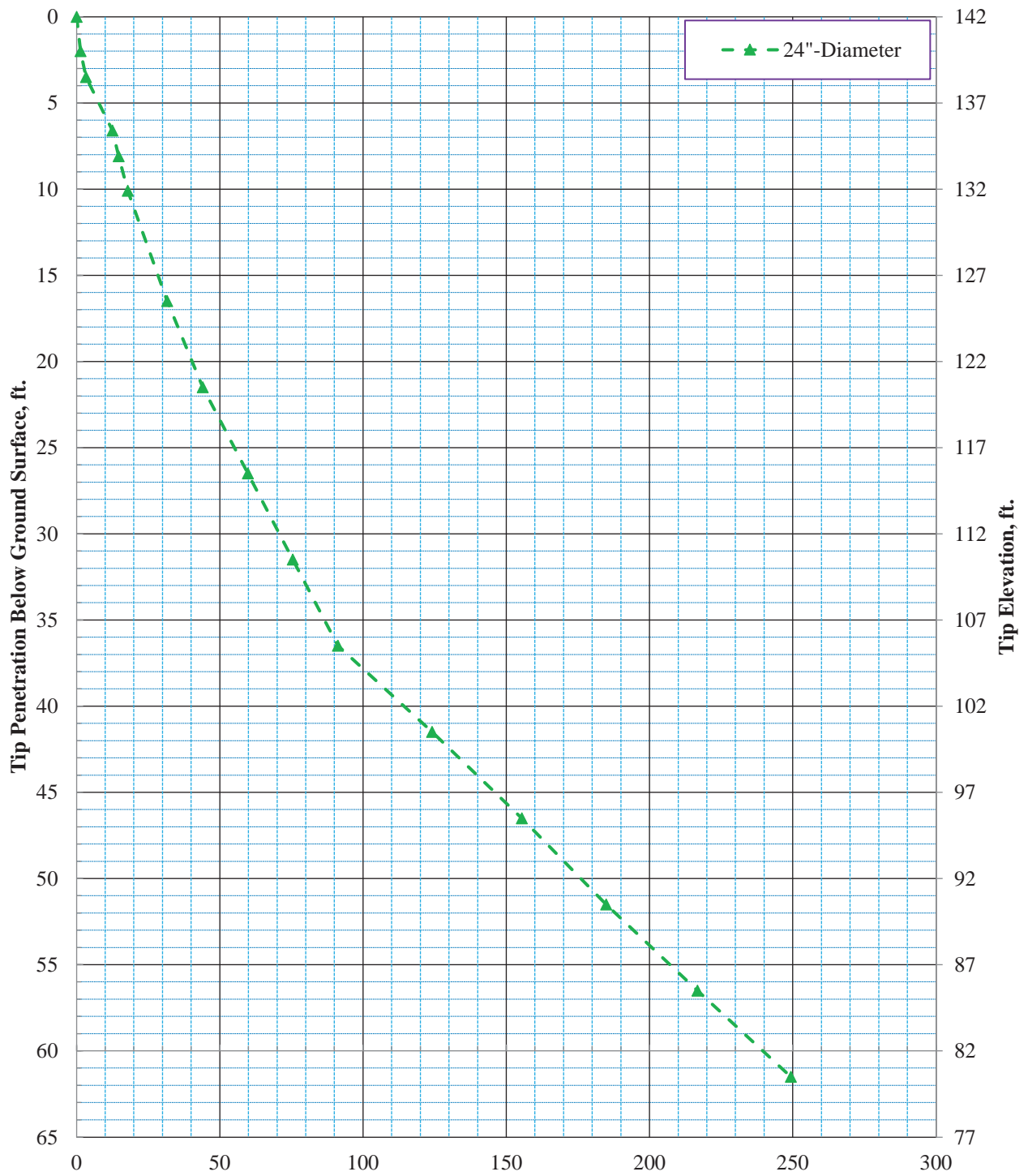
Note: Bridge engineer to verify geotechnical capacity not exceeding structural capacity.

Nominal Single Pile Axial Compression Capacity, tons

CLOSED-END STEEL SHELL PILE



Bent No. 3 - Sta. 5120+20.00, 53 Rt.
 Site No. 2 - I-69 over Cutoff Creek Relief
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County

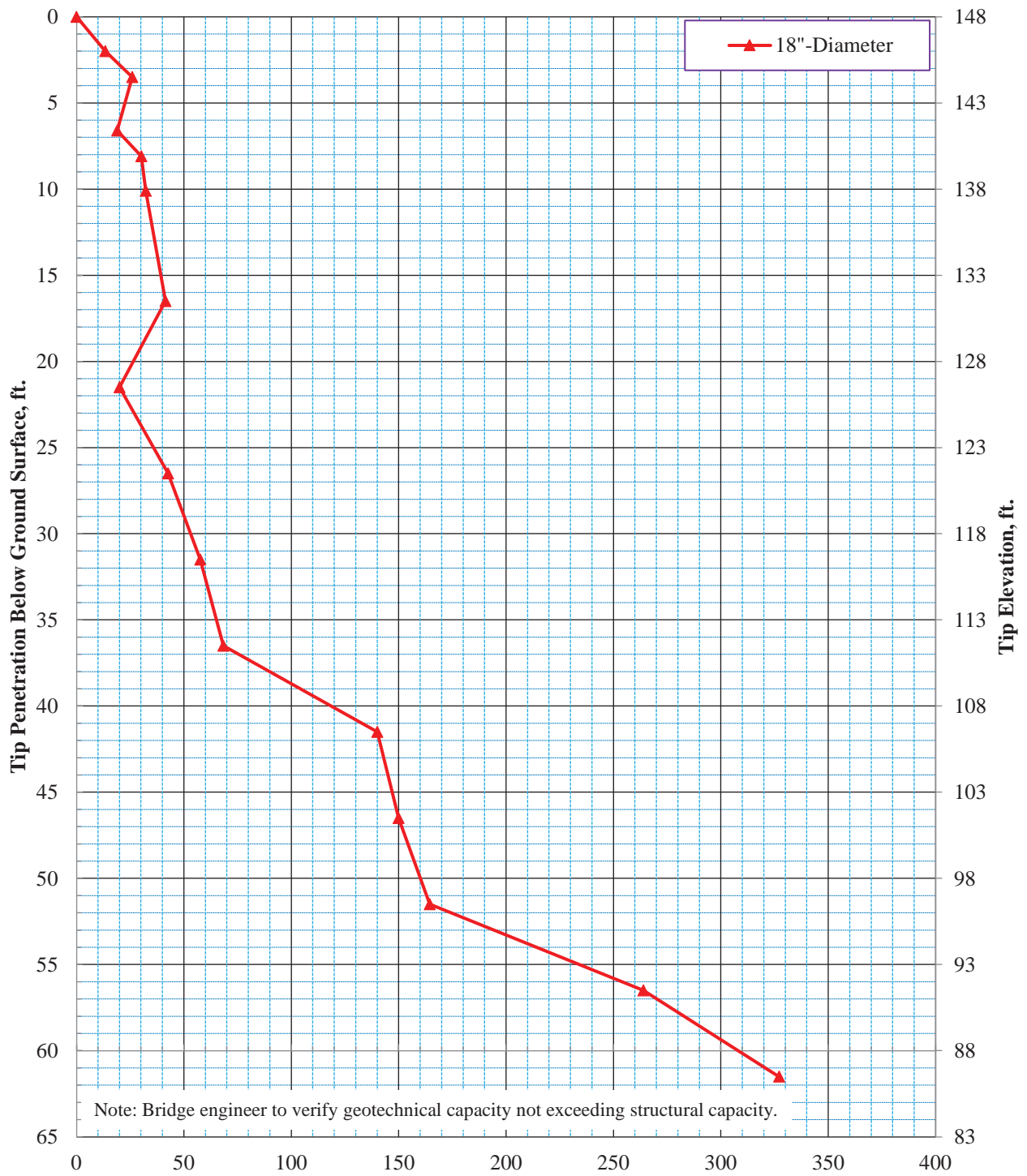


Nominal Single Pile Axial Uplift Capacity, tons

CLOSED-END STEEL SHELL PILE

Bent No. 3 - Sta. 5120+20.00, 53 Rt.
 Site No. 2 - I-69 over Cutoff Creek Relief
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County



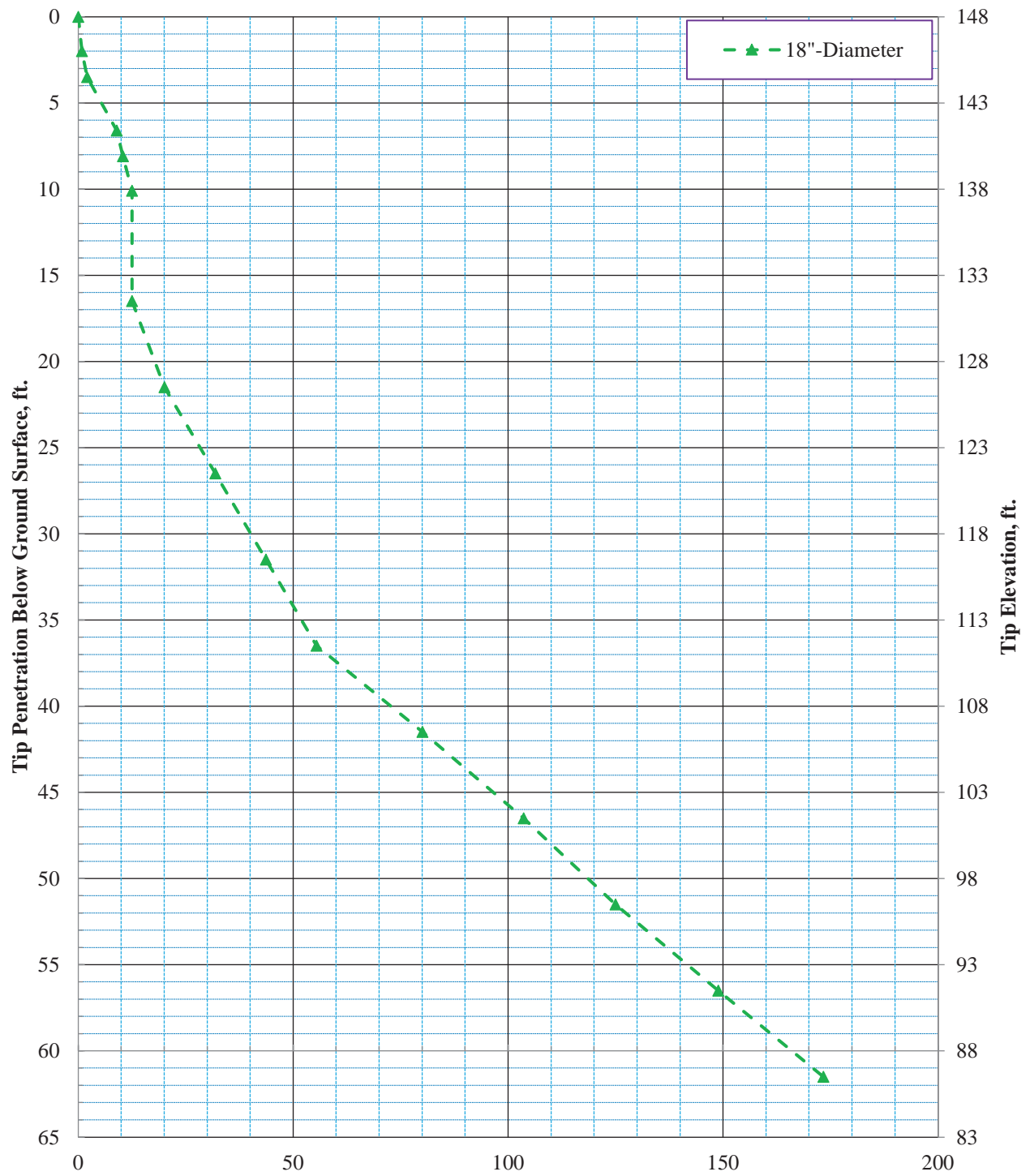


Nominal Single Pile Axial Compression Capacity, tons

CLOSED-END STEEL SHELL PILE



Bent No. 4 - Sta. 5121+03.00, 53 Rt.
 Site No. 2 - I-69 over Cutoff Creek Relief
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County



Nominal Single Pile Axial Uplift Capacity, tons

CLOSED-END STEEL SHELL PILE

Bent No. 4 - Sta. 5121+03.00, 53 Rt.
 Site No. 2 - I-69 over Cutoff Creek Relief
 Project No.: 020678
 Project Name: Hwy. 278 – Hwy. 65 (S)
 Location: Drew County





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

May 14, 2020

TO: Mr. Trinity Smith, Engineer of Roadway Design

SUBJECT: Job No. 020678
Hwy. 278 – Hwy. 65 (S)
Route 69 Section X
Drew & Desha Counties

Attached is the requested soil survey, strength data and Resilient Modulus test results for the above referenced job. The project consists of constructing a 16.78-mile portion of Interstate 69 on new location between Monticello and Highway 65. Samples were taken along the new alignment.

Between stations 4727+00 to 5315+00 the subgrade soils consist primarily of moderately plastic clayey silts. The soils will likely require stabilization to obtain a stable working platform. The addition of 9% Portland cement (by dry wt.) mixed to a depth of 12 inches should be used for quantity estimation purposes. The final subgrade elevation should be no less than three feet above the existing grade.

There were several wet areas encountered. Between stations 4767+00 to 4771+00 are several creeks crossing the centerline; 4831+00 to 4845+00 is a swamp at centerline. There are creeks at stations 4787+00, 4884+00, and 5280+00 that cross the centerline. At stations 5120+00 centerline, and 5148+00 30 feet left of centerline are ponds. The wet locations should be drained prior to construction. These areas will require a minimum of 3 feet undercut, backfilled with Select Granular Material.

Cut slopes in similar material on nearby projects have not supported vegetation and are prone to erosion. Cuts greater than 6 feet are of the greatest concern and should be constructed utilizing a 4:1 slope configuration. The Environmental Division or District 2 personnel may have recommendations that would allow for vegetation to grow on steeper slopes.

Between stations 5136+00 to 5599+52 the subgrade soils consist primarily of moderate to highly plastic clay and some locations of silt. This area consists of old Arkansas River and Bayou Bartholomew deposits and are now agricultural fields. Seasonal flooding occurs. The soils are prone to shrink/swell and settlement problems. The addition of 6% lime (by dry wt.) mixed to a depth of 18 inches should be used for quantity estimation purposes. The final subgrade elevation should be no less than three feet above the existing grade.

Bridge approach embankments between 87+67 and 115+00 east of this area will be evaluated and recommendations made with the subsurface investigation.

The fields between stations 5337+00 to 5365+00 were flooded during the time of investigation. Between stations 5405+00 to 5417+00 is an oxbow lake and 5466+00 to 5469+00 is Bayou Bartholomew. The oxbow lake will need to be drained prior to construction. These areas will require a minimum of 3 feet undercut, backfilled with Select Granular Material.



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

Between stations 5315+00 to 5599+52, the final subgrade elevation should be no less than 4' above existing grade.

The Materials Division will provide a Special Provision to address Select Granular Material and Special Compacted Embankment requirements at a later date.

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 in the vicinity of Sweet Home.

2. Asphalt Concrete Hot Mix

<u>Type</u>	<u>Asphalt Cement %</u>	<u>Mineral Aggregate %</u>
Surface Course	5.2	94.8
Binder Course	4.2	95.8
Base Course	3.5	96.5



Michael C. Benson
Materials Engineer

MCB:pt:bjj
Attachment

cc: State Constr. Eng. – Master File Copy
District 2 Engineer
System Information and Research Div.
G. C. File

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS

MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

*** SOIL SURVEY STRENGTH TEST REPORT ***

DATE - 03/30/2020
JOB NUMBER - 020678

SEQUENCE NO. - 1
MATERIAL CODE - SSRV
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 76
DISTRICT NO. - XX

JOB NAME - HWY. 278 - HWY. 65 (S)

* STATION LIMITS R-VALUE AT 240 psi *

BEGIN JOB - END JOB 6

RESILIENT MODULUS	
STA. 0084+00	7856
STA. 4728+00	10986
STA. 4848+00	11570
STA. 5030+00	9371
STA. 5167+00	9120

REMARKS -

-
AASHTO TESTS : T190

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS

MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

*** SOIL SURVEY STRENGTH TEST REPORT ***

DATE - 03/30/2020
JOB NUMBER - 020678

SEQUENCE NO. - 2
MATERIAL CODE - SSRV
SPEC. YEAR - 2014
SUPPLIER ID. - 1
COUNTY/STATE - 76
DISTRICT NO. - XX

JOB NAME - HWY. 278 - HWY. 65 (S)

* STATION LIMITS R-VALUE AT 240 psi *

RESILIENT MODULUS

STA. 5264+00 8458
STA. 5424+00 11523

REMARKS -
-

AASHTO TESTS : T190

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

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

Job No.	020678	Material Code	SSRVPS
Date Sampled:	2/28/2020	Station No.:	0084+00
Date Tested:	March 24, 2020	Location:	200'RT
Name of Project:	HWY. 278 - HWY. 65 (S)		
County:	Code: 21	Name:	DESHA
Sampled By:	THORNTON / MCKINNEY		
Lab No.:	20200549	Depth:	0-5
Sample ID:	RV125	AASHTO Class:	A-4 (0)
LATITUDE:		Material Type (1 or 2):	2
		LONGITUDE:	

1. Testing Information:

Preconditioning - Permanent Strain > 5% (Y=Yes or N= No)	N
Testing - Permanent Strain > 5% (Y=Yes or N=No)	N
Number of Load Sequences Completed (0-15)	15

2. Specimen Information:

Specimen Diameter (in):	
Top	3.95
Middle	3.95
Bottom	3.95
Average	3.95
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.02
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.02
Initial Area, Ao (sq. in):	12.18
Initial Volume, AoLo (cu. in):	97.68

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	3009.60
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4. Soil Properties:

Optimum Moisture Content (%):	14.9
Maximum Dry Density (pcf):	105.8
95% of MDD (pcf):	100.5
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3009.60
Compaction Moisture content (%):	15.2
Compaction Wet Density (pcf):	117.39
Compaction Dry Density (pcf):	101.90
Moisture Content After Mr Test (%):	15.2

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

#VALUE!

7. Resilient Modulus, Mr:

$6175(S_c)^{0.01918}(S_3)^{0.34364}$

8. Comments

9. Tested By:

GW _____

Date: March 24, 2020

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

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

Job No. 020678 **Material Code** SSRVPS
Date Sampled: 2/28/2020 **Station No.:** 0084+00
Date Tested: March 24, 2020 **Location:** 200'RT
Name of Project: HWY. 278 - HWY. 65 (S)
County: Code: 21 **Name:** DESHA
Sampled By: THORNTON / MCKINNEY
Lab No.: 20200549
Sample ID: RV125
LATITUDE:
Depth: 0-5
AASHTO Class: A-4 (0)
Material Type (1 or 2): 2
LONGITUDE:

PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Actual Applied		Actual Applied Max. Axial Load	Actual Applied Cyclic Load	Actual Applied Contact Load	Actual Applied Max. Axial Stress	Actual Applied Cyclic Stress	Actual Applied Contact Stress	Average Recov Def. LVDT 1 and 2	Resilient Strain	Resilient Modulus
			P _{max} lbs	P _{cyclic} lbs									
DESIGNATION	S ₃	S _{cyclic} psi	P _{max} lbs	P _{cyclic} lbs	P _{contact} lbs	P _{cyclic} lbs	S _{max} psi	S _{cyclic} psi	S _{contact} psi	H _{avg} in	ε _r in/in	M _r psi	
Sequence 1	6.0	2.0	25.2	22.3	2.9	22.3	2.1	1.8	0.2	0.00125	0.00016	11,741	
Sequence 2	6.0	4.0	47.5	44.6	2.9	44.6	3.9	3.7	0.2	0.00251	0.00031	11,705	
Sequence 3	6.0	6.0	70.5	66.7	3.7	66.7	5.8	5.5	0.3	0.00371	0.00046	11,843	
Sequence 4	6.0	8.0	94.9	88.7	6.2	88.7	7.8	7.3	0.5	0.00489	0.00061	11,958	
Sequence 5	6.0	10.0	119.2	110.6	8.6	110.6	9.8	9.1	0.7	0.00601	0.00075	12,122	
Sequence 6	4.0	2.0	25.1	22.2	2.9	22.2	2.1	1.8	0.2	0.00142	0.00018	10,309	
Sequence 7	4.0	4.0	47.0	44.1	2.9	44.1	3.9	3.6	0.2	0.00295	0.00037	9,836	
Sequence 8	4.0	6.0	68.9	66.0	3.0	66.0	5.7	5.4	0.2	0.00442	0.00055	9,818	
Sequence 9	4.0	8.0	93.1	87.8	5.3	87.8	7.6	7.2	0.4	0.00566	0.00071	10,209	
Sequence 10	4.0	10.0	117.5	109.8	7.7	109.8	9.6	9.0	0.6	0.00694	0.00087	10,413	
Sequence 11	2.0	2.0	24.6	21.7	2.9	21.7	2.0	1.8	0.2	0.00178	0.00022	8,040	
Sequence 12	2.0	4.0	46.0	43.1	2.9	43.1	3.8	3.5	0.2	0.00362	0.00045	7,856	
Sequence 13	2.0	6.0	67.5	64.5	2.9	64.5	5.5	5.3	0.2	0.00539	0.00067	7,892	
Sequence 14	2.0	8.0	90.4	86.0	4.4	86.0	7.4	7.1	0.4	0.00692	0.00086	8,187	
Sequence 15	2.0	10.0	114.1	107.2	6.9	107.2	9.4	8.8	0.6	0.00823	0.00103	8,582	

TESTED BY _____ DATE _____
 REVIEWED BY _____ DATE _____
 GW _____ March 24, 2020

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION

AASHTO T 307-99 - RESILIENT MODULUS OF SUBGRADE SOILS
RECOMPACTED / THINWALL TUBE SAMPLES

Job No.	020678	Material Code	SSRVPS	
Date Sampled:	2/28/2020	Station No.:	0084+00	
Date Tested:	March 24, 2020	Location:	200'RT	
Name of Project:	HWY. 278 - HWY. 65 (S)			
County:	Code: 21	Name:	DESHA	
Sampled By:	THORNTON / MCKINNEY		Depth:	0-5
Lab No.:	20200549	AASHTO Class:	A-4 (0)	
Sample ID:	RV125	Material Type (1 or 2):	2	
LATITUDE:		LONGITUDE:		

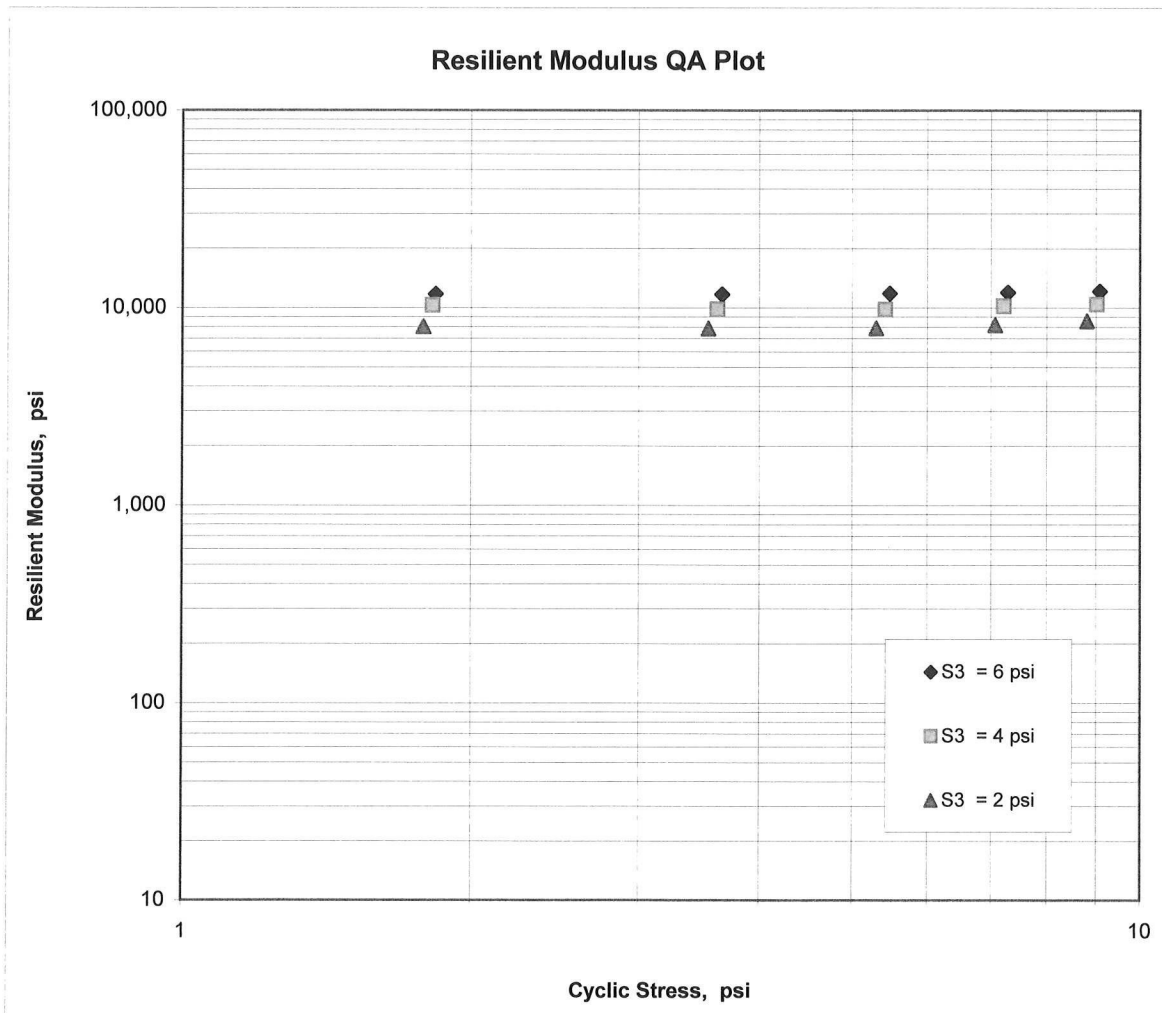
$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

$$K_1 = 6,175$$

$$K_2 = 0.01918$$

$$K_5 = 0.34364$$

$$R^2 = 0.98$$



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

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

Job No.	020678	Material Code	SSRVPS
Date Sampled:	2/28/2020	Station No.:	4728+00
Date Tested:	March 24, 2020	Location:	CL
Name of Project:	HWY. 278 - HWY. 65 (S)		
County:	Code: 21	Name:	DESHA
Sampled By:	THORNTON / MCKINNEY		
Lab No.:	20200550	Depth:	0-5
Sample ID:	RV126	AASHTO Class:	A-4 (2)
LATITUDE:		Material Type (1 or 2):	2
		LONGITUDE:	

1. Testing Information:

Preconditioning - Permanent Strain > 5% (Y=Yes or N= No)	N
Testing - Permanent Strain > 5% (Y=Yes or N=No)	N
Number of Load Sequences Completed (0-15)	15

2. Specimen Information:

Specimen Diameter (in):	
Top	3.95
Middle	3.95
Bottom	3.95
Average	3.95
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.02
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.02
Initial Area, Ao (sq. in):	12.18
Initial Volume, AoLo (cu. in):	97.68

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	3139.70
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4. Soil Properties:

Optimum Moisture Content (%):	12.3
Maximum Dry Density (pcf):	113.5
95% of MDD (pcf):	107.8
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3139.70
Compaction Moisture content (%):	12.5
Compaction Wet Density (pcf):	122.47
Compaction Dry Density (pcf):	108.86
Moisture Content After Mr Test (%):	12.4

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

#VALUE!

7. Resilient Modulus, Mr:

9972(Sc)^{-0.06707}(S3)^{0.32394}

8. Comments

9. Tested By:

GW

Date: March 24, 2020

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

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

Job No. 020678 **Material Code** SSRVPS
Date Sampled: 2/28/2020 **Station No.:** 4728+00
Date Tested: March 24, 2020 **Location:** CL
Name of Project: HWY. 278 - HWY. 65 (S)
County: Code: 21 **Name:** DESHA
Sampled By: THORNTON / MCKINNEY
Lab No.: 20200550
Sample ID: RV126
LATITUDE:
Depth: 0-5
AASHTO Class: A-4 (2)
Material Type (1 or 2): 2
LONGITUDE:

PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Actual Applied Max. Axial Load	Actual Applied Cyclic Load	Actual Applied Contact Load	Actual Applied Max. Axial Stress	Actual Applied Cyclic Stress	Actual Applied Contact Stress	Average Recov Def. LVDT 1 and 2	Resilient Strain	Resilient Modulus
	S ₃ psi	S _{cyclic} psi	P _{max} lbs	P _{cyclic} lbs	P _{contact} lbs	S _{max} psi	S _{cyclic} psi	S _{contact} psi	H _{avg} in	ε _r in/in	M _r psi
Sequence 1	6.0	2.0	25.2	22.5	2.7	2.1	1.8	0.2	0.00086	0.00011	17,270
Sequence 2	6.0	4.0	47.3	44.6	2.7	3.9	3.7	0.2	0.00179	0.00022	16,412
Sequence 3	6.0	6.0	70.3	66.7	3.6	5.8	5.5	0.3	0.00272	0.00034	16,162
Sequence 4	6.0	8.0	94.7	88.7	6.0	7.8	7.3	0.5	0.00372	0.00046	15,682
Sequence 5	6.0	10.0	119.0	110.5	8.5	9.8	9.1	0.7	0.00474	0.00059	15,344
Sequence 6	4.0	2.0	25.1	22.3	2.8	2.1	1.8	0.2	0.00098	0.00012	15,044
Sequence 7	4.0	4.0	47.0	44.3	2.8	3.9	3.6	0.2	0.00205	0.00026	14,183
Sequence 8	4.0	6.0	68.7	65.9	2.8	5.6	5.4	0.2	0.00319	0.00040	13,618
Sequence 9	4.0	8.0	93.1	87.9	5.2	7.6	7.2	0.4	0.00430	0.00054	13,475
Sequence 10	4.0	10.0	117.2	109.6	7.6	9.6	9.0	0.6	0.00540	0.00067	13,377
Sequence 11	2.0	2.0	24.7	22.0	2.8	2.0	1.8	0.2	0.00120	0.00015	12,049
Sequence 12	2.0	4.0	46.2	43.4	2.8	3.8	3.6	0.2	0.00252	0.00031	11,353
Sequence 13	2.0	6.0	67.4	64.6	2.8	5.5	5.3	0.2	0.00387	0.00048	10,986
Sequence 14	2.0	8.0	90.4	86.1	4.3	7.4	7.1	0.4	0.00515	0.00064	11,012
Sequence 15	2.0	10.0	114.6	107.9	6.7	9.4	8.9	0.6	0.00636	0.00079	11,174

TESTED BY _____ DATE March 24, 2020
 REVIEWED BY _____ DATE _____

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION

AASHTO T 307-99 - RESILIENT MODULUS OF SUBGRADE SOILS
RECOMPACTED / THINWALL TUBE SAMPLES

Job No.	020678	Material Code	SSRVPS	
Date Sampled:	2/28/2020	Station No.:	4728+00	
Date Tested:	March 24, 2020	Location:	CL	
Name of Project:	HWY. 278 - HWY. 65 (S)			
County:	Code: 21	Name:	DESHA	
Sampled By:	THORNTON / MCKINNEY		Depth:	0-5
Lab No.:	20200550	AASHTO Class:	A-4 (2)	
Sample ID:	RV126	Material Type (1 or 2):	2	
LATITUDE:		LONGITUDE:		

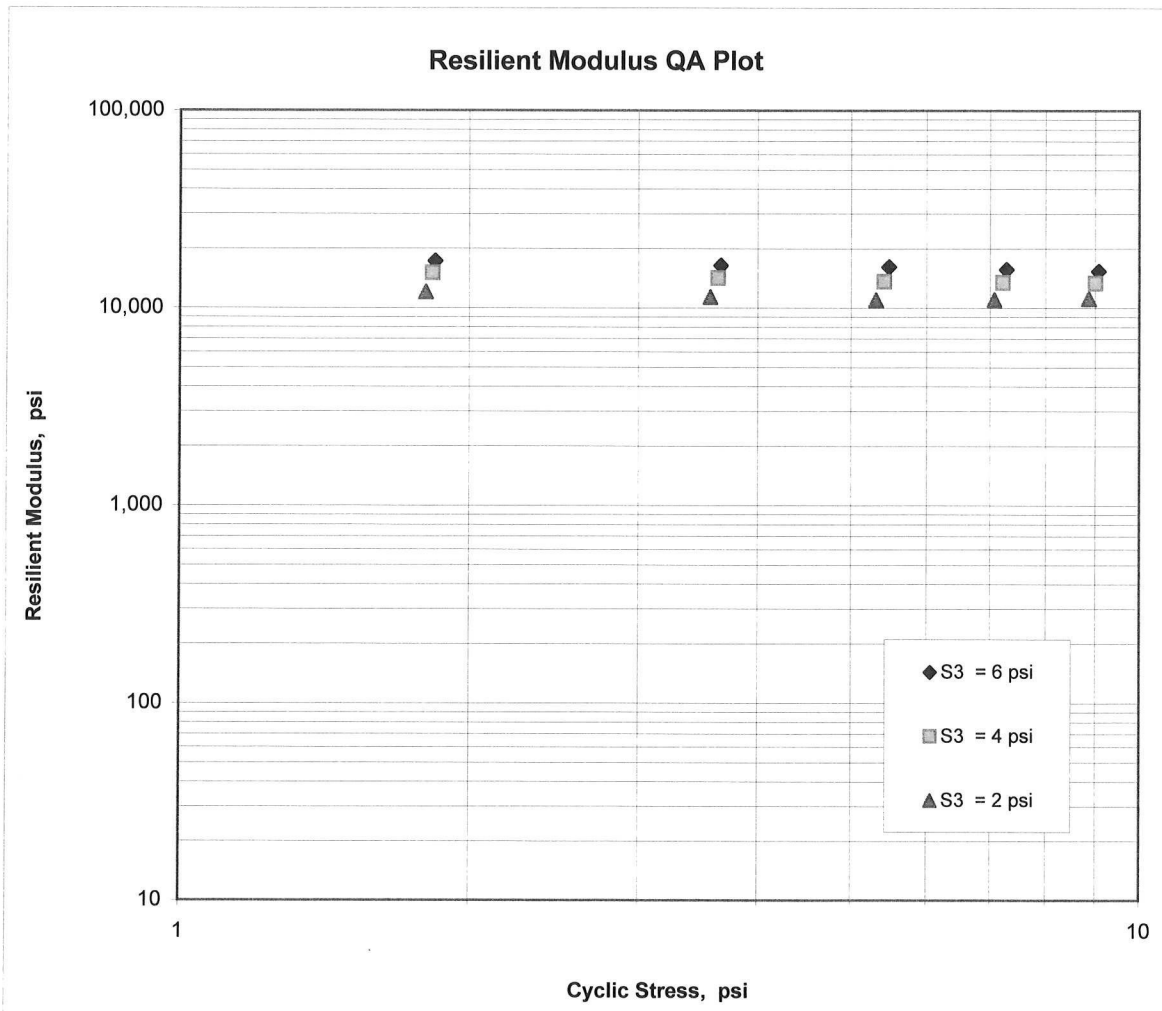
$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

$$K_1 = 9,972$$

$$K_2 = -0.06707$$

$$K_5 = 0.32394$$

$$R^2 = 0.99$$



ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION

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

Job No.	020678	Material Code	SSRVPS
Date Sampled:	2/28/2020	Station No.:	4848+00
Date Tested:	March 25, 2020	Location:	CL
Name of Project:	HWY. 278 - HWY. 65 (S)		
County:	Code: 21	Name:	DESHA
Sampled By:	THORNTON / MCKINNEY		
Lab No.:	20200551	Depth:	0-5
Sample ID:	RV127	AASHTO Class:	A-4 (6)
LATITUDE:		Material Type (1 or 2):	2
		LONGITUDE:	

1. Testing Information:

Preconditioning - Permanent Strain > 5% (Y=Yes or N= No)	N
Testing - Permanent Strain > 5% (Y=Yes or N=No)	N
Number of Load Sequences Completed (0-15)	15

2. Specimen Information:

Specimen Diameter (in):	
Top	3.95
Middle	3.96
Bottom	3.94
Average	3.95
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.02
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.02
Initial Area, Ao (sq. in):	12.18
Initial Volume, AoLo (cu. in):	97.68

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	3113.60
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4. Soil Properties:

Optimum Moisture Content (%):	15.0
Maximum Dry Density (pcf):	109.9
95% of MDD (pcf):	104.4
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3113.60
Compaction Moisture content (%):	15.3
Compaction Wet Density (pcf):	121.45
Compaction Dry Density (pcf):	105.33
Moisture Content After Mr Test (%):	15.3

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

#VALUE!

7. Resilient Modulus, Mr:

$11861(\text{Sc})^{-0.08430}(\text{S3})^{0.22742}$

8. Comments

9. Tested By:

GW

Date: March 25, 2020

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

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

Job No. 020678 **Material Code** SSRVPS
Date Sampled: 2/28/2020 **Station No.:** 4848+00
Date Tested: March 25, 2020 **Location:** CL
Name of Project: HWY. 278 - HWY. 65 (S)
County: Code: 21 **Name:** DESHA
Sampled By: THORNTON / MCKINNEY **Depth:** 0-5
Lab No.: 20200551 **AASHTO Class:** A-4 (6)
Sample ID: RV127 **Material Type (1 or 2):** 2
LATITUDE: **LONGITUDE:**

PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Actual Applied Max. Axial Load	P _{max} lbs	Actual Applied Cyclic Load	P _{cyclic} lbs	Actual Applied Contact Load	P _{contact} lbs	Actual Applied Max. Axial Stress	S _{max} psi	Actual Applied Cyclic Stress	S _{cyclic} psi	Actual Applied Contact Stress	S _{contact} psi	Average Recov Def. LVDT 1 and 2	Resilient Strain	ε _r in/in	Resilient Modulus	M _r psi
Sequence 1	6.0	2.0	25.2	22.4	2.8	2.1	1.8	0.2	0.0087	16,833									
Sequence 2	6.0	4.0	47.3	44.5	2.8	3.9	3.7	0.2	0.0180	16,303									
Sequence 3	6.0	6.0	70.1	66.4	3.7	5.8	5.5	0.3	0.0279	15,667									
Sequence 4	6.0	8.0	94.3	88.2	6.1	7.7	7.2	0.5	0.0387	14,980									
Sequence 5	6.0	10.0	118.0	109.4	8.6	9.7	9.0	0.7	0.0496	14,513									
Sequence 6	4.0	2.0	25.1	22.2	2.9	2.1	1.8	0.2	0.0095	15,417									
Sequence 7	4.0	4.0	47.1	44.2	2.9	3.9	3.6	0.2	0.0197	14,738									
Sequence 8	4.0	6.0	68.8	65.9	2.9	5.6	5.4	0.2	0.0306	14,199									
Sequence 9	4.0	8.0	92.4	87.2	5.3	7.6	7.2	0.4	0.0417	13,748									
Sequence 10	4.0	10.0	116.3	108.6	7.7	9.6	8.9	0.6	0.0536	13,347									
Sequence 11	2.0	2.0	25.0	22.2	2.8	2.1	1.8	0.2	0.0113	12,947									
Sequence 12	2.0	4.0	46.7	43.9	2.9	3.8	3.6	0.2	0.0231	12,486									
Sequence 13	2.0	6.0	68.0	65.1	2.8	5.6	5.3	0.2	0.0352	12,202									
Sequence 14	2.0	8.0	90.5	86.3	4.3	7.4	7.1	0.3	0.0480	11,832									
Sequence 15	2.0	10.0	113.5	106.8	6.7	9.3	8.8	0.5	0.0608	11,570									

TESTED BY _____ **DATE** March 25, 2020
REVIEWED BY _____ **DATE** _____

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

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

Job No.	020678	Material Code	SSRVPS
Date Sampled:	2/28/2020	Station No.:	4848+00
Date Tested:	March 25, 2020	Location:	CL
Name of Project:	HWY. 278 - HWY. 65 (S)		
County:	Code: 21	Name:	DESHA
Sampled By:	THORNTON / MCKINNEY		Depth: 0-5
Lab No.:	20200551	AASHTO Class:	A-4 (6)
Sample ID:	RV127	Material Type (1 or 2):	2
LATITUDE:		LONGITUDE:	

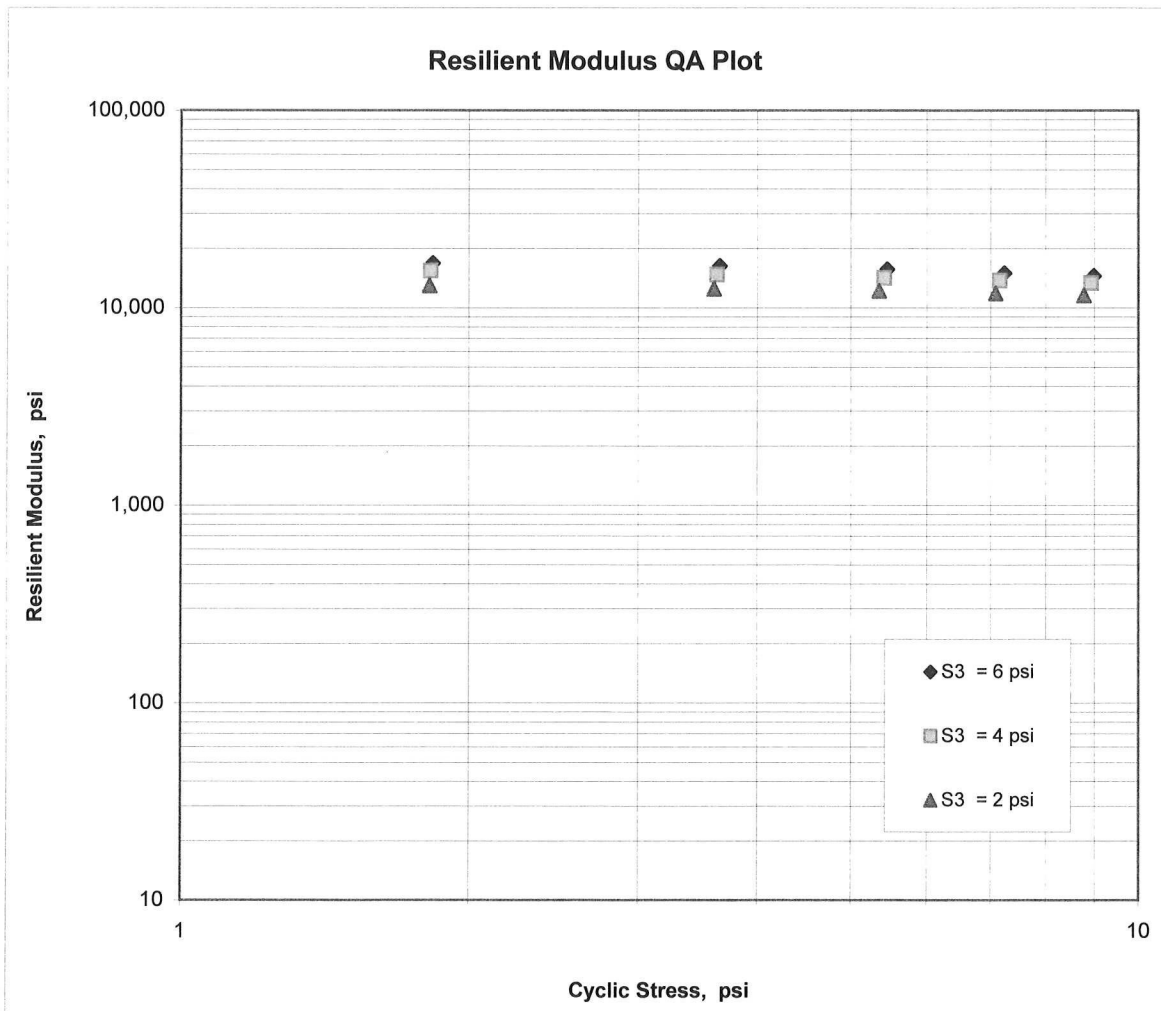
$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

$$K_1 = \frac{11,861}{\quad}$$

$$K_2 = \frac{-0.08430}{\quad}$$

$$K_5 = \frac{0.22742}{\quad}$$

$$R^2 = \frac{0.99}{\quad}$$



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

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

Job No.	020678	Material Code	SSRVPS
Date Sampled:	2/28/2020	Station No.:	5030+00
Date Tested:	March 25, 2020	Location:	CL
Name of Project:	HWY. 278 - HWY. 65 (S)		
County:	Code: 21	Name:	DESHA
Sampled By:	THORNTON / MCKINNEY		
Lab No.:	20200552	Depth:	0-5
Sample ID:	RV128	AASHTO Class:	A-6 (12)
LATITUDE:		Material Type (1 or 2):	2
		LONGITUDE:	

1. Testing Information:

Preconditioning - Permanent Strain > 5% (Y=Yes or N= No)	N
Testing - Permanent Strain > 5% (Y=Yes or N=No)	N
Number of Load Sequences Completed (0-15)	15

2. Specimen Information:

Specimen Diameter (in):	
Top	3.94
Middle	3.96
Bottom	3.95
Average	3.95
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.02
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.02
Initial Area, Ao (sq. in):	12.18
Initial Volume, AoLo (cu. in):	97.68

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	3156.10
------------------------------	---------

4. Soil Properties:

Optimum Moisture Content (%):	16.1
Maximum Dry Density (pcf):	109
95% of MDD (pcf):	103.6
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3156.10
Compaction Moisture content (%):	15.9
Compaction Wet Density (pcf):	123.11
Compaction Dry Density (pcf):	106.22
Moisture Content After Mr Test (%):	15.9

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

#VALUE!

7. Resilient Modulus, Mr:

12575(S_c)^{-0.17825}(S₃)^{0.16749}

8. Comments

9. Tested By:

GW

Date: March 25, 2020

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

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

Job No. 020678 **Material Code** SSRVPS
Date Sampled: 2/28/2020 **Station No.:** 5030+00
Date Tested: March 25, 2020 **Location:** CL
Name of Project: HWY. 278 - HWY. 65 (S)
County: Code: 21 **Name:** DESHA
Sampled By: THORNTON / MCKINNEY
Lab No.: 20200552
Sample ID: RV128
LATITUDE:
Depth: 0-5
AASHTO Class: A-6 (12)
Material Type (1 or 2): 2
LONGITUDE:

PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Actual Applied		Actual Applied		Actual Applied		Average Recov Def. LVDT 1 and 2	Resilient Strain	Resilient Modulus
			Max. Axial Load	Cyclic Load	Max. Axial Stress	Cyclic Stress	Contact Load	Contact Stress			
DESIGNATION	S ₃	S _{cyclic}	P _{max}	P _{cyclic}	P _{contact}	S _{max}	S _{cyclic}	S _{contact}	H _{avg}	ε _r	M _r
UNIT	psi	psi	lbs	lbs	lbs	psi	psi	psi	in	in/in	psi
Sequence 1	6.0	2.0	25.3	22.5	2.8	2.1	1.8	0.2	0.00100	0.00012	14,877
Sequence 2	6.0	4.0	47.3	44.6	2.8	3.9	3.7	0.2	0.00208	0.00026	14,110
Sequence 3	6.0	6.0	70.0	66.4	3.6	5.7	5.4	0.3	0.00336	0.00042	13,014
Sequence 4	6.0	8.0	93.6	87.5	6.1	7.7	7.2	0.5	0.00490	0.00061	11,773
Sequence 5	6.0	10.0	116.7	108.2	8.5	9.6	8.9	0.7	0.00653	0.00081	10,912
Sequence 6	4.0	2.0	25.3	22.5	2.7	2.1	1.8	0.2	0.00108	0.00013	13,786
Sequence 7	4.0	4.0	47.3	44.5	2.8	3.9	3.7	0.2	0.00226	0.00028	12,981
Sequence 8	4.0	6.0	69.0	66.2	2.8	5.7	5.4	0.2	0.00358	0.00045	12,164
Sequence 9	4.0	8.0	92.6	87.5	5.1	7.6	7.2	0.4	0.00512	0.00064	11,251
Sequence 10	4.0	10.0	115.6	108.0	7.5	9.5	8.9	0.6	0.00684	0.00085	10,399
Sequence 11	2.0	2.0	25.1	22.4	2.7	2.1	1.8	0.2	0.00120	0.00015	12,295
Sequence 12	2.0	4.0	47.0	44.3	2.7	3.9	3.6	0.2	0.00255	0.00032	11,433
Sequence 13	2.0	6.0	68.5	65.8	2.7	5.6	5.4	0.2	0.00406	0.00051	10,664
Sequence 14	2.0	8.0	91.0	86.8	4.2	7.5	7.1	0.3	0.00569	0.00071	10,049
Sequence 15	2.0	10.0	113.8	107.2	6.6	9.3	8.8	0.5	0.00753	0.00094	9,371

TESTED BY _____ **DATE** March 25, 2020
REVIEWED BY _____ **DATE** _____

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION

AASHTO T 307-99 - RESILIENT MODULUS OF SUBGRADE SOILS
RECOMPACTED / THINWALL TUBE SAMPLES

Job No.	020678	Material Code	SSRVPS
Date Sampled:	2/28/2020	Station No.:	5030+00
Date Tested:	March 25, 2020	Location:	CL
Name of Project:	HWY. 278 - HWY. 65 (S)		
County:	Code: 21	Name:	DESHA
Sampled By:	THORNTON / MCKINNEY		
Lab No.:	20200552	Depth:	0-5
Sample ID:	RV128	AASHTO Class:	A-6 (12)
LATITUDE:		Material Type (1 or 2):	2
		LONGITUDE:	

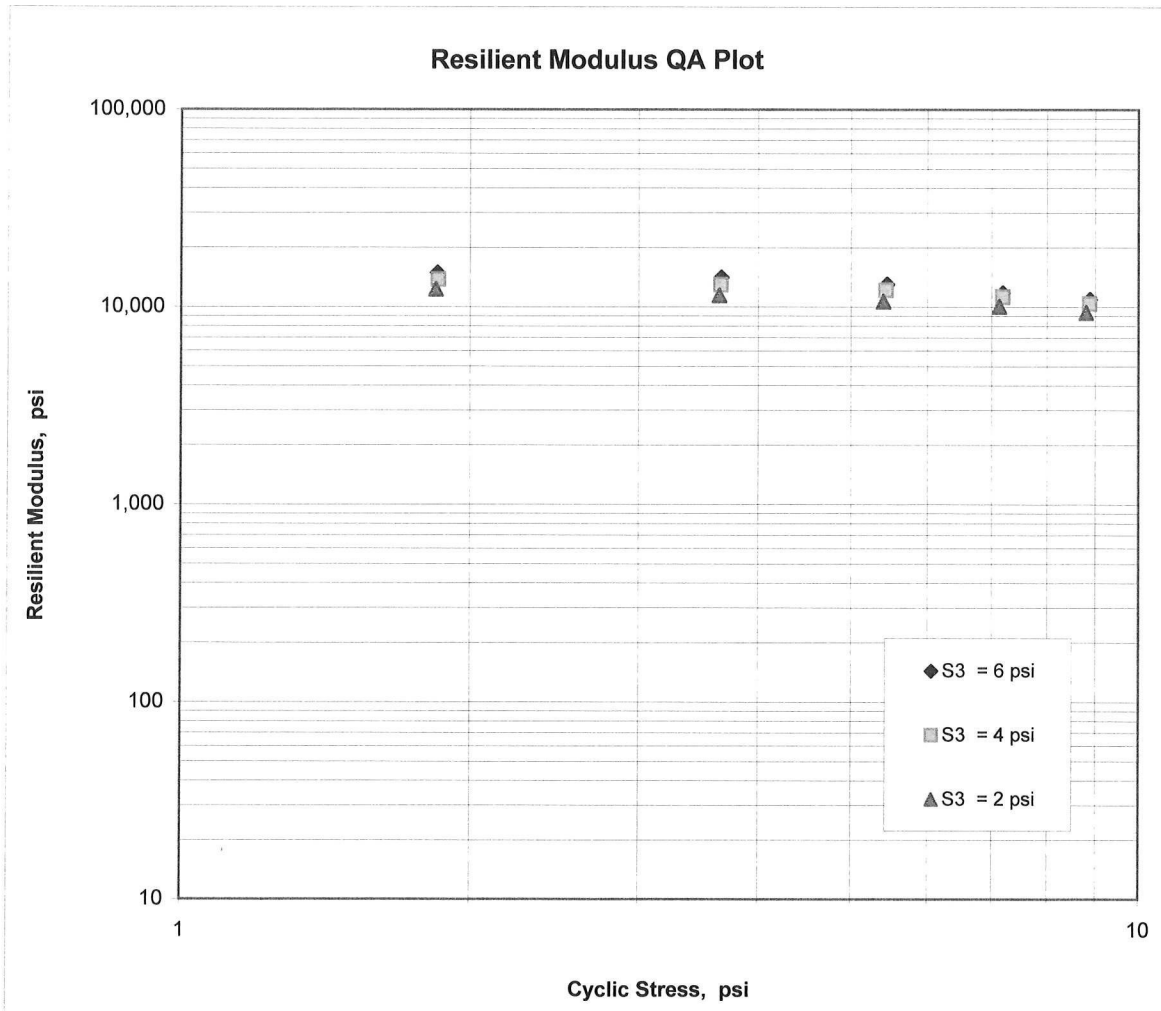
$$M_R = K_1 (S_C)^{K_2} (S_3)^{K_5}$$

$$K_1 = 12,575$$

$$K_2 = -0.17825$$

$$K_5 = 0.16749$$

$$R^2 = 0.94$$



ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION

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

Job No.	020678	Material Code	SSRVPS
Date Sampled:	2/28/2020	Station No.:	5167+00
Date Tested:	March 25, 2020	Location:	CL
Name of Project:	HWY. 278 - HWY. 65 (S)		
County:	Code: 21	Name:	DESHA
Sampled By:	THORNTON / MCKINNEY		
Lab No.:	20200626	Depth:	0-5
Sample ID:	RV129	AASHTO Class:	A-6 (7)
LATITUDE:		Material Type (1 or 2):	2
		LONGITUDE:	

1. Testing Information:

Preconditioning - Permanent Strain > 5% (Y=Yes or N= No)	N
Testing - Permanent Strain > 5% (Y=Yes or N=No)	N
Number of Load Sequences Completed (0-15)	15

2. Specimen Information:

Specimen Diameter (in):	
Top	3.95
Middle	3.95
Bottom	3.95
Average	3.95
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.02
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.02
Initial Area, Ao (sq. in):	12.18
Initial Volume, AoLo (cu. in):	97.68

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	3104.70
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4. Soil Properties:

Optimum Moisture Content (%):	15.9
Maximum Dry Density (pcf):	109.3
95% of MDD (pcf):	103.8
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3104.70
Compaction Moisture content (%):	15.8
Compaction Wet Density (pcf):	121.10
Compaction Dry Density (pcf):	104.58
Moisture Content After Mr Test (%):	15.7

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

7. Resilient Modulus, Mr: 10341(Sc)^-0.13337(S3)^0.24747

8. Comments

9. Tested By:

GW

Date: March 25, 2020

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

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

Job No. 020678 **Material Code** SSRVPS
Date Sampled: 2/28/2020 **Station No.:** 5167+00
Date Tested: March 25, 2020 **Location:** CL
Name of Project: HWY. 278 - HWY. 65 (S)
County: Code: 21 **Name:** DESHA
Sampled By: THORNTON / MCKINNEY
Lab No.: 20200626
Sample ID: RV129
LATITUDE:
Depth: 0-5
AASHTO Class: A-6 (7)
Material Type (1 or 2): 2
LONGITUDE:

PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Actual Applied		Actual Applied		Actual Applied		Average Recov Def. LVDT 1 and 2	Resilient Strain	Resilient Modulus
			Max. Axial Load	Cyclic Load	Max. Axial Stress	Cyclic Stress	Contact Stress				
DESIGNATION UNIT	S ₃ psi	S _{cyclic} psi	P _{max} lbs	P _{cyclic} lbs	P _{contact} lbs	S _{max} psi	S _{cyclic} psi	S _{contact} psi	H _{avg} in	ε _r in/in	M _r psi
Sequence 1	6.0	2.0	25.0	22.2	2.7	2.1	1.8	0.2	0.00101	0.00013	14,534
Sequence 2	6.0	4.0	47.3	44.5	2.8	3.9	3.7	0.2	0.00210	0.00026	13,979
Sequence 3	6.0	6.0	70.3	66.7	3.6	5.8	5.5	0.3	0.00333	0.00042	13,172
Sequence 4	6.0	8.0	94.2	88.2	6.0	7.7	7.2	0.5	0.00474	0.00059	12,259
Sequence 5	6.0	10.0	118.1	109.7	8.4	9.7	9.0	0.7	0.00611	0.00076	11,828
Sequence 6	4.0	2.0	25.1	22.4	2.7	2.1	1.8	0.2	0.00111	0.00014	13,246
Sequence 7	4.0	4.0	47.1	44.4	2.7	3.9	3.6	0.2	0.00235	0.00029	12,434
Sequence 8	4.0	6.0	68.9	66.1	2.7	5.7	5.4	0.2	0.00372	0.00046	11,711
Sequence 9	4.0	8.0	92.8	87.7	5.1	7.6	7.2	0.4	0.00518	0.00065	11,146
Sequence 10	4.0	10.0	116.8	109.4	7.4	9.6	9.0	0.6	0.00672	0.00084	10,722
Sequence 11	2.0	2.0	25.1	22.4	2.7	2.1	1.8	0.2	0.00131	0.00016	11,265
Sequence 12	2.0	4.0	46.8	44.1	2.7	3.8	3.6	0.2	0.00277	0.00035	10,472
Sequence 13	2.0	6.0	68.1	65.4	2.7	5.6	5.4	0.2	0.00436	0.00054	9,867
Sequence 14	2.0	8.0	90.7	86.5	4.2	7.4	7.1	0.3	0.00603	0.00075	9,437
Sequence 15	2.0	10.0	114.0	107.4	6.6	9.4	8.8	0.5	0.00775	0.00097	9,120

TESTED BY _____ DATE March 25, 2020
 REVIEWED BY _____ DATE _____

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION

AASHTO T 307-99 - RESILIENT MODULUS OF SUBGRADE SOILS
RECOMPACTED / THINWALL TUBE SAMPLES

Job No.	020678	Material Code	SSRVPS	
Date Sampled:	2/28/2020	Station No.:	5167+00	
Date Tested:	March 25, 2020	Location:	CL	
Name of Project:	HWY. 278 - HWY. 65 (S)			
County:	Code: 21	Name:	DESHA	
Sampled By:	THORNTON / MCKINNEY		Depth:	0-5
Lab No.:	20200626	AASHTO Class:	A-6 (7)	
Sample ID:	RV129	Material Type (1 or 2):	2	
LATITUDE:		LONGITUDE:		

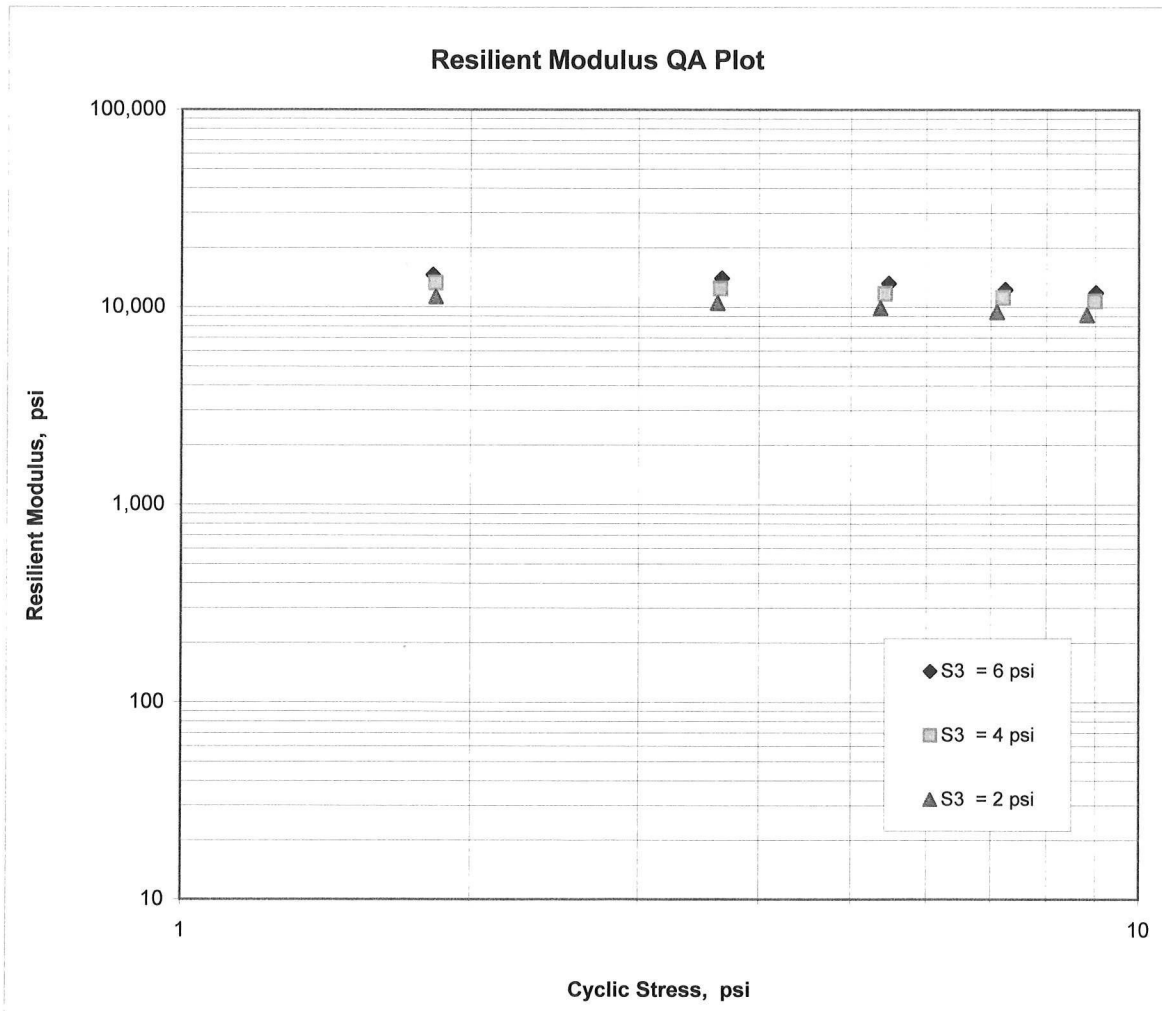
$$M_R = K_1 (S_c)^{K_2} (S_3)^{K_5}$$

$$K_1 = 10,341$$

$$K_2 = -0.13337$$

$$K_5 = 0.24747$$

$$R^2 = 0.99$$



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

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

Job No.	020678	Material Code	SSRVPS
Date Sampled:	2/28/2020	Station No.:	5264+00
Date Tested:	March 25, 2020	Location:	CL
Name of Project:	HWY. 278 - HWY. 65 (S)		
County:	Code: 21	Name:	DESHA
Sampled By:	THORNTON / MCKINNEY		
Lab No.:	20200553	Depth:	0-5
Sample ID:	RV130	AASHTO Class:	A-6 (10)
LATITUDE:		Material Type (1 or 2):	2
		LONGITUDE:	

1. Testing Information:

Preconditioning - Permanent Strain > 5% (Y=Yes or N= No)	N
Testing - Permanent Strain > 5% (Y=Yes or N=No)	N
Number of Load Sequences Completed (0-15)	15

2. Specimen Information:

Specimen Diameter (in):	
Top	3.95
Middle	3.95
Bottom	3.95
Average	3.95
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.02
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.02
Initial Area, Ao (sq. in):	12.18
Initial Volume, AoLo (cu. in):	97.68

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	3111.70
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4. Soil Properties:

Optimum Moisture Content (%):	14.9
Maximum Dry Density (pcf):	110.9
95% of MDD (pcf):	105.4
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3111.70
Compaction Moisture content (%):	14.8
Compaction Wet Density (pcf):	121.38
Compaction Dry Density (pcf):	105.73
Moisture Content After Mr Test (%):	14.7

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

#VALUE!

7. Resilient Modulus, Mr:

10651(Sc)^{-0.17572}(S3)^{0.21698}

8. Comments

9. Tested By:

_____ GW

Date: March 25, 2020

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

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

Job No. 020678 **Material Code** SSRVPS
Date Sampled: 2/28/2020 **Station No.:** 5264+00
Date Tested: March 25, 2020 **Location:** CL
Name of Project: HWY. 278 - HWY. 65 (S)
County: Code: 21 **Name:** DESHA
Sampled By: THORNTON / MCKINNEY
Lab No.: 20200553
Sample ID: RV130
LATITUDE:
Depth: 0-5
AASHTO Class: A-6 (10)
Material Type (1 or 2): 2
LONGITUDE:

PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Actual Applied		Actual Applied Contact Load	Actual Applied Max. Axial Load	P _{max} lbs	P _{cyclic} lbs	P _{contact} lbs	S _{max} psi	S _{cyclic} psi	S _{contact} psi	Average Recov Def. LVDT 1 and 2	Resilient Strain	Resilient Modulus
			Max. Axial Load	Cyclic Load											
DESIGNATION UNIT	S ₃ psi	S _{cyclic} psi	P _{max} lbs	P _{cyclic} lbs	P _{contact} lbs	S _{max} psi	P _{cyclic} lbs	P _{contact} lbs	S _{max} psi	S _{cyclic} psi	S _{contact} psi	H _{avg} in	ε _r in/in	M _r psi	
Sequence 1	6.0	2.0	25.2	22.5	2.7	2.1	2.1	2.7	2.1	1.9	0.2	0.00106	0.00013	14,020	
Sequence 2	6.0	4.0	47.5	44.8	2.7	3.9	3.9	2.7	3.9	3.7	0.2	0.00225	0.00028	13,095	
Sequence 3	6.0	6.0	70.2	66.7	3.5	5.8	5.8	3.5	5.8	5.5	0.3	0.00365	0.00046	12,031	
Sequence 4	6.0	8.0	94.1	88.2	5.9	7.7	7.7	5.9	7.7	7.2	0.5	0.00531	0.00066	10,932	
Sequence 5	6.0	10.0	117.3	108.9	8.4	9.6	9.6	8.4	9.6	8.9	0.7	0.00706	0.00088	10,160	
Sequence 6	4.0	2.0	25.2	22.6	2.7	2.1	2.1	2.7	2.1	1.9	0.2	0.00118	0.00015	12,610	
Sequence 7	4.0	4.0	47.3	44.6	2.7	3.9	3.9	2.7	3.9	3.7	0.2	0.00250	0.00031	11,762	
Sequence 8	4.0	6.0	69.1	66.4	2.7	5.7	5.7	2.7	5.7	5.4	0.2	0.00404	0.00050	10,809	
Sequence 9	4.0	8.0	92.6	87.6	5.0	7.6	7.6	5.0	7.6	7.2	0.4	0.00569	0.00071	10,139	
Sequence 10	4.0	10.0	116.2	108.7	7.5	9.5	9.5	7.5	9.5	8.9	0.6	0.00748	0.00093	9,577	
Sequence 11	2.0	2.0	25.2	22.5	2.7	2.1	2.1	2.7	2.1	1.8	0.2	0.00139	0.00017	10,669	
Sequence 12	2.0	4.0	47.1	44.4	2.7	3.9	3.9	2.7	3.9	3.6	0.2	0.00291	0.00036	10,044	
Sequence 13	2.0	6.0	68.4	65.7	2.7	5.6	5.6	2.7	5.6	5.4	0.2	0.00460	0.00057	9,399	
Sequence 14	2.0	8.0	90.8	86.6	4.2	7.5	7.5	4.2	7.5	7.1	0.3	0.00647	0.00081	8,807	
Sequence 15	2.0	10.0	114.2	107.5	6.6	9.4	9.4	6.6	9.4	8.8	0.5	0.00837	0.00104	8,458	

TESTED BY _____ DATE March 25, 2020
 REVIEWED BY _____ DATE _____

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

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

Job No.	020678	Material Code	SSRVPS
Date Sampled:	2/28/2020	Station No.:	5264+00
Date Tested:	March 25, 2020	Location:	CL
Name of Project:	HWY. 278 - HWY. 65 (S)		
County:	Code: 21	Name:	DESHA
Sampled By:	THORNTON / MCKINNEY		Depth: 0-5
Lab No.:	20200553	AASHTO Class:	A-6 (10)
Sample ID:	RV130	Material Type (1 or 2):	2
LATITUDE:		LONGITUDE:	

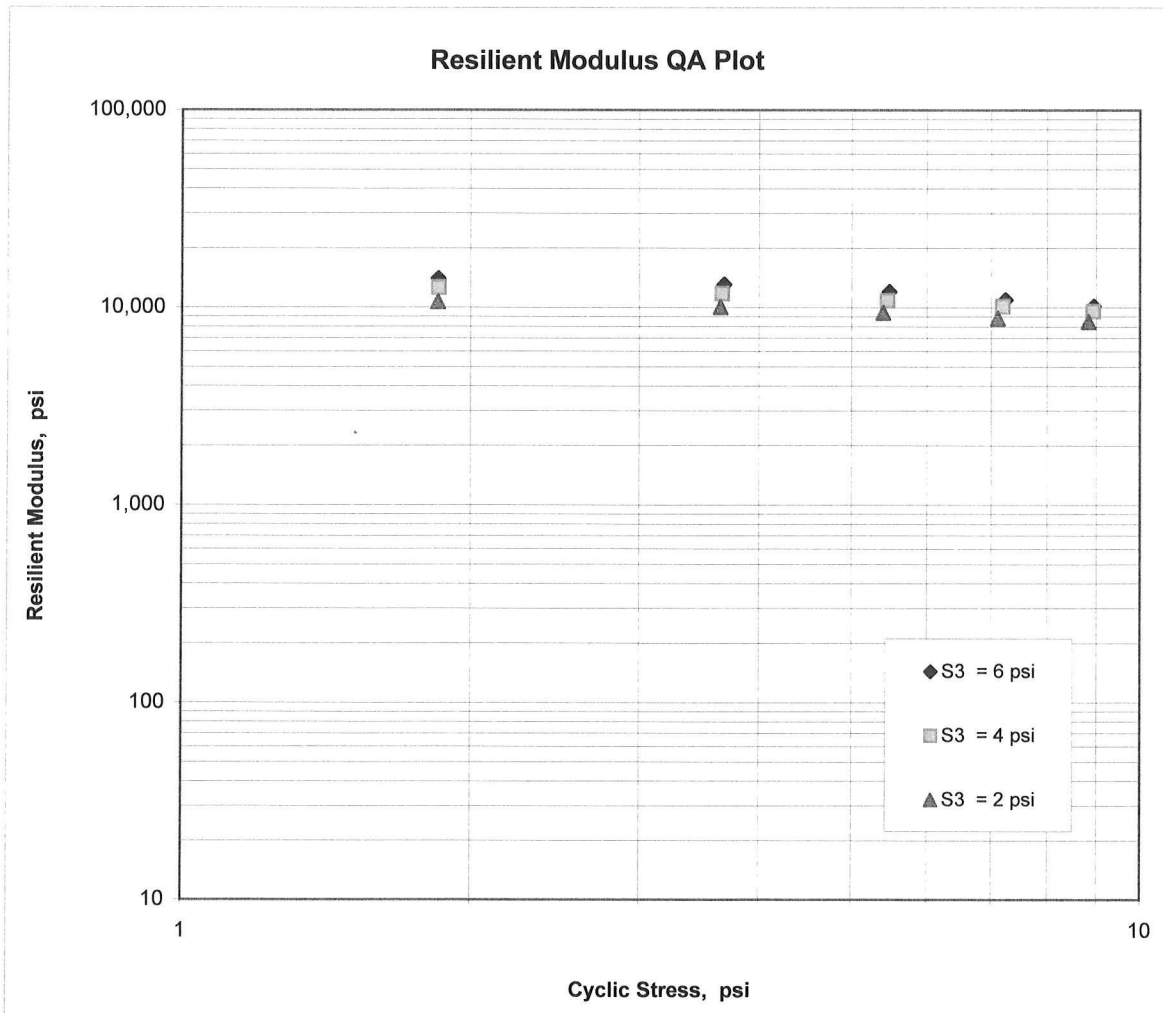
$$M_R = K_1 (S_c)^{K_2} (S_3)^{K_5}$$

$$K_1 = \underline{10,651}$$

$$K_2 = \underline{-0.17572}$$

$$K_5 = \underline{0.21698}$$

$$R^2 = \underline{0.96}$$



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

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

Job No.	020678	Material Code	SSRVPS
Date Sampled:	2/28/2020	Station No.:	5424+00
Date Tested:	March 25, 2020	Location:	CL
Name of Project:	HWY. 278 - HWY. 65 (S)		
County:	Code: 21	Name: DESHA	
Sampled By:	THORNTON / MCKINNEY		
Lab No.:	20200554	Depth:	0-5
Sample ID:	RV131	AASHTO Class:	A-6 (9)
LATITUDE:		Material Type (1 or 2):	2
		LONGITUDE:	

1. Testing Information:

Preconditioning - Permanent Strain > 5% (Y=Yes or N= No)	N
Testing - Permanent Strain > 5% (Y=Yes or N=No)	N
Number of Load Sequences Completed (0-15)	15

2. Specimen Information:

Specimen Diameter (in):	
Top	3.95
Middle	3.95
Bottom	3.95
Average	3.95
Membrane Thickness (in):	0.01
Height of Specimen, Cap and Base (in):	8.02
Height of Cap and Base (in):	0.00
Initial Length, Lo (in):	8.02
Initial Area, Ao (sq. in):	12.18
Initial Volume, AoLo (cu. in):	97.68

3. Soil Specimen Weight:

Weight of Wet Soil Used (g):	3095.80
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4. Soil Properties:

Optimum Moisture Content (%):	16.3
Maximum Dry Density (pcf):	107.4
95% of MDD (pcf):	102.0
In-Situ Moisture Content (%):	N/A

5. Specimen Properties:

Wet Weight (g):	3095.80
Compaction Moisture content (%):	16.2
Compaction Wet Density (pcf):	120.76
Compaction Dry Density (pcf):	103.92
Moisture Content After Mr Test (%):	16.1

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

#VALUE!

7. Resilient Modulus, Mr:

11632(Sc)^{-0.09479}(S3)^{0.24480}

8. Comments

9. Tested By:

GW

Date: March 25, 2020

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

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

Job No. 020678 **Material Code** SSRVPS
Date Sampled: 2/28/2020 **Station No.:** 5424+00
Date Tested: March 25, 2020 **Location:** CL
Name of Project: HWY. 278 - HWY. 65 (S)
County: Code: 21 **Name:** DESHA
Sampled By: THORNTON / MCKINNEY
Lab No.: 20200554
Sample ID: RV131
LATITUDE:
Depth: 0-5
AASHTO Class: A-6 (9)
Material Type (1 or 2): 2
LONGITUDE:

PARAMETER	Chamber Confining Pressure	Nominal Maximum Axial Stress	Actual Applied Max. Axial Load	Actual Applied Cyclic Load	Actual Applied Contact Load	Actual Applied Max. Axial Stress	Actual Applied Cyclic Stress	Actual Applied Contact Stress	Average Recov Def. LVDT 1 and 2	Resilient Strain	Resilient Modulus
DESIGNATION UNIT	S ₃ psi	S _{cyclic} psi	P _{max} lbs	P _{cyclic} lbs	P _{contact} lbs	S _{max} psi	S _{cyclic} psi	S _{contact} psi	H _{avg} in	ε _r in/in	M _r psi
Sequence 1	6.0	2.0	25.2	22.6	2.7	2.1	1.9	0.2	0.0085	0.00011	17,391
Sequence 2	6.0	4.0	47.3	44.7	2.7	3.9	3.7	0.2	0.00175	0.00022	16,775
Sequence 3	6.0	6.0	70.1	66.5	3.5	5.8	5.5	0.3	0.00275	0.00034	15,944
Sequence 4	6.0	8.0	93.7	87.8	5.9	7.7	7.2	0.5	0.00392	0.00049	14,766
Sequence 5	6.0	10.0	116.7	108.5	8.3	9.6	8.9	0.7	0.00521	0.00065	13,716
Sequence 6	4.0	2.0	25.2	22.5	2.7	2.1	1.9	0.2	0.00099	0.00012	15,054
Sequence 7	4.0	4.0	47.2	44.5	2.7	3.9	3.7	0.2	0.00205	0.00026	14,289
Sequence 8	4.0	6.0	69.0	66.3	2.7	5.7	5.4	0.2	0.00311	0.00039	14,062
Sequence 9	4.0	8.0	92.8	87.7	5.1	7.6	7.2	0.4	0.00425	0.00053	13,589
Sequence 10	4.0	10.0	115.6	108.3	7.3	9.5	8.9	0.6	0.00553	0.00069	12,899
Sequence 11	2.0	2.0	24.8	22.2	2.6	2.0	1.8	0.2	0.00117	0.00015	12,552
Sequence 12	2.0	4.0	46.6	44.0	2.6	3.8	3.6	0.2	0.00240	0.00030	12,077
Sequence 13	2.0	6.0	68.2	65.5	2.7	5.6	5.4	0.2	0.00362	0.00045	11,922
Sequence 14	2.0	8.0	91.0	86.8	4.1	7.5	7.1	0.3	0.00488	0.00061	11,714
Sequence 15	2.0	10.0	114.1	107.6	6.6	9.4	8.8	0.5	0.00615	0.00077	11,523

TESTED BY _____ **DATE** March 25, 2020
REVIEWED BY _____ **DATE** _____

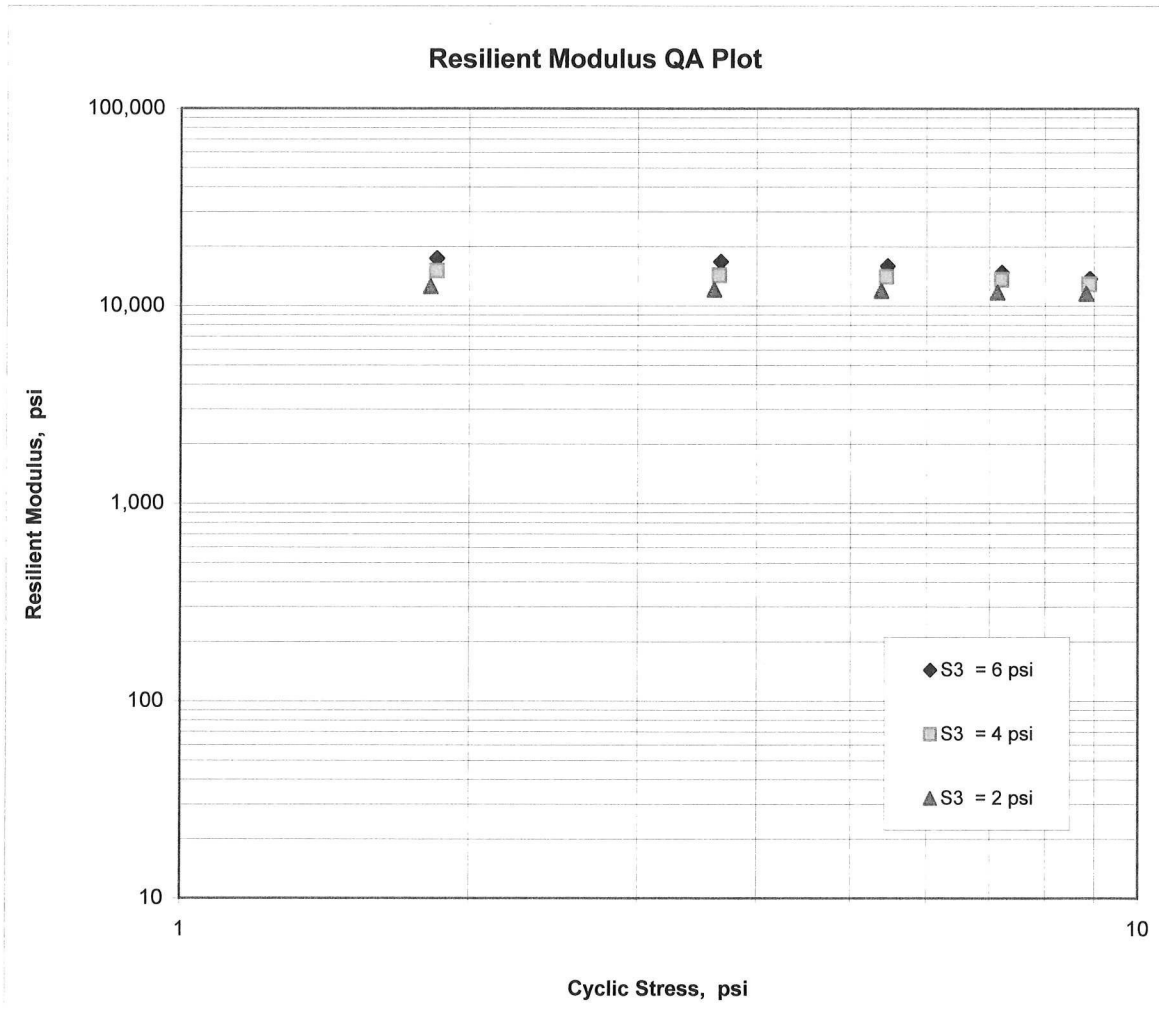
**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT
MATERIALS DIVISION**

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

Job No.	020678	Material Code	SSRVPS
Date Sampled:	2/28/2020	Station No.:	5424+00
Date Tested:	March 25, 2020	Location:	CL
Name of Project:	HWY. 278 - HWY. 65 (S)		
County:	Code: 21	Name:	DESHA
Sampled By:	THORNTON / MCKINNEY		Depth: 0-5
Lab No.:	20200554	AASHTO Class:	A-6 (9)
Sample ID:	RV131	Material Type (1 or 2):	2
LATITUDE:		LONGITUDE:	

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

$K_1 =$	<u>11,632</u>
$K_2 =$	<u>-0.09479</u>
$K_5 =$	<u>0.24480</u>
$R^2 =$	<u>0.94</u>



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

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 03/30/20 SEQUENCE NO. - 2
 JOB NUMBER - 020678 MATERIAL CODE - SSRVPS
 FEDERAL AID NO. - TO BE ASSIGNED SPEC. YEAR - 2014
 PURPOSE - SOIL SURVEY SAMPLE SUPPLIER ID. - 1
 SPEC. REMARKS - NO SPECIFICATION CHECK COUNTY/STATE - 76
 SUPPLIER NAME - COUNTIES DISTRICT NO. - XX
 NAME OF PROJECT - HWY. 278 - HWY. 65 (S)
 PROJECT ENGINEER - NOT APPLICABLE
 PIT/QUARRY - ARKANSAS
 LOCATION - MULTIPLE COUNTIES DATE SAMPLED - 02/28/20
 SAMPLED BY - THORNTON/FAULKNER DATE RECEIVED - 03/02/20
 SAMPLE FROM - TEST HOLE DATE TESTED - 03/30/20
 MATERIAL DESC. - SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS

LAB NUMBER	-	20200522	-	20200523	-	20200524
SAMPLE ID	-	S100	-	S101	-	S102
TEST STATUS	-	INFORMATION ONLY	-	INFORMATION ONLY	-	INFORMATION ONLY
STATION	-	4736+00	-	4800+00	-	4848+00
LOCATION	-	CL	-	CL	-	CL
DEPTH IN FEET	-	0-5	-	0-5	-	0-5
MAT'L COLOR	-	BROWN	-	BROWN	-	BROWN
MAT'L TYPE	-	-	-	-	-	-
LATITUDE DEG-MIN-SEC	-	33 38 26.60	-	33 39 11.30	-	33 39 40.60
LONGITUDE DEG-MIN-SEC	-	91 41 27.40	-	91 40 34.70	-	91 39 49.90
% PASSING	2	IN. -	-	-	-	-
	1	1/2 IN. -	-	-	-	-
		3/4 IN. -	-	-	-	-
		3/8 IN. -	-	-	-	-
		NO. 4 -	-	-	-	-
		NO. 10 -	-	-	-	-
		NO. 40 -	-	-	-	-
		NO. 80 -	100	100	-	100
		NO. 200 -	92	95	-	94
LIQUID LIMIT	-	26	-	31	-	31
PLASTICITY INDEX	-	06	-	10	-	10
AASHTO SOIL	-	A-4 (4)	-	A-4 (9)	-	A-4 (9)
UNIFIED SOIL	-	-	-	-	-	-
% MOISTURE CONTENT	-	26.8	-	31.7	-	26.2
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
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REMARKS -
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AASHTO TESTS : T24 T88 T89 T90 T265
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ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE	- 03/30/20	SEQUENCE NO.	- 7
JOB NUMBER	- 020678	MATERIAL CODE	- SSRVPS
FEDERAL AID NO.	- TO BE ASSIGNED	SPEC. YEAR	- 2014
PURPOSE	- SOIL SURVEY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	- NO SPECIFICATION CHECK	COUNTY/STATE	- 76
SUPPLIER NAME	- COUNTIES	DISTRICT NO.	- XX
NAME OF PROJECT	- HWY. 278 - HWY. 65 (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- MULTIPLE COUNTIES	DATE SAMPLED	- 02/28/20
SAMPLED BY	- THORNTON/FAULKNER	DATE RECEIVED	- 03/02/20
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 03/30/20
MATERIAL DESC.	- SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS		

LAB NUMBER	- 20200537	- 20200538	- 20200539
SAMPLE ID	- S114	- S115	- S116
TEST STATUS	- INFORMATION ONLY	- INFORMATION ONLY	- INFORMATION ONLY
STATION	- 5320+00	- 5344+00	- 5408+00
LOCATION	- CL	- CL	- CL
DEPTH IN FEET	- 0-5	- 0-5	- 0-5
MAT'L COLOR	- BROWN	- RED	- BROWN
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 33 40 29.60	- 33 40 22.60	- 33 40 8.40
LONGITUDE DEG-MIN-SEC	- 91 31 6.40	- 91 30 39.30	- 91 29 25.80
% PASSING	2 IN. -	-	-
	1 1/2 IN. -	-	-
	3/4 IN. -	-	-
	3/8 IN. -	-	-
	NO. 4 -	-	-
	NO. 10 -	-	-
	NO. 40 -	-	-
	NO. 80 - 100	- 100	- 100
	NO. 200 - 99	- 96	- 99
LIQUID LIMIT	- 56	- 36	- 29
PLASTICITY INDEX	- 38	- 20	- 10
AASHTO SOIL	- A-7-6(42)	- A-6(19)	- A-4(9)
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 27.1	-	- 28.4
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
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	-	-	-

REMARKS -
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AASHTO TESTS : T24 T88 T89 T90 T265
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ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE - 03/30/20	SEQUENCE NO. - 9
JOB NUMBER - 020678	MATERIAL CODE - SSRVPS
FEDERAL AID NO. - TO BE ASSIGNED	SPEC. YEAR - 2014
PURPOSE - SOIL SURVEY SAMPLE	SUPPLIER ID. - 1
SPEC. REMARKS - NO SPECIFICATION CHECK	COUNTY/STATE - 76
SUPPLIER NAME - COUNTIES	DISTRICT NO. - XX
NAME OF PROJECT - HWY. 278 - HWY. 65 (S)	
PROJECT ENGINEER - NOT APPLICABLE	
PIT/QUARRY - ARKANSAS	
LOCATION - MULTIPLE COUNTIES	DATE SAMPLED - 02/28/20
SAMPLED BY - THORNTON/FAULKNER	DATE RECEIVED - 03/02/20
SAMPLE FROM - TEST HOLE	DATE TESTED - 03/30/20
MATERIAL DESC. - SOIL SURVEY - R VALUE- PAVEMENT SOUNDINGS	

LAB NUMBER	- 20200543	- 20200544	- 20200545
SAMPLE ID	- S120	- S121	- S122
TEST STATUS	- INFORMATION ONLY	- INFORMATION ONLY	- INFORMATION ONLY
STATION	- 5496+00	- 5512+00	- 5520+00
LOCATION	- CL	- CL	- CL
DEPTH IN FEET	- 0-5	- 0-5	- 0-5
MAT'L COLOR	- BROWN	- BROWN	- BROWN
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 33 40 11.10	- 33 40 11.50	- 33 40 11.70
LONGITUDE DEG-MIN-SEC	- 91 27 41.70	- 91 27 22.80	- 91 27 13.30
% PASSING			
2 IN.	-	-	-
1 1/2 IN.	-	-	-
3/4 IN.	-	-	-
3/8 IN.	-	-	-
NO. 4	-	-	-
NO. 10	-	-	-
NO. 40	-	-	-
NO. 80	- 100	- 100	- 100
NO. 200	- 81	- 96	- 96
LIQUID LIMIT	- ND	- ND	- 29
PLASTICITY INDEX	- NP	- NP	- 10
AASHTO SOIL	- A-4 (0)	- A-4 (0)	- A-4 (9)
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	- 23.3	-	- 24.0
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
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	-	-	-

REMARKS -
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AASHTO TESTS : T24 T88 T89 T90 T265
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ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE	- 03/30/20	SEQUENCE NO.	- 1
JOB NUMBER	- 020678	MATERIAL CODE	- RV
FEDERAL AID NO.	- TO BE ASSIGNED	SPEC. YEAR	- 2014
PURPOSE	- SOIL SURVEY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	- NO SPECIFICATION CHECK	COUNTY/STATE	- 76
SUPPLIER NAME	- COUNTIES	DISTRICT NO.	- XX
NAME OF PROJECT	- HWY. 278 - HWY. 65 (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- MULTIPLE COUNTIES	DATE SAMPLED	- 02/28/20
SAMPLED BY	- THORNTON/FAULKNER	DATE RECEIVED	- 03/02/20
SAMPLE FROM	- TEST HOLE	DATE TESTED	- 03/30/20
MATERIAL DESC.	- SOIL SURVEY - RESISTANCE R-VALUE	ACTUAL RESULTS	

LAB NUMBER	- 20200549	- 20200550	- 20200551
SAMPLE ID	- RV125	- RV126	- RV127
TEST STATUS	- INFORMATION ONLY	- INFORMATION ONLY	- INFORMATION ONLY
STATION	- 00084+00	- 4728+00	- 4848+00
LOCATION	- 200 RT	- CL	- CL
DEPTH IN FEET	- 0-5	- 0-5	- 0-5
MAT'L COLOR	- BROWN	- BROWN	- BROWN
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 33 40 11.50	- 33 38 18.50	- 33 39 40.60
LONGITUDE DEG-MIN-SEC	- 91 25 36.60	- 91 41 32.10	- 91 39 49.90
% PASSING			
2 IN.	-	-	-
1 1/2 IN.	-	-	-
3/4 IN.	-	-	-
3/8 IN.	-	-	-
NO. 4	-	-	-
NO. 10	-	-	-
NO. 40	-	-	-
NO. 80	- 100	- 100	- 100
NO. 200	- 98	- 97	- 95
LIQUID LIMIT	- ND	- 23	- 27
PLASTICITY INDEX	- NP	- 04	- 07
AASHTO SOIL	- A-4 (0)	- A-4 (2)	- A-4 (6)
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
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REMARKS -
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AASHTO TESTS : T24 T88 T89 T90 T265
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ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT - LITTLE ROCK, ARKANSAS
MATERIALS DIVISION

MICHAEL BENSON, MATERIALS ENGINEER

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

DATE	- 03/30/20	SEQUENCE NO.	- 3
JOB NUMBER	- 020678	MATERIAL CODE	- RV
FEDERAL AID NO.	- TO BE ASSIGNED	SPEC. YEAR	- 2014
PURPOSE	- SOIL SURVEY SAMPLE	SUPPLIER ID.	- 1
SPEC. REMARKS	- NO SPECIFICATION CHECK	COUNTY/STATE	- 76
SUPPLIER NAME	- COUNTIES	DISTRICT NO.	- XX
NAME OF PROJECT	- HWY. 278 - HWY. 65 (S)		
PROJECT ENGINEER	- NOT APPLICABLE		
PIT/QUARRY	- ARKANSAS		
LOCATION	- MULTIPLE COUNTIES	DATE SAMPLED	- 02/28/20
SAMPLED BY	- THORNTON; FAULKNER	DATE RECEIVED	- 03/02/20
SAMPLE FROM	- 5167+00	DATE TESTED	- 03/30/20
MATERIAL DESC.	- SOIL SURVEY - RESISTANCE R-VALUE	ACTUAL RESULTS	

LAB NUMBER	- 20200626	-	-
SAMPLE ID	- RV129	-	-
TEST STATUS	- INFORMATION ONLY	-	-
STATION	- 5167+00	-	-
LOCATION	- CL	-	-
DEPTH IN FEET	-	-	-
MAT'L COLOR	- BR/GR	-	-
MAT'L TYPE	-	-	-
LATITUDE DEG-MIN-SEC	- 33 41 3.40	-	-
LONGITUDE DEG-MIN-SEC	- 91 34 1.50	-	-
% PASSING	2 IN.	-	-
	1 1/2 IN.	-	-
	3/4 IN.	-	-
	3/8 IN.	- 100	-
	NO. 4	- 97	-
	NO. 10	- 94	-
	NO. 40	- 87	-
	NO. 80	- 81	-
	NO. 200	- 75	-
LIQUID LIMIT	- 31	-	-
PLASTICITY INDEX	- 11	-	-
AASHTO SOIL	- A-6(7)	-	-
UNIFIED SOIL	-	-	-
% MOISTURE CONTENT	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
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REMARKS -
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AASHTO TESTS : T24 T88 T89 T90 T265
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