



Subsurface Investigation Geotechnical Data Report

I-24 Westbound Bridge over Shellmound Road
and Shellmound Road Bridge over I-24
Eastbound

PIN No.: 130900.00 and 130902.00

Marion County, TN
November 26, 2025





November 26, 2025

Mr. Andrew Parr, P.E.
Project Manager
Arcadis U.S., Inc.
1210 Premier Drive
Suite 200
Chattanooga, Tennessee 37421

Dear Mr. Parr,

We have completed the Subsurface Data Report for the proposed I-24 Westbound Bridge over Shellmound Road and Shellmound Road Bridge over I-24 Eastbound in Marion County, TN. Please call at your convenience if you have questions or comments. HDR appreciates the opportunity to provide geotechnical engineering services.

Sincerely,
HDR

A blue ink signature of Craig Hendrich, written in a cursive style.

Craig Hendrich, P.E., P.G.
TN Transportation Geotechnical Lead

A black ink signature of Eric J. Robertson, written in a cursive style.

Eric J. Robertson
Geotechnical Coordinator

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Appendix C: Laboratory Testing
Appendix D: Preliminary Soil Shear Strength Loss Analysis

Executive Summary

The proposed project consists of the replacement of two existing two-lane bridges, one along I-24 Westbound going over Shellmound Road and one along Shellmound Road going over I-24 Eastbound, and the associated roadway and approach improvements for the bridges in Marion County, TN. The new structures will replace the existing three-span bridges with a three-span 140-foot bridge along I-24 Westbound, beginning at Station 128+45 and ending at Station 129+85, and a single-span 154-foot bridge along Shellmound Road, beginning at Station 60+46 and ending at Station 62+00.

This report provides a discussion of the site and subsurface conditions, as well as a narrative on the field investigation detailing our findings. No foundation recommendations are discussed herein.

1 Introduction

This geotechnical data report provides a characterization of subsurface conditions and preliminary geotechnical information to the design-build team for the proposed I-24 Westbound (WB) Bridge over Shellmound Road and Shellmound Road Bridge over I-24 Eastbound (EB) in Marion County, TN. The proposed bridges will replace the existing I-24 WB Bridge over Shellmound Road and Shellmound Road Bridge over I-24 EB. Borings were advanced and soil samples were collected and delivered to the HDR laboratory in Paducah, KY for further testing.

2 Subsurface Exploration

Drilling and sampling activities were performed in September and October of 2025 by UES and logged by HDR field personnel. The subsurface investigation consisted of four (4) Standard Penetration Test (SPT) roadway borings (B-1 through B-4), six (6) SPT bridge borings (BR-1 through BR-6), four (4) pavement cores (PVMT-1 through PVMT-4) and two (2) Multi-channel Analysis of Surface Waves (MASW1 and MASW2) tests. SPTs were conducted at 2.5-foot intervals in the top 10 feet of each boring and at 5-foot intervals thereafter until refusal was encountered or the proposed boring depth was reached. Total boring termination depths ranged between 13.5 feet to 58.5 feet, corresponding to elevations ranging from 587.7 feet to 629.8 feet. Auger refusal was encountered at depths ranging from 11.9 feet to 38.8 feet, corresponding to elevations ranging from 607.7 feet to 629.8 feet. The final typed boring logs are included in Appendix B and summarized in Table 2-1 below.

Table 2-1. Test Boring Locations

Test Hole Number	Alignment	Location	Station	Offset (ft)	Boring Termination Depth (ft)	Auger Refusal Depth (ft)
B-1/PVMT-1	I-24	Roadway	136+98	20' Rt.	13.5	13.5
B-2/PVMT-2	I-24	Roadway	129+13	23' Rt.	16.0	16.0
B-3/PVMT-3	Shellmound Rd.	Roadway	59+47	7' Lt.	30.0	-
B-4/PVMT-4	Shellmound Rd.	Roadway	62+98	13' Rt.	30.0	-
BR-1	I-24	Abutment 1	133+11	21' Rt.	55.0	35.0
BR-2	I-24	Pier 1	132+46	81' Lt.	34.0	11.9
BR-3	I-24	Pier 2	132+42	29' Rt.	29.2	12.0
BR-4	I-24	Abutment 2	131+76	81' Lt.	33.5	15.0
BR-5	Shellmound Rd.	Abutment 1	60+21	8' Rt.	52.6	32.5
BR-6	Shellmound Rd.	Abutment 2	62+04	14' Rt.	58.5	38.8

All soil specimens were delivered to the HDR laboratory in Paducah, KY for testing and analysis and the following tests were performed:

Atterberg Limits	AASHTO T-89 and T-90
Sieve Analysis	AASHTO T27, AASHTO M145, and ASTM D2487
Sieve Analysis with Hydrometer	AASHTO T88
Natural Moisture Content	AASHTO T-265
One-Dimensional Consolidation Test	ASTM D-2435/D-2435M-11
Unconsolidated Undrained Triaxial Compression Test	AASHTO T-296
Unconfined Compression Test (Soil)	AASHTO T-208
Unconfined Compression Test (Rock)	ASTM D-7012; Method C
Consolidated Undrained Triaxial Test	ASTM D-4767
Soil Resistivity Test	ASTM G187, ASTM G51, ASTM D6919, ASTM D4327, and APHA 2320-B
Standard Proctor	AASHTO T-99; Method C
California Bearing Ratio (CBR)	AASHTO T-193

The full laboratory testing results are presented in Appendix C.

3 Geology, Soils, and Site Conditions

The Geologic Map of the Sequatchie Quadrangle, Tennessee (1986) was reviewed to determine the geologic conditions present at the site. The project area is situated in an area of low to moderate relief within the Sequatchie Valley. Approximate proposed grade elevations range from 375 feet to 380 feet, with nearby ridge top elevations over 980 feet.

The project site is located within the Valley and Ridge Province of Eastern Tennessee. The region was initially formed by marine deposits of carbonate bedrock during the pre-Cambrian to Ordovician Period. These deposits were then lifted and deformed by the oceanic Iapetus plate collision with the North American craton during the Appalachian Orogeny that created the Sequatchie Valley. The base of the valley was later filled with Pleistocene to Holocene alluvial sediments comprised of silty and sandy clay with quartz pebbles, gravel formed from siltstone and sandstone, and chert pieces. Flood-plain deposits grade into alluvial fan deposits containing sandstone cobbles and boulders. The thickness of the alluvium is currently unknown and may be up to 100 feet thick. The existing bridge approaches are supported atop this alluvium with roadway embankment fill, approximately 5 feet to 10 feet thick. The alluvium is supported with Ordovician marine deposits of lower member Carters Limestone, Lebanon Limestone, Ridley Limestone, Murfreesboro Limestone, and Knox Group. The limestone is primarily fine to medium grained, thinly to mediumly bedded with bedding inclined at 10 to 30 degrees, argillaceous and fossiliferous, and shale wisps and chert were found within. Anticipated thickness of

Ordovician deposits is 2,400 feet to 3,500 feet. Formations are inclined 10 degrees to 30 degrees along the project site as a result of the Sequatchie Valley Thrust Fault. It is believed Ordovician deposits are further supported by Cambrian marine deposits of limestone and shale. Cambrian deposits are anticipated to be approximately 600 feet thick.

Faulting was indicated on published mapping within the limits of the proposed alignment. However, recovered samples did not indicate the presence of faulting. The region surrounding the project area is located in close proximity to an active seismic region (East Tennessee Seismic Zone) and is considered one of the most active seismic regions in Eastern North America. Regional seismic events have been and are continually documented throughout Eastern Tennessee, Western North Carolina, Northwestern South Carolina, Northwestern Georgia and Northeastern Alabama.

Groundwater was not encountered immediately after drilling. Generally, the interlayered cohesive to fine grain composition of the upper sediment strata units and variable lateral extent of sand beds, lenses and seams suggests the potential for numerous perched water horizons. Construction of the proposed bridge foundations may intercept some of these horizons resulting in seepage into excavations. Soil boring profiles are provided in Appendix A.

3.1 I-24 Westbound Bridge over Shellmound Road

Material interpreted as roadway embankment fill was encountered during boring advancement within B-1 through B-2, and BR-1 through BR-4. Fill was intercepted from the existing ground surface to approximately 1 foot to 17 feet maximum depth. Field and laboratory classifications of recovered SPT samples indicate fill composed of sandy silts and Clayey Gravel with Sand (ML, GC).

Soil samples recovered from the geotechnical subsurface site exploration for the bridge site were classified into twenty-nine (29) classifications. According to the USCS, the classifications of the recovered soil samples ranged from GW (well-graded gravel with sand) to CH (fat clay). Natural moisture contents for the selected soil samples ranged from 1.6% to 30.8%. The percent of material passing the #200 sieve for the selected soil samples ranged from 4.1% to 90%. Liquid limits for the selected soil samples ranged from NP to 67%. The plasticity index for the selected soil samples ranged from NP to 36%. Laboratory testing performed on the recovered rock samples indicate unconfined compressive strengths ranging from 7,515 pounds per square inch (psi) to 12,202 psi and a consolidated undrained cohesion of 0.9 psi.

3.2 Shellmound Road Bridge over I-24 Eastbound

Material interpreted as roadway embankment fill was encountered during boring advancement within B-3, B-4, BR-5, and BR-6. Fill was intercepted from the existing ground surface to approximately 3.5 feet to 5.5 feet. Field and laboratory classifications of recovered SPT samples indicate fill composed of low to moderate plasticity lean clays and sandy silts (CL, ML).

Soil samples recovered from the geotechnical subsurface site exploration for the bridge site were classified into twenty-two (22) classifications. According to the USCS, the classifications of the samples ranged from GM (silty gravel with sand) to CH (gravelly fat

clay with sand). Natural moisture contents for the selected soil samples ranged from 6.1% to 28.3%. The percent passing the #200 sieve for the selected soil samples ranged from 9.3% to 84.4%. Liquid limits for the selected soil samples ranged from 22% to 62%. Plastic limits for the selected soil samples ranged from 5 to 24%. Laboratory testing performed on the recovered rock samples indicate unconfined compressive strengths ranging from 2,397 psi to 12,563 psi and a consolidated undrained cohesion of 4.0 psi.

4 Geologic Hazards

4.1 Corrosion

In addition to lab classification and triaxial shear testing, pH and resistivity testing was also conducted. The purpose of corrosion and deterioration testing is to provide soils data for use by a structural engineer to provide any necessary protection to the piling, concrete, reinforcing steel, etc. Corrosion and deterioration protection requirements and guidelines for piling are set forth in AASHTO 10th Edition (2024) Section 10.7.5 and Section 11.10.6.4.2a. Site-specific laboratory testing was completed on four (4) bulk samples collected. The test locations and their results are summarized in Table 4-1 below and are included in Appendix C.

Table 4-1. Corrosion and Deterioration Test Summary

Boring No.	Station	Offset	Sample Depth Range (ft)	pH	Chloride (ppm)	Sulfate (ppm)	Resistivity (ohm cm)
B-1/PVMT-1	136+98	20' Rt.	3.0-10.0	7.1	128	135	1,560
B-2/PVMT-2	129+13	23' Rt.	10.0-15.0	7.1	173	125	1,800
B-3/PVMT-3	59+47	7' Lt.	4.0-7.0	7.3	327	135	1,120
B-4/PVMT-4	62+98	13' Rt.	4.0-7.0	6.9	74	68	2,120

The following soil conditions should be considered as indicative of a potential pile corrosion or deterioration situation (AASHTO (2024) Section 10.7.5):

- Resistivity less than 2,000 ohm-cm
- pH less than 5.5
- pH between 5.5 and 8.5 in soils with high organic content
- Sulfate concentrations greater than 1,000 ppm

The following soil conditions should be considered as indicative of a potential steel reinforcement corrosion or deterioration situation (AASHTO (2024) 11.10.6.4.2a):

- Resistivity less than 3,000 ohm-cm
- pH less than 5.0 or greater than 10.0
- Sulfate concentrations greater than 200 ppm
- Chloride concentrations greater than 100 ppm
- The chloride and sulfate testing is waived if the resistivity is greater than or equal to 5000 ohm-cm

Based on the results of the corrosion and deterioration testing and the criteria established in AASHTO, both sites have moderate potential for pile and steel reinforcement corrosion or deterioration.

4.2 Seismic Considerations

The project site classifies as Site Class C based on SPT “N” values and shear wave velocity (V_s) data obtained from the MASW performed. The MASWs indicated average shear wave velocities, within the first 100 feet of the overburden soil, of 1570.9 feet per second (fps) to 2182.1 fps. MASW sounding logs are included in Appendix B. The peak ground acceleration coefficient for this project site, obtained from USGS (2009), is equal to 0.138g using Site Class C with a probability of exceedance of 7% in 75 years (approximately 1,071-year return period).

Preliminary analyses of the subsurface conditions in the borings were performed to evaluate the likelihood of liquefaction or cyclic softening during an extreme seismic event. The screening, identification, and evaluation of the geotechnical seismic hazards at the project site were completed using analyses conducted in accordance with Idriss and Boulanger Soil Liquefaction during Earthquakes (2008).

Based on the results of the seismic hazard evaluation, it is believed the soils encountered at the project site are not susceptible to liquefaction or shear strength loss due to cyclic softening during this seismic event. The results of the preliminary analysis are included in Appendix D.

5 Limitations to Report

Discussion of geologic and geotechnical conditions observed in the field, observed from field sample recovery, observed in laboratory examination of samples and computed data analysis, which are all quantified in this geotechnical data report, should be considered preliminary investigation and are subject to change upon the acquisition of additional data during the final investigation. A more detailed subsurface investigation including additional borings and laboratory testing for the purposes of evaluating cut slopes, embankment slopes, embankment settlements, and bridge foundation types and capacities will be required to ensure sufficient confidence in selected design parameters. This geotechnical data report is meant to provide the design-build teams and TDOT with subsurface information to compare and analyze potential foundation designs and alternatives which might be proposed in a final design for the proposed bridges on I-24 Westbound over Shellmound Road and on Shellmound Road over I-24 Eastbound in Marion County, Tennessee. No other warranty, express or implied, is made. The Geotechnical Engineer of Record for the project must review the data submitted in this report and develop their own interpretation of the testing results as they apply to design.

6 References

AASHTO, 2024; AASHTO LRFD Bridge Design Specifications Tenth Edition, 2024; Washington, DC, American Association of State Highway and Transportation Officials.

Boulanger, R.W., et al (2008); Soil Liquefaction during Earthquakes; Earthquake Engineering Research Institute.

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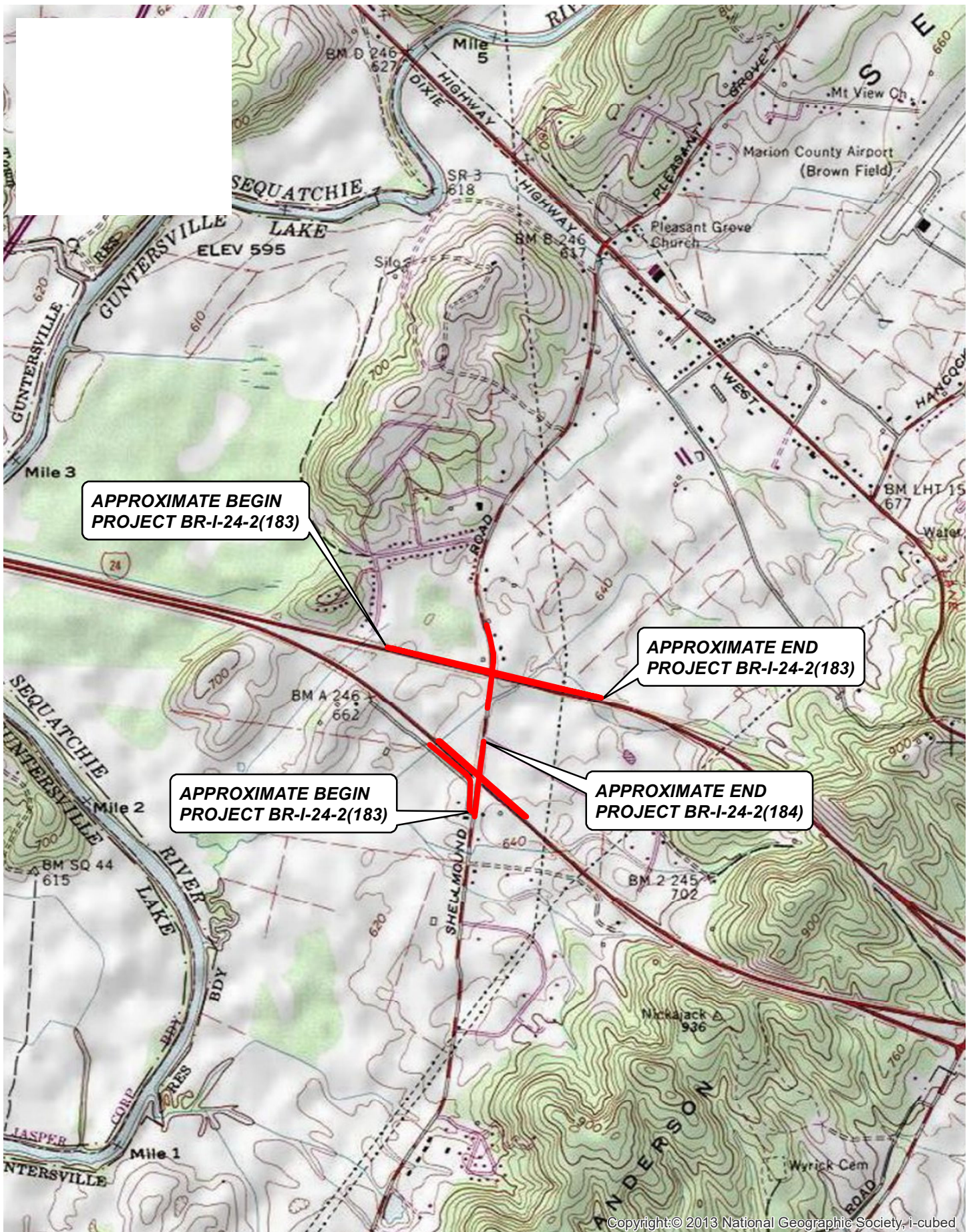
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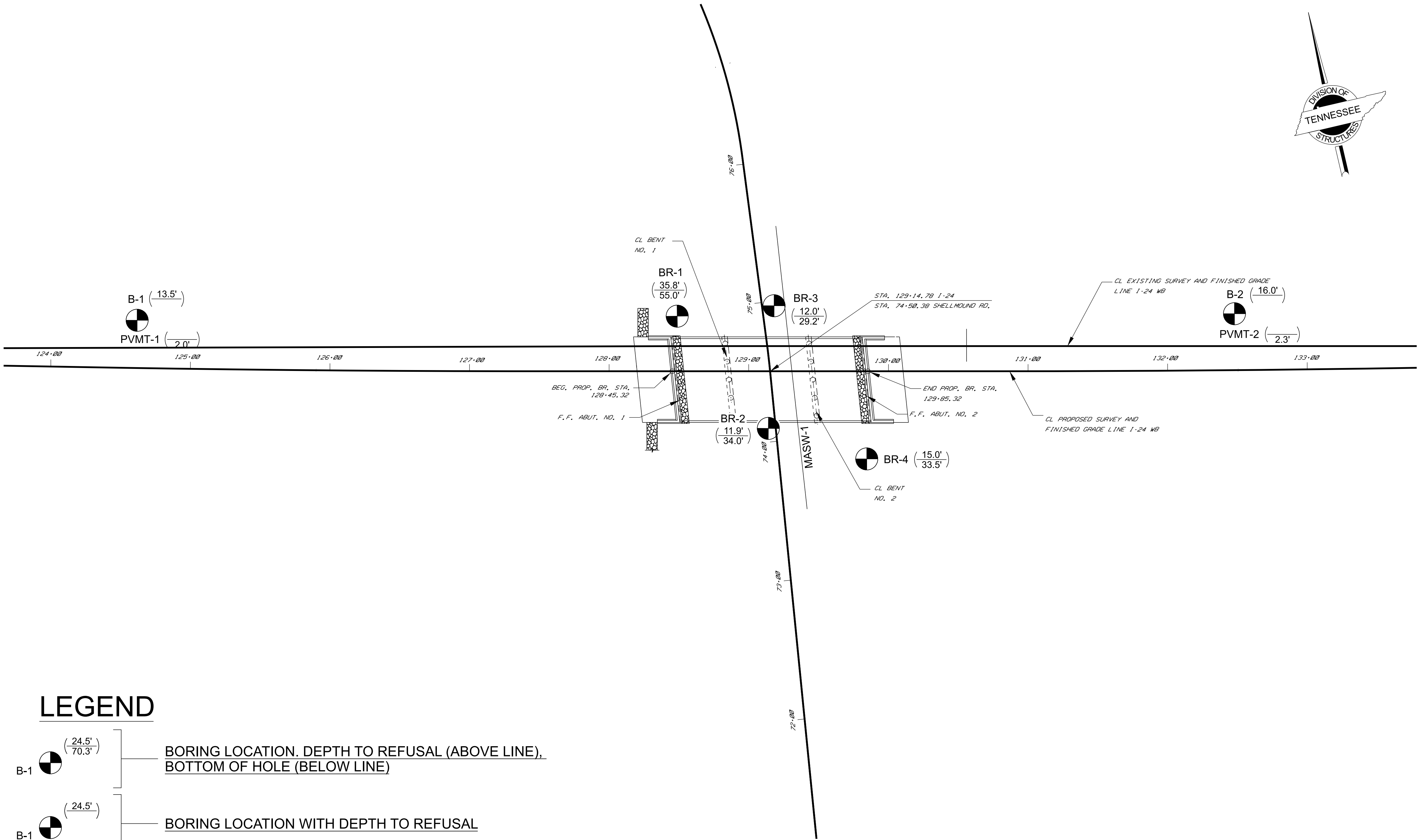
Appendix A: Plan and Boring Sheets



**I-24 WESTBOUND BRIDGE OVER SHELLMOUND ROAD
AND SHELLMOUND ROAD BRIDGE OVER I-24 EASTBOUND
MARION COUNTY - TENNESSEE**

VICINITY MAP

TYPE	YEAR	PROJECT NO.	SHEET NO.
L&G	2025	BR-I-24-2(184)	



LEGEND

- B-1 (24.5' / 70.3') BORING LOCATION. DEPTH TO REFUSAL (ABOVE LINE), BOTTOM OF HOLE (BELOW LINE)
- B-1 (24.5') BORING LOCATION WITH DEPTH TO REFUSAL
- B-1 (0.9') PAVEMENT CORE LOCATION BOTTOM OF PAVEMENT DEPTH

PLAN

SCALE: 1" = 50'

LINE AND GRADE

SEALED BY

COORDINATES ARE NAD 83(), ARE DATUM ADJUSTED BY THE FACTOR OF AND TIED TO THE TGRN. ALL ELEVATIONS ARE REFERENCED TO THE NAVD 1988 WITH GEOID .

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-24 WESTBOUND BRIDGE
OVER SHELLMOUND ROAD
GEOTECHNICAL
BORING LAYOUT
SCALE: 1" = 50'

TYPE	YEAR	PROJECT NO.	SHEET NO.
L & G	2025	BR-I-24-2(184)	

LEGEND

- B-1

(24.5')
(70.3')

— BORING LOCATION. DEPTH TO REFUSAL
(ABOVE LINE), BOTTOM OF HOLE (BELOW
LINE)
- B-1

(24.5')

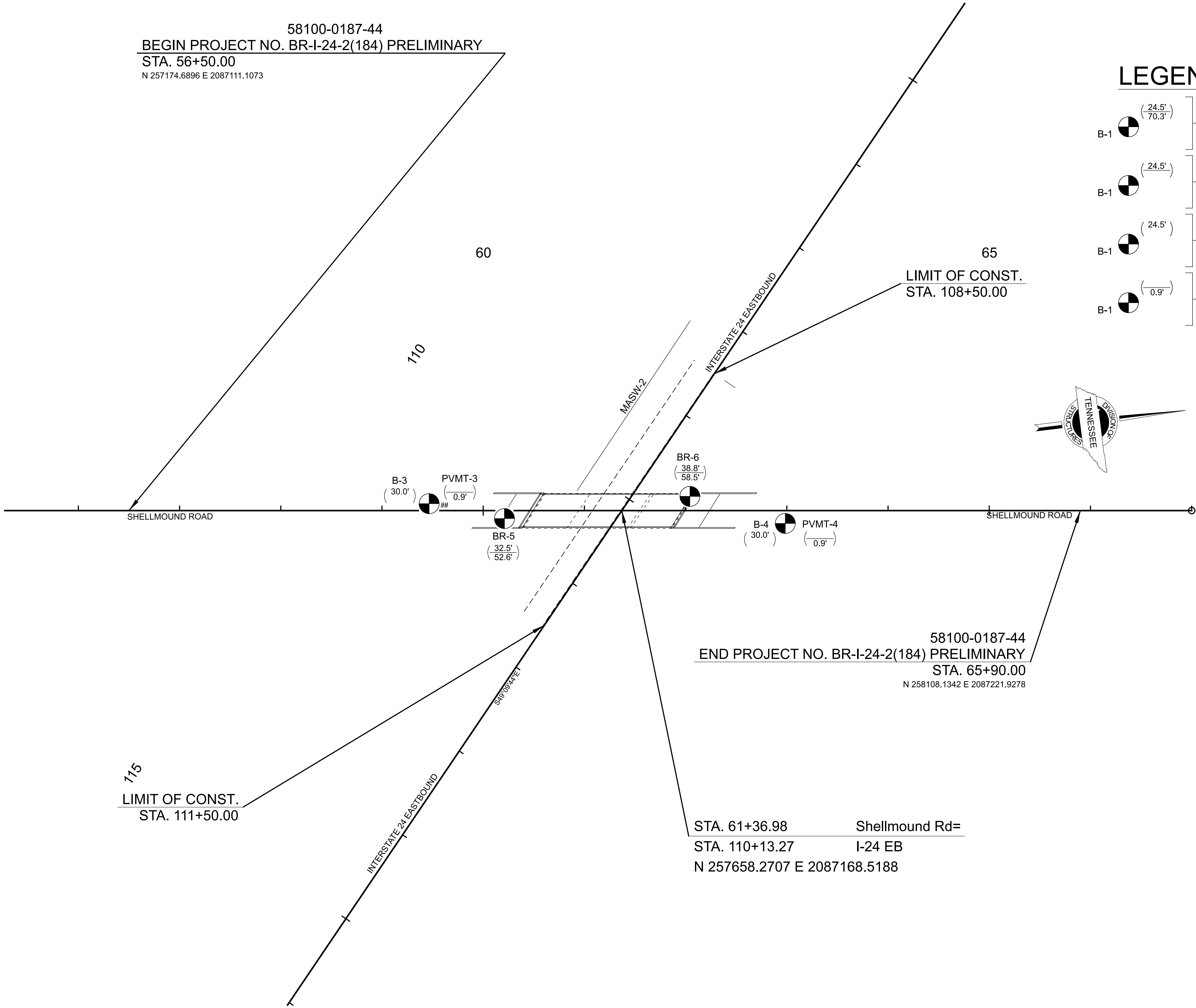
— BORING LOCATION WITH DEPTH TO
REFUSAL
- B-1

(24.5')

— BORING LOCATION TERMINATION DEPTH
(NO REFUSAL)
- B-1

(0.9')

— PAVEMENT CORE LOCATION BOTTOM OF
PAVEMENT DEPTH



LINE
AND
GRADE

SEALED BY

COORDINATES ARE NAD 83(2011), ARE
DATUM ADJUSTED BY THE FACTOR
OF 0.99998 AND TIED TO THE TGRN.
ALL ELEVATIONS ARE REFERENCED
TO THE NAVD 1988 WITH GEOID 18.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

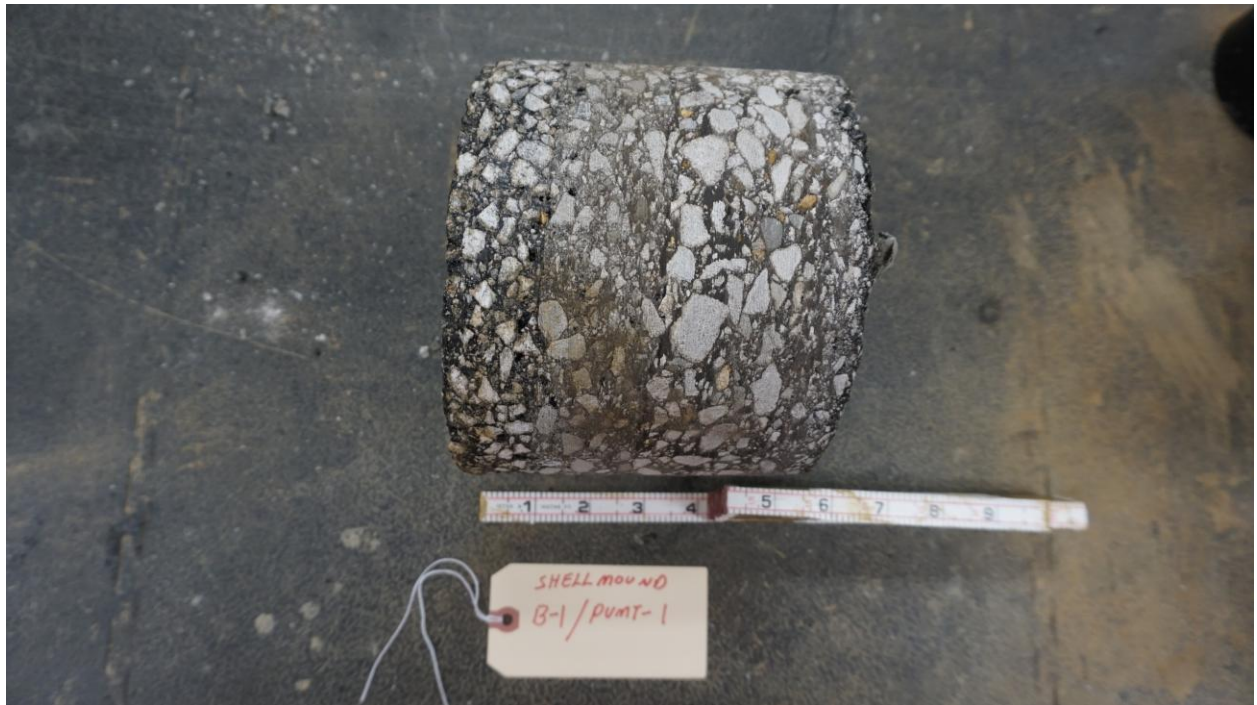
GEOTECHNICAL
BORING LAYOUT
SHELLMOUND ROAD BRIDGE
OVER I-24 EASTBOUND

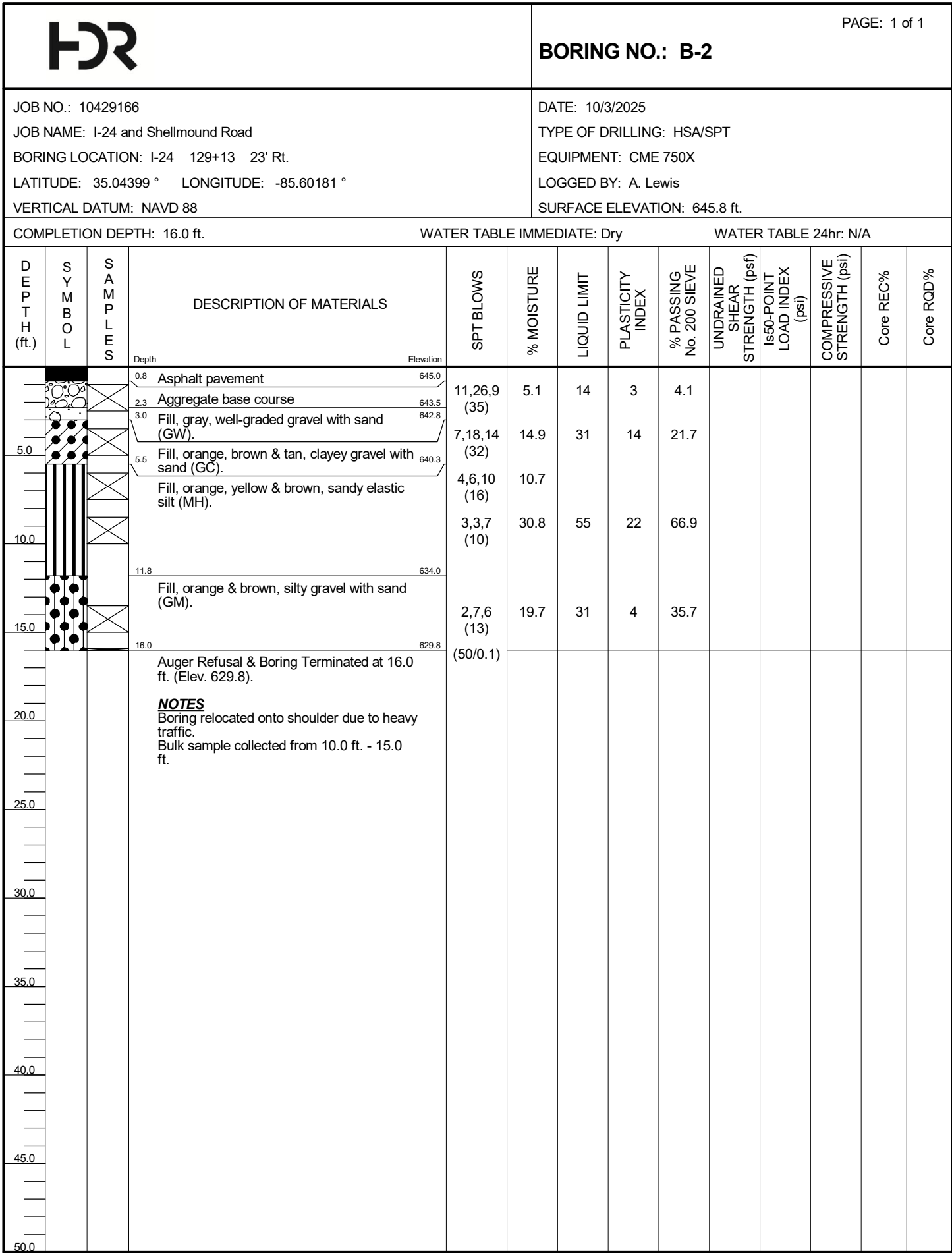
SCALE: 1" = 50'

Appendix B: Boring Logs and MASW Plots

PAVEMENT CORE PHOTOGRAPHIC RECORD

I-24 and Shellmound Road





							PAGE: 1 of 1							
							BORING NO.: B-2							
JOB NO.: 10429166 JOB NAME: I-24 and Shellmound Road BORING LOCATION: I-24 129+13 23' Rt. LATITUDE: 35.04399 ° LONGITUDE: -85.60181 ° VERTICAL DATUM: NAVD 88							DATE: 10/3/2025 TYPE OF DRILLING: HSA/SPT EQUIPMENT: CME 750X LOGGED BY: A. Lewis SURFACE ELEVATION: 645.8 ft.							
COMPLETION DEPTH: 16.0 ft.							WATER TABLE IMMEDIATE: Dry				WATER TABLE 24hr: N/A			
D E P T H (ft.)	S Y M B O L	S A M P L E S	DESCRIPTION OF MATERIALS		SPT BLOWS	% MOISTURE	LIQUID LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH (psf)	Is50-POINT LOAD INDEX (psi)	COMPRESSIVE STRENGTH (psi)	Core REC%	Core RQD%
			Depth	Elevation										
			0.8	Asphalt pavement	645.0									
			2.3	Aggregate base course	643.5									
			3.0	Fill, gray, well-graded gravel with sand (GW).	642.8									
5.0			5.5	Fill, orange, brown & tan, clayey gravel with sand (GC).	640.3	11,26,9 (35)	5.1	14	3	4.1				
				Fill, orange, yellow & brown, sandy elastic silt (MH).		7,18,14 (32)	14.9	31	14	21.7				
						4,6,10 (16)	10.7							
10.0						3,3,7 (10)	30.8	55	22	66.9				
			11.8		634.0									
				Fill, orange & brown, silty gravel with sand (GM).		2,7,6 (13)	19.7	31	4	35.7				
15.0			16.0		629.8	(50/0.1)								
			Auger Refusal & Boring Terminated at 16.0 ft. (Elev. 629.8). NOTES Boring relocated onto shoulder due to heavy traffic. Bulk sample collected from 10.0 ft. - 15.0 ft.											
20.0														
25.0														
30.0														
35.0														
40.0														
45.0														
50.0														

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JOB NO.: 10429166						DATE: 10/3/2025											
JOB NAME: I-24 and Shellmound Road						TYPE OF DRILLING: HSA/SPT											
BORING LOCATION: I-24 129+13 23' Rt.						EQUIPMENT: CME 750X											
LATITUDE: 35.04399 ° LONGITUDE: -85.60181 °						LOGGED BY: A. Lewis											
VERTICAL DATUM: NAVD 88						SURFACE ELEVATION: 645.8 ft.											
COMPLETION DEPTH: 16.0 ft.						WATER TABLE IMMEDIATE: Dry						WATER TABLE 24hr: N/A					
DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS		SPT BLOWS	% MOISTURE	LIQUID LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH (psf)	Is50-POINT LOAD INDEX (psi)	COMPRESSIVE STRENGTH (psi)	Core REC%	Core RQD%			
			Depth	Elevation													
			0.8	645.0	Asphalt pavement	11,26,9 (35)	5.1	14	3	4.1							
			2.3	643.5	Aggregate base course												
			3.0	642.8	Fill, gray, well-graded gravel with sand (GW).	7,18,14 (32)	14.9	31	14	21.7							
5.0			5.5	640.3	Fill, orange, brown & tan, clayey gravel with sand (GC).	4,6,10 (16)	10.7										
					Fill, orange, yellow & brown, sandy elastic silt (MH).	3,3,7 (10)	30.8	55	22	66.9							
10.0			11.8	634.0													
					Fill, orange & brown, silty gravel with sand (GM).	2,7,6 (13)	19.7	31	4	35.7							
15.0			16.0	629.8		(50/0.1)											
			Auger Refusal & Boring Terminated at 16.0 ft. (Elev. 629.8). NOTES Boring relocated onto shoulder due to heavy traffic. Bulk sample collected from 10.0 ft. - 15.0 ft.														
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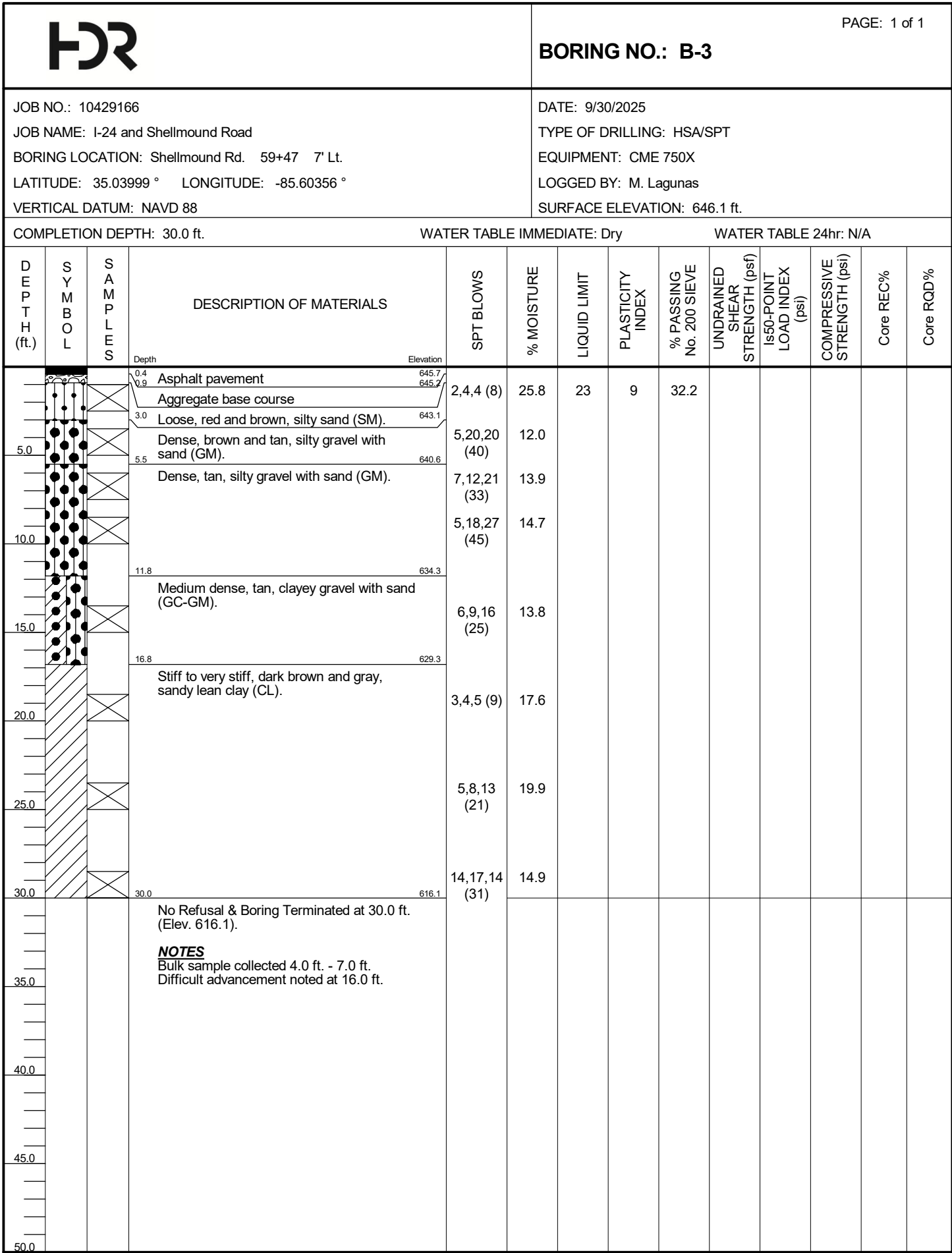
						PAGE: 1 of 1									
							BORING NO.: B-2								
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COMPLETION DEPTH: 16.0 ft.							WATER TABLE IMMEDIATE: Dry				WATER TABLE 24hr: N/A				
D E P T H (ft.)	S Y M B O L	S A M P L E S	DESCRIPTION OF MATERIALS		SPT BLOWS	% MOISTURE	LIQUID LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH (psf)	Is50-POINT LOAD INDEX (psi)	COMPRESSIVE STRENGTH (psi)	Core REC%	Core RQD%	
			Depth	Elevation											
			0.8 Asphalt pavement	645.0											
			2.3 Aggregate base course	643.5	11,26,9 (35)	5.1	14	3	4.1						
			3.0 Fill, gray, well-graded gravel with sand (GW).	642.8	7,18,14 (32)	14.9	31	14	21.7						
5.0			5.5 Fill, orange, brown & tan, clayey gravel with sand (GC). Fill, orange, yellow & brown, sandy elastic silt (MH).	640.3	4,6,10 (16) 3,3,7 (10)	10.7 30.8									
10.0			11.8	634.0											
15.0			Fill, orange & brown, silty gravel with sand (GM).		2,7,6 (13)	19.7	31	4	35.7						
			16.0	629.8	(50/0.1)										
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20.0															
25.0															
30.0															
35.0															
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50.0															

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PAVEMENT CORE PHOTOGRAPHIC RECORD

I-24 and Shellmound Road

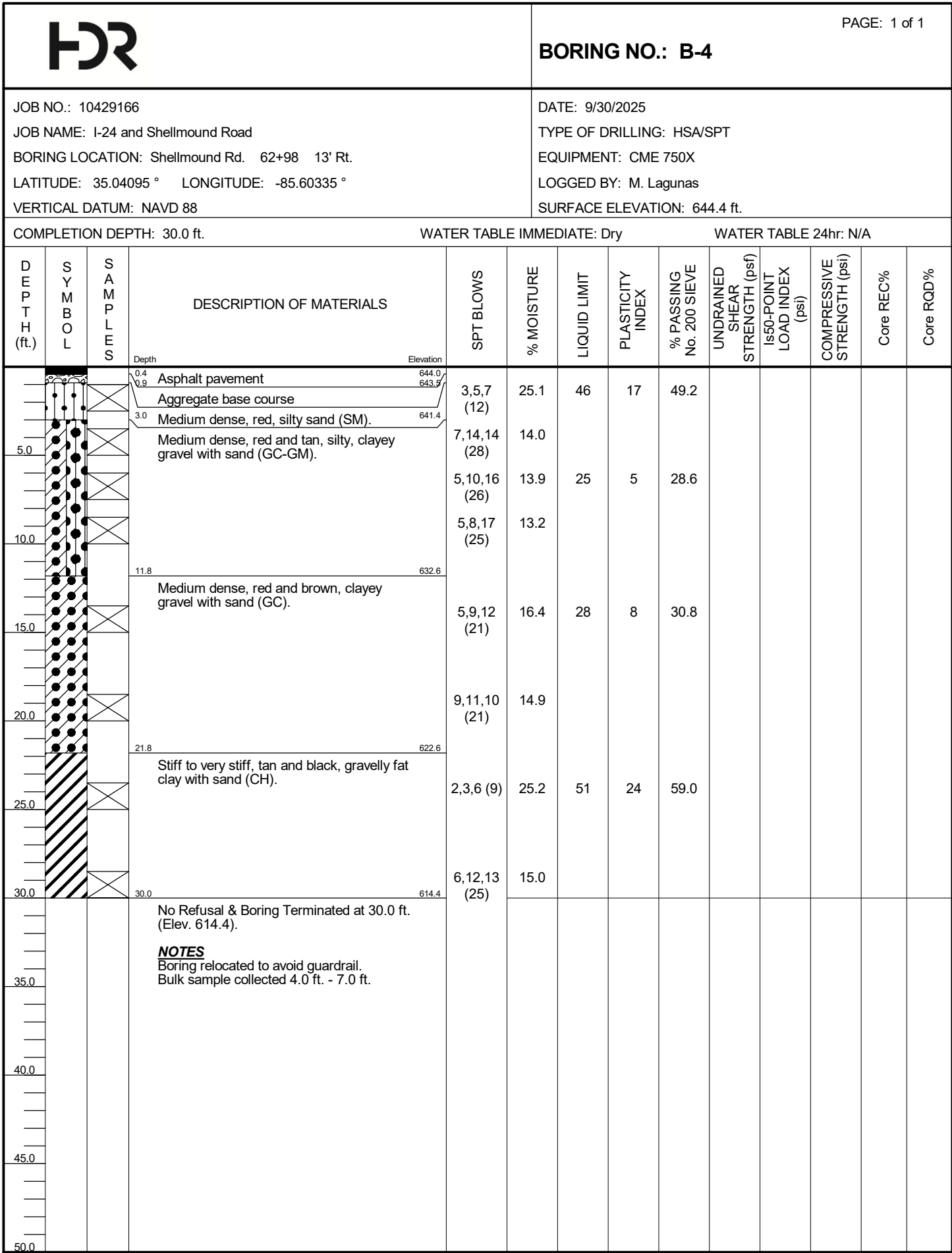


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PAVEMENT CORE PHOTOGRAPHIC RECORD

I-24 and Shellmound Road



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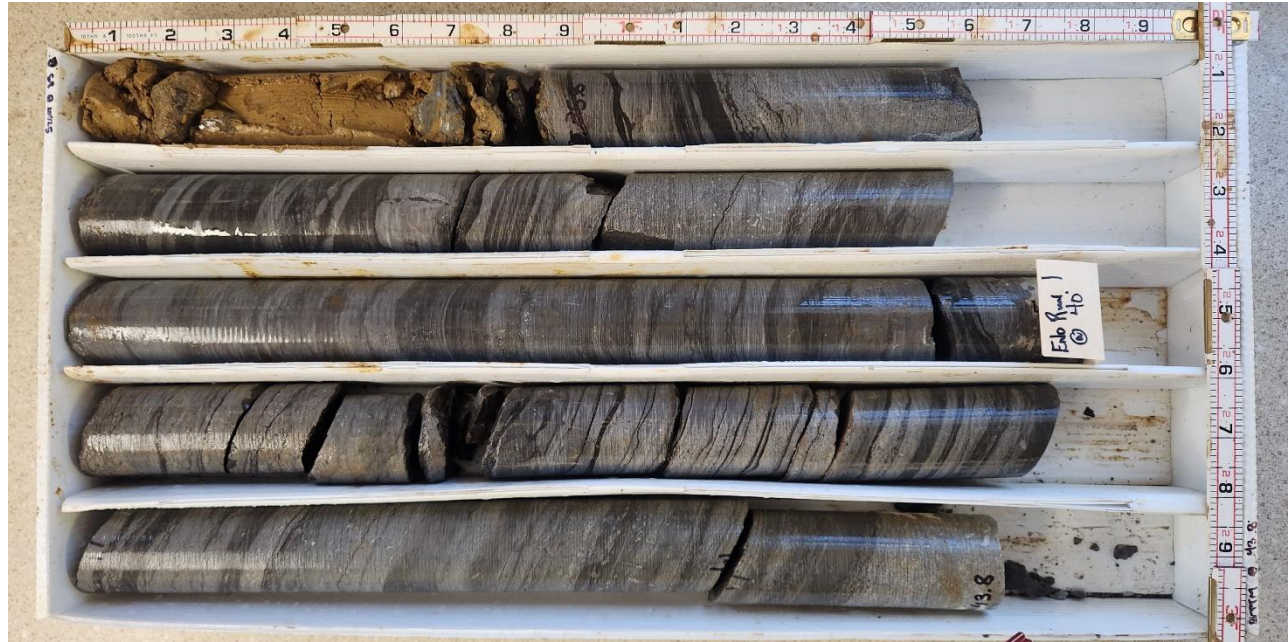
PAVEMENT CORE PHOTOGRAPHIC RECORD

I-24 and Shellmound Road



CORE PHOTOGRAPHIC RECORD

I-24 and Shellmound Road



BR-1 - Box 1 of 3



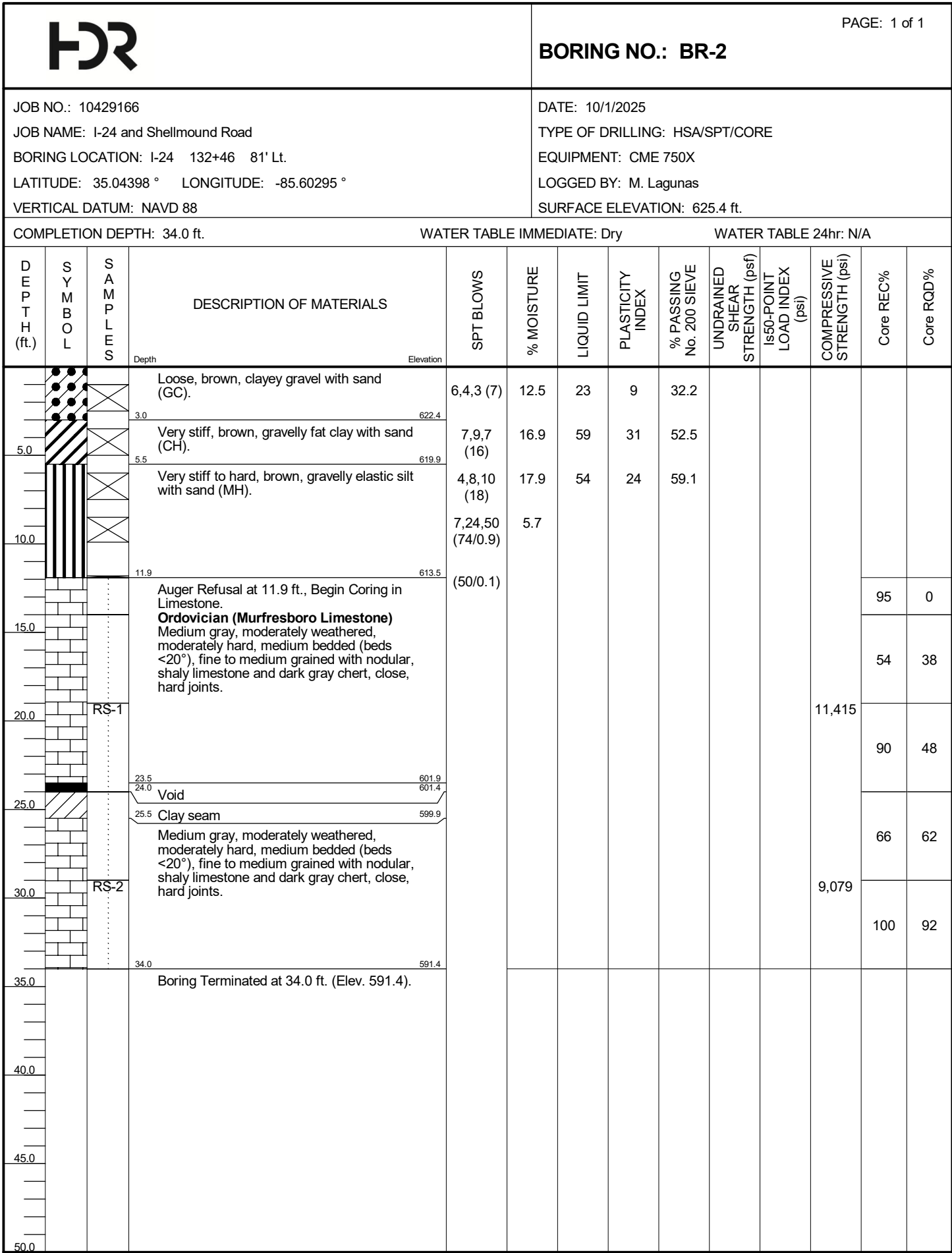
BR-1 - Box 2 of 3

CORE PHOTOGRAPHIC RECORD

I-24 and Shellmound Road



BR-1 - Box 3 of 3

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CORE PHOTOGRAPHIC RECORD

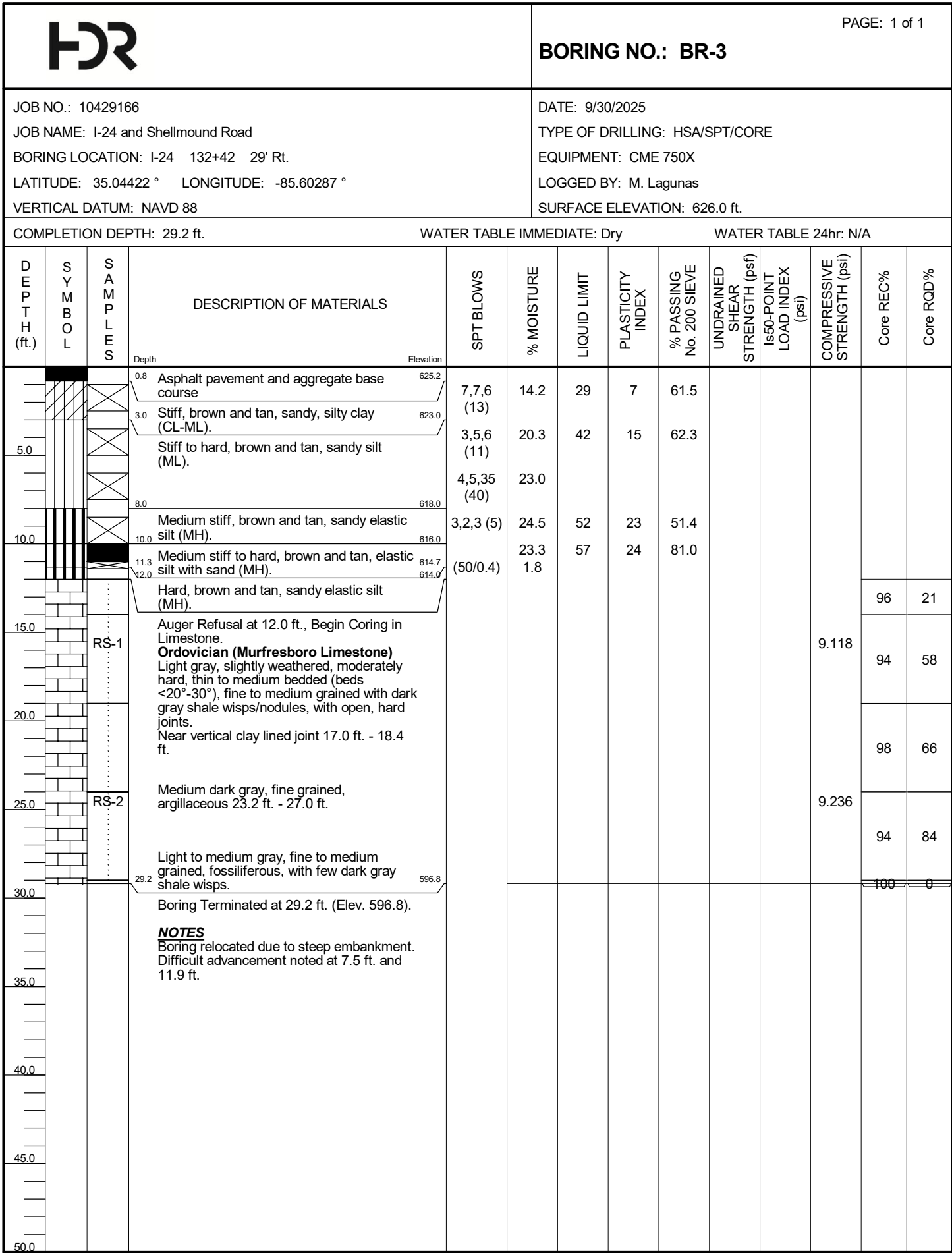
I-24 and Shellmound Road



BR-2 - Box 1 of 2



BR-2 - Box 2 of 2

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						BORING NO.: BR-3							
JOB NO.: 10429166 JOB NAME: I-24 and Shellmound Road BORING LOCATION: I-24 132+42 29' Rt. LATITUDE: 35.04422 ° LONGITUDE: -85.60287 ° VERTICAL DATUM: NAVD 88						DATE: 9/30/2025 TYPE OF DRILLING: HSA/SPT/CORE EQUIPMENT: CME 750X LOGGED BY: M. Lagunas SURFACE ELEVATION: 626.0 ft.							
COMPLETION DEPTH: 29.2 ft.						WATER TABLE IMMEDIATE: Dry				WATER TABLE 24hr: N/A			
DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SPT BLOWS	% MOISTURE	LIQUID LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH (psf)	Is50-POINT LOAD INDEX (psi)	COMPRESSIVE STRENGTH (psi)	Core REC%	Core RQD%
			Depth Elevation										
0.8			Asphalt pavement and aggregate base course	625.2									
3.0			Stiff, brown and tan, sandy, silty clay (CL-ML).	623.0	7,7,6 (13)	14.2	29	7	61.5				
5.0			Stiff to hard, brown and tan, sandy silt (ML).		3,5,6 (11)	20.3	42	15	62.3				
8.0				618.0	4,5,35 (40)	23.0							
10.0			Medium stiff, brown and tan, sandy elastic silt (MH).	616.0	3,2,3 (5)	24.5	52	23	51.4				
11.3			Medium stiff to hard, brown and tan, elastic silt with sand (MH).	614.7	23.3	57	24	81.0					
12.0			Hard, brown and tan, sandy elastic silt (MH).	614.0	1.8							96	21
15.0		RS-1	Auger Refusal at 12.0 ft., Begin Coring in Limestone. Ordovician (Murfresboro Limestone) Light gray, slightly weathered, moderately hard, thin to medium bedded (beds <20°-30°), fine to medium grained with dark gray shale wisps/nodules, with open, hard joints. Near vertical clay lined joint 17.0 ft. - 18.4 ft.								9.118	94	58
20.0												98	66
25.0		RS-2	Medium dark gray, fine grained, argillaceous 23.2 ft. - 27.0 ft.								9.236	94	84
29.2			Light to medium gray, fine to medium grained, fossiliferous, with few dark gray shale wisps.	596.8								100	0
Boring Terminated at 29.2 ft. (Elev. 596.8).													
NOTES Boring relocated due to steep embankment. Difficult advancement noted at 7.5 ft. and 11.9 ft.													

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HCR						PAGE: 1 of 1 BORING NO.: BR-3											
JOB NO.: 10429166 JOB NAME: I-24 and Shellmound Road BORING LOCATION: I-24 132+42 29' Rt. LATITUDE: 35.04422 ° LONGITUDE: -85.60287 ° VERTICAL DATUM: NAVD 88						DATE: 9/30/2025 TYPE OF DRILLING: HSA/SPT/CORE EQUIPMENT: CME 750X LOGGED BY: M. Lagunas SURFACE ELEVATION: 626.0 ft.											
COMPLETION DEPTH: 29.2 ft.						WATER TABLE IMMEDIATE: Dry						WATER TABLE 24hr: N/A					
D E P T H (ft.)	S Y M B O L	S A M P L E S	DESCRIPTION OF MATERIALS		SPT BLOWS	% MOISTURE	LIQUID LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH (psf)	Is50-POINT LOAD INDEX (psi)	COMPRESSIVE STRENGTH (psi)	Core REC%	Core RQD%			
			Depth	Elevation													
			0.8	625.2	Asphalt pavement and aggregate base course	7,7,6 (13)	14.2	29	7	61.5							
			3.0	623.0	Stiff, brown and tan, sandy, silty clay (CL-ML).	3,5,6 (11)	20.3	42	15	62.3							
5.0		X			Stiff to hard, brown and tan, sandy silt (ML).	4,5,35 (40)	23.0										
			8.0	618.0													
		X			Medium stiff, brown and tan, sandy elastic silt (MH).	3,2,3 (5)	24.5	52	23	51.4							
10.0			10.0	616.0													
		X			Medium stiff to hard, brown and tan, elastic silt with sand (MH).	23.3	57	24	81.0								
			11.3	614.7													
		X	12.0	614.0	Hard, brown and tan, sandy elastic silt (MH).	(50/0.4)	1.8										
15.0					Auger Refusal at 12.0 ft., Begin Coring in Limestone.								96	21			
					Ordovician (Murresboro Limestone)												
					Light gray, slightly weathered, moderately hard, thin to medium bedded (beds <20°-30°), fine to medium grained with dark gray shale wisps/nodules, with open, hard joints.								94	58			
20.0					Near vertical clay lined joint 17.0 ft. - 18.4 ft.												
													98	66			
25.0					Medium dark gray, fine grained, argillaceous 23.2 ft. - 27.0 ft.												
													94	84			
					Light to medium gray, fine to medium grained, fossiliferous, with few dark gray shale wisps.												
30.0			29.2	596.8	Boring Terminated at 29.2 ft. (Elev. 596.8). NOTES Boring relocated due to steep embankment. Difficult advancement noted at 7.5 ft. and 11.9 ft.								100	0			

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						PAGE: 1 of 1								
						BORING NO.: BR-3								
JOB NO.: 10429166 JOB NAME: I-24 and Shellmound Road BORING LOCATION: I-24 132+42 29' Rt. LATITUDE: 35.04422 ° LONGITUDE: -85.60287 ° VERTICAL DATUM: NAVD 88						DATE: 9/30/2025 TYPE OF DRILLING: HSA/SPT/CORE EQUIPMENT: CME 750X LOGGED BY: M. Lagunas SURFACE ELEVATION: 626.0 ft.								
COMPLETION DEPTH: 29.2 ft.						WATER TABLE IMMEDIATE: Dry				WATER TABLE 24hr: N/A				
D E P T H (ft.)	S Y M B O L	S A M P L E S	DESCRIPTION OF MATERIALS		SPT BLOWS	% MOISTURE	LIQUID LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH (psf)	Is50-POINT LOAD INDEX (psi)	COMPRESSIVE STRENGTH (psi)	Core REC%	Core RQD%
			Depth	Elevation										
0.0		X	Asphalt pavement and aggregate base course	625.2	7,7,6 (13)	14.2	29	7	61.5					
3.0		X	Stiff, brown and tan, sandy, silty clay (CL-ML).	623.0	3,5,6 (11)	20.3	42	15	62.3					
5.0		X	Stiff to hard, brown and tan, sandy silt (ML).		4,5,35 (40)	23.0								
8.0		X		618.0	3,2,3 (5)	24.5	52	23	51.4					
10.0		X	Medium stiff, brown and tan, sandy elastic silt (MH).	616.0		23.3	57	24	81.0					
11.3		X	Medium stiff to hard, brown and tan, elastic silt with sand (MH).	614.7	(50/0.4)	1.8								
12.0		X	Hard, brown and tan, sandy elastic silt (MH).	614.0									96	21
15.0			Auger Refusal at 12.0 ft., Begin Coring in Limestone.									9.118	94	58
20.0			Ordovician (Murresboro Limestone) Light gray, slightly weathered, moderately hard, thin to medium bedded (beds <20°-30°), fine to medium grained with dark gray shale wisps/nodules, with open, hard joints. Near vertical clay lined joint 17.0 ft. - 18.4 ft.										98	66
25.0			Medium dark gray, fine grained, argillaceous 23.2 ft. - 27.0 ft.									9.236	94	84
29.2			Light to medium gray, fine to medium grained, fossiliferous, with few dark gray shale wisps.	596.8									100	0
Boring Terminated at 29.2 ft. (Elev. 596.8). NOTES Boring relocated due to steep embankment. Difficult advancement noted at 7.5 ft. and 11.9 ft.														

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CORE PHOTOGRAPHIC RECORD

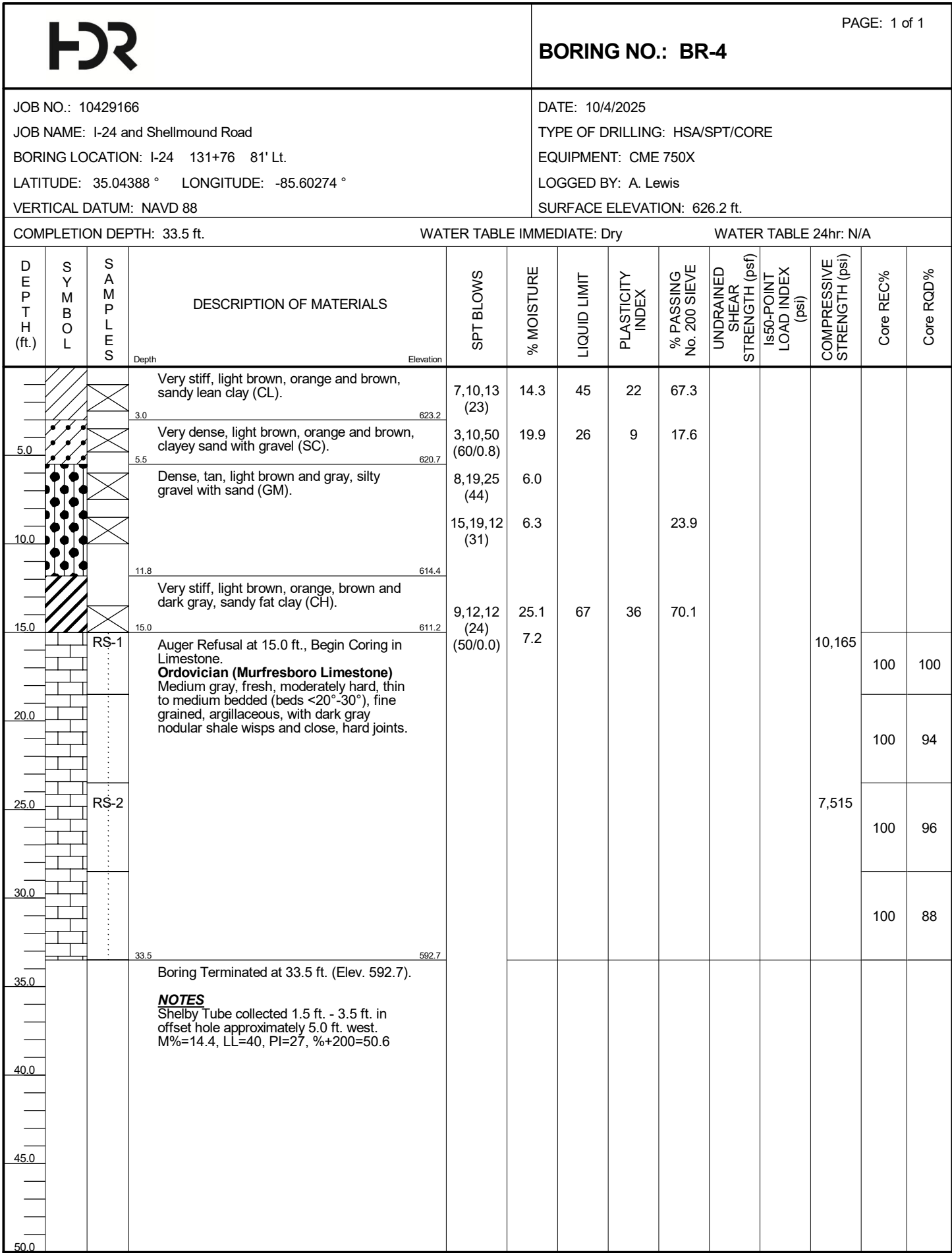
I-24 and Shellmound Road



BR-3 - Box 1 of 2



BR-3 - Box 2 of 2

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							PAGE: 1 of 1													
BORING NO.: BR-4																				
JOB NO.: 10429166							DATE: 10/4/2025													
JOB NAME: I-24 and Shellmound Road							TYPE OF DRILLING: HSA/SPT/CORE													
BORING LOCATION: I-24 131+76 81' Lt.							EQUIPMENT: CME 750X													
LATITUDE: 35.04388 ° LONGITUDE: -85.60274 °							LOGGED BY: A. Lewis													
VERTICAL DATUM: NAVD 88							SURFACE ELEVATION: 626.2 ft.													
COMPLETION DEPTH: 33.5 ft.							WATER TABLE IMMEDIATE: Dry							WATER TABLE 24hr: N/A						
DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS		SPT BLOWS	% MOISTURE	LIQUID LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH (psf)	1s50-POINT LOAD INDEX (psi)	COMPRESSIVE STRENGTH (psi)	Core REC%	Core RQD%						
			Depth	Elevation																
			3.0	623.2	7,10,13 (23)	14.3	45	22	67.3											
5.0			5.5	620.7	3,10,50 (60/0.8)	19.9	26	9	17.6											
					8,19,25 (44)	6.0														
10.0					15,19,12 (31)	6.3			23.9											
			11.8	614.4																
15.0			15.0	611.2	9,12,12 (24) (50/0.0)	25.1	67	36	70.1											
		RS-1	Auger Refusal at 15.0 ft., Begin Coring in Limestone.			7.2						10,165	100	100						
20.0			Ordovician (Murfresboro Limestone) Medium gray, fresh, moderately hard, thin to medium bedded (beds <20°-30°), fine grained, argillaceous, with dark gray nodular shale wisps and close, hard joints.										100	94						
25.0		RS-2										7,515	100	96						
30.0													100	88						
35.0			33.5	592.7	Boring Terminated at 33.5 ft. (Elev. 592.7).															
			NOTES Shelby Tube collected 1.5 ft. - 3.5 ft. in offset hole approximately 5.0 ft. west. M%=14.4, LL=40, PI=27, %+200=50.6																	
40.0																				
45.0																				
50.0																				

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CORE PHOTOGRAPHIC RECORD

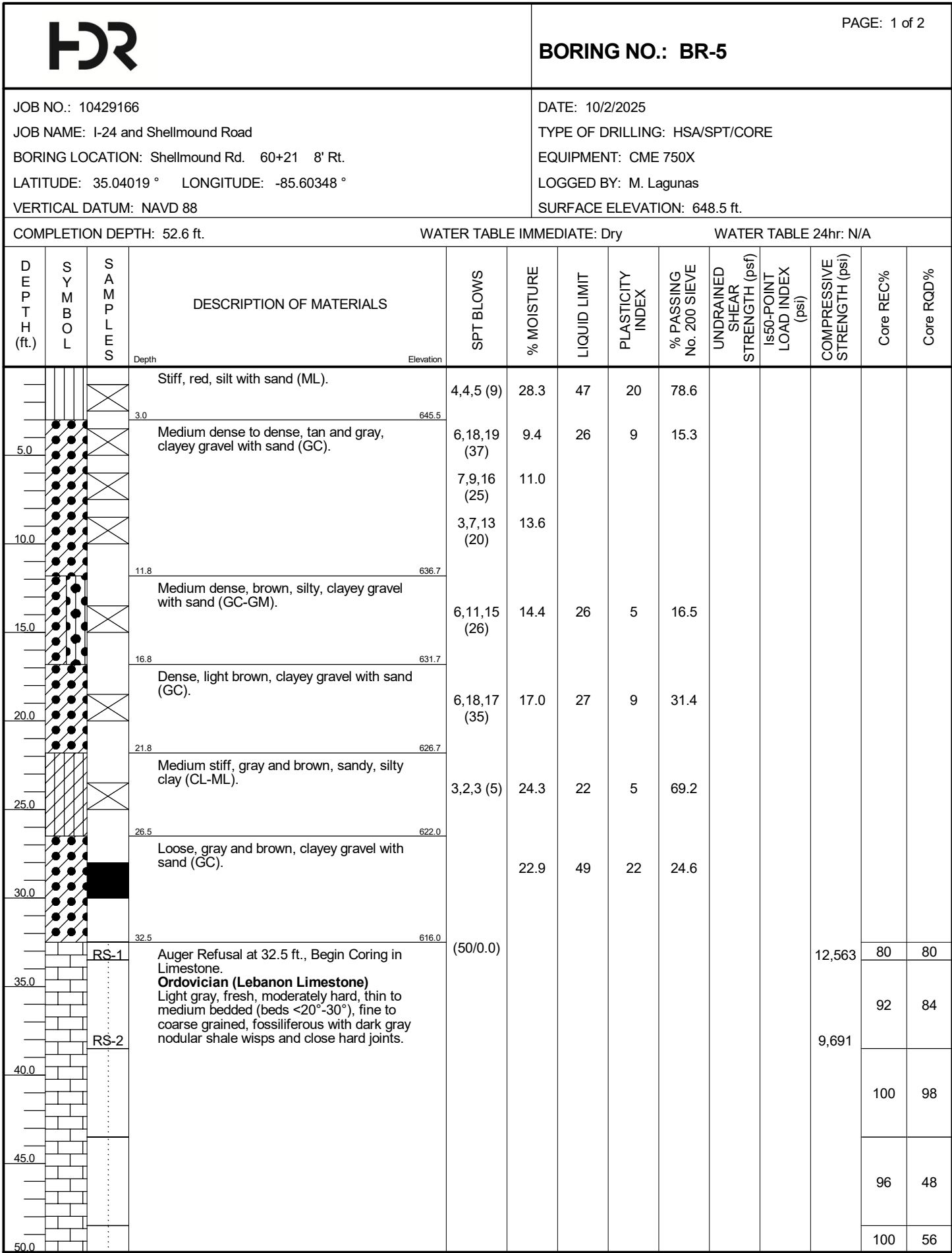
I-24 and Shellmound Road

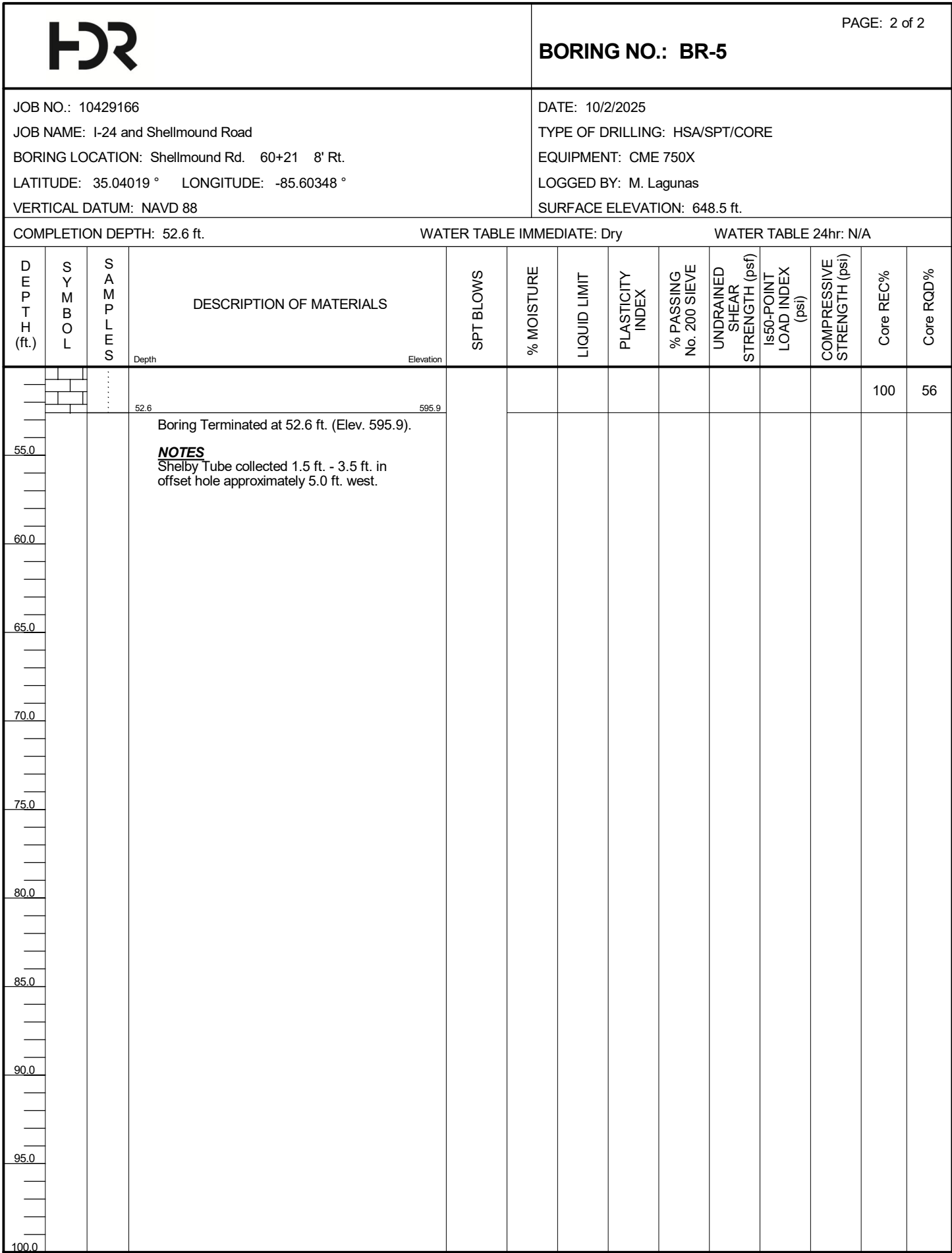


BR-4 - Box 1 of 2



BR-4 - Box 2 of 2



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CORE PHOTOGRAPHIC RECORD

I-24 and Shellmound Road



BR-5 - Box 1 of 2



BR-5 - Box 2 of 2

**BORING NO.: BR-6**

JOB NO.: 10429166

JOB NAME: I-24 and Shellmound Road

BORING LOCATION: Shellmound Rd. 62+04 14' Rt.

LATITUDE: 35.04070 ° LONGITUDE: -85.60348 °

VERTICAL DATUM: NAVD 88

DATE: 10/2/2025

TYPE OF DRILLING: HSA/SPT/CORE

EQUIPMENT: CME 750X

LOGGED BY: M. Lagunas

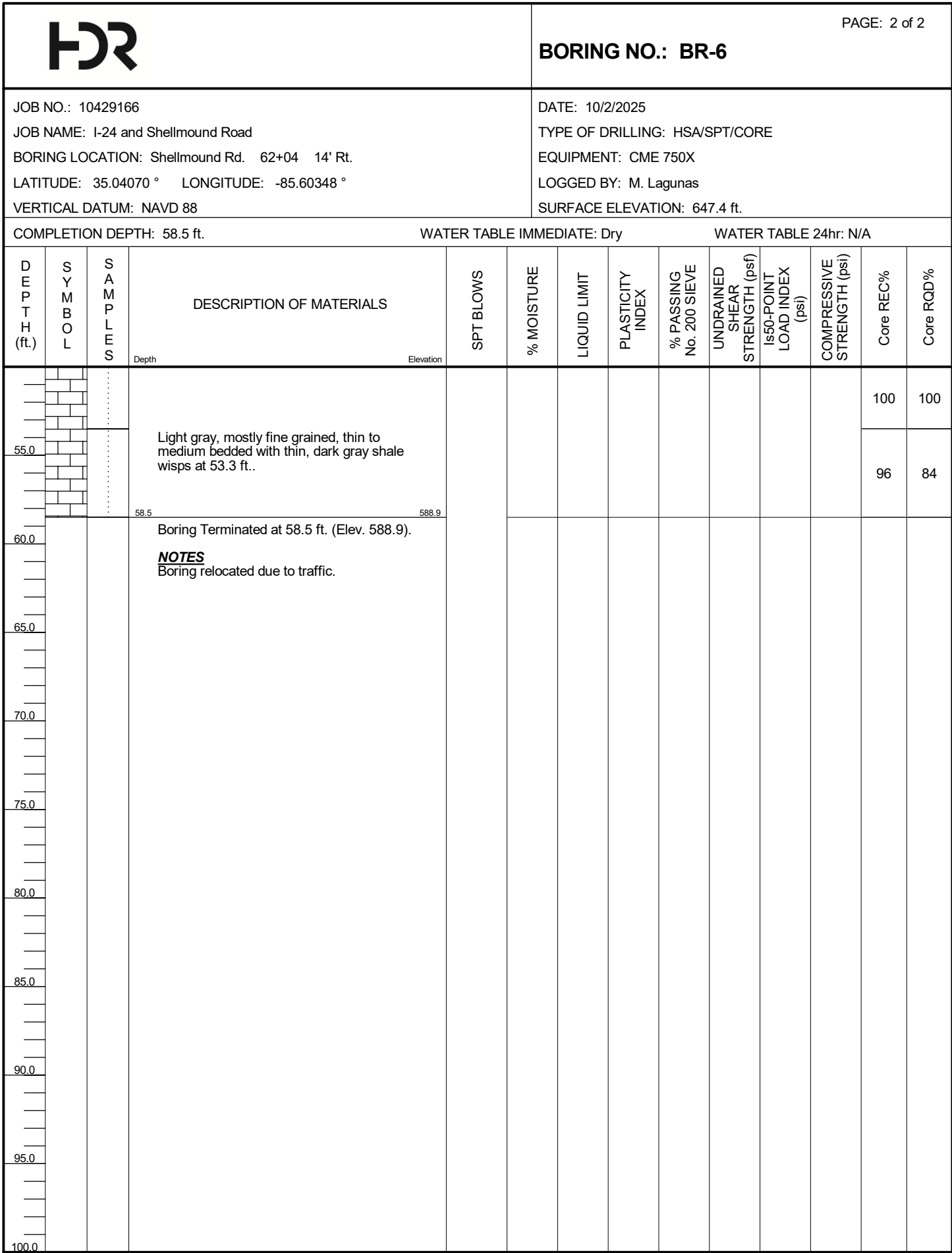
SURFACE ELEVATION: 647.4 ft.

COMPLETION DEPTH: 58.5 ft.

WATER TABLE IMMEDIATE: Dry

WATER TABLE 24hr: N/A

DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SPT BLOWS	% MOISTURE	LIQUID LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH (psf)	IS50-POINT LOAD INDEX (psi)	COMPRESSIVE STRENGTH (psi)	Core REC%	Core RQD%
			Depth	Elevation									
5.0			Stiff to very stiff, red, sandy silt (ML).	4,4,6 (10)	25.1	42	11	66.1					
				3,5,13 (18)	24.3								
10.0			Loose to medium dense, red, clayey gravel with sand (GC-GM).	3,4,10 (14)	14.1	26	7	22.2					
				2,3,7 (10)	15.1								
15.0				4,8,5 (13)	13.6								
20.0			Medium dense, red, brown and dark brown, clayey gravel with sand (GC-GM).	2,9,8 (17)	16.4	28	7	27.9					
25.0				2,14,15 (29)	19.2								
30.0			Stiff to very stiff, dark brown and tan, elastic silt with sand (MH).	2,4,10 (14)	27.2	62	24	84.4					
35.0				4,7,9 (16)	20.0								
40.0			Very dense, gray, poorly graded gravel with clay and sand (or silty clay and sand) (GP-GC).	18,40,50 (90/0.5)	6.1	28	10	9.3					
		RS-1	Auger Refusal at 38.8 ft., Begin Coring in Limestone.								2,397	91	83
			Ordovician (Ridley Limestone) Medium dark gray, fresh, moderately hard and reactive, medium bedded (beds <10°-20°), argillaceous to fossiliferous with close, hard joints.									100	94
50.0		RS-2									4,211	100	100

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						PAGE: 2 of 2									
						BORING NO.: BR-6									
JOB NO.: 10429166 JOB NAME: I-24 and Shellmound Road BORING LOCATION: Shellmound Rd. 62+04 14' Rt. LATITUDE: 35.04070 ° LONGITUDE: -85.60348 ° VERTICAL DATUM: NAVD 88						DATE: 10/2/2025 TYPE OF DRILLING: HSA/SPT/CORE EQUIPMENT: CME 750X LOGGED BY: M. Lagunas SURFACE ELEVATION: 647.4 ft.									
COMPLETION DEPTH: 58.5 ft.						WATER TABLE IMMEDIATE: Dry				WATER TABLE 24hr: N/A					
D E P T H (ft.)	S Y M B O L	S A M P L E S	DESCRIPTION OF MATERIALS			SPT BLOWS	% MOISTURE	LIQUID LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH (psf)	Is50-POINT LOAD INDEX (psi)	COMPRESSIVE STRENGTH (psi)	Core REC%	Core RQD%
			Depth	Elevation											
55.0			Light gray, mostly fine grained, thin to medium bedded with thin, dark gray shale wisps at 53.3 ft..	58.5	588.9									100	100
														96	84
60.0			Boring Terminated at 58.5 ft. (Elev. 588.9).												
65.0															
70.0															
75.0															
80.0															
85.0															
90.0															
95.0															
100.0															

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HDR						PAGE: 2 of 2							
						BORING NO.: BR-6							
JOB NO.: 10429166 JOB NAME: I-24 and Shellmound Road BORING LOCATION: Shellmound Rd. 62+04 14' Rt. LATITUDE: 35.04070 ° LONGITUDE: -85.60348 ° VERTICAL DATUM: NAVD 88						DATE: 10/2/2025 TYPE OF DRILLING: HSA/SPT/CORE EQUIPMENT: CME 750X LOGGED BY: M. Lagunas SURFACE ELEVATION: 647.4 ft.							
COMPLETION DEPTH: 58.5 ft.						WATER TABLE IMMEDIATE: Dry				WATER TABLE 24hr: N/A			
DEPTH (ft.)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	SPT BLOWS	% MOISTURE	LIQUID LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH (psf)	Is50-POINT LOAD INDEX (psi)	COMPRESSIVE STRENGTH (psi)	Core REC%	Core RQD%
			DepthElevation										
			Light gray, mostly fine grained, thin to medium bedded with thin, dark gray shale wisps at 53.3 ft..									100	100
55.0												96	84
			58.5588.9										
60.0			Boring Terminated at 58.5 ft. (Elev. 588.9).										
65.0													
70.0													
75.0													
80.0													
85.0													
90.0													
95.0													
100.0													

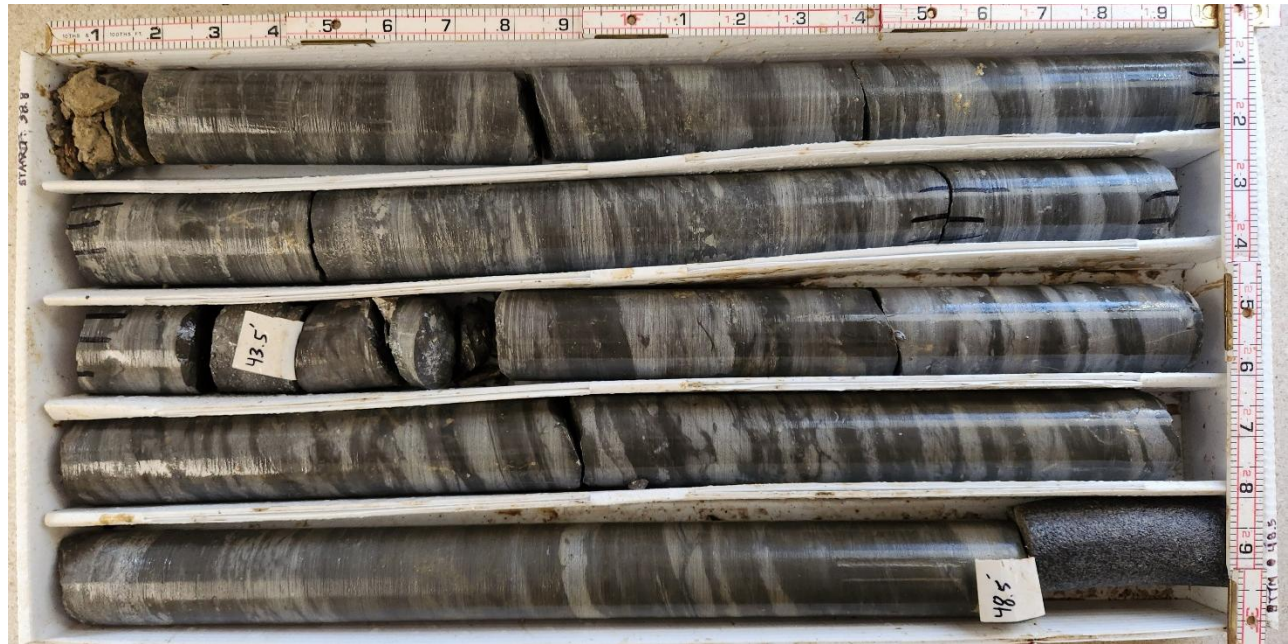
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						PAGE: 2 of 2							
						BORING NO.: BR-6							
JOB NO.: 10429166 JOB NAME: I-24 and Shellmound Road BORING LOCATION: Shellmound Rd. 62+04 14' Rt. LATITUDE: 35.04070 ° LONGITUDE: -85.60348 ° VERTICAL DATUM: NAVD 88						DATE: 10/2/2025 TYPE OF DRILLING: HSA/SPT/CORE EQUIPMENT: CME 750X LOGGED BY: M. Lagunas SURFACE ELEVATION: 647.4 ft.							
COMPLETION DEPTH: 58.5 ft.						WATER TABLE IMMEDIATE: Dry				WATER TABLE 24hr: N/A			
D E P T H (ft.)	S Y M B O L	S A M P L E S	DESCRIPTION OF MATERIALS	SPT BLOWS	% MOISTURE	LIQUID LIMIT	PLASTICITY INDEX	% PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH (psf)	Is50-POINT LOAD INDEX (psi)	COMPRESSIVE STRENGTH (psi)	Core REC%	Core RQD%
			Depth	Elevation									
55.0			Light gray, mostly fine grained, thin to medium bedded with thin, dark gray shale wisps at 53.3 ft..									100	100
												96	84
58.5			58.5	588.9									
60.0			Boring Terminated at 58.5 ft. (Elev. 588.9). NOTES Boring relocated due to traffic.										
65.0													
70.0													
75.0													
80.0													
85.0													
90.0													
95.0													
100.0													

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CORE PHOTOGRAPHIC RECORD

I-24 and Shellmound Road

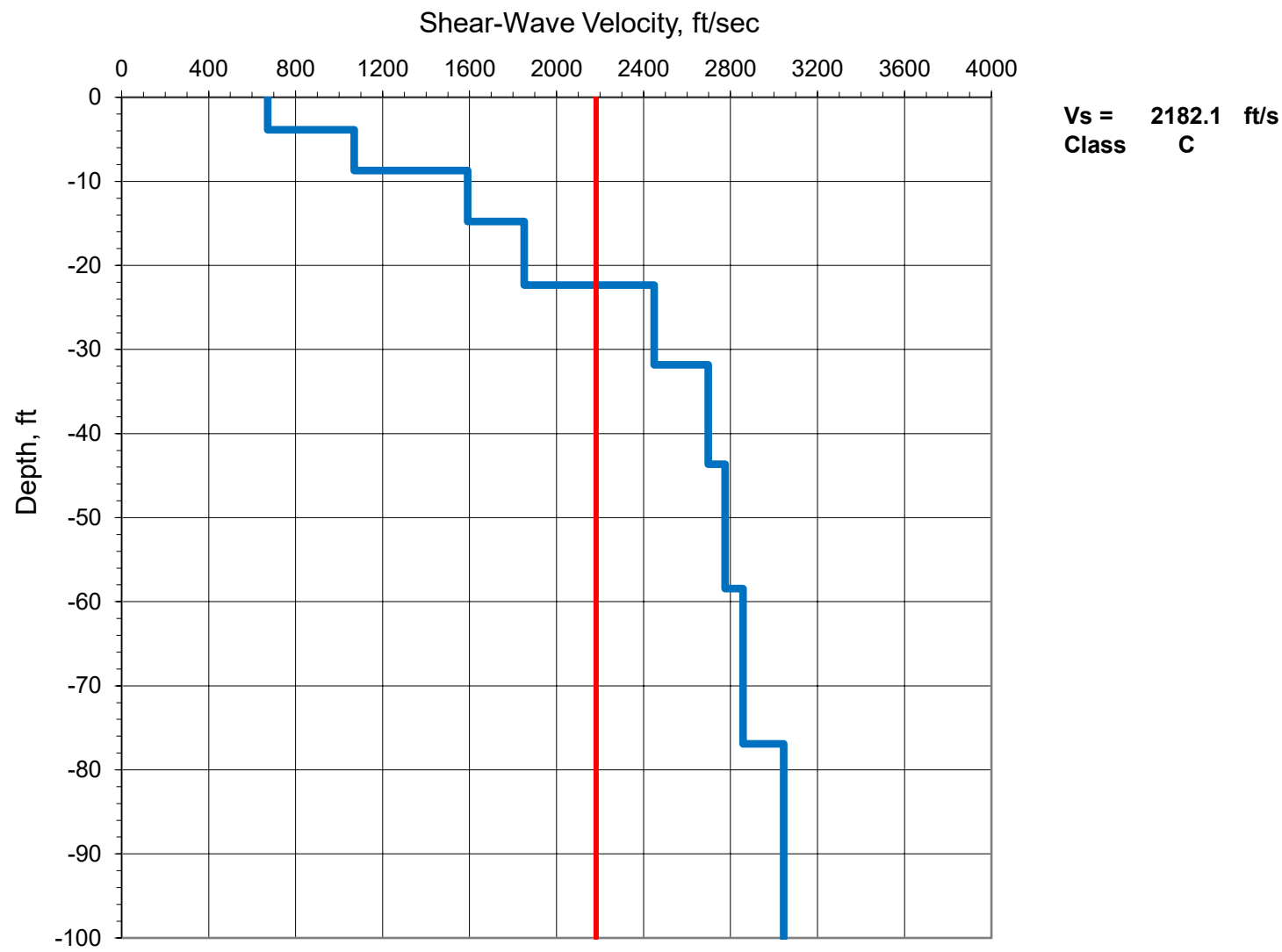


BR-6 - Box 1 of 2

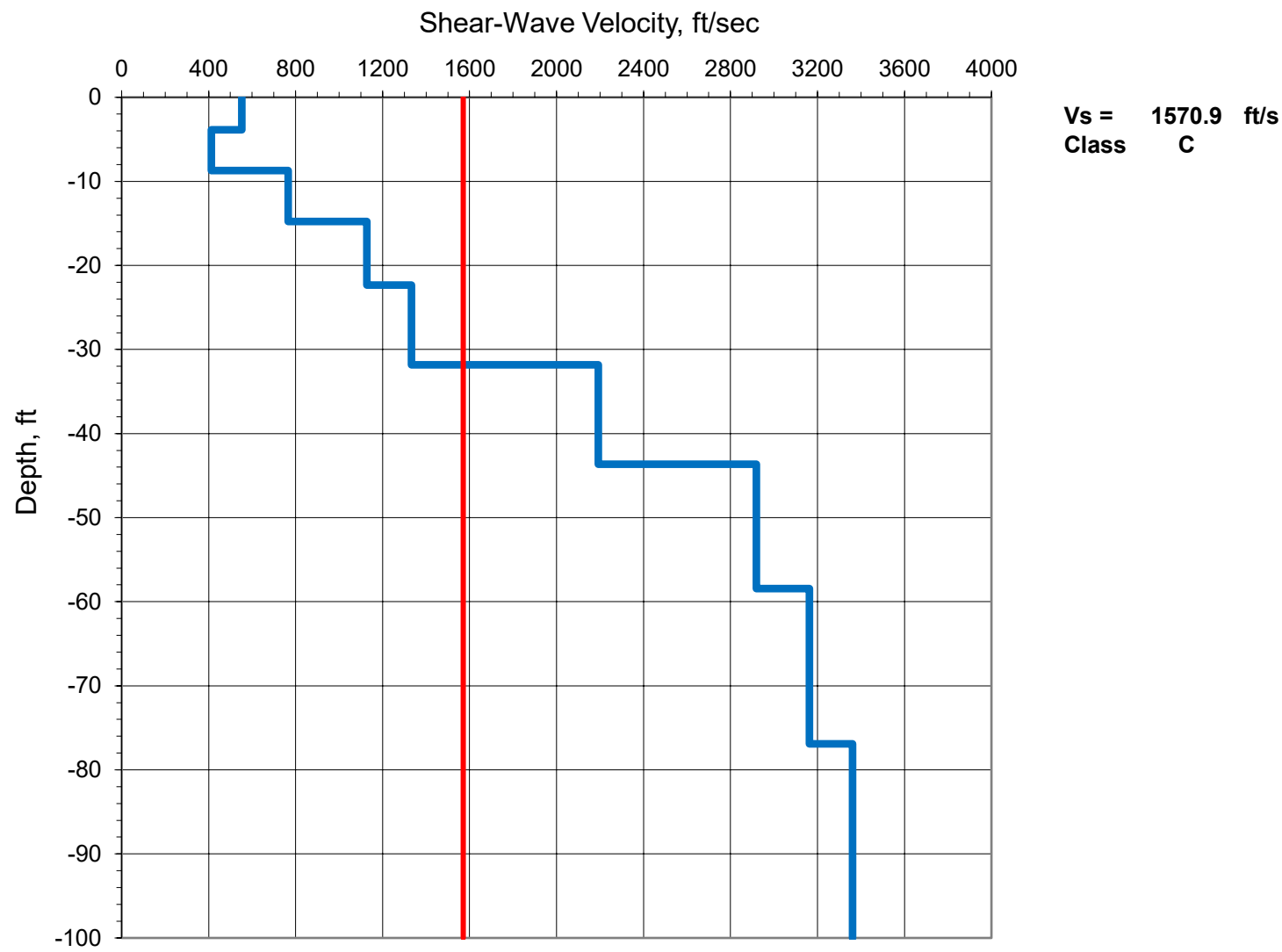


BR-6 - Box 2 of 2

TDOT SHELL MASW-1



TDOT SHELL MASW-2



Appendix C: Laboratory Testing



Shellmound Road Bridge over I-24 Eastbound Laboratory Summary



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Sandy Silt

Sample No. : BULK-1
Sample Loc. : Boring No. B-1
Sample Depth : 3.0' to 10.0'
Date Tested : 10/07/25
Date Reported : 10/17/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.0
1/4		6.3	mm	
No.4		4.75	mm	92.1
No.6		3.35	mm	
No.10		2	mm	78.1

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	71.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	63.0
No.270		0.053	mm	
Hyd. Rd. # 1		0.0290	mm	60.7
Hyd. Rd. # 2		0.0188	mm	56.7
Hyd. Rd. # 3		0.0110	mm	53.5
Hyd. Rd. # 4		0.0080	mm	50.2
Hyd. Rd. # 5		0.0058	mm	43.8
Hyd. Rd. # 6		0.0029	mm	39.0
Hyd. Rd. # 7		0.0013	mm	32.6

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.008 mm

CBR (AASHTO: T-193) : 2.1
Dry Dens. (AASHTO: T-99; Method (C)) : 108.39
Opt. Moist. (AASHTO: T-99; Method (C)) : 17.6

Natural Moisture (%) (AASHTO T265) : 5.2

Liquid Limit (AASHTO T89) : 45
Plastic Limit (AASHTO T90) : 27
Plasticity Index : 18

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 21.9
Coarse Sand (-No.10 + No.40) : 6.6
Fine Sand (-No.40 + No.200) : 8.5
Silt (-No.200 + 0.002mm) : 26.8
Clay (-0.002mm + 0.001mm) : 6.4
Colloids (-0.001mm) : 29.7

Liquidity Index : -1.23

Activity : 0.50

Sp. Gr. (AASHTO T100) : 2.574

AASHTO Classification: M145 : A-7-6 (10)

ASTM Classification: D2487 : ML

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 7.9
Coarse Sand (-No.4 + No.10) : 14.0
Medium Sand (-No.10 + No.40) : 6.6
Fine Sand (-No.40 + No.200) : 8.5
Silt (-No.200 + 0.005mm) : 20.2
Clay (-0.005mm + 0.001mm) : 13.1
Colloids (-0.001mm) : 29.7

Approved By :

Ken E. Walker

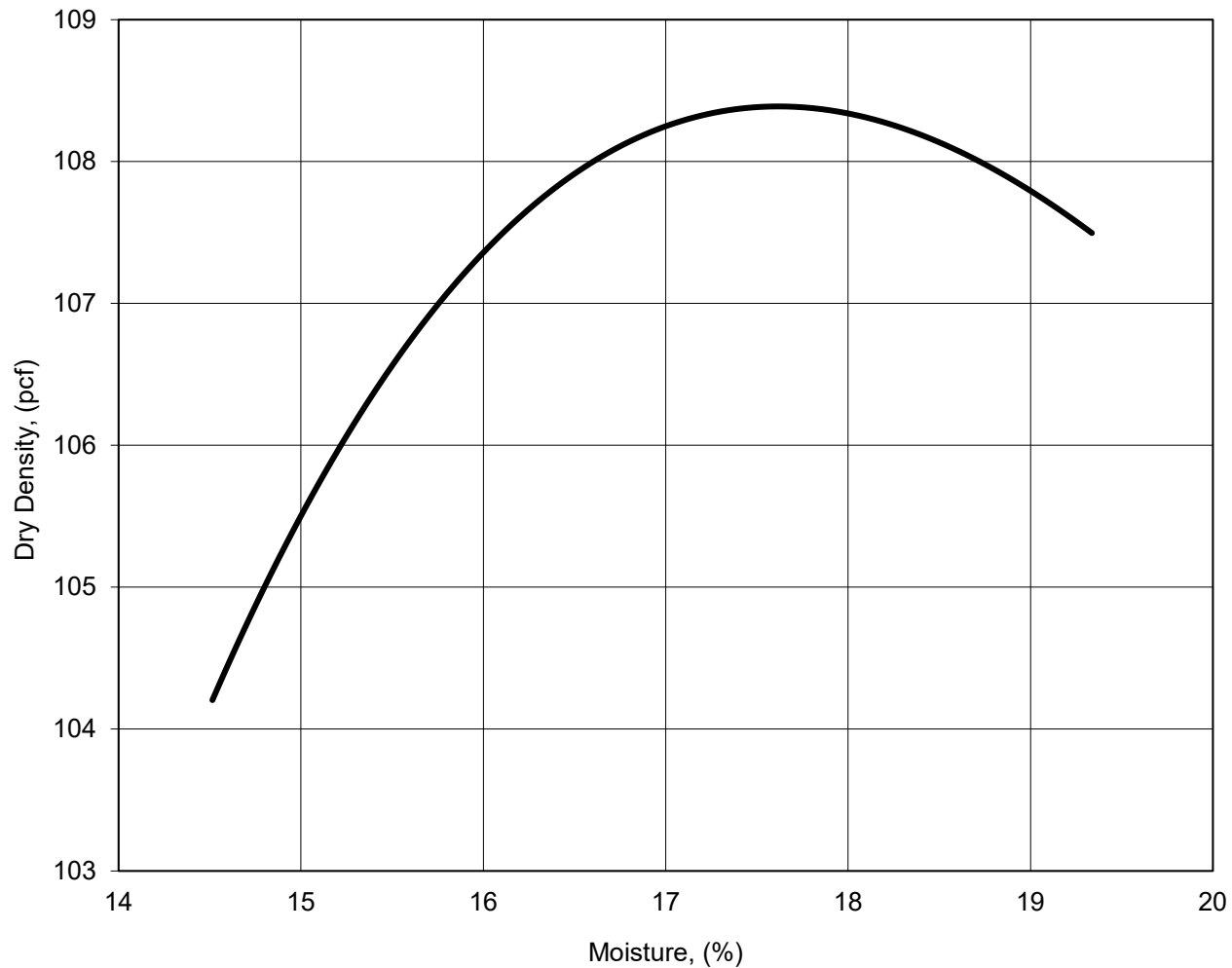
Soil No. 1



MOISTURE-DENSITY RELATIONSHIP

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Sandy Silt

Sample No. : BULK-1
Sample Loc. : Boring No. B-1
Sample Depth : 3.0' to 10.0'
Date Tested : 10/07/25
Date Reported : 10/17/25



MAXIMUM DENSITY: 108.4 pcf

OPTIMUM MOISTURE: 17.6 %

COMMENTS: AASHTO: T-99; Method (C)

APPROVED BY:

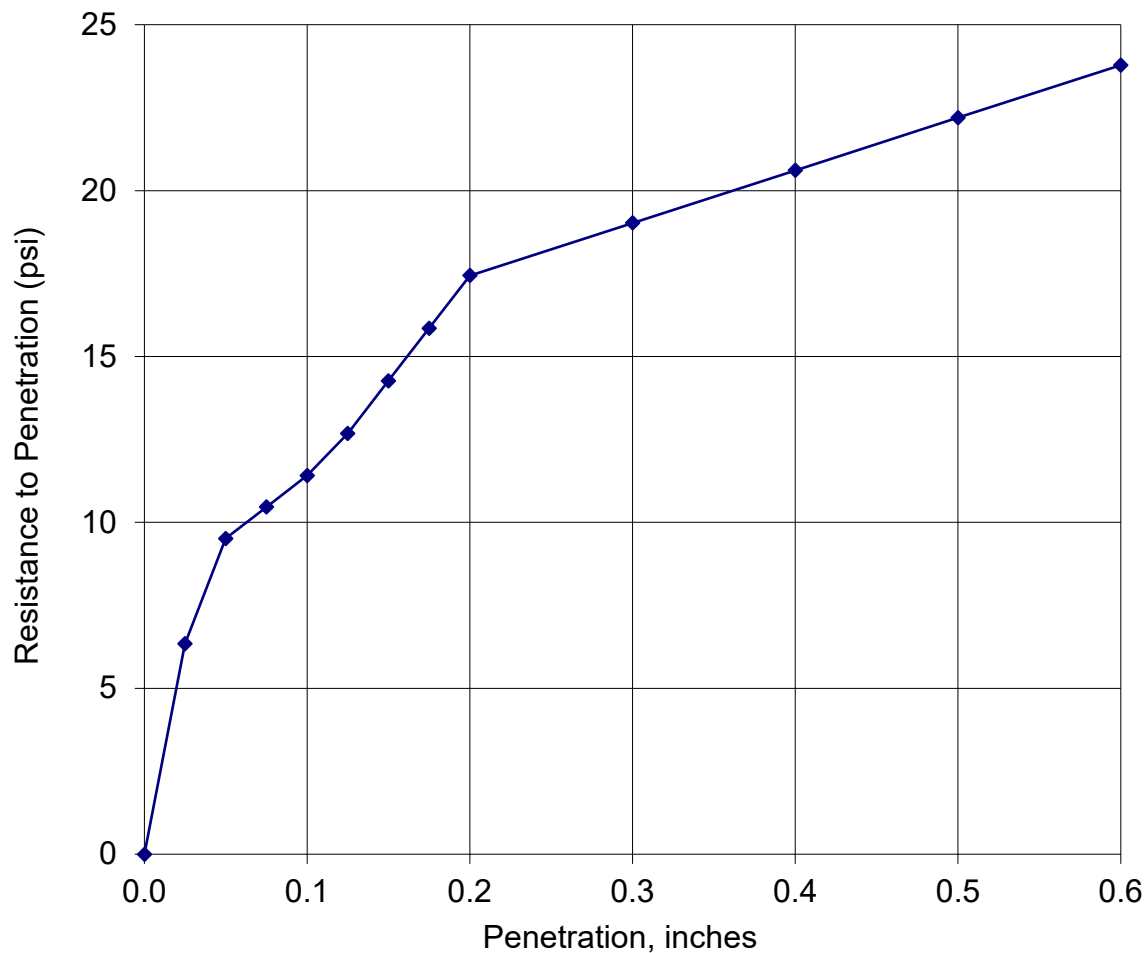
KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Sandy Silt

Sample No. : BULK-1
Sample Loc. : Boring No. B-1
Sample Depth : 3.0' to 10.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 10 Blows per layer
Percent Compacted = 86.4
Percent Swell = 1.48

C.B.R. @ 0.1 In. = 1.1
C.B.R. @ 0.2 In. = 1.2*

COMMENTS: AASHTO: T-193

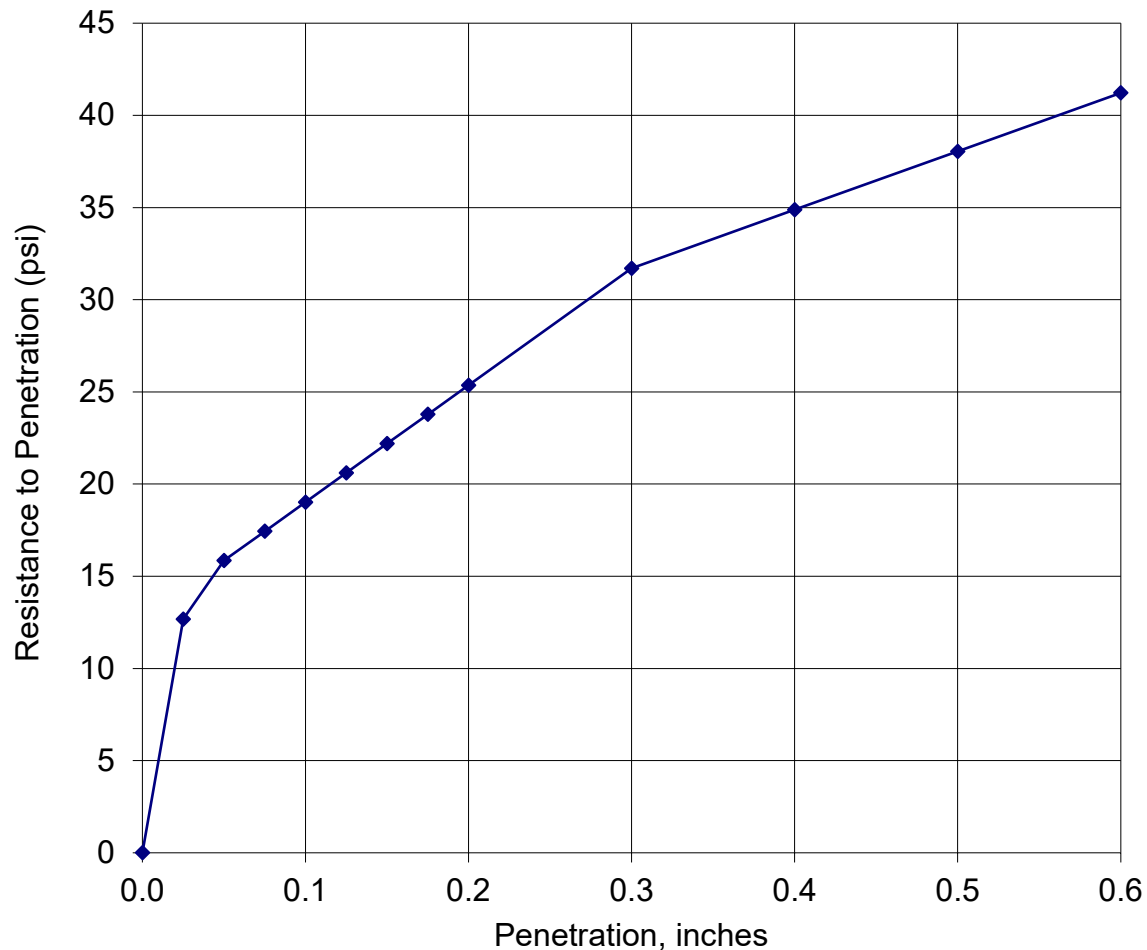
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Sandy Silt

Sample No. : BULK-1
Sample Loc. : Boring No. B-1
Sample Depth : 3.0' to 10.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 25 Blows per layer
Percent Compacted = 93.3
Percent Swell = 1.29

C.B.R. @ 0.1 In. = 1.9*
C.B.R. @ 0.2 In. = 1.7

COMMENTS: AASHTO: T-193

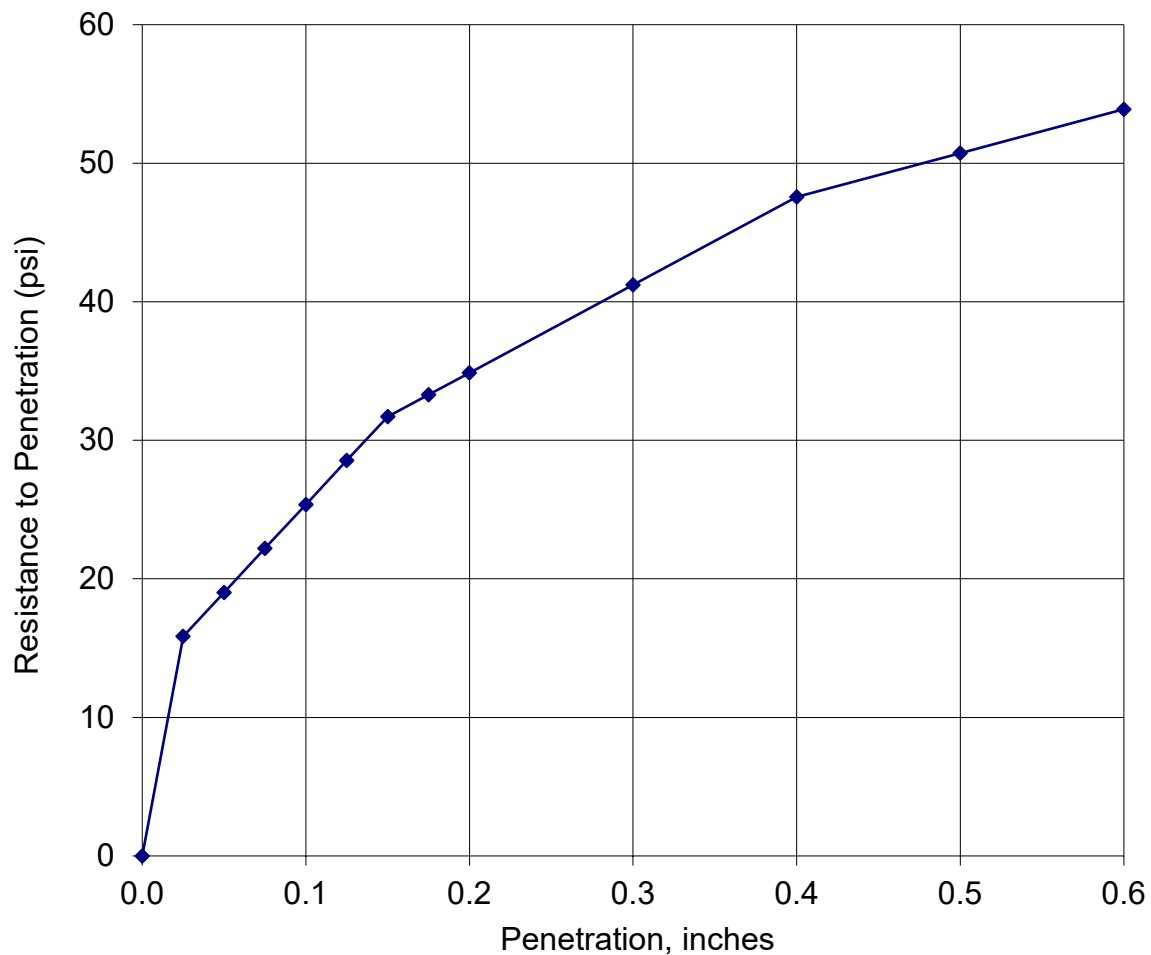
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Sandy Silt

Sample No. : BULK-1
Sample Loc. : Boring No. B-1
Sample Depth : 3.0' to 10.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 56 Blows per layer
Percent Compacted = 100
Percent Swell = 1.09

C.B.R. @ 0.1 In. = 2.5*
C.B.R. @ 0.2 In. = 2.3

COMMENTS: AASHTO: T-193

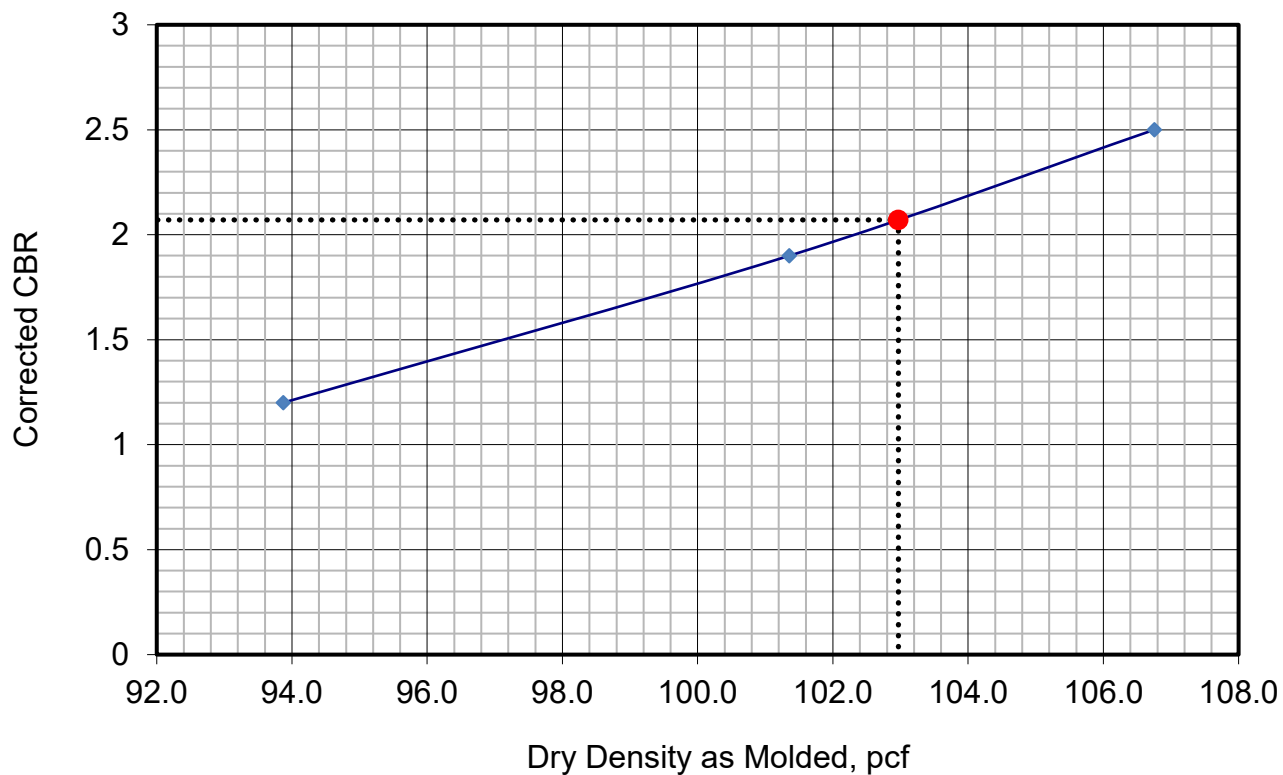
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Sandy Silt

Sample No. : BULK-1
Sample Loc. : Boring No. B-1
Sample Depth : 3.0' to 10.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



CBR Results					
Max Wet Density (pcf)	Max Dry Density (pcf)	Opt. Moisture Content (%)	10 Blows per Layer	25 Blows per Layer	56 Blows per Layer
127.5	108.4	17.6	1.2	1.9	2.5
CBR Values					
			93.9	101.4	106.8
Compacted Dry Density (pcf)					
			86.4%	93.3%	100.0%
Percent Compacted of Maximum Dry Density					

CBR Value @ 95% of the Maximum Dry Density (103 pcf) = 2.1

COMMENTS: AASHTO: T-193

APPROVED BY: KW



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Gray Poorly Graded Gravel with Clay and Sand (or Silty Clay and Sand)

Sample No. : SS-1
Sample Loc. : Boring No. B-1
Sample Depth : 1.0' to 2.5'
Date Tested : 10/20/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	70.5
1/4		6.3	mm	
No.4		4.75	mm	36.2
No.6		3.35	mm	
No.10		2	mm	20.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	12.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	7.6
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 6.278 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 3.7
Liquid Limit (AASHTO T89) : 20
Plastic Limit (AASHTO T90) : 11
Plasticity Index : 9
Liquidity Index : -0.82
Activity : NA
Sp. Gr. (AASHTO T100) : NA
AASHTO Classification: M145 : A-2-4 (0)
ASTM Classification: D2487 : GP-GC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 79.3
Coarse Sand (-No.10 + No.40) : 8.5
Fine Sand (-No.40 + No.200) : 4.6
Silt + Clay (-No.200) : 7.6

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 63.8
Coarse Sand (-No.4 + No.10) : 15.5
Medium Sand (-No.10 + No.40) : 8.5
Fine Sand (-No.40 + No.200) : 4.6
Silt + Clay (-No.200) : 7.6

Approved By : Ken E. Walker

Soil No. 2



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Red, Orange & Brown Gravelly Silt with Sand

Sample No. : SS-2

Sample Loc. : Boring No. B-1

Sample Depth : 3.5' to 5.0'

Date Tested : 10/20/25

Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	78.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	78.7
1/4		6.3	mm	
No.4		4.75	mm	71.8
No.6		3.35	mm	
No.10		2	mm	66.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	61.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	53.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.05 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 19.8

Liquid Limit (AASHTO T89) : 39

Plastic Limit (AASHTO T90) : 30

Plasticity Index : 9

Liquidity Index : -1.18

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-4 (3)

ASTM Classification: D2487 : ML

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 33.3

Coarse Sand (-No.10 + No.40) : 5.5

Fine Sand (-No.40 + No.200) : 7.9

Silt + Clay (-No.200) : 53.3

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 21.3

Fine Gravel (-3/4in. + No.4) : 6.9

Coarse Sand (-No.4 + No.10) : 5.1

Medium Sand (-No.10 + No.40) : 5.5

Fine Sand (-No.40 + No.200) : 7.9

Silt + Clay (-No.200) : 53.3

Approved By :

Ken E. Walker

Soil No. 3



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Red, Orange & Brown Sandy Elastic Silt

Sample No. : ST-1

Sample Loc. : Boring No. B-1

Sample Depth : 6.0' to 8.0'

Date Tested : 10/20/25

Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	97.3
1/4		6.3	mm	
No.4		4.75	mm	95.6
No.6		3.35	mm	
No.10		2	mm	93.6

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	80.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	54.0
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.046 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 18.8

Liquid Limit (AASHTO T89) : 51

Plastic Limit (AASHTO T90) : 29

Plasticity Index : 22

Liquidity Index : -0.46

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-6 (10)

ASTM Classification: D2487 : MH

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 6.4

Coarse Sand (-No.10 + No.40) : 13.5

Fine Sand (-No.40 + No.200) : 26.1

Silt + Clay (-No.200) : 54.0

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 4.4

Coarse Sand (-No.4 + No.10) : 2.0

Medium Sand (-No.10 + No.40) : 13.5

Fine Sand (-No.40 + No.200) : 26.1

Silt + Clay (-No.200) : 54.0

Approved By : Ken E. Walker

Soil No. 4



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Light Brown Clayey Sand

Sample No. : SS-3A
Sample Loc. : Boring No. B-1
Sample Depth : 8.5' to 9.5'
Date Tested : 10/25/25
Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	98.2
No.6		3.35	mm	
No.10		2	mm	87.3

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	57.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	41.8
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.182 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 21.6

Liquid Limit (AASHTO T89) : 48

Plastic Limit (AASHTO T90) : 26

Plasticity Index : 22

Liquidity Index : -0.21

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-6 (5)

ASTM Classification: D2487 : SC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 12.7

Coarse Sand (-No.10 + No.40) : 29.5

Fine Sand (-No.40 + No.200) : 16.0

Silt + Clay (-No.200) : 41.8

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 1.8

Coarse Sand (-No.4 + No.10) : 10.9

Medium Sand (-No.10 + No.40) : 29.5

Fine Sand (-No.40 + No.200) : 16.0

Silt + Clay (-No.200) : 41.8

Approved By : Ken E. Walker

Soil No. 5



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Light Brown Clayey Gravel with Sand

Sample No. : SS-3B
Sample Loc. : Boring No. B-1
Sample Depth : 9.5' to 10.0'
Date Tested : 10/20/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	92.6
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	68.8
1/4		6.3	mm	
No.4		4.75	mm	49.1
No.6		3.35	mm	
No.10		2	mm	35.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	27.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	24.2
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 4.903 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 19.2

Liquid Limit (AASHTO T89) : 27

Plastic Limit (AASHTO T90) : 16

Plasticity Index : 11

Liquidity Index : 0.32

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-6 (0)

ASTM Classification: D2487 : GC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 65.0

Coarse Sand (-No.10 + No.40) : 7.4

Fine Sand (-No.40 + No.200) : 3.4

Silt + Clay (-No.200) : 24.2

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 7.4

Fine Gravel (-3/4in. + No.4) : 43.5

Coarse Sand (-No.4 + No.10) : 14.1

Medium Sand (-No.10 + No.40) : 7.4

Fine Sand (-No.40 + No.200) : 3.4

Silt + Clay (-No.200) : 24.2

Approved By : Ken E. Walker

Soil No. 6



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-2
Sample Depth : 10.0' to 15.0'
Date Tested : 10/07/25
Date Reported : 10/17/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	99.2
1/4		6.3	mm	
No.4		4.75	mm	96.2
No.6		3.35	mm	
No.10		2	mm	85.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	80.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	71.4
No.270		0.053	mm	
Hyd. Rd. # 1		0.0296	mm	66.8
Hyd. Rd. # 2		0.0193	mm	61.3
Hyd. Rd. # 3		0.0114	mm	57.7
Hyd. Rd. # 4		0.0082	mm	54.1
Hyd. Rd. # 5		0.0059	mm	48.8
Hyd. Rd. # 6		0.0029	mm	45.2
Hyd. Rd. # 7		0.0013	mm	34.5

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.006 mm

CBR (AASHTO: T-193) : 2.0
Dry Dens. (AASHTO: T-99; Method (C)) : 104.8
Opt. Moist. (AASHTO: T-99; Method (C)) : 19.4

Natural Moisture (%) (AASHTO T265) : 5.8
Liquid Limit (AASHTO T89) : 49
Plastic Limit (AASHTO T90) : 25
Plasticity Index : 24
Liquidity Index : -0.81
Activity : 0.60
Sp. Gr. (AASHTO T100) : 2.548
AASHTO Classification: M145 : A-7-6 (17)
ASTM Classification: D2487 : CL

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 14.1
Coarse Sand (-No.10 + No.40) : 5.8
Fine Sand (-No.40 + No.200) : 8.7
Silt (-No.200 + 0.002mm) : 31.1
Clay (-0.002mm + 0.001mm) : 9.0
Colloids (-0.001mm) : 31.2

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 3.8
Coarse Sand (-No.4 + No.10) : 10.3
Medium Sand (-No.10 + No.40) : 5.8
Fine Sand (-No.40 + No.200) : 8.7
Silt (-No.200 + 0.005mm) : 23.5
Clay (-0.005mm + 0.001mm) : 16.7
Colloids (-0.001mm) : 31.2

Approved By : Ken E. Walker

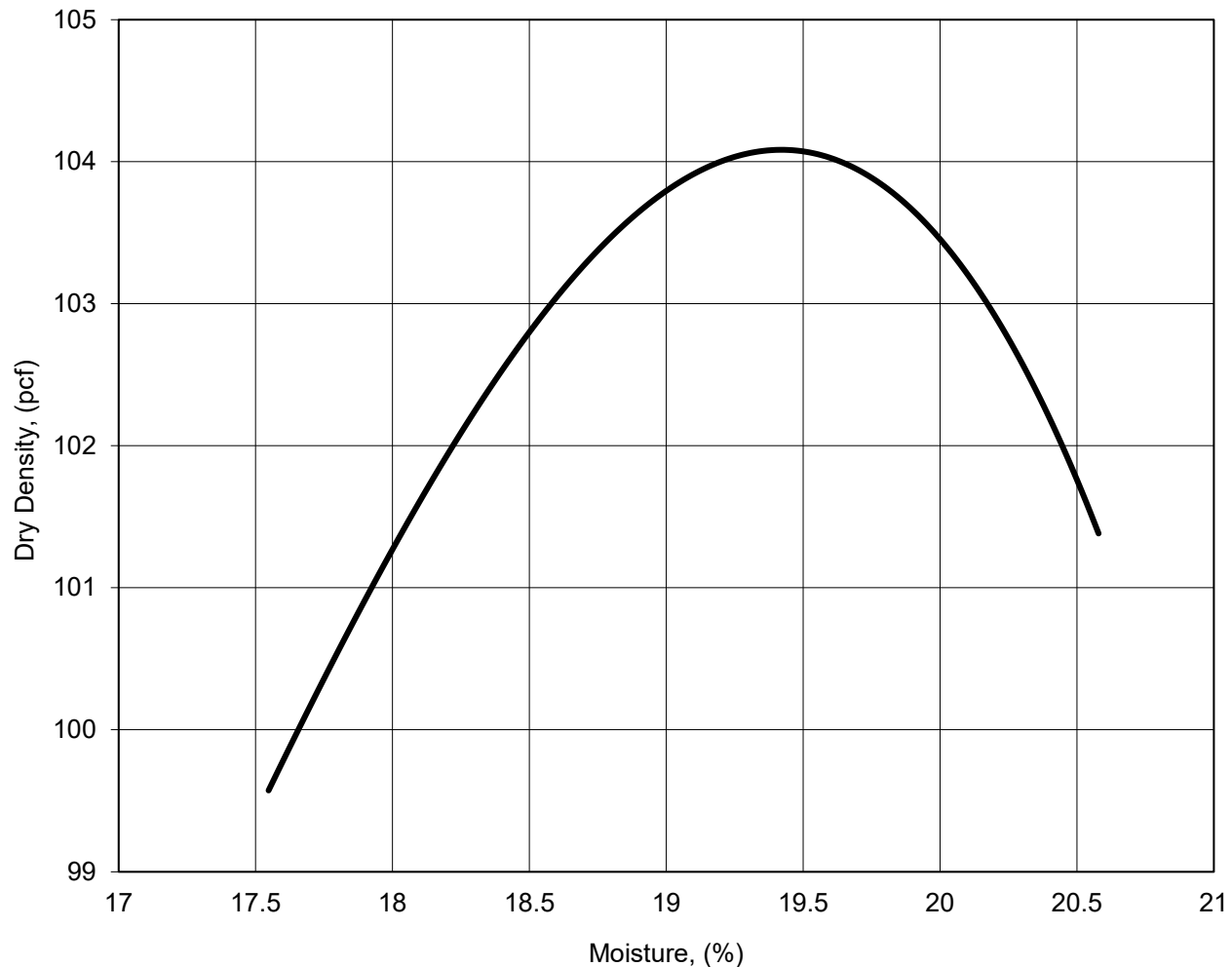
Soil No. 7



MOISTURE-DENSITY RELATIONSHIP

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-2
Sample Depth : 10.0' to 15.0'
Date Tested : 10/07/25
Date Reported : 10/17/25



MAXIMUM DENSITY: 104.1 pcf

OPTIMUM MOISTURE: 19.4 %

COMMENTS: AASHTO: T-99; Method (C)

APPROVED BY:

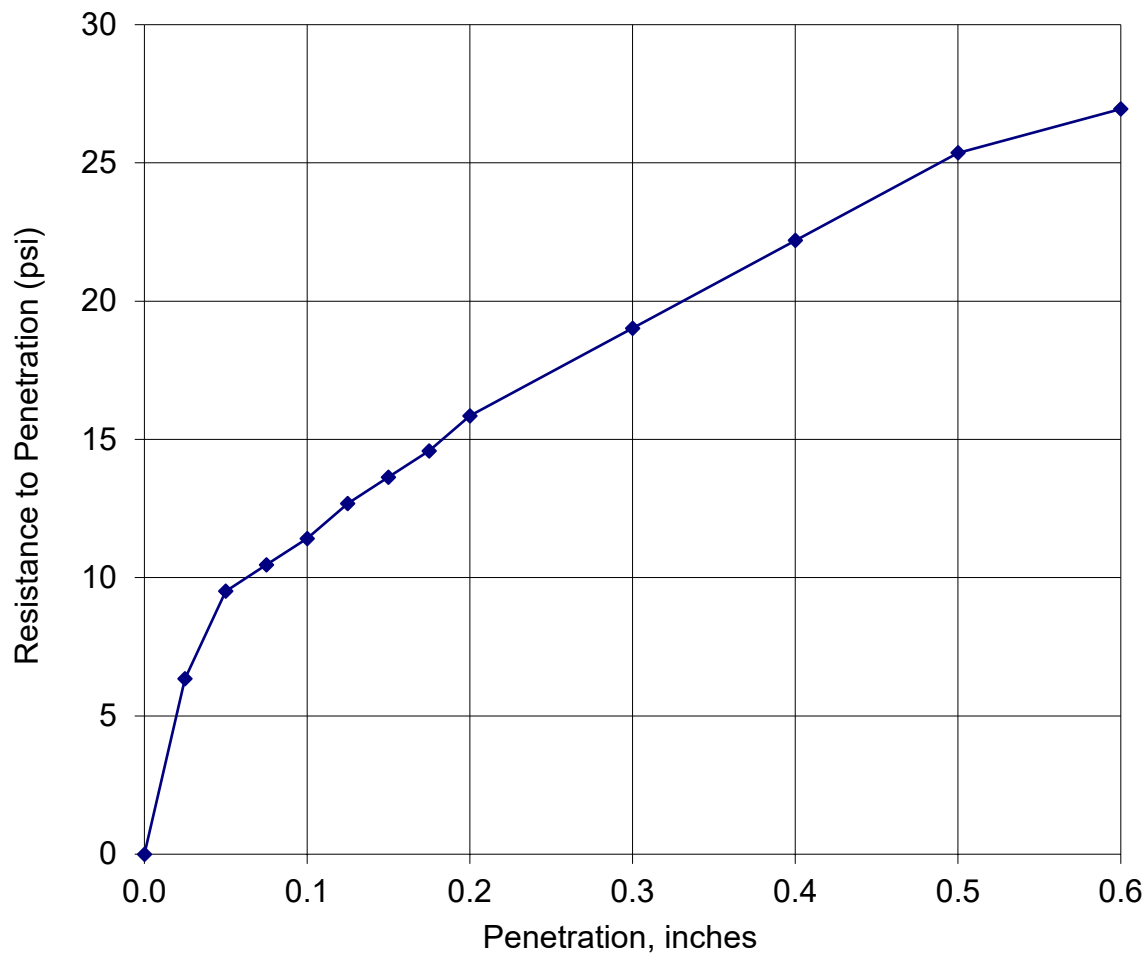
KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-2
Sample Depth : 10.0' to 15.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 10 Blows per layer
Percent Compacted = 91.1
Percent Swell = 0.96

C.B.R. @ 0.1 In. = 1.1*
C.B.R. @ 0.2 In. = 1.1

COMMENTS: AASHTO: T-193

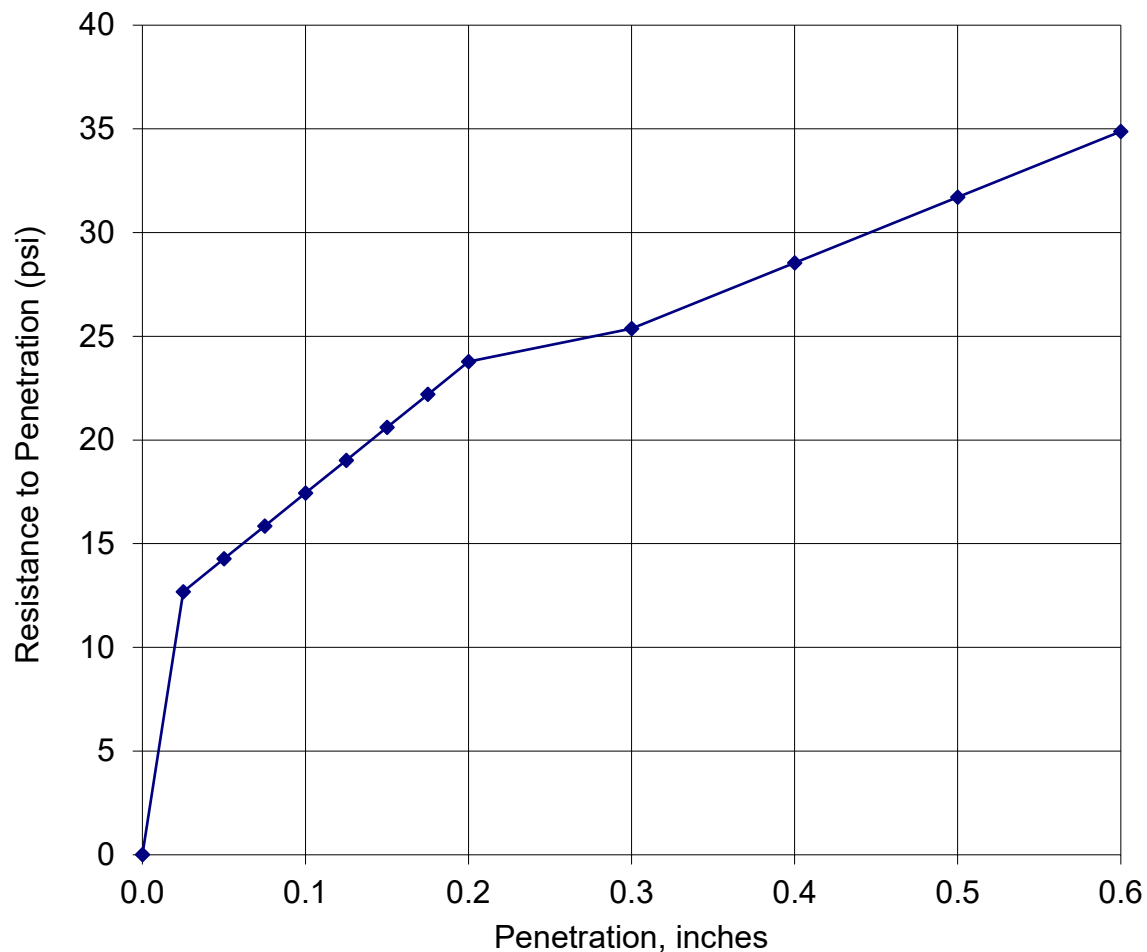
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-2
Sample Depth : 10.0' to 15.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 25 Blows per layer
Percent Compacted = 93.5
Percent Swell = 0.7

C.B.R. @ 0.1 In. = 1.7*
C.B.R. @ 0.2 In. = 1.6

COMMENTS: AASHTO: T-193

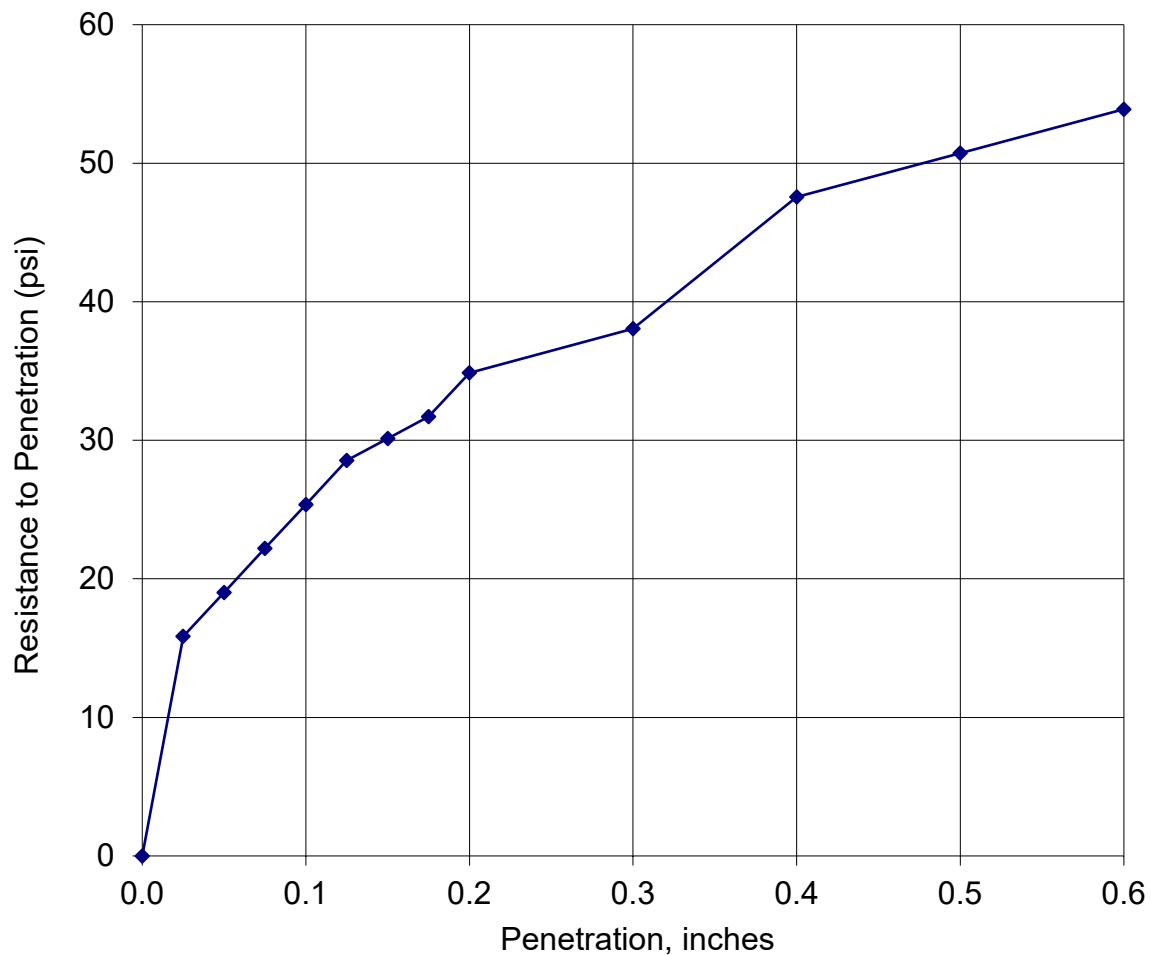
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-2
Sample Depth : 10.0' to 15.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 56 Blows per layer
Percent Compacted = 98.2
Percent Swell = 0.61

C.B.R. @ 0.1 In. = 2.5*
C.B.R. @ 0.2 In. = 2.3

COMMENTS: AASHTO: T-193

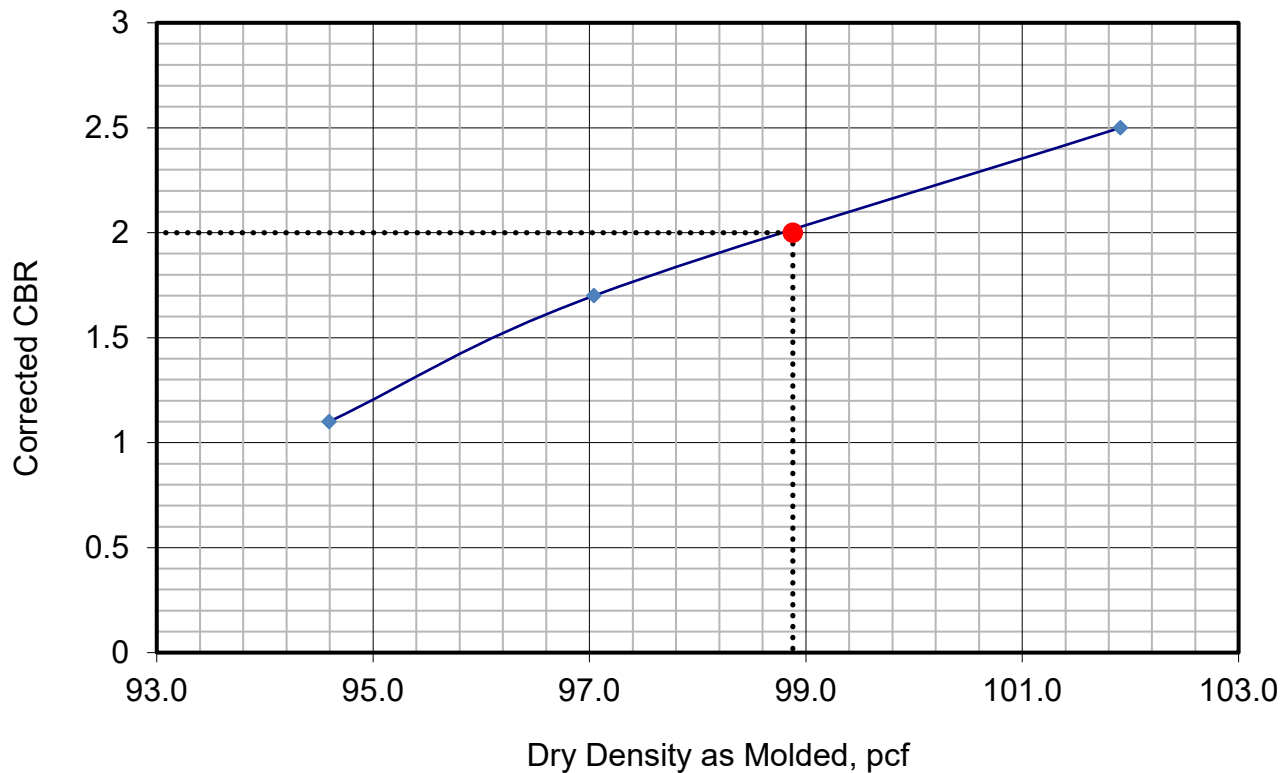
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-2
Sample Depth : 10.0' to 15.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



			CBR Results			CBR Values
Max Wet Density (pcf)	Max Dry Density (pcf)	Opt. Moisture Content (%)	10 Blows per Layer	25 Blows per Layer	56 Blows per Layer	
124.3	104.1	19.4	1.1	1.7	2.5	
			94.6	97.0	101.9	
			91.1%	93.5%	98.2%	Percent Compacted of Maximum Dry Density

CBR Value @ 95% of the Maximum Dry Density (98.9 pcf) = 2.0

COMMENTS: AASHTO: T-193

APPROVED BY: KW



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Gray Well-Graded Gravel with Sand

Sample No. : SS-1
Sample Loc. : Boring No. B-2
Sample Depth : 1.0' to 2.5'
Date Tested : 10/20/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	70.5
3/4	in.	19	mm	70.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	43.6
1/4		6.3	mm	
No.4		4.75	mm	24.5
No.6		3.35	mm	
No.10		2	mm	12.2

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	6.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	4.1
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 11.203 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 5.1

Liquid Limit (AASHTO T89) : 14

Plastic Limit (AASHTO T90) : 11

Plasticity Index : 3

Liquidity Index : -1.96

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-1-a (0)

ASTM Classification: D2487 : GW

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 87.8

Coarse Sand (-No.10 + No.40) : 5.5

Fine Sand (-No.40 + No.200) : 2.6

Silt + Clay (-No.200) : 4.1

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 29.5

Fine Gravel (-3/4in. + No.4) : 46.0

Coarse Sand (-No.4 + No.10) : 12.3

Medium Sand (-No.10 + No.40) : 5.5

Fine Sand (-No.40 + No.200) : 2.6

Silt + Clay (-No.200) : 4.1

Approved By : Ken E. Walker

Soil No. 8



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
 Project No. : 10429166
 Project County : Marion
 Project State : Tennessee
 Laboratory No. : 10429166
 Submitted By : HDR
 Soil Type : Orange, Brown & Tan Clayey Gravel with Sand

Sample No. : SS-2
 Sample Loc. : Boring No. B-2
 Sample Depth : 3.5' to 5.0'
 Date Tested : 10/21/25
 Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	84.4
3/4	in.	19	mm	73.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	58.0
1/4		6.3	mm	
No.4		4.75	mm	42.3
No.6		3.35	mm	
No.10		2	mm	35.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	29.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	21.7
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 6.673 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 14.9

Liquid Limit (AASHTO T89) : 31

Plastic Limit (AASHTO T90) : 17

Plasticity Index : 14

Liquidity Index : -0.16

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-6 (1)

ASTM Classification: D2487 : GC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 64.3

Coarse Sand (-No.10 + No.40) : 6.2

Fine Sand (-No.40 + No.200) : 7.8

Silt + Clay (-No.200) : 21.7

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 26.9

Fine Gravel (-3/4in. + No.4) : 30.8

Coarse Sand (-No.4 + No.10) : 6.6

Medium Sand (-No.10 + No.40) : 6.2

Fine Sand (-No.40 + No.200) : 7.8

Silt + Clay (-No.200) : 21.7

Approved By : Ken E. Walker

Soil No. 9



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Orange, Yellow & Tan Sandy Elastic Silt

Sample No. : SS-4

Sample Loc. : Boring No. B-2

Sample Depth : 8.5' to 10.0'

Date Tested : 10/21/25

Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	89.8
1/4		6.3	mm	
No.4		4.75	mm	86.1
No.6		3.35	mm	
No.10		2	mm	83.3

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	77.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	66.9
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.014 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 30.8

Liquid Limit (AASHTO T89) : 55

Plastic Limit (AASHTO T90) : 33

Plasticity Index : 22

Liquidity Index : -0.12

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-5 (15)

ASTM Classification: D2487 : MH

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 16.7

Coarse Sand (-No.10 + No.40) : 6.1

Fine Sand (-No.40 + No.200) : 10.3

Silt + Clay (-No.200) : 66.9

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 13.9

Coarse Sand (-No.4 + No.10) : 2.8

Medium Sand (-No.10 + No.40) : 6.1

Fine Sand (-No.40 + No.200) : 10.3

Silt + Clay (-No.200) : 66.9

Approved By :

Ken E. Walker

Soil No. 10



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Orange & Brown Silty Gravel with Sand

Sample No. : SS-5

Sample Loc. : Boring No. B-2

Sample Depth : 13.5' to 15.0'

Date Tested : 10/20/25

Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	76.5
1/4		6.3	mm	
No.4		4.75	mm	62.8
No.6		3.35	mm	
No.10		2	mm	49.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	40.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	35.7
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 2.04 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 19.7

Liquid Limit (AASHTO T89) : 31

Plastic Limit (AASHTO T90) : 27

Plasticity Index : 4

Liquidity Index : -1.73

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-4 (0)

ASTM Classification: D2487 : GM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 50.3

Coarse Sand (-No.10 + No.40) : 8.8

Fine Sand (-No.40 + No.200) : 5.2

Silt + Clay (-No.200) : 35.7

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 37.2

Coarse Sand (-No.4 + No.10) : 13.1

Medium Sand (-No.10 + No.40) : 8.8

Fine Sand (-No.40 + No.200) : 5.2

Silt + Clay (-No.200) : 35.7

Approved By :

Ken E. Walker

Soil No. 11



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
 Project No. : 10429166
 Project County : Marion
 Project State : Tennessee
 Laboratory No. : 10429166
 Submitted By : HDR
 Soil Type : Brown Clayey Sand with Gravel

Sample No. : BULK-1
 Sample Loc. : Boring No. B-3
 Sample Depth : 4.0' to 7.0'
 Date Tested : 10/07/25
 Date Reported : 10/17/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	91.6
1/4		6.3	mm	
No.4		4.75	mm	78.8
No.6		3.35	mm	
No.10		2	mm	62.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	56.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.7
No.270		0.053	mm	
Hyd. Rd. # 1		0.0281	mm	45.2
Hyd. Rd. # 2		0.0182	mm	42.1
Hyd. Rd. # 3		0.0108	mm	39.0
Hyd. Rd. # 4		0.0077	mm	36.5
Hyd. Rd. # 5		0.0056	mm	32.7
Hyd. Rd. # 6		0.0028	mm	30.3
Hyd. Rd. # 7		0.0012	mm	25.3

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.081 mm

CBR (AASHTO: T-193) : 2.1
 Dry Dens. (AASHTO: T-99; Method (C)) : 108.66
 Opt. Moist. (AASHTO: T-99; Method (C)) : 14.6

Natural Moisture (%) (AASHTO T265) : 21.5

Liquid Limit (AASHTO T89) : 43

Plastic Limit (AASHTO T90) : 24

Plasticity Index : 19

Liquidity Index : -0.15

Activity : 0.67

Sp. Gr. (AASHTO T100) : 2.723

AASHTO Classification: M145 : A-7-6 (6)

ASTM Classification: D2487 : SC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 37.5
 Coarse Sand (-No.10 + No.40) : 6.2
 Fine Sand (-No.40 + No.200) : 6.6
 Silt (-No.200 + 0.002mm) : 21.4
 Clay (-0.002mm + 0.001mm) : 4.8
 Colloids (-0.001mm) : 23.5

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
 Fine Gravel (-3/4in. + No.4) : 21.2
 Coarse Sand (-No.4 + No.10) : 16.3
 Medium Sand (-No.10 + No.40) : 6.2
 Fine Sand (-No.40 + No.200) : 6.6
 Silt (-No.200 + 0.005mm) : 17.4
 Clay (-0.005mm + 0.001mm) : 8.8
 Colloids (-0.001mm) : 23.5

Approved By : Ken E. Walker

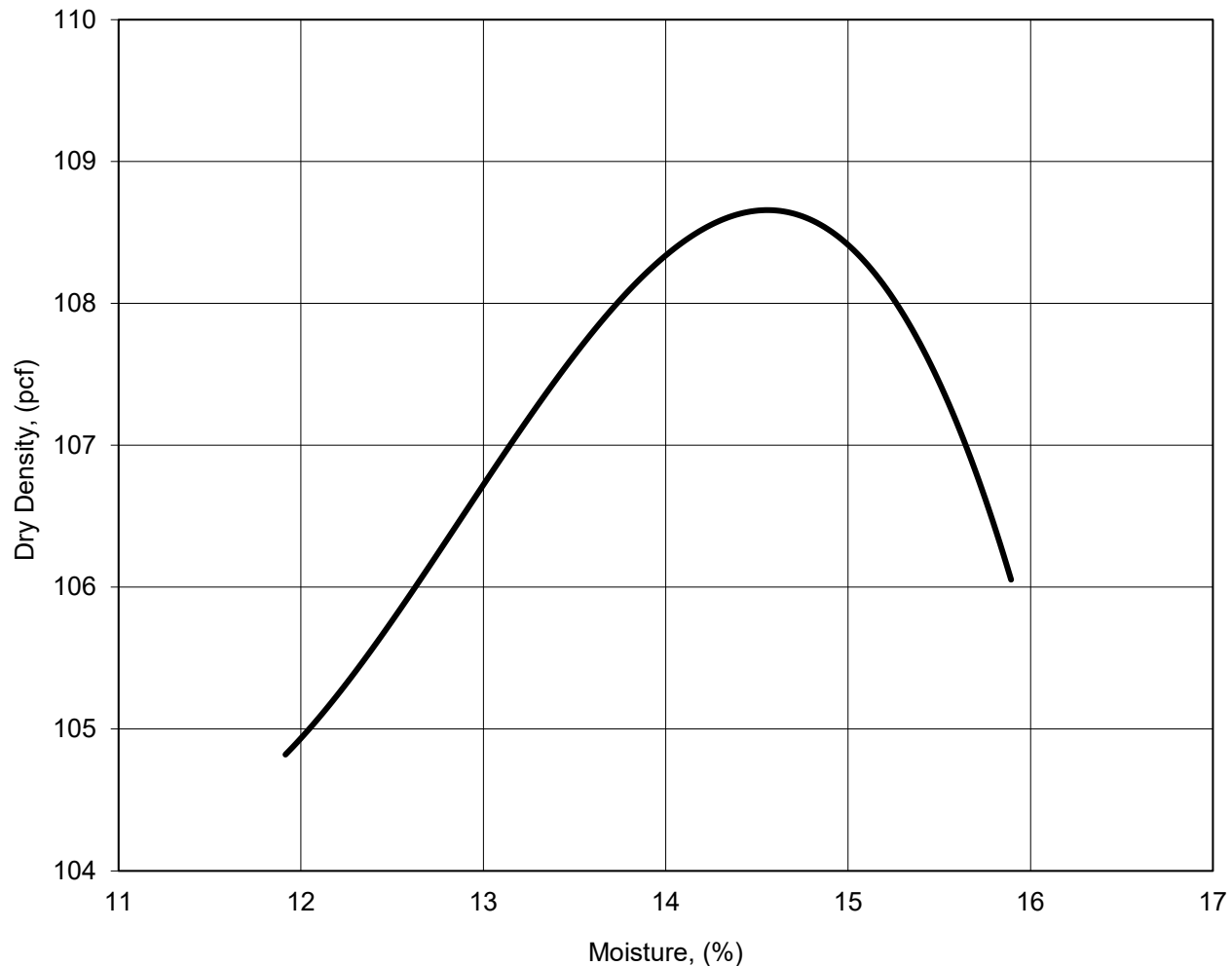
Soil No. 12



MOISTURE-DENSITY RELATIONSHIP

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Clayey Sand with Gravel

Sample No. : BULK-1
Sample Loc. : Boring No. B-3
Sample Depth : 4.0' to 7.0'
Date Tested : 10/07/25
Date Reported : 10/17/25



MAXIMUM DENSITY: 108.7 pcf

OPTIMUM MOISTURE: 14.6 %

COMMENTS: AASHTO: T-99; Method (C)

APPROVED BY:

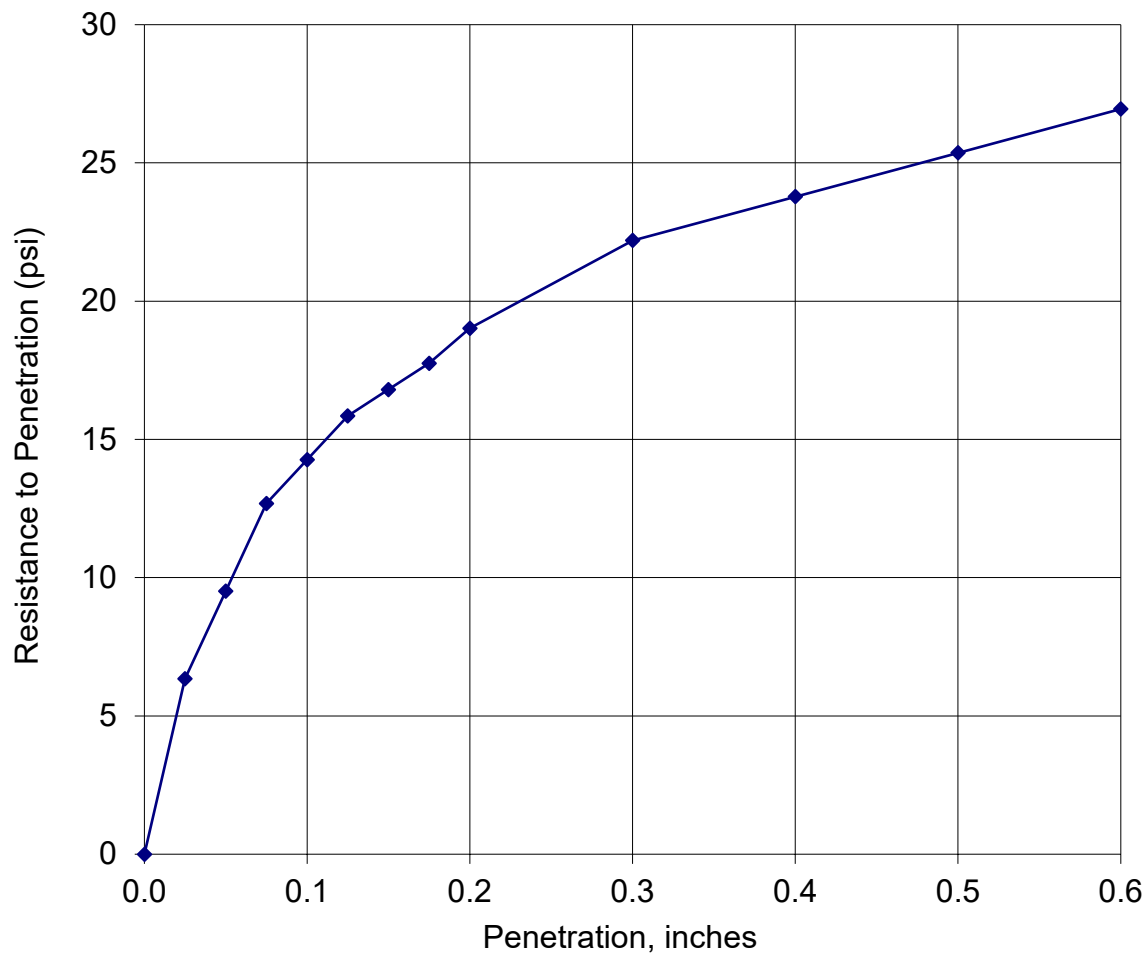
KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Clayey Sand with Gravel

Sample No. : BULK-1
Sample Loc. : Boring No. B-3
Sample Depth : 4.0' to 7.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 10 Blows per layer
Percent Compacted = 86.7
Percent Swell = 1.27

C.B.R. @ 0.1 In. = 1.4*
C.B.R. @ 0.2 In. = 1.3

COMMENTS: AASHTO: T-193

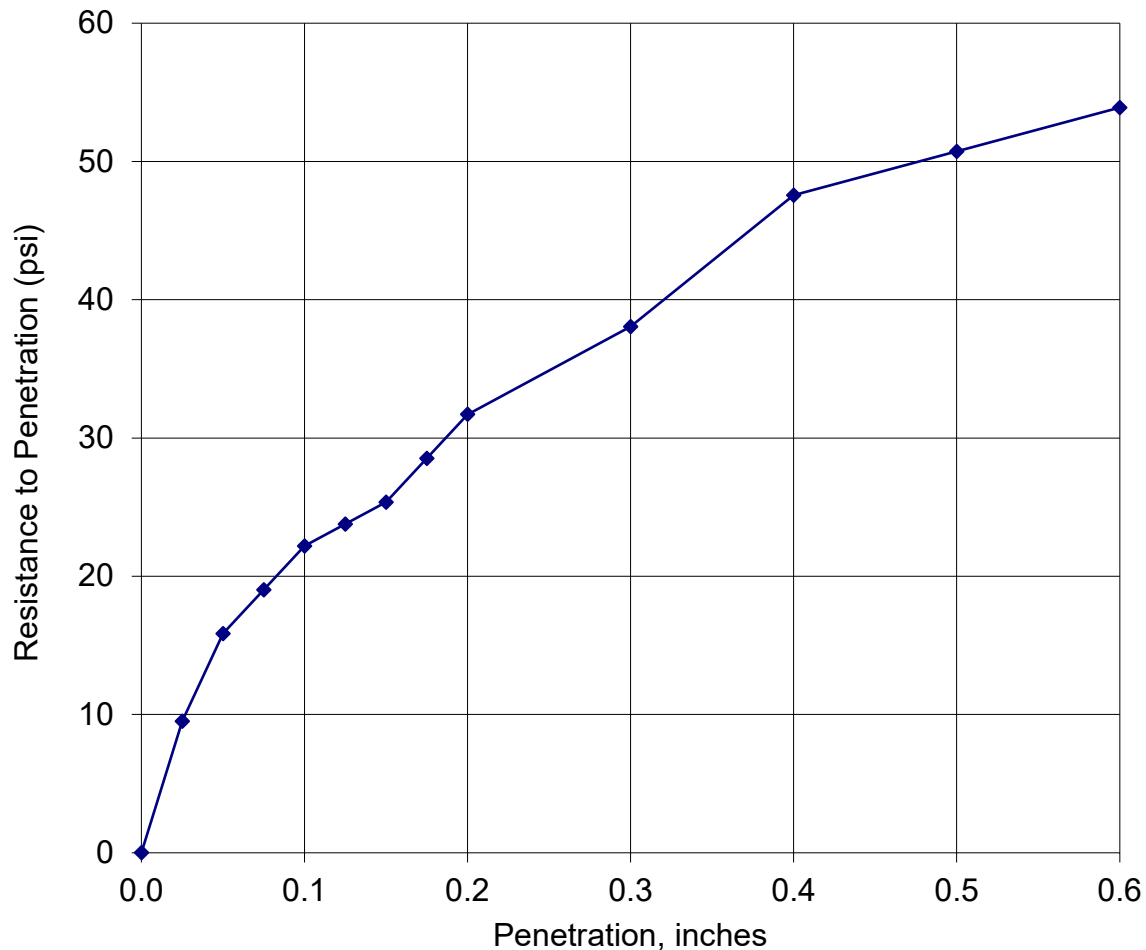
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Clayey Sand with Gravel

Sample No. : BULK-1
Sample Loc. : Boring No. B-3
Sample Depth : 4.0' to 7.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 25 Blows per layer
Percent Compacted = 95.9
Percent Swell = 1.05

C.B.R. @ 0.1 In. = 2.2*
C.B.R. @ 0.2 In. = 2.1

COMMENTS: AASHTO: T-193

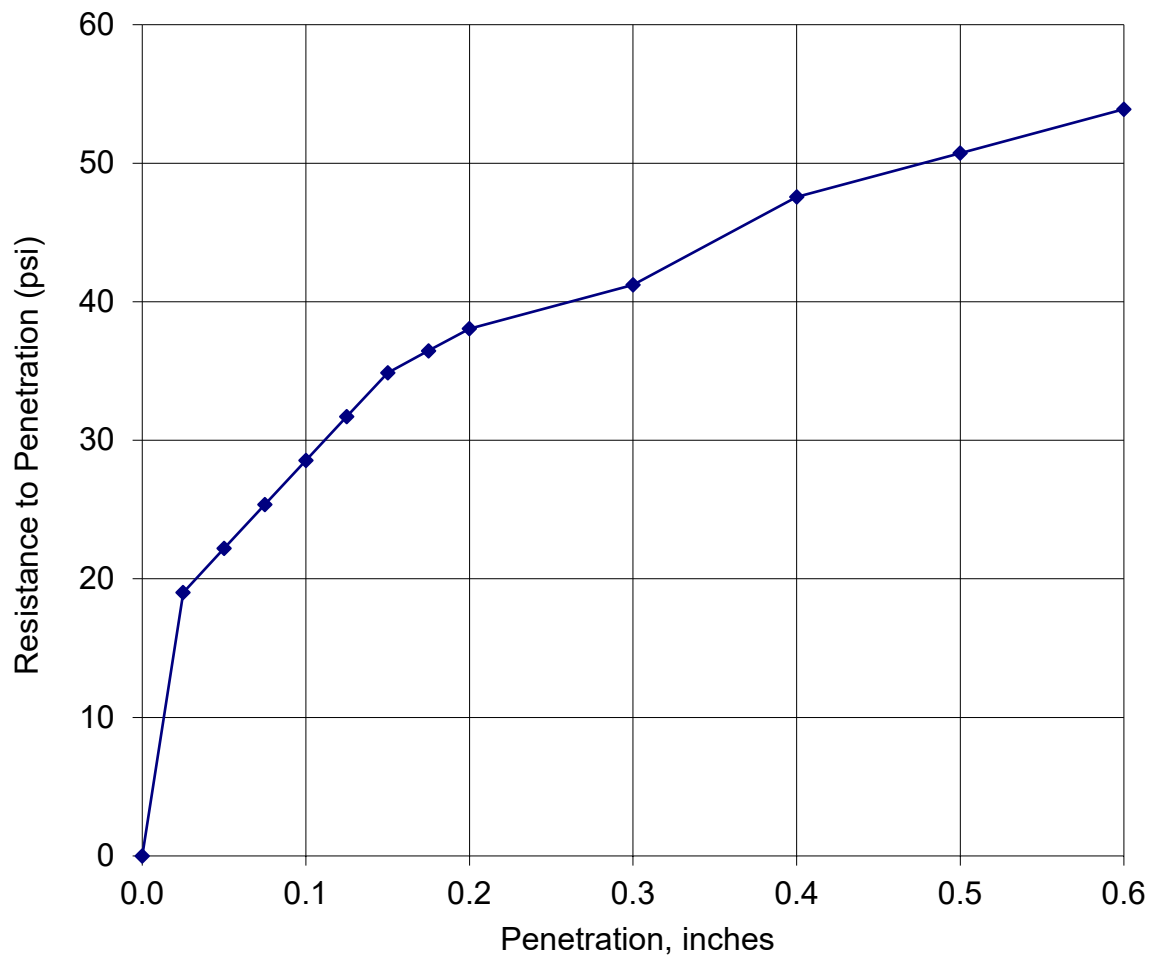
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Clayey Sand with Gravel

Sample No. : BULK-1
Sample Loc. : Boring No. B-3
Sample Depth : 4.0' to 7.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 56 Blows per layer
Percent Compacted = 98.2
Percent Swell = 0.83

C.B.R. @ 0.1 In. = 2.9*
C.B.R. @ 0.2 In. = 2.5

COMMENTS: AASHTO: T-193

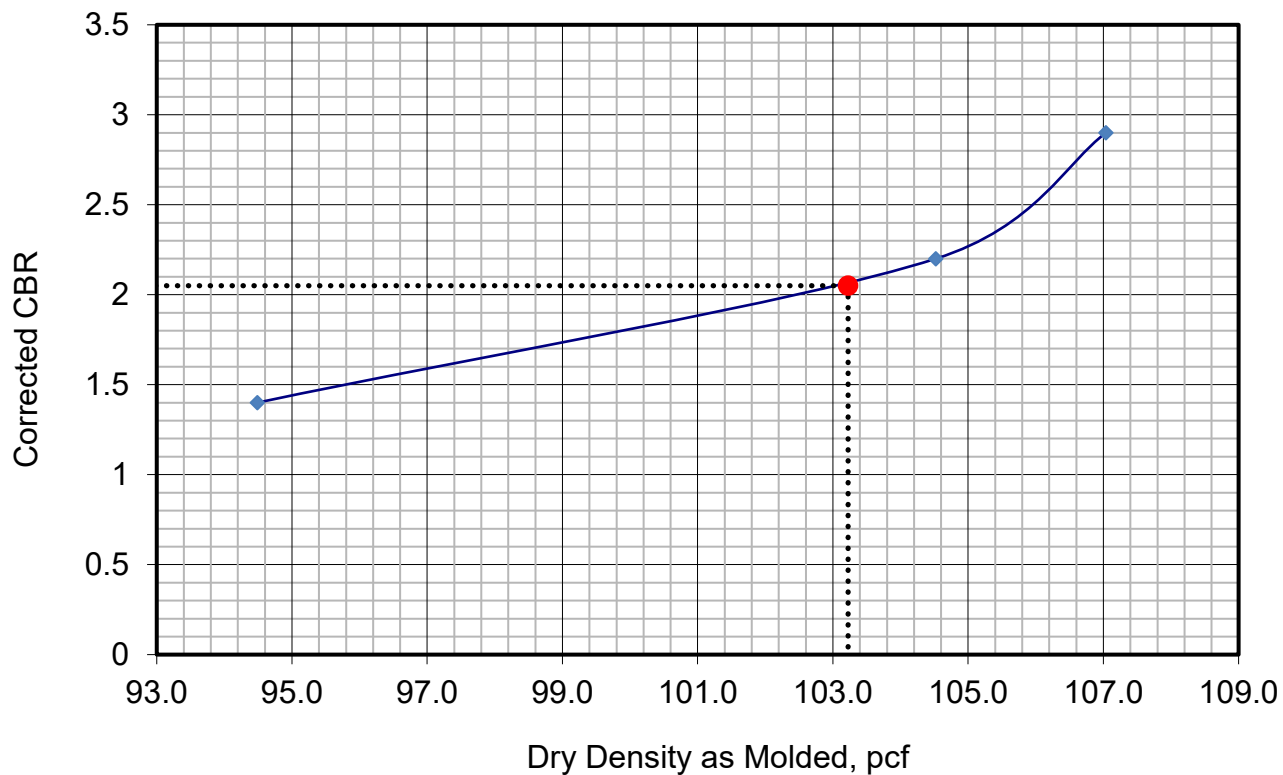
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
 Project No. : 10429166
 Project County : Marion
 Project State : Tennessee
 Laboratory No. : 10429166
 Submitted By : HDR
 Soil Type : Brown Clayey Sand with Gravel

Sample No. : BULK-1
 Sample Loc. : Boring No. B-3
 Sample Depth : 4.0' to 7.0'
 Date Tested : 10/7/25
 Date Reported : 10/17/25



			CBR Results			
Max Wet Density (pcf)	Max Dry Density (pcf)	Opt. Moisture Content (%)	10 Blows per Layer	25 Blows per Layer	56 Blows per Layer	
124.5	108.7	14.6	1.4	2.2	2.9	CBR Values
			94.5	104.5	107.0	Compacted Dry Density (pcf)
			86.7%	95.9%	98.2%	Percent Compacted of Maximum Dry Density

CBR Value @ 95% of the Maximum Dry Density (103.2 pcf) = 2.1

COMMENTS: AASHTO: T-193

APPROVED BY: KW



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Red & Brown Silty Sand

Sample No. : SS-1
Sample Loc. : Boring No. B-3
Sample Depth : 1.0' to 2.5'
Date Tested : 10/25/25
Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.5
No.6		3.35	mm	
No.10		2	mm	96.2

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	69.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	32.9
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.171 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 25.8

Liquid Limit (AASHTO T89) : 48

Plastic Limit (AASHTO T90) : 29

Plasticity Index : 19

Liquidity Index : -0.15

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-7 (2)

ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 3.8

Coarse Sand (-No.10 + No.40) : 27.2

Fine Sand (-No.40 + No.200) : 36.1

Silt + Clay (-No.200) : 32.9

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.5

Coarse Sand (-No.4 + No.10) : 3.3

Medium Sand (-No.10 + No.40) : 27.2

Fine Sand (-No.40 + No.200) : 36.1

Silt + Clay (-No.200) : 32.9

Approved By : Ken E. Walker

Soil No. 13



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown & Tan Silty Gravel with Sand

Sample No. : SS-2
Sample Loc. : Boring No. B-3
Sample Depth : 3.5' to 5.0'
Date Tested : 10/25/25
Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	67.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	55.6
1/4		6.3	mm	
No.4		4.75	mm	36.5
No.6		3.35	mm	
No.10		2	mm	24.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	18.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.5
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 7.753 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 12.0

Liquid Limit (AASHTO T89) : 28

Plastic Limit (AASHTO T90) : 23

Plasticity Index : 5

Liquidity Index : -2.30

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-1-b (0)

ASTM Classification: D2487 : GM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 75.1

Coarse Sand (-No.10 + No.40) : 6.1

Fine Sand (-No.40 + No.200) : 3.3

Silt + Clay (-No.200) : 15.5

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 32.9

Fine Gravel (-3/4in. + No.4) : 30.6

Coarse Sand (-No.4 + No.10) : 11.6

Medium Sand (-No.10 + No.40) : 6.1

Fine Sand (-No.40 + No.200) : 3.3

Silt + Clay (-No.200) : 15.5

Approved By : Ken E. Walker

Soil No. 14



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Tan Silty Gravel with Sand

Sample No. : SS-3
Sample Loc. : Boring No. B-3
Sample Depth : 6.0' to 7.5'
Date Tested : 10/25/25
Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	92.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	75.0
1/4		6.3	mm	
No.4		4.75	mm	55.1
No.6		3.35	mm	
No.10		2	mm	38.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	29.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	24.8
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 3.641 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 13.9

Liquid Limit (AASHTO T89) : 60

Plastic Limit (AASHTO T90) : 37

Plasticity Index : 23

Liquidity Index : -0.99

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-7 (3)

ASTM Classification: D2487 : GM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 61.5

Coarse Sand (-No.10 + No.40) : 9.2

Fine Sand (-No.40 + No.200) : 4.5

Silt + Clay (-No.200) : 24.8

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 7.9

Fine Gravel (-3/4in. + No.4) : 37.0

Coarse Sand (-No.4 + No.10) : 16.6

Medium Sand (-No.10 + No.40) : 9.2

Fine Sand (-No.40 + No.200) : 4.5

Silt + Clay (-No.200) : 24.8

Approved By :

Soil No. 15



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Tan Silty, Clayey Gravel with Sand

Sample No. : SS-5
Sample Loc. : Boring No. B-3
Sample Depth : 13.5' to 15.0'
Date Tested : 10/25/25
Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	86.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	61.9
1/4		6.3	mm	
No.4		4.75	mm	45.9
No.6		3.35	mm	
No.10		2	mm	33.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	24.3
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	20.1
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 5.673 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 13.8

Liquid Limit (AASHTO T89) : 26

Plastic Limit (AASHTO T90) : 19

Plasticity Index : 7

Liquidity Index : -0.74

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-4 (0)

ASTM Classification: D2487 : GC-GM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 66.5

Coarse Sand (-No.10 + No.40) : 9.2

Fine Sand (-No.40 + No.200) : 4.2

Silt + Clay (-No.200) : 20.1

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 14.0

Fine Gravel (-3/4in. + No.4) : 40.1

Coarse Sand (-No.4 + No.10) : 12.4

Medium Sand (-No.10 + No.40) : 9.2

Fine Sand (-No.40 + No.200) : 4.2

Silt + Clay (-No.200) : 20.1

Approved By : Ken E. Walker

Soil No. 16



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Dark Brown & Gray Sandy Lean Clay

Sample No. : SS-7

Sample Loc. : Boring No. B-3

Sample Depth : 23.5' to 25.0'

Date Tested : 10/25/25

Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	95.2
No.6		3.35	mm	
No.10		2	mm	88.6

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	76.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	63.7
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.018 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 19.9

Liquid Limit (AASHTO T89) : 42

Plastic Limit (AASHTO T90) : 23

Plasticity Index : 19

Liquidity Index : -0.16

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-6 (10)

ASTM Classification: D2487 : CL

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 11.4

Coarse Sand (-No.10 + No.40) : 12.1

Fine Sand (-No.40 + No.200) : 12.8

Silt + Clay (-No.200) : 63.7

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 4.8

Coarse Sand (-No.4 + No.10) : 6.6

Medium Sand (-No.10 + No.40) : 12.1

Fine Sand (-No.40 + No.200) : 12.8

Silt + Clay (-No.200) : 63.7

Approved By : Ken E. Walker

Soil No. 17



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-4
Sample Depth : 4.0' to 7.0'
Date Tested : 10/07/25
Date Reported : 10/17/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.1
No.6		3.35	mm	
No.10		2	mm	92.7

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	89.6
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	81.8
No.270		0.053	mm	
Hyd. Rd. # 1		0.0277	mm	69.3
Hyd. Rd. # 2		0.0177	mm	67.5
Hyd. Rd. # 3		0.0105	mm	61.1
Hyd. Rd. # 4		0.0075	mm	59.2
Hyd. Rd. # 5		0.0054	mm	53.7
Hyd. Rd. # 6		0.0027	mm	48.2
Hyd. Rd. # 7		0.0012	mm	42.7

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.003 mm

CBR (AASHTO: T-193) : 1.7
Dry Dens. (AASHTO: T-99; Method (C)) : 106.69
Opt. Moist. (AASHTO: T-99; Method (C)) : 17.0

Natural Moisture (%) (AASHTO T265) : 25.6

Liquid Limit (AASHTO T89) : 48
Plastic Limit (AASHTO T90) : 26
Plasticity Index : 22

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 7.3
Coarse Sand (-No.10 + No.40) : 3.1
Fine Sand (-No.40 + No.200) : 7.8
Silt (-No.200 + 0.002mm) : 35.6
Clay (-0.002mm + 0.001mm) : 6.0
Colloids (-0.001mm) : 40.1

Liquidity Index : 0.00

Activity : 0.48

Sp. Gr. (AASHTO T100) : 2.761

AASHTO Classification: M145 : A-7-6 (19)

ASTM Classification: D2487 : CL

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 0.9
Coarse Sand (-No.4 + No.10) : 6.4
Medium Sand (-No.10 + No.40) : 3.1
Fine Sand (-No.40 + No.200) : 7.8
Silt (-No.200 + 0.005mm) : 28.8
Clay (-0.005mm + 0.001mm) : 12.9
Colloids (-0.001mm) : 40.1

Approved By : Ken E. Walker

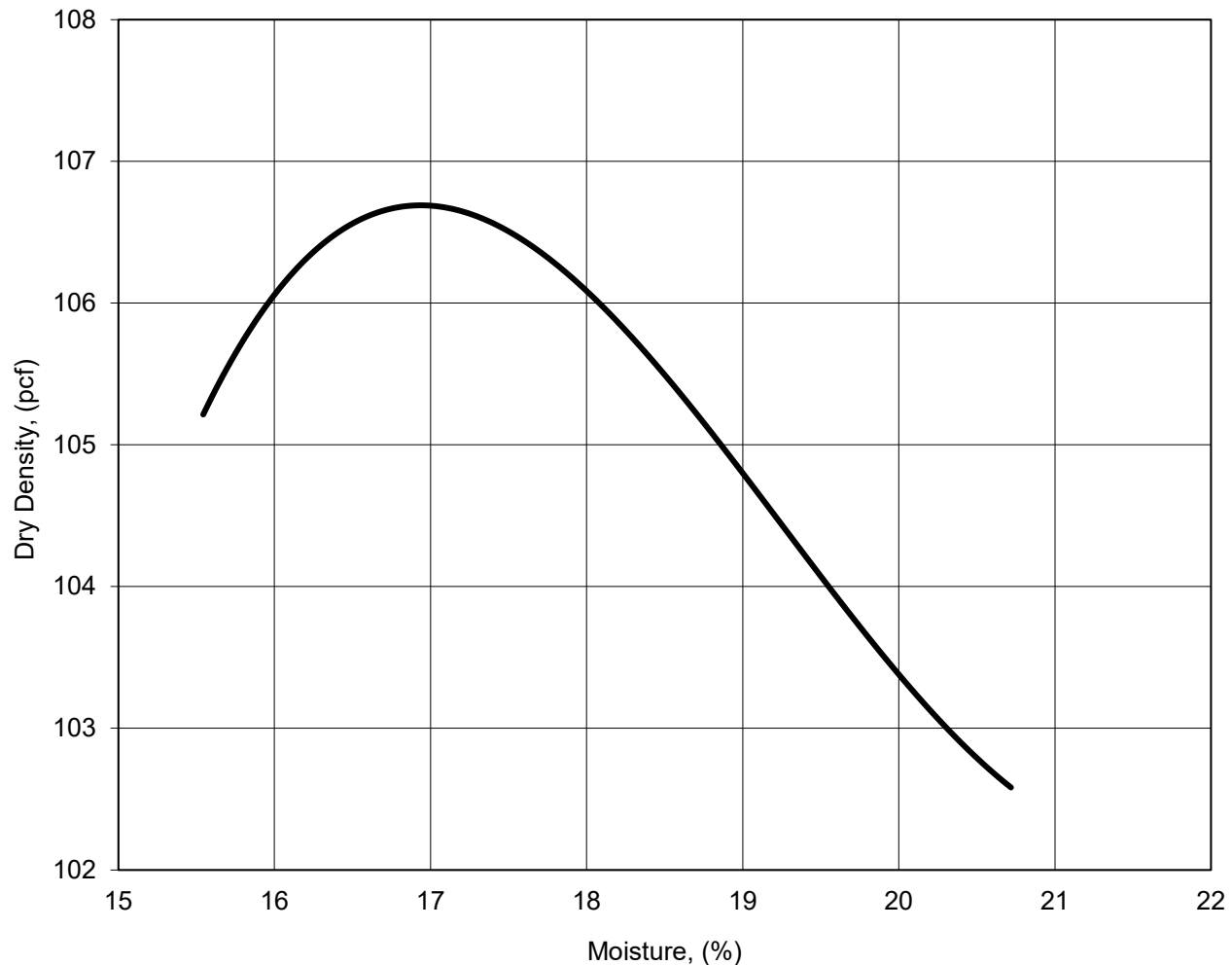
Soil No. 18



MOISTURE-DENSITY RELATIONSHIP

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-4
Sample Depth : 4.0' to 7.0'
Date Tested : 10/07/25
Date Reported : 10/17/25



MAXIMUM DENSITY: 106.7 pcf

OPTIMUM MOISTURE: 17 %

COMMENTS: AASHTO: T-99; Method (C)

APPROVED BY:

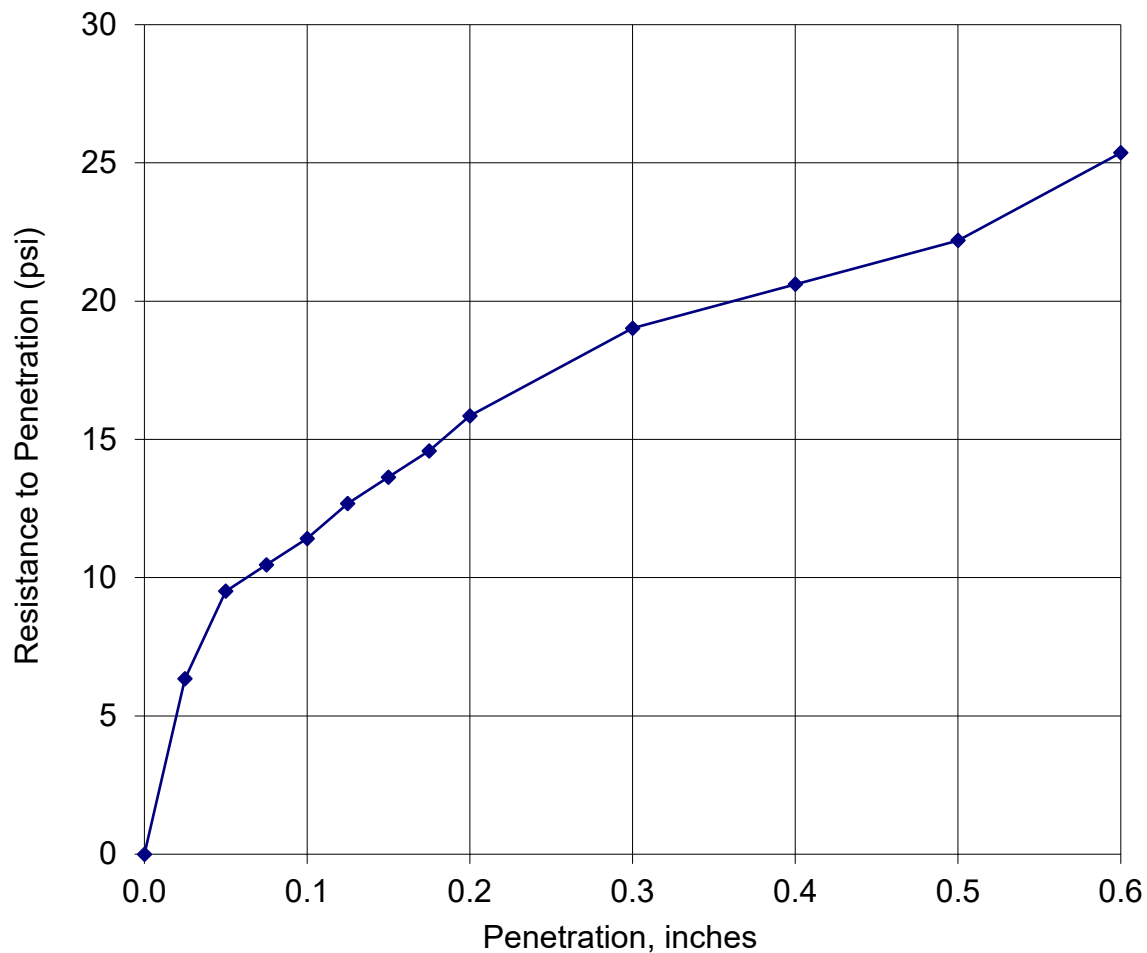
KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-4
Sample Depth : 4.0' to 7.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 10 Blows per layer
Percent Compacted = 87.9
Percent Swell = 2.35

C.B.R. @ 0.1 In. = 1.1*
C.B.R. @ 0.2 In. = 1.1

COMMENTS: AASHTO: T-193

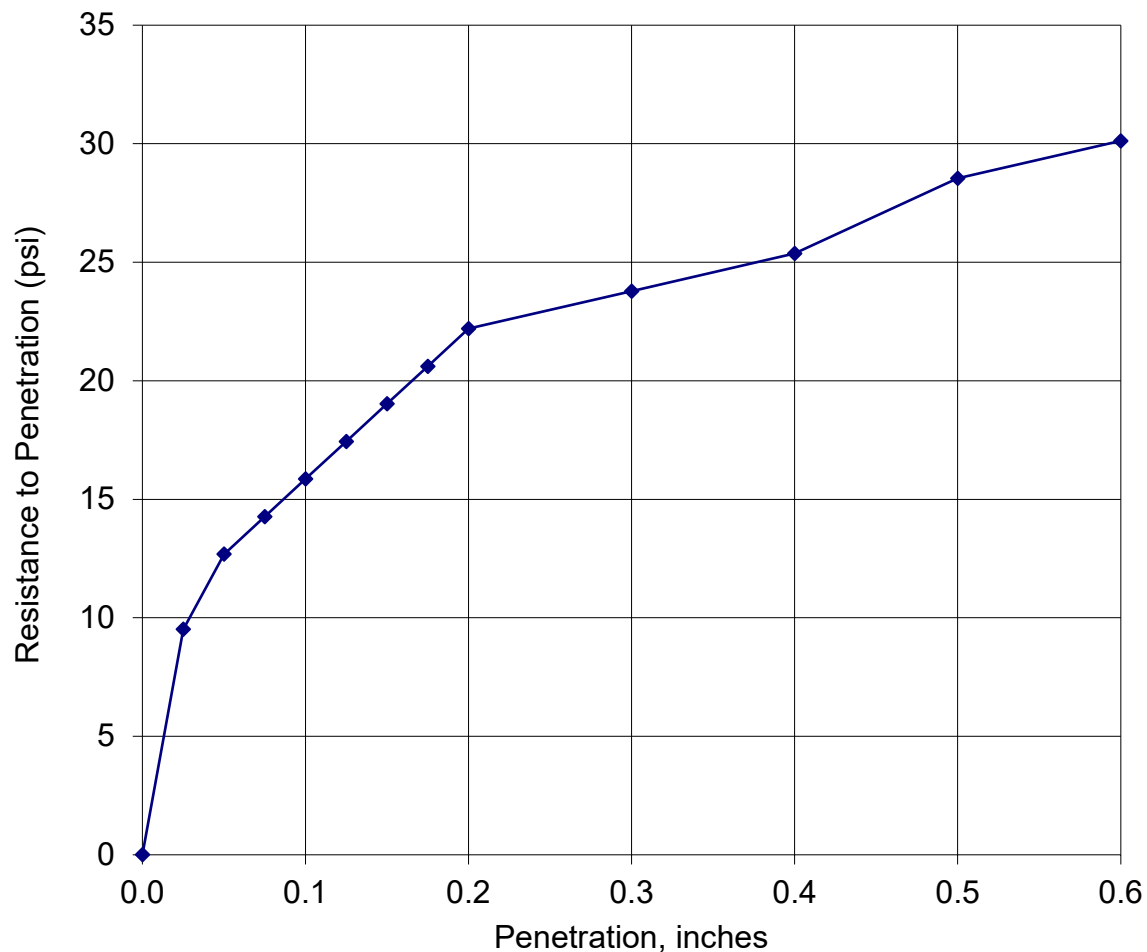
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-4
Sample Depth : 4.0' to 7.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 25 Blows per layer
Percent Compacted = 93.2
Percent Swell = 1.71

C.B.R. @ 0.1 In. = 1.6*
C.B.R. @ 0.2 In. = 1.5

COMMENTS: AASHTO: T-193

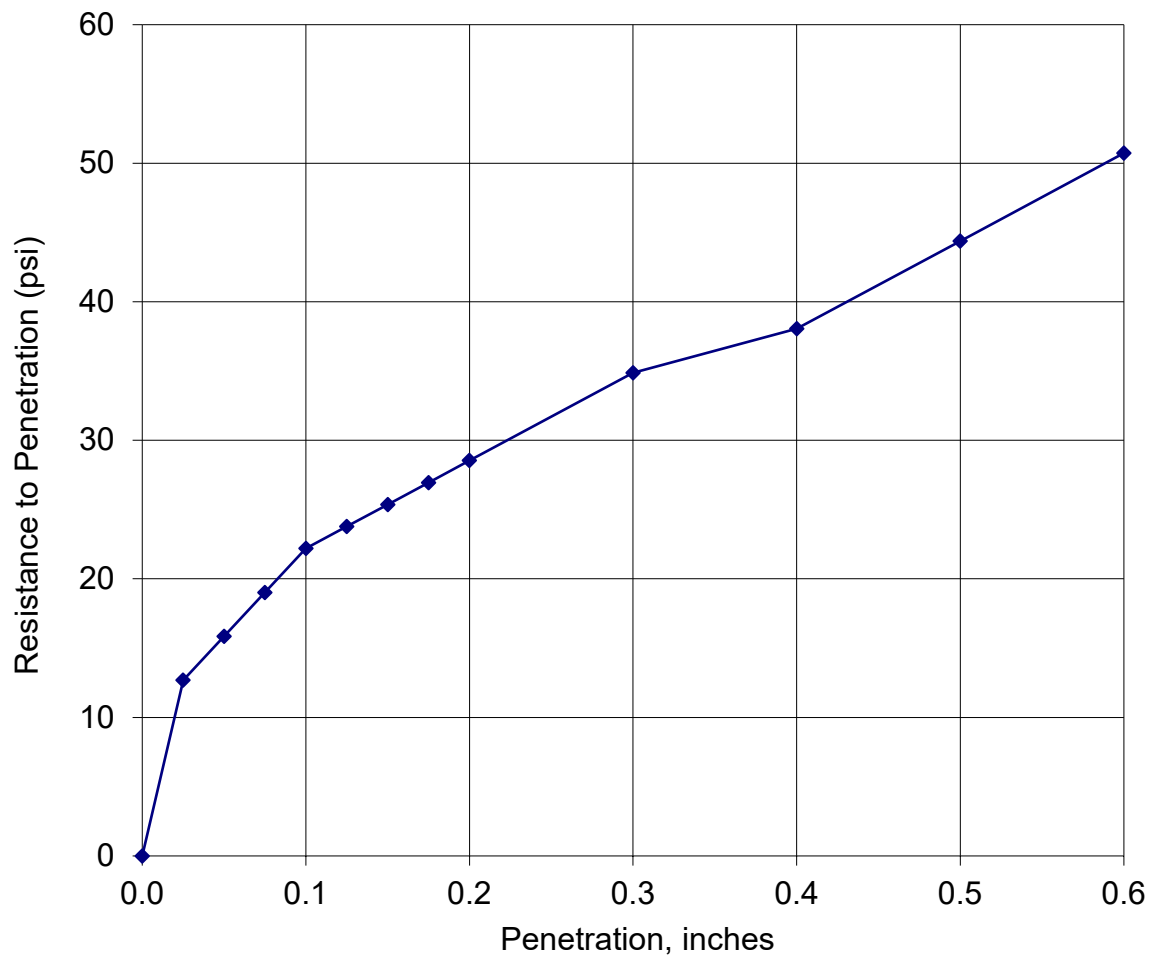
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-4
Sample Depth : 4.0' to 7.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



Compaction Effort = 56 Blows per layer
Percent Compacted = 97.9
Percent Swell = 1.27

C.B.R. @ 0.1 In. = 2.2*
C.B.R. @ 0.2 In. = 1.9

COMMENTS: AASHTO: T-193

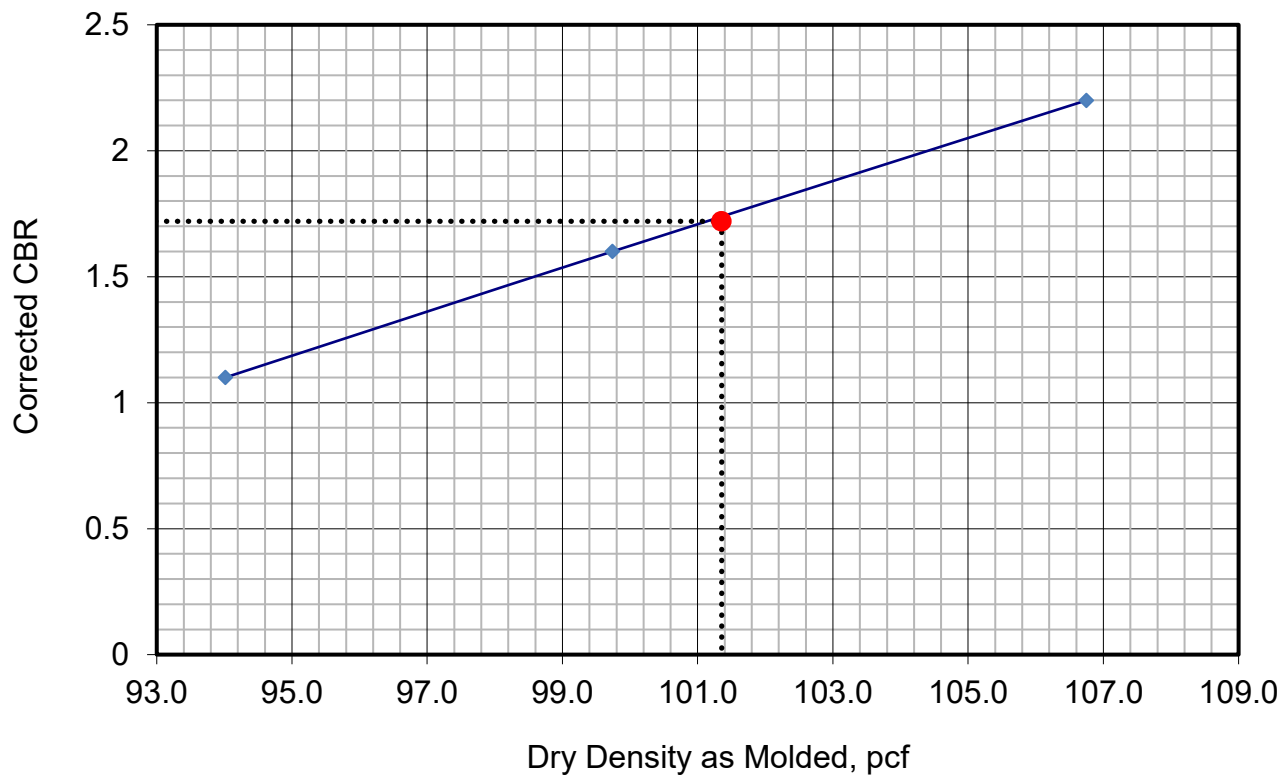
APPROVED BY: KW



CALIFORNIA BEARING RATIO

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Lean Clay with Sand

Sample No. : BULK-1
Sample Loc. : Boring No. B-4
Sample Depth : 4.0' to 7.0'
Date Tested : 10/7/25
Date Reported : 10/17/25



CBR Results					
Max Wet Density (pcf)	Max Dry Density (pcf)	Opt. Moisture Content (%)	10 Blows per Layer	25 Blows per Layer	56 Blows per Layer
124.8	106.7	17.0	1.1	1.6	2.2
CBR Values					
			94.0	99.7	106.8
			Compacted Dry Density (pcf)		
			87.9%	93.2%	97.9%
			Percent Compacted of Maximum Dry Density		

CBR Value @ 95% of the Maximum Dry Density (101.4 pcf) = 1.7

COMMENTS: AASHTO: T-193

APPROVED BY: _____

KW



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Red Silty Sand

Sample No. : SS-1
Sample Loc. : Boring No. B-4
Sample Depth : 1.0' to 2.5'
Date Tested : 10/21/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	98.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	77.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.2
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.079 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 25.1

Liquid Limit (AASHTO T89) : 46

Plastic Limit (AASHTO T90) : 29

Plasticity Index : 17

Liquidity Index : -0.20

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-6 (6)

ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 1.5

Coarse Sand (-No.10 + No.40) : 21.1

Fine Sand (-No.40 + No.200) : 28.2

Silt + Clay (-No.200) : 49.2

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 1.5

Medium Sand (-No.10 + No.40) : 21.1

Fine Sand (-No.40 + No.200) : 28.2

Silt + Clay (-No.200) : 49.2

Approved By :

Ken E. Walker

Soil No. 19



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Red & Tan Silty, Clayey Gravel with Sand

Sample No. : SS-3

Sample Loc. : Boring No. B-4

Sample Depth : 6.0' to 7.5'

Date Tested : 10/25/25

Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	83.9
1/4		6.3	mm	
No.4		4.75	mm	64.0
No.6		3.35	mm	
No.10		2	mm	45.6

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	34.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	28.6
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 2.46 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 13.9

Liquid Limit (AASHTO T89) : 25

Plastic Limit (AASHTO T90) : 20

Plasticity Index : 5

Liquidity Index : -1.28

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-4 (0)

ASTM Classification: D2487 : GC-GM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 54.4

Coarse Sand (-No.10 + No.40) : 11.4

Fine Sand (-No.40 + No.200) : 5.6

Silt + Clay (-No.200) : 28.6

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 36.0

Coarse Sand (-No.4 + No.10) : 18.4

Medium Sand (-No.10 + No.40) : 11.4

Fine Sand (-No.40 + No.200) : 5.6

Silt + Clay (-No.200) : 28.6

Approved By : Ken E. Walker

Soil No. 20



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Red & Brown Clayey Gravel with Sand

Sample No. : SS-5

Sample Loc. : Boring No. B-4

Sample Depth : 13.5' to 15.0'

Date Tested : 10/21/25

Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	79.5
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	64.8
1/4		6.3	mm	
No.4		4.75	mm	55.6
No.6		3.35	mm	
No.10		2	mm	44.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	35.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	30.8
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 3.07 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 16.4

Liquid Limit (AASHTO T89) : 28

Plastic Limit (AASHTO T90) : 20

Plasticity Index : 8

Liquidity Index : -0.49

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-4 (0)

ASTM Classification: D2487 : GC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 55.5

Coarse Sand (-No.10 + No.40) : 8.6

Fine Sand (-No.40 + No.200) : 5.1

Silt + Clay (-No.200) : 30.8

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 20.5

Fine Gravel (-3/4in. + No.4) : 23.9

Coarse Sand (-No.4 + No.10) : 11.1

Medium Sand (-No.10 + No.40) : 8.6

Fine Sand (-No.40 + No.200) : 5.1

Silt + Clay (-No.200) : 30.8

Approved By : Ken E. Walker

Soil No. 21



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Tan & Black Gravelly Fat Clay with Sand

Sample No. : SS-7

Sample Loc. : Boring No. B-4

Sample Depth : 23.5' to 25.0'

Date Tested : 10/25/25

Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	85.5
1/4		6.3	mm	
No.4		4.75	mm	77.4
No.6		3.35	mm	
No.10		2	mm	74.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	68.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	59.0
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.027 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 25.2

Liquid Limit (AASHTO T89) : 51

Plastic Limit (AASHTO T90) : 27

Plasticity Index : 24

Liquidity Index : -0.10

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-6 (12)

ASTM Classification: D2487 : CH

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 26.0

Coarse Sand (-No.10 + No.40) : 5.2

Fine Sand (-No.40 + No.200) : 9.8

Silt + Clay (-No.200) : 59.0

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 22.6

Coarse Sand (-No.4 + No.10) : 3.4

Medium Sand (-No.10 + No.40) : 5.2

Fine Sand (-No.40 + No.200) : 9.8

Silt + Clay (-No.200) : 59.0

Approved By : Ken E. Walker

Soil No. 22



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Gray Silty Sand with Gravel

Sample No. : SS-1
Sample Loc. : Boring No. BR-1
Sample Depth : 1.0' to 2.5'
Date Tested : 10/20/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	82.8
1/4		6.3	mm	
No.4		4.75	mm	56.6
No.6		3.35	mm	
No.10		2	mm	35.2

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	20.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	12.7
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 3.638 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 4.3

Liquid Limit (AASHTO T89) : 15

Plastic Limit (AASHTO T90) : 15

Plasticity Index : NP

Liquidity Index : NA

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-1-a (0)

ASTM Classification: D2487 : SM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 64.8

Coarse Sand (-No.10 + No.40) : 15.1

Fine Sand (-No.40 + No.200) : 7.4

Silt + Clay (-No.200) : 12.7

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 43.4

Coarse Sand (-No.4 + No.10) : 21.4

Medium Sand (-No.10 + No.40) : 15.1

Fine Sand (-No.40 + No.200) : 7.4

Silt + Clay (-No.200) : 12.7

Approved By : Ken E. Walker

Soil No. 23



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
 Project No. : 10429166
 Project County : Marion
 Project State : Tennessee
 Laboratory No. : 10429166
 Submitted By : HDR
 Soil Type : Orange & Light Brown Clayey Gravel with Sand

Sample No. : SS-4
 Sample Loc. : Boring No. BR-1
 Sample Depth : 8.5' to 10.0'
 Date Tested : 10/20/25
 Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	84.7
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	72.6
1/4		6.3	mm	
No.4		4.75	mm	62.9
No.6		3.35	mm	
No.10		2	mm	55.4

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	48.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	39.4
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.626 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 19.6
 Liquid Limit (AASHTO T89) : 35
 Plastic Limit (AASHTO T90) : 21
 Plasticity Index : 14
 Liquidity Index : -0.09
 Activity : NA
 Sp. Gr. (AASHTO T100) : NA
 AASHTO Classification: M145 : A-6 (2)
 ASTM Classification: D2487 : GC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 44.6
 Coarse Sand (-No.10 + No.40) : 7.2
 Fine Sand (-No.40 + No.200) : 8.8
 Silt + Clay (-No.200) : 39.4

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 15.3
 Fine Gravel (-3/4in. + No.4) : 21.8
 Coarse Sand (-No.4 + No.10) : 7.5
 Medium Sand (-No.10 + No.40) : 7.2
 Fine Sand (-No.40 + No.200) : 8.8
 Silt + Clay (-No.200) : 39.4

Approved By : Ken E. Walker

Soil No. 25



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown & Light Brown Clayey Sand with Gravel

Sample No. : SS-5
Sample Loc. : Boring No. BR-1
Sample Depth : 13.5' to 15.0'
Date Tested : 10/20/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	87.8
1/4		6.3	mm	
No.4		4.75	mm	73.9
No.6		3.35	mm	
No.10		2	mm	64.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	52.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	44.0
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.248 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 22.9

Liquid Limit (AASHTO T89) : 43

Plastic Limit (AASHTO T90) : 25

Plasticity Index : 18

Liquidity Index : -0.14

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-6 (4)

ASTM Classification: D2487 : SC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 36.0

Coarse Sand (-No.10 + No.40) : 11.3

Fine Sand (-No.40 + No.200) : 8.7

Silt + Clay (-No.200) : 44.0

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 26.1

Coarse Sand (-No.4 + No.10) : 9.9

Medium Sand (-No.10 + No.40) : 11.3

Fine Sand (-No.40 + No.200) : 8.7

Silt + Clay (-No.200) : 44.0

Approved By : Ken E. Walker

Soil No. 26



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Light Brown Clayey Sand

Sample No. : SS-6
Sample Loc. : Boring No. BR-1
Sample Depth : 18.5' to 20.0'
Date Tested : 10/25/25
Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	98.2
No.6		3.35	mm	
No.10		2	mm	88.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	66.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	49.5
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.079 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 21.0
Liquid Limit (AASHTO T89) : 38
Plastic Limit (AASHTO T90) : 24
Plasticity Index : 14
Liquidity Index : -0.21
Activity : NA
Sp. Gr. (AASHTO T100) : NA
AASHTO Classification: M145 : A-6 (4)
ASTM Classification: D2487 : SC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 11.1
Coarse Sand (-No.10 + No.40) : 22.8
Fine Sand (-No.40 + No.200) : 16.6
Silt + Clay (-No.200) : 49.5

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 1.8
Coarse Sand (-No.4 + No.10) : 9.3
Medium Sand (-No.10 + No.40) : 22.8
Fine Sand (-No.40 + No.200) : 16.6
Silt + Clay (-No.200) : 49.5

Approved By : Ken E. Walker

Soil No. 27



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Light Brown Elastic Silt

Sample No. : SS-8
Sample Loc. : Boring No. BR-1
Sample Depth : 28.5' to 30.0'
Date Tested : 10/20/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	97.5
No.6		3.35	mm	
No.10		2	mm	94.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	91.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	89.0
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.004 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 29.8

Liquid Limit (AASHTO T89) : 63

Plastic Limit (AASHTO T90) : 39

Plasticity Index : 24

Liquidity Index : -0.40

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-5 (27)

ASTM Classification: D2487 : MH

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 6.0

Coarse Sand (-No.10 + No.40) : 2.8

Fine Sand (-No.40 + No.200) : 2.2

Silt + Clay (-No.200) : 89.0

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 2.5

Coarse Sand (-No.4 + No.10) : 3.5

Medium Sand (-No.10 + No.40) : 2.8

Fine Sand (-No.40 + No.200) : 2.2

Silt + Clay (-No.200) : 89.0

Approved By : Ken E. Walker

Soil No. 28



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown Gravelly Fat Clay with Sand

Sample No. : SS-2
Sample Loc. : Boring No. BR-2
Sample Depth : 3.5' to 5.0'
Date Tested : 10/21/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	80.1
1/4		6.3	mm	
No.4		4.75	mm	71.1
No.6		3.35	mm	
No.10		2	mm	62.8

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	55.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	52.5
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.055 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 16.9
Liquid Limit (AASHTO T89) : 59
Plastic Limit (AASHTO T90) : 28
Plasticity Index : 31
Liquidity Index : -0.37
Activity : NA
Sp. Gr. (AASHTO T100) : NA
AASHTO Classification: M145 : A-7-6 (13)
ASTM Classification: D2487 : CH

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 37.2
Coarse Sand (-No.10 + No.40) : 6.9
Fine Sand (-No.40 + No.200) : 3.4
Silt + Clay (-No.200) : 52.5

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 28.9
Coarse Sand (-No.4 + No.10) : 8.3
Medium Sand (-No.10 + No.40) : 6.9
Fine Sand (-No.40 + No.200) : 3.4
Silt + Clay (-No.200) : 52.5

Approved By : Ken E. Walker

Soil No. 30



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Brown Gravelly Elastic Silt with Sand

Sample No. : SS-3

Sample Loc. : Boring No. BR-2

Sample Depth : 6.0' to 7.5'

Date Tested : 10/21/25

Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	87.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	80.0
1/4		6.3	mm	
No.4		4.75	mm	76.4
No.6		3.35	mm	
No.10		2	mm	71.3

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	66.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	59.1
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.027 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 17.9

Liquid Limit (AASHTO T89) : 54

Plastic Limit (AASHTO T90) : 30

Plasticity Index : 24

Liquidity Index : -0.50

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-5 (13)

ASTM Classification: D2487 : MH

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 28.7

Coarse Sand (-No.10 + No.40) : 5.2

Fine Sand (-No.40 + No.200) : 7.0

Silt + Clay (-No.200) : 59.1

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 13.0

Fine Gravel (-3/4in. + No.4) : 10.6

Coarse Sand (-No.4 + No.10) : 5.1

Medium Sand (-No.10 + No.40) : 5.2

Fine Sand (-No.40 + No.200) : 7.0

Silt + Clay (-No.200) : 59.1

Approved By :

Ken E. Walker

Soil No. 31



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown & Tan Sandy Silt

Sample No. : SS-2
Sample Loc. : Boring No. BR-3
Sample Depth : 3.5' to 5.0'
Date Tested : 10/20/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	96.9
No.6		3.35	mm	
No.10		2	mm	85.6

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	71.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	62.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.02 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 20.3

Liquid Limit (AASHTO T89) : 42

Plastic Limit (AASHTO T90) : 27

Plasticity Index : 15

Liquidity Index : -0.44

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-6 (8)

ASTM Classification: D2487 : ML

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 14.4

Coarse Sand (-No.10 + No.40) : 14.5

Fine Sand (-No.40 + No.200) : 8.8

Silt + Clay (-No.200) : 62.3

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 3.1

Coarse Sand (-No.4 + No.10) : 11.3

Medium Sand (-No.10 + No.40) : 14.5

Fine Sand (-No.40 + No.200) : 8.8

Silt + Clay (-No.200) : 62.3

Approved By : Ken E. Walker

Soil No. 33



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown & Tan Sandy Elastic Silt

Sample No. : SS-4
Sample Loc. : Boring No. BR-3
Sample Depth : 8.5' to 10.0'
Date Tested : 10/25/25
Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	98.9
No.6		3.35	mm	
No.10		2	mm	88.2

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	64.9
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	51.4
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.063 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 24.5

Liquid Limit (AASHTO T89) : 52

Plastic Limit (AASHTO T90) : 29

Plasticity Index : 23

Liquidity Index : -0.18

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-6 (9)

ASTM Classification: D2487 : MH

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 11.8

Coarse Sand (-No.10 + No.40) : 23.3

Fine Sand (-No.40 + No.200) : 13.5

Silt + Clay (-No.200) : 51.4

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 1.1

Coarse Sand (-No.4 + No.10) : 10.7

Medium Sand (-No.10 + No.40) : 23.3

Fine Sand (-No.40 + No.200) : 13.5

Silt + Clay (-No.200) : 51.4

Approved By : Ken E. Walker

Soil No. 34



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Brown & Tan Elastic Silt with Sand

Sample No. : ST-1
Sample Loc. : Boring No. BR-3
Sample Depth : 10.0' to 11.0'
Date Tested : 10/20/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	98.8
1/4		6.3	mm	
No.4		4.75	mm	95.4
No.6		3.35	mm	
No.10		2	mm	89.8

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	83.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	81.0
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.006 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 23.3

Liquid Limit (AASHTO T89) : 57

Plastic Limit (AASHTO T90) : 33

Plasticity Index : 24

Liquidity Index : -0.40

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-5 (22)

ASTM Classification: D2487 : MH

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 10.2

Coarse Sand (-No.10 + No.40) : 6.4

Fine Sand (-No.40 + No.200) : 2.4

Silt + Clay (-No.200) : 81.0

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 4.6

Coarse Sand (-No.4 + No.10) : 5.6

Medium Sand (-No.10 + No.40) : 6.4

Fine Sand (-No.40 + No.200) : 2.4

Silt + Clay (-No.200) : 81.0

Approved By : Ken E. Walker

Soil No. 35



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Light Brown, Orange & Brown Sandy Lean Clay

Sample No. : SS-1
Sample Loc. : Boring No. BR-4
Sample Depth : 1.0' to 2.5'
Date Tested : 10/25/25
Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.6
No.6		3.35	mm	
No.10		2	mm	94.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	80.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	67.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.014 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 14.3

Liquid Limit (AASHTO T89) : 45

Plastic Limit (AASHTO T90) : 23

Plasticity Index : 22

Liquidity Index : -0.39

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-6 (13)

ASTM Classification: D2487 : CL

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 6.0
Coarse Sand (-No.10 + No.40) : 14.0
Fine Sand (-No.40 + No.200) : 12.7
Silt + Clay (-No.200) : 67.3

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 0.4
Coarse Sand (-No.4 + No.10) : 5.6
Medium Sand (-No.10 + No.40) : 14.0
Fine Sand (-No.40 + No.200) : 12.7
Silt + Clay (-No.200) : 67.3

Approved By : Ken E. Walker

Soil No. 36



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
 Project No. : 10429166
 Project County : Marion
 Project State : Tennessee
 Laboratory No. : 10429166
 Submitted By : HDR
 Soil Type : Light Brown, Orange & Brown Clayey Sand with Gravel

Sample No. : SS-2
 Sample Loc. : Boring No. BR-4
 Sample Depth : 3.5' to 5.0'
 Date Tested : 10/25/25
 Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	85.6
1/4		6.3	mm	
No.4		4.75	mm	80.1
No.6		3.35	mm	
No.10		2	mm	73.3

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	39.4
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	17.6
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.69 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 19.9

Liquid Limit (AASHTO T89) : 26

Plastic Limit (AASHTO T90) : 17

Plasticity Index : 9

Liquidity Index : 0.35

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-4 (0)

ASTM Classification: D2487 : SC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 26.7

Coarse Sand (-No.10 + No.40) : 33.9

Fine Sand (-No.40 + No.200) : 21.8

Silt + Clay (-No.200) : 17.6

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 19.9

Coarse Sand (-No.4 + No.10) : 6.8

Medium Sand (-No.10 + No.40) : 33.9

Fine Sand (-No.40 + No.200) : 21.8

Silt + Clay (-No.200) : 17.6

Approved By : Ken E. Walker

Soil No. 38



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Tan & Gray Silty Gravel with Sand

Sample No. : SS-4
Sample Loc. : Boring No. BR-4
Sample Depth : 8.5' to 10.0'
Date Tested : 10/25/25
Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	89.2
3/4	in.	19	mm	82.1
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	63.6
1/4		6.3	mm	
No.4		4.75	mm	52.3
No.6		3.35	mm	
No.10		2	mm	42.0

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	29.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	23.9
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 3.916 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 6.3

Liquid Limit (AASHTO T89) : NA

Plastic Limit (AASHTO T90) : NA

Plasticity Index : NA

Liquidity Index : NA

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-1-b (0) *

ASTM Classification: D2487 : GM *

* Visual Classification

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 58.0

Coarse Sand (-No.10 + No.40) : 12.2

Fine Sand (-No.40 + No.200) : 5.9

Silt + Clay (-No.200) : 23.9

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 17.9

Fine Gravel (-3/4in. + No.4) : 29.8

Coarse Sand (-No.4 + No.10) : 10.3

Medium Sand (-No.10 + No.40) : 12.2

Fine Sand (-No.40 + No.200) : 5.9

Silt + Clay (-No.200) : 23.9

Approved By :

Ken E. Walker

Soil No. 39



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
 Project No. : 10429166
 Project County : Marion
 Project State : Tennessee
 Laboratory No. : 10429166
 Submitted By : HDR
 Soil Type : Light Brown, Orange & Brown Sandy Fat Clay

Sample No. : SS-5
 Sample Loc. : Boring No. BR-4
 Sample Depth : 13.5' to 15.0'
 Date Tested : 10/25/25
 Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	90.2
1/4		6.3	mm	
No.4		4.75	mm	89.0
No.6		3.35	mm	
No.10		2	mm	82.6

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	75.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	70.1
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.011 mm

CBR : NA
 Dry Dens. : NA
 Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 25.1

Liquid Limit (AASHTO T89) : 67

Plastic Limit (AASHTO T90) : 31

Plasticity Index : 36

Liquidity Index : -0.17

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-5 (26)

ASTM Classification: D2487 : CH

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 17.4

Coarse Sand (-No.10 + No.40) : 7.4

Fine Sand (-No.40 + No.200) : 5.1

Silt + Clay (-No.200) : 70.1

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 11.0

Coarse Sand (-No.4 + No.10) : 6.4

Medium Sand (-No.10 + No.40) : 7.4

Fine Sand (-No.40 + No.200) : 5.1

Silt + Clay (-No.200) : 70.1

Approved By : Ken E. Walker

Soil No. 40



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Red Silt with Sand

Sample No. : SS-1
Sample Loc. : Boring No. BR-5
Sample Depth : 1.0' to 2.5'
Date Tested : 10/20/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.3
No.6		3.35	mm	
No.10		2	mm	98.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	92.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	78.6
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.007 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 28.3

Liquid Limit (AASHTO T89) : 47

Plastic Limit (AASHTO T90) : 27

Plasticity Index : 20

Liquidity Index : 0.07

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-6 (17)

ASTM Classification: D2487 : ML

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 1.5

Coarse Sand (-No.10 + No.40) : 5.8

Fine Sand (-No.40 + No.200) : 14.1

Silt + Clay (-No.200) : 78.6

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.7

Coarse Sand (-No.4 + No.10) : 0.8

Medium Sand (-No.10 + No.40) : 5.8

Fine Sand (-No.40 + No.200) : 14.1

Silt + Clay (-No.200) : 78.6

Approved By : Ken E. Walker

Soil No. 41



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Tan & Gray Clayey Gravel with Sand

Sample No. : SS-2
Sample Loc. : Boring No. BR-5
Sample Depth : 3.5' to 5.0'
Date Tested : 10/21/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	79.9
1/4		6.3	mm	
No.4		4.75	mm	47.3
No.6		3.35	mm	
No.10		2	mm	28.8

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	18.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	15.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 5.031 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 9.4
Liquid Limit (AASHTO T89) : 26
Plastic Limit (AASHTO T90) : 17
Plasticity Index : 9
Liquidity Index : -0.87
Activity : NA
Sp. Gr. (AASHTO T100) : NA
AASHTO Classification: M145 : A-2-4 (0)
ASTM Classification: D2487 : GC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 71.2
Coarse Sand (-No.10 + No.40) : 10.3
Fine Sand (-No.40 + No.200) : 3.2
Silt + Clay (-No.200) : 15.3

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0
Fine Gravel (-3/4in. + No.4) : 52.7
Coarse Sand (-No.4 + No.10) : 18.5
Medium Sand (-No.10 + No.40) : 10.3
Fine Sand (-No.40 + No.200) : 3.2
Silt + Clay (-No.200) : 15.3

Approved By : Ken E. Walker

Soil No. 42



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Brown Silty, Clayey Gravel with Sand

Sample No. : SS-5

Sample Loc. : Boring No. BR-5

Sample Depth : 13.5' to 15.0'

Date Tested : 10/20/25

Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	87.8
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	60.1
1/4		6.3	mm	
No.4		4.75	mm	38.6
No.6		3.35	mm	
No.10		2	mm	25.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	19.5
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	16.5
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 6.86 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 14.4

Liquid Limit (AASHTO T89) : 26

Plastic Limit (AASHTO T90) : 21

Plasticity Index : 5

Liquidity Index : -1.38

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-1-b (0)

ASTM Classification: D2487 : GC-GM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 74.1

Coarse Sand (-No.10 + No.40) : 6.4

Fine Sand (-No.40 + No.200) : 3.0

Silt + Clay (-No.200) : 16.5

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 12.2

Fine Gravel (-3/4in. + No.4) : 49.2

Coarse Sand (-No.4 + No.10) : 12.7

Medium Sand (-No.10 + No.40) : 6.4

Fine Sand (-No.40 + No.200) : 3.0

Silt + Clay (-No.200) : 16.5

Approved By : Ken E. Walker

Soil No. 45



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Light Brown Clayey Gravel with Sand

Sample No. : SS-6
Sample Loc. : Boring No. BR-5
Sample Depth : 18.5' to 20.0'
Date Tested : 10/20/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	80.1
1/4		6.3	mm	
No.4		4.75	mm	61.7
No.6		3.35	mm	
No.10		2	mm	46.1

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	36.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	31.4
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 2.483 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 17.0

Liquid Limit (AASHTO T89) : 27

Plastic Limit (AASHTO T90) : 18

Plasticity Index : 9

Liquidity Index : -0.09

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-4 (0)

ASTM Classification: D2487 : GC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 53.9

Coarse Sand (-No.10 + No.40) : 10.0

Fine Sand (-No.40 + No.200) : 4.7

Silt + Clay (-No.200) : 31.4

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 38.3

Coarse Sand (-No.4 + No.10) : 15.6

Medium Sand (-No.10 + No.40) : 10.0

Fine Sand (-No.40 + No.200) : 4.7

Silt + Clay (-No.200) : 31.4

Approved By : Ken E. Walker

Soil No. 46



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Gray & Brown Sandy Silty Clay

Sample No. : SS-7
Sample Loc. : Boring No. BR-5
Sample Depth : 23.5' to 25.0'
Date Tested : 10/25/25
Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	97.8
No.6		3.35	mm	
No.10		2	mm	91.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	83.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	69.2
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.012 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 24.3

Liquid Limit (AASHTO T89) : 22

Plastic Limit (AASHTO T90) : 17

Plasticity Index : 5

Liquidity Index : 1.47

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-4 (1)

ASTM Classification: D2487 : CL-ML

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 8.1

Coarse Sand (-No.10 + No.40) : 8.2

Fine Sand (-No.40 + No.200) : 14.5

Silt + Clay (-No.200) : 69.2

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 2.2

Coarse Sand (-No.4 + No.10) : 5.9

Medium Sand (-No.10 + No.40) : 8.2

Fine Sand (-No.40 + No.200) : 14.5

Silt + Clay (-No.200) : 69.2

Approved By : Ken E. Walker

Soil No. 47



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Gray & Brown Clayey Gravel with Sand

Sample No. : ST-1

Sample Loc. : Boring No. BR-5

Sample Depth : 28.0' to 30.0'

Date Tested : 10/20/25

Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	89.6
3/4	in.	19	mm	85.9
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	69.4
1/4		6.3	mm	
No.4		4.75	mm	54.5
No.6		3.35	mm	
No.10		2	mm	40.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	30.1
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	24.6
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 3.597 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 22.9

Liquid Limit (AASHTO T89) : 49

Plastic Limit (AASHTO T90) : 27

Plasticity Index : 22

Liquidity Index : -0.20

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-7 (2)

ASTM Classification: D2487 : GC

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 59.5

Coarse Sand (-No.10 + No.40) : 10.4

Fine Sand (-No.40 + No.200) : 5.5

Silt + Clay (-No.200) : 24.6

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 14.1

Fine Gravel (-3/4in. + No.4) : 31.4

Coarse Sand (-No.4 + No.10) : 14.0

Medium Sand (-No.10 + No.40) : 10.4

Fine Sand (-No.40 + No.200) : 5.5

Silt + Clay (-No.200) : 24.6

Approved By :

Ken E. Walker

Soil No. 48



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Red Sandy Silt

Sample No. : SS-1
Sample Loc. : Boring No. BR-6
Sample Depth : 1.0' to 2.5'
Date Tested : 10/20/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	100.0
1/4		6.3	mm	
No.4		4.75	mm	99.3
No.6		3.35	mm	
No.10		2	mm	98.2

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	85.2
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	66.1
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.015 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 25.1

Liquid Limit (AASHTO T89) : 42

Plastic Limit (AASHTO T90) : 31

Plasticity Index : 11

Liquidity Index : -0.49

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-5 (7)

ASTM Classification: D2487 : ML

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 1.8

Coarse Sand (-No.10 + No.40) : 13.0

Fine Sand (-No.40 + No.200) : 19.1

Silt + Clay (-No.200) : 66.1

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.7

Coarse Sand (-No.4 + No.10) : 1.1

Medium Sand (-No.10 + No.40) : 13.0

Fine Sand (-No.40 + No.200) : 19.1

Silt + Clay (-No.200) : 66.1

Approved By : Ken E. Walker

Soil No. 49



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Red Silty, Clayey Gravel with Sand

Sample No. : SS-3
Sample Loc. : Boring No. BR-6
Sample Depth : 6.0' to 7.5'
Date Tested : 10/25/25
Date Reported : 10/29/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	100.0
3/4	in.	19	mm	83.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	63.2
1/4		6.3	mm	
No.4		4.75	mm	50.3
No.6		3.35	mm	
No.10		2	mm	35.9

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	26.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	22.2
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 4.665 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 14.1

Liquid Limit (AASHTO T89) : 26

Plastic Limit (AASHTO T90) : 19

Plasticity Index : 7

Liquidity Index : -0.64

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-4 (0)

ASTM Classification: D2487 : GC-GM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 64.1

Coarse Sand (-No.10 + No.40) : 9.1

Fine Sand (-No.40 + No.200) : 4.6

Silt + Clay (-No.200) : 22.2

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 17.0

Fine Gravel (-3/4in. + No.4) : 32.7

Coarse Sand (-No.4 + No.10) : 14.4

Medium Sand (-No.10 + No.40) : 9.1

Fine Sand (-No.40 + No.200) : 4.6

Silt + Clay (-No.200) : 22.2

Approved By : Ken E. Walker

Soil No. 50



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Red & Brown Silty, Clayey Gravel with Sand

Sample No. : SS-6

Sample Loc. : Boring No. BR-6

Sample Depth : 18.5' to 20.0'

Date Tested : 10/20/25

Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	100.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	70.7
1/4		6.3	mm	
No.4		4.75	mm	53.0
No.6		3.35	mm	
No.10		2	mm	41.3

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	32.7
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	27.9
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 3.805 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 16.4

Liquid Limit (AASHTO T89) : 28

Plastic Limit (AASHTO T90) : 21

Plasticity Index : 7

Liquidity Index : -0.67

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-2-4 (0)

ASTM Classification: D2487 : GC-GM

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 58.7

Coarse Sand (-No.10 + No.40) : 8.6

Fine Sand (-No.40 + No.200) : 4.8

Silt + Clay (-No.200) : 27.9

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 47.0

Coarse Sand (-No.4 + No.10) : 11.7

Medium Sand (-No.10 + No.40) : 8.6

Fine Sand (-No.40 + No.200) : 4.8

Silt + Clay (-No.200) : 27.9

Approved By :

Ken E. Walker

Soil No. 51



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound

Project No. : 10429166

Project County : Marion

Project State : Tennessee

Laboratory No. : 10429166

Submitted By : HDR

Soil Type : Dark Brown & Tan Elastic Silt with Sand

Sample No. : SS-8

Sample Loc. : Boring No. BR-6

Sample Depth : 28.5' to 30.0'

Date Tested : 10/20/25

Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	
1 1/4	in.	31.5	mm	
1	in.	25	mm	
3/4	in.	19	mm	
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	
1/4		6.3	mm	
No.4		4.75	mm	100.0
No.6		3.35	mm	
No.10		2	mm	98.4

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	90.0
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	84.4
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 0.005 mm

CBR : NA

Dry Dens. : NA

Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 27.2

Liquid Limit (AASHTO T89) : 62

Plastic Limit (AASHTO T90) : 38

Plasticity Index : 24

Liquidity Index : -0.45

Activity : NA

Sp. Gr. (AASHTO T100) : NA

AASHTO Classification: M145 : A-7-5 (25)

ASTM Classification: D2487 : MH

AASHTO Composition of Total Sample: M145

Gravel (3in. + No.10) : 1.6

Coarse Sand (-No.10 + No.40) : 8.4

Fine Sand (-No.40 + No.200) : 5.6

Silt + Clay (-No.200) : 84.4

ASTM Composition of Total Sample: D2487

Coarse Gravel (3in. + 3/4in.) : 0.0

Fine Gravel (-3/4in. + No.4) : 0.0

Coarse Sand (-No.4 + No.10) : 1.6

Medium Sand (-No.10 + No.40) : 8.4

Fine Sand (-No.40 + No.200) : 5.6

Silt + Clay (-No.200) : 84.4

Approved By : Ken E. Walker

Soil No. 52



SOIL CLASSIFICATION

Project Name : Arcadis_TDOT_WO2_Shellmound
Project No. : 10429166
Project County : Marion
Project State : Tennessee
Laboratory No. : 10429166
Submitted By : HDR
Soil Type : Gray Poorly Graded Gravel with Clay and Sand (or Silty Clay and Sand)

Sample No. : SS-10
Sample Loc. : Boring No. BR-6
Sample Depth : 37.5' to 38.5'
Date Tested : 10/21/25
Date Reported : 10/28/25

AASHTO T27 :

% Passing				
4	in.	101.6	mm	
3.5	in.	88.9	mm	
3	in.	76.2	mm	
2.5	in.	63.5	mm	
2	in.	50.8	mm	
1 3/4	in.	45	mm	
1 1/2	in.	38.1	mm	100.0
1 1/4	in.	31.5	mm	
1	in.	25	mm	66.0
3/4	in.	19	mm	66.0
1/2	in.	12.5	mm	
3/8	in.	9.5	mm	42.5
1/4		6.3	mm	
No.4		4.75	mm	28.4
No.6		3.35	mm	
No.10		2	mm	17.5

% Passing				
No.16		1.18	mm	
No.30		0.6	mm	
No.40		0.425	mm	11.8
No.50		0.3	mm	
No.60		0.25	mm	
No.80		0.18	mm	
No.100		0.15	mm	
No.200		0.075	mm	9.3
No.270		0.053	mm	
Hyd. Rd. # 1			mm	
Hyd. Rd. # 2			mm	
Hyd. Rd. # 3			mm	
Hyd. Rd. # 4			mm	
Hyd. Rd. # 5			mm	
Hyd. Rd. # 6			mm	
Hyd. Rd. # 7			mm	

AASHTO T88

*Method B used for #200 Wash with a soaking time of 1440 minutes

D50 = 11.852 mm

CBR : NA
Dry Dens. : NA
Opt. Moist. : NA

Natural Moisture (%) (AASHTO T265) : 6.1
Liquid Limit (AASHTO T89) : 28
Plastic Limit (AASHTO T90) : 18
Plasticity Index : 10
Liquidity Index : -1.21
Activity : NA
Sp. Gr. (AASHTO T100) : NA
AASHTO Classification: M145 : A-2-4 (0)
ASTM Classification: D2487 : GP-GC

AASHTO Composition of Total Sample: M145

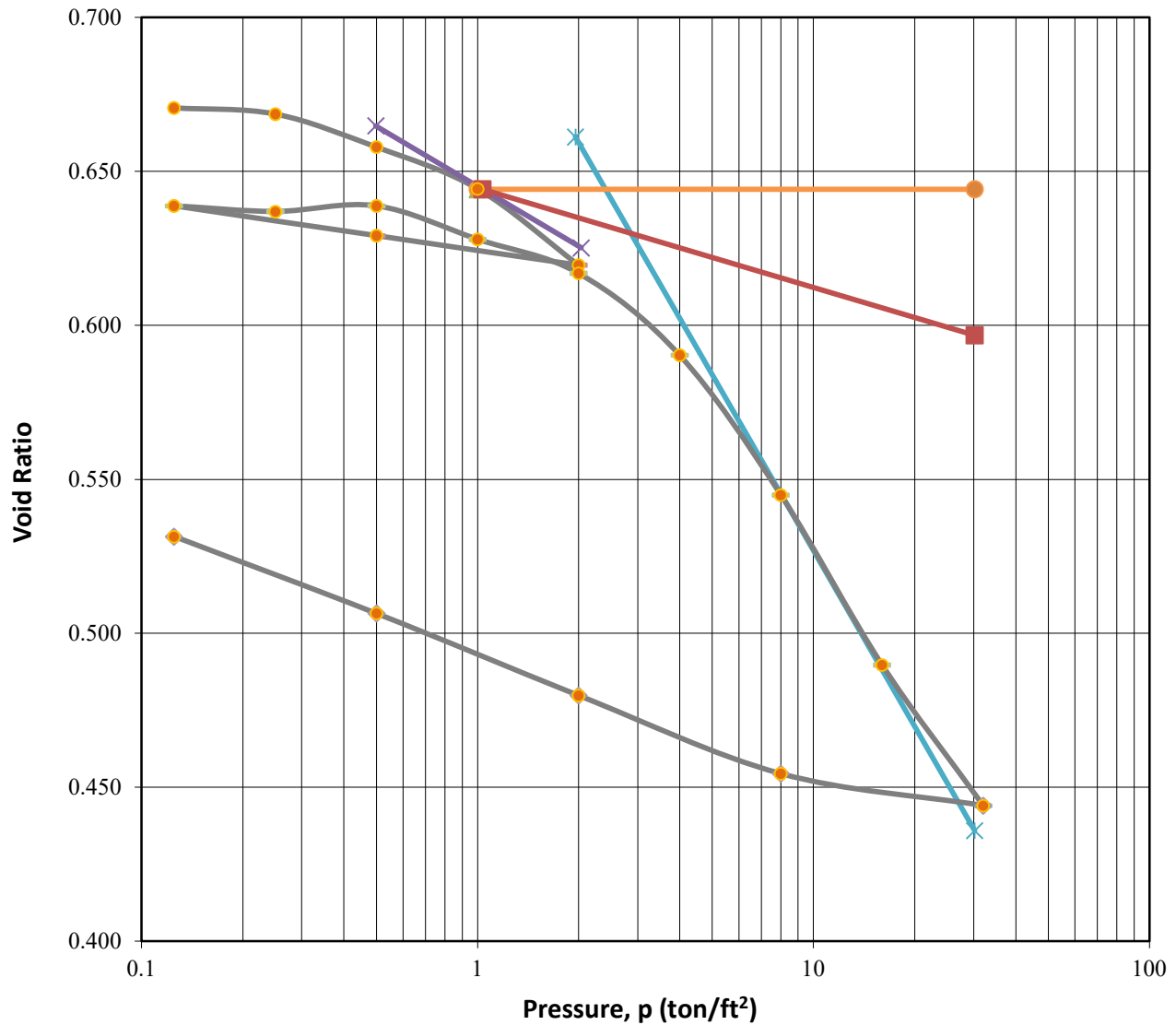
Gravel (3in. + No.10) : 82.5
Coarse Sand (-No.10 + No.40) : 5.7
Fine Sand (-No.40 + No.200) : 2.5
Silt + Clay (-No.200) : 9.3

ASTM Composition of Total Sample: D2487

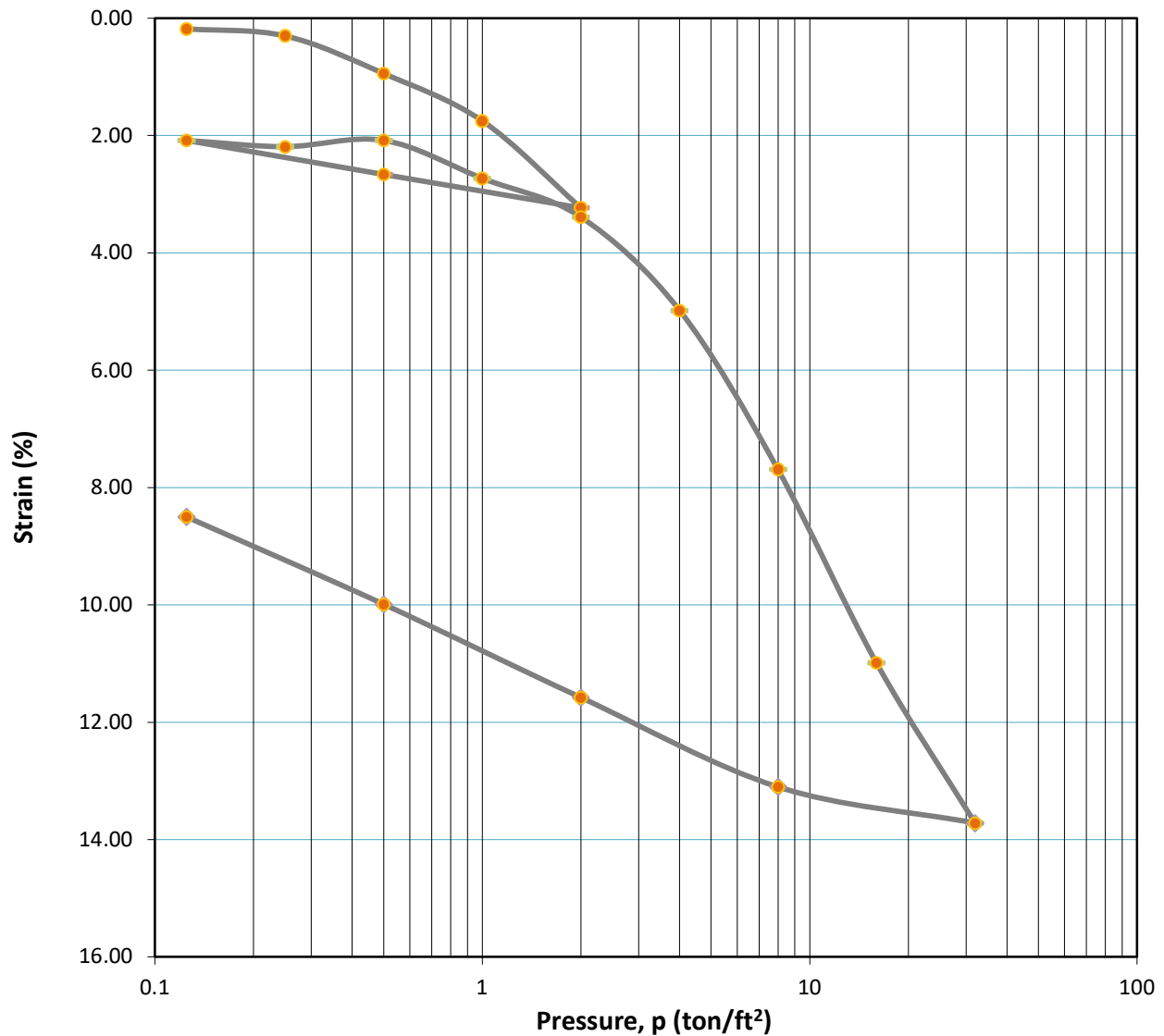
Coarse Gravel (3in. + 3/4in.) : 34.0
Fine Gravel (-3/4in. + No.4) : 37.6
Coarse Sand (-No.4 + No.10) : 10.9
Medium Sand (-No.10 + No.40) : 5.7
Fine Sand (-No.40 + No.200) : 2.5
Silt + Clay (-No.200) : 9.3

Approved By : Ken E. Walker

Soil No. 53



			Test Date: 11/6/2025
Summary of Consolidation Test Results			
Overburden Press. (tsf)	0.41	Compression Index, C _c	0.19
Preconsol. Press., P _c (tsf)	2.86		Rebound Index, C _r
Over Consolidation Ratio	6.97		
Soil Description: Sandy Elastic Silt			
Project Number:	10429166	Depth: 6.0-8.0	Remarks: ASTM D2435/D2435M-11
Sample Number:	ST-1	Boring Number: B-1	
Project: TDOT Shellmond Rd			
Client: TDOT			
Location: Tennessee			



	Before	After	Liquid Limits:	51	Test Date:	11/6/2025
Moisture (%):	18.8	23.9	Plastic Limits:	29		
Dry Density (pcf):	98.7	102.7	Plasticity Index (%):	22		
Saturation (%):	73.6	100.0				
Void Ratio:	0.68	0.61	Specific Gravity:	2.650	ASSUMED	
Sample Description:	Sandy Elastic Silt					
Project Number:	10429166			Depth: 6.0-8.0	Remarks: ASTM D2435/D2435M-11	
Sample Number:	ST-1		Boring Number: B-1			
Project:	TDOT Shellmond Rd					
Client:	TDOT					
Location:	Tennessee					



CONSOLIDATION TEST

Test Summary

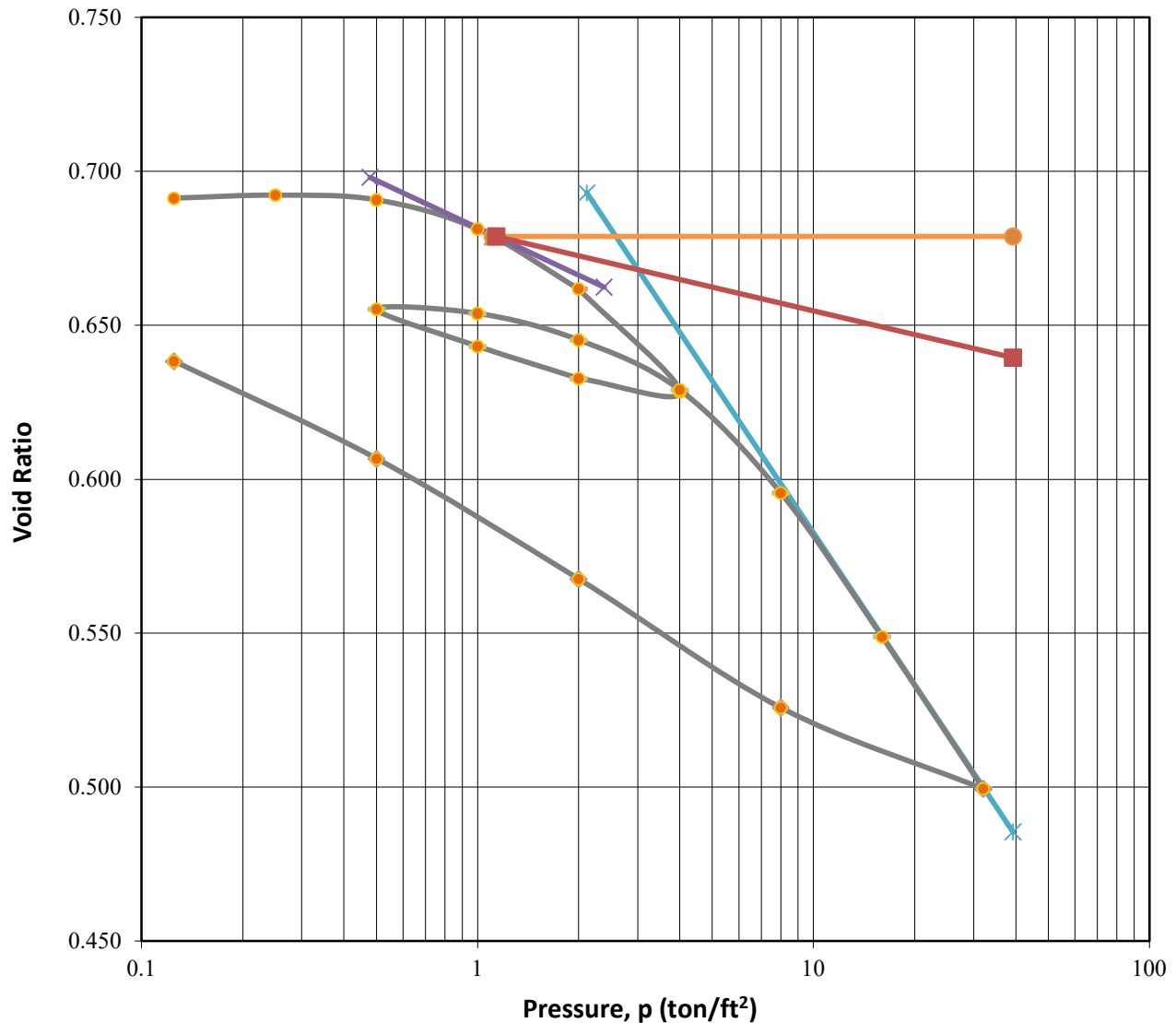
Project: TDOT Shellmond Rd
Location: Tennessee
Job Number: 10429166
Project Number: 10429166
Test Date: 11/6/2025

Sample Number: ST-1
Boring Number: B-1
Depth: 6.0-8.0
Sample Type: Undisturbed

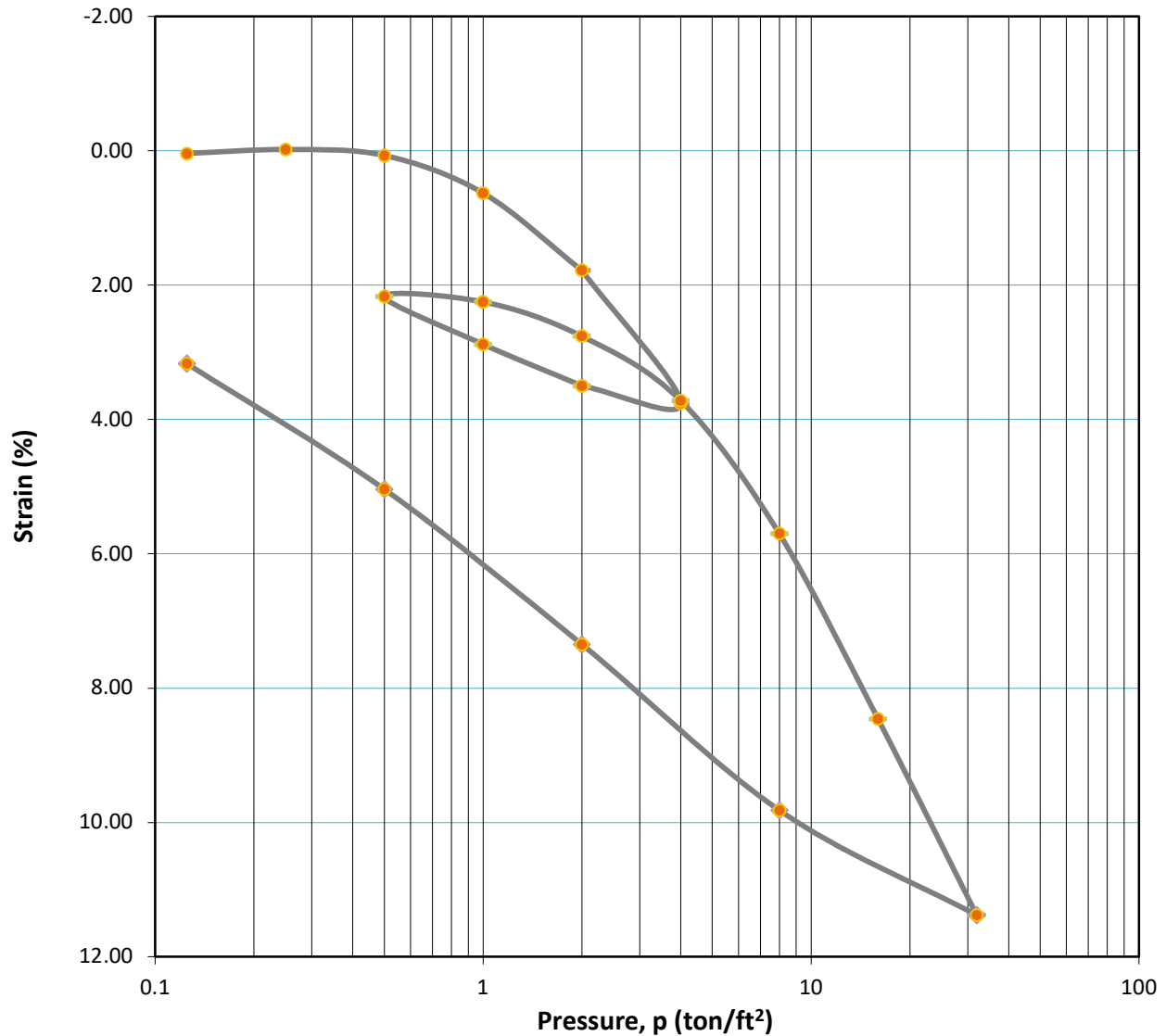
Sample Description: Sandy Elastic Silt
Remarks:

Index	Load Sequence tsf	Change in Height in	Specimen Height in	Height of Void in	Vertical Strain	Void Ratio	t90 Fitting Time Hr	t50 Fitting Time Hr	t90 Cv ft ² /Day	t50 Cv ft ² /Day
0	0.000	0.0000	1.0000	0.0000	0.0000	0.6767	0.0000	0.0000	0.0000	0.0000
0	0.125	0.0018	0.9982	0.4007	0.1800	0.6706	0.1383	0.0399	0.2546	0.2046
1	0.250	0.0030	0.9970	0.3995	0.3000	0.6686	0.0916	0.0126	0.3836	0.6431
2	0.500	0.0094	0.9906	0.3931	0.9400	0.6579	0.0940	0.0078	0.3689	1.0219
3	1.000	0.0175	0.9825	0.3850	1.7500	0.6444	0.0457	0.0114	0.7456	0.6709
4	2.000	0.0323	0.9677	0.3702	3.2300	0.6196	0.2491	0.0321	0.1329	0.2253
5	0.500	0.0266	0.9734	0.3759	2.6600	0.6291	0.0000	0.0000	0.0000	0.0000
6	0.125	0.0208	0.9792	0.3817	2.0800	0.6388	0.0000	0.0000	0.0000	0.0000
7	0.250	0.0219	0.9781	0.3806	2.1900	0.6370	0.2503	0.0163	0.1350	0.4828
8	0.500	0.0208	0.9792	0.3817	2.0800	0.6388	0.1089	0.0255	0.3112	0.2961
9	1.000	0.0273	0.9727	0.3752	2.7300	0.6280	0.1576	0.0213	0.2121	0.3458
10	2.000	0.0339	0.9661	0.3686	3.3900	0.6169	0.1327	0.0204	0.2485	0.3520
11	4.000	0.0498	0.9502	0.3527	4.9800	0.5903	0.0755	0.0160	0.4226	0.4203
12	8.000	0.0769	0.9231	0.3256	7.6900	0.5449	0.1350	0.0122	0.2230	0.5748
13	16.000	0.1099	0.8901	0.2926	10.9900	0.4897	0.1144	0.0228	0.2448	0.2850
14	32.000	0.1372	0.8628	0.2653	13.7200	0.4440	0.1043	0.0148	0.2523	0.4120
15	8.000	0.1310	0.8690	0.2715	13.1000	0.4544	0.0000	0.0000	0.0000	0.0000
16	2.000	0.1158	0.8842	0.2867	11.5800	0.4798	0.0000	0.0000	0.0000	0.0000
17	0.500	0.0999	0.9001	0.3026	9.9900	0.5065	0.0000	0.0000	0.0000	0.0000
18	0.125	0.0850	0.9150	0.3175	8.5000	0.5314	0.0000	0.0000	0.0000	0.0000

Approved By: Ken E. Walker



Summary of Consolidation Test Results				Test Date: 11/6/2025
Overburden Press. (tsf)	0.63	Compression Index, C _c	0.16	
Preconsol. Press., P _c (tsf)	3.01			
Over Consolidation Ratio	4.76	Rebound Index, C _r	0.03	
Soil Description:		Elastic Silt w/ Sand		
Project Number:	10429166	Depth: 10.0-11.0	Remarks: ASTM D2435/D2435M-11	
Sample Number:	ST-1	Boring Number: BR-3		
Project:	TDOT Shellmond Rd			
Client:	TDOT			
Location:	Tennessee			



	Before	After	Liquid Limits:	57	Test Date:	11/6/2025
Moisture (%):	23.3	26.0	Plastic Limits:	33		
Dry Density (pcf):	97.6	98.6	Plasticity Index (%):	24		
Saturation (%):	89.0	100.0				
Void Ratio:	0.69	0.68	Specific Gravity:	2.650	ASSUMED	
Sample Description:	Elastic Silt w/ Sand					
Project Number:	10429166	Depth: 10.0-11.0		Remarks: ASTM D2435/D2435M-11		
Sample Number:	ST-1	Boring Number: BR-3				
Project:	TDOT Shellmond Rd					
Client:	TDOT					
Location:	Tennessee					



CONSOLIDATION TEST

Test Summary

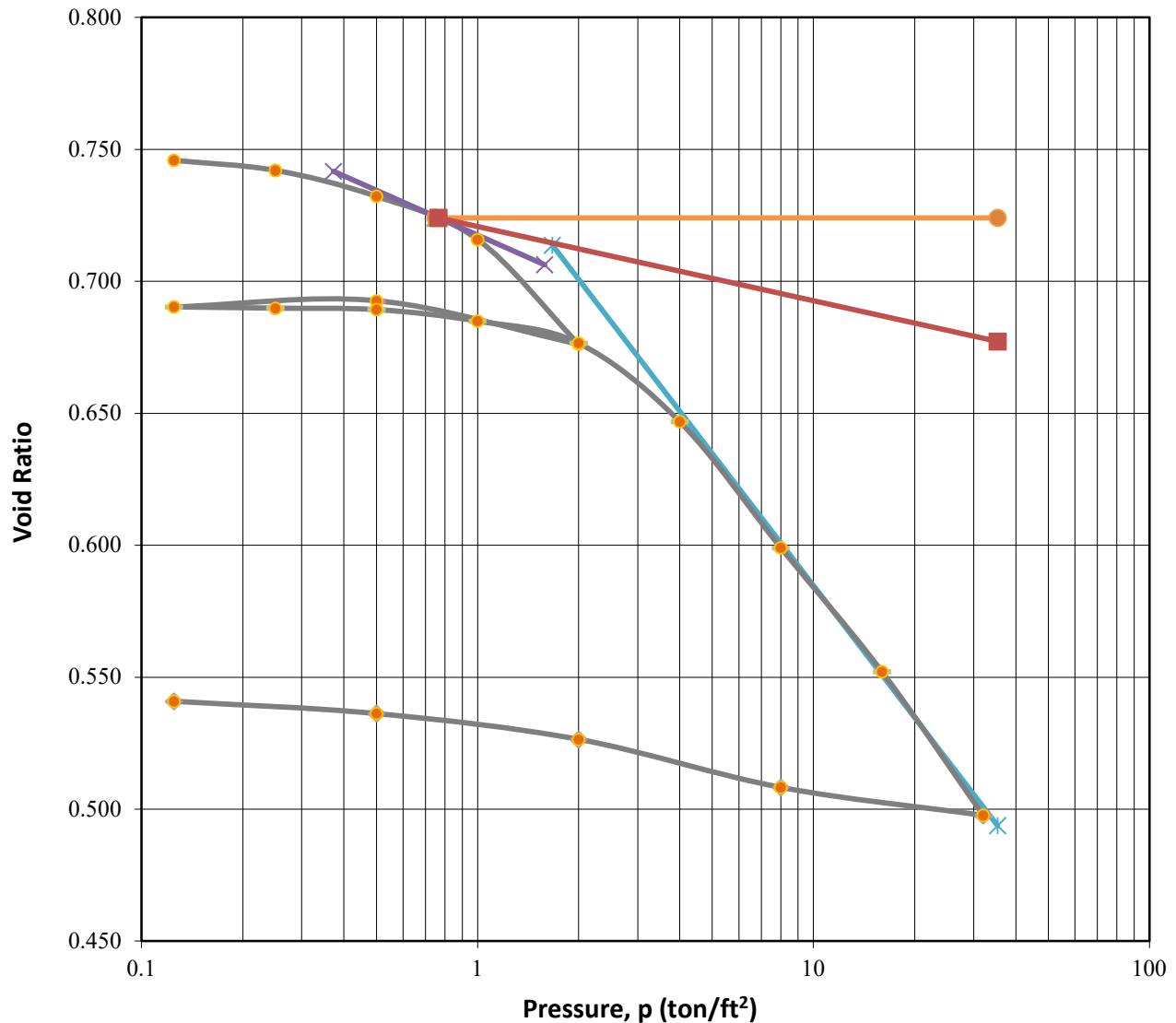
Project: TDOT Shellmond Rd
Location: Tennessee
Job Number: 10429166
Project Number: 10429166
Test Date: 11/6/2025

Sample Number: ST-1
Boring Number: BR-3
Depth: 10.0-11.0
Sample Type: Undisturbed

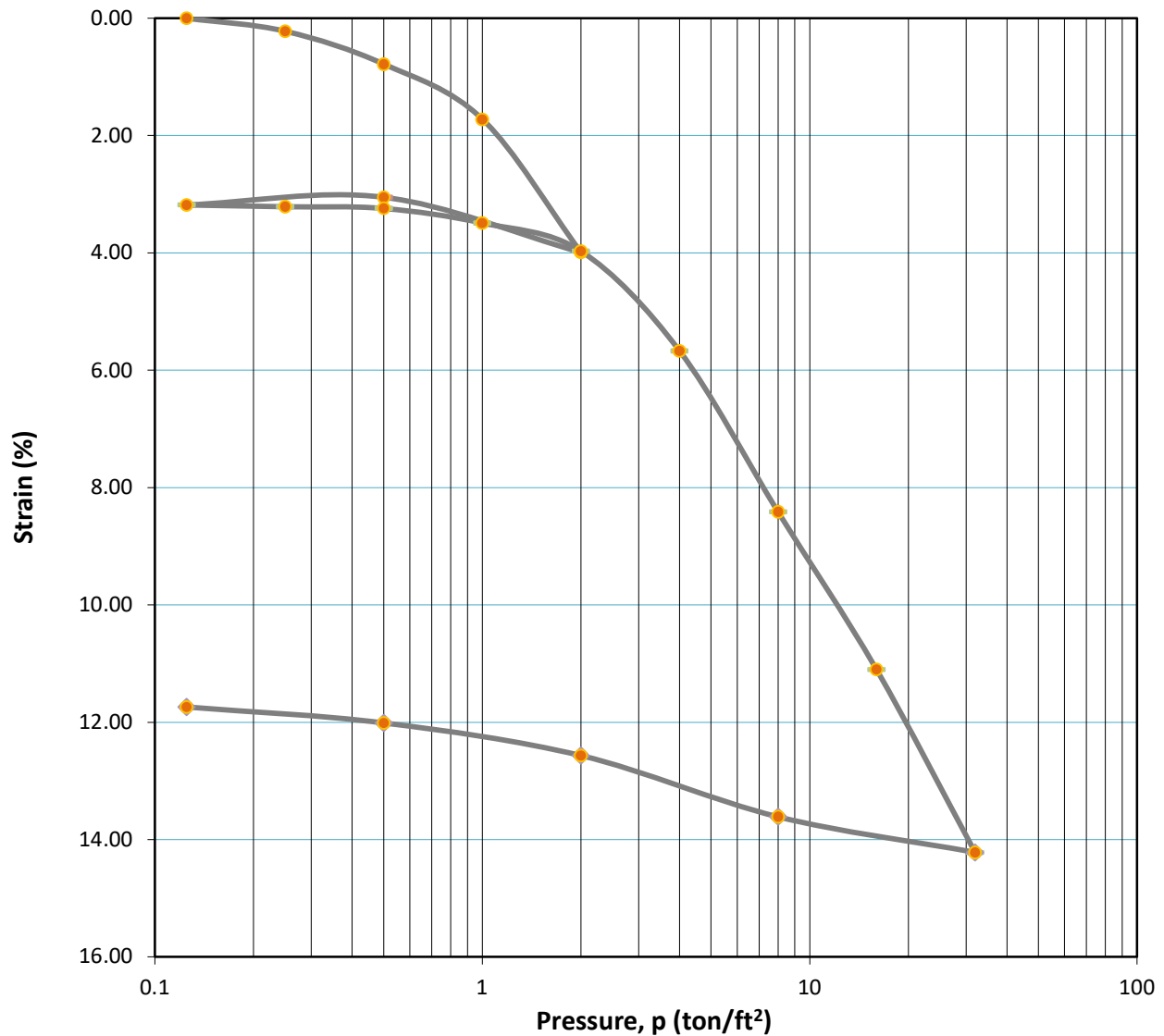
Sample Description: Elastic Silt w/ Sand
Remarks:

Index	Load Sequence tsf	Change in Height in	Specimen Height in	Height of Void in	Vertical Strain	Void Ratio	t90 Fitting Time Hr	t50 Fitting Time Hr	t90 Cv ft ² /Day	t50 Cv ft ² /Day
0	0.000	0.0000	1.0000	0.0000	0.0000	0.6950	0.0000	0.0000	0.0000	0.0000
0	0.125	0.0004	0.9996	0.4086	0.0400	0.6913	0.0108	0.0026	3.2646	3.1301
1	0.250	-0.0002	1.0002	0.4092	-0.0200	0.6923	0.0366	0.0085	0.9649	0.9619
2	0.500	0.0007	0.9993	0.4083	0.0700	0.6908	0.0535	0.0084	0.6601	0.9772
3	1.000	0.0063	0.9937	0.4027	0.6300	0.6813	0.1694	0.0285	0.2060	0.2817
4	2.000	0.0178	0.9822	0.3912	1.7800	0.6618	0.1327	0.0142	0.2569	0.5445
5	4.000	0.0376	0.9624	0.3714	3.7600	0.6283	0.9927	0.2182	0.0330	0.0328
6	2.000	0.0350	0.9650	0.3740	3.5000	0.6327	0.0000	0.0000	0.0000	0.0000
7	1.000	0.0288	0.9712	0.3802	2.8800	0.6432	0.0000	0.0000	0.0000	0.0000
8	0.500	0.0217	0.9783	0.3873	2.1700	0.6552	0.0000	0.0000	0.0000	0.0000
9	1.000	0.0225	0.9775	0.3865	2.2500	0.6539	0.3393	0.0573	0.0995	0.1308
10	2.000	0.0276	0.9724	0.3814	2.7600	0.6453	0.5612	0.9119	0.0595	0.0080
11	4.000	0.0372	0.9628	0.3718	3.7200	0.6290	1.0992	3.1542	0.0298	0.0022
12	8.000	0.0570	0.9430	0.3520	5.7000	0.5955	1.5271	0.3420	0.0206	0.0193
13	16.000	0.0846	0.9154	0.3244	8.4600	0.5488	1.3633	2.8685	0.0217	0.0020
14	32.000	0.1138	0.8862	0.2952	11.3800	0.4994	1.0815	0.2525	0.0257	0.0202
15	8.000	0.0982	0.9018	0.3108	9.8200	0.5258	0.0000	0.0000	0.0000	0.0000
16	2.000	0.0735	0.9265	0.3355	7.3500	0.5676	0.0000	0.0000	0.0000	0.0000
17	0.500	0.0504	0.9496	0.3586	5.0400	0.6067	0.0000	0.0000	0.0000	0.0000
18	0.125	0.0317	0.9683	0.3773	3.1700	0.6383	0.0000	0.0000	0.0000	0.0000

Approved By: Ken E. Walker



Summary of Consolidation Test Results				Test Date:	11/6/2025
Overburden Press. (tsf)	0.14	Compression Index, C _c	Rebound Index, C _r	0.17	
Preconsol. Press., P _c (tsf)	1.00			0.01	
Over Consolidation Ratio	6.94				
Soil Description:		Sandy Silt			
Project Number:	10429166	Depth: 1.5-3.5	Remarks: ASTM D2435/D2435M-11		
Sample Number:	ST-1	Boring Number: BR-4			
Project:	TDOT Shellmond Rd.				
Client:	TDOT				
Location:	Tennessee				



	Before	After	Liquid Limits:	40	Test Date:	11/6/2025
Moisture (%):	16.0	19.5	Plastic Limits:	27		
Dry Density (pcf):	99.4	112.4	Plasticity Index (%):	13		
Saturation (%):	59.5	99.2				
Void Ratio:	0.75	0.55	Specific Gravity:	2.784	MEASURED	
Sample Description:	Sandy Silt					
Project Number:	10429166			Depth: 1.5-3.5	Remarks: ASTM D2435/D2435M-11	
Sample Number:	ST-1			Boring Number: BR-4		
Project:	TDOT Shellmond Rd.					
Client:	TDOT					
Location:	Tennessee					



CONSOLIDATION TEST

Test Summary

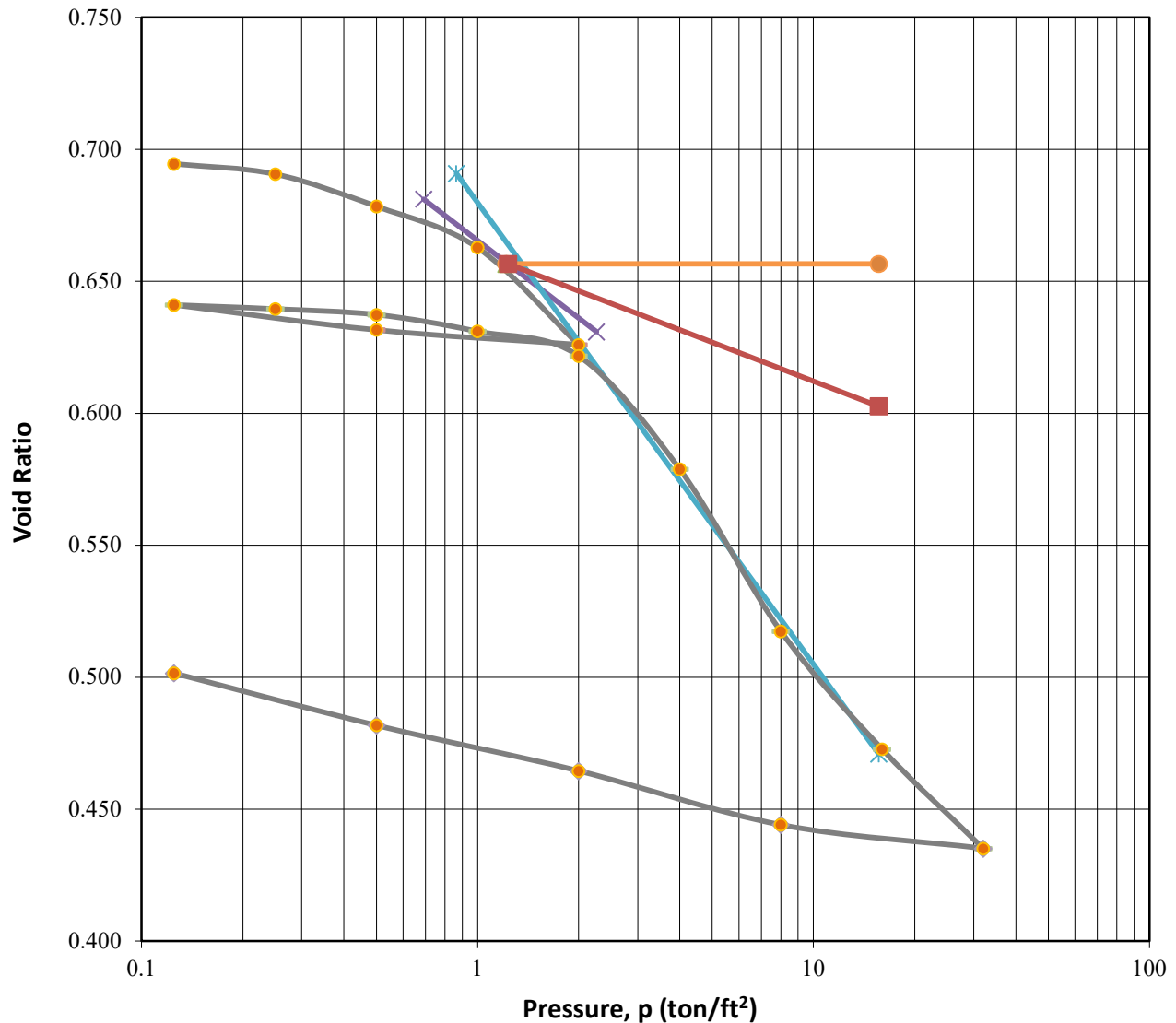
Project: TDOT Shellmond Rd.
Location: Tennessee
Job Number: 10249166
Project Number: 10429166
Test Date: 11/6/2025

Sample Number: ST-1
Boring Number: BR-4
Depth: 1.5-3.5
Sample Type: Undisturbed

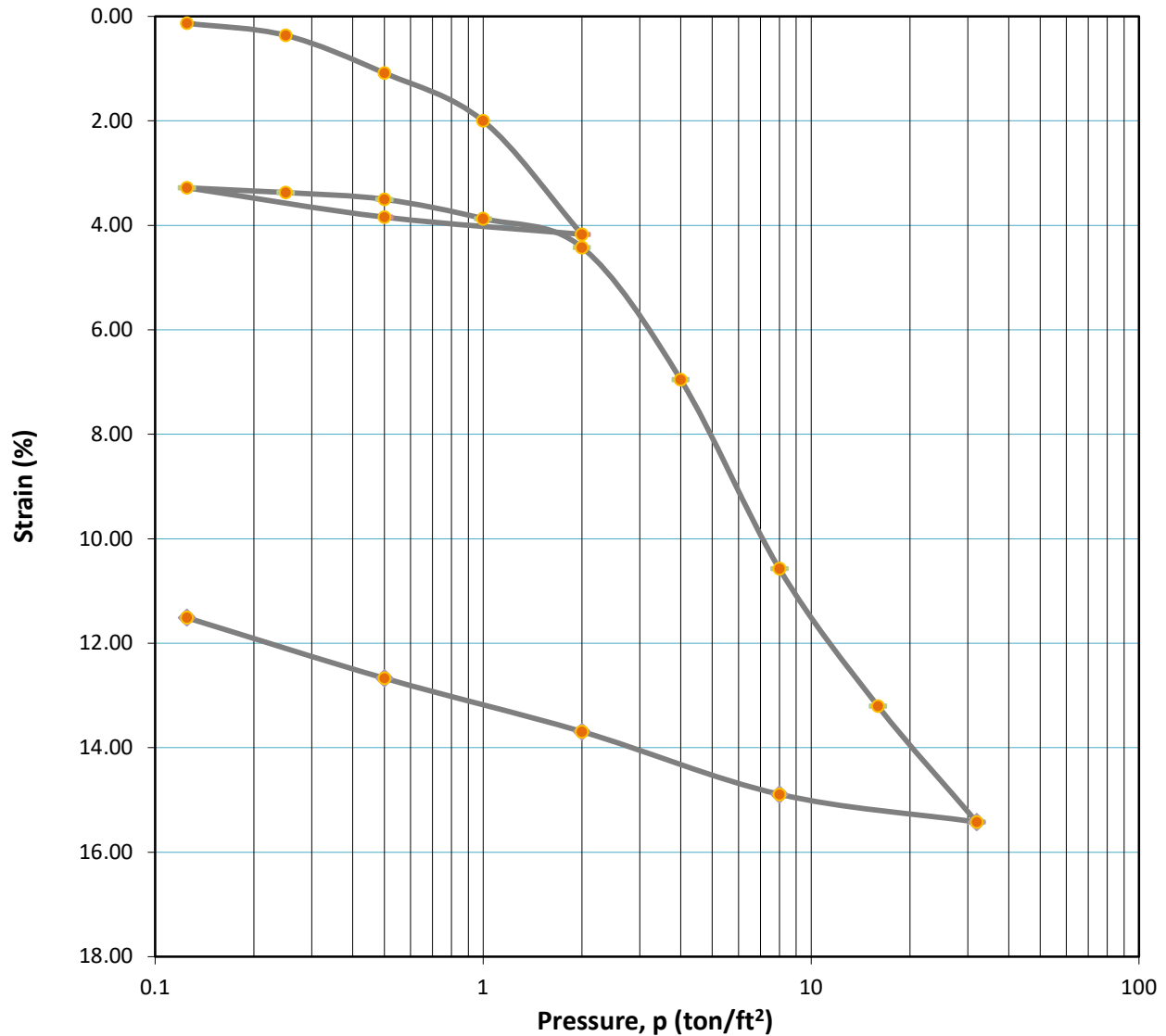
Sample Description: Sandy Silt
Remarks:

Index	Load Sequence tsf	Change in Height in	Specimen Height in	Height of Void in	Vertical Strain	Void Ratio	t90 Fitting Time Hr	t50 Fitting Time Hr	t90 Cv ft ² /Day	t50 Cv ft ² /Day
0	0.000	0.0000	1.0000	0.0000	0.0000	0.7490	0.0000	0.0000	0.0000	0.0000
0	0.125	0.0000	1.0000	0.4272	0.0000	0.7459	0.0275	0.0319	1.2837	0.2573
1	0.250	0.0022	0.9978	0.4250	0.2200	0.7420	0.1366	0.0237	0.2575	0.3442
2	0.500	0.0078	0.9922	0.4194	0.7800	0.7322	0.0710	0.0150	0.4898	0.5327
3	1.000	0.0172	0.9828	0.4100	1.7200	0.7158	0.0600	0.1720	0.5689	0.0446
4	2.000	0.0399	0.9601	0.3873	3.9900	0.6762	0.0781	0.0109	0.4171	0.6428
5	0.500	0.0305	0.9695	0.3967	3.0500	0.6926	0.0000	0.0000	0.0000	0.0000
6	0.125	0.0318	0.9682	0.3954	3.1800	0.6903	0.0000	0.0000	0.0000	0.0000
7	0.250	0.0321	0.9679	0.3951	3.2100	0.6898	0.3358	0.2926	0.0986	0.0246
8	0.500	0.0324	0.9676	0.3948	3.2400	0.6893	0.0343	0.0052	0.9639	1.3874
9	1.000	0.0349	0.9651	0.3923	3.4900	0.6849	0.0231	0.4544	1.4217	0.0156
10	2.000	0.0397	0.9603	0.3875	3.9700	0.6766	0.0350	0.1743	0.9322	0.0400
11	4.000	0.0567	0.9433	0.3705	5.6700	0.6469	0.2550	1.1999	0.1233	0.0054
12	8.000	0.0841	0.9159	0.3431	8.4100	0.5990	0.0671	0.0139	0.4418	0.4130
13	16.000	0.1110	0.8890	0.3162	11.1000	0.5521	0.0336	0.0072	0.8309	0.6981
14	32.000	0.1422	0.8578	0.2850	14.2200	0.4976	0.1107	0.2406	0.2349	0.0176
15	8.000	0.1361	0.8639	0.2911	13.6100	0.5083	0.0000	0.0000	0.0000	0.0000
16	2.000	0.1257	0.8743	0.3015	12.5700	0.5264	0.0000	0.0000	0.0000	0.0000
17	0.500	0.1201	0.8799	0.3071	12.0100	0.5362	0.0000	0.0000	0.0000	0.0000
18	0.125	0.1174	0.8826	0.3098	11.7400	0.5409	0.0000	0.0000	0.0000	0.0000

Approved By: Kevin E. Walker



Summary of Consolidation Test Results				Test Date: 11/6/2025
Overburden Press. (tsf)	1.73	Compression Index, C _c	0.17	
Preconsol. Press., P _c (tsf)	1.41			
Over Consolidation Ratio	0.81	Rebound Index, C _r	0.01	
Soil Description: Clayey Gravel w/ Sand				
Project Number:	10429166	Depth: 28.0-30.0	Remarks: ASTM D2435/D2435M-11	
Sample Number:	ST-1	Boring Number: BR-5		
Project:	TDOT Shellmond Rd			
Client:	TDOT			
Location:	Tennessee			



	Before	After	Liquid Limits:	49	Test Date:	11/6/2025
Moisture (%):	22.9	23.0	Plastic Limits:	27		
Dry Density (pcf):	97.3	109.8	Plasticity Index (%):	22		
Saturation (%):	86.5	100.0				
Void Ratio:	0.70	0.51	Specific Gravity:	2.650	ASSUMED	
Sample Description: Clayey Gravel w/ Sand						
Project Number:	10429166		Depth: 28.0-30.0		Remarks: ASTM D2435/D2435M-11	
Sample Number:	ST-1		Boring Number: BR-5			
Project:	TDOT Shellmond Rd					
Client:	TDOT					
Location:	Tennessee					



CONSOLIDATION TEST

Test Summary

Project: TDOT Shellmond Rd
Location: Tennessee
Job Number: 10429166
Project Number: 10429166
Test Date: 11/6/2025

Sample Number: ST-1
Boring Number: BR-5
Depth: 28.0-30.0
Sample Type: Undisturbed

Sample Description: Clayey Gravel w/ Sand
Remarks:

Index	Load Sequence tsf	Change in Height in	Specimen Height in	Height of Void in	Vertical Strain	Void Ratio	t90 Fitting Time Hr	t50 Fitting Time Hr	t90 Cv ft ² /Day	t50 Cv ft ² /Day
0	0.000	0.0000	1.0000	0.0000	0.0000	0.6998	0.0000	0.0000	0.0000	0.0000
0	0.125	0.0013	0.9987	0.4093	0.1300	0.6945	0.0292	0.0045	1.2052	1.8256
1	0.250	0.0036	0.9964	0.4070	0.3600	0.6906	0.0535	0.0114	0.6555	0.7086
2	0.500	0.0108	0.9892	0.3998	1.0800	0.6784	0.0387	0.0071	0.8923	1.1108
3	1.000	0.0200	0.9800	0.3906	2.0000	0.6628	0.0347	0.0067	0.9776	1.1391
4	2.000	0.0417	0.9583	0.3689	4.1700	0.6260	0.0330	0.1971	0.9822	0.0351
5	0.500	0.0384	0.9616	0.3722	3.8400	0.6316	0.0000	0.0000	0.0000	0.0000
6	0.125	0.0328	0.9672	0.3778	3.2800	0.6411	0.0000	0.0000	0.0000	0.0000
7	0.250	0.0337	0.9663	0.3769	3.3700	0.6395	0.4988	0.1361	0.0661	0.0525
8	0.500	0.0350	0.9650	0.3756	3.5000	0.6373	0.1573	0.0560	0.2092	0.1269
9	1.000	0.0387	0.9613	0.3719	3.8700	0.6311	0.0669	0.0132	0.4878	0.5292
10	2.000	0.0442	0.9558	0.3664	4.4200	0.6217	0.0492	0.0087	0.6555	0.7926
11	4.000	0.0695	0.9305	0.3411	6.9500	0.5788	0.0265	0.0062	1.1525	1.0037
12	8.000	0.1057	0.8943	0.3049	10.5700	0.5174	0.0914	0.0192	0.3091	0.2718
13	16.000	0.1320	0.8680	0.2786	13.2000	0.4728	0.0973	0.0214	0.2736	0.2141
14	32.000	0.1542	0.8458	0.2564	15.4200	0.4351	0.0839	0.0181	0.3011	0.2248
15	8.000	0.1489	0.8511	0.2617	14.8900	0.4441	0.0000	0.0000	0.0000	0.0000
16	2.000	0.1369	0.8631	0.2737	13.6900	0.4644	0.0000	0.0000	0.0000	0.0000
17	0.500	0.1267	0.8733	0.2839	12.6700	0.4817	0.0000	0.0000	0.0000	0.0000
18	0.125	0.1151	0.8849	0.2955	11.5100	0.5014	0.0000	0.0000	0.0000	0.0000

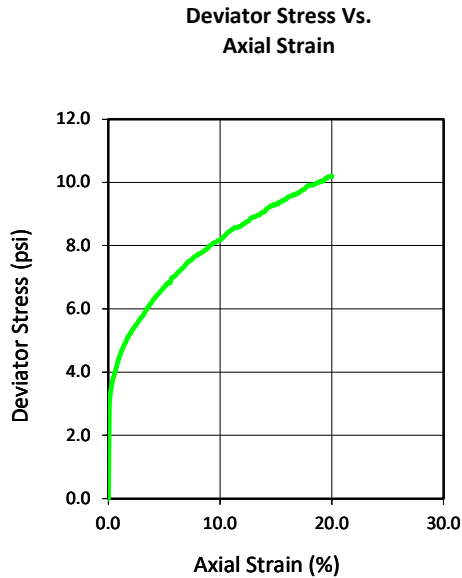
Approved By: Ken E. Walker



Consolidated Undrained Triaxial Test (ASTM D4767)

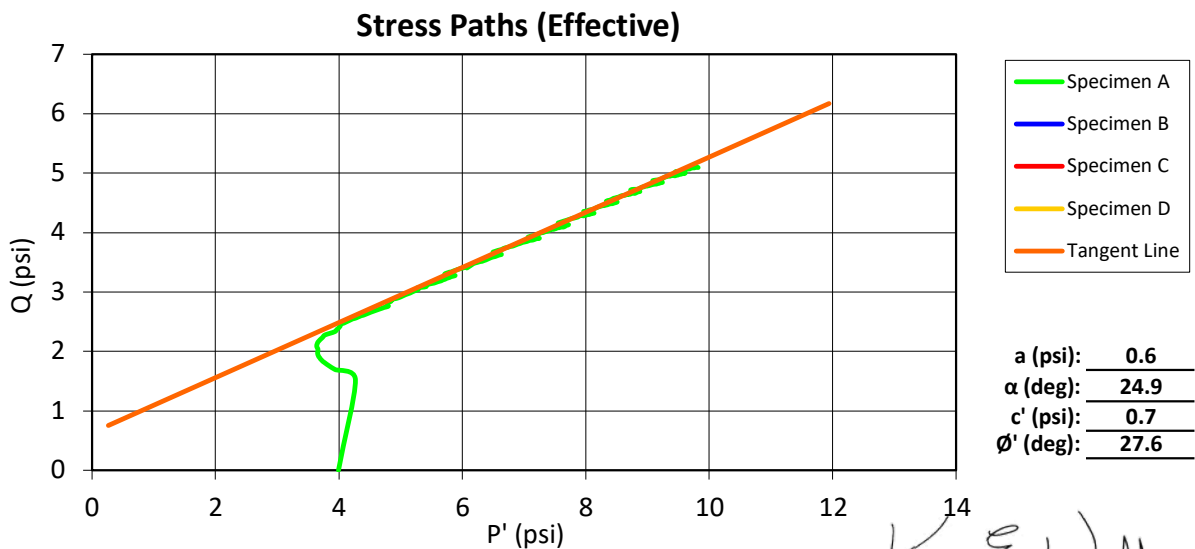
PROJECT NAME : Shellmound Rd
PROJECT NO. : 10429166
PROJECT LOCATION : Tennessee
BORING NUMBER : BR-4
REMARKS : NA

SAMPLE NO. : ST-1
SAMPLE DEPTH : 1.5-3.5
SAMPLE TYPE : Undisturbed
DESCRIPTION : Sandy Silt
TEST TYPE : Consolidated Undrained



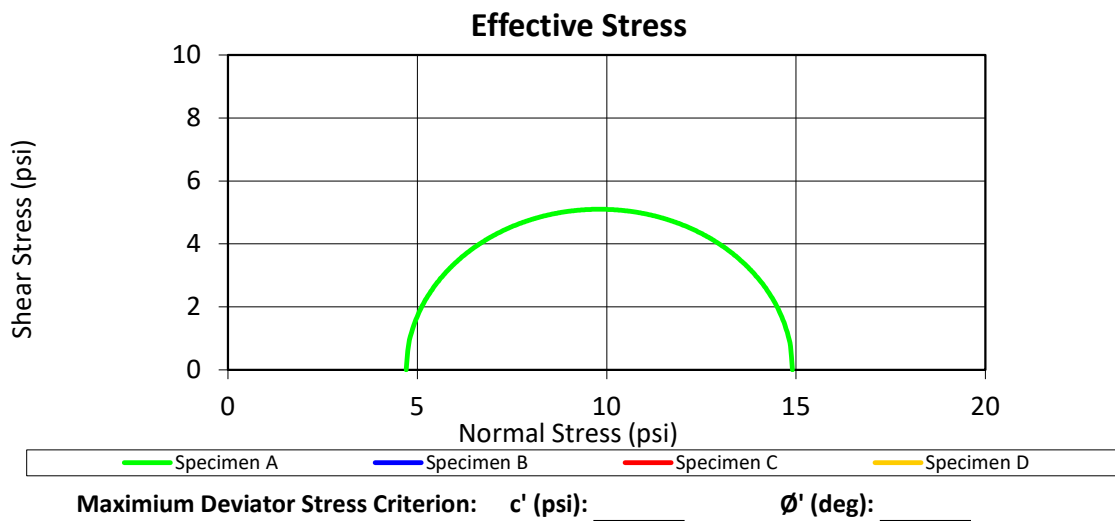
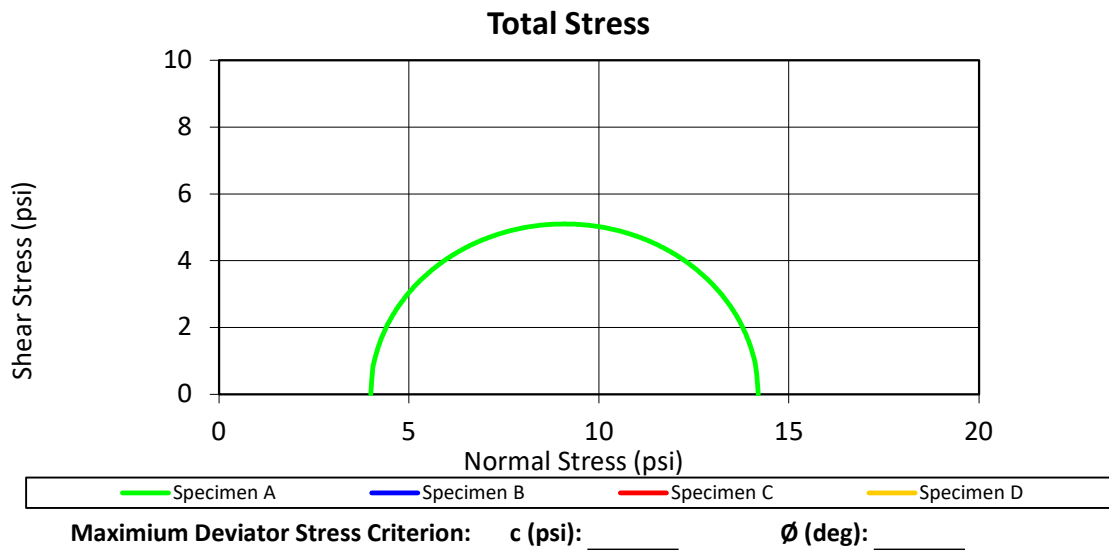
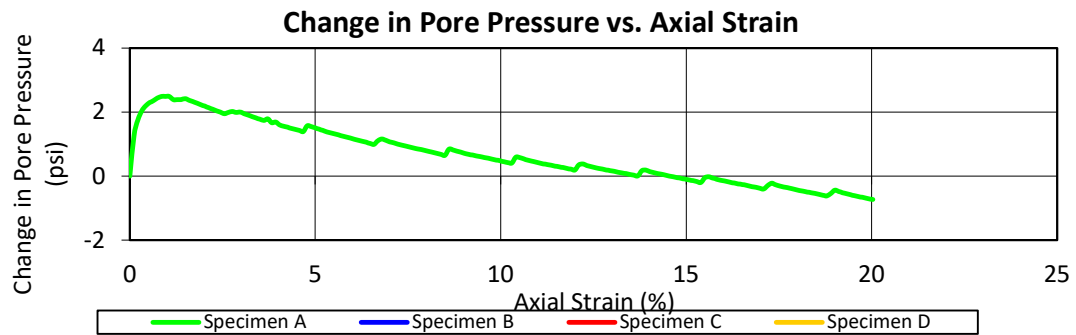
Specimen				
Initial	A	B	C	D
Water Content (%)	20.6			
Dry Density (pcf)	99.8			
Saturation (%)	77.3			
Void Ratio	0.741			
Diameter (in)	2.839			
Height (in)	5.654			
Specific Gravity	2.78			
Liquid Limit	40			
Plastic Limit	27			
After Consolidation	A	B	C	D
B-Value	0.95			
Water Content (%)	29.5			
Dry Density (pcf)	99.9			
Saturation (%)	100.0			
Void Ratio	0.739			
Effective Stress (psi)	4.0			
Back Press. (psi)	84.3			
Rate of Strain	0.005			

Effective Stress		After Shear	A	B	C	D
a (psi)	0.9	σ'_1 at Failure (psi)	14.91			
alpha (deg)	25.1	σ'_3 at Failure (psi)	4.71			
c' (psi)	0.6					
ϕ' (deg)	27.9					



a (psi): 0.6
 α (deg): 24.9
c' (psi): 0.7
 ϕ' (deg): 27.6

Approved By: Keri E. Walker
Date: 11-25-25

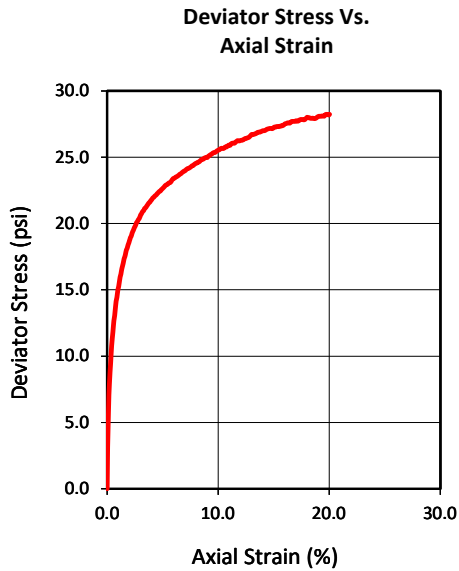




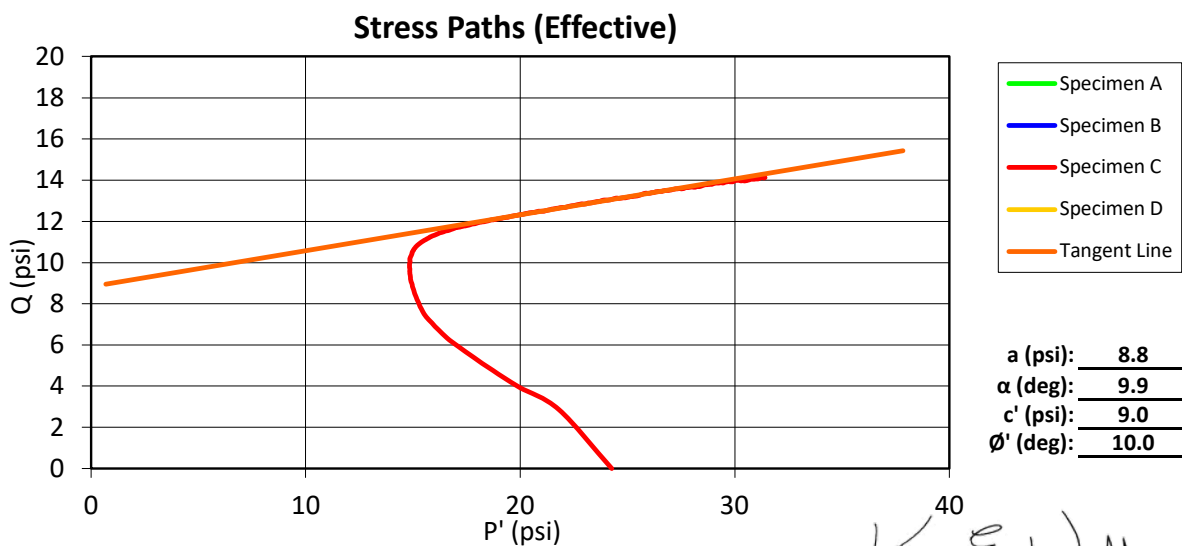
Consolidated Undrained Triaxial Test (ASTM D4767)

PROJECT NAME : Shellmound Rd
PROJECT NO. : 10429166
PROJECT LOCATION : Tennessee
BORING NUMBER : BR-5
REMARKS : N/A

SAMPLE NO. : ST-1
SAMPLE DEPTH : 28.0-30.0
SAMPLE TYPE : Undisturbed
DESCRIPTION : Clayey Gravel with Sand
TEST TYPE : Consolidated Undrained

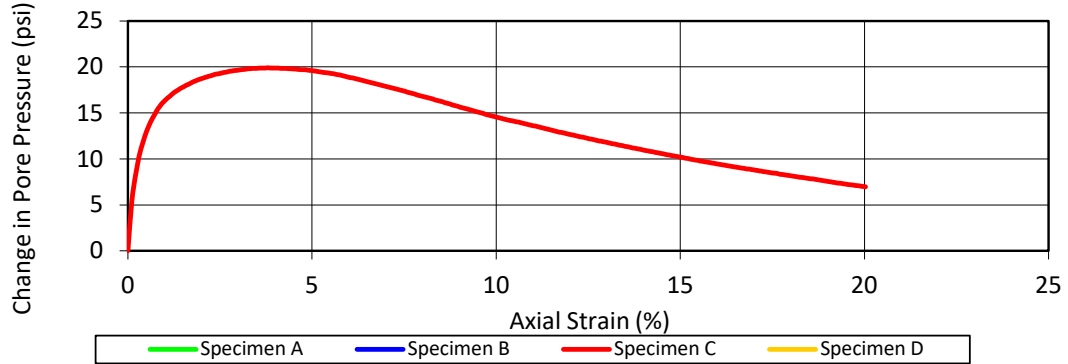


Specimen				
Initial	A	B	C	D
Water Content (%)			23.1	
Dry Density (pcf)			105.1	
Saturation (%)			106.6	
Void Ratio			0.574	
Diameter (in)			2.844	
Height (in)			5.892	
Specific Gravity			2.65	
Liquid Limit			49	
Plastic Limit			27	
After Consolidation	A	B	C	D
B-Value			0.98	
Water Content (%)			23.8	
Dry Density (pcf)			105.2	
Saturation (%)			100.0	
Void Ratio			0.572	
Effective Stress (psi)			24.2	
Back Press. (psi)			60.6	
Rate of Strain			0.005	
Effective Stress		After Shear		
		A	B	C
a (psi)	8.8			45.39
alpha (deg)	9.9			17.15
c' (psi)	9.0			
Ø' (deg)	10.0			

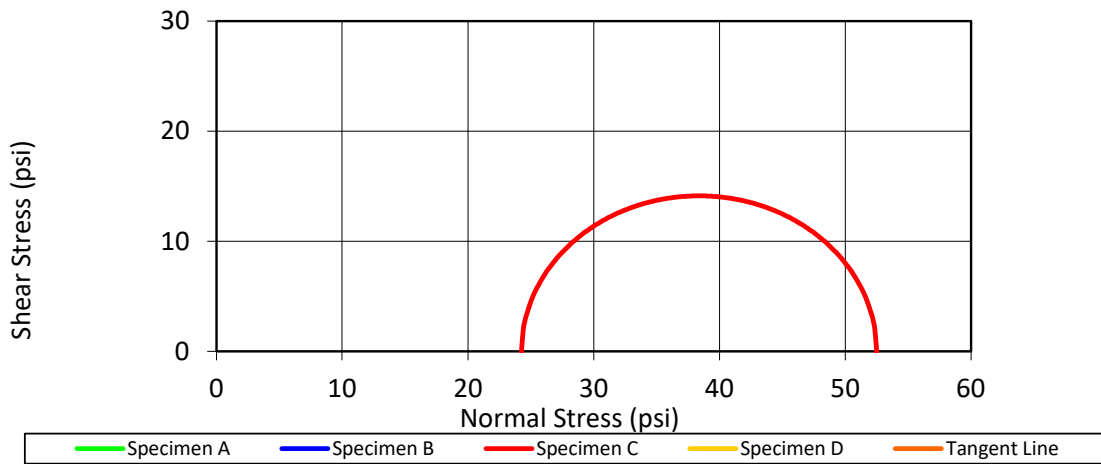


Approved By: Kevin E. Walker
Date: 11-25-25

Change in Pore Pressure vs. Axial Strain

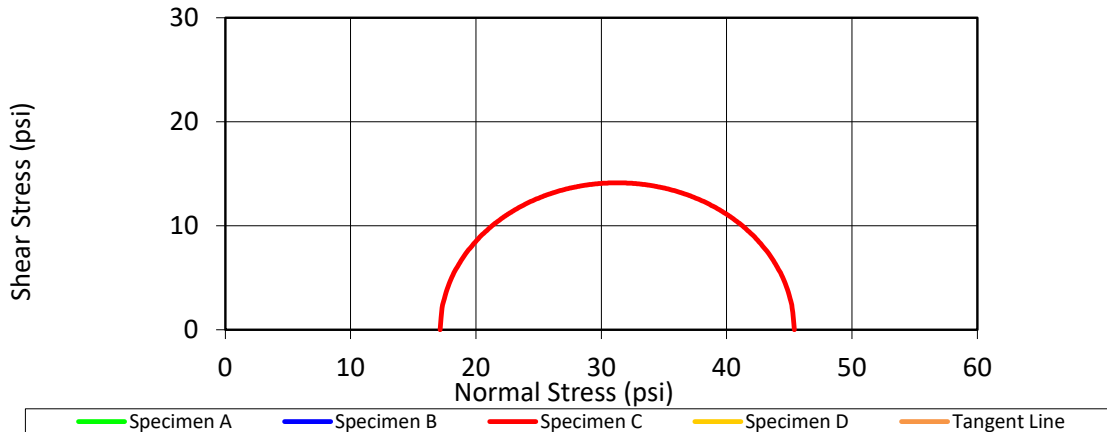


Total Stress



Maximum Deviator Stress Criterion: c (psi): _____ ϕ (deg): _____

Effective Stress



Maximum Deviator Stress Criterion: c' (psi): _____ ϕ' (deg): _____



Unconsolidated Undrained
TRIAXIAL COMPRESSION TEST

Page 1 of 3

PROJECT NAME : Arcadis_TDOT_WO2_Shellmound
PROJECT # : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY # : 10429166
SUBMITTED BY : HDR

POINT # : 1
SAMPLE LOC. : B-1
SAMPLE DEPTH : 6.0' to 8.0'
DATE TESTED : 11/7/2025
DATE REPORTED : 11/10/2025

SOIL TYPE : Red, Orange & Brown Sandy Elastic Silt
WET DENSITY : 125.21 pcf
DRY DENSITY : 102.12 pcf
MOISTURE : 22.62 %

DELTA HEIGHT : 0.45 cm
DELTA VOLUME : NA
CHAMBER PRES. : 11.63 psi
INITIAL HEIGHT : 14.75 cm
INITIAL DIAMETER : 7.27 cm
COMMENTS : AASHTO T-296

RESULTS:

	ϵ_a	σ_3 (psi)	σ_1 (psi)	σ_1/σ_3
1	0.00	11.63	11.63	1.00
2	0.09	11.63	14.36	1.24
3	0.18	11.63	16.25	1.4
4	0.27	11.63	17.72	1.52
5	0.36	11.63	19.18	1.65
6	0.44	11.63	20.43	1.76
7	0.53	11.63	21.68	1.86
8	1.07	11.63	28.11	2.42
9	1.60	11.63	32.71	2.81
10	2.13	11.63	38.09	3.28
11	2.67	11.63	40.81	3.51
12	3.20	11.63	43.55	3.75
13	3.55	11.63	45.47	3.91
14	4.44	11.63	47.42	4.08
15	5.33	11.63	49.4	4.25
16	6.22	11.63	50.87	4.38
17	7.11	11.63	51.93	4.47
18	8.00	11.63	52.98	4.56
19	8.89	11.63	53.64	4.61
20	9.77	11.63	53.76	4.62
21	10.66	11.63	54.54	4.69
22	11.55	11.63	54.96	4.73
23	12.44	11.63	55.02	4.73
24	13.33	11.63	55.4	4.77
25	14.22	11.63	55.44	4.77
26	15.11	11.63	55.96	4.81
27	15.99	11.63	55.81	4.8
28	16.88	11.63	55.5	4.77
29	17.77	11.63	55.81	4.8
30	18.66	11.63	55.64	4.79
31	19.55	11.63	55.93	4.81
32	20.44	11.63	55.74	4.79



Unconsolidated Undrained
TRIAXIAL COMPRESSION TEST

Page 2 of 3

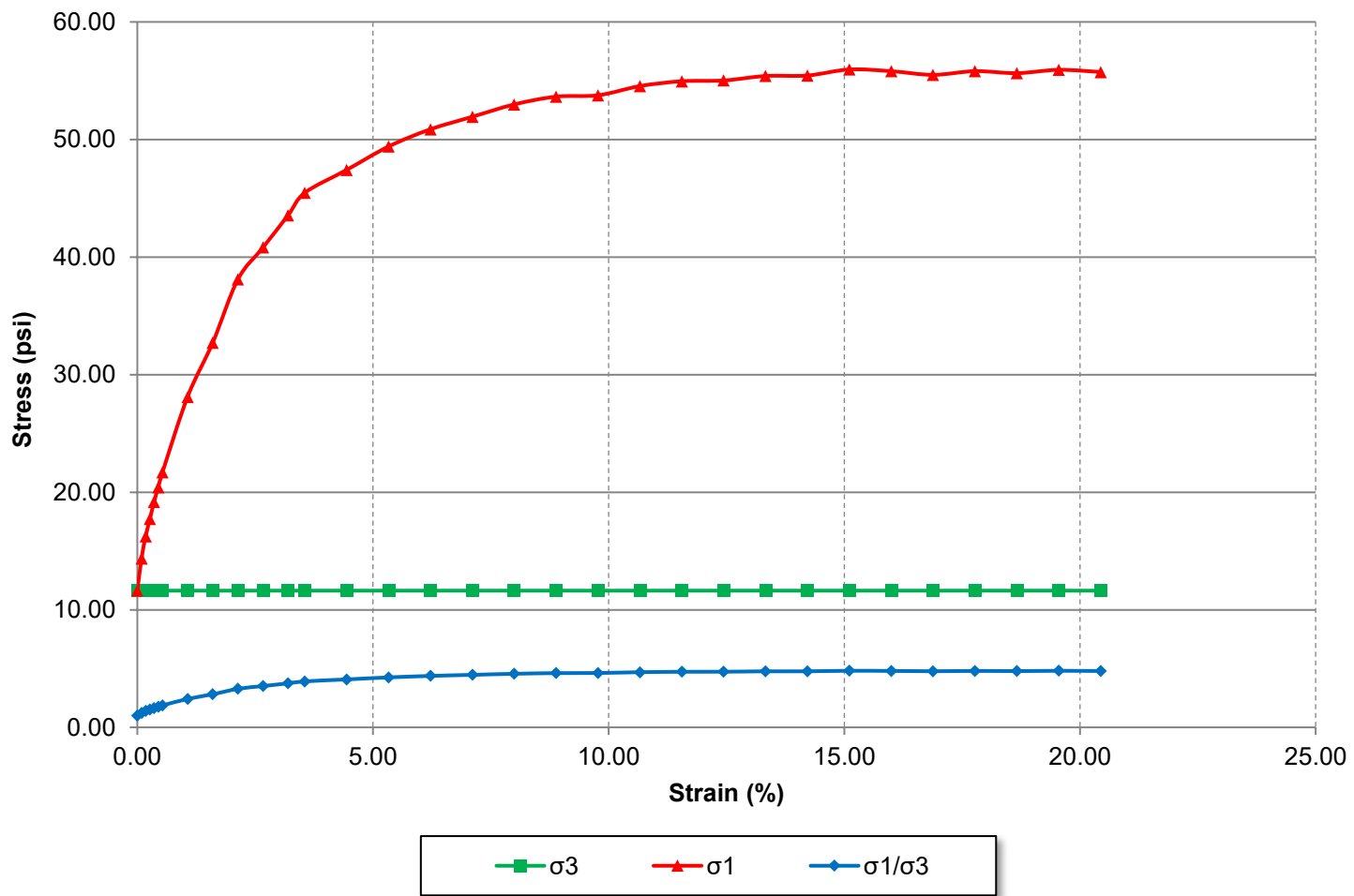
PROJECT NAME : Arcadis_TDOT_WO2_Shellmound
PROJECT # : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY # : 10429166
SUBMITTED BY : HDR

POINT # : 1
SAMPLE LOC. : B-1
SAMPLE DEPTH : 6.0' to 8.0'
DATE TESTED : 11/7/2025
DATE REPORTED : 11/10/2025

FINAL MOISTURE : 22.62 %
FINAL HEIGHT : 11.37 cm
FINAL DIAMETER : 8.12 cm

EFF. CONS. STRESS : 11.63 psi
SPECIFIC GRAVITY : 2.65
COMMENTS : AASHTO T-296

RESULTS:





Unconsolidated Undrained
TRIAXIAL COMPRESSION TEST

PROJECT NAME : Arcadis_TDOT_WO2_Shellmound
PROJECT # : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY # : 10429166
SUBMITTED BY : HDR

COMMENTS : AASHTO T-296
SAMPLE LOC. : B-1
SAMPLE DEPTH : 6.0' to 8.0'
DATE TESTED : 11/7/2025
DATE REPORTED : 11/10/2025

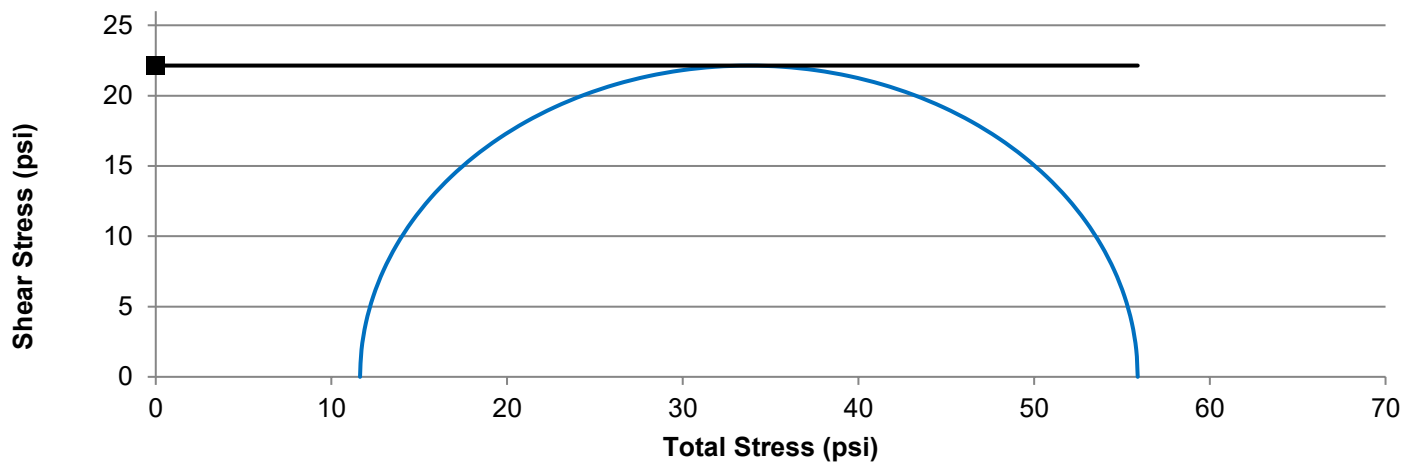
Page 3 of 3

COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total	Compressive Strength =	6375 psf
1	11.63 psi	55.89 psi	Cohesion =	3187 psf
			Phi =	0 deg
			Tan (Phi) =	0

At Maximum Deviator Stress 15%

Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test



Approved By: Ken E. Walker



Unconsolidated Undrained
TRIAXIAL COMPRESSION TEST

Page 1 of 3

PROJECT NAME : Arcadis_TDOT_WO2_Shellmound
PROJECT # : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY # : 10429166
SUBMITTED BY : HDR

POINT # : 1
SAMPLE LOC. : BR-3
SAMPLE DEPTH : 10.0' to 11.0'
DATE TESTED : 11/7/2025
DATE REPORTED : 11/10/2025

SOIL TYPE : Brown & Tan Elastic Silt with Sand
WET DENSITY : 121.05 pcf
DRY DENSITY : 94.63 pcf
MOISTURE : 27.92 %

DELTA HEIGHT : 0.41 cm
DELTA VOLUME : NA
CHAMBER PRES. : 8.84 psi
INITIAL HEIGHT : 14.8 cm
INITIAL DIAMETER : 7.34 cm
COMMENTS : AASHTO T-296

RESULTS:

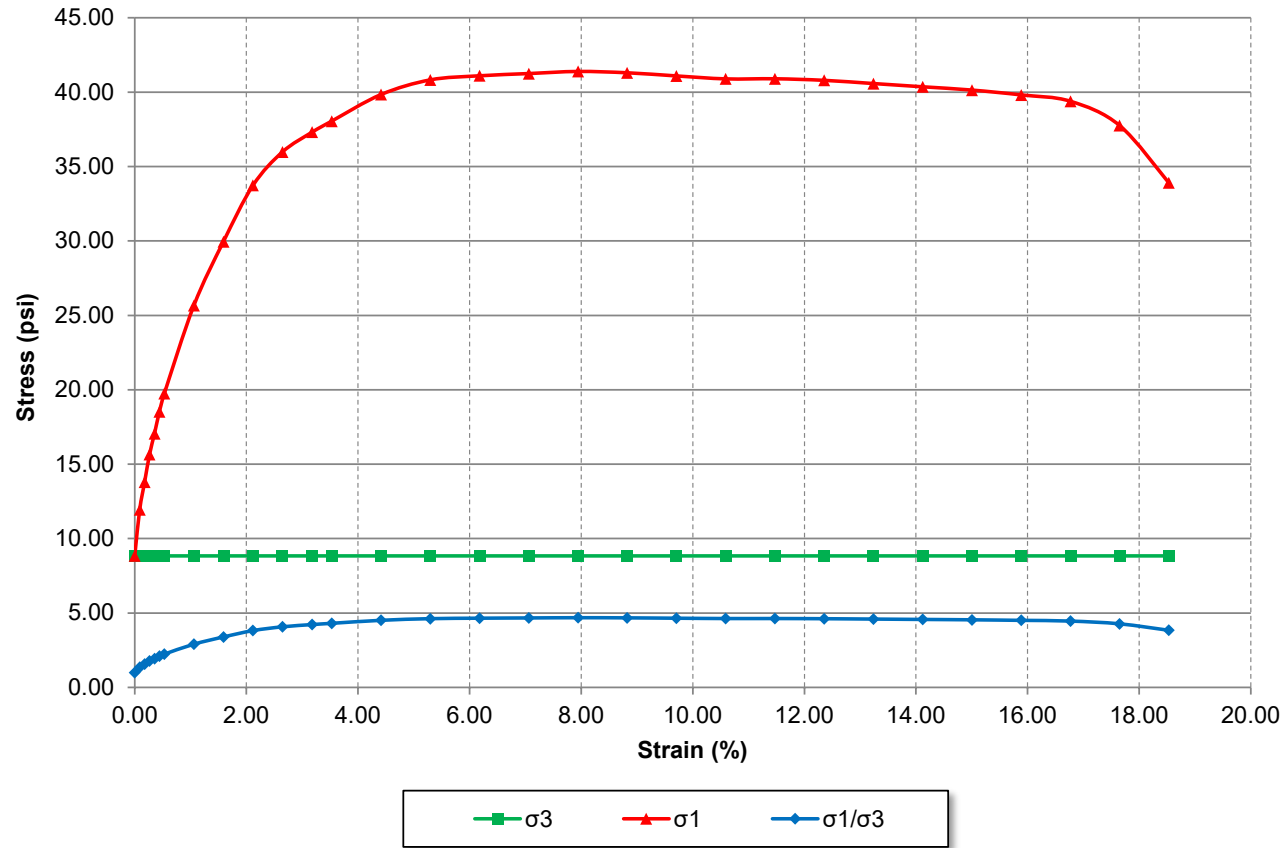
	ϵ_a	σ_3 (psi)	σ_1 (psi)	σ_1/σ_3
1	0.00	8.84	8.84	1.00
2	0.09	8.84	11.94	1.35
3	0.18	8.84	13.8	1.56
4	0.26	8.84	15.65	1.77
5	0.35	8.84	17.05	1.93
6	0.44	8.84	18.53	2.1
7	0.53	8.84	19.74	2.23
8	1.06	8.84	25.66	2.9
9	1.59	8.84	29.95	3.39
10	2.12	8.84	33.73	3.82
11	2.65	8.84	35.98	4.07
12	3.18	8.84	37.31	4.22
13	3.53	8.84	38.05	4.31
14	4.41	8.84	39.84	4.51
15	5.29	8.84	40.82	4.62
16	6.18	8.84	41.1	4.65
17	7.06	8.84	41.25	4.67
18	7.94	8.84	41.39	4.68
19	8.82	8.84	41.3	4.67
20	9.71	8.84	41.09	4.65
21	10.59	8.84	40.89	4.63
22	11.47	8.84	40.9	4.63
23	12.35	8.84	40.79	4.62
24	13.24	8.84	40.58	4.59
25	14.12	8.84	40.36	4.57
26	15.00	8.84	40.14	4.54
27	15.88	8.84	39.81	4.51
28	16.77	8.84	39.39	4.46
29	17.65	8.84	37.76	4.27
30	18.53	8.84	33.9	3.84



Unconsolidated Undrained
TRIAXIAL COMPRESSION TEST

PROJECT NAME	: Arcadis_TDOT_WO2_Shellmound	POINT #	: 1
PROJECT #	: 10429166	SAMPLE LOC.	: BR-3
PROJECT COUNTY	: Marion	SAMPLE DEPTH	: 10.0' to 11.0'
PROJECT STATE	: Tennessee	DATE TESTED	: 11/7/2025
LABORATORY #	: 10429166	DATE REPORTED	: 11/10/2025
SUBMITTED BY	: HDR		
FINAL MOISTURE	: 27.92 %	EFF. CONS. STRESS	: 8.84 psi
FINAL HEIGHT	: 11.72 cm	SPECIFIC GRAVITY	: 2.65
FINAL DIAMETER	: 8.11 cm	COMMENTS	: AASHTO T-296

RESULTS:





Unconsolidated Undrained
TRIAXIAL COMPRESSION TEST

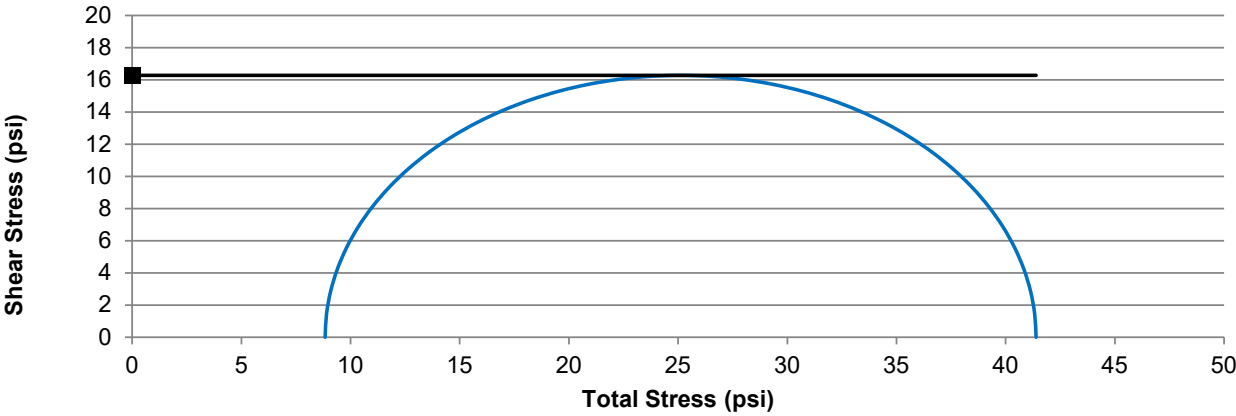
PROJECT NAME	: Arcadis_TDOT_WO2_Shellmound	COMMENTS	: AASHTO T-296	Page 3 of 3
PROJECT #	: 10429166	SAMPLE LOC.	: BR-3	
PROJECT COUNTY	: Marion	SAMPLE DEPTH	: 10.0' to 11.0'	
PROJECT STATE	: Tennessee	DATE TESTED	: 11/7/2025	
LABORATORY #	: 10429166	DATE REPORTED	: 11/10/2025	
SUBMITTED BY	: HDR			

COEFFICIENT OF INTERNAL FRICTION AND COHESION BY THE METHOD OF LEAST SQUARES

Test	Lateral	Total	Compressive Strength =	4688 psf
1	8.84 psi	41.39 psi	Cohesion =	2344 psf
			Phi =	0 deg
			Tan (Phi) =	0

Maximum Deviator Stress

**Triaxial Mohr's Circles
Unconsolidated Undrained Triaxial Test**



Approved By: Ken E. Walker



Project Name : Shellmound Road

Location : Marion County, Tennessee

Subject : Rock Core Summary

Unconfined Compression (Rock Core) Summary

Boring Number	Sample Number	Depth (ft)	Air-Dry Density (pcf)	Max Stress (psi)
BR-1	RS-1	36.6 to 37.0	171.8	12,202
BR-1	RS-2	42.4 to 42.8	171.2	9,577
BR-2	RS-1	19.1 to 19.5	170.8	11,415
BR-2	RS-2	29.1 to 29.5	167.6	9,079
BR-3	RS-1	15.4 to 15.8	168.5	9,118
BR-3	RS-2	24.3 to 24.7	170.5	9,236
BR-4	RS-1	15.3 to 15.7	169.7	10,165
BR-4	RS-2	24.4 to 24.8	173.5	7,515
BR-5	RS-1	33.0 to 33.4	170.6	12,563
BR-5	RS-2	37.8 to 38.2	170.6	9,691
BR-6	RS-1	39.0 to 39.4	168.4	2,397
BR-6	RS-2	48.6 to 50.0	170.9	4,211



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound
PROJECT NO. : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY NO. : 10429166
SUBMITTED BY : HDR

SAMPLE NO. : RS-1
SAMPLE LOC. : BR-1
SAMPLE DEPTH : 36.6' to 37.0'
DATE TESTED : 10/15/2025
DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Dark Gray, Argillaceous

Machine Used : ELE CT-7250

Diameter : 1.97 in

Height : 4.09 in

Area : 3.06 in²

Volume : 0.0073 ft³

RESULTS :

Air Dry Moisture:	0.6	%
Air-Dry Density :	171.8	lbs/ft. ³
Maximum Stress :	12,202	psi
Elapsed Time :	11:01	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Keri E. Walker



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound
PROJECT NO. : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY NO. : 10429166
SUBMITTED BY : HDR

SAMPLE NO. : RS-2
SAMPLE LOC. : BR-1
SAMPLE DEPTH : 42.4' to 42.8'
DATE TESTED : 10/15/2025
DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Dark Gray, Argillaceous

Machine Used : ELE CT-7250

Diameter : 1.98 in

Height : 4.04 in

Area : 3.06 in²

Volume : 0.0072 ft³

RESULTS :

Air Dry Moisture:	0.4	%
Air-Dry Density :	171.2	lbs/ft. ³
Maximum Stress :	9,577	psi
Elapsed Time :	9:17	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Ken E. Walker



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound
PROJECT NO. : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY NO. : 10429166
SUBMITTED BY : HDR

SAMPLE NO. : RS-1
SAMPLE LOC. : BR-2
SAMPLE DEPTH : 19.1' to 19.5'
DATE TESTED : 10/15/2025
DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Medium Gray, Argillaceous

Machine Used : ELE CT-7250

Diameter : 1.97 in

Height : 4.18 in

Area : 3.03 in²

Volume : 0.0073 ft³

RESULTS :

Air Dry Moisture:	0.3	%
Air-Dry Density :	170.8	lbs/ft. ³
Maximum Stress :	11,415	psi
Elapsed Time :	9:35	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Ken E. Walker



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound
PROJECT NO. : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY NO. : 10429166
SUBMITTED BY : HDR

SAMPLE NO. : RS-2
SAMPLE LOC. : BR-2
SAMPLE DEPTH : 29.1' to 29.5'
DATE TESTED : 10/15/2025
DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Light Gray, Argillaceous

Machine Used : ELE CT-7250

Diameter : 1.98 in

Height : 4.09 in

Area : 3.09 in²

Volume : 0.0073 ft³

RESULTS :

Air Dry Moisture:	0.1	%
Air-Dry Density :	167.6	lbs/ft. ³
Maximum Stress :	9,079	psi
Elapsed Time :	8:34	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Ken E. Walker



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound

PROJECT NO. : 10429166

PROJECT COUNTY : Marion

PROJECT STATE : Tennessee

LABORATORY NO. : 10429166

SUBMITTED BY : HDR

SAMPLE NO. : RS-1

SAMPLE LOC. : BR-3

SAMPLE DEPTH : 15.4' to 15.8'

DATE TESTED : 10/15/2025

DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Medium Gray, Argillaceous

Machine Used : ELE CT-7250

Diameter : 1.98 in

Height : 4.16 in

Area : 3.09 in²

Volume : 0.0074 ft³

RESULTS :

Air Dry Moisture:	0.1	%
Air-Dry Density :	168.5	lbs/ft. ³
Maximum Stress :	9,118	psi
Elapsed Time :	7:40	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Kevin E. Walker



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound
PROJECT NO. : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY NO. : 10429166
SUBMITTED BY : HDR

SAMPLE NO. : RS-2
SAMPLE LOC. : BR-3
SAMPLE DEPTH : 24.3' to 24.7'
DATE TESTED : 10/15/2025
DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Dark Gray, Argillaceous

Machine Used : ELE CT-7250

Diameter : 1.97 in

Height : 4.14 in

Area : 3.05 in²

Volume : 0.0073 ft³

RESULTS :

Air Dry Moisture:	0.4	%
Air-Dry Density :	170.5	lbs/ft. ³
Maximum Stress :	9,236	psi
Elapsed Time :	6:58	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Ken E. Walker



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound

PROJECT NO. : 10429166

PROJECT COUNTY : Marion

PROJECT STATE : Tennessee

LABORATORY NO. : 10429166

SUBMITTED BY : HDR

SAMPLE NO. : RS-2

SAMPLE LOC. : BR-4

SAMPLE DEPTH : 24.4' to 24.8'

DATE TESTED : 10/15/2025

DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Light, Gray, Argillaceous with shale nodules

Machine Used : ELE CT-7250

Diameter : 1.98 in

Height : 4.56 in

Area : 3.07 in²

Volume : 0.0081 ft³

RESULTS :

Air Dry Moisture:	1.9	%
Air-Dry Density :	173.5	lbs/ft. ³
Maximum Stress :	7,515	psi
Elapsed Time :	7:33	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Kevin E. Walker



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound	
PROJECT NO. : 10429166	SAMPLE NO. : RS-1
PROJECT COUNTY : Marion	SAMPLE LOC. : BR-4
PROJECT STATE : Tennessee	SAMPLE DEPTH : 15.3' to 15.7'
LABORATORY NO. : 10429166	DATE TESTED : 10/15/2025
SUBMITTED BY : HDR	DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Light Gray, Argillaceous

Machine Used : ELE CT-7250

Diameter : 1.98 in

Area : 3.08 in²

Height : 4.17 in

Volume : 0.0074 ft³

RESULTS :

Air Dry Moisture:	0.1	%
Air-Dry Density :	169.7	lbs/ft. ³
Maximum Stress :	10,165	psi
Elapsed Time :	8:44	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Kevin E. Walker



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound
PROJECT NO. : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY NO. : 10429166
SUBMITTED BY : HDR

SAMPLE NO. : RS-1
SAMPLE LOC. : BR-5
SAMPLE DEPTH : 33.0' to 33.4'
DATE TESTED : 10/15/2025
DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Light Gray, Fossiliferous

Machine Used : ELE CT-7250

Diameter : 1.97 in

Height : 4.10 in

Area : 3.04 in²

Volume : 0.0072 ft³

RESULTS :

Air Dry Moisture:	0.8	%
Air-Dry Density :	170.6	lbs/ft. ³
Maximum Stress :	12,563	psi
Elapsed Time :	11:00	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Kevin E. Walker



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound
PROJECT NO. : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY NO. : 10429166
SUBMITTED BY : HDR

SAMPLE NO. : RS-2
SAMPLE LOC. : BR-5
SAMPLE DEPTH : 37.8' to 38.2'
DATE TESTED : 10/15/2025
DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Light Gray, Fossiliferous

Machine Used : ELE CT-7250

Diameter : 1.97 in

Height : 4.16 in

Area : 3.05 in²

Volume : 0.0073 ft³

RESULTS :

Air Dry Moisture:	0.1	%
Air-Dry Density :	170.6	lbs/ft. ³
Maximum Stress :	9,691	psi
Elapsed Time :	9:13	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Ken E. Walker



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound
PROJECT NO. : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY NO. : 10429166
SUBMITTED BY : HDR

SAMPLE NO. : RS-1
SAMPLE LOC. : BR-6
SAMPLE DEPTH : 39.0' to 39.4'
DATE TESTED : 10/15/2025
DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Dark, Gray, Argillaceous

Machine Used : ELE CT-7250

Diameter : 1.97 in

Height : 4.13 in

Area : 3.05 in²

Volume : 0.0073 ft³

RESULTS :

Air Dry Moisture:	2.8	%
Air-Dry Density :	168.4	lbs/ft. ³
Maximum Stress :	2,397	psi
Elapsed Time :	3:09	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Kevin E. Walker



ASTM: D7012-Method C

UNCONFINED COMPRESSION TEST (ROCK CORE)

PROJECT NAME : Arcadis TDOT WO2 Shellmound
PROJECT NO. : 10429166
PROJECT COUNTY : Marion
PROJECT STATE : Tennessee
LABORATORY NO. : 10429166
SUBMITTED BY : HDR

SAMPLE NO. : RS-2
SAMPLE LOC. : BR-6
SAMPLE DEPTH : 48.6' to 50.0'
DATE TESTED : 10/15/2025
DATE REPORTED : 10/20/2025

ROCK DESCRIPTION : Limestone - Dark Gray, Argillaceous

Machine Used : ELE CT-7250

Diameter : 1.98 in

Height : 3.97 in

Area : 3.06 in²

Volume : 0.0071 ft³

RESULTS :

Air Dry Moisture:	0.9	%
Air-Dry Density :	170.9	lbs/ft. ³
Maximum Stress :	4,211	psi
Elapsed Time :	5:12	min.
Rate of Loading :	60	lb/sec



Comments :

Approved By : Ken E. Walker

Appendix D: Preliminary Soil Shear Strength Loss Analysis

Designed By: EJR
Checked By: CSH

Raw Data Input

Project Name: Shellmound Road
County: Marion County, TN

Boring Number:	B-1	Hammer Energy Ratio (ER), %:	85
Latitude:	35.04448	C _E :	1.42
Longitude:	-85.60436	Bore Hole Diameter, in.:	4
Ground Elevation, ft msl:	640.1	C ₆ :	1.00
Groundwater Depth, ft:	13.5	Liner Required:	N
Groundwater Elevation, ft msl:	626.6	Liner Used:	N
		C ₅ :	1.00

Strength Loss	8-1
Limited Liquefaction	35.04448
Full Liquefaction	-85.60436
	640.1
	13.5
	626.6

Hammer Energy Ratio (ER), %:	85
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

M_w :	4.9	MSF_{sand} :	1.80
$R(km)$:	14.89	MSF_{clay} :	1.13

Design EQ:	100-yr
Site Class:	C
PGA:	0.125
$\phi_{SL-Sand}$	1.00
$\phi_{NSL-Sand}$	1.00
$\phi_{SL-Clay}$	1.00

[illegible]

Designed By: EJR
Checked By: CSH

Raw Data Input

Project Name: Shellmound Road
County: Marion County, TN

Boring Number:	B-2	Hammer Energy Ratio (ER), %:	85
Latitude:	35.04399	C ₁ :	1.42
Longitude:	-85.60181	Bore Hole Diameter, in:	4
Ground Elevation, ft msl:	645.8	C ₂ :	1.00
Groundwater Depth, ft:	16.0	Liner Required:	N
Groundwater Elevation, ft msl:	629.8	Liner Used:	N
		C ₃ :	1.00

Strength Loss	8-2
Limited Liquefaction	35.04399
Full Liquefaction	-85.60181
	645.8
	16.0
	629.8

Hammer Energy Ratio (ER), %:	85
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

M_w :	4.9	MSF_{sand} :	1.80
$R(km)$:	14.89	MSF_{clay} :	1.13

Design EQ:	100-yr
Site Class:	C
PGA:	0.125
$\phi_{SL-Sand}$	1.00
$\phi_{NSL-Sand}$	1.00
$\phi_{SL-Clay}$	1.00

[illegible]

Designed By: EJR
Checked By: CSH

Raw Data Input

Project Name: Shellmound Road
County: Marion County, TN

Boring Number:	B-3	Hammer Energy Ratio (ER), %:	85
Latitude:	35.03999	C _E :	1.42
Longitude:	-85.60356	Bore Hole Diameter, in.:	4
Ground Elevation, ft msl:	646.1	C ₆ :	1.00
Groundwater Depth, ft:	30.0	Liner Required:	N
Groundwater Elevation, ft msl:	616.1	Liner Used:	N
		C ₅ :	1.00

Strength Loss	8-3
Limited Liquefaction	35.03999
Full Liquefaction	-85.60356
	646.1
	30.0
	616.1

Hammer Energy Ratio (ER), %:	85
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

M_w :	4.9	MSF_{sand} :	1.80
$R(km)$:	14.89	MSF_{clay} :	1.13

Design EQ:	100-yr
Site Class:	C
PGA:	0.125
$\phi_{SL-Sand}$	1.00
$\phi_{NSL-Sand}$	1.00
$\phi_{SL-Clay}$	1.00

[illegible]

Designed By: EJR
Checked By: CSH

Raw Data Input

Project Name: Shellmound Road
County: Marion County, TN

Boring Number:	B-4	Hammer Energy Ratio (ER), %:	85
Latitude:	35.04095	C _E :	1.42
Longitude:	-85.603335	Bore Hole Diameter, in.:	4
Ground Elevation, ft msl:	644.4	C _H :	1.00
Groundwater Depth, ft:	30.0	Liner Required:	N
Groundwater Elevation, ft msl:	614.4	Liner Used:	N
		C _S :	1.00

Strength Loss	8-4
Limited Liquefaction	35.04095
Full Liquefaction	-85.60335
	644.4
	30.0
	614.4

Hammer Energy Ratio (ER), %:	85
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

M_w :	4.9	MSF_{sand} :	1.80
$R(km)$:	14.89	MSF_{clay} :	1.13

Design EQ:	100-yr
Site Class:	C
PGA:	0.125
$\phi_{SL-Sand}$	1.00
$\phi_{NSL-Sand}$	1.00
$\phi_{SL-Clay}$	1.00

*Assumed		C _c 1.00		Calculated Strengths												Strength Override				Soil Strength Loss Triggering Summary												Reduced Seismic Shear		Geotechnical Seismic Hazards				Static Shear Strengths		Seismic Shear Strengths																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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SPT Sample	Depth, ft	Elev, ft msl	N _{mes} , bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K _{ch}	SSL Soil Type	φ ⁱ , deg	c, psf	γ _{sat} , pcf	φ ⁱ , deg	c, psf	C _E	C _N	C _A	C _S	C _B	C _r	σ, psf	δ, psf	N ₆₀	N _{L60}	N ₂₀	N _{1,60,0}	N _{1,60,0,0}	LI	ΔN _{1,60}	SSL Potential	SSL Susceptibility Screening	(D/C) _{SL}	φ _{SL}	(D/C) _{SL} ≤ φ _{SL}	φ ₁₀ , deg	φ _{6lim} , deg	τ ₁₀ , psf	LDI, ft	ΣLDI, ft	Σ _{v-10} , in	Σ _{v-10} , in	φ ⁱ , deg	c, psf	φ ⁱ , deg	c, psf																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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Designed By: EJR
Checked By: CSH

Raw Data Input

Project Name: Shellmound Road
County: Marion County, TN

Boring Number	BR-2	Hammer Energy Ratio (ER), %	85
Latitude	35.04398	C _u	1.42
Longitude	-85.60295	Bore Hold Diameter, in.:	4
Ground Elevation, ft msl	625.4	C _u	1.00
Groundwater Depth, ft	34.0	Liner Required:	N
Groundwater Elevation, ft msl	591.4	Liner Used:	N
		C _s	1.00

Strength Loss	BR-2
Limited Liquefaction	35.04398
Full Liquefaction	-85.60295
	625.4
	34.0
	591.4

Hammer Energy Ratio (ER), %:	85
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

M _{wp}	4.9	MSF _{undr}	1.80
R(km):	14.89	MSF _{day}	1.13

Design EQ:	100-yr
Site Class:	C
PGA:	0.125
Φ _{SL-Sand}	1.00
Φ _{NdL-Sand}	1.00
Φ _{SL-Clay}	1.00

*Assumed															Calculated Strengths				Strength Override																						Soil Strength Loss Triggering Summary				Reduced Seismic Shear				Geotechnical Seismic Hazards				Strengths		Seismic Shear Strengths																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
SPT Sample	Depth, ft	Elev, ft msl	N _{max} , bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K _{sh}	SSL Soil Type	φ', deg	c, psf	γ _{sat} , pcf	φ', deg	c, psf	C _E	C _N	C _R	C _S	C _B	C _r	σ, psf	σ _v , psf	N ₆₀	N _{1,60}	N _{1,60} [*]	N _{1,60} [*]	N _{1,60} [*]	LI	ΔN _{1,60} [*]	N _{1,60} [*]	SSL Potential	SSL Susceptibility Screening	(D/C) _{SL}	φ _{SL}	(D/C) _{SL} ≤ φ _{SL}	φ _{SL} , deg	φ _{SL,lim} , deg	τ _{res} , psf	LDI, ft	ΣLDI, ft	S _{V,1Dv} , in	ΣS _{V,1Dv} , in	φ', deg	c, psf	φ', deg	c, psf																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Raw Data Input

Boring Number:	BR-3
Latitude:	35.04422
Longitude:	-85.60287
Elevation, ft msl:	626.0
Water Depth, ft:	29.2
Elevation, ft msl:	596.8

Strength Loss	BR-3
Limited Liquefaction	35.04422
Full Liquefaction	-85.60287
	626.0
	29.2
	596.8

M_w :	4.9	MSF_{sand} :	1.80
$R(km)$:	14.89	MSF_{clay} :	1.13

Design EQ:	100-yr
Site Class:	C
PGA:	0.125
$\phi_{SL-Sand}$	1.00
$\phi_{NSL-Sand}$	1.00
$\phi_{SL-Clay}$	1.00

*Assumed														Calculated Strength				Strength Override				Soil Strength Loss Triggering Summary										Reduced Seismic Shear				Geotechnical Seismic Hazards				Strengths		Seismic Shear Strengths																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
SPT Sample	Depth, ft	Elev, ft msl	N _{meas} , bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K _{sc}	SSL Soil Type	φ', deg	c, psf	γ _{soil} , pcf	φ', deg	c, psf	C _e	C _u	C _R	C _s	C _a	C _i	α, psf	β, psf	N ₆₀	N _{1,60}	N' ₆₀	N' _{1,60}	N' _{1,60(z)}	LI	ΔN' _{1,60}	N' _{1,60(z)}	SSL Potential	SSL Susceptibility Screening	(D/C) _{SL} > φ _{SL}	φ _{SL}	(D/C) _{SL} ≤ φ _{SL}	φ _{SL} , deg	φ _{0.001} , deg	τ _{cr} , psf	LDI, ft	ΣLDI, ft	S _{v10v} in	ΣS _{v10v} in	φ', deg	c, psf	φ', deg	c, psf																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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Designed By: EJR
Checked By: CSH

Raw Data Input

Project Name: Shellmound Road
County: Marion County, TN

Boring Number:	BR-4	Hammer Energy Ratio (ER), %:	85
Latitude:	35.04388	C ₁ :	1.42
Longitude:	-85.60274	Bore Hole Diameter, in.:	4
Ground Elevation, ft msl:	626.2	C ₂ :	1.00
Groundwater Depth, ft:	33.5	Liner Required:	N
Groundwater Elevation, ft msl:	592.7	Liner Used:	N
		C ₃ :	1.00

Strength Loss	BR-4
Limited Liquefaction	35.04388
Full Liquefaction	-85.60274
	626.2
	33.5
	592.7

Hammer Energy Ratio (ER), %:	85
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

M_w :	4.9	MSF_{sand} :	1.80
$R(km)$:	14.89	MSF_{clay} :	1.13

Design EQ:	100-yr
Site Class:	C
PGA:	0.125
$\phi_{SL-Sand}$	1.00
$\phi_{NSL-Sand}$	1.00
$\phi_{SL-Clay}$	1.00

*Assumed																C _e	1.00											Calculated Strengths		Strength Override												Soil Strength Loss Triggering Summary				Reduced Seismic Shear				Geotechnical Seismic Hazards				Static Shear Strengths		Seismic Shear Strengths	
SPT Sample	Depth, ft	Elev. ft msl	N ₆₀ , bpf	FC, %		LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K ₀	SSL Soil Type	φ', deg	c, psf	Y _{max} , pcf	φ', deg	c, psf		C _e	C _h	C _R	C _L	C _T	a, psf	σ, psf	N ₆₀	N _{1,60}	N _{1,40}	N _{1,300}	N _{1,300,SS}	LI	ΔN _{1,60,SS}	N _{1,60,SS}	SSL Potential	SSL Susceptibility Screening	(D/C) _{SL}	φ _{SL}	(D/C) _{SL} ≤ φ _{SL}	φ _{SL} , deg	φ _{SL(0.05)} , deg	τ _{SL} , psf	LDI, ft	ΣLDI, ft	S _{v1,0.05} , in	ΣS _{v1,0.05} , in	φ', deg	c, psf	φ', deg	c, psf					
SS-1	1.8	624.4	23	67.3	45	23	22	14.3	CL	Quaternary	Holocene	1	Clay-Like	-	4890	120		1.42	1.70	0.75	1.0	1.00	1.2	216	216	32.6	55.4	24.4	41.5	49.1	4.0	5.5	47.0	PSL	NS Clay-Like	0.00	1	No Strength Loss	-	-	-	-	0.0	-	0.0	-	4890	-	0								
SS-2	4.2	622	100	17.6	26	17	9	19.9	SC	Quaternary	Holocene	1	Clay-Like	-	10630	120		1.42	1.70	0.75	1.0	1.00	1.1	504	504	141.7	240.8	106.3	50.0	54.4	NP	4.0	54.0	PSL	HS Clay-Like	0.00	1	No Strength Loss	-	-	-	-	0.0	-	0.0	-	21250	-	0								
SS-3	6.8	619.4	44	23.9	NP	NP	NP	6.0	GM	Quaternary	Holocene	1	Sand-Like	48	-	120		1.42	1.57	0.80	1.0	1.00	1.1	816	816	62.3	97.6	50.1	50.0	56.0	NP	5.0	55.0	NSLS	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0	-	48	-	48	0							
SS-4	9.3	616.9	31	23.9	NP	NP	NP	6.3	GM	Quaternary	Holocene	1	Sand-Like	48	-	120		1.42	1.34	0.85	1.0	1.00	1.1	1116	1116	43.9	58.8	37.2	49.8	55.7	NP	5.0	54.8	NSLS	Sand-Like	0.00	1	No Liquefaction	-	-	-	-	0.0	-	0.0	-	48	-	48	0							
SS-5	14.3	611.9	24	70.1	67	31	36	25.1	CH	Quaternary	Holocene	1	Clay-Like	-	5100	120		1.42	1.08	0.91	1.0	1.00	1.1	1716	1716	34.0	36.7	30.9	33.3	37.7	NP	5.0	38.3	PSL	HS Clay-Like	0.03	1	No Strength Loss	-	-	-	-	0.0	-	0.0	-	5100	-	0								
SS-6	15.1	611.1	100	70.1	67	31	36	7.2	CH	Quaternary	Holocene	1	Clay-Like	-	21250	120		1.42	1.05	0.92	1.0	1.00	1.2	1812	1812	141.7	148.8	129.7	50.0	58.8	-0.67	5.5	55.5	PSL	NS Clay-Like	0.01	1	No Strength Loss	-	-	-	-	0.0	-	0.0	-	21250	-	0								

Designed By: EJR
Checked By: CSH

Raw Data Input

Project Name: Shellmound Road
County: Marion County, TN

Boring Number:	BR-5	Hammer Energy Ratio (ER), %:	85
Latitude:	-35.04019	C ₁ :	1.42
Longitude:	-85.60348	Bore Hole Diameter, in.:	4
Ground Elevation, ft msl:	648.5	C ₂ :	1.00
Groundwater Depth, ft:	52.6	Liner Required:	N
Groundwater Elevation, ft msl:	595.9	Liner Used:	N
		C ₃ :	1.00

Strength Loss	BR-5
Limited Liquefaction	35.04019
Full Liquefaction	-85.60348
	648.5
	52.6
	595.9

Hammer Energy Ratio (ER), %:	85
Bore Hold Diameter, in.:	4
Liner Required	N
Liner Used	N

M_w :	4.9	MSF_{sand} :	1.80
$R(km)$:	14.89	MSF_{clay} :	1.13

Design EQ:	100-yr
Site Class:	C
PGA:	0.125
$\phi_{SL-Sand}$	1.00
$\phi_{NSL-Sand}$	1.00
$\phi_{SL-Clay}$	1.00

*Assumed										C _c : 1.00		Calculated Strengths				Strength Override				Soil Strength Loss Triggering Summary										Reduced Seismic Shear				Geotechnical Seismic Hazards				Static Shear Strengths		Seismic Shear Strengths											
SPT Sample	Depth, ft	Elev, ft msl	N ₆₀ , bpf	FC, %	LL	PL	PI	w, %	USCS Soil Type	Soil Layer	General Geology	Epoch	K _{sat}	SSL Soil Type	φ', deg	c, psf	γ _{sat} , pcf	φ', deg	c, psf											C _c	C _N	C _q	C _s	C _B	C _f	σ, psf	σ ₁ , psf	N ₆₀	N _{1,60}			N _{1,60}	N _{1,60,0.5}	LI	ΔN _{1,60}	N _{1,60,0.5}	SSL Potential	SSL Susceptibility Screening	(D/C) _{SL}	φ _{SL}	(D/C) _{SL} ≤ φ _{SL}
0																																																			
SS-1	1.8	646.7	9	78.6	47	27	20	28.3	ML		Quaternary	Holocene	1	Clay-Like	-	1910	120			1.42	1.70	0.75	1.0	1.00	1.2	216	216	12.8	21.7	9.6	16.3	20.3	0.04	5.5	21.8	PSL	NS Clay-Like	0.01	1	No Strength Loss	-	-	-	-	0.0	-	0.0	-	1910	-	0
SS-2	4.3	644.2	37	15.3	26	17	9	9.4	GC		Quaternary	Holocene	1	Clay-Like	-	3930	120			1.42	1.70	0.75	1.0	1.00	1.1	516	516	52.4	89.1	39.3	50.0	53.8	-0.82	3.4	53.4	PSL	NS Clay-Like	0.01	1	No Strength Loss	-	-	-	-	0.0	-	0.0	-	7860	-	0
SS-3	6.8	641.7	25	15.3	26	17	9	11.0	GC		Quaternary	Holocene	1	Clay-Like	-	2660	120			1.42	1.57	0.80	1.0	1.00	1.1	816	816	35.4	55.4	28.4	44.5	48.0	-0.64	3.4	47.9	PSL	NS Clay-Like	0.01	1	No Strength Loss	-	-	-	-	0.0	-	0.0	-	5310	-	0
SS-4	9.3	639.2	20	15.3	26	17	9	13.6	GC		Quaternary	Holocene	1	Clay-Like	-	2130	120			1.42	1.34	0.85	1.0	1.00	1.1	1116	1116	28.3	37.9	24.0	32.1	34.8	-0.36	3.4	35.5	PSL	NS Clay-Like	0.02	1	No Strength Loss	-	-	-	-	0.0	-	0.0	-	4250	-	0
SS-5	14.3	634.2	26	16.5	26	21	5	14.4	GC-GM		Quaternary	Holocene	1	Sand-Like	44	-	120			1.42	1.08	0.91	1.0	1.00	1.1	1716	1716	36.8	36.9	33.5	36.1	39.3	-1.38	3.7	39.8	NSL-S	Sand-Like	0.01	1	No Liquefaction	-	-	-	-	0.0	-	0.0	44	-	44	0
SS-6	19.3	629.2	35	31.4	27	18	9	17.0	GC		Quaternary	Holocene	1	Clay-Like	-	3720	120			1.42	0.93	0.95	1.0	1.00	1.2	2316	2316	49.6	46.1	46.9	43.6	50.6	-0.14	5.4	49.0	PSL	NS Clay-Like	0.02	1	No Strength Loss	-	-	-	-	0.0	-	0.0	-	7440	-	0
SS-7	24.3	624.2	5	69.2	22	17	5	24.3	CL-ML		Quaternary	Holocene	1	Sand-Like	29	-	120			1.42	0.83	0.97	1.0	1.00	1.4	2916	2916	7.1	5.9	6.9	5.7	8.2	1.53	5.5	11.2	NSL-S	Sand-Like	0.30	1	No Liquefaction	-	-	-	-	0.0	-	0.0	29	-	29	0

