

REFERENCE: BR-0004

PROJECT: 67004

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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BEAUFORT & HYDE
PROJECT DESCRIPTION BRIDGE NO. 66 ON -L- (US-264)
OVER PUNGO RIVER BETWEEN SR 1710 (BIBLE
SHORE RD.) AND NC-45 AT STA. 23 + 50

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0004	1	17

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
- BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

C. SWAFFORD

K. TACKETT

MID-ATLANTIC

DRILLING, INC.

INVESTIGATED BY HDR

DRAWN BY G. ALBRIGHT

CHECKED BY S. KABRA

SUBMITTED BY HDR

DATE SEPTEMBER 2024



HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-01116



Signed by:

Saket Kabra

01/10/2025

93B8C24A-11A2-428F

SIGNATURE

DATE

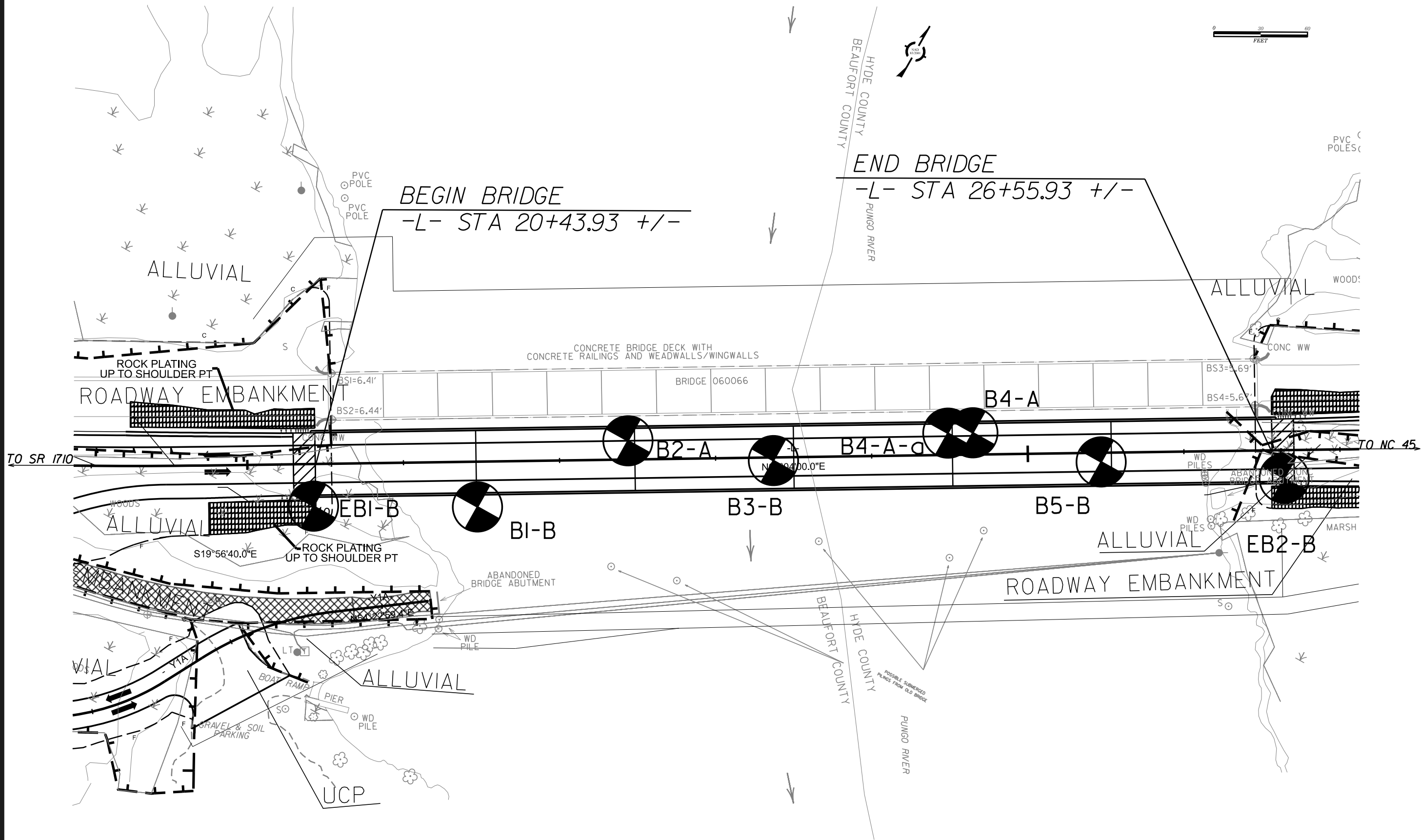
**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT**

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

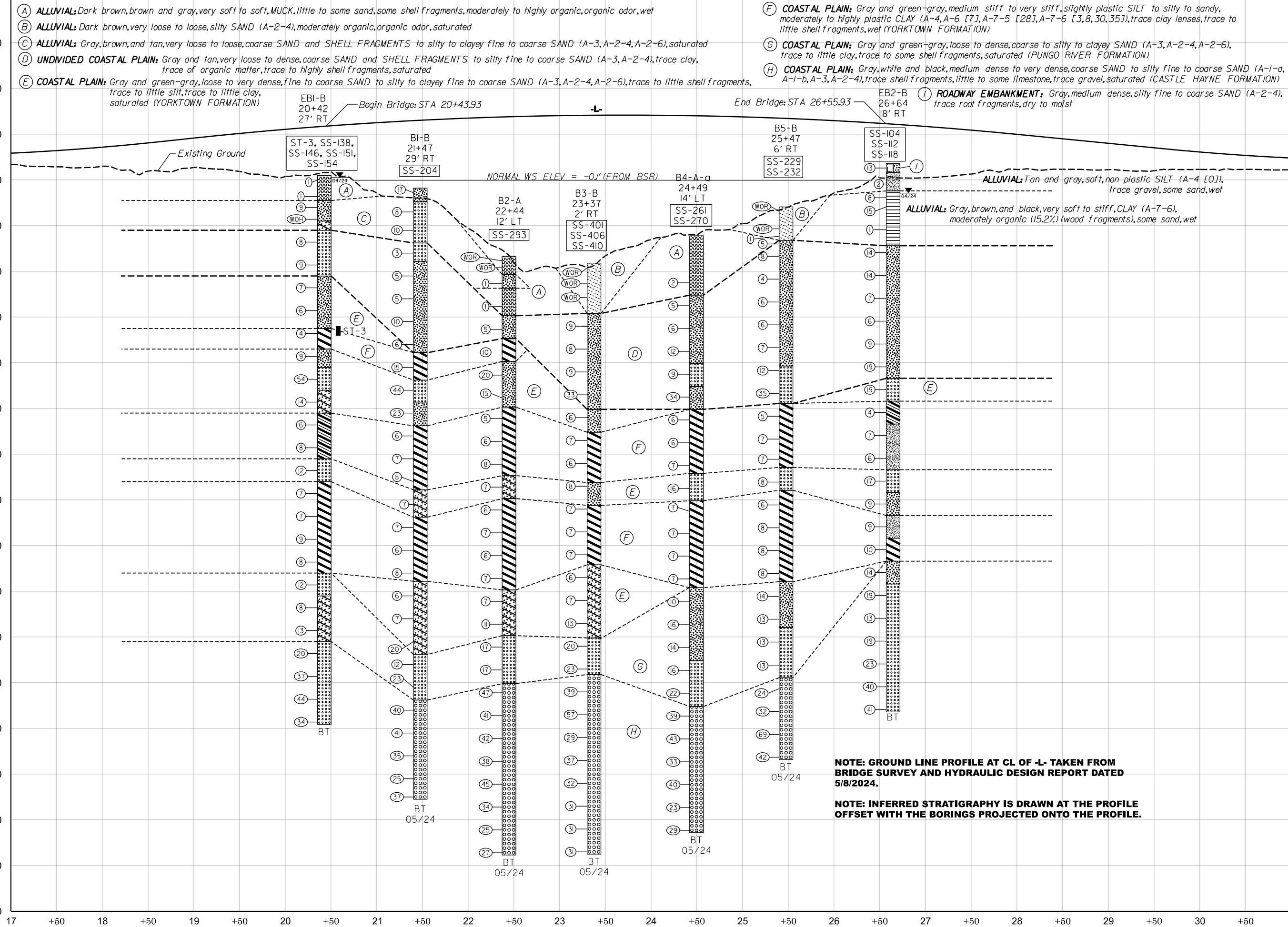
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																																																					
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</p>	<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>	<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>	<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																					
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="6">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="4">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="2">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1-a</th> <th>A-1-b</th> <th>A-3</th> <th>A-2-4</th> <th>A-2-5</th> <th>A-2-6</th> <th>A-2-7</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> <tr> <td>GROUP CLASS.</td> <td colspan="2">A-1</td> <td>A-3</td> <td colspan="2">A-2</td> <td>A-2-7</td> <td>A-4</td> <td>A-5</td> <td>A-6</td> <td>A-7</td> <td>A-1, A-2</td> <td>A-3</td> <td>A-4, A-5</td> <td>A-6, A-7</td> <td></td> </tr> <tr> <td>SYMBOL</td> <td colspan="2">[Symbol]</td> <td>[Symbol]</td> <td colspan="2">[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> </tr> <tr> <td>% PASSING #10 #40 #200</td> <td colspan="2">50 MX 30 MX 15 MX</td> <td>51 MN 10 MX 25 MX</td> <td>35 MX 35 MX</td> <td>35 MX 35 MX</td> <td>35 MX 35 MX</td> <td>36 MN 36 MN</td> <td>36 MN 36 MN</td> <td>36 MN 36 MN</td> <td>36 MN 36 MN</td> <td>36 MN 36 MN</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td>MUCK, PEAT</td> <td></td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td colspan="2">-</td> <td>NP</td> <td>40 MX 10 MX</td> <td>41 MN 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 10 MX</td> <td>41 MN 11 MN</td> <td>40 MX 10 MX</td> <td>41 MN 11 MN</td> <td>40 MX 10 MX</td> <td>41 MN 11 MN</td> <td>SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td>HIGHLY ORGANIC SOILS</td> <td></td> </tr> <tr> <td>GROUP INDEX</td> <td colspan="2">0</td> <td>0</td> <td>4 MX</td> <td>4 MX</td> <td>4 MX</td> <td>8 MX 12 MX</td> <td>16 MX</td> <td>NO MX</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="2">STONE FRAGS, GRAVEL, AND SAND</td> <td>FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td></td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GEN. 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ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>SLIGHTLY COMPRESSIBLE</td> <td>LL < 31</td> </tr> <tr> <td>MODERATELY COMPRESSIBLE</td> <td>LL = 31 - 50</td> </tr> <tr> <td>HIGHLY COMPRESSIBLE</td> <td>LL > 50</td> </tr> </table> <p>PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>	SLIGHTLY COMPRESSIBLE	LL < 31	MODERATELY COMPRESSIBLE	LL = 31 - 50	HIGHLY COMPRESSIBLE	LL > 50	ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE	<p>WEATHERING</p> <p>FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V SL.): ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SL.): ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MOD.): SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p> <p>MODERATELY SEVERE (MOD. SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p> <p>SEVERE (SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i></p> <p>VERY SEVERE (V SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i></p> <p>COMPLETE: ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>
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REVISIONS

5/26/20

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NOTE: GROUND LINE PROFILE AT CL OF -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 5/8/2024.

NOTE: INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE OFFSET WITH THE BORINGS PROJECTED ONTO THE PROFILE.

BR-0004
 PROFILE 004

NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 WAKE COUNTY

ROADWAY DESIGN UNIT
 ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
 DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

PREPARED BY
 HDR

HDR Engineering, Inc. of the Carolinas
 150 Fayetteville St., Suite 1000, Fayetteville, NC 28401
 N.C. B.E.L.S. License Number: F-0119

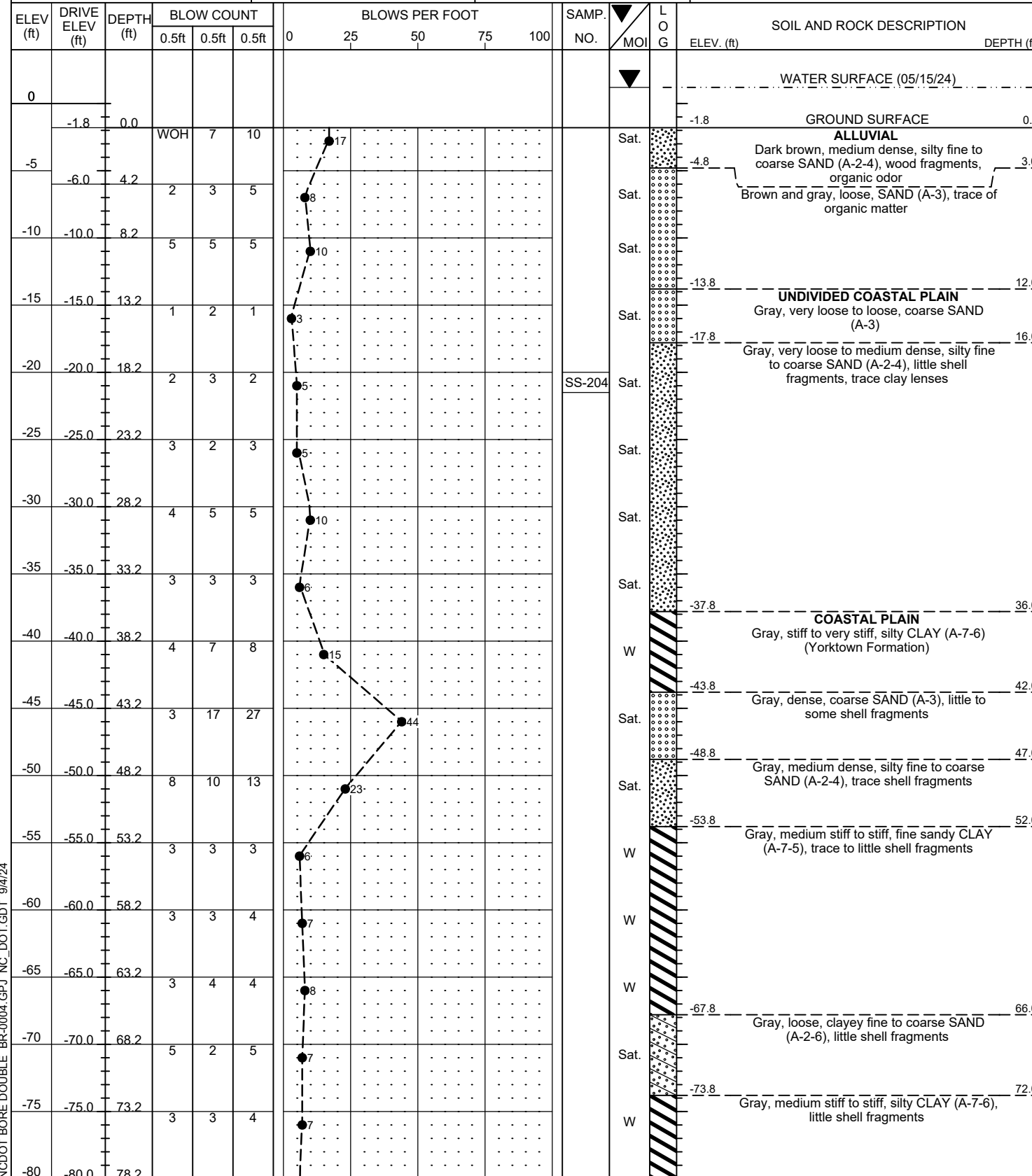
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 VE = 5

REVISIONS

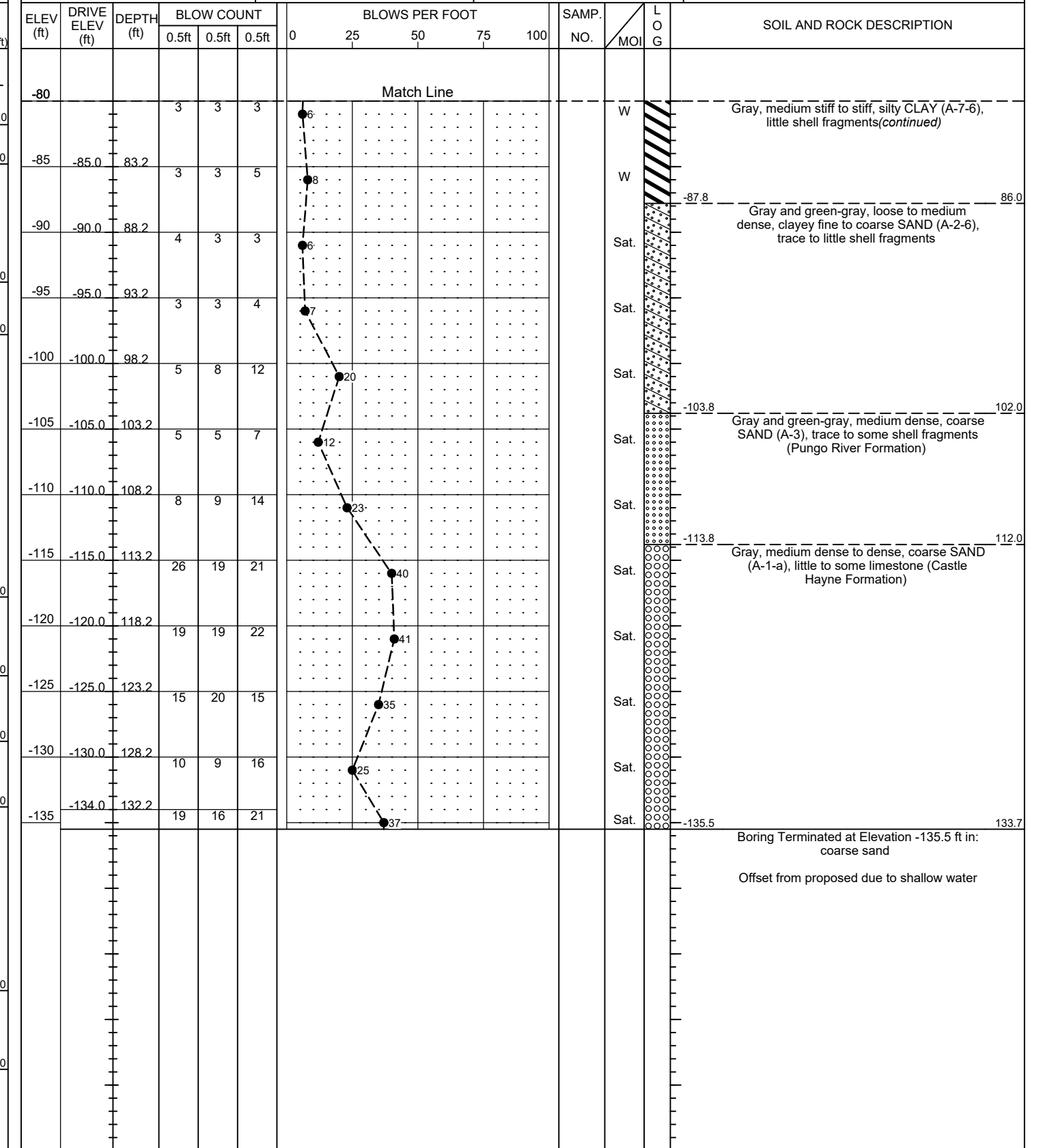
GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67004.1.1	TIP BR-0004	COUNTY BEAUFORT/HYDE	GEOLOGIST Swafford, C
SITE DESCRIPTION BRIDGE NO. 66 ON US 264 OVER PUNGO RIVER			GROUND WTR (ft)
BORING NO. B1-B	STATION 21+47	OFFSET 29 ft RT	ALIGNMENT -L-
COLLAR ELEV. -1.8 ft	TOTAL DEPTH 133.7 ft	NORTHING 672,148	EASTING 2,742,796
DRILL RIG/HAMMER EFF./DATE MID152 Diedrich D-25 80% 01/03/2023		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Wiggins, M.	START DATE 05/15/24	COMP. DATE 05/16/24	SURFACE WATER DEPTH 3.0ft



WBS 67004.1.1	TIP BR-0004	COUNTY BEAUFORT/HYDE	GEOLOGIST Swafford, C
SITE DESCRIPTION BRIDGE NO. 66 ON US 264 OVER PUNGO RIVER			GROUND WTR (ft)
BORING NO. B1-B	STATION 21+47	OFFSET 29 ft RT	ALIGNMENT -L-
COLLAR ELEV. -1.8 ft	TOTAL DEPTH 133.7 ft	NORTHING 672,148	EASTING 2,742,796
DRILL RIG/HAMMER EFF./DATE MID152 Diedrich D-25 80% 01/03/2023		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Wiggins, M.	START DATE 05/15/24	COMP. DATE 05/16/24	SURFACE WATER DEPTH 3.0ft



NCDOT BORE DOUBLE BR-0004.GPJ NC_DOT.GDT 9/4/24

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67004.1.1		TIP BR-0004		COUNTY BEAUFORT/HYDE		GEOLOGIST Swafford, C	
SITE DESCRIPTION BRIDGE NO. 66 ON US 264 OVER PUNGO RIVER							GROUND WTR (ft)
BORING NO. B2-A		STATION 22+44		OFFSET 12 ft LT		ALIGNMENT -L-	
COLLAR ELEV. -16.7 ft		TOTAL DEPTH 131.0 ft		NORTHING 672,233		EASTING 2,742,860	
DRILL RIG/HAMMER EFF./DATE MID152 Diedrich D-25 80% 01/03/2023		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic			
DRILLER Wiggins, M.		START DATE 05/22/24		COMP. DATE 05/24/24		SURFACE WATER DEPTH 17.4ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
0														0.0
														0.0
-5														0.0
														0.0
-10														0.0
														0.0
-15														0.0
														0.0
-20	-16.7	0.0												0.0
	-18.2	1.5	WOR	WOR	WOR									0.0
			WOR	WOR	WOR									0.0
-25	-21.7	5.0	1	0	1									0.0
														0.0
-30	-26.7	10.0	WOH	WOH	1									0.0
														0.0
-35	-31.7	15.0	2	2	3									0.0
														0.0
-40	-36.7	20.0	4	5	5									0.0
														0.0
-45	-41.7	25.0	4	8	12									0.0
														0.0
-50	-46.7	30.0	3	6	9									0.0
														0.0
-55	-51.2	34.5	2	3	2									0.0
														0.0
-60	-56.2	39.5	2	3	3									0.0
														0.0
-65	-61.2	44.5	3	3	5									0.0
														0.0
-70	-66.2	49.5	3	3	4									0.0
														0.0
-75	-71.2	54.5	3	3	3									0.0
														0.0
-80	-76.2	59.5	2	3	4									0.0
														0.0

WBS 67004.1.1		TIP BR-0004		COUNTY BEAUFORT/HYDE		GEOLOGIST Swafford, C	
SITE DESCRIPTION BRIDGE NO. 66 ON US 264 OVER PUNGO RIVER							GROUND WTR (ft)
BORING NO. B2-A		STATION 22+44		OFFSET 12 ft LT		ALIGNMENT -L-	
COLLAR ELEV. -16.7 ft		TOTAL DEPTH 131.0 ft		NORTHING 672,233		EASTING 2,742,860	
DRILL RIG/HAMMER EFF./DATE MID152 Diedrich D-25 80% 01/03/2023		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic			
DRILLER Wiggins, M.		START DATE 05/22/24		COMP. DATE 05/24/24		SURFACE WATER DEPTH 17.4ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
-80														0.0
														0.0
-85														0.0
														0.0
-90														0.0
														0.0
-95														0.0
														0.0
-100														0.0
														0.0
-105														0.0
														0.0
-110														0.0
														0.0
-115														0.0
														0.0
-120														0.0
														0.0
-125														0.0
														0.0
-130														0.0
														0.0
-135														0.0
														0.0
-140														0.0
														0.0
-145														0.0
														0.0
-147.7														0.0

NCDOT BORE DOUBLE BR-0004.GPJ NC_DOT_GDT 9/4/24

GEOTECHNICAL BORING REPORT BORE LOG

WBS 67004.1.1		TIP BR-0004		COUNTY BEAUFORT/HYDE		GEOLOGIST Swafford, C										
SITE DESCRIPTION BRIDGE NO. 66 ON US 264 OVER PUNGO RIVER							GROUND WTR (ft)									
BORING NO. B4-A		STATION 24+65		OFFSET 14 ft LT		ALIGNMENT -L-										
COLLAR ELEV. -12.1 ft		TOTAL DEPTH 5.9 ft		NORTHING 672,344		EASTING 2,743,050										
DRILL RIG/HAMMER EFF./DATE MID152 Diedrich D-25 80% 01/03/2023				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Wiggins, M.		START DATE 05/21/24		COMP. DATE 05/21/24		SURFACE WATER DEPTH 12.4ft										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
0																
-5																
-10																
-12.1	0.0													-12.1	GROUND SURFACE	0.0
-14.0	1.9		WOR	WOR	WOR	0	...	...	...	...			W		ALLUVIAL	
-16.5	4.4		WOR	WOR	WOR	0	...	...	...	...			W		Brown, very soft, MUCK, organic odor	
-18.0			WOR	WOR	WOR	0	...	...	...	...			W			5.9
															Boring Terminated at Elevation -18.0 ft in Alluvial: MUCK	
															Large wood debris in the way. Pulled up and offset so casing could be set. Continued on B4-A-a	

NCDOT BORE DOUBLE BR-0004.GPJ NC_DOT.GDT 9/4/24

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67004.1.1		TIP BR-0004		COUNTY BEAUFORT/HYDE		GEOLOGIST Swafford, C										
SITE DESCRIPTION BRIDGE NO. 66 ON US 264 OVER PUNGO RIVER							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 26+64		OFFSET 18 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 3.6 ft		TOTAL DEPTH 120.0 ft		NORTHING 672,416		EASTING 2,743,239										
DRILL RIG/HAMMER EFF./DATE MID6214 CME-45C 85% 01/03/2023			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Powell, B.		START DATE 04/23/24		COMP. DATE 04/23/24		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
5	3.6	0.0	4	5	8											
0	0.1	3.5	1	2	0											
-5	-2.9	6.5	5	3	5											
-10	-4.9	8.5	3	6	9											
-15	-9.9	13.5	WOH	WOH	1											
-20	-14.9	18.5	5	6	8											
-25	-19.9	23.5	6	8	6											
-30	-24.9	28.5	3	4	3											
-35	-29.9	33.5	3	3	3											
-40	-34.9	38.5	5	4	5											
-45	-39.9	43.5	5	10	9											
-50	-44.9	48.5	8	10	9											
-55	-49.9	53.5	2	2	2											
-60	-54.9	58.5	3	3	4											
-65	-59.9	63.5	3	2	4											
-70	-64.9	68.5	5	6	11											
-75	-69.9	73.5	4	4	5											
-75	-74.9	78.5														

WBS 67004.1.1		TIP BR-0004		COUNTY BEAUFORT/HYDE		GEOLOGIST Swafford, C										
SITE DESCRIPTION BRIDGE NO. 66 ON US 264 OVER PUNGO RIVER							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 26+64		OFFSET 18 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 3.6 ft		TOTAL DEPTH 120.0 ft		NORTHING 672,416		EASTING 2,743,239										
DRILL RIG/HAMMER EFF./DATE MID6214 CME-45C 85% 01/03/2023			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Powell, B.		START DATE 04/23/24		COMP. DATE 04/23/24		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-75			3	4	5											
-80	-79.9	83.5	3	4	6											
-85	-84.9	88.5	5	5	9											
-90	-89.9	93.5	7	8	11											
-95	-94.9	98.5	4	5	8											
-100	-99.9	103.5	8	9	10											
-105	-104.9	108.5	15	11	12											
-110	-109.9	113.5	11	18	22											
-115	-114.9	118.5	26	23	18											

NCDOT BORE DOUBLE BR-0004.GPJ NC_DOT_GDT 9/4/24

-L- SOIL TEST RESULTS

Boring No.	SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	NORTHING	EASTING
								C.SAND	F.SAND	SILT	CLAY	10	40	200				
EB1-B	SS-138	20+42	27' RT	0.1.5	NT	NT	NT	NT	NT	NT	NT	NT	NT	110.8	15.2	672098	2742704	
EB1-B	SS-146	20+42	27' RT	33.6-35.1	A-7-6 [8]	52	29	8.4	54.8	9.6	27.3	99.9	93.3	44.3	73.2	NT	672098	2742704
EB1-B	SS-151	20+42	27' RT	58.6-60.1	A-6 [7]	40	18	25.4	28.6	20.9	25.2	95.4	75.8	52.8	31.9	NT	672098	2742704
EB1-B	SS-154	20+42	27' RT	73.6-75.1	A-7-6 [35]	59	39	5	17.4	30.9	46.6	98.5	94.6	84.9	46.5	NT	672098	2742704
EB1-B	ST-3-1	20+42	30' RT	34.6-35	A-2-4	NP	NP	2.8	76.4	5.4	15.4	99.7	98.9	24.8	-	NT	672098	2742704
EB1-B	ST-3-2	20+42	30' RT	33.5 - 34	A-4 [0]	NP	NP	14.3	49.1	16.6	20	99.9	95.9	37.9	41	NT	672098	2742704
B1-B	SS-204	21+47	29' RT	18.2-19.7	A-2-4	NP	NP	19.3	67.1	8.9	4.7	91.5	77.8	16.1	-	NT	672148	2742796
B2-A	SS-293	22+44	12' LT	39.5-41.0	A-7-6 [3]	44	16	21.6	34.9	34.7	8.8	82.9	68.3	42.9	45	NT	672233	2742860
B3-B	SS-401	23+37	2' RT	3.4-4.9	A-2-4	NP	NP	ND	ND	ND	ND	100	64.1	16	-	NT	672266	2742947
B3-B	SS-406	23+37	2' RT	27.8-29.3	A-2-4	20	NP	28.3	64.1	4.3	3.3	93	88	8.8	-	NT	672266	2742947
B3-B	SS-410	23+37	2' RT	48.0-49.3	A-2-4	33	5	22.2	45.8	23.2	8.8	86.3	72.4	33.5	-	NT	672266	2742947
B4-A-a	SS-261	24+49	14' LT	19.3-20.8	A-2-4	NP	NP	21.4	65.9	8	4.7	96.9	87.2	15.1	-	NT	672336	2743036
B4-A-a	SS-270	24+49	14' LT	64.1-65.6	A-7-5 [28]	55	24	1.9	6.9	70.2	21	100	98.5	95.8	50	NT	672336	2743036
B5-B	SS-229	25+47	6' RT	3.8-5.2	A-2-4	NP	NP	ND	ND	ND	ND	100	64.1	16	-	NT	672368	2743131
B5-B	SS-232	25+47	6' RT	9.8-11.3	A-2-4	20	NP	1	87.6	3.7	7.7	99.8	99.6	14.5	-	NT	672368	2743131
EB2-B	SS-104	26+65	18' RT	13.5-15.0	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	141	15.2	672416	2743239
EB2-B	SS-112	26+65	18' RT	53.5-55.0	A-6 [7]	33	13	1.1	32.4	27	39.7	96.19	95.8	67.9	39.7	NT	672416	2743239
EB2-B	SS-118	26+65	18' RT	83.5-85.0	A-7-6 [30]	53	30	2.7	15.0	39.9	42.4	98.5	96.8	91.9	40.4	NT	672416	2743239

ND = Not Determined

NT = Not Tested

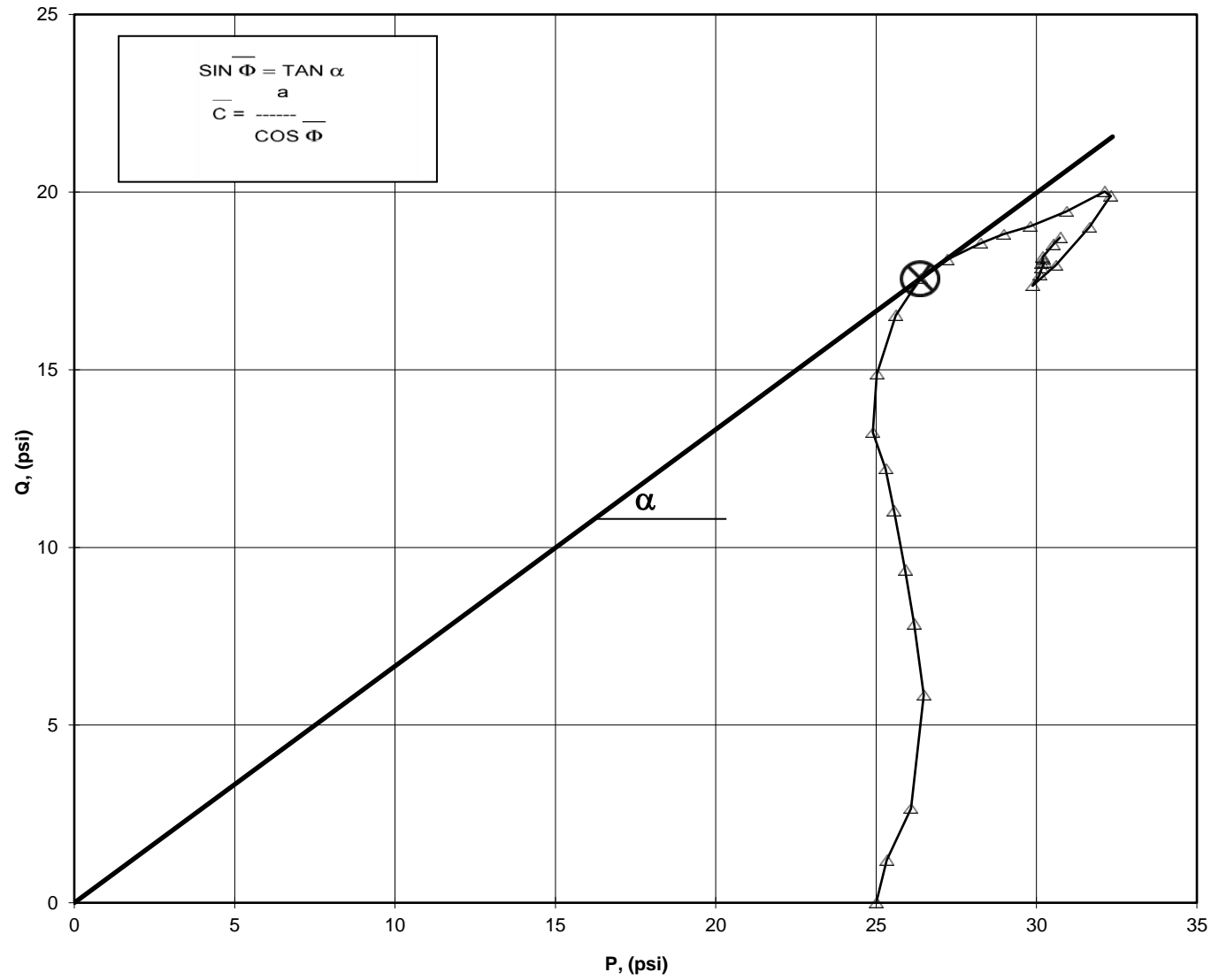
**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
AASHTO T-297**

Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Reference: Bridge No. 66 on US 264 over Pu Depth (ft): 33-35
 Project No.: R-2024-155-001 Sample No.: ST-3
 Lab ID: R-2024-155-001-005

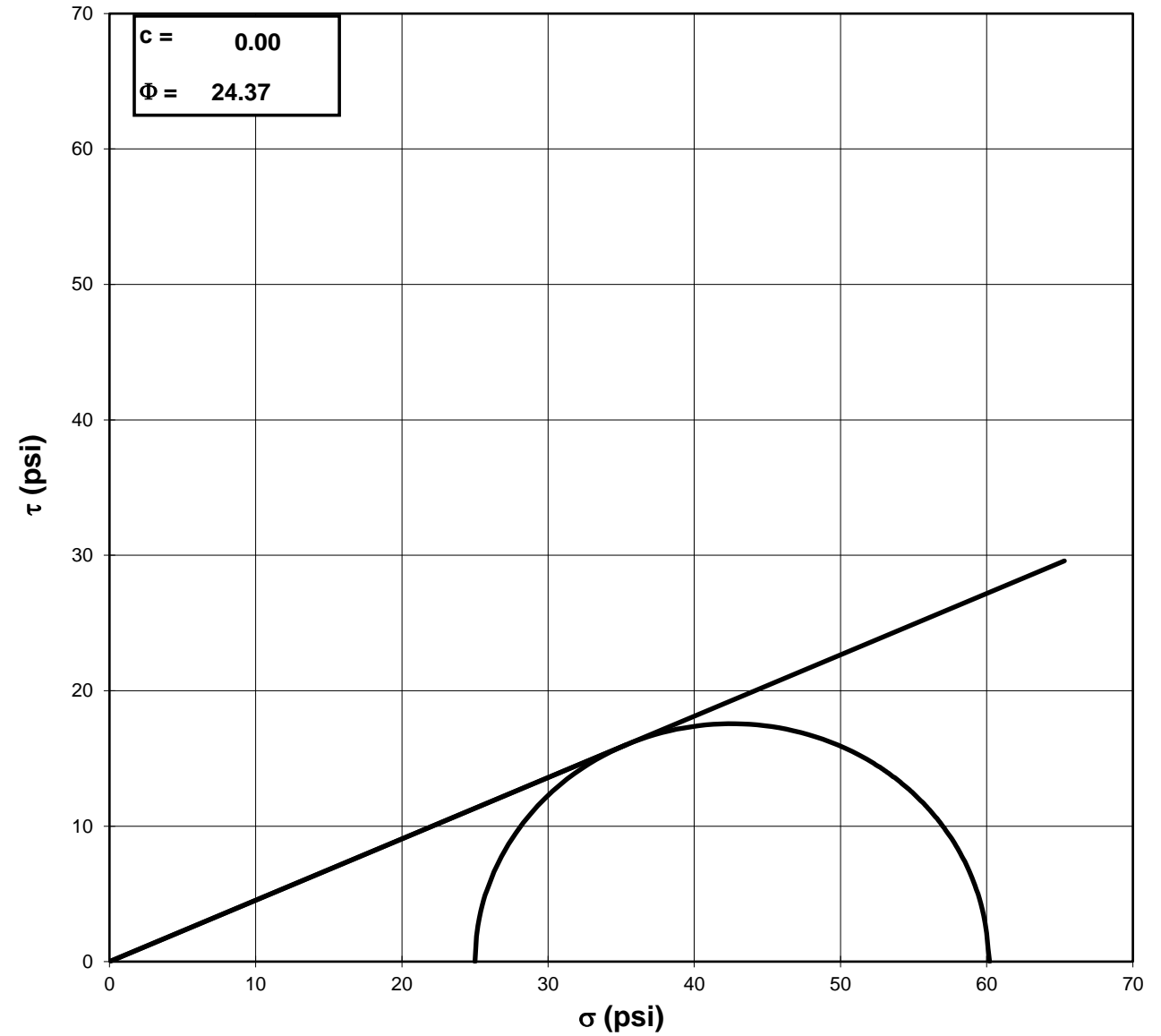
**MOHR TOTAL STRENGTH ENVELOPE
AASHTO T-297**

Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Reference: Bridge No. 66 on US 264 over Pu Depth (ft): 33-35
 Project No.: R-2024-155-001 Sample No.: ST-3
 Lab ID: R-2024-155-001-005
 Visual Description: Brown Sandy Clay (UND)

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	0.00	C̄	=	0.00
α	=	33.7	Φ̄	=	41.76



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: 129-02-0411 Date: 5/17/24 Approved By: MPS Date: 5/23/24

Tested By: 129-02-0411 Date: 5/17/24 Approved By: MPS Date: 5/23/24

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS**
AASHTO T-297

Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Reference: Bridge No. 66 on US 264 over Pur Depth (ft): 33-35
 Project No.: R-2024-155-001 Sample No.: ST-3
 Lab ID: R-2024-155-001-005

Visual Description: Brown Sandy Clay (UND)

Stage No.	0
Test No.	1

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	6.144	Diameter 1:	2.862
Length 2:	6.168	Diameter 2:	2.865
Length 3:	6.177	Diameter 3:	2.857
Length 4:	6.152	Diameter 4:	2.833
Avg. Length:	6.160	Avg. Diam.:	2.854

PRESSURES (psi)

Cell Pressure (psi)	85.0
Back Pressure (psi)	60.0
Eff. Conf. Pressure (psi)	25.0
Pore Pressure Response (%)	95

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	3.0
Final Change (ml)	21.0

MAXIMUM OBLIQUITY POINTS

\bar{P}	=	26.37
Q	=	17.56

Initial Dial Reading (mil)	202
Dial Reading After Saturation (mil)	218
Dial Reading After Consolidation (mil)	282

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
19.3	0.000	60.0
34.2	0.001	60.9
52.3	0.002	61.6
92.2	0.008	64.4
117.2	0.013	66.7
136.2	0.019	68.5
157.3	0.028	70.5
172.2	0.037	71.9
185.4	0.049	73.3
206.5	0.070	74.9
228.4	0.099	75.9
242.9	0.136	76.2
251.1	0.171	75.9
258.7	0.214	75.3
263.2	0.243	74.9
267.9	0.285	74.2
275.8	0.343	73.5
286.1	0.403	72.9
286.5	0.448	72.6
277.5	0.508	72.4
264.9	0.553	72.3
258.9	0.598	72.5
265.2	0.643	72.6
269.2	0.673	72.7
272.8	0.702	72.8
274.0	0.732	72.9
277.0	0.762	72.9
280.0	0.808	73.0
287.4	0.853	73.0
291.9	0.883	73.0
293.1	0.913	73.0

Tested By: 129-02-0411 Date: 5/17/24 Input Checked By: MPS Date: 5/23/24

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS**
AASHTO T-297

Client: HDR Engineering, Inc. Boring No.: EB1-B
 Client Reference: Bridge No. 66 on US 264 over Pur Depth (ft): 33-35
 Project No.: R-2024-155-001 Sample No.: ST-3
 Lab ID: R-2024-155-001-005

Visual Description: Brown Sandy Clay (UND)

Effective Confining Pressure (psi)	25.0	Stage No.	0
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	6.16
Initial Sample Diameter (in)	2.85
Initial Sample Area (in ²)	6.40
Initial Sample Volume (in ³)	39.42

VOLUME CHANGE

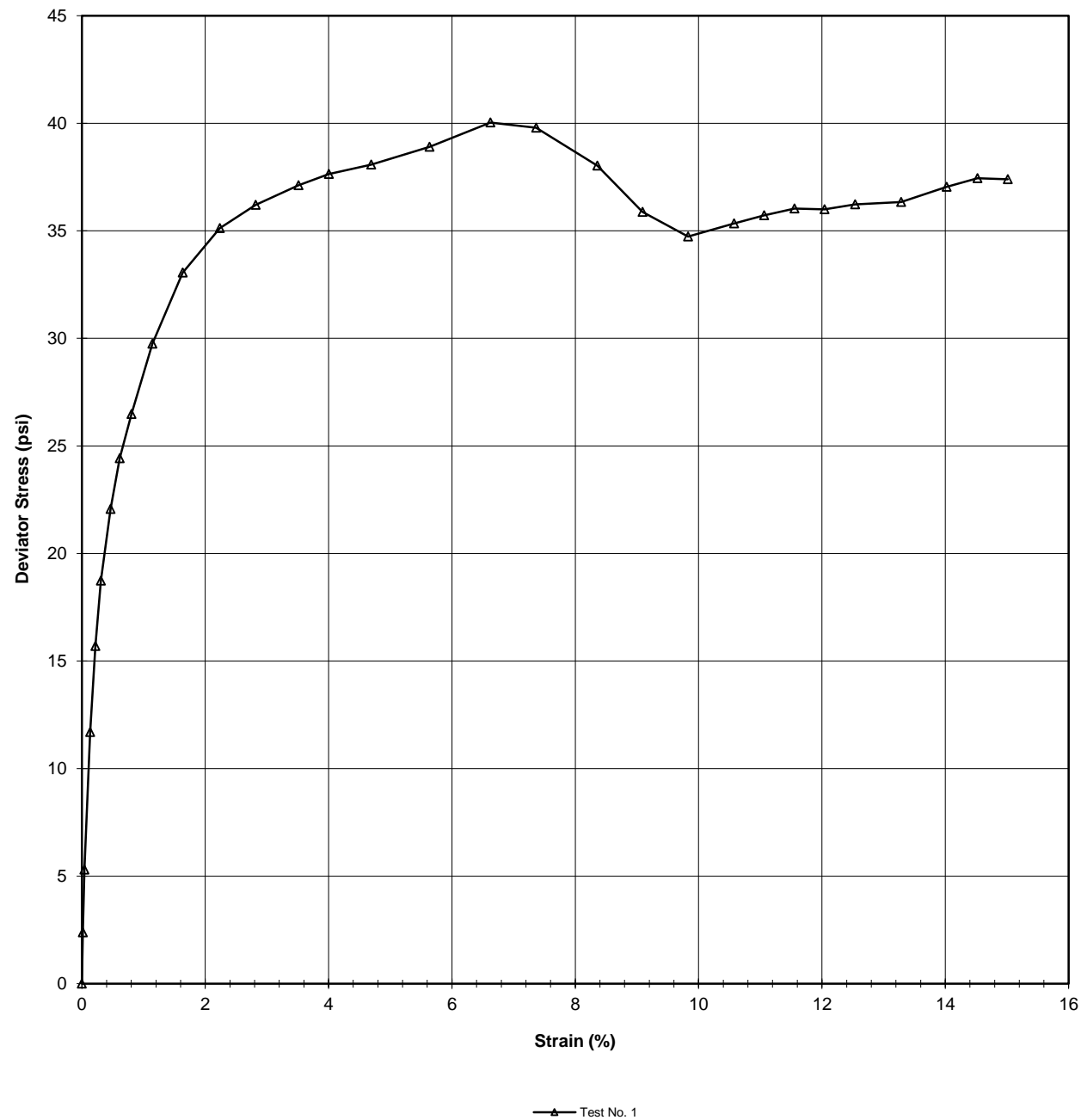
Volume After Consolidation (in ³)	37.83
Length After Consolidation (in)	6.08
Area After Consolidation (in ²)	6.221

Strain (%)	Deviator Stress PSI	ΔU	$\bar{\sigma}_1$	$\bar{\sigma}_3$	Effective Principal Stress Ratio	\bar{A}	\bar{P}	Q
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0.01	2.39	0.87	26.52	24.1	1.099	0.38	25.32	1.19
0.04	5.30	1.57	28.73	23.4	1.226	0.31	26.08	2.65
0.13	11.70	4.37	32.33	20.6	1.567	0.39	26.48	5.85
0.22	15.70	6.66	34.03	18.3	1.856	0.45	26.18	7.85
0.31	18.74	8.46	35.27	16.5	2.133	0.48	25.91	9.37
0.47	22.07	10.47	36.59	14.5	2.519	0.50	25.56	11.03
0.61	24.43	11.92	37.51	13.1	2.868	0.51	25.29	12.21
0.80	26.48	13.34	38.14	11.7	3.271	0.53	24.90	13.24
1.14	29.75	14.86	39.89	10.1	3.933	0.53	25.02	14.87
1.63	33.06	15.92	42.14	9.1	4.641	0.51	25.61	16.53
2.24	35.13	16.19	43.93	8.8	4.988	0.49	26.37	17.56
2.82	36.20	15.89	45.31	9.1	4.976	0.46	27.21	18.10
3.51	37.12	15.30	46.82	9.7	4.829	0.43	28.26	18.56
4.00	37.63	14.85	47.78	10.1	4.708	0.42	28.97	18.82
4.69	38.08	14.24	48.84	10.8	4.539	0.39	29.80	19.04
5.63	38.90	13.52	50.37	11.5	4.389	0.37	30.93	19.45
6.62	40.03	12.89	52.14	12.1	4.306	0.34	32.12	20.02
7.36	39.79	12.59	52.20	12.4	4.205	0.33	32.31	19.89
8.36	38.02	12.37	50.66	12.6	4.010	0.34	31.65	19.01
9.09	35.88	12.34	48.54	12.7	3.834	0.36	30.60	17.94
9.83	34.73	12.49	47.24	12.5	3.775	0.38	29.88	17.36
10.57	35.34	12.58	47.76	12.4	3.844	0.37	30.09	17.67
11.06	35.72	12.70	48.03	12.3	3.903	0.37	30.16	17.86
11.55	36.03	12.77	48.27	12.2	3.946	0.37	30.25	18.02
12.04	36.00	12.86	48.14	12.1	3.965	0.38	30.14	18.00
12.54	36.22	12.91	48.31	12.1	3.997	0.38	30.20	18.11
13.28	36.34	12.98	48.36	12.0	4.023	0.38	30.19	18.17
14.02	37.04	13.00	49.04	12.0	4.088	0.37	30.52	18.52
14.52	37.44	13.00	49.45	12.0	4.119	0.37	30.73	18.72
15.01	37.40	12.95	49.45	12.0	4.105	0.36	30.75	18.70

**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
AASHTO T-297**

Client: HDR Engineering, Inc. Boring No.: EB1-B
Client Reference: Bridge No. 66 on US 264 over Pungo Depth (ft): 33-35
Project No.: R-2024-155-001 Sample No.: ST-3
Lab ID: R-2024-155-001-005
Visual Description: Brown Sandy Clay (UND)



**CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11**

Client: HDR Engineering, Inc.
Client Reference: Bridge No. 66 on US 264 over Pungo River
Project No.: R-2024-155-001
Lab ID: R-2024-155-001-005 Specific Gravity (Assumed) 2.68
Visual Description: Brown Sandy Clay (UND)

SAMPLE CONDITION SUMMARY

Boring No.:	EB1-B
Depth (ft):	33-35
Sample No.:	ST-3
Test No.:	T1
Deformation Rate (in/min)	0.001
Back Pressure (psi)	60.0
Consolidation Time (days)	2
Moisture Content (%) (INITIAL)	47.7
Total Unit Weight (pcf)	106.6
Dry Unit Weight (pcf)	72.2
Moisture Content (%) (FINAL)	45.0
Initial State Void Ratio, e	1.318
Void Ratio at Shear, e	1.225



Tested By: 129-02-0411 Date: 5/17/24 Approved By: MPS Date: 5/23/24

Tested By: 129-02-0411 Date: 5/17/24 Input Checked By: MPS Date: 5/23/24

SITE PHOTOGRAPHS
BR-0004

Bridge No. 66 on -L- (US-264) over Pungo River between SR 1710 (Bible Shore Rd.) and NC-45



-Downstream-



-EB1 facing upstation-



-EB2 facing downstation-