

REFERENCE: U-4758

PROJECT: 40251

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY GUILFORD

PROJECT DESCRIPTION SR 1818 (JOHNSON ST)/
SR 1850 (SANDY RIDGE RD) FROM
SR 1820 (SKEET CLUB RD) TO I-40

SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-)
OVER WEST FORK DEEP RIVER

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4758	1	29

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 MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE 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

S&ME PERSONNEL

GEU/ERO PERSONNEL

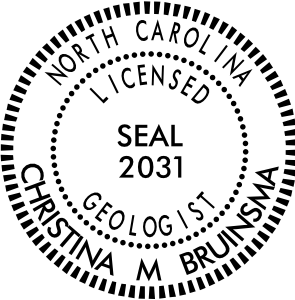
INVESTIGATED BY S&MENCDOT GEU

DRAWN BY C. BRUINSMA, LG

CHECKED BY C. YOUNGBLOOD, LG

SUBMITTED BY C. YOUNGBLOOD, LG

DATE APRIL 2021



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4/30/2021
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																																																																																																																																																																																																																																																																																																																																																																												
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										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.										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:										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 (RESJ) 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 INTRUDING 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 (N 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 (TSJ) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																																																																																																																																																																																																																																																																																																																																												
SOIL LEGEND AND AASHTO CLASSIFICATION <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>GENERAL CLASS.</th><th colspan="4">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>GROUP CLASS.</th><th>A-1</th><th>A-3</th><th>A-2</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-4, A-5</th><th></th></tr><tr><th>SYMBOL</th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><th>Z PASSING #10 #40 #200</th><td>50 MX 30 MX 15 MX</td><td>50 MX 25 MX 10 MX</td><td>51 MN 35 MX 35 MX 35 MX 35 MX 35 MX</td><td>36 MN 36 MN 36 MN 36 MN 36 MN 36 MN</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><th>MATERIAL PASSING #10 LL PI</th><td>— 6 MX</td><td>— NP</td><td>40 MX 41 MN 10 MX 11 MN 40 MX 41 MN 10 MX 11 MN</td><td>40 MX 41 MN 10 MX 11 MN 40 MX 41 MN 10 MX 11 MN</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><th>GROUP INDEX</th><td>0</td><td>0</td><td>0</td><td>4 MX</td><td>8 MX</td><td>12 MX</td><td>16 MX</td><td>NO MX</td><td></td><td></td></tr><tr><th>USUAL TYPES OF MAJOR MATERIALS</th><td>STONE FRAGS, GRAVEL, AND SAND</td><td>FINE SAND</td><td>SILTY OR CLAYEY GRAVEL AND SAND</td><td>SILTY SOILS</td><td>CLAYEY SOILS</td><td></td><td></td><td></td><td></td><td></td></tr><tr><th>GEN. RATING AS SUBGRADE</th><td colspan="3">EXCELLENT TO GOOD</td><td colspan="3">FAIR TO POOR</td><td>FAIR TO POOR</td><td>POOR</td><td>UNSATISFACTORY</td><td></td></tr></thead></table>										GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)				SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		GROUP CLASS.	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5		SYMBOL											Z PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX 10 MX	51 MN 35 MX 35 MX 35 MX 35 MX 35 MX	36 MN 36 MN 36 MN 36 MN 36 MN 36 MN							MATERIAL PASSING #10 LL PI	— 6 MX	— NP	40 MX 41 MN 10 MX 11 MN 40 MX 41 MN 10 MX 11 MN	40 MX 41 MN 10 MX 11 MN 40 MX 41 MN 10 MX 11 MN							GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX			USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS						GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD			FAIR TO POOR			FAIR TO POOR	POOR	UNSATISFACTORY		MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>ORGANIC MATERIAL</th><th>GRANULAR SOILS</th><th>SILT - CLAY SOILS</th><th>OTHER MATERIAL</th></tr></thead><tbody><tr><td>TRACE OF ORGANIC MATTER</td><td>2 - 3%</td><td>3 - 5%</td><td>TRACE</td></tr><tr><td>LITTLE ORGANIC MATTER</td><td>3 - 5%</td><td>5 - 12%</td><td>LITTLE</td></tr><tr><td>MODERATELY ORGANIC</td><td>5 - 10%</td><td>12 - 20%</td><td>SOME</td></tr><tr><td>HIGHLY ORGANIC</td><td>> 10%</td><td>> 20%</td><td>HIGHLY</td></tr></tbody></table> PERCENTAGE OF MATERIAL <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>ORGANIC MATERIAL</th><th>GRANULAR SOILS</th><th>SILT - CLAY SOILS</th><th>OTHER MATERIAL</th></tr></thead><tbody><tr><td>TRACE OF ORGANIC MATTER</td><td>2 - 3%</td><td>3 - 5%</td><td>TRACE</td></tr><tr><td>LITTLE ORGANIC MATTER</td><td>3 - 5%</td><td>5 - 12%</td><td>LITTLE</td></tr><tr><td>MODERATELY ORGANIC</td><td>5 - 10%</td><td>12 - 20%</td><td>SOME</td></tr><tr><td>HIGHLY ORGANIC</td><td>> 10%</td><td>> 20%</td><td>HIGHLY</td></tr></tbody></table> GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP MISCELLANEOUS SYMBOLS <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>SYMBOL</th><th>DESCRIPTION</th></tr></thead><tbody><tr><td></td><td>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td></tr><tr><td></td><td>SOIL SYMBOL</td></tr><tr><td></td><td>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td></tr><tr><td></td><td>INFERRED SOIL BOUNDARY</td></tr><tr><td></td><td>INFERRED ROCK LINE</td></tr><tr><td></td><td>ALLUVIAL SOIL BOUNDARY</td></tr><tr><td></td><td>DIP & DIP DIRECTION OF ROCK STRUCTURES</td></tr><tr><td></td><td>TEST BORING</td></tr><tr><td></td><td>SLOPE INDICATOR INSTALLATION</td></tr><tr><td></td><td>CONE PENETROMETER TEST</td></tr><tr><td></td><td>SOUNDING ROD</td></tr><tr><td></td><td>TEST BORING WITH CORE</td></tr><tr><td></td><td>SPT N-VALUE</td></tr></tbody></table> RECOMMENDATION SYMBOLS <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>SYMBOL</th><th>DESCRIPTION</th></tr></thead><tbody><tr><td></td><td>UNDERCUT</td></tr><tr><td></td><td>SHALLOW UNDERCUT</td></tr><tr><td></td><td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td></tr><tr><td></td><td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td></tr><tr><td></td><td>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</td></tr></tbody></table> ABBREVIATIONS <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>MEQ. - MEDIUM</th><th>MICA. - MICACEOUS</th><th>MOD. - MODERATELY</th><th>NP - NON PLASTIC</th><th>ORG. - ORGANIC</th><th>PMT - PRESSUREMETER TEST</th><th>SAP. - SAPROLITIC</th><th>SD. - SAND, SANDY</th><th>SL. - SILT, SILTY</th><th>SLI. - SLIGHTLY</th><th>TCR - TRICONE REFUSAL</th><th>W - MOISTURE CONTENT</th><th>V - VERY</th></tr></thead><tbody><tr><td>AR - AUGER REFUSAL</td><td>BT - BORING TERMINATED</td><td>CL. - CLAY</td><td>CPT - CONE PENETRATION TEST</td><td>CSE. - COARSE</td><td>DMT - OILATOMETER TEST</td><td>OPT - DYNAMIC PENETRATION TEST</td><td>e - VOID RATIO</td><td>F - FINE</td><td>FOSS. - FOSSILIFEROUS</td><td>FRAC. - FRACTURED, FRACTURES</td><td>FRAGS. - FRAGMENTS</td><td>HL. - HIGHLY</td></tr><tr><td>MEQ. - MEDIUM</td><td>MICA. - MICACEOUS</td><td>MOD. - MODERATELY</td><td>NP - NON PLASTIC</td><td>ORG. - ORGANIC</td><td>PMT - PRESSUREMETER TEST</td><td>SAP. - SAPROLITIC</td><td>SD. - SAND, SANDY</td><td>SL. - SILT, SILTY</td><td>SLI. - SLIGHTLY</td><td>TCR - TRICONE REFUSAL</td><td>W - MOISTURE CONTENT</td><td>V - VERY</td></tr></tbody></table> SOIL MOISTURE - CORRELATION OF TERMS <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th><th>FIELD MOISTURE DESCRIPTION</th><th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th></tr></thead><tbody><tr><td rowspan="2">LL - LIQUID LIMIT PL - PLASTIC LIMIT</td><td>- SATURATED - (SAT.)</td><td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td></tr><tr><td>- WET - (W)</td><td>SEMI-SOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td></tr><tr><td>OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT</td><td>- MOIST - (M)</td><td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td></tr><tr><td></td><td>- DRY - (D)</td><td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td></tr></tbody></table> PLASTICITY <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>NON PLASTIC</th><th>SLIGHTLY PLASTIC</th><th>MODERATELY PLASTIC</th><th>HIGHLY PLASTIC</th></tr></thead><tbody><tr><td>0-5</td><td>6-15</td><td>16-25</td><td>26 OR MORE</td></tr><tr><td>VERY LOW</td><td>SLIGHT</td><td>MEDIUM</td><td>HIGH</td></tr></tbody></table> COLOR DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	SYMBOL	DESCRIPTION		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		SOIL SYMBOL		ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT		INFERRED SOIL BOUNDARY		INFERRED ROCK LINE		ALLUVIAL SOIL BOUNDARY		DIP & DIP DIRECTION OF ROCK STRUCTURES		TEST BORING		SLOPE INDICATOR INSTALLATION		CONE PENETROMETER TEST		SOUNDING ROD		TEST BORING WITH CORE		SPT N-VALUE	SYMBOL	DESCRIPTION		UNDERCUT		SHALLOW UNDERCUT		UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE		UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK		UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	MEQ. - MEDIUM	MICA. - MICACEOUS	MOD. - MODERATELY	NP - NON PLASTIC	ORG. - ORGANIC	PMT - PRESSUREMETER TEST	SAP. - SAPROLITIC	SD. - SAND, SANDY	SL. - SILT, SILTY	SLI. - SLIGHTLY	TCR - TRICONE REFUSAL	W - MOISTURE CONTENT	V - VERY	AR - AUGER REFUSAL	BT - BORING TERMINATED	CL. - CLAY	CPT - CONE PENETRATION TEST	CSE. - COARSE	DMT - OILATOMETER TEST	OPT - DYNAMIC PENETRATION TEST	e - VOID RATIO	F - FINE	FOSS. - FOSSILIFEROUS	FRAC. - FRACTURED, FRACTURES	FRAGS. - FRAGMENTS	HL. - HIGHLY	MEQ. - MEDIUM	MICA. - MICACEOUS	MOD. - MODERATELY	NP - NON PLASTIC	ORG. - ORGANIC	PMT - PRESSUREMETER TEST	SAP. - SAPROLITIC	SD. - SAND, SANDY	SL. - SILT, SILTY	SLI. - SLIGHTLY	TCR - TRICONE REFUSAL	W - MOISTURE CONTENT	V - VERY	SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL - LIQUID LIMIT PL - PLASTIC LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	- WET - (W)	SEMI-SOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE		- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	NON PLASTIC	SLIGHTLY PLASTIC	MODERATELY PLASTIC	HIGHLY PLASTIC	0-5	6-15	16-25	26 OR MORE	VERY LOW	SLIGHT	MEDIUM	HIGH	TEXTURE OR GRAIN SIZE <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>U.S. STD. SIEVE SIZE OPENING (MM)</th><th>4</th><th>10</th><th>40</th><th>60</th><th>200</th><th>270</th></tr></thead><tbody><tr><td></td><td>4.75</td><td>2.00</td><td>0.42</td><td>0.25</td><td>0.075</td><td>0.053</td></tr></tbody></table> <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>BOULDER (BLDR.)</th><th>COBBLE (COB.)</th><th>GRAVEL (GR.)</th><th>COARSE SAND (CSSE. 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MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270		4.75	2.00	0.42	0.25	0.075	0.053	BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)								GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005		IN.	12	3					SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL - LIQUID LIMIT PL - PLASTIC LIMIT	- SATURATED - (SAT.)	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	- WET - (W)	SEMI-SOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																																																																																																																																																																																																																																								
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EQUIPMENT USED ON SUBJECT PROJECT <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th>DRILL UNITS:</th><th>ADVANCING TOOLS:</th><th>HAMMER TYPE:</th></tr></thead><tbody><tr><td>☐ CME-45C</td><td>☒ CLAY BITS</td><td>☒ AUTOMATIC ☐ MANUAL</td></tr><tr><td>☒ CME-55</td><td>☐ 6" CONTINUOUS FLIGHT AUGER</td><td>CORE SIZE: ☐ -B ☐ -H</td></tr><tr><td>☒ CME-550</td><td>☒ 8" HOLLOW AUGERS</td><td>☒ -N</td></tr><tr><td>☐ VANE SHEAR TEST</td><td>☐ HARD FACED FINGER BITS</td><td>HAND TOOLS: ☐ POST HOLE DIGGER</td></tr><tr><td>☐ PORTABLE HOIST</td><td>☐ TUNG.-CARBIDE INSERTS</td><td>☐ HAND AUGER</td></tr><tr><td>☒ BK-51 (1993)</td><td>☐ CASING ☐ W/ ADVANCER</td><td>☐ SOUNDING ROD</td></tr><tr><td></td><td>☐ TRICONE ☐ STEEL TEETH</td><td>☐ VANE SHEAR TEST</td></tr><tr><td></td><td>☒ TRICONE ☐ TUNG.-CARB.</td><td></td></tr><tr><td></td><td>☐ CORE BIT</td><td></td></tr></tbody></table>										DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	☐ CME-45C	☒ CLAY BITS	☒ AUTOMATIC ☐ MANUAL	☒ CME-55	☐ 6" CONTINUOUS FLIGHT AUGER	CORE SIZE: ☐ -B ☐ -H	☒ CME-550	☒ 8" HOLLOW AUGERS	☒ -N	☐ VANE SHEAR TEST	☐ HARD FACED FINGER BITS	HAND TOOLS: ☐ POST HOLE DIGGER	☐ PORTABLE HOIST	☐ TUNG.-CARBIDE INSERTS	☐ HAND AUGER	☒ BK-51 (1993)	☐ CASING ☐ W/ ADVANCER	☐ SOUNDING ROD		☐ TRICONE ☐ STEEL TEETH	☐ VANE SHEAR TEST		☒ TRICONE ☐ TUNG.-CARB.			☐ CORE BIT		NOTES: F.I.A.D. - FILLED IMMEDIATELY AFTER DRILLING																																																																																																																																																																																																																																																																																																																																																																		
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION

SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR
JOINTED ROCKS (Hoek and Marinos, 2000)

From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.

SURFACE CONDITIONS

VERY GOOD
Very rough, fresh unweathered surfaces

GOOD
Rough, slightly weathered, iron stained surfaces

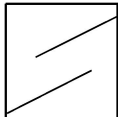
FAIR
Smooth, moderately weathered and altered surfaces

POOR
Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments

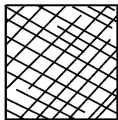
VERY POOR
Slickensided, highly weathered surfaces with soft clay coatings or fillings

STRUCTURE

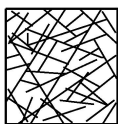
DECREASING SURFACE QUALITY →



INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities



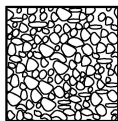
BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets



VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets



BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity

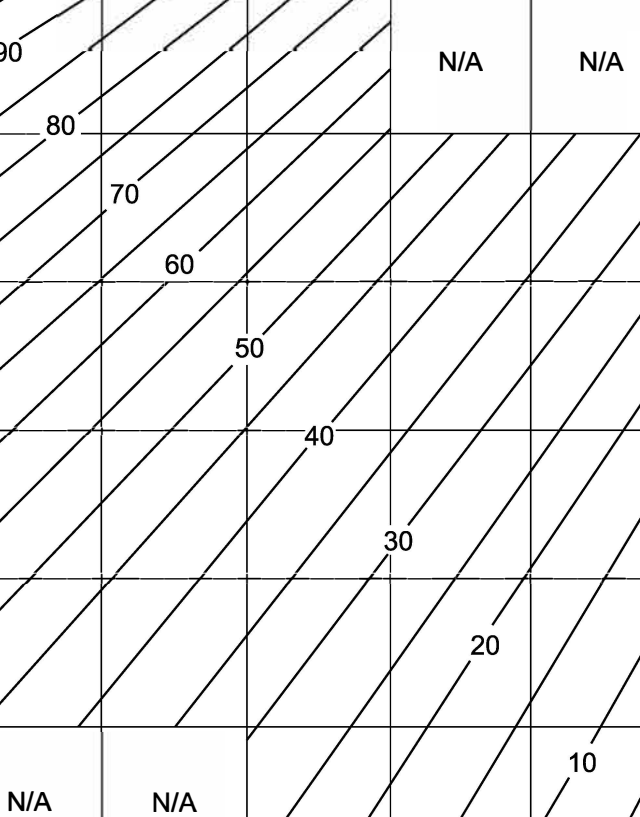


DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces



LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes

DECREASING INTERLOCKING OF ROCK PIECES
↓



GSI FOR HETEROGENEOUS ROCK MASSES SUCH
AS FLYSCH (Marinos, P and Hoek E., 2000)

From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.

SURFACE CONDITIONS OF
DISCONTINUITIES
(Predominantly bedding planes)

VERY GOOD - Very Rough, fresh unweathered surfaces

GOOD - Rough, slightly weathered surfaces

FAIR - Smooth, moderately weathered and altered surfaces

POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments

VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings

COMPOSITION AND STRUCTURE



A. Thick bedded, very blocky sandstone
The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.



B. Sandstone with thin inter-layers of siltstone



C. Sandstone and siltstone in similar amounts



D. Siltstone or silty shale with sandstone layers



E. Weak siltstone or clayey shale with sandstone layers

C, D, E, and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to **F** and **H**.

F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure

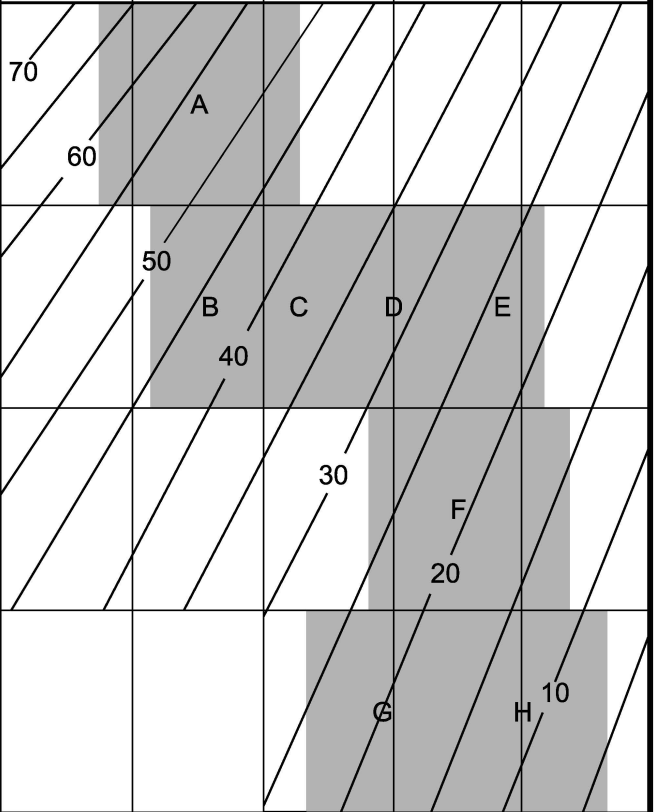


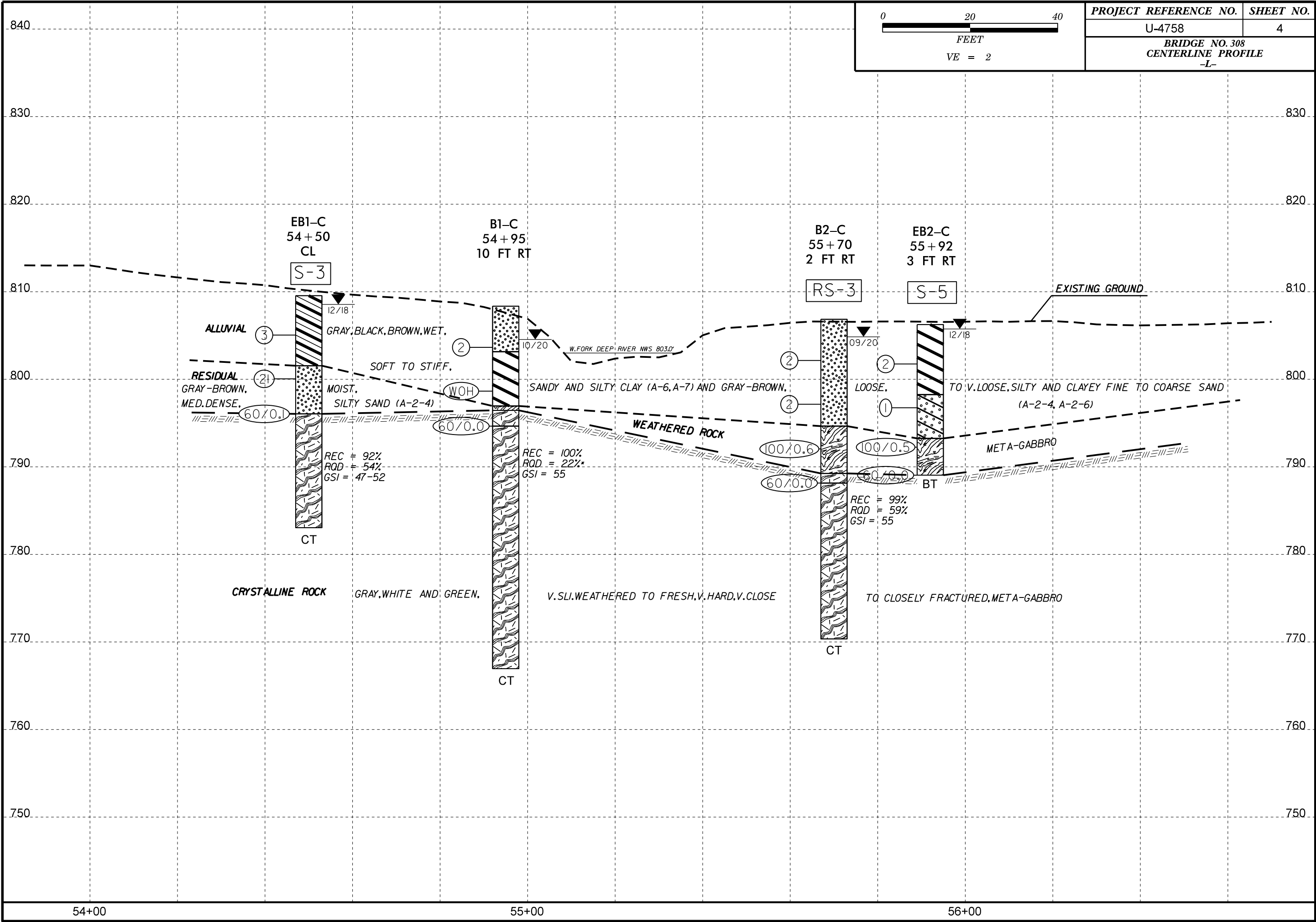
G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers

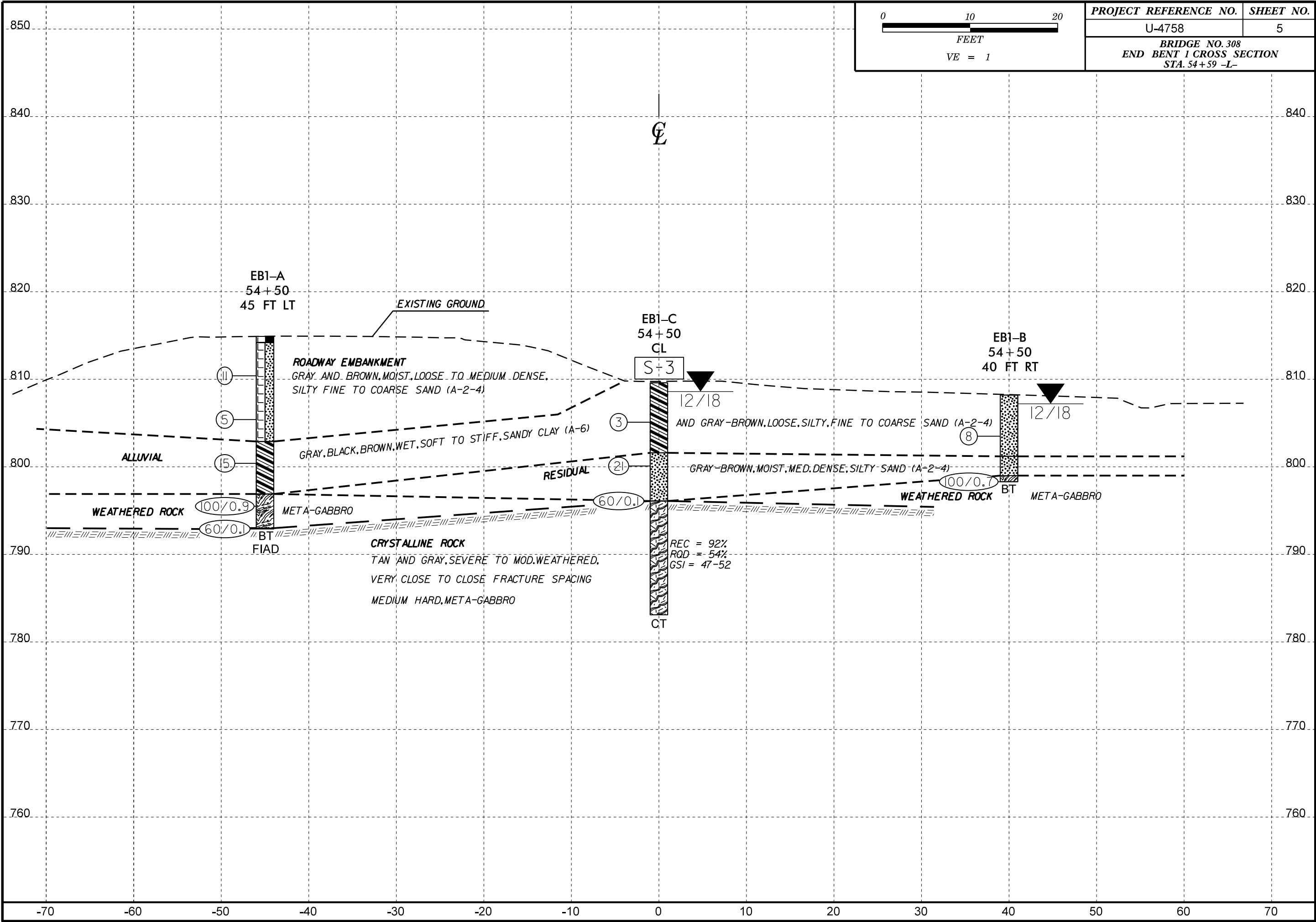


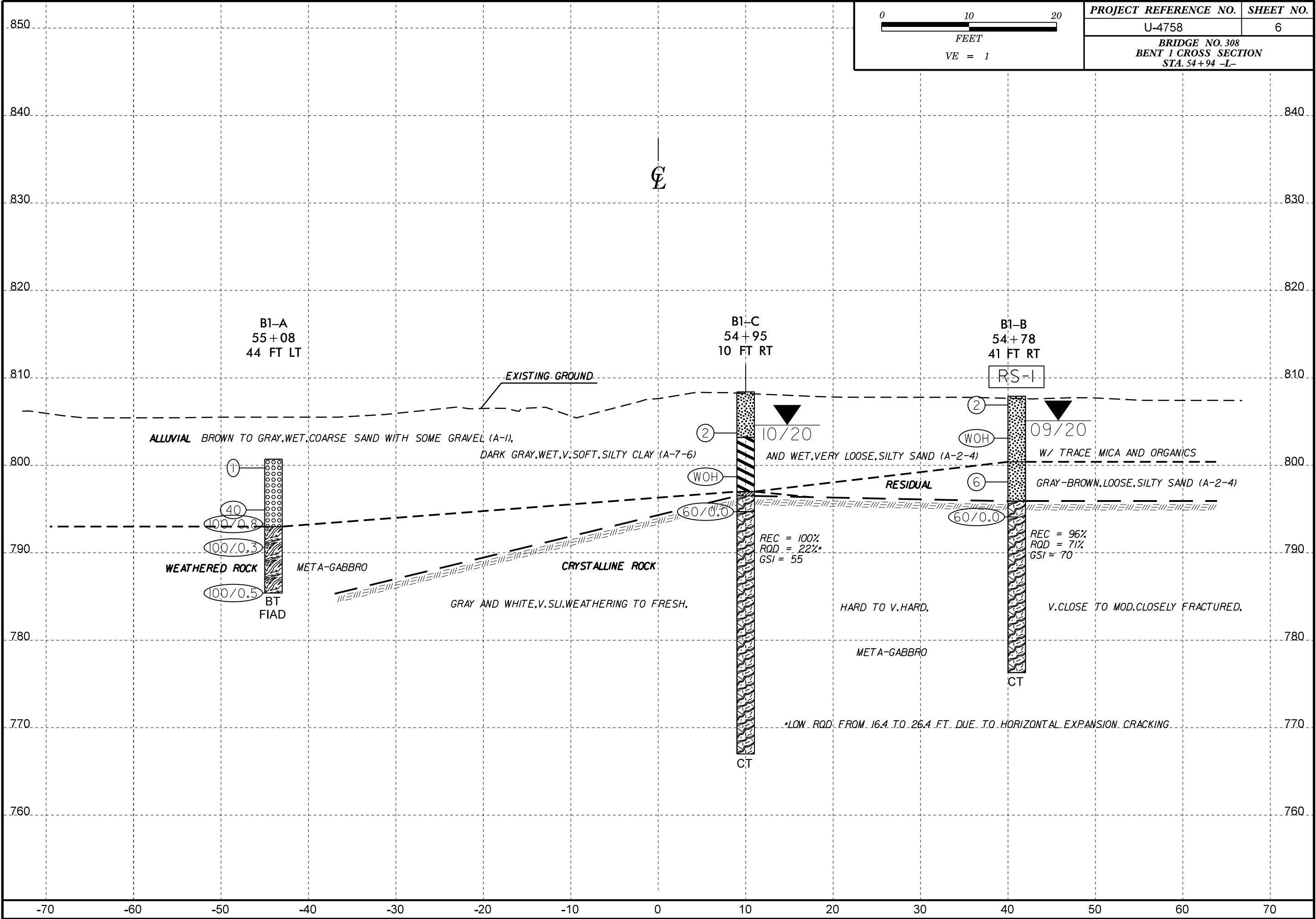
H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.

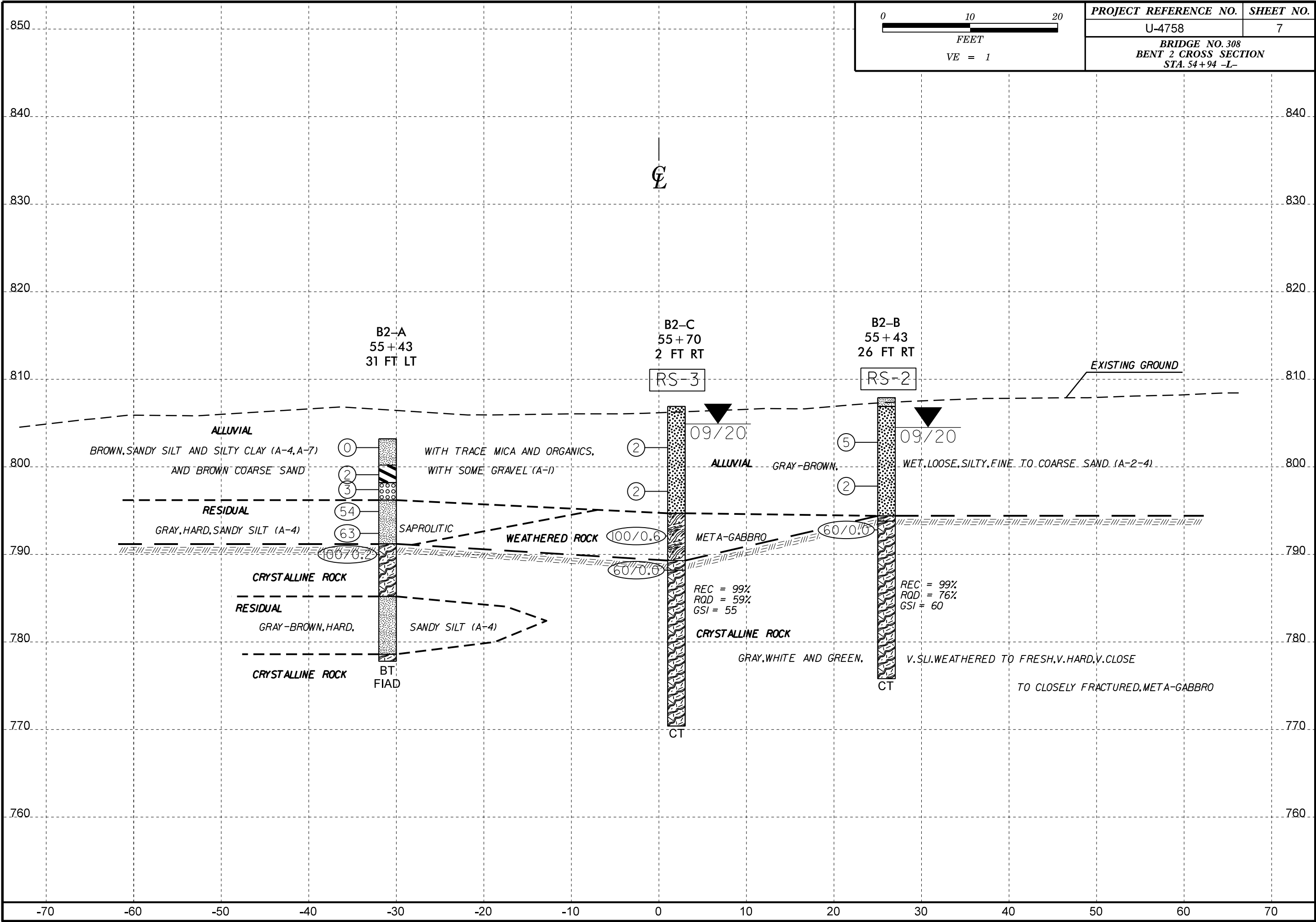
→ Means deformation after tectonic disturbance

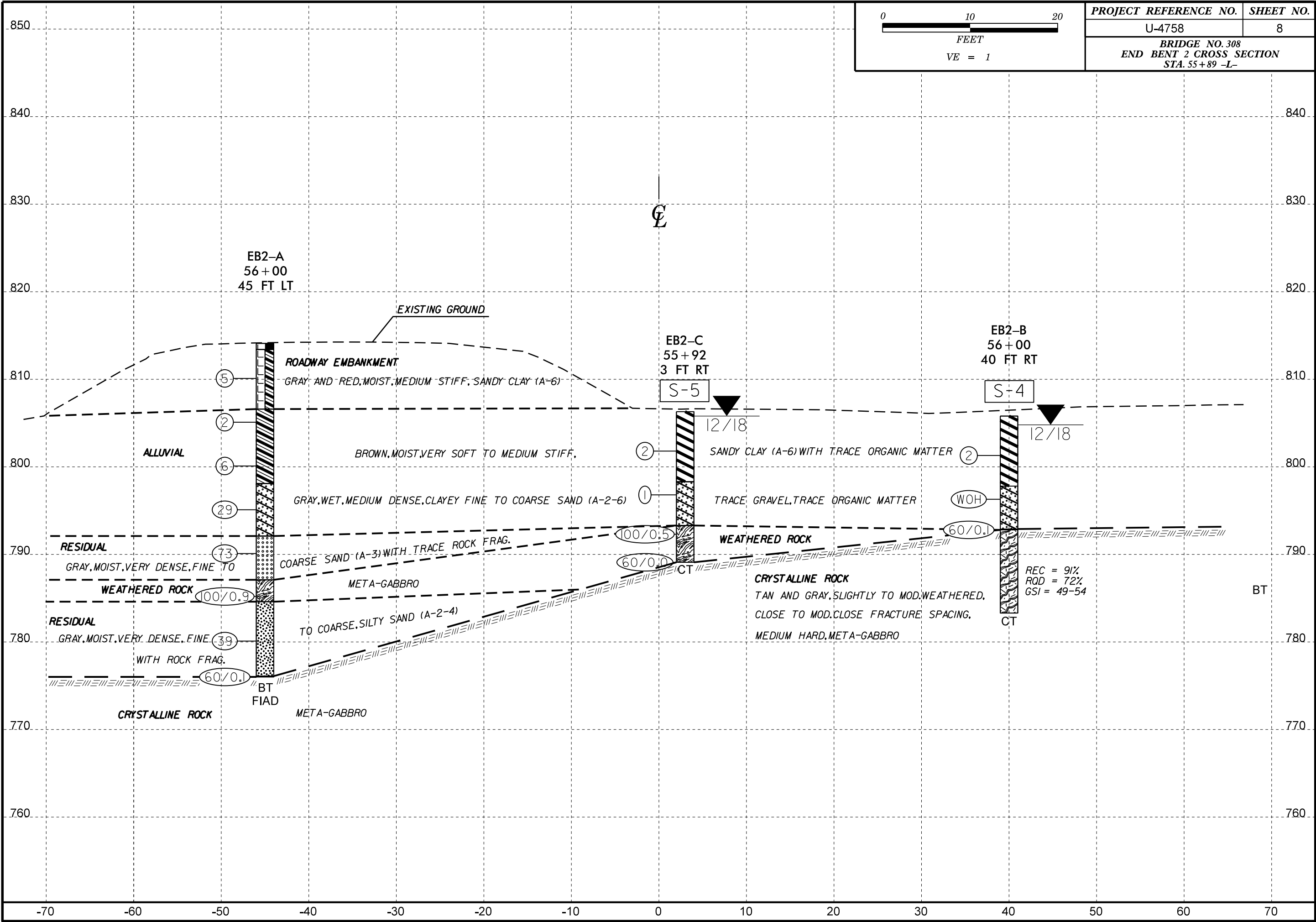












GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40251.1.1	TIP U-4758	COUNTY GUILFORD	GEOLOGIST Bhuiyan, A.	
SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-) OVER WEST FORK DEEP RIVER				GROUND WTR (ft)
BORING NO. EB1-A	STATION 54+50	OFFSET 45 ft LT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 814.9 ft	TOTAL DEPTH 22.0 ft	NORTHING 837,278	EASTING 1,700,054	24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE SME9978 CME-750 74% 12/19/2018		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic
DRILLER Marlowe, J.	START DATE 12/12/18	COMP. DATE 12/12/18	SURFACE WATER DEPTH N/A	

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)		
815																
810	811.4	3.5	7	6	5							M	814.9	GROUND SURFACE	0.0	
													814.2	ROADWAY EMBANKMENT (PAVEMENT)	0.7	
805	806.4	8.5	2	3	2							M		LOOSE TO MED. DENSE, GRAY AND BROWN, SILTY FINE TO COARSE SAND, A-2-4		
800	801.4	13.5	1	6	9							W	802.9	ALLUVIAL	12.0	
														STIFF, GRAY AND BLACK, SANDY CLAY, A-6		
795	796.4	18.5	44	56/0.4									796.9	WEATHERED ROCK (META-GABBRO)	18.0	
	793.0	21.9	60/0.1										793.0	CRYSTALLINE ROCK (META-GABBRO)	21.9	
													792.9	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 792.9 ft IN CRYSTALLINE ROCK (META-GABBRO)	22.0	

NC DOT BORE DOUBLE U4758 GEO BRDG0308.GPJ NC_DOT.GDT 4/22/21

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 40251.1.1			TIP U-4758			COUNTY GUILFORD			GEOLOGIST Bhuiyan, A.				
SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-) OVER WEST FORK DEEP RIVER									GROUND WTR (ft)				
BORING NO. EB1-C			STATION 54+50			OFFSET CL			ALIGNMENT -L-			0 HR. N/A	
COLLAR ELEV. 809.6 ft			TOTAL DEPTH 26.5 ft			NORTHING 837,245			EASTING 1,700,085			24 HR. 1.0	
DRILL RIG/HAMMER EFF./DATE SME0593 CME-550X 86% 05/01/2019						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic				
DRILLER Marlowe, J.			START DATE 12/18/18			COMP. DATE 12/18/18			SURFACE WATER DEPTH N/A				
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)
810													809.6 GROUND SURFACE 0.0
805	806.1	3.5	1	2	1						S-3	27%	ALLUVIAL SOFT, RED AND BROWN, SANDY CLAY, A-6
800	801.1	8.5	2	4	17							M	801.6 RESIDUAL MEDIUM DENSE, BROWN, SILTY FINE TO COARSE SAND, A-2-4 8.0
795	796.2	13.4	60/0.1										796.1 CRYSTALLINE ROCK TAN AND GRAY, META-GABBRO 13.5
790													REC = 92% RQD = 54% GSI = 47-52
785													783.1 Boring Terminated at Elevation 783.1 ft IN CRYSTALLINE ROCK (META-GABBRO) 26.5

GEOTECHNICAL BORING REPORT
CORE LOG

SHEET 10

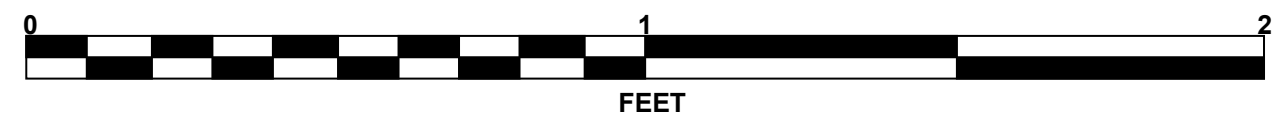
WBS 40251.1.1				TIP U-4758				COUNTY GUILFORD				GEOLOGIST Bhuiyan, A.										
SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-) OVER WEST FORK DEEP RIVER												GROUND WTR (ft)										
BORING NO. EB1-C				STATION 54+50				OFFSET CL				ALIGNMENT -L-				0 HR. N/A						
COLLAR ELEV. 809.6 ft				TOTAL DEPTH 26.5 ft				NORTHING 837,245				EASTING 1,700,085				24 HR. 1.0						
DRILL RIG/HAMMER EFF./DATE SME0593 CME-550X 86% 05/01/2019								DRILL METHOD Mud Rotary				HAMMER TYPE Automatic										
DRILLER Marlowe, J.				START DATE 12/18/18				COMP. DATE 12/18/18				SURFACE WATER DEPTH N/A										
CORE SIZE NQ				TOTAL RUN 13.0 ft																		
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS ELEV. (ft) DEPTH (ft)											
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %													
796.1											Begin Coring @ 13.5 ft											
795	796.1	13.5	3.0	3:56/1.0 2:32/1.0 2:41/1.0	(2.6) 87%	(1.1) 37%		(11.9) 92%	(7.0) 54%		796.1 CRYSTALLINE ROCK 13.5 TAN AND GRAY, SEVERE TO MODERATELY WEATHERED, VERY CLOSE TO CLOSE FRACTURE SPACING, MEDIUM HARD, META-GABBRO REC = 92% RQD = 54% GSI = 47-52											
	793.1	16.5																				
			5.0	2:15/1.0 1:57/1.0 2:25/1.0 2:18/1.0 2:01/1.0	(4.8) 96%	(1.7) 34%																
790	788.1	21.5																				
			5.0	2:01/1.0 2:42/1.0 2:02/1.0 2:14/1.0 2:25/1.0	(4.5) 90%	(4.2) 84%																
785	783.1	26.5									783.1 Boring Terminated at Elevation 783.1 ft IN CRYSTALLINE ROCK (META-GABBRO)											

NCDOT BORE DOUBLE U4758_GEO_BRDG0308.GPJ NC_DOT.GDT 3/25/21

NCDOT CORE SINGLE U4758_GEO_BRDG0308.GPJ NC_DOT.GDT 3/25/21

CORE PHOTOGRAPHS

EB1-C BOXES 1 & 2: 13.5 - 26.5 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

[illegible]

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 40251.1.1			TIP U-4758			COUNTY GUILFORD			GEOLOGIST Sanderson, A.						
SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-) OVER WEST FORK DEEP RIVER									GROUND WTR (ft)						
BORING NO. B1-A			STATION 55+08			OFFSET 44 ft LT			ALIGNMENT -L-			0 HR. N/A			
COLLAR ELEV. 800.7 ft			TOTAL DEPTH 15.3 ft			NORTHING 837,317			EASTING 1,700,098			24 HR. N/A			
DRILL RIGHAMMER EFF./DATE GEUBK-51 1993						DRILL METHOD Mud Rotary			HAMMERTYPE Automatic						
DRILLER Conley, H			START DATE 02/03/93			COMP. DATE 02/03/93			SURFACE WATER DEPTH N/A						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
805															
800	800.7	0.0												800.7	0.0
			1	0	1										
795	795.9	4.8	13	15	25										
	794.1	6.6	14	29	71/0.3										
790	790.9	9.8	100/0.3											793.0	7.7
	785.9	14.8	100/0.5											785.4	15.3
														Boring Terminated at Elevation 785.4 ft IN WEATHERED ROCK (DIORITE)	
														INFORMATION BASED ON 1993 INVESTIGATIONS. ALL ELEVATIONS ARE ESTIMATES BASED ON ROAD FINISHED BRIDGE ELEVATION/AS BUILD PLANS	

NCDOT BORE DOUBLE U4758_GEO_BRDG0308.GPJ NC DOT.GDT 3/25/21

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40251.1.1			TIP U-4758			COUNTY GUILFORD			GEOLOGIST Jones, A. N.				
SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-) OVER WEST FORK DEEP RIVER									GROUND WTR (ft)				
BORING NO. B1-C			STATION 54+95			OFFSET 10 ft RT			ALIGNMENT -L-				
COLLAR ELEV. 808.4 ft			TOTAL DEPTH 41.4 ft			NORTHING 387,268			EASTING 1,700,125				
DRILL RIG/HAMMER EFF./DATE RFC0074 CME-55 80% 03/08/2019						DRILL METHOD Wash Boring			HAMMER TYPE Automatic				
DRILLER Pinter, D. G.			START DATE 09/03/20			COMP. DATE 09/30/20			SURFACE WATER DEPTH N/A				
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			DEPTH (ft)
810													
805	804.7	3.7	1	1	1								808.4 GROUND SURFACE 0.0
800	799.7	8.7	WOH	WOH	WOH								ALLUVIAL BROWN AND GRAY, VERY LOOSE, SILTY SAND (A-2-4) W/ TRACE MICA 5.2
795	794.7	13.7	60/0.0										DARK GRAY, V. SOFT, SILTY CLAY (A-7-6) 11.4
790													797.0 11.9
785													796.5 11.9
780													794.7 13.7
775													WEATHERED ROCK GNEISS/META-GABBRO CRYSTALLINE ROCK GRAY, WHITE, BLACK, GNEISS CRYSTALLINE ROCK GRAY AND WHITE, META-GABBRO REC=100% RQD=22% GSI = 55
770													767.0 41.4
													Boring Terminated at Elevation 767.0 ft IN CRYSTALLINE ROCK (META-GABBRO)

GEOTECHNICAL BORING REPORT

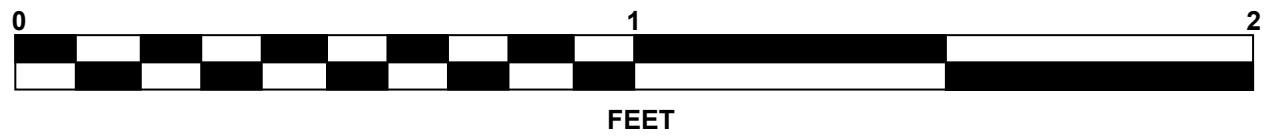
CORE LOG

WBS 40251.1.1			TIP U-4758			COUNTY GUILFORD			GEOLOGIST Jones, A. N.		
SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-) OVER WEST FORK DEEP RIVER									GROUND WTR (ft)		
BORING NO. B1-C			STATION 54+95			OFFSET 10 ft RT			ALIGNMENT -L-		
COLLAR ELEV. 808.4 ft			TOTAL DEPTH 41.4 ft			NORTHING 387,268			EASTING 1,700,125		
DRILL RIG/HAMMER EFF./DATE RFC00074 CME-55 80% 03/08/2019						DRILL METHOD Wash Boring			HAMMER TYPE Automatic		
DRILLER Pinter, D. G.			START DATE 09/03/20			COMP. DATE 09/30/20			SURFACE WATER DEPTH N/A		
CORE SIZE NQ			TOTAL RUN 27.7 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
794.66											Begin Coring @ 13.7 ft
	794.7	13.7	2.7	N=60/0.0 1:32/0.7 2:01/1.0 1:44/1.0	(2.7) 100%	(2.2) 81%		(27.7) 100%	(6.1) 22%		794.7
	792.0	16.4									CRYSTALLINE ROCK
			5.0	2:15/1.0 2:10/1.0 2:25/1.0 2:22/1.0 2:48/1.0	(5.0) 100%	(0.0) 0%					GRAY AND WHITE, V. SLI. WEATHERING TO FRESH, HARD TO V. HARD,V. CLOSE TO MOD. CLOSELY FRACTURED, META-GABBRO
790											LOW RQD FROM 16.4 TO 26.4 FT DUE TO HORIZONTAL EXPANSION CRACKING
	787.0	21.4									GSI = 55
			5.0	2:00/1.0 2:32/1.0 2:28/1.0 2:36/1.0 2:26/1.0	(5.0) 100%	(0.0) 0%					
785											
	782.0	26.4									
			5.0	2:06/1.0 2:19/1.0 2:17/1.0 2:28/1.0 2:14/1.0	(5.0) 100%	(0.0) 0%					
780											
	777.0	31.4									
			5.0	2:06/1.0 2:18/1.0 1:48/1.0 1:46/1.0 2:14/1.0	(5.0) 100%	(0.0) 0%					
775											
	772.0	36.4									
			5.0	2:18/1.0 1:49/1.0 2:09/1.0 2:30/1.0 2:18/1.0	(5.0) 100%	(4.1) 82%					
770											
	767.0	41.4									767.0
											Boring Terminated at Elevation 767.0 ft IN CRYSTALLINE ROCK (META-GABBRO)

CORE PHOTOGRAPHS

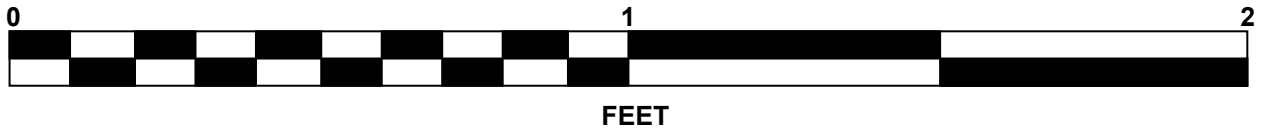
B1-C

BOXES 1 & 2: 13.7 - 31.9 FEET



B1-C

BOXES 3: 31.9 - 41.4 FEET



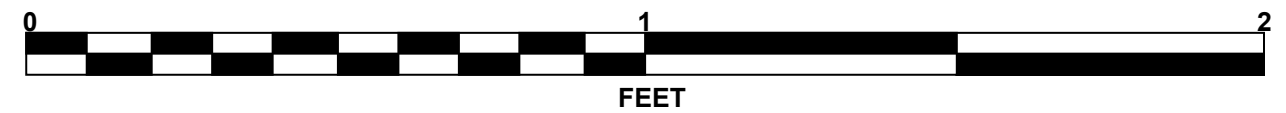
WBS 40251.1.1			TIP U-4758			COUNTY GUILFORD			GEOLOGIST Jones, A. N.						
SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-) OVER WEST FORK DEEP RIVER									GROUND WTR (ft)						
BORING NO. B1-B			STATION 54+78			OFFSET 41 ft RT			ALIGNMENT -L-			0 HR. N/A			
COLLAR ELEV. 807.9 ft			TOTAL DEPTH 31.6 ft			NORTHING 837,234			EASTING 1,700,134			24 HR. 2.8			
DRILL RIG/HAMMER EFF./DATE RFC0074 CME-55 80% 03/08/2019						DRILL METHOD Wash Boring			HAMMER TYPE Automatic						
DRILLER Pinter, D. G.			START DATE 09/02/20			COMP. DATE 09/03/20			SURFACE WATER DEPTH N/A						
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)
810															
	807.9	0.0	WOH	1	1	2						M		807.9	0.0
805	804.1	3.8	WOH	WOH	WOH							Sat.			
800	799.1	8.8	1	3	3							Sat.		800.4	7.5
795	794.1	13.8	60/0.0											795.9	12.0
790														794.1	13.8
785											RS-1				
780															
														776.3	31.6
Boring Terminated at Elevation 776.3 ft IN CRYSTALLINE ROCK (GNEISS)															

WBS 40251.1.1			TIP U-4758			COUNTY GUILFORD			GEOLOGIST Jones, A. N.			
SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-) OVER WEST FORK DEEP RIVER									GROUND WTR (ft)			
BORING NO. B1-B			STATION 54+78			OFFSET 41 ft RT			ALIGNMENT -L-			
COLLAR ELEV. 807.9 ft			TOTAL DEPTH 31.5 ft			NORTHING 837,234			EASTING 1,700,134			
DRILL RIG/HAMMER EFF./DATE RFC0074 QME-55 80% 03/08/2019						DRILL METHOD Wash Boring			HAMMER TYPE Automatic			
DRILLER Pinter, D. G.			START DATE 09/02/20			COMP. DATE 09/03/20			SURFACE WATER DEPTH N/A			
CORE SIZE NQ			TOTAL RUN 17.8 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %RQD (ft) %		SAMP. NO.	STRATA REC. (ft) %RQD (ft) %		L O G	DESCRIPTION AND REMARKS	
											ELEV. (ft) DEPTH (ft)	
794.08											Begin Coring @ 13.8 ft	
	794.1	13.8	2.8	N=60/0.0 0:55/0.8 1:17/1.0 1:36/1.0	(2.6) 93%	(2.0) 71%		(17.0) 96%	(12.7) 71%		794.1 GRAY, BLACK, WHITE, V. SLIGHT WEATHERING TO FRESH, HARD TO VERY HARD, CLOSE TO MOD. CLOSELY FRACTURED, META-GABBRO	13.8
790	791.3	16.6	5.0	1:25/1.0 1:58/1.0 1:50/1.0 1:39/1.0 1:43/1.0	(4.4) 88%	(2.0) 40%					W/ WEATHERED ZONE FROM 20.5-21.5 FEET	
785	786.3	21.6	5.0	1:24/1.0 2:29/1.0 1:31/1.0 1:59/1.0 1:37/1.0	(5.0) 100%	(4.6) 92%	RS-1				GSI=70	
780	781.3	26.6	5.0	2:35/1.0 2:13/1.0 2:16/1.0 2:32/1.0 2:41/1.0	(5.0) 100%	(4.1) 82%						
	776.3	31.6									776.3 Boring Terminated at Elevation 776.4 ft IN CRYSTALLINE ROCK (GNEISS)	31.6

CORE PHOTOGRAPHS

B1-B

BOXES 1 & 2: 13.8 - 31.5 FEET



GEOTECHNICAL BORING REPORT

BORE LOG

[illegible]

NCDOT BORE DOUBLE U4758 GEO BRDG0308.GPJ NC DOT.GDT 4/29/21

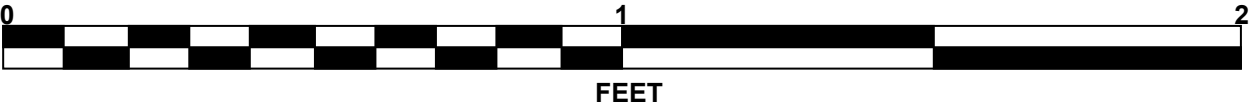
GEOTECHNICAL BORING REPORT

CORE LOG

NCDOT BORE DOUBLE U4758_GEO_BRDG0308.GPJ NC_DOT.GDT 4/29/21

CORE PHOTOGRAPHS

B2-C
BOXES 1 & 2: 18.7 - 36.5 FEET



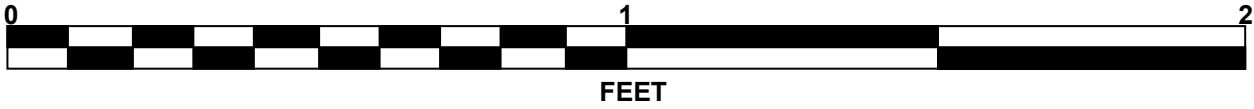
GEOTECHNICAL BORING REPORT

CORE LOG

[illegible]

WBS 40251.1.1				TIP U-4758				COUNTY GUILFORD				GEOLOGIST Jones, A. N.										
SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-) OVER WEST FORK DEEP RIVER												GROUND WTR (ft)										
BORING NO. B2-B				STATION 55+43				OFFSET 26 ft RT				ALIGNMENT -L-				0 HR. N/A						
COLLAR ELEV. 807.9 ft				TOTAL DEPTH 32.1 ft				NORTHING 837,289				EASTING 1,700,171				24 HR. 3.4						
DRILL RIG/HAMMER EFF./DATE RFC00074 CME-55 80% 03/08/2019								DRILL METHOD Wash Boring				HAMMER TYPE Automatic										
DRILLER Pinter, D. G.				START DATE 09/09/20				COMP. DATE 09/09/20				SURFACE WATER DEPTH N/A										
CORE SIZE NQ				TOTAL RUN 18.0 ft																		
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %ROD (ft) %		SAMP. NO.	STRATA REC. (ft) %ROD (ft) %		L O G	DESCRIPTION AND REMARKS ELEV. (ft) DEPTH (ft)											
793.82											Begin Coring @ 14.1 ft											
	793.8	14.1	3.0	1:33/1.0 N=60/0.0	(2.8)	(1.8)		(17.8)	(13.7)		793.8 GRAY, WHITE AND GREEN, V. SLI. WEATHERED TO FRESH, V. HARD, V. CLOSE TO MOC. CLOSELY FRACTURED, META-GABBRO 14.1											
	790.8	17.1		1:33/1.0 1:08/1.0 1:36/1.0	93%	60%		99%	76%													
790			5.0	1:09/1.0 1:09/1.0 1:18/1.0 1:33/1.0 1:14/1.0	(5.0)	(3.0)		100%	60%													
785	785.8	22.1		1:22/1.0 1:16/1.0 1:02/1.0 1:09/1.0 1:13/1.0	(5.0)	(3.9)	RS-2															
			5.0		100%	78%																
780	780.8	27.1		1:33/1.0 2:06/1.0 2:11/1.0 2:14/1.0	(5.0)	(5.0)																
			5.0		100%	100%																
	775.8	32.1									775.8 Boring Terminated at Elevation 775.8 ft IN CRYSTALLINE ROCK (META-GABBRO) 32.1											

B2-B
BOXES 1 & 2: 14.1 - 32.1 FEET



NCDOT BORE DOUBLE U4758_GEO_BRDG0308.GPJ NC_DOT.GDT 3/25/21

WBS 40251.1.1		TIP U-4758		COUNTY GUILFORD		GEOLOGIST Bhuiyan, A.							
SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-) OVER WEST FORK DEEP RIVER							GROUND WTR (ft)						
BORING NO. EB2-C		STATION 55+92		OFFSET 3 ft RT		ALIGNMENT -L-		0 HR. N/A					
COLLAR ELEV. 806.3 ft		TOTAL DEPTH 17.2 ft		NORTHING 837,340		EASTING 1,700,191		24 HR. 0.5					
DRILL RIGHAMMER EFF./DATE SIME0593 CME-550X 86% 05/01/2019				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic							
DRILLER Marlowe, J.		START DATE 12/19/18		COMP. DATE 12/19/18		SURFACE WATER DEPTH N/A							
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	MOI		
810													
805													806.3 GROUND SURFACE 0.0
													ALLUVIAL
	802.8	3.5		1	1	1					S-5	33%	VERY SOFT, GRAY, SILTY CLAY, A-7-6
800													
	797.8	8.5		WOH	WOH	1						W	798.3 VERY LOOSE, GRAY, CLAYEY FINE TO 8.0
													COARSE SAND, A-2-6
795													793.3 WEATHERED ROCK 13.0
	792.8	13.5		100/0.5						100/0.5			(META-GABBRO)
790													
	789.1	17.2		60/0.0						60/0.0			789.1 Boring Terminated WITH STANDARD 17.2
													PENETRATION TEST REFUSAL at
													Elevation 789.1 ft ON CRYSTALLINE
													ROCK (META-GABBRO)

WBS 40251.1.1						TIP U-4758						COUNTY GUILFORD						GEOLOGIST Bhuiyan, A.							
SITE DESCRIPTION BRIDGE NO. 308 ON SR 1818 (-L-) OVER WEST FORK DEEP RIVER																		GROUND WTR (ft)							
BORING NO. EB2-B						STATION 56+00						OFFSET 40 ft RT						ALIGNMENT -L-						0 HR. N/A	
COLLAR ELEV. 805.8 ft						TOTAL DEPTH 22.5 ft						NORTHING 837,318						EASTING 1,700,222						24 HR. 1.0	
DRILL RIG/HAMMER EFF./DATE SIME0593 CME-550X 86% 05/01/2019												DRILL METHOD H.S. Augers						HAMMER TYPE Automatic							
DRILLER Marlowe, J.						START DATE 12/19/18						COMP. DATE 12/19/18						SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION											
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)										
810																									
805															805.8 GROUND SURFACE 0.0										
800	802.3	3.5									S-4	37%			ALLUVIAL VERY SOFT, GRAY, SILTY CLAY, A-7-6										
	797.3	8.5	1	1	1										797.8 VERY LOOSE, GRAY, CLAYEY FINE TO COARSE SAND, A-2-6 8.0										
795	792.9	12.9	WOH	WOH	WOH							W			792.9 CRYSTALLINE ROCK 12.9 TAN AND GRAY, META-GABBRO 13.0										
790															REC = 91% RQD = 72% GSI = 49-54										
785															783.3 Boring Terminated at Elevation 783.3 ft IN CRYSTALLINE ROCK (META-GABBRO) 22.5										

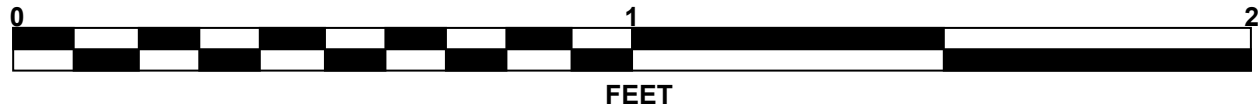
NCDOT CORE SINGLE U4758 GEO BRDG0308.GPJ NC_DOT_GDT 3/25/21

[illegible]

CORE PHOTOGRAPHS

EB2-B

BOX 1: 13.0 - 22.5 FEET



SUMMARY OF LABORATORY TEST DATA
Soil Classification and Gradation



S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616																							
S&ME Project #:				6235-18-015								Date Report:				2/26/2019							
State Project No.:				40251.1.1				County:				Guilford				Date Tested:				2/5-2/19			
Federal ID No.:				N/A				TIP No.:				U-4758											
Project Name:				Bridge No. 308 on SR 1818 (Johnson St.) over West Fork Deep River																			
Client Name:				ATKINS								Client Address: Raleigh, NC											
Sample No.	Station	Offset	Alignment	Sample Depth (ft)	AASHTO Classification		Total % Passing Sieve #					Total Mortar Fraction (%)				LL	PL	PI	Moist. %				
							10	40	60	200	270	Coarse Sand	Fine Sand	Silt	Clay								
S-3	54+50	CL	-L-	2.0-3.0	A-6	(5)	98	89	83	60	-	15	34	31	20	32	19	13	26.8				
S-4	56+00	40' RT	-L-	2.0-3.0	A-7-6	(24)	100	99	98	90	-	2	12	41	45	51	28	23	36.7				
S-5	55+92	3' RT	-L-	2.0-3.0	A-7-6	(14)	100	96	93	80	-	7	19	35	39	42	25	17	33.2				
References / Comments / Deviations: ND=Not Detemined. NP=Non-Plastic.																							
AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT										AASHTO T89: Determining the Liquid Limit of Soils													
AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils										AASHTO T265: Laboratory Determination of Moisture Content of Soils													
AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes																							
Mal Krajan, ET								104-01-0703				Stacie Mitchell, PE				Project Manager							
Technician Name:				Signature				Certification #				Technical Responsibility:				Position							
This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.																							

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
PHYSICAL TESTING LABORATORY

T. I. P. No. U-4758

REPORT ON SAMPLES OF ROCK COMPRESSION

Project 40251.1.1 County Guilford Owner C.M. Bruinsma
Date: Sampled 9/23/2020 Received 10/1/2020 Reported 11/5/2020
Sampled from BR#308 onSR 1818 over West Fork Deep R. By C. M. Bruinsma
Submitted by C. M. Bruinsma Standard Specifications
Tested By Michael Dubeau Date Tested 11/5/2020

TEST RESULTS

Proj. Sample No.	RS-1	RS-2	RS-3			
Boring Sample No.	B1-B	B2-B	B2-C			
Diameter in	1.984	1.984	1.984			
Specimen Height in	3.681	3.564	3.681			
Area in ²	3.092	3.092	3.092			
H/D Ratio	1.86	1.80	1.86			
Weight lbf	1.21	1.08	1.23			
Unit Weight lbf/ft ³	183.7	169.4	186.8			
Ultimate lbf	50100	26400	18610			
Ultimate ksi	16.20	8.55	6.02			
Ultimate Corrected ksi	16.05	8.43	5.97			
Sec Mod @ 40% Mpsi	11.43	8.52	11.86			
Station						
Offset						
Alignment						
Depth (ft)	22.30	22.10	31.50			
to	22.90	23.40	32.30			

cc:

Joshua Law
Physical Testing Engineer

North Carolina Dept. of Transportation
Division of Highways
Materials and Tests
Physical Testing Laboratory

Rock Compression

Lab Number:
Project #:
County:
Tip ID:

0
40251.1.1
Guilford
U-4758

Structure Description:
Test Date:

Br No 308 SR 1818 over.
11/05/2020

Sample No.	Diameter in	Specimen Height in	Area in ²	H/D Ratio	Weight lbf	Unit Weight lbf/ft ³	Ultimate lbf	Ultimate ksi	Ultimate (corrected) ksi	40% Ult. Load lbf	Sec Mod @ 40% Mpsi
RS-1	1.9840	3.681	3.0915	1.855	1.21	183.7	50100	16.2	16.05	20000	11.43
RS-2	1.9840	3.564	3.0915	1.796	1.08	169.4	26400	8.55	8.43	10570	8.52
RS-3	1.9840	3.721	3.0915	1.876	1.23	184.8	18610	6.02	5.97	7450	11.86

SITE PHOTOGRAPH

Bridge No. 308 on –L– (SR 1818) over West Fork Deep River



Looking Northeast towards End Bent 2