

REFERENCE: BR-0116

PROJECT: 67116

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY NASH
PROJECT DESCRIPTION BRIDGE NO. 80 ON COOPER
ROAD OVER GIDEON SWAMP AT -L- STA. 16+09

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
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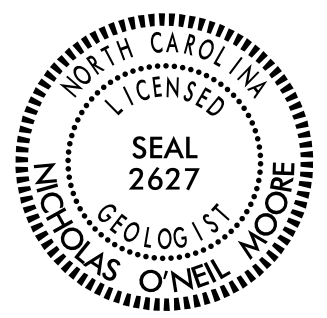
INVESTIGATED BY N.O. MOORE

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DATE OCTOBER 2019



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8636AEA7851148 SIGNATURE DATE

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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 209, 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*

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS		
	A-1	A-3	A-2		A-2		A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7				
GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6							
SYMBOL																	
% 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 35 MX	35 MX 35 MX	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN							
MATERIAL PASSING #40 LL PI	- 6 MX	- NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 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		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER			HIGHLY ORGANIC SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR			FAIR TO POOR	POOR	UNSUITABLE					
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30																	

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270
	4.76	2.00	0.42	0.25	0.075	0.053
BOULDER (BLDR.)						
COBBLE (COB.)						
GRAVEL (GR.)						
COARSE SAND (CSE, SD.)						
FINE SAND (F SD.)						
SILT (SL.)						
CLAY (CL.)						
GRAIN SIZE	305	75	2.0	0.25	0.05	0.005
MM						
IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
PL - PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

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.

GRADATION

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.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE LL < 31
MODERATELY COMPRESSIBLE LL = 31 - 50
HIGHLY COMPRESSIBLE LL > 50

PERCENTAGE OF 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

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

- 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

RECOMMENDATION SYMBOLS

- UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK

ABBREVIATIONS

- AR - AUGER REFUSAL
- BT - BORING TERMINATED
- CL - CLAY
- CPT - CONE PENETRATION TEST
- CSE - COARSE
- DMT - DILATOMETER TEST
- DPT - DYNAMIC PENETRATION TEST
- e - VOID RATIO
- F - FINE
- FOSS. - FOSSILIFEROUS
- FRAC. - FRACTURED, FRACTURES
- FRAGS. - FRAGMENTS
- HI. - HIGHLY
- MED. - 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
- VST - VANE SHEAR TEST
- WEA. - WEATHERED
- γ - UNIT WEIGHT
- γ_d - DRY UNIT WEIGHT
- S - BULK
- SS - SPLIT SPOON
- ST - SHELBY TUBE
- RS - ROCK
- RT - RECOMPACTED TRIAXIAL
- CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

- DRILL UNITS:
 - CME-45C
 - CME-55
 - CME-550
 - VANE SHEAR TEST
 - PORTABLE HOIST
- ADVANCING TOOLS:
 - CLAY BITS
 - 6" CONTINUOUS FLIGHT AUGER
 - 8" HOLLOW AUGERS
 - HARD FACED FINGER BITS
 - TUNG-CARBIDE INSERTS
 - CASING w/ ADVANCER
 - TRICONE * STEEL TEETH
 - TRICONE * TUNG-CARB.
 - CORE BIT
- HAMMER TYPE:
 - AUTOMATIC MANUAL
- CORE SIZE:
 - B
 - H
 - N
- HAND TOOLS:
 - POST HOLE DIGGER
 - HAND AUGER
 - SOUNDING ROD
 - VANE SHEAR TEST

ROCK DESCRIPTION

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:

WEATHERED ROCK (WR) - NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.

CRYSTALLINE ROCK (CR) - FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.

NON-CRYSTALLINE ROCK (NCR) - FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.

COASTAL PLAIN SEDIMENTARY ROCK (CP) - COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH - ROCK FRESH, CRYSTALS BRIGHT, FINE JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.

VERY SLIGHT (V SLI.) - 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.

SLIGHT (SLI.) - 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.

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.

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. *IF TESTED, WOULD YIELD SPT REFUSAL*

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. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*

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. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*

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.

ROCK HARDNESS

VERY HARD - CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.

HARD - CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.

MODERATELY HARD - CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.

MEDIUM HARD - CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.

SOFT - CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.

VERY SOFT - CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.

MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.

INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.

EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

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 DISLOGGED 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 (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 (SROD) - 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.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

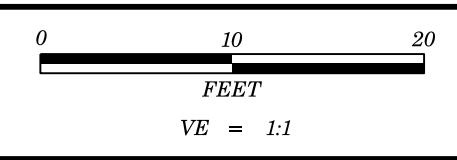
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

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

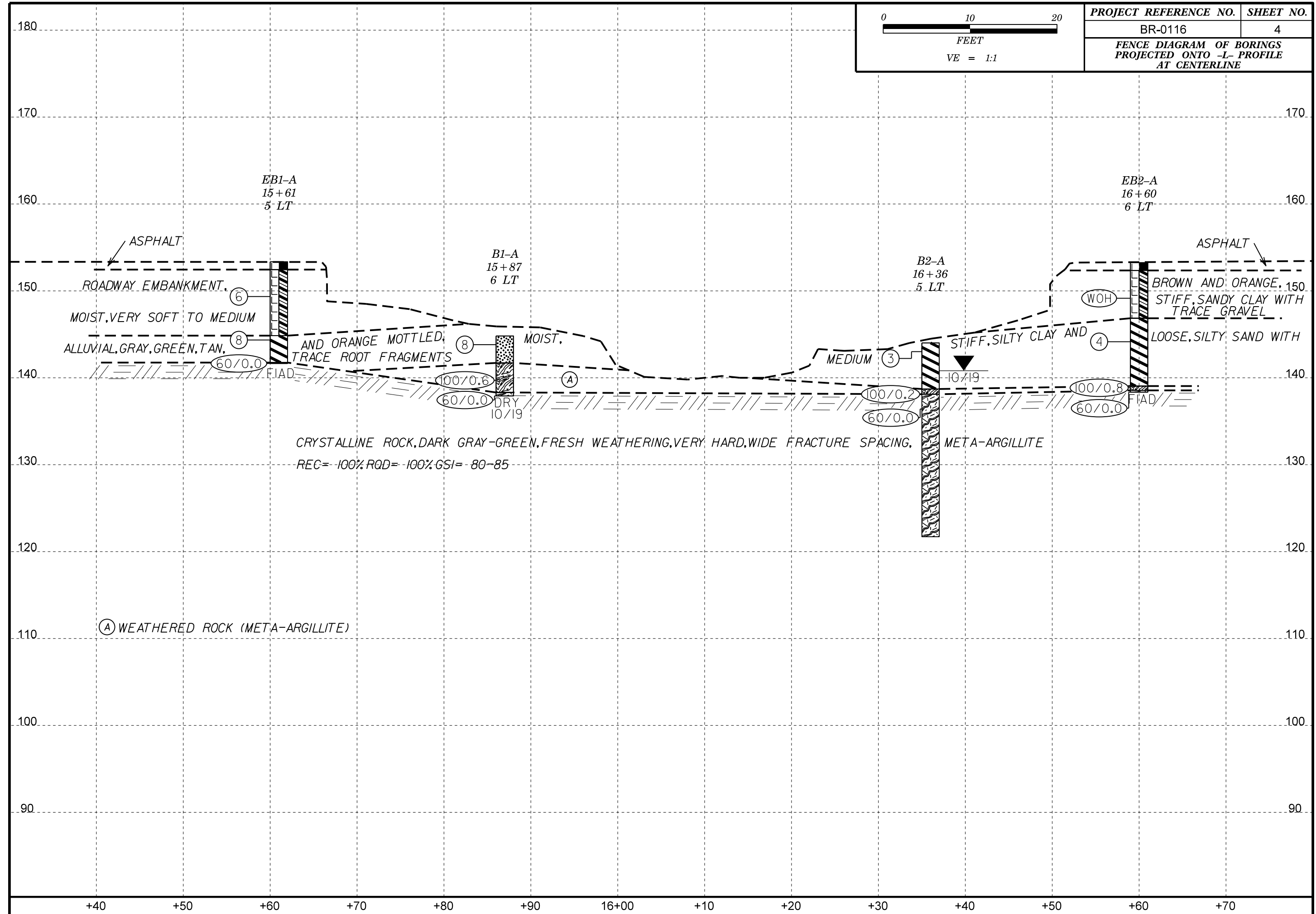
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

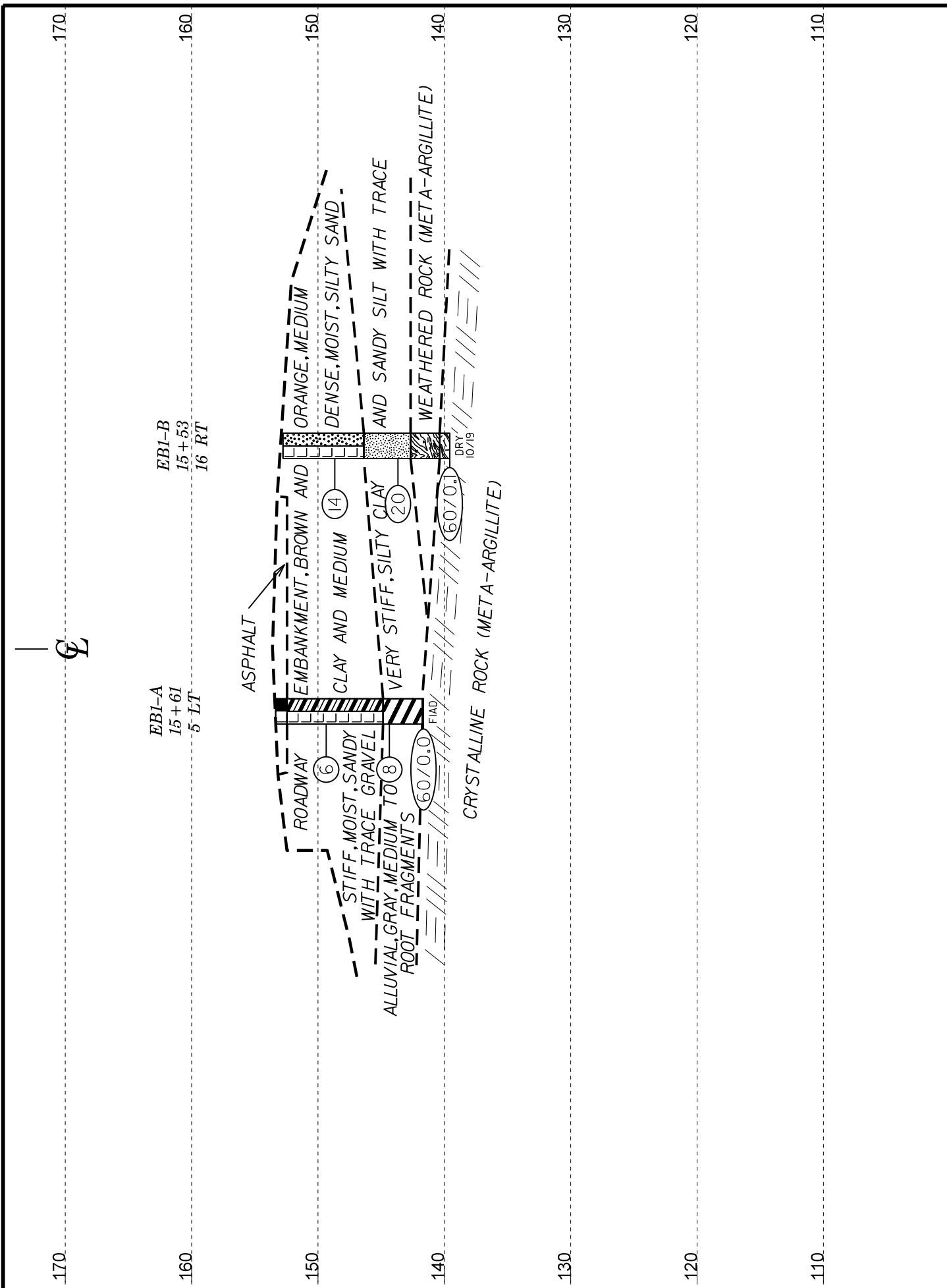
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)		SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)				
From the lithology, structure and surface conditions 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.		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	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.		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
STRUCTURE		DECREASING SURFACE QUALITY →					COMPOSITION AND STRUCTURE						
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities		90			N/A	N/A	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.	70					
BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets		80					B. Sandstone with thin inter-layers of siltstone	60					
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets			70				C. Sandstone and siltstone in similar amounts		50				
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity			60				D. Siltstone or silty shale with sandstone layers			40			
DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces				50			E. Weak siltstone or clayey shale with sandstone layers				30		
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes				40			F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure					20	
				30			G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers						10
				20			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.						
				10									
		N/A	N/A										

→ Means deformation after tectonic disturbance



PROJECT REFERENCE NO.	SHEET NO.
BR-0116	4
FENCE DIAGRAM OF BORINGS PROJECTED ONTO -L- PROFILE AT CENTERLINE	

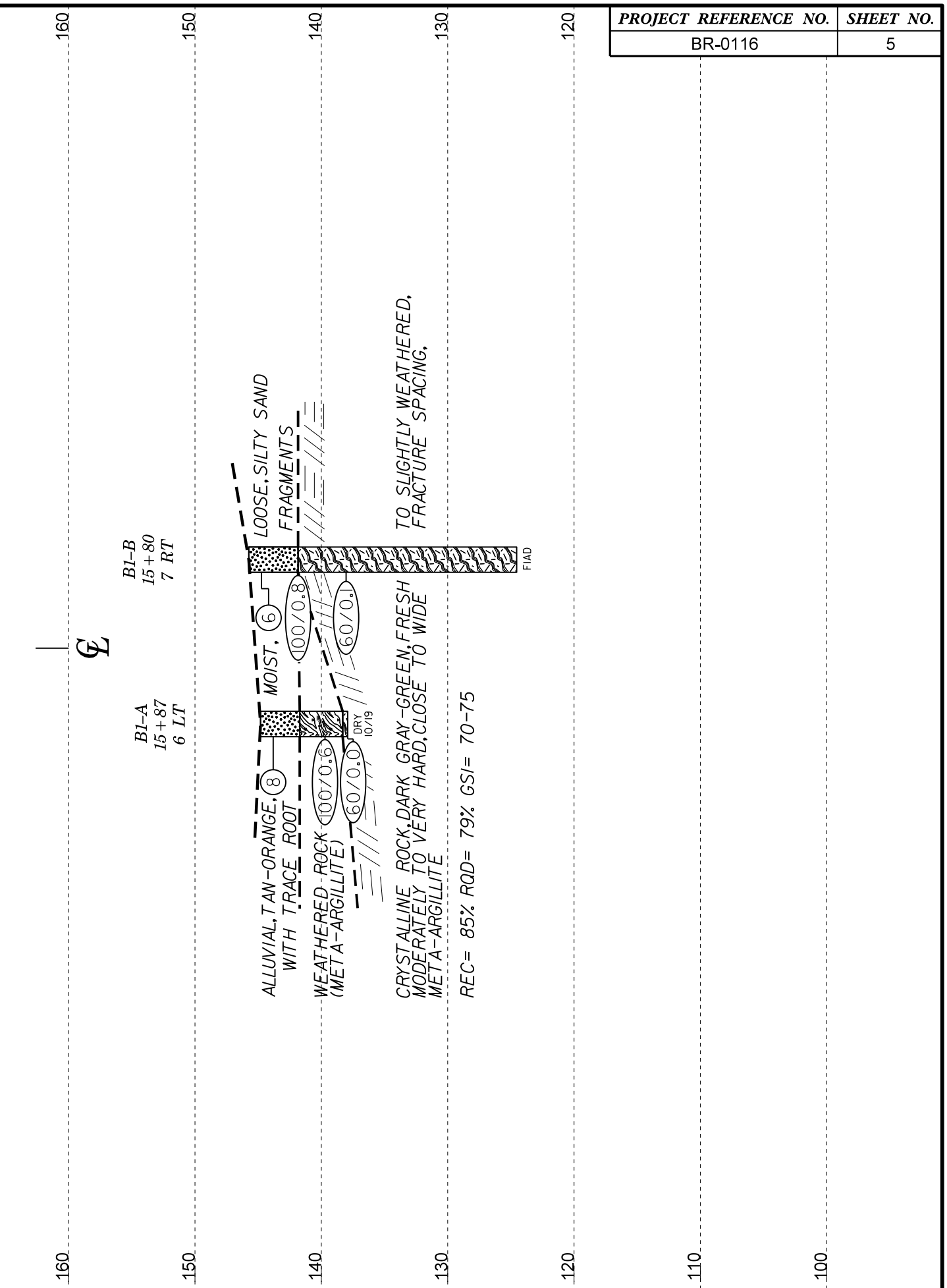




HORIZ. SCALE 0 10 20 (FEET)

VE = 1:1

CROSS SECTION OF END BENT 1 AT -L- STATION 15+57 SKEW = 107

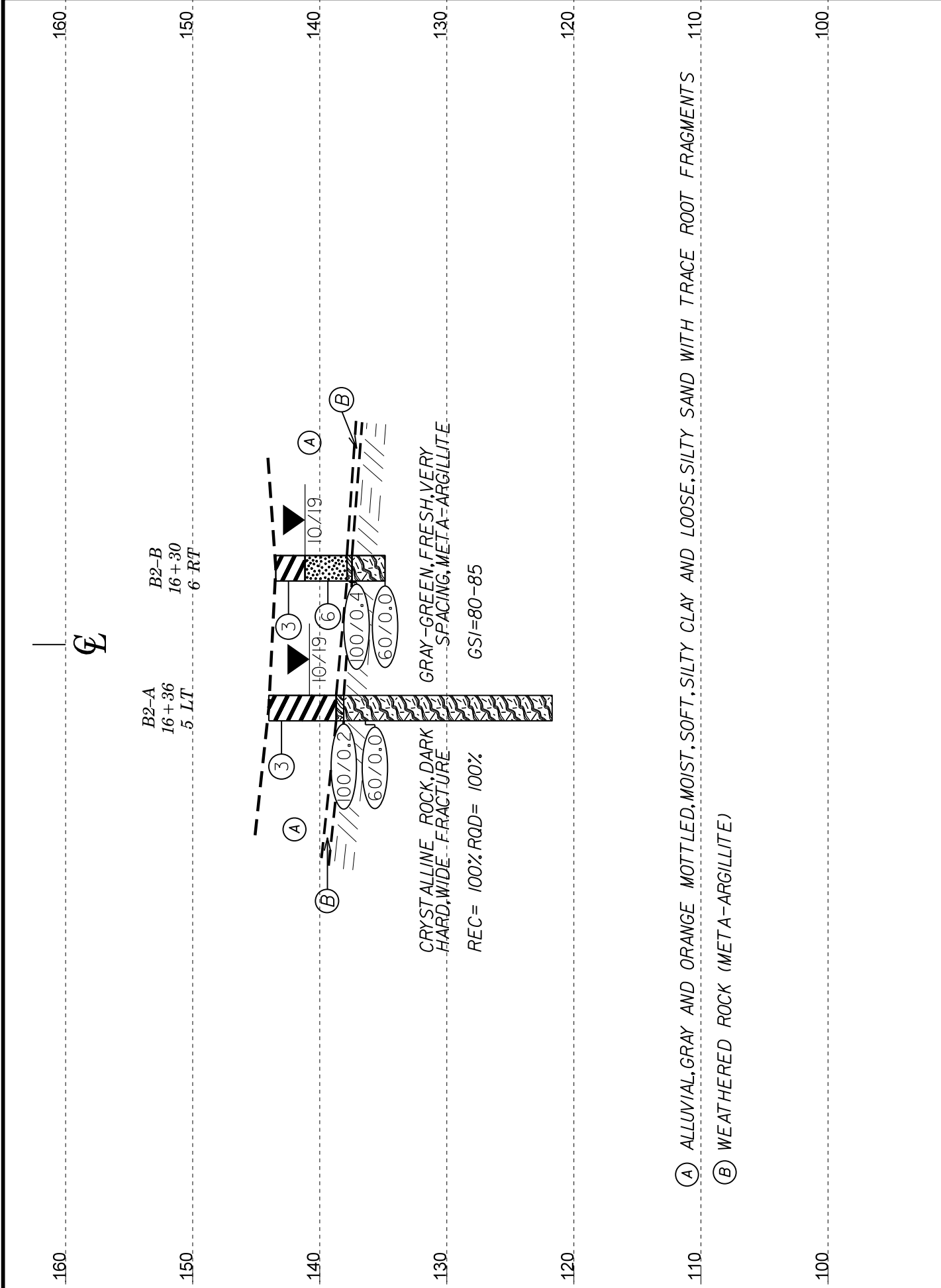


HORIZ. SCALE 0 10 20 (FEET)

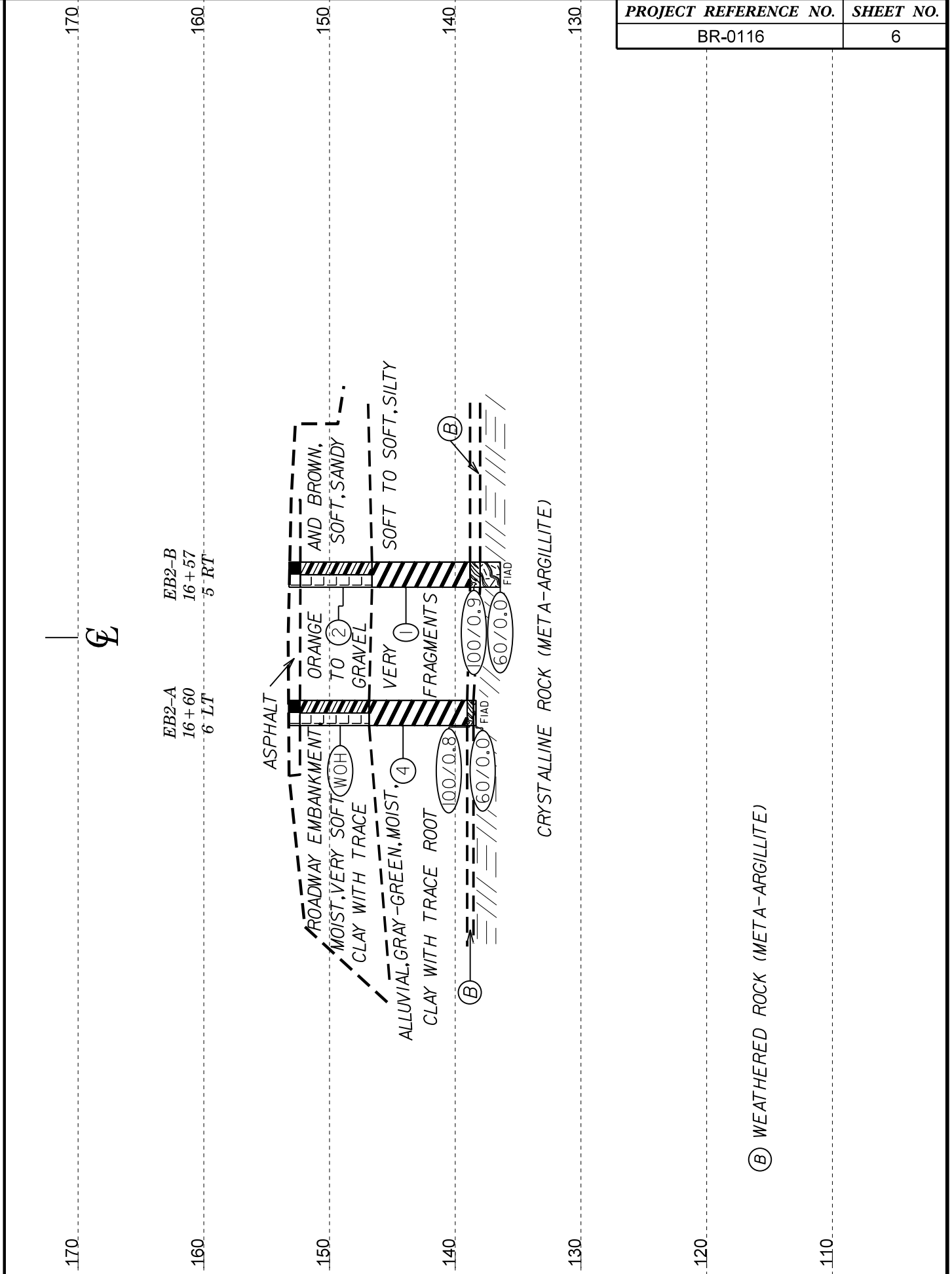
VE = 1:1

CROSS SECTION OF BENT 1 AT -L- STATION 15+84 SKEW = 107

REC= 85% RQD= 79% GSI= 70-75



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1
CROSS SECTION OF BENT 2 AT -L- STATION 16+33 SKEW = 107



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1
CROSS SECTION OF END BENT 2 AT -L- STATION 16+58 SKEW = 107

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67116.1.1		TIP BR-0116		COUNTY NASH		GEOLOGIST Moore, N. O.											
SITE DESCRIPTION BRIDGE NO. 80 ON COOPER ROAD OVER GIDEON SWAMP							GROUND WTR (ft)										
BORING NO. EB1-A		STATION 15+61		OFFSET 5 ft LT		ALIGNMENT -L-											
COLLAR ELEV. 153.4 ft		TOTAL DEPTH 11.7 ft		NORTHING 866,710		EASTING 2,308,410											
DRILL RIGHAMMER EFF./DATE RFC0074 CME-55 80% 03/08/2019			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
DRILLER Pinter, D. G.		START DATE 10/02/19		COMP. DATE 10/02/19		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							
155														153.4	0.0	GROUND SURFACE	
														152.5	0.9	ROADWAY EMBANKMENT ASPHALT	
150	150.4	3.0	4	3	3								M			BROWN AND ORANGE, SANDY CLAY WITH TRACE GRAVEL	
145	145.4	8.0	3	3	5								M			ALLUVIAL GRAY, SILTY CLAY WITH TRACE ROOT FRAGMENTS	
	141.7	11.7	60/0.0			60/0.0									141.7	11.7	CRYSTALLINE ROCK (META-ARGILLITE)
															Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 141.7 ft IN CRYSTALLINE ROCK (META-ARGILLITE)		

WBS 67116.1.1		TIP BR-0116		COUNTY NASH		GEOLOGIST Moore, N. O.											
SITE DESCRIPTION BRIDGE NO. 80 ON COOPER ROAD OVER GIDEON SWAMP							GROUND WTR (ft)										
BORING NO. EB1-B		STATION 15+53		OFFSET 16 ft RT		ALIGNMENT -L-											
COLLAR ELEV. 152.8 ft		TOTAL DEPTH 13.2 ft		NORTHING 866,713		EASTING 2,308,433											
DRILL RIGHAMMER EFF./DATE RFC0074 CME-55 80% 03/08/2019			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
DRILLER Pinter, D. G.		START DATE 10/02/19		COMP. DATE 10/02/19		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							
155														152.8	0.0	GROUND SURFACE	
																ROADWAY EMBANKMENT BROWN, SILTY SAND WITH TRACE GRAVEL	
150	149.7	3.1	7	7	7								M			ALLUVIAL BROWN AND GRAY-GREEN, SANDY SILT	
145	144.7	8.1	5	8	12								M			WEATHERED ROCK (META-ARGILLITE)	
140	139.7	13.1	60/0.1			60/0.1									139.6	13.2	CRYSTALLINE ROCK (META-ARGILLITE)
															Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 139.6 ft IN CRYSTALLINE ROCK (META-ARGILLITE)		

NCDOT BORE DOUBLE BR0116 GEO_BRDG_BH.GPJ NC_DOT.GDT 10/17/19

GEOTECHNICAL BORING REPORT BORE LOG

WBS 67116.1.1	TIP BR-0116	COUNTY NASH	GEOLOGIST Moore, N. O.
SITE DESCRIPTION BRIDGE NO. 80 ON COOPER ROAD OVER GIDEON SWAMP			GROUND WTR (ft)
BORING NO. B1-A	STATION 15+87	OFFSET 6 ft LT	ALIGNMENT -L-
COLLAR ELEV. 144.8 ft	TOTAL DEPTH 6.9 ft	NORTHING 866,733	EASTING 2,308,397
DRILL RIGHAMMER EFF/DATE RFC0074 CME-55 80% 03/08/2019		DRILL METHOD Wash Boring	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 10/03/19	COMP. DATE 10/03/19	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				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)			
145	144.8	0.0	2	3	5										144.8	GROUND SURFACE	0.0	
																	ALLUVIAL	
																	TAN-ORANGE, SILTY SAND WITH TRACE ROOT FRAGMENTS	3.1
140	140.3	4.5	73	27/0.1													WEATHERED ROCK (META-ARGILLITE)	
	137.9	6.9	60/0.0														CRYSTALLINE ROCK (META-ARGILLITE)	6.5
																		6.9
																	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 137.9 ft IN CRYSTALLINE ROCK (META-ARGILLITE)	

NCDOT BORE DOUBLE BR0116_GEO_BRDG_BH.GPJ NC_DOT.GDT 10/17/19

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 67116.1.1		TIP BR-0116		COUNTY NASH		GEOLOGIST Moore, N. O.										
SITE DESCRIPTION BRIDGE NO. 80 ON COOPER ROAD OVER GIDEON SWAMP							GROUND WTR (ft)									
BORING NO. B1-B		STATION 15+80		OFFSET 7 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 145.7 ft		TOTAL DEPTH 21.2 ft		NORTHING 866,733		EASTING 2,308,412										
DRILL RIGHAMMER EFF./DATE RFC0074 CME-55 80% 03/08/2019				DRILL METHOD Core Boring		HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 10/07/19		COMP. DATE 10/07/19		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						
150																
145	145.7	0.0	3	3	3									145.7	GROUND SURFACE	0.0
140	143.1	2.6	2	4	96/0.3								M	141.8	ALLUVIAL TAN-ORANGE, SILTY SAND WITH TRACE ROOT FRAGMENTS AND GRAVEL	3.9
135	138.1	7.6	60/0.1											138.0	CRYSTALLINE ROCK (META-ARGILLITE)	7.7
130																
125																
														124.5	Boring Terminated at Elevation 124.5 ft IN CRYSTALLINE ROCK (META-ARGILLITE)	21.2

WBS 67116.1.1		TIP BR-0116		COUNTY NASH		GEOLOGIST Moore, N. O.						
SITE DESCRIPTION BRIDGE NO. 80 ON COOPER ROAD OVER GIDEON SWAMP							GROUND WTR (ft)					
BORING NO. B1-B		STATION 15+80		OFFSET 7 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 145.7 ft		TOTAL DEPTH 21.2 ft		NORTHING 866,733		EASTING 2,308,412						
DRILL RIGHAMMER EFF./DATE RFC0074 CME-55 80% 03/08/2019				DRILL METHOD Core Boring		HAMMER TYPE Automatic						
DRILLER Pinter, D. G.		START DATE 10/07/19		COMP. DATE 10/07/19		SURFACE WATER DEPTH N/A						
CORE SIZE N				TOTAL RUN 13.5 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
138.04	138.0	7.7	1.2	02:53/1.0	(0.8)	(0.5)		(11.5)	(10.6)		Begin Coring @ 7.7 ft	7.7
135	136.8	8.9	4.8	00:47/0.2	67%	42%		85%	79%		DARK GRAY-GREEN, FRESH TO SLIGHTLY WEATHERED, MODERATELY TO VERY HARD, CLOSE TO WIDE FRACTURE SPACING, META-ARGILLITE	
130	132.0	13.7	5.0	04:07/1.0 04:43/1.0 05:14/1.0 05:39/1.0 05:19/0.8	(4.4)	(4.3)					REC=85% RQD=79% GSI=70-75	
125	124.5	21.2	2.5	03:04/1.0 02:09/1.0 02:40/1.0 02:00/1.0 02:02/1.0	(5.0)	(5.0)	RS-1					
				12:24/1.0 1:10/1.0 04:35/0.5	(1.3)	(0.8)	RS-2					
					52%	32%					Boring Terminated at Elevation 124.5 ft IN CRYSTALLINE ROCK (META-ARGILLITE)	21.2

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 67116.1.1		TIP BR-0116		COUNTY NASH		GEOLOGIST Moore, N. O.											
SITE DESCRIPTION BRIDGE NO. 80 ON COOPER ROAD OVER GIDEON SWAMP							GROUND WTR (ft)										
BORING NO. B2-A		STATION 16+36		OFFSET 5 ft LT		ALIGNMENT -L-											
COLLAR ELEV. 144.0 ft		TOTAL DEPTH 22.3 ft		NORTHING 866,776		EASTING 2,308,374											
DRILL RIGHAMMER EFF./DATE RFO0074 CME-55 80% 03/08/2019				DRILL METHOD Core Boring		HAMMER TYPE Automatic											
DRILLER Pinter, D. G.		START DATE 10/03/19		COMP. DATE 10/03/19		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)			
145	144.0	0.0	WOH	WOH	3							M	144.0	0.0	GROUND SURFACE		
140	138.3	5.7											138.7	5.3	ALLUVIAL GRAY AND ORANGE MOTTLED, SILTY CLAY WITH TRACE ROOT FRAGMENTS		
135	136.4	7.6	100/0.2										138.1	5.9	WEATHERED ROCK (META-ARGILLITE)		
130													136.4	7.6	CRYSTALLINE ROCK (META-ARGILLITE)		
125															DARK GRAY-GREEN, FRESH, VERY HARD, WIDE FRACTURE SPACING, META-ARGILLITE		
															REC= 100% RQD=100% GSI=80-85		
															RS-1		
															RS-2		
															121.7	22.3	Boring Terminated at Elevation 121.7 ft IN CRYSTALLINE ROCK (META-ARGILLITE)

WBS 67116.1.1		TIP BR-0116		COUNTY NASH		GEOLOGIST Moore, N. O.					
SITE DESCRIPTION BRIDGE NO. 80 ON COOPER ROAD OVER GIDEON SWAMP							GROUND WTR (ft)				
BORING NO. B2-A		STATION 16+36		OFFSET 5 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 144.0 ft		TOTAL DEPTH 22.3 ft		NORTHING 866,776		EASTING 2,308,374					
DRILL RIGHAMMER EFF./DATE RFO0074 CME-55 80% 03/08/2019				DRILL METHOD Core Boring		HAMMER TYPE Automatic					
DRILLER Pinter, D. G.		START DATE 10/03/19		COMP. DATE 10/03/19		SURFACE WATER DEPTH N/A					
CORE SIZE N				TOTAL RUN 14.7 ft							
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
					REC. (%)	RQD (%)		REC. (%)	RQD (%)		
136.41											Begin Coring @ 7.6 ft
135	136.4	7.6	4.7	N=60/0.0 04:36/1.0 04:11/1.0 04:02/1.0 04:04/1.0 02:17/0.7	(4.7) 100%	(4.7) 100%		(14.7) 100%	(14.7) 100%		DARK GRAY-GREEN, FRESH, VERY HARD, WIDE FRACTURE SPACING, META-ARGILLITE
130	131.7	12.3	5.0	03:10/1.0 03:10/1.0 03:12/1.0 03:24/1.0 03:26/1.0	(5.0) 100%	(5.0) 100%	RS-1				REC= 100% RQD=100% GSI=80-85
125	126.7	17.3	5.0	03:41/1.0 03:22/1.0 03:53/1.0 03:56/1.0 03:41/1.0	(5.0) 100%	(5.0) 100%	RS-2				
	121.7	22.3									Boring Terminated at Elevation 121.7 ft IN CRYSTALLINE ROCK (META-ARGILLITE)

GEOTECHNICAL BORING REPORT BORE LOG

WBS 67116.1.1	TIP BR-0116	COUNTY NASH	GEOLOGIST Moore, N. O.
SITE DESCRIPTION BRIDGE NO. 80 ON COOPER ROAD OVER GIDEON SWAMP			GROUND WTR (ft)
BORING NO. B2-B	STATION 16+30	OFFSET 6 ft RT	ALIGNMENT -L-
COLLAR ELEV. 143.5 ft	TOTAL DEPTH 8.6 ft	NORTHING 866,776	EASTING 2,308,387
DRILL RIGHAMMER EFF/DATE RFC0074 CME-55 80% 03/08/2019		DRILL METHOD Wash Boring	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 10/02/19	COMP. DATE 10/02/19	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			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
145															143.5	GROUND SURFACE	0.0
	143.5	0.0	1	1	2	3								M	141.2	ALLUVIAL GRAY AND ORANGE MOTTLED, SILTY CLAY WITH TRACE ROOT FRAGMENTS	2.3
140	140.4	3.1	1	2	4	6								M	137.9	GREEN AND BROWN MOTTLED, SILTY SAND WITH TRACE ROOT FRAGMENTS	5.6
	138.1	5.4	100/0.4												137.5	WEATHERED ROCK (META-ARGILLITE)	6.0
135	134.9	8.6	60/0.0												134.9	CRYSTALLINE ROCK (META-ARGILLITE)	8.6
																Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 134.9 ft IN CRYSTALLINE ROCK (META-ARGILLITE)	

NCDOT BORE DOUBLE BR0116_GEO_BRDG_BH.GPJ NC_DOT.GDT 10/18/19

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67116.1.1		TIP BR-0116		COUNTY NASH		GEOLOGIST Moore, N. O.										
SITE DESCRIPTION BRIDGE NO. 80 ON COOPER ROAD OVER GIDEON SWAMP							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 16+60		OFFSET 6 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 153.3 ft		TOTAL DEPTH 14.9 ft		NORTHING 866,797		EASTING 2,308,362										
DRILL RIGHAMMER EFF./DATE RFC0074 CME-55 80% 03/08/2019			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 10/02/19		COMP. DATE 10/02/19		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						
155														153.3	GROUND SURFACE	0.0
														152.4	ROADWAY EMBANKMENT ASPHALT	0.9
150	150.2	3.1	WOH	WOH	WOH								M	146.9	ORANGE AND BROWN, SANDY CLAY WITH TRACE GRAVEL	6.4
145	145.2	8.1	1	1	3								M	139.1	ALLUVIAL GRAY-GREEN, SILTY CLAY WITH TRACE ROOT FRAGMENTS	14.2
140	140.2	13.1	2	4	100/0.3									138.6	WEATHERED ROCK (META-ARGILLITE)	14.7
	138.4	14.9	60/0.0											138.4	CRYSTALLINE ROCK (META-ARGILLITE)	14.9
Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 138.4 ft IN CRYSTALLINE ROCK (META-ARGILLITE)																

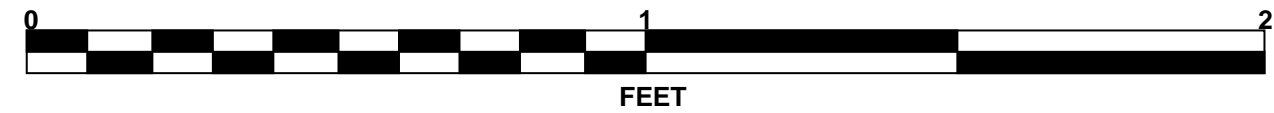
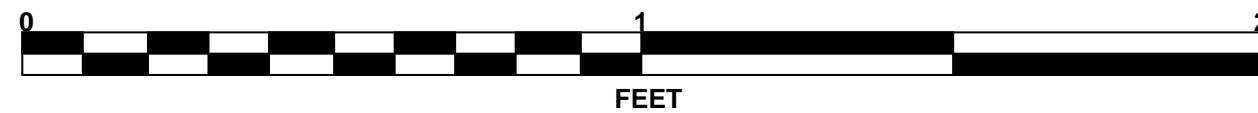
WBS 67116.1.1		TIP BR-0116		COUNTY NASH		GEOLOGIST Moore, N. O.										
SITE DESCRIPTION BRIDGE NO. 80 ON COOPER ROAD OVER GIDEON SWAMP							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 16+57		OFFSET 5 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 153.2 ft		TOTAL DEPTH 16.8 ft		NORTHING 866,799		EASTING 2,308,373										
DRILL RIGHAMMER EFF./DATE RFC0074 CME-55 80% 03/08/2019			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Pinter, D. G.		START DATE 10/02/19		COMP. DATE 10/02/19		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						
155														153.2	GROUND SURFACE	0.0
														152.3	ROADWAY EMBANKMENT ASPHALT	0.9
150	149.9	3.3	1	1	1								M	146.6	ORANGE AND RED, SANDY CLAY WITH TRACE GRAVEL	6.6
145	144.9	8.3	WOH	WOH	1								M	139.1	ALLUVIAL GRAY, SILTY CLAY WITH TRACE ROOT FRAGMENTS	14.2
140	139.9	13.3	2	1	100/0.4									138.8	WEATHERED ROCK (META-ARGILLITE)	14.4
	136.4	16.8	60/0.0											138.0	CRYSTALLINE ROCK (META-ARGILLITE)	15.2
														136.4	CRYSTALLINE ROCK (META-ARGILLITE)	16.8
Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 136.4 ft IN CRYSTALLINE ROCK (META-ARGILLITE)																

CORE PHOTOGRAPHS

B1-B
BOXES 1 & 2: 7.7 - 21.2 FEET



B2-A
BOXES 1 & 2: 7.6 - 22.3 FEET



PROJ. NO. - 67116.1.1
ID NO. - BR-0116
COUNTY - NASH

B1-B

ROCK TEST RESULTS											
SAMPLE NO.	DIAMETER IN	SPECIMEN HEIGHT IN	AREA IN ²	H/D RATIO	WEIGHT IBF	UNIT WEIGHT IBF/FT3	ULTIMATE IBF	ULTIMATE KSI	ULTIMATE CORRECTED KSI	40% ULT. LOAD IBF	SEC MOD @ 40% MPsi
RS-1	1.98	3.49	3.08	1.76	1.07	172.1	62800	20.4	20.1	25100	0.57
RS-2	1.98	3.93	3.08	1.99	1.29	184.2	35000	11.36	11.35	13990	6.69

B2-A

ROCK TEST RESULTS											
SAMPLE NO.	DIAMETER IN	SPECIMEN HEIGHT IN	AREA IN ²	H/D RATIO	WEIGHT IBF	UNIT WEIGHT IBF/FT3	ULTIMATE IBF	ULTIMATE KSI	ULTIMATE CORRECTED KSI	40% ULT. LOAD IBF	SEC MOD @ 40% MPsi
RS-1	1.98	3.90	3.08	1.97	1.23	177	51000	16.55	16.52	20400	6.98
RS-2	1.98	3.95	3.08	2.00	1.30	184.7	40200	13.06	13.06	16080	8.61