

REFERENCE: 17BP.12.R.63

PROJECT: NA

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.12.R.63	1	21

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

**STRUCTURE
SUBSURFACE INVESTIGATION**

COUNTY CATAWBA
PROJECT DESCRIPTION DIVISION 12 BRIDGES

SITE DESCRIPTION REPLACE BRIDGE NO. 59 ON
SR 1120 (GREEDY HIGHWAY) OVER JACOB FORK
CREEK

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2, 2A	LEGEND (SOIL & ROCK)
2B, 2C	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4-17	BORE LOGS, CORE LOGS, & ROCK CORE PHOTOS
18	ROCK TEST RESULTS

PERSONNEL

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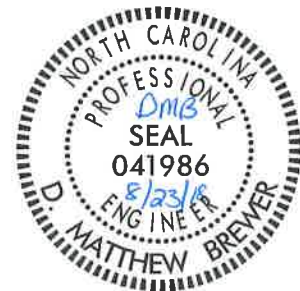
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS
(PAGE 1 OF 2)

SOIL DESCRIPTION										GRADATION									
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.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS									
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										MINERALOGICAL COMPOSITION									
GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-3, A-4, A-5, A-6, A-7										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.									
SYMBOL										COMPRESSIBILITY									
% PASSING #10, #40, #200										SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50									
MATERIAL PASSING #40 LL, PI										PERCENTAGE OF MATERIAL									
GROUP INDEX										ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL									
USUAL TYPES OF MAJOR MATERIALS										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									
GEN. RATING AS SUBGRADE										GROUND WATER									
EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR POOR UNSUITABLE										▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▽ STATIC WATER LEVEL AFTER 24 HOURS ▽PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA ○ SPRING OR SEEP									
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS									
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY									
VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD										DIP & DIP DIRECTION OF ROCK STRUCTURES SPT DMT VST PMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE									
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS									
U.S. STD. SIEVE SIZE OPENING (MM) 4, 10, 40, 60, 200, 270										UNCLASIFIED EXCAVATION - UNSUITABLE WASTE UNCLASIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK UNCLASIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL									
BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE, SD.), FINE SAND (F SD.), SILT (SL.), CLAY (CL.)										ABBREVIATIONS									
GRAIN SIZE MM, IN. 305, 12, 75, 3, 2.0, 0.25, 0.05, 0.005										AR - AUGER REFUSAL MED. - MEDIUM BT - BORING TERMINATED MICA - MICACEOUS CL. - CLAY MOD. - MODERATELY CPT - CONE PENETRATION TEST NP - NON PLASTIC CSE. - COARSE PMT - PRESSUREMETER TEST DPT - DILATOMETER TEST SAP. - SAPROLITIC DMT - DYNAMIC PENETRATION TEST SD. - SAND, SANDY e - VOID RATIO SL. - SILT, SILTY F - FINE SILI. - SLIGHTLY FOSS. - FOSSILIFEROUS TCR - TRICONE REFUSAL FRAC. - FRACTURED, FRACTURES w - MOISTURE CONTENT FRAGS. - FRAGMENTS v - VERY HI. - HIGHLY									
SOIL MOISTURE - CORRELATION OF TERMS										SAMPLE ABBREVIATIONS									
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO									
LL LIQUID LIMIT SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																			
PLASTIC RANGE (PI) 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										EQUIPMENT USED ON SUBJECT PROJECT									
PLASTICITY INDEX (PI) DRY STRENGTH										DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:									
NON PLASTIC 0-5 VERY LOW										<input type="checkbox"/> CME-45C <input type="checkbox"/> CLAY BITS <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL									
SLIGHTLY PLASTIC 6-15 SLIGHT										<input type="checkbox"/> CME-55 <input type="checkbox"/> 6' CONTINUOUS FLIGHT AUGER									
MODERATELY PLASTIC 16-25 MEDIUM										<input checked="" type="checkbox"/> CME-550 <input checked="" type="checkbox"/> 8" HOLLOW AUGERS									
HIGHLY PLASTIC 26 OR MORE HIGH										<input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> HARD FACED FINGER BITS									
COLOR										<input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> TUNG-CARBIDE INSERTS									
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.										<input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER									
										<input type="checkbox"/> TRICONE _____ STEEL TEETH									
										<input type="checkbox"/> TRICONE _____ TUNG-CARB.									
										<input checked="" type="checkbox"/> CORE BIT									
										CORE SIZE: <input type="checkbox"/> -B _____ <input type="checkbox"/> -H _____									
										<input checked="" type="checkbox"/> -N Q2									
										HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST									





**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 2 OF 2)

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, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
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.
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.
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. <u>IF TESTED, WOULD YIELD SPT REFUSAL</u>
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. <u>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</u>
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. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>
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 FINGERNAIL.

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 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 (ROQ) - 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 (SROQ) - 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.

BENCH MARK: BM #1 - RR SPIKE IN BASE OF 14' MAPLE 46' LEFT OF -L- STA. 15+17 N-692840 E-1289114

ELEVATION: 91.53 FEET

NOTES:

SURVEY INFORMATION AND ROADWAY DESIGNS PROVIDED BY MATTERN AND CRAIG

**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 (PAGE 1 OF 2)**

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (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

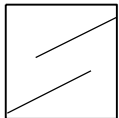
FAIR
Smooth, moderately weathered and altered surfaces

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

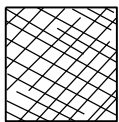
VERY POOR
Slackensided, highly weathered surfaces with soft clay coatings or fillings

DECREASING SURFACE QUALITY →

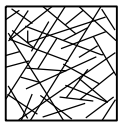
STRUCTURE



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



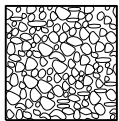
BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets



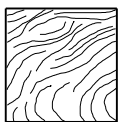
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets



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
↓

90				N/A	N/A
80					
	70				
		60			
			50		
				40	
					30
					20
					10
N/A	N/A				

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 (PAGE 2 OF 2)**

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

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

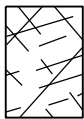
GOOD - Rough, slightly weathered surfaces

FAIR - Smooth, moderately weathered and altered surfaces

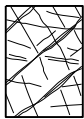
POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments

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 peltic 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.



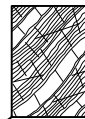
B. Sandstone with thin inter-layers of siltstone



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

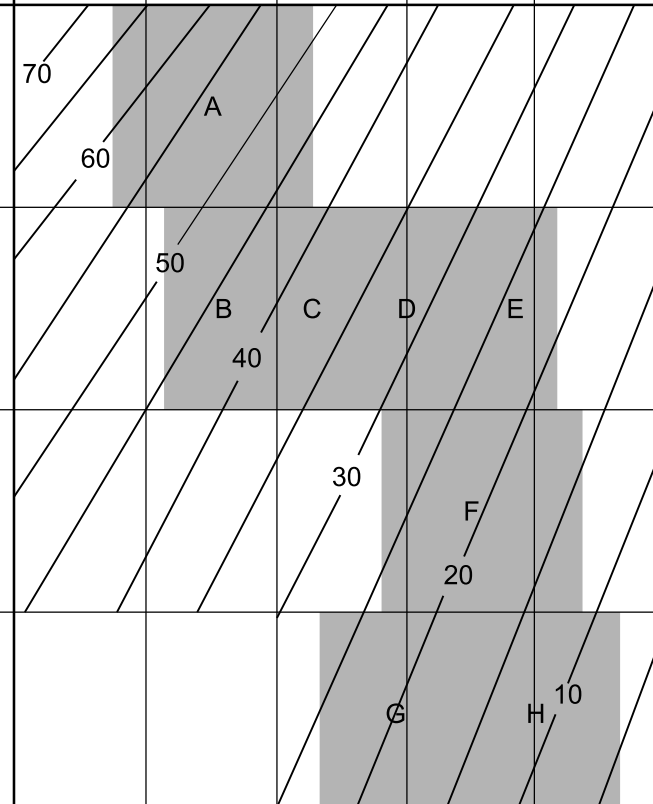


G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers

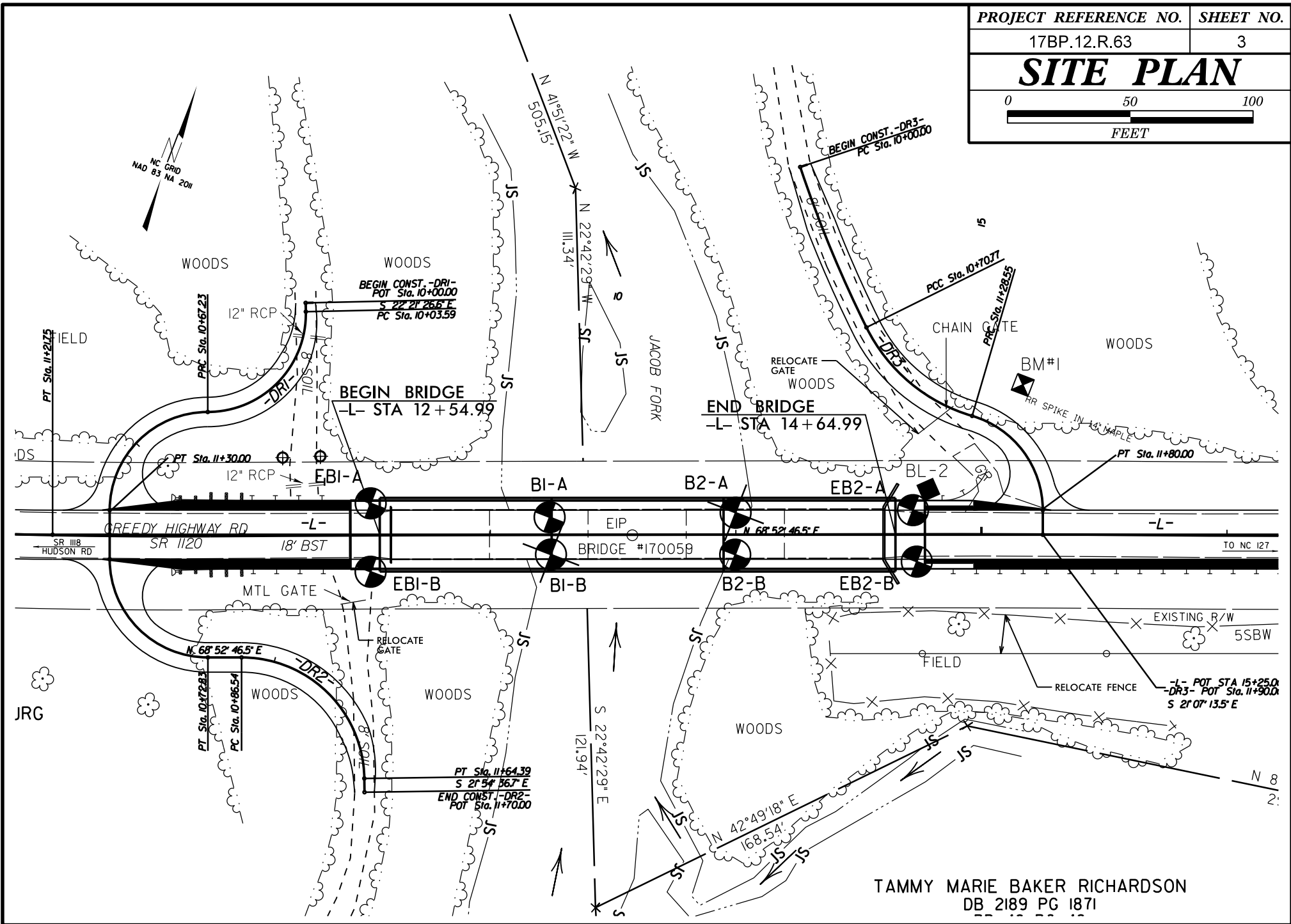
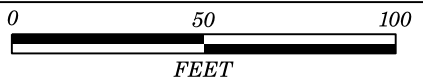


H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.

➔ Means deformation after tectonic disturbance



SITE PLAN



TAMMY MARIE BAKER RICHARDSON
DB 2189 PG 1871

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.12.R.63			TIP N/A			COUNTY CATAWBA			GEOLOGIST A. Suttle						
SITE DESCRIPTION Replace Bridge No. 59 on SR 1120 (Greedy Highway) over Jacob Fork Creek										GROUND WTR (ft)					
BORING NO. EB1-A			STATION 12+51			OFFSET 13 ft LT			ALIGNMENT -L-						
COLLAR ELEV. 905.6 ft			TOTAL DEPTH 20.1 ft			NORTHING 692,699			EASTING 1,288,884						
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 87% 01/10/2018						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER C. Odom			START DATE 07/18/18			COMP. DATE 07/18/18			SURFACE WATER DEPTH N/A						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
910															
905	905.6	0.0	4	7	5								M	905.6	0.0
900	902.1	3.5	2	1	2								M	902.6	3.0
	899.6	6.0	4	11	11								M		
	896.8	8.8	16	15	15								M	897.1	8.5
895															
	891.8	13.8	16	39	30								M	891.8	13.8
890															
	886.8	18.8												887.1	18.5
	885.6	20.0	100/0.5											885.6	20.0
			60/0.1											885.5	20.1

NCDOT BORE SINGLE 17BP12R63_GEO_BORELOGS.GPJ NC_DOT.GDT 8/23/18

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.12.R.63		TIP N/A		COUNTY CATAWBA		GEOLOGIST A. Suttle										
SITE DESCRIPTION Replace Bridge No. 59 on SR 1120 (Greedy Highway) over Jacob Fork Creek							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 12+51		OFFSET 15 ft RT		ALIGNMENT -L-	0 HR. Dry									
COLLAR ELEV. 905.7 ft		TOTAL DEPTH 23.0 ft		NORTHING 692,673		EASTING 1,288,894	24 HR. Dry									
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 87% 01/10/2018				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 07/18/18		COMP. DATE 07/18/18		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)	
910																
905	905.7	0.0	2	3	6										905.7	GROUND SURFACE 0.0
	902.2	3.5	2	2	2											ROADWAY EMBANKMENT Soft to Stiff, Gray-Red-Brown, Clayey SILT (A-5) with trace mica and gravel
900	899.7	6.0	3	4	4											
	897.0	8.7	5	4	7											
895	892.0	13.7	10	35	42									892.7	13.0	
890	887.0	18.7												887.7	18.0	RESIDUAL Very Dense, Gray-Brown, Silty Fine to Coarse SAND (A-2-4) with trace mica and gravel-sized rock fragments
885	882.7	23.0	60/0.0											882.7	23.0	WEATHERED ROCK Red-White (BIOTITE GNEISS)
																Boring Terminated with Standard Penetration Test Refusal at Elevation 882.7 ft On Crystalline Rock (BIOTITE GNEISS)

NCDOT BORE SINGLE 17BP12R63_GEO_BORELOGS.GPJ NC_DOT.GDT 8/23/18

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.12.R.63		TIP N/A		COUNTY CATAWBA			GEOLOGIST A. Suttle									
SITE DESCRIPTION Replace Bridge No. 59 on SR 1120 (Greedy Highway) over Jacob Fork Creek								GROUND WTR (ft)								
BORING NO. B1-A		STATION 13+24		OFFSET 7 ft LT		ALIGNMENT -L-		0 HR. N/A								
COLLAR ELEV. 882.0 ft		TOTAL DEPTH 1.1 ft		NORTHING 692,720		EASTING 1,288,954		24 HR. N/A								
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 87% 01/10/2018				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 07/17/18		COMP. DATE 07/17/18		SURFACE WATER DEPTH 0.9ft										
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						ELEV. (ft)
885																
	882.0	0.0												882.0	GROUND SURFACE 0.0	
	880.9	1.1	100/0.3							100/0.3				880.9	WEATHERED ROCK 1.1	
			60/0.0							60/0.0					Gray-White (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 880.9 ft On Crystalline Rock (BIOTITE GNEISS)	

NCDOT BORE SINGLE 17BP12R63_GEO_BORELOGS.GPJ NC_DOT_GDT 8/6/18

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.12.R.63			TIP N/A		COUNTY CATAWBA			GEOLOGIST A. Suttle							
SITE DESCRIPTION Replace Bridge No. 59 on SR 1120 (Greedy Highway) over Jacob Fork Creek									GROUND WTR (ft)						
BORING NO. B1-B			STATION 13+24		OFFSET 8 ft RT		ALIGNMENT -L-		0 HR. N/A						
COLLAR ELEV. 881.6 ft			TOTAL DEPTH 25.0 ft		NORTHING 692,706		EASTING 1,288,960		24 HR. N/A						
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 87% 01/10/2018					DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER C. Odom			START DATE 07/17/18		COMP. DATE 07/17/18		SURFACE WATER DEPTH 0.5ft								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
885															
	881.6	0.0												881.6	0.0
880		60/0.0				60	0	0	0						
875											RS-1				
870											RS-2				
865															
860															
														856.6	25.0
														Boring Terminated at Elevation 856.6 ft In Crystalline Rock (BIOTITE GNEISS)	

NCDOT BORE SINGLE 17BP12R63_GEO_BORELOGS.GPJ NC_DOT.GDT 8/23/18

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 17BP.12.R.63			TIP N/A			COUNTY CATAWBA			GEOLOGIST A. Suttle		
SITE DESCRIPTION Replace Bridge No. 59 on SR 1120 (Greedy Highway) over Jacob Fork Creek										GROUND WTR (ft)	
BORING NO. B1-B			STATION 13+24			OFFSET 8 ft RT			ALIGNMENT -L-		
COLLAR ELEV. 881.6 ft			TOTAL DEPTH 25.0 ft			NORTHING 692,706			EASTING 1,288,960		
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 87% 01/10/2018						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic		
DRILLER C. Odom			START DATE 07/17/18			COMP. DATE 07/17/18			SURFACE WATER DEPTH 0.5ft		
CORE SIZE NQ2			TOTAL RUN 25.0 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %		
881.62											Ground Surface
880	881.6	0.0	5.0	N=60/0.0 3:18/1.0 3:27/1.0 3:59/1.0 3:11/1.0 4:25/1.0	(4.9) 98%	(4.9) 98%		(24.6) 98%	(24.1) 96%		
	876.6	5.0					RS-1				CRYSTALLINE ROCK Fresh, Hard to Very Hard, Gray-White, BIOTITE GNEISS, with Close to Moderately Close Fracture Spacing RS-1: 3.0' - 3.4' Unit Weight: 179.5 Unconfined Compressive Strength: 6,454 psi (929 ksf) GSI: 80 - 85
875			5.0	4:42/1.0 4:31/1.0 2:30/1.0 2:37/1.0 2:27/1.0	(4.8) 96%	(4.8) 96%					RS-2: 8.6' - 9.0' Unit Weight: 176.5 Unconfined Compressive Strength: 6,676 psi (961 ksf) GSI: 80 - 85
	871.6	10.0					RS-2				
870			5.0	3:47/1.0 4:19/1.0 3:48/1.0 4:19/1.0 3:40/1.0	(5.0) 100%	(4.8) 96%					
	866.6	15.0									Slickenside at 9.3'
865			5.0	3:29/1.0 5:15/1.0 4:39/1.0 3:22/1.0 2:47/1.0	(4.9) 98%	(4.9) 98%					
	861.6	20.0									
860			5.0	2:12/1.0 2:54/1.0 3:39/1.0 4:23/1.0 6:18/1.0	(5.0) 100%	(4.7) 94%					
	856.6	25.0									Boring Terminated at Elevation 856.6 ft In Crystalline Rock (BIOTITE GNEISS)



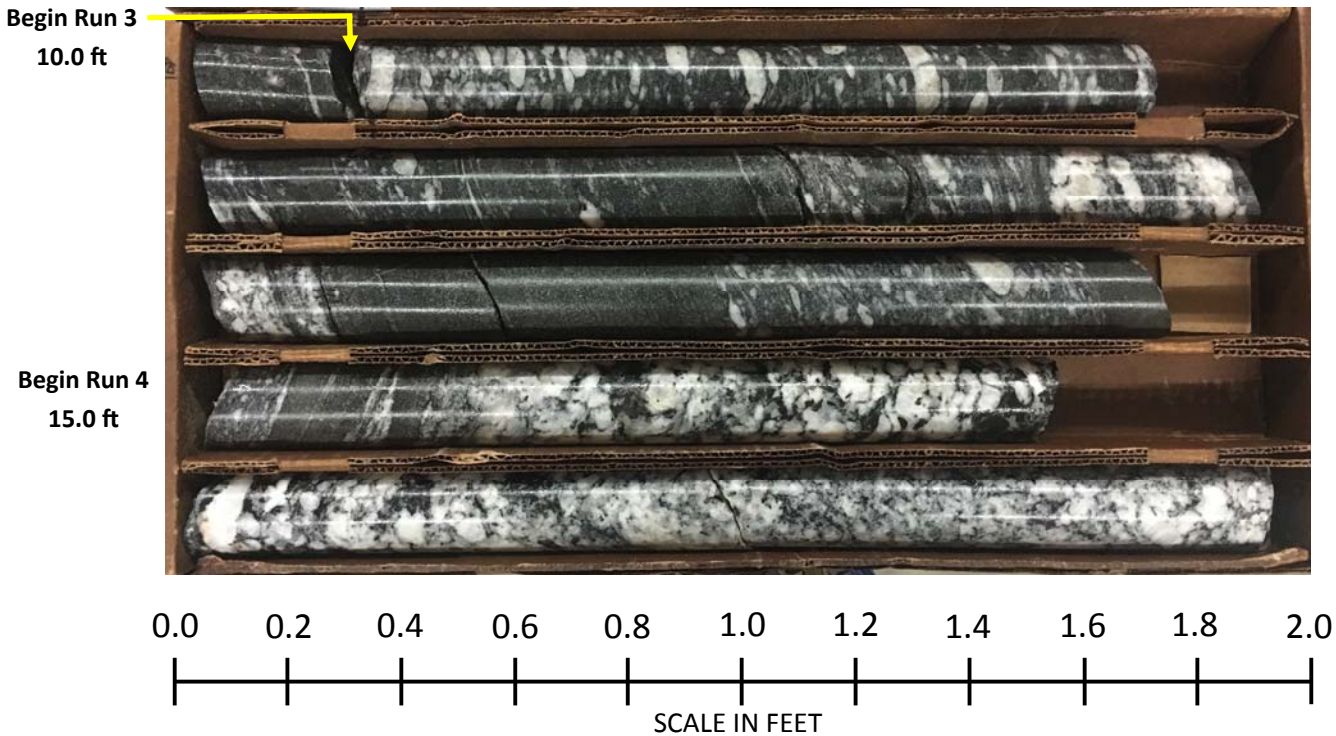
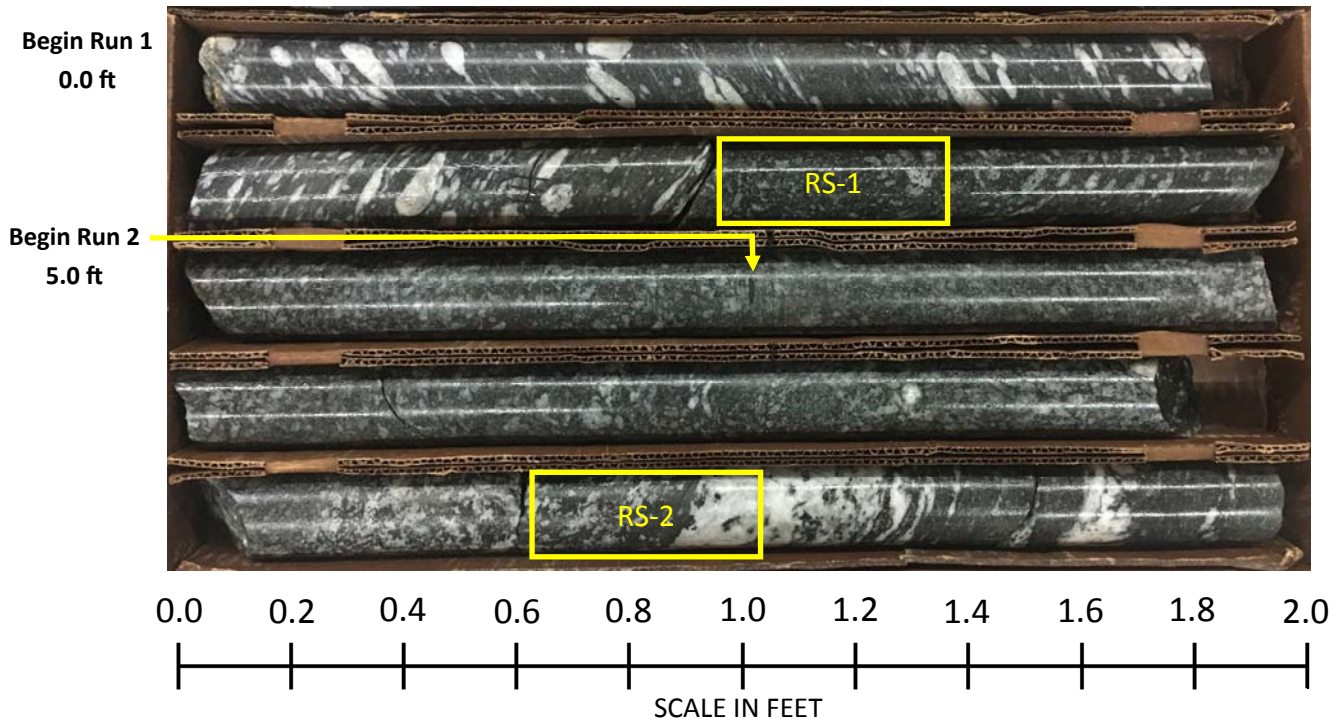
Bridge No. 059 on -L- SR 1120 (Greedy Highway Road) over Jacob Fork

TIP No. 17BP.12.R.63

ECS Southeast Project No. 08: 12250-E

Rock Core Photographs: Boring - B1-B

Station: 13+24 Offset: 8' RT





Bridge No. 059 on -L- SR 1120 (Greedy Highway Road) over Jacob Fork

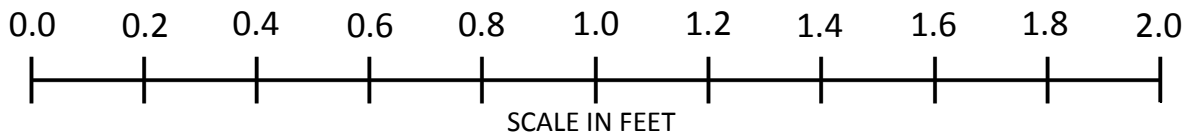
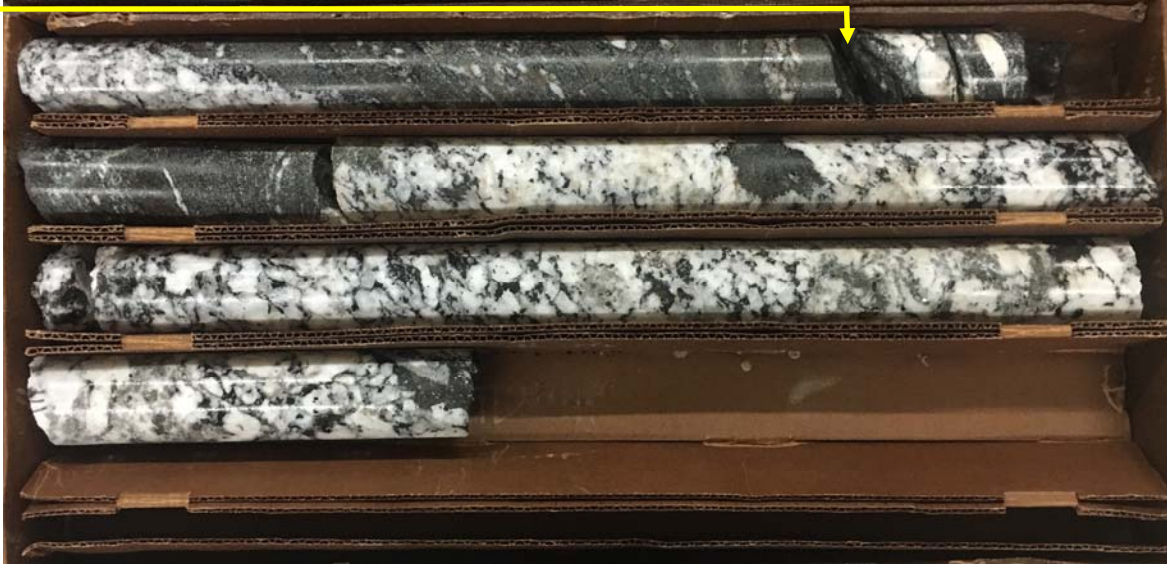
TIP No. 17BP.12.R.63

ECS Southeast Project No. 08: 12250-E

Rock Core Photographs: Boring - B1-B

Station: 13+24 Offset: 8' RT

**Begin Run 5
20.0 ft**



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.12.R.63		TIP N/A		COUNTY CATAWBA		GEOLOGIST A. Suttle										
SITE DESCRIPTION Replace Bridge No. 59 on SR 1120 (Greedy Highway) over Jacob Fork Creek							GROUND WTR (ft)									
BORING NO. B2-A		STATION 14+00		OFFSET 9 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 881.7 ft		TOTAL DEPTH 28.8 ft		NORTHING 692,749		EASTING 1,289,024										
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 87% 01/10/2018				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 07/16/18		COMP. DATE 07/16/18		SURFACE WATER DEPTH 0.8ft										
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)	
885																
	881.7	0.0												881.7		GROUND SURFACE 0.0
880	879.2	2.5	40	60/0.4					100/0.9					879.2		WEATHERED ROCK Gray-Brown (BIOTITE GNEISS) 2.5
			60/0.0						60/0.0							CRYSTALLINE ROCK Fresh, Hard to Very Hard, Gray-White-Black, BIOTITE GNEISS, with Close to Moderately Close Fracture Spacing
875											RS-3					
870											RS-4					
865																
860																
855																
														852.9		Boring Terminated at Elevation 852.9 ft In Crystalline Rock (BIOTITE GNEISS) 28.8

NCDOT BORE SINGLE 17BP12R63_GEO_BORELOGS.GPJ NC_DOT.GDT 8/23/18

GEOTECHNICAL BORING REPORT CORE LOG

WBS 17BP.12.R.63				TIP N/A		COUNTY CATAWBA				GEOLOGIST A. Suttle				
SITE DESCRIPTION Replace Bridge No. 59 on SR 1120 (Greedy Highway) over Jacob Fork Creek										GROUND WTR (ft)				
BORING NO. B2-A				STATION 14+00				OFFSET 9 ft LT				ALIGNMENT -L-		0 HR. N/A
COLLAR ELEV. 881.7 ft				TOTAL DEPTH 28.8 ft				NORTHING 692,749				EASTING 1,289,024		24 HR. N/A
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 87% 01/10/2018								DRILL METHOD H.S. Augers				HAMMER TYPE Automatic		
DRILLER C. Odom				START DATE 07/16/18				COMP. DATE 07/16/18				SURFACE WATER DEPTH 0.8ft		
CORE SIZE NQ2				TOTAL RUN 26.3 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS			
					REC. (ft)	RQD (%)		REC. (ft)	RQD (%)		ELEV. (ft)	DEPTH (ft)		
879.21												Begin Coring @ 2.5 ft		
	879.2	2.5	4.2	N=60/0.0 3:54/1.0 3:33/1.0 3:04/1.0 3:47/1.0	(4.2) 100%	(3.7) 88%		(25.5) 97%	(23.8) 90%	879.2		2.5		
	875	6.7		0:51/0.2 3:46/1.0 3:21/1.0 4:26/1.0 4:25/1.0 4:17/1.0	(4.2) 84%	(3.6) 72%	RS-3			875				
	870	11.7	5.0				RS-4			870				
	865	16.7	5.0	1:57/1.0 2:11/1.0 2:42/1.0 3:32/1.0 2:56/1.0	(5.0) 100%	(4.6) 92%				865				
	860	21.7	5.0	2:12/1.0 3:39/1.0 4:02/1.0 4:40/1.0 6:05/1.0	(5.0) 100%	(5.0) 100%				860				
	855	26.7	5.0	5:30/1.0 4:57/1.0 4:41/1.0 5:23/1.0 7:50/1.0	(5.0) 100%	(4.8) 96%				855				
	852.9	28.8	2.1	8:53/1.0 10:10/1.1	(2.1) 100%	(2.1) 100%				852.9		28.8		
												Boring Terminated at Elevation 852.9 ft In Crystalline Rock (BIOTITE GNEISS)		

NCDOT CORE SINGLE 17BP12R63_GEO_BORELOGS.GPJ NC_DOT.GDT 8/23/18



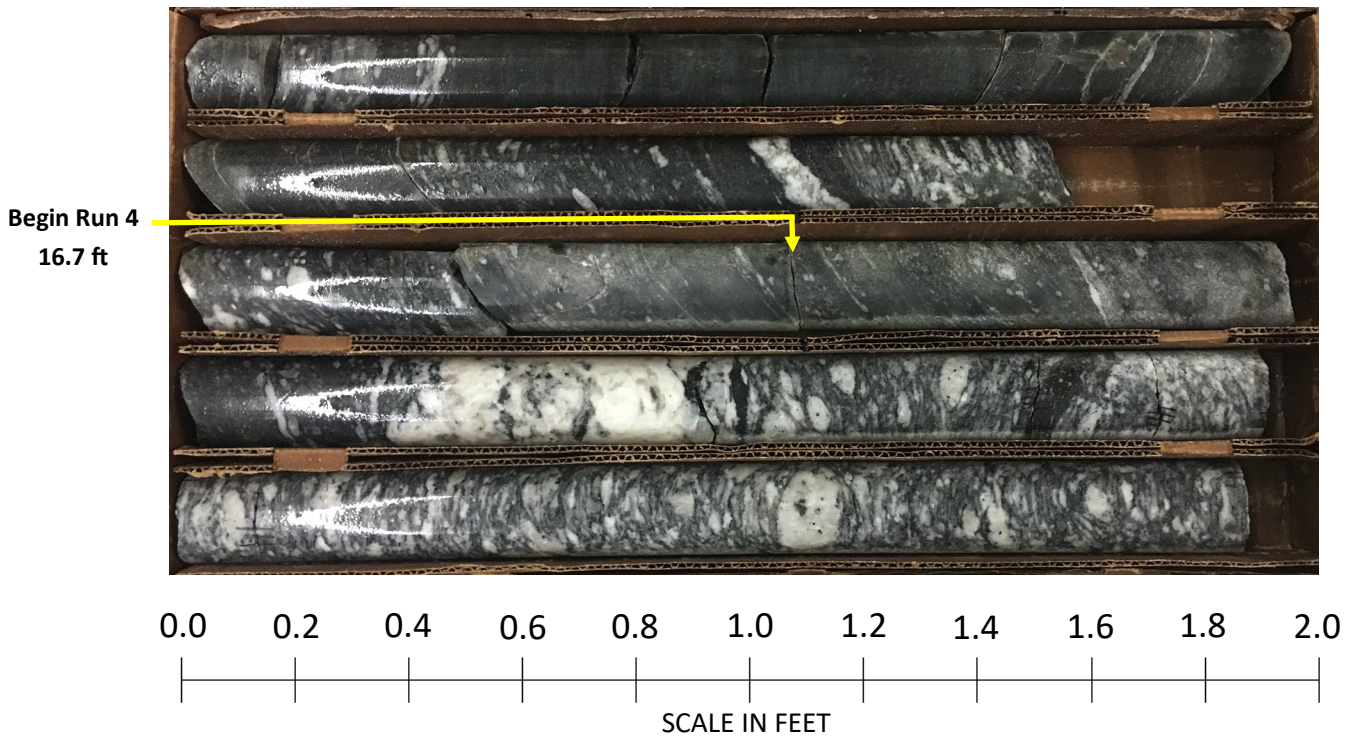
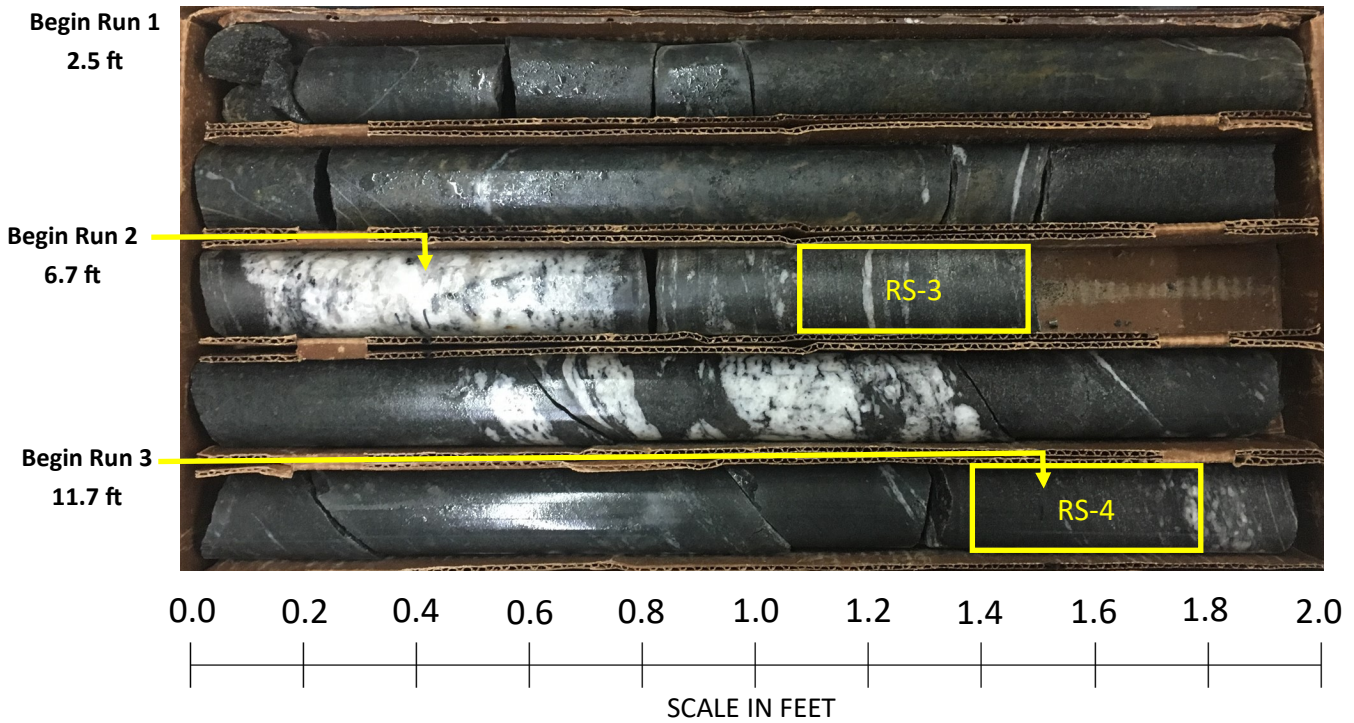
Bridge No. 059 on -L- SR 1120 (Greedy Highway Road) over Jacob Fork

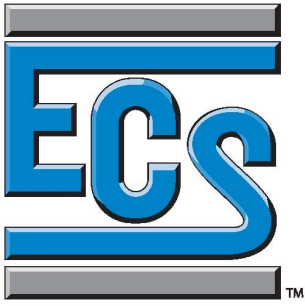
TIP No. 17BP.12.R.63

ECS Southeast Project No. 08: 12250-E

Rock Core Photographs: Boring - B2-A

Station: 14+00 Offset: 9' LT





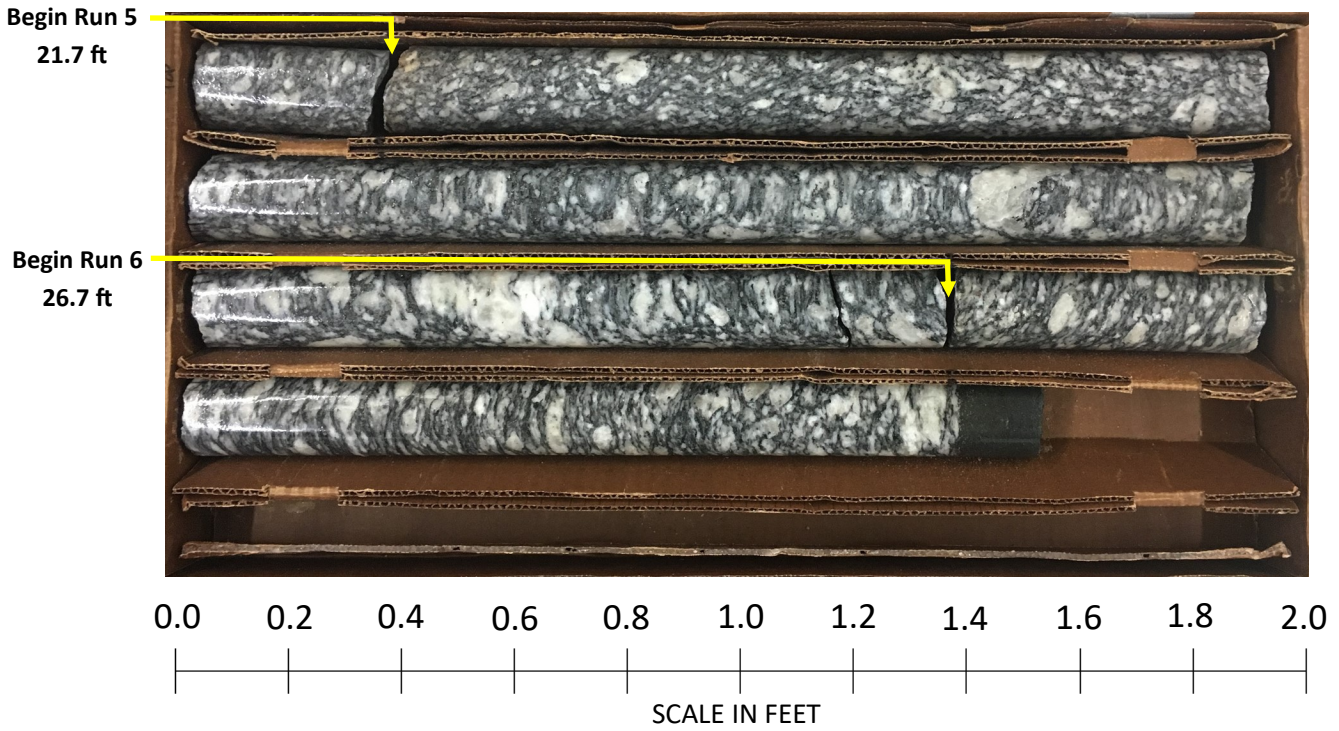
Bridge No. 059 on -L- SR 1120 (Greedy Highway Road) over Jacob Fork

TIP No. 17BP.12.R.63

ECS Southeast Project No. 08: 12250-E

Rock Core Photographs: Boring - B2-A

Station: 14+00 Offset: 9' LT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.12.R.63		TIP N/A		COUNTY CATAWBA			GEOLOGIST A. Suttle								
SITE DESCRIPTION Replace Bridge No. 59 on SR 1120 (Greedy Highway) over Jacob Fork Creek								GROUND WTR (ft)							
BORING NO. B2-B		STATION 14+00		OFFSET 8 ft RT		ALIGNMENT -L-		0 HR. N/A							
COLLAR ELEV. 883.3 ft		TOTAL DEPTH 1.8 ft		NORTHING 692,733		EASTING 1,289,030		24 HR. N/A							
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 87% 01/10/2018				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Odom		START DATE 07/17/18		COMP. DATE 07/17/18		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)
885															
	883.3	0.0	8	5	37	•	•	•	•	•			883.3	GROUND SURFACE	0.0
	881.5	1.8	60/0.0			•	•	•	•	•			881.5	ALLUVIAL Dense, Black-Brown, Fine to Coarse Sandy GRAVEL (A-1-b)	1.8
														Boring Terminated with Standard Penetration Test Refusal at Elevation 881.5 ft On Crystalline Rock (BIOTITE GNEISS)	

NCDOT BORE SINGLE 17BP12R63_GEO_BORELOGS.GPJ NC_DOT.GDT 8/3/18

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 17BP.12.R.63	TIP N/A	COUNTY CATAWBA	GEOLOGIST A. Suttle
SITE DESCRIPTION Replace Bridge No. 59 on SR 1120 (Greedy Highway) over Jacob Fork Creek			GROUND WTR (ft)
BORING NO. EB2-A	STATION 14+72	OFFSET 10 ft LT	ALIGNMENT -L-
COLLAR ELEV. 905.8 ft	TOTAL DEPTH 16.2 ft	NORTHING 692,776	EASTING 1,289,091
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 87% 01/10/2018		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Odom	START DATE 07/16/18	COMP. DATE 07/16/18	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							
910																	
905	905.8	0.0	3	4	4										905.8	GROUND SURFACE	0.0
	902.3	3.5	4	3	3										902.8	ROADWAY EMBANKMENT Medium Stiff, Red-Brown, Fine to Coarse Sandy SILT (A-4) with trace mica	3.0
900	899.8	6.0	6	3	3											Medium Stiff to Hard, Red-Brown, Clayey SILT (A-5) with trace gravel	
	897.0	8.8	3	4	3												
895																	
	892.0	13.8	6	8	36												
890	889.7	16.1													889.7	CRYSTALLINE ROCK Red-Brown (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 889.6 ft In Crystalline Rock (BIOTITE GNEISS)	16.1
			60/0.1												889.6		16.2

NCDOT BORE SINGLE 17BP12R63_GEO_BORELOGS.GPJ NC_DOT.GDT 8/6/18

GEOTECHNICAL BORING REPORT BORE LOG

WBS 17BP.12.R.63			TIP N/A			COUNTY CATAWBA			GEOLOGIST A. Suttle							
SITE DESCRIPTION Replace Bridge No. 59 on SR 1120 (Greedy Highway) over Jacob Fork Creek										GROUND WTR (ft)						
BORING NO. EB2-B			STATION 14+74			OFFSET 11 ft RT			ALIGNMENT -L-							
COLLAR ELEV. 905.5 ft			TOTAL DEPTH 17.7 ft			NORTHING 692,757			EASTING 1,289,100							
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 87% 01/10/2018						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic							
DRILLER C. Odom			START DATE 07/16/18			COMP. DATE 07/16/18			SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
910																
905	905.5	0.0													905.5	GROUND SURFACE 0.0
			2	3	3	6							M			
	902.0	3.5	2	2	1	3							M		902.5	ROADWAY EMBANKMENT Loose, Red-Brown, Silty Fine to Coarse SAND (A-2-4) with trace mica and gravel 3.0
900	899.5	6.0	3	2	2	4							M			Soft, Red-Brown, Clayey SILT (A-5) with trace mica and gravel
	896.6	8.9	2	2	2	4							M			
895																
	891.6	13.9	2	1	3	4							M			
890																
	887.8	17.7													887.8	17.7
			60/0.0			60/0.0								Boring Terminated with Standard Penetration Test Refusal at Elevation 887.8 ft On Crystalline Rock (BIOTITE GNEISS)		

PROJECT REFERENCE NO.	SHEET NO.
17BP.12.R.63	18
ROCK TEST RESULTS	

17BP.12.R.63 ROCK TEST RESULTS										
SAMPLE NO.	BORING	STATION	OFFSET	DEPTH INTERVAL	LENGTH (IN.)	DIAMETER (IN.)	RUN RQD	ROCK TYPE	UNIT WEIGHT LB/FT ³	UNCONFINED COMPRESSIVE STRENGTH (PSI/KSF)
RS-1	B1-B	13+24	8' RT	3.0' - 3.4'	4.450	1.955	98%	Biotite Gneiss	179.5	6,454 psi / 929 ksf
RS-2	B1-B	13+24	8' RT	8.6' - 9.0'	4.460	1.956	96%	Biotite Gneiss	176.5	6,676 psi / 961 ksf
RS-3	B2-A	14+00	9' LT	7.4' - 7.8'	4.347	1.970	72%	Biotite Gneiss	179.4	7,283 psi / 1,049 ksf
RS-4	B2-A	14+00	9' LT	11.6' - 12.0'	4.376	1.976	92%	Biotite Gneiss	178.7	5,985 psi / 862 ksf

RS = NQ2 Rock Core Barrel Sample (ASTM D-2113)