STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4734	1	24

REFERENCE: U-4734

PROJECT: 36600

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *FORSYTH*

PROJECT DESCRIPTION *SR 2601 (Macy Grove Road) Extension From North of SR 1005 (East Mountain Street) To NC 150 (North Main Street)*

SITE DESCRIPTION *Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek*

CONTENTS

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:
1. 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.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

C. Taylor

B. Fowler

INVESTIGATED BY *M. Gragg*

DRAWN BY *W. Thompson*

CHECKED BY *K. Bussey*

SUBMITTED BY *HDR Engineering*

DATE *August 2017*

NORTH CAROLINA LICENSED SEAL 1413 GEOLOGIST D. MICHAEL GRAGG

DocuSigned by: D. Michael Gragg AF4EAFEB00144D7...

9/5/2017

SIGNATURE DATE

This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.
This file or an individual page shall not be considered a certified document.

PROJECT REFERENCE NO.	SHEET NO.
U-4734	2

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 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

SOIL LEGEND AND AASHTO CLASSIFICATION

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-3	A-4, A-5 A-6, A-7	
	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	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
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	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
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	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 RESISTENCE (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	4	10	40	60	200	270
OPENING (MM)	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	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- 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

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
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- 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

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

SAMPLE ABBREVIATIONS

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
- [X] D-25
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N Q Conventional

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 YEILD 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 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 PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED 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 (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 (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BL-16
N 863948.3290
E 1691491.6840 ELEVATION: 891.63 FEET

NOTES:
BORING ELEVATIONS OBTAINED BY SURVEY CONDUCTED 07-19-2017

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-4734	2A

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)

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.

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 ⇩

SURFACE CONDITIONS

VERY GOOD — Very rough, fresh unweathered surfaces

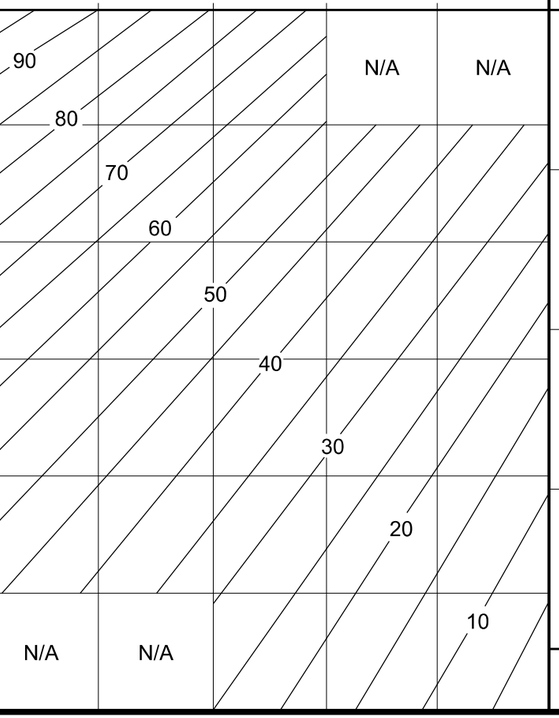
GOOD — Rough, slightly weathered, iron stained surfaces

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

DECREASING SURFACE QUALITY ⇨



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.

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 interlayers 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.*

SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)

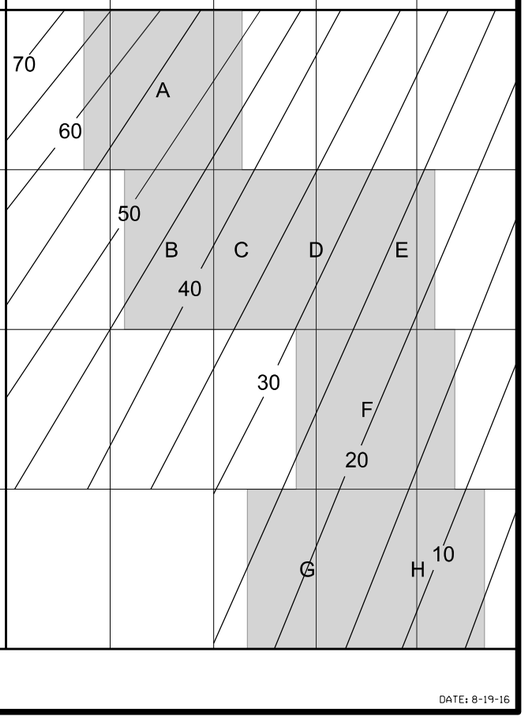
VERY GOOD - Very Rough, fresh unweathered surfaces

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



→ Means deformation after tectonic disturbance

DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
U-4734	3

SITE PLAN

0 50 100
FEET

NAD 83 /NA 2011

BEGIN BRIDGE
-L- POT Sta 37+45+/-
78° Skew

END BRIDGE
-L- POT Sta 39+25+/-
78° Skew

RESIDUAL SOILS
35+00

ALLUVIAL SOILS

RESIDUAL SOILS
40+00

POND

N 79°35'39" E 166.90'

EBI-A TYPE B-77
EBI-B TYPE B-77
EBI-C
BI-A
BI-B
BI-C
EB2-A TYPE B-77
EB2-B TYPE B-77
EB2-C

78° Skew

S 76°42'59" E

S 85°18'15.9" E

CAT-1

GRAU 350 TL-3

To SR 2036
(Smith Edwards Road)

SR 2601 (Macy Grove Road)

N 16°41'30.0" E -L-

S 06°36'58" W
138.93'

To SR 1005
(East Mountain Street)

RAYMOND R &
PHYLLIS L HAUCK
DB 3062 PG 2720
PB 46 PG 155

N 79°35'39" E
406.28'

REEDY FORK CREEK

-GW- PC Sta. 12+32.43

-GW- PT Sta. 12+82.46

-GW- PC Sta. 13+61.98

BL-16

TOP=892.25'
IN=881.90'
OUT=881.35'

N 12°27'58.1" E

BM#3
ELEV.=891.20'

4SBW

20' SEWER EASEMENT DB 4229 PG 410

SOIL PATH

20' SEWE

PLAN ALONG STRUCTURE

0	50	100

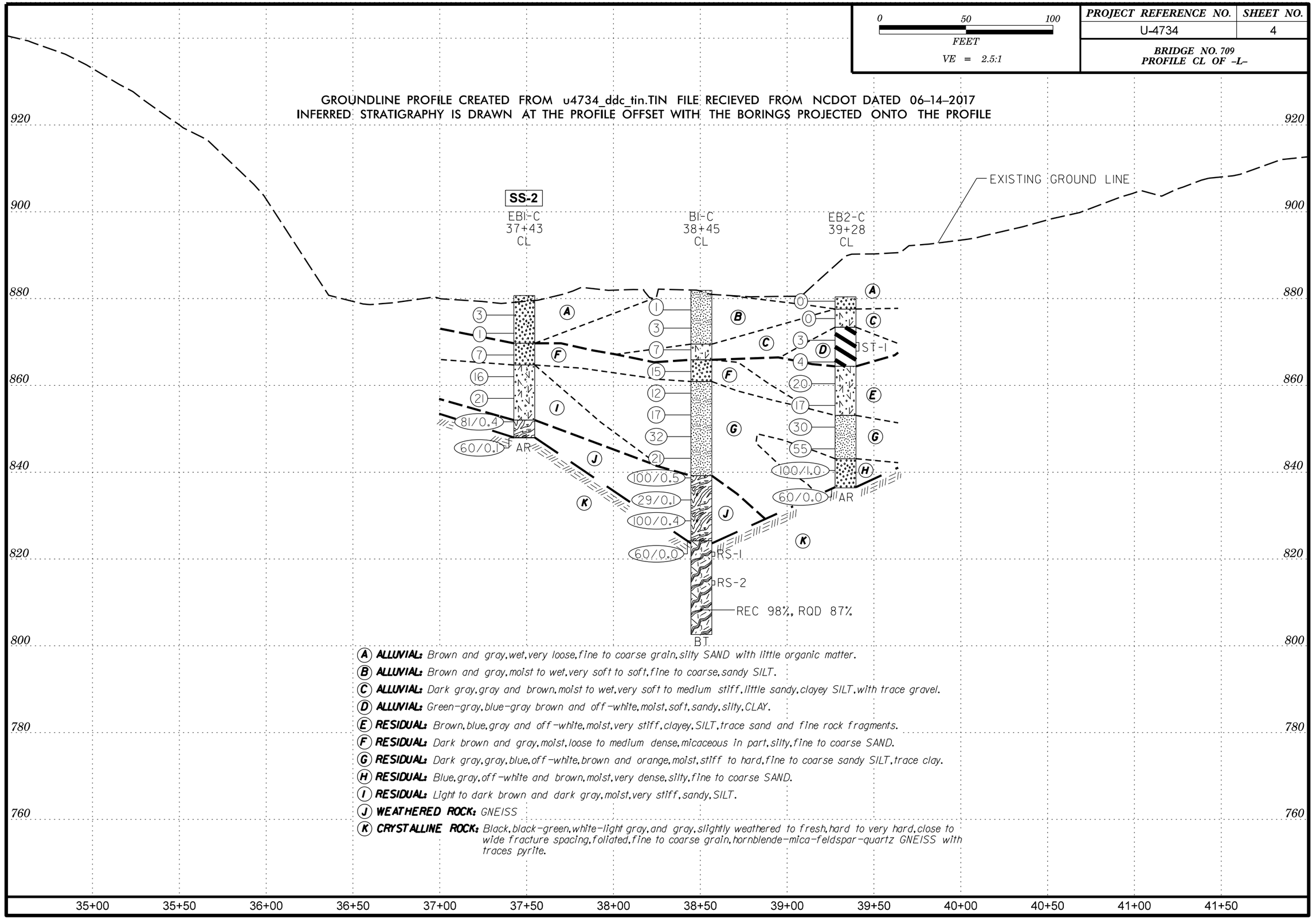
FEET

VE = 2.5:1

PROJECT REFERENCE NO.	SHEET NO.
U-4734	4

BRIDGE NO. 709
PROFILE CL OF -L-

GROUNDLINE PROFILE CREATED FROM u4734_ddc_tin.TIN FILE RECIEVED FROM NCDOT DATED 06-14-2017
INFERRED STRATIGRAPHY IS DRAWN AT THE PROFILE OFFSET WITH THE BORINGS PROJECTED ONTO THE PROFILE



(A) **ALLUVIAL:** Brown and gray, wet, very loose, fine to coarse grain, silty SAND with little organic matter.

(B) **ALLUVIAL:** Brown and gray, moist to wet, very soft to soft, fine to coarse, sandy SILT.

(C) **ALLUVIAL:** Dark gray, gray and brown, moist to wet, very soft to medium stiff, little sandy, clayey SILT, with trace gravel.

(D) **ALLUVIAL:** Green-gray, blue-gray brown and off-white, moist, soft, sandy, silty, CLAY.

(E) **RESIDUAL:** Brown, blue, gray and off-white, moist, very stiff, clayey, SILT, trace sand and fine rock fragments.

(F) **RESIDUAL:** Dark brown and gray, moist, loose to medium dense, micaceous in part, silty, fine to coarse SAND.

(G) **RESIDUAL:** Dark gray, gray, blue, off-white, brown and orange, moist, stiff to hard, fine to coarse sandy SILT, trace clay.

(H) **RESIDUAL:** Blue, gray, off-white and brown, moist, very dense, silty, fine to coarse SAND.

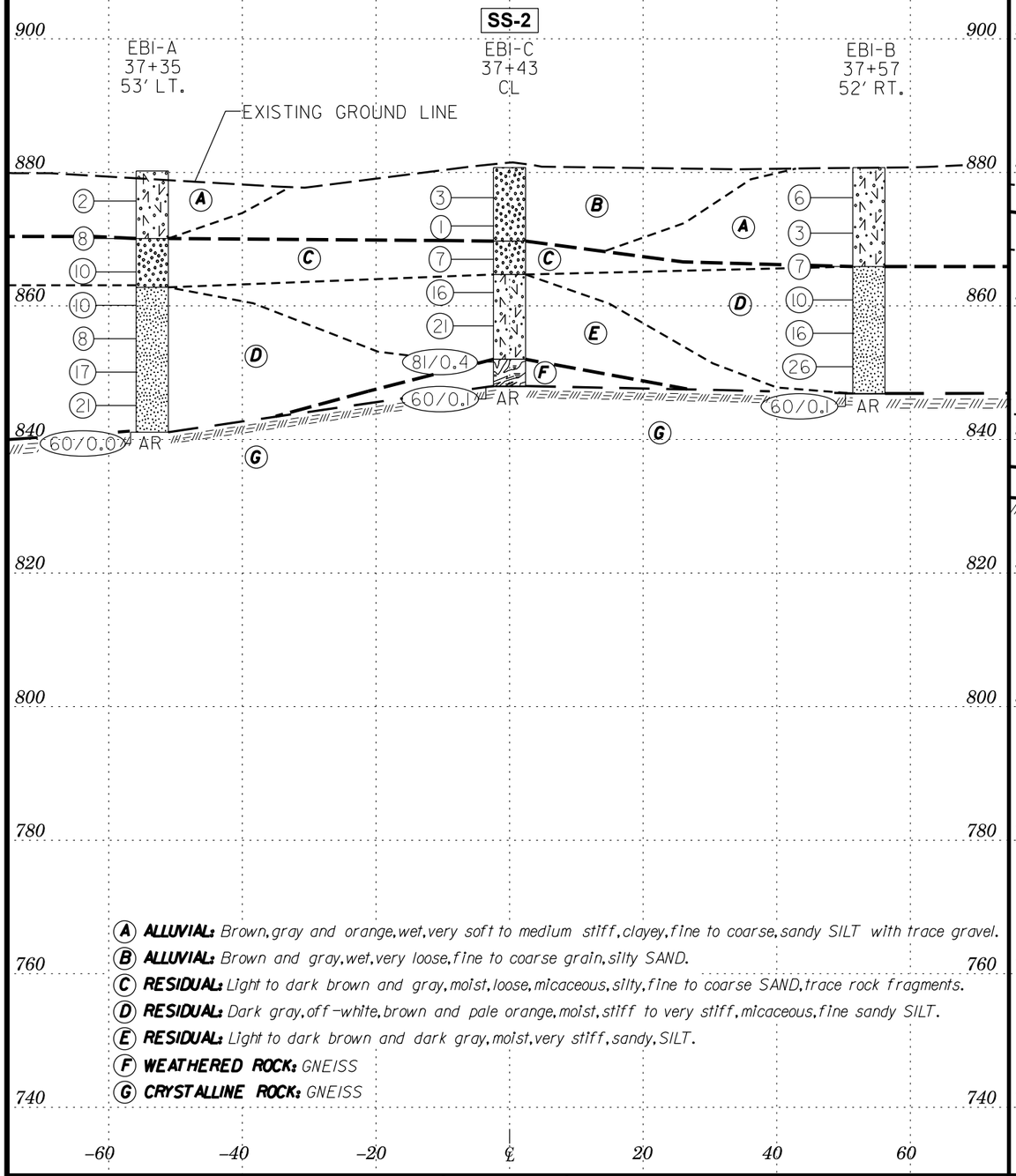
(I) **RESIDUAL:** Light to dark brown and dark gray, moist, very stiff, sandy, SILT.

(J) **WEATHERED ROCK:** GNEISS

(K) **CRYSTALLINE ROCK:** Black, black-green, white-light gray, and gray, slightly weathered to fresh, hard to very hard, close to wide fracture spacing, foliated, fine to coarse grain, hornblende-mica-feldspar-quartz GNEISS with traces pyrite.

PROJECT REFERENCE NO.	SHEET NO.
U-4734	5

CROSS SECTION CREATED FROM u4734_ddc_tin.TIN FILE RECIEVED
FROM NCDOT DATED 06-14-2017
78 DEGREE SKEW
-L-

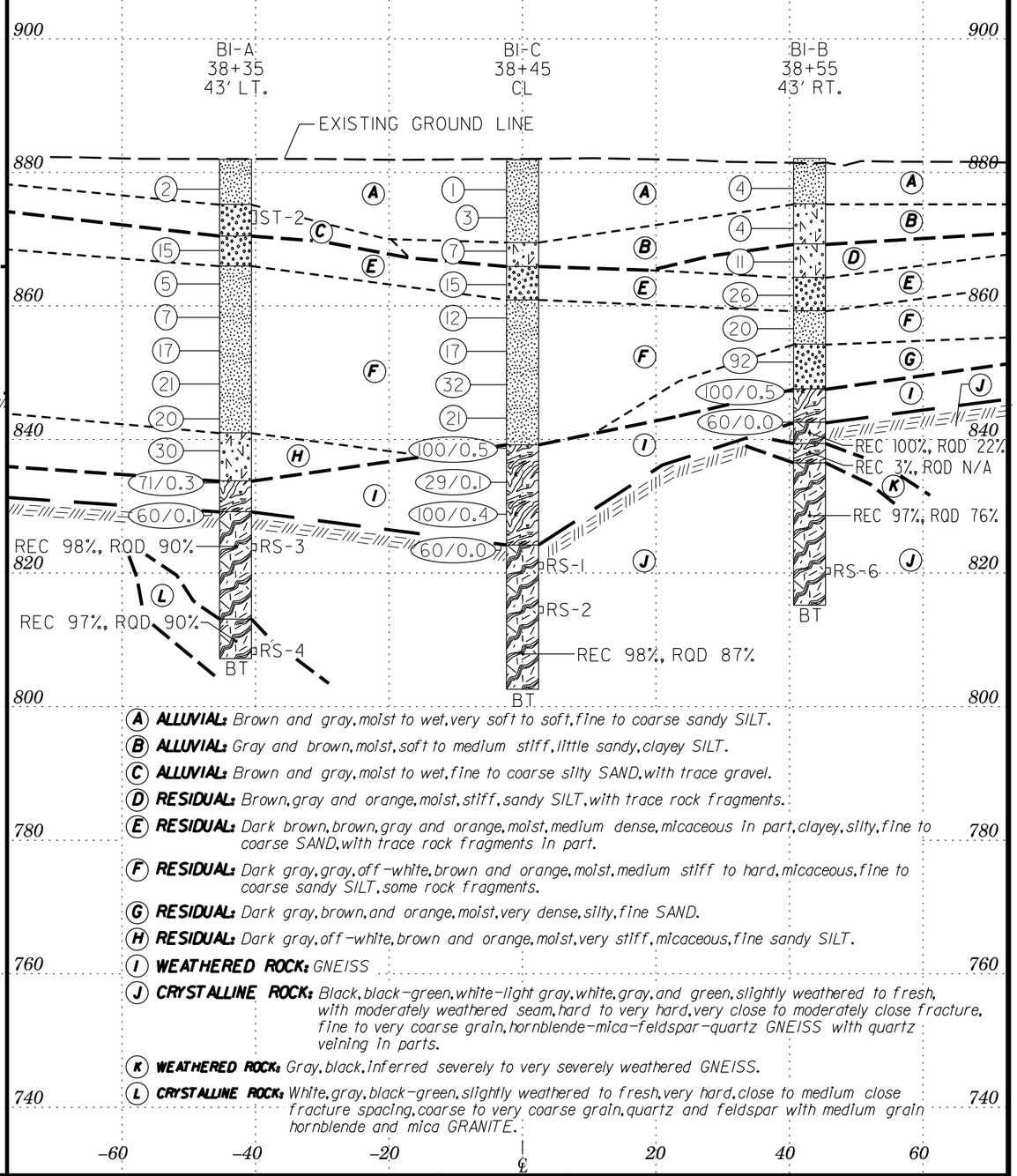


(A) **ALLUVIAL:** Brown, gray and orange, wet, very soft to medium stiff, clayey, fine to coarse, sandy SILT with trace gravel.
(B) **ALLUVIAL:** Brown and gray, wet, very loose, fine to coarse grain, silty SAND.
(C) **RESIDUAL:** Light to dark brown and gray, moist, loose, micaceous, silty, fine to coarse SAND, trace rock fragments.
(D) **RESIDUAL:** Dark gray, off-white, brown and pale orange, moist, stiff to very stiff, micaceous, fine sandy SILT.
(E) **RESIDUAL:** Light to dark brown and dark gray, moist, very stiff, sandy, SILT.
(F) **WEATHERED ROCK:** GNEISS
(G) **CRYSTALLINE ROCK:** GNEISS

HORIZ. SCALE (FEET) 0 20 40 | VE = N/A

BRIDGE NO. 709 - END BENT 1
CROSS SECTION - STA. 37+45.01

CROSS SECTION CREATED FROM u4734_ddc_tin.TIN FILE RECIEVED
FROM NCDOT DATED 06-14-2017
78 DEGREE SKEW
-L-



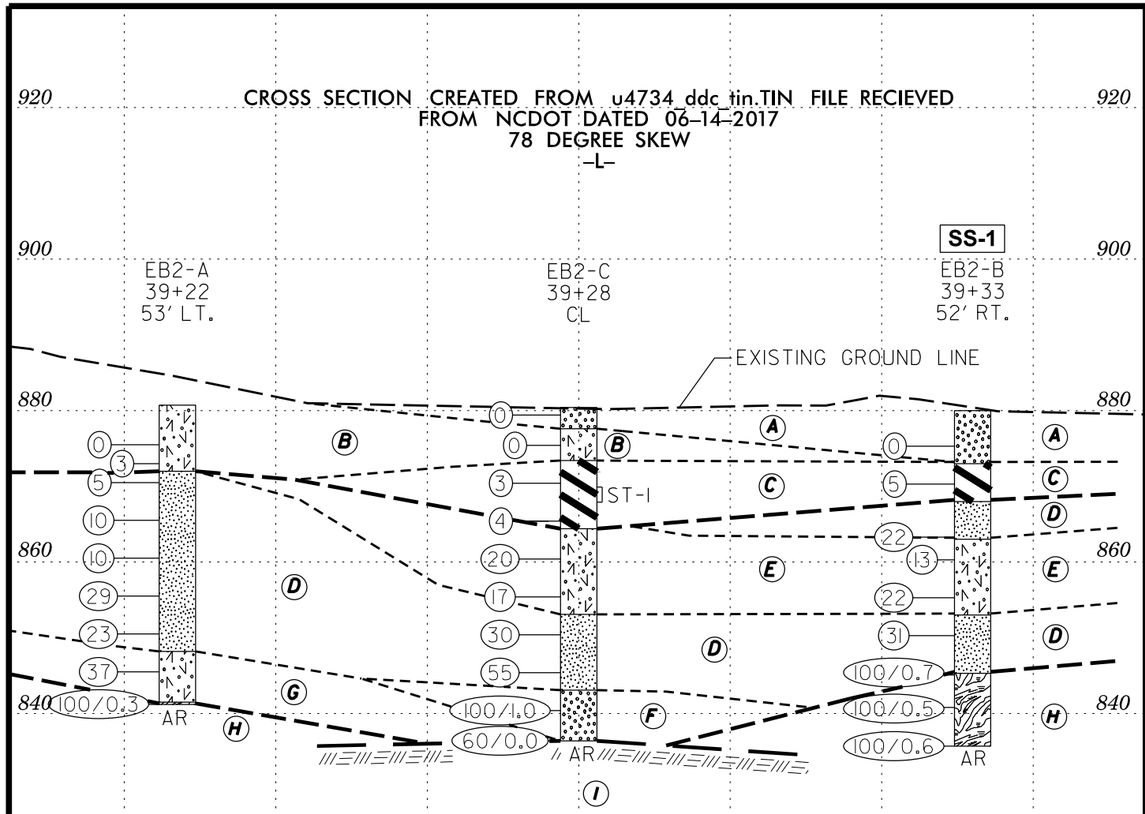
(A) **ALLUVIAL:** Brown and gray, moist to wet, very soft to soft, fine to coarse sandy SILT.
(B) **ALLUVIAL:** Gray and brown, moist, soft to medium stiff, little sandy, clayey SILT.
(C) **ALLUVIAL:** Brown and gray, moist to wet, fine to coarse silty SAND, with trace gravel.
(D) **RESIDUAL:** Brown, gray and orange, moist, stiff, sandy SILT, with trace rock fragments.
(E) **RESIDUAL:** Dark brown, brown, gray and orange, moist, medium dense, micaceous in part, clayey, silty, fine to coarse SAND, with trace rock fragments in part.
(F) **RESIDUAL:** Dark gray, gray, off-white, brown and orange, moist, medium stiff to hard, micaceous, fine to coarse sandy SILT, some rock fragments.
(G) **RESIDUAL:** Dark gray, brown, and orange, moist, very dense, silty, fine SAND.
(H) **RESIDUAL:** Dark gray, off-white, brown and orange, moist, very stiff, micaceous, fine sandy SILT.
(I) **WEATHERED ROCK:** GNEISS
(J) **CRYSTALLINE ROCK:** Black, black-green, white-light gray, white, gray, and green, slightly weathered to fresh, with moderately weathered seam, hard to very hard, very close to moderately close fracture, fine to very coarse grain, hornblende-mica-feldspar-quartz GNEISS with quartz veining in parts.
(K) **WEATHERED ROCK:** Gray, black, inferred severely to very severely weathered GNEISS.
(L) **CRYSTALLINE ROCK:** White, gray, black-green, slightly weathered to fresh, very hard, close to medium close fracture spacing, coarse to very coarse grain, quartz and feldspar with medium grain hornblende and mica GRANITE.

HORIZ. SCALE (FEET) 0 20 40 | VE = N/A

BRIDGE NO. 709 - BENT 1
CROSS SECTION - STA. 38+45.00

PROJECT REFERENCE NO.	SHEET NO.
U-4734	6

CROSS SECTION CREATED FROM u4734_ddc_tin.TIN FILE RECIEVED FROM NCDOT DATED 06-14-2017
78 DEGREE SKEW
-L-



(A) **ALLUVIAL:** Brown and brown-gray, moist, very soft, silty, fine to coarse SAND, with little organic matter.

(B) **ALLUVIAL:** Dark gray, gray and brown, moist to wet, very soft to soft, clayey, sandy, SILT, trace gravel.

(C) **ALLUVIAL:** Green-gray, blue-gray, gray, brown and off-white, moist, soft to medium stiff, sandy, silty, CLAY, trace gravel.

(D) **RESIDUAL:** Brown, gray, dark gray and off-white, moist, medium-stiff to hard, micaceous in part, sandy SILT with traces clay, quartz, and rock fragments.

(E) **RESIDUAL:** Brown, blue, gray and off-white, moist, stiff to very stiff, micaceous, clayey, SILT, trace to some sand and fine rock and quartz fragments.

(F) **RESIDUAL:** Blue, gray, off-white and brown, moist, very dense, silty, fine to coarse SAND.

(G) **RESIDUAL:** Brown, dark gray and off-white, moist, hard, sandy, SILT, trace clay and some coarse quartz fragments.

(H) **WEATHERED ROCK:** GNEISS

(I) **CRYSTALLINE ROCK:** GNEISS

HORIZ. SCALE (FEET) 0 20 40

VE = N/A

BRIDGE NO. 709 - END BENT 2
CROSS SECTION - STA. 39+25.00

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 37+35	**OFFSET** 53 ft LT	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 880.3 ft	**TOTAL DEPTH** 39.1 ft	**NORTHING** 863,706	**EASTING** 1,691,342	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins M.	**START DATE** 07/10/17	**COMP. DATE** 07/10/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
885										
880										880.3 GROUND SURFACE 0.0
	876.8	3.5	2	1	1	2		W		**ALLUVIAL** Brown and gray, soft, fine to coarse, sandy SILT (A-5)
875	871.2	9.1	0	1	7	8		W		870.2 10.1
870	866.2	14.1	6	6	4	10		M		**RESIDUAL** Brown and gray, loose, micaceous, fine to coarse, silty SAND trace rock fragments (A-2-5)
865	861.2	19.1	4	4	6	10		M		862.9 17.4 Dark gray, off-white, brown and pale orange, stiff to very stiff, micaceous, fine sandy SILT (A-4)
860	856.2	24.1	4	4	4	8		M		
855	851.2	29.1	7	8	9	17		M		
850	846.2	34.1	4	6	15	21		M		
845	841.2	39.1	60/0.0			60/0.0				841.2 39.1 Boring Terminated with Standard Penetration Test Refusal at Elevation 841.2 ft on Crystalline Rock (GNEISS).

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 37+57	**OFFSET** 52 ft RT	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 880.7 ft	**TOTAL DEPTH** 33.9 ft	**NORTHING** 863,697	**EASTING** 1,691,449	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Fowler, B.	**START DATE** 07/10/17	**COMP. DATE** 07/10/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
885										
880										880.7 GROUND SURFACE 0.0
	877.2	3.5	1	2	4	6		W		**ALLUVIAL** Gray, brown and orange, soft to medium stiff, fine to coarse sandy, SILT, trace clay (A-5)
875	871.9	8.8	0	1	2	3		W		
870	866.9	13.8	0	1	6	7		M		865.9 14.8 **RESIDUAL** Brown, orange, gray and dark gray, stiff to very stiff, micaceous, fine sandy, SILT (A-4)
865	861.9	18.8	3	4	6	10		M		
860	856.9	23.8	5	8	8	16		M		
855	851.9	28.8	13	13	13	26		M		
850	846.9	33.8	60/0.1			60/0.1				846.9 33.8 846.8 33.9 **CRYSTALLINE ROCK** GNEISS Boring Terminated with Standard Penetration Test Refusal at Elevation 846.8 ft in Crystalline Rock (GNEISS).

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 37+43	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 880.7 ft	**TOTAL DEPTH** 32.8 ft	**NORTHING** 863,699	**EASTING** 1,691,396	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Fowler, B.	**START DATE** 07/10/17	**COMP. DATE** 07/10/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
885											
880										880.7 GROUND SURFACE	0.0
	877.2	3.5	0	1	2	3	SS-2	W		**ALLUVIAL** Brown and gray, very loose, fine to coarse grain, silty SAND (A-2-4)	
875	873.0	7.7	0	0	1	1				869.7	11.0
870	868.0	12.7	3	3	4	7		M		**RESIDUAL** Light to dark brown, loose, micaceous, silty, fine to coarse SAND, trace rock fragments (A-2-5)	
865	863.0	17.7	3	5	11	16		M		864.7	16.0
860	858.0	22.7	7	7	14	21		M		Light to dark brown and dark gray, very stiff, sandy, SILT (A-5)	
855	853.0	27.7	17	19	81/0.4	100/0.9				852.0	28.7
850	848.0	32.7	60/0.1			60/0.1				**WEATHERED ROCK** GNEISS	
										848.0	32.7
										847.9 **CRYSTALLINE ROCK** GNEISS	32.8
										Boring Terminated with Standard Penetration Test Refusal at Elevation 847.9 ft in Crystalline Rock (GNEISS).	

NCDOT BORE DOUBLE_NCDOT U4734.GPJ NC_DOT.GDT 8/24/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 38+35	**OFFSET** 43 ft LT	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 882.0 ft	**TOTAL DEPTH** 74.8 ft	**NORTHING** 863,799	**EASTING** 1,691,381	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Fowler, B.	**START DATE** 07/12/17	**COMP. DATE** 07/13/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
885										882.0 GROUND SURFACE 0.0
880	878.5	3.5	2	1	1	2		M		**ALLUVIAL** Brown and gray, soft, coarse sandy SILT (A-4)
875										875.2 6.8 Brown and gray, fine to coarse silty SAND, with trace gravel (A-2-4)
870	869.3	12.7	4	5	10	15		M		870.5 11.5 **RESIDUAL** Gray and brown, medium dense, micaceous, clayey, silty, fine to coarse SAND (A-2-5)
865	864.3	17.7	2	2	3	5		M		866.0 16.0 Gray, brown and orange, medium stiff to very stiff, micaceous, fine to coarse sandy SILT, some rock fragments (A-4)
860	859.3	22.7	2	3	4	7				
855	854.3	27.7	5	7	10	17		M		
850	849.3	32.7	13	11	10	21		M		
845	844.1	37.9	5	6	14	20		M		
840	839.3	42.7	9	14	16	30		M		841.0 41.0 Dark gray, off-white, brown and orange, very stiff, micaceous, fine sandy SILT (A-5)
835	834.3	47.7	29	71/0.3		100/0.8				833.8 48.2 **WEATHERED ROCK** GNEISS
830	829.3	52.7	60/0.1			60/0.1				829.2 52.8 **CRYSTALLINE ROCK** GNEISS
825							RS-3			
820										
815										813.1 68.9 **CRYSTALLINE ROCK** GRANITE
810							RS-4			807.2 74.8 Boring Terminated at Elevation 807.2 ft in Crystalline Rock (GRANITE).

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 38+35	**OFFSET** 43 ft LT	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 882.0 ft	**TOTAL DEPTH** 74.8 ft	**NORTHING** 863,799	**EASTING** 1,691,381	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Fowler, B.	**START DATE** 07/12/17	**COMP. DATE** 07/13/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
805						Match Line				Other Samples: ST-2 (7.7 - 9.7)

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 38+35	**OFFSET** 43 ft LT	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 882.0 ft	**TOTAL DEPTH** 74.8 ft	**NORTHING** 863,799	**EASTING** 1,691,381	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Fowler, B.	**START DATE** 07/12/17	**COMP. DATE** 07/13/17	**SURFACE WATER DEPTH** N/A	
CORE SIZE N/A	**TOTAL RUN** 22.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
829.2											Begin Coring @ 52.8 ft
	829.2	52.8	2.0	04:03	(1.7)	(1.6)		(15.7)	(14.5)		829.2 **CRYSTALLINE ROCK** 52.8
	827.2	54.8		04:13	85%	80%		98%	90%		Black, black-green, white-light gray, very slight weathered seams, hard with very hard veins, close to moderately close fracture spacing, medium to coarse grain, hornblende-mica-feldspar-quartz GNEISS
			5.0	04:35	(4.9)	(4.5)					20 10°-20° discontinuities, hard walls, few along foliation; 1 70° joint with iron oxide stain
825				04:36	98%	90%					GSI = 69-74
				03:59			RS-3				
	822.2	59.8		04:50							
			5.0	04:45	(4.9)	(4.5)					
				04:07	98%	90%					
820				04:42							
				05:19							
	817.2	64.8		04:17							
			5.0	05:02	(5.0)	(4.4)					
				05:03	100%	88%					
815				04:19							
				04:52							
	812.2	69.8		04:27							813.1 68.9
			5.0	06:26	(4.9)	(4.8)		(5.7)	(5.3)		**CRYSTALLINE ROCK**
				05:58	98%	96%		97%	90%		White, gray, black-green, slightly weathered to fresh, very hard, close to medium close fracture spacing, coarse to very coarse grains, grain quartz and feldspar with medium grain hornblende and mica GRANITE
810				04:33							6 0°-10° discontinuities with hard walls, tight, trace iron oxide staining; 1 60° healed joint; 2 80° healed joints
				05:42							GSI = 63-68
				07:23							
	807.2	74.8		05:09			RS-4				807.2 74.8
											Boring Terminated at Elevation 807.2 ft in Crystalline Rock (GRANITE).
											Other Samples:
											ST-2 (7.7 - 9.7)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 38+55	**OFFSET** 43 ft RT	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 882.1 ft	**TOTAL DEPTH** 66.9 ft	**NORTHING** 863,794	**EASTING** 1,691,469	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Fowler, B.	**START DATE** 07/13/17	**COMP. DATE** 07/14/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
885											
										882.1 GROUND SURFACE	0.0
880	878.6	3.5	0	2	2	4		W		**ALLUVIAL** Gray and brown, soft, coarse sandy SILT (A-4)	
875	872.6	9.5	1	2	2	4		W		875.3 Gray, soft, sandy, clayey SILT (A-5)	6.8
870	867.6	14.5	4	5	6	11		M		869.3 **RESIDUAL** Brown, gray and orange, stiff, sandy SILT, with trace rock fragments (A-5)	12.8
865	862.6	19.5	8	13	13	26		M		864.3 Brown, gray and orange, medium dense, silty, coarse SAND, with trace rock fragments (A-2-5)	17.8
860	857.6	24.5	12	13	7	20		M		859.3 Dark gray, brown and orange, very stiff, fine to coarse sandy SILT (A-4)	22.8
855	852.6	29.5	17	45	47	92				854.3 Dark gray, brown, and orange, very dense, silty, fine SAND (A-2-4)	27.8
850	847.6	34.5	100/0.5			100/0.5				847.6 **WEATHERED ROCK** GNEISS	34.5
845	842.6	39.5	60/0.0			60/0.0				842.6 **CRYSTALLINE ROCK** GNEISS	39.5
840										839.4 **WEATHERED ROCK** GNEISS	42.7
835							RS-5			836.5 **CRYSTALLINE ROCK** GNEISS	45.6
830											
825											
820							RS-6			815.2	66.9
										Boring Terminated at Elevation 815.2 ft in Crystalline Rock (GNEISS). Note: RS-5 fractured diagonally through sample during preparation rendering it unsuitable for testing.	

NCDOT BORE DOUBLE NCDOT U4734.GPJ NC_DOT.GDT 8/24/17

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 38+55	**OFFSET** 43 ft RT	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 882.1 ft	**TOTAL DEPTH** 66.9 ft	**NORTHING** 863,794	**EASTING** 1,691,469	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Fowler, B.	**START DATE** 07/13/17	**COMP. DATE** 07/14/17	**SURFACE WATER DEPTH** N/A	
CORE SIZE N/A	**TOTAL RUN** 27.4 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
842.6											Begin Coring @ 39.5 ft
840	842.6 840.2	39.5 41.9	2.4	01:56/0.4 03:23 03:12	(2.4) 100%	(0.7) 29%		(3.2) 100%	(0.7) 22%		**CRYSTALLINE ROCK** (842.6 – 39.5) Gray, light gray and white, slightly weathered, hard, very close to moderately close fracture spacing, hornblende-mica-feldspar-quartz GNEISS with quartz vein. 8 0° discontinuities, smooth walls; 2 80° joints with iron oxide stained, moderately weathered walls; 1 40° joint, hard walls GSI = 52-55
			5.0	02:32 00:32 00:27 01:38 04:32	(2.3) 46%	(0.6) 12%		(0.1) 3%	N/A		(839.4 – 42.7)
835	835.2	46.9					RS-5	(20.7) 97%	(16.1) 76%		(836.5 – 45.6)
			5.0	05:37 07:31 05:11 04:01 07:21	(4.5) 90%	(3.8) 76%					**WEATHERED ROCK** Gray, black, inferred severely to very severely weathered GNEISS.
830	830.2	51.9									**CRYSTALLINE ROCK** Gray, light gray, white, black, and green, slightly weathered with moderately weathered seam grading to fresh, hard, very close to moderately close, fractured, hornblende-mica-feldspar-quartz GNEISS with segment feldspar-quartz rich veining 17 0° discontinuities, smooth-hard walls; 2 30°-40° joints with hard walls, faint iron oxide stain; 15 15°-20° foliation discontinuities; 2 35° foliation discontinuities; 1 60° foliation discontinuities Foliation: 15°-20° at 39.5'-58.8'; 25°-35° at 58.8'-64.0'; 60° at 64.0'-66.9' GSI = 44-47 (45.6'-52.5') GSI = 64-67 (52.5'-66.9')
			5.0	04:37 06:22 05:01 05:27 07:07	(5.0) 100%	(2.9) 58%					
825	825.2	56.9									
			5.0	05:58 04:03 04:40 04:02 08:17	(5.0) 100%	(4.6) 92%					
820	820.2	61.9					RS-6				
			5.0	05:03 03:33 06:01 06:07 07:42	(4.8) 96%	(4.2) 84%					
	815.2	66.9									815.2 – 66.9 Boring Terminated at Elevation 815.2 ft in Crystalline Rock (GNEISS).

Note: RS-5 fractured diagonally through sample during preparation rendering it unsuitable for testing.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 38+45	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 881.9 ft	**TOTAL DEPTH** 79.3 ft	**NORTHING** 863,797	**EASTING** 1,691,425	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Fowler, B.	**START DATE** 07/11/17	**COMP. DATE** 07/12/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
885										
										881.9 GROUND SURFACE 0.0
880										**ALLUVIAL** Brown and gray, very soft to soft, fine to coarse, sandy SILT (A-4)
	878.4	3.5	1	1	0	1		M		
875	874.2	7.7	1	1	2	3		W		
870	869.2	12.7	3	3	4	7		M		869.5 12.4 Gray and brown, medium stiff, little sandy, clayey SILT (A-5)
865	864.2	17.7	4	6	9	15		M		865.9 16.0 **RESIDUAL** Dark brown and gray, medium dense, silty, fine to coarse SAND (A-2-5)
860	859.2	22.7	3	5	7	12		M		860.9 21.0 Dark gray, off-white, brown and orange, stiff to hard, fine to coarse sandy SILT (A-4)
855	854.2	27.7	4	7	10	17		M		
850	849.2	32.7	10	13	19	32		M		
845	844.2	37.7	7	8	13	21		M		
840	839.2	42.7	100/0.5			100/0.5				839.2 42.7 **WEATHERED ROCK** GNEISS
835	834.2	47.7	71	29/0.1		100/0.6				
830	829.2	52.7	100/0.4			100/0.4				
825	824.2	57.7	60/0.0			60/0.0	RS-1			824.2 57.7 **CRYSTALLINE ROCK** GNEISS
820										
815							RS-2			
810										
805										

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 38+45	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 881.9 ft	**TOTAL DEPTH** 79.3 ft	**NORTHING** 863,797	**EASTING** 1,691,425	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Fowler, B.	**START DATE** 07/11/17	**COMP. DATE** 07/12/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
805						Match Line				**CRYSTALLINE ROCK** GNEISS *(continued)* 802.6 79.3 Boring Terminated at Elevation 802.6 ft in Crystalline Rock (GNEISS). Other Samples: ST-1 (10.0 - 12.0)

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 38+45	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 881.9 ft	**TOTAL DEPTH** 79.3 ft	**NORTHING** 863,797	**EASTING** 1,691,425	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Fowler, B.	**START DATE** 07/11/17	**COMP. DATE** 07/12/17	**SURFACE WATER DEPTH** N/A	
CORE SIZE N/A	**TOTAL RUN** 21.6 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
824.2											Begin Coring @ 57.7 ft
	824.2	57.7	1.6	04:39/0.6	(1.5)	(1.3)		(21.2)	(18.8)		ELEV. (ft) 824.2 **CRYSTALLINE ROCK** DEPTH (ft) 57.7
	822.6	59.3		10:14	94%	81%		98%	87%		Black, black-green, white-light gray, and gray, slightly weathered to fresh,
			5.0	09:40							hard to very hard, close to wide fracture spacing, foliated, fine to coarse
820				07:36	(5.0)	(4.8)	RS-1				grain, hornblende-mica-feldspar-quartz GNEISS with traces pyrite
				10:32	100%	96%					18 0°-20° discontinuities with slightly rough to rough walls; 5 35°-40° foliation
	817.6	64.3		06:27							discontinuities; 1 30° joint with very slight weathering;
				08:15							Foliation: 40° at 63.0'; 50° at 66.5'
			5.0	06:51	(4.9)	(4.9)					Crenulated and contorted below 74.3'
				08:03							GSI = 54-59
815				08:29	98%	98%					
				07:32			RS-2				
	812.6	69.3		06:21							
			5.0	07:05	(5.0)	(3.9)					
				07:36	100%	78%					
810				08:22							
				08:36							
	807.6	74.3		06:10							
			5.0	11:56	(4.8)	(3.9)					
				11:30	96%	78%					
805				11:12							
				10:21							
	802.6	79.3		08:55							ELEV. (ft) 802.6 DEPTH (ft) 79.3
											Boring Terminated at Elevation 802.6 ft in Crystalline Rock (GNEISS).
											Other Samples:
											ST-1 (10.0 - 12.0)

NCDOT CORE DOUBLE NCDOT U4734.GPJ NC_DOT.GDT 8/24/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 39+22	**OFFSET** 53 ft LT	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 880.7 ft	**TOTAL DEPTH** 39.5 ft	**NORTHING** 863,886	**EASTING** 1,691,396	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Wiggins M.	**START DATE** 06/28/17	**COMP. DATE** 06/28/17	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
885										
880										880.7 GROUND SURFACE 0.0
										ALLUVIAL Gray and brown, very soft to soft, clayey SILT, trace sand and gravel (A-5)
	876.5	4.2	0	0	0	0		M		
875	874.0	6.7	1	1	2	3		M		
	871.5	9.2	2	3	2	5		M		872.0 8.7
870										**RESIDUAL** Brown, gray, dark gray and off-white, medium stiff to very stiff, micaceous, sandy, SILT, trace rock fragments (A-4)
	866.5	14.2	2	5	5	10		M		
865	861.5	19.2	3	3	7	10		M		
860	856.5	24.2	7	14	15	29		M		
855	851.5	29.2	11	11	12	23		M		
850	846.5	34.2	5	11	26	37		M		
845	841.5	39.2	100/0.3			100/0.3				848.2 32.5 Brown, dark gray and off-white, hard, sandy, SILT, trace clay and some coarse quartz fragments (A-5)
										841.5 39.2 **WEATHERED ROCK** GNEISS 841.2 39.5 Boring Terminated at Elevation 841.2 ft in Weathered Rock (GNEISS).

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 39+33	**OFFSET** 52 ft RT	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 880.0 ft	**TOTAL DEPTH** 44.3 ft	**NORTHING** 863,866	**EASTING** 1,691,500	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Wiggins M.	**START DATE** 06/29/17	**COMP. DATE** 06/29/17	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
880										880.0 GROUND SURFACE 0.0
										ALLUVIAL Brown-gray, very soft, fine to coarse grain, silty SAND, with little organic matter (A-2-4)
	876.3	3.7	0	0	0	0	SS-1	W		873.0 7.0
875	871.3	8.7	3	2	3	5		M		Blue-gray to gray, medium stiff, sandy, CLAY, trace gravel (A-7-5)
870										868.0 12.0
	864.3	15.7	7	10	12	22		M		**RESIDUAL** Brown, orange, and white, very stiff, sandy, SILT (A-4)
865	861.3	18.7	1	5	8	13		M		863.0 17.0 Blue, gray and brown, stiff to very stiff, micaceous, SILT, some sand, some quartz fragments (A-5)
860	856.3	23.7	8	9	13	22		M		
855	851.3	28.7	11	14	17	31		M		853.0 27.0 Blue, gray, brown and off-white, hard, sandy, SILT (A-4)
850	846.3	33.7	17	55	45/0.2	100/0.7				845.3 34.7 **WEATHERED ROCK** GNEISS
845	841.3	38.7	100/0.5			100/0.5				
840	836.3	43.7	61	39/0.1		100/0.6				835.7 44.3 Boring Terminated at Elevation 835.7 ft in Weathered Rock (GNEISS).

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 36600.1.2	**TIP** U-4734	**COUNTY** FORSYTH	**GEOLOGIST** Taylor, C.	
SITE DESCRIPTION Bridge No. 709 on SR 2601 (Macy Grove Road) over Reedy Fork Creek				**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 39+28	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 880.4 ft	**TOTAL DEPTH** 44.0 ft	**NORTHING** 863,876	**EASTING** 1,691,449	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Wiggins M.	**START DATE** 06/29/17	**COMP. DATE** 06/29/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
885											
880	880.4	0.0	0	0	0	0		M		880.4 GROUND SURFACE	0.0
	876.4	4.0								877.6 **ALLUVIAL** Brown,very loose, silty, fine to coarse SAND, with little organic matter (A-2-4)	2.8
875			0	0	0	0		W		Brown, gray and dark gray, very soft, sandy, SILT, with trace gravel (A-5)	
	871.4	9.0								873.4	7.0
870			1	2	1	3		M		Green-gray, blue-gray brown and off-white, soft, sandy, silty CLAY (A-7-5)	
	866.4	14.0									
865			0	2	2	4		M		864.4	16.0
	861.4	19.0								**RESIDUAL** Brown, blue, gray and off-white, very stiff, clayey SILT, trace sand and fine rock fragments, (A-5)	
860			4	9	11	20		M			
	856.4	24.0									
855			4	6	11	17		M			
	851.4	29.0								853.1	27.3
850			8	14	16	30		M		Brown, blue, gray and off-white, hard, sandy SILT, trace clay (A-4)	
	846.4	34.0									
845			14	17	38	55		M			
	841.4	39.0								843.1	37.3
840			30	37	63	100/1.0				Blue, gray, off-white and brown, very dense, silty, fine to coarse SAND (A-2-4)	
	836.4	44.0								836.4	44.0
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 836.4 ft on Crystalline Rock (GNEISS).	

Other Samples:
ST-1 (10.5 - 12.5)

NCDOT BORE DOUBLE NCDOT U4734.GPJ NC_DOT.GDT 8/24/17

PROJECT REFERENCE NO.	SHEET NO.
U-4734	17

SOIL TEST RESULTS

SAMPLE NO.	BORING NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	EB2-B	52' RT	39+33	3.7-5.2 FT	A-2-4(0)	36	8	34.0	23.7	31.2	0.8	92.5	58.5	34.8	27	3.72
SS-2	EBI-C	CL	37+43	3.7-5.2 FT	A-2-4(0)	34	6	25.1	43.1	26.1	1.0	98.8	73.7	30.6	32	NT
ST-1	EB2-C	CL	39+28	10.5-10.9 FT	A-7-5(1)	55	14	23.4	40.3	32.0	0.8	99.3	75.9	35.6	53	NT
ST-2	BI-A	43' LT	38+35	7.7-8.1FT	A-2-4(0)	29	2	35.4	50.3	8.0	0.1	94.1	58.7	8.4	34	NT

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

SAMPLE NO.	BORING NO.	DEPTH (FT)	ROCK TYPE	GEOLOGIC MAP UNIT	RUN RQD	LENGTH (FT)	DIAMETER (FT)	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH (PSI)	YOUNG'S MODULUS (PSI)	SPLITTING TENSILE STRENGTH (PSI)	REMARKS
RS-1	BI-C	60.3-60.6	GNEISS	PPg	96%	0.3	0.166	182.36	4,991	-	-	Fresh
RS-2	BI-C	66.9-67.3	GNEISS	PPg	98%	0.3	0.165	173.61	4,542	-	-	Fresh
RS-3	BI-A	57.6-56.9	GNEISS	PPg	90%	0.3	0.165	186.39	2,949	-	-	Fresh
RS-4	BI-A	73.2-73.6	GRANITE	PPg	96%	0.3	0.165	164.04	7,425	-	-	Fresh
RS-6	BI-B	61.3-61.6	GNEISS	PPg	92%	0.3	0.164	166.58	5,321	-	-	Fresh

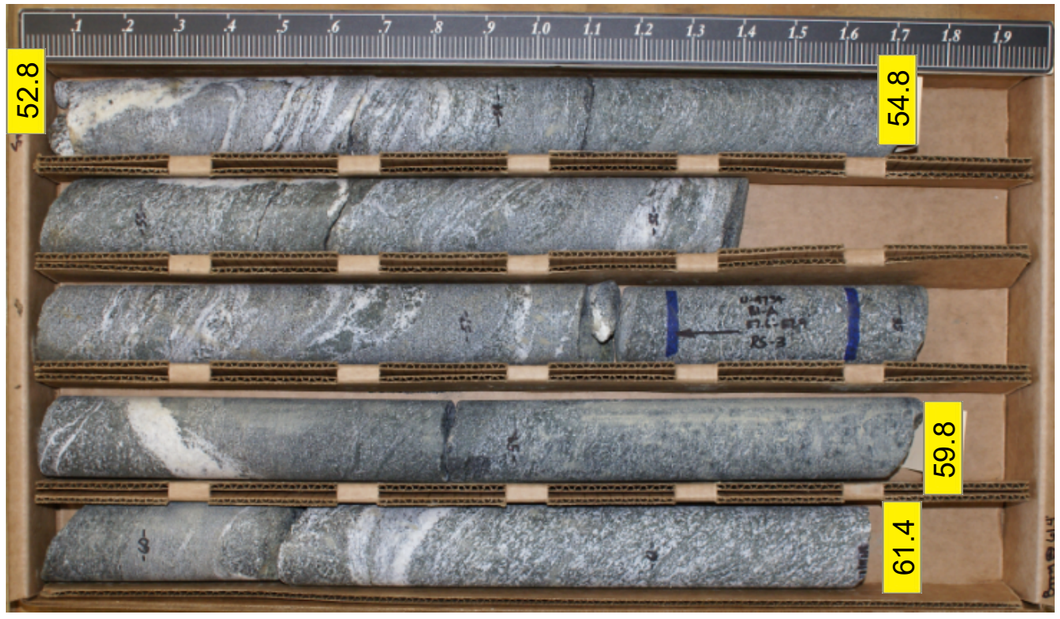
NOTE: RS-5 FRACTURED DIAGONALLY THROUGH SAMPLE DURING PREPARATION RENDERING IT UNSUITABLE FOR TESTING.

DATE: 9-15-14

CORE PHOTOGRAPHIC RECORD

Bridge No. 709 on SR 2601 (Macy Grove Road) Over Reedy Fork Creek

B1-A
STA. 38+35 @ 43' LT
Box 1 of 3: 52.8 - 61.4 FEET



0.0 1.0 2.0

FEET

B1-A
STA. 38+35 @ 43' LT
BOX 2 of 3: 61.4 - 69.8 FEET

0.0 1.0 2.0

FEET

CORE PHOTOGRAPHIC RECORD

Bridge No. 709 on SR 2601 (Macy Grove Road) Over Reedy Fork Creek

B1-A
STA. 38+35 @ 43' LT
Box 3 of 3: 69.8 - 74.8 FEET

0.0 1.0 2.0

FEET

CORE PHOTOGRAPHIC RECORD

Bridge No. 709 on SR 2601 (Macy Grove Road) Over Reedy Fork Creek

B1-B
STA. 38+55 @ 43' RT
Box 1 of 3: 39.5 - 51.9 FEET

B1-B
STA. 38+55 @ 43' RT
Box 2 of 3: 51.9 - 60.6 FEET

NOTE: RS-5 FRACTURED DIAGONALLY THROUGH SAMPLE DURING PREPARATION RENDERING IT UNSUITABLE FOR TESTING.

CORE PHOTOGRAPHIC RECORD

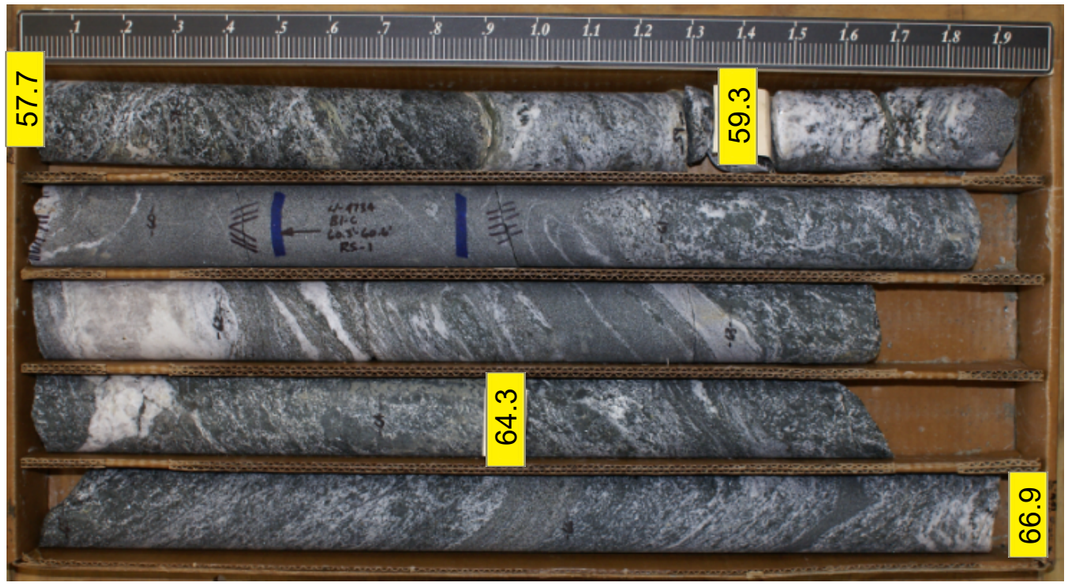
Bridge No. 709 on SR 2601 (Macy Grove Road) Over Reedy Fork Creek

B1-B
STA. 38+55 @ 43' RT
Box 3 of 3: 60.6 - 66.9 FEET

CORE PHOTOGRAPHIC RECORD

Bridge No. 709 on SR 2601 (Macy Grove Road) Over Reedy Fork Creek

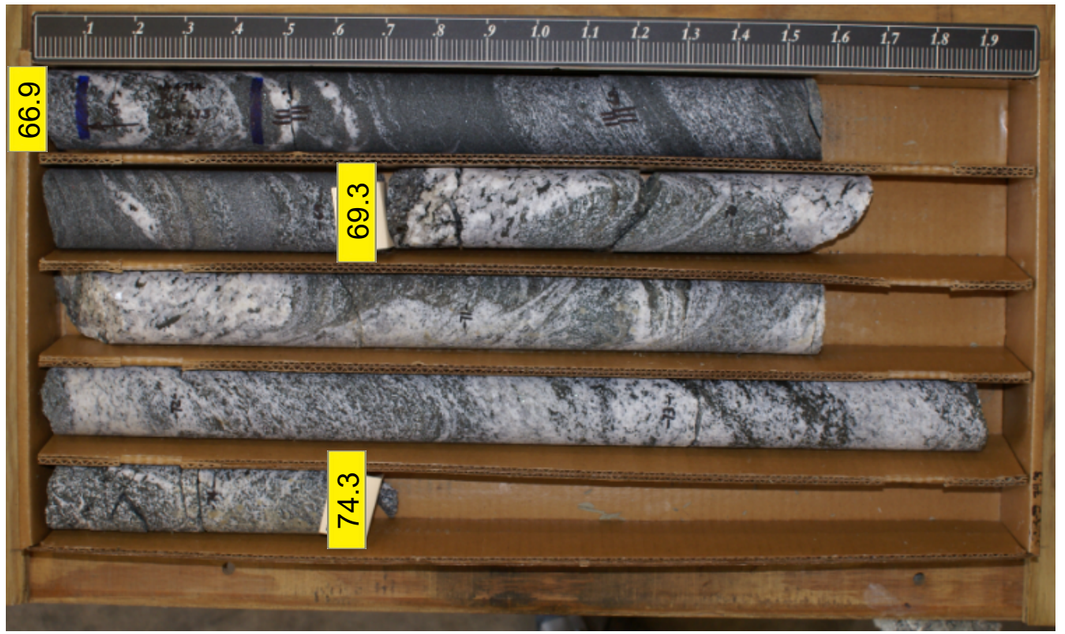
B1-C
STA. 38+45 @ CL
Box 1 of 3: 57.7 - 66.9 FEET



0.0 1.0 2.0

FEET

B1-C
STA. 38+45 @ CL
Box 2 of 3: 66.9 - 74.3 FEET



0.0 1.0 2.0

FEET

CORE PHOTOGRAPHIC RECORD

Bridge No. 709 on SR 2601 (Macy Grove Road) Over Reedy Fork Creek

B1-C
STA. 38+45 @ CL
Box 3 of 3: 74.3 - 79.3 FEET