

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5885	1	9

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

**STRUCTURE
SUBSURFACE INVESTIGATION**

COUNTY McDOWELL

PROJECT DESCRIPTION DIVISION 13 EXPRESS DESIGN
BUILD BRIDGES SUBSURFACE INVESTIGATION

SITE DESCRIPTION REPLACE BRIDGE NO.108 ON
SR 1560 OVER NORTH FORK CATAWBA RIVER

CONTENTS

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2, 2A	LEGEND
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9	LAB SAMPLE RESULTS

PERSONNEL

Z. R. TIDMORE

W. T. DUGGINS

INVESTIGATED BY TERRACON CONSULTANTS

DRAWN BY W. D. FIELDS

CHECKED BY J. D. HOSKINS

SUBMITTED BY TERRACON CONSULTANTS

DATE MAY 2016

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

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

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

NOTES:

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

Terracon
Consulting Engineers & Scientists
2401 BRENTWOOD ROAD, SUITE 107
RALEIGH, NORTH CAROLINA 27604
PHONE: (919) 873-2211 FAX: (919) 873-3655
NC REGISTERED FIRM P-2089



DocuSigned by:

James D. Hoskins, 000 5/18/2016

92C8A41785 SIGNATURE

DATE

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

REFERENCE: B-5885

PROJECT: 48078

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 25/825 DIP & DIP DIRECTION OF ROCK STRUCTURES SOIL SYMBOL SPT DMT VST PMT TEST BORING ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CORE BORING MONITORING WELL INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY 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 4.76 2.00 0.42 0.25 0.075 0.053										UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK									
GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3										ABBREVIATIONS									
SOIL MOISTURE - CORRELATION OF TERMS										AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL. - CLAY MOD. - MODERATELY ? - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC 7/2 - DRY UNIT WEIGHT CSE. - COARSE ORG. - ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP. - SAPROLITIC S - BULK e - VOID RATIO SD. - SAND, SANDY SS - SAND SPOON F - FINE SL. - SILT, SILTY ST - SHELBY TUBE FOSS. - FOSSILIFEROUS SLL. - SLIGHTLY RS - ROCK FRAC. - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS. - FRAGMENTS w - MOISTURE CONTENT CBR - CALIFORNIA BEARING RATIO HI. - HIGHLY v - VERY									
PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT									
PLASTICITY INDEX (PI) DRY STRENGTH										DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:									
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH										<input type="checkbox"/> CME-45C <input type="checkbox"/> CLAY BITS <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/> CME-55 <input type="checkbox"/> 6' CONTINUOUS FLIGHT AUGER <input type="checkbox"/> CME-550 <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> ACKER RENEGADE <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE _____ * STEEL TEETH <input type="checkbox"/> TRICONE _____ * TUNG-CARB. <input type="checkbox"/> CORE BIT <input type="checkbox"/> _____									
COLOR										CORE SIZE: HAND TOOLS:									
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"/> -B _____ <input type="checkbox"/> -H _____ <input checked="" type="checkbox"/> -N 02 <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST									

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SUBSURFACE INVESTIGATION

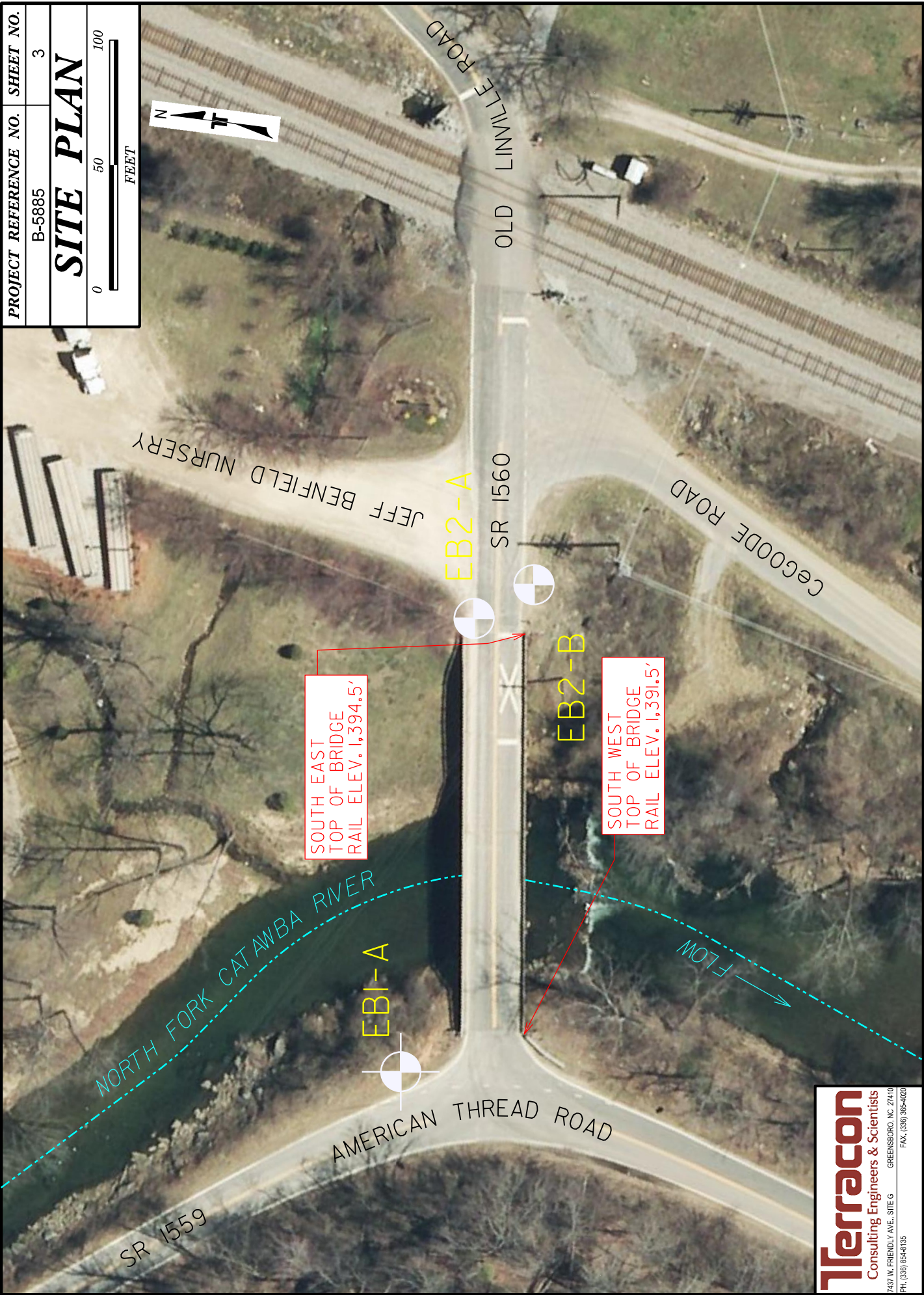
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS (PAGE 2 OF 2)

ROCK DESCRIPTION		TERMS AND DEFINITIONS
<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>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.</p> <p>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.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>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.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (ROD) - 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.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>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.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p>TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>
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		BEDDING
TERM	SPACING	TERM
VERY WIDE	MORE THAN 10 FEET	THICKNESS
WIDE	3 TO 10 FEET	VERY THICKLY BEDDED
MODERATELY CLOSE	1 TO 3 FEET	THICKLY BEDDED
CLOSE	0.16 TO 1 FOOT	THINLY BEDDED
VERY CLOSE	LESS THAN 0.16 FEET	VERY THINLY BEDDED
		THICKLY LAMINATED
		THINLY LAMINATED
		< 0.008 FEET
INDURATION		
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.
BENCH MARK: TRAVERSE STATION MARKER GPS 100 ON OLD LINVILLE ROAD AND CeGOOD ROAD		ELEVATION: 1,393.31 FEET
NOTES:		
FIAD - FILLED IMMEDIATELY AFTER DRILLING		

PROJECT REFERENCE NO. B-5885 SHEET NO. 3

SITE PLAN

0 50 100
FEET



GEOTECHNICAL BORING REPORT BORE LOG

WBS 48078		TIP B-5885		COUNTY McDOWELL		GEOLOGIST Tidmore, Z. R.										
SITE DESCRIPTION Replace Bridge No. 108 on SR 1560 (Old Linville Rd.) over North Fork Catawba River							GROUND WTR (ft)									
BORING NO. EB1-A		STATION N/A		OFFSET N/A		ALIGNMENT -L-	0 HR. N.M.									
COLLAR ELEV. 1,389.1 ft		TOTAL DEPTH 20.6 ft		NORTHING 760,666		EASTING 1,105,223	24 HR. FIAD									
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 03/21/2016				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic										
DRILLER Duggins, W.		START DATE 04/08/16		COMP. DATE 04/08/16		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					ELEV. (ft)	
1390														1,389.1	GROUND SURFACE	0.0
														1,387.6	ROADWAY EMBANKMENT boulder	1.5
1385	1,386.0	3.1	14	5	5							M		1,383.1	ROADWAY EMBANKMENT stiff, tannish brown, clayey silt with rock fragments	6.0
1380	1,381.0	8.1	4	4	3							M		1,379.5	RESIDUAL medium stiff, brown, sandy silt	9.6
														1,378.5	CRYSTALLINE ROCK (gneiss)	10.6
1375														1,377.0	WEATHERED ROCK (gneiss)	12.1
															CRYSTALLINE ROCK (gneiss)	
1370																
														1,368.5	Boring Terminated at Elevation 1,368.5 ft in crystalline rock (gneiss)	20.6

NCDOT BORE SINGLE B5885_GEO_BRDG0108_BL.GPJ NC_DOT.GDT 5/16/16

GEOTECHNICAL BORING REPORT CORE LOG

WBS 48078			TIP B-5885			COUNTY McDOWELL			GEOLOGIST Tidmore, Z. R.		
SITE DESCRIPTION Replace Bridge No. 108 on SR 1560 (Old Linville Rd.) over North Fork Catawba River										GROUND WTR (ft)	
BORING NO. EB1-A			STATION N/A			OFFSET N/A			ALIGNMENT -L-		0 HR. N.M.
COLLAR ELEV. 1,389.1 ft			TOTAL DEPTH 20.6 ft			NORTHING 760,666			EASTING 1,105,223		24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 03/21/2016						DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic		
DRILLER Duggins, W.			START DATE 04/08/16			COMP. DATE 04/08/16			SURFACE WATER DEPTH N/A		
CORE SIZE NQ2			TOTAL RUN 8.5 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
1377										Begin Coring @ 12.1 ft	
1375	1,377.0	12.1	3.5	5:42/1.0 4:51/1.0 3:05/1.5	(3.0) 86%	(1.8) 51%				1,377.0	12.1
	1,373.5	15.6								poor to fair, gray and white, gneiss, fresh to slightly weathered, very hard to hard, very close to close tight to slightly open joints, with very thin to thin foliations Qu=19,700 psi	
1370			5.0	2:36/1.0 4:28/1.0 5:56/1.0 8:45/1.0 11:08/1.0	(5.0) 100%	(2.4) 48%					
	1,368.5	20.6								1,368.5	20.6
Boring Terminated at Elevation 1,368.5 ft in crystalline rock (gneiss)											

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BORE LOG

WBS 48078		TIP B-5885		COUNTY McDOWELL		GEOLOGIST Tidmore, Z. R.										
SITE DESCRIPTION Replace Bridge No. 108 on SR 1560 (Old Linville Rd.) over North Fork Catawba River							GROUND WTR (ft)									
BORING NO. EB2-A		STATION N/A		OFFSET N/A		ALIGNMENT -L-										
COLLAR ELEV. 1,392.0 ft		TOTAL DEPTH 27.5 ft		NORTHING 760,674		EASTING 1,105,331										
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 03/21/2016				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Duggins, W.		START DATE 04/08/16		COMP. DATE 04/08/16		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						
1395														1,392.0	GROUND SURFACE	0.0
1390	1,389.2	2.8	2	2	2	4							D	1,386.0	ROADWAY EMBANKMENT soft, brown, sandy silt with gravel	6.0
1385	1,384.2	7.8	4	2	2	4							M	1,382.0	soft, reddish brown, clayey silt	10.0
1380	1,379.2	12.8	2	2	2	4							W	1,377.2	ALLUVIAL soft, gray, clayey sandy silt	14.8
1375	1,374.2	17.8	10	31	12									1,376.2	boulder	15.8
1370	1,369.2	22.8	15	38	39									1,371.7	RESIDUAL hard, white and gray, saprolitic sandy silt	20.3
1365	1,364.6	27.4												1,370.7	WEATHERED ROCK (gneiss)	21.3
														1,364.5	RESIDUAL hard, tan, saprolitic sandy silt	27.5
															Boring Terminated with Standard Penetration Test Refusal at Elevation 1,364.5 ft in crystalline rock (gneiss)	

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GEOTECHNICAL BORING REPORT

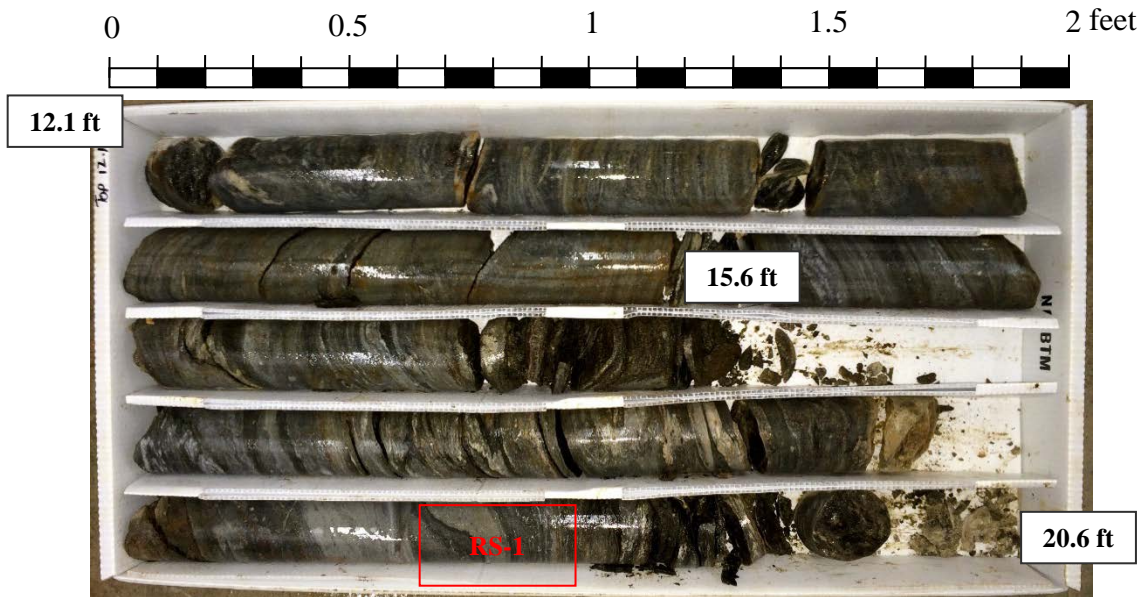
BORE LOG

WBS 48078		TIP B-5885		COUNTY McDOWELL		GEOLOGIST Tidmore, Z. R.										
SITE DESCRIPTION Replace Bridge No. 108 on SR 1560 (Old Linville Rd.) over North Fork Catawba River							GROUND WTR (ft)									
BORING NO. EB2-B		STATION N/A		OFFSET N/A		ALIGNMENT -L-	0 HR. 16.0									
COLLAR ELEV. 1,392.2 ft		TOTAL DEPTH 32.2 ft		NORTHING 760,652		EASTING 1,105,342	24 HR. FIAD									
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 86% 03/21/2016				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Duggins, W.		START DATE 04/08/16		COMP. DATE 04/08/16		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						
1395																
														1,392.2	GROUND SURFACE	0.0
1390	1,389.9	2.3	4	2	2								M	ROADWAY EMBANKMENT soft, reddish brown, sandy clay		
														1,387.2		5.0
1385	1,384.9	7.3	3	1	34								W	soft, reddish brown, sandy silt		
														1,383.9		8.3
														1,382.9	boulder	9.3
1380	1,379.9	12.3	11	12	10								W	very stiff, reddish brown, sandy silt		
1375	1,374.9	17.3	23	77/0.3									▽			
														1,375.2	WEATHERED ROCK (gneiss)	17.0
1370	1,369.8	22.4	61	39/0.3						100/0.8			Sat.			
1365	1,364.8	27.4	46	44/0.4									Sat.			
1360	1,360.0	32.2	60/0.0							90/0.9 Prematurely Terminated			Sat.			
														1,360.0	Boring Terminated with Standard Penetration Test Refusal at Elevation 1,360.0 ft on crystalline rock (gneiss)	32.2

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Rock Core Photo

<i>Project No.:</i> 48078	<i>I.D. No.:</i> B-5885	<i>County:</i> MCDOWELL	<i>Boring Location:</i> EB1-A
<i>Site Description:</i> Replace Bridge No. 108 on SR 1560 (Old Linville Rd.) over North Fork Catawba River			
<i>Driller:</i> Duggins, W. T.	<i>Core Size:</i> NQ2	<i>Drill Machine:</i> Acker Renegade	
<i>Geologist / Engineer:</i> Tidmore, Z. R.	<i>Total Run Length:</i> 8.5 feet	<i>Date:</i> 4/08/16	



Notes:

- 1) Used core barrel with wire line

Terracon

Terracon Consultants, Inc.
 2401 Brentwood Road, Suite 107
 Raleigh, North Carolina 27604
www.terracon.com

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NC 48078
TIP: B-5885
COUNTY: McDowell
Replace Bridge NO. 108 ON SR 1560 (Old Linville Road) Over North Fork Catawba River

Sample #	Boring #	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD (%)	Length (in)	Diameter (in)	Unit Weight (PCF)	Unconfined Compressive Strength (PSI)	Remarks
RS-1	EB1-A	19.8-20.1	Gneiss	Ccu	48	3.96	1.95	-	19,700	rock appears to be Ybgg