

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	WBS NO. 17BP.13.R.50	1	8

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. WBS NO. 17BP.13.R.50 F.A. PROJ. _____

COUNTY McDOWELL

PROJECT DESCRIPTION DIVISION 13

LOW IMPACT BRIDGE REPLACEMENT

SITE DESCRIPTION BRIDGE NO. 52 ON SR 1105

(CHERRY SPRINGS ROAD) OVER LITTLE CROOKED CREEK

CONTENTS

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2, 2A	LEGEND
3	BORING LOCATION MAP
4-7	BORE LOGS

PERSONNEL

R. DeLOST

F. WOODARD

C. WARD

INVESTIGATED BY R. DeLOST

CHECKED BY S. PROVANCE

SUBMITTED BY S. PROVANCE

DATE 8/14/2012

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) 250-4088. 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 DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION 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.

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

DRAWN BY: T. RIDEOUT



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

SOIL DESCRIPTION										GRADATION																																																																																																																																																											
SOIL IS CONSIDERED TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.																																																																																																																																																											
										THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS <u>ANGULAR</u>, <u>SUBANGULAR</u>, <u>SUBROUNDED</u>, OR <u>ROUNDED</u>.																																																																																																																																																											
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION																																																																																																																																																											
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.										COMPRESSIBILITY																																																																																																																																																											
GENERAL CLASS. <table border="1" style="width: 100%; text-align: center;"><thead><tr><th colspan="2">GRANULAR MATERIALS (≤ 35% PASSING #200)</th><th colspan="2">SILT-CLAY MATERIALS (> 35% PASSING #200)</th><th colspan="2">ORGANIC MATERIALS</th></tr><tr><th>A-1</th><th>A-3</th><th>A-2</th><th>A-4</th><th>A-5</th><th>A-6</th><th>A-7</th><th>A-1, A-2</th><th>A-4, A-5</th><th>A-6, A-7</th></tr></thead><tbody><tr><td>A-1-a</td><td>A-1-b</td><td>A-2-4</td><td>A-2-5</td><td>A-2-6</td><td>A-2-7</td><td></td><td>A-7-5</td><td>A-7-6</td><td></td></tr><tr><td colspan="10"></td><td colspan="10"></td></tr><tr><td colspan="10"></td><td colspan="10"></td></tr><tr><td colspan="10"></td><td colspan="10"></td></tr><tr><td colspan="10"></td><td colspan="10"></td></tr><tr><td colspan="10"></td><td colspan="10"></td></tr><tr><td colspan="10"></td><td colspan="10"></td></tr></tbody></table>										GRANULAR MATERIALS (≤ 35% PASSING #200)		SILT-CLAY MATERIALS (> 35% PASSING #200)		ORGANIC MATERIALS		A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	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																																																																																																																										LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50									
										GRANULAR MATERIALS (≤ 35% PASSING #200)		SILT-CLAY MATERIALS (> 35% PASSING #200)		ORGANIC MATERIALS																																																																																																																																																							
A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	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																																																																																																																																																													
PERCENTAGE OF MATERIAL										GROUND WATER																																																																																																																																																											
ORGANIC MATERIAL <table border="1" style="width: 100%; text-align: center;"><thead><tr><th>GRANULAR SOILS</th><th>SILT - CLAY SOILS</th><th>OTHER MATERIAL</th></tr></thead><tbody><tr><td>TRACE OF ORGANIC MATTER</td><td>2 - 3%</td><td>3 - 5%</td></tr><tr><td>LITTLE ORGANIC MATTER</td><td>3 - 5%</td><td>5 - 12%</td></tr><tr><td>MODERATELY ORGANIC</td><td>5 - 10%</td><td>12 - 20%</td></tr><tr><td>HIGHLY ORGANIC</td><td>>10%</td><td>>20%</td></tr></tbody></table>										GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	MODERATELY ORGANIC	5 - 10%	12 - 20%	HIGHLY ORGANIC	>10%	>20%	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP																																																																																																																																												
										GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL																																																																																																																																																									
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%																																																																																																																																																																			
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%																																																																																																																																																																			
MODERATELY ORGANIC	5 - 10%	12 - 20%																																																																																																																																																																			
HIGHLY ORGANIC	>10%	>20%																																																																																																																																																																			
MISCELLANEOUS SYMBOLS										ABBREVIATIONS																																																																																																																																																											
PRIMARY SOIL TYPE <table border="1" style="width: 100%; text-align: center;"><thead><tr><th>COMPACTNESS OR CONSISTENCY</th><th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th><th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th></tr></thead><tbody><tr><td>VERY LOOSE</td><td><4</td><td></td></tr><tr><td>LOOSE</td><td>4 TO 10</td><td></td></tr><tr><td>MEDIUM DENSE</td><td>10 TO 30</td><td></td></tr><tr><td>DENSE</td><td>30 TO 50</td><td></td></tr><tr><td>VERY DENSE</td><td>>50</td><td></td></tr><tr><td>VERY SOFT</td><td><2</td><td><0.25</td></tr><tr><td>SOFT</td><td>2 TO 4</td><td>0.25 TO 0.50</td></tr><tr><td>MEDIUM STIFF</td><td>4 TO 8</td><td>0.5 TO 1.0</td></tr><tr><td>STIFF</td><td>8 TO 15</td><td>1 TO 2</td></tr><tr><td>VERY STIFF</td><td>15 TO 30</td><td>2 TO 4</td></tr><tr><td>HARD</td><td>>30</td><td>>4</td></tr></tbody></table>										COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	VERY LOOSE	<4		LOOSE	4 TO 10		MEDIUM DENSE	10 TO 30		DENSE	30 TO 50		VERY DENSE	>50		VERY SOFT	<2	<0.25	SOFT	2 TO 4	0.25 TO 0.50	MEDIUM STIFF	4 TO 8	0.5 TO 1.0	STIFF	8 TO 15	1 TO 2	VERY STIFF	15 TO 30	2 TO 4	HARD	>30	>4	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD																																																																																																																							
										COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)																																																																																																																																																									
VERY LOOSE	<4																																																																																																																																																																				
LOOSE	4 TO 10																																																																																																																																																																				
MEDIUM DENSE	10 TO 30																																																																																																																																																																				
DENSE	30 TO 50																																																																																																																																																																				
VERY DENSE	>50																																																																																																																																																																				
VERY SOFT	<2	<0.25																																																																																																																																																																			
SOFT	2 TO 4	0.25 TO 0.50																																																																																																																																																																			
MEDIUM STIFF	4 TO 8	0.5 TO 1.0																																																																																																																																																																			
STIFF	8 TO 15	1 TO 2																																																																																																																																																																			
VERY STIFF	15 TO 30	2 TO 4																																																																																																																																																																			
HARD	>30	>4																																																																																																																																																																			
TEXTURE OR GRAIN SIZE										EQUIPMENT USED ON SUBJECT PROJECT																																																																																																																																																											
U.S. STD. SIEVE SIZE OPENING (MM) <table border="1" style="width: 100%; text-align: center;"><thead><tr><th>4</th><th>10</th><th>40</th><th>60</th><th>200</th><th>270</th></tr></thead><tbody><tr><td>4.75</td><td>2.00</td><td>0.42</td><td>0.25</td><td>0.075</td><td>0.053</td></tr></tbody></table>										4	10	40	60	200	270	4.75	2.00	0.42	0.25	0.075	0.053	AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST • - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC - FRACTURED, FRACTURES FRAGS - FRAGMENTS HL - 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 YST - VANE SHEAR TEST WEA. - WEATHERED γ_u - 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																																																																																																																																															
										4	10	40	60	200	270																																																																																																																																																						
4.75	2.00	0.42	0.25	0.075	0.053																																																																																																																																																																
SOIL MOISTURE - CORRELATION OF TERMS										HAMMER TYPE:																																																																																																																																																											
SOIL MOISTURE SCALE (ATTERBERG LIMITS) <table border="1" style="width: 100%; text-align: center;"><thead><tr><th>FIELD MOISTURE DESCRIPTION</th><th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th></tr></thead><tbody><tr><td>- SATURATED - (SAT.)</td><td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td></tr><tr><td>- WET - (W)</td><td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td></tr><tr><td>- MOIST - (M)</td><td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td></tr><tr><td>- DRY - (D)</td><td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td></tr></tbody></table>										FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	DRILL UNITS: MOBILE B- _____ BK-51 CME-45C CME-550 PORTABLE HOIST ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG.-CARBIDE INSERTS CASING _____ W/ ADVANCER TRICONE _____ STEEL TEETH TRICONE _____ TUNG.-CARB. CORE BIT HAMMER TYPE: ☒ AUTOMATIC ☐ MANUAL CORE SIZE: -B _____ -N _____ -H _____ HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST																																																																																																																																																	
										FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION																																																																																																																																																										
- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																																																																																																																																				
- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																				
- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE																																																																																																																																																																				
- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																				
PLASTICITY										COLOR																																																																																																																																																											
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY										PLASTICITY INDEX (PI) <table border="1" style="width: 100%; text-align: center;"><thead><tr><th>0-5</th><th>6-15</th><th>16-25</th><th>26 OR MORE</th></tr></thead><tbody><tr><td>VERY LOW</td><td>SLIGHT</td><td>MEDIUM</td><td>HIGH</td></tr></tbody></table>										0-5	6-15	16-25	26 OR MORE	VERY LOW	SLIGHT	MEDIUM	HIGH																																																																																																																																										
										0-5	6-15	16-25	26 OR MORE																																																																																																																																																								
VERY LOW	SLIGHT	MEDIUM	HIGH																																																																																																																																																																		
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.																																																																																																																																																																					

		PROJECT REFERENCE NO. WBS NO. 17BP.13.R.50		SHEET NO. 2A	
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS					
ROCK DESCRIPTION			TERMS AND DEFINITIONS		
HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. 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:			<u>ALLUVIUM (ALLUV.)</u> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <u>AQUIFER</u> - A WATER BEARING FORMATION OR STRATA. <u>ARENACEOUS</u> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <u>ARGILLACEOUS</u> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. <u>ARTESIAN</u> - 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. <u>CALCAREOUS (CALC.)</u> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <u>CORE RECOVERY (REC.)</u> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <u>DIKE</u> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <u>FAULT</u> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <u>FISSILE</u> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <u>FLOAT</u> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. <u>FLOOD PLAIN (FP)</u> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <u>FORMATION (FM.)</u> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <u>JOINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <u>LENS</u> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <u>MOTTLED (MOT.)</u> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <u>RESIDUAL (RES.) SOIL</u> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <u>ROCK QUALITY DESIGNATION (RQD)</u> - 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. <u>SAPROLITE (SAP.)</u> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <u>SILL</u> - 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. <u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <u>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</u> - 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. <u>STRATA CORE RECOVERY (SRC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <u>STRATA ROCK QUALITY DESIGNATION (SRQD)</u> - 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. <u>TOPSOIL (TS.)</u> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.		
	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.				
	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.				
	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 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i>				
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. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i>				
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i>				
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		BEDDING			
TERM	SPACING	TERM	THICKNESS		
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	> 4 FEET		
WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET		
MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET		
CLOSE	0.16 TO 1 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET		
VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET		
		THINLY LAMINATED	< 0.008 FEET		
INDURATION					
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE 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.				
		BENCH MARK: NW CORNER OF BRIDGE DECK (NEAREST EB1-B) ELEVATION: 100 FT.			
		NOTES:			

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	WBS NO. 17BP.13.R.50	3	8



BORING LOCATION MAP

***BRIDGE NO. 52 ON SR 1105
(CHERRY SPRINGS ROAD) OVER
LITTLE CROOKED CREEK***

WBS NO. 17BP.13.R.50

MCDOWELL COUNTY, NORTH CAROLINA

DRAWN BY: T. RIDEOUT



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 4 OF 7

WBS 17BP.13.R.50		TIP 17BP.13.R.50		COUNTY McDOWELL		GEOLOGIST DeLost, R										
SITE DESCRIPTION Bridge No. 52 on SR 1105 (Cherry Springs Road) Over Little Crooked Creek							GROUND WTR (ft)									
BORING NO. EB1-A		STATION N/A		OFFSET N/A		ALIGNMENT -L-		0 HR. N/A								
COLLAR ELEV. 99.9 ft		TOTAL DEPTH 40.5 ft		NORTHING 680,854		EASTING 1,051,572		24 HR. N/A								
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER Woodard, F.		START DATE 06/23/12		COMP. DATE 06/23/12		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			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)	DEPTH (ft)
100														99.9	GROUND SURFACE	0.0
95	94.9	5.0	1	WOH	WOH								W			
90	89.9	10.0	1	1	3								Sat.	91.6	RESIDUAL	8.3
85	84.9	15.0	2	3	3								Sat.		Tan, pink, white & gray, loose to v. dense, f. to cse. grain, saprolitic, quartz sand (A-2-6).	
80	79.9	20.0	2	5	4								W			
75	74.9	25.0	5	8	8								W			
70	69.9	30.0	12	25	41								D			
65	64.9	35.0	10	42	58/0.3									63.9	WEATHERED ROCK	36.0
60	59.9	40.0	100/0.5											59.4	Weathered rock (Meta-Gneiss/Pegmatite).	40.5
															Boring Terminated by Auger Refusal at Elevation 59.4 ft on Crystalline Rock (Meta-Gneiss/Pegmatite).	

NCDOT BORE SINGLE 058&000_GEO_BRD0052_BORE.GPJ NC_DOT_GDT 7/18/12



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 5 OF 7

WBS 17BP.13.R.50		TIP 17BP.13.R.50		COUNTY McDOWELL		GEOLOGIST DeLost, R											
SITE DESCRIPTION Bridge No. 52 on SR 1105 (Cherry Springs Road) Over Little Crooked Creek							GROUND WTR (ft)										
BORING NO. EB1-B		STATION N/A		OFFSET N/A		ALIGNMENT -L-		0 HR. N/A									
COLLAR ELEV. 100.0 ft		TOTAL DEPTH 41.1 ft		NORTHING 680,840		EASTING 1,051,558		24 HR. N/A									
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011				DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Woodard, F.		START DATE 06/23/12		COMP. DATE 06/23/12		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)		
100															100.0	GROUND SURFACE	0.0
95	95.0	5.0	1	1	WOH										96.2	ALLUVIAL Tan & gray, v. soft, micaceous, f. grain, quartz, sandy clay w/topsoil, roots & rock frags. (A-5).	3.8
90	90.0	10.0	3	4	1									Sat.		RESIDUAL Gray, blue, white, v. loose gravel to f. grain, quartz, poorly sorted, clayey sand (A-2-7).	
85	85.0	15.0	1	1	1									Sat.			
80	80.0	20.0	2	5	7									Sat.		86.7	13.3
75	75.0	25.0	8	8	4									Sat.		84.3	15.7
70	70.0	30.0	9	19	20									Sat.			
65	65.0	35.0	18	56	44/0.3									D			
60	60.0	40.0	62	38/0.1												64.0	36.0
																WEATHERED ROCK Weathered Rock (Meta-Gneiss/Pegmatite).	
																58.9	41.1
																Boring Terminated by Auger Refusal at Elevation 58.9 ft on Crystalline Rock (Meta-Gneiss/Pegmatite).	

NCDOT BORE SINGLE 059&000_GEO_BRDG0052_BORE.GPJ NC_DOT_GDT 7/18/12



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

SHEET 6 OF 7

WBS 17BP.13.R.50			TIP 17BP.13.R.50			COUNTY McDOWELL			GEOLOGIST DeLost, R					
SITE DESCRIPTION Bridge No. 52 on SR 1105 (Cherry Springs Road) Over Little Crooked Creek									GROUND WTR (ft)					
BORING NO. EB2-A			STATION N/A			OFFSET N/A			ALIGNMENT -L-					
COLLAR ELEV. 99.2 ft			TOTAL DEPTH 46.8 ft			NORTHING 680,837			EASTING 1,051,594					
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic					
DRILLER Woodard, F.			START DATE 06/23/12			COMP. DATE 06/23/12			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	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)
100														GROUND SURFACE 0.0
95	94.4	4.8	1	1	WOH							M		ALLUVIAL Tan, gray & white, v. loose, f. to cse. grain quartz, clayey sand w/topsoil & roots (A-5).
90	89.4	9.8	2	3	3							Sat.		Tan, white, brown & gray, loose, cse. grain rounded quartz grains w/f. grain silt matrix (A-2-5).
85	84.4	14.8	5	5	3							Sat.		RESIDUAL Tan, white & pink, loose, f. grain, loose, f. grain to cse. grain quartz sand (A-2-6).
80	79.4	19.8	3	4	7							Sat.		Tan, pink, white & black, med. dense, f. to cse. grain, clayey, micaceous, quartz, saprolitic sand (A-2-7)
75	74.4	24.8	2	8	9							W		
70	69.4	29.8	2	7	12							W		
65	64.4	34.8	20	36	30							D		
60	59.4	39.8	7	20	48							W		Pink, tan & white, v. dense, f. grain, saprolitic, quartz sand (A-2-6).
55	54.4	44.8	100/0.5											WEATHERED ROCK Weathered rock (Meta-Gneiss/Pegmatite). Boring Terminated by Auger Refusal at Elevation 52.4 ft on Crystalline Rock (Meta-Gneiss/Pegmatite).

NCDOT BORE SINGLE 059&000_GEO_BRD0052_BORE.GPJ NC_DOT_GDT 7/18/12



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 7 OF 7

WBS 17BP.13.R.50		TIP 17BP.13.R.50		COUNTY McDOWELL		GEOLOGIST DeLost, R							
SITE DESCRIPTION Bridge No. 52 on SR 1105 (Cherry Springs Road) Over Little Crooked Creek						GROUND WTR (ft)							
BORING NO. EB2-B		STATION N/A		OFFSET N/A		ALIGNMENT -L-							
COLLAR ELEV. 101.0 ft		TOTAL DEPTH 45.8 ft		NORTHING 680,820		EASTING 1,051,585							
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic							
DRILLER Woodard, F.		START DATE 06/24/12		COMP. DATE 06/24/12		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)
105													
100													101.0 GROUND SURFACE 0.0
95	96.7	4.3	WOH	WOH	1							W	ALLUVIAL Brown, gray & tan, v. soft, f. grain, micaceous, quartz, sandy clay w/topsoil (A-4).
90	91.7	9.3	2	2	1							Sat.	93.4 Gray, tan & white, v. loose, f. grain, sub-rounded, sorted, micaceous, clayey, quartz sand (A-2-7). 7.6
85	86.7	14.3	2	2	1							Sat.	86.4 RESIDUAL Tan, white & pink, soft, f. grain, micaceous, quartz, sandy clay (A-4). 14.6
80	81.7	19.3	3	5	4							W	83.4 Tan, pink, white & black, loose to v. dense, f. grain, micaceous, saprolitic quartz sand (A-2-6). 17.6
75	76.7	24.3	1	4	6							W	
70	71.7	29.3	4	9	13							D	
65	66.7	34.3	4	17	64							D	
60	61.7	39.3	23	43	57/0.4								60.7 40.3
	56.7	44.3	50	50/0.2									WEATHERED ROCK Weathered rock (Meta Gneiss/Pegmatite).
													55.2 45.8
													Boring Terminated by Auger Refusal at Elevation 55.2 ft on Crystalline Rock (Meta-Gneiss/Pegmatite).

NCDOT BORE SINGLE 058&000_GEO_BRDG0052_BORE.GPJ NC_DOT_GDT 7/18/12