

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C. | B-4609 | 1 | 14 |

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 38434.1.1 (B-4609) F.A. PROJ. BRZ-1163(6)
COUNTY Randolph
PROJECT DESCRIPTION Bridge No. 16 over Taylor Creek on SR 1163
(Union Church Rd.)

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CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF DESIGN, PLANNING AND DESIGN AND NOT FOR THE CONSTRUCTION OF ANY STRUCTURE. THE BUREAU FIELD BORELOG LOGS, ROCK LOGS, AND SOIL TEST DATA AVAILABLE MAY BE REVISED OR SUPPLEMENTED BY CONTACTING THE DIVISION OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1000 TRYON ST., RALEIGH, N.C. 27603. THE SUBSURFACE PLANS AND REPORTS, NOW THE FIELD BORELOG LOGS, ROCK LOGS, OR SOIL TEST DATA ARE 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 BOUNDS OR BETWEEN SAMPLED STRATA WITHIN THE BOUNDS. THE LABORATORY SAMPLE DATA AND THE IN SITU (UNSATURATED) DATA CAN BE USED ONLY TO THE EXTENT OF RELIABILITY INDICATED BY THE STANDARD TEST METHODS. THE UNDERGROUND WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS OBSERVED 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 METEOROLOGICAL FACTORS.

THE BIDDOR 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 LOGS/BORES FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE ACCURACY OR RELIABILITY OF THE INVESTIGATION DATA, NOR THE OPERATING RECORDS, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDOR OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO VERIFY WHETHER AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL MAKE HIS 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.

PROJECT: 38434.1.1 ID: B-4609

PERSONNEL

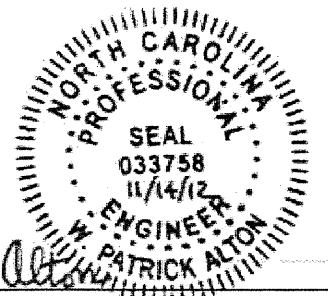
- K. Murphy
- J. Gilchrist
- M. Renza

INVESTIGATED BY F&R, Inc.

CHECKED BY P. Alton, P.E.

SUBMITTED BY F&R, Inc.

DATE 11/12



DRAWN BY: D. Racey

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 MAKING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIM FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

Patrick Alton

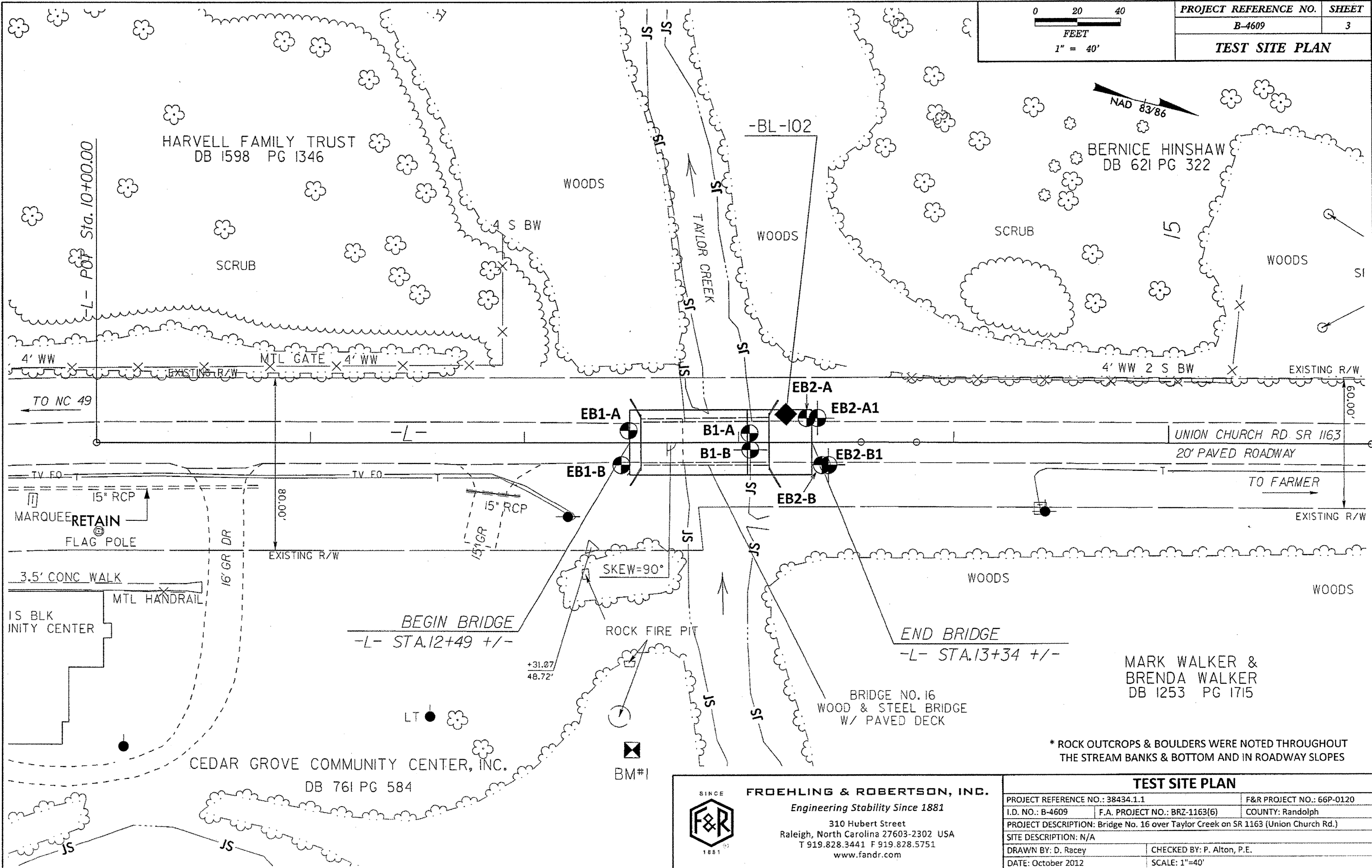
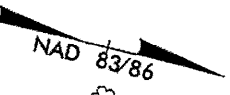
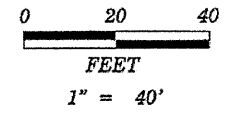
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

| | |
|---------------------------------|----------------|
| PROJECT REFERENCE NO. B-4609 | SHEET NO. 2 |
|---------------------------------|----------------|

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

| SOIL DESCRIPTION | GRADATION | ROCK DESCRIPTION | TERMS AND DEFINITIONS |
|--|---|--|--|
| 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 (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY, SILTY CLAY, WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6 | 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. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUND, OR ROUNDED. | 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: 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 PHYLITE, 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. | 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, 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 INTRODUCED 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 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. STRATA CORE RECOVERY (SCREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. |
| SOIL LEGEND AND AASHTO CLASSIFICATION | MINERALOGICAL COMPOSITION | WEATHERING | |
| GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS | MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. | 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. 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, YIELDS SPT N VALUES > 100 BPF. 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. IF TESTED, YIELDS 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. | |
| COMPRESSION | PERCENTAGE OF MATERIAL | GROUND WATER | |
| SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE | ORGANIC MATERIAL TRACE OF ORGANIC MATTER LITTLE ORGANIC MATTER MODERATELY ORGANIC HIGHLY ORGANIC | 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 | |
| COMPRESSIBILITY | GROUND WATER | MISCELLANEOUS SYMBOLS | |
| LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-62 LIQUID LIMIT GREATER THAN 62 | 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 | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES | TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD |
| TEXTURE OR GRAIN SIZE | ABBREVIATIONS | ROCK HARDNESS | |
| U.S. STD. SIEVE SIZE OPENING (MM) 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 e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS H - HIGHLY | 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 GROUVED 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 GROUVED 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. | |
| CONSISTENCY OR DENSENESS | EQUIPMENT USED ON SUBJECT PROJECT | FRACTURE SPACING | |
| PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-55 <input type="checkbox"/> PORTABLE HOIST | TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.36 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET | |
| GENERALY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE 4 TO 10 LOOSE 10 TO 30 MEDIUM DENSE 30 TO 50 DENSE 50 TO 100 VERY DENSE >100 | ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE <input type="checkbox"/> STEEL TEETH <input type="checkbox"/> TRICONE <input type="checkbox"/> TUNG-CARB. <input checked="" type="checkbox"/> CORE BIT | 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 | |
| GENERALY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT <2 SOFT 2 TO 4 MEDIUM STIFF 4 TO 8 STIFF 8 TO 15 VERY STIFF 15 TO 30 HARD >30 | HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> B <input checked="" type="checkbox"/> N 0.3 <input type="checkbox"/> H HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST | BEDDING | |
| GENERALY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT <2 SOFT 2 TO 4 MEDIUM STIFF 4 TO 8 STIFF 8 TO 15 VERY STIFF 15 TO 30 HARD >30 | 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. | |
| SOIL MOISTURE - CORRELATION OF TERMS | | | |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION | | | |
| LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT | - 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 | | | |
| NONPLASTIC 0-5 LOW PLASTICITY 6-15 MED. PLASTICITY 16-25 HIGH PLASTICITY 26 OR MORE | | | |
| 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. | | | |
| | | | NOTES: FIAD = FILLED IMMEDIATELY AFTER DRILLING N/M = NOT MEASURED |



* ROCK OUTCROPS & BOULDERS WERE NOTED THROUGHOUT THE STREAM BANKS & BOTTOM AND IN ROADWAY SLOPES

MARK WALKER &
BRENDA WALKER
DB 1253 PG 1715

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| TEST SITE PLAN | | |
|--|-------------------------------|------------------|
| PROJECT REFERENCE NO.: 38434.1.1 | F&R PROJECT NO.: 66P-0120 | |
| I.D. NO.: B-4609 | F.A. PROJECT NO.: BRZ-1163(6) | COUNTY: Randolph |
| PROJECT DESCRIPTION: Bridge No. 16 over Taylor Creek on SR 1163 (Union Church Rd.) | | |
| SITE DESCRIPTION: N/A | | |
| DRAWN BY: D. Racey | CHECKED BY: P. Alton, P.E. | |
| DATE: October 2012 | SCALE: 1"=40' | |



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

| | | | |
|--|---------------------|--------------------------|-------------------------|
| WBS 38434.1.1 | TIP B-4609 | COUNTY RANDOLPH | GEOLOGIST K. Murphy |
| SITE DESCRIPTION Bridge No. 16 over Taylor Creek on SR 1163 (Union Church Rd.) | | | GROUND WTR (ft) |
| BORING NO. EB1-A | STATION 12+49 | OFFSET 6 ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 548.5 ft | TOTAL DEPTH 18.6 ft | NORTHING 700,435 | EASTING 1,736,221 |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011 | | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic |
| DRILLER J. Gilchrist | START DATE 10/09/12 | COMP. DATE 10/09/12 | SURFACE WATER DEPTH N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) |
|-----------|-----------------|------------|------------|--------|-------|----------------|----|----|----|-----|-----------|-----|---|------------|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | |
| 550 | | | | | | | | | | | | | 548.5 GROUND SURFACE 0.0 | |
| | 547.8 | 0.7 | | | | | | | | | | | 547.5 ASPHALT (0.7') ABC STONE (0.3') | 1.0 |
| | | | 8 | 3 | 3 | | | | | | | | 546.5 ROADWAY EMBANKMENT Red-orange, silty CLAY (A-7-5). Red & brown, fine sandy SILT (A-4). | 2.0 |
| 545 | 545.0 | 3.5 | | | | | | | | | | | 541.5 Brown, silty CLAY (A-7-5), with trace organics. | 7.0 |
| | | | 6 | 5 | 6 | | | | | | | | 539.0 RESIDUAL Brown, fine sandy SILT (A-4). | 9.5 |
| 540 | 540.0 | 8.5 | | | | | | | | | | | 535.0 WEATHERED ROCK Tan, (FELSIC METAVOLCANIC ROCK). | 13.5 |
| | | | 2 | 1 | 4 | | | | | | | | 531.5 CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK) | 17.0 |
| 535 | 535.0 | 13.5 | 38 | 62/0.3 | | | | | | | | | 529.9 Boring Terminated with Standard Penetration Test Refusal at Elevation 529.9 ft in CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK) | 18.6 |
| | 532.3 | 16.2 | | | | | | | | | | | | |
| | | | 100/0.4 | | | | | | | | | | | |
| 530 | 530.0 | 18.5 | | | | | | | | | | | | |
| | | | 60/0.1 | | | | | | | | | | | |

NOTES:

- 1) Driller indicates harder drilling at a depth of 17.0'.
- 2) Boring Filled Immediately After Drilling (FIAD) due to boring location in road.
- 3) Original boring offset 5' north due to boulder encountered at 2.0'.

| | | | |
|--|---------------------|--------------------------|-------------------------|
| WBS 38434.1.1 | TIP B-4609 | COUNTY RANDOLPH | GEOLOGIST K. Murphy |
| SITE DESCRIPTION Bridge No. 16 over Taylor Creek on SR 1163 (Union Church Rd.) | | | GROUND WTR (ft) |
| BORING NO. EB1-B | STATION 12+45 | OFFSET 10 ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 547.8 ft | TOTAL DEPTH 16.0 ft | NORTHING 700,436 | EASTING 1,736,237 |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011 | | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic |
| DRILLER J. Gilchrist | START DATE 10/09/12 | COMP. DATE 10/09/12 | SURFACE WATER DEPTH N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) |
|-----------|-----------------|------------|------------|-------|--------|----------------|----|----|----|-----|-----------|-----|---|------------|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | |
| 550 | | | | | | | | | | | | | 547.8 GROUND SURFACE 0.0 | |
| | 547.8 | 0.0 | | | | | | | | | | | 545.8 ROADWAY EMBANKMENT Brown-orange, silty CLAY (A-7-5), with some fine to coarse sand. | 2.0 |
| | | | 1 | 1 | 2 | | | | | | | | 540.8 RESIDUAL Orange, fine sandy SILT (A-4), with some gravel-sized rock fragments from 11.4'-12.9'. | 7.0 |
| 545 | 544.3 | 3.5 | | | | | | | | | | | 534.3 WEATHERED ROCK Gray & brown, (FELSIC METAVOLCANIC ROCK). | 14.0 |
| | | | 5 | 5 | 5 | | | | | | | | | |
| 540 | 539.3 | 8.5 | | | | | | | | | | | | |
| | | | 5 | 5 | 7 | | | | | | | | | |
| | 536.4 | 11.4 | | | | | | | | | | | | |
| | | | 31 | 26 | 27 | | | | | | | | | |
| 535 | 534.3 | 13.5 | | | | | | | | | | | | |
| | | | 27 | 67 | 33/0.2 | | | | | | | | | |
| | 531.8 | 16.0 | | | | | | | | | | | | |
| | | | 60/0.0 | | | | | | | | | | | |

NOTES:

- 1) 0.0-0.1' = Surficial Organic Soils
- 2) Driller indicates harder drilling at a depth of 10.0'.
- 3) Driller indicates softer drilling at a depth of 12.5'.

NCDOT BORE DOUBLE B4609_GEO_BORELOGS_0016.GPJ NC_DOT_GDT 11/13/12



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

| WBS 38434.1.1 | | TIP B-4609 | | COUNTY RANDOLPH | | GEOLOGIST K. Murphy | | | | | | | | | | |
|--|-----------------|---------------------|------------|-------------------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|------|---|
| SITE DESCRIPTION Bridge No. 16 over Taylor Creek on SR 1163 (Union Church Rd.) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. B1-A | | STATION 13+05 | | OFFSET 4 ft LT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 537.9 ft | | TOTAL DEPTH 24.6 ft | | NORTHING 700,490 | | EASTING 1,736,209 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011 | | | | DRILL METHOD NW Casing w/ SPT | | HAMMER TYPE Automatic | | | | | | | | | | |
| DRILLER J. Gilchrist | | START DATE 10/15/12 | | COMP. DATE 10/16/12 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | ELEV. (ft) | DEPTH (ft) | | |
| 540 | | | | | | | | | | | | | | | | |
| | 537.9 | 0.0 | 1 | 1 | 21 | | | | | | | | | 537.9 | 0.0 | GROUND SURFACE |
| | | | | | | | | | | | | | | | | |
| 535 | 533.4 | 4.5 | 100/0.5 | | | | | | | | | | | 533.4 | 4.5 | ALLUVIAL Brown, silty CLAY (A-7-5), with trace gravel & organics (rootlets). |
| | | | | | | | | | | | | | | | | |
| 530 | 528.4 | 9.5 | 11 | 15 | 16 | | | | | | | | | 530.4 | 7.5 | WEATHERED ROCK Gray, (FELSIC METAVOLCANIC ROCK). |
| | | | | | | | | | | | | | | | | |
| 525 | 523.4 | 14.5 | 29 | 27 | 12 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 520 | 518.4 | 19.5 | 100/0.3 | | | | | | | | | | | 518.4 | 19.5 | RESIDUAL Gray & green to tan, silty fine to coarse SAND (A-2-4), with some gravel-sized rock fragments from 9.5'-11.0', saprolitic at 14.5'. |
| | | | | | | | | | | | | | | | | |
| 515 | 513.4 | 24.5 | 60/0.1 | | | | | | | | | | | 513.4 | 24.5 | WEATHERED ROCK Gray, (FELSIC METAVOLCANIC ROCK). |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 513.3 | 24.5 | CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK) Boring Terminated with Standard Penetration Test Refusal at Elevation 513.3 ft in CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK) |

NCDOT BORE SINGLE B4609 GEO_BORELOGS_0016.GPJ NC_DOT_GDT 11/13/12

NOTES:
1) Driller indicates softer drilling at depths of 3.5'-4.5' and 7.5'-9.5'.
2) Driller indicates harder drilling at a depth of 14.0'.



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

| WBS 38434.1.1 | | TIP B-4609 | | COUNTY RANDOLPH | | GEOLOGIST K. Murphy | | | | | |
|--|-----------------|-------------------------------------|------------|-----------------------|-------|-------------------------|-----------------|-----------|-----|--|------------|
| SITE DESCRIPTION Bridge No. 16 over Taylor Creek on SR 1163 (Union Church Rd.) | | | | | | | GROUND WTR (ft) | | | | |
| BORING NO. B1-B | | STATION 13+05 | | OFFSET 3 ft RT | | ALIGNMENT -L- | | | | | |
| COLLAR ELEV. 537.7 ft | | TOTAL DEPTH 28.4 ft | | NORTHING 700,492 | | EASTING 1,736,216 | | | | | |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011 | | DRILL METHOD NW Casing W/SPT & Core | | HAMMER TYPE Automatic | | | | | | | |
| DRILLER J. Gilchrist | | START DATE 10/11/12 | | COMP. DATE 10/11/12 | | SURFACE WATER DEPTH N/A | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | | | | |
| 540 | | | | | | | | | | | |
| | 537.7 | 0.0 | 3 | 1 | 16 | | | | W | GROUND SURFACE | 0.0 |
| | | | | | | | | | | ALLUVIAL Brown, fine sandy SILT (A-4), with trace clay. | |
| | 534.7 | 3.0 | | | | | | | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 3.0 |
| | | | | | | | | | | CRYSTALLINE ROCK Gray, (FELSIC METAVOLCANIC ROCK) | 5.2 |
| | | | | | | | | | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 6.4 |
| | | | | | | | | | | CRYSTALLINE ROCK Gray, (FELSIC METAVOLCANIC ROCK) | 8.3 |
| | | | | | | | | | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | |
| | 526.0 | 11.7 | 14 | 86 | 0.1 | | | | | CRYSTALLINE ROCK Gray, (FELSIC METAVOLCANIC ROCK) | 12.3 |
| | | | | | | | | | | CRYSTALLINE ROCK Gray, (FELSIC METAVOLCANIC ROCK) | 13.0 |
| | | | | | | | | | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 14.8 |
| | | | | | | | | | | CRYSTALLINE ROCK Gray, (FELSIC METAVOLCANIC ROCK) | 15.3 |
| | | | | | | | | | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 16.5 |
| | | | | | | | | | | CRYSTALLINE ROCK Gray, (FELSIC METAVOLCANIC ROCK) | 17.1 |
| | | | | | | | | | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 18.3 |
| | | | | | | | | | | CRYSTALLINE ROCK Gray, (FELSIC METAVOLCANIC ROCK) | 20.9 |
| | | | | | | | | | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 21.5 |
| | | | | | | | | | | CRYSTALLINE ROCK Gray, (FELSIC METAVOLCANIC ROCK) | 27.8 |
| | | | | | | | | | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 28.4 |
| | 511.2 | 28.5 | 11 | 28 | 72 | 0.3 | | | | CRYSTALLINE ROCK Gray, (FELSIC METAVOLCANIC ROCK) | 28.4 |
| | | | | | | | | | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | |
| | | | | | | | | | | CRYSTALLINE ROCK Gray, (FELSIC METAVOLCANIC ROCK) | 27.8 |
| | | | | | | | | | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 28.4 |
| NOTES: 1) Began coring at a depth of 3.4'. | | | | | | | | | | | |

NCDOT BORE SINGLE B4609_GEO_BORELOGS_0018.GPJ NC_DOT_GDT 11/14/12



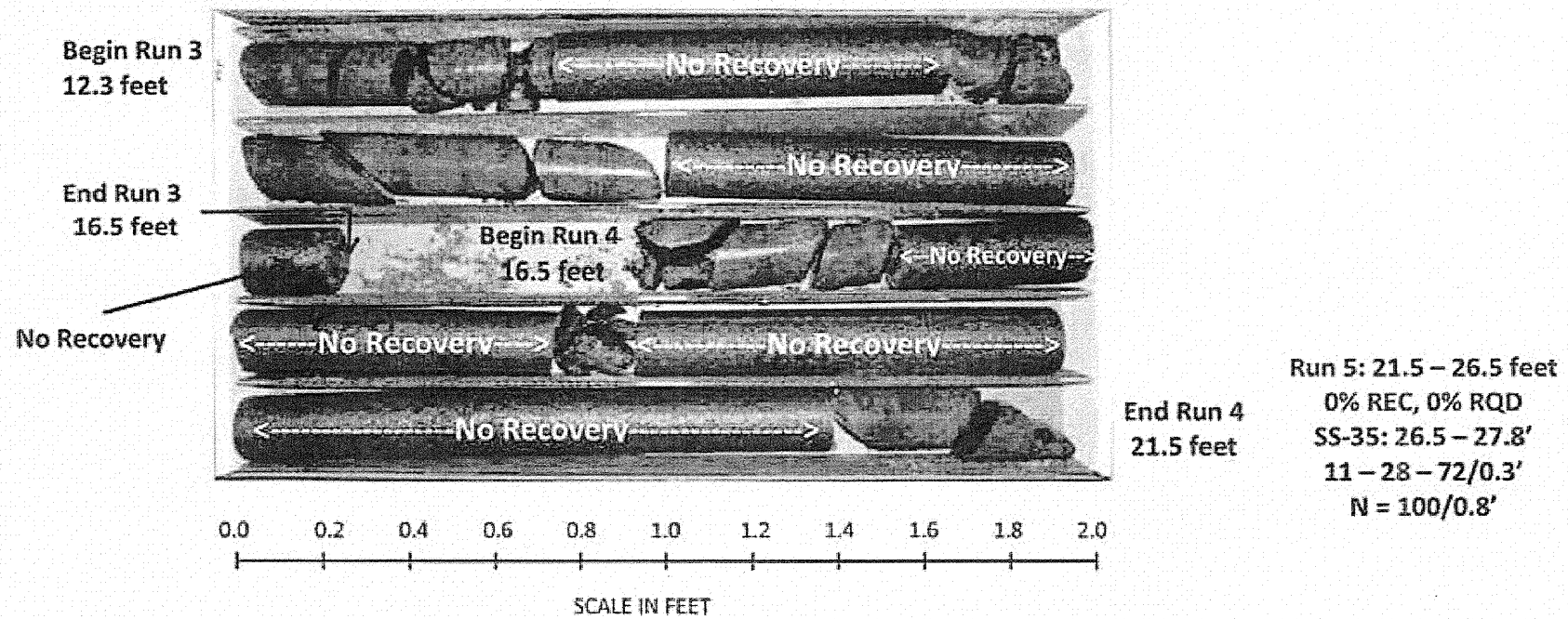
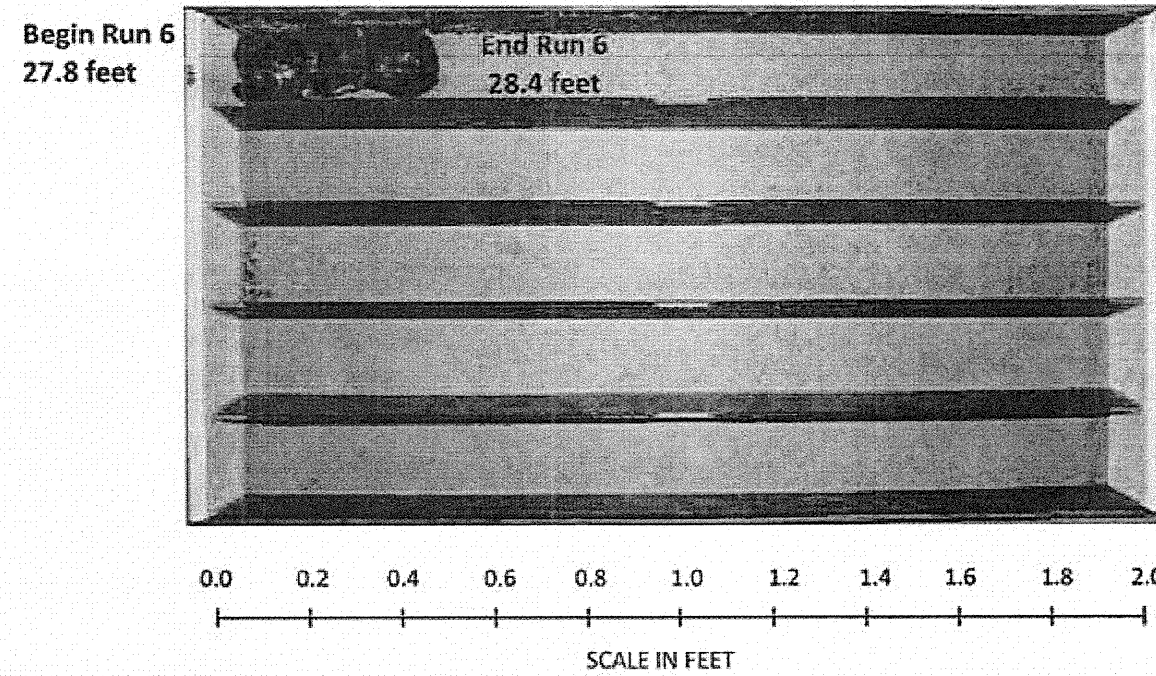
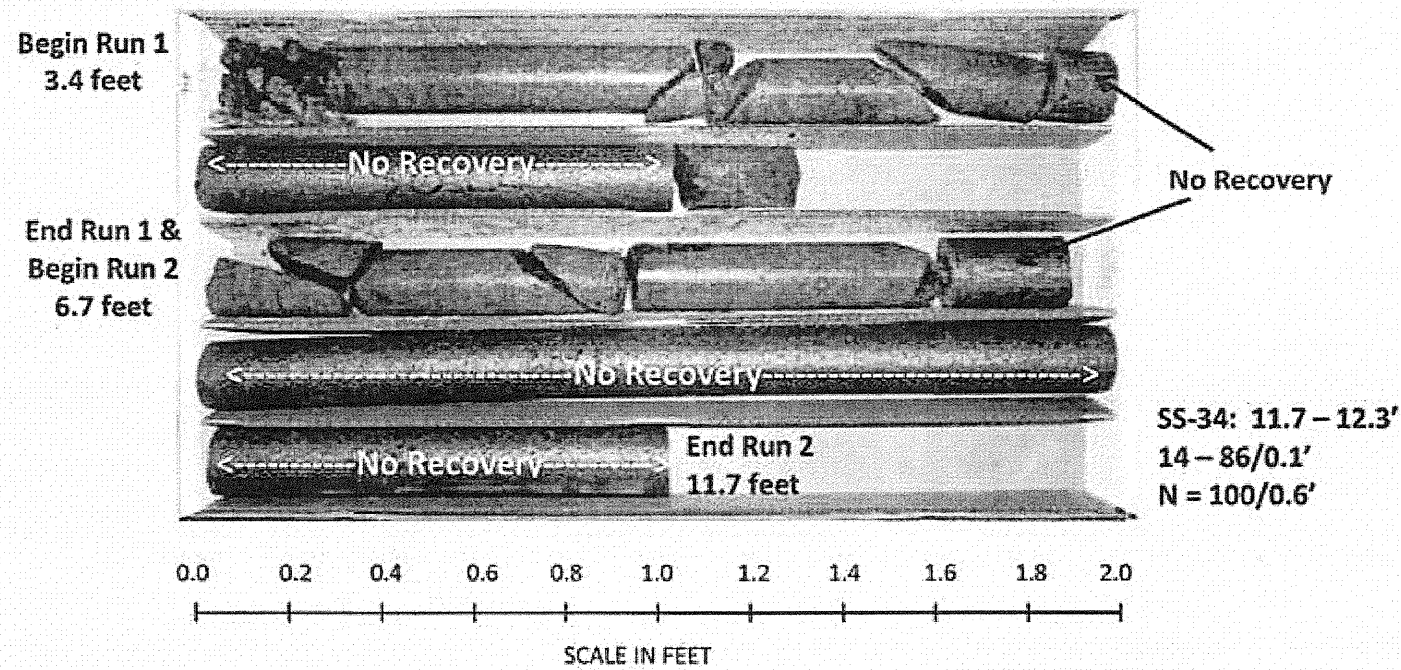
NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

| WBS 38434.1.1 | | TIP B-4609 | | COUNTY RANDOLPH | | GEOLOGIST K. Murphy | | | | | | |
|---|---------------|-------------------------------------|----------|-----------------------|---------|-------------------------|-----------------|---------|---------|-----|---|------------|
| SITE DESCRIPTION Bridge No. 16 over Taylor Creek on SR 1163 (Union Church Rd.) | | | | | | | GROUND WTR (ft) | | | | | |
| BORING NO. B1-B | | STATION 13+05 | | OFFSET 3 ft RT | | ALIGNMENT -L- | | | | | | |
| COLLAR ELEV. 537.7 ft | | TOTAL DEPTH 28.4 ft | | NORTHING 700,492 | | EASTING 1,736,216 | | | | | | |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011 | | DRILL METHOD NW Casing W/SPT & Core | | HAMMER TYPE Automatic | | | | | | | | |
| DRILLER J. Gilchrist | | START DATE 10/11/12 | | COMP. DATE 10/11/12 | | SURFACE WATER DEPTH N/A | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | SAMP. NO. | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
| | | | | | REC (%) | ROD (%) | | REC (%) | ROD (%) | | | |
| CORE SIZE NQ3 TOTAL RUN 23.1 ft | | | | | | | | | | | | |
| 584.3 | | | | | | | | | | | | |
| | 534.3 | 3.4 | 3.3 | 2:38/1.0 | (2.1) | (1.2) | | (1.8) | (1.2) | | Begin Coring @ 3.4 ft | 3.4 |
| | | | | 1:41/1.0 | 84% | 36% | | 100% | 87% | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), very close to close fracture spacing. | 5.2 |
| | | | | 1:11/1.0 | | | | (0.0) | (0.0) | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 6.4 |
| | 531.0 | 6.7 | 5.0 | 1:00/0.3 | (1.8) | (1.1) | | (1.9) | (1.1) | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), close fracture spacing. | 8.3 |
| | | | | 1:59/1.0 | 32% | 22% | | 100% | 58% | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | |
| | | | | 1:56/1.0 | | | | (0.0) | (0.0) | | CRYSTALLINE ROCK Gray, (FELSIC METAVOLCANIC ROCK) | 12.3 |
| | | | | 0:30/1.0 | | | | 0% | 0% | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 13.0 |
| | | | | 0:41/1.0 | | | | (0.0) | (0.0) | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), very close to close fracture spacing. | 14.0 |
| | | | | 1:00/1.0 | | | | (0.0) | (0.0) | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 15.3 |
| | | | | 1:35/1.0 | (2.0) | (0.4) | | (0.7) | (0.0) | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), very close to close fracture spacing. | 16.5 |
| | | | | 1:58/1.0 | 48% | 10% | | 100% | 0% | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 17.1 |
| | | | | 2:00/1.0 | | | | (0.0) | (0.0) | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), close fracture spacing. | 18.3 |
| | | | | 1:00/1.0 | | | | (1.3) | (0.4) | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 20.9 |
| | | | | 0:13/0.2 | (1.3) | (0.0) | | (0.0) | (0.0) | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), very close fracture spacing. | 21.5 |
| | | | | 1:23/1.0 | 28% | 0% | | 100% | 0% | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 27.8 |
| | | | | 1:42/1.0 | | | | (0.6) | (0.0) | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), very close fracture spacing. | 28.4 |
| | | | | 1:29/1.0 | | | | (0.0) | (0.0) | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | |
| | | | | 2:16/1.0 | | | | (0.1) | (0.0) | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), very close fracture spacing. | 20.9 |
| | | | | 1:50/1.0 | | | | (0.0) | (0.0) | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 21.5 |
| | | | | 1:08/1.0 | (0.0) | (0.0) | | (0.6) | (0.0) | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), very close fracture spacing. | 27.8 |
| | | | | 1:02/1.0 | 0% | 0% | | 100% | 0% | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 28.4 |
| | | | | 1:09/1.0 | | | | (0.0) | (0.0) | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), very close fracture spacing. | |
| | | | | 0:43/1.0 | | | | (0.0) | (0.0) | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | |
| | | | | W=100/0.8 | | | | (0.6) | (0.0) | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), very close fracture spacing. | 27.8 |
| | | | | 10:12/0.6 | (0.6) | (0.0) | | 100% | 0% | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | 28.4 |
| | 509.9 | 27.8 | 0.6 | | | | | (0.6) | (0.0) | | CRYSTALLINE ROCK Gray, mod. to sil. weath., mod. hard (FELSIC METAVOLCANIC ROCK), very close fracture spacing. | 28.4 |
| | | | | | | | | 100% | 0% | | WEATHERED ROCK (FELSIC METAVOLCANIC ROCK) | |
| NOTES: 1) Began coring at a depth of 3.4'. Boring Terminated at Elevation 509.3 ft in CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK) | | | | | | | | | | | | |

NCDOT BORE SINGLE B4609_GEO_BORELOGS_0018.GPJ NC_DOT_GDT 11/14/12



CORE PHOTOGRAPHS: Bridge No. 16 on SR 1163 (Union Church Road) over Taylor Creek, B1-B: Station 13+05, 3' Rt





NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

| | | | |
|--|--------------------|--------------------------|-------------------------|
| WBS 38434.1.1 | TIP B-4609 | COUNTY RANDOLPH | GEOLOGIST K. Murphy |
| SITE DESCRIPTION Bridge No. 16 over Taylor Creek on SR 1163 (Union Church Rd.) | | | GROUND WTR (ft) |
| BORING NO. EB2-A | STATION 13+32 | OFFSET 11 ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 553.0 ft | TOTAL DEPTH 9.0 ft | NORTHING 700,514 | EASTING 1,736,196 |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011 | | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic |
| DRILLER J. Gilchrist | | START DATE 10/09/12 | COMP. DATE 10/09/12 |
| | | | SURFACE WATER DEPTH N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | L O G | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|-------|---------------------------|------------|----------------|---|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | | |
| 555 | | | | | | | | | | | | | | | | | |
| 553.0 | 553.0 | 0.0 | 1 | 3 | 7 | | | | | | | | | | 553.0 | GROUND SURFACE | |
| | | | | | | 10 | | | | | | | | | | | ROADWAY EMBANKMENT Brown, fine to coarse sandy SILT (A-4). |
| 550 | | | | | | | | | | | | | | | 551.0 | 2.0 | Brown, silty CLAY (A-7-5). |
| 549.5 | 549.5 | 3.5 | 3 | 3 | 4 | | | | | | | | | | | | |
| 545 | | | | | | | | | | | | | | | 548.0 | 5.0 | WEATHERED ROCK Gray, (FELSIC METAVOLCANIC ROCK). |
| 544.5 | 544.5 | 8.5 | 100 | 0.2 | | | | | | | | | | | 544.1 | 8.9 | |
| | 544.1 | 8.9 | 60 | 0.1 | | | | | | | | | | | 544.0 | 9.0 | CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK) Boring Terminated with Standard Penetration Test Refusal at Elevation 544.0 ft in CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK) |

NOTES:

- 1) 0.0-0.1' = Surficial Organic Soils
- 2) Driller indicates harder drilling at a depth of 5.0'.
- 3) Original boring offset 5' north due to boulder encountered at 5.0'.

NCDOT BORE SINGLE B-4609 GEO_BORELOGS_0016.GPJ NC_DOT.GDT 11/13/12

| WBS 38434.1.1 | | TIP B-4609 | | COUNTY RANDOLPH | | GEOLOGIST K. Murphy | | | | | | | | | | |
|--|-----------------|---------------------|------------|-------------------------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|--|------|
| SITE DESCRIPTION Bridge No. 16 over Taylor Creek on SR 1163 (Union Church Rd.) | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. | STATION | OFFSET | ALIGNMENT | | | 0 HR. | Dry | | | | | | | | | |
| EB2-A1 | 13+37 | 11 ft LT | -L- | | | 24 HR. | FIAD | | | | | | | | | |
| COLLAR ELEV. | TOTAL DEPTH | NORTHING | EASTING | | | | | | | | | | | | | |
| 553.0 ft | 25.6 ft | 700,519 | 1,736,195 | | | | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011 | | | | DRILL METHOD NW Casing W/SPT & Core | | HAMMER TYPE Automatic | | | | | | | | | | |
| DRILLER J. Gilchrist | | START DATE 10/10/12 | | COMP. DATE 10/10/12 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 555 | | | | | | | | | | | | | | | | |
| 553.0 | 0.0 | 0.0 | 1 | 2 | 6 | | | | | | | | | 553.0 | GROUND SURFACE | 0.0 |
| | | | | | | | | | | | | | | | ROADWAY EMBANKMENT | |
| | | | | | | | | | | | | | | | Brown to tan, fine to coarse sandy SILT (A-4). | |
| 550 | 549.5 | 3.5 | 4 | 5 | 5 | | | | | | | | | 550.0 | Brown, silty CLAY (A-7-5), with some fine to coarse sand. | 3.0 |
| | | | | | | | | | | | | | | 547.5 | RESIDUAL | 5.5 |
| | | | | | | | | | | | | | | | Tan & brown, fine sandy SILT (A-4), with a layer of rock fragments from 6.9'-7.2'. | |
| 545 | 546.1 | 6.9 | 7.5 | 11 | 15 | | | | | | | | | | | |
| | 544.5 | 8.5 | 6 | 8 | 10 | | | | | | | | | | | |
| | 541.8 | 11.2 | | | | | | | | | | | | | | |
| | 541.3 | 11.7 | 100/0.4 | | | | | | | | | | | | | |
| | | | 60/0.1 | | | | | | | | | | | | | |
| 540 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | WEATHERED ROCK | 11.2 |
| | | | | | | | | | | | | | | | (FELSIC METAVOLCANIC ROCK) | 11.7 |
| | | | | | | | | | | | | | | | CRYSTALLINE ROCK | 11.8 |
| | | | | | | | | | | | | | | | Gray, (FELSIC METAVOLCANIC ROCK) | 13.1 |
| | | | | | | | | | | | | | | | WEATHERED ROCK | 14.5 |
| | | | | | | | | | | | | | | | (FELSIC METAVOLCANIC ROCK) | 14.5 |
| | | | | | | | | | | | | | | | CRYSTALLINE ROCK | 16.9 |
| | | | | | | | | | | | | | | | Gray, (FELSIC METAVOLCANIC ROCK) | 16.9 |
| | | | | | | | | | | | | | | | WEATHERED ROCK | 17.6 |
| | | | | | | | | | | | | | | | (FELSIC METAVOLCANIC ROCK) | 17.6 |
| | | | | | | | | | | | | | | | CRYSTALLINE ROCK | 18.4 |
| | | | | | | | | | | | | | | | Gray, (FELSIC METAVOLCANIC ROCK) | 18.4 |
| | | | | | | | | | | | | | | | WEATHERED ROCK | 18.8 |
| | | | | | | | | | | | | | | | (FELSIC METAVOLCANIC ROCK) | 18.8 |
| | | | | | | | | | | | | | | | CRYSTALLINE ROCK | 19.3 |
| | | | | | | | | | | | | | | | Gray, mod. to sil. weath., mod. hard to hard (FELSIC METAVOLCANIC ROCK), very close fracture spacing. | 19.3 |
| | | | | | | | | | | | | | | | WEATHERED ROCK | 22.6 |
| | | | | | | | | | | | | | | | (FELSIC METAVOLCANIC ROCK) | 22.6 |
| | | | | | | | | | | | | | | | CRYSTALLINE ROCK | 23.2 |
| | | | | | | | | | | | | | | | Gray, mod. to sil. weath., mod. hard to hard (FELSIC METAVOLCANIC ROCK), very close fracture spacing. | 23.2 |
| | | | | | | | | | | | | | | | WEATHERED ROCK | 25.6 |
| | | | | | | | | | | | | | | | (FELSIC METAVOLCANIC ROCK) | 25.6 |
| | | | | | | | | | | | | | | | CRYSTALLINE ROCK | |
| | | | | | | | | | | | | | | | Gray, mod. to sil. weath., mod. hard to hard (FELSIC METAVOLCANIC ROCK), very close to close fracture spacing. | |
| | | | | | | | | | | | | | | | Boring Terminated at Elevation 527.4 ft in CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK) | |

NOTES:
 1) 0.0-0.1' = Surficial Organic Soils
 2) Driller indicates harder drilling at a depth of 5.5'.
 3) Auger refusal at a depth of 11.7', began coring at a depth of 11.8'.

NCDOT BORE SINGLE B4609 GEO BORELOGS 0016 OF 1 NC DOT.GBT 11/14/12

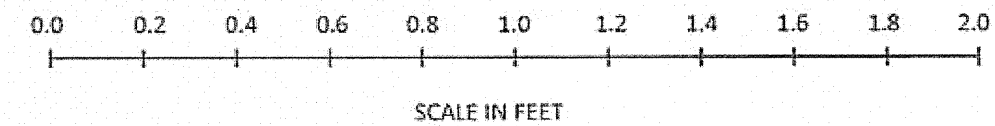
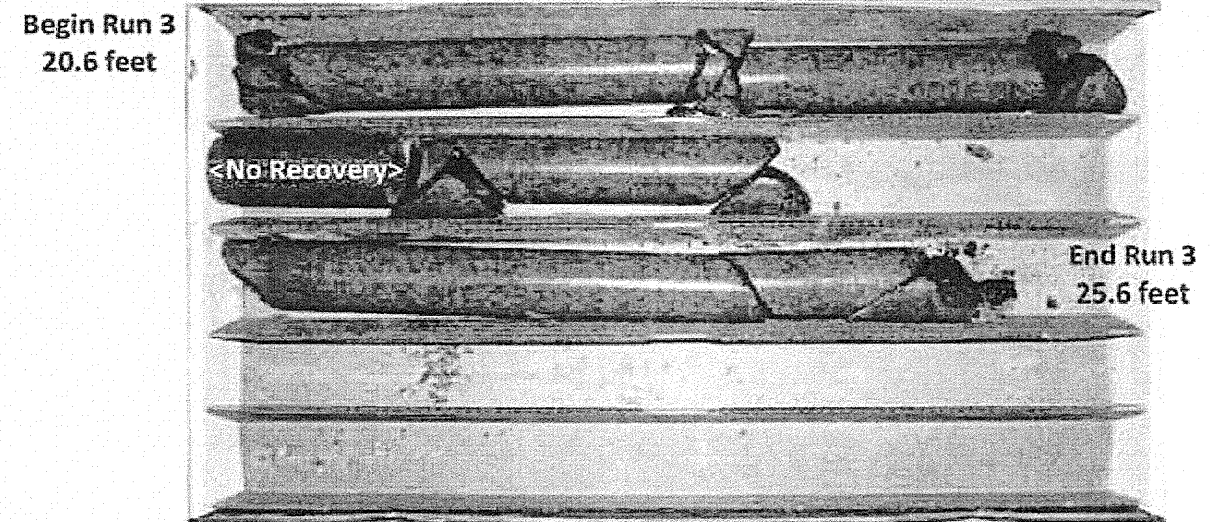
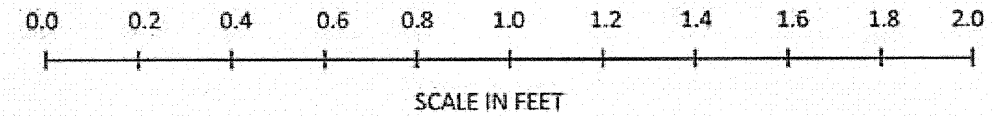
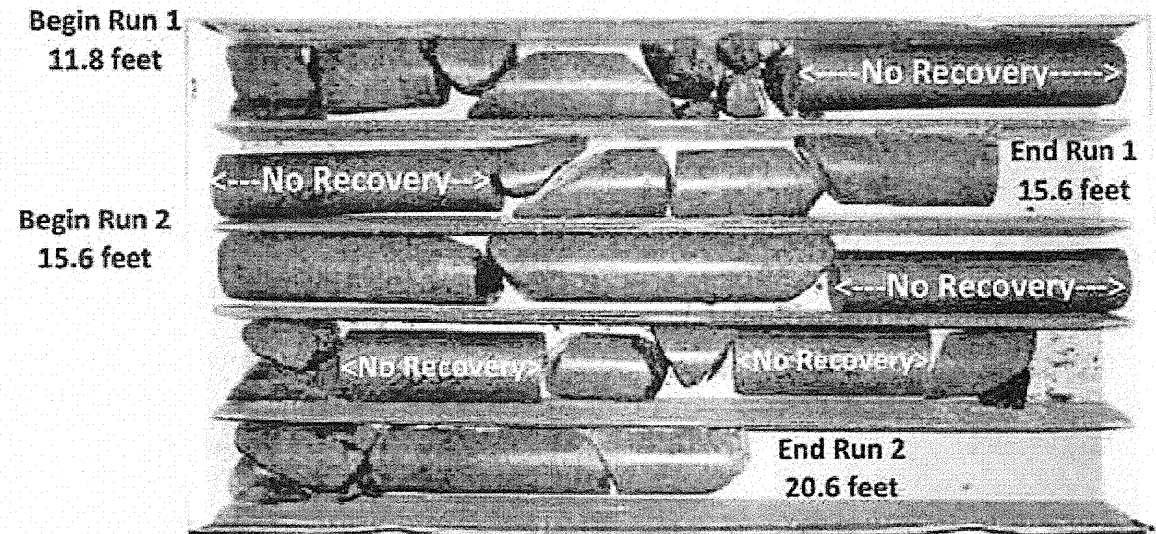
| WBS 38434.1.1 | | TIP B-4609 | | COUNTY RANDOLPH | | GEOLOGIST K. Murphy | | | | | | |
|--|---------------|---------------------|-----------|-------------------------------------|----------|-------------------------|-----------------|----------|---------|-----|--|------------|
| SITE DESCRIPTION Bridge No. 16 over Taylor Creek on SR 1163 (Union Church Rd.) | | | | | | | GROUND WTR (ft) | | | | | |
| BORING NO. | STATION | OFFSET | ALIGNMENT | | | 0 HR. | Dry | | | | | |
| EB2-A1 | 13+37 | 11 ft LT | -L- | | | 24 HR. | FIAD | | | | | |
| COLLAR ELEV. | TOTAL DEPTH | NORTHING | EASTING | | | | | | | | | |
| 553.0 ft | 25.6 ft | 700,519 | 1,736,195 | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011 | | | | DRILL METHOD NW Casing W/SPT & Core | | HAMMER TYPE Automatic | | | | | | |
| DRILLER J. Gilchrist | | START DATE 10/10/12 | | COMP. DATE 10/10/12 | | SURFACE WATER DEPTH N/A | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | SAMP. NO. | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
| | | | | | REC. (%) | RQD (%) | | REC. (%) | RQD (%) | | | |
| 541.2 | 541.2 | 11.8 | 3.8 | 1:48/1.0 | (2.3) | (0.4) | | (1.3) | (0.0) | | Begin Coring @ 11.8 ft | 11.8 |
| 540 | | | | 1:28/1.0 | 61% | 11% | | 100% | 0% | | CRYSTALLINE ROCK | 13.1 |
| | | | | 2:52/1.0 | | | | (0.0) | (0.0) | | Gray, mod. to sil. weath., mod. hard to hard (FELSIC METAVOLCANIC ROCK), very close to close fracture spacing. | 13.1 |
| | | | | 4:27/0.8 | | | | (2.4) | (1.7) | | WEATHERED ROCK | 14.5 |
| | | | | 1:28/1.0 | (3.3) | (1.6) | | 100% | 71% | | CRYSTALLINE ROCK | 16.9 |
| | | | | 1:52/1.0 | | | | (0.0) | (0.0) | | Gray, mod. to sil. weath., mod. hard to hard (FELSIC METAVOLCANIC ROCK), close fracture spacing. | 16.9 |
| | | | | 1:46/1.0 | | | | (0.0) | (0.0) | | WEATHERED ROCK | 17.6 |
| | | | | 2:08/1.0 | | | | (0.3) | (0.0) | | (FELSIC METAVOLCANIC ROCK) | 17.6 |
| | | | | 2:40/1.0 | | | | 100% | 0% | | CRYSTALLINE ROCK | 18.4 |
| | | | | 2:17/1.0 | (4.4) | (3.1) | | (0.0) | (0.0) | | Gray, mod. to sil. weath., mod. hard to hard (FELSIC METAVOLCANIC ROCK), very close fracture spacing. | 18.4 |
| | | | | 2:05/1.0 | 88% | 62% | | (0.0) | (0.0) | | WEATHERED ROCK | 18.8 |
| | | | | 3:30/1.0 | | | | (0.4) | (0.0) | | (FELSIC METAVOLCANIC ROCK) | 18.8 |
| | | | | 2:00/1.0 | | | | (0.0) | (0.0) | | CRYSTALLINE ROCK | 19.3 |
| | | | | 2:03/1.0 | | | | (0.0) | (0.0) | | Gray, mod. to sil. weath., mod. hard to hard (FELSIC METAVOLCANIC ROCK), very close to close fracture spacing. | 19.3 |
| | | | | | | | | (3.2) | (1.9) | | WEATHERED ROCK | 22.6 |
| | | | | | | | | 87% | 58% | | (FELSIC METAVOLCANIC ROCK) | 22.6 |
| | | | | | | | | (0.0) | (0.0) | | CRYSTALLINE ROCK | 23.2 |
| | | | | | | | | (0.0) | (0.0) | | Gray, mod. to sil. weath., mod. hard to hard (FELSIC METAVOLCANIC ROCK), very close to close fracture spacing. | 23.2 |
| | | | | | | | | (2.4) | (1.5) | | WEATHERED ROCK | 25.6 |
| | | | | | | | | 100% | 63% | | (FELSIC METAVOLCANIC ROCK) | 25.6 |
| | | | | | | | | | | | CRYSTALLINE ROCK | |
| | | | | | | | | | | | Gray, mod. to sil. weath., mod. hard to hard (FELSIC METAVOLCANIC ROCK), very close to close fracture spacing. | |
| | | | | | | | | | | | Boring Terminated at Elevation 527.4 ft in CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK) | |

NOTES:
 1) 0.0-0.1' = Surficial Organic Soils
 2) Driller indicates harder drilling at a depth of 5.5'.
 3) Auger refusal at a depth of 11.7', began coring at a depth of 11.8'.

NCDOT BORE SINGLE B4609 GEO BORELOGS 0016 OF 1 NC DOT.GBT 11/14/12



CORE PHOTOGRAPHS: Bridge No. 16 on SR 1163 (Union Church Road) over Taylor Creek, EB2-A1: Station 13+37, 11' Lt





NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

| | | | |
|--|---------------------|--------------------------|-------------------------|
| WBS 38434.1.1 | TIP B-4609 | COUNTY RANDOLPH | GEOLOGIST K. Murphy |
| SITE DESCRIPTION Bridge No. 16 over Taylor Creek on SR 1163 (Union Church Rd.) | | | GROUND WTR (ft) |
| BORING NO. EB2-B | STATION 13+39 | OFFSET 11 ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 553.1 ft | TOTAL DEPTH 11.0 ft | NORTHING 700,526 | EASTING 1,736,215 |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 83% 12/15/2011 | | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic |
| DRILLER J. Gilchrist | START DATE 10/09/12 | COMP. DATE 10/09/12 | SURFACE WATER DEPTH N/A |

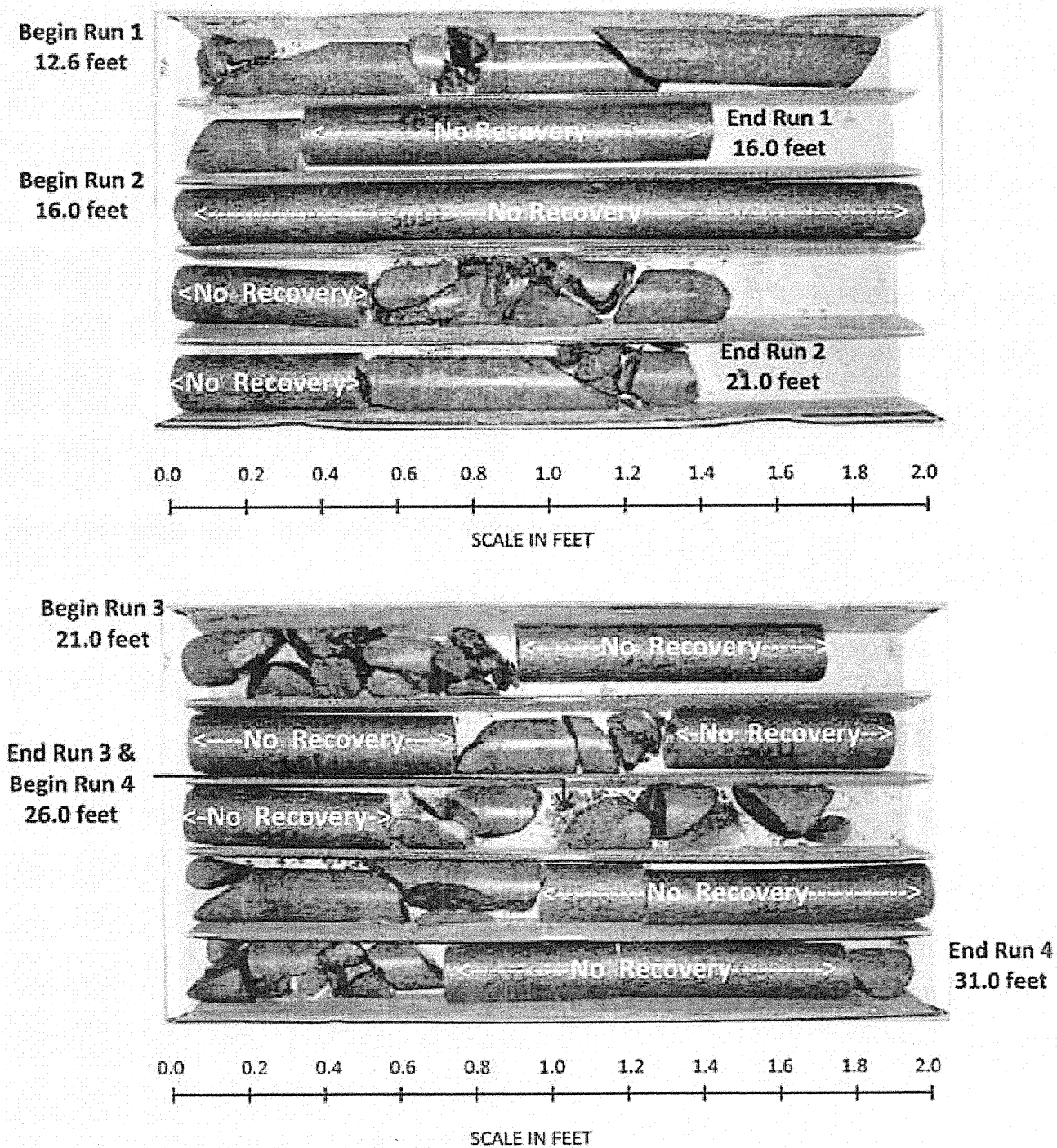
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|--------|-------|----------------|----|----|----|-----|-----------|-----|---------------------------|------------|---|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 555 | | | | | | | | | | | | | | | |
| | 553.1 | 0.0 | | | | | | | | | | | | 553.1 | GROUND SURFACE |
| | | | 1 | 1 | 3 | | | | | | | | W | 551.1 | ROADWAY EMBANKMENT Brown, silty CLAY (A-7-5). |
| | | | | | | | | | | | | | | 2.0 | Tan & brown, fine sandy SILT (A-4). |
| 550 | 549.6 | 3.5 | 3 | 4 | 6 | | | | | | | | M | | |
| | | | | | | | | | | | | | | | |
| 545 | 544.6 | 8.5 | 47 | 53/0.4 | | | | | | | | | | 8.5 | WEATHERED ROCK Brown & gray, (FELSIC METAVOLCANIC ROCK). |
| | | | | | | | | | | | | | | | |
| | 542.6 | 10.5 | | | | | | | | | | | | | |
| | 542.1 | 11.0 | 100/0.3 | | | | | | | | | | | 11.0 | Boring Terminated with Standard Penetration Test Refusal at Elevation 542.1 ft on CRYSTALLINE ROCK (FELSIC METAVOLCANIC ROCK) |
| | | | 60/0.0 | | | | | | | | | | | | |

NOTES:
1) 0.0-0.2' = Surficial Organic Soils

NCDOT BORE SINGLE B4609_GEO_BORELOGS_D016.GPJ NC_DOT.GDT 11/13/12



CORE PHOTOGRAPHS: Bridge No. 16 on SR 1163 (Union Church Road) over Taylor Creek, EB2-B1: Station 13+42, 11' Rt

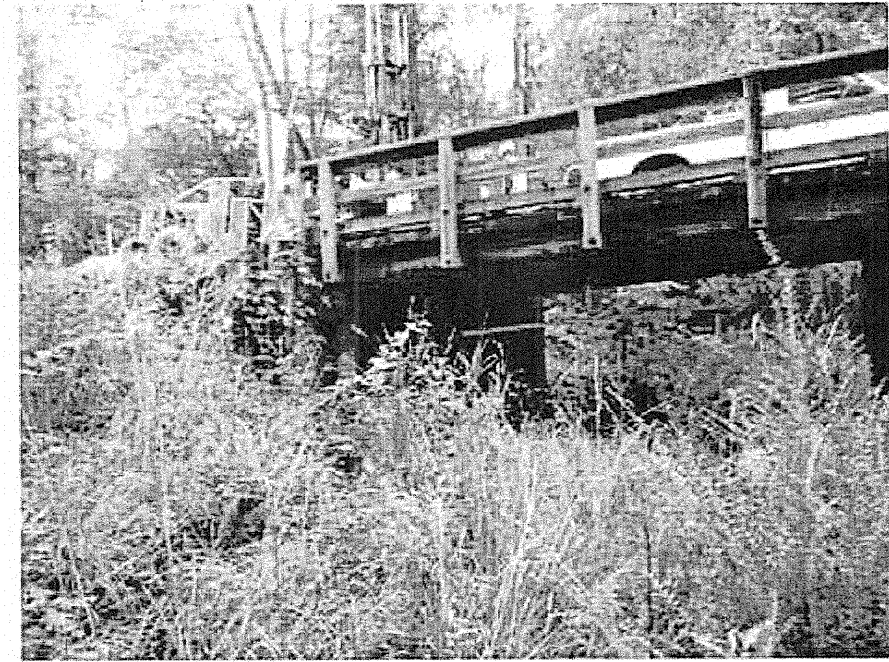




Bridge No. 16 over Taylor's Creek on SR 1163 (Union Church Rd.)
SITE PHOTOGRAPHS



Photograph No. 1: General view of the bridge site looking west



Photograph No. 3: View looking southwest towards existing End Bent 1



Photograph No. 2: View looking upstream towards End Bent 2 & Bent 1



Photograph No. 4: View looking north towards existing End Bent 2