

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 17BP.8.R.64 (SF-610050) F.A. PROJ. N/A
 COUNTY MONTGOMERY
 PROJECT DESCRIPTION BRIDGE NO. 50 ON SR 1115 (GADDY FARM RD)
OVER BIG TOWN CREEK

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CAUTION NOTICE

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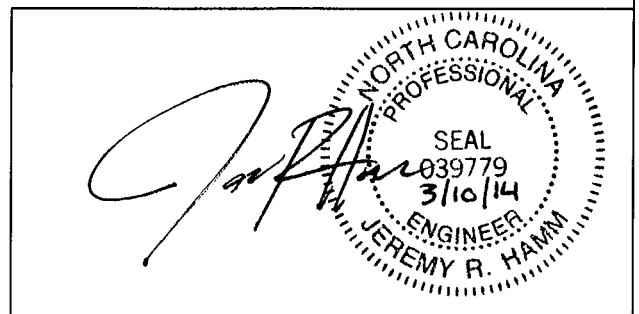
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS 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 IT IS 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: HUNSBERGER, W. S.



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

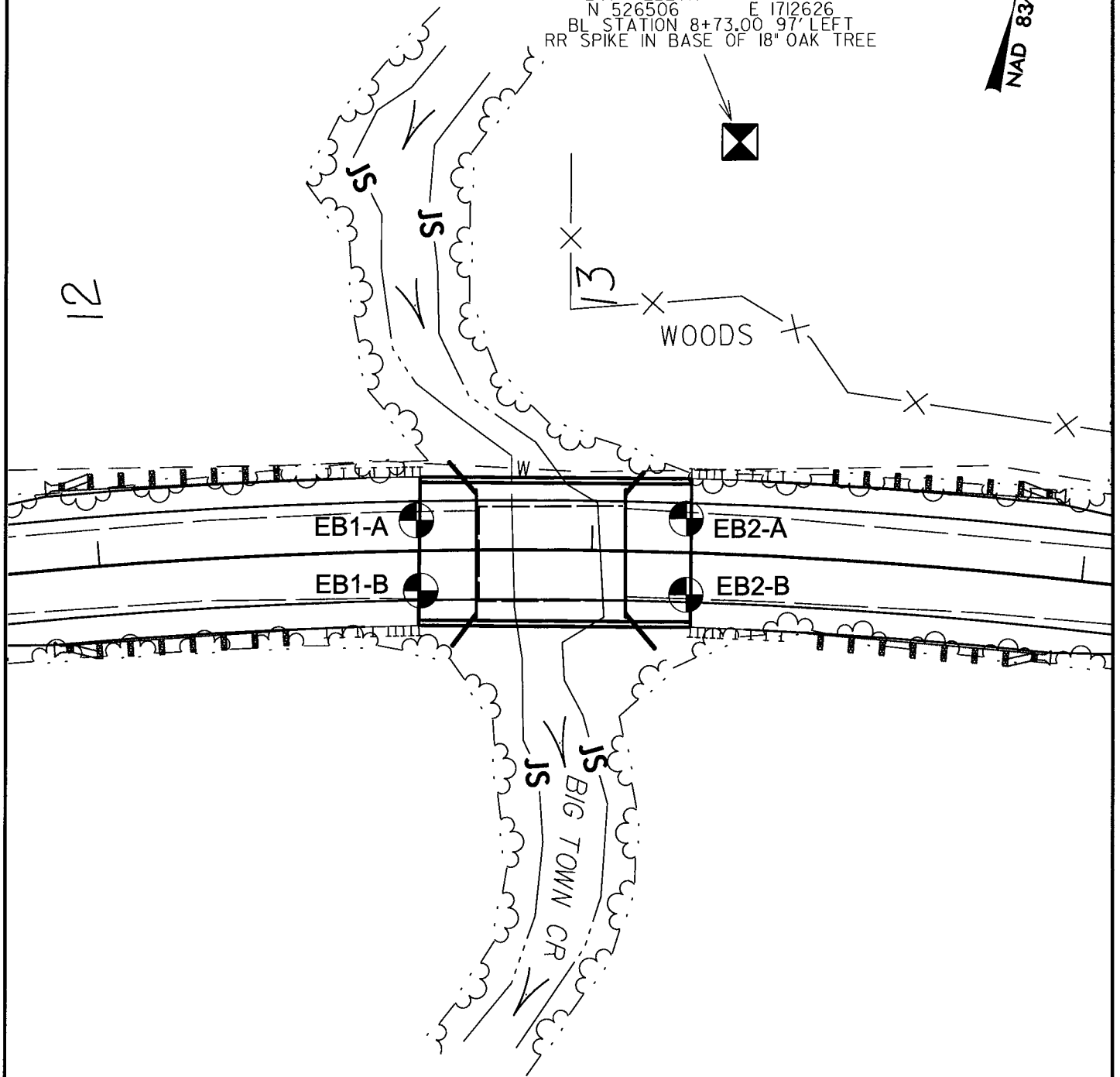
| SOIL DESCRIPTION | | | | | | | | | | GRADATION | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|
| SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS 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. EXAMPLES: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LINTERS, HIGHLY 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. | | | | | | | | | |
| SOIL LEGEND AND AASHTO CLASSIFICATION | | | | | | | | | | ANGULARITY OF GRAINS | | | | | | | | | |
| GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS | | | | | | | | | | 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> . | | | | | | | | | |
| MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. | | | | | | | | | | MINERALOGICAL COMPOSITION | | | | | | | | | |
| GROUP CLASS. A-1 A-1-b A-3 A-2 A-2-4 A-2-5 A-2-6 A-2-7 A-4 A-5 A-6 A-7 A-7-5 A-7-6 A-7-7 A-1, A-2 A-3 A-4, A-5 A-6, A-7 | | | | | | | | | | COMPRESSIBILITY | | | | | | | | | |
| SYMBOL | | | | | | | | | | SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 | | | | | | | | | |
| % PASSING 10 50 MX 30 MX 50 MX 51 MN 18 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN 36 MN 36 MN | | | | | | | | | | PERCENTAGE OF MATERIAL | | | | | | | | | |
| LIQUID LIMIT PLASTIC INDEX | | | | | | | | | | 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 | | | | | | | | | |
| GROUP INDEX | | | | | | | | | | GROUND WATER | | | | | | | | | |
| USUAL TYPES OF MAJOR MATERIALS | | | | | | | | | | ▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▽ 24 STATIC WATER LEVEL AFTER 24 HOURS ▽ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA ○ SPRING OR SEEP | | | | | | | | | |
| GEN. RATING AS A SUBGRADE | | | | | | | | | | EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR POOR UNSUITABLE | | | | | | | | | |
| PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30 | | | | | | | | | | MISCELLANEOUS SYMBOLS | | | | | | | | | |
| CONSISTENCY OR DENSENESS | | | | | | | | | | 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 | | | | | | | | | |
| PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | | | | | | | | | | SPT OPT DMT TEST BORING VST PNT AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD | | | | | | | | | |
| GENERALY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE | | | | | | | | | | TEST BORING W/ CORE SPT N-VALUE SPT REFUSAL | | | | | | | | | |
| GENERALY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD | | | | | | | | | | N/A <0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4 | | | | | | | | | |
| TEXTURE OR GRAIN SIZE | | | | | | | | | | ABBREVIATIONS | | | | | | | | | |
| U.S. STO. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 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 - OILATOMETER TEST OPT - DYNAMIC PENETRATION TEST V - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURE, 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 TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY WEA. - WEATHERED γ - UNIT WEIGHT γ _d - DRY UNIT WEIGHT | | | | | | | | | |
| BOULDER (BLOR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.) | | | | | | | | | | SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO | | | | | | | | | |
| GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3 | | | | | | | | | | EQUIPMENT USED ON SUBJECT PROJECT | | | | | | | | | |
| SOIL MOISTURE - CORRELATION OF TERMS | | | | | | | | | | ORILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST CME-55 | | | | | | | | | |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | | | | | | | 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 | | | | | | | | | |
| LL LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | | | | | | | | | | HAMMER TYPE: [X] AUTOMATIC [] MANUAL | | | | | | | | | |
| PLASTIC RANGE (PI) - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | CORE SIZE: [] -B [] -N [] -H | | | | | | | | | |
| OM OPTIMUM MOISTURE - MDIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE | | | | | | | | | | HAND TOOLS: [] POST HOLE DIGGER [] HAND AUGER [] SOUNDING ROD [] VANE SHEAR TEST | | | | | | | | | |
| SL SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | |
| PLASTICITY | | | | | | | | | | | | | | | | | | | |
| NONPLASTIC 0-5 VERY LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH | | | | | | | | | | | | | | | | | | | |
| COLOR | | | | | | | | | | | | | | | | | | | |
| DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. | | | | | | | | | | | | | | | | | | | |

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SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

| ROCK DESCRIPTION | | TERMS AND DEFINITIONS | |
|---|---|---|--------------------------|
| <p>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:</p> | | <p>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 DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS 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 (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p> | |
| <p>WEATHERED ROCK (WR)</p>  | <p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p> | | |
| <p>CRYSTALLINE ROCK (CR)</p>  | <p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p> | | |
| <p>NON-CRYSTALLINE ROCK (NCR)</p>  | <p>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.</p> | | |
| <p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p>  | <p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p> | | |
| WEATHERING | | | |
| <p>FRESH</p> | <p>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> | | |
| <p>VERY SLIGHT (V SL.)</p> | <p>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.</p> | | |
| <p>SLIGHT (SL.)</p> | <p>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.</p> | | |
| <p>MODERATE (MOD.)</p> | <p>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.</p> | | |
| <p>MODERATELY SEVERE (MOD. SEV.)</p> | <p>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></p> | | |
| <p>SEVERE (SEV.)</p> | <p>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></p> | | |
| <p>VERY SEVERE (V SEV.)</p> | <p>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></p> | | |
| <p>COMPLETE</p> | <p>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.</p> | | |
| ROCK HARDNESS | | | |
| <p>VERY HARD</p> | <p>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> | | |
| <p>HARD</p> | <p>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> | | |
| <p>MODERATELY HARD</p> | <p>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.</p> | | |
| <p>MEDIUM HARD</p> | <p>CAN BE GROUDED 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.</p> | | |
| <p>SOFT</p> | <p>CAN BE GROUDED 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.</p> | | |
| <p>VERY SOFT</p> | <p>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.</p> | | |
| FRACTURE SPACING | | BEDDING | |
| <p>TERM</p> | <p>SPACING</p> | <p>TERM</p> | <p>THICKNESS</p> |
| <p>VERY WIDE</p> | <p>MORE THAN 10 FEET</p> | <p>VERY THICKLY BEDDED</p> | <p>> 4 FEET</p> |
| <p>WIDE</p> | <p>3 TO 10 FEET</p> | <p>THICKLY BEDDED</p> | <p>1.5 - 4 FEET</p> |
| <p>MODERATELY CLOSE</p> | <p>1 TO 3 FEET</p> | <p>THINLY BEDDED</p> | <p>0.16 - 1.5 FEET</p> |
| <p>CLOSE</p> | <p>0.16 TO 1 FEET</p> | <p>VERY THINLY BEDDED</p> | <p>0.03 - 0.16 FEET</p> |
| <p>VERY CLOSE</p> | <p>LESS THAN 0.16 FEET</p> | <p>THICKLY LAMINATED</p> | <p>0.008 - 0.03 FEET</p> |
| | | <p>THINLY LAMINATED</p> | <p>< 0.008 FEET</p> |
| INDURATION | | | |
| <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> | | | |
| <p>FRIABLE</p> | <p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> | | |
| <p>MODERATELY INDURATED</p> | <p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> | | |
| <p>INDURATED</p> | <p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> | | |
| <p>EXTREMELY INDURATED</p> | <p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p> | | |
| <p>BENCH MARK: BMI: RR SPIKE IN BASE OF 18" OAK TREE N= 526506 E= 1712626</p> | | <p align="right">ELEVATION: 265.55 FT.</p> | |
| <p>NOTES: F.I.A.D. - FILLED IMMEDIATELY AFTER DRILLING CI - BOREHOLE CAVE IN DEPTH</p> | | | |

NAD 83/NSRS 2007

BMI ELEVATION = 265.55'
N 526506 E 1712626
BL STATION 8+73.00 97' LEFT
RR SPIKE IN BASE OF 18" OAK TREE



12

13

WOODS

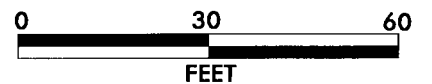
EB1-A

EB2-A

EB1-B

EB2-B

BIG TOWN CR



NOTES:

- PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEOTECHNICAL ENGINEERING UNIT IN FEBRUARY 2014
- APPROXIMATE BRIDGE SKEW: 90 DEGREES



FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
RALEIGH, NC 27607
PHONE: 919.871.0800
FAX: 919.871.0803

BORING LOCATION PLAN

BRIDGE NO. 50 ON SR 1115
OVER BIG TOWN CREEK
MONTGOMERY COUNTY, NC
WBS: 17BP.B.R.64; TIP: SF-610050



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

| | | | |
|---|---------------------|--------------------------|-----------------------------|
| WBS 17BP.8.R.64 | TIP SF-610050 | COUNTY MONTGOMERY | GEOLOGIST Hunsberger, W. S. |
| SITE DESCRIPTION BRIDGE NO. 50 ON SR 1115 OVER BIG TOWN CREEK | | | GROUND WTR (ft) |
| BORING NO. EB1-A | STATION 12+64 | OFFSET 6 ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 266.7 ft | TOTAL DEPTH 17.2 ft | NORTHING 526,419 | EASTING 1,712,575 |
| DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013 | | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic |
| DRILLER Toothman, R. E. | START DATE 02/25/14 | COMP. DATE 02/25/14 | 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 | | | | | |
| 270 | | | | | | | | | | | | | | | |
| 265 | 265.7 | 1.0 | 6 | 7 | 7 | | | | | | | | D | EXISTING PAVEMENT 0.75' BITUMINOUS CONCRETE | 0.0 0.8 |
| | 263.2 | 3.5 | 2 | 2 | 2 | | | | | | | | M | ROADWAY EMBANKMENT BROWN TAN AND BLACK, SI. F. TO MED. SAND (A-2-4) W/ GRAVEL | 3.0 |
| 260 | 260.7 | 6.0 | 3 | 3 | 10 | | | | | | | | M | ALLUVIAL GRAY AND TAN, F. SANDY AND SI. CLAY (A-7) W/ GRAVEL, TRACE ORGANICS | 7.2 |
| | 258.2 | 8.5 | 5 | 6 | 12 | | | | | | | | M | GRAY AND TAN, CLAYEY F. TO CSE. SAND (A-2-6) | 8.0 |
| 255 | 253.2 | 13.5 | 19 | 26 | 26 | | | | | | | | M | RESIDUAL DK. BROWN DK. TAN AND DK. ORANGE, SI. F. TO MED. SAND (A-2-4) W/ ROCK FRAGS, SAP. | |
| 250 | 249.6 | 17.1 | 60/0.1 | | | 60/0.1 | | | | | | | M | CRYSTALLINE ROCK DK. GRAY, METAVOLCANIC ROCK Boring Terminated by Auger Refusal at Elevation 249.5 ft in CR: METAVOLCANIC ROCK | 17.1 17.2 |

NCDOT BORE SINGLE SF610050_GEO_BRDG0050_GINT.GPJ NC_DOT_GDT 3/10/14



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

| | | | | |
|---|---------------------|--------------------------|---|-----------------------|
| WBS 17BP.8.R.64 | TIP SF-610050 | COUNTY MONTGOMERY | GEOLOGIST Hunsberger, W. S. | |
| SITE DESCRIPTION BRIDGE NO. 50 ON SR 1115 OVER BIG TOWN CREEK | | | GROUND WTR (ft) 0 HR. 7.5 24 HR. FIAD | |
| BORING NO. EB2-A | STATION 13+19 | OFFSET 7 ft LT | | ALIGNMENT -L- |
| COLLAR ELEV. 266.7 ft | TOTAL DEPTH 13.3 ft | NORTHING 526,429 | | EASTING 1,712,629 |
| DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013 | | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic |
| DRILLER Toothman, R. E. | START DATE 02/25/14 | COMP. DATE 02/25/14 | 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 | | | | |
| 270 | | | | | | | | | | | | | | |
| 265 | 265.7 | 1.0 | 6 | 6 | 5 | 11 | | | | | | D | EXISTING PAVEMENT 0.67' BITUMINOUS CONCRETE | 0.0 0.7 |
| | 263.2 | 3.5 | 2 | 1 | 2 | 3 | | | | | | M | ROADWAY EMBANKMENT TAN BROWN AND GRAY, CLAYEY SILT (A-4) | 3.8 |
| 260 | 260.7 | 6.0 | 6 | 6 | 6 | 12 | | | | | | W | ALLUVIAL ORANGE BROWN AND GRAY, F. TO MED. SANDY CLAY (A-7) W/ TRACE ORGANICS / RESIDUAL | 5.5 |
| | 258.2 | 8.5 | 7 | 8 | 8 | 16 | | | | | | | RESIDUAL ORANGE TAN AND GRAY, SI. F. TO CSE. SAND (A-2-4) W/ ROCK FRAGS | |
| 255 | 253.5 | 13.2 | 60/0.1 | | | 60/0.1 | | | | | | | CRYSTALLINE ROCK GRAY, METAVOLCANIC ROCK | 13.2 13.3 |
| | | | | | | | | | | | | | Boring Terminated by Auger Refusal at Elevation 253.4 ft in CR: METAVOLCANIC ROCK | |

NCDOT BORE SINGLE SF610050_GEO_BRDC0050_GINT.GPJ NC_DOT_GDT 3/10/14



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

| | | | |
|---|---------------------|--------------------------|-----------------------------|
| WBS 17BP.8.R.64 | TIP SF-610050 | COUNTY MONTGOMERY | GEOLOGIST Hunsberger, W. S. |
| SITE DESCRIPTION BRIDGE NO. 50 ON SR 1115 OVER BIG TOWN CREEK | | | |
| BORING NO. EB2-B | STATION 13+19 | OFFSET 9 ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 266.5 ft | TOTAL DEPTH 25.2 ft | NORTHING 526,414 | EASTING 1,712,631 |
| DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013 | | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic |
| DRILLER Toothman, R. E. | START DATE 02/25/14 | COMP. DATE 02/25/14 | 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 | | | | | |
| 270 | | | | | | | | | | | | | | | |
| 265 | 265.5 | 1.0 | 4 | 5 | 7 | | | | | | | | | EXISTING PAVEMENT | 0.0 |
| | | | | | | | | | | | | | | 0.67" BITUMINOUS CONCRETE | 0.7 |
| | 263.0 | 3.5 | 1 | 2 | 3 | | | | | | | | | ROADWAY EMBANKMENT TAN BROWN AND GRAY, F. SANDY SILT (A-2-4) W/ GRAVEL, W/ CLAY LAYERS | |
| 260 | 260.5 | 6.0 | 4 | 3 | 2 | | | | | | | | | ALLUVIAL GRAY AND TAN, CLAYEY F. TO CSE. SAND (A-2-6) W/ GRAVEL | 5.5 |
| | 258.0 | 8.5 | 7 | 41 | 44 | | | | | | | | | RESIDUAL LT. GRAY, SI. F. SAND (A-2-4) W/ ROCK FRAGS, SAP. | 9.1 |
| 255 | | | | | | | | | | | | | | | |
| | 253.0 | 13.5 | 41 | 59/0.4 | | | | | | | | | | | 13.5 |
| 250 | | | | | | | | | | | | | | WEATHERED ROCK LT. GRAY DK. BROWN AND DK. ORANGE, METAVOLCANIC ROCK | |
| | 248.0 | 18.5 | 27 | 36 | 64/0.3 | | | | | | | | | | |
| 245 | | | | | | | | | | | | | | | |
| | 243.0 | 23.5 | 53 | 47/0.1 | | | | | | | | | | | |
| | 241.3 | 25.2 | 60/0.0 | | | | | | | | | | | Boring Terminated by Auger Refusal at Elevation 241.3 ft on CR: METAVOLCANIC ROCK | 25.2 |

NCDOT BORE SINGLE SF610050_GEO_BRD60050_GINT.GPJ NC_DOT_GDT 3/10/14