| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
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| N.C. | 17BP.13.R.78 | 1 | 13 |

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

| PROJ. REFERENCE NO. | 17BP.13.R.78 | F.A. PROJ. <i>N/A</i> |
|---------------------|---------------------------------------|--------------------------|
| COUNTY Yancey | · · · · · · · · · · · · · · · · · · · | |
| PROJECT DESCRIPTION | Structure No. 990133 on | SR 1146 over Cane Branch |
| | | |

MAP 1 YANCEY 133

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| C. Boyce |
|---------------------------------------|
| J. Pickett |
| M. Hosseini |
| R. Kral, E.I. |
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| INVESTIGATED BY F&R, Inc. |
| CHECKED BY M. Walko, P.E. |
| SUBMITTED BY F&R, Inc. |
| DATEApril 2013 |
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PERSONNEL

CAUTION NOTICE

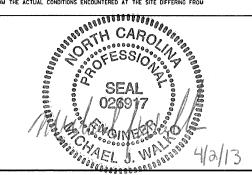
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, 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 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 MIDICATED IN THE SUBSURFACE 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 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, IN OR THE INTERPRETATIONS MADE, OR OPHION 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 DEBUS NECESSARY TO SATISFY HUSSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAM 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: M. Brewer, E.I.

| PROJECT REFERENCE NO. | SHEET NO. |
|-----------------------|-----------|
| 17BP.13.R.78 | 2 |

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

| | | | | SOIL D | DESC | RIP | TION | | | | | | | ATION | 2011 511-5 70 001-205 | | | | |
|--|--|--------|--------------------|----------------------------|-------------|----------------|-------------------|--------------------|----------------------|--|--|---|-------------------------|-----------------------------------|--|--|--|--|--|
| | ISIDERED TO I | | | | | | | | | | .s | 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 | | | | | | | |
| 100 BLOWS F | PER FOOT ACC | CORDIN | IG TO ST | ANDARD PEN | ETRATI | ON TE | ST (AA | SHTO T20 | 16, ASTM D-15 | 586). SOIL | | POORLY GRADED) <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. | | | | | | | |
| | ION IS BASED Y.COLOR.TEXT | | | | | | | | | | | ANGULARITY OF GRAINS | | | | | | | |
| | OGICAL COMPO | OSITIO | N, ANGULA | ARITY, STRUC | TURE, I | PLASTI | ICITY, E | TC. EXAM | PLE: | THE ANGULARITY OR ROUNDIESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS ANGULAR, | | | | | | | | | |
| | | | | AY, MOIST WITH IN | | | | | | SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITION | | | | | | | | | |
| | | | | D AND A | | | | | CATION | | | | | | | | | | |
| GENERAL CLASS. | | | MATERI SSING #: | | | | | ERIALS IG #200) | ORGA | NIC MATER | IERAL NAMES SUCH AS QUARTZ,FELDS ENEVER THEY ARE CONSIDERED OF SI | GNIFICANCE. | , KAULIN, ETC. ARE U | SED IN DESCRIPTIONS | | | | | |
| GROUP | | A-3 | | A-2 | А | -4 ¢ | 4-5 A | -6 A-7 | A-1, A-2 | A-4, A-5 | | COMPRES | SIBILITY | | | | | | |
| CLASS. | A-1-a A-1-b | | A-2-4 A- | 2-5 A-2-6 A- | 2-7 | | | A-7-5 A-7-6 | A-3 | A-6, A-7 | SLIGHTLY COMPRESSIBLE | | | LESS THAN 31 | | | | | |
| SYMBOL | | | | | S | ., | 7. | | | | MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE | | | EQUAL TO 31-50 GREATER THAN 50 | | | | | |
| % PASSING | 3000000000 | ••••• | -02:-05:-0 | 200 | C Process | generat . | | | 1,,,,,, | CIL T | ********* | PEF | RCENTAGE | OF MATERIA | _ | | | | |
| | 50 MX | | | | | | | | GRANULAR | SILT- CLAY | MUCK. PEAT | ORGANIC MATERIAL GRANULA | | 7 Y | OTHER MATERIAL | | | | |
| | 30 MX 50 MX 5 | | 35 MX 35 | MX 35 MX 35 | MX 36 | MN 36 | 5 MN 36 | MN 36 M | SOILS | SOILS | PEHI | SOILS ACE OF ORGANIC MATTER 2 - 3% | | TRA | | | | | |
| LIQUID LIMIT | | | 40 101 41 | 10 10 10 | VAL 40 | | 40 | MX 41 MN | | | | TLE ORGANIC MATTER 3 - 5% | | LIT | TLE 10 - 20% | | | | |
| PLASTIC INDEX | 6 MX | | | MN 40 MX 41 MX 11 MN 11 | | | | | SOILS LITTLE | | HIGHLY | DERATELY ORGANIC 5 - 107 SHLY ORGANIC >10% | % 12 - 20% >20% | SOM HIG | | | | | |
| GROUP INDEX | 0 | 0 | 0 | 4 MX | : 8 | MX 12 | 2 MX 16 | MX No M | MODER | ATE | ORGANIC | | GROUNE | WATER | | | | | |
| USUAL TYPES | | INE | SII TY | OR CLAYE | , | SILT | v | CLAYEY | AMOUN ORGAN | | SOILS | ✓ WATER LEVEL IN | BORE HOLE IMN | EDIATELY AFTER D | PRILLING | | | | |
| OF MAJOR MATERIALS | | SAND | | L AND SAN | | SOILS | | SOILS | MATTE | | | STATIC WATER LE | VEL AFTER 2 | 4 HOURS | | | | | |
| GEN. RATING | SHIND | | | | | | | | 5AID TO | | | ∇ nu | _ | | | | | | |
| AS A | EXCE | LLEN | r to GC | IOD | | FAI | IR TO | POOR | FAIR TO POOR | POOR | UNSUITABLE | —— TENENED WATER, S | SATURATED ZON | E, OR WATER BEARI | NG STRATA | | | | |
| SUBGRADE | DF A-7-5 S | LIBGR | OUP IS | < 11 - | 30 • 1 | PI NE | Δ-7- | 6 SUBGE | NUB IS ~ | 11 - 30 | | SPRING OR SEEP | | | | | | | |
| | 51 11 7 5 5 | ,000, | | SISTENC | | | | | 1001 15 / | LL 30 | | MIS | SCELLANEO | OUS SYMBOLS | | | | | |
| | | | | ESS OR | F | ANGE | OF STA | ANDARD | | OF UNCONF | | ROADWAY EMBANKMENT (RE | . s | PT | TEST BORING | | | | |
| PRIMARY | SOIL TYPE | " | CONSIS | | PENE | | on res -value: | ISTENCE | COMPRE (1 | SSIVE STF TONS/FT ² | RENGTH) | WITH SOIL DESCRIPTION | | PTOMT TEST BORIN STPMT | G W/ CORE | | | | |
| GENER | ALL V | | VERY LO | OOSE | | | <4 | | | | | ⊫∐ ├── SOIL SYMBOL | \oplus | AUGER BORING | SPT N-VALUE | | | | |
| GRANUI | | | LOOSE MEDIUM | | | | TO 10 | | | N/A | | ↓ | Ĭ | | (REF)— SPT REFUSAL | | | | |
| MATER (NON-0 | IAL COHESIVE) | · | DENSE | | | | TO 30 | | | | | ARTIFICIAL FILL (AF) OTHE THAN ROADWAY EMBANKMEN | | CORE BORING | 3. 7 1.2. 33.12 | | | | |
| | 5011251727 | | VERY DE | | | | >50 | | | | | INFERRED SOIL BOUNDARY | MW O | MONITORING WEL | L | | | | |
| GENER | AL L V | | VERY SOFT |)FT | | 2 | <2 TO 4 | | _ | <0.25 | | _ | | PIEZOMETER | | | | | |
| SILT-C | | | MEDIUM | STIFF | | 4 | TO 8 | | | 0.25 TO 0.9 0.5 TO 1.0 | | INFERRED ROCK LINE | Δ | INSTALLATION | | | | | |
| MATER (COHE: | | | STIFF VERY S1 | | | | TO 15 | | | 1 TO 2 | | ALLUVIAL SOIL BOUNDARY | \bigcirc | SLOPE INDICATO | R | | | | |
| (COHE: | DIVE) | | HARD | | | 15 | >30 | ´ | | 2 TO 4 >4 | | DIP & DIP DIRECTION OF | | INSTALLATION | | | | | |
| | | | TE | XTURE | OR | GRA | IN S | SIZE | | | | ROCK STRUCTURES | | CONE PENETROM | ETER TEST | | | | |
| U.S. STD. SIE | EVE SIZE | | | 4 10 | 1 | 40 | 60 | 200 | 0 270 | | | | • | SOUNDING ROD | | | | | |
| OPENING (MI | | | | 4.76 2.0 | | 0.42 | 0.2 | | | | | | ADDDEN | IATIONC | | | | | |
| BOULDE | -p C0E | BBLE | CI | RAVEL | С | OARSE | | FIN | | SILT | CLAY | R - AUGER REFUSAL | ABBREV | | w - MOISTURE CONTENT | | | | |
| (BLDR. | | OB.) | | (GR.) | | SAND SE. SI | | SAN (F S | ן ט | (SL.) | (CL.) | RT - HOGER REFUSAL BT - BORING TERMINATED | FRAGS FRA | GMENTS | V - VERY | | | | |
| GRAIN M | 1M 3Ø5 | | 75 | 2.0 | | JL. J. | 0.2 | | 0.05 | 0.005 | 5 | L CLAY | MED MEDIU | | WEA WEATHERED | | | | |
| | N. 12 | | 3 | | | | | | 0.00 | 0.000 | | PT - CONE PENETRATION TEST | MICA MICA MOD MODER | | γ - UNIT WEIGHT $\gamma_{ m d}$ - DRY UNIT WEIGHT | | | | |
| | SO | IL N | MOIST | URE - (| CORF | RELA | 10174 | V OF | TERMS | | | T - CORING TERMINATED | NP - NON PL | ASTIC | SAMPLE ABBREVIATIONS | | | | |
| | MOISTURE SO | | | FIELD N | | | GU | IDF FOR | FIELD MOI | STURE DES | SCRIPTION | MT - DILATOMETER TEST PT - DYNAMIC PENETRATION TEST | ORG ORGAN | IC UREMETER TEST | S - BULK | | | | |
| (ATTE | RBERG LIMIT | S) | | DESCR | IPTION | | | | | | | - VOID RATIO | SAP SAPRO | LITIC | SS - SPLIT SPOON ST - SHELBY TUBE | | | | |
| | | | | - SATU | | - | | | IOUID: VERY | | | MBANK EMBANKMENT - FINE | SDY SANDY SL SILT, S | | RS - ROCK | | | | |
| LL _ | LIQUID | LIMIT | | (SA | т.) | | FI | ROM BEL | OW THE GR | DUND WATE | ER TABLE | OSS FOSSILIFEROUS | SLI SLIGHT | LY | RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING | | | | |
| PLASTIC | T | | | | | | SI | EMISOLIO | : REQUIRES | DRYING TO | 0 | RAC FRACTURED, FRACTURES | TCR - TRICO | | RATIO | | | | |
| RANGE < | _ PLASTIC | - 1 TM | | - WE | T - (W |) | Α | TTAIN OF | TIMUM MOI | STURE | | EQUIPMEN' | T USED O | N SUBJECT P | ROJECT | | | | |
| "" PLL | + PLASTIC | LIM | | | | | | | | | | RILL UNITS: ADVA | NCING TOOLS: | | HAMMER TYPE: | | | | |
| OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE | | | | | | | | | | | | _ | CLAY BITS | | X AUTOMATIC MANUAL | | | | |
| SL | + SHRINKA | GE L | IMIT . | | | | | | | | | J MOBILE B □ | | | | | | | |
| | | | | - DRY | - (D) | | | | ADDITIONAL TIMUM MOI | | 0 | 7 | 6" CONTINUOUS | | CORE SIZE: | | | | |
| | 1 | | | | | <u> </u> | | Ur | . In John MUI: | 0 1 U.NL | | | 8" HOLLOW AUGE | | B | | | | |
| PLASTICITY | | | | | | | | | | | | CME-550X | HARD FACED FI | NGER BITS | X -N <u>Q2</u> | | | | |
| NOND: ACT: | PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 0-5 VERY LOW | | | | | | | | | | | | TUNGCARBIDE | NSERTS | | | | | |
| NONPLASTIC | | | | | 1-5 5-15 | | | | SLIG | | | CME-75 | CASING | // ADVANCER | HAND TOOLS: | | | | |
| MED. PLAST | ICITY | | | 16 | -25 | 1005 | | | MEDI HIG | | | PORTABLE HOIST | TRICONE | STEEL TEETH | POST HOLE DIGGER | | | | |
| HIGH PLAST | 110111 | | | 26 | OR N | | | | пір | •• | | 1 = | TRICONE | "TUNGCARB. | HAND AUGER | | | | |
| | COLOR | | | | | | | | | | | 」 │ 등 | | | SOUNDING ROD | | | | |
| | ONS MAY INC | | | | | | | | | | GRAY). | - 1 円 | CORE BIT | | VANE SHEAR TEST | | | | |
| MODIFIE | ERS SUCH AS | s LIG | HI, DARK | , STREAKED | , ETC. | ARĒ | USED | ıu DESC | KIRF APPEA | HANCE. | | J ——— | | | Ī | | | | |
| | | | | | | | | | | | | | | | | | | | |

| PROJECT REFERENCE NO. | SHEET NO. |
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| 17BP.13.R.78 | 2A |

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

| | | | T5010 AVD 05511171010 | | | | | | | | |
|-------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| HARD ROCK | | OCK DESCRIPTION AL THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED | TERMS AND DEFINITIONS | | | | | | | | |
| ROCK LINE | INDICATES THE LEVEL AT WHICH | NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. | ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. | | | | | | | | |
| | | SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. ANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE | AQUIFER - A WATER BEARING FORMATION OR STRATA. | | | | | | | | |
| OF WEATHE | RED ROCK. | | ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. | | | | | | | | |
| | RIALS ARE TYPICALLY DIVIDED A | | 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. | | | | | | | | |
| WEATHERED ROCK (WR) | | STAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 ER FOOT IF TESTED. | ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL | | | | | | | | |
| | 19/1-19/1 FINE TO | COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT | AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE | | | | | | | | |
| CRYSTALLINE ROCK (CR) | WOULD Y | ELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, | GROUND SURFACE. | | | | | | | | |
| | EINE TO | ABBRO, SCHIST, ETC. COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN | CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. | | | | | | | | |
| NON-CRYSTALI ROCK (NCR) | LINE SEDIMENT | ARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED, ROCK TYPE PHYLLITE, SLATE, SANDSTONE, ETC. | COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. | | | | | | | | |
| COASTAL PLAT SEDIMENTARY (CP) | IN COASTAL | PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED | 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. | | | | | | | | |
| 1017 | SHELL BE | WEATHERING | DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. | | | | | | | | |
| FRESH | ROCK FRESH, CRYSTALS BRIGHT, HAMMER IF CRYSTALLINE. | FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER | DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. | | | | | | | | |
| VERY SLIGHT (V SLI.) | CRYSTALS ON A BROKEN SPECIM | STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, EN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF | DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. | | | | | | | | |
| SLIGHT | | STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO AIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELOSPAR | FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. | | | | | | | | |
| (SLI.) | CRYSTALS ARE DULL AND DISCO | LORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. | FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. | | | | | | | | |
| MODERATE (MOD.) | GRANITOID ROCKS, MOST FELDSP | SHOW DISCOLORATION AND WEATHERING EFFECTS. IN ARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULC AND CLOVE CICHETOANT ACCOUNT OF THE COMPANY OF THE COMP | FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. | | | | | | | | |
| MODERATE | WITH FRESH ROCK. | DWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED | FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. | | | | | | | | |
| MODERATELY SEVERE (MOD. SEV.) | AND DISCOLORED AND A MAJORI | OLORED OR STAINED. IN GRANITOID ROCKS, ALL FELOSPARS DULL TY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. | FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. | | | | | | | | |
| | IF TESTED, WOULD YIELD SPT R | <u>EFUSAL</u> | JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. | | | | | | | | |
| SEVERE (SEV.) | | OLORED OR STAINED ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME STRONG ROCK USUALLY REMAIN. | <u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. | | | | | | | | |
| | IF TESTED, YIELDS SPT N VALL | | LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. | | | | | | | | |
| VERY SEVERE | ALL ROCK EXCEPT QUARTZ DISC | OLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT | MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN | | | | | | | | |
| (V SEV.) | | JCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK | 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 | | | | | | | | |
| | | KAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR K FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> | INTERVENING IMPERVIOUS STRATUM. | | | | | | | | |
| COMPLETE | ROCK REDUCED TO SOIL ROCK F | ABRIC NOT DISCERNIBLE OR DISCERNIBLE ONLY IN SMALL AND | RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. | | | | | | | | |
| | | JARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS | ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND | | | | | | | | |
| | | ROCK HARDNESS | EXPRESSED AS A PERCENTAGE. | | | | | | | | |
| VERY HARD | CANNOT BE SCRATCHED BY KN SEVERAL HARD BLOWS OF THE | FE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES | SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. | | | | | | | | |
| HARD | | OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED | 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. | | | | | | | | |
| MODERATELY HARD | EXCAVATED BY HARD BLOW OF | OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED | SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. | | | | | | | | |
| MEDIUM | BY MODERATE BLOWS. | 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. | STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF | | | | | | | | |
| MEDIUM HARD | | CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE | 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. | | | | | | | | |
| SOFT | FROM CHIPS TO SEVERAL INCH | ADILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS ES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN | STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. | | | | | | | | |
| VERY SOFT | | NGER PRESSURE. AN BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INCH E BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY | 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 | | | | | | | | |
| | FINGERNAIL. RACTURE SPACING | BEDDING | TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. | | | | | | | | |
| | | TERM THICKNESS | DENOU MADIX Comment information and the MCI to account to the | | | | | | | | |
| TERM VERY WID | | T VERY THICKLY BEDDED > 4 FEET | BENCH MARK: Survey information provided by KCI Associates of NC. | | | | | | | | |
| WIDE | 3 TO 10 FEET | THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET | ELEVATION: FT. | | | | | | | | |
| MODERATE CLOSE | ELY CLOSE 1 TO 3 FEET 0.16 TO 1 FEET | VERY THINLY BEDDED 0.03 - 0.16 FEET | | | | | | | | | |
| VERY CLC | | THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET | NOTES: | | | | | | | | |
| | | THINLY LAMINATED < 0.008 FEET INDURATION | - | | | | | | | | |
| EUB SEDIMENT | TARY ROCKS INDIDATION IS THE | HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. | 1 | | | | | | | | |
| | | | | | | | | | | | |
| FR | G | JBBING WITH FINGER FREES NUMEROUS GRAINS: ENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. | | | | | | | | | |
| MOI | | RAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; REAKS EASILY WHEN HIT WITH HAMMER. | | | | | | | | | |

DIFFICULT TO BREAK WITH HAMMER.

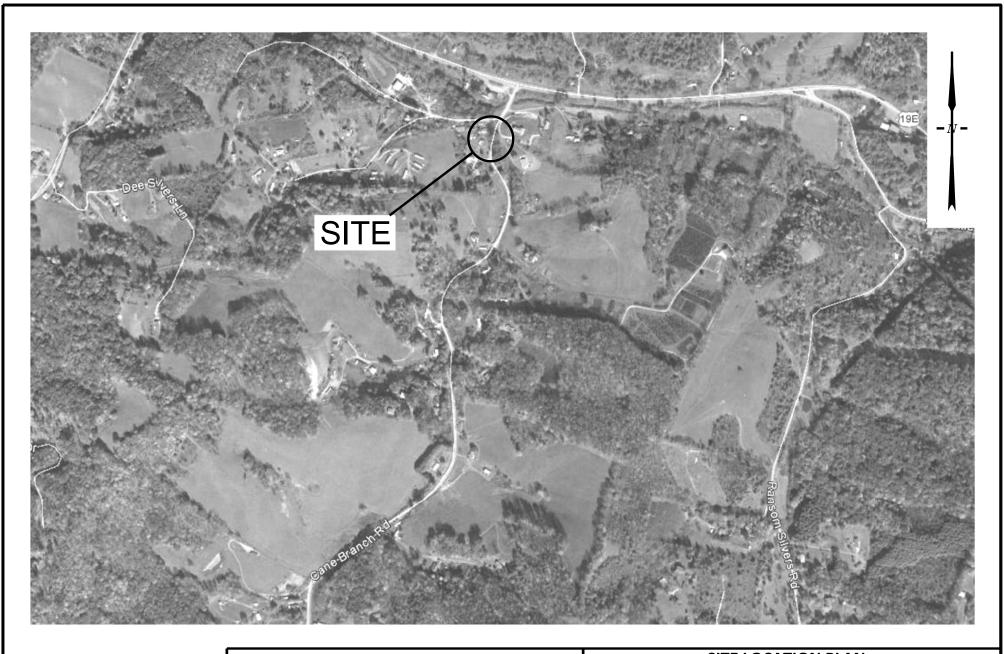
SAMPLE BREAKS ACROSS GRAINS.

INDURATED

EXTREMELY INDURATED

GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;

SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;



SINCE FROEHLING & ROBERTSON, INC.



Engineering Stability Since 1881

2505 Hutchison-McDonald Road Charlotte, North Carolina 28269 IUSA T 704.596.2889 | F 704.596.3784 www.fandr.com

PROJECT REFERENCE NO.: 17BP.13.R.78 F&R PROJECT NO.: 63N-0266 I.D. NO.: N/A F.A. PROJECT NO.: N/A COUNTY: Yancey

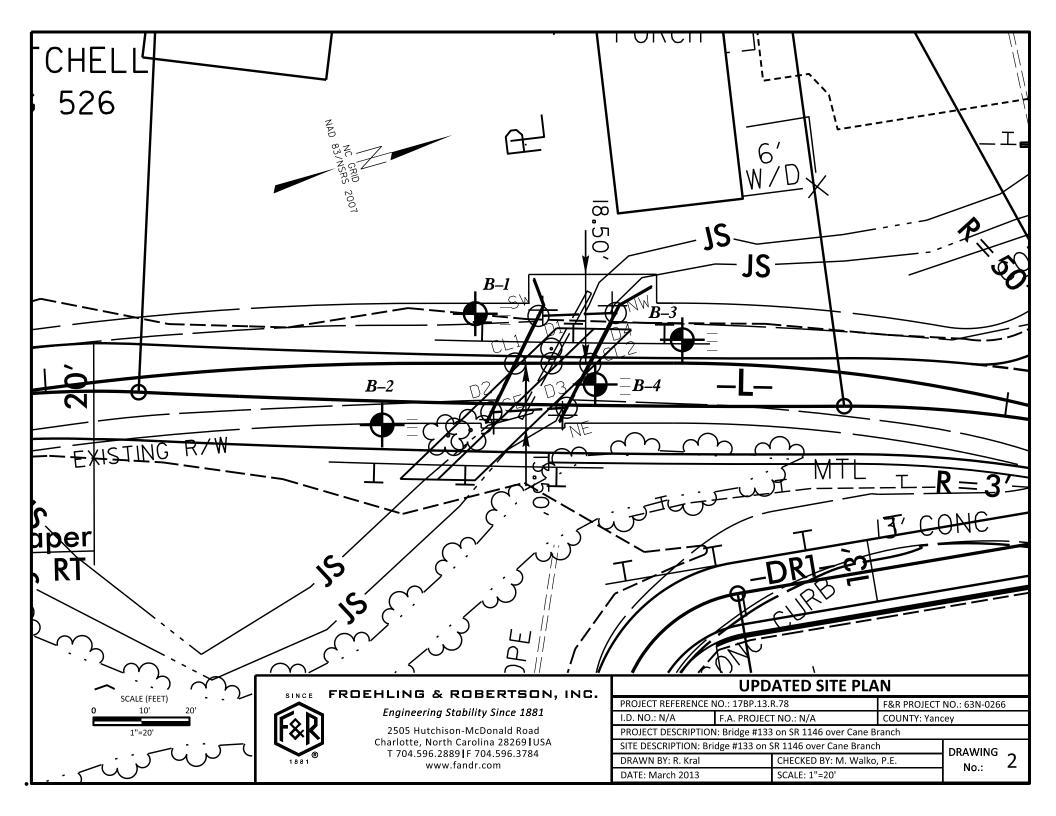
PROJECT DESCRIPTION: Bridge #133 on SR 1146 over Cane Branch

SITE DESCRIPTION: Bridge #133 on SR 1146 over Cane Branch
DRAWN BY: R. Kral

DATE: March 2013

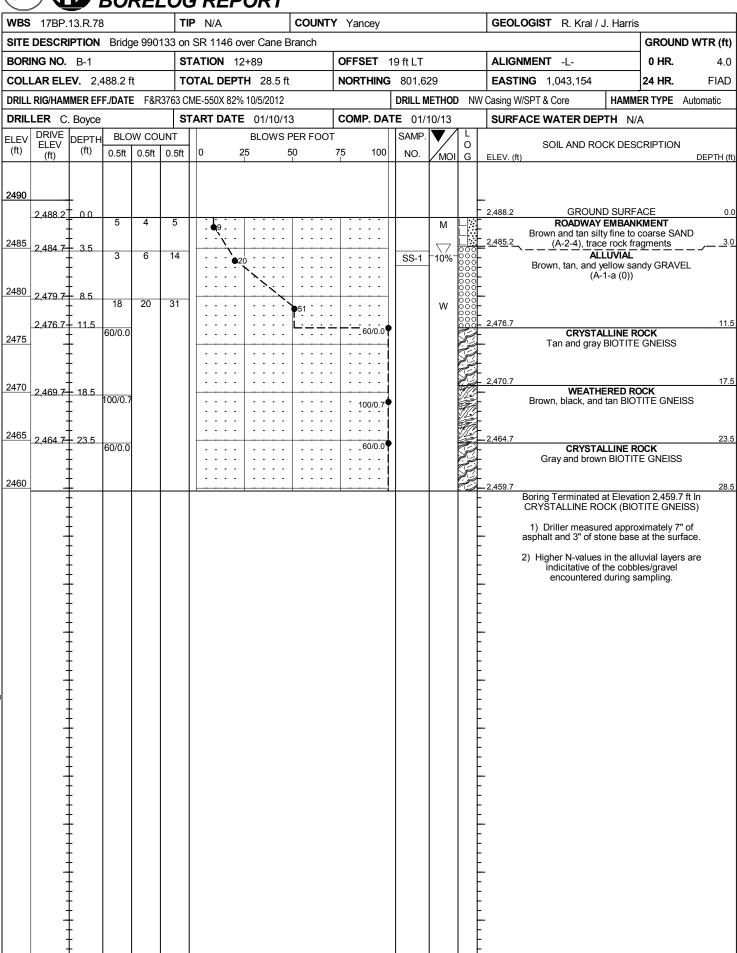
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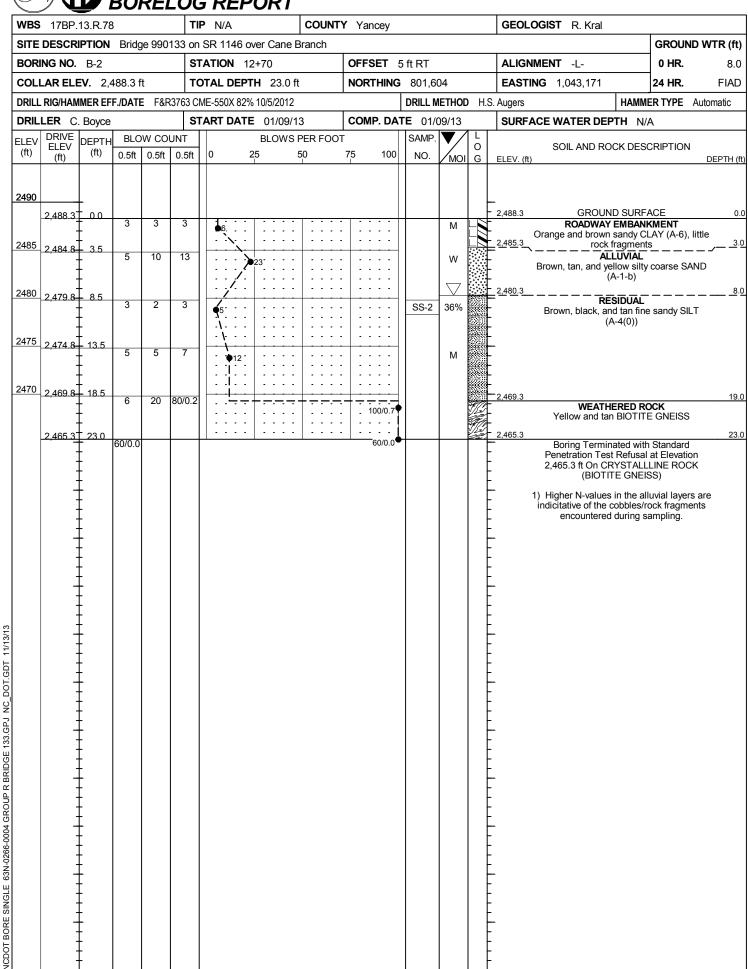


11/13/13

NCDOT BORE SINGLE 63N-0266-0004 GROUP R BRIDGE 133.GPJ NC_DOT.GDT



| WBS | 17BP | .13.R.78 | 3 | | TIP | N/A | | С | OUNT | Y Y | 'ancey | | GEOLOGIST R. Kral / | J. Harris | i | | |
|-------|--------------|---------------|--------|--|--------------|--------------|------------------|--------------|--------------|------------|--------------|--------------------------|--|-------------------------|-----------------|-------------|--|
| SITE | DESCF | RIPTION | Brid | ge 990133 | on SF | ₹ 1146 | over Can | e Brar | nch | | | | | | GROUND WTR (ft) | | |
| BORI | NG NO | . B-1 | | | STA | TION | 12+89 | | | OF | FSET | 19 ft LT | ALIGNMENT -L- | | 0 HR. | 4. | |
| COLL | AR EL | EV. 2, | 488.2 | ft | тот | AL DE | PTH 28. | 5 ft | | NC | RTHING | 801,629 | EASTING 1,043,154 | | 24 HR. | FIAI | |
| DRILL | RIG/HA | MMER EF | F./DAT | E F&R376 | 3 CME | -550X 8 | 2% 10/5/20′ | 12 | | _ | | DRILL METHOD NW | Casing W/SPT & Core | HAMM | ER TYPE | Automatic | |
| DRIL | LER (| C. Boyce | ! | | STAI | RT DA | TE 01/10 | 0/13 | | СС | MP. DA | TE 01/10/13 | SURFACE WATER DEF | PTH N/ | A | | |
| COR | E SIZE | NQ2 | | | TOTA | AL RUI | N 11.0 ft | | | | | | I | | | | |
| ELEV | RUN | DEPTH | RUN | DRILL | REC | JN RQD | SAMP. | STR REC. | RATA | L | | | ESCRIPTION AND REMARI | / C | | | |
| (ft) | ELEV (ft) | (ft) | (ft) | RATE (Min/ft) | (ft) % | (ft) % | NO. | (ft) % | (ft) % | Ğ | ELEV. (| | ESCRIPTION AND REMARI | \S | | DEPTH | |
| 476.7 | | | | | | | | | | | | | Begin Coring @ 11.5 ft | | | | |
| 2475 | 2,476.7 | 11.5 | 6.0 | N=60/0.0 1:36/1.0 | (4.8) 80% | (0.5) 8% | | (4.8) 80% | (0.5) 8% | | 2,476.7 | Tan and gray, moder | CRYSTALLINE ROCK rately hard to hard, slightly to | moderat | ely weath | 11 ered, | |
| | | ‡ | | N=60/0.0 1:36/1.0 1:55/1.0 1:48/1.0 0:42/1.0 2:53/1.0 | | | | | | | <u> </u> | very close to | closely spaced fractured Bl | OTITE G | NÉISS | | |
| 170 | 2,470.7 | 17.5 | | 2:53/1.0 2:18/1.0 | | | | | | | 2,470.7 | | | | | 17 | |
| 2470 | | † | | N=100/0.7 | | | | | | | _ | Brov | WEATHERED ROCK yn, black, and tan BIOTITE (| SNEISS | | | |
| | | <u> </u> | | | | | | | | | - | | , | | | | |
| 2465 | 2,464.7 | 23.5 | | | | | | | | | _ 2,464.7 | | | | | 23 | |
| | , | <u> </u> | 5.0 | N=60/0.0 2:09/1.0 | (2.4) 48% | (1.2) 24% | | (2.4) 48% | (1.2) 24% | | <u> </u> | Gray and brown | CRYSTALLINE ROCK moderately hard to hard, sli | ightly to n | noderately | | |
| | | <u> </u> | | N=60/0.0 2:09/1.0 2:50/1.0 2:07/1.0 2:28/1.0 3:04/1.0 | .5 /0 | / 0 | | .0 /0 | /3 | | <u> </u> | weathered, very cl | ose to closely spaced fractu | red BIOT | TE GNE | SS | |
| 2460 | 2,459.7 | 28.5 | | 3:04/1:0 | | | | | | | 2,459.7 | Boring Terminate | d at Elevation 2,459.7 ft In C | RYSTALI | INF ROC | 28 | |
| | | <u> </u> | | | | | | | | | - | Bonning Tommato | (BIOTITE GNEISS) | T C T T L | | ,,,, | |
| | | Ŧ | | | | | | | | | - | 1) Driller measured | approximately 7" of asphalt | and 3" of | stone bas | se at | |
| | | Ŧ | | | | | | | | | F | | the surface. | | | | |
| | | Ŧ | | | | | | | | | F | 2) Higher N-va cobble | lues in the alluvial layers are s/gravel encountered during | e indicitat sampling | ive of the | | |
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VCDOT BORE SINGLE 63N-0266-0004 GROUP R BRIDGE 133.GPJ NC DOT.GDT 11/13/13

TIP N/A **COUNTY** Yancey GEOLOGIST R. Kral WBS 17BP.13.R.78 SITE DESCRIPTION Bridge 990133 on SR 1146 over Cane Branch **GROUND WTR (ft)** OFFSET BORING NO. B-3 **STATION** 13+33 ALIGNMENT 0 HR. 13 ft LT 4.0 COLLAR ELEV. 2,488.5 ft TOTAL DEPTH 5.0 ft **NORTHING** 801,669 **EASTING** 1,043,171 24 HR. **FIAD DRILL RIG/HAMMER EFF./DATE** F&R3763 CME-550X 82% 10/5/2012 DRILL METHOD H.S. Augers **HAMMER TYPE** Automatic DRILLER C. Boyce **START DATE** 01/09/13 **COMP. DATE** 01/09/13 **SURFACE WATER DEPTH** N/A DRIVE **BLOW COUNT BLOWS PER FOOT** SAMP ELEV DEPTH **ELEV** 0 SOIL AND ROCK DESCRIPTION (ft) (ft) 100 0.5ft 0.5ft 0.5ft 25 50 75 NO (ft) G ELEV. (ft) DEPTH (ft) 2490 2.488.5 **GROUND SURFACE** 2,488.5 0.0 13 ROADWAY EMBANKMENT М Brown silty clayey fine to coarse SAND (A-2-6), trace rock fragments 2485 2,485.0 3.5 2,485.0 80/0.3 WEATHERED ROCK 20 2,483.5 5.0 2,483.5 5.0 100/0.8 60/0.0 **Gray BIOTITE GNEISS** 60/0.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 2,483.5 ft On CRYSTALLLINE ROCK (BIOTITE GNEISS) 1) Driller measured approximately 4.5" of asphalt and 4" of stone base at the surface.

11/13/13

NCDOT BORE SINGLE 63N-0266-0004 GROUP R BRIDGE 133.GPJ NC_DOT.GDT

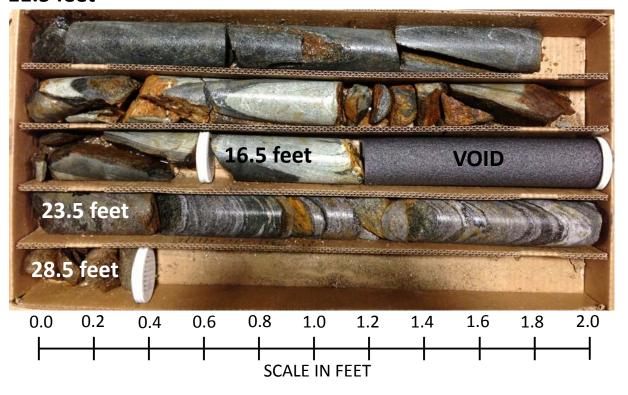
TIP N/A **COUNTY** Yancey GEOLOGIST R. Kral / J. Harris WBS 17BP.13.R.78 SITE DESCRIPTION Bridge 990133 on SR 1146 over Cane Branch **GROUND WTR (ft)** BORING NO. B-4 OFFSET 4 ft LT **STATION** 13+15 ALIGNMENT 0 HR. 4.0 COLLAR ELEV. 2,488.4 ft TOTAL DEPTH 15.0 ft NORTHING 801,649 **EASTING** 1,043,175 24 HR. **FIAD DRILL RIG/HAMMER EFF./DATE** F&R3763 CME-550X 82% 10/5/2012 DRILL METHOD NW Casing W/SPT & Core HAMMER TYPE Automatic DRILLER C. Boyce **START DATE** 01/10/13 **COMP. DATE** 01/10/13 **SURFACE WATER DEPTH** N/A DRIVE **BLOW COUNT BLOWS PER FOOT** SAMP. ELEV DEPTH **ELEV** 0 SOIL AND ROCK DESCRIPTION (ft) (ft) 100 0.5ft 0.5ft 0.5ft 25 50 75 NO (ft) G ELEV. (ft) DEPTH (ft) 2490 **GROUND SURFACE** 2,488.4 2,488.4 0.0 ROADWAY EMBANKMENT М Red clayey silty fine to coarse SAND (A-2-4), little rock fragments 2485 2,484.9 3.5 2,484.9 80/0.3 WEATHERED ROCK 5.0 2,483.4 5.0 2,483.4 Brown BIOTITE GNEISS 60/0.0 CRYSTALLINE ROCK Gray and white BIOTITE GNEISS 2480 2475 Boring Terminated at Elevation 2,473.4 ft In CRYSTALLINE ROCK (BIOTITE GNEISS) 1) Driller measured approximately 7" of asphalt and 3.5" of stone base at the surface.

| WBS | 17BP. | 13.R.7 | 8 | | TIP | N/A | | С | OUNT | Y | 'ancey | | GEOLOGIST R. Kral / | GEOLOGIST R. Kral / J. Harris | | | |
|-------|--------------|---------------|----------|--|--------------|--------------|------------------|--------------|--------------|----|----------|----------------------|--|-------------------------------|--------------|-----------|--|
| SITE | DESCR | IPTION | Brid | ge 990133 | 3 on SF | ₹ 1146 | over Can | e Brar | nch | | | | | | GROUN | ND WTR (f | |
| BORI | NG NO. | B-4 | | | STA | TION | 13+15 | | | OF | FSET 4 | ft LT | ALIGNMENT -L- | | 0 HR. | 4. | |
| COLL | AR ELI | EV. 2, | 488.4 | ft | тот | AL DE | PTH 15. | 0 ft | | NC | RTHING | 801,649 | EASTING 1,043,175 | 24 HR. | FIA | | |
| | | | | E F&R376 | | | | | | | | DRILL METHOD NW | Casing W/SPT & Core | ER TYPE | Automatic | | |
| DRIL | LER C | . Boyce | <u> </u> | | STAI | RT DA | TE 01/10 | 0/13 | | СС | MP. DA | Γ E 01/10/13 | SURFACE WATER DEF | | | | |
| | E SIZE | | | | TOTA | AL RUI | N 10.0 ft | | | | | | | | | | |
| ELEV | RUN ELEV | DEPTH | RUN | DRILL RATE | REC. | UN RQD | SAMP. | STF REC. | RATA | L | | | ESCRIPTION AND REMARK | /S | | | |
| (ft) | (ft) | (ft) | (ft) | (Min/ft) | (ft) % | (ft) % | NO. | (ft) % | (ft) % | Ğ | ELEV. (1 | | ESCRIPTION AND REMARK | \S | | DEPTH | |
| 483.4 | | | | | | | | | | | | | Begin Coring @ 5.0 ft | | | | |
| | 2,483.4 | 5.0 | 5.0 | N=60/0.0 1:24/1.0 1:34/1.0 1:34/1.0 1:37/1.0 | (4.4) 88% | (3.0) 60% | | (9.0) 90% | (7.0) 70% | | 2,483.4 | Gray and white, hard | CRYSTALLINE ROCK I, very slightly to moderately | weathere | ed, very clo | sely | |
| 2480 | - | ‡ | | 1:34/1:0 1:37/1:0 | | | | | | | F | to modera | ately spaced fractured BIOT | ITE GNE | ISS | | |
| | 2,478.4 | 10.0 | 5.0 | 2:15/1.0 | (4.6) | (4.0) | | | | | F | | | | | | |
| 2475 | | ŧ | | 2:12/1.0 2:09/1.0 | 92% | 80% | | | | | ‡ | | | | | | |
| | 2,473.4 | 15.0 | | 1:37/1.0 1:30/1.0 | | | | | | | 2,473.4 | | | | | 1 | |
| | | ‡ | | | | | | | | | - | Boring Terminated | d at Elevation 2,473.4 ft In C (BIOTITE GNEISS) | RYSTAL | LINE ROC | CK | |
| | - | ‡ | | | | | | | | | <u> </u> | Driller measured a | approximately 7" of asphalt a | and 3.5" o | of stone ba | ise at | |
| | | ‡ | | | | | | | | | - | , | the surface. | | | | |
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Bridge 990133 – SR 1146 across Cane Branch CORE PHOTOGRAPHS: B-1: Station 12+89

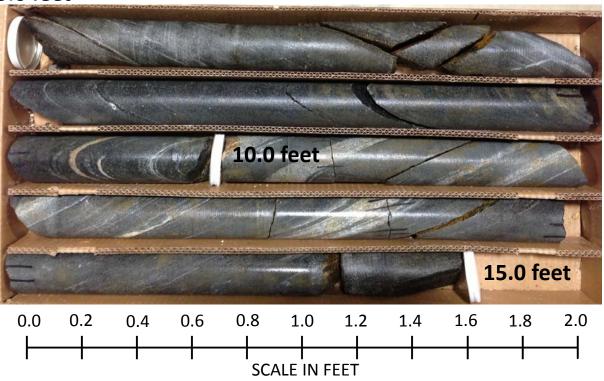
11.5 feet





Bridge 990133 – SR 1146 across Cane Branch CORE PHOTOGRAPHS: B-4: Station 13+15

5.0 feet





MAP 2 YANCEY145

APPENDIX B

NCDOT LEGEND SHEET, SITE LOCATION PLAN,
BORING LOCATION PLAN & BORELOG REPORTS

| PROJECT REFERENCE NO. | SHEET NO. |
|-------------------------------|-----------|
| 17BP.13.R.80-Structure 990145 | I |

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

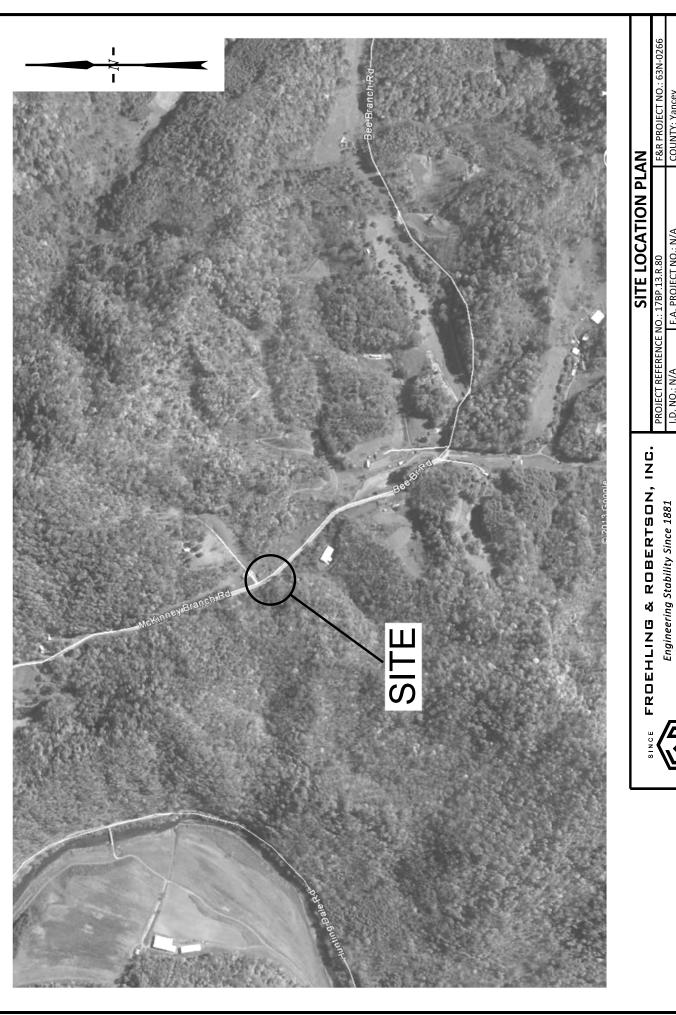
| SOIL DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|-----------------|----------------------|----------------|---------------|-----------------------------------|---------|----------------|-------------------------|---|-------------------|--|--------------------------|-------------|-------------------|------------------|------------------------|----------------------------|---------|--|-------|
| | | | | SOIL | DE | SCRI | PTIC | N | | | | | | | | | | GRADA | TION | | | |
| SOIL IS CO | ISIDERED T | O BE T | HE UNCO | SOLIDATE | D, SEM | I-CONS | OLIDAT | ED, OR | WEAT | HERED EARTH | H MATERIAL | .s | WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. LINIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO | | | | | | | | | |
| THAT CAN E | PER FOOT | ACCORD! | NG TO S | TANDARD F | PENETF | RATION | TEST (| AASHT | 0 T28 | 6, ASTM D-15 | 86). SOIL | | POORLY GRADED) <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. | | | | | | | | | |
| CLASSIFICAT CONSISTENC | TION IS BA | SED ON | THE AAS | HTO SYSTI | EM. BA | SIC DE | SCRIPT | IONS C | ENERA | LLY SHALL | INCLUDE: | | ANGULARITY OF GRAINS | | | | | | | | | |
| AS MINERAL | OGICAL COL | ROSITIONE. | ON, ANGUL | ARITY, STE | RUCTUR | RE, PLAS | STICITY | , ETC. | EXAMP | LEI | וטאס טענא | | THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS ANGULAR, | | | | | | | | | |
| | V | ERY STIFF. | CRAY, SALTY | LAY, MOIST WIT | H INTER | BEDDED F | INE SAND | LAVERS, | HIGHLY P | LASTIC, A-7-6 | | | SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITION | | | | | | | | | |
| SOIL LEGEND AND AASHTO CLASSIFICATION | | | | | | | | | | | | | ļ | | | | | | | | | |
| GENERAL CLASS. | | | | | | | | | | | | IALS | MINERAL | NAMES SUCH | AS QUAF | RTZ.FEL RED OF | LDSPAR, MIC | A, TALC, | KAOLIN, ETC. ARE | USED | IN DESCRIPTIONS | |
| GROUP | A-1 | (\(\S \) 35% PASSING "200) (> 35% PASSING "200) | | | | | | | | | | | WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY | | | | | | | | | |
| | A-1-a A-1- | _ | A-2-4 A | 2-5 A-2-6 | A-2-7 | n , | н 5 | н о | A-7-5 A-7-6 | A-1, A-2 A-3 | A-6, A-7 | | SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 | | | | | | | | | |
| SYMBOL | 00000000 | g::::: | WW. | | | | | | | 333333 | | | MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 | | | | | | | | | |
| % PASSING | 00000000 | 3 | 1000000 | | <i>**</i> | | (4),(14) | | ~ | 00000 | *************************************** | | HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 PERCENTAGE OF MATERIAL | | | | | | | | | |
| * 10 | 50 MX | | | | | | | | | GRANULAR | SILT- CLAY | MUCK, | 0004 | NIC HATERI | | GRANU | | T - CLAY | | | | |
| * 40 * 200 | 30 MX 50 M 15 MX 25 M | 51 MN | 25 MY 26 | เมงาระบง | 25 114 | 20 101 | 20 101 | 26 1111 | 20 800 | SOILS | SOILS | PEAT | | NIC MATERI ORGANIC M | | SOI | | SOILS | _ | | er material | |
| | 13 114 23 11 | 10 11/ | | | | | | | | | | | | M JIMBUHU RGANIC MAT | | 2 - : | | - 5% - 12% | | RACE | 1 - 10% 10 - 20% | |
| LIQUID LIMIT PLASTIC INDEX | 6 мх | NP | | MN 48 MX MX II MN | | | | | | SOILS | | | MODERATE HIGHLY OF | LY ORGANIC | : | 5 - 3 | | - 20% | 9 | SOME | 20 - 35% | |
| GROUP INDEX | 8 | 0 | a | | нх | ļ | 12 HX | | | LITTLE MODER | | HIGHLY ORGANIC | MIGHET OF | TUHALL | | >10 | | >20% | | HIGHLY | 35% AND ABOVE | |
| USUAL TYPES | | - | <u>-</u> | | | | | | | AMOUN | | SOILS | ∇ | | | | | | WATER | | 1110 | |
| OF MAJOR | GRAVEL, AND | FINE | | OR CLA | | SIL | | CLA | | ORGANI MATTEI | | | V | | | | | | DIATELY AFTER | Y UHILL | .INU | |
| MATERIALS GEN, RATING | SAND | | | | | | | | | | | 1 | 4 | | STATIC W | VATER L | LEVEL AFT | ER _27 | _ HOURS | | | |
| AS A | EX | CELLEN | TO G | 000 | | F | AIR T | D P00 | R | FAIR TO POOR | POOR | UNSUITABLE | | | PERCHED | WATER, | , SATURATE | D ZONE, | OR WATER BEA | ARING S | STRATA | |
| SUBGRADE | NE 4 7 E | 011000 | 20110 10 | | | | | | | | | | O-W | (L | SPRING O | R SEEF | 2 | | | | | |
| Pit | JF A-7-5 | 20801 | | SISTE | | | | | | OUP IS > | LL - 30 | | | | | м | IISCELL | ANEOL | JS SYMBOL | 9 | | |
| | | Τ. | | NESS OR | | RANGE | E OF S | TANDA | RD | | F UNCONF | | ETT | | ***** | | | | | | SAMPLE | |
| PRIMARY | SOIL TYPE | ٠ ا | CONSIS | | PE | NETRA | rion Ri In-Vali | | NCE | | SSIVE STRI ONS/FT2 : | | | ROADWAY WITH SOI | | | (E) | OPT DET | CPT DMT TEST BOR PMT | RING | DESIGNATIONS | |
| GENER | A1 1 V | | VERY L | OOSE | | | 4 | | | | | | | - SOIL SYM | IDO) | | | Ф | AUGER BORING | • | S - BULK SAMPLE | |
| GRANUI | | | LOOS MEDIUM | | | | 4 TO | | | | N/A | | | | | | | \oplus | HOOSE BOXING | , | SS - SPLIT SPOON | |
| MATER | IAL COHESIVE) | | DENS | | | | 30 TO 50 | | | | | | | THAN ROA | | | | \triangle | CORE BORING | | SAMPLE | |
| WON I | .u. (LJIVL) | | VERY D | ENSE . | | | >50 | | | | | | MU | INFERRED | | | | \vee | | | ST - SHELBY TUBE SAMPLE | |
| GENER | A) 1 V | | VERY SI |)FT | | | (2 2 TO | 4 | | | <0.25 | | | | | | ' ' | "O | MONITORING W | VELL | RS - ROCK SAMPLE | |
| SILT-C | | | MEDIUM | | | | 4 TO | 8 | | | 25 TO 0.5 3.5 TO 1.0 | | THEME | INFERRED | ROCK LI | INE | | Δ | PIEZOMETER | | RT - RECOMPACTED TRIA | |
| MATER (COHE: | | | STIFF VERY S | | ı | | 8 TO 15 1 TO 2 15 TO 30 2 TO 4 | | | | | | | ALLUV]AL | SOIL BO | OUNDARY | Y | _ | INSTALLATION | | SAMPLE | HAIHL |
| \curre. | 3114 | | HARD | | | | >30 | | | | >4 | | | | | | | | CBR - CALIFORNIA BEAR | ING | | |
| | | | TE | XTURE | OF | GR | AIN | SIZE | Ξ , | | | | ROCK STRUCTURES RATIO SAMP SPT N-VALUE | | | | | | RATIO SAMPLE | | | |
| u.s. STD. SIE | VE SIZE | | | 4 | 10 | 40 | | 30 | 200 | 270 | | | • | SOUNDING | ROD | | | ÆF)— | SPT REFUSAL | | | |
| OPENING (MI | | | | | 2.00 | 0.42 | | | 0.075 | | | | | | | | | $\stackrel{\smile}{=}$ | | | | |
| BOULDE | e c | OBBLE | | RAVEL. | | COARS | | | FINE | | ILT | CLAY | AR - AI | IGER REFUS | :AI | | HI H | | ATIONS | | w - MOISTURE CONTENT | |
| (BLDR.) | | COB.) | | (GR.) | İ | SANI (CSE. | | | SAND (F SO | | SL.) | (CL.) | | RING TERM | | | | MEDIUM | | | V - VERY | |
| GRAIN M | м 305 | | 75 | | 2.0 | | | .25 | | 0.05 | 0.005 | | CL CL | .AY :ONE PENET | BATION 1 | теет | | MICACE MODERA | | | VST - VANE SHEAR TEST WEA WEATHERED | r |
| SIZE I | N. 12 | | 3 | | | | | | | | | | CSE C | | MATTON . | 1231 | | ON PLAS | | | 7 - UNIT WEIGHT 7 - DRY UNIT WEIGHT | |
| | | | MOIST | URE - | | _ | ATIO | ON C |)F T | ERMS | | | | DILATOMETE IYNAMIC PE | | N TEC | | ORGANIC | REMETER TEST | | $\gamma_{ m d}$ - DRY UNIT WEIGHT | |
| | MOISTURE RBERG LIM | | | | MOIS CRIPTI | | 0 | SUIDE | FOR I | FIELD MOIS | TURE DES | CRIPTION | | ID RATIO | MEINHIIL | 714 IES | | SAPROLI | | | | |
| /HIII | TOLING EN | 113/ | | | | | | | | | | ~~~~ | F - FIN | | 20110 | | | AND, SAN | | | | |
| | | | | | TURAT: | ED - | | | | OUID; VERY W THE GRO | | | | FOSSILIFEF FRACTURED | | RES | | ILT, SIL' SLIGHTL' | | | | |
| LL | LIOUI | LIMIT | Γ. | | | | | | | | | | FRAGS | FRAGMENT | s | | TCR - | TRICONE | REFUSAL | | | |
| PLASTIC RANGE < | | | | - w | ET - | (W) | | | | REQUIRES (| | | | | EOU | TDMEN | NT HEE | ח חאו | CHD TECT | ם חחח | ICCT | |
| (PI) PLL. | PLAST | IC LIM | IT. | | | | | ATTAL | N OPI | IMUM MOIS | TURE | - | | | EGUI | TI- MICT | VI USE | ט טוע | SUBJECT | | | |
| | | | | | | | | CO. 1 | | 00 NEAD 0 | OT11484 14 | 01011105 | DRILL UN | ITSı | | ADV | ANCING TO | DLS: | | 1 — | AMMER TYPE: | |
| OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE | | | | | | | | | UISTURE | Пмо | BILE B | | | CLAY BIT | s | | LX | AUTOMATIC MANU | AL | | | |
| JL . | SL SHRINKAGE LIMIT | | | | | | | | | 1 | [| o.cc | - | | 6" CONTIN | uous FLI | IGHT AUGER | CO | DRE SIZE: | | | |
| | - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | , | вк- | 51 | | X | 8' HOLLOW | ALICERS | | 1 ~ | - | | | |
| | PLASTICITY PLASTICITY | | | | | | | | | | | | | | HARD FAC | | | 1 | | | | |
| | PLASTICITY INDEX (PI) DRY STRENGTH | | | | | | | | | | L_I CME | -45C | | ᅵ屵 | | | | [X | -N_Q2_ | | | |
| NONPLASTIC | ONPLASTIC 0-5 VERY LOW | | | | | | | | | | X CME | -550x | | | TUNGCAR | | | [|]-H | | | |
| | W PLASTICITY 6-15 SLIGHT D. PLASTICITY 16-25 MEDIUM | | | | | | | | | _ | | | 빌 | | | ADVANCER | H | AND TOOLS: | | | | |
| | H PLASTICITY 26 OR MORE HIGH | | | | | | | | PO | RTABLE HOIS | ST | X | TRICONE_ | 213/16 ' ' | STEEL TEETH | | POST HOLE DIGGER | | | | | |
| | COLOR | | | | | | | | | П | | | | TRICONE_ | | TUNGCARB. | | HAND AUGER | | | | |
| DESCRIPTIO | NS MAY I | NCLUDE | COLOR | OR COLO | | | IONS ? | TAN. R | ED. Y | LLOW-RROW | VN. BLUF-C | RAY). | <u></u> | | | X | CORE BIT | | | [_ | SOUNDING ROD | |
| | | | | | | | | | | | | | | | | | | | | = | VANE SHEAR TEST | |
| | MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. | | | | | | | | | | | | | | • | | | 1 _ | .] = | | | |

| PROJECT REFERENCE NO. | SHEET NO. |
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| 17BP.13.R.80-Structure 990145 | IA |

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

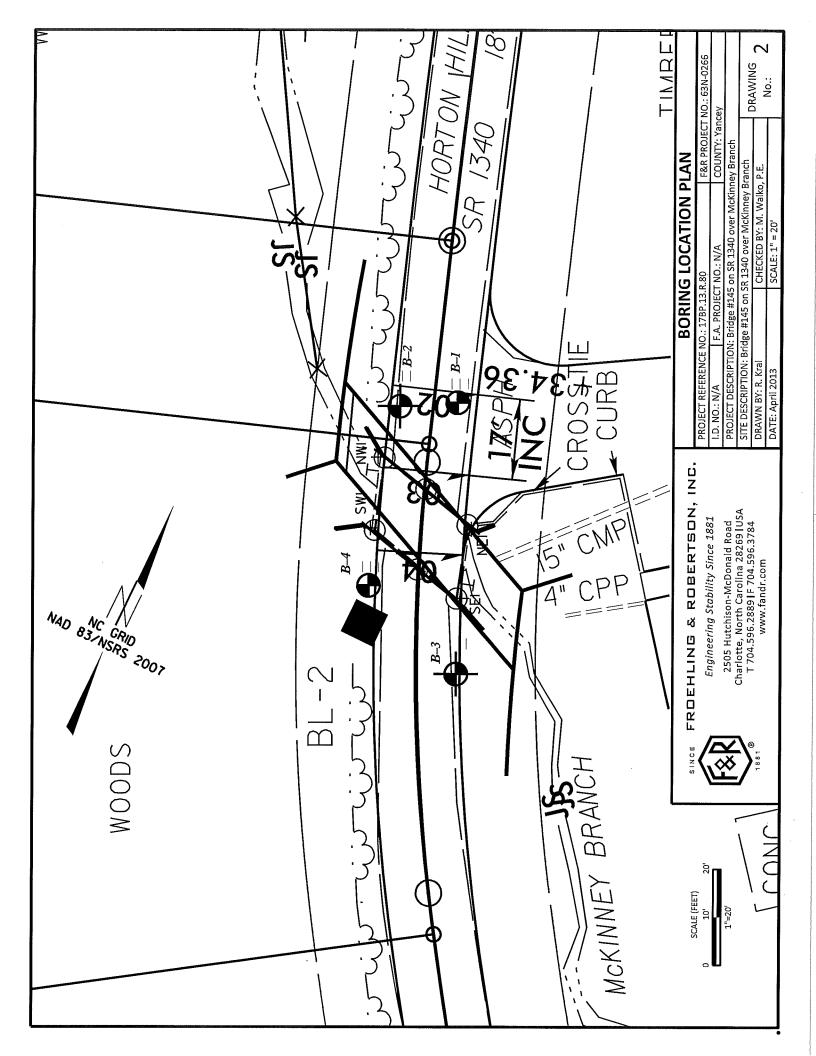
GEOTECHNICAL ENGINEERING UNIT SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

| | | | DOOL | DECCRIPTION | | TEDMO AND OSCILIZAÇÃO | | | | | | | |
|-------------------------------------|---------------------|--------------------------------|-----------------------------------|---|--|--|--|--|--|--|--|--|--|
| HARD ROCK | IS NON- | COASTAL PLAIN | MATERIAL THA | DESCRIPTION T IF TESTED, WOULD YIELD SPT REFL | JSAL. AN INFERRED | TERMS AND DEFINITIONS | | | | | | | |
| ROCK LINE | INDICATE | S THE LEVEL | AT WHICH NON-C | COASTAL PLAIN MATERIAL WOULD YIE SAMPLER EQUAL TO OR LESS THAN | LD SPT REFUSAL. | ACUIFER - A WATER BEARING FORMATION OR STRATA. | | | | | | | |
| IN NON-CO | ASTAL PL | AIN MATERIAL. | THE TRANSITIO | ON BETWEEN SOIL AND ROCK IS OFTE | N REPRESENTED BY A ZONE | ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. | | | | | | | |
| | | | DIVIDED AS FOLL | .OWS: | | ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, | | | | | | | |
| WEATHERED ROCK (WR) | | | BLOWS PER FOO | | | 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 NECESSABILY RISE TO OR ABOVE THE | | | | | | | |
| CRYSTALLINE ROCK (CR) | | 1 | WOULD YIELD SF GNEISS, GABBRO, | | INCLUDES GRANITE, | GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. | | | | | | | |
| NON-CRYSTALL ROCK (NCR) | LINE | | SEDIMENTARY RO | GRAIN METAMORPHIC AND NON-COAS CK THAT WOULD YEILD SPT REFUSAL ITE, SLATE, SANDSTONE, ETC. | TAL PLAIN . IF TESTED, ROCK TYPE | COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. | | | | | | | |
| COASTAL PLAT SEDIMENTARY (CP) | ROCK ROCK | | COASTAL PLAIN | SEDIMENTS CEMENTED INTO ROCK, BU OCK TYPE INCLUDES LIMESTONE, SANO | | CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOT LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. | | | | | | | |
| | | | | ATHERING | | DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. | | | | | | | |
| FRESH | | ESH, CRYSTALS IF CRYSTALLIN | | DINTS MAY SHOW SLIGHT STAINING. R | OCK RINGS UNDER | DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. | | | | | | | |
| VERY SLIGHT (V SLI.) | CRYSTAL | | N SPECIMEN FAC | ED, SOME JOINTS MAY SHOW THIN CL E SHINE BRIGHTLY, ROCK RINGS UND | | <u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH, | | | | | | | |
| SLIGHT (SLI.) | ROCK GE | NERALLY FRESI | H, JOINTS STAIN | ED AND DISCOLORATION EXTENDS INT NY. IN GRANITOID ROCKS SOME OCCAS | | FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO DNE ANOTHER PARALLEL TO THE FRACTURE, | | | | | | | |
| | CRYSTAL | s are dull a | NO DISCOLORED. | CRYSTALLINE ROCKS RING UNDER HAD DISCOLORATION AND WEATHERING EFF | MMER BLOWS. | FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. | | | | | | | |
| MODERATE (MOD.) | GRANITO | D ROCKS, MOST | FELDSPARS AR | E DULL AND DISCOLORED, SOME SHOW | CLAY, ROCK HAS | FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. | | | | | | | |
| | WITH FRE | ESH ROCK. | | D SHOWS SIGNIFICANT LOSS OF STRE | | FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. | | | | | | | |
| SEVERE (MOD, SEV.) | AND DISC AND CAN | OLORED AND A BE EXCAVATED | MAJORITY SHO | OR STAINED, IN GRANITOID ROCKS, A W KADLINIZATION. ROCK SHOWS SEVEN GIST'S PICK, ROCK GIVES 'CLUNK' SON | RE LOSS OF STRENGTH | <u>FORMATION (FM.)</u> A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. | | | | | | | |
| | | | D SPT REFUSAL | OD CTAINED DOOR E-0010 0-5 | on Eulopus aus analysis | JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. | | | | | | | |
| SEVERE (SEV.) | IN STREM | GTH TO STROK | IG SOIL. IN GRA | OR STAINED ROCK FABRIC CLEAR AN NITOID ROCKS ALL FELDSPARS ARE N ROCK USUALLY REMAIN. | | ITS LATERAL EXTENT. | | | | | | | |
| | | | N VALUES > 10 | | | <u>LENS</u> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <u>MOTTLED (MOTJ.</u> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN | | | | | | | |
| (V SEV.) | THE MASS | S IS EFFECTIVE | ELY REDUCED TO | OR STAINED. ROCK FABRIC ELEMENT D SOIL STATUS, WITH ONLY FRAGMENT | SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. | | | | | | | | |
| | | | | OF ROCK WEATHERED TO A DEGREE : IC REMAIN. <u>IF TESTED, YIELDS SPT</u> | | <u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM, | | | | | | | |
| | | | | NOT DISCERNIBLE, OR DISCERNIBLE OF IAY BE PRESENT AS DIKES OR STRING | | RESIDUAL IRES, SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. | | | | | | | |
| | ALSO AN | | | HARDNESS | OERS, SHEROLITE 15 | ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO DR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. | | | | | | | |
| VERY HARD | | | BY KNIFE OR | SHARP PICK. BREAKING OF HAND SPEC | CIMENS REQUIRES | EARPOLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. | | | | | | | |
| HARD | CAN BE | | | IST'S PICK. ONLY WITH DIFFICULTY, HARD HAMM | ER BLOWS REQUIRED | <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 | | | | | | | |
| MODERATELY HARD | EXCAVA1 | FED BY HARD B | | . GOUGES OR GROOVES TO 0.25 INCH OGIST'S PICK, HAND SPECIMENS CAN | | TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. | | | | | | | |
| MEDIUM HARO | CAN BE | EXCAVATED IN | SMALL CHIPS 1 | HES DEEP BY FIRM PRESSURE OF KN | | STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 148 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH | | | | | | | |
| SOFT | POINT O | F A GEOLOGIST GROVED OR GO | F'S PICK. RUGED READILY (| BY KNIFE OR PICK, CAN BE EXCAVATE | ED IN FRAGMENTS | A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PEMETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. <u>STRATA CORE RECOVERY (SREC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH | | | | | | | |
| VERY | PIECES | CAN BE BROKE | N BY FINGER PR | IZE BY MODERATE BLOWS OF A PICK RESSURE. EXCAVATED READILY WITH POINT OF | | OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY | | | | | | | |
| SOFT | OR MORE | IN THICKNESS | CAN BE BROKE | N BY FINGER PRESSURE, CAN BE SCA | RATCHED READILY 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. | | | | | | | |
| | ACTUR | E SPACIN | | BEDDING TERM |] THICKNESS | TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER, | | | | | | | |
| TERM VERY WIDE | | SPAC MORE THAN | | VERY THICKLY BEODED | > 4 FEET | BENCH MARK: SURVEY INFORMATION PROVIDED BY KCI | | | | | | | |
| MIDE | | 3 TO 10 F | EET | THICKLY BEDDED THINLY BEDDED | 1.5 - 4 FEET 0.16 - 1.5 FEET | ELEVATION: _ FT. | | | | | | | |
| MODERATEL CLOSE | | Ø.16 TO 1 | FEET | VERY THINLY BEDDED | 0.03 - 0.16 FEET | NOTES: | | | | | | | |
| VERY CLOS | 3 Ε | LESS THAN | 0.16 FEET | THINLY LAMINATED | 0.008 - 0.03 FEET < 0.008 FEET | - | | | | | | | |
| OR SEDIMENTA | ARY ROCKS | S, INDURATION I | | JRATION NG OF THE MATERIAL BY CEMENTING, | HEAT, PRESSURE, ETC. | | | | | | | | |
| | ABLE | | | WITH FINGER FREES NUMEROUS GRAIN LOW BY HAMMER DISINTEGRATES SAM | | | | | | | | | |
| FRI | | | | | | | | | | | | | |
| | ERATELY | INDURATED | | AN BE SEPARATED FROM SAMPLE WIT ASILY WHEN HIT WITH HAMMER. | H STEEL PROBE: | | | | | | | | |
| M00H | ERATELY JRATED | INDURATED | BREAKS E | | · | | | | | | | | |



| ı | : 2 | | | | C 100 1: 1 1 1 0 |
|----------|--------------|---------------------------|--|-----------------------|-------------------------------------|
| \vdash | | , P.E. | CHECKED BY: M. Walko, P.E. | | DRAWN BY: R. Kral |
| | DRAWING | 3ranch | SITE DESCRIPTION: Bridge #145 on SR 1340 over McKinney Branch | dge #145 on ! | SITE DESCRIPTION: Bri |
| | | ney Branch | PROJECT DESCRIPTION: Bridge #145 on SR 1340 over McKinney Branch | ۱: Bridge #145 | PROJECT DESCRIPTION |
| | cey | COUNTY: Yancey | T NO.: N/A | F.A. PROJECT NO.: N/A | I.D. NO.: N/A |
| 5 | NO.: 63N-026 | F&R PROJECT NO.: 63N-0266 | R.80 | 10.: 17BP.13. | PROJECT REFERENCE NO.: 17BP.13.R.80 |

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NCDOT BORE SINGLE 63N-0266-0005 - GROUP R BRIDGE 145.GPJ NC_DOT.GDT 4/24/13

| | _ \ | | UU | NL | | J r | \ <i>L</i> _ | URI | | | | | | | | | | | |
|--------------|--------------|---------------|-------------|--------|--------|------|---|-----------|----------------------|----------|---------|---------|-------|----|--------------------------------------|---|------------------------|--------------------------|-------------------|
| WBS | 17BP. | 13.R.8 | 0 | | TI | P N | I/A | | COUN | ΙΤΥ | Yancey | | | | GEOLOGI | ST R. Kral | | | |
| SITE | DESCR | IPTION | l Brid | ige 99 | 0145 c | n SF | R 1340 | across I | McKinne ₁ | y Brai | nch | | | | | | | GROUN | ID WTR (ft) |
| BOR | ING NO. | B-1 | | | S. | ΓΑΤΙ | ON 1 | 3+32 | | O | FFSET | 5 ft RT | | | ALIGNME | NT -L- | | 0 HR. | N/A |
| COLI | AR ELE | EV. 2, | 347.0 | ft | TO | OTAL | DEPT | H 11.5 | ft | N | ORTHING | 840,9 | 987 | | EASTING | 1,018,560 | | 24 HR. | 4.0 |
| DRILL | . RIG/HAI | MMER E | FF./DA | TE F8 | R3763 | CME- | 550X 81 | % 12/15/2 | 011 | <u> </u> | | DRILL I | METHO | DΗ | .S. Augers | | HAMM | ER TYPE | Automatic |
| DRIL | LER C | . Boyce | | | S | TART | DATE | 12/18/ | ′12 | C | OMP. DA | TE 12/ | 18/12 | | SURFACE | WATER DEP | TH N/ | Α | |
| ELEV (ft) | | DEPTH (ft) | T | 0.5ft | | 0 | 2 | BLOWS | S PER FOO | | | SAMP. | | LO | ELEV. (ft) | SOIL AND RO | | | DEPTH (ft) |
| 2350 | | - | | | | | | | | | | | | | <u>-</u> | | | | |
| 2345 | _2,347.0 | - 00 - | 6 | 5 | 8 | · | • • 13• | | - | | | SS-1 | 18% | | 2,347.0 2,346.4 - 2,345.5 - | Asphalt (2.5") ROADWAY | EMBAN | ase (4") KMENT | 0.0 0.5 1.5 |
| 2340 | 2,343.5° | - 3.5 - | 17 | 83/0.2 | | | · · · · · · · · · · · · · · · · · · · | | | ÷+· | 100/0.7 | | | | Bro | Dark brown sa own and tan silty (A-2-4) some | y fine to c | oarse SAN | ND |
| 2010 | 2,338.5 | - | 100/0.4 | | | | | | | | 100/0.4 | • | | | - 2,338.5 | Soil and Cobb WEATHE Gray and brown | RED RO | CK | 8.5 |
| | 2,335.5= | - 11.5 | 60/0.0 | | | 1: | | | | | 60/0.0 | | | | - <u>2,335.5</u> - - P | Gray and brown Boring Termina enetration Test ,335.5 ft On CF (BIOTIT | ated with Refusal a | Standard at Elevation | 11.5 |

TIP N/A WBS 17BP.13.R.80 **COUNTY** Yancey GEOLOGIST R. Kral / J. Harris SITE DESCRIPTION Bridge 990145 on SR 1340 across McKinney Branch GROUND WTR (ft) BORING NO. B-2 **STATION** 13+30 OFFSET 7 ft LT ALIGNMENT -L-0 HR. N/A COLLAR ELEV. 2,346.9 ft TOTAL DEPTH 23.5 ft **EASTING** 1,018,549 **NORTHING** 840,981 24 HR. 3.6 DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 81% 12/15/2011 DRILL METHOD NW Casing W/SPT & Core HAMMER TYPE Automatic DRILLER C. Boyce **START DATE** 12/18/12 COMP. DATE 12/18/12 SURFACE WATER DEPTH N/A DRIVE **BLOW COUNT BLOWS PER FOOT** SAMP DEPTH ELEV 0 SOIL AND ROCK DESCRIPTION (ft) (ft) 0.5ft | 0.5ft | 0.5ft 50 100 NO. MOI G ELEV. (ft) DEPTH (ft 2350 **GROUND SURFACE** 2,346.9. 0.0 Asphalt (2" 2,345.4 2345 ROADWAY EMBANKMENT 2,343.4 Dark brown fine to coarse sandy CLAY (A-6) 12 36 little rock fragments M 2,341.9 5.0 Brown and gray silty fine to coarse SAND (A-2-4) 2340 2,339.9 2,339.4 COLLUVIAL - 60/0.0 60/0.0 Brown and gray silty fine to coarse SAND (A-2-4) with cobbles Intermittent Boulders 2335 2.334.9 12.0 2,334.4 12.5 Brown and gray silty fine to coarse SAND 20 23 29 W (A-2-4) with cobbles Intermittent Boulders 2330 2,328.4 18.5 18.5 60/0.0 - 60/0.0 **CRYSTALLINE ROCK** Gray, black, tan and white BIOTITE GNEISS 2325 2,323.4 23.5 Boring Terminated at Elevation 2,323.4 ft In CRYSTALLINE ROCK (BIOTITE GNEISS) 1) Drillers used coring equipment (NQ-2) and roller cone to penetrate boulders in the colluvial layers. 63N-0266-0005 - GROUP R BRIDGE 145.GPJ NC_DOT.GDT 4/26/13

NCDOT BORE SINGLE

| VVD3 17 | BP.13.R.8 | 60 | | TIP | N/A | | С | OUNT | Υ ` | 'ancey | | GEOLOGIST R. Kral / | J. Harri | is | |
|-----------|-------------|-------------|---|-------------------|------------------------|--------------|--------------------------|-------------------------|------|------------------------|---|--|-----------------|----------------------|--------------|
| | CRIPTION | l Brid | lge 99014 | 15 on 8 | SR 134 | 40 across | McKi | nney | Bran | ch | | | | GROUND V | VTR (I |
| BORING | NO. B-2 | | | STA | TION | 13+30 | | | OF | FSET 7ftL7 | - | ALIGNMENT -L- | | 0 HR. | N/ |
| COLLAR | ELEV. 2, | 346.9 | ft | тот | AL DE | PTH 23. | 5 ft | | NC | RTHING 84 | 0,981 | EASTING 1,018,549 | | 24 HR. | 3. |
| DRILL RIG | HAMMER E | FF./DA | TE F&R3 | 763 CM | E-550X | 81% 12/15 | /2011 | | | DRIL | L METHOD NW | Casing W/SPT & Core | HAMM | ER TYPE Aut | omatic |
| ORILLER | C. Boyce | € | | STAI | RT DA | TE 12/1 | 8/12 | | CC | MP. DATE 1 | 2/18/12 | SURFACE WATER DEF | TH N/ | 'A | |
| CORE SI | E NQ-2 | | | | | N 5.0 ft | | | | | | | | | |
| LEV RU | V DEFIN | RUN (ft) | DRILL RATE | REC. (ft) % | JN RQD (ft) % | SAMP. NO. | STR REC. (ft) % | ATA RQD (ft) % | L O | | DE | ESCRIPTION AND REMARK | s | | |
| 28.41 | | | (Min/ft) | | <u>%</u> | | % | <u>%</u> | G | ELEV. (ft) | *************************************** | Begin Coring @ 18.5 ft | | | <u>DEPTH</u> |
| 2,32 | 8.4 18.5 | 5.0 | N=60/0.0 10:42/1.0 7:30/1.0 7:51/1.0 12:05/1.0 12:00/1.0 | (4.5) 90% | (3.4) 68% | | (4.5) 90% | (3.4) 68% | | - 2,328.4 - Gr - | | CRYSTALLINE ROCK white, very slightly to slightly osely spaced fractured BIOTI | weathere | ed, hard, very SS | 1 |
| 2,32 | 3.4 23.5 | | 12:05/1.0 12:00/1.0 | | | | | | | - 2,323.4 - | Boring Terminated | d at Elevation 2,323.4 ft In CF | RYSTALL | INE ROCK | 23 |
| | | | | | | | | | | - 11 | Drillers used cori | (BIOTITE GNEISS) ing equipment (NQ-2) and ro boulders in the colluvial layer | ller cone s. | to penetrate | |

NCDOT BORE SINGLE 63N-0266-0005 - GROUP R BRIDGE 145.GPJ NC_DOT.GDT

TIP N/A WBS 17BP.13.R.80 **COUNTY** Yancey GEOLOGIST R. Kral / J. Harris SITE DESCRIPTION Bridge 990145 on SR 1340 across McKinney Branch GROUND WTR (ft) BORING NO. B-3 **STATION** 12+75 OFFSET 8 ft RT ALIGNMENT -L-0 HR. N/A COLLAR ELEV. 2,348.8 ft TOTAL DEPTH 15.0 ft **NORTHING** 840,936 **EASTING** 1,018,584 24 HR. 4.0 DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 81% 12/15/2011 DRILL METHOD NW Casing W/SPT & Core **HAMMER TYPE** Automatic DRILLER C. Boyce **START DATE** 12/19/12 COMP. DATE 12/19/12 SURFACE WATER DEPTH N/A **BLOW COUNT BLOWS PER FOOT** SAMP. DEPTH ELEV SOIL AND ROCK DESCRIPTION (ft) (ft) 0.5ft 0.5ft 0.5ft 50 75 100 NO. (ft) MOI G ELEV. (ft) DEPTH (ft) 2350 **GROUND SURFACE** 2,348.8 2.348.8 0.0 5 ROADWAY EMBANKMENT М Dark brown silty fine to coarse SAND (A-2-4) little rock fragments 2345 2,345.3 3.5 2,345.3 60/0.2 18 40 COLLUVIAL SS-2 2,343.8 5.0 100/0.7 Brown and black sandy GRAVEL (A-1-a(0)) Intermittent Boulders 2,340.8 2340 2,340.3 WEATHERED ROCK 100/0.5 100/0.5 Brown and gray BIOTITE GNEISS 10,0 CRYSTALLINE ROCK Gray, black, tan and white BIOTITE GNEISS 2335 2.333.8 Boring Terminated at Elevation 2,333.8 ft In CRYSTALLINE ROCK (BIOTITE GNEISS) 1) Drillers used coring equipment (NQ-2) and roller cone to penetrate boulders in the colluvial layers.



| | 17BP. | | | RE E | TIP | | | | | | ′ancey | GEOLOGIST R. Kral / | J. Harri | s | |
|--|-------------|--------------------|---------------|----------------------------------|-----------|--------------|-----------------|-------------------|--------------|----------|--|---|--------------|--------------|-----------|
| ITE | DESCR | IPTION | I Brid | dge 9901 | 45 on \$ | SR 134 | 40 acros | s McKi | nney | Bran | ch | | | GROUNI | WTR (|
| OR | ING NO. | B-3 | | | STA | TION | 12+75 | | | OF | FSET 8 ft RT | ALIGNMENT -L- | | 0 HR. | N |
| COLLAR ELEV. 2,348.8 ft TOTAL DEPTH 15.0 ft | | | | | | NC | RTHING 840,936 | EASTING 1,018,584 | 24 HR. | 4 | | | | | |
| DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 81% 12/15/2011 | | | | | | | 81% 12/1 | 5/2011 | | · | DRILL METHOD NW | Casing W/SPT & Core | HAMM | ER TYPE | Automatio |
| RIL | LER C. | Boyce | Э | | STAI | RT DA | TE 12/1 | 9/12 | | CC | MP. DATE 12/19/12 | SURFACE WATER DEF | | | |
| OR | E SIZE | NQ-2 | | | TOTA | AL RUI | N 5.0 ft | | | | | | | - | |
| .EV | RUN ELEV | DEPTH | RUN | DRILL RATE | REC. | JN RQD | SAMP. | STR REC. | ATA RQD | L | 5 | ECODIDITION AND DEMARK | | | |
| ft) | (ft) | (ft) | (ft) | (Min/ft) | (ft) % | (ft) % | NO. | (ft) % | (ft) % | G | ELEV. (ft) | ESCRIPTION AND REMARK | .5 | | DEPTH |
| 8.82 | 0.000.0 | 40.0 | | | | | | | | | | Begin Coring @ 10.0 ft | | | |
| | 2,338.8 | 10.0 | 5.0 | 3:52/1.0 3:52/1.0 | 98% | (3.6) 72% | | (4.9) 98% | (3.6) 72% | | - 2,338.8 - Gray, black, tan and | CRYSTALLINE ROCK white, very slightly to slightly | weathere | d. hard. ver | 1 v |
| 35 | | - | | 4:48/1.0 5:21/1.0 3:25/1.0 | | | | | | | - close to modera | tely closely spaced fractured | BIOTITE | GNEISS | , |
| - | 2,333.8 | <u>. 15.0</u> - | | 3:25/1.0 | | | | | | | 2,333.8 Boring Terminated | d at Elevation 2,333.8 ft In CF | RYSTALLI | NE ROCK | 1 |
| | 1 | - | | | | | | | | | • | (BIOTITE GNEISS) | | TE NOON | |
| | + | - | | | | | | | | | 1) Drillers used cor | ing equipment (NQ-2) and ro | iller cone t | to penetrate | |
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NCDOT CORE SINGLE 63N-0266-0005 - GROUP R BRIDGE 145.GPJ NC_DOT.GDT 4/26/13

| | 17BP. | | | | | IP N | | | | | | | ancey | | | | GEOLOGIST R. Kral |
|--------------|-----------------------|---------------|--------------|--------|--------|------|---------|---------------|---------|-----------|------|---------------------------------------|--------|---------------|-------|-------------|---|
| SITE | DESCR | IPTION | l Brid | ige 99 | | | | | | lcKi | nney | · · · · · · · · · · · · · · · · · · · | | | | | GROUND WTR (ft) |
| BOR | ING NO. | B-4 | | | S | TATI | ON 1 | 2+9 | 3 | | | OF | SET | 10 ft LT | - | | ALIGNMENT -L- 0 HR. N/A |
| COL | LAR ELE | V. 2, | 348.5 | ft | T | OTAI | . DEP | TH | 7.5 ft | | | NOI | RTHING | 3 840, | 945 | | EASTING 1,018,560 24 HR. 2.8 |
| DRIL | L RIG/HAN | MER E | FF./DA | TE F | &R3763 | CME | -550X 8 | 31% 1 | 2/15/20 |)11 | | | | DRILL | METHO | D H | H.S. Augers HAMMER TYPE Automatic |
| DRIL | LER C | Boyce | · | | | TAR | DAT | | | | | | MP. DA | TE 12 | | | SURFACE WATER DEPTH N/A |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLC 0.5ft | 0.5ft | | 0 | | BI 25 1 | LOWS | PER 50 | F001 | 75 1 | 100 | SAMP NO. | MO | L O G | SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft |
| 2350 | 2,345.0 | - | 60/0.0 | 14 | 12 | | | 1. | | : | | | 60/0.0 | | W | | - 2,348.5 GROUND SURFACE 0.1 ROADWAY EMBANKMENT Brown and orange silty fine to coarse SAND (A-2-4) some rock fragments Cobbles from 5 to 7.5 feet 2,341.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 2,341.0 ft On CRYSTALLINE ROCK (BIOTITE GNEISS) (BIOTITE GNEISS) |
| | | | | | | | | | | | | | | | | | |