

| | | | |
|-------|-----------------------------|-----------|--------------|
| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
| N.C. | 17BP.12.R.44 | 1 | 7 |

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY Cleveland
PROJECT DESCRIPTION DIVISION 12 LOW IMPACT
BRIDGE REPLACEMENT
SITE DESCRIPTION BRIDGE NO. 022356 ON SR 1159
(SKINNER ROAD) OVER BEAVERDAM CREEK
TRIBUTARY

CONTENTS

| <u>SHEET NO.</u> | <u>DESCRIPTION</u> |
|------------------|---------------------|
| 1 | TITLE SHEET |
| 2, 2A | LEGEND |
| 3 | BORING LOCATION MAP |
| 4-7 | BORE LOGS |

PERSONNEL

P. Weaver
J. White
D. Jeffreys

INVESTIGATED BY ESP Associates, P.A.
DRAWN BY P. Petrucci
CHECKED BY P. Weaver
SUBMITTED BY ESP Associates, P.A.
DATE June, 2015

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 - 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.

Paul M. Weaver
SIGNATURE

6/17/2015
DATE

REFERENCE: N/A

PROJECT: 17BP.12.R.44

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT





SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS
(PAGE 1 OF 2)

| SOIL DESCRIPTION | | | | | | | | | | GRADATION | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|
| SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6 | | | | | | | | | | WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES. | | | | | | | | | |
| SOIL LEGEND AND AASHTO CLASSIFICATION | | | | | | | | | | ANGULARITY OF GRAINS | | | | | | | | | |
| GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS | | | | | | | | | | MINERALOGICAL COMPOSITION | | | | | | | | | |
| GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1-A2, A-3, A-4, A-5, A-6, A-7 | | | | | | | | | | MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. | | | | | | | | | |
| SYMBOL | | | | | | | | | | COMPRESSIBILITY | | | | | | | | | |
| % PASSING #10, #40, #200 | | | | | | | | | | SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50 | | | | | | | | | |
| MATERIAL PASSING #40 LL, PI | | | | | | | | | | PERCENTAGE OF MATERIAL | | | | | | | | | |
| GROUP INDEX | | | | | | | | | | ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL | | | | | | | | | |
| USUAL TYPES OF MAJOR MATERIALS | | | | | | | | | | TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE | | | | | | | | | |
| GEN. RATING AS SUBGRADE | | | | | | | | | | GROUND WATER | | | | | | | | | |
| EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR POOR UNSUITABLE | | | | | | | | | | ▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▽ STATIC WATER LEVEL AFTER 24 HOURS ▽PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA ○ SPRING OR SEEP | | | | | | | | | |
| CONSISTENCY OR DENSENESS | | | | | | | | | | MISCELLANEOUS SYMBOLS | | | | | | | | | |
| PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | | | | | | | | | | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION 25/825 DIP & DIP DIRECTION OF ROCK STRUCTURES SOIL SYMBOL SPT DMT VST PMT TEST BORING ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CORE BORING MONITORING WELL INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY | | | | | | | | | |
| TEXTURE OR GRAIN SIZE | | | | | | | | | | RECOMMENDATION SYMBOLS | | | | | | | | | |
| U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053 | | | | | | | | | | UNDERCUT EXCAVATION UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | | | | | | | | | |
| GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3 | | | | | | | | | | ABBREVIATIONS | | | | | | | | | |
| SOIL MOISTURE - CORRELATION OF TERMS | | | | | | | | | | AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL. - CLAY MOD. - MODERATELY ? - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC 7/2 - DRY UNIT WEIGHT CSE. - COARSE PMT - PRESSUREMETER TEST DMT - DILATOMETER TEST SAP. - SAPROLITIC DPT - DYNAMIC PENETRATION TEST SD. - SAND, SANDY SL. - SILT, SILTY e - VOID RATIO FOSS. - FOSSILIFEROUS S.I. - SLIGHTLY f - FINE FRAC. - FRACTURED, FRACTURES TCR - TRICONE REFUSAL FRAGS. - FRAGMENTS w - MOISTURE CONTENT HI. - HIGHLY HI. - HIGHLY | | | | | | | | | |
| PLASTICITY | | | | | | | | | | EQUIPMENT USED ON SUBJECT PROJECT | | | | | | | | | |
| PLASTICITY INDEX (PI) DRY STRENGTH | | | | | | | | | | DRILL UNITS: CME-45C CME-55 CME-550 VANE SHEAR TEST PORTABLE HOIST CME-550X | | | | | | | | | |
| NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC | | | | | | | | | | 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 3/4" HOLLOW AUGER | | | | | | | | | |
| COLOR | | | | | | | | | | HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B H N HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST | | | | | | | | | |
| 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. | | | | | | | | | | | | | | | | | | | |

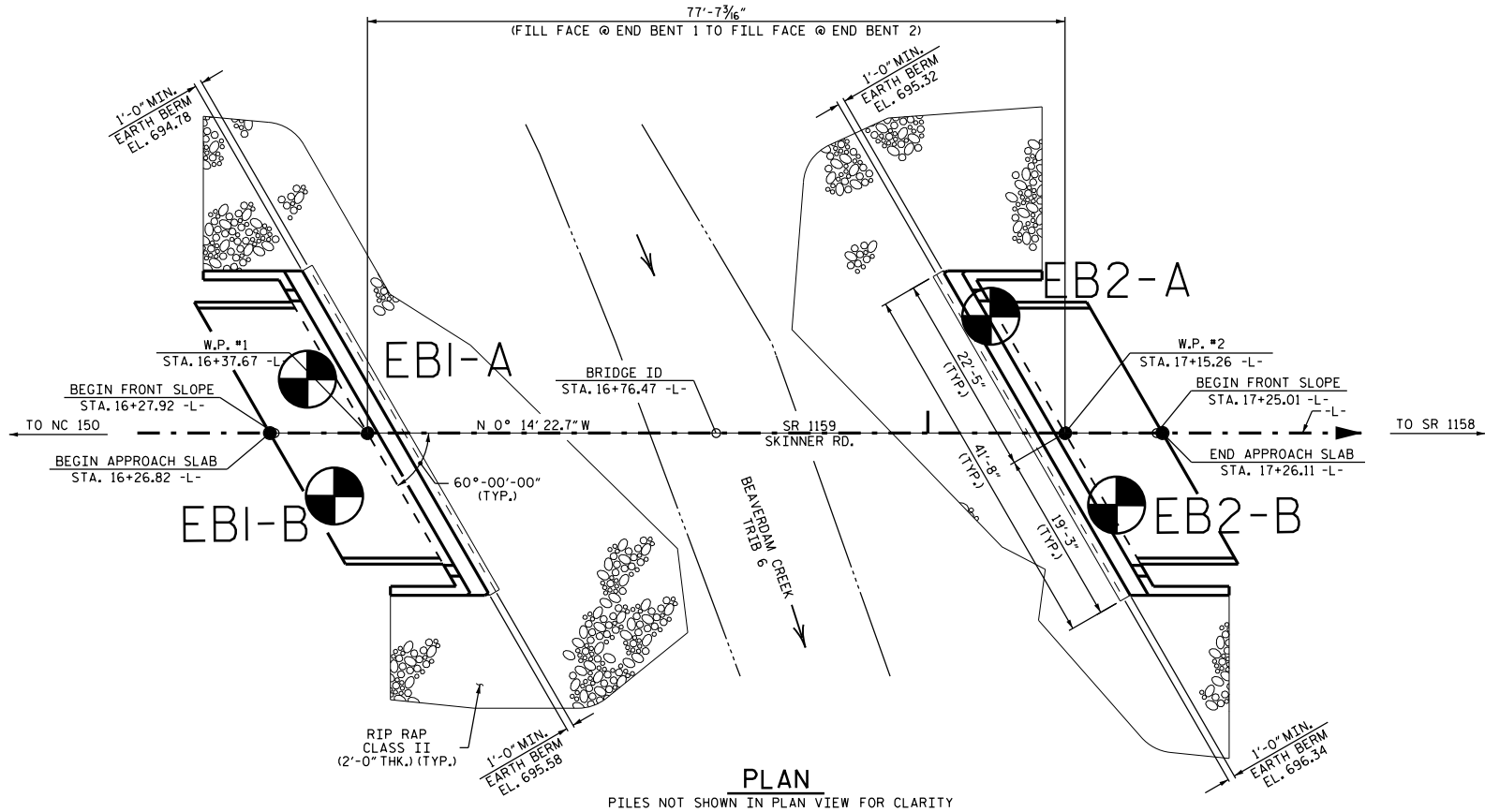
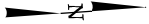
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT**

SUBSURFACE INVESTIGATION

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

| ROCK DESCRIPTION | | TERMS AND DEFINITIONS |
|--|---|---|
| <p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p> | | <p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. 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, SUCH 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 (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. 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 (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. 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 (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.</p> |
| WEATHERED ROCK (WR) |  | NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. |
| CRYSTALLINE ROCK (CR) |  | FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. |
| NON-CRYSTALLINE ROCK (NCR) |  | FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. |
| COASTAL PLAIN SEDIMENTARY ROCK (CP) |  | COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC. |
| WEATHERING | | |
| FRESH | | ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. |
| VERY SLIGHT (V SL.) | | ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. |
| SLIGHT (SL.) | | ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. |
| MODERATE (MOD.) | | SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. |
| MODERATELY SEVERE (MOD. SEV.) | | ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> |
| SEVERE (SEV.) | | ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i> |
| VERY SEVERE (V SEV.) | | ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i> |
| COMPLETE | | ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE. |
| ROCK HARDNESS | | |
| VERY HARD | | CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. |
| HARD | | CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. |
| MODERATELY HARD | | CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. |
| MEDIUM HARD | | CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. |
| SOFT | | CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. |
| VERY SOFT | | CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL. |
| FRACTURE SPACING | | BEDDING |
| TERM | SPACING | TERM |
| VERY WIDE | MORE THAN 10 FEET | THICKNESS |
| WIDE | 3 TO 10 FEET | VERY THICKLY BEDDED |
| MODERATELY CLOSE | 1 TO 3 FEET | THICKLY BEDDED |
| CLOSE | 0.16 TO 1 FOOT | THINLY BEDDED |
| VERY CLOSE | LESS THAN 0.16 FEET | VERY THINLY BEDDED |
| | | THICKLY LAMINATED |
| | | THINLY LAMINATED |
| | | < 0.008 FEET |
| INDURATION | | |
| FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. | | |
| FRIABLE | | RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. |
| MODERATELY INDURATED | | GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. |
| INDURATED | | GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. |
| EXTREMELY INDURATED | | SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS. |
| | | BENCH MARK: BM#1: COTTON SPIKE IN 20' SYCAMORE, |
| | | -L- STA 15+04.64, 45.58' LT |
| | | ELEVATION: 703.64 FEET |
| NOTES: | | |
| F.I.A.D. = FILLED IMMEDIATELY AFTER DRILLING | | |
| DATE: 8-15-14 | | |

| | |
|-----------------------|-----------|
| PROJECT REFERENCE NO. | SHEET NO. |
| 17BP.12.R.44 | 3 |
| SITE PLAN | |
| | |



GEOTECHNICAL BORING REPORT BORE LOG

| WBS 17BP.12.R.44 | | | TIP N/A | | | COUNTY CLEVELAND | | | GEOLOGIST Weaver, P.M. | | | | | | |
|---|-----------------|------------|---------------------|-------|-------|--------------------------|----|----|-------------------------|-----|-----------|---------|---------------------------|------------|--------|
| SITE DESCRIPTION Bridge No. 022356 on SR 1159 (Skinner Road) over Beaverdam Creek Tributary | | | | | | | | | GROUND WTR (ft) | | | | | | |
| BORING NO. EB1-B | | | STATION 16+34 | | | OFFSET 7 ft RT | | | ALIGNMENT -L- | | | | | | |
| COLLAR ELEV. 702.2 ft | | | TOTAL DEPTH 15.5 ft | | | NORTHING 557,149 | | | EASTING 1,214,259 | | | | | | |
| DRILL RIG/HAMMER EFF./DATE SDS8513 CME-550X 91% 09/05/2014 | | | | | | DRILL METHOD H.S. Augers | | | HAMMER TYPE Automatic | | | | | | |
| DRILLER J. White | | | START DATE 06/15/15 | | | COMP. DATE 06/15/15 | | | SURFACE WATER DEPTH N/A | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG MOI | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 705 | | | | | | | | | | | | | | | |
| 700 | 698.7 | 3.5 | 3 | 3 | 5 | | | | | | | | | | |
| 695 | 693.7 | 8.5 | 7 | 7 | 3 | | | | | | | | | | |
| 690 | 688.7 | 13.5 | 59 | 9 | 17 | | | | | | | | | | |
| | 686.7 | 15.5 | 60/0.0 | | | | | | | | | | | | 60/0.0 |

| | | | | | |
|--|-------|--|---|--|------|
| | 702.2 | | GROUND SURFACE | | 0.0 |
| | 701.7 | | Asphalt | | 0.5 |
| | | | ROADWAY EMBANKMENT | | |
| | | | Brown and Red, Medium Stiff to Stiff, Fine Sandy, Silty CLAY (A-6), Micaceous | | |
| | 696.0 | | RESIDUAL | | 6.2 |
| | | | Reddish Brown, Loose to Medium Dense, Silty, Coarse to Fine SAND (A-2-4) with Little Mica | | |
| | 691.2 | | Gray with Black, Silty, Fine SAND and Rock Fragments (A-1-b), Micaceous | | 11.0 |
| | 688.2 | | Reddish Brown with Tan and Black, Very Stiff, Fine Sandy SILT (A-4), Micaceous | | 14.0 |
| | 686.8 | | WEATHERED ROCK | | 15.4 |
| | 686.7 | | BIOTITE GNEISS | | 15.5 |

Boring Terminated with Standard Penetration Test Refusal at Elevation 686.7 ft On Crystalline Rock: BIOTITE GNEISS

Boring Offset from Bent Due to Overhead Powerlines

NCDOT BORE SINGLE BRIDGE 356 GINT LOGS.GPJ NC_DOT.GDT 6/17/15

GEOTECHNICAL BORING REPORT

BORE LOG

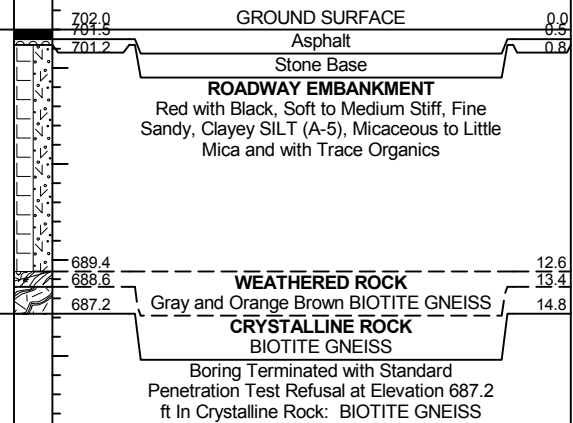
| WBS 17BP.12.R.44 | | | TIP N/A | | | COUNTY CLEVELAND | | | GEOLOGIST Weaver, P.M. | | | | | | | | |
|---|-----------------|------------|---------------------|-------|-------|--------------------------|----|----|-------------------------|-----------------|-----------|-----|-----|---|--|------|------|
| SITE DESCRIPTION Bridge No. 022356 on SR 1159 (Skinner Road) over Beaverdam Creek Tributary | | | | | | | | | | GROUND WTR (ft) | | | | | | | |
| BORING NO. EB2-A | | | STATION 17+07 | | | OFFSET 13 ft LT | | | ALIGNMENT -L- | | | | | | | | |
| COLLAR ELEV. 701.5 ft | | | TOTAL DEPTH 13.0 ft | | | NORTHING 557,222 | | | EASTING 1,214,239 | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE SDS8513 CME-550X 91% 09/05/2014 | | | | | | DRILL METHOD H.S. Augers | | | HAMMER TYPE Automatic | | | | | | | | |
| DRILLER J. White | | | START DATE 06/15/15 | | | COMP. DATE 06/15/15 | | | SURFACE WATER DEPTH N/A | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | | |
| 705 | | | | | | | | | | | | | | | | | |
| 700 | | | | | | | | | | | | | | 701.5 | GROUND SURFACE | 0.0 | |
| | 698.0 | 3.5 | 2 | 3 | 4 | | | | | | | | M | ROADWAY EMBANKMENT Reddish Brown, Soft to Medium Stiff, Fine Sandy, Clayey SILT (A-5) with Little Mica | | | |
| 695 | | | | | | | | | | | | | | | | | |
| | 693.0 | 8.5 | 2 | 1 | 3 | | | | | | | | M | | | | |
| 690 | | | | | | | | | | | | | | 690.0 | | 11.5 | |
| | 688.5 | 13.0 | 60/0.0 | | | 60/0.0 | | | | | | | | | WEATHERED ROCK BIOTITE GNEISS | | 13.0 |
| | | | | | | | | | | | | | | | Boring Terminated with Standard Penetration Test Refusal at Elevation 688.5 ft On Crystalline Rock: BIOTITE GNEISS | | |

NCDOT BORE SINGLE BRIDGE 358 GINT LOGS.GPJ NC_DOT.GDT 6/17/15

GEOTECHNICAL BORING REPORT BORE LOG

| | | | |
|---|---------------------|--------------------------|-------------------------|
| WBS 17BP.12.R.44 | TIP N/A | COUNTY CLEVELAND | GEOLOGIST Weaver, P.M. |
| SITE DESCRIPTION Bridge No. 022356 on SR 1159 (Skinner Road) over Beaverdam Creek Tributary | | | GROUND WTR (ft) |
| BORING NO. EB2-B | STATION 17+21 | OFFSET 8 ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 702.0 ft | TOTAL DEPTH 14.8 ft | NORTHING 557,236 | EASTING 1,214,260 |
| DRILL RIG/HAMMER EFF./DATE SDS8513 CME-550X 91% 09/05/2014 | | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic |
| DRILLER J. White | START DATE 06/15/15 | COMP. DATE 06/15/15 | SURFACE WATER DEPTH N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|-----|---------------------------|------------|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 705 | | | | | | | | | | | | | | | | |
| 700 | | | | | | | | | | | | | | | | |
| | 698.5 | 3.5 | 2 | 1 | 2 | | | | | | | | | | | |
| 695 | | | | | | | | | | | | | | | | |
| | 693.5 | 8.5 | 1 | 1 | 3 | | | | | | | | | | | |
| 690 | | | | | | | | | | | | | | | | |
| | 688.5 | 13.5 | | | | | | | | | | | | | | |
| | 687.2 | 14.8 | 60/0.1 | | | | | | | | | | | | | |
| | | | 60/0.0 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |



NCDOT BORE SINGLE BRIDGE 358 GINT LOGS.GPJ NC_DOT.GDT 6/17/15