| STATE | STATE PROJECT REFERENCE NO. | SHEET<br>NO. | TOTAL<br>SHEETS |
|-------|-----------------------------|--------------|-----------------|
| N.C.  | 17BP.13.R.126               | 1            | 11              |

### STATE OF NORTH CAROLINA

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

### **STRUCTURE** SUBSURFACE INVESTIGATION

| PROJ. REI | FERENCE NO. | _17BP.13.F | R.126 | <u> </u> |    | Т  | IP PR | oJ. <i>NA</i> |      |       |
|-----------|-------------|------------|-------|----------|----|----|-------|---------------|------|-------|
| COUNTY    | Yancey      |            |       |          |    |    |       |               |      |       |
| PROJECT   | DESCRIPTION | Structure  | No.   | 990026   | on | SR | 1323  | (Shoal Ci     | reek | Road) |
| over Shoo | al Creek    |            |       |          |    |    |       |               |      |       |
|           |             |            |       |          |    |    |       |               |      |       |

### **CONTENTS**

### SHEET **DESCRIPTION** ļ TITLE SHEET **LEGEND** 2, 2A 3 SITE PLAN BORING LOCATION PLAN 4 BORE LOG REPORTS, CORE REPORTS, & ROCK CORE PHOTOS 5-10

|   | ۲ | Ł | K | 2 | U | N | N | Ł, |
|---|---|---|---|---|---|---|---|----|
| _ |   |   |   |   |   |   |   |    |

C. Boyce S. Joyner

M. Brewer, E.I.

INVESTIGATED BY F&R, Inc.

M. Walko, P.E. CHECKED BY

F&R, Inc. SUBMITTED BY\_\_\_

July 2014 DATE \_\_\_

CAUTION NOTICE

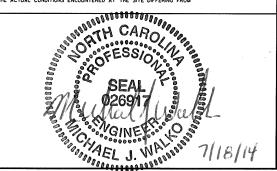
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES, THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHMICAL ENGINEERING UNIT AT (1919) 107-6850. 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 BORNOS 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 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 PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OF ACCURACY OF THE INVESTIGATION MADE, ROP THE INTERPRETATIONS MADE, OR OPPOINT OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTEDED TO CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HAUSELF AS TO CONDITIONS TO BE ENCOUNTEDED ON THIS PROJECT. THE CONTRACTOR IS CAUTIONED TO LAMB FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE STEP DIFFERING FROM THOSE SIDESURFACE 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.126     |     | 2     |     |

### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

### DIVISION OF HIGHWAYS

### GEOTECHNICAL ENGINEERING UNIT

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

|                                 |  |  |                         | SOIL [                  | DESCR                | IPTIO                   | N                 |                |                          |                                  |            |                      |                        |                                 |                   |                         |                 |                        | ATION                           |                    |                          |                     |      |
|---------------------------------|--|--|-------------------------|-------------------------|----------------------|-------------------------|-------------------|----------------|--------------------------|----------------------------------|------------|----------------------|------------------------|---------------------------------|-------------------|-------------------------|-----------------|------------------------|---------------------------------|--------------------|--------------------------|---------------------|------|
| THAT CAN E                      | ISIDERED TO<br>BE PENETRATI<br>PER FOOT ACTION IS BASE | ED WIT                                 | TH A CONTI              | NUOUS FLIG<br>NDARD PEN | GHT POWE<br>ETRATION | R AUGE<br>TEST          | R, AND<br>(AASHT) | YIELD          | LESS THAN                | 1<br>586), SOIL                  | s          | POORLY I             | <u>I</u> - IN<br>GRADE | DICATES THAT<br>ED)             | SOIL              | PARTI<br>RE OF          | UNIFORM         | ALL PART               | PARTICLE SIZES APPROXIMATELY TH | IE SAME<br>MORE SI | SIZE. (ALSO              | RSE.                |      |
| CONSISTENC                      | Y, COLOR, TEX<br>OGICAL COMP                           | KTURE.                                 | MOISTURE,               | AASHTO CL               | ASSIFICA'            | TCON, AN                | D OTHE            | R PER          | RTINENT FAC              |                                  |            | THE AND              | IGUIL AF               | RITY OR ROUNE                   | INFSS             |                         |                 |                        | OF GRAINS ESIGNATED BY THE      |                    | ANGUI AR.                |                     |      |
|                                 |  |  | GRAY, SILTY CLA         |                         |                      |                         |                   |                |                          |                                  |            |                      |                        | SUBROUNDED.                     |                   |                         |                 |                        |                                 |                    | - Intoocharj             |                     |      |
|                                 |  |  | _EGEND                  |                         |                      |                         |                   |                | ATION                    |                                  |            |                      |                        |                                 |                   |                         |                 |                        | COMPOSITION                     |                    |                          |                     |      |
| GENERAL<br>CLASS.<br>GROUP      |  |  | R MATERIA<br>ASSING #20 |                         | (> 3                 | CLAY N<br>5% PAS<br>A-5 | SING #2           |                |                          | NIC MATER                        | IALS       | WHENEVER             | R THE                  | EY ARE CONSIL                   | JAH I Z,<br>DERED | OF SIG                  | ONIFICANO       | Œ.                     | SIBILITY                        | USED IN            | DESCRIPTIO               | ONS                 |      |
| CLASS.                          | A-1-a A-1-b  |  |                         | 5 A-2-6 A-              | 2-7                  | 177                     |                   | A-7-5<br>A-7-6 | A-1, A-2<br>A-3          | A-6, A-7                         |            |                      |                        | GHTLY COMPRE                    |                   |                         | COM             | NES                    | LIQUID LIMIT                    | LESS 1             | THAN 3I                  |                     |      |
| SYMBOL                          |  |  |                         |                         | 8                    | 7.7                     |                   |                |                          |                                  |            |                      |                        | DERATELY COM<br>HLY COMPRESS    |                   | BLE                     |                 |                        | LIOUID LIMIT<br>LIOUID LIMIT    | EQUAL              | TO 31-50                 |                     |      |
| % PASSING<br># 10               | EQ. NV   |  |                         |                         |                      |                         |                   | •              | CDANU AD                 | SILT-                            | MUCK,      |                      |                        |                                 | CDA               |                         |                 |                        | OF MATERIA                      | łL                 |                          |                     |      |
| * 40                            | 50 HX<br>30 HX 50 HX<br>15 HX 25 HX                    | 51 MN<br>10 MX                         | 35 MX 35 M              | 1X 35 MX 35             | MX 36 M              | 36 MN                   | 36 MN             | 36 MN          | GRANULAR<br>SOILS        | CLAY<br>SOILS                    | PEAT       | TRACE OF             | F ORC                  | <u>MATERIAL</u><br>SANIC MATTER | 2                 | ANULAF<br>SOILS<br>- 3% | 3               | - CLA<br>301LS<br>- 5% |                                 | OTHER<br>PACE      | MATERIAL<br>1 - 10%      |                     |      |
| LIOUID LIMIT<br>PLASTIC INDEX   | 6 MX   | NP                                     | 40 MX 41 M              | N 40 MX 41              | MN 40 MX             | 41 MN<br>10 MX          | 48 MX             | 41 MN<br>11 MN | SOILS                    |                                  |            | MODERATE<br>HIGHLY O | ELY (                  |                                 | 5                 | - 5%<br>- 10%<br>>10%   | 12              | - 12%<br>- 20%<br>20%  | 50                              | TTLE<br>IME        | 10 - 20%<br>20 - 35%     | 4                   |      |
| GROUP INDEX                     | 0  | ø                                      | e                       | 4 MX                    | _                    | 12 MX                   |                   |                | LITTLE<br>MODER          | ATE                              | HIGHLY     | MIGHET 0             | UNUHIN                 | iic .                           |                   | 7167.                   |                 |                        | WATER                           | GHLY               | 35% AND                  | ABOVE               |      |
| USUAL TYPES                     |  | FINE                                   | SILTY                   | OR CLAYEY               |                      | LTY                     | CLA               |                | AMOUN<br>ORGAN           |                                  | SOILS      | 又                    |                        | WATER                           | LEVEL             | IN B                    |                 |                        | EDIATELY AFTER                  | DRILLIN            | ıg                       |                     |      |
| MATERIALS                       | GRAVEL, AND<br>SAND                                    | SAND                                   |                         | AND SAN                 |                      | ils                     | SOIL              |                | MATTE                    |                                  |            | _                    | _                      |                                 |                   |                         |                 | _                      | 4 HOURS                         |                    |                          |                     |      |
| Gen, rating<br>as a<br>subgrade | EXC  | ELLEN                                  | IT TO GOO               | D                       |                      | FAIR T                  | 0 P00I            | 2              | FAIR TO<br>POOR          | POOR                             | UNSUITABLE | \ \nabla_Pw          |                        |                                 |                   |                         | ATURATE         | ZONE                   | , OR WATER BEAR                 | ING STR            | RATA                     |                     |      |
| PI (                            | OF A-7-5   | SUBGF                                  |                         |                         |                      |                         |                   |                | OUP IS >                 | LL - 30                          |            | Ou                   | <u> </u>               | SPRING                          | OR SE             |                         |                 |                        |                                 | _                  |                          |                     |      |
|                                 |  | Τ.                                     |                         | ISTENC                  |                      | DEN<br>E OF 9           |                   |                | RANGE (                  | OF UNCONF                        | INED       |                      |                        |                                 |                   | MIS                     |                 |                        | US SYMBOLS                      | <u> </u>           |                          |                     |      |
| PRIMARY                         | SOIL TYPE  | _                                      | CONSIST                 | ENCY                    | PENETRA              |                         | ESISTE            |                | COMPRES                  | SSIVE STR<br>ONS/FT <sup>2</sup> | ENGTH      |                      |                        | DADWAY EMBAI<br>TH SOIL DES     |                   |                         |                 | O SP OP OP             | TONT TEST BORII                 | NG                 | <b>•</b>                 | TEST BOI<br>W/ CORE |      |
| GENER                           |  |  | VERY LOO<br>LOOSE       | SE                      |                      | <4<br>4 TO              | 10                |                |                          |                                  |            | <u> </u>             | - so                   | IL SYMBOL                       |                   |                         |                 | Ψ                      | AUGER BORING                    |                    | 0-                       | SPT N-VA            | +LUE |
| GRANUI<br>MATER                 | IAL  |  | MEDIUM D                | ENSE                    |                      | 10 TO                   | 30                |                |                          | N/A                              |            |                      |                        | TIFICIAL FIL                    |                   |                         |                 | $\bigcirc$             | CORE BORING                     |                    | REF)—                    | SPT REFU            | JSAL |
| (NON-C                          | COHESIVE)  |  | VERY DEN                |                         |                      | 30 TO<br>>50            |                   |                |                          |                                  |            |                      |                        | IAN ROADWAY                     |                   |                         |                 | Υ<br>Ό                 | MONITORING WE                   | LL                 |                          |                     |      |
| GENER                           |  |  | VERY SOF<br>SOFT        |                         |                      | <2<br>2 TO              |                   |                | Ø.                       | <0.25<br>.25 TO 0.5              | 50         | =111=711 <u>=</u>    |                        | FERRED ROCK                     |                   | init i                  |                 | Δ                      | PIEZOMETER                      |                    |                          |                     |      |
| SILT-C<br>MATER                 |  |  | MEDIUM S<br>STIFF       | TIFF                    |                      | 4 TO<br>8 TO            |                   |                | (                        | 0.5 TO 1.0<br>1 TO 2             |            | *****                |                        | LUVIAL SOIL                     |                   | ΔΩΥ                     |                 |                        | INSTALLATION SLOPE INDICATO     | 00                 |                          |                     |      |
| (COHE:                          | SIVE)  |  | VERY STIF               | FF                      |                      | 15 TO<br>>30            |                   |                |                          | 2 TO 4                           |            | 25/025               |                        | P & DIP DIRE                    |                   |                         | ,               | $\bigcirc$             | INSTALLATION                    | Un.                |                          |                     |      |
|                                 |  | ــــــــــــــــــــــــــــــــــــــ |                         | TURE                    | OR GF                |                         |                   |                |                          |                                  |            | ≥37625<br>→          |                        | CK STRUCTUR                     |                   | ur                      |                 |                        | CONE PENETROM                   | ÆTER T             | EST                      |                     |      |
| U.S. STD. SI                    |  |  |                         | 4 10                    | 46                   | 3                       | 60                | 200<br>3.075   | 270<br>6 0.053           |                                  |            |                      |                        |                                 |                   |                         |                 | •                      | SOUNDING ROD                    |                    |                          |                     |      |
|                                 |  | BBLE                                   | T                       |                         | COAF                 |                         | _                 | FINE           |                          | .,, ,                            | C/ AV      | AD . A               | cco                    | DEFLICAL                        |                   |                         |                 |                        | ATIONS                          |                    | . NOTOTUE                | C COUTCH            |      |
| BOULDE<br>(BLDR.)               |  | (.80)                                  | (6                      | IVEL<br>R.)             | SA!<br>(CSE.         |                         |                   | SAND<br>F SO   |                          | SILT<br>(SL.)                    | (CL.)      | BT - BI              | ORINO                  | REFUSAL<br>3 TERMINATED         | )                 |                         | FRAGS.<br>HI HI | GHL Y                  |                                 | v                  | v - MOISTUR<br>v - VERY  |                     | '    |
|                                 | м 305  |  | 75                      | 2.0                     |                      |                         | 2.25              |                | 0.05                     | 0.005                            |            | CL CI                |                        | PENETRATION                     | I TEST            |                         | MED I           |                        |                                 |                    | /EA WEAT<br>'Y - UNIT W  |                     |      |
| SIZE II                         |  | 71 1                                   | 3<br>MOTOTU             | nr 6                    | ODDE                 | ATI                     | <u> </u>          |                | EDMO                     |                                  |            | CSE (                |                        | SE<br>3 TERMINATED              | ,                 |                         | MOD 1           |                        |                                 |                    | ∕d- DRY UN               |                     |      |
| SOIL I                          | SO<br>YOISTURE S                                       |  | MOISTU<br>              | FIELD M                 |                      |                         |                   |                |                          | T                                |            | DMT - I              | DILAT                  | TOMETER TES                     | T                 |                         | ORG 0           | ORGANI                 | C                               | s                  | SAMPLE :                 | ABBREVIATI          | IONS |
| IATTE                           | RBERG LIMI   | TS)                                    |                         | DESCRI                  |                      |                         | OIUE              | ruK .          | FIELD MOIS               | IUNE DES                         | CHILIIN    | e - V0               | OID R                  |                                 | IIUN T            | E51                     | SAP S           | SAPROL                 | REMETER TEST<br>ITIC            | S                  | S - SPLIT                |                     |      |
|                                 |  |  |                         | - SATUR                 |                      |                         |                   |                | IOUID; VERY<br>W THE GRO |                                  |            | EMBANK<br>F - F[N    |                        | MBANKMENT                       |                   |                         | SDY S           |                        | .TY                             | R                  | S - ROCK                 |                     |      |
| LL                              | LIOUID   | LIMIT                                  | г                       | · · ·                   | •                    |                         |                   |                | # 1712 G110              |                                  |            |                      |                        | SILIFEROUS<br>CTURED. FRAC      | TUDES             |                         | SLI S           | LIGHTL                 |                                 |                    | IT - RECOM<br>BR - CALIF |                     |      |
| PLASTIC  <br>RANGE <<br>(PI) _  |  |  |                         | - WET                   | - (W)                |                         |                   |                | REOUIRES I               |                                  |            | rync, -              | THE                    |                                 |                   | ENT                     |                 |                        | SUBJECT P                       | ROJE               | CT                       | 0                   |      |
| "" PLL.                         | PLASTI   | C LIM                                  |                         |                         |                      |                         |                   |                |                          |                                  |            | DRILL U              | INITS:                 |                                 |                   | ADVAN                   | CING TOO        | LS:                    |                                 | HAMN               | MER TYPE:                |                     |      |
| OM .<br>SL .                    | OPTIMUM<br>SHRINKA                                     |  |                         | - MOIS                  | T - (M)              |                         | SOLI              | ); AT          | OR NEAR O                | OPTIMUM M                        | OISTURE    | ма                   | OBILE                  | 8                               | [                 | c                       | LAY BITS        | 3                      |                                 | X                  | AUTOMATIC                | MAN                 | IUAL |
|                                 |  |  |                         | - DRY                   | - (D)                |                         |                   |                | ADDITIONAL<br>TIMUM MOIS |                                  | )          | Вк                   | <-51                   |                                 |                   | =                       | · CONTINU       |                        | JGHT AUGER                      |                    | SIZE:                    |                     |      |
|                                 | L  |  |                         | PL 4                    | STICI                | TY                      |                   |                |                          |                                  |            | П.                   | ,                      |                                 |                   | =                       | ARD FACE        |                        |                                 | M                  |                          |                     |      |
|                                 |  |  |                         | PLASTICI                |                      |                         |                   |                | DRY STR                  | ENGTH                            |            | CM                   | 4E-450                 |                                 |                   | =                       | JNGCARE         |                        |                                 |                    | N_Q2                     |                     |      |
| NONPLASTIC                      |  |  |                         | 0-                      | -5<br>-15            |                         |                   |                | VERY L                   |                                  |            | Х см                 | 1E-550                 | 2x                              |                   | =                       | ASING           | _                      | ADVANCER                        |                    |                          |                     |      |
| MED, PLASTI                     | CITY   |  |                         | 16-                     | 25                   | _                       |                   |                | MEDIL                    | IM                               |            | Pol                  | RTARI                  | LE HOIST                        |                   | =                       | RICONE          |                        | 'STEEL TEETH                    | HAN                | D TOOLS:<br>POST HOLI    |                     |      |
| HIGH PLAST                      | ICITY  |  |                         |                         | OR MORI              |                         |                   |                | HIGH                     | !                                |            |                      |                        |                                 |                   | =                       | RICONE          |                        | *TUNGCARB.                      | ΙH                 | HAND AUG                 |                     |      |
|                                 |  |  |                         |                         | COLOR                |                         |                   |                |                          |                                  |            | Ц _                  |                        |                                 |                   |                         | ORE BIT         |                        |                                 |                    | SOUNDING                 |                     |      |
| DESCRIPTIO                      | RS SUCH A  |  |                         |                         |                      |                         |                   |                |                          |                                  | iRAY).     | П                    |                        |                                 |                   | <u> </u>                | D11             |                        |                                 |                    | VANE SHE                 | AR TEST             |      |
|                                 |  | 10                                     | ,                       |                         | we Fill              |                         |                   |                | ~ ~                      |                                  |            |                      |                        |                                 | ⊥-                |                         |                 |                        |                                 |                    |                          |                     |      |

| PROJECT REFERENCE NO. | SHEET NO. |
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| 17BP.13.R.126         | 2A        |

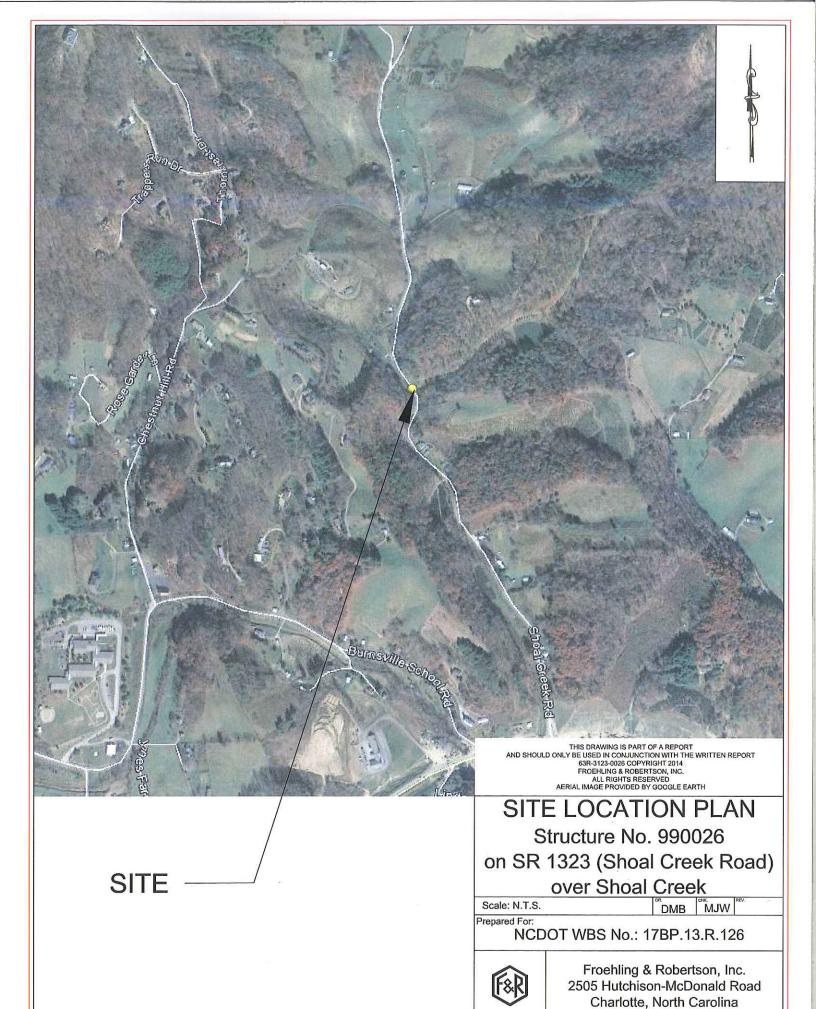
### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

### DIVISION OF HIGHWAYS

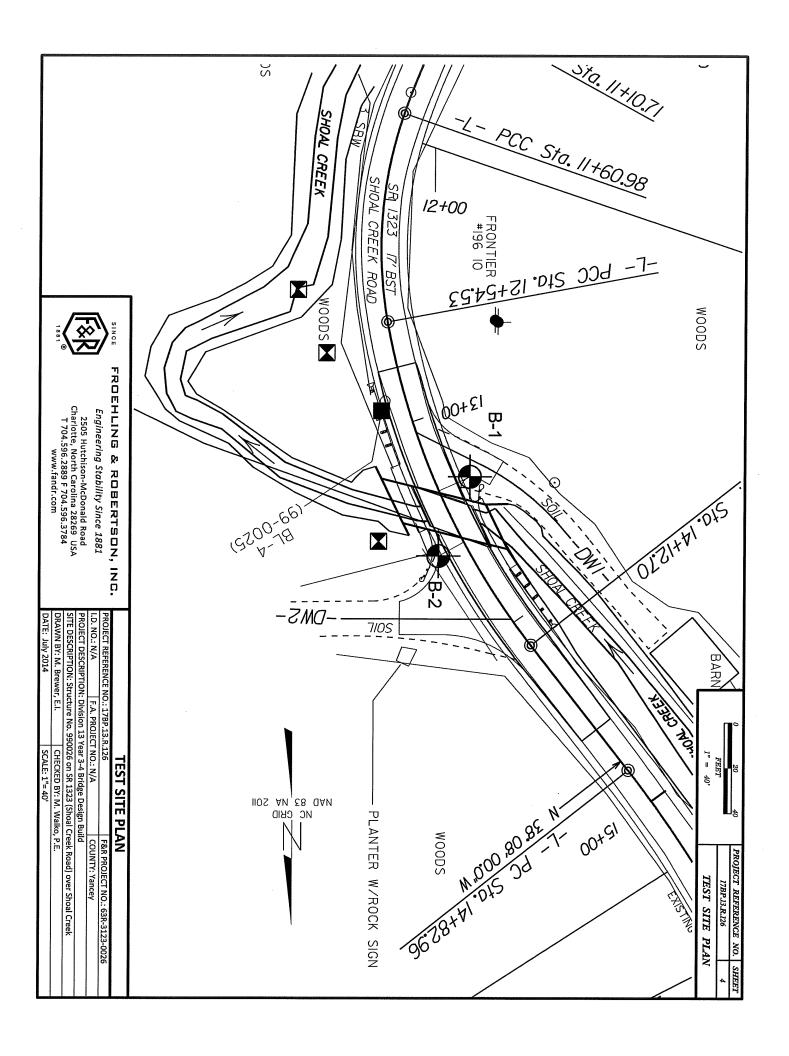
### GEOTECHNICAL ENGINEERING UNIT

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

|  |           |                              |                                    |   | 11-10-11                   |  |   |
|--|-----------|------------------------------|------------------------------------|---|----------------------------|--|---|
| HARD BUCK                              | IS NON-   | COASTAL PLA                  |                                    | DESCRIPTION T IF TESTED, WOULD YI                                   | FID SPT PC                 | FIISAL AN INFFRRED                             | TERMS AND DEFINITIONS   |
| ROCK LINE                              | INDICATE  | S THE LEVEL                  | . AT WHICH NON-O                   | COASTAL PLAIN MATERIA   | AL WOULD Y                 |  | ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.  |
| IN NON-COA                             | ASTAL PLA | AIN MATERIA                  | Y A SPLII SPUUN<br>L. THE TRANSITI | SAMPLER EQUAL TO U  | ROCK IS OF                 | TEN REPRESENTED BY A ZONE                      | AQUIFER - A WATER BEARING FORMATION OR STRATA.  ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.  |
| OF WEATHER<br>ROCK MATER               |           |                              | DIVIDED AS FOLI                    | OWS:  |                            |  | ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,  |
| Weathered<br>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 NECESSARILY RISE TO OR ABOVE THE  |
| CRYSTALLINE<br>ROCK (CR)               |           |                              |                                    | GRAIN IGNEOUS AND P<br>T REFUSAL IF TESTED<br>SCHIST.ETC.           |                            |  | GROUND SURFACE.  CALCARGOUS ICALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  |
| NON-CRYSTALL<br>ROCK (NCR)             | INE       |                              | FINE TO COARSE<br>SEDIMENTARY RO   | GRAIN METAMORPHIC   | SPT REFUS                  | STAL PLAIN<br>AL IF TESTED, ROCK TYPE          | COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.   |
| COASTAL PLAIN<br>SEDIMENTARY F<br>(CP) | N<br>ROCK |                              | COASTAL PLAIN                      | SEDIMENTS CEMENTED<br>OCK TYPE INCLUDES LI                          | INTO ROCK, E               | BUT MAY NOT YIELD<br>NDSTONE, 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.   |
|  |           |                              |                                    | ATHERING  |                            |  | DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.  |
|  |           | ESH, CRYSTAL<br>IF CRYSTALL  |                                    | DINTS MAY SHOW SLIGH  | IT STAINING.               | ROCK RINGS UNDER                               | DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.   |
| (V SLI.)                               | CRYSTAL   |                              | EN SPECIMEN FAC                    |   |                            | CLAY COATINGS IF OPEN,<br>NOER HAMMER BLOWS IF | <u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.  |
| SLIGHT                                 | ROCK GE   | NERALLY FRE                  | SH, JOINTS STAIN                   | ED AND DISCOLORATION<br>AY. IN GRANITOID ROCK                       |                            |  | FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  |
|  | CRYSTAL   | S ARE DULL                   | AND DISCOLORED.                    | CRYSTALLINE ROCKS F   | RING UNDER                 | HAMMER BLOWS.                                  | FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.   |
| (MOD.)                                 | GRANITOI  | D ROCKS, MO                  | ST FELDSPARS AR                    | DISCOLORATION AND WI<br>E DULL AND DISCOLORE<br>D SHOWS SIGNIFICANT | ED, SOME SHO               | OW CLAY. ROCK HAS                              | FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.  |
|  | WITH FRE  | ESH ROCK.                    |                                    | OR STAINED. IN GRAN   |                            |  | FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.   |
| SEVERE<br>(MOD. SEV.)                  | AND DISC  | OLORED AND<br>BE EXCAVAT     | A MAJORITY SHO<br>ED WITH A GEOLO  |   | SHOWS SEV                  | ERE LOSS OF STRENGTH                           | FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.  |
| SEVERE                                 | ALL ROC   | K EXCEPT OU                  |                                    | OR STAINED. ROCK FAI  |                            | AND EVIDENT BUT REDUCED                        | 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   |
| 102711                                 | EXTENT.   | SOME FRAGM                   |                                    | ROCK USUALLY REMAIN   |                            | CHULINIZED TO SUME                             | ITS LATERAL EXTENT.  LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.  |
| (V SEV.)                               | THE MASS  | S IS EFFECT<br>IG. SAPROLITI | IVELY REDUCED T<br>E IS AN EXAMPLE | O SOIL STATUS, WITH O<br>OF ROCK WEATHERED                          | INLY FRAGME<br>TO A DEGREE | SUCH THAT ONLY MINOR                           | 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  |
|  |           |                              |                                    | RIC REMAIN. <u>IF TESTE</u><br>NOT DISCERNIBLE.OR D                 |                            | PT N VALUES < 100 BPF                          | INTERVENING IMPERVIOUS STRATUM.  RESIDUAL GRESJ SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  |
| 9                                      | SCATTERE  |                              |                                    | MAY BE PRESENT AS DI  |                            |  | 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   |
|  |           |                              |                                    | HARDNESS  |                            |  | EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE  |
| VERY HARD                              | SEVERAL   | L HARD BLOW                  | S OF THE GEOLOG                    |   |                            |  | PARENT ROCK.  SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND   |
| HARD                                   | TO DETA   | ACH HAND SP                  | ECIMEN.                            | ONLY WITH DIFFICULT   |                            |  | RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  |
| MODERATELY<br>HARD                     | EXCAVA"   |                              | BLOW OF A GEO                      | k. GOUGES OR GROOVES<br>LOGIST'S PICK. HAND SI                      |                            |  | SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.   |
| MEDIUM<br>HARD                         | CAN BE    | GROOVED OR                   | GOUGED 0.05 IN<br>IN SMALL CHIPS   | CHES DEEP BY FIRM PR<br>TO PEICES 1 INCH MAXI                       |                            |  | 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. |
| SOFT                                   | FROM C    | HIPS TO SEV                  |                                    | BY KNIFE OR PICK. CAI<br>SIZE BY MODERATE BLO<br>RESSURE.           |                            |  | STRATA CORE RECOVERY (SPEC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  |
| VERY<br>SOFT                           | CAN BE    | CARVED WITH                  | H KNIFE. CAN BE                    | EXCAVATED READILY WI<br>EN BY FINGER PRESSUR                        |                            |  | 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.   |
| FR                                     |           | RE SPACI                     | ING                                |   | BEDDIN                     | 1G   | TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  |
| TERM                                   |           | SP                           | ACING                              | TERM<br>VERY THICKLY  | BENNER                     | THICKNESS > 4 FEET                             | BENCH MARK: Survey information provided by Mattern & Craig.   |
| VERY WIDE<br>WIDE                      |           | MORE TH<br>3 TO 10           | IAN 10 FEET<br>FEET                | THICKLY BEDDE   | 0                          | 1.5 - 4 FEET                                   | ELEVATION: FT.  |
| MODERATEL<br>CLOSE                     | Y CLOSE   |                              | EET                                | THINLY BEDOED<br>VERY THINLY B                                      | EDDED                      | 0.16 - 1.5 FEET<br>0.03 - 0.16 FEET            |   |
| VERY CLOS                              | SE .      |                              | IAN Ø.16 FEET                      | THICKLY LAMINA<br>THINLY LAMINA                                     |                            | 0.008 - 0.03 FEET<br>< 0.008 FEET              | NOTES:  |
| FOR SEDIMENTA                          | ARY BULL  | S. INDURATION                |                                    | JRATION   | BY CEMENTIN                | IG. HEAT, PRESSURE, ETC.                       |   |
|  | ABLE      |                              | RUBBING                            | WITH FINGER FREES NO<br>BLOW BY HAMMER DISIN                        | JMEROUS GRA                | AINS;  |   |
| MODE                                   | ERATELY   | INDURATED                    | GRAINS (                           | AN BE SEPARATED FRO<br>EASILY WHEN HIT WITH                         | M SAMPLE W                 |  |   |
| INDU                                   | JRATED    |                              |                                    | ARE DIFFICULT TO SEPA<br>T TO BREAK WITH HAM                        |                            | STEEL PROBE;                                   |   |
| EXTR                                   | REMELY II | NDURATED                     | SHARP H                            | AMMER BLOWS REQUIRED<br>BREAKS ACROSS GRAINS                        | D TO BREAK                 | SAMPLE;  |   |
|  |           |                              |                                    |   |                            |  | DEVICED 00/03/00  |



Proj.: 63R-3123-0026 | Date: July 2014 | Sheet No. 3



## NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

| <b>WBS</b> 17BP.13 | .R.126      |          | TIF    | P N/A                                   | COUNT          | Y YANCEY      |              |        |             | GEOLOGIST M. Brewe  | r  |                                   |         |
|--------------------|-------------|----------|--------|---|----------------|---------------|--------------|--------|-------------|---|--|-----------------------------------|---------|
| SITE DESCRIPT      | ION Struc   | ture No. | . 9900 | 026 on SR 1323                          | (Shoal Creek F | Road) over Sh | oal Cree     | ek     |             | •   |  | GROUND \                          | NTR (ft |
| BORING NO. E       | 3-1         |          | ST     | FATION 13+33                            |                | OFFSET        | 5 ft LT      |        |             | ALIGNMENT -L-   |  | 0 HR.                             | 3.      |
| COLLAR ELEV        | 2,583.4 ft  | t        | TC     | OTAL DEPTH                              | 15.0 ft        | NORTHING      | 806,7        | 30     |             | <b>EASTING</b> 1,037,379  |  | 24 HR.                            | FIAD    |
| DRILL RIG/HAMME    | R EFF./DATE | F&R37    | 763 CN | ME-550X 75% 10/2                        | 4/2013         |               | DRILL N      | IETHOI | ) SP        | T Core Boring   | НАММЕ  | RTYPE Aut                         | tomatic |
| DRILLER C. B       | oyce        |          | ST     | TART DATE 02                            | 2/06/14        | COMP. DA      | ΓE 02/0      | 06/14  |             | SURFACE WATER DEP   | TH N/A                                       | <b>\</b>                          |         |
|                    |             | 0.5ft 0  | _      | BL-<br>0 25                             | OWS PER FOOT   | 75 100        | SAMP.<br>NO. | MOI    | L<br>O<br>G | SOIL AND RO   | CK DESC                                      |                                   | DEPTH ( |
| 2,583.4            | 3.5         |          | 5      | . • • • · · · · · · · · · · · · · · · · |                |               |              | М<br>\ |             | 7.2,583.4 GROUNI 7.2,581.4 Surficial Organ 7.2,581.4 ROADWAY 8.2 Brown-black, silty (A-2-4), with tra | c Laden<br>EMBANK<br>fine to co<br>ce mica a | Soils (5").<br>MENT<br>parse SAND |         |
| 2,576.9            | 60/0.0      |          |        |   |                | 60/0.0        |              |        |             |   | fine to co<br>ace to litt                    | parse SAND<br>le gravel.<br>DCK   | 6       |
|                    |             |          |        |   |                |               |              |        |             | Boring Terminated a CRYSTALLINE RO  |  |                                   |         |

# NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

| WBS          | 5 17BF              |               |             | RE B   | TIP               |                              |                |              |                         | ΥY          | ANCEY   |                   | GEOLOGIST M. Brewe  | <br>er  |         |           |
|--------------|---------------------|---------------|-------------|--|-------------------|------------------------------|----------------|--------------|-------------------------|-------------|---|-------------------|---|---------|---------|-----------|
| SITE         | DESC                | RIPTION       | Stru        | cture No.  | 99002             | 6 on S                       | R 1323 (S      | Shoal C      | Creek I                 | Road        | ) over S  | noal Creek        |   |         | GROU    | ND WTR (f |
| BOR          | ING NO              | . B-1         |             |  | STA               | TION                         | 13+33          |              |                         | OF          | FSET  | 15 ft LT          | ALIGNMENT -L-   |         | 0 HR.   | 3.        |
| COL          | LAR EL              | <b>EV.</b> 2, | 583.4       | ft   | TOT               | AL DE                        | <b>PTH</b> 15. | 0 ft         |                         | NO          | RTHING  | 806,730           | <b>EASTING</b> 1,037,379  |         | 24 HR.  | FIAI      |
| DRIL         | L RIG/HA            | MMER EI       | F./DAT      | E F&R376   | 3 CME             | -550X 7                      | 5% 10/24/2     | 013          |                         |             |   | DRILL METHOD SPT  | Core Boring   | HAMMI   | R TYPE  | Automatic |
| DRIL         | LER (               | C. Boyce      | )           |  | STAI              | RT DA                        | TE 02/0        | 6/14         |                         | CC          | MP. DA  | TE 02/06/14       | SURFACE WATER DEF   | TH N//  | 4       |           |
| COR          | E SIZE              | NQ2           |             |  | TOTA              | AL RUI                       | N 8.5 ft       |              |                         |             |   |                   |   |         |         |           |
| ELEV<br>(ft) | RUN<br>ELEV<br>(ft) | DEPTH<br>(ft) | RUN<br>(ft) | DRILL<br>RATE<br>(Min/ft)  | REC.<br>(ft)<br>% | JN<br>RQD<br>(ft)<br>%       | SAMP.<br>NO.   | REC.         | ATA<br>RQD<br>(ft)<br>% | L<br>O<br>G | ELEV. (   |                   | ESCRIPTION AND REMARK   | (S      |         | DEPTH     |
| 2576.9       | 9                   |               |             |  |                   |                              |                |              |                         |             |   |                   | Begin Coring @ 6.5 ft   |         |         |           |
| 2575<br>2570 | 2,571.9             | 11.5          | 3.5         | N=60/0.0<br>2:10/1.0<br>2:43/1.0<br>2:35/1.0<br>2:21/1.0<br>2:23/1.0<br>2:26/1.0<br>2:16/1.0 | 91%               | (4.7)<br>94%<br>(2.9)<br>83% |                | (8.2)<br>96% | (7.6)<br>89%            |             | _ 2,576.9<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>- 2,568.4 |                   | CRYSTALLINE ROCK<br>fresh, hard to very hard, whi<br>with close and very close frac |         |         | TITE 6    |
|              |                     |               |             | 1:08/0.5   |                   |                              |                |              |                         |             |   | Boring Terminated | d at Elevation 2,568.4 ft IN Ci<br>(BIOTITE GNEISS)                                 | RYSTALL | INE ROC | ;         |

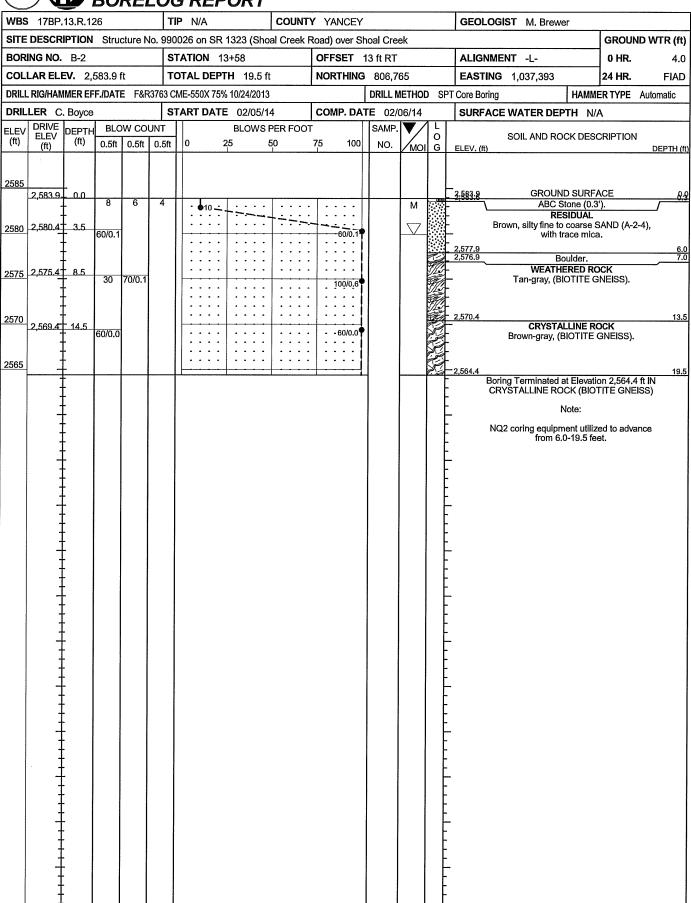


# Structure No. 990026 on SR 1323 (Shoal Creek Road) CORE PHOTOGRAPHS: B-1: Station 13+33, 15' LT



## NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

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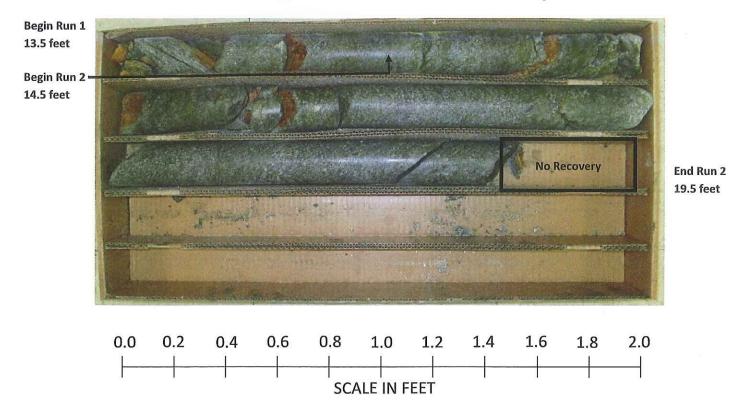


# NCDOT GEOTECHNICAL ENGINEERING UNIT

| WBS           | 17BP.         |               |            |  | TIP            |                  | 3 REF       | $\overline{}$ |              | Υ      | 'ANCEY            |           |                | GEOLOGIS       | ST M. Brewe                  | r         |           |           |
|---------------|---------------|---------------|------------|--|----------------|------------------|-------------|---------------|--------------|--------|-------------------|-----------|----------------|----------------|------------------------------|-----------|-----------|-----------|
| SITE          | DESCR         | IPTION        | Struc      | cture No.  | 99002          | 6 on S           | R 1323 (S   | hoal (        | Creek        | Road   | l) over Sh        | oal Creel | ζ              |                |                              |           | GROU      | ND WTR (f |
| BOR           | NG NO.        | B-2           |            |  | STA            | TION             | 13+58       |               |              | OF     | FSET 1            | 3 ft RT   |                | ALIGNMEN       | √T -L-                       |           | 0 HR.     | 4.        |
| COLI          | LAR ELE       | <b>EV.</b> 2, | 583.9 1    | ft   | TOT            | AL DE            | PTH 19.     | 5 ft          |              | NC     | RTHING            | 806,76    | 5              | EASTING        | 1,037,393                    |           | 24 HR.    | FIA       |
| DRILL         | RIG/HAM       | MER EF        | F./DATI    | E F&R376   | 3 CME          | -550X 7          | 5% 10/24/20 | 013           |              | -L     |                   | DRILL ME  | THOD SPT       | Core Boring    |                              | HAMMI     | ER TYPE   | Automatic |
| DRIL          | LER C.        | . Boyce       |            |  | STAI           | RT DA            | TE 02/0     | 5/14          |              | CC     | MP. DAT           |           |                |                | WATER DEP                    | <u> </u>  |           |           |
|               | E SIZE        |               |            |  |                |                  | N 6.0 ft    |               |              | 1      |                   |           |                | L              |                              |           |           |           |
| ELEV          | RUN           | DEPTH         | RUN        | DRILL  | RI             | IN               | SAMP.       | STF           | RATA         | L      |                   |           |                |                |                              |           |           |           |
| (ft)          | ELEV<br>(ft)  | (ft)          | (ft)       | RATE<br>(Min/ft)   | (ft)           | RQD<br>(ft)<br>% | NO.         | (ft)<br>%     | (f)<br>(%)   | O<br>G | ELEV. (ft         | )         | D              | ESCRIPTION     | AND REMARK                   | S         |           | DEPTH     |
| 5 <b>79</b> A |               |               |            |  |                |                  |             |               |              |        | ,                 |           |                | Begin Corin    | ng @ 13.5 ft                 |           |           |           |
| 2070          | 3;569:4       | 13:5          | 1.0<br>5.0 | 2:46/1.0<br>N=60/0.0<br>3:30/1.0<br>2:49/1.0<br>1:58/1.0<br>1:28/1.0<br>1:31/1.0 | (1.0)<br>\100% | (0.3)            |             | (5.5)<br>92%  | (2.7)<br>45% | R      | 2,570.4           | Mo        | derately to st | CRYSTAL        | LINE ROCK<br>ed, soft, mediu | m hard :  | and hard  | 13        |
|               | -             | _             | 5.0        | 3:30/1.0<br>2:49/1.0   | (4.5)          | (2.4)            |             | 0270          | 10,0         |        | t                 | brow      | n-gray, (BIOT  | TTE GNEISS)    | , with very close            | e and clo | se fractu | re        |
| 2565          | -<br>-2,564.4 | - 10.5        |            | 1:58/1.0   | 90%            | 48%              |             |               |              |        |                   |           |                | spa            | acing.                       |           |           | 40        |
|               | 2,007.7       | -             |            | 1.31/1.0   |                |                  |             |               |              |        | 2,304.4           | Borin     | g Terminated   | at Elevation 2 | 2,564.4 ft IN CF             | RYSTALL   | INE ROC   | 19<br>CK  |
|               | -             | -             |            |  |                |                  |             |               |              |        |                   |           |                | ,              | É GNEISS)                    |           |           |           |
|               | 4             | _             |            | ŀ  |                |                  |             |               |              |        | _                 |           |                | N              | lote:                        |           |           |           |
|               | 1             | -             |            |  |                |                  |             |               |              | ĺ      | _                 | NC        | Q2 coring equ  | ipment utilize | d to advance fr              | om 6.0-1  | 9.5 feet. |           |
|               | 1             | -             |            |  |                |                  |             |               |              |        | _                 |           |                |                |                              |           |           |           |
|               | -             | _             |            |  |                |                  |             |               |              |        | _                 |           |                |                |                              |           |           |           |
|               | 1             | _             |            |  |                |                  |             |               |              |        |                   |           |                |                |                              |           |           |           |
|               | +             | -             |            |  |                |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | 7             | -             |            |  |                |                  |             |               |              |        | <del>-</del>      |           |                |                |                              |           |           |           |
|               | ‡             | -             |            |  |                |                  |             |               |              |        | <b>-</b>          |           |                |                |                              |           |           |           |
|               |               | -             |            |  |                |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | f             | -             |            |  |                |                  |             |               |              |        | _                 |           |                |                |                              |           |           |           |
|               | +             | -             |            |  |                |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | 7             | -             |            |  |                |                  |             |               |              |        | _                 |           |                |                |                              |           |           |           |
|               | 1             | -             |            |  |                |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | ‡             | -             |            |  |                |                  | Ì           |               |              |        | -                 |           |                |                |                              |           |           |           |
|               |               |               |            |  |                |                  |             |               |              |        | <del>-</del>      |           |                |                |                              |           |           |           |
|               | 1             |               |            |  |                |                  |             |               |              |        | _                 |           |                |                |                              |           |           |           |
| İ             | 1             | -             |            |  |                |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | 7             | -             |            |  |                |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | ‡             |               |            |  |                |                  |             |               |              |        | <del>-</del><br>- |           |                |                |                              |           |           |           |
|               |               |               |            |  |                |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | 1             | :             |            |  |                |                  |             |               |              |        | -<br>-            |           |                |                |                              |           |           |           |
|               |               | .             |            |  |                |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               |               | .             |            |  |                |                  |             |               |              |        | _                 |           |                |                |                              |           |           |           |
|               | ‡             | .             |            |  |                | ı                | ļ           |               |              |        | -                 |           |                |                |                              |           |           |           |
| ĺ             | ‡             | .             |            |  |                |                  |             |               |              |        | -<br>-            |           |                |                |                              |           |           |           |
|               | †             | :             |            |  |                |                  |             |               |              |        | <del>-</del>      |           |                |                |                              |           |           |           |
|               | Ŧ             |               |            |  |                |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | ‡             | .             |            |  |                | l                |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | †             | :             |            |  |                |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | ‡             | :             |            |  |                |                  |             |               |              |        | <u>.</u>          |           |                |                |                              |           |           |           |
|               | 1             | :             | ]          |  |                | l                |             |               |              |        | •                 |           |                |                |                              |           |           |           |
|               | Ŧ             | .             |            |  |                | İ                |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | ‡             |               |            |  |                |                  |             |               |              |        | •                 |           |                |                |                              |           |           |           |
|               |               | :             |            |  |                | ļ                |             |               |              |        |                   |           |                |                |                              |           |           |           |
|               | f             | :             | ļ          |  |                |                  |             |               |              |        |                   |           |                |                |                              |           |           |           |
|               | Ŧ             | .             |            |  | Ì              |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | ‡             | :             |            |  |                |                  |             |               |              |        | -                 |           |                |                |                              |           |           |           |
|               | <u> </u>      | :             |            |  | ļ              | 1                |             |               |              |        |                   |           |                |                |                              |           |           |           |
|               | +             | .             | 1          |  | l              |                  |             |               |              |        | •                 |           |                |                |                              |           |           |           |



# Structure No. 990026 on SR 1323 (Shoal Creek Road) CORE PHOTOGRAPHS: B-2: Station 13+58, 13' RT



| STATE | STATE PROJECT REPERENCE NO. | SHEET<br>NO. | TOTAL<br>SHEETS | ĺ |
|-------|-----------------------------|--------------|-----------------|---|
| N.C.  | 17BP.13.R.127               | 1            | 11              |   |

### STATE OF NORTH CAROLINA

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

### **STRUCTURE** SUBSURFACE INVESTIGATION

| PROJ. REF | FERENCE NO. | 17BP.13.R | .127 | <i>'</i> |    | 1  | IP PR | OJ. <i>N</i> / | 4     |       |
|-----------|-------------|-----------|------|----------|----|----|-------|----------------|-------|-------|
| COUNTY    | Yancey      |           |      |          |    |    | ***   |                |       |       |
| PROJECT   | DESCRIPTION | Structure | No.  | 990167   | on | SR | 1323  | (Shoal         | Creek | Road) |
| over Shoo | al Creek    |           |      |          |    |    |       |                |       |       |
|           |             |           |      |          |    |    |       |                |       |       |

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SHEET **DESCRIPTION** 1 TITLE SHEET 2, 2A LEGEND 3 SITE PLAN 4 BORING LOCATION PLAN BORE LOG REPORTS, CORE REPORTS, & ROCK CORE PHOTOS 5-10

|                  | C. Boyce        |
|------------------|-----------------|
|                  | S. Joyner       |
|                  | M. Hosseini     |
|                  | M. Brewer, E.I. |
|                  |                 |
|                  |                 |
| -                |                 |
|                  |                 |
|                  |                 |
| INVESTIGATED BY. | F&R, Inc.       |
| CHECKED BY       | M. Walko, P.E.  |
| SUBMITTED BY     | F&R, Inc.       |
| DΔTF             | May 2014        |

PERSONNEL

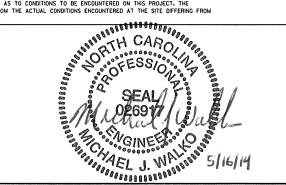
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GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABLITY 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.

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- 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.



| PROJECT REFERENCE NO. | SHEET NO. |
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| 17BP.13.R.127         | 2         |

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

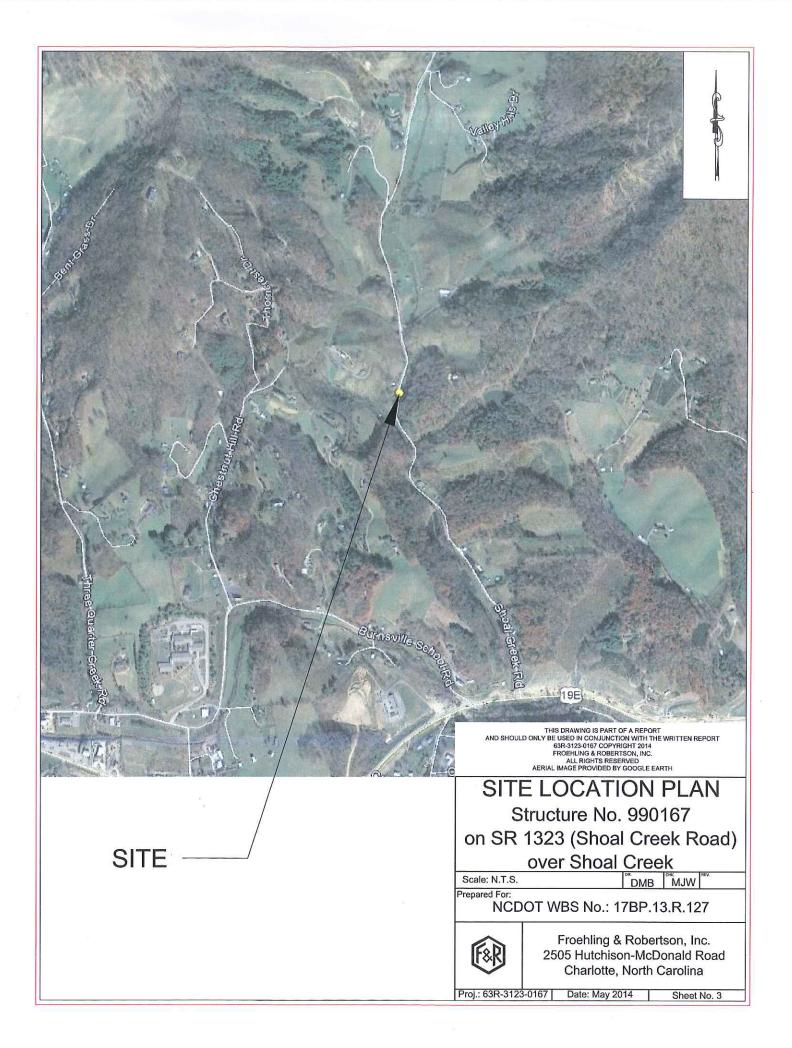
|  | SOIL DESCRIPTION GRADATION  |   |               |                |  |              |        |          |                               |                   |   |                                |   |            |                 |                  |                 |                  |                              |                               |                 |          |
|--|-----------------------------|---|---------------|----------------|--|--------------|--------|----------|-------------------------------|-------------------|---|--------------------------------|---|------------|-----------------|------------------|-----------------|------------------|------------------------------|-------------------------------|-----------------|----------|
|  |                             |   |               | SOIL           | . DE   | SCRI         | PTIC   | ON       |                               |                   |   |                                | GRADATION   |            |                 |                  |                 |                  |                              |                               |                 |          |
| SOIL IS CON  | NSIDERED TO                 | BE T  | HE UNCON      | SOLIDATE       | D, SEM   | 1-CONS       | OLIDAT | ED, OR   | WEAT                          | ERED EARTI        | H MATERIAL  | .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 |            |                 |                  |                 |                  |                              |                               |                 |          |
|  | BE PENETRAT<br>PER FOOT A   |   |               |                |  |              |        |          |                               |                   |   |                                | POORLY GRADED)  GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.   |            |                 |                  |                 |                  |                              |                               |                 |          |
| CLASSIFICAT<br>CONSISTENC  | TION IS BASI                | ED ON<br>XTURF.                               | THE AASH      | TO SYST        | EM. BA   | SIC DE       | SCRIPT | IONS C   | ENERA                         | LLY SHALL         | INCLUDE:  | ı                              | ANGULARITY OF GRAINS  |            |                 |                  |                 |                  |                              |                               |                 |          |
| AS MINERAL   | OGICAL COM                  | POSITIO                                       | DN, ANGUL     | ARITY, ST      | RUCTUR   | E, PLAS      | STICIT | Y, ETC.  | EXAMP                         | LE:               |   |                                |   |            |                 |                  |                 | IS IS DE         | SIGNATED BY THE              | TERMS ANGULA                  | R,              |          |
|  |                             |   | GRAY, SILTY C |                |  |              |        |          |                               |                   |   |                                | SUBANGU   | ULAH,      | SUBROUNDED, OR  |                  |                 | TCAL             | COMPOCITIO                   | ON.                           |                 |          |
| GENERAL  |                             |   |               |                | ) AA   |              |        |          |                               | ATION             |   |                                | MINERAL   | NAME       | S SUCH AS DUAS  |                  |                 |                  | COMPOSITION KAOLIN, ETC. ARE |                               | PTIONS          |          |
| GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS  |                             |   |               |                |  |              |        |          |                               |                   |   |                                |   | R THE      | Y ARE CONSIDER  | RED OF S         | IGNIFICAN       | CE.              | KHOLIN, ETC. HRE             | OSED IN DESCRI                | FILUNS          |          |
| GROUP  | A-1                         | A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 |               |                |  |              |        |          |                               |                   |   |                                |   |            | COMPRESSIBILITY |                  |                 |                  |                              |                               |                 |          |
| CLASS.   | A-1-b                       | *****   | A-2-4 A-      | 2-5 A-2-       | 6 A-2-7  | ora recora i |        |          | A-7-5<br>A-7-6                | A-3               | A-6, A-7  |                                | ,   |            | GHTLY COMPRESS  |                  |                 |                  | LIQUID LIMIT                 | LESS THAN 31<br>EQUAL TO 31-5 | :0              |          |
| SYMBOL   |                             |   |               |                |  |              | ۱,7,1  |          |                               |                   |   |                                |   |            | HLY COMPRESSIB  |                  |                 |                  |                              | GREATER THAN                  |                 |          |
| % PASSING  |                             |   |               |                |  |              |        |          | •                             |                   | SILT-   |                                |   |            |                 |                  |                 |                  | OF MATERIA                   | L                             |                 |          |
|  | 50 MX<br>30 MX 50 MX        | 51 MN   |               |                |  |              |        |          |                               | GRANULAR<br>SOILS | CLAY<br>SOILS   | MUCK,<br>PEAT                  | ORGA  | anic i     | MATERIAL        | GRANUL:<br>SOIL: |                 | T - CLA<br>SOILS | Y                            | OTHER MATERI                  | <u>AL</u>       |          |
| * 200  | 15 MX 25 MX                 | 10 MX   | 35 MX 35      | MX 35 M        | X 35 MX  | 36 MN        | 36 MN  | 36 MN    | 36 MN                         |                   | 20172   |                                |   |            | IANIC MATTER    | 2 - 3            |                 | - 5%             |                              | ACE 1 -                       |                 |          |
| LIQUID LIHIT   |                             | ١   | 40 MX 41      | MN 40 M        | 41 MN  | 40 HX        | 41 MN  | 48 MX    | 41 MN                         | SOILS             | WITH  |                                | MODERATE  | ELY 0      | RGANIC          | 5 - 10           |                 | - 12%<br>- 20%   | SO                           | TTLE 10 -<br>ME 20 -          |                 |          |
| PLASTIC INDEX  | 6 MX                        |   | 10 MX 10      |                |  | -            | _      | -        |                               | LITTLE<br>MODER   |   | HIGHLY                         | HIGHLY OF   | ORGAN:     | IC              | >10%             |                 | >20%             |                              | GHLY 35%                      | AND ABOVE       | <u> </u> |
| GROUP INDEX  | 0                           | 0   | 0             |                | MX   | 8 MX         | 12 MX  | 16 MX    | No MX                         | AMOUN             | TS OF   | ORGANIC<br>SOILS               | $\nabla$  |            |                 |                  |                 |                  | WATER                        |                               |                 |          |
|  | STONE FRAGS.<br>GRAVEL, AND | FINE  |               | OR CLA         |  | SIL          |        | CLA      |                               | ORGAN<br>MATTE    |   |                                | 1   | _          |                 |                  |                 | _                | DIATELY AFTER                | DRILLING                      |                 |          |
| MATERIALS<br>GEN, RATING   | SAND                        | SHIND   | ·             |                | Jritu  | 30,          |        | 30.1     |                               |                   |   |                                | <b>▼</b>  |            | STATIC W        | ATER L           | EVEL AFT        | ER               | HOURS                        |                               |                 |          |
| AS A   | EXC                         | ELLEN   | IT TO GO      | OD             |  | F            | AIR T  | O P00    | R                             | FAIR TO<br>POOR   | POOR  | UNSUITABLE                     | B .   |            | PERCHED         | WATER,           | SATURATE        | D ZONE           | OR WATER BEAR                | ING STRATA                    |                 |          |
|  | SUBGRADE     105K           |   |               |                |  |              |        |          |                               |                   |   |                                |   | Λ-         | SPRING O        | R SEEP           |                 |                  |                              |                               |                 |          |
|  |                             |   | CON           | SISTE          | NCY  |              |        |          |                               |                   |   |                                |   |            |                 | M                | SCELL           |                  | US SYMBOLS                   |                               |                 |          |
| PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH |                             |   |               |                |  |              |        |          |                               |                   | m   |                                | ADWAY EMBANKI   |            | E)              | (1) SP           | TONT TEST BORI  | NG 👈             |                              | T BORING<br>CORE              |                 |          |
| CONSISTENCY (N-VALUE) (TONS/FT2 )  |                             |   |               |                |  |              |        |          |                               |                   |   | TH SOIL DESCR                  | IPTION  |            | Us vs           | AUGER BORING     |                 |                  | N-VALUE                      |                               |                 |          |
| GENERALLY VERY LOOSE (4 LOOSE 4 TO 10  |                             |   |               |                |  |              |        |          |                               |                   | - so  | IL SYMBOL                      |   |            | Ψ               | HOUER BURING     |                 |                  |                              |                               |                 |          |
| MATERIAL MEDIUM DENSE 10 TO 30 N/A   |                             |   |               |                |  |              |        |          |                               |                   |   | TIFICIAL FILL<br>AN ROADWAY EN |   |            | Q-              | CORE BORING      | REF             | ) SP1            | REFUSAL                      |                               |                 |          |
| (NON-COHESIVE) DENSE 30 10 50  |                             |   |               |                |  |              |        |          |                               | M1                |   | FERRED SOIL BO                 |   |            | <b>™</b> Ö      | MONITORING WE    | 11              |                  |                              |                               |                 |          |
| VERY SOFT  |                             |   |               |                |  |              |        |          |                               |                   |   |                                |   |            |                 | PIEZOMETER       |                 |                  |                              |                               |                 |          |
| SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0   |                             |   |               |                |  |              |        |          |                               | - IN              | FERRED ROCK L   | INE                            |   | Δ          | INSTALLATION    |                  |                 |                  |                              |                               |                 |          |
| MATERIAL   STIFF   8 TO 15   1 TO 2   (COHESIVE)   VERY STIFF   15 TO 30   2 TO 4                                  |                             |   |               |                |  |              |        |          | *****                         | r AL              | LUVIAL SOIL B   | OUNDARY                        |   | $\bigcirc$ | SLOPE INDICATO  | OR               |                 |                  |                              |                               |                 |          |
| HARD >30 >4  |                             |   |               |                |  |              |        |          | 25/025 DIP & DIP DIRECTION OF |                   |   |                                |   |            |                 |                  |                 |                  |                              |                               |                 |          |
| TEXTURE OR GRAIN SIZE  |                             |   |               |                |  |              |        |          |                               |                   | ->  | ΝU                             | LK SINULIUNES   | •          |                 | $lue{lue}$       | CONE PENETRUM   | ETER TEST        |                              |                               |                 |          |
| U.S. STD. SII  |                             |   |               | 4              | 10   | 40           |        | 60       | 200                           | 270               |   |                                |   |            |                 |                  |                 | •                | SOUNDING ROD                 |                               |                 |          |
| OPENING (M   | M)                          |   | <del></del>   | 1.76           | 2.00   | COAR         |        | 1.25     | 0.075                         | 9.053             | T   |                                | ABBREVIATIONS ABBREVIATIONS   |            |                 |                  |                 |                  |                              |                               |                 |          |
| BOULDE<br>(BLDR.)  |                             | BBLE  |               | RAVEL<br>(GR.) |  | SAN          | D      |          | SAND                          | 1 .               | SILT<br>(SL.)   | CLAY<br>(CL.)                  | AR - AUGER REFUSAL FRAGS FRAGMENTS W - MOISTURE CONTENT BT - BORING TERMINATED HI HIGHLY V - VERY   |            |                 |                  |                 |                  |                              |                               |                 |          |
|  |                             |   | 75            |                | 2.0  | (CSE.        |        | <br>0.25 | (F SE                         | 0.05              | 0.005   |                                | CL CLAY MED MEDIUM WEA WEATHERED  |            |                 |                  |                 |                  |                              |                               |                 |          |
|  | IM 305<br>N. 12             |   | 3             |                | 2.0  |              |        | W.23     |                               | 6.65              | 6,663   |                                | CPT - CONE PENETRATION TEST MICA, - MICACEOUS 7 - UNIT WEIGHT CSE, - COARSE MOD MODERATELY 7 - DRY UNIT WEIGHT  |            |                 |                  |                 |                  |                              |                               |                 |          |
|  | SC                          | )IL   | MOIST         | URE            | - CO   | RREL         | ATI    | ON C     | )F ]                          | ERMS              |   |                                | CT - CORING TERMINATED NP - NON PLASTIC SAMPLE ARRESTIATIONS  |            |                 |                  |                 |                  |                              |                               |                 |          |
|  | MOISTURE !                  |   |               |                | D MOIS   |              |        | GUIDE    | FOR                           | FIELD MOIS        | STURE DES   | CRIPTION                       | DMI - DILATOMETER TEST ORG ORGANIC S - BULK   |            |                 |                  |                 |                  |                              |                               |                 |          |
| (ATTERBERG LIMITS) DESCRIPTION CORRECTION CONTROL DESCRIPTION  |                             |   |               |                |  |              |        |          |                               |                   |   |                                | e - VOID RATIO SAP SAPROLITIC ST - SHELRY TURE  |            |                 |                  |                 |                  |                              |                               |                 |          |
| - SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE                           |                             |   |               |                |  |              |        |          |                               |                   | EMBANK EMBANKMENT SDY SANDY RS - ROCK F - FINE SL SILT, SILTY RT - RECOMPACTED TRIAXIAL |                                |   |            |                 |                  | n TRIAVIAL      |                  |                              |                               |                 |          |
| LL LIQUIO LIMIT  |                             |   |               |                |  |              |        |          |                               |                   |   |                                | SILIFEROUS<br>CTURED, FRACTU  | IDES       |                 | SLIGHTL          | .y<br>E REFUSAL | CBR - C          | ALIFORNIA                    | BEARING                       |                 |          |
| PLASTIC RANGE <  |                             |   |               | _              | WET -  | (W)          |        |          |                               | REQUIRES          |   | )                              | Times   |            |                 |                  |                 |                  |                              | ROJECT                        | RATIO           |          |
| (P) PLASTIC LIMITATTAIN OPTIMUM MOISTURE   |                             |   |               |                |  |              |        |          |                               |                   |   |                                |   |            |                 | 000000           | HAMMER TYP      | · .              |                              |                               |                 |          |
| OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE  |                             |   |               |                |  |              |        |          |                               | DRILL UN          | INITS:  |                                | ADVA  | NCING TO   | OLS:            |                  | X AUTOMA        |                  | MANUAL                       |                               |                 |          |
| SL SHRINKAGE LIMIT REQUIRES ADDITIONAL WATER TO  |                             |   |               |                |  |              |        |          |                               | мо                | OBILE   | B                              |   | CLAY BIT   | S               |                  | [A] 1.0.0       |                  | ]                            |                               |                 |          |
|  |                             |   |               |                |  |              |        |          |                               | <u></u> — .       | 6° CONTINUOUS FLIGHT AUGER CORE SIZE:   |                                |   |            |                 |                  |                 |                  |                              |                               |                 |          |
| HITAIN OFTINUM MUISTURE  |                             |   |               |                |  |              |        |          |                               |                   | L.J. 8K-  | <-51                           |   | X          | 8' HOLLOW       | AUGER            | S               | ☐-B              | _                            |                               |                 |          |
| PLASTICITY   |                             |   |               |                |  |              |        |          |                               |                   | СМЕ   | 4E-450                         | 2   |            | HARD FAC        | ED FIN           | GER BITS        | X -N 02          | _                            |                               |                 |          |
| PLASTICITY INDEX (PI) DRY STRENGTH   |                             |   |               |                |  |              |        |          |                               |                   |   |                                |   | TUNGCAR    | BIDE IN         | SERTS            | П-н             |                  |                              |                               |                 |          |
| NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT   |                             |   |               |                |  |              |        |          |                               | X CMI             | 4E-55(  | 2X                             | ΙĒ  | CASING     | □ w             | ' ADVANCER       |                 |                  |                              |                               |                 |          |
| MED. PLAST   | ICITY                       |   |               |                | 16-25  |              |        |          |                               | MEDI              | ML  |                                | POF   | RTABI      | LE HOIST        | lΠ               | TRICONE         |                  | STEEL TEETH                  | HAND TOOLS                    | S:<br>HOLE DIG( | SER      |
| MUN PLASI  | I ICITY                     |   |               |                |  | MORE         |        |          |                               |                   | •   |                                |   |            |                 |                  | TRICONE         |                  | * TUNGCARB.                  | HAND                          |                 | *        |
|  |                             |   |               | ••             |  | LOR          |        |          |                               | m a. : == :       |   |                                | ⊔ _   |            | <del></del>     |                  | CORE BIT        |                  |                              | SOUND                         | ING ROD         |          |
|  | ONS MAY IN<br>ERS SUCH A    |   |               |                |  |              |        |          |                               |                   |   | JKAY).                         |   |            |                 |                  |                 |                  |                              | VANE                          | SHEAR TE        | ST       |
|  |                             |   | ,             |                |  |              |        |          |                               |                   |   |                                |   |            |                 |                  |                 |                  |                              | <u> </u>                      |                 |          |
|  |                             |   |               |                | MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE. |              |        |          |                               |                   |   |                                |   |            |                 |                  |                 |                  |                              |                               |                 |          |

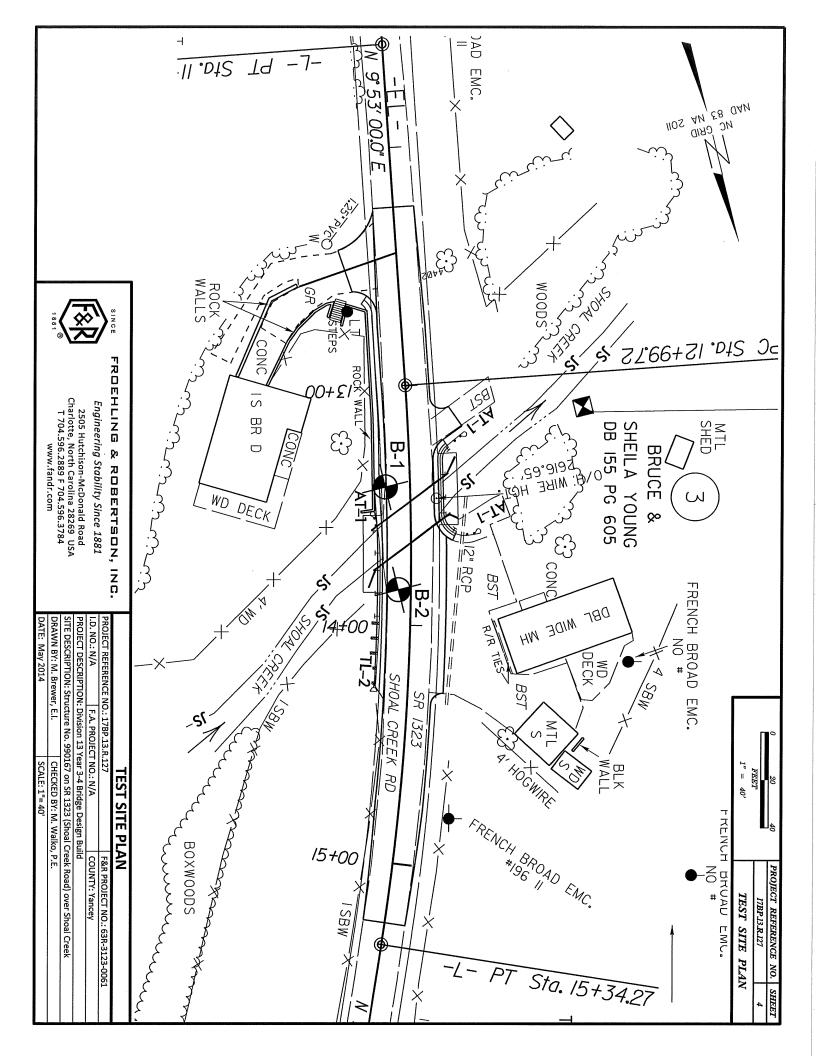
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| 17BP.13.R.127         | 2A        |

## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

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

|  | DESCRIPTION   | TERMS AND DEFINITIONS   |  |  |  |  |  |  |
|--|---|---|--|--|--|--|--|--|
| ROCK LINE INDICATES THE LEVEL AT WHICH NON                                     | AT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED<br>-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.                                | ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.  |  |  |  |  |  |  |
| IN NON-COASTAL PLAIN MATERIAL. THE TRANSIT                                     | N SAMPLER EOUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.<br>ION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE                    | ACUIFER - A WATER BEARING FORMATION OR STRATA,  |  |  |  |  |  |  |
| OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FO                  | LLOWS:  | ARGILLACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND, ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,   |  |  |  |  |  |  |
|  | PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100  | OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.  |  |  |  |  |  |  |
|  | IOT IF TESTED.<br>SE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT  | 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   |  |  |  |  |  |  |
|  | SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,  | GROUND SURFACE,  CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE,  |  |  |  |  |  |  |
| NON-CRYSTALLINE FINE TO COARS ROCK (NCR) SEDIMENTARY I INCLUDES PHYL           | SE GRAIN METAMORPHIC AND NON-COASTAL PLAIN<br>ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED, ROCK TYPE<br>LLITE, SLATE, SANDSTONE, ETC. | COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.   |  |  |  |  |  |  |
| COASTAL PLAIN SEDIMENTARY ROCK (CP)  COASTAL PLAIN SPT REFUSAL. SHELL BEDS, E  | I SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD<br>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.   |  |  |  |  |  |  |
|  | ATHERING  | DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.  |  |  |  |  |  |  |
| FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW HAMMER IF CRYSTALLINE.                  | JOINTS MAY SHOW SLIGHT STAINING ROCK RINGS UNDER  | DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.   |  |  |  |  |  |  |
|  | NED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,<br>ACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF                         | <u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.  |  |  |  |  |  |  |
| (SLI.) I INCH. OPEN JOINTS MAY CONTAIN C                                       | NED AND DISCOLORATION EXTENDS INTO ROCK UP TO<br>LAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR                                     | FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  |  |  |  |  |  |  |
|  | D. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  # DISCOLORATION AND WEATHERING EFFECTS, IN   | FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM  |  |  |  |  |  |  |
| (MOD.) GRANITOID ROCKS, MOST FELDSPARS A DULL SOUND UNDER HAMMER BLOWS A       | RE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS<br>ND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED                                 | PAGENT MATERIAL.  FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY   |  |  |  |  |  |  |
|  | D OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL  | THE STREAM.   |  |  |  |  |  |  |
| SEVERE AND DISCOLORED AND A MAJORITY SH  | OW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH<br>OGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.                           | FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.  |  |  |  |  |  |  |
| SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORE  | D OR STAINED ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED  | <u>JOINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO  |  |  |  |  |  |  |
| EXTENT. SOME FRAGMENTS OF STRONG   |   | TIS LATERAL EXTENT.  LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.  |  |  |  |  |  |  |
| IF TESTED, YIELDS SPT N VALUES >  VERY SEVERE ALL ROCK EXCEPT DUARTZ DISCOLORE | D OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT  | MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN   |  |  |  |  |  |  |
|  | TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK<br>E OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR                            | 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  |  |  |  |  |  |  |
| VESTIGES OF THE ORIGINAL ROCK FAR  | RIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF  | INTERVENING IMPERVIOUS STRATUM.   |  |  |  |  |  |  |
| SCATTERED CONCENTRATIONS, QUARTZ   | NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND<br>MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS                               | 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   |  |  |  |  |  |  |
| ALSO AN EXAMPLE.   | ( HARDNESS  | ROCK SCHENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.   |  |  |  |  |  |  |
|  | SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES   | SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.   |  |  |  |  |  |  |
| HARD CAN BE SCRATCHED BY KNIFE OR PIO<br>TO DETACH HAND SPECIMEN.              | CK 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.  |  |  |  |  |  |  |
|  | CK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE<br>DLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED                                    | SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.   |  |  |  |  |  |  |
| MEDIUM CAN BE GROOVED OR GOUGED 0.05 II  | NCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.<br>TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE                             | 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 |  |  |  |  |  |  |
|  | BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS SIZE BY MODERATE BLOWS OF A PICK POINT, SMALL, THIN PRESSURE                          | 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.   |  |  |  |  |  |  |
| VERY CAN BE CARVED WITH KNIFE. CAN BE<br>SOFT OR MORE IN THICKNESS CAN BE BROW | EXCAVATED READILY WITH POINT OF PICK, PIECES I INCH<br>KEN 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 TH TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  |  |  |  |  |  |  |
| FINGERNAIL. FRACTURE SPACING   | I BEDDING   | TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  |  |  |  |  |  |  |
| TERM SPACING   | TERM THICKNESS  | BENCH MARK: Survey information provided by Mattern & Craia.   |  |  |  |  |  |  |
| VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET                                  | VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET  |   |  |  |  |  |  |  |
| MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET                              | THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET   | ELEVATION: FT.  |  |  |  |  |  |  |
| VERY CLOSE LESS THAN Ø.16 FEET   | THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET   | NOTES:  |  |  |  |  |  |  |
|  | URATION   |   |  |  |  |  |  |  |
| DUDDING  | ING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  |   |  |  |  |  |  |  |
|  | BLOW BY HAMMER DISINTEGRATES SAMPLE.  |   |  |  |  |  |  |  |
| BREAKS   | CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE:<br>EASILY WHEN HIT WITH HAMMER.  |   |  |  |  |  |  |  |
| DIFFICU  | ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;<br>LT TO BREAK WITH HAMMER.   |   |  |  |  |  |  |  |
|  | HAMMER BLOWS REQUIRED TO BREAK SAMPLE;<br>BREAKS ACROSS GRAINS.   |   |  |  |  |  |  |  |





5/15/14

NC\_DOT.GDT

NCDOT BORE SINGLE 63R-3123-0167 MATTERN & CRAIG YANCEY 990167 BORINGS LOGS.GPJ

WBS 17BP.13.R.127 TIP N/A **COUNTY** Yancey GEOLOGIST M. Brewer **GROUND WTR (ft)** SITE DESCRIPTION Structure No. 990167 on SR 1323 (Shoal Creek Road) over Shoal Creek OFFSET 10 ft RT ALIGNMENT -L-0 HR. 7.0 BORING NO. B-1 **STATION** 13+42 **NORTHING** 807,272 **FIAD** COLLAR ELEV. 2,599.3 ft TOTAL DEPTH 25.6 ft **EASTING** 1,037,277 24 HR. DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 75% 10/24/2013 DRILL METHOD SPT Core Boring HAMMER TYPE Automatic DRILLER C. Boyce **START DATE** 02/05/14 COMP. DATE 02/05/14 SURFACE WATER DEPTH N/A DRIVE ELEV **BLOW COUNT BLOWS PER FOOT** SAMP DEPTH SOIL AND ROCK DESCRIPTION 0 (ft) (ft) 25 100 0.5ft 50 0.5ft 0.5ft NO. MOI DEPTH (ft) (ft) G ELEV. (ft) 2600 **GROUND SURFACE** Asphalt (0.2') and ABC Stone (0.3') 2,598.3 1.0 2 М ROADWAY EMBANKMENT Brown, silty fine to coarse SAND (A-2-4), 2,595.8 - 3.5 2,594.8 - 4.5 2,595.4 with trace gravel. 100/0.4 -100/0.4 -60/0.0 Intermittent Boulders with brown-orange, silty 60/0.0 fine to coarse SAND (A-2-4), with trace mica. 2,590.3 2590 2,589.8 RESIDUAL 10 44 32 Gray, orange and brown, silty fine to coarse SAND (A-2-4), with trace gravel. 2585 2,583.3 2,582.7 16.6 40 60/0.1 WEATHERED ROCK 100/0.6 60/0.0 60/0.0 Brown and orange (BIOTITE GNEISS) CRYSTALLINE ROCK 2580 Gray, brown and white (BIOTITE GNEISS). 2575 25.6 2,573.7 Boring Terminated at Elevation 2,573.7 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS) NQ2 Coring equipment utilized to advance from 4.5-25.6'

|         | / <b>Y</b>  |             |          | <u>KE D</u>  |               |                  | JIL       |              |                          |          |            |            |            | T              |                                |            |              |             |
|---------|-------------|-------------|----------|--|---------------|------------------|-----------|--------------|--------------------------|----------|------------|------------|------------|----------------|--------------------------------|------------|--------------|-------------|
| <b></b> | 17BP.       |             | -        |  | TIP           |                  |           |              |                          | Y Ya     |            |            |            | GEOLOGI        | ST M. Brev                     | T          |              |             |
|         |             |             | l Stru   | ucture No  |               |                  |           | (Shoa        | al Cree                  |          |            | Shoal Cree | ek<br>     | 1              |                                | -1         | ID WTR (ft)  |             |
|         | ING NO.     |             |          |  | <del> </del>  |                  | 13+42     |              |                          |          | ET 10      |            |            | ALIGNME        |                                | 0 HR.      | 7.0          |             |
| COL     | LAR ELE     | EV. 2,      | 599.3    | ft   | TOT           | AL DE            | PTH 25    | .6 ft        |                          | NOR      | THING      | 807,272    |            | EASTING        | 1,037,277                      |            | 24 HR.       | FIAD        |
| DRIL    | L RIG/HAI   | MMER E      | FF./DA   | TE F&R3  | 763 CM        | E-550X           | 75% 10/24 | 1/2013       |                          |          |            | DRILL METH | IOD SP1    | Core Boring    |                                | HAMM       | ER TYPE      | Automatic   |
| DRIL    | LER C       | . Boyce     | <b>ə</b> |  | STAI          | RT DA            | TE 02/0   | 5/14         |                          | COM      | P. DATI    | E 02/05/1  | 4          | SURFACE        | WATER DE                       | PTH N      | /A           |             |
| COR     | E SIZE      | NQ-2        |          |  |               |                  | N 9.0 ft  |              |                          |          |            |            |            |                |                                |            |              |             |
| ELEV    | RUN<br>ELEV | DEPTH       |          | DRILL<br>RATE  | I REC.        | UN<br>RQD        | SAMP.     | REC.         | RATA<br>RQD<br>(ft)<br>% | - P      |            |            | n          | ESCRIPTION     | AND REMAR                      | KS         |              |             |
| (ft)    | (ft)        | (ft)        | (ft)     | (Min/ft)   | (ft)<br>%     | RQD<br>(ft)<br>% | NO.       | (ft)<br>%    | (ft)<br>%                | Ğ        | ELEV. (ft) |            |            |                | 7 II D I CIVII II C            |            |              | DEPTH (ft   |
| 2582.7  | 2,582.7_    | 16.6        | -        | 11.00/0.0  | (5.0)         | (0.0)            |           | (0.0)        | (0.0)                    |          |            |            |            |                | ng @ 16.6 ft                   |            |              |             |
| 2580    | 2,002.7     | - 10.0      | 5.0      | 1:48/1.0<br>1:26/1.0   | (5.0)<br>100% | (3.0)<br>60%     |           | (8.6)<br>96% | (6.6)<br>73%             |          | 2,582.7    | Moderately | and slight | tly weathered  | LLINE ROCK<br>to fresh, hard t | o very har | d, gray, bro | 16.6<br>own |
| 2000    |             |             |          | N=60/0.0<br>1:48/1.0<br>1:26/1.0<br>1:32/1.0<br>2:21/1.0<br>2:20/1.0 |               |                  |           |              |                          |          |            | and white, | (BIOTITE   | GNEISS), wit   | h very close to                | close fra  | cture spaci  | ng.         |
|         | 2,577.7 -   | - 21.6<br>- | 4.0      | 1 2:36/1.0   | (3.6)         | (3.6)            |           |              |                          |          |            |            |            |                |                                |            |              |             |
| 2575    |             | -           |          | 2:03/1.0<br>2:12/1.0   | 90%           | 90%              |           |              |                          |          |            |            |            |                |                                |            |              |             |
|         | 2,573.7 -   | - 25.6<br>- |          | 1:54/1.0   |               |                  |           |              |                          |          | 2,573.7    | Boring T   | Terminated | d at Elevation | 2,573.7 ft IN C                | RYSTALL    | INE ROCK     | 25.6        |
|         | -           | _           |          |  |               |                  |           |              |                          |          |            | _          |            | (BIOTIT        | E GNEISS)                      |            |              |             |
|         | -           | _           |          |  |               |                  |           |              |                          |          |            | NQ         | 2 Coring   | equipment util | ized to advanc                 | e from 4.5 | 5-25.6'      |             |
|         | -           | -           |          |  |               |                  |           |              |                          | <u> </u> |            |            |            |                |                                |            |              |             |
|         |             | _           |          |  |               |                  |           |              |                          | ΙĿ       |            |            |            |                |                                |            |              |             |
|         | -           | -           |          |  |               |                  |           |              |                          | ΙĿ       |            |            |            |                |                                |            |              |             |
|         | ]           | <b>-</b>    |          |  |               |                  |           |              |                          | <u> </u> |            |            |            |                |                                |            |              |             |
|         | _           | <u>-</u>    |          |  |               |                  |           |              |                          | ΙĿ       |            |            |            |                |                                |            |              |             |
|         | ]           | -           |          |  |               |                  |           |              |                          | l F      |            |            |            |                |                                |            |              |             |
|         | -           | -           |          |  |               |                  |           |              |                          | l F      |            |            |            |                |                                |            |              |             |
|         | 7           | -           |          |  |               |                  |           |              |                          | l F      |            |            |            |                |                                |            |              |             |
|         | 1           | -           |          |  |               |                  |           |              |                          | F        |            |            |            |                |                                |            |              |             |
|         | 1           | -           |          |  |               |                  |           |              |                          | l F      |            |            |            |                |                                |            |              |             |
|         |             | -           |          |  |               |                  |           |              |                          | F        |            |            |            |                |                                |            |              |             |
|         | 1           | -           |          |  |               |                  |           |              |                          | <b> </b> |            |            |            |                |                                |            |              |             |
|         | _           | -           |          |  |               |                  |           |              |                          | F        |            |            |            |                |                                |            |              |             |
|         | 1           |             |          |  |               |                  |           |              |                          |          |            |            |            |                |                                | •          |              |             |
|         |             | -           |          |  |               |                  |           |              |                          | l E      |            |            |            |                |                                |            |              |             |
|         | 1           | <b>-</b>    |          |  |               |                  |           |              |                          | <u> </u> |            |            |            |                |                                |            |              |             |
|         | 1           | -           |          |  |               |                  |           |              |                          | l E      |            |            |            |                |                                |            |              |             |
|         | $\exists$   | -           |          |  |               |                  |           |              |                          | l E      |            |            |            |                |                                |            |              |             |
|         |             | •           |          |  |               |                  |           |              |                          | l F      |            |            |            |                |                                |            |              |             |
|         | 1           | -           |          |  |               |                  |           |              |                          | l F      |            |            |            |                |                                |            |              |             |
|         | 7           |             |          |  |               |                  |           |              |                          | ΙF       |            |            |            |                |                                |            |              |             |
|         | 1           |             |          |  |               |                  |           |              |                          | F        |            |            |            |                |                                |            |              |             |
|         | 1           | -           |          |  |               |                  |           |              |                          | ΙÞ       |            |            |            |                |                                |            |              |             |
|         | #           | -           |          |  |               |                  |           |              |                          |          |            |            |            |                |                                |            |              |             |
|         |             |             |          |  |               |                  |           |              |                          |          |            |            |            |                |                                |            |              |             |
|         | 4           |             |          |  |               |                  |           |              |                          |          |            |            |            |                |                                |            |              |             |
| 5       | 1           |             |          |  |               |                  |           |              |                          | <u> </u> |            |            |            |                |                                |            |              |             |
|         |             | -           |          |  |               |                  |           |              |                          | l E      |            |            |            |                |                                |            |              |             |
|         | 7           | -           |          |  |               |                  |           |              |                          | F        |            |            |            |                |                                |            |              |             |
|         | ‡           |             |          |  |               |                  |           |              |                          | F        |            |            |            |                |                                |            |              |             |
|         | ‡           | ·<br>-      |          |  |               |                  |           |              |                          | -        |            |            |            |                |                                |            |              |             |
|         | ‡           | ·<br>·      |          |  |               |                  | ,         |              |                          |          |            |            |            |                |                                |            |              |             |
|         | ‡           | •           |          |  |               |                  |           |              |                          |          |            |            |            |                |                                |            |              |             |
|         | 1           | <u>.</u>    |          |  |               |                  |           |              |                          | -        |            |            |            |                |                                |            |              |             |
| 1       | 1           |             |          | ı  | l i           | .                |           |              |                          | I L      |            |            |            |                |                                |            |              |             |



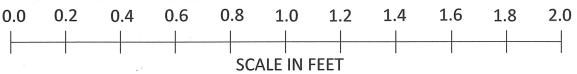
### Structure No. 990167 on SR 1323 (Shoal Creek Rd) CORE PHOTOGRAPHS: B-1: Station 13+42, 10' RT



Begin Run 2 21.6 feet



End Run 2 25.6 feet



**COUNTY** Yancey GEOLOGIST M. Brewer WBS 17BP.13.R.127 SITE DESCRIPTION Structure No. 990167 on SR 1323 (Shoal Creek Road) over Shoal Creek GROUND WTR (ft) **STATION** 13+85 OFFSET 5 ft RT ALIGNMENT -L-0 HR. 5.0 BORING NO. B-2 **NORTHING** 807,315 **EASTING** 1,037,282 24 HR. FIAD COLLAR ELEV. 2,599.8 ft TOTAL DEPTH 20.5 ft DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 75% 10/24/2013 DRILL METHOD SPT Core Boring **HAMMER TYPE** Automatic DRILLER C. Boyce COMP. DATE 02/05/14 SURFACE WATER DEPTH N/A **START DATE** 02/05/14 DRIVE DEPTH **BLOW COUNT BLOWS PER FOOT** SAME FLEV ELEV 0 SOIL AND ROCK DESCRIPTION (ft) (ft) 0 100 0,5ft 0.5ft 0.5ft 25 NO. MOI (ft) G ELEV. (ft) DEPTH (ft) 2600 **GROUND SURFACE** 2 599 8 0.0 Asphalt (0.2') and ABC Stone (0.3') 2,598.8 1.0 3 3 ROADWAY EMBANKMENT Μ Brown, and tan and orange, silty fine to 2,596.3 WOH 8 coarse SAND (A-2-4), with trace gravel. W/ 2,592.8 2,592.8 60/0.0 60/0.0 Intermittent Boulders. 2590 10.5 RESIDUAL No recovery. 2,585,3 14.5 2585 CRYSTALLINE ROCK 2,584.3 15.5 · 60/0.0 60/0.0 Gray, brown and white (BIOTITE GNEISS). 2580 20.5 Boring Terminated at Elevation 2,579.3 ft IN CRYSTALLINE ROCK (BIOTITE GNEISS) NQ2 Coring equipment utilized to advance from 7.0-20.5' NCDOT BORE SINGLE 63R-3123-0167 MATTERN & CRAIG YANCEY 990167 BORINGS LOGS.GPJ NC\_DOT.GDT

| COLLAR ELEV. 2,599.8 ft  |                 | <u>/ \_</u>                  |                  | CO    | KE D   | Un                      | IIV              | JKE           | PU                | K I              |     |                   |            |                      |                     |                   |             |                   |            |  |  |
|--|-----------------|------------------------------|------------------|-------|--|-------------------------|------------------|---------------|-------------------|------------------|-----|-------------------|------------|----------------------|---------------------|-------------------|-------------|-------------------|------------|--|--|
| BORING NO. B-2 STATION 13+85 OFFSET 5 ft RT ALIGNMENT -L-  COLLAR ELEV. 2,599.8 ft TOTAL DEPTH 20.5 ft NORTHING 807,315 EASTING 1,037,282 24 HR. FIAI  DRILL RIG/HAMMER EFF. JDATE F&R3763 CME-550X 75% 10/24/2013 DRILL METHOD SPT Core Boring HAMMER TYPE Automatic  DRILLER C. Boyce START DATE 02/05/14 COMP. DATE 02/05/14 SURFACE WATER DEPTH N/A  CORE SIZE NQ-2 TOTAL RUN 6.0 ft  ELEV (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft)   | WBS             | 17BP.                        | .13.R.1          | 27    |  | TIP                     | N/A              |               | c                 | OUNT             | ΥΥ  | ′ancey            |            |                      | GEOLOGIST M. Brewer |                   |             |                   |            |  |  |
| BORING NO. B-2 STATION 13+85 OFFSET 5 ft RT ALIGNMENT -L-  COLLAR ELEV. 2,599.8 ft TOTAL DEPTH 20.5 ft NORTHING 807,315 EASTING 1,037,282 24 HR. FIAI  DRILL RIG/HAMMER EFF. JDATE F&R3763 CME-550X 75% 10/24/2013 DRILL METHOD SPT Core Boring HAMMER TYPE Automatic  DRILLER C. Boyce START DATE 02/05/14 COMP. DATE 02/05/14 SURFACE WATER DEPTH N/A  CORE SIZE NQ-2 TOTAL RUN 6.0 ft  ELEV (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft)   | SITE            | DESCR                        | IPTION           | Stru  | cture No                                     | . 9901                  | 67 on            | SR 1323       | (Shoa             | al Cree          | k R | oad) over         | Shoal Cre  | ek                   |                     |                   | GROUN       | ID WTR (ft)       |            |  |  |
| DRILL RIG/HAMMER EFF./DATE   F&R3763 CME-550X 75% 10/24/2013   DRILL METHOD   SPT Core Boring   HAMMER TYPE   Automatic  | BOR             | ING NO.                      | B-2              |       |  | STA                     | TION             | 13+85         |                   |                  | OF  | FSET 5            | ft RT      |                      | ALIGNME             | NT -L-            | 0 HR.       | 5.0               |            |  |  |
| DRILL RIG/HAMMER EFF./DATE   F&R3763 CME-550X 75% 10/24/2013   DRILL METHOD   SPT Core Boring   HAMMER TYPE   Automatic  | COLI            | AR ELE                       | EV. 2,           | 599.8 | ft   | тот                     | AL DE            | <b>PTH</b> 20 | .5 ft             |                  | NC  | RTHING            | 807,315    |                      | EASTING             | 1,037,282         |             | 24 HR.            | FIAD       |  |  |
| DRILLER C. Boyce   |                 |                              |                  |       |  | L                       |                  |               |                   |                  |     |                   |            | HOD SP1              | L                   |                   | НАММ        | L                 |            |  |  |
| CORE SIZE   NQ-2   TOTAL RUN   6.0 ft  |                 |                              |                  |       |  |                         |                  |               |                   |                  | CC  |                   |            |                      |                     |                   |             |                   |            |  |  |
| ELEV (ft)   RUN (ft)   |                 |                              |                  |       |  | <b></b>                 |                  |               |                   |                  | -   |                   |            | •                    | OOM AOL             | ·                 |             | , <b>,</b>        |            |  |  |
| (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft)  |                 |                              | Γ                | B     | DRILL  | Б                       | IIII             | T             | STF               | ATA              | L   |                   |            |                      |                     |                   |             |                   |            |  |  |
| 2,585,3 14.5 1.0 2:07/1.0 (1.0) (1.0) (1.0) (5.7) 2,585.3 CRYSTALLINE ROCK 12 2,580 2,579.3 20.5 2:17/1.0 2:17/ |                 | ELEV<br>(ft)                 | (ft)             |       | RATE   | REC.<br>(ft)<br>%       | RQD<br>(ft)<br>% |               | REC.<br>(ft)<br>% | RQD<br>(ft)<br>% | 0   | ELEV. (ft)        | ****       | DEPTH (ft)           |                     |                   |             |                   |            |  |  |
| 2,585,3 14.5 1.0 2:07/1.0 (1.0) (1.0) (1.0) (5.7) 2,585.3 CRYSTALLINE ROCK 12 2,580 2,579.3 20.5 2:17/1.0 2:17/ | 2 <b>585</b> 53 |                              |                  |       |  |                         |                  |               |                   |                  |     |                   |            |                      | Begin Cor           | ing @ 14.5 ft     |             |                   |            |  |  |
| Boring Terminated at Elevation 2,579.3 ft IN CRYSTALLINE ROCK  (BIOTITE GNEISS)  |                 | 2,585.3<br>2,584.3<br>-<br>- | - 15:5<br>-<br>- |       | 2:07/1.0<br>N=60/0.0<br>2:21/1.0<br>1:52/1.0 | (1.0)<br>\100%<br>(4.7) | (4.7)            |               | (5.7)<br>95%      | (5.7)<br>95%     |     | 2,585.3           | Slightly v | veathered<br>(BIOTIT | to fresh, hard      | i to very hard, g | gray, browi | n and white<br>J. | 14.5<br>e, |  |  |
| Boring Terminated at Elevation 2,579.3 ft IN CRYSTALLINE ROCK  (BIOTITE GNEISS)  | 2580            | 2.579.3                      | -<br>- 20.5      |       | 2:15/1:0                                     | 3470                    | 3476             |               |                   | i                | 2   | -<br>             |            |                      |                     |                   |             |                   | 20.5       |  |  |
|  |                 |                              |                  |       | 2.1771.0                                     |                         |                  |               |                   |                  |     |                   | Boring 7   | Terminated           | at Elevation        | 2,579.3 ft IN C   | RYSTALL     | INE ROCK          |            |  |  |
| NQ2 Coring equipment utilized to advance from 7.0-20.5'  |                 | -                            | _                |       |  |                         |                  |               |                   |                  | -   | <b>-</b><br>-     |            |                      | •                   | ,                 |             |                   |            |  |  |
|  |                 | -                            | _                |       |  |                         |                  |               |                   |                  |     | _                 | NC         | Q2 Coring 6          | equipment ut        | ilized to advand  | e from 7.0  | -20.5'            |            |  |  |
|  |                 | -                            |                  |       |  |                         |                  |               |                   |                  |     | <del>-</del><br>- |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | -                            | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | -                            | -                |       |  |                         |                  |               |                   |                  |     |                   |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | -                            | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 1                            | -                |       |  |                         |                  |               |                   |                  |     | <u>-</u>          |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 4                            | -                |       |  |                         |                  |               |                   |                  |     | <del>-</del>      |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 1                            | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 1                            | -                |       |  |                         |                  |               |                   |                  |     | -<br>-            |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 1                            | -                |       |  |                         |                  |               |                   |                  |     | <del>-</del>      |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 1                            | _                |       |  |                         |                  |               |                   |                  |     | <b>-</b><br>-     |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | +                            | -                |       |  |                         | 3                |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 7                            | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | ‡                            | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | <u> </u>                     | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 4                            | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 1                            |                  |       |  |                         |                  |               |                   |                  |     | <del>-</del><br>- |            |                      |                     |                   |             |                   |            |  |  |
|  |                 |                              | -<br>-           |       |  |                         |                  |               |                   |                  |     | -<br>             |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 1                            | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | +                            | -                |       |  |                         |                  |               |                   |                  |     | _                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 4                            | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | ‡                            | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 1                            | -                |       |  |                         |                  |               |                   |                  |     | _                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 4                            | -                |       |  |                         |                  |               |                   |                  |     | _                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 1                            | -                |       |  |                         |                  |               |                   |                  |     | <u>.</u>          |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 1                            | -                |       |  |                         |                  |               |                   |                  |     | <u>.</u>          |            |                      |                     |                   |             |                   |            |  |  |
|  |                 |                              | -                |       |  |                         |                  |               |                   |                  |     | <del>_</del>      |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 7                            | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 1                            | -                |       |  |                         |                  |               |                   |                  |     | •                 |            |                      |                     |                   |             |                   | İ          |  |  |
|  |                 | 1                            | -                |       |  |                         |                  |               |                   |                  |     | <del>-</del>      |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | +                            | .                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 7                            | -                |       |  |                         |                  |               |                   |                  |     | •                 |            |                      |                     |                   |             |                   | l          |  |  |
|  |                 | 7                            | -                |       |  |                         |                  |               |                   |                  |     | -                 |            |                      |                     |                   |             |                   | İ          |  |  |
|  |                 | 1                            | .                |       |  |                         |                  |               |                   |                  |     |                   |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | 7                            | .                |       |  |                         |                  |               |                   |                  |     |                   |            |                      |                     |                   |             |                   |            |  |  |
| +  |                 | 7                            | -                |       |  |                         |                  |               |                   |                  | İ   | <del>-</del><br>- |            |                      |                     |                   |             |                   | ĺ          |  |  |
|  |                 | ‡                            | :                |       |  |                         |                  |               |                   | l                | ļ   | <del>.</del><br>• |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | <u>†</u>                     | ·                |       |  |                         |                  |               |                   |                  | ŀ   | _                 |            |                      |                     |                   |             |                   |            |  |  |
|  |                 | Ī                            | .                |       |  |                         |                  |               |                   |                  | [   |                   |            |                      |                     |                   |             |                   |            |  |  |

NCDOT CORE SINGLE 63R-3123-0167 MATTERN & CRAIG YANCEY 990167 BORINGS LOGS.GPJ NC\_DOT.GDT 5/15/14



# Structure No. 990167 on SR 1323 (Shoal Creek Rd) CORE PHOTOGRAPHS: B-2: Station 13+85, 5' RT

