

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C.  | WBS NO. 17BP.14.R.80        | 1         | 8            |

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

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**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. WBS NO. 17BP.14.R.80 F.A. PROJ. \_\_\_\_\_  
COUNTY HAYWOOD  
PROJECT DESCRIPTION DIVISION 14  
LOW IMPACT BRIDGE REPLACEMENT

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SITE DESCRIPTION BRIDGE NO. 102 ON SR 1173  
(PLOTT CREEK ROAD) ACROSS PLOTT CREEK

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**PERSONNEL**

M. GRAGG

B. SMITH

S. GOWER

INVESTIGATED BY F&H

CHECKED BY S. PROVANCE

SUBMITTED BY F&H

DATE 10/31/2011

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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

DRAWN BY: T. RIDEOUT



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

| SOIL DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |  |  |  |  |  |  | GRADATION                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|
| SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:<br>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LENSES, HIGHLY PLASTIC, A-7-6 |  |  |  |  |  |  |  |  |  | WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.<br>UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)<br>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. |  |  |  |  |  |  |  |  |  |
| SOIL LEGEND AND AASHTO CLASSIFICATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |  |  | ANGULARITY OF GRAINS                                                                                                                                                                                                                                                     |  |  |  |  |  |  |  |  |  |
| MINERALOGICAL COMPOSITION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |  | COMPRESSIBILITY                                                                                                                                                                                                                                                          |  |  |  |  |  |  |  |  |  |
| PERCENTAGE OF MATERIAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |  |  |  |  |  | GROUND WATER                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |
| MISCELLANEOUS SYMBOLS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |  |  | ABBREVIATIONS                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |  |  |
| EQUIPMENT USED ON SUBJECT PROJECT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |  |  |  |

GENERAL CLASS. GRANULAR MATERIALS ( $\leq 35\%$  PASSING #200) SILT-CLAY MATERIALS ( $> 35\%$  PASSING #200) ORGANIC MATERIALS

GROUP CLASS. A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-3 A-4, A-5 A-6, A-7

SYMBOL

% PASSING  
# 10  
# 40  
# 200

LIQUID LIMIT PLASTIC INDEX

GROUP INDEX

USUAL TYPES OF MAJOR MATERIALS

GENERAL RATING AS A SUBGRADE

PI OF A-7-5 SUBGROUP IS  $\leq LL - 30$ ; PI OF A-7-6 SUBGROUP IS  $> LL - 30$

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE

COMPACTNESS OR CONSISTENCY

RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)

RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE OPENING (MM)

BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)

GRAIN SIZE MM 305 75 2.0 0.25 0.075 0.005

GRAIN SIZE IN. 12 3

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)

FIELD MOISTURE DESCRIPTION

GUIDE FOR FIELD MOISTURE DESCRIPTION

LL - LIQUID LIMIT

PL - PLASTIC LIMIT

OM - OPTIMUM MOISTURE

SL - SHRINKAGE LIMIT

PLASTICITY

NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY

PLASTICITY INDEX (PI)

DRY STRENGTH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION

SOIL SYMBOL

ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT

INFERRED SOIL BOUNDARY

INFERRED ROCK LINE

ALLUVIAL SOIL BOUNDARY

DIP & DIP DIRECTION OF ROCK STRUCTURES

SPT DPT DMT VST TEST BORING

AUGER BORING

CORE BORING

MONITORING WELL

PIEZOMETER INSTALLATION

SLOPE INDICATOR INSTALLATION

CONE PENETROMETER TEST

SOUNDING ROD

TEST BORING W/ CORE

SPT N-VALUE

SPT REFUSAL

AR - AUGER REFUSAL

BT - BORING TERMINATED

CL - CLAY

CPT - CONE PENETRATION TEST

CSE - COARSE

DMT - DILATOMETER TEST

DPT - DYNAMIC PENETRATION TEST

e - VOID RATIO

F - FINE

FOSS - FOSSILIFEROUS

FRAC - FRACTURED, FRACTURES

FRAGS - FRAGMENTS

HL - HIGHLY

MED - MEDIUM

MICA - MICACEOUS

MOD - MODERATELY

NP - NON PLASTIC

ORG - ORGANIC

PMT - PRESSUREMETER TEST

SAP - SAPROLITIC

SD - SAND, SANDY

SL - SILT, SILTY

SLI - SLIGHTLY

TCR - TRICONE REFUSAL

w - MOISTURE CONTENT

v - VERY

VST - VANE SHEAR TEST

WEA - WEATHERED

% - UNIT WEIGHT

%<sub>d</sub> - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK

SS - SPLIT SPOON

ST - SHELBY TUBE

RS - ROCK

RT - RECOMPACTED TRIAXIAL

CBR - CALIFORNIA BEARING RATIO

DRILL UNITS:

MOBILE B-\_\_\_\_\_

BK-51

CME-45C

CME-550

PORTABLE HOIST

ADVANCING TOOLS:

CLAY BITS

6" CONTINUOUS FLIGHT AUGER

8" HOLLOW AUGERS

HARD FACED FINGER BITS

TUNG.-CARBIDE INSERTS

CASING

W/ ADVANCER

TRICONE

STEEL TEETH

TRICONE

TUNG.-CARB.

CORE BIT

HAMMER TYPE:

AUTOMATIC

MANUAL

CORE SIZE:

B-\_\_\_\_\_

N-\_\_\_\_\_

H-\_\_\_\_\_

HAND TOOLS:

POST HOLE DIGGER

HAND AUGER

SOUNDING ROD

VANE SHEAR TEST

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

| ROCK DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                        | TERMS AND DEFINITIONS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                          |
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| <p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p> |                                                                                                                                                                                                                                                                                                                                                                        | <p><u>ALLUVIUM (ALLUV.)</u> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p><u>AQUIFER</u> - A WATER BEARING FORMATION OR STRATA.</p> <p><u>ARENACEOUS</u> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p><u>ARGILLACEOUS</u> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p><u>ARTESIAN</u> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p><u>CALCAREOUS (CALC.)</u> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p><u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p><u>CORE RECOVERY (REC.)</u> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p><u>DIKE</u> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p><u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p><u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p><u>FAULT</u> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p><u>FISSILE</u> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p><u>FLOAT</u> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p><u>FLOOD PLAIN (FP)</u> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p><u>FORMATION (FM.)</u> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p><u>JOINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p><u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p><u>LENS</u> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p><u>MOTTLED (MOT.)</u> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p><u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p><u>RESIDUAL (RES.) SOIL</u> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p><u>ROCK QUALITY DESIGNATION (RQD)</u> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p><u>SAPROLITE (SAP.)</u> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p><u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p><u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p><u>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</u> - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p><u>STRATA CORE RECOVERY (SREC)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p><u>STRATA ROCK QUALITY DESIGNATION (SRQD)</u> - 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.</p> <p><u>TOPSOIL (TS.)</u> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p> |                          |
| <p>WEATHERED ROCK (WR)</p>                                                                                                                                                                                                                                                                                                                                                            | <p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</p>                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>CRYSTALLINE ROCK (CR)</p>                                                                                                                                                                                                                                                                                                                                                          | <p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>NON-CRYSTALLINE ROCK (ICR)</p>                                                                                                                                                                                                                                                                                                                                                     | <p>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</p>                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p>                                                                                                                                                                                                                                                                                                                                            | <p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| WEATHERING                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>FRESH</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p>                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>VERY SLIGHT (V SL.)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                             | <p>ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p>                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>SLIGHT (SL.)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p>                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>MODERATE (MOD.)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p>SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p>                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>MODERATELY SEVERE (MOD. SEV.)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <u>IF TESTED, WOULD YIELD SPT REFUSAL</u></p>                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>SEVERE (SEV.)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <u>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</u></p>                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>VERY SEVERE (V SEV.)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</u></p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>COMPLETE</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p>ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| ROCK HARDNESS                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>VERY HARD</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p>                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>HARD</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p>                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>MODERATELY HARD</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p>CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.</p>                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>MEDIUM HARD</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p>                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>SOFT</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.</p>                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>VERY SOFT</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.</p>                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| FRACTURE SPACING                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                        | BEDDING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                          |
| <p>TERM</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>SPACING</p>                                                                                                                                                                                                                                                                                                                                                         | <p>TERM</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <p>THICKNESS</p>         |
| <p>VERY WIDE</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>MORE THAN 10 FEET</p>                                                                                                                                                                                                                                                                                                                                               | <p>VERY THICKLY BEDDED</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p>&gt; 4 FEET</p>       |
| <p>WIDE</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>3 TO 10 FEET</p>                                                                                                                                                                                                                                                                                                                                                    | <p>THICKLY BEDDED</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>1.5 - 4 FEET</p>      |
| <p>MODERATELY CLOSE</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p>1 TO 3 FEET</p>                                                                                                                                                                                                                                                                                                                                                     | <p>THINLY BEDDED</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p>0.16 - 1.5 FEET</p>   |
| <p>CLOSE</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p>0.16 TO 1 FEET</p>                                                                                                                                                                                                                                                                                                                                                  | <p>VERY THINLY BEDDED</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <p>0.03 - 0.16 FEET</p>  |
| <p>VERY CLOSE</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p>LESS THAN 0.16 FEET</p>                                                                                                                                                                                                                                                                                                                                             | <p>THICKLY LAMINATED</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>0.008 - 0.03 FEET</p> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                        | <p>THINLY LAMINATED</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>&lt; 0.008 FEET</p>   |
| INDURATION                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>FRIABLE</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p>                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>MODERATELY INDURATED</p>                                                                                                                                                                                                                                                                                                                                                                                                                                            | <p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p>                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>INDURATED</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p>                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |
| <p>EXTREMELY INDURATED</p>                                                                                                                                                                                                                                                                                                                                                                                                                                             | <p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                          |

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| <p><u>ALLUVIUM (ALLUV.)</u> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.</p> <p><u>AQUIFER</u> - A WATER BEARING FORMATION OR STRATA.</p> <p><u>ARENACEOUS</u> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p><u>ARGILLACEOUS</u> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p><u>ARTESIAN</u> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p><u>CALCAREOUS (CALC.)</u> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p><u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p><u>CORE RECOVERY (REC.)</u> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p><u>DIKE</u> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p><u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p><u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p><u>FAULT</u> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p><u>FISSILE</u> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p><u>FLOAT</u> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p><u>FLOOD PLAIN (FP)</u> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p><u>FORMATION (FM.)</u> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p><u>JOINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p><u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p><u>LENS</u> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p><u>MOTTLED (MOT.)</u> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p><u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p><u>RESIDUAL (RES.) SOIL</u> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p><u>ROCK QUALITY DESIGNATION (RQD)</u> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p><u>SAPROLITE (SAP.)</u> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p><u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p><u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p><u>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</u> - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p><u>STRATA CORE RECOVERY (SREC)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p><u>STRATA ROCK QUALITY DESIGNATION (SRQD)</u> - 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.</p> <p><u>TOPSOIL (TS.)</u> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p> |  |
| <p>BENCH MARK: ORANGE PAINT CIRCLE LABELED G NE CORNER OF BRIDGE DECK (NEAREST EB2-A)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| <p>ELEVATION: 100 FT.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| <p>NOTES:</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C.  | WBS NO. 17BP.14.R.80        | 3         | 8            |



**BORING LOCATION MAP**  
**BRIDGE NO. 102**  
**ON SR 1173**  
**(PLOTT CREEK ROAD)**  
**ACROSS PLOTT CREEK**  
**WBS NO. 17BP.14.R.80**  
 HAYWOOD COUNTY, NORTH CAROLINA

DRAWN BY: T. RIDEOUT



# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 4 OF 7

| WBS 17BP.14.R.80                                                                      |                 |            | TIP 17BP.14.R.80    |       |       | COUNTY HAYWOOD                     |    |    | GEOLOGIST Smith, B. C.  |                 |           |     |     |                           |            |                                                                                                              |
|---------------------------------------------------------------------------------------|-----------------|------------|---------------------|-------|-------|------------------------------------|----|----|-------------------------|-----------------|-----------|-----|-----|---------------------------|------------|--------------------------------------------------------------------------------------------------------------|
| SITE DESCRIPTION Bridge No. 102 on -L- (SR 1173, Plott Creek Road) Across Plott Creek |                 |            |                     |       |       |                                    |    |    |                         | GROUND WTR (ft) |           |     |     |                           |            |                                                                                                              |
| BORING NO. EB1-A                                                                      |                 |            | STATION N/A         |       |       | OFFSET N/A                         |    |    | ALIGNMENT -L-           |                 |           |     |     |                           |            |                                                                                                              |
| COLLAR ELEV. 95.4 ft                                                                  |                 |            | TOTAL DEPTH 50.3 ft |       |       | NORTHING 653,681                   |    |    | EASTING 804,793         |                 |           |     |     |                           |            |                                                                                                              |
| DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011                           |                 |            |                     |       |       | DRILL METHOD NW Casing w/ Advancer |    |    | HAMMER TYPE Automatic   |                 |           |     |     |                           |            |                                                                                                              |
| DRILLER Gower, S. D.                                                                  |                 |            | START DATE 10/28/11 |       |       | COMP. DATE 10/28/11                |    |    | SURFACE WATER DEPTH N/A |                 |           |     |     |                           |            |                                                                                                              |
| ELEV (ft)                                                                             | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT          |       |       | BLOWS PER FOOT                     |    |    |                         |                 | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION |            |                                                                                                              |
|                                                                                       |                 |            | 0.5ft               | 0.5ft | 0.5ft | 0                                  | 25 | 50 | 75                      | 100             |           |     |     | ELEV. (ft)                | DEPTH (ft) |                                                                                                              |
| 100                                                                                   |                 |            |                     |       |       |                                    |    |    |                         |                 |           |     |     |                           |            |                                                                                                              |
| 95                                                                                    | 95.4            | 0.0        |                     |       |       |                                    |    |    |                         |                 |           |     |     |                           | 95.4       | GROUND SURFACE                                                                                               |
| 90                                                                                    | 90.1            | 5.3        | 2                   | 6     | 8     |                                    |    |    |                         |                 |           |     |     |                           | 90.4       | ALLUVIAL<br>Brown, med. dense, clayey, fine grain sand w/trace gravel (A-3).                                 |
| 85                                                                                    | 85.1            | 10.3       | 2                   | 2     | 2     |                                    |    |    |                         |                 |           |     |     |                           |            | 5.0                                                                                                          |
| 80                                                                                    | 80.1            | 15.3       | 1                   | 2     | 3     |                                    |    |    |                         |                 |           |     |     |                           |            | RESIDUAL<br>Orange-brown, black & white, soft to stiff, saprolitic, f. sandy, micaceous silt (A-4).          |
| 75                                                                                    | 75.1            | 20.3       | 3                   | 7     | 8     |                                    |    |    |                         |                 |           |     |     |                           |            | 22.8                                                                                                         |
| 70                                                                                    | 70.1            | 25.3       | 2                   | 4     | 9     |                                    |    |    |                         |                 |           |     |     |                           |            | RESIDUAL<br>Brown, black & white, med. dense to v. dense, saprolitic, silty, f. grain, micaceous sand (A-3). |
| 65                                                                                    | 65.1            | 30.3       | 6                   | 10    | 10    |                                    |    |    |                         |                 |           |     |     |                           |            | 42.8                                                                                                         |
| 60                                                                                    | 60.1            | 35.3       | 5                   | 7     | 9     |                                    |    |    |                         |                 |           |     |     |                           |            | WEATHERED ROCK<br>Weathered rock (Gneiss)                                                                    |
| 55                                                                                    | 55.1            | 40.3       | 7                   | 12    | 14    |                                    |    |    |                         |                 |           |     |     |                           |            | 50.3                                                                                                         |
| 50                                                                                    | 50.1            | 45.3       | 12                  | 24    | 41    |                                    |    |    |                         |                 |           |     |     |                           |            | Boring Terminated with Standard Penetration Test Refusal at Elevation 45.1 ft on Crystalline Rock (Gneiss).  |
|                                                                                       | 45.1            | 50.3       | 100/0.4             |       |       |                                    |    |    |                         |                 |           |     |     |                           |            |                                                                                                              |
|                                                                                       |                 |            |                     |       |       |                                    |    |    |                         |                 |           |     |     |                           |            |                                                                                                              |

NCDOT BORE SINGLE GEO\_BRDG0102.GPJ NC\_DOT\_GDT 10/31/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 5 OF 7

|                                                                                       |                 |                     |            |                                    |       |                         |    |    |           |     |      |                           |                                                                                                                             |
|---------------------------------------------------------------------------------------|-----------------|---------------------|------------|------------------------------------|-------|-------------------------|----|----|-----------|-----|------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| WBS 17BP.14.R.80                                                                      |                 | TIP 17BP.14.R.80    |            | COUNTY HAYWOOD                     |       | GEOLOGIST Smith, B. C.  |    |    |           |     |      |                           |                                                                                                                             |
| SITE DESCRIPTION Bridge No. 102 on -L- (SR 1173, Plott Creek Road) Across Plott Creek |                 |                     |            |                                    |       | GROUND WTR (ft)         |    |    |           |     |      |                           |                                                                                                                             |
| BORING NO. EB1-B                                                                      |                 | STATION N/A         |            | OFFSET N/A                         |       | ALIGNMENT -L-           |    |    |           |     |      |                           |                                                                                                                             |
| COLLAR ELEV. 100.3 ft                                                                 |                 | TOTAL DEPTH 54.2 ft |            | NORTHING 653,628                   |       | EASTING 804,731         |    |    |           |     |      |                           |                                                                                                                             |
| DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011                           |                 |                     |            | DRILL METHOD NW Casing w/ Advancer |       | HAMMER TYPE Automatic   |    |    |           |     |      |                           |                                                                                                                             |
| DRILLER Gower, S. D.                                                                  |                 | START DATE 10/27/11 |            | COMP. DATE 10/27/11                |       | SURFACE WATER DEPTH N/A |    |    |           |     |      |                           |                                                                                                                             |
| ELEV (ft)                                                                             | DRIVE ELEV (ft) | DEPTH (ft)          | BLOW COUNT |                                    |       | BLOWS PER FOOT          |    |    | SAMP. NO. | MOI | LOG  | SOIL AND ROCK DESCRIPTION |                                                                                                                             |
|                                                                                       |                 |                     | 0.5ft      | 0.5ft                              | 0.5ft | 0                       | 25 | 50 | 75        | 100 |      |                           | ELEV. (ft) DEPTH (ft)                                                                                                       |
| 105                                                                                   |                 |                     |            |                                    |       |                         |    |    |           |     |      |                           |                                                                                                                             |
| 100                                                                                   | 100.3           | 0.0                 |            |                                    |       |                         |    |    |           |     |      |                           | 100.3 GROUND SURFACE 0.0                                                                                                    |
| 95                                                                                    | 96.2            | 4.1                 | 2          | 7                                  | 5     |                         |    |    |           |     | M    |                           | ALLUVIAL<br>Brown, med. dense, fine grain sand and gravel (A-1-b).                                                          |
|                                                                                       |                 |                     | 7          | 12                                 | 15    |                         |    |    |           |     | Sat. |                           | 93.7 6.6                                                                                                                    |
| 90                                                                                    | 91.2            | 9.1                 | WOH        | 2                                  | 2     |                         |    |    |           |     | Sat. |                           | RESIDUAL<br>Golden brown w/orange-brown staining, black & white, soft to stiff, saprolitic, f. sandy, micaceous silt (A-4). |
| 85                                                                                    | 86.2            | 14.1                | 1          | 2                                  | 3     |                         |    |    |           |     | Sat. |                           |                                                                                                                             |
| 80                                                                                    | 81.2            | 19.1                | 2          | 3                                  | 5     |                         |    |    |           |     | Sat. |                           |                                                                                                                             |
| 75                                                                                    | 76.2            | 24.1                | 2          | 3                                  | 4     |                         |    |    |           |     | Sat. |                           | 73.7 26.6                                                                                                                   |
| 70                                                                                    | 71.2            | 29.1                | 5          | 7                                  | 12    |                         |    |    |           |     | Sat. |                           | RESIDUAL<br>Golden brown, black, white & brown, loose to v. dense, saprolitic, silty, f. grain, micaceous sand (A-3).       |
| 65                                                                                    | 66.2            | 34.1                | 5          | 9                                  | 12    |                         |    |    |           |     | Sat. |                           |                                                                                                                             |
| 60                                                                                    | 61.2            | 39.1                | 7          | 10                                 | 14    |                         |    |    |           |     | Sat. |                           |                                                                                                                             |
| 55                                                                                    | 56.2            | 44.1                | 4          | 3                                  | 3     |                         |    |    |           |     | Sat. |                           |                                                                                                                             |
| 50                                                                                    | 51.2            | 49.1                | 12         | 27                                 | 32    |                         |    |    |           |     | Sat. |                           |                                                                                                                             |
|                                                                                       | 46.2            | 54.1                | 60/0.1     |                                    |       |                         |    |    |           |     |      |                           | 46.1 54.2                                                                                                                   |
|                                                                                       |                 |                     |            |                                    |       |                         |    |    |           |     |      |                           | Boring Terminated with Standard Penetration Test Refusal at Elevation 46.1 ft on Crystalline Rock (Gneiss).                 |

NCDOT BORE SINGLE GEO\_BRDG0102.GPJ NC\_DOT.GDT 10/31/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

SHEET 6 OF 7

|                                                                                       |                     |                                    |                         |
|---------------------------------------------------------------------------------------|---------------------|------------------------------------|-------------------------|
| WBS 17BP.14.R.80                                                                      | TIP 17BP.14.R.80    | COUNTY HAYWOOD                     | GEOLOGIST Smith, B. C.  |
| SITE DESCRIPTION Bridge No. 102 on -L- (SR 1173, Plott Creek Road) Across Plott Creek |                     |                                    |                         |
| BOREING NO. EB2-A                                                                     | STATION N/A         | OFFSET N/A                         | ALIGNMENT -L-           |
| COLLAR ELEV. 95.4 ft                                                                  | TOTAL DEPTH 57.1 ft | NORTHING 653,655                   | EASTING 804,821         |
| DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011                           |                     | DRILL METHOD NW Casing w/ Advancer | HAMMER TYPE Automatic   |
| DRILLER Gower, S. D.                                                                  | START DATE 10/27/11 | COMP. DATE 10/27/11                | SURFACE WATER DEPTH N/A |

| ELEV<br>(ft) | DRIVE<br>ELEV<br>(ft) | DEPTH<br>(ft) | BLOW COUNT |       |       | BLOWS PER FOOT |    |    |    |     | SAMP.<br>NO. | L<br>O<br>G | SOIL AND ROCK DESCRIPTION                                                                                            |            |
|--------------|-----------------------|---------------|------------|-------|-------|----------------|----|----|----|-----|--------------|-------------|----------------------------------------------------------------------------------------------------------------------|------------|
|              |                       |               | 0.5ft      | 0.5ft | 0.5ft | 0              | 25 | 50 | 75 | 100 |              |             | ELEV. (ft)                                                                                                           | DEPTH (ft) |
| 100          |                       |               |            |       |       |                |    |    |    |     |              |             |                                                                                                                      |            |
| 95           | 95.4                  | 0.0           |            |       |       |                |    |    |    |     |              |             | 95.4                                                                                                                 | 0.0        |
| 90           | 90.1                  | 5.3           | 1          | 7     | 7     |                |    |    |    |     |              | W           | GROUND SURFACE                                                                                                       |            |
| 85           | 85.1                  | 10.3          | 12         | 13    | 9     |                |    |    |    |     |              | Sat.        | ALLUVIAL                                                                                                             |            |
| 80           | 80.1                  | 15.3          | 3          | 3     | 4     |                |    |    |    |     |              | Sat.        | Brown, med. dense, silty, f. grain sand & gravel (A-1-b).                                                            |            |
| 75           | 75.1                  | 20.3          | 1          | 2     | 2     |                |    |    |    |     |              | Sat.        |                                                                                                                      |            |
| 70           | 70.1                  | 25.3          | 2          | 3     | 4     |                |    |    |    |     |              | Sat.        | RESIDUAL                                                                                                             |            |
| 65           | 65.1                  | 30.3          | 5          | 8     | 9     |                |    |    |    |     |              | Sat.        | Brown & golden brown, soft to med. stiff, saprolitic, f. sandy, micaceous silt (A-4).                                | 7.8        |
| 60           | 60.1                  | 35.3          | 6          | 8     | 12    |                |    |    |    |     |              | Sat.        |                                                                                                                      |            |
| 55           | 55.1                  | 40.3          | 6          | 10    | 14    |                |    |    |    |     |              | Sat.        | RESIDUAL                                                                                                             |            |
| 50           | 50.1                  | 45.3          | 10         | 11    | 14    |                |    |    |    |     |              | Sat.        | Golden brown, white & brown, med. dense to v. dense, saprolitic, silty, f. grain micaceous sand (A-3).               | 22.8       |
| 45           | 45.1                  | 50.3          | 35         | 46    | 51    |                |    |    |    |     |              | Sat.        |                                                                                                                      |            |
| 40           | 40.1                  | 55.3          | 22         | 32    | 43    |                |    |    |    |     |              | Sat.        |                                                                                                                      |            |
|              | 38.3                  | 57.1          | 100/0.4    |       |       |                |    |    |    |     |              | Sat.        | WEATHERED ROCK                                                                                                       | 52.8       |
|              |                       | 60/0.0        |            |       |       |                |    |    |    |     |              | Sat.        | Weathered rock (Gneiss).                                                                                             |            |
|              |                       |               |            |       |       |                |    |    |    |     |              |             | Boring Terminated with Casing & Standard Penetration Test Refusal at Elevation 38.3 ft on Crystalline Rock (Gneiss). | 57.1       |

NCDOT BORE SINGLE GEO BRDG0102.GPJ NC DOT.GDT 10/31/11



|                                                                                       |                 |            |                     |       |        |                                    |    |    |                         |         |           |       |                                                                                                                       |
|---------------------------------------------------------------------------------------|-----------------|------------|---------------------|-------|--------|------------------------------------|----|----|-------------------------|---------|-----------|-------|-----------------------------------------------------------------------------------------------------------------------|
| WBS 17BP.14.R.80                                                                      |                 |            | TIP 17BP.14.R.80    |       |        | COUNTY HAYWOOD                     |    |    | GEOLOGIST Smith, B. C.  |         |           |       |                                                                                                                       |
| SITE DESCRIPTION Bridge No. 102 on -L- (SR 1173, Plott Creek Road) Across Plott Creek |                 |            |                     |       |        |                                    |    |    | GROUND WTR (ft)         |         |           |       |                                                                                                                       |
| BORING NO. EB2-B                                                                      |                 |            | STATION N/A         |       |        | OFFSET N/A                         |    |    | ALIGNMENT -L-           |         |           |       |                                                                                                                       |
| COLLAR ELEV. 99.7 ft                                                                  |                 |            | TOTAL DEPTH 54.8 ft |       |        | NORTHING 653,609                   |    |    | EASTING 804,770         |         |           |       |                                                                                                                       |
| DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87.6% 08/15/2011                           |                 |            |                     |       |        | DRILL METHOD NW Casing w/ Advancer |    |    | HAMMER TYPE Automatic   |         |           |       |                                                                                                                       |
| DRILLER Gower, S. D.                                                                  |                 |            | START DATE 10/27/11 |       |        | COMP. DATE 10/27/11                |    |    | SURFACE WATER DEPTH N/A |         |           |       |                                                                                                                       |
| ELEV (ft)                                                                             | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT          |       |        | BLOWS PER FOOT                     |    |    |                         |         | SAMP. NO. | L O G | SOIL AND ROCK DESCRIPTION                                                                                             |
|                                                                                       |                 |            | 0.5ft               | 0.5ft | 0.5ft  | 0                                  | 25 | 50 | 75                      | 100     |           |       | ELEV. (ft) DEPTH (ft)                                                                                                 |
| 100                                                                                   |                 |            |                     |       |        |                                    |    |    |                         |         |           |       |                                                                                                                       |
|                                                                                       | 99.7            | 0.0        | 2                   | 5     | 9      | 14                                 |    |    |                         |         |           | M     | 99.7 GROUND SURFACE 0.0                                                                                               |
| 95                                                                                    | 94.9            | 4.8        | WOH                 | 1     | 5      | 6                                  |    |    |                         |         |           | Sat.  | 97.2 ALLUVIAL Brown, med. dense, f. grain sand w/trace gravel (A-3). 2.5                                              |
| 90                                                                                    | 89.9            | 9.8        |                     |       |        | 2                                  |    |    |                         |         |           | Sat.  | 92.4 ALLUVIAL Brown, loose, silty, f. grain sand and gravel (A-1-b). 7.3                                              |
| 85                                                                                    | 84.9            | 14.8       |                     | 1     | 1      | 4                                  |    |    |                         |         |           | Sat.  | RESIDUAL Orange-brown to golden brown, v. soft to stiff, saprolitic, f. sandy, micaceous silt (A-4).                  |
| 80                                                                                    | 79.9            | 19.8       |                     | 4     | 2      | 4                                  |    |    |                         |         |           | Sat.  |                                                                                                                       |
| 75                                                                                    | 74.9            | 24.8       |                     | 1     | 2      | 5                                  |    |    |                         |         |           | Sat.  |                                                                                                                       |
| 70                                                                                    | 69.9            | 29.8       |                     | 2     | 3      | 8                                  |    |    |                         |         |           | Sat.  | 72.4 RESIDUAL Brown, black & white, dense to med. dense, silty, f. grain micaceous sand (A-3). 27.3                   |
| 65                                                                                    | 64.9            | 34.8       |                     | 6     | 9      | 19                                 |    |    |                         |         |           | Sat.  |                                                                                                                       |
| 60                                                                                    | 59.9            | 39.8       |                     | 10    | 11     | 32                                 |    |    |                         |         |           | Sat.  | 62.4 WEATHERED ROCK Weathered rock (Gneiss) 37.3                                                                      |
| 55                                                                                    | 54.9            | 44.8       |                     | 40    | 60/0.4 |                                    |    |    |                         | 100/0.9 |           |       |                                                                                                                       |
| 50                                                                                    | 49.9            | 49.8       |                     | 22    | 48     |                                    |    |    |                         |         |           |       |                                                                                                                       |
| 45                                                                                    | 44.9            | 54.8       |                     | 24    | 49     |                                    |    |    |                         |         |           |       |                                                                                                                       |
|                                                                                       |                 | 60/0.0     |                     |       |        |                                    |    |    |                         | 60/0.0  |           |       | 44.9 Boring Terminated with Standard Penetration Test Refusal at Elevation 44.9 ft on Crystalline Rock (Gneiss). 54.8 |