STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.14.R.78	1	24

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *17BP.14.R.78* F.A. PROJ. *N/A*

COUNTY *SWAIN*

PROJECT DESCRIPTION *DIVISION 14 GROUP T BRIDGE REPLACEMENT*

SITE DESCRIPTION *REPLACE BRIDGE NO. 860132 ON SR 1122 (CHESTNUT COVE ROAD) OVER CHESTNUT COVE CREEK*

CONTENTS

PERSONNEL

F. Cox

D. Rhodes

K. Lloyd

INVESTIGATED BY *AMEC E&I, Inc.*

CHECKED BY *S. Johnson, P.G. P.E.*

SUBMITTED BY *M. Lear, P.G.*

DATE *August 2012*

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) 707-6850. 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 (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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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: *R. Rahie*

NORTH CAROLINA LICENSED 8/29/12 GEOLOGIST SEAL 1927 MICHAEL B. LEAR

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SIGNATURE

NC Engineering F-1253 NC Geology C-247

PROJECT REFERENCE NO.	SHEET NO.
17BP.14.R.78	2

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

SOIL DESCRIPTION

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:

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LENSES, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 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	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GENERAL RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

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

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL - LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL - PLASTIC LIMIT		
OM - OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL - SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

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

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- TEST BORING (SPT, DPT, DMT, PMT)
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING W/ CORE
- SPT N-VALUE
- REF — SPT REFUSAL

ABBREVIATIONS

AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST
BT - BORING TERMINATED	MICA. - MICACEOUS	WEA. - WEATHERED
CL. - CLAY	MOD. - MODERATELY	γ - UNIT WEIGHT
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	γ_d - DRY UNIT WEIGHT
CSE. - COARSE	ORG. - ORGANIC	
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	SAMPLE ABBREVIATIONS
DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC	S - BULK
e - VOID RATIO	SD. - SAND, SANDY	SS - SPLIT SPOON
F - FINE	SL. - SILT, SILTY	ST - SHELBY TUBE
FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY	RS - ROCK
FRAC. - FRACTURED, FRACTURES	TCR - TRICONE REFUSAL	RT - RECOMPACTED TRIAXIAL
FRAGS. - FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING RATIO
HI. - HIGHLY	V - VERY	

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] B-53
- [X] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 6" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [X] TRICONE 3" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] HANDIR.

CORE SIZE:
- [ ] -B_____
- [X] -N 0
- [ ] -H_____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

REVISED 03/23/09

PROJECT REFERENCE NO.	SHEET NO.
I78P.14.R.78	2A

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

ROCK DESCRIPTION

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:

WEATHERED ROCK (WR)		NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)		FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)		FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED, ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)		COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS, IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	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. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: NCDOT REBAR & CAP STAMPED BL-2 LOCATED AT STATION 13+23.96 (EL), 9.42 LT

ELEVATION: 2684.21 FT.

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

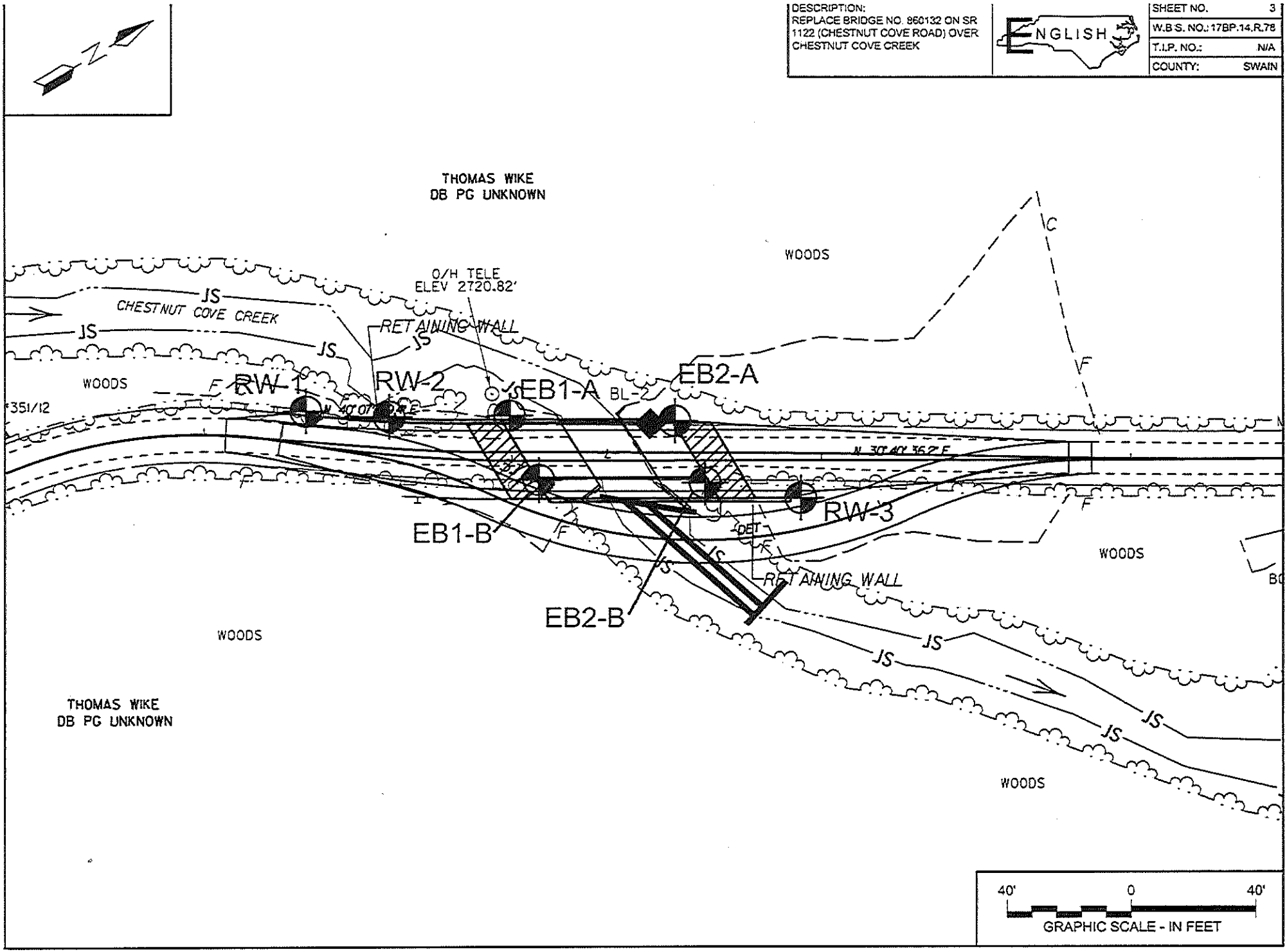
CI - CAVE IN

REVISED 09/23/09

DESCRIPTION:
REPLACE BRIDGE NO. 860132 ON SR 1122 (CHESTNUT COVE ROAD) OVER CHESTNUT COVE CREEK

ENGLISH

SHEET NO.	3
W.B.S. NO.:	17BP.14.R.78
T.I.P. NO.:	N/A
COUNTY:	SWAIN



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd	
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek				GROUND WTR (ft)
BORING NO. EB1-A	STATION 11+99	OFFSET 15 ft LT	ALIGNMENT -L-	0 HR. 8.1
COLLAR ELEV. 2,686.6 ft	TOTAL DEPTH 20.5 ft	NORTHING 620,498	EASTING 701,698	24 HR. CI @ 6.2
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/27/12	COMP. DATE 04/27/12	SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2690										
	2,686.6	0.0								2,686.6 GROUND SURFACE 0.0
2685			4	3	60/0.2	60/0.2		M		2,685.4 ROADWAY EMBANKMENT 1.2 Brown, fine to coarse sandy SILT (A-4) with some fine to coarse gravel ALLUVIAL Dark gray, gray, tan, and white, Gravel, Cobbles, and Boulders (GNEISS)
2680										
2675										2,676.1 10.5 CRYSTALLINE ROCK Dark gray, tan and white, GNEISS
2670										2,666.1 20.5 Boring Terminated at Elevation 2,666.1 ft In Crystalline Rock: GNEISS

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

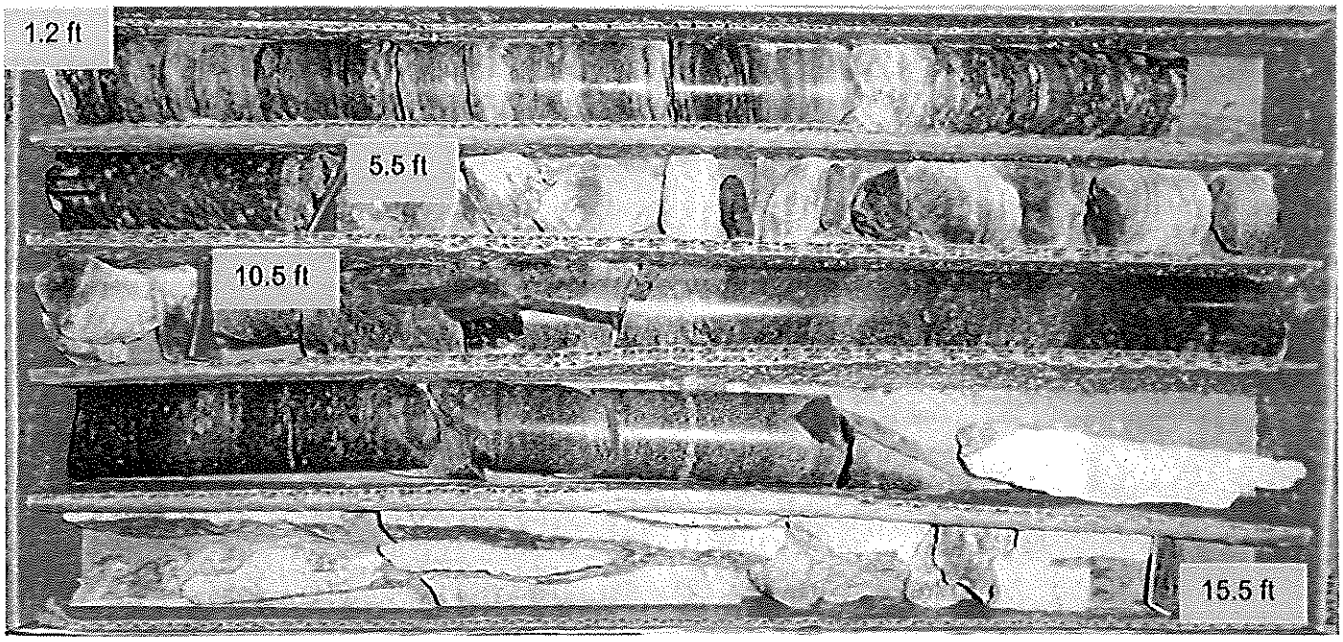
WBS 17BP.14,R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd	
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek				GROUND WTR (ft)
BORING NO. EB1-A	STATION 11+99	OFFSET 15 ft LT	ALIGNMENT -L-	0 HR. 8.1
COLLAR ELEV. 2,686.6 ft	TOTAL DEPTH 20.5 ft	NORTHING 620,498	EASTING 701,698	24 HR. CI @ 6.2
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/27/12	COMP. DATE 04/27/12	SURFACE WATER DEPTH N/A	
CORE SIZE NQ	TOTAL RUN 19.3 ft			

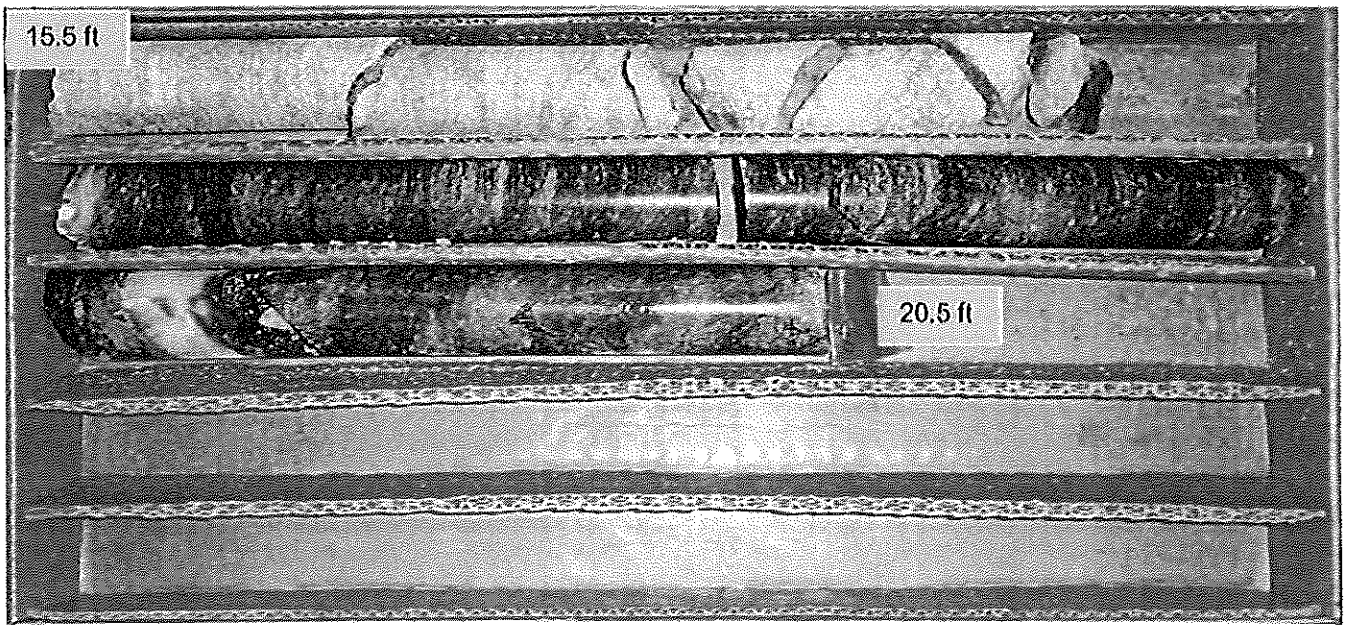
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2685.4											ELEV. (ft) / DEPTH (ft)
											Begin Coring @ 1.2 ft
	2,685.4	1.2	4.3	4:07 4:03 1:47 3:23/1.3	(2.4) 56%	N/A		(4.2) 45%	N/A		2,685.4 **ALLUVIAL** 1.2 Dark gray, gray, tan, and white, Gravel, Cobbles, and Boulders (GNEISS) Rod drops at 2.2-2.9 ft and 3.5-4.1 ft
	2,681.1	5.5									
2680			5.0	2:55 3:03 5:17 3:58 4:50	(1.8) 36%	N/A					
	2,676.1	10.5									2,676.1
2675			5.0	3:23 4:28 5:02 4:52 5:10	(4.8) 96%	(4.2) 84%		(9.8) 98%	(8.6) 86%		**CRYSTALLINE ROCK** 10.5 Dark gray, tan and white, moderately weathered to fresh, moderately hard to hard, close to moderately close fracture spacing, GNEISS 2 joints at 90°, open to tight with iron staining 5 joints at 45° - 60°, open to tight with iron staining 2 joints at 0° -15°, open with iron staining
	2,671.1	15.5									
2670			5.0	5:42 5:19 4:05 4:58 5:07	(5.0) 100%	(4.4) 88%					
	2,666.1	20.5									2,666.1 20.5 Boring Terminated at Elevation 2,666.1 ft In Crystalline Rock: GNEISS

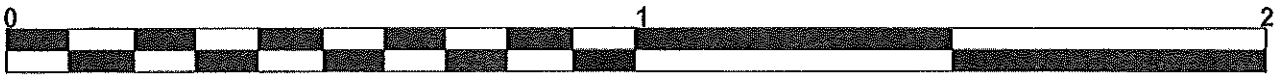
CORE PHOTOGRAPHS

EB1-A

BOXES 1 & 2: 1.2 - 20.5 FEET







NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek			GROUND WTR (ft)
BORING NO. EB1-B	STATION 12+07	OFFSET 6 ft RT	ALIGNMENT -L-	0 HR. 8.6
COLLAR ELEV. 2,686.2 ft	TOTAL DEPTH 25.3 ft	NORTHING 620,495	EASTING 701,721	24 HR. 8.6
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/27/12	COMP. DATE 04/27/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2690										
	2,686.2	0.0								2,686.2 GROUND SURFACE 0.0
2685			4	8	9	17		M		ROADWAY EMBANKMENT Tan and brown, very stiff, moist, fine to coarse sandy SILT (A-4) with trace gravel
	2,682.4	3.8	8	43	45	88		M		2,681.9 4.3 2,680.9 ALLUVIAL 5.3 Brown, very dense, moist, silty, fine to coarse SAND and GRAVEL (A-1-b) with dark gray and white, cobbles and boulders (GNEISS)
2680										2,678.2 8.0 CRYSTALLINE ROCK Dark gray and white, GNEISS
2675										2,674.5 11.7 WEATHERED ROCK 2,672.2 No Recovery - Severely weathered GNEISS 14.0 CRYSTALLINE ROCK Dark gray and tan to greenish gray, GNEISS
2670										
2665										2,660.9 25.3 Boring Terminated at Elevation 2,660.9 ft In Crystalline Rock: GNEISS

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

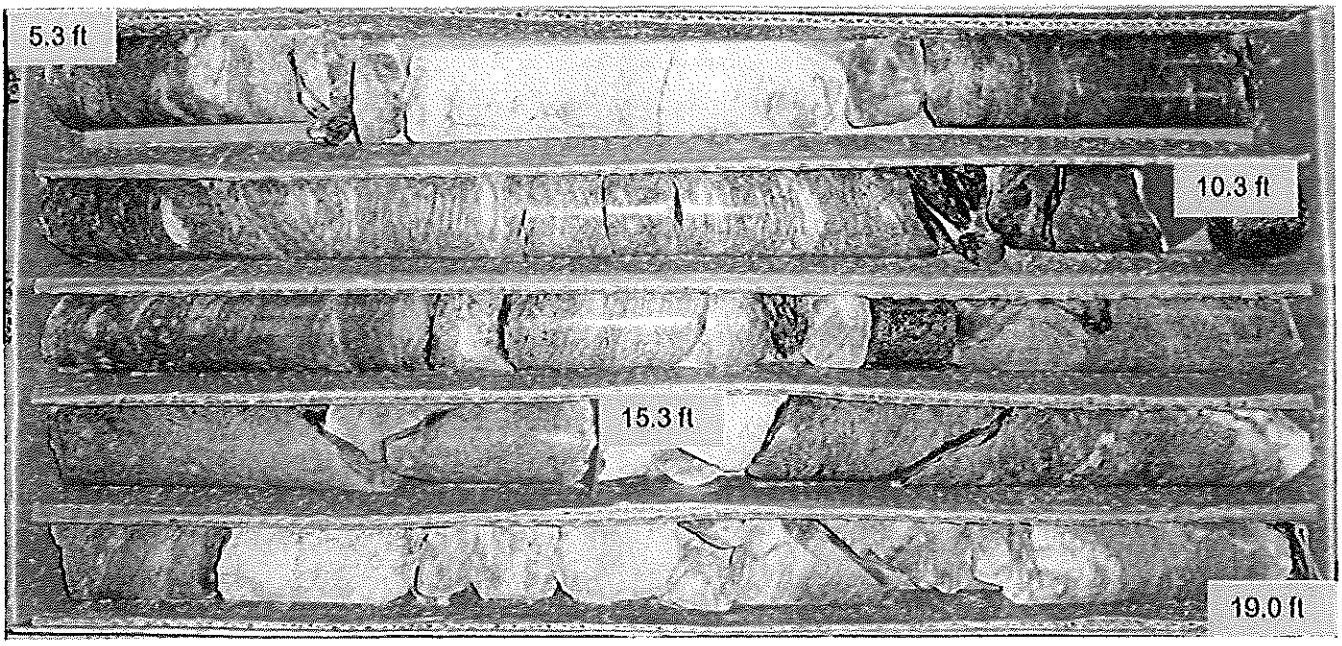
WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek			GROUND WTR (ft)
BORING NO. EB1-B	STATION 12+07	OFFSET 6 ft RT	ALIGNMENT -L-	0 HR. 8.6
COLLAR ELEV. 2,686.2 ft	TOTAL DEPTH 25.3 ft	NORTHING 620,495	EASTING 701,721	24 HR. 8.6
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/27/12	COMP. DATE 04/27/12	SURFACE WATER DEPTH N/A
CORE SIZE NQ	TOTAL RUN 20.0 ft		

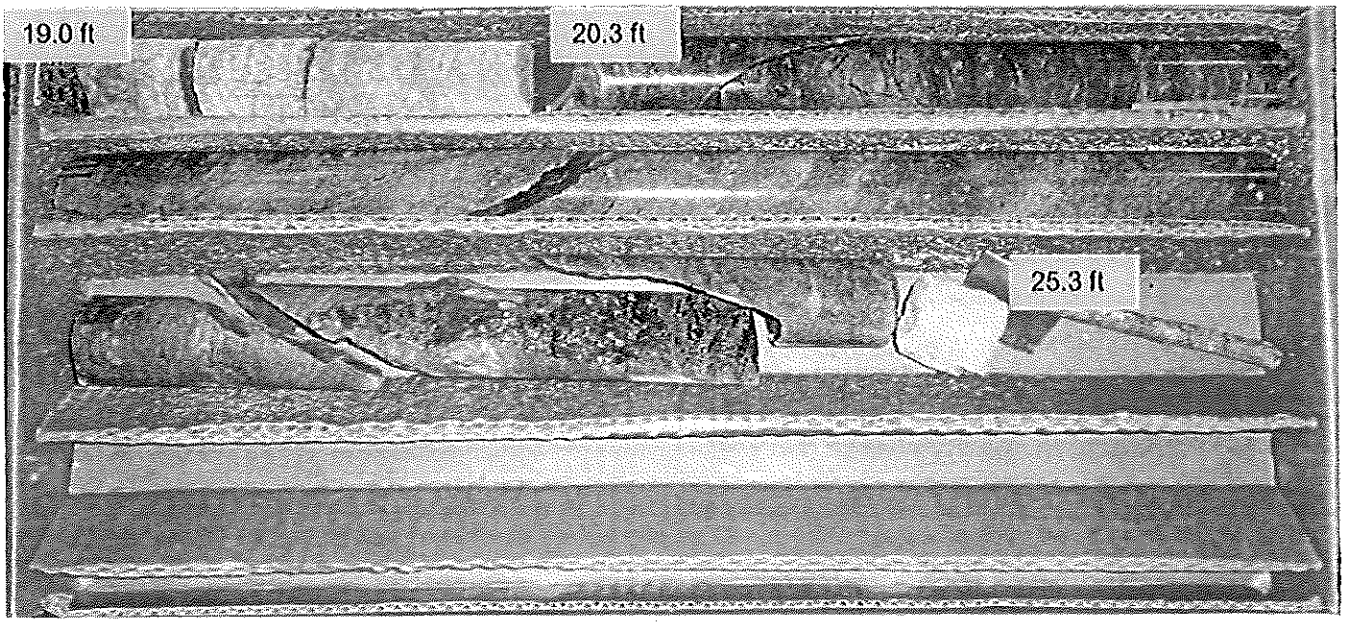
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN ROD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA ROD (ft) %	LOG	DESCRIPTION AND REMARKS
2680.9											Begin Coring @ 5.3 ft
2680	2,680.9	5.3	5.0	3:23 4:28 4:47 6:30 5:00	(3.7) 74%	(1.6) 32%		(1.4) 52%	N/A		2,680.9 ALLUVIAL 5.3 Dark gray and white, Cobbles and Boulders (GNEISS) 2,678.2 8.0 CRYSTALLINE ROCK Dark gray, slightly weathered, hard, close fracture spacing, GNEISS 10 joints at 0°-30° open, with iron staining
	2,675.9	10.3						(3.7) 100%	(2.1) 57%		
2675			5.0	3:48 1:20 1:36 7:30 6:07	(2.7) 54%	(1.5) 30%					2,674.5 11.7 WEATHERED ROCK No Recovery - Severely weathered GNEISS 2,672.2 14.0 CRYSTALLINE ROCK Dark gray and tan to greenish gray, moderately weathered to fresh, moderately hard to very hard, close to moderately close fracture spacing, GNEISS 7 joints at 45°-60° open, with iron staining 5 joints at 0°-30° open, with iron staining
	2,670.9	15.3						(0.0) 0%	N/A		
2670			5.0	4:06 4:47 2:58 3:01 4:03	(3.8) 76%	(2.1) 42%		(0.6) 85%	(7.4) 65%		
	2,665.9	20.3									
2665			5.0	4:31 4:17 4:23 5:20 4:59	(4.5) 90%	(4.3) 86%					
	2,660.9	25.3									2,660.9 25.3 Boring Terminated at Elevation 2,660.9 ft In Crystalline Rock: GNEISS

CORE PHOTOGRAPHS

EB1-B

BOXES 1 & 2: 5.3 - 25.3 FEET





NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd	
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek				GROUND WTR (ft)
BORING NO. EB2-A	STATION 12+53	OFFSET 13 ft LT	ALIGNMENT -L-	0 HR. 8.6
COLLAR ELEV. 2,683.6 ft	TOTAL DEPTH 30.9 ft	NORTHING 620,543	EASTING 701,727	24 HR. Cl @ 6.0
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/25/12	COMP. DATE 04/26/12	SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2685										
	2,683.6	0.0								2,683.6 GROUND SURFACE 0.0
			2	5	2	7		M		ROADWAY EMBANKMENT Tan brown, silty fine to coarse SAND (A-2-4) with some gravel
2680	2,679.7	3.9								2,679.2 4.4
			2	60/0.1		60/0.1		M		ALLUVIAL Gray and brown, medium dense to very dense, moist, silty GRAVEL (A-1-a) with little fine to coarse sand and cobbles and boulders (GNEISS)
	2,677.7	5.9	8	6	5	11		M		
2675	2,675.8	7.8	2	5	8	13		M		
	2,671.6	12.0								2,671.6 12.0
			60/0.4			60/0.4				2,671.2 12.4 WEATHERED ROCK Gray and brown, GNEISS
2670										2,670.8 12.8 CRYSTALLINE ROCK Dark gray and white, GNEISS
2665										2,666.5 17.1 WEATHERED ROCK Gray and brown, GNEISS
	2,662.7	20.9	60/0.3			60/0.3				2,662.3 21.3 CRYSTALLINE ROCK Dark gray and white, Gneiss
2660										
2655										2,652.7 30.9 Boring Terminated at Elevation 2,652.7 ft In Crystalline Rock: GNEISS

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

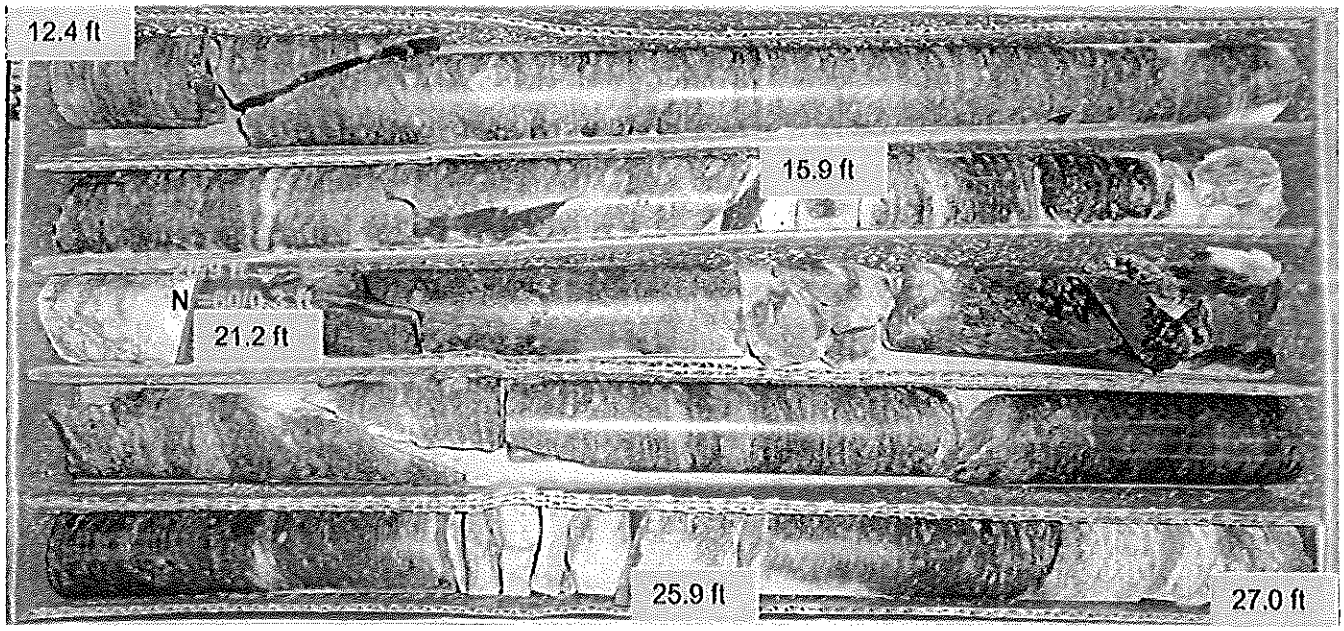
WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd	
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek				GROUND WTR (ft)
BORING NO. EB2-A	STATION 12+53	OFFSET 13 ft LT	ALIGNMENT -L-	0 HR. 8.6
COLLAR ELEV. 2,683.6 ft	TOTAL DEPTH 30.9 ft	NORTHING 620,543	EASTING 701,727	24 HR. Cl @ 6.0
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/25/12	COMP. DATE 04/26/12	SURFACE WATER DEPTH N/A	
CORE SIZE NQ	TOTAL RUN 18.2 ft			

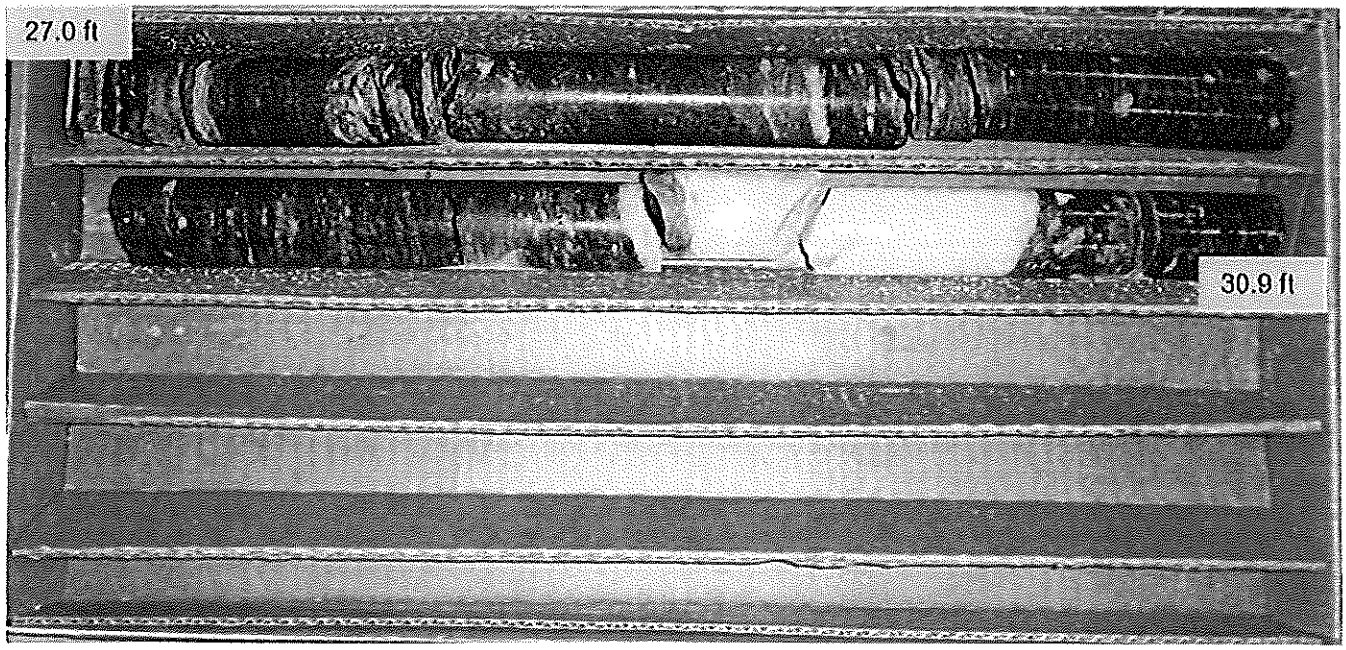
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2671.2											ELEV. (ft) / DEPTH (ft)
											Begin Coring @ 12.4 ft
2670	2,671.2	12.4	3.5	4:44 6:35 4:53	(3.1) 89%	(2.8) 80%		(0.0) 0%	N/A		2,671.2 / 12.4 WEATHERED ROCK No Recovery-Severely weathered GNEISS
	2,667.7	15.9		2:31/0.5				(4.3) 100%	(2.8) 65%		2,670.8 / 12.8 CRYSTALLINE ROCK Dark gray and white, moderately to slightly weathered, moderately hard to hard, close to moderately close fracture spacing, GNEISS
			5.0	5:44 3:17 4:09 7:08 7:21	(1.2) 24%	(0.0) 0%		(0.0) 0%	N/A		2,666.5 / 17.1 WEATHERED ROCK No Recovery-Severely weathered GNEISS
2665	2,662.7	20.9									
	2,662.4	21.2		N=60/0.3							2,662.3 / 21.3
			4.7	5:58 6:32 4:41 3:24 3:36/0.7	(4.6) 98%	(3.7) 79%		(9.4) 98%	(7.1) 74%		CRYSTALLINE ROCK Dark gray and white, moderately to slightly weathered, moderately hard to hard, close to moderately close fracture spacing, GNEISS
2660											
	2,657.7	25.9									
			5.0	2:28 2:38 2:28 3:00	(4.8) 96%	(3.4) 68%					
2655											
	2,652.7	30.9		4:45							2,652.7 / 30.9 Boring Terminated at Elevation 2,652.7 ft In Crystalline Rock: GNEISS

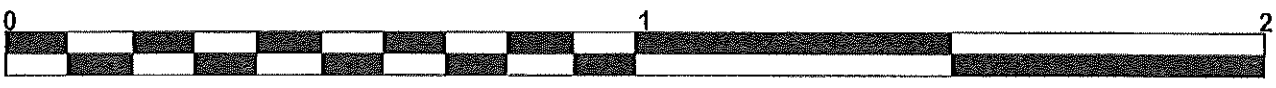
CORE PHOTOGRAPHS

EB2-A

BOXES 1 & 2: 12.4 - 30.9 FEET







NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek			GROUND WTR (ft)
BORING NO. EB2-B	STATION 12+62	OFFSET 7 ft RT	ALIGNMENT -L-	0 HR. 8.2
COLLAR ELEV. 2,683.2 ft	TOTAL DEPTH 25.6 ft	NORTHING 620,541	EASTING 701,750	24 HR. Cl @ 4.0
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/26/12	COMP. DATE 04/27/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2685										
	2,683.2	0.0	3	4	4	ϕ8		M		2,683.2 GROUND SURFACE 0.0 ROADWAY EMBANKMENT Tan and gray brown, fine to coarse sandy SILT (A-4) with trace coarse gravel
2680	2,679.0	4.2	3	3	2	ϕ5		M		2,676.9 6.3
2675								▽		ALLUVIAL Gray and white, Gravel, Cobbles and Boulders (GNEISS) Rod Drop from 9.6-10.6 ft.
2670										
2665										2,666.1 17.1 CRYSTALLINE ROCK Gray and white, GNEISS
2660										2,657.6 25.6 Boring Terminated at Elevation 2,657.6 ft In Crystalline Rock: GNEISS

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

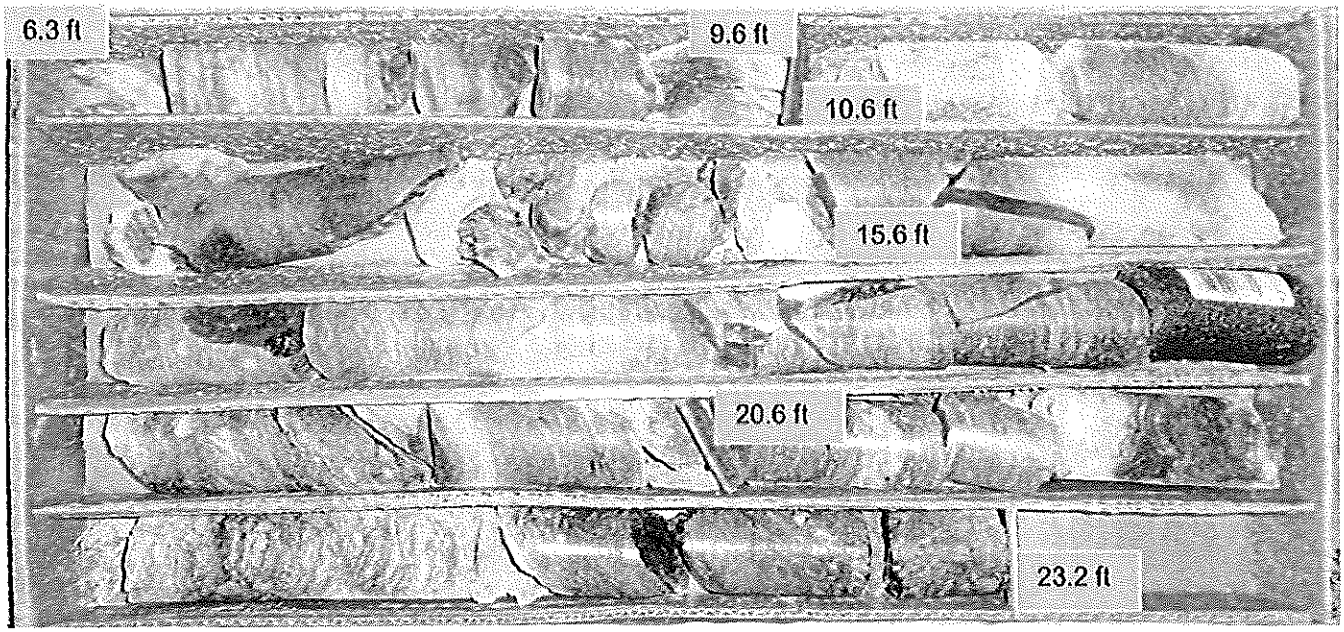
WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek			GROUND WTR (ft)
BORING NO. EB2-B	STATION 12+62	OFFSET 7 ft RT	ALIGNMENT -L-	0 HR. 8.2
COLLAR ELEV. 2,683.2 ft	TOTAL DEPTH 25.6 ft	NORTHING 620,541	EASTING 701,750	24 HR. Cl @ 4.0
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/26/12	COMP. DATE 04/27/12	SURFACE WATER DEPTH N/A
CORE SIZE NQ	TOTAL RUN 19.3 ft		

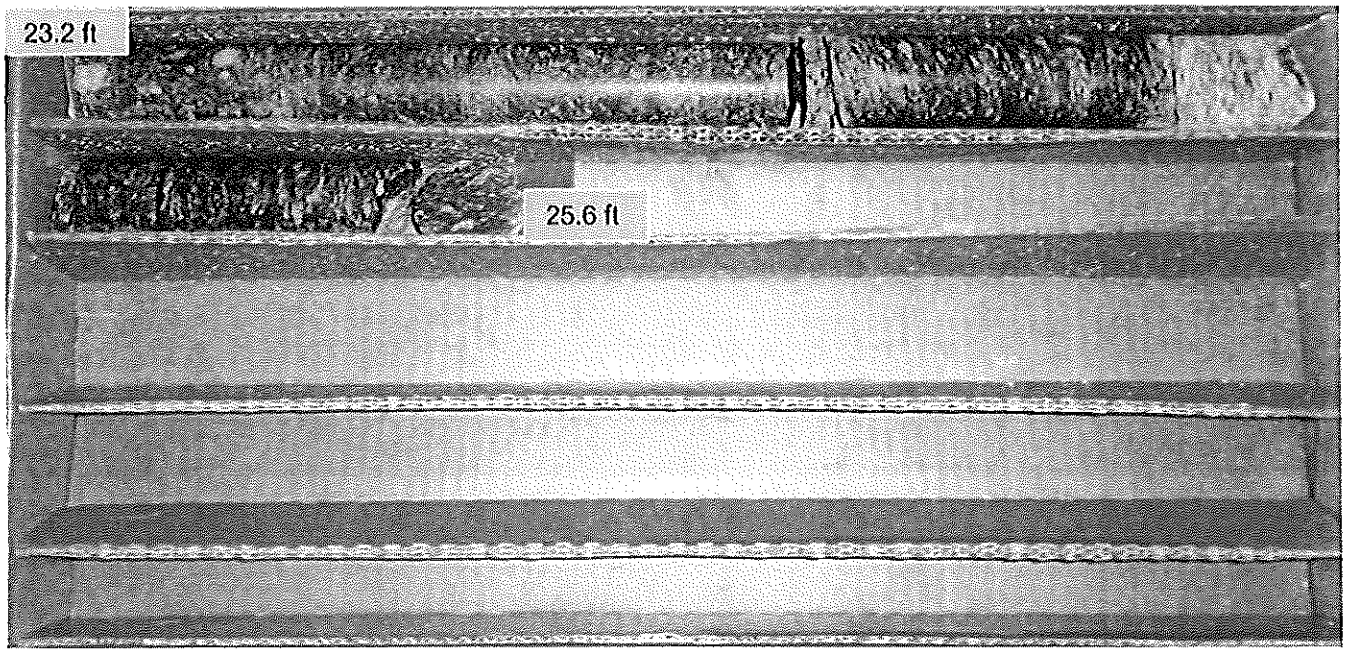
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2676.9											Begin Coring @ 6.3 ft
2675	2,676.9	6.3	4.3	4:15 3:24 3:07/1.3	(1.2) 28%	N/A		(3.4) 31%	N/A		ELEV. 2,676.9 — ALLUVIAL — DEPTH 6.3 Gray and white, Gravel, Cobbles and Boulders (GNEISS)
	2,672.6	10.6		ND							Rod Drop from 9.6-10.6 ft.
2670			5.0	3:47 3:40 3:41 4:12 3:51	(2.2) 44%	N/A					
	2,667.6	15.6									ELEV. 2,666.1 — DEPTH 17.1
2665			5.0	4:51 5:27 4:18 4:27 4:36	(3.5) 70%	(2.3) 46%		(8.3) 98%	(6.1) 72%		CRYSTALLINE ROCK Gray and white, moderately to very slightly weathered, moderately hard to very hard, close to moderately close fracture spacing, GNEISS 6 joints at 45° - 60° open to tight, with iron staining 1 joint at 90°
	2,662.6	20.6									
2660			5.0	4:00 4:00 5:12 4:48	(4.8) 96%	(3.2) 64%					
	2,657.6	25.6		4:39							ELEV. 2,657.6 — DEPTH 25.6 Boring Terminated at Elevation 2,657.6 ft In Crystalline Rock: GNEISS

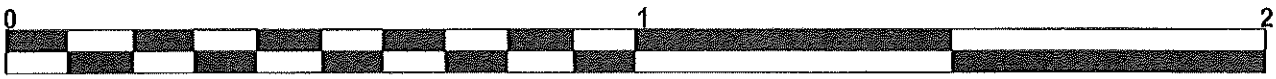
CORE PHOTOGRAPHS

EB2-B

BOXES 1 & 2: 6.3 - 25.6 FEET







NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek			GROUND WTR (ft)
BORING NO. RW-1	STATION 11+35	OFFSET 11 ft LT	ALIGNMENT -L-	0 HR. Cl @ 3.4
COLLAR ELEV. 2,696.0 ft	TOTAL DEPTH 15.8 ft	NORTHING 620,442	EASTING 701,664	24 HR. Cl @ 3.4
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/27/12	COMP. DATE 04/27/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2700										
	2,696.0	0.0								2,696.0 GROUND SURFACE 0.0
2695			3	36	60/0.3	60/0.3		M		2,694.7 ROADWAY EMBANKMENT 1.3 Gray brown, hard, moist, fine to coarse sandy SILT (A-4) with some fine to coarse gravel
2690										ALLUVIAL Dark gray, tan, and white, Gravel, Cobbles and Boulders (GNEISS)
2685										2,683.7 12.3 CRYSTALLINE ROCK Dark gray and white, GNEISS
										2,680.2 15.8 Boring Terminated at Elevation 2,680.2 ft in Crystalline Rock: GNEISS

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

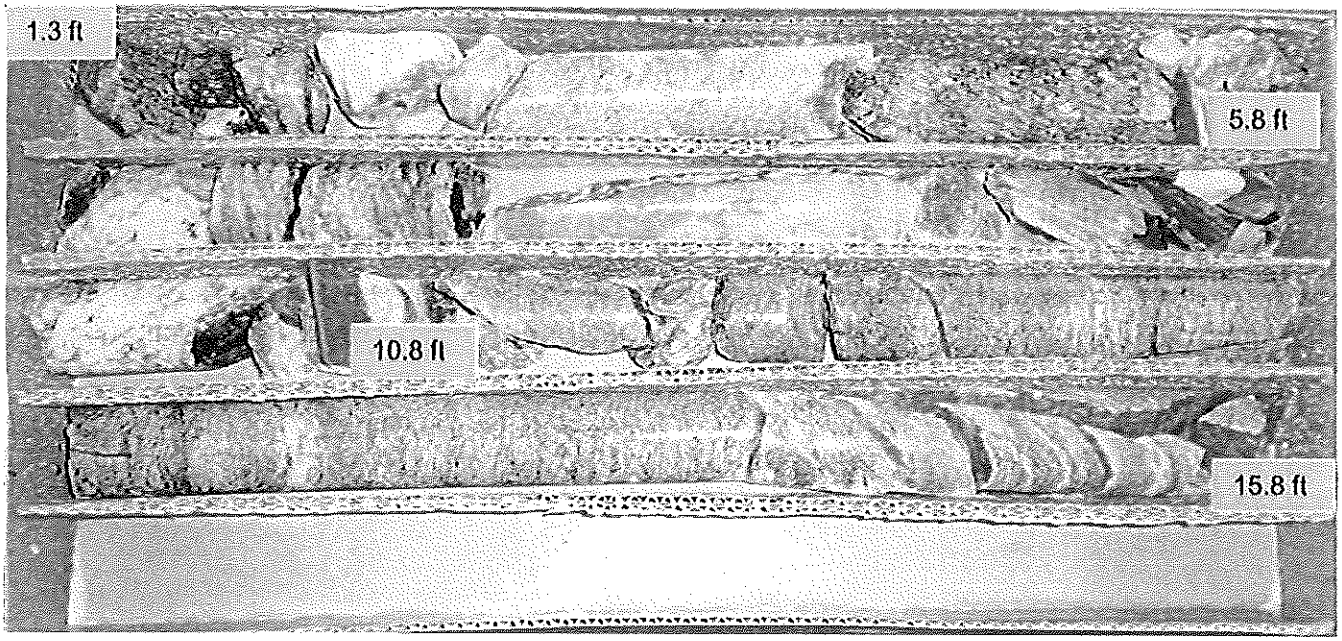
WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd	
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek				GROUND WTR (ft)
BORING NO. RW-1	STATION 11+35	OFFSET 11 ft LT	ALIGNMENT -L-	0 HR. Cl @ 3.4
COLLAR ELEV. 2,696.0 ft	TOTAL DEPTH 15.8 ft	NORTHING 620,442	EASTING 701,664	24 HR. Cl @ 3.4
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/27/12	COMP. DATE 04/27/12	SURFACE WATER DEPTH N/A	
CORE SIZE NQ	TOTAL RUN 14.5 ft			

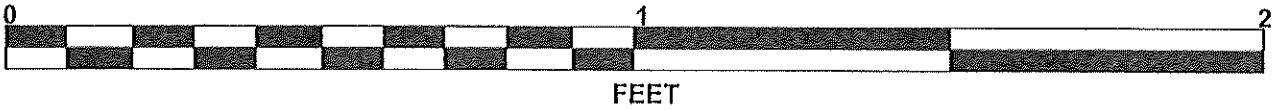
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2694.7											Begin Coring @ 1.3 ft
	2,694.7	1.3	4.5	4:32 4:25 4:31 6:08/1.5	(1.7) 38%	N/A		(4.5) 41%	N/A		2,694.7 ALLUVIAL 1.3 Dark gray, tan, and white, Gravel, Cobbles and Boulders (GNEISS)
2690	2,690.2	5.8	5.0	5:02 2:48 3:14 3:24 3:15	(2.8) 56%	N/A					
2685	2,685.2	10.8	5.0	4:09 3:45 4:19 3:47 3:40	(3.5) 70%	(1.7) 34%		(3.5) 100%	(1.7) 49%		2,683.7 12.3 CRYSTALLINE ROCK Drak gray and white, moderately weathered, moderately hard to hard, close to moderately close fracture spacing, GNEISS 4 joints at 30°-45° open and tight, with iron staining 1 joint at 70° 2,680.2 15.8 Boring Terminated at Elevation 2,680.2 ft In Crystalline Rock: GNEISS
	2,680.2	15.8									

CORE PHOTOGRAPHS

RW-1

BOX 1: 1.3 - 15.8 FEET





NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek			GROUND WTR (ft)
BORING NO. RW-2	STATION 11+59	OFFSET 12 ft LT	ALIGNMENT -L-	0 HR. Cl @ 4.5
COLLAR ELEV. 2,691.5 ft	TOTAL DEPTH 17.5 ft	NORTHING 620,464	EASTING 701,679	24 HR. Cl @ 4.5
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/28/12	COMP. DATE 04/28/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2695										ELEV. (ft) DEPTH (ft)
	2,691.5	0.0								2,691.5 GROUND SURFACE 0.0
2690			11	13	60/0.3	60/0.3		M		ROADWAY EMBANKMENT
										2,689.5 Gray brown, hard, moist, fine to coarse sandy SILT (A-4) with some fine to coarse gravel 2.0
2685										ALLUVIAL Dark gray and white, Gravel, Cobbles and Boulders (GNEISS)
2680										2,678.4 13.1
										CRYSTALLINE ROCK Gray and tan to orange brown, Gneiss
2675										2,674.0 17.5
										Boring Terminated at Elevation 2,674.0 ft In Crystaline Rock: GNEISS

NCDOT BORE SINGLE BRIDGE 132.GPJ NC_DOT.GDT 7/12/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

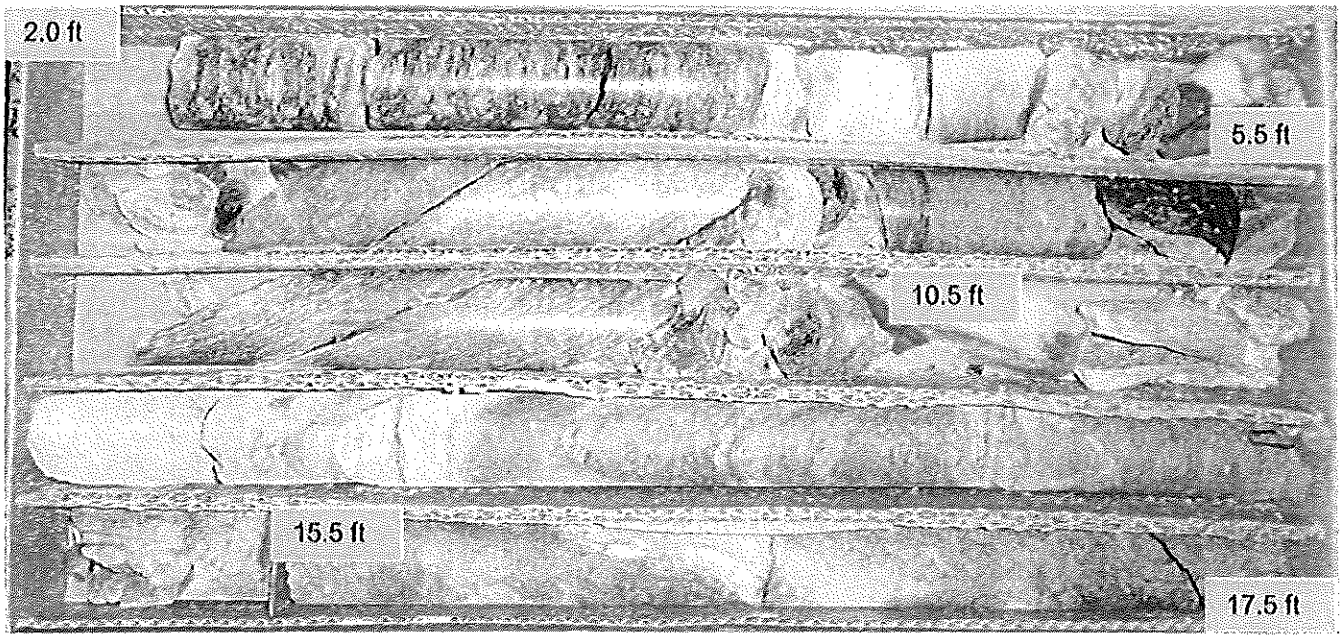
WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek			GROUND WTR (ft)
BORING NO. RW-2	STATION 11+59	OFFSET 12 ft LT	ALIGNMENT -L-	0 HR. Cl @ 4.5
COLLAR ELEV. 2,691.5 ft	TOTAL DEPTH 17.5 ft	NORTHING 620,464	EASTING 701,679	24 HR. Cl @ 4.5
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/28/12	COMP. DATE 04/28/12	SURFACE WATER DEPTH N/A
CORE SIZE NQ	TOTAL RUN 15.5 ft		

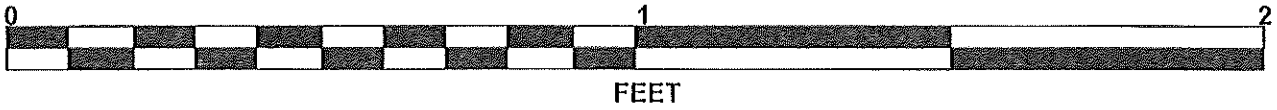
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2689.5											Begin Coring @ 2.0 ft
	2,689.5	2.0	3.5	4:16 3:27 2:18 1:27/0.5	(1.9) 54%	N/A		(6.7) 51%	N/A		ELEV. 2,689.5 ALLUVIAL — DEPTH 2.0 Dark gray and white, Gravel, Cobbles and Boulders (GNEISS)
	2,686.0	5.5									
2685			5.0	4:55 2:57 2:40 4:36 3:25	(2.9) 58%	N/A					
	2,681.0	10.5									
2680			5.0	4:01 2:49 3:58 5:55 3:48	(3.3) 66%	(1.5) 30%					ELEV. 2,678.4 — DEPTH 13.1
	2,676.0	15.5						(4.1) 93%	(2.9) 66%		CRYSTALLINE ROCK Gray and tan to orange brown, moderately severely to moderately weathered, moderately hard to hard, close to moderately close fracture spacing, GNEISS
2675			2.0	5:10 4:42	(1.7) 85%	(1.4) 70%					ELEV. 2,674.0 — DEPTH 17.5
	2,674.0	17.5									Boring Terminated at Elevation 2,674.0 ft In Crystalline Rock: GNEISS

CORE PHOTOGRAPHS

RW-2

BOX 1: 2.0 - 17.5 FEET





NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd	
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek				GROUND WTR (ft)
BORING NO. RW-3	STATION 12+93	OFFSET 12 ft RT	ALIGNMENT -L-	0 HR. 8.6
COLLAR ELEV. 2,680.5 ft	TOTAL DEPTH 19.1 ft	NORTHING 620,565	EASTING 701,770	24 HR. 8.6
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/28/12	COMP. DATE 04/28/12	SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
2685										
2680	2,680.5	0.0	4	4	4	8		M		2,680.5 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT
										Gray brown, stiff, moist, fine to coarse sandy SILT (A-4) with little fine to coarse gravel and trace mica
2675										2,677.6 2.9
										ALLUVIAL
										Dark gray and white, Gravel, Cobbles and Boulders (GNEISS)
2670										
										2,667.1 13.4
2665										CRYSTALLINE ROCK
										Dark gray to tan and white, GNEISS
										2,661.4 19.1
										Boring Terminated at Elevation 2,661.4 ft In Crystalline Rock: GNEISS

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 17BP.14.R.78	TIP 17BP.14.R.78	COUNTY SWAIN	GEOLOGIST K. Lloyd
SITE DESCRIPTION Replace Bridge 860132 on SR 1122 (Chestnut Cove Road) over Chestnut Cove Creek			GROUND WTR (ft)
BORING NO. RW-3	STATION 12+93	OFFSET 12 ft RT	ALIGNMENT -L-	0 HR. 8.6
COLLAR ELEV. 2,680.5 ft	TOTAL DEPTH 19.1 ft	NORTHING 620,565	EASTING 701,770	24 HR. 8.6
DRILL RIG/HAMMER EFF./DATE MAC9354 CME-45C 81% 03/01/11		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic
DRILLER F. Cox	START DATE 04/28/12	COMP. DATE 04/28/12	SURFACE WATER DEPTH N/A
CORE SIZE NQ	TOTAL RUN 16.2 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
2677.6											Begin Coring @ 2.9 ft
	2,677.6	2.9	1.0	1:47	(0.4)	N/A		(5.3)	N/A		2,677.6 ALLUVIAL 2.9
	2,676.6	3.9	5.2	8:10/1.2	40%	N/A		50%			Dark gray and white, Gravel, Cobbles and Boulders (GNEISS)
2675				4:12	(1.8)						
				3:59	35%						
				3:52							
	2,671.4	9.1		2:15							
2670			5.0	3:34	(3.9)	(0.5)					
				3:15	78%	10%					
				3:34							
				3:17							
	2,666.4	14.1		2:41							2,667.1 13.4
								(5.1)	(1.9)		CRYSTALLINE ROCK
2665			5.0	3:54	(4.3)	(1.4)		89%	33%		Dark gray to tan and white, moderately to slightly weathered, moderately hard to hard, close to moderately close fracture spacing, GNEISS
				2:41	86%	28%					
				3:47							
				3:14							
	2,661.4	19.1		3:28							2,661.4 19.1
											Boring Terminated at Elevation 2,661.4 ft In Crystalline Rock: GNEISS

CORE PHOTOGRAPHS

RW-3

BOX 1: 2.9 - 19.1 FEET