STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	38517.1.1 (B-4744)	1	23

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *38517.1.1 (B-4744)* F.A. PROJ. *BRZ-1604(4)*

COUNTY *FORSYTH*

PROJECT DESCRIPTION *REPLACE BRIDGE NO. 15 OVER LITTLE YADKIN RIVER ON SR 1604 (SPAINHOUR MILL RD.)*

SITE DESCRIPTION

ID: B-4744

PROJECT: 38517.1.1

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CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS 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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PERSONNEL

FROEHLING &

ROBERTSON, INC.

INVESTIGATED BY *R.Q. CALLAWAY*

CHECKED BY *C.B. LITTLE*

SUBMITTED BY *C.B. LITTLE*

DATE *JANUARY 2012*

NORTH CAROLINA LICENSED SEAL 1104 GEOLOGIST CLINTON B. LITTLE 1-10-12

DRAWN BY: *J.K. McCLURE*

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

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

PROJECT REFERENCE NO.	SHEET NO.
38517.1.1 (B-4744)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

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 LAYERS, 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 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
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				
GEN. 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 (SL.)	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	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

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
- SPT / DPT / DMT / VST PMT — TEST BORING
- 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
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
HI. - 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
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N Q3
- [ ] -H_____

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

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 PEICES 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: BM2: BL STA. 13+36 105' LT.
RR SPIKE SET IN BASE OF 48" FORKED SYCAMORE NEAR BLOCK TOBACCO BARN. (N 915146, E 1574759.) ELEVATION: 771.90 FT.

NOTES:
STRATIGRAPHY FOR PROFILES AND CROSS-SECTIONS ARE THROUGH THE BORINGS.

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET
38517.1.1 (B-4744)	3

SITE PLAN

0 50 100
FEET

SKEW=90°

NAD 83/95

BEGIN CONSTRUCTION
-DRV2- PC Sta. 10+65.00

NOAH GATES AND WIFE
BETH GATES
DB 2078 PG 3442

15+00

-L- PT Sta. 16+14.56

END CONSTRUCTION
-DRV3- PT Sta. 11+90.00

STEVEN K. ABEE AND WIFE
SUSAN R. WINKLER-ABEE
DB 2165 PG 3875

-L- PC Sta. 19+05.35

BM-2
-BL- STA 13+36.05
105' LEFT
ELEV. = 771.90'

B4744-1 PINC 13+57.91

TOBACCO BARN (BLK)

20+00

WOODS

GRAVEL DRIVE

-DET- PC Sta. 12+23.20

25' ELEC

OGR

HORSE PASTURE

25 ELEC

LITTLE YADKIN RIVER

SOIL

EXISTING R/W

100'

15" RCP

TO STOKES COUNTY

S 5° 01' 18.8" E

EB1-A

B1-A

B2-A

EB2-A

18" RCP

STEVEN KERR. ABEE AND WIFE
SUSAN RENEE WINKLER-ABEE
DB 2809 PG 3539

-L-

EB1-B

S 17° 47' 18.2" E

B1-B

USC&GS MONUMENT

B2-B

EB2-B

SPAINHOUR MILL RD. (SR 1604)

18" BST

TO KING

-DET- S 17° 47' 18.2" E

EXISTING R/W

WOODS

15" RCP

EB1-DET

WOODS

REMOVE EXIST. BRIDGE

EB2-DET

WOODS

24' MTL. GATE

TEMP. DETOUR BRIDGE

END BRIDGE
-DET- STA. 15+22.00

END BRIDGE
-L- STA. 18+75.25

END APPROACH SLAB
-L- STA. 18+86.25

-DET- PC Sta. 17+05.50

RUINS

-DRV1- POT Sta. 11+49.17

DO NOT DISTURB GATE

-L- POC Sta. 15+39.64

-DRV1- POT Sta. 10+00.00

BEGIN BRIDGE
-DET- STA. 13+62.00

BEGIN BRIDGE
-L- STA. 16+97.75

BEGIN APPROACH SLAB
-L- STA. 16+86.75

-DET- PT Sta. 13+34.61

15+00

END CONSTRUCTION
-DRV1- Sta. 11+00.00

JOE SPANGLER AND WIFE
JANET M. SPANGLER
DB 1935 PG 540

DALLAS M. BUTNER AND
SHERRY H. BUTNER
DB 2500 PG 280

-L-	
PI Sta 15+10.28	PI Sta 20+87.61
Δ = 6° 27' 57.4" (LT)	Δ = 32° 45' 49.5" (RT)
D = 3° 05' 49.4"	D = 9° 14' 28.5"
L = 208.78'	L = 354.54'
T = 104.50'	T = 182.26'
R = 1,850.00' (65 mph)	R = 620.00' (40 mph)
e = 0.06 FT/FT	e = 0.06 FT/FT
RO = SEE PLANS	RO = SEE PLANS

PROJECT REFERENCE NO.	SHEET
38517.1.1 (B-4744)	4

Profile -L-
Bridge No. 15 over Little Yadkin River on SR 1604 (Spainhour Mill Rd.)

0 50 100
FEET
V.E. = 5:1

TBM # 2 RR SPIKE SET IN BASE OF 48" FORKED SYCAMORE NEAR BLOCK TOBACCO BARN
N 915146 E 1574759 EL. 771.90

PI = 14+30.00
EL = 801.88'
VC = 66'
K = 66
V = 40 mph

PI = 15+80.00
EL = 787.48'
VC = 234'
K = 26
V = 25 mph

PI = 19+80.00
EL = 785.08'
VC = 190'
K = 26
V = 25 mph

-L-

℄ STA. 17+86.5
3 SPANS: 1@ 60', 1@ 70', and 1@ 45'
24" CORED SLAB
90° SKEW

(-)0.6000%
(+)6.6000%

EB1-A
16+94 -L-
11.0 LT.
ELEV. 782.8

RS-1
RS-2
B1-A
17+68 -L-
20.0 LT.
ELEV. 757.7

RS-5
RS-6
B2-A
18+16 -L-
19.0 LT.
ELEV. 755.6

SS-21
EB2-A
18+79 -L-
15.0 LT.
ELEV. 781.6

ROADWAY EMBANKMENT (FILL)
BROWN MOIST
MEDIUM STIFF TO STIFF
SANDY GRAVELLY SILT

8
23
82
68
24

1.5:1

Q500 WATER SURFACE
ELEV. = 778.1'
Q100 WATER SURFACE
ELEV. = 775.5'
Q25 WATER SURFACE
ELEV. = 772.9'
Q10 WATER SURFACE
ELEV. = 770.8'

ROADWAY EMBANKMENT (FILL)
RED AND BROWN MOIST
SOFT TO MED. STIFF
MICACEOUS SILTY CLAY

3
2
2
2
14

RESIDUAL
TAN SOFT TO MEDIUM STIFF
MOIST TO WET VERY MICACEOUS SILT.
INTERVAL OF FINE SAND AT 13.5'
COULD BE VOID BACKFILL.

RESIDUAL
MOIST RED BROWN TO WHITE MEDIUM STIFF
MICACEOUS TO HIGHLY MICACEOUS SILTY SOIL.
PROBABLY WEATHERED SCHIST AND GNEISS LAYERS.

WATER SURFACE = 756.0'
DATE OF SURVEY 12-22-2011

WEATHERED ROCK
QUARTZ-FELDSPAR GNEISS
CRYSTALLINE ROCK

100
60/0
100/.6
60/0.0
100/.5
100/.4
60/0.0

A
B

BT
FIAD
(11/7/2011)

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
(BLACK BIOTITE SCHIST)
CRYSTALLINE ROCK

VERY SLIGHTLY WEATHERED HARD CLOSELY FRACTURED FELDSPAR MICA GNEISS WITH BIOTITE PARTINGS AT 1" TO 6" SPACING.
R1=2, R2=8, R3=10, R4=12, R5=4 RMR=36
ROCK TYPE "E" POOR ROCK
REC=90%
RQD=29%

FRESH HARD MODERATELY CLOSELY FRACTURED FELDSPAR MICA GNEISS.
MORE MICACEOUS BANDS AT 9.3' - 9.8' AND 15.0' to 16.0'
R1=4, R2=13, R3=20, R4=20, R5=4
RMR=61
ROCK TYPE "E"
GOOD ROCK
REC=100%
RQD=71%

OFF-WHITE, FRESH, VERY HARD, WIDELY FRACTURED, MASSIVE FELDSPAR BIOTITE GNEISS.
R1=7, R2=8, R3=20, R4=25, R5=0 RMR=60
ROCK TYPE "E" FAIR ROCK
REC=100% RQD=100%

GRAY, FRESH, MODERATELY HARD, WIDELY FRACTURED BIOTITE FELDSPAR GNEISS WITH INCLUDED LAYERS OF OFF-WHITE FELDSPAR BIOTITE GNEISS.
BIOTITE RICH LAYERS ARE WEAK ALONG THE LAYER.
R1=4, R2=20, R3=20, R4=12, R5=4 RMR=60
ROCK TYPE "E" FAIR ROCK
REC=100% RQD=97%

OFF-WHITE, FRESH, VERY HARD, WIDELY FRACTURED, MASSIVE FELDPAR BIOTITE GNEISS.
R1=7, R2=13, R3=25, R4=25, R5=4
RMR=74
ROCK TYPE "E"
GOOD ROCK
REC=98%
RQD=71%

BORING DESCRIPTIONS

(A) WEATHERED ROCK
SEVERELY WEATHERED
FELDSPAR MICA GNEISS

(B) WEATHERED ROCK
SEVERELY WEATHERED
FELDSPAR BIOTITE GNEISS

810 800 790 780 770 760 750 740 730

15+00 16+00 17+00 18+00 19+00 20+00 21+00

PROJECT REFERENCE NO.	SHEET
38517.1.1 (B-4744)	5

0 50 100 FEET V.E. = 5:1

Profile -DET-
Bridge No. 15 over Little Yadkin River on SR 1604 (Spainhour Mill Rd.)

-DET-

BEGIN GRADE
-DET- STA. 11+10.00
EL = 799.53'

PI = 12+60.00
EL = 786.33'
VC = 220'
K = 27
V = 25 mph

BRIDGE ℄ -DET- STA. 14+42.00
ELEV. = 785.24
SKEW 90°-00'-00"
MINIMUM LENGTH = 160'

END GRADE
-DET- STA. 17+80.00
EL = 794.13'

PI = 16+40.00
EL = 784.05'
VC = 210'
K = 27
V = 25 mph

SS-12

EB1-DET
13+78 -DET-
17.0 RT.
ELEV. 770.7
=
17+19 -L-
57.0 RT.

EB2-DET
15+24 -DET-
23.0 RT.
ELEV. 767.9
=
18+65 -L-
63.0 RT.

(-)8.8600%
(-)0.6000%
(-)0.6000%
(+)7.2000%

CLASS II RIP RAP (NOT KEYED IN)
1.5:1
RESIDUAL
RED OR RED BROWN MOIST MICACEOUS SOFT TO HARD CLAYEY SANDY SILT
4
6
GRAY-TAN & BROWN V. DENSE MOIST HIGHLY MICACEOUS SILTY F. SAND
61
100/.9
WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
60/.1
CRYSTALLINE ROCK
BT

CLASS II RIP RAP (NOT KEYED IN)
1.5:1
RESIDUAL
ALLUVIUM
LOOSE MOIST SANDY LOAM
1
2
3
11
16
24
31
35
BRIDGE ROD DRIVE, NO SAMPLE, PRESUMED RESIDUAL SOIL
BRIDGE ROD REFUSAL
CRYSTALLINE ROCK

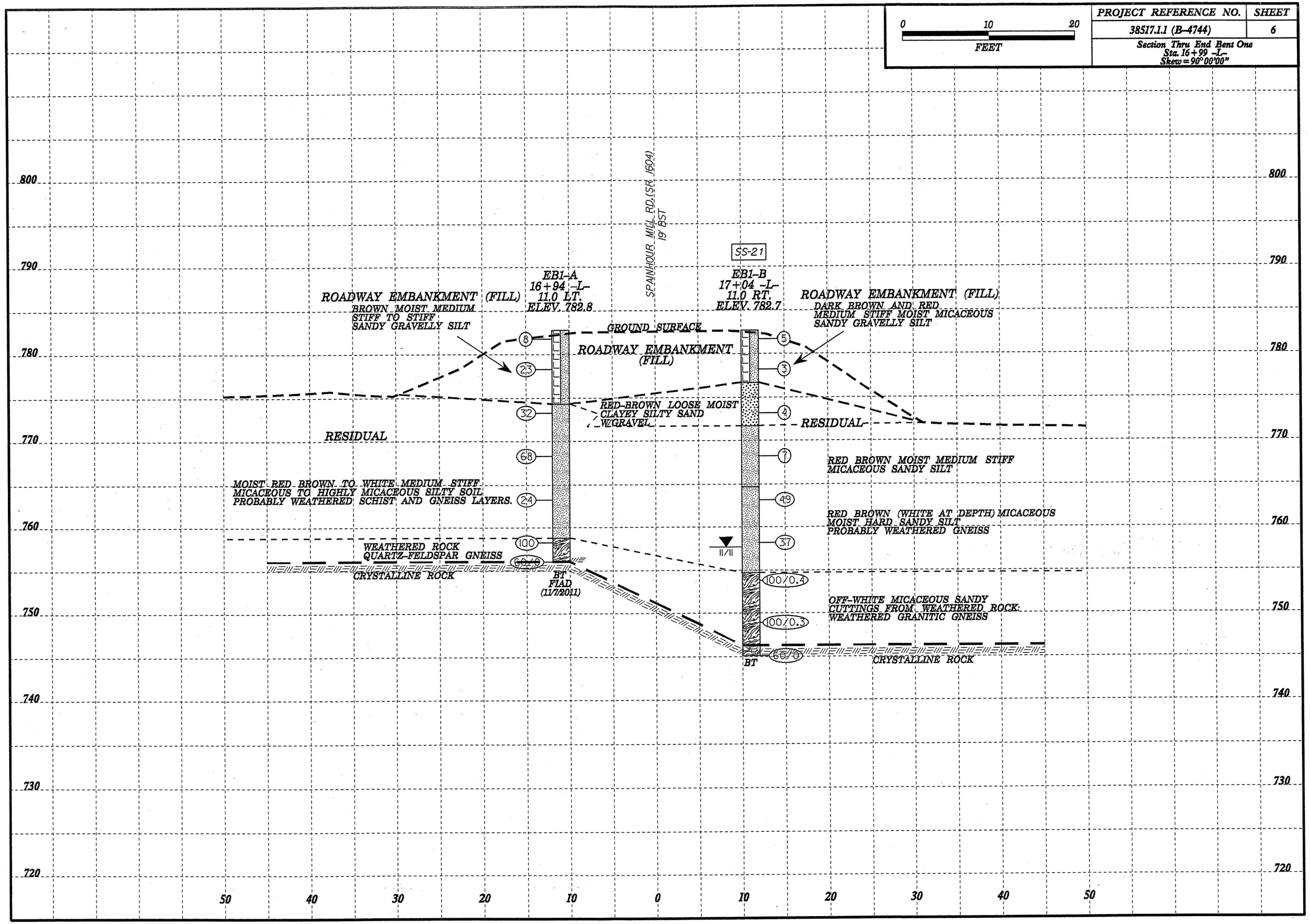
810
800
790
780
770
760
750

11 12 13 14 15 16 17 18

PROJECT REFERENCE NO.	SHEET
38517.1.1 (B-4744)	6

Section Thru End Bent One
Sta. 16+99 -L-
Skew = 90°00'00"

0 10 20
FEET



PROJECT REFERENCE NO.	SHEET
38517.1.1 (B-4744)	7

Section Thru Bent One
Sta. 17+59 -L-
Skew = 90° 00'00"

0 10 20
FEET

SPANHOUR MILL RD.(SR 1604)
19' BST

EXISTING BRIDGE

RS-1
RS-2

B1-A
17+68 -L-
20.0' LT.
ELEV. 757.7

RS-3
RS-4

B1-B
17+57 -L-
23.0' RT.
ELEV. 759.5

ALLUVIUM
LOOSE TAN WET SAND

RESIDUAL

GROUND SURFACE

WEATHERED ROCK
SEVERELY WEATHERED FELDSPAR MICA GNEISS

90/.5
60/0.3

VERY SLIGHTLY WEATHERED, HARD, CLOSELY FRACTURED, FELDSPAR MICA GNEISS WITH BIOTITE PARTINGS AT 1" TO 6" SPACING.
R1=2, R2=8, R3=10, R4=12, R5=4
RMR=86
ROCK TYPE "E"
POOR ROCK

REC=90% RQD=29%

FRESH, HARD, MODERATELY CLOSELY FRACTURED, FELDSPAR MICA GNEISS.
MORE MICACEOUS BANDS AT 9.3'-9.8' AND 15.0' to 16.0'
R1=4, R2=13, R3=20, R4=20, R5=4
RMR=61
ROCK TYPE "E"
GOOD ROCK

REC=100%
RQD=71%

BT

RESIDUAL

WEATHERED ROCK

CRYSTALLINE ROCK

(10)

TAN STIFF FINE SANDY SILT (A-4)
W/ROCK FRAGMENTS

100/.2

TAN FLAT CHIPS BREAKING ALONG HORIZONTAL FOLIATION

CRYSTALLINE ROCK, FELDSPAR BIOTITE GNEISS
OFF-WHITE, SLIGHTLY WEATHERED, HARD, CLOSELY FRACTURED FELDSPAR BIOTITE GNEISS. DOMINANTLY FELDSPAR WITH BIOTITE RICH BANDS AT 1 TO 6" SPACING.
R1=4, R2=8, R3=10, R4=12, R5=0
RMR=94
ROCK TYPE "E"
POOR ROCK

REC=100% RQD=43%

GRAY, FRESH, MODERATELY HARD, CLOSELY BANDED BIOTITE GNEISS. BIOTITE LAYERS ARE AT 1" SPACING, OR LESS, AND CORE EASILY BREAKS ALONG BIOTITE LAYERS.
R1=7, R2=8, R3=20, R4=12, R5=4
RMR=51
ROCK TYPE "E"
FAIR ROCK

REC=84% RQD=44%

BT

800 790 780 770 760 750 740 730 720

50 40 30 20 10 0 10 20 30 40 50

0	10	20
FEET		

PROJECT REFERENCE NO.	SHEET
38517.1.1 (B-4744)	8

Section Thru Bent Two
Sta. 18+29 -L-
Skew = 90° 00'00"

SPAINHOUR MILL RD. (SR. 1604)
19'BST

EXISTING BRIDGE

RS-5
RS-6

B2-A
18+16 -L-
19.0 LT.
ELEV. 755.6

RS-7
RS-8

B2-B
18+20 -L-
16.0 RT.
ELEV. 757.0

GROUND SURFACE

RESIDUAL

RESIDUAL

WEATHERED ROCK
SEVERELY WEATHERED
FELDSPAR BIOTITE GNEISS

GRAY AND BROWN, WET, MEDIUM DENSE
FINE SAND WITH GRAVEL

WEATHERED ROCK, SEVERELY WEATHERED FELDSPAR BIOTITE GNEISS

CRYSTALLINE ROCK

OFF-WHITE, FRESH, VERY HARD, WIDELY FRACTURED,
MASSIVE FELDSPAR BIOTITE GNEISS.
R1=7, R2=8, R3=20, R4=25, R5=0 RMR=60
ROCK TYPE "E" FAIR ROCK

REC=100% RQD=100%

GRAY, FRESH, MODERATELY HARD, WIDELY FRACTURED
BIOTITE FELDSPAR GNEISS, WITH INCLUDED LAYERS
OF OFF-WHITE FELDSPAR BIOTITE GNEISS.
BIOTITE RICH LAYERS ARE WEAK ALONG THE LAYER.
R1=4, R2=20, R3=20, R4=12, R5=4 RMR=60
ROCK TYPE "E" FAIR ROCK

REC=100% RQD=97%

OFF-WHITE, FRESH, VERY HARD, WIDELY FRACTURED,
MASSIVE FELDPAR BIOTITE GNEISS.
R1=7, R2=13, R3=25, R4=25, R5=4
RMR=74
ROCK TYPE "E"
GOOD ROCK

REC=98% RQD=71%

ALTERNATING BANDS 1/4" TO 1' OF OFF-WHITE, HARD, FRESH
FELDSPAR BIOTITE GNEISS, AND GRAY MODERATELY HARD
FRESH BIOTITE FELDSPAR GNEISS.
BIOTITE RICH LAYERS ARE WEAK NORMAL TO THE CORE
AND SUBJECT TO MACHINE OR DRILLING BREAKS.
R1=7, R2=13, R3=20, R4=12, R5=4
RMR=56
ROCK TYPE "E"
POOR ROCK

REC=100% RQD=69%

BT

BT

800 790 780 770 760 750 740 730 720

50 40 30 20 10 0 10 20 30 40 50

PROJECT REFERENCE NO.	SHEET
38517.1.1 (B-4744)	9

Section Thru End Bent Two
Sta. 18+74 -L-
Skew = 90° 00'00"

0 10 20
FEET

SPAINHOUR MILL RD. (SR 1604)
19' BST

SS-29
SS-30
EB2-A
18+79 -L-
15.0 LT.
ELEV. 781.6

SS-17
EB2-B
18+79 -L-
11.0 RT.
ELEV. 782.7

ROADWAY EMBANKMENT (FILL)
RED AND BROWN MOIST
SOFT TO MED. STIFF
MICACEOUS SILTY CLAY

GROUND SURFACE

ROADWAY EMBANKMENT (FILL)

ROADWAY EMBANKMENT (FILL)
RED MICACEOUS SILTY GRAVELLY CLAYEY SOIL
SOFT, MOIST TO WET

RESIDUAL

TAN SOFT TO MEDIUM STIFF
MOIST TO WET VERY MICACEOUS SILT.
INTERVAL OF FINE SAND AT 13.5'
COULD BE VOID BACKFILL.

RESIDUAL

TAN MICACEOUS MOIST TO WET SOFT SOIL.
SILT AND FINE SAND LAYER AT 13.5'
AS AT ADJACENT BORING.

LT. BROWN LOOSE TO MED. DENSE
MOIST CLAYEY SILTY F. SAND

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
(BLACK BIOTITE SCHIST)

CRYSTALLINE ROCK

WEATHERED ROCK, SEVERELY WEATHERED CRYSTALLINE ROCK (BIOTITE GNEISS)

CRYSTALLINE ROCK

BT
FIAD
(11/7/2011)

BT

800 790 780 770 760 750 740 730 720

50 40 30 20 10 0 10 20 30 40 50

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 16+94	**OFFSET** 11 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 782.8 ft	**TOTAL DEPTH** 26.7 ft	**NORTHING** 915,279	**EASTING** 1,574,601	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/07/11	**COMP. DATE** 11/07/11	**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)
785										
	782.8	0.0								782.8 GROUND SURFACE 0.0
			1	3	5	8		M		**ROADWAY EMBANKMENT** BROWN MOIST MEDIUM STIFF TO STIFF SANDY GRAVELLY SILT, EMBANKMENT
780	779.3	3.5	1	8	15	23		M		
775	774.3	8.5	6	18	14	32		M		774.3 8.5 **RESIDUAL** RESIDUAL, MOIST, RED BROWN TO WHITE, MEDIUM STIFF, MICACEOUS TO HIGHLY MICACEOUS SILTY SOIL. PROBABLY WEATHERED SCHIST AND GNEISS LAYERS.
770	769.3	13.5	3	5	63	68		M		
765	764.3	18.5	8	15	9	24		M		
760	759.3	23.5	6	13	87	100		M		758.8 24.0 **WEATHERED ROCK** WEATHERED ROCK, QUARTZ-FELDSPAR GNEISS
	756.1	26.7	60/0			60/0				756.1 26.7 Boring Terminated with Standard Penetration Test Refusal at Elevation 756.1 ft on crystalline rock

NCDOT BORE SINGLE B4744_GEO_BH_BRDG0015_FORSYTH.GPJ NC_DOT.GDT 1/4/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 17+04	**OFFSET** 11 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 782.7 ft	**TOTAL DEPTH** 37.6 ft	**NORTHING** 915,263	**EASTING** 1,574,583	**24 HR.** 25.0
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/03/11	**COMP. DATE** 11/03/11	**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)
785										
	782.7	0.0								782.7 GROUND SURFACE 0.0
			1	2	3	5		M		**ROADWAY EMBANKMENT** EMBANKMENT FILL, DARK BROWN AND RED, MEDIUM STIFF, MOIST, MICACEOUS, SANDY GRAVELLY SILT
780	779.2	3.5	1	1	2	3		M		776.7 6.0 **RESIDUAL** RED-BROWN LOOSE CLAYEY SILTY SAND W/ GRAVEL
775	774.2	8.5	2	2	2	4	SS-21	M		771.7 11.0 **RESIDUAL** RESIDUAL, RED BROWN, MOIST, MEDIUM STIFF , MICACEOUS SANDY SILT.
770	769.2	13.5	3	3	4	7		M		764.7 18.0 **RESIDUAL** RED BROWN, (WHITE AT DEPTH), MICACEOUS, MOIST, HARD SANDY SILT. PROBABLY WEATHERED GNEISS.
765	764.2	18.5	15	26	23	49		M		
760	759.2	23.5	18	21	16	37		M		754.7 28.0 **WEATHERED ROCK** OFF-WHITE, MICACEOUS SANDY CUTTINGS FROM WEATHERED ROCK: WEATHERED GRANITIC GNEISS.
755	754.2	28.5	100/.4			100/0.4				
750	749.2	33.5	100/.3			100/0.3				746.3 36.4
	745.1	37.6	60/0			60/0				745.1 **CRYSTALLINE ROCK** 37.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 745.1 ft in crystalline rock

NCDOT BORE SINGLE B4744_GEO_BH_BRDG0015_FORSYTH.GPJ NC_DOT.GDT 1/4/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 17+68	**OFFSET** 20 ft LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 757.7 ft	**TOTAL DEPTH** 16.0 ft	**NORTHING** 915,211	**EASTING** 1,574,632 — **24 HR.** 1.1
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/01/11	**COMP. DATE** 11/01/11	**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)
760											
	757.7	0.0								GROUND SURFACE	0.0
	756.6	1.1	23	65	35/0.1	100/.6				WEATHERED ROCK	1.1
755			60/0.1			60/0.1				SEVERELY WEATHERED FELDSPAR MICA GNEISS	
										CRYSTALLINE ROCK	
							RS-1			FELDSPAR MICA GNEISS	6.0
750										CRYSTALLINE ROCK	
										FELDSPAR MICA GNEISS	
							RS-2				
745											
	741.7	16.0									16.0

Boring Terminated at Elevation 741.7 ft in crystalline rock (feldspar mica gneiss)

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 17+68	**OFFSET** 20 ft LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 757.7 ft	**TOTAL DEPTH** 16.0 ft	**NORTHING** 915,211	**EASTING** 1,574,632 — **24 HR.** 1.1
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/01/11	**COMP. DATE** 11/01/11	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ3	**TOTAL RUN** 15.0 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 ELEV. (ft)	DEPTH (ft)
756.7											Begin Coring @ 1.0 ft	
755	756.7	1.0	5.0	2:37/1.0	(4.4)	(1.4)		(4.4)	(1.4)		756.6 WEATHERED ROCK *(continued)*	1.1
				N=60/0.1	88%	28%		90%	29%		CRYSTALLINE ROCK	
				3:23/1.0							VERY SLIGHTLY WEATHERED, HARD, CLOSELY FRACTURED,	
				2:50/1.0							FELDSPAR MICA GNEISS WITH BIOTITE PARTINGS AT 1" TO 6"	
				3:24/1.0							SPACING.	
	751.7	6.0		2:56/1.0			RS-1				R1=2, R2=8, R3=10, R4=12, R5=4	
750			5.0	2:28/1.0	(5.0)	(4.4)		(10.0)	(7.1)		RMR=36	751.7 6.0
				3:01/1.0	100%	88%		100%	71%		ROCK TYPE "E"	
				3:10/1.0							POOR ROCK	
				3:24/1.0							CRYSTALLINE ROCK	
	746.7	11.0		3:56/1.0			RS-2				FRESH, HARD, MODERATELY CLOSELY FRACTURED, FELDSPAR	
745			5.0	4:41/1.0	(5.0)	(2.7)					MICA GNEISS. MORE MICACEOUS BANDS AT 9.3' - 9.8' AND 15.0' to	
				4:33/1.0	100%	54%					16.0'	
				5:50/1.0							R1=4, R2=13, R3=20, R4=20, R5=4	
				4:07/1.0							RMR=61	
	741.7	16.0		3:06/1.0							741.7 ROCK TYPE "E"	16.0
											GOOD ROCK	

Boring Terminated at Elevation 741.7 ft in crystalline rock (feldspar mica gneiss)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING	
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 17+57	**OFFSET** 23 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 759.5 ft	**TOTAL DEPTH** 26.3 ft	**NORTHING** 915,209	**EASTING** 1,574,588	**24 HR.** 3.8
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/31/11	**COMP. DATE** 11/01/11	**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)
760											
	759.5	0.0	2	4	6	10		M		759.5 GROUND SURFACE	0.0
										758.5 **ALLUVIAL** LOOSE TAN WET ALLUVIAL SAND	1.0
	756.0	3.5								756.0 **RESIDUAL**	3.5
755	754.8	4.7	19	81/.2		100/.7				754.8 TAN STIFF FINE SANDY SILT W/ ROCK FRAGMENTS (A-4)	4.7
			60/.1			60/.1				754.7 **WEATHERED ROCK**	4.8
							RS-3			TAN FLAT CHIPS BREAKING ALONG HORIZONTAL FOLIATION	
750										751.2 **CRYSTALLINE ROCK** FELDSPAR BIOTITE GNEISS	8.3
							RS-4			**CRYSTALLINE ROCK** FELDSPAR BIOTITE GNEISS	
745										**CRYSTALLINE ROCK** BANDED BIOTITE GNEISS	
740											
735										733.2	26.3
										Boring Terminated at Elevation 733.2 ft in crystalline rock (biotite gneiss)	

NCDOT BORE SINGLE B4744_GEO_BH_BRDG0015_FORSYTH.GPJ NC_DOT.GDT 1/4/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING	
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 17+57	**OFFSET** 23 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 759.5 ft	**TOTAL DEPTH** 26.3 ft	**NORTHING** 915,209	**EASTING** 1,574,588	**24 HR.** 3.8
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/31/11	**COMP. DATE** 11/01/11	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 21.5 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 ELEV. (ft)	DEPTH (ft)
754.7											Begin Coring @ 4.8 ft	
	754.7	4.8	1.5	1:20/0.5	(1.5)	(0.0)		(3.5)	(1.5)		754.7 **CRYSTALLINE ROCK**	4.8
	753.2	6.3		2:54/1.0	100%	0%		100%	43%		OFF-WHITE, SLIGHTLY WEATHERED, HARD, CLOSELY FRACTURED FELDSPAR BIOTITE GNEISS. DOMINANTLY FELDSPAR WITH BIOTITE RICH BANDS AT 1 TO 6" SPACING.	
			5.0	2:21/1.0							751.2	8.3
				2:40/1.0	(3.9)	(0.5)	RS-3				R1=4, R2=8, R3=10, R4=12, R5=0	
750				1:37/1.0	78%	10%					RMR=34	
				3:12/1.0							ROCK TYPE "E"	
	748.2	11.3		2:46/1.0				(15.1)	(7.9)		POOR ROCK	
			5.0	3:04/1.0	(4.4)	(2.9)	RS-4	84%	44%		**CRYSTALLINE ROCK**	
				2:53/1.0	88%	58%					GRAY, FRESH, MODERATELY HARD, CLOSELY BANDED BIOTITE GNEISS. BIOTITE LAYERS ARE AT 1" SPACING, OR LESS, AND	
				2:40/1.0							CORE EASILY BREAKS ALONG BIOTITE LAYERS.	
745				2:50/1.0							R1=7, R2=8, R3=20, R4=12, R5=4	
	743.2	16.3		2:32/1.0							RMR=51	
			5.0	2:51/1.0	(4.5)	(2.4)					ROCK TYPE "E"	
				2:26/1.0	90%	48%					FAIR ROCK	
740				2:33/1.0								
				2:40/1.0								
	738.2	21.3		2:50/1.0								
			5.0	3:14/1.0	(4.3)	(2.1)						
				2:41/1.0	86%	42%						
735				2:55/1.0								
				3:34/1.0								
	733.2	26.3		3:42/1.0							733.2	26.3
											Boring Terminated at Elevation 733.2 ft in crystalline rock (biotite gneiss)	

NCDOT CORE SINGLE B4744_GEO_BH_BRDG0015_FORSYTH.GPJ NC_DOT.GDT 1/4/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 18+16	**OFFSET** 19 ft LT	**ALIGNMENT** -L- **0 HR.** 0.3
COLLAR ELEV. 755.6 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 915,165	**EASTING** 1,574,646 **24 HR.** 0.3
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/02/11	**COMP. DATE** 11/02/11	**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)
760											
755	755.6	0.0	5	40	60/0	100/.5 60/0.0				755.6 GROUND SURFACE	0.0
										754.6 **WEATHERED ROCK** SEVERELY WEATHERED FELDSPAR BIOTITE GNEISS	1.0
750							RS-5			751.6 **CRYSTALLINE ROCK** FELDSPAR BIOTITE GNEISS	4.0
										CRYSTALLINE ROCK BIOTITE FELDSPAR GNEISS	
745							RS-6			745.6	10.0
										CRYSTALLINE ROCK FELDSPAR BIOTITE GNEISS	
740										735.6	20.0
										Boring Terminated at Elevation 735.6 ft in crystalline rock (feldspar biotite gneiss)	

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 18+16	**OFFSET** 19 ft LT	**ALIGNMENT** -L- **0 HR.** 0.3
COLLAR ELEV. 755.6 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 915,165	**EASTING** 1,574,646 **24 HR.** 0.3
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/02/11	**COMP. DATE** 11/02/11	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ3	**TOTAL RUN** 19.0 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 ELEV. (ft)	DEPTH (ft)
754.6											Begin Coring @ 1.0 ft	
	754.6	1.0	4.0	3:22/1.0 3:08/1.0 2:58/1.0 3:37/1.0	(3.8) 95%	(1.7) 43%		(3.0) 100%	(3.0) 100%		754.6 **CRYSTALLINE ROCK** OFF-WHITE, FRESH, VERY HARD, WIDELY FRACTURED, MASSIVE FELDSPAR BIOTITE GNEISS. R1=7, R2=8, R3=20, R4=25, R5=0 RMR=60 ROCK TYPE "E" FAIR ROCK	1.0
750	750.6	5.0	5.0	2:51/1.0 2:20/1.0 2:47/1.0 2:43/1.0 2:48/1.0	(5.0) 100%	(4.8) 96%	RS-5	(6.0) 100%	(5.8) 97%		751.6	4.0
745	745.6	10.0	5.0	3:53/1.0 3:45/1.0 3:58/1.0 3:55/1.0 5:48/1.0	(5.0) 100%	(2.7) 54%	RS-6	(9.8) 98%	(7.1) 71%		745.6 **CRYSTALLINE ROCK** GRAY, FRESH, MODERATELY HARD, WIDELY FRACTURED BIOTITE FELDSPAR GNEISS, WITH INCLUDED LAYERS OF OFF-WHITE FELDSPAR BIOTITE GNEISS. BIOTITE RICH LAYERS ARE WEAK ALONG THE LAYER. R1=4, R2=20, R3=20, R4=12, R5=4 RMR=60 ROCK TYPE "E" FAIR ROCK	10.0
740	740.6	15.0	5.0	5:00/1.0 4:05/1.0 4:53/1.0 5:04/1.0 5:57/1.0	(4.8) 96%	(4.4) 88%					735.6 **CRYSTALLINE ROCK** OFF-WHITE, FRESH, VERY HARD, WIDELY FRACTURED, MASSIVE FELDPAR BIOTITE GNEISS. R1=7, R2=13, R3=25, R4=25, R5=4 RMR=74 ROCK TYPE "E" GOOD ROCK	20.0
	735.6	20.0									Boring Terminated at Elevation 735.6 ft in crystalline rock (feldspar biotite gneiss)	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING	
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 18+20	**OFFSET** 16 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 757.0 ft	**TOTAL DEPTH** 21.5 ft	**NORTHING** 915,151	**EASTING** 1,574,614	**24 HR.** 0.3
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/02/11	**COMP. DATE** 11/03/11	**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)
760											
	757.0	0.0	27	10	4	14		M		757.0 GROUND SURFACE	0.0
755										755.2 **RESIDUAL** GRAY AND BROWN, WET, MEDIUM DENSE FINE SAND WITH GRAVEL	1.8
	754.0	3.0	60/0			60/0	RS-7			754.0 **WEATHERED ROCK** SEVERELY WEATHERED FELDSPAR BIOTITE GNEISS	3.0
750										**CRYSTALLINE ROCK** FELDSPAR BIOTITE GNEISS	
							RS-8				
745											
740										735.5	21.5
										Boring Terminated at Elevation 735.5 ft in crystalline rock (feldspar biotite gneiss)	

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING	
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 18+20	**OFFSET** 16 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 757.0 ft	**TOTAL DEPTH** 21.5 ft	**NORTHING** 915,151	**EASTING** 1,574,614	**24 HR.** 0.3
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/02/11	**COMP. DATE** 11/03/11	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 18.5 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 ELEV. (ft)	DEPTH (ft)
754											Begin Coring @ 3.0 ft	
	754.0	3.0	3.5	*N=60/0* 2:20/0.5 5:26/1.0 4:24/1.0 4:44/1.0	(3.5) 100%	(2.1) 60%	RS-7	(18.5) 100%	(12.8) 69%		754.0 **CRYSTALLINE ROCK** ALTERNATING BANDS 1/4" TO 1', OF OFF-WHITE, HARD, FRESH FELDSPAR BIOTITE GNEISS, AND GRAY MODERATELY HARD FRESH BIOTITE FELDSPAR GNEISS. BIOTITE RICH LAYERS ARE WEAK NORMAL TO THE CORE AND SUBJECT TO MACHINE OR DRILLING BREAKS. R1=7, R2=13, R3=20, R4=12, R5=4 RMR=56 ROCK TYPE "E" POOR ROCK	3.0
750	750.5	6.5	5.0	4:38/1.0 3:13/1.0 3:00/1.0 3:22/1.0 3:05/1.0	(5.0) 100%	(4.6) 92%	RS-8					
745	745.5	11.5	5.0	3:27/1.0 3:53/1.0 3:57/1.0 3:53/1.0 3:16/1.0	(5.0) 100%	(2.9) 58%						
740	740.5	16.5	5.0	3:47/1.0 3:50/1.0 2:55/1.0 3:28/1.0 3:00/1.0	(5.0) 100%	(1.8) 36%						
	735.5	21.5									735.5	21.5
											Boring Terminated at Elevation 735.5 ft in crystalline rock (feldspar biotite gneiss)	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING	
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 18+79	**OFFSET** 15 ft LT	**ALIGNMENT** -L-	**0 HR.** 20.8
COLLAR ELEV. 781.6 ft	**TOTAL DEPTH** 24.4 ft	**NORTHING** 915,104	**EASTING** 1,574,661	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/07/11	**COMP. DATE** 11/07/11	**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)
785										
	781.6	0.0								781.6 GROUND SURFACE 0.0
780			1	2	1	3		M		**ROADWAY EMBANKMENT** RED AND BROWN MOIST SOFT TO MED. STIFF MICACEOUS SILTY CLAY
	778.1	3.5	1	1	1	2		M		
775										
	773.1	8.5	1	1	1	2	SS-29	M		773.6 8.0 **RESIDUAL** TAN, SOFT TO MEDIUM STIFF, MOIST TO WET, VERY MICACEOUS SILT. INTERVAL OF FINE SAND AT 13.5' COULD BE VOID BACKFILL.
770										
	768.1	13.5	1	1	1	2	SS-30	M		
765										
	763.1	18.5	1	5	9	14		W		760.6 21.0
760										**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK (BLACK BIOTITE SCHIST)
	758.1	23.5								
	757.2	24.4	100/.4			100/.4		W		757.2 24.4
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 757.2 ft on crystalline rock

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING	
SITE DESCRIPTION REPLACE BRIDGE 15 OVER LITTLE YADKIN RIVER ON SR 1604				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 18+79	**OFFSET** 11 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 782.7 ft	**TOTAL DEPTH** 24.5 ft	**NORTHING** 915,096	**EASTING** 1,574,636	**24 HR.** 22.0
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/03/11	**COMP. DATE** 11/03/11	**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)
785										
	782.7	0.0								782.7 GROUND SURFACE 0.0
780			1	2	1	3		M		**ROADWAY EMBANKMENT** RED, MICACEOUS SILTY GRAVELLY CLAYEY SOIL, SOFT, MOIST TO WET
	779.2	3.5	1	1	1	2		M		
775										
	774.2	8.5	1	0	1	1		M		774.7 8.0 **RESIDUAL** TAN, MICACEOUS, MOIST TO WET, SOFT SOIL. SILT AND FINE SAND LAYER AT 13.5' AS AT ADJACENT BORING.
770										
	769.2	13.5	0	1	2	3		M		
765										
	764.2	18.5	4	6	4	10	SS-17	M		764.7 18.0 **RESIDUAL** LT. BROWN LOOSE TO MED. DENSE MOIST CLAYEY SILTY F. SAND
760										760.1 22.6 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK (BIOTITE GNEISS)
	759.2	23.5								
	758.2	24.5	71	29/0		100/.5				758.2 24.5
			60/0.0			60/0				Boring Terminated with Standard Penetration Test Refusal at Elevation 758.2 ft on crystalline rock

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING
SITE DESCRIPTION DETOUR BRIDGE OVER LITTLE YADKIN RIVER ON SR 1604			**GROUND WTR (ft)**
BORING NO. EB1-DET	**STATION** 17+19	**OFFSET** 57 ft RT	**ALIGNMENT** -L- — **0 HR.** 17.3
COLLAR ELEV. 770.7 ft	**TOTAL DEPTH** 18.6 ft	**NORTHING** 915,235	**EASTING** 1,574,544 — **24 HR.** 14.7
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/03/11	**COMP. DATE** 11/03/11	**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)
775											
770	770.7	0.0	1	2	2	4 6		M		770.7 GROUND SURFACE	0.0
	767.2	3.5	3	3	3			M		**RESIDUAL** RED OR RED BROWN, MOIST, MICACEOUS, SOFT TO HARD, CLAYEY SANDY SILT	
765										762.7	8.0
	762.2	8.5	6	25	36	61	SS-12	M		**RESIDUAL** GRAY-TAN & BROWN V. DENSE MOIST HIGHLY MICACEOUS SILTY F. SAND	
760										756.1	14.6
	757.2	13.5	29	71/.4		100/.9		▽		**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	
755										752.2	18.5
	752.2	18.5	60/.1			60/.1				752.1 **CRYSTALLINE ROCK**	18.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 752.1 ft in crystalline rock	

NCDOT BORE SINGLE B4744_GEO_BH_BRDG0015_FORSYTH.GPJ NC_DOT.GDT 1/4/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 38517.1.1	**TIP** B-4744	**COUNTY** FORSYTH	**GEOLOGIST** C. MANNING	
SITE DESCRIPTION DETOUR BRIDGE OVER LITTLE YADKIN RIVER ON SR 1604				**GROUND WTR (ft)**
BORING NO. EB2-DET	**STATION** 18+65	**OFFSET** 63 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 767.9 ft	**TOTAL DEPTH** 8.0 ft	**NORTHING** 915,094	**EASTING** 1,574,583	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 75% 2/15/2011		**DRILL METHOD** Rod Sounding	**HAMMER TYPE** Manual	
DRILLER Contract Driller	**START DATE** 11/07/11	**COMP. DATE** 11/07/11	**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)
770										767.9 GROUND SURFACE	0.0
			1	0		1 2				**ALLUVIAL**	
765			1	1		7				765.9 LOOSE MOIST SANDY LOAM	2.0
			3	4		11				**RESIDUAL** BRIDGE ROD DRIVE, NO SAMPLE, PRESUMED RESIDUAL SOIL	
			4	7		16					
			6	10		24					
760	759.9	8.0	10	14		31				759.9	8.0
			13	18		35				Boring Terminated by Bridge Rod Refusal at Elevation 759.9 ft on crystalline rock	
			60/0	20	15	60/0					

NCDOT BORE SINGLE B4744_GEO_BH_BRDG0015_FORSYTH.GPJ NC_DOT.GDT 1/4/12

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
SOILS LABORATORY

T. I. P. No. B-4744

REPORT ON SAMPLES OF SOILS FOR QUALITY

Project 38517.1.1 **County** FORSYTH **Owner**

Date: Sampled 11/7/11 **Received** 12/7/11 **Reported** 12/12/11

Sampled from BRG **By** R Q CALLAWAY

Submitted by N WAINAINA 1995 **Standard Specifications**

776005 TO 776010
1/9/12

TEST RESULTS

Proj. Sample No.		SS-12	SS-17	SS-21	SS-29	SS-30	SS-38
Lab. Sample No.		776005	776006	776007	776008	776009	776010
Retained #4 Sieve	%	-	-	2	2	-	-
Passing #10 Sieve	%	100	100	94	96	100	98
Passing #40 Sieve	%	94	99	80	87	98	89
Passing #200 Sieve	%	27	27	35	40	56	33

MINUS NO. 10 FRACTION

SOIL MORTAR - 100%							
Coarse Sand Ret - #60	%	22.4	9.9	27.6	21.3	6.2	23.6
Fine Sand Ret - #270	%	54.2	65.3	37.1	39.9	39.5	45.9
Silt 0.05 - 0.005 mm	%	19.4	12.8	19.2	22.7	36.2	18.4
Clay < 0.005 mm	%	4.0	12.1	16.1	16.1	18.1	12.1
Passing #40 Sieve	%	-	-	-	-	-	-
Passing #200 Sieve	%	-	-	-	-	-	-

L. L.	32	26	24	32	24	35
P. I.	NP	NP	4	5	4	NP
AASHTO Classification	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-4(0)	A-4(0)	A-2-4(0)
Station	17+19	18+79	17+04	18+79	18+79	16+94
Offset	57 RT	11 RT	11 RT	15 LT	15 LT	11 LT
Alignment	L	L	L	L	L	L
Location	EB1-DET	EB2-B	EB1-B	EB2-A	EB2-A	EB1-A
Depth (Ft)	9.30	18.50	8.50	8.50	13.50	18.50
to	10.00	20.00	10.00	10.00	15.00	20.00

cc: R Q CALLAWAY

Soils Engineer

M & T Form 503

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
PHYSICAL TESTING LABORATORY

T. I. P. No. B-4744

REPORT ON SAMPLES OF ROCK COMPRESSION

Project 38517 **County** Forsyth **Owner**

Date: Sampled 11/29/2011 **Received** 12/2/2011 **Reported** 12/9/11

Sampled from **By**

Submitted by Roger Callaway 2006 **Standard Specifications**

Tested By David Dowdy **Date Tested** 12/5/2011

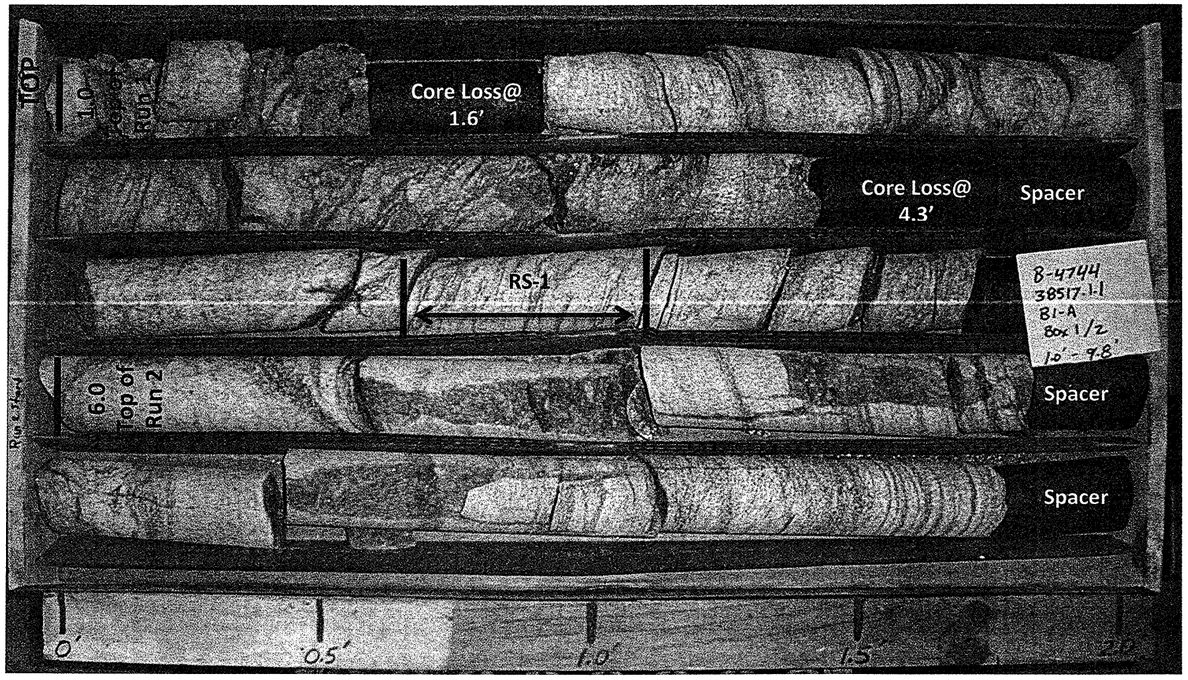
TEST RESULTS

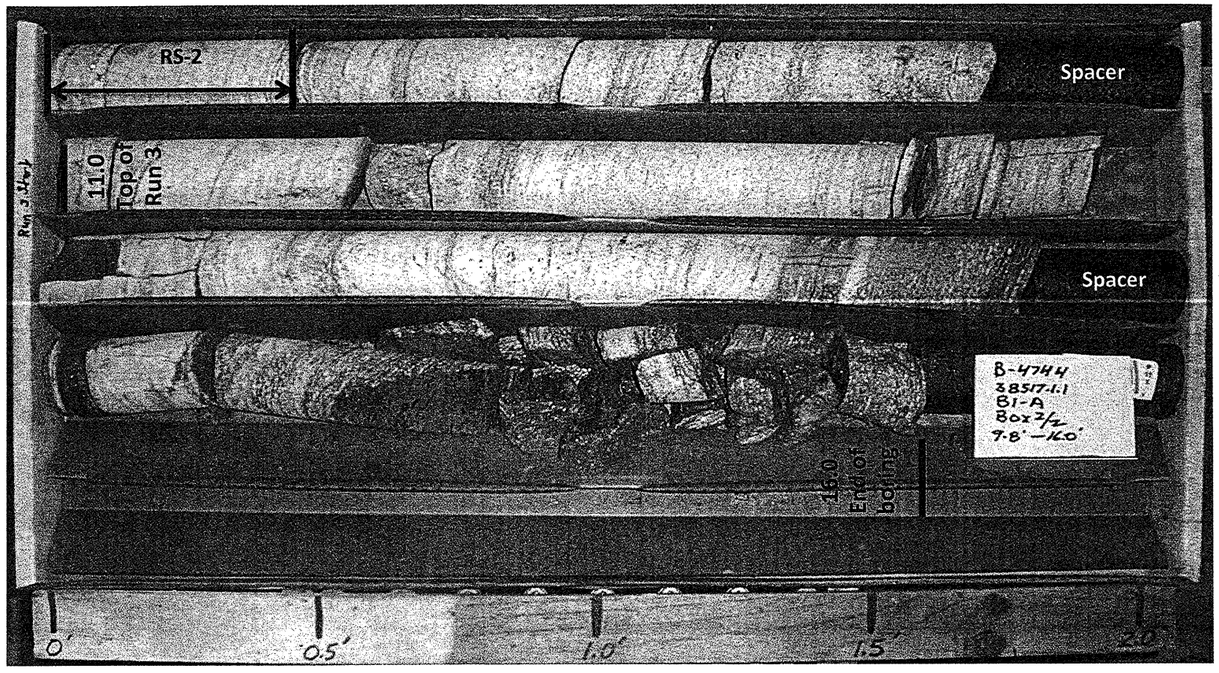
Proj. Sample No.		RS-1	RS-2	RS-3	RS-4	RS-5	RS-6	RS-7	RS-8
Lab. Sample No.									
Diameter	in	1.768	1.769	1.765	1.764	1.770	1.769	1.771	1.771
Specimen Height	in	3.890	3.895	3.611	3.951	3.948	3.647	3.752	3.660
Area	in^2	2.455	2.458	2.447	2.444	2.461	2.458	2.463	2.463
H/D Ratio		2.20	2.20	2.05	2.24	2.23	2.06	2.12	2.07
Weight	lbf	0.91	0.92	0.84	1.02	0.95	0.93	0.89	0.94
Unit Weight	lbf/ft^3	164.7	166.1	164.3	182.5	169.0	179.3	166.4	180.2
Ultimate	lbf	7450	16170	9580	21100	25100	12480	33300	21400
Ultimate	ksi	3.035	6.579	3.915	8.634	10.201	5.078	13.518	8.687
Ultimate Corrected	ksi	3.07	6.65	3.93	8.75	10.33	5.1	13.63	8.73
Sec Mod @ 40%	Mpsi	1.11	3.08	0.566	4.26	3.66	0.664	5.35	1.734
Station		17+68	17+68	17+57	17+57	18+16	18+16	18+20	18+20
Offset		20.0 LT	20.0 LT	23.0 RT	23.0 RT	19.0 LT	19.0 LT	16.0 RT	16.0 RT
Alignment		L	L	L	L	L	L	L	L
Depth (ft)		5.10	9.80	7.00	10.80	3.40	8.40	3.40	9.00
	to	5.50	10.20	7.40	11.30	3.90	8.80	3.80	9.40

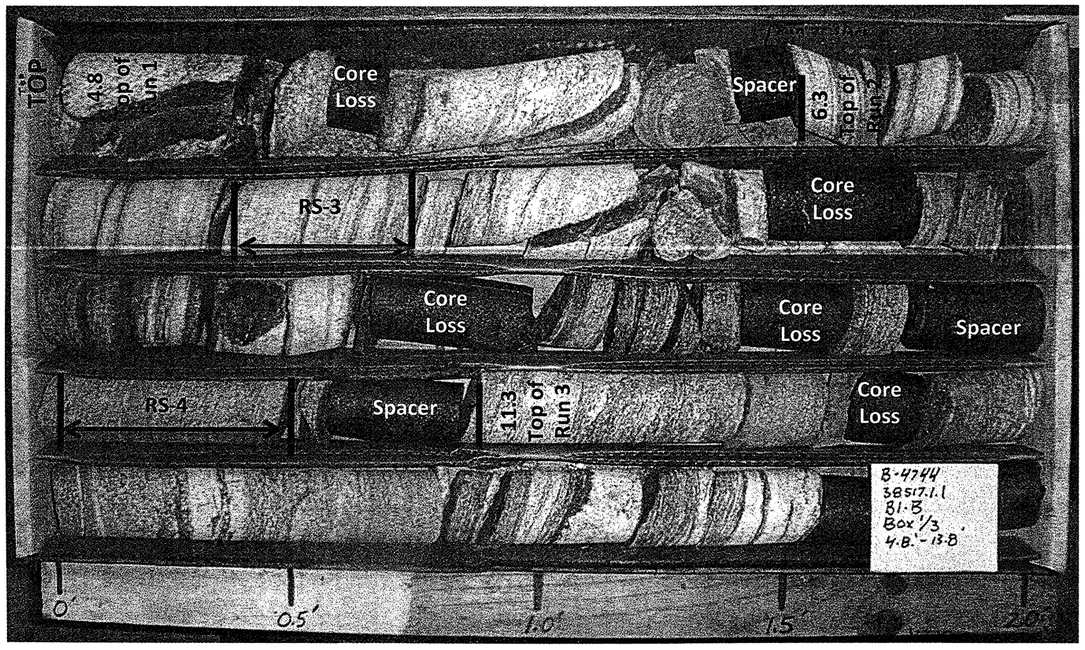
cc:

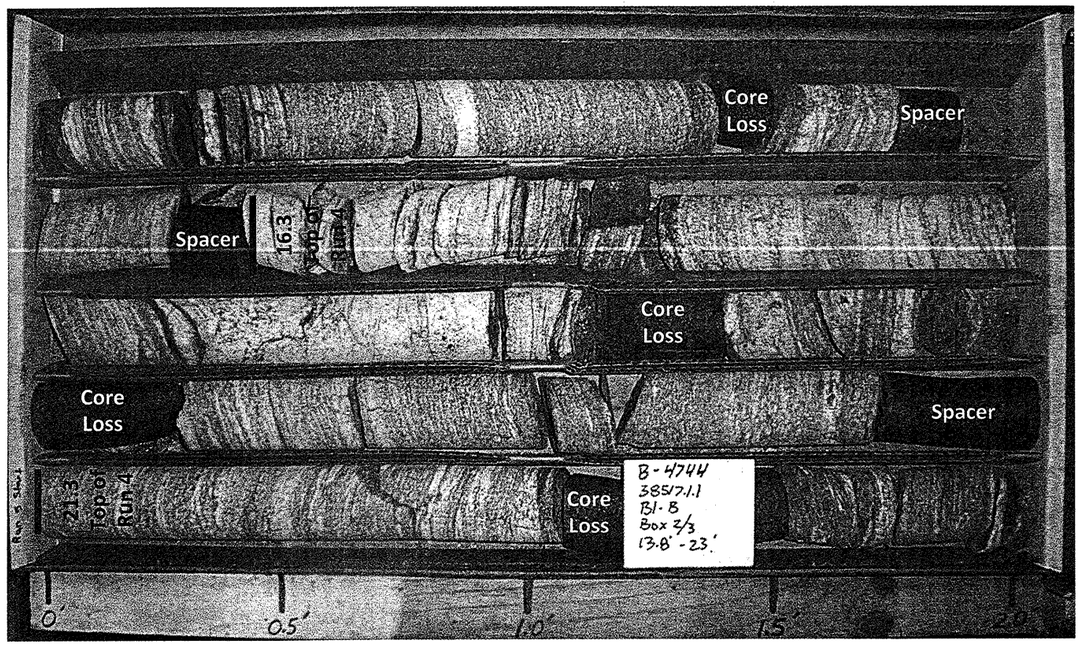
V. O. Conallen

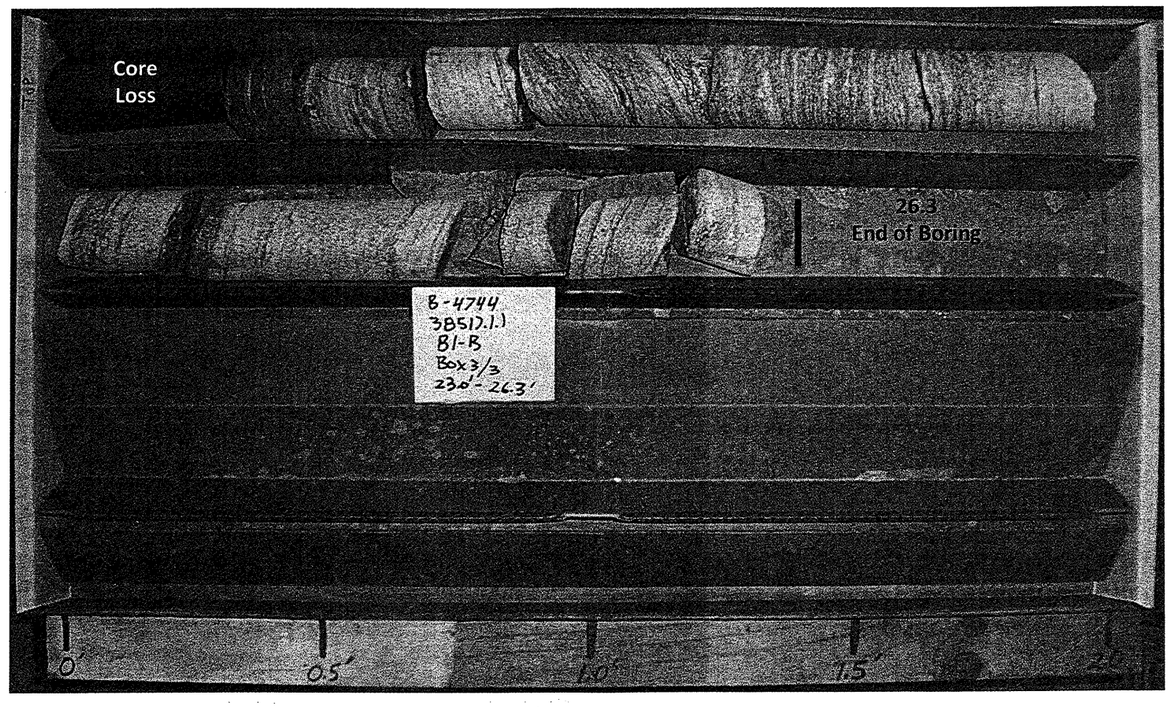
Physical Testing Engineer


TOP
1.0
Top of Run 2
Core Loss@ 1.6'
Core Loss@ 4.3'
Spacer
RS-1
B-4744
38517-1-1
B1-A
80x1/2,
1.0'-7.8'
6.0
Top of Run 2
Spacer
Spacer
0'
0.5'
1.0'
1.5'
2.0'

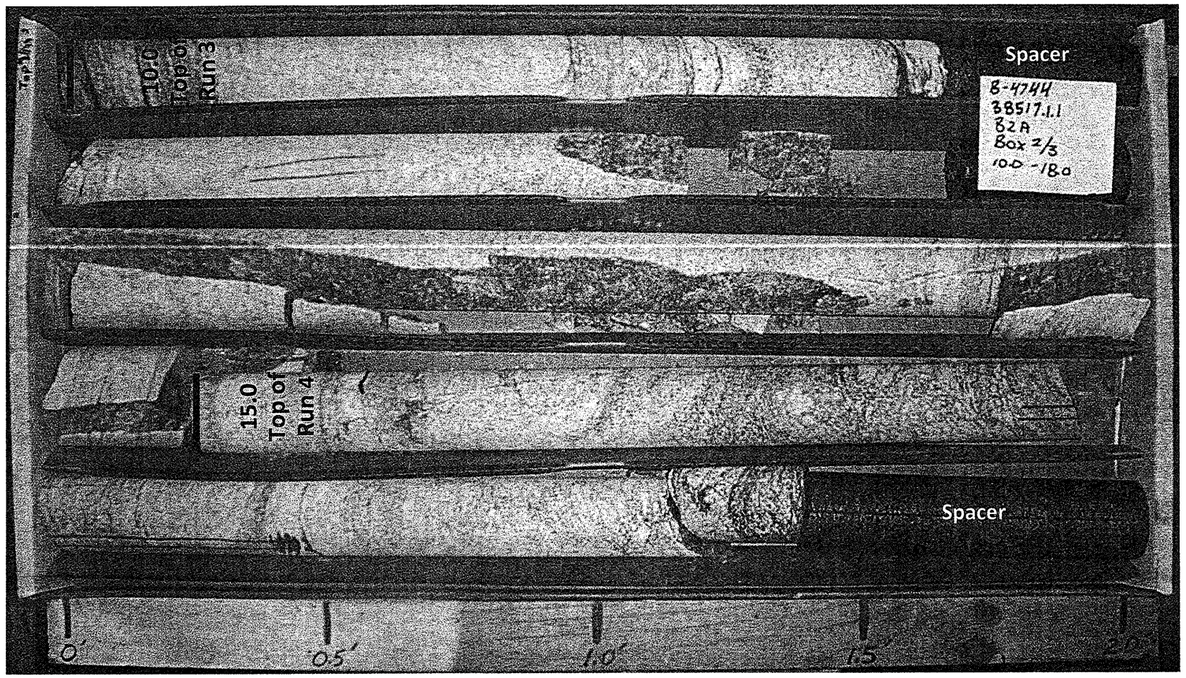

RS-2
Spacer
11.0
Top of Run 3
Spacer
B-4744
38517-1-1
B1-A
80x2/2
7.8'-16.0'
16.0
End of boring
0'
0.5'
1.0'
1.5'
2.0'

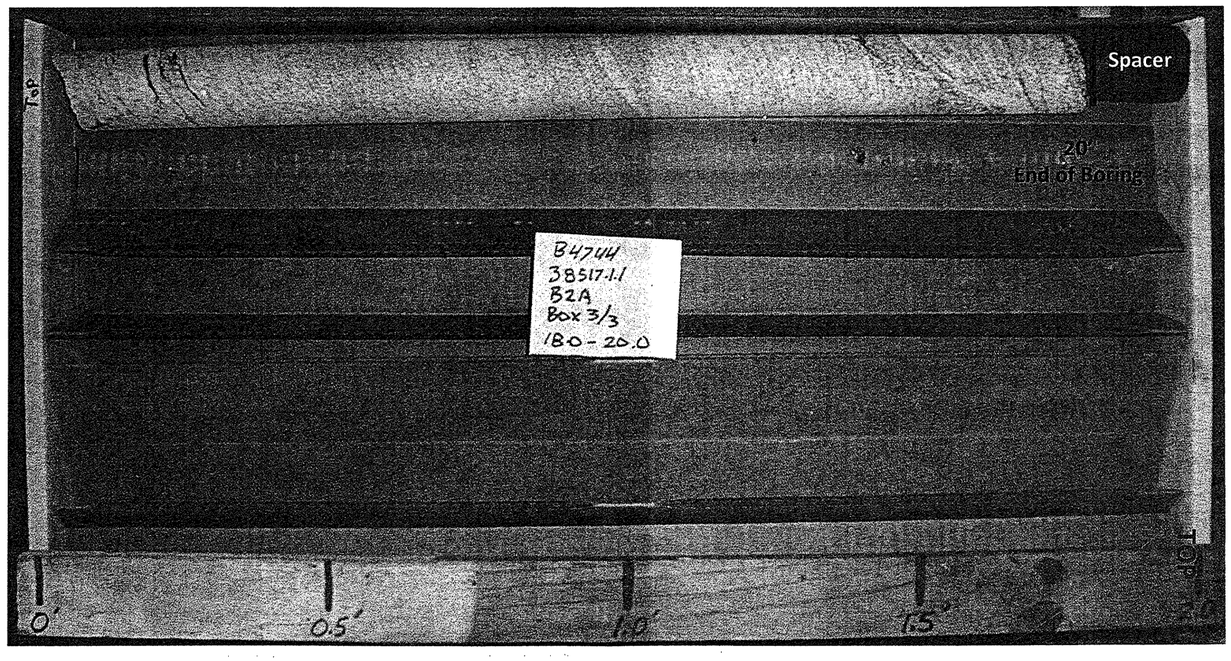

TOP
4.8
Top of Run 1
Core Loss
Spacer
6.3
Top of Run 2
RS-3
Core Loss
Core Loss
Core Loss
Spacer
RS-4
Spacer
11.3
Top of Run 3
Core Loss
B-4744
385171.1
B1-B
Box 1/3
4.8' - 13.8'
0'
0.5'
1.0'
1.5'
2.0'


Core Loss
Spacer
16.3
Top of Run 4
Spacer
Core Loss
Core Loss
Spacer
21.3
Top of Run 4
Core Loss
B-4744
385171.1
B1-B
Box 2/3
13.8' - 23.'
0'
0.5'
1.0'
1.5'
2.0'


Core Loss
26.3
End of Boring
B-4744
385171.1
B1-B
Box 3/3
23.0' - 26.3'
0'
0.5'
1.0'
1.5'
2.0'

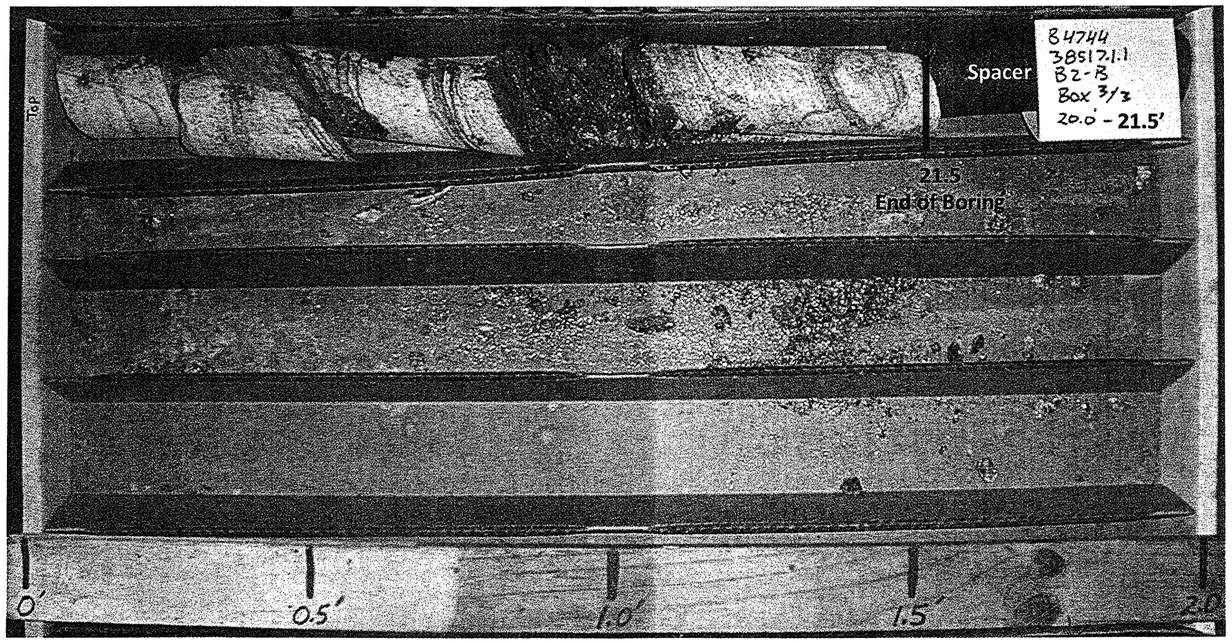

Top
TOP
1.0
Top of
Run 1
Spacer
Spacer
Spacer
B-4744
38517.1.1
B2A
Box 1/3
1.0' - 10.0'
RS-5
5.0
Top of
Run 2
RS-6
0'
0.5'
1.0'
1.5'


Top
10.0
Top of
Run 3
Spacer
B-4744
38517.1.1
B2A
Box 2/3
10.0 - 18.0
15.0
Top of
Run 4
Spacer
0'
0.5'
1.0'
1.5'
2.0'


Top
Spacer
20'
End of Boring
B4744
38517.1.1
B2A
Box 3/3
18.0 - 20.0
TOP
0'
0.5'
1.0'
1.5'
2.0'


Top
3.0
Top of Run 1
RS-7
Spacer
B-4744
385171.1
B2-B
Box 1/3
3.0 - 11.5'
16.5
Top of Run 2
RS-8
Spacer
0'
0.5'
1.0'
1.5'
2.0


11.5
Top of Run 3
Spacer
Spacer
16.5
Top of Run 2
B-4744
385171.1
B2-B
Box 2/3
11.5 - 20.0
Spacer
0'
0.5'
1.0'
1.5'
2.0


Top
Spacer
B4744
385171.1
B2-B
Box 3/3
20.0 - 21.5'
21.5
End of Boring
0'
0.5'
1.0'
1.5'
2.0

PROJECT REFERENCE NO.	SHEET
38517.1.1 (B-4744)	23

AERIAL PHOTO

0 50 100
FEET

-L- PT Sta. 16+14.56

-L- PC Sta. 19+05.35

B4744-1 PINC 13+57.91

NOAH GATES AND WIFE
BETH GATES
DB 2078 PG 3442

LITTLE YADKIN RIVER

BM-2
STA 13+36.05
105' LEFT
ELEV. = 771.90

N 34° 23' W

NAD 83/95

-DET- PC Sta. 12+23.20

TO STOKES COUNTY

S 57° 18' E

S 57° 18' E

USGS MONUMENT

-DET- S 57° 18' E

SPAINHOUR MILL RD (SR 1604)
19' BST

TO KING

DITCH CONTAINS WATER FLOW AT DATE OF SURVEY 4/17/09-4/27/09

WOODS

WOODS

WOODS

WOODS

WOODS

WOODS

15" RCP

24" MTL. CATE

RUINS

N 59° 52' 22.2" W

-DRVI- POT Sta. 11+49.17

-DRVI- POT Sta. 10+00.00

POC Sta. 15+39.64

-DET- PT Sta. 13+34.61

15+00

-DET- PC Sta. 17+05.50

00+02