STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	38579.1.1 (B-4809)	1	15

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 38579.1.1 (B-4809) F.A. PROJ. _____

COUNTY ROWAN

PROJECT DESCRIPTION BRIDGE NO. 221 OVER COLD WATER CREEK /LAKE FISHER

SITE DESCRIPTION _____

ID: B-4809

PROJECT: 38579.1.1

CONTENTS

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.

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PERSONNEL

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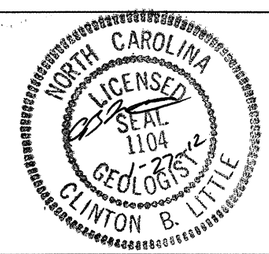
DATE JANUARY 2012



DRAWN BY: C. E. BURRIS

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PROJECT REFERENCE NO.	SHEET NO.
38579.1.1 (B-4809)	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	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
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
- 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
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2 15/16" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N NO/NQ
- [ ] -H_____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] 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: BM #2 -BL- STA. 14+65.72 18.57' LT
-L- STA 20+38.38 13.18' RT
N 643988 E 1532836 ELEVATION: 651.15 FT.

NOTES:

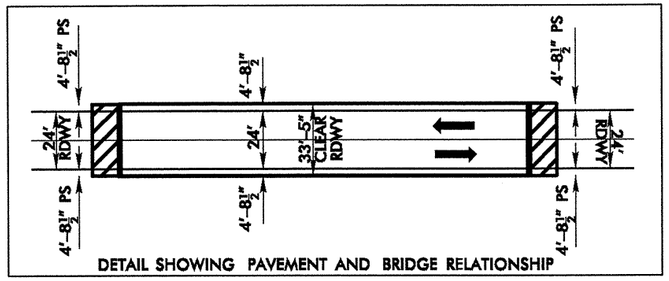
REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET
38579.1.1 (B-4809)	3

SITE PLAN

0 50 100
FEET

SKEW = 90°



DETAIL SHOWING PAVEMENT AND BRIDGE RELATIONSHIP

NC GRID
NAD 83/NSRS 2007

LAKE FISHER

BOARD OF WATER & LIGHTS
NO DEED REFERENCE

BEGIN APPROACH SLAB
-L- STA 18+70.25

END APPROACH SLAB
-L- STA 20+74.75

BEGIN PAVEMENT
-L- STA 17+00.00

END PAVEMENT
-L- STA 22+00.00

END RETAINING WALL # 1
-L- STA.18+81.25

BEGIN RETAINING WALL # 1
-L- STA.17+27.00

BEGIN RETAINING WALL # 3
-L- STA.20+63.75

END RETAINING WALL # 3
-L- STA.22+00.00

+54.00
27'
4'-8½" PS
+96.08
27'
4'-8½" PS

EXISTING R/W
60.00'
EXISTING R/W
S 87° 51' 37.7" E
TO CHINA GROVE RD
-L- SR 1308 MOOSE RD
TO I-85
19' BST
MTL GUARDRAIL w/WD POST
8:1
F
C
W
2%

W.P. #3
STA. 20+07.56
ELEV. 649.61
A/G 8" DIP
ELEV. 650.38
B1-A
BRIDGE # 221
EB2-A
EB1-B
B2-B
CONC. AND STEEL
BM2
651.15
W.P. #2
STA. 19+37.44
W.P. #1
STA. 18+82.25
W.P. #4
STA. 20+62.75

+45.81
120' LANE TAPER
4'-8½" PS
4'-8½" PS
+92.30
120' LANE TAPER

BM #2 = 13802 BM #26
-BL- STA. 14+65.72
18.57' LT.
N = 643988 E = 1532836
ELEV. = 651.15'
-L- STA 20+38.38, 13.18'

BEGIN RETAINING WALL # 2
-L- STA.17+27.00

BEGIN RETAINING WALL # 4
-L- STA.20+63.75

BOARD OF WATER & LIGHTS
NO DEED REFERENCE

END RETAINING WALL # 2
-L- STA.18+81.25

BEGIN BRIDGE
-L- STA 18+81.25

END BRIDGE
-L- STA 20+63.75

END RETAINING WALL # 4
-L- STA.22+00.00

LAKE FISHER

PROJECT REFERENCE NO.	SHEET
38579.1.1 (B-4809)	4
BRIDGE NO. 221 ROWAN CO. PROFILE ALONG -L- VE=5:1	

0 50 100 FEET

SCALES:
1"=50' HORIZ.
1"=10' VERT.

CHANNEL AT EXISTING UPSTREAM BRIDGE FACE

LAKE FISHER FULL POOL ELEV. = 645.25

EXISTING BRIDGE (TO BE REMOVED)

℄ -L- STA. 19+72.5
PROP. 1@55', 1@70', 1@55' 24" CORED SLAB
PROP. GRADE = 652.90'
SKEW = 90°

SS-1
SS-2
SS-3
SS-5
SS-6
MS-1

EB1-B
18+81 -L-
6 RT
ELEV. = 651.4'

B1-A
19+37 -L-
6 LT
ELEV. = 637.6'

B2-B
20+09 -L-
6 RT
ELEV. = 641.8'

SS-18
SS-19
SS-20
SS-21

EB2-A
20+53 -L-
6 LT
ELEV. = 651.4'

PI = 19+70.00
EL = 653.06'
VC = 140'
K = 158

HISTORICAL FLOOD INFORMATION ELEV. = 651.2 +/-

(+)0.3000%

(-)0.5850%

(-)0.5850%

IB1

IB2

ROADWAY EMBANKMENT PAVEMENT AND ABC STONE

ROADWAY EMBANKMENT PAVEMENT AND ABC STONE

RED-BROWN TO GRAY MED. STIFF MOIST SILTY SANDY CLAY (A-7-6)

GRAY MED. STIFF MOIST SILTY SANDY CLAY (A-6)

GRAY STIFF TO VERY SOFT MOIST TO WET CLAYEY SANDY SILT W/GRAVEL (A-4)

ALLUVIAL GRAY LOOSE WET COARSE SAND (A-2-4)

WEATHERED ROCK

SEVERELY WEATHERED CRYSTALLINE ROCK

CRYSTALLINE ROCK

RED-TAN LOOSE MOIST CLAYEY SILTY SAND W/GRAVEL (A-2)

OLIVE STIFF TO MED. STIFF MOIST CLAYEY SANDY SILT (A-4)

OLIVE MED. STIFF TO STIFF MOIST SANDY SILTY CLAY (A-6)

ALLUVIAL GRAY VERY SOFT WET CLAYEY SANDY SILT (A-4)

WEATHERED ROCK

SEVERELY WEATHERED CRYSTALLINE ROCK

CRYSTALLINE ROCK

ALLUVIAL

WEATHERED ROCK

CRYSTALLINE ROCK

GRAY MOTTLED PORPHYRITIC METAVOLCANIC ROCK PROBABLY ANDESITE; CRACKLE BRECCIA WITH CALCITE AND MANGANO CALCITE VEINS AND FRACTURE FILL. BLACK FRACTURE COATINGS MAY BE MANGANESE OXIDE. ROCK TYPE D

REC. = 96%
RQD. = 58%
R1 = 2
R2 = 13
R3 = 5
R4 = 12
R5 = 4
RMR = 36

METAVOLCANIC, HIGHLY FRACTURED WITH CALCITE AND MANGANO-CALCITE FRACTURE FILLING; MUCH OF THE ROCK IS A CRACKLE BRECCIA BUT WITHOUT SEPARATION ON THE JOINTS OR FRACTURES. ROCK VARIES FROM ANDESITIC PORPHYRY TO VOLCANIC BRECCIA. ROCK TYPE D

REC. = 87%
RQD. = 50%
R1 = 2
R2 = 8
R3 = 2
R4 = 12
R5 = 4
RMR = 31

TCR 06/15/11

TCR 06/15/11

BT 01/09/12

BT 01/10/12

WOH

WOH

06/11

06/11

100/.1

60/.1

100/.2

60/.1

60/.1

BORING DESCRIPTIONS

Ⓐ ALLUVIAL, 0-7.4, GRAY, WET, VERY LOOSE, ORGANIC RICH, SILTY CLAYEY SAND

Ⓑ RESIDUAL, 7.4-8.2 MORE DRILLING RESISTANCE, PRESUMED RESIDUAL CLAY.

Ⓒ ALLUVIAL, 0-9.5 TAN, WET, MICACEOUS VERY LOOSE, CLAYEY SILTY FINE SAND

Ⓓ RESIDUAL, 9.5-12.5, BROWN TO BLUE-GRAY, WET, SOFT SANDY CLAY

680 670 660 650 640 630 620 610 600 590

16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00

PROJECT REFERENCE NO.	SHEET
38579.1.1 (B-4809)	5

SECTION THROUGH EB-1
STA. 18+82.25 -L-
SKEW=90°

0 10 20
FEET

680 670 660 650 640 630 620 610 600 590

SS-1
SS-2
SS-3
SS-5
SS-6
MS-1

EB1-B
18+81 -L-
6' RT
ELEV. = 651.4'

ROADWAY EMBANKMENT
PAVEMENT AND ABC STONE

EXISTING GROUND

RED-BROWN TO GRAY MED. STIFF MOIST SILTY SANDY CLAY (A-7-6)

6
6
4
13
4
1
6
50/.3
100/.1

ROADWAY EMBANKMENT
06/11
06/11

GRAY MED. STIFF MOIST SILTY SANDY CLAY (A-6)

GRAY STIFF TO VERY SOFT MOIST TO WET CLAYEY SANDY SILT W/GRAVEL (A-4)

ALLUVIAL

GRAY LOOSE WET COARSE SAND (A-2-4)

WEATHERED ROCK

SEVERELY WEATHERED CRYSTALLINE ROCK

CRYSTALLINE ROCK

TCR
06/15/11

50 40 30 20 10 0 10 20 30 40 50

PROJECT REFERENCE NO.	SHEET
38579.1.1 (B-4809)	6

SECTION THROUGH B-1
STA. 19+37.44 -L-
SKEW=90°

0 10 20
FEET

670
660
650
640
630
620
610
600
590

BRIDGE 221

B1-A
19+37 -L-
6 LT
ELEV.=637.6'

EXISTING GROUND

ALLUVIAL
GRAY, WET, VERY LOOSE, ORGANIC RICH, SILTY CLAYEY SAND

WOH

RESIDUAL

MORE DRILLING RESISTANCE, PRESUMED RESIDUAL CLAY

WEATHERED ROCK

CRYSTALLINE ROCK

GRAY MOTTLED PORPHYRITIC METAVOLCANIC ROCK, PROBABLY ANDESITE; CRACKLE BRECCIA WITH CALCITE AND MANGANO CALCITE VEINS AND FRACTURE FILL. BLACK FRACTURE COATINGS MAY BE MANGANESE OXIDE. ROCK IS VERY WEAK, RQD COULD BE MUCH HIGHER OR LOWER DEPENDING ON INTERPRETATION OF MACHINE BREAKS. ROCK TYPE D.

REC.=96%
RQD.=68%

R1=2
R2=13
R3=5
R4=12
R5=4
RMR=36

BT
01/09/12

50 40 30 20 10 0 10 20 30 40 50

PROJECT REFERENCE NO.	SHEET
38579.1.1 (B-4809)	7

SECTION THROUGH B-2
STA. 20+07.56 -L-
SKEW=90°

0 10 20
FEET

670 660 650 640 630 620 610 600 590

BRIDGE 221

B2-B
20+09 -L-
6 RT
ELEV.=641.8'

EXISTING GROUND

ALLUVIAL
TAN, WET, MICACEOUS
VERY LOOSE, CLAYEY
SILTY FINE SAND

WOH

RESIDUAL
BROWN TO BLUE-GRAY, WET,
SOFT SANDY CLAY

3

WEATHERED ROCK
SEVERELY WEATHERED
CRYSTALLINE ROCK

100/.2

CRYSTALLINE ROCK

METAVOLCANIC, HIGHLY FRACTURED
WITH CALCITE AND MANGANO-CALCITE
FRACTURE FILLING; MUCH OF THE
ROCK IS A CRACKLE BRECCIA BUT WITHOUT
SEPARATION ON THE JOINTS OR FRACTURES.
ROCK VARIES FROM ANDESITIC PORPHYRY
TO VOLCANIC BRECCIA. RQD COULD BE MUCH
BETTER, OR SOME WORSE DEPENDING ON
INTERPRETATION OF MACHINE BREAKS.
ROCK TYPE D.

REC.=87%
RQD.=50%

R1=2
R2=8
R3=5
R4=12
R5=4
RMR=31

BT
01/10/12

50 40 30 20 10 0 10 20 30 40 50

PROJECT REFERENCE NO.	SHEET
38579.1.1 (B-4809)	8

SECTION THROUGH EB-2
STA. 20+62.75 -L-
SKEW=90°

0 10 20
FEET

SS-18
SS-19
SS-20
SS-21

EB2-A
20+53 -L-
6 LT
ELEV.=651.4'

ROADWAY EMBANKMENT
PAVEMENT AND ABC STONE

ROADWAY EMBANKMENT
RED-TAN LOOSE MOIST CLAYEY SILTY SAND W/GRAVEL (A-2)

EXISTING GROUND

OLIVE STIFF TO MED. STIFF MOIST CLAYEY SANDY SILT (A-4)

OLIVE MED. STIFF TO STIFF MOIST SANDY SILTY CLAY (A-6)

ALLUVIAL GRAY VERY SOFT WET CLAYEY SANDY SILT (A-4)

WEATHERED ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK

CRYSTALLINE ROCK

TCR
06/15/11

680 670 660 650 640 630 620 610 600 590

50 40 30 20 10 0 10 20 30 40 50

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38579.1.1	**TIP** B-4809	**COUNTY** ROWAN	**GEOLOGIST** Murray, C. C.	
SITE DESCRIPTION Bridge 221 over Lake Fisher on SR 1308				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 18+81	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** 4.0
COLLAR ELEV. 651.4 ft	**TOTAL DEPTH** 32.9 ft	**NORTHING** 644,001	**EASTING** 1,532,679	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 09/02/2009		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Estep, J. E.	**START DATE** 06/15/11	**COMP. DATE** 06/15/11	**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)
655										
	651.4	0.0								651.4 GROUND SURFACE 0.0
650	650.4	1.0								650.4 **ROADWAY EMBANKMENT** PAVEMENT AND ABC STONE 1.0
	649.4	2.0	3	3	3	6		M		**ROADWAY EMBANKMENT** RED-BROWN TO GRAY MED. STIFF MOIST SILTY SANDY CLAY (A-7-6)
645	645.9	5.5	1	3	3	6	SS-1	25%		
	643.4	8.0								643.4 8.0
	640.9	10.5	2	2	2	4	SS-2	M		**ROADWAY EMBANKMENT** GRAY MED. STIFF MOIST SILTY SANDY CLAY (A-6) 10.5
640	638.4	13.0	4	7	6	13	SS-3	M		**ROADWAY EMBANKMENT** GRAY STIFF TO VERY SOFT MOIST TO WET CLAYEY SANDY SILT W/ GRAVEL (A-4)
	635.9	15.5	0	1	3	4		W		
635	633.4	18.0	1	0	1	1	SS-5	W		633.4 18.0
			2	2	4	6	SS-6	W		**ALLUVIAL** GRAY LOOSE WET COARSE SAND (A-2-4) 20.0
630	628.4	23.0								631.4
			100	60/.1		60/.1 REF				**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK 23.5
625	622.0	29.4	100/.1			100/.1 REF				627.9 **CRYSTALLINE ROCK**
620										618.5 32.9

Boring Terminated with Tri-Cone Roller bit refusal at Elevation 618.5 ft in crystalline rock

Other Samples:
M-1 (5.5 - 7.0)

NCDOT BORE SINGLE B4809_GEO_BH_BRDG0221_ROWAN.GPJ NC_DOT.GDT 1/25/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38579.1.1	**TIP** B-4809	**COUNTY** ROWAN	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge 221 over Lake Fisher on SR 1308				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 19+37	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 637.6 ft	**TOTAL DEPTH** 31.4 ft	**NORTHING** 644,011	**EASTING** 1,532,735	**24 HR.** NM
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 01/09/12	**COMP. DATE** 01/09/12	**SURFACE WATER DEPTH** 7.2ft	

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)
640										637.6 GROUND SURFACE 0.0
										ALLUVIAL 0-7.4, GRAY, WET, VERY LOOSE, ORGANIC RICH, SILTY CLAYEY SAND
635										
	631.8	5.8	0	0	0			W		
630			WOH			0				630.2 7.4
										629.4 8.2
										629.0 8.6
625										**RESIDUAL** 7.4-8.2 MORE DRILLING RESISTANCE, PRESUMED RESIDUAL CLAY.
										WEATHERED ROCK 8.2-8.6 VERY SLOW PENETRATION, PRESUMED WEATHERED ROCK
620										**CRYSTALLINE ROCK** PORPHYRITIC METAVOLCANIC ROCK
615										
610										606.2 31.4
										Boring Terminated at Elevation 606.2 ft in porphyritic metavolcanic rock

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 38579.1.1	**TIP** B-4809	**COUNTY** ROWAN	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge 221 over Lake Fisher on SR 1308				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 19+37	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 637.6 ft	**TOTAL DEPTH** 31.4 ft	**NORTHING** 644,011	**EASTING** 1,532,735	**24 HR.** NM
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 01/09/12	**COMP. DATE** 01/09/12	**SURFACE WATER DEPTH** 7.2ft	
CORE SIZE NO/NQ	**TOTAL RUN** 22.8 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)
629											Begin Coring @ 8.6 ft
	629.0	8.6	2.8	2.28/1.0 2.19/1.0 2.3/0.8	(2.3) 82%	(1.1) 39%		(22.0) 96%	(13.2) 58%		629.0 **CRYSTALLINE ROCK** 8.6
	626.2	11.4									8.6-31.4, GRAY MOTTLED PORPHYRITIC METAVOLCANIC ROCK, PROBABLY ANDESITE; CRACKLE BRECCIA WITH CALCITE AND MANGANO CALCITE VEINS AND FRACTURE FILL. BLACK FRACTURE COATINGS MAY BE MANGANESE OXIDE. ROCK IS VERY WEAK, RQD COULD BE MUCH HIGHER OR LOWER DEPENDING ON INTERPRETATION OF MACHINE BREAKS. CLASS IV. POOR ROCK. ROCK TYPE D.
625			5.0	1.5/1.0 1.45/1.0 1.53/1.0 1.4/1.0 1.42/1.0	(4.9) 98%	(2.3) 46%					R1=2
	621.2	16.4									R2=13
620			5.0	1.36/1.0 1.41/1.0 1.45/1.0 1.3/1.0 1.33/1.0	(5.0) 100%	(3.1) 62%					R3=5
	616.2	21.4									R4=12
615			5.0	1.4/1.0 1.3/1.0 1.34/1.0 1.41/1.0 1.39/1.0	(5.0) 100%	(3.8) 76%					R5=4
	611.2	26.4									RMR=36
610			5.0	1.28/1.0 1.35/1.0 1.4/1.0 1.31/1.0 1.36/1.0	(4.8) 96%	(1.2) 24%					
	606.2	31.4									606.2 31.4
											Boring Terminated at Elevation 606.2 ft in porphyritic metavolcanic rock

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38579.1.1	**TIP** B-4809	**COUNTY** ROWAN	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge 221 over Lake Fisher on SR 1308				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 20+09	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 641.8 ft	**TOTAL DEPTH** 40.7 ft	**NORTHING** 643,996	**EASTING** 1,532,807	**24 HR.** NM
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 01/10/12	**COMP. DATE** 01/10/12	**SURFACE WATER DEPTH** 3.0ft	

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)
645										641.8 GROUND SURFACE 0.0
640										**ALLUVIAL** 0-9.5 TAN, WET, MICACEOUS VERY LOOSE, CLAYEY SILTY FINE SAND
	636.8	5.0	0	0	0	WOH 0		M		
635										
	631.8	10.0	0	1	2	3		M		632.3 9.5
630										**RESIDUAL** 9.5-12.5, BROWN TO BLUE-GRAY, WET, SOFT SANDY CLAY 629.3 12.5
	626.8	15.0	100/.2			100/.2				**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK 624.9 16.9
625										**CRYSTALLINE ROCK** METAVOLCANIC ROCK
620										
615										
610										
605										601.1 40.7 Boring Terminated at Elevation 601.1 ft in metavolcanic rock

NCDOT BORE SINGLE B4809_GEO_BH_BRDG0221_ROWAN.GPJ NC_DOT.GDT 1/25/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 38579.1.1	**TIP** B-4809	**COUNTY** ROWAN	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge 221 over Lake Fisher on SR 1308				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 20+09	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 641.8 ft	**TOTAL DEPTH** 40.7 ft	**NORTHING** 643,996	**EASTING** 1,532,807	**24 HR.** NM
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 01/10/12	**COMP. DATE** 01/10/12	**SURFACE WATER DEPTH** 3.0ft	
CORE SIZE NO/NQ	**TOTAL RUN** 23.8 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
624.9											ELEV. (ft) DEPTH (ft)
	624.9	16.9	3.8	1.4/1.0 1.5/1.0 1.55/1.0 1.39/0.8	(2.5) 66%	(1.0) 26%		(20.6) 87%	(11.8) 50%		Begin Coring @ 16.9 ft
620	621.1	20.7	5.0	1.4/1.0 1.08/1.0 1.39/1.0 1.4/1.0 2.0/1.0	(4.6) 92%	(2.4) 48%					624.9 **CRYSTALLINE ROCK** 16.9-40.7 METAVOLCANIC, HIGHLY FRACTURED WITH CALCITE AND MANGANO-CALCITE FRACTURE FILLING; MUCH OF THE ROCK IS A CRACKLE BRECCIA BUT WITHOUT SEPARATION ON THE JOINTS OR FRACTURES. ROCK VARIES FROM ANDESITIC PORPHYRY TO VOLCANIC BRECCIA. RQD COULD BE MUCH BETTER, OR SOME WORSE DEPENDING ON INTERPRETATION OF MACHINE BREAKS. THE RECOVERY IS GOOD, BUT IT IS A VERY WEAK ROCK, THAT CAN BE BROKEN BY HAND. CLASS IV. POOR ROCK. ROCK TYPE D. R1=2 R2=8 R3=5 R4=12 R5=4 RMR=31
615	616.1	25.7	5.0	2.03/1.0 1.55/1.0 1.49/1.0 1.52/1.0 1.56/1.0	(3.9) 78%	(1.1) 22%					
610	611.1	30.7	5.0	1.59/1.0 2.03/1.0 2.0/1.0 1.5/1.0 1.55/1.0	(4.7) 94%	(3.7) 74%					
605	606.1	35.7	5.0	2.0/1.0 1.45/1.0 1.51/1.0 1.56/1.0 2.02/1.0	(4.9) 98%	(3.6) 72%					
	601.1	40.7									601.1 40.7 Boring Terminated at Elevation 601.1 ft in metavolcanic rock

NCDOT CORE SINGLE B4809_GEO_BH_BRDG0221_ROWAN.GPJ NC_DOT.GDT 1/25/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38579.1.1	**TIP** B-4809	**COUNTY** ROWAN	**GEOLOGIST** Murray, C. C.	
SITE DESCRIPTION Bridge 221 over Lake Fisher on SR 1308				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 20+53	**OFFSET** 6 ft LT	**ALIGNMENT** -L-	**0 HR.** 5.0
COLLAR ELEV. 651.4 ft	**TOTAL DEPTH** 38.7 ft	**NORTHING** 644,007	**EASTING** 1,532,851	**24 HR.** NM
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 09/02/2009		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic	
DRILLER Estep, J. E.	**START DATE** 06/16/11	**COMP. DATE** 06/16/11	**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)
										651.4	0.0
										GROUND SURFACE	
650	650.4	1.0								**ROADWAY EMBANKMENT** PAVEMENT AND ABC STONE	
	648.7	2.7	2	2	7	9		M		**ROADWAY EMBANKMENT** RED-TAN LOOSE MOIST CLAYEY SILTY SAND W/ GRAVEL (A-2)	
645	646.2	5.2	3	4	5	9	SS-18	M			646.2 5.2
	643.7	7.7	3	3	4	7	SS-19	M		**ROADWAY EMBANKMENT** OLIVE STIFF TO MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	
640	641.2	10.2	3	3	4	7	SS-20	M			641.2 10.2
	638.7	12.7	3	4	5	9				**ROADWAY EMBANKMENT** OLIVE MED. STIFF TO STIFF MOIST SANDY SILTY CLAY (A-6)	
635	633.7	17.7	1	0	1	1	SS-21	W			633.7 17.7
630	631.4	20.0								**ALLUVIAL** GRAY VERY SOFT WET CLAYEY SANDY SILT (A-4)	
	628.7	22.7	100	60/.1		60/.1 REF				**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	628.2 23.2
625	622.2	29.2	60/.1			60/.1 REF				**CRYSTALLINE ROCK**	
620	617.2	34.2	60/.1			60/.1 REF					
615	612.7	38.7								Boring Terminated with Tri-Cone Roller bit refusal at Elevation 612.7 ft in crystalline rock	

NCDOT BORE DOUBLE B4809_GEO_BH_BRDG0221_ROWAN.GPJ NC_DOT.GDT 1/25/12

TEST RESULTS

PROJECT: 38579.1.1 (B-4809)
COUNTY: ROWAN
SITE DESCRIPTION: BRIDGE NO. 221 OVER COLD WATER CREEK / LAKE FISHER

SOIL SAMPLE RESULTS

SAMPLE NO.	*OFFSET*	*STATION*	*DEPTH INTERVAL*	*AASHTO CLASS*	*N*	*L.L.*	*P.I.*	*% BY WEIGHT*				*% PASSING SIEVES*			*%*	*%*	*UNIT*	*VOID*
								C. SAND	*F. SAND*	*SILT*	*CLAY*	*10*	*40*	*200*	*MOISTURE*	*ORGANIC*	*WT. (d)*	*RATIO*
		EB1-B																
SS-1	6 RT.	18+81 -L-	5.5-7.0	A-7-6(12)	6	45	23	14.4	16.2	30.8	38.6	84	75	62				
MS-1	6 RT.	18+81 -L-	5.5-7.0												24.6			
SS-2	6 RT.	18+81 -L-	8.0-9.5	A-6(4)	4	38	15	23.8	23.6	30.4	22.3	84	71	49				
SS-3	6 RT.	18+81 -L-	10.5-12.0	A-4(1)	13	30	9	32.7	22.1	31.0	14.2	81	62	41				
SS-5	6 RT.	18+81 -L-	15.5-17.0	A-4(0)	1	25	5	33.9	26.2	21.6	18.3	95	74	43				
SS-6	6 RT.	18+81 -L-	18.0-19.5	A-2-4(0)	6	23	NP	68.1	22.0	5.8	4.1	95	59	11				
		EB2-A																
SS-18	6 LT.	20+53 -L-	5.2-6.7	A-4(0)	9	30	7	26.4	22.5	32.8	18.3	75	61	43				
SS-19	6 LT.	20+53 -L-	7.7-9.2	A-4(0)	7	31	8	24.0	27.2	32.6	16.2	71	59	40				
SS-20	6 LT.	20+53 -L-	10.2-11.7	A-6(10)	7	40	18	12.6	18.7	34.2	34.5	88	81	65				
SS-21	6 LT.	20+53 -L-	17.7-19.2	A-4(0)	1	23	3	5.3	53.0	27.5	14.2	100	99	51				

PROJECT: 38579.1.1 (B-4809)
BORING NO.: B1-A
SITE DESCRIPTION: BRIDGE NO. 221 OVER COLD WATER CREEK / LAKE FISHER

PROJECT: 38579.1.1 (B-4809)
BORING NO.: B2-B
SITE DESCRIPTION: BRIDGE NO. 221 OVER COLD WATER CREEK / LAKE FISHER