STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33486.1.1 (B-4133)	1	15

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *33486.1.1 (B-4133)* F.A. PROJ. *BRSTP-1001(26)*

COUNTY *HALIFAX*

PROJECT DESCRIPTION *BRIDGE 011 ON -L- (SR 1001, JUSTICE BRANCH RD.) OVER BURNT COAT SWAMP AT STA. 26+70.5*

ID: B-4133

PROJECT: 33486.1.1

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DATE *MAY 2009*

NORTH CAROLINA LICENSED SEAL 1912 GEOLOGIST NEIL T. ROBERSON

5-6-09

DRAWN BY: *W. D. FIELDS*

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PROJECT REFERENCE NO.	SHEET NO.
33486.1.1 (B-4133)	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 PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
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 ($TONS/FT^2$)
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 SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- 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
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

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

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
- MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N XWL
- [ ] -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: BM2 - RR SPIKE IN BASE OF 24" GUM TREE,
-BL- STA. 19+51, 30' RT
N=892719; E=2390843 ELEVATION: 87.6 FT.

NOTES:

REVISED 02/23/06

PROJECT REFERENCE NO.	SHEET
33486.1.1 (B-4133)	3

SITE PLAN

0 40 80
FEET

BEGIN BRIDGE
STA. 25+85.00

BEGIN APPROACH SLAB
STA. 25+73.00

-L- PT Sta. 25+38.94

END BRIDGE
STA 27+56.00

END APPROACH SLAB
STA. 27+68.00

25

29

ISLAND

WE

TOB

WLB

EB1-A
25+85
9' LT

B1-A
26+29
6' LT

B2-A
27+00
9' LT

EB2-A
27+56
9' LT

TO DARLINGTON

-L-

S 28° 38' 44.6" E TO ENFIELD

SR 1001 (22' BST)

EB1-B
25+85
16' RT

B1-B
26+42
7' RT

B2-B
26+75
6' RT

EB2-B
27+56
8' RT

WOODS

BURNT COAT SWAMP

REMOVE EXIST. STRUC.

SKEW = 90°

0	50	100
FEET		
VE = 5:1		

PROJECT REFERENCE NO.	SHEET
33486.1.1 (B-4133)	4

PROFILE ALONG -L-

EB1-A
25+85
9' LT

B1-A
26+29
6' LT

B2-A
27+00
9' LT

EB2-A
27+56
9' LT

EXIST. ALIGNMENT

EXIST. BRIDGE AND PIERS TO BE REMOVED

ROADWAY EMBANKMENT, TAN-BROWN, MOIST TO WET, VERY LOOSE, CLAYEY SAND (2)

ROADWAY MOIST TO SANDY

EMBANKMENT, RED-BROWN, WET, MEDIUM STIFF, CLAY

03/09

(3) (4) (12) ALLUVIAL, GRAY TO BROWN, WET (7) TO SATURATED, (6) SOFT TO (13) STIFF, SANDY SILT AND

(26) LOOSE TO MEDIUM DENSE, (5) COASTAL PLAIN, SOFT TO MEDIUM STIFF, RESIDUAL, GREEN TO WEATHERED 100/0.5

DARK GRAY SANDY (1) GRAY, SILTY SAND AND BROWN, CLAY AND SILT SATURATED. 100/1.0

WOH WET AND VERY LOOSE. SILTY SAND (YORKTOWN FORMATION)

WOH TO SATURATED,

HARD, (57) SANDY SILT AND

100/0.4 ROCK 60/0.1

DENSE (49) TO VERY DENSE, SILTY AND (58) CLAYEY SAND

CRYSTALLINE ROCK
GREEN-GRAY TO PINK,
SLIGHTLY WEATHERED TO FRESH,
WIDE FRACTURE SPACING,
HARD, CHLORITE AND EPIDOTE
META-DIORITE
REC = 78%
ROD = 48%

(META-DIORITE)

100/0.9

100/0.7

(A) ALLUVIAL, GRAY, WET TO SATURATED, VERY SOFT, SILTY CLAY

GROUNDLINE PROFILE OF -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULICS DESIGN REPORT DATED 01/03/08. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

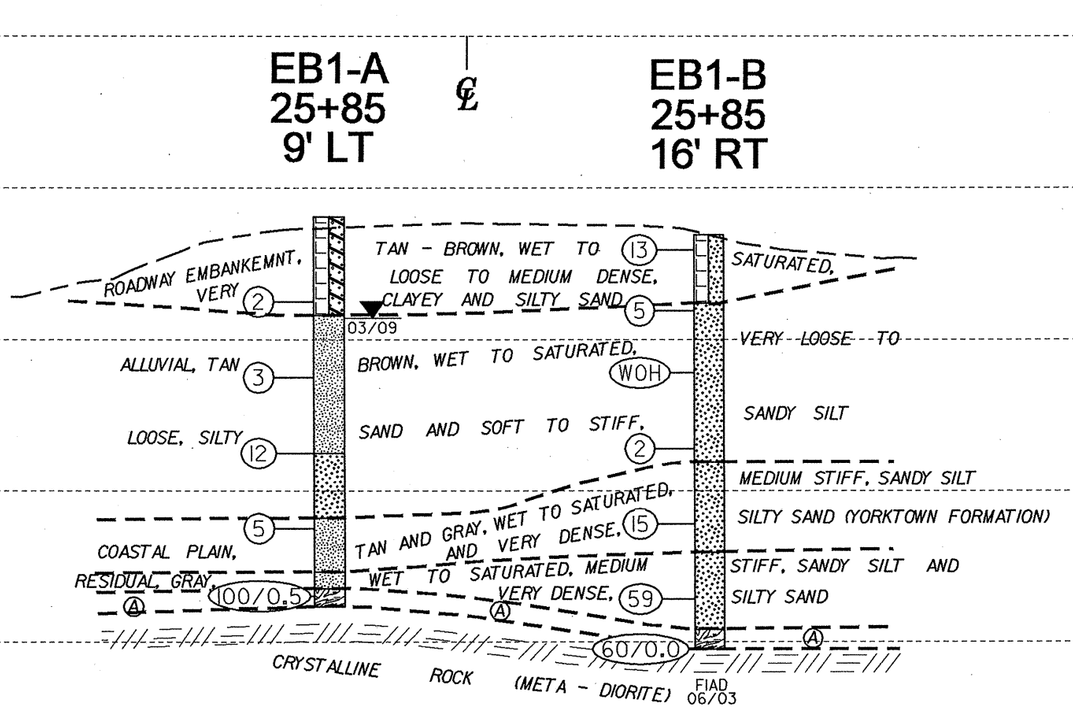
120 110 100 90 80 70 60 50 40 30

24+00 25+00 26+00 27+00 28+00 29+00 30+00

HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

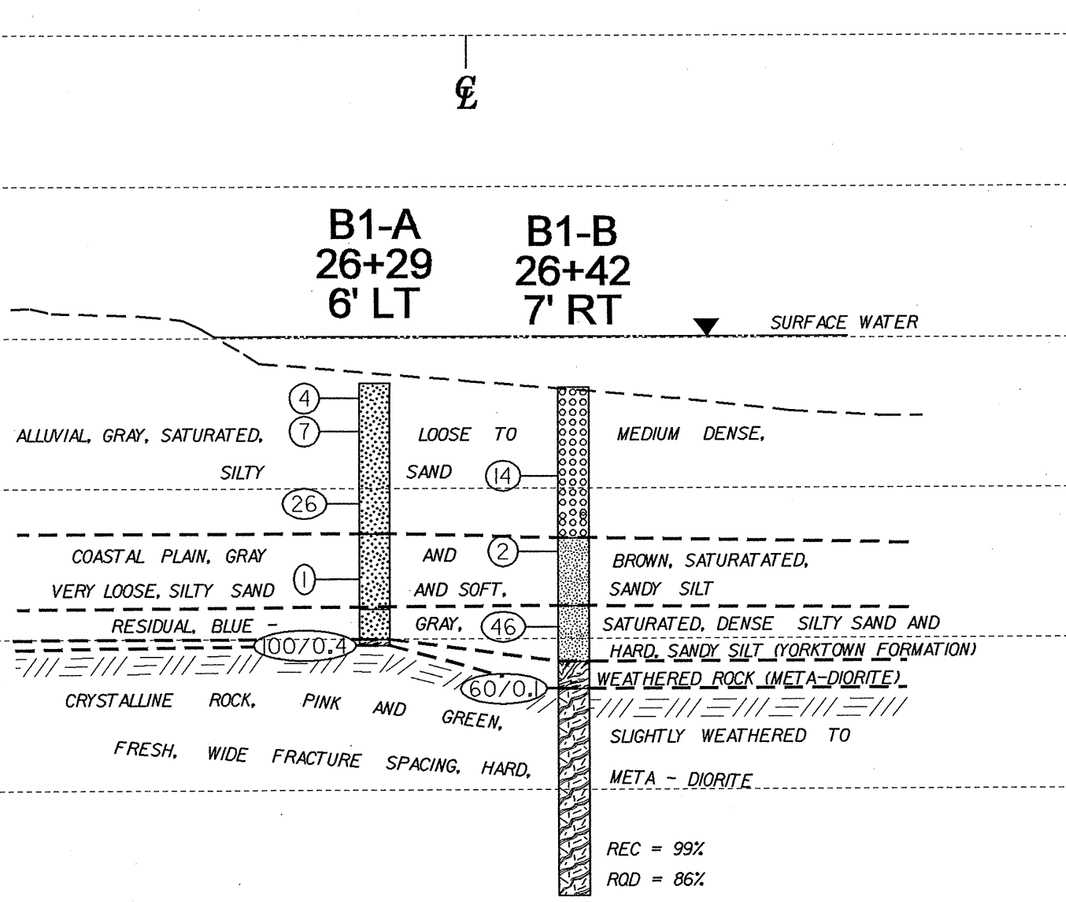
CROSS SECTION THROUGH END BENT 1



HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTION THROUGH BENT 1

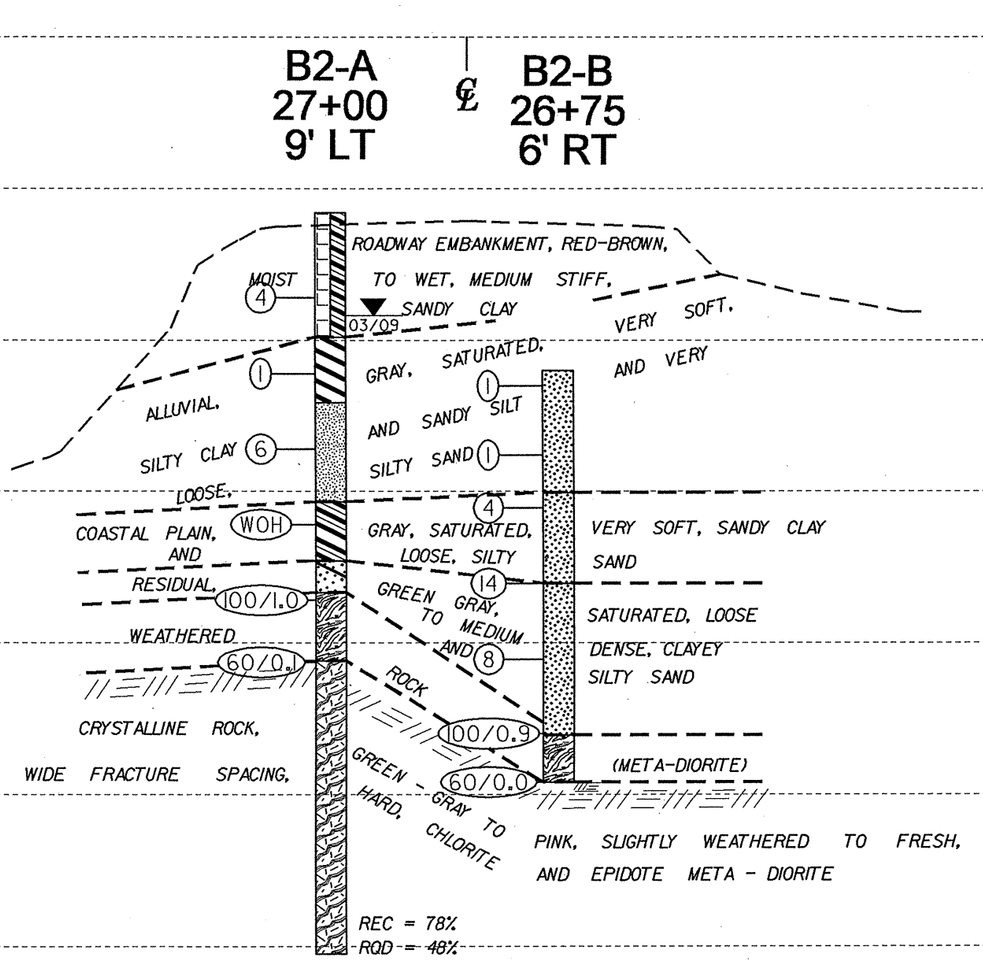


PROJECT REFERENCE NO.	SHEET
33486.1.1 (B-4133)	5

HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTIONS THROUGH BENT 2

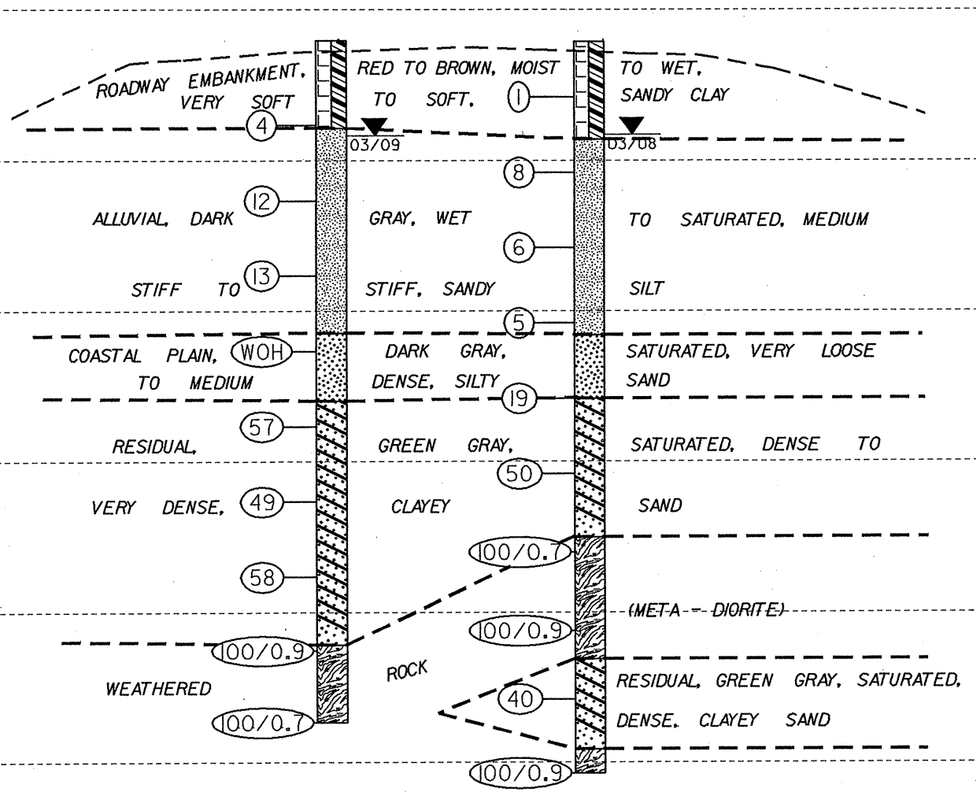


SKEW = 90

HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTIONS THROUGH END BENT 2



SKEW = 90

PROJECT REFERENCE NO.	SHEET
33486.1.1 (B-4311)	6

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

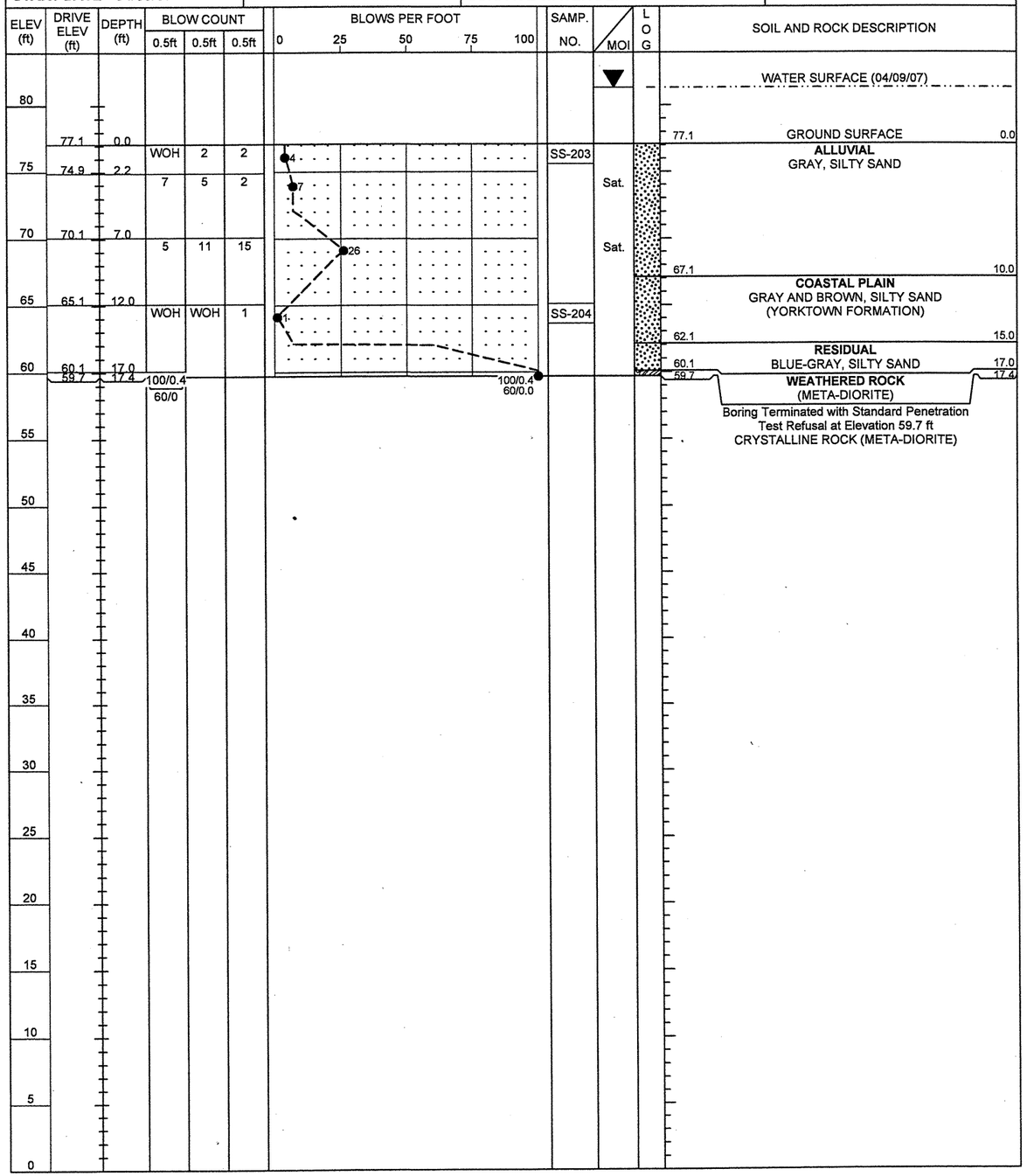
PROJECT NO. 33486.1.1	**ID.** B-4133	**COUNTY** Halifax	**GEOLOGIST** Roberson, N. T.
SITE DESCRIPTION BRIDGE NO. 11 ON SR 1001 OVER BURNT COAT SWAMP			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 25+85	**OFFSET** 9ft LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 88.1 ft	**TOTAL DEPTH** 25.8 ft	**NORTHING** N/A	**EASTING** N/A — **24 HR.** 6.7
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 03/30/09	**COMP. DATE** 03/30/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 25.8 ft

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	ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
										88.1	GROUND SURFACE	0.0
											ROADWAY EMBANKMENT TAN-BROWN, CLAYEY SAND	
	83.5	4.6	1	1	1	2		Sat.		81.6		6.5
											ALLUVIAL TAN-BROWN, SANDY SILT	
	78.5	9.6	1	2	1	3		Sat.				
										72.5		15.6
	73.5	14.6	7	8	4	12		Sat.			GRAY, SILTY SAND	
										68.2		19.9
	68.5	19.6	3	4	1	5		Sat.			**COASTAL PLAIN** GRAY, CLAYEY SAND (YORKTOWN FORMATION)	
										64.6		23.5
	63.5	24.6	100/0.5			100/0.5				63.5	**RESIDUAL** GRAY, SANDY SILT	24.6
										62.3		25.8
											WEATHERED ROCK (META-DIORITE)	
											Boring Terminated at Elevation 62.3 ft IN CRYSTALLINE ROCK	

PROJECT NO. 33486.1.1	**ID.** B-4133	**COUNTY** Halifax	**GEOLOGIST** Hager, M. M.
SITE DESCRIPTION BRIDGE NO. 11 ON SR 1001 OVER BURNT COAT SWAMP			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 25+85	**OFFSET** 16ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 86.9 ft	**TOTAL DEPTH** 27.4 ft	**NORTHING** N/A	**EASTING** N/A — **24 HR.** FIAD
DRILL MACHINE CME-45B	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 06/16/03	**COMP. DATE** 06/16/03	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 27.4 ft

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
	86.9	0.0								86.9 GROUND SURFACE 0.0
			3	6	7	13				**ROADWAY EMBANKMENT** TAN-BROWN, SILTY SAND
	82.9	4.0								82.4 4.5
			11	3	2	5				**ALLUVIAL** TAN-BROWN, SILTY SAND
	78.8	8.1	WOH	WOH	WOH	0		W		
	73.8	13.1	WOH	WOH	2	2	SS-205	W		71.9 15.0
	68.8	18.1	7	8	7	15	SS-206	W		**COASTAL PLAIN** TAN, SILTY SAND (YORKTOWN FORMATION)
	63.8	23.1	4	15	44	59	SS-207			65.9 21.0
	59.5	27.4	60/0.0			60/0.0				**RESIDUAL** GRAY, SILTY SAND
										60.8 26.1
										59.5 **WEATHERED ROCK** (META-DIORITE) 27.4
										Boring Terminated with Standard Penetration Test Refusal at Elevation 59.5 ft CRYSTALLINE ROCK

PROJECT NO. 33486.1.1	**ID.** B-4133	**COUNTY** Halifax	**GEOLOGIST** Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 11 ON SR 1001 OVER BURNT COAT SWAMP			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 26+29	**OFFSET** 6ft LT	**ALIGNMENT** -L- **0 HR.** N/A
COLLAR ELEV. 77.1 ft	**TOTAL DEPTH** 17.4 ft	**NORTHING** N/A	**EASTING** N/A **24 HR.** N/A
DRILL MACHINE CME-45B	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 04/09/07	**COMP. DATE** 04/09/07	**SURFACE WATER DEPTH** 4.2ft	**DEPTH TO ROCK** 17.4 ft



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33486.1.1	**ID.** B-4133	**COUNTY** Halifax	**GEOLOGIST** Roberson, N. T.
SITE DESCRIPTION BRIDGE NO. 11 ON SR 1001 OVER BURNT COAT SWAMP			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 26+42	**OFFSET** 7ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 76.7 ft	**TOTAL DEPTH** 33.8 ft	**NORTHING** N/A	**EASTING** N/A — **24 HR.** N/A
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 03/24/09	**COMP. DATE** 03/24/09	**SURFACE WATER DEPTH** 3.4ft	**DEPTH TO ROCK** 20.0 ft

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)
80										WATER SURFACE (03/24/09)	
										76.7 GROUND SURFACE	0.0
75										**ALLUVIAL** TAN-BROWN, COARSE SAND	
	71.8	4.9									
70			7	6	8	14	SS-101	Sat.			
	66.8	9.9								66.7	10.0
65			1	1	1	2	SS-102	Sat.		**COASTAL PLAIN** GRAY, SANDY SILT (YORKTOWN FORMATION)	
	61.8	14.9								62.2	14.5
60			9	22	24	46	SS-103	Sat.		**RESIDUAL** GRAY, SANDY SILT	
	56.8	19.9								58.5	18.2
55			60/0.1			60/0.1	RS-1			**WEATHERED ROCK** (META-DIORITE)	
										56.7	20.0
50										**CRYSTALLINE ROCK** (PINK AND GREEN, SLIGHTLY WEATHERED TO FRESH, HARD, WIDE FRACTURE SPACING, CHLORITE, EPIDOTE, META-DIORITE) REC = 99% RQD = 86%	
45							RS-2				
40										42.9	33.8
35										Boring Terminated at Elevation 42.9 ft IN CRYSTALLINE ROCK	
30											
25											
20											
15											
10											
5											
0											

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 33486.1.1	**ID.** B-4133	**COUNTY** Halifax	**GEOLOGIST** Roberson, N. T.
SITE DESCRIPTION BRIDGE NO. 11 ON SR 1001 OVER BURNT COAT SWAMP			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 26+42	**OFFSET** 7ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 76.7 ft	**TOTAL DEPTH** 33.8 ft	**NORTHING** N/A	**EASTING** N/A — **24 HR.** N/A
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic
START DATE 03/24/09	**COMP. DATE** 03/24/09	**SURFACE WATER DEPTH** 3.4ft	**DEPTH TO ROCK** 20.0 ft
CORE SIZE NX	**TOTAL RUN** 13.8 ft	**DRILLER** Turnage, J. R.	

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)
56.7										Begin Coring @ 20.0 ft	
56.7	20.0	3.8	1:27/0.8 1:04/1.0 1:34/1.0 0:44/1.0	(3.6) 95%	(2.5) 66%	RS-1	(13.6) 99%	(11.9) 86%		56.7 **CRYSTALLINE ROCK** PINK AND GREEN, SLIGHTLY WEATHERED TO FRESH, HARD, WIDE FRACTURE SPACING, CHLORITE, EPIDOTE, META-DIORITE	20.0
52.9	23.8	5.0	1:44/1.0 1:11/1.0 1:57/1.0 2:01/1.0 1:21/1.0	(5.0) 100%	(4.8) 96%						
47.9	28.8	5.0	1:34/1.0 1:31/1.0 2:02/1.0 2:30/1.0 3:16/1.0	(5.0) 100%	(4.6) 92%	RS-2					
42.9	33.8									42.9	33.8
										Boring Terminated at Elevation 42.9 ft IN CRYSTALLINE ROCK	

NCDOT BORE DOUBLE B4133_GEO_BR011.GPJ NC_DOT.GDT 06/02/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33486.1.1	**ID.** B-4133	**COUNTY** Halifax	**GEOLOGIST** Roberson, N. T.
SITE DESCRIPTION BRIDGE NO. 11 ON SR 1001 OVER BURNT COAT SWAMP			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 27+00	**OFFSET** 9ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 88.4 ft	**TOTAL DEPTH** 48.9 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** 6.8
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic	
START DATE 03/25/09	**COMP. DATE** 03/25/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 29.6 ft	

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	ELEV. (ft)	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
										88.4	GROUND SURFACE	0.0
	83.8	4.6	3	2	2	4		M			**ROADWAY EMBANKMENT** RED BROWN, SANDY CLAY WITH ABC	
										80.2		8.2
	78.8	9.6	0	0	1	1	SS-108	Sat.			**ALLUVIAL** GRAY, SANDY SILT	
										75.9		12.5
	73.8	14.6	2	3	3	6		Sat.			TAN BROWN, SAND WITH GRAVEL	
										69.3		19.1
	68.8	19.6	WOH	WOH	WOH	WOH	SS-109	Sat.			**COASTAL PLAIN** GRAY, CLAYEY FINE SAND	
										65.4		23.0
	63.8	24.6	27	59	41	100/1.0		Sat.		63.3	**RESIDUAL** GRAY, CLAYEY SAND	25.1
											WEATHERED ROCK (META-DIORITE)	
	58.8	29.6	60/0.1			60/0.1				58.8		29.6
											CRYSTALLINE ROCK (GREEN-GRAY TO PINK, SLIGHTLY WEATHERED TO FRESH, HARD, WIDE FRACTURE SPACING, CHLORITE, EPIDOTE META-DIORITE) REC = 77% RQD = 48%	
							RS-3					
							RS-4					
										39.5		48.9
											Boring Terminated at Elevation 39.5 ft IN CRYSTALLINE ROCK	

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 33486.1.1	**ID.** B-4133	**COUNTY** Halifax		**GEOLOGIST** Roberson, N. T.
SITE DESCRIPTION BRIDGE NO. 11 ON SR 1001 OVER BURNT COAT SWAMP				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 27+00	**OFFSET** 9ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 88.4 ft	**TOTAL DEPTH** 48.9 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** 6.8
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic	
START DATE 03/25/09	**COMP. DATE** 03/25/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 29.6 ft	
CORE SIZE NX	**TOTAL RUN** 19.2 ft	**DRILLER** Turnage, J. R.		

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	ELEV. (ft)	DESCRIPTION AND REMARKS	DEPTH (ft)
58.75												Begin Coring @ 29.6 ft	
	58.8	29.6	4.7	*N=60/0.1* 2:24/0.7 1:15/1.0 1:06/1.0 0:58/1.0 0:45/1.0	(1.7) 36%	(0.0) 0%		(14.9) 77%	(9.3) 48%		58.8	**CRYSTALLINE ROCK** GREEN-GRAY TO PINK, SLIGHTLY WEATHERED TO FRESH, HARD, WIDE FRACTURE SPACING, CHLORITE, EPIDOTE META-DIORITE	29.6
55	54.1	34.3											
	54.0	34.4	5.0	1:35/1.0 1:34/1.0 1:08/1.0 1:23/1.0 1:12/1.0	(4.1) 82%	(2.3) 46%							
50	49.0	39.4	5.0	2:10/1.0 2:11/1.0 1:09/1.0 1:01/1.0 1:11/1.0	(4.6) 92%	(2.5) 50%	RS-3						
45	44.0	44.4	4.5	2:22/1.0 1:46/1.0 3:49/1.0 5:04/1.0	(4.5) 100%	(4.5) 100%	RS-4						
40	39.5	48.9									39.5		48.9
35												Boring Terminated at Elevation 39.5 ft IN CRYSTALLINE ROCK	
30													
25													
20													
15													
10													
5													
0													
-5													
-10													
-15													
-20													

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 33486.1.1	**ID.** B-4133	**COUNTY** Halifax	**GEOLOGIST** Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 11 ON SR 1001 OVER BURNT COAT SWAMP			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 26+75	**OFFSET** 6ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 78.0 ft	**TOTAL DEPTH** 27.2 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** N/A
DRILL MACHINE CME-45B	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
START DATE 04/09/07	**COMP. DATE** 04/09/07	**SURFACE WATER DEPTH** 3.2ft	**DEPTH TO ROCK** 27.2 ft	

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)
										WATER SURFACE (04/09/07)		
80	78.0	0.0								GROUND SURFACE	78.0	0.0
			WOH	WOH	1	1				**ALLUVIAL** GRAY AND BROWN, SILTY SAND		
75	73.4	4.6										
			WOH	WOH	1	1	SS-200	M				
70	69.9	8.1									69.9	8.1
			2	2	2	4		Sat.		**COASTAL PLAIN** BLUE-GRAY, SILTY SAND		
65	64.9	13.1									63.9	14.1
			6	8	6	14	SS-201	W		**RESIDUAL** LIGHT GRAY, MICACEOUS, SAPROLITIC, SILTY SAND		
60	59.9	18.1										
			WOH	1	7	8	SS-202	W				
55	54.9	23.1									53.9	24.1
			15	22	78/.4	100/0.9				**WEATHERED ROCK** (META-DIORITE)		
50	50.8	27.2									50.8	27.2
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 50.8 ft CRYSTALLINE ROCK (META-DIORITE)		
45												
40												
35												
30												
25												
20												
15												
10												
5												
0												

PROJECT NO. 33486.1.1	**ID.** B-4133	**COUNTY** Halifax	**GEOLOGIST** Roberson, N. T.
SITE DESCRIPTION BRIDGE NO. 11 ON SR 1001 OVER BURNT COAT SWAMP			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 27+56	**OFFSET** 9ft LT	**ALIGNMENT** -L-	**0 HR.** 5.1
COLLAR ELEV. 87.9 ft	**TOTAL DEPTH** 45.3 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** 6.3
DRILL MACHINE CME-550X	**DRILL METHOD** NW Casing w/ Advancer		**HAMMER TYPE** Automatic	
START DATE 03/30/09	**COMP. DATE** 03/30/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
90										GROUND SURFACE	87.9	0.0
										ROADWAY EMBANKMENT TAN, SANDY CLAY		
85	83.3	4.6						W			82.1	5.8
			4	2	2	4				**ALLUVIAL** TAN-GRAY, FINE, SANDY SILT		
80	78.3	9.6						Sat.				
			5	6	6	12						
75	73.3	14.6										
			4	5	8	13		Sat.				
70	68.3	19.6									68.5	19.4
			WOH	WOH	WOH	0				**COASTAL PLAIN** DARK GRAY SILTY SAND (YORKTOWN FORMATION)		
65	63.3	24.6						Sat.				
			20	27	30	57						
60	58.3	29.6								**RESIDUAL** GREEN-GRAY, CLAYEY SAND		
			15	23	26	49		Sat.				
55	53.3	34.6										
			14	26	32	58		Sat.				
50	48.3	39.6									47.8	40.1
			29	71/0.4		100/0.9				**WEATHERED ROCK** (META-DIORITE)		
45	43.3	44.6									42.6	45.3
			41	59/0.2		100/0.7				Boring Terminated at Elevation 42.6 ft IN WEATHERED ROCK		
40												
35												
30												
25												
20												
15												
10												

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33486.1.1	**ID.** B-4133	**COUNTY** Halifax		**GEOLOGIST** Roberson, N. T.
SITE DESCRIPTION BRIDGE NO. 11 ON SR 1001 OVER BURNT COAT SWAMP				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 27+56	**OFFSET** 8ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 87.9 ft	**TOTAL DEPTH** 48.6 ft	**NORTHING** N/A	**EASTING** N/A	**24 HR.** 6.2
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers			**HAMMER TYPE** Automatic
START DATE 03/24/08	**COMP. DATE** 03/24/08	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 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)
90												
										GROUND SURFACE	87.9	0.0
85	85.2	2.7								**ROADWAY EMBANKMENT** RED-BROWN, SANDY CLAY		
			1	0	1	1	SS-104	M				
80	80.2	7.7									81.4	6.5
			3	3	5	8	SS-105	Sat.		**ALLUVIAL** DARK GRAY, SANDY SILT		
75	75.2	12.7										
			1	2	4	6		Sat.				
70	70.2	17.7										
			4	4	1	5		Sat.			68.4	19.5
65	65.2	22.7								**COASTAL PLAIN** DARK GRAY, SILTY SAND (YORKTOWN FORMATION)		
			0	7	12	19	SS-106	Sat.			64.2	23.7
60	60.2	27.7								**RESIDUAL** GRAY, CLAYEY SAND		
			10	19	31	50	SS-107	Sat.				
55	55.2	32.7									55.0	32.9
			20	43	57/0.2	100/0.7				**WEATHERED ROCK** (META-DIORITE)		
50	50.2	37.7										
			18	40	60/0.4	100/0.9						
45	45.2	42.7									46.9	41.0
			17	17	23	40				**RESIDUAL** GRAY, CLAYEY SAND		
40	40.2	47.7									40.9	47.0
			33	67/0.4		100/0.9				**WEATHERED ROCK** (META-DIORITE)	39.3	48.6
35										Boring Terminated at Elevation 39.3 ft IN WEATHERED ROCK		
30												
25												
20												
15												
10												

NCDOT BORE_DOUBLE B4133_GEO_BR011.GPJ NC_DOT.GDT 05/06/09

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-205	16 RT	25+85	13.1-14.6	A-2-4(0)	19	NP	8.0	66.0	14.4	11.6	100	98	35	-	-
SS-206	16 RT	25+85	18.1-19.6	A-1-b(0)	14	NP	85.8	10.8	3.4	0.0	100	34	4	-	-
SS-207	16 RT	25+85	23.1-24.6	A-2-4(0)	24	NP	36.6	44.0	9.8	9.6	100	79	26	-	-

B1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-203	6 LT	26+29	0.0-0.5	A-7-6(19)	49	24	8.0	16.4	16.0	59.6	100	96	77	-	-
SS-204	6 LT	26+29	12.0-13.5	A-2-4(0)	24	NP	13.8	67.0	11.6	7.6	100	94	22	-	-

B1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-101	15 RT	26+42	4.9-6.4	A-1-b(0)	25	NP	80.7	17.0	1.2	1.0	98	50	3	-	-
SS-102	15 RT	26+42	10.0-11.4	A-4(0)	29	9	13.7	56.7	19.6	10.1	100	97	38	-	-
SS-103	15 RT	26+42	14.9-16.4	A-4(0)	26	7	23.3	44.7	14.9	17.1	100	90	37	-	-

B2-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-108	9 LT	27+00	9.6-11.1	A-7-6(14)	48	26	9.7	30.6	11.3	48.4	100	98	62	-	-
SS-109	9 LT	27+00	19.6-21.1	A-6(4)	35	16	19.2	41.3	21.4	18.1	100	92	45	-	-
SS-202	6 RT	26+75	18.1-19.6	A-2-4(0)	24	NP	36.2	46.2	8.0	9.6	100	83	23	-	-

B2-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-200	6 RT	26+75	4.6-6.1	A-2-5(0)	49	10	84.4	9.8	5.8	0.0	100	39	6	-	-
SS-201	6 RT	26+75	13.1-14.6	A-2-4(0)	23	NP	15.2	64.0	13.2	7.6	100	93	22	-	-
SS-202	6 RT	26+75	18.1-19.6	A-2-4(0)	24	NP	36.2	46.2	8.0	9.6	100	83	23	-	-

EB2-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-104	8 RT	27+56	2.7-4.2	A-6(2)	29	14	27.6	35.9	8.3	28.2	100	84	42	-	-
SS-105	8 RT	27+56	7.7-9.2	A-4(0)	23	6	9.0	59.2	7.7	24.2	100	99	36	-	-
SS-106	8 RT	27+56	22.7-23.7	A-2-4(0)	23	4	19.9	53.5	11.5	15.1	86	78	24	-	-
SS-107	8 RT	27+56	27.7-29.2	A-2-6(0)	29	11	38.3	31.9	14.7	15.1	99	79	33	-	-

B1-B

ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	H/D RATIO	UNIT WT lbs/ft3	Ultimate lbf	Ultimate ksi	Ultimate (corrected) ksi	Sec. Mod. @ 40% Mpsi
RS-1	7 RT	26+42	20.8-21.3	2.13	162.7	48400	17.71	17.84	9.33
RS-2	7 RT	26+42	31.3-31.7	2.16	162.2	85700	31.2	31.5	5.56

B2-A

ROCK TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	H/D RATIO	UNIT WT lbs/ft3	Ultimate lbf	Ultimate ksi	Ultimate (corrected) ksi	Sec. Mod. @ 40% Mpsi
RS-3	9 LT	27+00	43.1-43.7	2.08	158.3	36000	13.12	13.18	4.17
RS-4	9 LT	27+00	47.3-47.6	2.08	163.1	110100	40.1	40.3	11.94

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33486.1.1 TIP: B-4133 COUNTY: HALIFAX

DESCRIPTION(1): BR. 011 ON SR 1001 OVER BURNT COAT SWAMP

EXISTING BRIDGE

Information from: Field Inspection X Microfilm ____ (reel ____ pos: ____)
Other (explain) ____

Bridge No.: 11 Length: 91 Total Bents: 4 Bents in Channel: 2 Bents in Floodplain: 2
Foundation Type: Timber Piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Some abutment scour, approximately 3-5 feet deep and within the entire footprint of the existing structure

Interior Bents: contraction scour within entire opening to approximately 3 feet depth.

Channel Bed: none

Channel Bank: none

EXISTING SCOUR PROTECTION

Type(3): Abutment walls

Extent(4): at both end bents

Effectiveness(5): effective

Obstructions(6): none

INSTRUCTIONS

1 Describe the specific site's location, including route number and body of water crossed.
2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
3 Note existing scour protection (e.g. rip rap).
4 Describe extent of existing scour protection.
5 Describe whether or not the scour protection appears to be working.
6 Note obstructions such as dams, fallen trees, debris at bents, etc.
7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
10 Determine the approximate floodplain width from field observation or a topographic map.
11 Describe the material covering the floodplain (e.g. grass, trees, crops).
12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoritical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): Alluvial sand and silty sand; SS-203, SS-101

Channel Bank Material(8): Alluvial sand and silty sand; SS-203, SS-101

Channel Bank Cover(9): Grass, trees, vines and shrubs

Floodplain Width(10): 1100 feet

Floodplain Cover(11): Wetland forest

Stream is(12): Aggrading ____ Degrading X Static ____

Channel Migration Tendency(13): None

Observations and Other Comments: ____

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

The Geotechnical Engineering Unit agrees with the Hydraulics Unit's theoretical scour for the 50 year storm event.

B1: 57.5 feet
B2: 64.0 feet

Comparison of DSE to Hydraulics Unit theoretical scour:
No change

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank							
Sample No.							
Retained #4							
Passed #10							
Passed #40							
Passed #200							
Coarse Sand							
Fine Sand							
Silt							
Clay							
LL							
PI							
AASHTO							
Station							
Offset							
Depth							

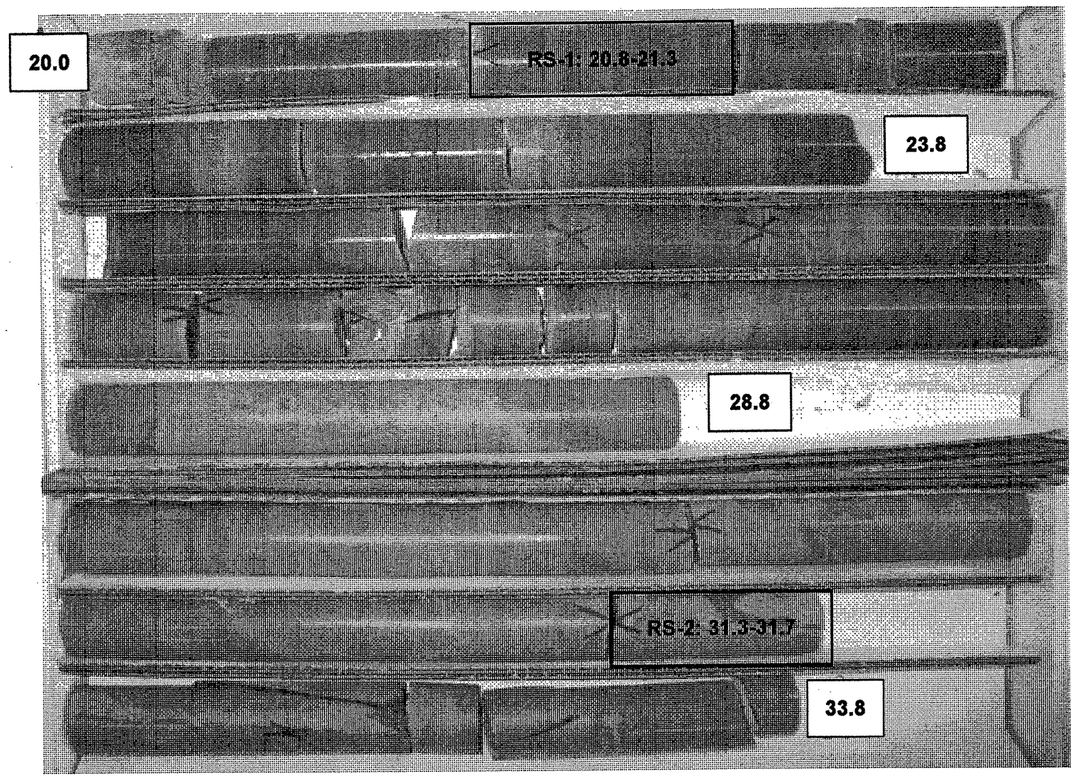
Template Revised 02/07/06

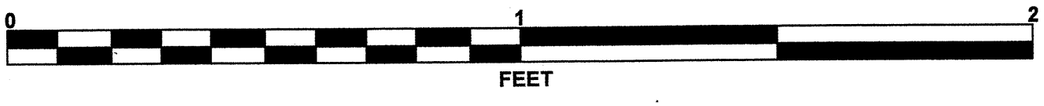
Reported by: Neil Roberson Date: 3/24/2009

CORE PHOTOGRAPHS

B1-B

BOXES 1 & 2: 20.0 to 33.8 FEET





B2-A

BOXES 1 & 2: 29.7 to 48.9 FEET