STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3601	1	22

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 38868.1.1 (R-3601) F.A. PROJ. _____

COUNTY BRUNSWICK

PROJECT DESCRIPTION BRIDGE NO. 103 AND 105 ON US17/NC133/US74/US76 OVER BRUNSWICK RIVER AT -LMED- STA. 60+12.65.

PROJECT: 38868.1.1

ID: R-3601

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CAUTION NOTICE

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PERSONNEL

C.M. WRIKE

MID-ATLANTIC DRILLING, INC.

INVESTIGATED BY T.C. BOTTOMS

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE MAY 2011

NORTH CAROLINA LICENSED SEAL 2240 GEOLOGIST TYLER C. BOTTOMS 5/25/11

DRAWN BY: C.P. TURNER

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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	50 MX													
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	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 ($TONS/FT^2$)
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	- 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
- [X] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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: R.R. SPIKE SET IN 26" PINE AT -BL- STA. 57+28.06, 131.47' RT

ELEVATION: 27.47 FT.

NOTES:

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET
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SITE PLAN

0 100 200

FEET

SKEW = 59° 18' 31"

N

BRUNSWICK RIVER

← FLOOD/EBB →

-LMED-

55+00

60+00

65+00

WOODS

F C C

CONC

B4-A SBL

B5-A SBL

B6-A SBL

B7-A SBL

B8-A SBL

B4-B NBL

B5-B NBL

B6-B NBL

B7-B NBL

B8-B NBL

TO LELAND

US 17 S / US 74 W / US 76 W / NC 133 S

US 17

US 17 N / US 74 E / US 76 E / NC 133 N

TO WILMINGTON

C F

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

STRUCTURE 105
PROFILE THROUGH LEFT LANE BORINGS PROJECTED ALONG -LMED-

VE = 2.0

MEAN WATER SURFACE

B4-A SBL
58+16
80' LT

B5-A SBL
58+86
87' LT

B6-A SBL
59+32
71' LT

B7-A SBL
60+33
79' LT

B8-A SBL
60+99
76' LT

VERY LOOSE TO MEDIUM DENSE TAN AND GRAY SAND, SATURATED (ALLUVIAL)

VERY LOOSE TO MEDIUM DENSE TAN AND GRAY SAND, SATURATED (ALLUVIAL)

LOOSE TO VERY DENSE GRAY AND GREEN MICACEOUS SAND, SATURATED, AND MEDIUM HARD GRAY SANDSTONE, (PEEDEE FORMATION)

STIFF TO HARD GRAY AND GREEN MICACEOUS SANDY SILT AND SANDY CLAY, WET, AND MEDIUM HARD GRAY SANDSTONE (PEEDEE FORMATION)

Ⓐ VERY SOFT TO MEDIUM STIFF GRAY SANDY CLAY, WET (ALLUVIAL)

NOTE: GROUNDLINE PROFILE OF -LMED- LEFT LANE PRODUCED FROM ROADWAY .TIN FILE DATED 03/07/11.

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE PROFILE.

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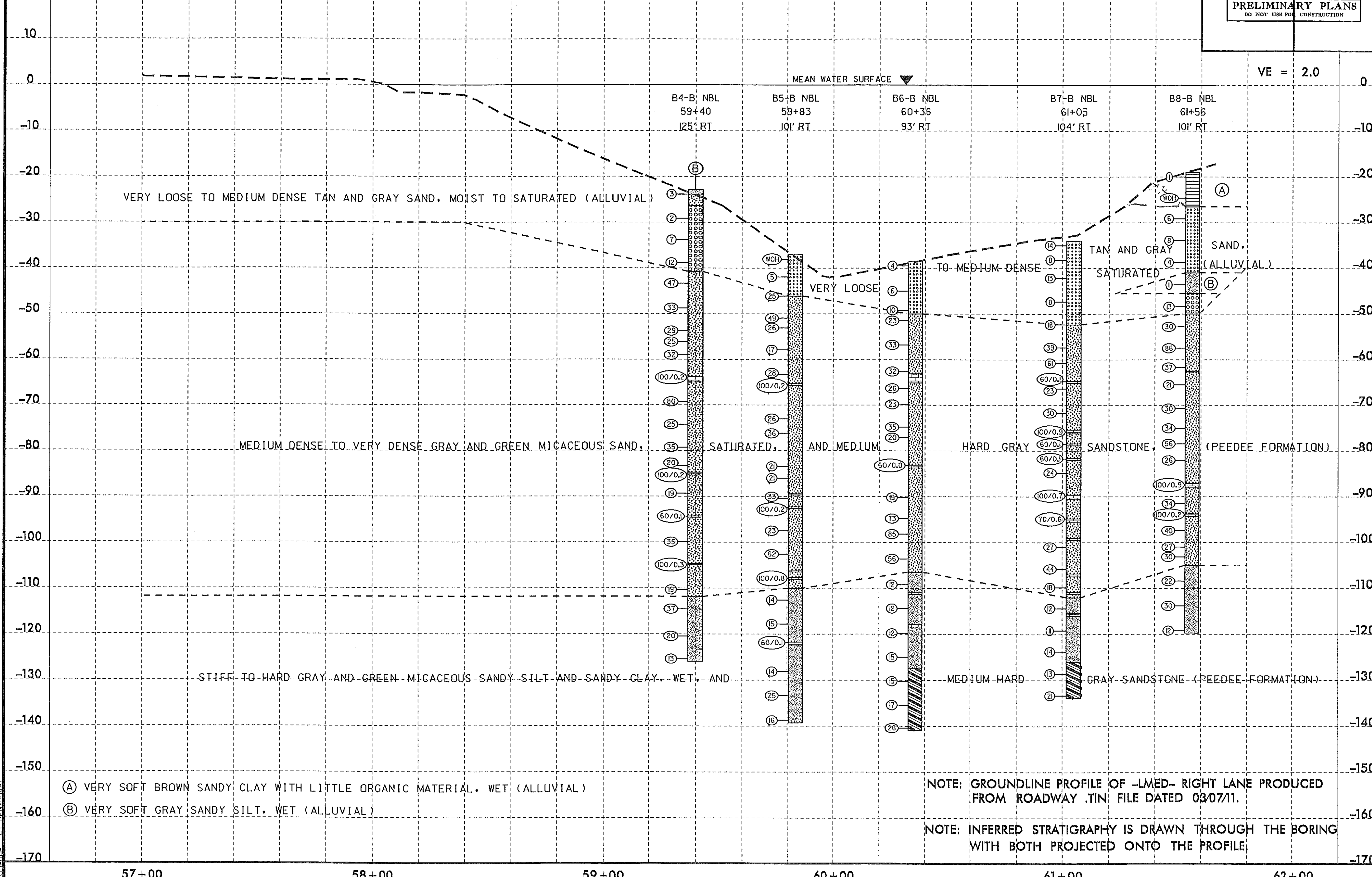
ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

INCOMPLETE PLANS — DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS — DO NOT USE FOR CONSTRUCTION

STRUCTURE 103
PROFILE THROUGH RIGHT LANE BORINGS PROJECTED ALONG -LMED-



Ⓐ VERY SOFT BROWN SANDY CLAY WITH LITTLE ORGANIC MATERIAL, WET (ALLUVIAL)

Ⓑ VERY SOFT GRAY SANDY SILT, WET (ALLUVIAL)

NOTE: GROUNDLINE PROFILE OF -LMED- RIGHT LANE PRODUCED FROM ROADWAY .TIN FILE DATED 03/07/11.

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE PROFILE.

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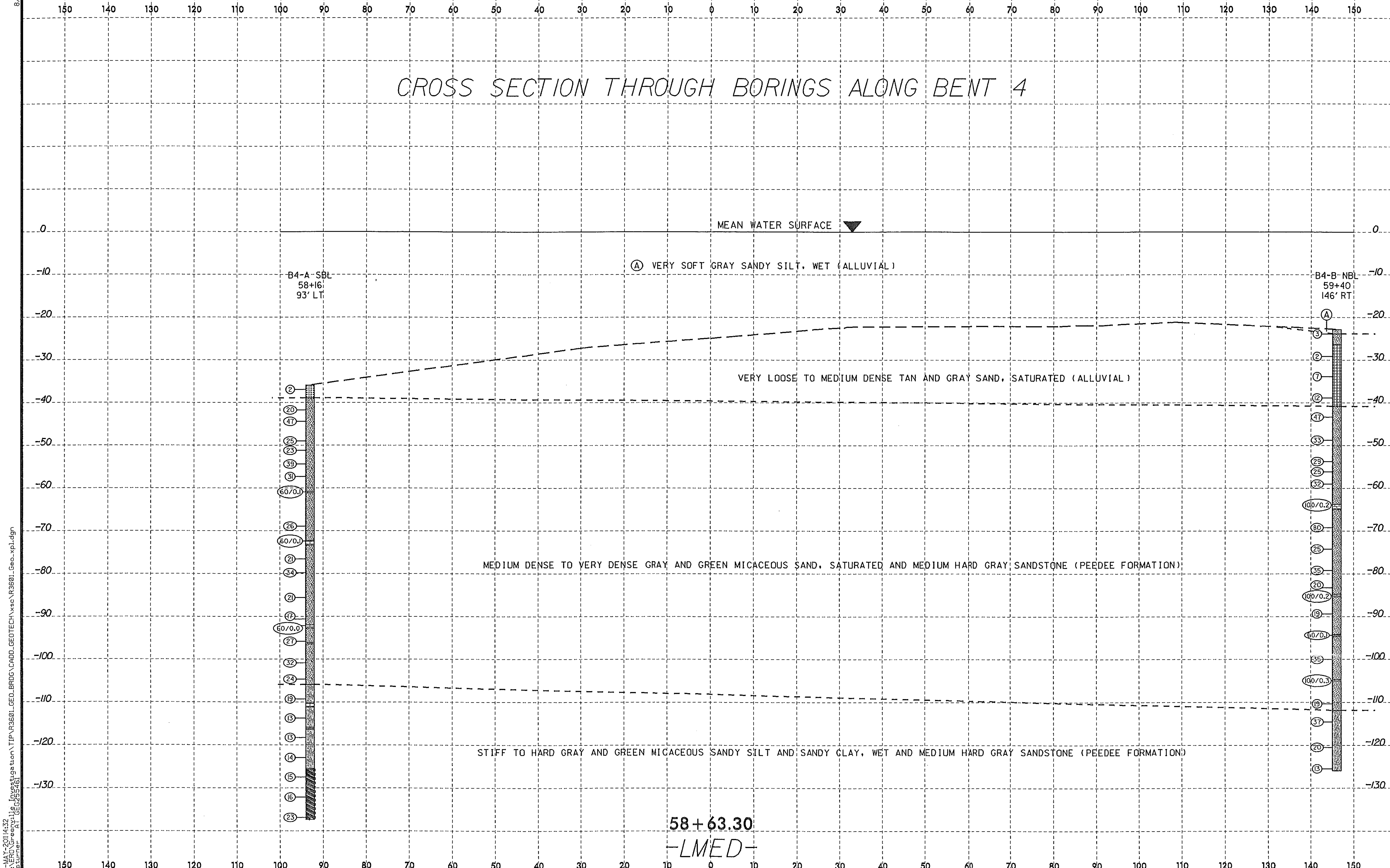
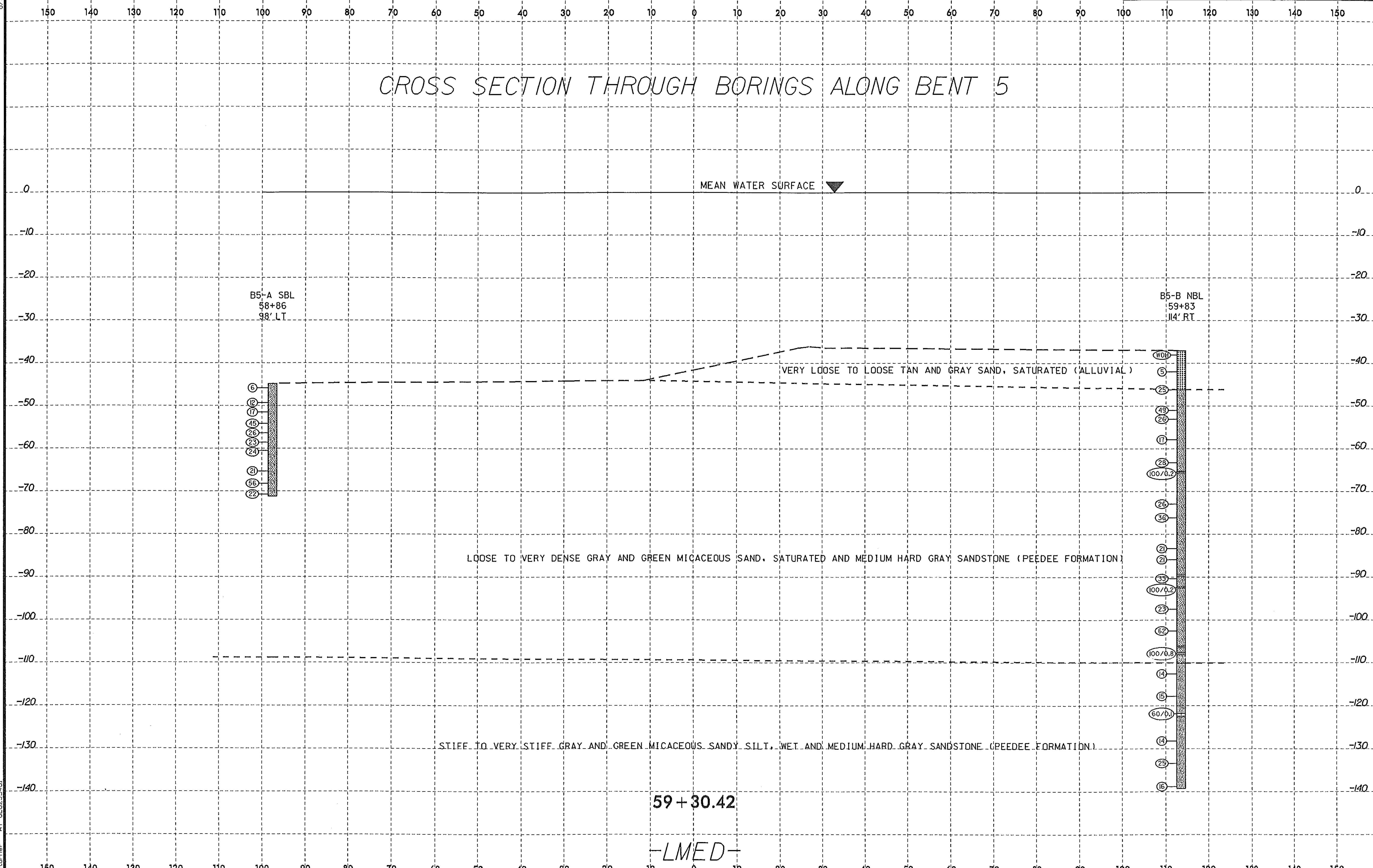
PROJ. REFERENCE NO.	SHEET NO.
R-3601	6 OF 22



PROJ. REFERENCE NO.	SHEET NO.
R-3601	7 OF 22

CROSS SECTION THROUGH BORINGS ALONG BENT 5



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PROJ. REFERENCE NO.	SHEET NO.
R-3601	8 OF 22

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CROSS SECTION THROUGH BORINGS ALONG BENT 6

MEAN WATER SURFACE

B6-A SBL
59+32
84' LT

B6-B NBL
60+36
110' RT

VERY LOOSE TO LOOSE TAN AND GRAY SAND, SATURATED (ALLUVIAL)

MEDIUM DENSE TO VERY DENSE GRAY AND GREEN MICACEOUS SAND, SATURATED AND MEDIUM HARD GRAY SANDSTONE (PEEDEE FORMATION)

STIFF TO HARD GRAY AND GREEN MICACEOUS SANDY SILT AND SANDY CLAY, WET AND MEDIUM HARD GRAY SANDSTONE (PEEDEE FORMATION)

B6-A SBL: 3, 18, 22, 43, 30, 100/0.2, 27, 60/0.1, 32, 100/0.4, 10, 16, 14, 14, 13, 15, 12, 15, 14, 17, 24, 92, 16, 16, 26

B6-B NBL: 4, 6, 10, 23, 33, 32, 26, 23, 35, 20, 60/0.0, 15, 73, 85, 56, 12, 12, 12, 12, 15, 15, 17, 26

59+75.90
-LMED-

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PROJ. REFERENCE NO.	SHEET NO.
R-3601	9 OF 22

0 5 10

CROSS SECTION THROUGH BORINGS ALONG BENT 7

MEAN WATER SURFACE

B7-A SBL
60+33
84' LT

B7-B NBL
61+05
112' RT

VERY LOOSE TO MEDIUM DENSE TAN AND GRAY SAND, SATURATED (ALLUVIAL)

MEDIUM DENSE TO VERY DENSE GRAY AND GREEN MICACEOUS SAND, SATURATED AND MEDIUM HARD GRAY SANDSTONE (PEEDEE FORMATION)

STIFF TO HARD GRAY AND GREEN MICACEOUS SANDY SILT AND SANDY CLAY, WET AND MEDIUM HARD GRAY SANDSTONE (PEEDEE FORMATION)

60+63.25
-LMED-

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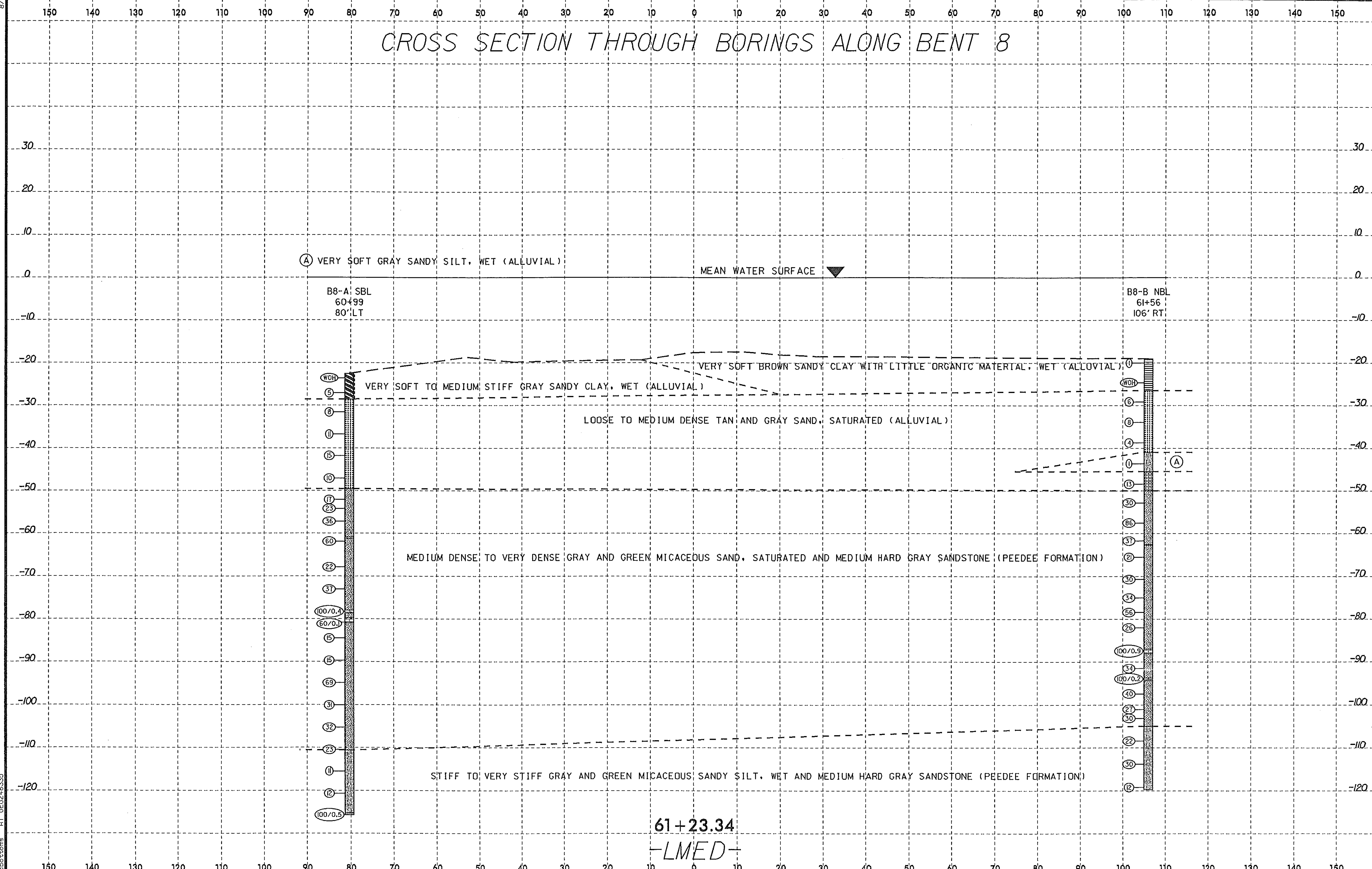
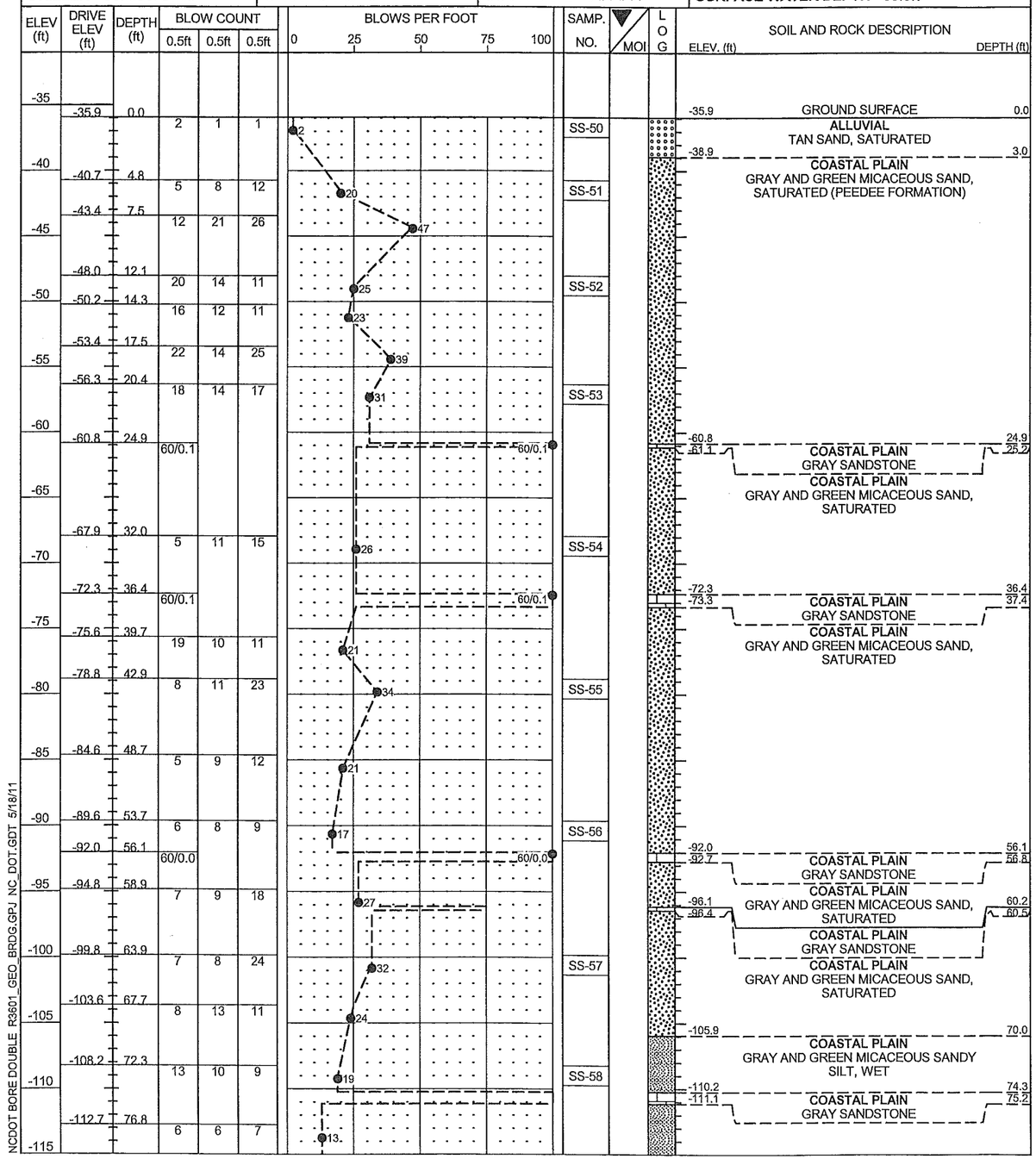
CROSS SECTION THROUGH BORINGS ALONG BENT 8



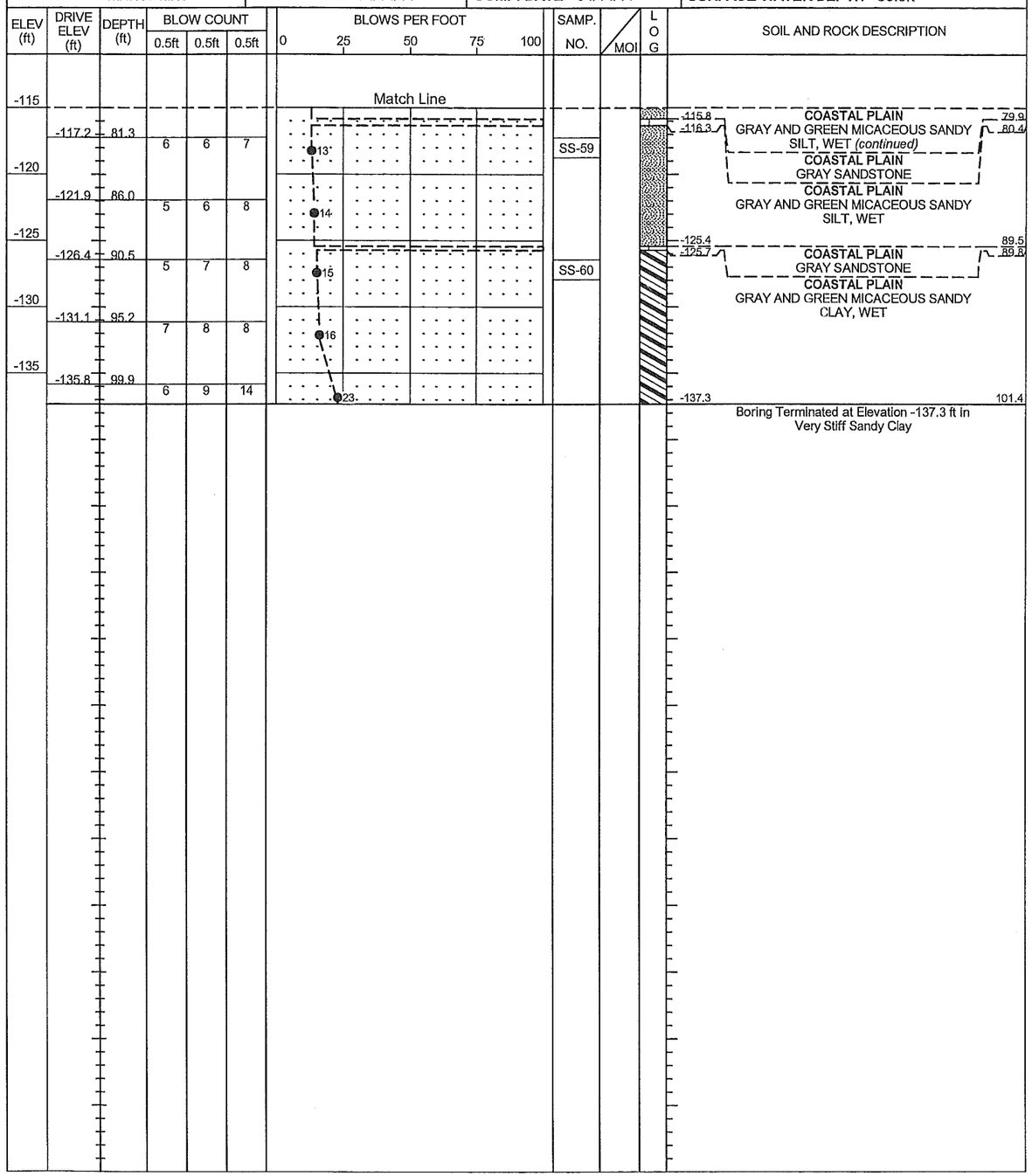
61+23.34
-LMED-

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 105 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B4-A SBL	**STATION** 58+16	**OFFSET** 80 ft LT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -35.9 ft	**TOTAL DEPTH** 101.4 ft	**NORTHING** 177,859	**EASTING** 2,306,223	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/14/11	**COMP. DATE** 04/14/11	**SURFACE WATER DEPTH** 33.3ft	



WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 105 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B4-A SBL	**STATION** 58+16	**OFFSET** 80 ft LT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -35.9 ft	**TOTAL DEPTH** 101.4 ft	**NORTHING** 177,859	**EASTING** 2,306,223	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/14/11	**COMP. DATE** 04/14/11	**SURFACE WATER DEPTH** 33.3ft	



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 103 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B4-B NBL	**STATION** 59+40	**OFFSET** 125 ft RT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -22.8 ft	**TOTAL DEPTH** 103.1 ft	**NORTHING** 177,676	**EASTING** 2,306,377	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/04/11	**COMP. DATE** 04/05/11	**SURFACE WATER DEPTH** 23.3ft	

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))
-20										
	-22.8	0.0								-22.8 / 0.0 GROUND SURFACE
-25			WOH	1	2	3	SS-1	83%		-23.8 / 1.0 ALLUVIAL GRAY SANDY SILT, WET
	-28.1	5.3								-26.3 / 3.5 ALLUVIAL GRAY SAND, SATURATED
-30			2	1	1	2	SS-2			
	-32.8	10.0								
-35			2	3	4	7				
	-37.8	15.0					SS-3			
-40			5	5	7	12				
	-42.3	19.5								-40.8 / 18.0 COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED (PEEDEE FORMATION)
-45			12	17	30	47	SS-4			
	-47.7	24.9								
-50			14	14	19	33				
	-52.7	29.9								
-55			9	12	17	29	SS-5			
	-55.1	32.3								
	-58.0	35.2	26	9	16	25				
-60			7	17	15	32				
	-63.2	40.4								
-65			14	100/0.2		100/0.2				
	-68.2	45.4								
-70			10	64	16	80	SS-6			
	-73.2	50.4								
-75			9	10	15	25				
	-78.2	55.4								
-80			69	16	19	35	SS-7			
	-82.2	59.4								
-85			6	9	11	20				
	-84.7	61.9	100/0.2			100/0.2				
-90			7	8	11	19	SS-8			
	-88.3	65.5								
	-93.7	70.9	33	60/0.1		60/0.1				
-95										
	-98.9	76.1								
-100			9	17	18	35				

-63.7 / 40.9 COASTAL PLAIN GRAY SANDSTONE
-64.9 / 42.1 COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED

-84.7 / 61.9 COASTAL PLAIN GRAY SANDSTONE
-85.3 / 62.5 COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED

-94.1 / 71.3 COASTAL PLAIN GRAY SANDSTONE
-94.5 / 71.7 COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 103 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B4-B NBL	**STATION** 59+40	**OFFSET** 125 ft RT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -22.8 ft	**TOTAL DEPTH** 103.1 ft	**NORTHING** 177,676	**EASTING** 2,306,377	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/04/11	**COMP. DATE** 04/05/11	**SURFACE WATER DEPTH** 23.3ft	

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
-100						Match Line				
	-104.1	81.3	9	100/0.3		100/0.3	SS-9			COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED *(continued)*
-105										-104.6 / 81.8
	-109.3	86.5	7	8	11	19				-105.0 / 82.2 COASTAL PLAIN GRAY SANDSTONE
-110										COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED
	-113.5	90.7	75	19	18	37				-111.8 / 89.0
-115							SS-10			COASTAL PLAIN GRAY AND GREEN MICACEOUS SANDY SILT, WET
	-119.4	96.6	6	6	14	20				
-120										
	-124.4	101.6	6	6	7	13				-125.9 / 103.1 Boring Terminated at Elevation -125.9 ft in Stiff Sandy Silt
-125										

NCDOT BORE DOUBLE R3601_GEO_BRDG.GPJ NC_DOT.GDT 5/18/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

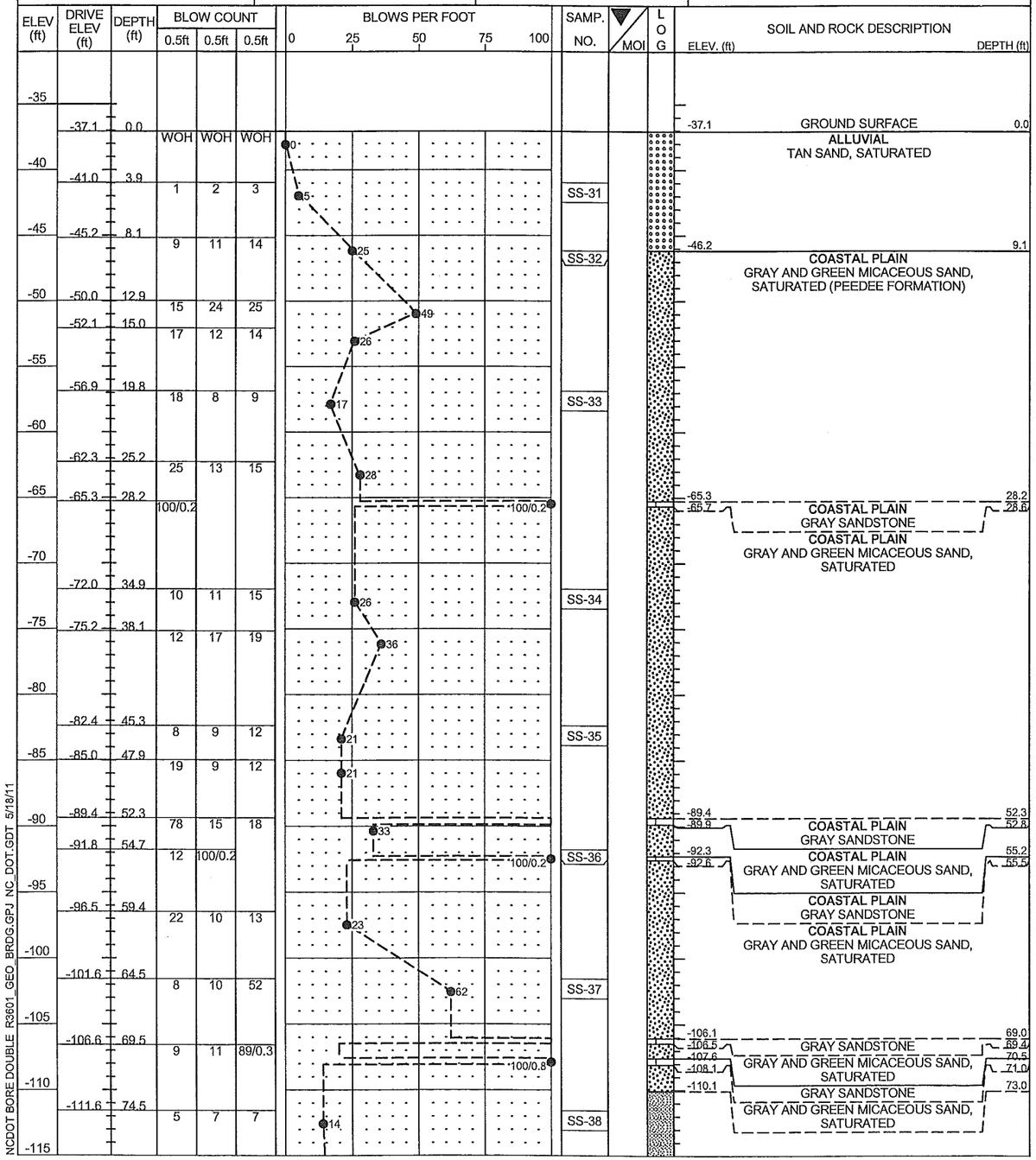
WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.
SITE DESCRIPTION BRIDGE NO. 105 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER			**GROUND WTR (ft)**
BORING NO. B5-A SBL	**STATION** 58+86	**OFFSET** 87 ft LT	**ALIGNMENT** -LMED- — **0 HR.** N/A
COLLAR ELEV. -44.8 ft	**TOTAL DEPTH** 26.4 ft	**NORTHING** 177,877	**EASTING** 2,306,292 — **24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/26/11	**COMP. DATE** 04/27/11	**SURFACE WATER DEPTH** 44.6ft

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)
-40										
-45	-44.8	0.0								-44.8 GROUND SURFACE 0.0
			1	1	5	6	SS-92			COASTAL PLAIN
	-48.3	3.5								GRAY AND GREEN MICACEOUS SAND,
-50	-50.5	5.7	5	5	7	12				SATURATED (PEEDEE FORMATION)
			8	8	9	17				
	-53.2	8.4	14	25	20	45	SS-93			
-55	-55.4	10.6								
	-57.6	12.8	11	16	10	26				
			18	11	12	23				
-60	-59.5	14.7	20	10	14	24	SS-94			
-65	-64.3	19.5	6	9	12	21				
	-67.2	22.4								
			49	30	26	56	SS-95			
-70	-69.7	24.9	12	12	10					
						22				-71.2 26.4
										Boring Terminated at Elevation -71.2 ft in Medium Dense Sand

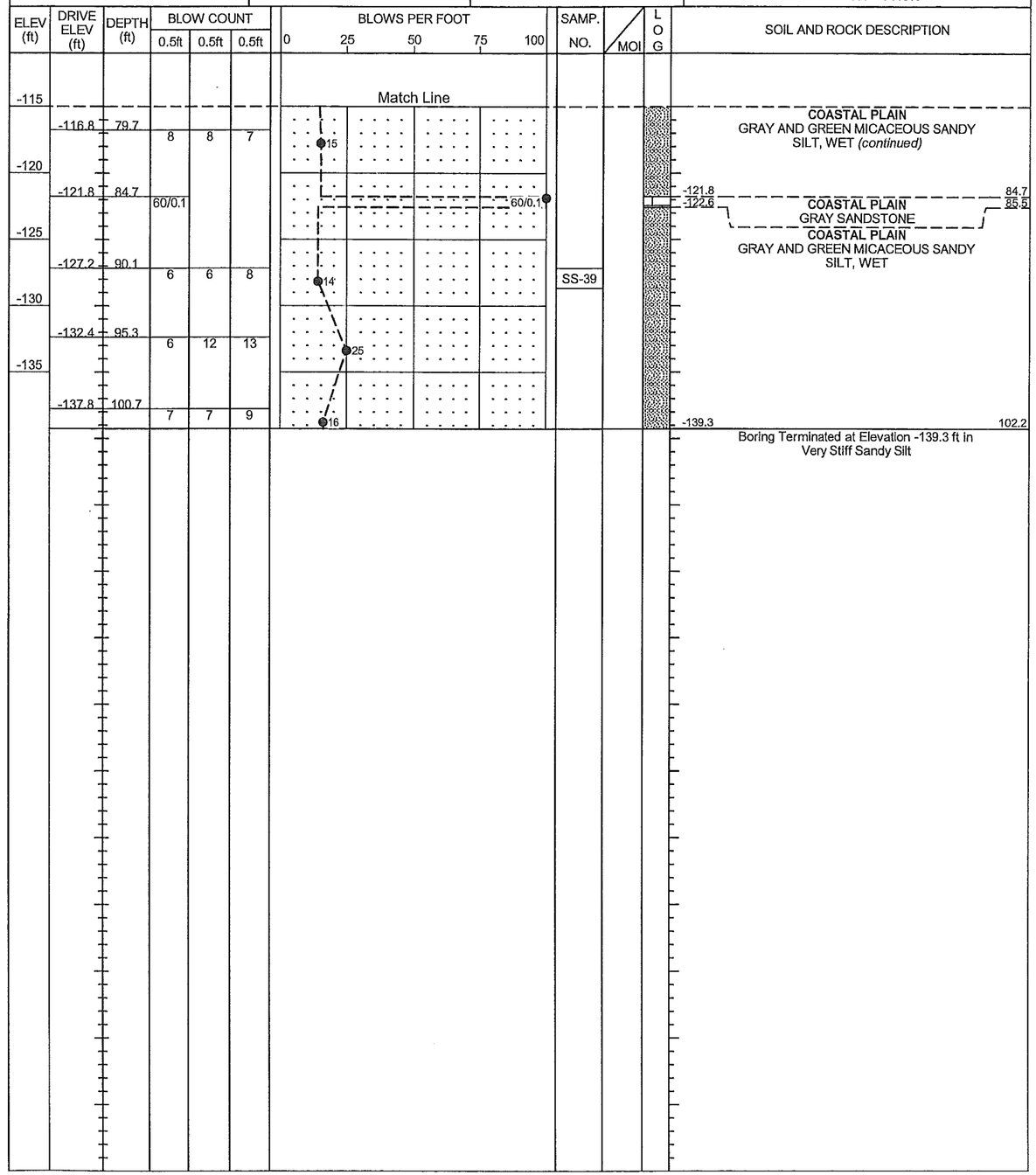
NCDOT BORE DOUBLE R3601_GEO_BRDG.GPJ NC_DOT.GDT 5/18/11

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 103 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B5-B NBL	**STATION** 59+83	**OFFSET** 101 ft RT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -37.1 ft	**TOTAL DEPTH** 102.2 ft	**NORTHING** 177,706	**EASTING** 2,306,416	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/11/11	**COMP. DATE** 04/11/11	**SURFACE WATER DEPTH** 33.6ft	



WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 103 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B5-B NBL	**STATION** 59+83	**OFFSET** 101 ft RT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -37.1 ft	**TOTAL DEPTH** 102.2 ft	**NORTHING** 177,706	**EASTING** 2,306,416	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/11/11	**COMP. DATE** 04/11/11	**SURFACE WATER DEPTH** 33.6ft	



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 105 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B6-A SBL	**STATION** 59+32	**OFFSET** 71 ft LT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -43.8 ft	**TOTAL DEPTH** 102.8 ft	**NORTHING** 177,865	**EASTING** 2,306,341	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 04/19/11	**COMP. DATE** 04/25/11	**SURFACE WATER DEPTH** 46.4ft	

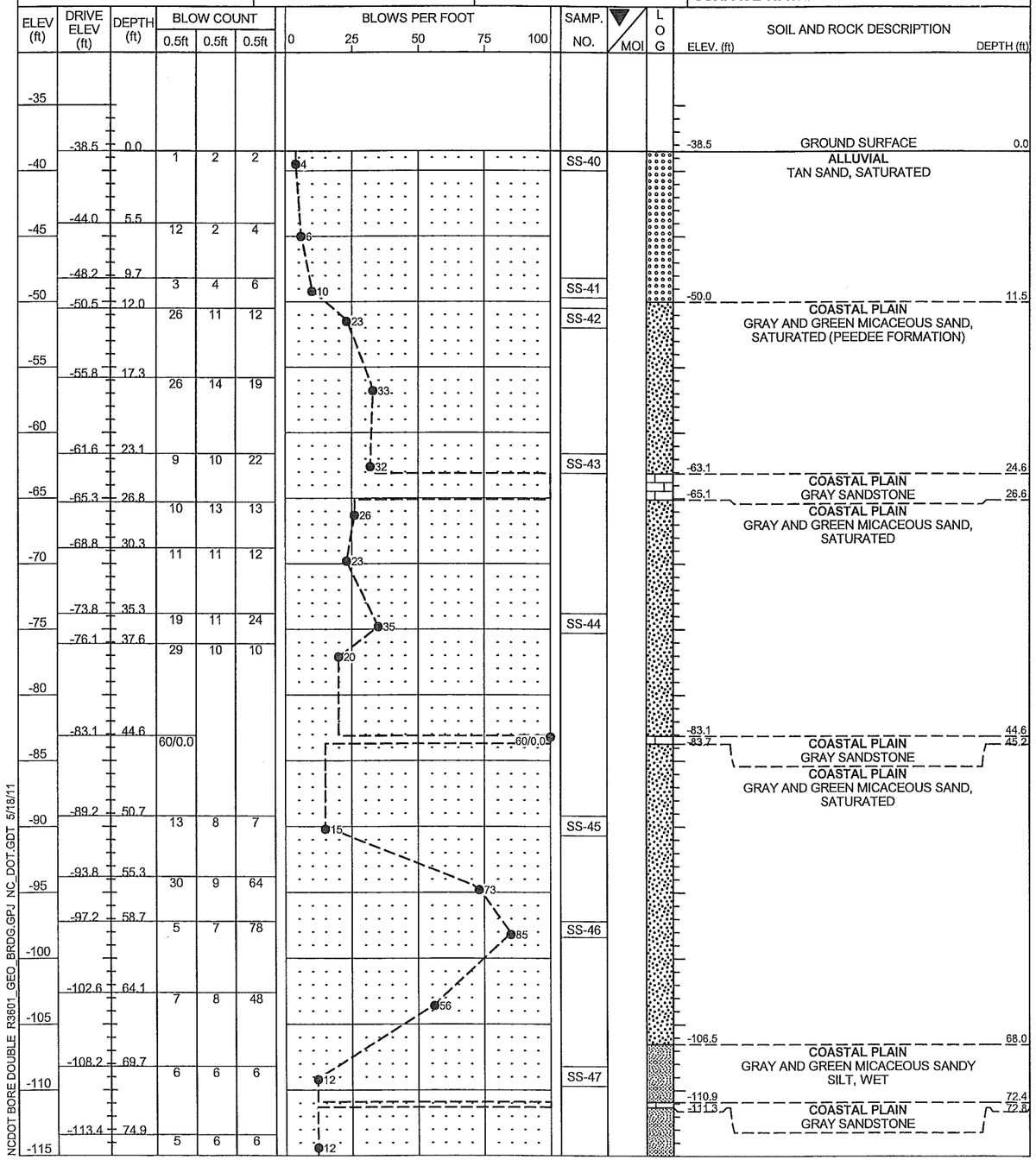
WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 105 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B6-A SBL	**STATION** 59+32	**OFFSET** 71 ft LT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -43.8 ft	**TOTAL DEPTH** 102.8 ft	**NORTHING** 177,865	**EASTING** 2,306,341	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 04/19/11	**COMP. DATE** 04/25/11	**SURFACE WATER DEPTH** 46.4ft	

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)
-43.8		0.0								GROUND SURFACE 0.0
			2	2	1	3				ALLUVIAL TAN SAND, SATURATED
-46.8		3.0								COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED (PEEDEE FORMATION)
	-49.1	5.3	8	8	10	18	SS-81			
	-52.8	9.0	20	8	14	22				
	-55.9	12.1	49	24	19	43	SS-82			
	-58.3	14.5	31	15	16	31				
-60.8	-60.8	17.0	100/0.2			100/0.2				
-61.5		17.7								COASTAL PLAIN GRAY SANDSTONE
	-64.2	20.4	11	12	15	27	SS-83			COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED
-69.5	-69.5	25.7	41	60/0.1		60/0.1				
-70.5		26.7								COASTAL PLAIN GRAY SANDSTONE
	-73.5	29.7	7	15	17	32	SS-84			COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED
	-78.6	34.8	7	100/0.4		100/0.4				
-79.1		35.3								COASTAL PLAIN GRAY SANDSTONE
-81.0		37.2								COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED
	-84.0	40.2	6	5	5	10	SS-85			
	-89.5	45.7	6	7	9	16				
	-94.7	50.9	7	6	8	14	SS-86			
	-96.6	52.8	11	7	7	14				
	-100.0	56.2	5	6	7	13				
	-101.9	58.1	6	7	8	15	SS-87			
	-106.3	62.5	4	5	7	12				
-110.4		66.6								
-110.9		67.1								GRAY SANDSTONE
	-111.3	67.5	5	7	8	15	SS-88			GRAY AND GREEN MICACEOUS SANDY SILT, WET
-115.5		71.7								
-116.1		72.3								GRAY SANDSTONE
	-116.1	72.3	15	6	8	14				GRAY AND GREEN MICACEOUS SANDY SILT, WET
-118.5		74.7								
-119.9		76.1								GRAY SANDSTONE

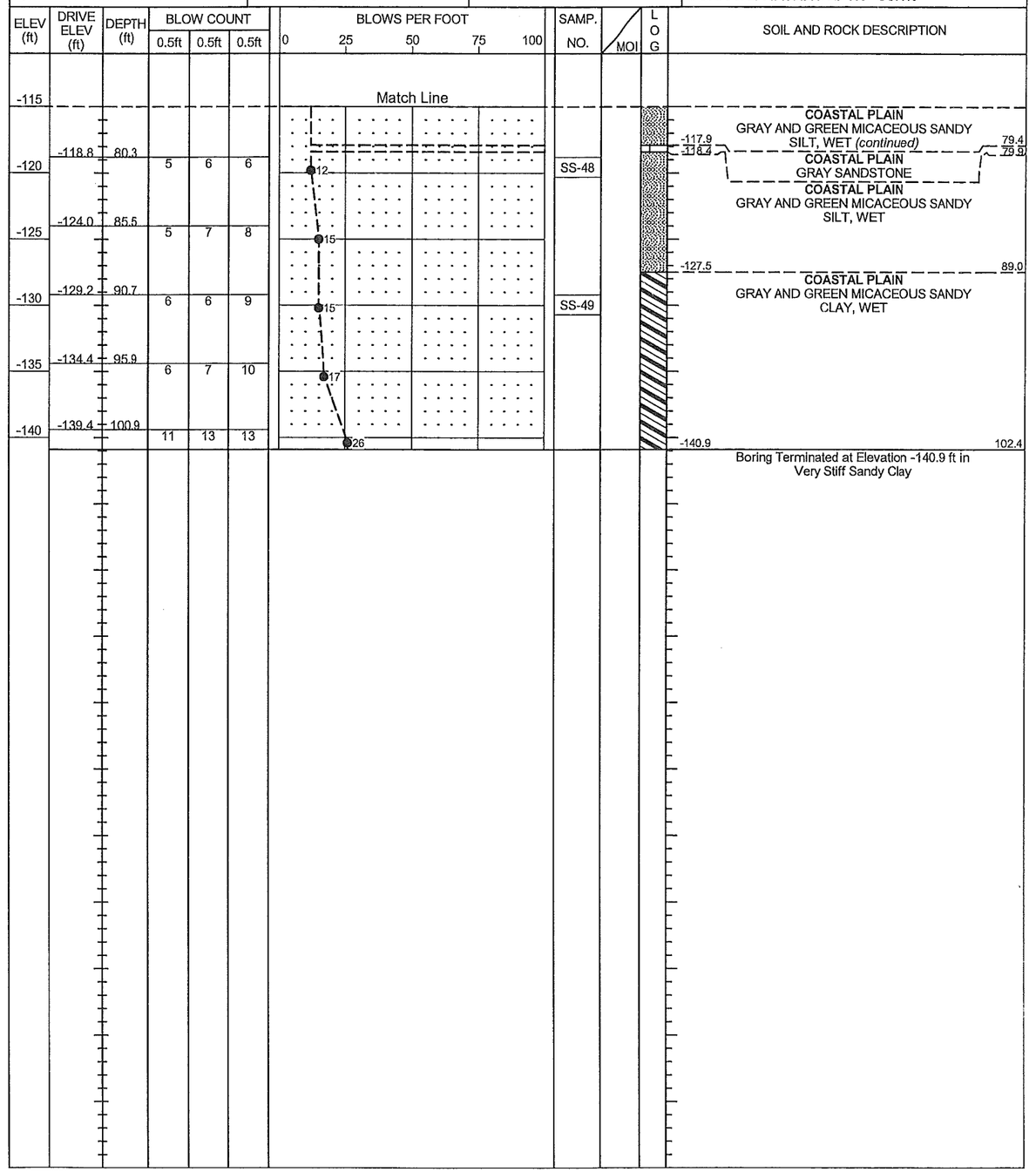
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
						Match Line				
-120.9		77.1	5	9	8	17	SS-89			COASTAL PLAIN GRAY AND GREEN MICACEOUS SANDY SILT, WET *(continued)*
-125.9		82.1	36	10	14	24				
-130.5		86.7	31	73	19	92	SS-90			
-130.5		86.7								COASTAL PLAIN GRAY AND GREEN SANDY CLAY, WET
-135.3		91.5	6	6	10	16				
-140.3		96.5	7	7	9	16	SS-91			
-145.1		101.3	10	13	13	26				
-146.6		102.8								Boring Terminated at Elevation -146.6 ft in Very Stiff Sandy Clay

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 103 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B6-B NBL	**STATION** 60+36	**OFFSET** 93 ft RT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -38.5 ft	**TOTAL DEPTH** 102.4 ft	**NORTHING** 177,721	**EASTING** 2,306,466	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/12/11	**COMP. DATE** 01/13/11	**SURFACE WATER DEPTH** 36.1ft	



WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 103 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B6-B NBL	**STATION** 60+36	**OFFSET** 93 ft RT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -38.5 ft	**TOTAL DEPTH** 102.4 ft	**NORTHING** 177,721	**EASTING** 2,306,466	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/12/11	**COMP. DATE** 01/13/11	**SURFACE WATER DEPTH** 36.1ft	



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.
SITE DESCRIPTION BRIDGE NO. 105 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER			**GROUND WTR (ft)**
BORING NO. B7-A SBL	**STATION** 60+33	**OFFSET** 79 ft LT	**ALIGNMENT** -LMED- — **0 HR.** N/A
COLLAR ELEV. -32.6 ft	**TOTAL DEPTH** 104.2 ft	**NORTHING** 177,890	**EASTING** 2,306,440 — **24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/18/11	**COMP. DATE** 04/19/11	**SURFACE WATER DEPTH** 34.1ft

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)
-32.6		0.0	WOR	WOH	1	1	SS-71			GROUND SURFACE 0.0 ALLUVIAL BROWN SAND, SATURATED
-36.3		3.7	3	5	5	10				
-41.2		8.6	5	11	15	26	SS-72			
-46.2		13.6	3	4	5	9				
-48.0		15.4	7	5	14	19	SS-73			-47.8 15.2 COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED (PEEDEE FORMATION)
-50.3		17.7	8	7	10	17				
-53.9		21.3	37	22	11	33				
-57.3		24.7	14	17	25	42	SS-74			
-60.9		28.3	19	100/0.2		100/0.2				-60.9 28.3 -62.0 29.4 COASTAL PLAIN GRAY SANDSTONE COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED
-67.0		34.4	7	14	19	33	SS-75			
-71.2		38.6	24	16	34	50				
-76.1		43.5	10	17	18	35	SS-76			
-78.1		45.5	63	20	18	38				-78.1 45.5 -78.6 46.0 GRAY SANDSTONE -80.2 47.6 GRAY AND GREEN MICACEOUS SAND, SATURATED -80.7 48.1 GRAY SANDSTONE COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED
-80.2		47.6	94	20	15	35				
-88.0		55.4	33	12	12	24	SS-77			
-94.1		61.5	5	11	12	23				-96.3 63.7 -96.9 64.3 GRAY SANDSTONE COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED
-99.3		66.7	25	10	12	22	SS-78			
-104.5		71.9	6	6	7	13				-101.6 69.0 -101.9 69.3 GRAY SANDSTONE COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED
-109.7		77.1								-107.6 75.0

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
-110			5	6	94/0.4	Match Line 100/0.9	SS-79			110.7 78.1 111.4 78.8 COASTAL PLAIN GRAY AND GREEN MICACEOUS SANDY SILT, WET *(continued)* GRAY SANDSTONE COASTAL PLAIN GRAY AND GREEN MICACEOUS SANDY SILT, WET
-116.1		83.5	5	5	6	11				
-120.9		88.3	5	5	6	11	SS-80			-119.4 86.8 -119.8 87.2 GRAY SANDSTONE COASTAL PLAIN GRAY AND GREEN MICACEOUS SANDY SILT, WET
-125.7		93.1	5	5	6	11				
-130.5		97.9	14	16	13	29				
-135.3		102.7	5	7	9	16				-136.8 104.2 Boring Terminated at Elevation -136.8 ft in Very Stiff Sandy Silt

WBS 38868.1.1 | TIP R-3601 | COUNTY BRUNSWICK | GEOLOGIST Wrike, C. M.
SITE DESCRIPTION BRIDGE NO. 105 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER | GROUND WTR (ft)
BORING NO. B7-A SBL | STATION 60+33 | OFFSET 79 ft LT | ALIGNMENT -LMED- | 0 HR. N/A
COLLAR ELEV. -32.6 ft | TOTAL DEPTH 104.2 ft | NORTHING 177,890 | EASTING 2,306,440 | 24 HR. N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic
DRILLER Contract Driller | START DATE 04/18/11 | COMP. DATE 04/19/11 | SURFACE WATER DEPTH 34.1ft

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 103 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B7-B NBL	**STATION** 61+05	**OFFSET** 104 ft RT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -34.0 ft	**TOTAL DEPTH** 99.9 ft	**NORTHING** 177,719	**EASTING** 2,306,535	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/07/11	**COMP. DATE** 04/08/11	**SURFACE WATER DEPTH** 34.6ft	

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 103 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B7-B NBL	**STATION** 61+05	**OFFSET** 104 ft RT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -34.0 ft	**TOTAL DEPTH** 99.9 ft	**NORTHING** 177,719	**EASTING** 2,306,535	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 04/07/11	**COMP. DATE** 04/08/11	**SURFACE WATER DEPTH** 34.6ft	

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
-30										ELEV. (ft) / DEPTH (ft)
	-34.0	0.0								-34.0 / 0.0 GROUND SURFACE
-35			4	7	7	14	SS-21			ALLUVIAL TAN SAND, SATURATED
	-37.2	3.2								
-40			3	3	5	8				
	-41.2	7.2								
-45			7	7	6	13				
	-46.4	12.4								
-50			2	3	5	8	SS-22			
	-51.4	17.4								
-55			4	6	12	18				
	-52.4	18.4								-52.4 / 18.4
	-56.4	22.4								COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED (PEEDEE FORMATION)
			22	24	15	39	SS-23			
-60	-59.8	25.8								
			27	34	27	61				
-65	-64.7	30.7	60/0.1			60/0.1				
	-65.4	31.4								
			12	11	12	23	SS-24			
-70	-70.7	36.7								
			22	13	17	30				
-75	-74.4	40.4								
			15	11	89/0.4	100/0.9				
	-78.4	44.4								
-80			60/0.1			60/0.1				
	-81.6	47.6								
	-83.8	49.8	60/0.1			60/0.1				
-85			13	13	11	24	SS-25			
	-88.6	54.6								
-90			8	10	90/0.2	100/0.7				
	-93.8	59.8								
-95			7	10	60/0.1	70/0.6	SS-26			
	-100.0	66.0								
-100			4	12	15	27				
	-104.8	70.8								
-105			58	23	21	44	SS-27			
	-108.8	74.8								
-110			6	7	11	18				

-64.7 / 30.7	COASTAL PLAIN GRAY SANDSTONE			
-65.1 / 31.1	COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED			
-75.4 / 41.4				
-76.2 / 42.2	GRAY SANDSTONE GRAY AND GREEN MICACEOUS SAND, SATURATED			
-78.4 / 44.4				
-78.8 / 44.8	GRAY SANDSTONE GRAY AND GREEN MICACEOUS SAND, SATURATED			
-81.6 / 47.6				
-82.0 / 48.0	GRAY SANDSTONE COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED			
-89.6 / 55.6				
-90.6 / 56.6	COASTAL PLAIN GRAY SANDSTONE COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED			
-94.8 / 60.8				
-95.6 / 61.6	COASTAL PLAIN GRAY SANDSTONE COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED			
-99.1 / 65.1				
-99.5 / 65.5	GRAY SANDSTONE COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED			
-106.8 / 72.8				
-107.4 / 73.4	GRAY SANDSTONE GRAY AND GREEN MICACEOUS SAND, SATURATED			

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
-110						Match Line				ELEV. (ft) / DEPTH (ft)
	-113.4	79.4	4	5	7	12	SS-28			-110.8 / 76.8 GRAY SANDSTONE
-115										-111.2 / 77.2 GRAY AND GREEN MICACEOUS SAND, SATURATED
	-118.2	84.2	5	5	6	11	SS-29			-112.0 / 78.0
-120										-115.4 / 81.4 GRAY AND GREEN MICACEOUS SANDY SILT, WET
	-122.8	88.8	6	6	8	14				-116.0 / 82.0 GRAY SANDSTONE COASTAL PLAIN GRAY AND GREEN MICACEOUS SANDY SILT, WET
-125										
	-127.6	93.6	5	6	7	13	SS-30			-126.0 / 92.0
-130										COASTAL PLAIN GRAY AND GREEN MICACEOUS SANDY CLAY, WET
	-132.4	98.4	15	10	11	21				-133.9 / 99.9
										Boring Terminated at Elevation -133.9 ft in Very Stiff Sandy Clay

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 105 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B8-A SBL	**STATION** 60+99	**OFFSET** 76 ft LT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -22.6 ft	**TOTAL DEPTH** 103.1 ft	**NORTHING** 177,897	**EASTING** 2,306,507	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 04/15/11	**COMP. DATE** 04/15/11	**SURFACE WATER DEPTH** 24.3ft	

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)
	-22.6	0.0	WOH	WOH	WOH	0	SS-61			-22.6 GROUND SURFACE	0.0
										ALLUVIAL GRAY SANDY CLAY, WET	
	-26.1	3.5	WOH	2	3	5					
	-28.6	6.0								ALLUVIAL TAN SAND, SATURATED	
	-30.6	8.0	2	4	4	8	SS-62				
	-35.8	13.2	5	5	6	11					
	-40.8	18.2	4	8	7	15	SS-63				
	-46.1	23.5	4	4	6	10					
	-49.6	27.0								COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED (PEEDEE FORMATION)	
	-51.1	28.5	10	8	9	17	SS-64				
	-53.2	30.6	11	10	13	23					
	-56.2	33.6	42	19	17	36	SS-65				
	-60.9	38.3	77	30	30	60					
	-61.2	38.6								COASTAL PLAIN GRAY SANDSTONE	
										COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED	
	-66.9	44.3	6	7	15	22	SS-66				
	-72.1	49.5	7	24	13	37					
	-77.3	54.7	8	100/0.4		100/0.4					
	-78.0	55.4								GRAY SANDSTONE	
	-78.7	56.1									
	-79.8	57.2	60/0.1			60/0.1				GRAY AND GREEN MICACEOUS SAND, SATURATED	
	-80.9	58.3								GRAY SANDSTONE	
	-83.5	60.9	8	7	8	15	SS-67			COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED	
	-88.7	66.1	5	6	8	14					
	-93.9	71.3	9	35	34	69	SS-68				
	-99.1	76.5	10	9	12						

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 105 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B8-A SBL	**STATION** 60+99	**OFFSET** 76 ft LT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -22.6 ft	**TOTAL DEPTH** 103.1 ft	**NORTHING** 177,897	**EASTING** 2,306,507	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 04/15/11	**COMP. DATE** 04/15/11	**SURFACE WATER DEPTH** 24.3ft	

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
-100						Match Line				
	-104.3	81.7	20	15	17	32	SS-69			
	-109.5	86.9	6	13	10	23				
	-114.5	91.9	6	5	6	11	SS-70			
	-119.7	97.1	5	5	7	12				
	-124.7	102.1	7	100/0.5		100/0.5				
	-125.2	102.6								COASTAL PLAIN GRAY AND GREEN MICACEOUS SAND, SATURATED (*continued*)
	-125.7	103.1								COASTAL PLAIN GRAY SANDSTONE Boring Terminated at Elevation -125.7 ft In Medium Hard Sandstone

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 103 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B8-B NBL	**STATION** 61+56	**OFFSET** 101 ft RT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -19.0 ft	**TOTAL DEPTH** 100.7 ft	**NORTHING** 177,728	**EASTING** 2,306,585	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 04/06/11	**COMP. DATE** 04/06/11	**SURFACE WATER DEPTH** 16.3ft	

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))
-19.0	0.0		1	1	0	1	SS-11	131%		GROUND SURFACE 0.0 **ALLUVIAL** BROWN SANDY CLAY WITH LITTLE ORGANIC MATERIAL (7.6% ORGANIC), WET
-23.6	4.6		WOH	WOH	WOH	0				
-26.5		7.5								**ALLUVIAL** TAN SAND, SATURATED
-28.1	9.1		5	3	3	6	SS-12			
-32.9	13.9		WOH	4	4	8				
-37.7	18.7		3	2	2	4	SS-13			
-41.0		22.0								**ALLUVIAL** GRAY SANDY SILT, WET
-42.6	23.6		WOH	WOH	1	1	SS-14			
-45.5		26.5								**ALLUVIAL** GRAY SAND, SATURATED
-47.4	28.4		3	6	7	13	SS-15			
-50.0		31.0								**COASTAL PLAIN** GRAY AND GREEN MICACEOUS SAND, SATURATED (PEEDEE FORMATION)
-51.8	32.8		8	11	19	30	SS-16			
-56.5	37.5		6	51	35	86				
-60.7	41.7		13	16	21	37	SS-17			
-62.5		43.5								**COASTAL PLAIN** GRAY SANDSTONE
-62.7		43.7								**COASTAL PLAIN** GRAY AND GREEN MICACEOUS SAND, SATURATED
-64.5	45.5		34	13	8	21				
-69.7	50.7		29	13	17	30	SS-18			
-74.0	55.0		16	11	23	34				
-77.4	58.4		56	36	20	56				
-81.0	62.0		7	9	17	26	SS-19			
-87.0		68.0								**COASTAL PLAIN** GRAY SANDSTONE
-88.0		69.0								**COASTAL PLAIN** GRAY AND GREEN MICACEOUS SAND, SATURATED
-86.0	67.0		6	7	93/0.4	100/0.9				
-90.5	71.5		55	17	17	34				
-93.7		74.7								**COASTAL PLAIN**
-93.7	74.7		100/0.2			100/0.2				

WBS 38868.1.1	**TIP** R-3601	**COUNTY** BRUNSWICK	**GEOLOGIST** Wrike, C. M.	
SITE DESCRIPTION BRIDGE NO. 103 ON US 17/ US 133/ US 74/ US 76 OVER THE BRUNSWICK RIVER				**GROUND WTR (ft)**
BORING NO. B8-B NBL	**STATION** 61+56	**OFFSET** 101 ft RT	**ALIGNMENT** -LMED-	**0 HR.** N/A
COLLAR ELEV. -19.0 ft	**TOTAL DEPTH** 100.7 ft	**NORTHING** 177,728	**EASTING** 2,306,585	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MAD CME-45C		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 04/06/11	**COMP. DATE** 04/06/11	**SURFACE WATER DEPTH** 16.3ft	

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
-95						Match Line				
-96.4	77.4		7	10	30	40				GRAY SANDSTONE **COASTAL PLAIN** GRAY AND GREEN MICACEOUS SAND, SATURATED *(continued)*
-100.0	81.0		13	11	16	27				
-102.1	83.1		23	12	18	30				
-105.0		86.0								**COASTAL PLAIN** GRAY AND GREEN MICACEOUS SANDY SILT, WET
-107.4	88.4		4	11	11	22	SS-20			
-112.8	93.8		36	13	17	30				
-118.2	99.2		5	6	6	12				
-119.7		100.7								Boring Terminated at Elevation -119.7 ft in Stiff Sandy Silt

38868.1.1
R-3601

BRIDGE NO. 105 ON US17/NC133/US74/US76 OVER BRUNSWICK RIVER AT -LMED- STA. 60+12.65

B4-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-50	80 LT	58+16	0.0-1.5	A-1-b(0)	19	NP	88.0	7.7	2.3	2.0	100	41	5	-	-
SS-51	80 LT	58+16	4.8-6.3	A-2-4(0)	21	NP	6.0	77.0	8.9	8.1	97	96	18	-	-
SS-52	80 LT	58+16	12.1-13.6	A-2-4(0)	20	NP	9.3	74.4	8.2	8.1	88	85	16	-	-
SS-53	80 LT	58+16	20.4-21.9	A-2-4(0)	20	NP	14.9	71.8	6.3	7.1	100	98	16	-	-
SS-54	80 LT	58+16	32.0-33.5	A-2-4(0)	19	NP	2.4	75.5	11.9	10.1	100	100	24	-	-
SS-55	80 LT	58+16	42.9-44.4	A-2-4(0)	20	NP	1.3	81.0	9.6	8.1	100	100	20	-	-
SS-56	80 LT	58+16	53.7-55.2	A-2-4(0)	21	NP	0.5	78.1	12.2	9.1	100	100	24	-	-
SS-57	80 LT	58+16	63.9-65.4	A-2-4(0)	22	NP	2.6	70.6	14.6	12.1	100	100	32	-	-
SS-58	80 LT	58+16	72.3-73.8	A-4(0)	23	2	1.4	65.8	16.6	16.2	100	100	39	-	-
SS-59	80 LT	58+16	81.3-82.8	A-4(0)	28	7	1.4	65.6	12.8	20.2	100	100	40	-	-
SS-60	80 LT	58+16	90.5-92.0	A-6(2)	30	11	1.4	60.9	15.4	22.3	100	99	46	-	-

B5-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-92	87 LT	58+86	0.0-1.5	A-2-4(0)	20	NP	4.3	82.5	4.9	8.2	100	99	16	-	-
SS-93	87 LT	58+86	8.4-9.9	A-2-4(0)	14	NP	22.6	53.1	9.9	14.4	76	66	20	-	-
SS-94	87 LT	58+86	14.7-16.2	A-2-4(0)	21	NP	8.6	79.9	4.2	7.2	100	99	14	-	-
SS-95	87 LT	58+86	22.4-23.9	A-2-4(0)	19	NP	9.7	73.3	8.8	8.2	80	75	16	-	-

B6-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-81	67 LT	59+32	5.3-6.8	A-2-4(0)	21	NP	5.5	80.8	5.7	8.1	92	90	15	-	-
SS-82	67 LT	59+32	12.1-13.6	A-2-4(0)	19	NP	16.1	69.7	7.2	7.1	87	84	15	-	-
SS-83	67 LT	59+32	20.1-21.6	A-2-4(0)	18	NP	4.6	79.5	6.8	9.1	100	100	18	-	-
SS-84	67 LT	59+32	29.7-31.2	A-2-4(0)	20	NP	2.9	83.5	5.5	8.1	99	99	15	-	-
SS-85	67 LT	59+32	40.2-41.7	A-2-4(0)	21	NP	1.0	78.4	8.5	12.1	100	100	23	-	-
SS-86	67 LT	59+32	50.9-52.4	A-2-4(0)	20	NP	0.8	74.5	14.5	10.1	100	100	29	-	-
SS-87	67 LT	59+32	58.1-59.6	A-2-4(0)	22	NP	0.6	72.8	16.3	10.3	100	100	31	-	-
SS-88	67 LT	59+32	67.5-69.0	A-4(0)	22	NP	0.6	69.1	15.8	14.4	100	100	36	-	-
SS-89	67 LT	59+32	77.1-78.6	A-4(0)	27	6	0.8	63.0	15.6	20.6	100	100	43	-	-
SS-9	67 LT	59+32	86.7-88.2	A-6(4)	32	14	4.7	53.9	18.7	22.6	98	95	49	-	-
SS-91	67 LT	59+32	96.5-98.0	A-6(3)	30	13	1.0	57.4	16.9	24.7	100	100	51	-	-

B7-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-71	79 LT	60+33	0.0-1.5	A-3(0)	23	NP	90.6	6.3	1.1	2.0	99	54	3	-	-
SS-72	79 LT	60+33	8.6-10.1	A-3(0)	24	NP	82.4	16.6	0.0	1.0	100	65	2	-	-
SS-73	79 LT	60+33	15.4-16.9	A-2-4(0)	20	NP	5.8	80.2	4.9	9.1	96	94	16	-	-
SS-74	79 LT	60+33	24.7-26.2	A-2-4(0)	17	NP	19.6	69.5	4.8	6.1	100	98	13	-	-
SS-75	79 LT	60+33	34.4-35.9	A-2-4(0)	18	NP	4.8	83.4	4.6	7.1	100	100	13	-	-
SS-76	79 LT	60+33	43.5-45.0	A-2-4(0)	20	NP	2.6	83.0	6.3	8.1	100	100	16	-	-
SS-77	79 LT	60+33	55.4-56.9	A-2-4(0)	20	NP	0.6	78.0	11.3	10.1	100	100	25	-	-
SS-78	79 LT	60+33	66.7-68.2	A-2-4(0)	21	NP	0.6	71.9	13.3	14.1	100	100	31	-	-
SS-79	79 LT	60+33	77.1-78.6	A-4(0)	23	2	1.0	68.1	16.8	14.1	100	100	37	-	-
SS-80	79 LT	60+33	88.3-89.8	A-4(0)	27	7	0.6	63.8	15.4	20.2	100	100	43	-	-

B8-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-61	76 LT	60+99	0.0-1.5	A-7-6(10)	44	22	3.2	42.6	23.8	30.3	100	99	56	-	-
SS-62	76 LT	60+99	8.0-9.5	A-3(0)	21	NP	83.3	14.2	0.4	2.0	100	69	3	-	-
SS-63	76 LT	60+99	18.2-19.7	A-3(0)	18	NP	78.5	19.3	0.2	2.0	100	79	3	-	-
SS-64	76 LT	60+99	28.5-30.0	A-2-4(0)	19	NP	6.2	79.2	5.6	9.1	99	97	17	-	-
SS-65	76 LT	60+99	33.6-35.1	A-2-4(0)	17	NP	16.2	64.6	7.1	12.1	81	77	18	-	-
SS-66	76 LT	60+99	44.3-45.8	A-2-4(0)	20	NP	4.3	75.9	9.7	10.1	99	99	22	-	-
SS-67	76 LT	60+99	60.9-62.4	A-2-4(0)	21	NP	1.6	79.8	8.5	10.1	100	100	22	-	-
SS-68	76 LT	60+99	71.3-72.8	A-2-4(0)	21	NP	1.6	71.7	14.5	12.1	100	99	31	-	-
SS-69	76 LT	60+99	81.7-83.2	A-4(0)	21	NP	0.6	65.3	22.0	12.1	100	100	39	-	-
SS-70	76 LT	60+99	91.9-93.4	A-4(0)	24	2	0.8	64.2	14.7	20.2	100	100	42	-	-

PROJECT REFERENCE NO.	SHEET NO.
R-3601	21 OF 22

38868.1.1
R-3601

BRIDGE NO. 103 ON US17/NC133/US74/US76 OVER BRUNSWICK RIVER AT -LMED- STA. 60+12.65

B4-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-1	125 RT	59+40	1.0-1.5	A-2-4(0)	25	10	25.7	39.6	12.5	22.2	97	92	35	83.4	-
SS-2	125 RT	59+40	5.3-6.8	A-1-b(0)	26	NP	95.7	2.9	1.4	0.0	95	24	2	-	-
S-3	125 RT	59+40	15.0-16.5	A-1-b(0)	21	NP	96.0	3.8	0.2	0.0	100	11	0	-	-
SS-4	125 RT	59+40	19.5-21.0	A-2-4(0)	19	NP	6.4	81.9	4.6	7.1	100	98	13	-	-
SS-5	125 RT	59+40	29.9-31.4	A-2-4(0)	24	NP	2.7	85.5	4.7	7.1	100	99	15	-	-
SS-6	125 RT	59+40	45.4-46.9	A-2-4(0)	20	NP	6.9	76.7	8.4	8.1	100	98	18	-	-
SS-7	125 RT	59+40	55.4-56.9	A-2-4(0)	20	NP	2.2	78.2	9.5	10.1	100	99	22	-	-
SS-8	125 RT	59+40	65.5-67.0	A-2-4(0)	20	NP	0.7	79.7	11.5	8.1	100	100	22	-	-
SS-9	125 RT	59+40	76.1-77.6	A-2-4(0)	21	NP	0.8	74.3	16.8	8.1	100	100	29	-	-
SS-10	125 RT	59+40	90.7-92.2	A-4(0)	27	7	0.8	61.6	17.4	20.2	100	100	44	-	-

B5-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-31	101 RT	59+83	3.9-5.4	A-3(0)	25	NP	88.5	8.2	2.3	1.0	98	57	4	-	-
SS-32	101 RT	59+83	9.1-9.6	A-2-4(0)	19	NP	12.1	76.1	5.7	6.1	90	85	13	-	-
SS-33	101 RT	59+83	19.8-21.3	A-2-4(0)	18	NP	10.5	73.8	7.6	8.1	82	79	15	-	-
SS-34	101 RT	59+83	34.9-36.4	A-2-4(0)	19	NP	3.2	79.8	7.9	9.1	100	100	19	-	-
SS-35	101 RT	59+83	45.3-46.8	A-2-4(0)	20	NP	1.2	82.9	8.8	7.1	100	100	18	-	-
SS-36	101 RT	59+83	54.7-55.4	A-2-4(0)	20	NP	1.8	69.8	18.2	10.1	100	99	32	-	-
SS-37	101 RT	59+83	64.5-66.0	A-2-4(0)	21	1	0.8	69.8	19.2	10.1	100	100	34	-	-
SS-38	101 RT	59+83	74.5-76.0	A-4(0)	22	1	0.8	66.6	20.4	12.1	100	100	38	-	-
SS-39	101 RT	59+83	90.1-91.6	A-4(1)	28	10	0.8	62.6	16.4	20.2	100	100	44	-	-

B6-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-40	93 RT	60+36	0.0-1.5	A-3(0)	22	NP	72.4	24.8	1.8	1.0	97	63	3	-	-
SS-41	93 RT	60+36	9.7-11.2	A-3(0)	24	NP	71.7	23.3	4.0	1.0	81	51	5	-	-
SS-42	93 RT	60+36	12.0-13.5	A-2-4(0)	20	NP	7.3	79.6	6.1	7.1	86	84	14	-	-
SS-43	93 RT	60+36	23.1-24.6	A-2-4(0)	21	NP	6.7	80.1	6.2	7.1	97	96	15	-	-
SS-44	93 RT	60+36	35.3-36.8	A-2-4(0)	21	NP	1.7	85.6	6.6	6.1	100	100	15	-	-
SS-45	93 RT	60+36	50.7-52.2	A-2-4(0)	22	NP	1.0	81.3	10.6	7.1	100	100	21	-	-
SS-46	93 RT	60+36	58.7-60.2	A-2-4(0)	21	NP	1.0	72.8	16.1	10.1	100	99	30	-	-
SS-47	93 RT	60+36	69.7-71.2	A-4(0)	25	4	0.4	68.2	19.2	12.1	100	100	37	-	-
SS-48	93 RT	60+36	80.3-81.8	A-4(0)	26	NP	0.6	63.6	15.6	20.2	100	100	43	-	-
SS-49	93 RT	60+36	90.7-92.2	A-6(4)	33	15	0.6	58.5	18.6	22.3	100	100	51	-	-

B7-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-21	104 RT	61+05	0.0-1.5	A-3(0)	21	NP	84.7	9.5	1.7	4.0	98	62	6	-	-
SS-22	104 RT	61+05	12.4-13.9	A-3(0)	25	NP	69.8	28.6	1.6	0.0	100	86	2	-	-
SS-23	104 RT	61+05	22.4-23.9	A-2-4(0)	17	NP	16.0	62.6	11.3	10.1	86	78	21	-	-
SS-24	104 RT	61+05	31.4-32.9	A-2-4(0)	21	NP	7.3	77.9	6.8	8.1	100	99	17	-	-
SS-25	104 RT	61+05	49.8-51.3	A-2-4(0)	19	NP	4.6	74.3	12.9	8.1	98	95	23	-	-
SS-26	104 RT	61+05	59.8-60.8	A-2-4(0)	22	NP	1.4	78.4	12.1	8.1	100	100	23	-	-
SS-27	104 RT	61+05	70.8-72.3	A-2-4(0)	21	NP	0.6	70.9	16.4	12.1	100	100	33	-	-
SS-28	104 RT	61+05	79.4-80.9	A-4(0)	25	3	0.8	66.5	16.6	16.2	100	100	38	-	-
SS-29	104 RT	61+05	84.2-85.7	A-4(0)	27	5	0.6	63.8	17.4	18.2	100	100	41	-	-
SS-30	104 RT	61+05	93.6-95.1	A-6(3)	33	14	1.0	59.6	17.2	22.2	100	100	47	-	-

B8-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-11	101 RT	61+56	0.0-1.5	A-7-6(11)	45	21	7.9	31.3	36.6	24.2	98	95	62	130.7	7.6
SS-12	101 RT	61+56	9.1-10.6	A-3(0)	24	NP	76.2	20.6	1.2	2.0	100	87	4	-	-
SS-13	101 RT	61+56	18.7-20.2	A-3(0)	25	NP	78.2	20.0	1.8	0.0	100	83	2	-	-
SS-14	101 RT	61+56	23.6-25.1	A-4(0)	29	7	9.1	53.7	21.0	16.2	100	99	39	-	-
SS-15	101 RT	61+56	28.4-29.9	A-1-b(0)	19	NP	87.8	10.1	1.1	1.0	90	30	2	-	-
SS-16	101 RT	61+56	32.8-34.3	A-2-4(0)	19	NP	6.0	78.0	9.0	7.1	100	98	19	-	-
SS-17	101 RT	61+56	41.7-43.2	A-2-4(0)	20	NP	15.8	67.9	8.3	8.1	100	99	19	-	-
SS-18	101 RT	61+56	50.7-52.2	A-2-4(0)	17	NP	3.6	73.6	10.6	12.1	100	99	25	-	-
SS-19	101 RT	61+56	62.0-63.5	A-2-4(0)	22	NP	1.6	82.9	7.4	8.1	100	100	18	-	-
SS-20	101 RT	61+56	88.4-89.9	A-4(0)	21	2	8.7	56.8	20.4	14.1	100	93	41	-	-

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 38868.1.1 TIP: R-3601 COUNTY: BRUNSWICK

DESCRIPTION(1): BRIDGE NOS. 103 AND 105 ON NC 133/ US 17/74/76 OVER THE BRUNSWICK RIVER

EXISTING BRIDGE

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

Bridge No.: 103/105 Length: 786' Total Bents: 14 Bents in Channel: 12 Bents in Floodplain: 2
Foundation Type: CONCRETE PILES

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NONE NOTED

Interior Bents: EXTENSIVE SCOUR AT BENTS 4, 5, 6, 7

Channel Bed: MODERATE SCOUR

Channel Bank: NONE NOTED

EXISTING SCOUR PROTECTION

Type(3): CONCRETE END WALLS

Extent(4): 10-15' OUTSIDE EDGE OF BRIDGE

Effectiveness(5): EFFECTIVE

Obstructions(6): NONE NOTED

DESIGN INFORMATION

Channel Bed Material(7): SAND AND CLAY

Channel Bank Material(8): SAND

Channel Bank Cover(9): MARSH GRASS

Floodplain Width(10): 700' (±)

Floodplain Cover(11): MARSH GRASS

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

Channel Migration Tendency(13): MODERATE TENDENCY TO MIGRATE WEST TOWARD END BENT 1

Observations and Other Comments: ____

DESIGN SCOUR ELEVATIONS(14) Feet ____ Meters ____

BENTS

Comparison of DSE to Hydraulics Unit theoretical scour:
NO BSR AVAILABLE

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							

See Sheets 20, 21
"Soil Test Results",
for samples:
(CHANNEL BED) SS-1,SS-61

Template Revised 02/07/06

Reported by: Tyler C. Bottoms **Date:** 5/25/2011

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.