STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2633B	1	9

ID: R-2633B

PROJECT: 34491.1.2

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34491.1.2 (R-2633B) F.A. PROJ. STPNHF-17-(1)

COUNTY BRUNSWICK

PROJECT DESCRIPTION US 17 (WILMINGTON BYPASS) FROM 74-76 EAST OF MALMO IN BRUNSWICK COUNTY TO NORTH OF WILMINGTON IN NEW HANOVER COUNTY.

SITE DESCRIPTION BRIDGE NO. 253 AND 254 ON PROPOSED US 17 BYPASS (-L-) OVER SR 1430 (-Y8-, CEDAR HILL RD.) AT -L- STA. 281+51.83.

THIS REPORT WAS ORIGINALLY DONE UNDER TIP R-2633B,
BUT IS BEING LET UNDER TIP R-2633BA

CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PERSONNEL
J.P. DELOATCH
R.E. SMITH
J.M. EDMONDSON

INVESTIGATED BY T.C. BOTTOMS
CHECKED BY D.N. ARGENBRIGHT
SUBMITTED BY D.N. ARGENBRIGHT
DATE MARCH 2011

NORTH CAROLINA LICENSED SEAL 2240 GEOLOGIST TYLER C. BOTTOMS
3/28/11

DRAWN BY: C.P. TURNER

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

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

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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											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
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-45B
- [ ] 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:

ELEVATION: FT.

NOTES:

EBL = EAST BOUND LANE
WBL = WEST BOUND LANE

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET
R-2633B	3 OF 9

SITE PLAN

0 50 100

FEET

N

-Y8-

SR 1430

28

280

285

30

-L-

F

C

EB1-A
WBL

EB2-A
WBL

EB1-B
EBL

EB2-B
EBL

BRIDGE NO. 254

BRIDGE NO. 253

END BRIDGE
-L- STA. 282+16.72

BEGIN C&G
STA. 10+07.62

2'-6" C&G

BEGIN BRIDGE
-L- STA. 280+63.72

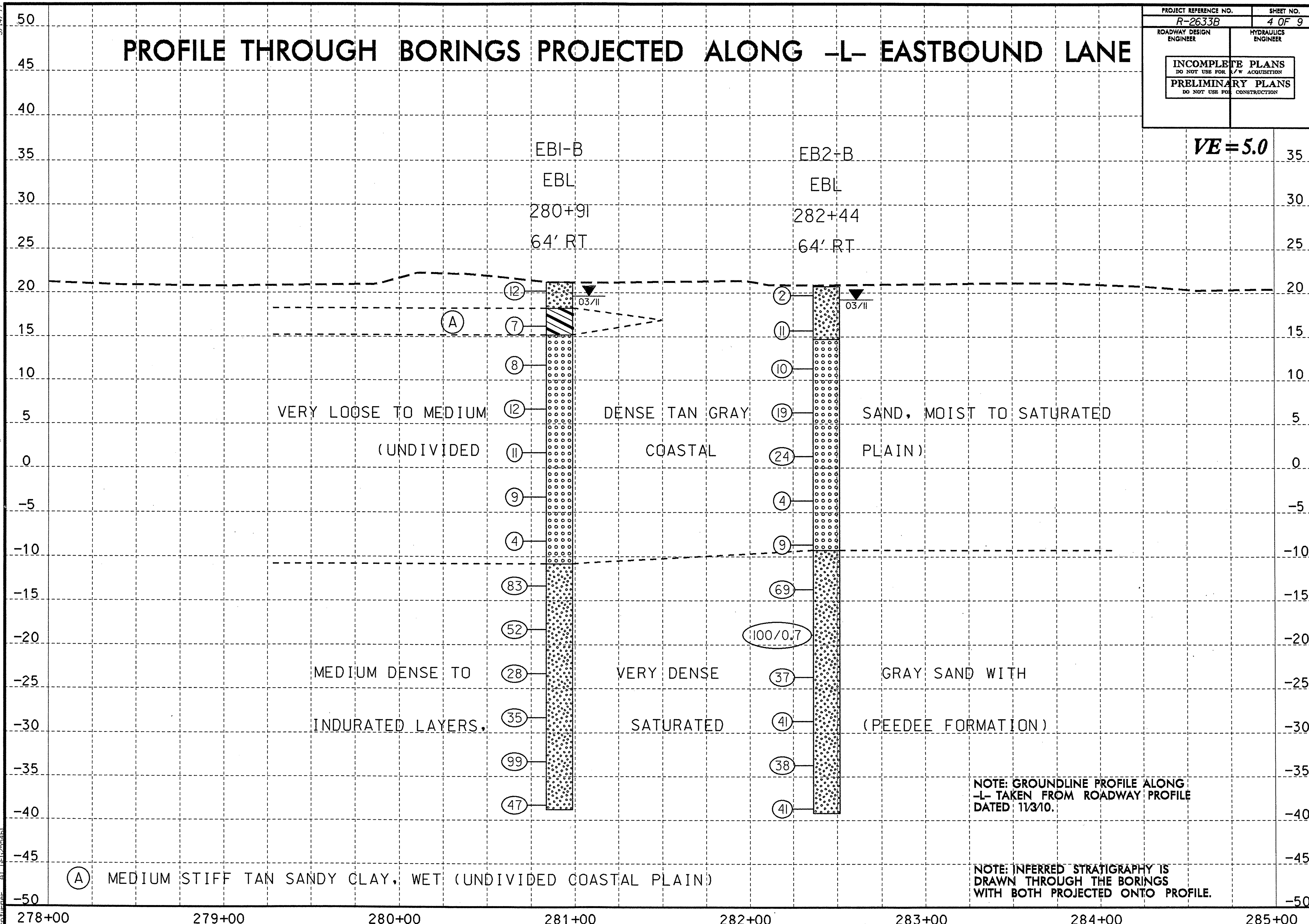
SKEW = 67°58'31"

EB1 BENT LINE

EB2 BENT LINE

POT Sta. 281+51.83 -L-=
POC Sta. 29+68.59 -Y8-
Δ= 67° 58' 31.00"

PROFILE THROUGH BORINGS PROJECTED ALONG -L- EASTBOUND LANE



PROFILE THROUGH BORINGS PROJECTED ALONG -L- WESTBOUND LANE

PROJECT REFERENCE NO.	SHEET NO.
R-2633B	5 OF 9
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

VE = 5.0

EB1-A
WBL
280+36
64' LT

EB2-A
WBL
281+89
64' LT

03/11

LOOSE TO MEDIUM DENSE TAN GRAY SAND, MOIST TO SATURATED (UNDIVIDED COASTAL PLAIN)

MEDIUM DENSE TO SATURATED VERY DENSE GRAY SAND WITH INDURATED LAYERS, (PEEDEE FORMATION)

100/0.7

(A) MEDIUM STIFF TAN SANDY CLAY, WET (UNDIVIDED COASTAL PLAIN)

NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM ROADWAY PROFILE DATED 11/3/10.

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

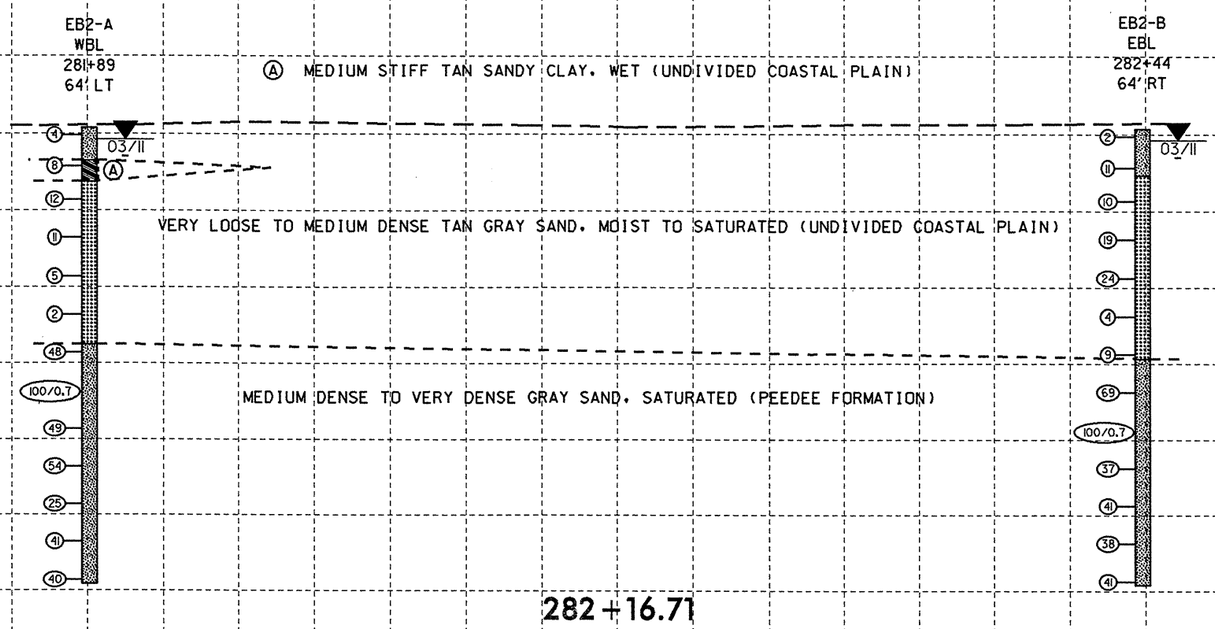
50 45 40 35 30 25 20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45 -50

278+00 279+00 280+00 281+00 282+00 283+00 284+00 285+00

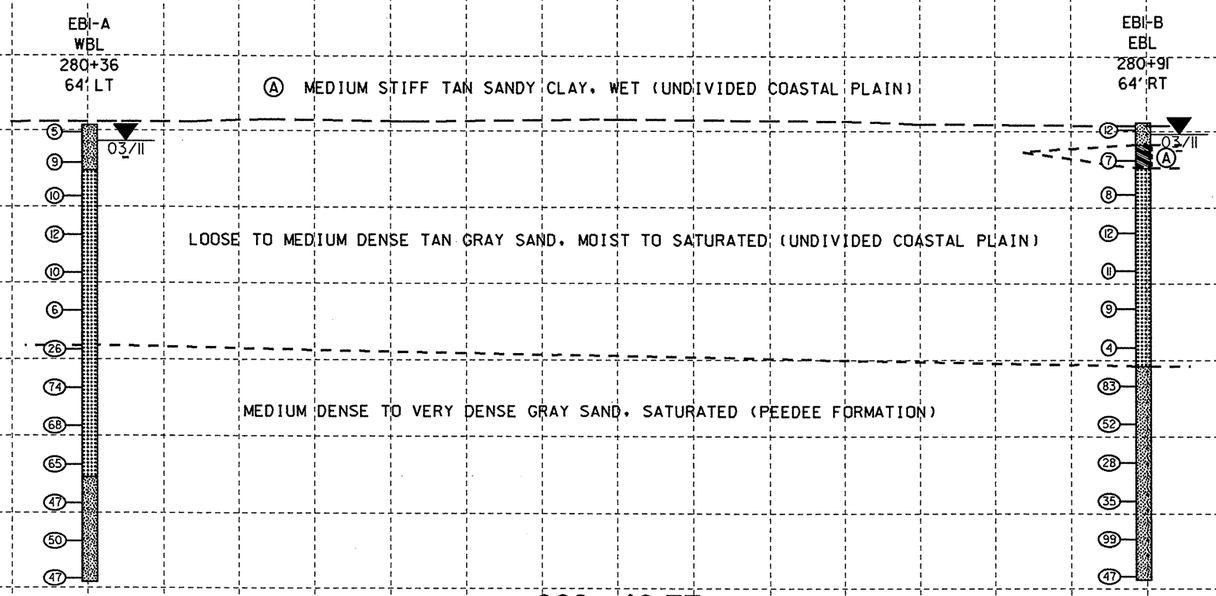
5/14/99

21-MAR-2011 5:27
C:\Projects\Project Files\Investigation\TIP\R2633B_GEO_BRDG_L ovr Y8\CADD_GEOTECH\Site&Sub\R-2633B_GEO_RDY_PFL_L_OVER_Y8.dgn

CROSS SECTIONS THROUGH END BENTS 1 AND 2



282+16.71



280+63.77

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34491.1.2	**TIP** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** DeLoatch, J. P.	
SITE DESCRIPTION BRIDGE NO. 254 ON -L- (US 17 BYPASS) OVER -Y8- (SR 1430)				**GROUND WTR (ft)**
BORING NO. EB1-A W.B.L.	**STATION** 280+36	**OFFSET** 64 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 20.7 ft	**TOTAL DEPTH** 59.9 ft	**NORTHING** 191,882	**EASTING** 2,296,795	**24 HR.** 2.2
DRILL RIG/HAMMER EFF./DATE GFO0063 CME-45B 81% 03/26/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Smith, R. E.	**START DATE** 03/01/11	**COMP. DATE** 03/01/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
20	20.7	0.0								20.7 GROUND SURFACE 0.0
			2	2	3	5 9	SS-15	▼		**UNDIVIDED COASTAL PLAIN** TAN GRAY SAND, MOIST TO SATURATED
15	16.7	4.0	3	4	5	10	SS-16			14.7 6.0
	12.3	8.4	4	5	5					
10	7.3	13.4	4	5	7	12	SS-17			
5	2.3	18.4	4	5	5	10				
0	-2.7	23.4	3	3	3	6	SS-18			
-5	-7.7	28.4	2	15	11	26				-8.2 28.9
-10	-12.7	33.4	30	32	42	74	SS-19			**COASTAL PLAIN** GRAY SAND WITH INDURATED LAYERS, SATURATED (PEEDEE FORMATION)
-15	-17.7	38.4	32	32	36	68				
-20	-22.7	43.4	33	28	37	65				
-25	-27.7	48.4	22	27	20	47	SS-20			-25.3 46.0
-30	-32.7	53.4	20	22	28	50				
-35	-37.7	58.4	14	21	26	47	SS-21			-39.2 59.9
										Boring Terminated at Elevation -39.2 ft in Dense Sand

WBS 34491.1.2	**TIP** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** DeLoatch, J. P.	
SITE DESCRIPTION BRIDGE NO. 253 ON -L- (US 17 BYPASS) OVER -Y8- (SR 1430)				**GROUND WTR (ft)**
BORING NO. EB1-B E.B.L.	**STATION** 280+91	**OFFSET** 64 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 21.2 ft	**TOTAL DEPTH** 60.0 ft	**NORTHING** 191,755	**EASTING** 2,296,852	**24 HR.** 1.6
DRILL RIG/HAMMER EFF./DATE GFO0063 CME-45B 81% 03/26/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Smith, R. E.	**START DATE** 03/01/11	**COMP. DATE** 03/01/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV (ft)
20	21.2	0.0								21.2 GROUND SURFACE 0.0
			2	4	8	12		▼		**UNDIVIDED COASTAL PLAIN** TAN SAND, MOIST TO SATURATED
15	17.2	4.0	2	3	4	7	SS-22			18.2 3.0
	12.7	8.5	2	4	4					**UNDIVIDED COASTAL PLAIN** TAN SANDY CLAY, WET
10	7.7	13.5	7	6	6	8	SS-23			15.2 6.0
5	2.7	18.5	6	5	6	12				**UNDIVIDED COASTAL PLAIN** TAN GRAY SAND, SATURATED
0	-2.3	23.5	6	5	4	11	SS-24			
-5	-7.3	28.5	3	1	3	9				
-10	-12.3	33.5	58	50	33	4	SS-25			-10.8 32.0
-15	-17.3	38.5	20	22	30	83				**COASTAL PLAIN** GRAY SAND WITH INDURATED LAYERS, SATURATED (PEEDEE FORMATION)
-20	-22.3	43.5	11	13	15	52	SS-26			
-25	-27.3	48.5	9	17	18	28				
-30	-32.3	53.5	15	20	79	35	SS-27			
-35	-37.3	58.5	16	21	26	99	SS-28			
						47				-38.8 60.0
										Boring Terminated at Elevation -38.8 ft in Dense Sand

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** DeLoatch, J. P.	
SITE DESCRIPTION BRIDGE NO. 254 ON -L- (US 17 BYPASS) OVER -Y8- (SR 1430)				**GROUND WTR (ft)**
BORING NO. EB2-A W.B.L.	**STATION** 281+89	**OFFSET** 64 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 20.8 ft	**TOTAL DEPTH** 59.9 ft	**NORTHING** 191,885	**EASTING** 2,296,948	**24 HR.** 1.6
DRILL RIG/HAMMER EFF./DATE GFO0063 CME-45B 81% 03/26/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Smith, R. E.	**START DATE** 02/28/11	**COMP. DATE** 02/28/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										20.8	
	20.8	0.0	2	2	2	4				GROUND SURFACE	0.0
										UNDIVIDED COASTAL PLAIN TAN SAND, MOIST TO SATURATED	
	16.8	4.0	WOH	4	4	8	SS-1			16.5	4.3
										UNDIVIDED COASTAL PLAIN TAN SANDY CLAY, WET	
	12.4	8.4	3	5	7	12				13.8	7.0
							SS-2			**UNDIVIDED COASTAL PLAIN** TAN GRAY SAND, SATURATED	
	7.4	13.4	4	6	5	11					
	2.4	18.4	5	3	2	5	SS-3				
	-2.6	23.4	2	1	1	2					
	-7.6	28.4	25	14	34	48	SS-4			-7.5	28.3
										COASTAL PLAIN GRAY SAND WITH INDURATED LAYERS, SATURATED (PEEDEE FORMATION)	
	-12.6	33.4	24	60	40/0.2	100/0.7					
	-17.6	38.4	15	19	30	49	SS-5				
	-22.6	43.4	14	31	23	54					
	-27.6	48.4	9	12	13	25	SS-6				
	-32.6	53.4	15	19	22	41					
	-37.6	58.4	12	19	21	40	SS-7			-39.1	59.9
										Boring Terminated at Elevation -39.1 ft in Dense Sand	

WBS 34491.1.2	**TIP** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** DeLoatch, J. P.	
SITE DESCRIPTION BRIDGE NO. 253 ON -L- (US 17 BYPASS) OVER -Y8- (SR 1430)				**GROUND WTR (ft)**
BORING NO. EB2-B E.B.L.	**STATION** 282+44	**OFFSET** 64 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 20.7 ft	**TOTAL DEPTH** 59.9 ft	**NORTHING** 191,758	**EASTING** 2,297,005	**24 HR.** 1.5
DRILL RIG/HAMMER EFF./DATE GFO0063 CME-45B 81% 03/26/2010		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Smith, R. E.	**START DATE** 03/01/11	**COMP. DATE** 03/01/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										20.7	
	20.7	0.0	1	1	1	2	SS-8			GROUND SURFACE	0.0
										UNDIVIDED COASTAL PLAIN TAN GRAY SAND, MOIST TO SATURATED	
	16.7	4.0	4	6	5	11				14.7	6.0
	12.3	8.4	2	4	6	10	SS-9				
	7.3	13.4	6	9	10	19					
	2.3	18.4	8	11	13	24	SS-10				
	-2.7	23.4	2	2	2	4					
	-7.7	28.4	2	2	7	9	SS-11			-9.3	30.0
										COASTAL PLAIN GRAY SAND WITH INDURATED LAYERS, SATURATED (PEEDEE FORMATION)	
	-12.7	33.4	14	32	37	69					
	-17.7	38.4	40	58	42/0.2	100/0.7	SS-12				
	-22.7	43.4	6	14	23	37					
	-27.7	48.4	13	20	21	41	SS-13				
	-32.7	53.4	13	15	23	38					
	-37.7	58.4	12	16	25	41	SS-14			-39.2	59.9
										Boring Terminated at Elevation -39.2 ft in Dense Sand	

PROJECT REFERENCE NO.	SHEET
R-2633B	9 OF 9

34491.1.2

R-2633B

DUAL BRIDGES ON PROPOSED US 17 BYPASS OVER SR 1430 (CEDAR HILL ROAD) AT -L- STA. 281+51.83.

EB1-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-15	64 LT	280+36	1.0-1.5	A-2-4(0)	20	NP	24.6	55.1	12.2	8.1	100	92	22	-	-
SS-16	64 LT	280+36	4.0-5.5	A-2-4(0)	20	6	49.9	28.8	7.2	14.1	99	71	22	-	-
SS-17	64 LT	280+36	13.4-14.9	A-3(0)	22	NP	24.3	70.8	2.8	2.0	100	98	6	-	-
SS-18	64 LT	280+36	23.4-24.9	A-3(0)	23	NP	19.2	77.1	2.7	1.0	100	97	4	-	-
SS-19	64 LT	280+36	33.4-34.9	A-3(0)	20	NP	13.4	76.2	6.4	4.0	83	80	10	-	-
SS-20	64 LT	280+36	48.4-49.9	A-2-4(0)	19	NP	8.8	74.2	8.9	8.1	80	77	17	-	-
SS-21	64 LT	280+36	58.4-59.9	A-2-4(0)	21	NP	3.3	85.1	6.6	5.1	100	99	15	-	-

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-22	64 RT	280+91	4.0-5.5	A-6(2)	29	13	19.6	36.2	18.0	26.3	89	82	43	-	-
SS-23	64 RT	280+91	8.5-10.0	A-3(0)	22	NP	34.3	58.4	2.2	5.1	100	79	8	-	-
SS-24	64 RT	280+91	18.5-20.0	A-3(0)	22	NP	13.9	81.6	2.4	2.0	100	98	5	-	-
SS-25	64 RT	280+91	23.5-25.0	A-3(0)	21	NP	19.7	73.7	3.5	3.0	100	98	8	-	-
SS-26	64 RT	280+91	33.5-35.0	A-2-4(0)	19	NP	10.5	76.0	8.5	5.1	86	83	14	-	-
SS-27	64 RT	280+91	43.5-45.0	A-2-4(0)	19	NP	5.8	77.0	8.2	9.1	100	99	19	-	-
SS-28	64 RT	280+91	53.5-55.0	A-2-4(0)	21	NP	7.4	82.8	5.8	4.0	90	87	11	-	-

EB2-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-1	64 LT	281+89	4.3-5.5	A-6(8)	33	18	9.7	31.9	22.0	36.4	100	97	63	-	-
SS-2	64 LT	281+89	8.4-9.9	A-3(0)	25	NP	9.8	84.8	2.3	3.0	100	98	7	-	-
SS-3	64 LT	281+89	18.4-19.9	A-3(0)	23	NP	19.5	76.4	2.1	2.0	100	99	5	-	-
SS-4	64 LT	281+89	28.4-29.9	A-2-4(0)	14	NP	18.6	58.6	14.7	8.1	96	91	34	-	-
SS-5	64 LT	281+89	38.4-39.9	A-2-4(0)	17	NP	10.4	73.6	6.9	9.1	100	99	18	-	-
SS-6	64 LT	281+89	48.4-49.9	A-2-4(0)	21	NP	5.6	75.1	9.3	10.1	96	95	22	-	-
SS-7	64 LT	281+89	58.4-59.9	A-2-4(0)	22	NP	2.3	87.0	5.7	5.1	100	100	14	-	-

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-8	64 RT	282+44	1.0-1.5	A-2-4(0)	18	NP	36.6	48.1	5.3	10.1	99	81	16	-	-
SS-9	64 RT	282+44	8.4-9.9	A-3(0)	22	NP	18.8	75.2	2.0	4.0	100	94	7	-	-
SS-10	64 RT	282+44	18.4-19.9	A-3(0)	23	NP	18.1	79.0	0.9	2.0	100	98	4	-	-
SS-11	64 RT	282+44	28.4-29.9	A-3(0)	22	NP	19.2	76.5	1.3	3.0	100	98	5	-	-
SS-12	64 RT	282+44	38.4-39.6	A-2-4(0)	18	NP	15.4	69.3	8.3	7.1	64	60	11	-	-
SS-13	64 RT	282+44	48.4-49.9	A-2-4(0)	20	NP	4.3	81.1	8.5	6.1	90	89	16	-	-
SS-14	64 RT	282+44	58.4-59.9	A-2-4(0)	22	NP	3.5	88.3	5.2	3.0	100	100	11	-	-

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2633BA	1	13

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34491.1.2 (R-2633BA) F.A. PROJ. STPNHF-17(1)

COUNTY BRUNSWICK

PROJECT DESCRIPTION US 17 (WILMINGTON BYPASS) FROM US 74 /76 EAST OF MALMO TO WEST OF THE CAPE FEAR RIVER IN BRUNSWICK COUNTY

SITE DESCRIPTION BRIDGE ON SR 1426 RELOCATED OVER US 17 (WILMINGTON BYPASS) AT -Y7- STA. 31+63.68

ID: R-2633BA

PROJECT: 34491.1.2

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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PERSONNEL

S&ME, INC

INVESTIGATED BY T.C. BOTTOMS

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE DECEMBER 2011

NORTH CAROLINA LICENSED SEAL 2240 GEOLOGIST TYLER C. BOTTOMS

12/20/11

DRAWN BY: C.P. TURNER

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

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

PROJECT REFERENCE NO.	SHEET NO.
R-2633BA	2 OF 13

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
#/. - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [X] CME-750
- [ ] 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: TBM-1: DTM POINT AT -Y7- STA. 39+01, 71.50' LT (TAKEN FROM ROADWAY DTM FILE)

ELEVATION: 34.02 FT.

NOTES:

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET
R-2633BA	3 OF 13

SITE PLAN

0 40 80
FEET

N

185

182

30

34

-Y7-

-L-

F

POT Sta. 182+99.94 -L-=
POC Sta. 31+63.68 -Y7-

EB1-A

B1-A

EB2-A

EB1-B

B1-B

EB2-B

SKEW = 104° 30′ 17″

EB1 BENT LINE

B1 BENT LINE

EB2 BENT LINE

LP_B2

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
R-2633BA	4 OF 13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

PROFILE THROUGH BORINGS PROJECTED ALONG -Y7-

VE = 5

EB1-B
30+57
27' RT

B1-A
31+70
26' LT

EB2-A
32+82
26' LT

LOOSE TO DENSE (8, 14, 34) TAN AND GRAY (11, 12, 16) SAND AND (10, 23, 15) CLAYEY SAND,

MOIST TO SATURATED (ALLUVIAL)

VERY LOOSE TO DENSE (5, 10) GRAY SAND, (3, 14, 42) SATURATED (4, 10, 46) (PEEDEE FORMATION)

(A) 100/0.7 (50, 90, 40) (A) 100/0.3 (55, 70, 32) (A) 100/0.8 (60, 57, 25)

MEDIUM DENSE TO VERY DENSE GRAY SAND WITH SOFT TO HARD

(A) 100/0.8 (40, 55, 40) (65, 35, 65) (30, 65, 55)

CALCAREOUS (43, 20) SANDSTONE (70, 100/0.3, 22, 27) LENSES, (55, 25) SATURATED

(A) SOFT TO HARD GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)

(PEEDEE FORMATION)

NOTE: GROUNDLINE PROFILE ALONG -Y7- TAKEN FROM ROADWAY PROFILE DATED 11/11/11.

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

55 50 45 40 35 30 25 20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45

29+00 30+00 31+00 32+00 33+00 34+00 35+00

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CROSS SECTION THROUGH END BENT 1

EBI-A
30+70
26' LT

EBI-B
30+57
27' RT

LOOSE TO DENSE TAN AND GRAY SAND AND CLAYEY SAND, MOIST TO SATURATED (ALLUVIAL)

LOOSE TO MEDIUM DENSE GRAY SAND, SATURATED (PEEDEE FORMATION)

SOFT TO HARD GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)

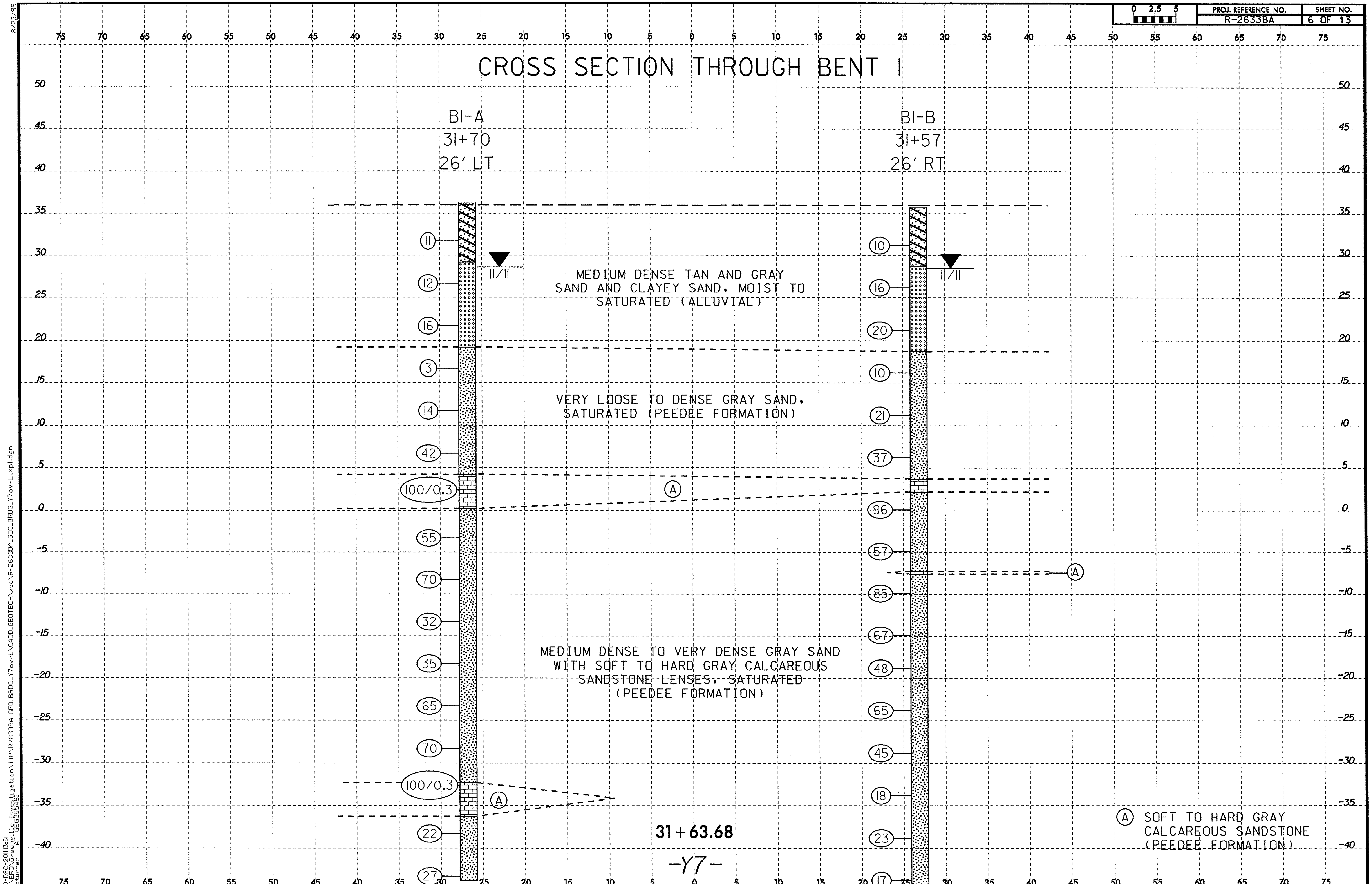
DENSE TO VERY DENSE GRAY SAND WITH SOFT TO HARD GRAY CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)

SOFT TO HARD GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)

MEDIUM DENSE TO VERY DENSE GRAY SAND WITH SOFT TO HARD GRAY CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)

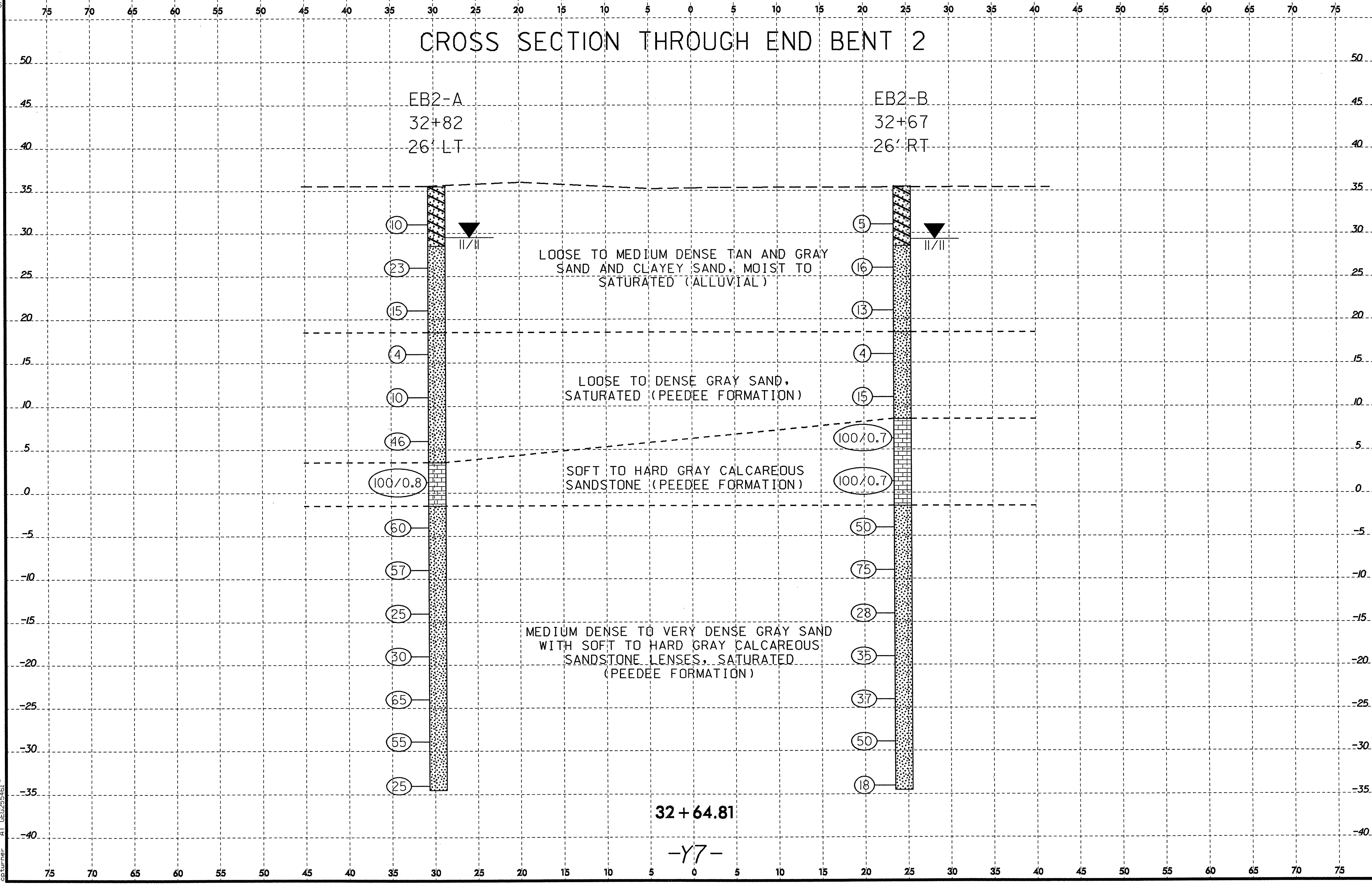
30+55.00

-Y7-



PROJ. REFERENCE NO.
R-2633BA
SHEET NO.
6 OF 13
CROSS SECTION THROUGH BENT I
BI-A
31+70
26' LT
BI-B
31+57
26' RT
MEDIUM DENSE TAN AND GRAY SAND AND CLAYEY SAND, MOIST TO SATURATED (ALLUVIAL)
VERY LOOSE TO DENSE GRAY SAND, SATURATED (PEEDEE FORMATION)
MEDIUM DENSE TO VERY DENSE GRAY SAND WITH SOFT TO HARD GRAY CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)
11/11
11
12
16
3
14
42
100/0.3
55
70
32
35
65
70
100/0.3
22
27
10
16
20
10
21
37
96
57
85
67
48
65
45
18
23
17
A
31+63.68
-Y7-
A SOFT TO HARD GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)
8/23/99
20-DEC-2011 13:51

CROSS SECTION THROUGH END BENT 2



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.	
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOCATED) OVER -L- (US 17 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 30+70	**OFFSET** 26 ft LT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 36.1 ft	**TOTAL DEPTH** 70.0 ft	**NORTHING** 193,546	**EASTING** 2,287,311	**24 HR.** 7.3
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/21/11	**COMP. DATE** 11/21/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
										GROUND SURFACE	36.1	0.0
	32.6	3.5	4	5	6	11				ALLUVIAL TAN AND GRAY SAND AND CLAYEY SAND, MOIST TO SATURATED		
	27.6	8.5	6	7	8	15					30.1	6.0
	22.6	13.5	9	11	14	25				COASTAL PLAIN GRAY SAND, SATURATED (PEEDEE FORMATION)	22.1	14.0
	17.6	18.5	2	3	5	8						
	12.6	23.5	4	5	5	10						
	7.6	28.5	100/0.3			100/0.3				COASTAL PLAIN GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)	9.1	27.0
	2.6	33.5	100/0.4			100/0.4						
	-2.4	38.5	22	48	38	86				COASTAL PLAIN GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)	-0.9	37.0
	-7.4	43.5	12	14	16	30						
	-12.4	48.5	12	12	18	30						
	-17.4	53.5	37	63/0.2		100/0.7				COASTAL PLAIN GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)	-15.9	52.0
	-22.4	58.5	20	25	30	55				COASTAL PLAIN GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)	-20.9	57.0
	-27.4	63.5	11	18	22	40						
	-32.4	68.5	8	12	13	25				Boring Terminated at Elevation -33.9 ft in Medium Dense Sand	-33.9	70.0

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.	
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOCATED) OVER -L- (US 17 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 30+57	**OFFSET** 27 ft RT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 36.2 ft	**TOTAL DEPTH** 70.0 ft	**NORTHING** 193,562	**EASTING** 2,287,259	**24 HR.** 7.3
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/21/11	**COMP. DATE** 11/21/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
										GROUND SURFACE	36.2	0.0
	32.7	3.5	4	3	5	8				ALLUVIAL TAN AND GRAY SAND AND CLAYEY SAND, MOIST TO SATURATED		
	27.7	8.5	5	6	8	14					29.2	7.0
	22.7	13.5	12	16	18	34				COASTAL PLAIN GRAY SAND, SATURATED (PEEDEE FORMATION)	19.2	17.0
	17.7	18.5	3	2	3	5						
	12.7	23.5	3	4	6	10						
	7.7	28.5	47	53/0.2		100/0.7				COASTAL PLAIN GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)	9.2	27.0
	2.7	33.5	23	24	26	50				COASTAL PLAIN GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)	4.2	32.0
	-2.3	38.5	29	41	49	90						
	-7.3	43.5	13	20	20	40						
	-12.3	48.5	25	29	26	55						
	-17.3	53.5	10	16	24	40						
	-22.3	58.5	20	27	73/0.3	100/0.8				COASTAL PLAIN GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)	-20.8	57.0
	-27.3	63.5	15	20	23	43				COASTAL PLAIN GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)	-25.8	62.0
	-32.3	68.5	9	9	11	20				Boring Terminated at Elevation -33.8 ft in Medium Dense Sand	-33.8	70.0

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.	
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOCATED) OVER -L- (US 17 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 31+70	**OFFSET** 26 ft LT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 36.2 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 193,447	**EASTING** 2,287,307	**24 HR.** 7.6
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/17/11	**COMP. DATE** 11/17/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
40										
										36.2 GROUND SURFACE 0.0
35										**ALLUVIAL** TAN AND GRAY SAND AND CLAYEY SAND, MOIST TO SATURATED
	32.7	3.5	7	5	6	11				
30	27.7	8.5	5	6	6	12				29.2 7.0
25	22.7	13.5	7	8	8	16				
20	17.7	18.5	4	1	2	3				19.2 17.0 **COASTAL PLAIN** GRAY SAND, SATURATED (PEEDEE FORMATION)
15	12.7	23.5	3	6	8	14				
10	7.7	28.5	20	20	22	42				
5	2.7	33.5	100/0.3			100/0.3				4.2 32.0 **COASTAL PLAIN** GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)
0	-2.3	38.5	30	24	31	55				0.2 36.0 **COASTAL PLAIN** GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)
-5	-7.3	43.5	13	36	34	70				
-10	-12.3	48.5	14	12	20	32				
-15	-17.3	53.5	10	15	20	35				
-20	-22.3	58.5	15	27	38	65				
-25	-27.3	63.5	21	31	39	70				
-30	-32.3	68.5	100/0.3			100/0.3				-32.3 68.5 **COASTAL PLAIN** GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)
-35	-37.3	73.5	8	10	12	22				-36.3 72.5
-40										

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.	
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOCATED) OVER -L- (US 17 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 31+70	**OFFSET** 26 ft LT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 36.2 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 193,447	**EASTING** 2,287,307	**24 HR.** 7.6
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/17/11	**COMP. DATE** 11/17/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-40						Match Line				
	-42.3	78.5	7	10	17	27				**COASTAL PLAIN** GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION) *(continued)*
										-43.8 80.0 Boring Terminated at Elevation -43.8 ft in Medium Dense Sand

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.	
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOCATED) OVER -L- (US 17 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 31+57	**OFFSET** 26 ft RT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 35.7 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 193,462	**EASTING** 2,287,255	**24 HR.** 7.2
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/17/11	**COMP. DATE** 11/17/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
40										
35										35.7 GROUND SURFACE 0.0
	32.2	3.5	3	4	6	10				**ALLUVIAL** TAN AND GRAY SAND, MOIST TO SATURATED
30	27.2	8.5	5	6	10	16		▼		28.7 7.0
25	22.2	13.5	7	10	10	20				
20	17.2	18.5	4	5	5	10				18.7 17.0 **COASTAL PLAIN** GRAY SAND, SATURATED (PEEDEE FORMATION)
15	12.2	23.5	7	11	10	21				
10	7.2	28.5	5	9	28	37				
5	1.1	34.6	16	30	66	96	RS-1			3.7 32.0 **COASTAL PLAIN** GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)
0	-3.9	39.6	12	31	26	57				2.2 33.5 **COASTAL PLAIN** GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)
-5	-8.9	44.6	11	21	64	85				-7.3 43.0 **COASTAL PLAIN** GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)
-10	-13.9	49.6	12	23	44	67				-7.6 43.3 **COASTAL PLAIN** GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)
-15	-17.8	53.5	12	22	26	48				
-20	-22.8	58.5	21	31	34	65				
-25	-27.8	63.5	19	20	25	45				
-30	-32.8	68.5	7	7	11	18				
-35	-37.8	73.5	13	11	12	23				
-40										

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.	
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOCATED) OVER -L- (US 17 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 31+57	**OFFSET** 26 ft RT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 35.7 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 193,462	**EASTING** 2,287,255	**24 HR.** 7.2
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/17/11	**COMP. DATE** 11/17/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-40						Match Line				
	-42.8	78.5	6	7	10	17				-44.3 80.0 Boring Terminated at Elevation -44.3 ft in Medium Dense Sand

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.	
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOCATED) OVER -L- (US 17 BYPASS)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 31+57	**OFFSET** 26 ft RT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 35.7 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 193,462	**EASTING** 2,287,255	**24 HR.** 7.2
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/17/11	**COMP. DATE** 11/17/11	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQZ	**TOTAL RUN** 15.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
5.6											Begin Coring @ 30.1 ft
5	5.6	30.1	4.5		(1.5) 33%	(0.3) 7%					COASTAL PLAIN GRAY SAND, SATURATED (PEEDEE FORMATION) *(continued)*
	1.1	34.6					RS-1				3.7 — 32.0
0	-0.4	36.1		N=96							2.2 — 33.5
			3.5		(0.0) 0%	(0.0) 0%					COASTAL PLAIN GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)
	-3.9	39.6									COASTAL PLAIN GRAY SAND, SATURATED (PEEDEE FORMATION)
-5	-5.4	41.1		N=57							
			3.5		(0.3) 9%	(0.0) 0%					-7.3 — 43.0
	-8.9	44.6									-7.6 — 43.3
-10	-10.4	46.1		N=85							COASTAL PLAIN GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)
			3.5		(0.0) 0%	(0.0) 0%					COASTAL PLAIN GRAY SAND, SATURATED (PEEDEE FORMATION)
	-13.9	49.6									
-15				N=67							
				N=48							
-20											
				N=65							
-25											
				N=45							
-30											
				N=18							
-35											
				N=23							
-40											
				N=17							-44.3 — 80.0
											Boring Terminated at Elevation -44.3 ft in Medium Dense Sand

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

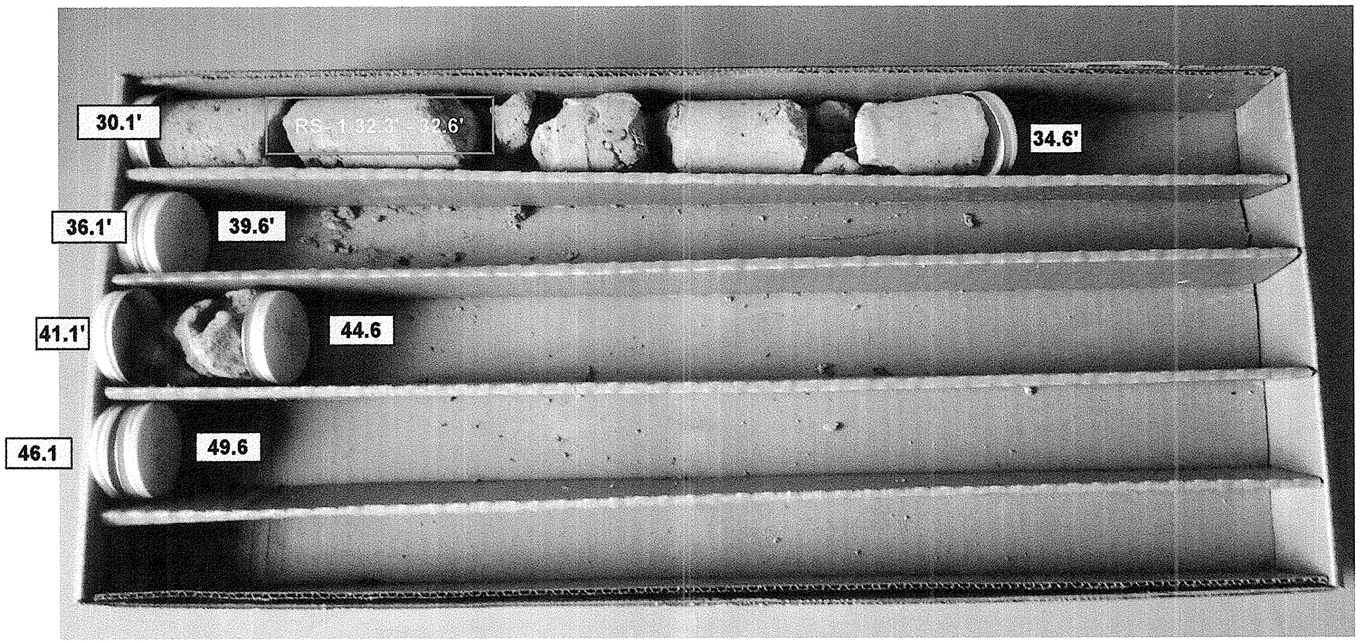
WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.	
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOCATED) OVER -L- (US 17 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 32+82	**OFFSET** 26 ft LT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 35.5 ft	**TOTAL DEPTH** 70.0 ft	**NORTHING** 193,336	**EASTING** 2,287,304	**24 HR.** 6.0
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/16/11	**COMP. DATE** 11/16/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
										GROUND SURFACE	35.5	0.0
										ALLUVIAL TAN AND GRAY SAND AND CLAYEY SAND, MOIST TO SATURATED		
	32.0	3.5	3	4	6	10					28.5	7.0
	27.0	8.5	8	10	13	23						
	22.0	13.5	5	6	9	15					18.5	17.0
	17.0	18.5	3	2	2	4				**COASTAL PLAIN** GRAY SAND, SATURATED (PEEDEE FORMATION)		
	12.0	23.5	5	5	5	10						
	7.0	28.5	3	7	39	46					3.5	32.0
	2.0	33.5	48	52/0.3		100/0.8				**COASTAL PLAIN** GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)		
	-3.0	38.5	30	30	30	60					-1.5	37.0
	-8.0	43.5	37	27	30	57				**COASTAL PLAIN** GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)		
	-13.0	48.5	10	12	13	25						
	-18.0	53.5	12	15	15	30						
	-23.0	58.5	14	35	30	65						
	-28.0	63.5	20	25	30	55						
	-33.0	68.5	9	11	14	25					-34.5	70.0
										Boring Terminated at Elevation -34.5 ft in Medium Dense Sand		

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.	
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOCATED) OVER -L- (US 17 BYPASS)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 32+67	**OFFSET** 26 ft RT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 35.5 ft	**TOTAL DEPTH** 70.0 ft	**NORTHING** 193,351	**EASTING** 2,287,252	**24 HR.** 6.2
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/16/11	**COMP. DATE** 11/16/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
										GROUND SURFACE	35.5	0.0
										ALLUVIAL TAN AND GRAY SAND AND CLAYEY SAND, MOIST TO SATURATED		
	32.0	3.5	4	2	3	5					28.5	7.0
	27.0	8.5	5	5	11	16						
	22.0	13.5	4	7	6	13					18.5	17.0
	17.0	18.5	1	2	2	4				**COASTAL PLAIN** GRAY SAND, SATURATED (PEEDEE FORMATION)		
	12.0	23.5	6	8	7	15						
	7.0	28.5	30	70/0.2		100/0.7					8.5	27.0
	2.0	33.5	49	51/0.2		100/0.7				**COASTAL PLAIN** GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)		
	-3.0	38.5	21	14	36	50					-1.5	37.0
	-8.0	43.5	35	35	40	75				**COASTAL PLAIN** GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)		
	-13.0	48.5	10	12	16	28						
	-18.0	53.5	17	17	18	35						
	-23.0	58.5	6	19	18	37						
	-28.0	63.5	16	24	26	50						
	-33.0	68.5	7	7	11	18					-34.5	70.0
										Boring Terminated at Elevation -34.5 ft in Medium Dense Sand		

CORE PHOTOGRAPH
B1-B
Box 1 of 1 (30.1' to 34.6', 36.1' to 39.6', 41.1' to 44.6', 46.1' to 49.6')



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2633BA	1	8

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34491.1.2 (R-2633BA) F.A. PROJ. STPNHF-17(1)

COUNTY BRUNSWICK

PROJECT DESCRIPTION US 17 (WILMINGTON BYPASS) FROM US 74 /76 EAST OF MALMO TO WEST OF THE CAPE FEAR RIVER IN BRUNSWICK COUNTY

SITE DESCRIPTION BRIDGE ON SR 1426 RELOCATED OVER CSX RAILROAD /SEABOARD COAST LINE RAILROAD BETWEEN SR 1429 AND SR 1455 AT -Y7- STA. 38+50.27

ID: R-2633BA

PROJECT: 34491.1.2

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CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PERSONNEL

S&ME, INC.

INVESTIGATED BY T.C. BOTTOMS

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE DECEMBER 2011

NORTH CAROLINA LICENSED SEAL 2240 GEOLOGIST TYLER C. BOTTOMS

12/17/12

DRAWN BY: C.P. TURNER

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PROJECT REFERENCE NO.	SHEET NO.
R-2633BA	2 OF 8

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		
	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [X] CME-750
- [ ] 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: TBM-1: DTM POINT AT -Y7- STA. 39+01, 71.50' LT (TAKEN FROM ROADWAY DTM FILE)

ELEVATION: 34.02 FT.

NOTES:

REVISED 09/23/09

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SITE PLAN

0 40 80

FEET

37

40

F

-EY7A-

-Y7-

12' SOIL

EB1-A

EB2-A

EB1-B

EB2-B

SKEW = 116° 13' 46"

EB1 BENT LINE

EB2 BENT LINE

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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

PROFILE THROUGH BORINGS PROJECTED ALONG -Y7-

VE = 5

EBI-B
37+62
26' RT

EXIST. RR
℄

EB2-A
39+52
38' LT

LOOSE TO MEDIUM DENSE SATURATED TAN AND GRAY SAND AND CLAYEY SAND, MOIST TO SATURATED (UNDIVIDED COASTAL PLAIN)

VERY LOOSE TO MEDIUM DENSE GRAY SAND, VERY SOFT TO MODERATELY HARD GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)

MEDIUM DENSE TO MODERATELY HARD VERY DENSE GRAY SAND WITH CALCAREOUS SANDSTONE (PEEDEE FORMATION) VERY SOFT TO LENSES, SATURATED

EBI-B		EB2-A	
18		14	
20	▼ 11/11	5	▼ 11/11
16		6	
2		2	
6		11	
100/0.9'		17	
100/0.8'		25	
100/0.7'		44	
100/0.8'		70	
49		74	
33		28	
50		55	
45		73	
50		30	

NOTE: GROUNDLINE PROFILE ALONG -Y7- TAKEN FROM ROADWAY PROFILE DATED 11/11.

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

60 55 50 45 40 35 30 25 20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35 -40

35+00 36+00 37+00 38+00 39+00 40+00 41+00 42+00

5/14/99

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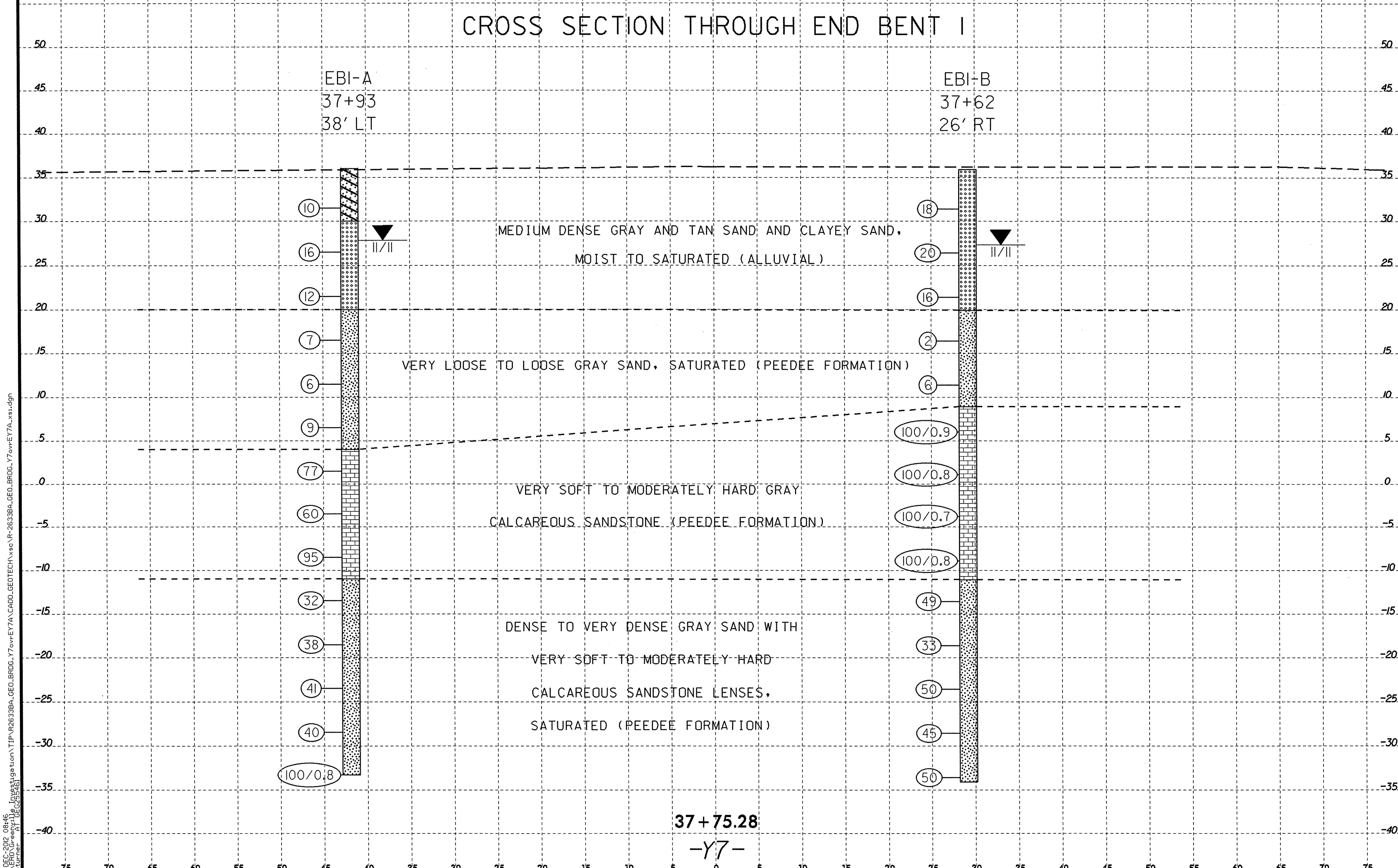
CROSS SECTION THROUGH END BENT I



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opturner AT GEO25461

CROSS SECTION THROUGH END BENT 2

EB2-A
39+52
38' LT

EB2-B
39+19
26' RT

VERY LOOSE TO MEDIUM DENSE GRAY SAND
AND CLAYEY SAND, MOIST TO SATURATED
(UNDIVIDED COASTAL PLAIN)

SOFT GRAY SILTY CLAY, WET
(UNDIVIDED COASTAL PLAIN)

VERY LOOSE TO MEDIUM DENSE GRAY
SAND, SATURATED (PEEDEE FORMATION)

MEDIUM DENSE TO VERY DENSE GRAY SAND
WITH VERY SOFT TO MODERATELY HARD
CALCAREOUS SANDSTONE LENSES,
SATURATED (PEEDEE FORMATION)

EB2-A		EB2-B	
14		13	
5	11/11	3	11/11
6		4	ST-1
2			ST-2
11		6	
17		15	
25		12	
A		14	
44		100/0.7	A
70		72	
74		48	
28		34	
55		40	
73		90	
30		37	

39+32.67

-Y7-

(A) VERY SOFT TO MODERATELY HARD GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)

8/23/99

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NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.	
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOC.) OVER -EY7A- (CSX SEABOARD RAILROAD)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 37+93	**OFFSET** 38 ft LT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 36.0 ft	**TOTAL DEPTH** 69.3 ft	**NORTHING** 192,828	**EASTING** 2,287,332	**24 HR.** 8.2
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/15/11	**COMP. DATE** 11/16/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
										GROUND SURFACE	36.0	0.0
	32.5	3.5	4	5	5	10				**ALLUVIAL** GRAY AND TAN SAND AND CLAYEY SAND, MOIST TO SATURATED	30.0	6.0
	27.5	8.5	6	8	8	16						
	22.5	13.5	6	6	6	12				**COASTAL PLAIN** GRAY SAND, SATURATED (PEEDEE FORMATION)	20.0	16.0
	17.5	18.5	4	4	3	7						
	12.5	23.5	2	3	3	6						
	7.5	28.5	2	4	5	9						
	2.5	33.5	28	40	37	77					4.0	32.0
	-2.5	38.5	18	27	33	60				**COASTAL PLAIN** GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)		
	-7.5	43.5	12	15	80	95						
	-12.5	48.5	11	16	16	32					-11.0	47.0
	-17.5	53.5	5	12	26	38				**COASTAL PLAIN** GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)		
	-22.5	58.5	15	18	23	41						
	-27.5	63.5	13	18	22	40						
	-32.5	68.5	50	50/0.3		100/0.8					-33.3	69.3
										Boring Terminated at Elevation -33.3 ft in Very Dense Sand with Sandstone Lenses		

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.	
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOC.) OVER -EY7A- (CSX SEABOARD RAILROAD)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 37+62	**OFFSET** 26 ft RT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 35.9 ft	**TOTAL DEPTH** 70.0 ft	**NORTHING** 192,854	**EASTING** 2,287,266	**24 HR.** 8.6
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/15/11	**COMP. DATE** 11/15/11	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
										GROUND SURFACE	35.9	0.0
	32.4	3.5	11	10	8	18				**ALLUVIAL** TAN SAND, MOIST TO SATURATED	19.9	16.0
	27.4	8.5	5	9	11	20						
	22.4	13.5	5	7	9	16				**COASTAL PLAIN** GRAY SAND, SATURATED (PEEDEE FORMATION)	8.9	27.0
	17.4	18.5	WOH	1	1	2						
	12.4	23.5	2	2	4	6						
	7.4	28.5	36	44	56/0.4	100/0.9						
	2.4	33.5	39	50	50/0.3	100/0.8						
	-2.6	38.5	33	64	36/0.2	100/0.7						
	-7.6	43.5	40	42	58/0.3	100/0.8						
	-12.6	48.5	14	23	26	49				**COASTAL PLAIN** GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)	-11.1	47.0
	-17.6	53.5	11	13	20	33						
	-22.6	58.5	12	21	29	50						
	-27.6	63.5	42	25	20	45						
	-32.6	68.5	14	19	31	50					-34.1	70.0
										Boring Terminated at Elevation -34.1 ft in Dense Sand		

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOC.) OVER -EY7A- (CSX SEABOARD RAILROAD)			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 39+52	**OFFSET** 38 ft LT	**ALIGNMENT** -Y7- **0 HR.** N/A
COLLAR ELEV. 34.3 ft	**TOTAL DEPTH** 70.0 ft	**NORTHING** 192,671	**EASTING** 2,287,346 **24 HR.** 8.4
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/15/11	**COMP. DATE** 11/15/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
35										34.3 GROUND SURFACE 0.0
										ALLUVIAL GRAY SAND AND CLAYEY SAND, MOIST TO SATURATED
30	30.8	3.5	4	5	9	14				28.3 6.0
25	25.8	8.5	2	1	4	5				
20	20.8	13.5	3	4	2	6				18.3 16.0
15	15.8	18.5	WOH	WOH	2	2				**COASTAL PLAIN** GRAY SAND, SATURATED (PEEDEE FORMATION)
10	10.8	23.5	5	6	5	11				
5	5.8	28.5	3	7	10	17				
0	0.8	33.5	3	7	18	25				
-5	-4.2	38.5	23	16	28	44				-2.7 37.0 -3.7 38.0 **COASTAL PLAIN** GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION) **COASTAL PLAIN** GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)
-10	-9.2	43.5	27	35	35	70				
-15	-14.2	48.5	17	21	53	74				
-20	-19.2	53.5	17	12	16	28				
-25	-24.2	58.5	22	20	35	55				
-30	-29.2	63.5	13	45	28	73				
-35	-34.2	68.5	9	12	18	30				-35.7 70.0 Boring Terminated at Elevation -35.7 ft in Dense Sand with Sandstone Lenses

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Brandsen, J.
SITE DESCRIPTION BRIDGE ON -Y7- (SR 1426 RELOC.) OVER -EY7A- (CSX SEABOARD RAILROAD)			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 39+19	**OFFSET** 26 ft RT	**ALIGNMENT** -Y7- **0 HR.** N/A
COLLAR ELEV. 34.1 ft	**TOTAL DEPTH** 70.0 ft	**NORTHING** 192,697	**EASTING** 2,287,279 **24 HR.** 8.5
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 12/01/2006		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/14/11	**COMP. DATE** 11/14/11	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
35										34.1 GROUND SURFACE 0.0
										ALLUVIAL GRAY SAND, MOIST TO SATURATED
30	30.6	3.5	4	6	7	13				
25	25.6	8.5	1	1	2	3				22.1 12.0
20	20.6	13.5	3	2	2	4				**ALLUVIAL** GRAY CLAY, WET
15	15.6	18.5	WOH	3	3	6				17.1 17.0
10	10.6	23.5	5	9	6	15				**COASTAL PLAIN** GRAY SAND, SATURATED (PEEDEE FORMATION)
5	5.6	28.5	3	4	8	12				
0	0.6	33.5	3	4	10	14				-1.9 36.0 **COASTAL PLAIN** GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION)
-5	-4.4	38.5	22	31	79/0.2	100/0.7				-7.9 42.0 **COASTAL PLAIN** GRAY SAND WITH CALCAREOUS SANDSTONE LENSES, SATURATED (PEEDEE FORMATION)
-10	-9.4	43.5	28	38	34	72				
-15	-14.4	48.5	16	22	26	48				
-20	-19.4	53.5	10	15	19	34				
-25	-24.4	58.5	18	22	18	40				
-30	-29.4	63.5	20	66	24	90				
-35	-34.4	68.5	15	15	22	37				-35.9 70.0 Boring Terminated at Elevation -35.9 ft in Dense Sand with Sandstone Lenses

Other Samples:
ST-1 (12.0 - 13.5)
ST-2 (15.0 - 17.0)

ID: R-2633B

CONTRACT: 34491.1.2

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4-5	PROFILES
6-10	CROSS SECTIONS
11-16	BORELOGS/CORELOGS
17-18	SOIL TEST RESULTS
19	SCOUR REPORT
20	CORE PHOTO

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34491.1.2 (R-2633B) F.A. PROJ. STPNHF-17(1)

COUNTY BRUNSWICK

PROJECT DESCRIPTION US 17 (WILMINGTON BYPASS) FROM 74-76 EAST OF MALMO IN BRUNSWICK COUNTY TO NORTH OF WILMINGTON IN NEW HANOVER COUNTY.

SITE DESCRIPTION DUAL BRIDGES ON PROPOSED US 17 BYPASS OVER CARTWHEEL BRANCH AT -L- STA. 265+52.5

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2633B	1	20

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34491.1.2	STPNHF-17(1)	P.E.
		R/W & UTIL.

CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PERSONNEL

S&ME PERSONNEL

INVESTIGATED BY J.L. STONE

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE DECEMBER 2010

NORTH CAROLINA LICENSED SEAL 2007 GEOLOGIST JOSEPH L. STONE 12-13-10

DRAWN BY: C.R. SUMNER

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

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

PROJECT REFERENCE NO.	SHEET NO.
R-2633B	2 OF 20

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B- _____
- [X] -N- X
- [ ] -H- _____

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BENCH MARK: BM:6 -BL- STA. 489+38 138' RT

ELEVATION: 24.9 FT.

NOTES:
-

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET
R-2633B	3

0 50 100
FEET

SKEW = 60 °

NAD 83

265+00

WLB

CARTWHEELL BRANCH

WLB

269+00

EB1-A SBL

B1-A SBL

B3-A SBL

EB2-A SBL

US-17 SOUTHBOUND LN.

-L- N 88° 49' 45.0" E

-L-

TO SR 1426

TO SR 1430 (CEDAR HILL RD.)

B2-A NBL

US-17 NORTHBOUND LN.

EB1-B NBL

B1-B NBL

B3-B NBL

EB2-B NBL

-RP_C3- S 88° 52' 15.0" E

EB1 BENT LINE

B1 BENT LINE

B2 BENT LINE

B3 BENT LINE

EB2 BENT LINE

WLB

WLB

15+00

PROJECT REFERENCE NO.	SHEET NO.
R-2633B	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PROFILE THROUGH BORINGS PROJECTED ALONG -L- 44' LT

VE = 5

EB1-A SBL 263+50 59' LT

B1-A SBL 264+38 59' LT

B3-A SBL 266+18 59' LT

EB2-A SBL 266+87 59' LT

WATER SURFACE

VERY LOOSE TO MEDIUM DENSE BROWN AND CLAYEY SAND, MOIST TO SAT.

VERY LOOSE TO VERY DENSE GRAY SAND WITH THIN SANDSTONE LAYERS, SAT. (PEEDEE FORMATION)

ORANGE, AND GRAY SAND (UNDIVIDED COASTAL PLAIN)

Ⓐ VERY LOOSE BROWN MUCK, SAT. (ALLUVIAL)

Ⓑ LOOSE BROWN SAND, MOIST (ARTIFICIAL FILL)

NOTE: GROUNDLINE PROFILE AT 44' LT OF -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 04/29/2008

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

70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120

259+00 260+00 261+00 262+00 263+00 264+00 265+00 266+00 267+00 268+00 269+00 270+00 271+00 272+00

5/14/99

PROFILE THROUGH BORINGS PROJECTED ALONG –L– 52' RT

PROJECT REFERENCE NO.	SHEET NO.
R-2633B	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

VE = 5

EBI-B NBL 264+28 53' RT

BI-B NBL 265+19 73' RT

B2-A NBL 265+65 5' RT

B3+B NBL 266+97 81' RT

EB2-B NBL 267+69 84' RT

ENLARGEMENT OF BI-B NBL CORE AREA

STRATA AVG. REC.= 100% ROD.= 0%

VERY LOOSE TO MEDIUM SAND AND

DENSE BROWN CLAYEY SAND, (UNDIVIDED

ORANGE MOIST COASTAL AND GRAY TO SAT. PLAIN)

VERY LOOSE TO VERY

DENSE GRAY SAND WITH (PEEDEE FORMATION)

THIN SANDSTONE LAYERS, SAT.

Ⓐ LOOSE BROWN SAND, MOIST TO SAT. (ARTIFICIAL FILL)

Ⓑ VERY LOOSE BROWN MUCK, SAT. (ALLUVIAL)

NOTE: GROUNDLINE PROFILE AT 52' RT OF –L– TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 04/29/2008

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

70 60 50 40 30 20 10 0 –10 –20 –30 –40 –50 –60 –70 –80 –90 –100 –110 –120

259+00 260+00 261+00 262+00 263+00 264+00 265+00 266+00 267+00 268+00 269+00 270+00 271+00 272+00

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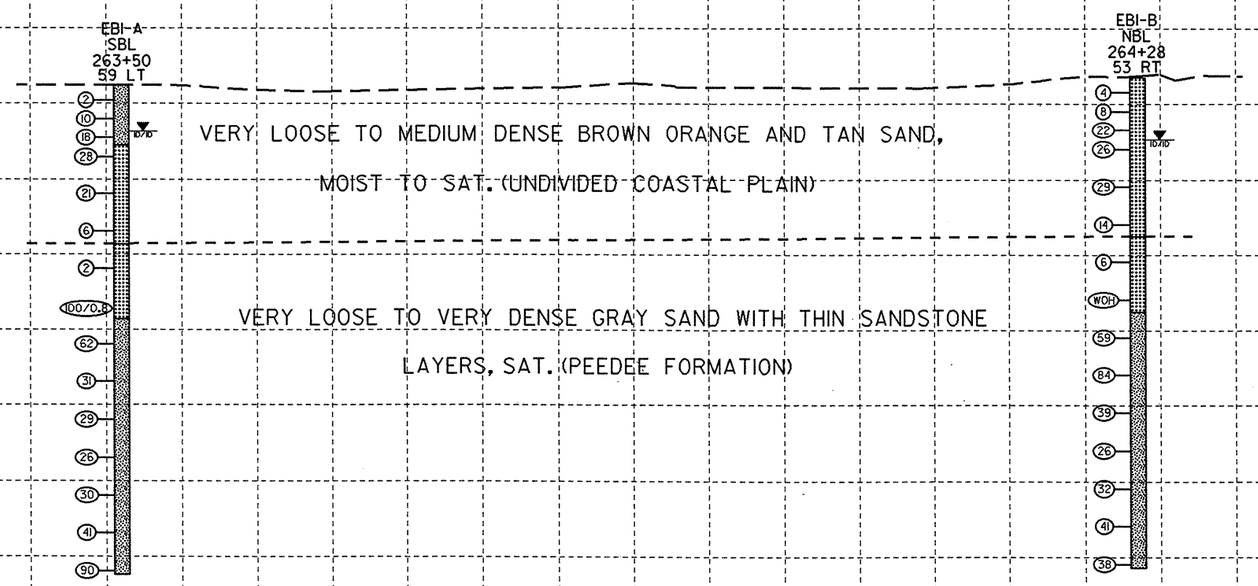
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2633B	6

CROSS SECTION THROUGH END BENT 1



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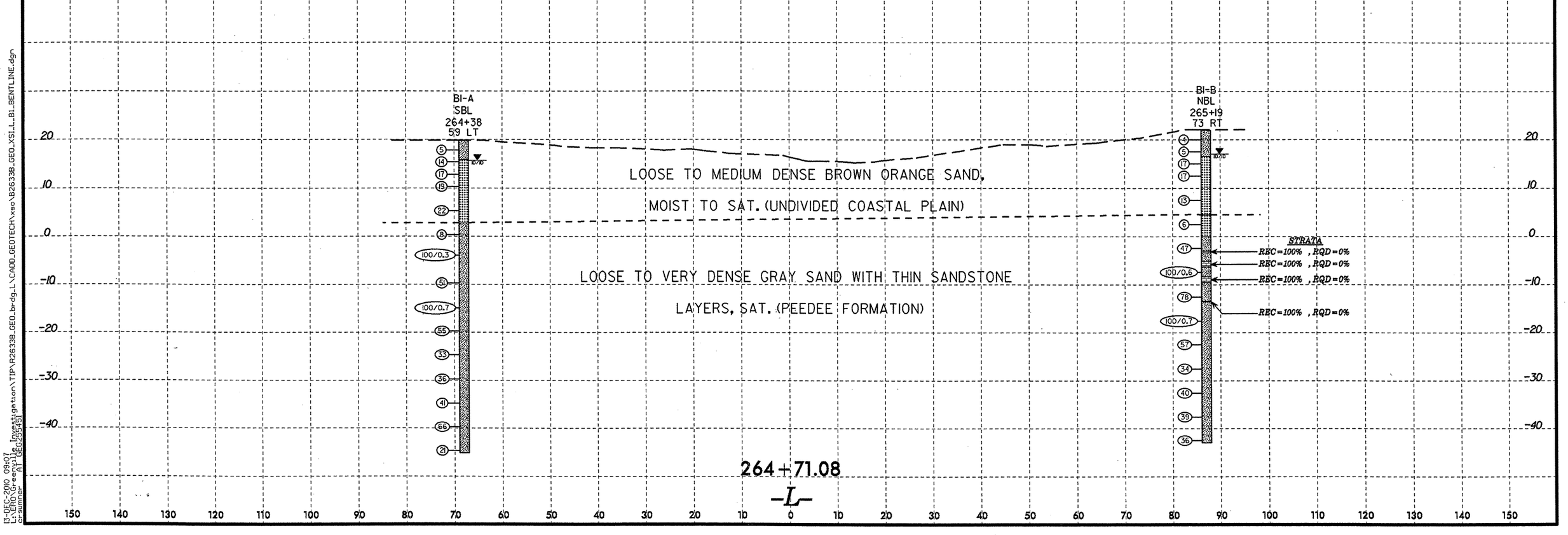

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PROJ. REFERENCE NO.	SHEET NO.
R-2633B	8

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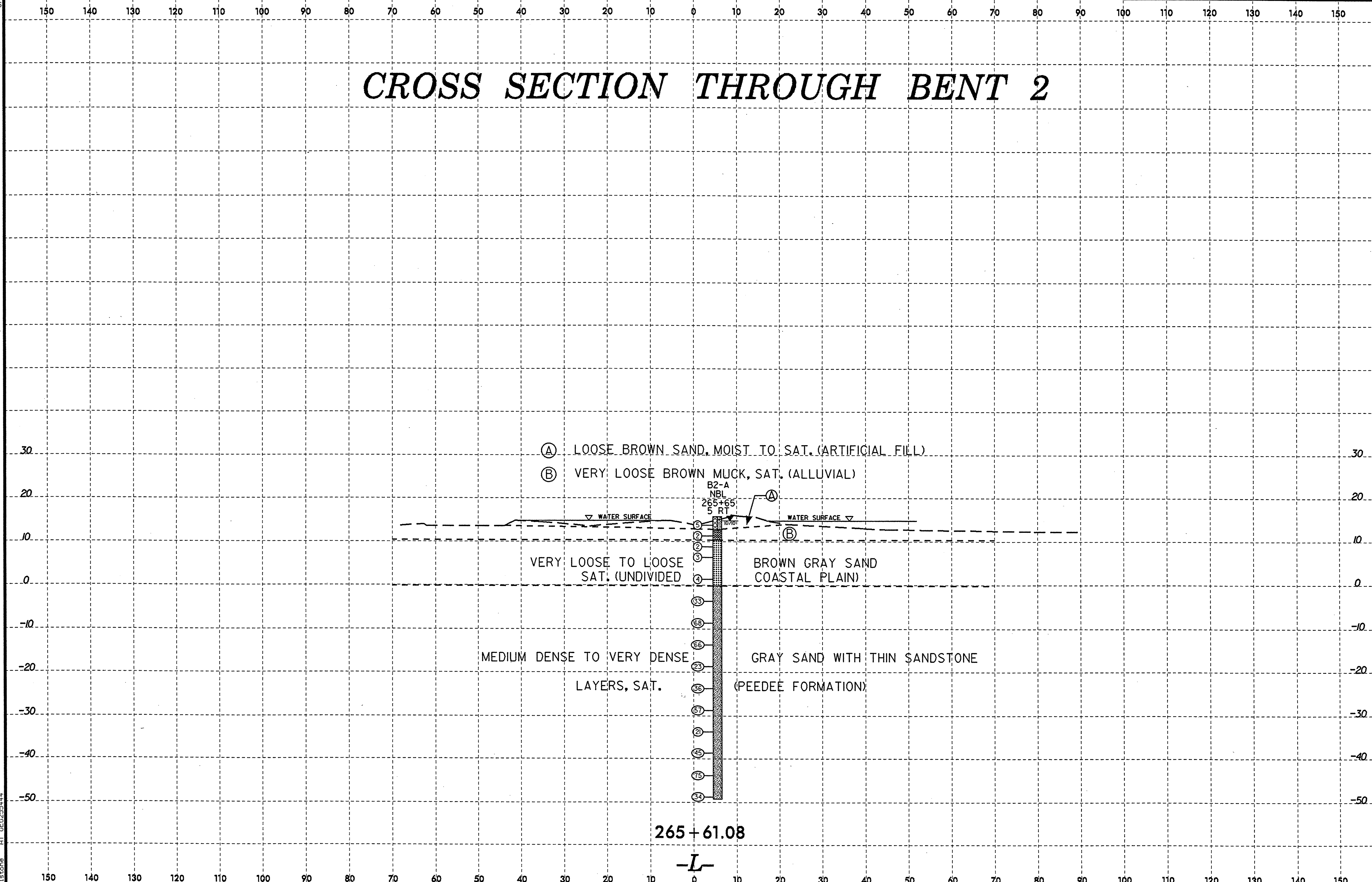

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	R-2633B	9

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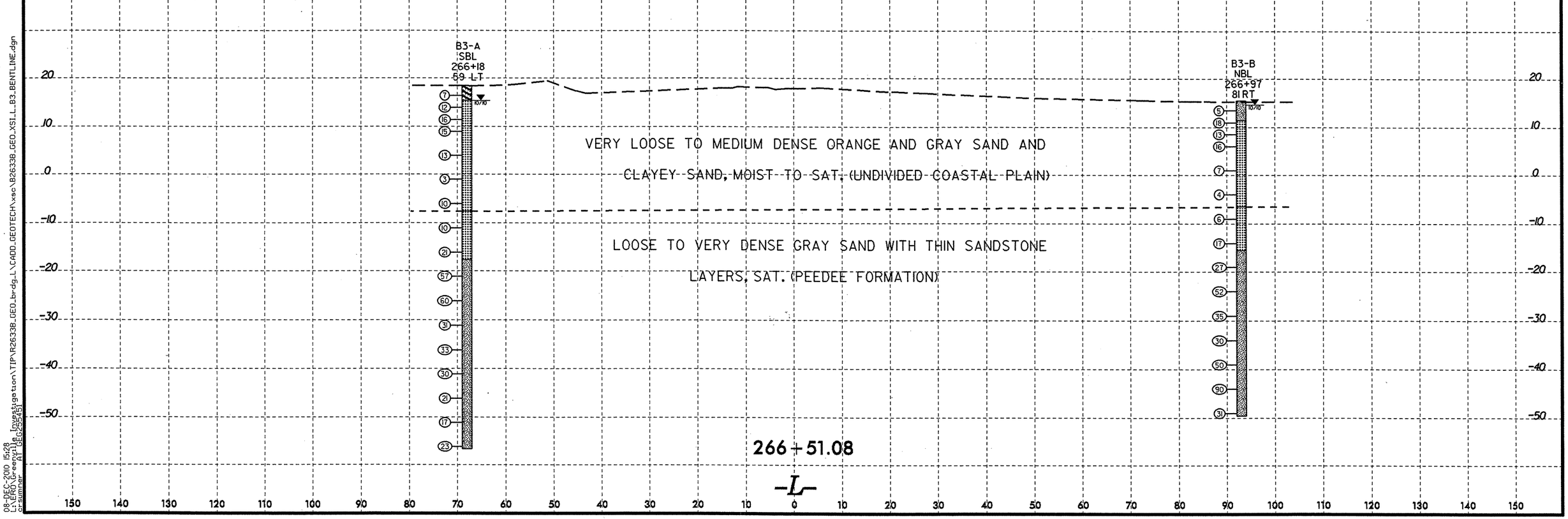

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2633B	10

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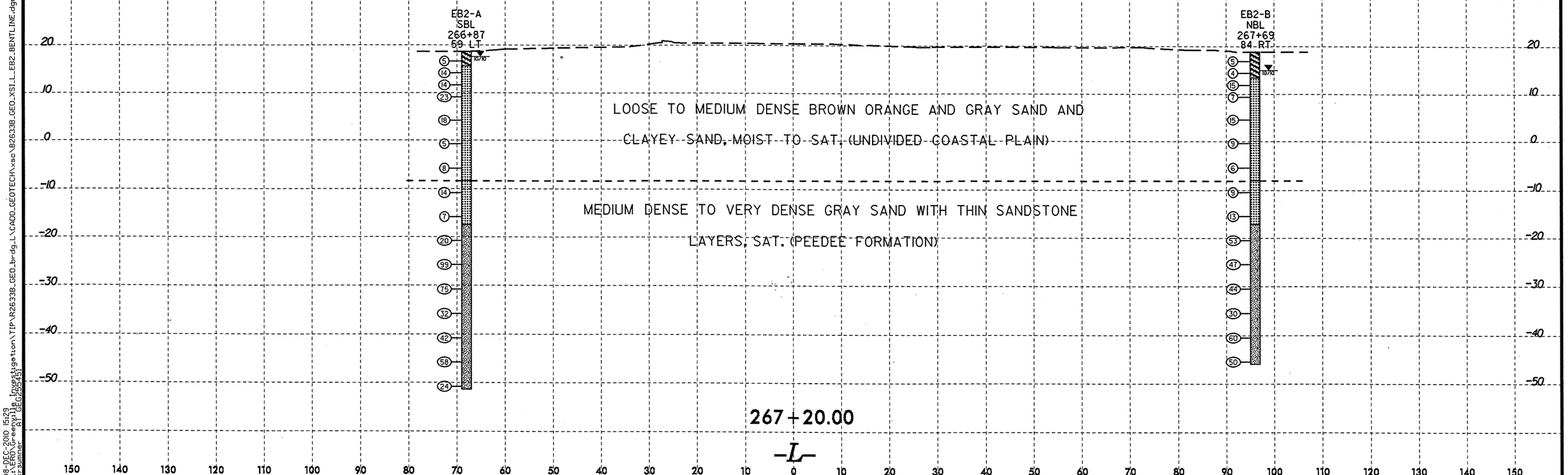

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NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** N. BRADLEY	
SITE DESCRIPTION DUAL BRIDGES ON -L- (US17 WILMINGTON BYPASS) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. EB1-A SBL	**STATION** 263+50	**OFFSET** 59 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 22.5 ft	**TOTAL DEPTH** 64.8 ft	**NORTHING** 191,843	**EASTING** 2,295,110	**24 HR.** 6.2
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/21/10	**COMP. DATE** 10/22/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										22.5 GROUND SURFACE	0.0
	21.5	1.0								**UNDIVIDED COASTAL PLAIN** TAN ORANGE SAND, MOIST TO SAT.	
20	19.0	3.5	1	1	1	2	SS-67				
	16.5	6.0	2	4	6	10					
15	14.0	8.5	3	5	13	18	SS-68			14.5	8.0
			11	13	15	28					
10	9.2	13.3	8	9	12	21					
5	4.2	18.3	6	4	2	6	SS-69			1.5	21.0
0	-0.8	23.3	2	1	1	2	SS-70			**COASTAL PLAIN** GRAY SAND WITH THIN SANDSTONE LAYERS, SAT. (PEEDEE FORMATION)	
-5	-5.8	28.3	21	44	56/0.3	100/0.8					
-10	-10.8	33.3	21	32	30	62	SS-71			-8.5	31.0
-15	-15.8	38.3	13	13	18	31					
-20	-20.8	43.3	12	17	12	29	SS-72				
-25	-25.8	48.3	8	11	15	26					
-30	-30.8	53.3	6	17	13	30	SS-73				
-35	-35.8	58.3	30	18	23	41					
-40	-40.8	63.3	14	13	77	90				-42.3	64.8
-45										Boring Terminated at Elevation -42.3 ft IN VERY DENSE SAND	
-50											
-55											

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** N. BRADLEY	
SITE DESCRIPTION DUAL BRIDGES ON -L- (US17 WILMINGTON BYPASS) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. EB1-B NBL	**STATION** 264+28	**OFFSET** 53 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 23.5 ft	**TOTAL DEPTH** 64.9 ft	**NORTHING** 191,733	**EASTING** 2,295,190	**24 HR.** 8.3
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/20/10	**COMP. DATE** 10/20/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
										23.5 GROUND SURFACE	0.0
	22.5	1.0								**UNDIVIDED COASTAL PLAIN** BROWN ORANGE SAND, MOIST TO SAT.	
20	20.0	3.5	1	2	2	4	SS-52				
	17.5	6.0	3	4	4	8					
15	15.0	8.5	7	10	12	22	SS-53				
			9	13	13	26					
10	10.1	13.4	13	16	13	29	SS-54				
5	5.1	18.4	9	8	6	14					
0	0.1	23.4	2	2	4	6	SS-55			2.5	21.0
-5	-4.9	28.4	WOH	WOH	WOH	0				**COASTAL PLAIN** GRAY SAND WITH THIN SANDSTONE LAYERS, SAT. (PEEDEE FORMATION)	
-10	-9.9	33.4	13	26	33	59	SS-56				
-15	-14.9	38.4	31	47	37	84					
-20	-19.9	43.4	10	17	22	39	SS-57				
-25	-24.9	48.4	12	12	14	26					
-30	-29.9	53.4	12	12	20	32	SS-58				
-35	-34.9	58.4	6	17	24	41					
-40	-39.9	63.4	13	18	20	38				-41.4	64.9
-45										Boring Terminated at Elevation -41.4 ft IN DENSE SAND	
-50											
-55											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** N. BRADLEY	
SITE DESCRIPTION DUAL BRIDGES ON -L- (US17 WILMINGTON BYPASS) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. B1-A SBL	**STATION** 264+38	**OFFSET** 59 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 19.8 ft	**TOTAL DEPTH** 65.0 ft	**NORTHING** 191,845	**EASTING** 2,295,198	**24 HR.** 4.2
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/20/10	**COMP. DATE** 10/20/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
20										
	18.8	1.0								19.8 GROUND SURFACE 0.0
			1	2	3	5 14	SS-59			**UNDIVIDED COASTAL PLAIN**
15	16.3	3.5								BROWN ORANGE SAND, MOIST TO SAT.
			7	6	8	17				15.8 4.0
	13.8	6.0								
10			5	6	11	19	SS-60			
	11.3	8.5								
			8	8	11					
5	6.3	13.5				22	SS-61			
			11	13	9					
0	1.3	18.5								2.8 17.0
			2	2	6	8	SS-62			**COASTAL PLAIN**
-5	-3.7	23.5								GRAY SAND WITH THIN SANDSTONE
			100/0.3			100/0.3				LAYERS, SAT. (PEEDEE FORMATION)
-10	-8.7	28.5								
			37	26	25	51	SS-63			
-15	-13.7	33.5								
			17	34	66/0.2	100/0.7				
-20	-18.7	38.5								
			68	30	25	55	SS-64			
-25	-23.7	43.5								
			7	13	20	33				
-30	-28.7	48.5								
			13	16	20	36	SS-65			
-35	-33.7	53.5								
			11	21	20	41				
-40	-38.7	58.5								
			11	16	50	66	SS-66			
-45	-43.7	63.5								-45.2 65.0
			4	8	13	21				Boring Terminated at Elevation -45.2 ft IN
-50										MEDIUM DENSE SAND
-55										
-60										

NCDOT BORE DOUBLE BORINGS.GPJ NC_DOT.GDT 12/8/10

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** N. BRADLEY	
SITE DESCRIPTION DUAL BRIDGES ON -L- (US17 WILMINGTON BYPASS) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. B1-B NBL	**STATION** 265+19	**OFFSET** 73 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 22.1 ft	**TOTAL DEPTH** 65.0 ft	**NORTHING** 191,715	**EASTING** 2,295,281	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/19/10	**COMP. DATE** 10/19/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
25										
										22.1 GROUND SURFACE 0.0
	21.1	1.0								**UNDIVIDED COASTAL PLAIN**
20			3	3	1	4	SS-44			BROWN TO ORANGE SAND, MOIST TO
	18.6	3.5								SAT.
			3	2	3	5				
15	16.1	6.0								16.6 5.5
			6	7	10	17	SS-45			
	13.6	8.5								
10			6	7	10	17				
	8.6	13.5								
			5	7	6	13	SS-46			
5	3.6	18.5								
			4	4	2	6	SS-47			
0	-1.4	23.5								0.1 22.0
			7	25	22	47	SS-48			**COASTAL PLAIN**
-5	-6.4	28.5								GRAY SAND WITH THIN CEMENTED
			93	7/0.1		100/0.6				SANDSTONE LAYERS, SAT (PEEDEE
-10	-11.4	33.5								FORMATION)
			26	33	45	76	SS-49			2.9 25.0
-15	-16.4	38.5								3.3 GRAY CALCAREOUS SANDSTONE 25.4
			31	45	55/0.2	100/0.7				5.1 GRAY SAND, SAT (PEEDEE FORMATION) 27.2
-20	-21.4	43.5								6.3 GRAY CALCAREOUS SANDSTONE 28.4
			30	24	33	57	SS-50			GRAY SAND, SAT (PEEDEE FORMATION)
-25	-26.4	48.5								8.3 30.4
			10	14	20	34				9.4 GRAY CALCAREOUS SANDSTONE 31.5
-30	-31.4	53.5								GRAY SAND, SAT (PEEDEE FORMATION)
			6	13	27	40	SS-51			
-35	-36.4	58.5								13.3 35.4
			9	17	22	39				13.4 GRAY CALCAREOUS SANDSTONE 35.5
-40	-41.4	63.5								GRAY SAND, SAT (PEEDEE FORMATION)
			12	18	18	36				
-45										42.9 65.0
-50										Boring Terminated at Elevation -42.9 ft IN
-55										DENSE SAND

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** N. BRADLEY	
SITE DESCRIPTION DUAL BRIDGES ON -L- (US17 WILMINGTON BYPASS) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. B1-B NBL	**STATION** 265+19	**OFFSET** .73 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 22.1 ft	**TOTAL DEPTH** 65.0 ft	**NORTHING** 191,715	**EASTING** 2,295,281	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 10/19/10	**COMP. DATE** 10/19/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 15.4 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS (ELEV. (ft) / DEPTH (ft))
-2.9											Begin Coring @ 25.0 ft
	-2.9	25.0									
	-3.3	25.4	0.4	0:05/0.4	(0.4) 100%	(0.0) 0%		(0.4) 100%	(0.0) 0%		-2.9 GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION) 25.0
-5			5.0	0:23/1.0 0:44/1.0 0:51/1.0	(1.2) 24%	(0.0) 0%		(1.2) 100%	(0.0) 0%		-3.3 GRAY SAND, SAT (PEEDEE FORMATION) 25.4 -5.1 GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION) 27.2
				0:37/1.0 N=100/0.6							-6.3 GRAY SAND, SAT (PEEDEE FORMATION) 28.4
	-8.3	30.4									-8.3 30.4
-10			5.0	0:48/1.0 0:32/1.0 0:43/1.0 0:28/1.0	(1.1) 22%	(0.0) 0%		(1.1) 100%	(0.0) 0%		-9.4 GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION) 31.5 GRAY SAND, SAT (PEEDEE FORMATION)
				0:47/1.0 N=78			SS-49				
	-13.3	35.4									-13.3 35.4
-15			5.0	0:45/1.0 0:44/1.0 0:23/1.0 0:10/1.0 0:21/1.0	(0.1) 2%	(0.0) 0%		(0.1) 100%	(0.0) 0%		-13.4 GRAY CALCAREOUS SANDSTONE (PEEDEE FORMATION) 35.5 GRAY SAND, SAT (PEEDEE FORMATION)
	-18.3	40.4		N=100/0.7 0:15/1.0							
-20				N=57			SS-50				
-25				N=34							
-30				N=40			SS-51				
-35				N=39							
-40				N=36							
-42.9											-42.9 65.0 Boring Terminated at Elevation -42.9 ft IN DENSE SAND
-45											END CORING @ 40.4 FT
-50											
-55											
-60											
-65											
-70											
-75											
-80											

NCDOT CORE DOUBLE BORINGS.GPJ NC_DOT.GDT 12/8/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** N. BRADLEY
SITE DESCRIPTION DUAL BRIDGES ON -L- (US17 WILMINGTON BYPASS) OVER CARTWHEEL BRANCH			**GROUND WTR (ft)**
BORING NO. B2-A NBL	**STATION** 265+65	**OFFSET** 5 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 15.8 ft	**TOTAL DEPTH** 65.0 ft	**NORTHING** 191,784	**EASTING** 2,295,327	**24 HR.** 1.0
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/18/10	**COMP. DATE** 10/19/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
										GROUND SURFACE	15.8	0.0
	14.8	1.0	2	2	3	5	SS-36			ARTIFICIAL FILL BROWN SAND, MOIST	12.8	3.0
	12.3	3.5	1	1	1	2	SS-37			ALLUVIAL BROWN MUCK, SAT.	10.3	5.5
	9.8	6.0	1	1	1	2	SS-38			UNDIVIDED COASTAL PLAIN BROWN GRAY SAND, SAT.		
	7.3	8.5	1	2	1	3						
	2.3	13.5	1	2	2	4						
	-2.7	18.5	12	15	18	33	SS-39				-0.2	16.0
	-7.7	23.5	23	27	41	68				COASTAL PLAIN GRAY SAND WITH THIN SANDSTONE LAYERS, SAT. (PEEDEE FORMATION)		
	-12.7	28.5	13	30	36	66	SS-40					
	-17.7	33.5	7	9	14	23						
	-22.7	38.5	16	15	21	36	SS-41					
	-27.7	43.5	59	33	24	57						
	-32.7	48.5	26	10	11	21	SS-42					
	-37.7	53.5	12	19	26	45						
	-42.7	58.5	9	50	25	75	SS-43					
	-47.7	63.5	10	15	19	34					-49.2	65.0
										Boring Terminated at Elevation -49.2 ft IN DENSE SAND		

NCDOT BORE DOUBLE BORINGS.GPJ NC_DOT.GDT 12/8/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** N. BRADLEY
SITE DESCRIPTION DUAL BRIDGES ON -L- (US17 WILMINGTON BYPASS) OVER CARTWHEEL BRANCH			**GROUND WTR (ft)**
BORING NO. B3-A SBL	**STATION** 266+18	**OFFSET** 59 ft LT	**ALIGNMENT** -L- **0 HR.** N/A
COLLAR ELEV. 18.4 ft	**TOTAL DEPTH** 75.0 ft	**NORTHING** 191,849	**EASTING** 2,295,378 **24 HR.** 3.0
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 10/15/10	**COMP. DATE** 10/15/10	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										18.4 GROUND SURFACE	0.0
	17.4	1.0								UNDIVIDED COASTAL PLAIN ORANGE BROWN CLAYEY SAND, MOIST TO SAT.	
15	14.9	3.5	1	3	4	7	SS-27			15.4 UNDIVIDED COASTAL PLAIN ORANGE GRAY SAND, SAT.	3.0
	12.4	6.0	4	4	8	12 16	SS-28				
10	9.9	8.5	6	8	8						
			5	6	9	15					
5	4.9	13.5					SS-29				
			7	7	6	13					
0	-0.1	18.5									
			2	1	2	3					
-5	-5.1	23.5									
			3	5	5	10	SS-30				
-10	-10.1	28.5								-7.6	26.0
			3	3	7	10	SS-31			COASTAL PLAIN GRAY SAND WITH THIN SANDSTONE LAYERS, SAT. (PEEDEE FORMATION)	
-15	-15.1	33.5									
			4	6	15	21					
-20	-20.1	38.5									
			15	25	32	57	SS-32				
-25	-25.1	43.5									
			10	27	33	60					
-30	-30.1	48.5									
			6	12	19	31	SS-33				
-35	-35.1	53.5									
			10	11	22	33					
-40	-40.1	58.5									
			13	13	17	30	SS-34				
-45	-45.1	63.5									
			6	9	12	21	SS-35				
-50	-50.1	68.5									
			5	7	10	17					
-55	-55.1	73.5									
			14	11	12	23				-56.6	75.0
-60										Boring Terminated at Elevation -56.6 ft IN MEDIUM DENSE SAND	

NCDOT BORE DOUBLE BORINGS.GPJ NC_DOT.GDT 12/8/10

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** N. BRADLEY
SITE DESCRIPTION DUAL BRIDGES ON -L- (US17 WILMINGTON BYPASS) OVER CARTWHEEL BRANCH			**GROUND WTR (ft)**
BORING NO. B3-B NBL	**STATION** 266+97	**OFFSET** 81 ft RT	**ALIGNMENT** -L- **0 HR.** N/A
COLLAR ELEV. 15.6 ft	**TOTAL DEPTH** 65.0 ft	**NORTHING** 191,710	**EASTING** 2,295,460 **24 HR.** 0.8
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 10/13/10	**COMP. DATE** 10/13/10	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										15.6 GROUND SURFACE	0.0
										UNDIVIDED COASTAL PLAIN GRAY ORANGE SAND, MOIST TO SAT.	
15	14.6	1.0	1	2	3	5	SS-9			11.6	4.0
	12.1	3.5	8	6	12	18					
10	9.6	6.0	5	5	8	13	SS-10				
	7.1	8.5	5	6	10	16					
5											
	2.1	13.5	5	5	2	7	SS-11				
0	-2.9	18.5									
			2	2	2	4					
-5	-7.9	23.5								-6.4	22.0
			3	3	3	6	SS-12			COASTAL PLAIN GRAY SAND WITH THIN SANDSTONE LAYERS, SAT. (PEEPEE FORMATION)	
-10	-12.9	28.5									
			7	8	9	17					
-15	-17.9	33.5								-15.4	31.0
			10	10	17	27	SS-13				
-20	-22.9	38.5									
			15	27	25	52					
-25	-27.9	43.5									
			8	15	20	35	SS-14				
-30	-32.9	48.5									
			9	14	16	30					
-35	-37.9	53.5									
			30	22	28	50	SS-15				
-40	-42.9	58.5									
			14	24	66	90	SS-16				
-45	-47.9	63.5									
			8	12	19	31				-49.4	65.0
-50										Boring Terminated at Elevation -49.4 ft IN DENSE SAND	
-55											
-60											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** N. BRADLEY	
SITE DESCRIPTION DUAL BRIDGES ON -L- (US17 WILMINGTON BYPASS) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. EB2-A SBL	**STATION** 266+87	**OFFSET** 59 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 18.6 ft	**TOTAL DEPTH** 69.9 ft	**NORTHING** 191,850	**EASTING** 2,295,447	**24 HR.** 1.0
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/14/10	**COMP. DATE** 10/14/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										18.6 GROUND SURFACE	0.0
	17.6	1.0								UNDIVIDED COASTAL PLAIN ORANGE GRAY CLAYEY SAND, MOIST TO SAT.	
15	15.1	3.5	2	2	3	5	SS-17			15.6	3.0
	12.6	6.0	4	4	10	14	SS-18			UNDIVIDED COASTAL PLAIN ORANGE GRAY SAND, SAT.	
10	10.1	8.5	4	6	8	14					
	5.2	13.4	7	10	13	23	SS-19				
5											
	0.2	18.4	6	7	11	18					
0											
	-4.8	23.4	3	2	3	5	SS-20				
-5											
	-9.8	28.4	2	3	5	8					
-10											
	-14.8	33.4	4	5	9	14	SS-21			-8.4 COASTAL PLAIN GRAY SAND WITH THIN SANDSTONE LAYERS, SAT. (PEEDEE FORMATION)	27.0
-15											
	-19.8	38.4	3	4	3	7					
-20											
	-24.8	43.4	7	5	15	20	SS-22				
-25											
	-29.8	48.4	15	47	52	99	SS-23				
-30											
	-34.8	53.4	27	25	50	75					
-35											
	-39.8	58.4	9	11	21	32	SS-24				
-40											
	-44.8	63.4	12	18	24	42	SS-25				
-45											
	-49.8	68.4	8	12	46	58					
-50											
			6	12	12	24	SS-26			-51.3 Boring Terminated at Elevation -51.3 ft IN MEDIUM DENSE SAND	69.9
-55											
-60											

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** N. BRADLEY	
SITE DESCRIPTION DUAL BRIDGES ON -L- (US17 WILMINGTON BYPASS) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. EB2-B NBL	**STATION** 267+69	**OFFSET** 84 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 18.7 ft	**TOTAL DEPTH** 64.8 ft	**NORTHING** 191,709	**EASTING** 2,295,532	**24 HR.** 3.9
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 10/13/10	**COMP. DATE** 10/13/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										18.7 GROUND SURFACE 0.0
	17.7	1.0								UNDIVIDED COASTAL PLAIN ORANGE BROWN CLAYEY SAND, MOIST TO SAT.
15	15.2	3.5	1	3	2	5	SS-1			13.2 5.5
	12.7	6.0	2	2	2	4				UNDIVIDED COASTAL PLAIN ORANGE BROWN SAND, SAT.
10	10.2	8.5	7	8	7	15	SS-2			
	5.4	13.3	2	3	4	7				
5										
	0.4	18.3	6	7	8	15				
0										
	-4.6	23.3	3	4	5	9	SS-3			
-5										
	-9.6	28.3	2	3	3	6				
-10										
	-14.6	33.3	3	4	5	9	SS-4			-8.3 COASTAL PLAIN GRAY SAND WITH THIN SANDSTONE LAYERS, SAT. (PEEDEE FORMATION) 27.0
-15										
	-19.6	38.3	5	7	6	13				
-20										
	-24.6	43.3	11	19	34	53	SS-5			-17.3 36.0
-25										
	-29.6	48.3	8	19	28	47				
-30										
	-34.6	53.3	8	15	29	44	SS-6			
-35										
	-39.6	58.3	9	13	17	30	SS-7			
-40										
	-44.6	63.3	16	25	35	60	SS-8			
-45										
			29	24	26	50				-46.1 Boring Terminated at Elevation -46.1 ft IN DENSE TO VERY DENSE SAND 64.8
-50										
-55										
-60										

R-2633B

34491.1.2

BRIDGE OVER CARTWHEEL BRANCH ON PROPOSED US17 BYPASS AT -L- STA. 265+52

SBL SAMPLE RESULTS

SOIL TEST RESULTS EB1-A SBL

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-67	59 LT	263+50	1.0-2.5	A-2-4(0)	17	NP	24.7	63.0	6.2	6.0	100	90	14	-	-
SS-68	59 LT	263+50	6.0-7.5	A-2-4(0)	21	NP	9.1	80.8	0.1	10.1	100	99	12	-	-
SS-69	59 LT	263+50	18.3-19.8	A-3(0)	22	NP	17.3	77.5	1.1	4.0	100	99	6	-	-
SS-70	59 LT	263+50	23.3-24.8	A-3(0)	19	NP	19.6	73.1	2.2	5.0	100	99	8	-	-
SS-71	59 LT	263+50	33.3-34.8	A-2-4(0)	19	NP	8.9	74.3	6.7	10.1	91	89	18	-	-
SS-72	59 LT	263+50	43.3-44.8	A-2-4(0)	21	NP	7.3	82.8	1.9	8.1	100	100	12	-	-
SS-73	59 LT	263+50	53.3-54.8	A-2-4(0)	20	NP	3.2	83.2	5.5	8.1	90	89	15	-	-

SOIL TEST RESULTS B1-A SBL

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-59	59 LT	264+38	1.0-2.5	A-2-4(0)	19	NP	37.5	51.4	5.1	6.0	97	77	13	-	-
SS-60	59 LT	264+38	6.0-7.5	A-3(0)	22	NP	15.3	79.5	0.2	5.0	100	99	6	-	-
SS-61	59 LT	264+38	13.5-15.0	A-3(0)	23	NP	13.0	81.7	2.3	3.0	100	100	7	-	-
SS-62	59 LT	264+38	18.5-20.0	A-2-4(0)	15	NP	22.2	61.8	10.0	6.0	100	99	17	-	-
SS-63	59 LT	264+38	28.5-30.0	A-2-4(0)	15	NP	14.7	62.0	13.2	10.1	83	79	22	-	-
SS-64	59 LT	264+38	38.5-40.0	A-2-4(0)	15	NP	11.5	70.9	9.6	8.1	63	61	13	-	-
SS-65	59 LT	264+38	48.5-50.0	A-2-4(0)	20	NP	3.8	81.0	9.2	6.0	97	96	17	-	-
SS-66	59 LT	264+38	58.5-60.0	A-2-4(0)	22	NP	1.4	88.0	6.5	4.0	100	100	14	-	-

SOIL TEST RESULTS B3-A SBL

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-27	59 LT	266+18	1.0-2.5	A-2-7(3)	49	31	48.9	20.9	4.0	26.2	99	69	31	-	-
SS-28	59 LT	266+18	3.5-5.0	A-3(0)	24	NP	13.1	77.7	3.2	6.0	100	98	10	-	-
SS-29	59 LT	266+18	13.5-15.0	A-3(0)	24	NP	13.1	81.2	2.7	3.0	100	99	7	-	-
SS-30	59 LT	266+18	23.5-25.0	A-3(0)	28	NP	22.3	72.8	4.8	0.0	100	98	6	-	-
SS-31	59 LT	266+18	28.5-30.0	A-3(0)	26	NP	8.5	85.6	2.9	3.0	100	99	7	-	-
SS-32	59 LT	266+18	38.5-40.0	A-2-4(0)	20	NP	7.6	78.1	8.2	6.0	100	99	17	-	-
SS-33	59 LT	266+18	48.5-50.0	A-2-4(0)	25	NP	2.0	86.9	7.0	4.0	100	100	13	-	-
SS-34	59 LT	266+18	58.5-60.0	A-2-4(0)	25	NP	2.6	86.2	6.1	5.0	100	100	13	-	-
SS-35	59 LT	266+18	63.5-65.0	A-2-4(0)	22	NP	1.0	81.4	9.6	8.0	100	100	23	-	-

SOIL TEST RESULTS EB2-A SBL

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-17	59 LT	266+87	1.0-2.5	A-2-6(1)	40	22	62.2	15.1	2,6	20.1	97	58	23	-	-
SS-18	59 LT	266+87	3.5-5.0	A-3(0)	24	NP	19.7	72.2	4,0	4.0	100	92	10	-	-
SS-19	59 LT	266+87	8.5-10.0	A-3(0)	25	NP	14.3	80.3	3.4	2.0	100	100	7	-	-
SS-20	59 LT	266+87	18.4-19.9	A-3(0)	25	NP	24.5	71.3	2.1	2.0	100	99	5	-	-
SS-21	59 LT	266+87	28.4-29.9	A-3(0)	25	NP	8.5	83.7	5.8	2.0	100	100	9	-	-
SS-22	59 LT	266+87	38.4-39.9	A-2-4(0)	23	NP	5.8	84.9	5,2	4.0	100	100	11	-	-
SS-23	59 LT	266+87	43.4-44.9	A-2-4(0)	20	NP	9.0	75.1	11,0	5.0	89	86	17	-	-
SS-24	59 LT	266+87	53.4-54.9	A-2-4(0)	24	NP	1.8	87.7	5,4	5.0	100	100	14	-	-
SS-25	59 LT	266+87	58.4-59.9	A-2-4(0)	23	NP	1.3	85.8	7.8	5.0	100	100	17	-	-
SS-26	59 LT	266+87	68.4-69.9	A-2-4(0)	24	NP	1.8	78.9	12.3	7.0	100	99	25	-	-

R-2633B

34491.1.2

BRIDGE OVER CARTWHEEL BRANCH ON PROPOSED US17 BYPASS AT -L- STA. 265+52 NBL SAMPLE RESULTS

SOIL TEST RESULTS EB1-B NBL

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-52	53 RT	264+28	1.0-2.5	A-3(0)	20	NP	27.4	64.0	4.5	4.0	100	89	10	-	-
SS-53	53 RT	264+28	6.0-7.5	A-3(0)	19	NP	11.7	79.8	0.5	8.1	100	97	10	-	-
SS-54	53 RT	264+28	13.4-14.9	A-3(0)	24	NP	9.7	84.2	2.1	4.0	100	100	8	-	-
SS-55	53 RT	264+28	23.4-24.9	A-3(0)	24	NP	22.2	71.9	1.9	4.0	100	99	7	-	-
SS-56	53 RT	264+28	33.4-34.9	A-2-4(0)	16	NP	13.9	67.9	10.2	8.1	93	90	19	-	-
SS-57	53 RT	264+28	48.4-49.9	A-2-4(0)	18	NP	4.9	81.3	6.7	7.0	100	100	16	-	-
SS-58	53 RT	264+28	58.4-59.9	A-2-4(0)	22	NP	2.3	87.0	6.6	4.0	100	100	13	-	-

SOIL TEST RESULTS B2-A NBL

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-36	5 RT	265+65	1.0-2.5	A-2-4(0)	20	NP	25.4	61.4	9.3	4.0	100	90	15	-	-
SS-37	5 RT	265+65	3.5-5.0	A-2-5(0)	43	NP	28.4	55.3	14.3	2.0	97	85	17	-	-
SS-38	5 RT	265+65	6.0-7.5	A-3(0)	29	NP	35.4	60.0	4.6	0.0	100	86	5	-	-
SS-39	5 RT	265+65	18.5-20.0	A-2-4(0)	20	NP	18.4	70.6	7.9	3.0	100	95	13	-	-
SS-40	5 RT	265+65	28.5-30.0	A-2-4(0)	17	NP	9.5	68.9	13.6	8.0	100	98	24	-	-
SS-41	5 RT	265+65	38.5-40.0	A-2-4(0)	20	NP	5.1	79.7	9.2	6.0	100	99	18	-	-
SS-42	5 RT	265+65	48.5-50.0	A-2-4(0)	22	NP	2.0	83.2	7.7	7.0	100	100	18	-	-
SS-43	5 RT	265+65	58.5-60.0	A-2-4(0)	20	NP	10.1	71.7	12.2	6.0	74	69	17	-	-

SOIL TEST RESULTS B1-B NBL

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-44	73 RT	265+19	1.0-2.5	A-2-4(0)	24	8	22.3	48.9	10.7	18.1	100	87	32	-	-
SS-45	73 RT	265+19	6.0-7.5	A-3(0)	24	NP	12.0	82.3	2.7	3.0	100	100	7	-	-
SS-46	73 RT	265+19	13.5-15.0	A-3(0)	25	NP	14.1	81.3	4.6	0.0	100	99	5	-	-
SS-47	73 RT	265+19	18.5-20.0	A-3(0)	21	NP	20.9	71.0	6.0	2.0	100	99	9	-	-
SS-48	73 RT	265+19	23.5-25.0	A-2-4(0)	17	NP	23.6	58.5	11.9	6.0	100	97	20	-	-
SS-49	73 RT	265+19	33.5-35.0	A-2-4(0)	16	NP	13.9	59.2	16.9	10.1	97	92	29	-	-
SS-50	73 RT	265+19	43.5-45.0	A-2-4(0)	20	NP	4.6	81.6	7.7	6.0	100	100	16	-	-
SS-51	73 RT		53.5-55.0	A-2-4(0)	22	NP	5.8	81.1	7.0	6.0	87	84	14	-	-

SOIL TEST RESULTS B3-B NBL

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-9	81 RT	266+97	1.0-2.5	A-2-4(0)	19	NP	28.2	62.3	7.5	2.0	100	88	11	-	-
SS-10	81 RT	266+97	6.0-7.5	A-3(0)	24	NP	14.4	82.2	3.4	0.0	100	100	4	-	-
SS-11	81 RT	266+97	13.5-15.0	A-3(0)	25	NP	16.0	79.3	4.7	0.0	100	99	6	-	-
SS-12	81 RT	266+97	23.5-25.0	A-3(0)	24	NP	7.1	86.2	4.7	2.0	100	100	9	-	-
SS-13	81 RT	266+97	33.5-35.0	A-2-4(0)	20	NP	5.1	72.4	12.4	10.1	100	99	25	-	-
SS-14	81 RT	266+97	43.5-45.0	A-2-4(0)	22	NP	4.5	83.2	8.3	4.1	99	98	14	-	-
SS-15	81 RT	266+97	53.5-55.0	A-2-4(0)	22	NP	10.5	75.1	8.3	6.1	77	71	14	-	-
SS-16	81 RT	266+97	58.5-60.0	A-2-4(0)	23	NP	3.0	83.4	7.5	6.1	98	96	18	-	-

SOIL TEST RESULTS EB2-B NBL

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	84 RT	267+69	1.0-2.5	A-2-6(11)	33	18	56.4	20.3	3.0	20.3	97	64	24	-	-
SS-2	84 RT	267+69	6.0-7.5	A-3(0)	22	NP	9.9	82.6	1.4	6.1	100	99	8	-	-
SS-3	84 RT	267+69	18.3-19.8	A-3(0)	21	NP	20.1	73.6	4.3	2.0	100	98	8	-	-
SS-4	84 RT	267+69	28.3-29.8	A-3(0)	23	NP	15.0	77.5	3.4	4.1	100	98	9	-	-
SS-5	84 RT	267+69	38.3-39.8	A-2-4(0)	19	NP	8.9	75.3	7.7	8.1	97	94	18	-	-
SS-6	84 RT	267+69	48.3-49.8	A-2-4(0)	22	NP	3.9	86.0	4.1	6.1	100	100	13	-	-
SS-7	84 RT	267+69	53.3-54.8	A-2-4(0)	22	NP	2.0	87.2	6.7	4.1	100	100	14	-	-
SS-8	84 RT	267+69	58.3-59.8	A-2-4(0)	21	NP	4.7	83.6	5.7	6.1	97	94	15	-	-

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 34491.1.2 TIP: R-2633B COUNTY: BRUNSWICK

DESCRIPTION(1): BRIDGE ON PROPOSED US 17 BYPASS OVER CARTWHEEL BRANCH

EXISTING BRIDGE

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

Bridge No.: NA Length: ____ Total Bents: ____ Bents in Channel: ____ Bents in Floodplain: ____
Foundation Type: NA

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NA

Interior Bents: NA

Channel Bed: NONE NOTED

Channel Bank: NONE NOTED

EXISTING SCOUR PROTECTION

Type(3): NA

Extent(4): NA

Effectiveness(5): NA

Obstructions(6): NA

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): MUCK

Channel Bank Material(8): SAND

Channel Bank Cover(9): TREES AND SHRUBS

Floodplain Width(10): 200' (±)

Floodplain Cover(11): POND WITH TREES

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

Channel Migration Tendency(13): NONE

Observations and Other Comments: OLD MILL DAM LOCATED ALONG CENTER LINE OF -L-, AT THE APPROXIMATE LOCATION OF BENT 2

DESIGN SCOUR ELEVATIONS(14) Feet ____ Meters ____

BENTS

Comparison of DSE to Hydraulics Unit theoretical scour:
THE GEU AGREES WITH THE BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 4-29-10. THIS SITE IS LOCATED IN BACKWATER AREAS ASSOCIATED WITH THE CAPE FEAR RIVER. THERE IS NO SCOUR INDICATED BY THE HYDRAULIC UNIT.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

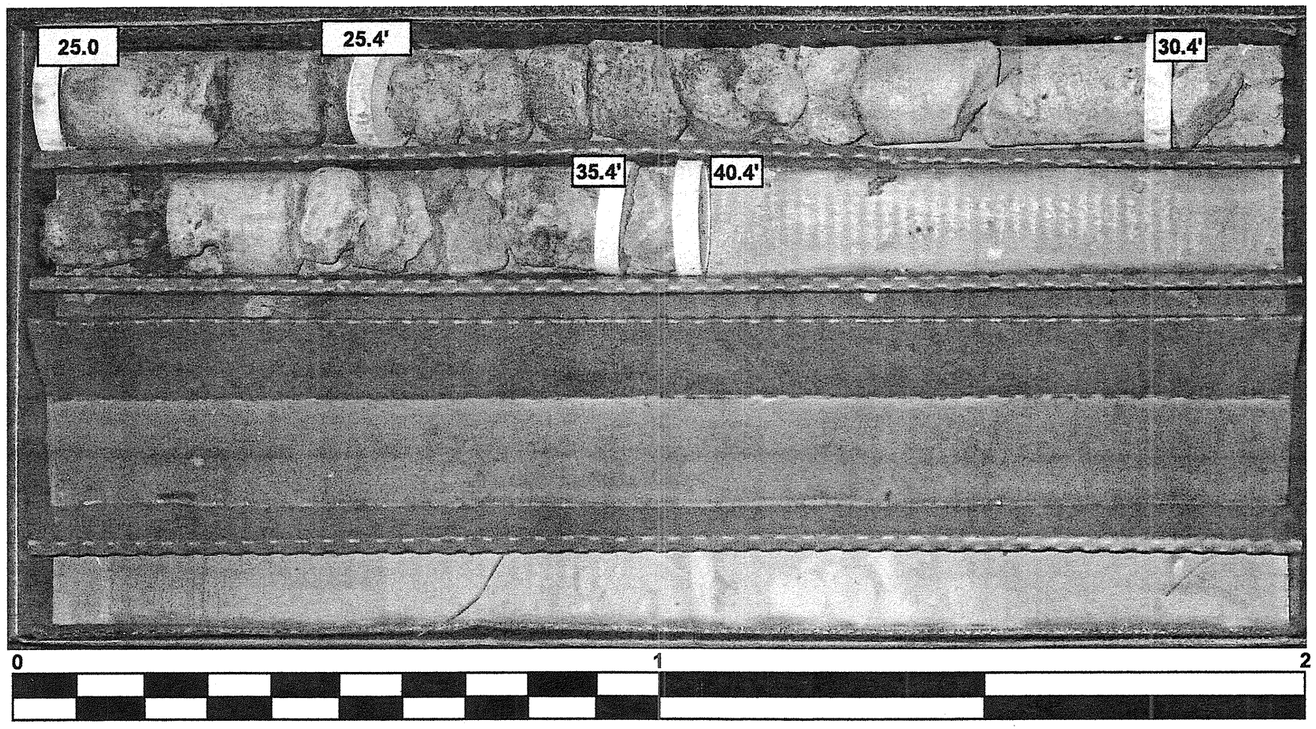
Bed or Bank						
Sample No.						
Retained #4						
Passed #10						
Passed #40						
Passed #200						
Coarse Sand						
Fine Sand						
Silt						
Clay						
LL						
PI						
AASHTO						
Station						
Offset						
Depth						

See Sheets 17 and 18 "Soil Test Results", for samples:
(CHANNEL BANK) SS-59, SS-9
(CHANNEL BED) SS-37

Template Revised 02/07/06

Reported by: _____ Date: 12/9/2010

CORE PHOTOGRAPH
B1-B NBL
Box 1 of 1 (25.0' to 25.4', 25.4' to 30.4', 30.4' to 35.4' and 35.4' to 40.4')



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2633BA	1	31

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *34491.1.2 (R-2633BA)* F.A. PROJ. *STPNHF-17(1)*

COUNTY *BRUNSWICK*

PROJECT DESCRIPTION *US 17 (WILMINGTON BYPASS) FROM US 74 /76 EAST OF MALMO IN BRUNSWICK COUNTY TO SR 1430 (CEDAR HILL ROAD)*

SITE DESCRIPTION *BRIDGE ON US 17 (WILMINGTON BYPASS) OVER CSX RAILROAD /SEABOARD COAST LINE RAILROAD BETWEEN US 74/76 AND SR 1426 AT -L- STA. 147+38.89*

REVISED

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PERSONNEL

URS PERSONNEL

CATLIN PERSONNEL

INVESTIGATED BY *J.L. STONE*

CHECKED BY *D.N. ARGENBRIGHT*

SUBMITTED BY *D.N. ARGENBRIGHT*

DATE *SEPTEMBER 2013*

NORTH CAROLINA LICENSED SEAL 2007 GEOLOGIST JOSEPH L. STONE 7/26/13

PROJECT: 34491.1.2

ID: R-2633BA

DRAWN BY: *C.P. TURNER*

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

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

PROJECT REFERENCE NO.	SHEET NO.
R-2633BA	2 OF 31

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-4, A-5	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-6-5, A-7-6	A-3	A-6, A-7	
SYMBOL														
% PASSING #10	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	11 MN	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-750
- [ ] PORTABLE HOIST
- [X] CME-45B
- [X] DIEDRICH D-25

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: M 1894 REBAR SET

ELEVATION: 44.5 FT.

NOTES:

UNDIVIDED C.P. = UNDIVIDED COASTAL PLAIN

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET
R-2633BA	3 OF 31

SITE PLAN

0 100 200
FEET

N

145

150

640

-EY6-

-L- STA. 147+38.89 =
-EY6- STA. 15+63.72

SKEW = 24°28'54"

CSX RR TRACKS

CSX RAILROAD

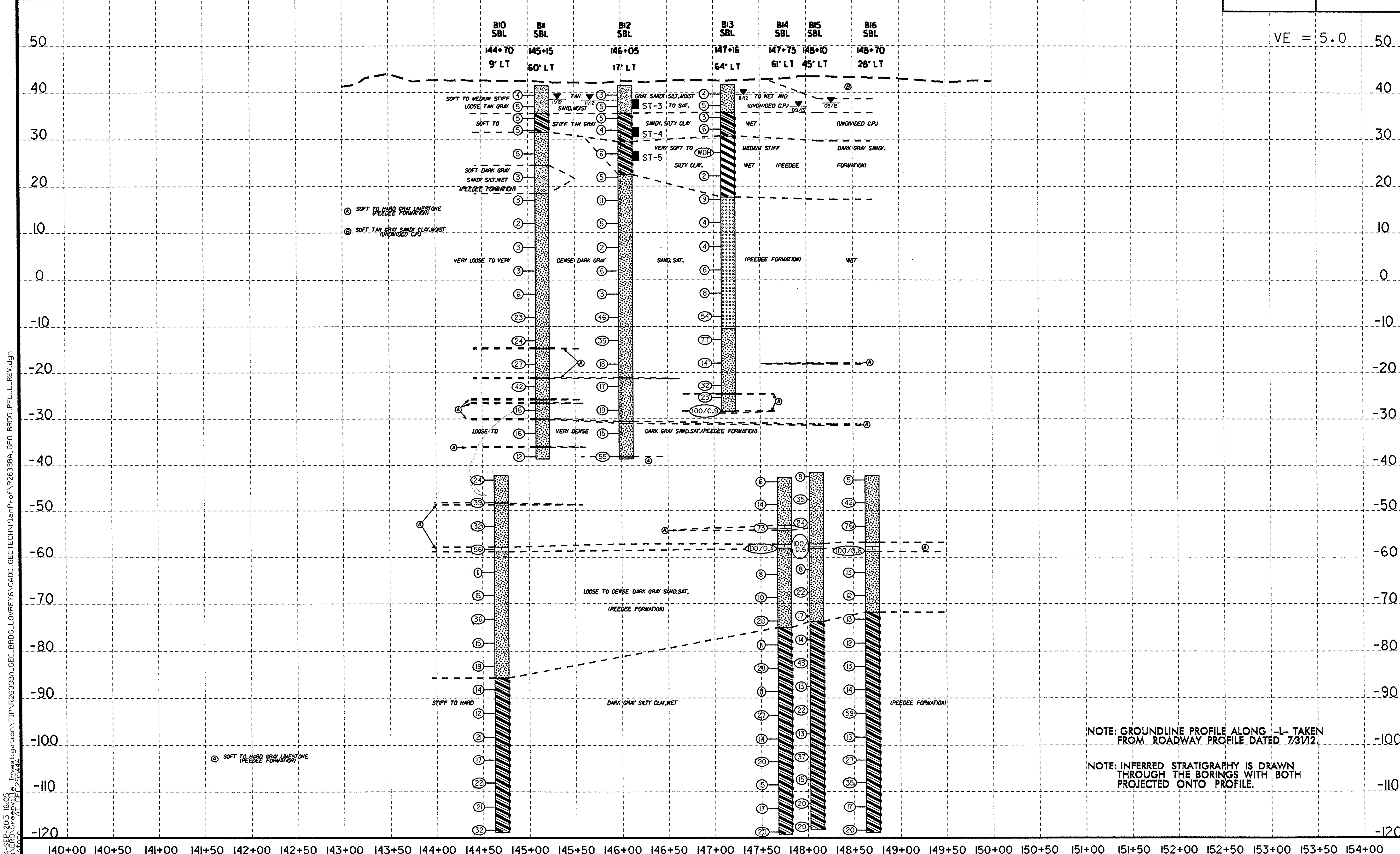
TO US 74/76

TO SR 1426

B1 NBL
B2 NBL
B3 NBL
B4 NBL
B5 NBL
B6 NBL
B7 NBL
B8 NBL
B9 NBL
B10 SBL
B11 SBL
B12 SBL
B13 SBL
B14 SBL
B15 SBL
B16 SBL

PROJECT REFERENCE NO.	SHEET NO.
R-2633BA	4 OF 31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PROFILE THROUGH SOUTHBOUND LANE BORINGS PROJECTED ALONG -L-



NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM ROADWAY PROFILE DATED 7/31/12.

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

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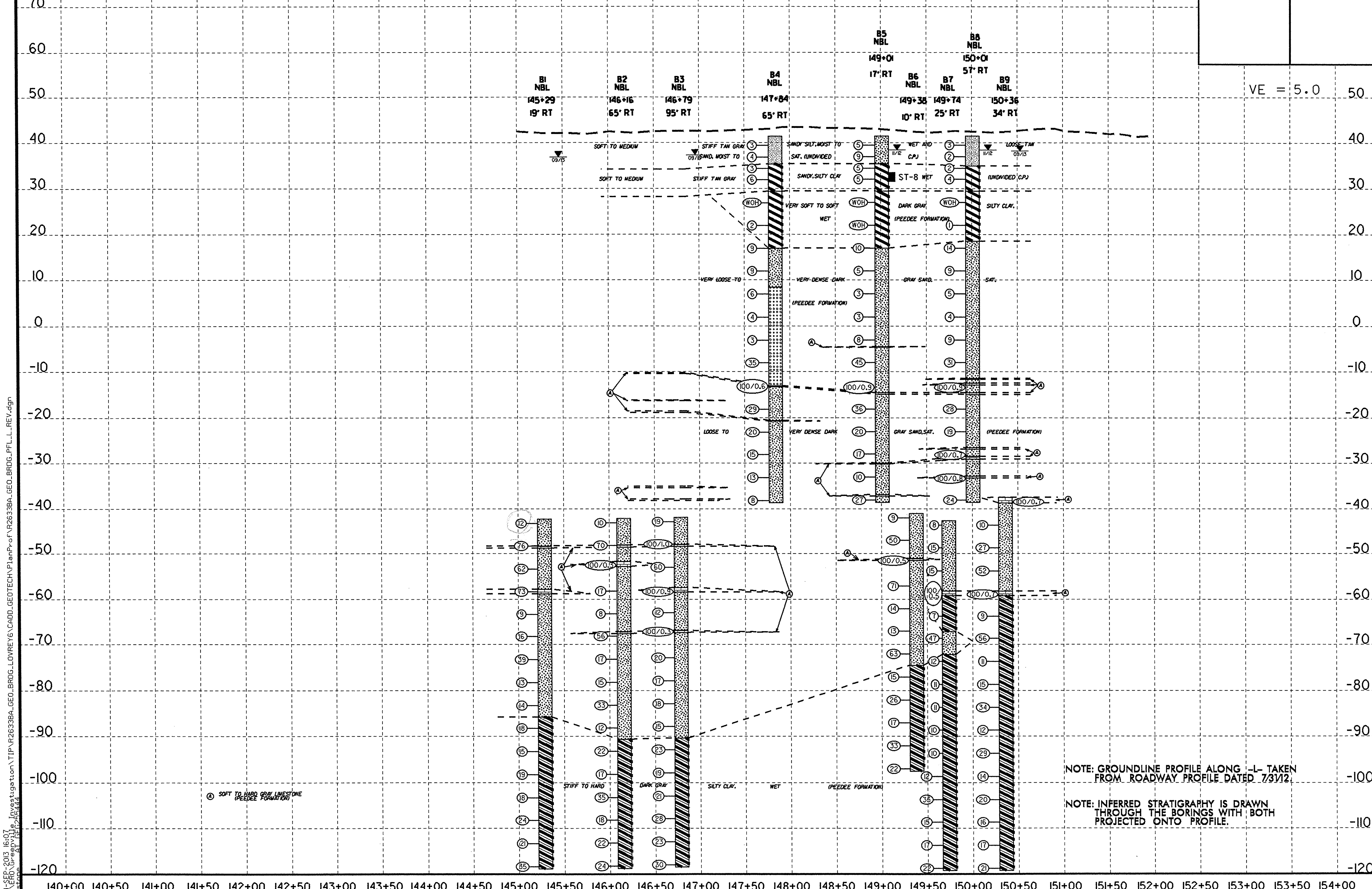
PROJECT REFERENCE NO.	SHEET NO.
R-2633BA	5 OF 31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PROFILE THROUGH NORTHBOUND LANE BORINGS PROJECTED ALONG -L-

VE = 5.0



NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM ROADWAY PROFILE DATED 7/31/12.

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

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NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B1 NBL	**STATION** 145+29	**OFFSET** 19 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.2 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,097	**EASTING** 2,283,600	**24 HR.** 4.3
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 86% 07/25/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/09/13	**COMP. DATE** 09/10/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
										GROUND SURFACE	41.2	0.0

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
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DRILLER Contract Driller	**START DATE** 09/09/13	**COMP. DATE** 09/10/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
-40	-42.3	83.5	4	5	7	12				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-45	-47.3	88.5	9	39	37	76				-48.3 89.5
-50	-52.3	93.5	20	32	30	62				-48.8 90.0 **COASTAL PLAIN** GRAY LIMESTONE (PEEDEE FORMATION) **COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-55	-57.3	98.5	11	43	30	73				-57.8 99.0
-60	-62.3	103.5	3	4	5	9				-58.8 100.0 **COASTAL PLAIN** GRAY LIMESTONE (PEEDEE FORMATION) **COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-65	-67.3	108.5	8	8	8	16				
-70	-72.3	113.5	9	20	19	39				
-75	-77.3	118.5	5	6	7	13				
-80	-82.3	123.5	5	7	7	14				
-85	-87.3	128.5	5	8	10	18				-85.8 127.0 **COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)
-90	-92.3	133.5	5	6	9	15				
-95	-97.3	138.5	7	9	10	19				
-100	-102.3	143.5	9	8	10	18				
-105	-107.3	148.5	7	10	14	24				
-110	-112.3	153.5	7	10	11	21				
-115										

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B1 NBL	**STATION** 145+29	**OFFSET** 19 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.2 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,097	**EASTING** 2,283,600	**24 HR.** 4.3
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 86% 07/25/2013		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 09/09/13	**COMP. DATE** 09/10/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-115						Match Line				ELEV. (ft) DEPTH (ft)
	-117.3	158.5	9	14	21	35				**COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION) *(continued)* -118.8 160.0
										Boring Terminated at Elevation -118.8 ft IN HARD SANDY CLAY

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B2 NBL	**STATION** 146+16	**OFFSET** 65 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.3 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,059	**EASTING** 2,283,690	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID5152 D-25 88% 04/09/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/10/13	**COMP. DATE** 09/12/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
										41.3 GROUND SURFACE 0.0
40										
35										
30										
25										
20										
15										
10										
5										
0										
-5										
-10										
-15										
-20										
-25										
-30										
-35										

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B2 NBL	**STATION** 146+16	**OFFSET** 65 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.3 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,059	**EASTING** 2,283,690	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID5152 D-25 88% 04/09/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/10/13	**COMP. DATE** 09/12/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
-40										
		-42.2 83.5	5	5	5	10				
-45										
		-47.2 88.5	19	34	36	70				
-50										
		-52.2 93.5	100/0.3			100/0.3				
-55										
		-57.2 98.5	8	7	10	17				
-60										
		-62.2 103.5	4	4	4	8				
-65										
		-67.2 108.5	6	13	43	56				
-70										
		-72.2 113.5	6	8	9	17				
-75										
		-77.2 118.5	6	7	8	15				
-80										
		-82.2 123.5	7	11	22	33				
-85										
		-87.2 128.5	6	7	5	12				
-90										
		-92.2 133.5	7	7	15	22				
-95										
		-97.2 138.5	7	8	9	17				
-100										
		-102.2 143.5	12	17	18	35				
-105										
		-107.2 148.5	7	8	10	18				
-110										
		-112.2 153.5	9	9	13	22				
-115										

COASTAL PLAIN
DARK GRAY SAND, SAT. (PEEDEE FORMATION)

48.1 89.4
48.6 89.9
COASTAL PLAIN
GRAY LIMESTONE (PEEDEE FORMATION)

51.7 93.0
52.8 94.1
COASTAL PLAIN
DARK GRAY SAND, SAT. (PEEDEE FORMATION)

COASTAL PLAIN
GRAY LIMESTONE (PEEDEE FORMATION)

COASTAL PLAIN
DARK GRAY SAND, SAT. (PEEDEE FORMATION)

67.2 108.5
67.7 109.0
COASTAL PLAIN
GRAY LIMESTONE (PEEDEE FORMATION)

COASTAL PLAIN
DARK GRAY SAND, SAT. (PEEDEE FORMATION)

90.7 132.0
COASTAL PLAIN
DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B2 NBL	**STATION** 146+16	**OFFSET** 65 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.3 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,059	**EASTING** 2,283,690	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID5152 D-25 88% 04/09/2013		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 09/10/13	**COMP. DATE** 09/12/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
-115						Match Line					
	-117.2	158.5	8	11	13	24				**COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION) *(continued)*	
										-118.7	160.0
										Boring Terminated at Elevation -118.7 ft IN VERY STIFF SANDY CLAY	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B3 NBL	**STATION** 146+79	**OFFSET** 95 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 41.6 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,033	**EASTING** 2,283,754 / **24 HR.** 4.3
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 86% 07/25/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 09/10/13	**COMP. DATE** 09/11/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
45										
										41.6 GROUND SURFACE 0.0
40										
35										
30										
25										
20										
15										
10										
5										
0										
-5										
-10										
-15										
-20										
-25										
-30										
-35										

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B3 NBL	**STATION** 146+79	**OFFSET** 95 ft RT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 41.6 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,033	**EASTING** 2,283,754 / **24 HR.** 4.3
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 86% 07/25/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 09/10/13	**COMP. DATE** 09/11/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
-40	-41.9	83.5	3	6	13	19				COASTAL PLAIN DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-45	-46.9	88.5	15	40	60	100/1.0				47.9 89.5 / 48.4 90.0 COASTAL PLAIN GRAY LIMESTONE (PEEDEE FORMATION)
-50	-51.9	93.5	10	13	47	60				COASTAL PLAIN DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-55	-56.9	98.5	8	55	50/0.4	100/0.9				57.4 99.0 / 58.4 100.0 COASTAL PLAIN GRAY LIMESTONE (PEEDEE FORMATION)
-60	-61.9	103.5	4	4	8	12				COASTAL PLAIN DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-65	-66.9	108.5	100/0.3			100/0.3				66.9 108.5 / 67.4 109.0 COASTAL PLAIN GRAY LIMESTONE (PEEDEE FORMATION)
-70	-71.9	113.5	6	7	13	20				COASTAL PLAIN DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-75	-76.9	118.5	7	7	10	17				
-80	-81.9	123.5	6	8	10	18				
-85	-86.9	128.5	6	7	8	15				
-90	-91.9	133.5	11	12	11	23				90.4 132.0 COASTAL PLAIN DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)
-95	-96.9	138.5	6	9	10	19				
-100	-101.9	143.5	9	9	12	21				
-105	-106.9	148.5	8	9	19	28				
-110	-111.9	153.5	8	11	12	23				
-115										

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B3 NBL	**STATION** 146+79	**OFFSET** 95 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.6 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,033	**EASTING** 2,283,754	**24 HR.** 4.3
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 86% 07/25/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/10/13	**COMP. DATE** 09/11/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
-115						Match Line					
	-116.9	158.5	8	11	19	30				**COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION) *(continued)* -118.4	160.0
										Boring Terminated at Elevation -118.4 ft IN VERY STIFF SANDY CLAY	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX SEABOARD COAST LINE R.R.)			**GROUND WTR (ft)**
BORING NO. B4 NBL	**STATION** 147+84	**OFFSET** 65 ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 41.4 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 194,069	**EASTING** 2,283,856 — **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MAD3964 CME-45C 83% 07/24/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/14/12	**COMP. DATE** 11/15/12	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
45											
40	40.4	1.0								41.4 GROUND SURFACE	0.0
	37.9	3.5	2	1	2	3 4	SS-9			**UNDIVIDED COASTAL PLAIN** TAN GRAY SANDY SILT, MOIST TO WET	
35	35.4	6.0	2	1	3					35.4	6.0
	32.9	8.5	1	1	2	3	SS-10			**UNDIVIDED COASTAL PLAIN** TAN SANDY CLAY, WET	
30	27.9	13.5	2	3	3	6				29.4	12.0
25	22.9	18.5	WOH	WOH	WOH	0	SS-11			**COASTAL PLAIN** DARK GRAY SILTY CLAY, WET (PEEDEE FORMATION)	
20	17.9	23.5	WOH	1	1	2					
15	12.9	28.5	3	3	6	9	SS-12			16.9	24.5
10	7.9	33.5	1	4	5	9				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)	
5	2.9	38.5	3	4	2	6	SS-13			8.4	33.0
0	-2.1	43.5	2	2	2	4					
-5	-7.1	48.5	3	1	2	3					
-10	-12.1	53.5	8	13	22	35					
-15	-17.1	58.5	24	44	56/0.1	100/0.6	SS-14			-13.1 -13.3 LIMESTONE 54.5 54.7 **COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)	
-20	-22.1	63.5	8	14	15	29					
-25	-27.1	68.5	8	8	12	20				-20.6 -20.7 LIMESTONE 62.0 62.1 **COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)	
-30	-32.1	73.5	7	7	8	15					
-35			6	6	7	13	SS-15				

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX SEABOARD COAST LINE R.R.)			**GROUND WTR (ft)**
BORING NO. B4 NBL	**STATION** 147+84	**OFFSET** 65 ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 41.4 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 194,069	**EASTING** 2,283,856 — **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MAD3964 CME-45C 83% 07/24/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/14/12	**COMP. DATE** 11/15/12	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
	-37.1	78.5	5	4	4	8				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION) *(continued)* -38.6 80.0
										Boring Terminated at Elevation -38.6 ft IN LOOSE SAND

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX SEABOARD COAST LINE R.R.)				**GROUND WTR (ft)**
BORING NO. B5 NBL	**STATION** 149+01	**OFFSET** 17 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.5 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 194,121	**EASTING** 2,283,970	**24 HR.** 3.1
DRILL RIG/HAMMER EFF./DATE MAD3964 CME-45C 83% 07/24/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/07/12	**COMP. DATE** 11/07/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
										41.5	0.0
										GROUND SURFACE	
40	40.5	1.0	2	2	3	5				**UNDIVIDED COASTAL PLAIN** TAN SAND, MOIST TO SAT.	
	38.0	3.5	5	5	4	9					
35	35.5	6.0	2	2	3	5				35.5	6.0
	33.0	8.5	2	2	3	5				**UNDIVIDED COASTAL PLAIN** TAN SILTY CLAY, WET	
30											
	28.0	13.5	WOH	WOH	WOH	0				29.5	12.0
25										**COASTAL PLAIN** DARK GRAY SILTY CLAY, WET (PEEDEE FORMATION)	
	23.0	18.5	WOH	WOH	WOH	0					
20											
	18.0	23.5	2	2	8	10				17.0	24.5
15										**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)	
	13.0	28.5	2	3	2	5					
10											
	8.0	33.5	3	1	2	3					
5											
	3.0	38.5	2	1	2	3					
0											
	-2.0	43.5	3	2	6	8					
-5										-4.5	46.0
	-7.0	48.5	15	17	28	45				-4.6 LIMESTONE	-46.1
-10										**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)	
	-12.0	53.5	23	32	68/0.4	100/0.9					
-15										-14.5	56.0
	-17.0	58.5	9	17	19	36				-14.8 LIMESTONE	-56.3
-20										**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)	
	-22.0	63.5	7	9	11	20					
-25											
	-27.0	68.5	6	7	10	17					
-30										-30.0	71.5
	-32.0	73.5	4	4	6	10				-30.2 LIMESTONE	-71.7
-35										**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)	

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX SEABOARD COAST LINE R.R.)				**GROUND WTR (ft)**
BORING NO. B5 NBL	**STATION** 149+01	**OFFSET** 17 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.5 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 194,121	**EASTING** 2,283,970	**24 HR.** 3.1
DRILL RIG/HAMMER EFF./DATE MAD3964 CME-45C 83% 07/24/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/07/12	**COMP. DATE** 11/07/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
	-37.0	78.5	46	12	15	27				-36.8 78.3 -37.1 LIMESTONE 78.6 -38.5 80.0
										Boring Terminated at Elevation -38.5 ft IN MEDIUM DENSE SAND
										SHELBY TUBES COLLECTED AT -L- 149+06 17' RT
										Other Samples: ST-8 (8.0 - 10.0)

NCDOT BORE DOUBLE R2633BA_LOVEREY6_BORINGSWORKING.GPJ NC_DOT.GDT 9/24/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B6 NBL	**STATION** 149+38	**OFFSET** 10 ft RT	**ALIGNMENT** -L-	**0 HR.** 1.2
COLLAR ELEV. 41.5 ft	**TOTAL DEPTH** 140.0 ft	**NORTHING** 194,129	**EASTING** 2,284,007	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 08/31/13	**COMP. DATE** 08/31/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										41.5 GROUND SURFACE	0.0

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B6 NBL	**STATION** 149+38	**OFFSET** 10 ft RT	**ALIGNMENT** -L-	**0 HR.** 1.2
COLLAR ELEV. 41.5 ft	**TOTAL DEPTH** 140.0 ft	**NORTHING** 194,129	**EASTING** 2,284,007	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 08/31/13	**COMP. DATE** 08/31/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
-40	-42.0	83.5	3	3	6	9				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-45	-47.0	88.5	16	27	23	50				
-50	-52.0	93.5	100/0.5			100/0.5				-51.9 93.4 -52.5 94.0 **COASTAL PLAIN** GRAY LIMESTONE (PEEDEE FORMATION) **COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-55	-57.0	98.5	15	46	25	71				
-60	-62.0	103.5	4	5	9	14				
-65	-67.0	108.5	6	6	7	13				
-70	-72.0	113.5	21	34	29	63				
-75	-77.0	118.5	6	7	8	15				-75.5 117.0 **COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)
-80	-82.0	123.5	15	13	13	26				
-85	-87.0	128.5	5	8	9	17				
-90	-92.0	133.5	24	19	14	33				
-95	-97.0	138.5	7	10	12	22				-98.5 140.0 Boring Terminated at Elevation -98.5 ft IN VERY STIFF SANDY CLAY

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B7 NBL	**STATION** 149+74	**OFFSET** 25 ft RT	**ALIGNMENT** -L-	**0 HR.** 4.0
COLLAR ELEV. 40.8 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,115	**EASTING** 2,284,043	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/11/13	**COMP. DATE** 09/12/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										40.8 GROUND SURFACE	0.0

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B7 NBL	**STATION** 149+74	**OFFSET** 25 ft RT	**ALIGNMENT** -L-	**0 HR.** 4.0
COLLAR ELEV. 40.8 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,115	**EASTING** 2,284,043	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/11/13	**COMP. DATE** 09/12/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-42.7	83.5		3	4	4	8				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-47.7	88.5		6	6	9	15				
-52.7	93.5		14	6	9	15				
-57.7	98.5		6	100/0.5		100/0.5				-58.2 99.0 -59.2 100.0 **COASTAL PLAIN** GRAY LIMESTONE (PEEDEE FORMATION)
-62.7	103.5		5	4	3	7				**COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)
-67.7	108.5		28	17	30	47				-67.2 108.0 **COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-72.7	113.5		5	6	6	12				-72.2 113.0 **COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)
-77.7	118.5		5	5	6	11				
-82.7	123.5		6	5	6	11				
-87.7	128.5		5	5	5	10				
-92.7	133.5		5	4	6	10				
-97.7	138.5		5	5	7	12				
-102.7	143.5		14	15	20	35				
-107.7	148.5		6	7	8	15				
-112.7	153.5		8	7	10	17				

Match Line

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B7 NBL	**STATION** 149+74	**OFFSET** 25 ft RT	**ALIGNMENT** -L-	**0 HR.** 4.0
COLLAR ELEV. 40.8 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,115	**EASTING** 2,284,043	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/11/13	**COMP. DATE** 09/12/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
-115						Match Line					
	-117.7	158.5	8	10	12	22				**COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION) *(continued)* -119.2	160.0
										Boring Terminated at Elevation -119.2 ft IN VERY STIFF SANDY CLAY	

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX SEABOARD COAST LINE R.R.)				**GROUND WTR (ft)**
BORING NO. B8 NBL	**STATION** 150+01	**OFFSET** 57 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.5 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 194,083	**EASTING** 2,284,070	**24 HR.** 3.1
DRILL RIG/HAMMER EFF./DATE MAD3964 CME-45C 83% 07/24/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/08/12	**COMP. DATE** 11/08/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										41.5 GROUND SURFACE	0.0
	40.5	1.0								**UNDIVIDED COASTAL PLAIN** TAN GRAY SANDY SILT, MOIST TO WET	
	38.0	3.5	1	2	1	3					
	35.5	6.0	WOH	WOH	2	2	SS-20				
	33.0	8.5	WOH	1	1	2				35.0	6.5
	28.0	13.5	1	2	2	4				**UNDIVIDED COASTAL PLAIN** TAN GRAY SILTY CLAY, WET	
	23.0	18.5	WOH	WOH	WOH	0	SS-21			29.5	12.0
	18.0	23.5	WOH	WOH	1	1				**COASTAL PLAIN** DARK GRAY SILTY CLAY, WET (PEEDEE FORMATION)	
	13.0	28.5	3	8	6	14					
	8.0	33.5	3	5	4	9	SS-22				
	3.0	38.5	4	2	3	5					
	-2.0	43.5	2	1	3	4					
	-7.0	48.5	3	5	4	9					
	-12.0	53.5	9	17	14	31	SS-23				
			14	20	80/0.4	100/0.9					
	-17.0	58.5	15	17	11	28					
	-22.0	63.5	7	7	12	19	SS-24				
	-27.0	68.5	10	28	72/0.2	100/0.7					
	-32.0	73.5	7	60	40/0.3	100/0.8					
										-11.5 53.0 LIMESTONE -11.7 53.2	
										-12.5 54.0 LIMESTONE -12.9 54.4	
										-14.5 56.0 LIMESTONE -14.9 56.4	
										COASTAL PLAIN DARK GRAY SAND, SAT. (PEEDEE FORMATION)	
										-26.6 68.1 LIMESTONE -26.9 68.4	
										-28.5 70.0 LIMESTONE -29.1 70.6	
										COASTAL PLAIN DARK GRAY SAND, SAT. (PEEDEE FORMATION)	
										-32.8 74.3 LIMESTONE -33.2 74.7	

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX SEABOARD COAST LINE R.R.)				**GROUND WTR (ft)**
BORING NO. B8 NBL	**STATION** 150+01	**OFFSET** 57 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.5 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 194,083	**EASTING** 2,284,070	**24 HR.** 3.1
DRILL RIG/HAMMER EFF./DATE MAD3964 CME-45C 83% 07/24/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/08/12	**COMP. DATE** 11/08/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
	-37.0	78.5	7	9	15	24				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION) *(continued)* -38.5 80.0
										Boring Terminated at Elevation -38.5 ft IN MEDIUM DENSE SAND

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WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B9 NBL	**STATION** 150+36	**OFFSET** 34 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.1 ft	**TOTAL DEPTH** 160.3 ft	**NORTHING** 194,107	**EASTING** 2,284,105	**24 HR.** 2.9
DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 83% 11/30/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/05/13	**COMP. DATE** 09/09/13	**SURFACE WATER DEPTH** N/A	

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B9 NBL	**STATION** 150+36	**OFFSET** 34 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.1 ft	**TOTAL DEPTH** 160.3 ft	**NORTHING** 194,107	**EASTING** 2,284,105	**24 HR.** 2.9
DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 83% 11/30/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/05/13	**COMP. DATE** 09/09/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
45												
40										GROUND SURFACE	41.1	0.0
35												
30												
25												
20												
15												
10												
5												
0												
-5												
-10												
-15												
-20												
-25												
-30												
-35												

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
-35						Match Line				
		-37.7	78.8	75	25/0.2	100/0.7				
-40										
		-42.7	83.8	4	4	6				
-45						10				
		-47.7	88.8	6	6	21				
-50						27				
		-52.7	93.8	10	24	28				
-55						52				
		-57.7	98.8	39	33	67/0.2				
-60						100/0.7				
		-62.7	103.8	4	4	5				
-65						9				
		-67.7	108.8	26	37	19				
-70						56				
		-72.7	113.8	4	4	7				
-75						11				
		-77.7	118.8	9	7	8				
-80						15				
		-82.7	123.8	11	18	16				
-85						34				
		-87.7	128.8	5	5	7				
-90						12				
		-92.7	133.8	7	9	20				
-95						29				
		-97.7	138.8	4	6	8				
-100						14				
		-102.7	143.8	12	10	10				
-105						20				
		-107.7	148.8	5	7	9				
-110						16				
		-112.7	153.8	6	8	9				
-115						17				

-38.9 **COASTAL PLAIN** 80.0
GRAY LIMESTONE (PEEDEE FORMATION)
COASTAL PLAIN
DARK GRAY SAND, SAT. (PEEDEE FORMATION)

-58.5 99.6
-59.5 100.6
COASTAL PLAIN
GRAY LIMESTONE (PEEDEE FORMATION)
COASTAL PLAIN
DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)

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BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B9 NBL	**STATION** 150+36	**OFFSET** 34 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.1 ft	**TOTAL DEPTH** 160.3 ft	**NORTHING** 194,107	**EASTING** 2,284,105	**24 HR.** 2.9
DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 83% 11/30/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/05/13	**COMP. DATE** 09/09/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
-115						Match Line				
	-117.7	158.8	6	9	12	21				**COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION) *(continued)* -119.2 / 160.3
										Boring Terminated at Elevation -119.2 ft IN VERY STIFF SANDY CLAY

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B10 SBL	**STATION** 144+70	**OFFSET** 9 ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 41.2 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,120	**EASTING** 2,283,539 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 86% 07/25/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 09/11/13	**COMP. DATE** 09/12/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
										41.2 GROUND SURFACE 0.0
40										
35										
30										
25										
20										
15										
10										
5										
0										
-5										
-10										
-15										
-20										
-25										
-30										
-35										

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B10 SBL	**STATION** 144+70	**OFFSET** 9 ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 41.2 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,120	**EASTING** 2,283,539 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 86% 07/25/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 09/11/13	**COMP. DATE** 09/12/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
-40										
	-42.3	83.5	4	5	19	24				
-45										COASTAL PLAIN DARK GRAY SAND, SAT. (PEEDEE FORMATION)
	-47.3	88.5	10	17	22	39				
-50										-48.3 89.5 -48.8 90.0 COASTAL PLAIN GRAY LIMESTONE (PEEDEE FORMATION)
	-52.3	93.5	7	12	20	32				COASTAL PLAIN DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-55										
	-57.3	98.5	13	21	35	56				-57.8 99.0 -58.8 100.0 COASTAL PLAIN GRAY LIMESTONE (PEEDEE FORMATION)
-60										
	-62.3	103.5	4	3	8	11				COASTAL PLAIN DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-65										
	-67.3	108.5	6	7	8	15				
-70										
	-72.3	113.5	22	18	18	36				
-75										
	-77.3	118.5	6	7	8	15				
-80										
	-82.3	123.5	6	7	12	19				
-85										-85.8 127.0 COASTAL PLAIN DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)
	-87.3	128.5	6	7	7	14				
-90										
	-92.3	133.5	6	5	7	12				
-95										
	-97.3	138.5	7	9	12	21				
-100										
	-102.3	143.5	8	7	10	17				
-105										
	-107.3	148.5	8	11	11	22				
-110										
	-112.3	153.5	7	9	12	21				
-115										

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B10 SBL	**STATION** 144+70	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.2 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,120	**EASTING** 2,283,539	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 86% 07/25/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/11/13	**COMP. DATE** 09/12/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
-115						Match Line					
	-117.3	158.5	18	16	16	32				**COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION) *(continued)* -118.8	160.0
										Boring Terminated at Elevation -118.8 ft IN HARD SANDY CLAY	

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX SEABOARD COAST LINE R.R.)				**GROUND WTR (ft)**
BORING NO. B11 SBL	**STATION** 145+15	**OFFSET** 60 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.4 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 194,175	**EASTING** 2,283,579	**24 HR.** 2.9
DRILL RIG/HAMMER EFF./DATE MAD3964 CME-45C 83% 07/24/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/12/12	**COMP. DATE** 11/12/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
										41.4 GROUND SURFACE 0.0
40	40.4	1.0	2	2	2	4	SS-1	▼		**UNDIVIDED COASTAL PLAIN** TAN GRAY SANDY SILT, MOIST TO WET
	37.9	3.5	1	2	3	5				
35	35.4	6.0	1	2	3	5	SS-2			35.4 6.0
	32.9	8.5	2	3	2	5				**UNDIVIDED COASTAL PLAIN** TAN GRAY SANDY CLAY, WET
30										31.4 10.0
	27.9	13.5	1	2	3	5	SS-3			**COASTAL PLAIN** DARK GRAY SAND, SAT (PEEDEE FORMATION)
25										
	22.9	18.5	2	1	2	3	SS-4			24.4 17.0
20										**COASTAL PLAIN** DARK GRAY SANDY SILT, WET (PEEDEE FORMATION)
	17.9	23.5	2	2	1	3	SS-5			18.4 23.0
15										**COASTAL PLAIN** DARK GRAY SAND, SAT (PEEDEE FORMATION)
	12.9	28.5	2	1	1	2				
10										
	7.9	33.5	2	1	2	3				
5										
	2.9	38.5	2	2	1	3				
0										
	-2.1	43.5	3	3	3	6	SS-6			
-5										
	-7.1	48.5	6	11	12	23				
-10										
	-12.1	53.5	12	12	12	24				
-15										-14.6 56.0
	-17.1	58.5	46	13	14	27	SS-7			-14.8 56.2 LIMESTONE
-20										DARK GRAY SAND, SAT (PEEDEE FORMATION)
	-22.1	63.5	11	27	15	42				-21.1 62.5
-25										-21.3 62.7 LIMESTONE
	-27.1	68.5	8	7	9	16				DARK GRAY SAND, SAT (PEEDEE FORMATION)
-30										-25.7 67.1
	-32.1	73.5	5	6	10	16	SS-8			-25.9 67.3 LIMESTONE
-35										-26.5 67.9 LIMESTONE
										-26.7 68.1 DARK GRAY SAND, SAT (PEEDEE FORMATION)
										-30.0 71.4
										-30.2 71.6 LIMESTONE
										DARK GRAY SAND, SAT (PEEDEE FORMATION)

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX SEABOARD COAST LINE R.R.)				**GROUND WTR (ft)**
BORING NO. B11 SBL	**STATION** 145+15	**OFFSET** 60 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.4 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 194,175	**EASTING** 2,283,579	**24 HR.** 2.9
DRILL RIG/HAMMER EFF./DATE MAD3964 CME-45C 83% 07/24/2012		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 11/12/12	**COMP. DATE** 11/12/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
	-37.1	78.5	5	5	7	12				-35.9 77.3
										-36.1 77.5 LIMESTONE
										-38.6 80.0 DARK GRAY SAND, SAT (PEEDEE FORMATION)
										Boring Terminated at Elevation -38.6 ft IN MEDIUM DENSE SAND

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WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX SEABOARD COAST LINE R.R.)				**GROUND WTR (ft)**
BORING NO. B12 SBL	**STATION** 146+05	**OFFSET** 17 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.4 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 194,140	**EASTING** 2,283,673	**24 HR.** 3.1
DRILL RIG/HAMMER EFF./DATE MAD3964 CME-45C 83% 07/24/2012		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/12/12	**COMP. DATE** 11/12/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
										41.4 0.0 GROUND SURFACE
40	40.4	1.0	1	1	2	3				**UNDIVIDED COASTAL PLAIN** TAN GRAY SANDY SILT, MOIST TO WET
	37.9	3.5	2	2	3	5				
35	35.4	6.0	1	2	3	5				35.4 6.0 **UNDIVIDED COASTAL PLAIN** TAN GRAY SANDY CLAY, WET
	32.9	8.5	2	2	2	4				
30										29.4 12.0 **COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)
	27.9	13.5	1	3	3	6				
25										
	22.9	18.5	1	3	2	5				22.4 19.0 **COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
20										
	17.9	23.5	5	5	6	11				
15										
	12.9	28.5	3	3	2	5				
10										
	7.9	33.5	3	1	1	2				
5										
	2.9	38.5	2	3	3	6				
0										
	-2.1	43.5	3	1	2	3				
-5										
	-7.1	48.5	15	19	27	46				
-10										
	-12.1	53.5	16	18	17	35				
-15										
	-17.1	58.5	8	8	10	18				
-20										-21.1 62.5 -21.4 62.8 LIMESTONE DARK GRAY SAND, SAT. (PEEDEE FORMATION)
	-22.1	63.5	7	8	9	17				
-25										
	-27.1	68.5	8	8	11	19				
-30										-30.6 72.0 -31.0 72.4 LIMESTONE DARK GRAY SAND, SAT. (PEEDEE FORMATION)
	-32.1	73.5	6	6	9	15				
-35										

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX SEABOARD COAST LINE R.R.)				**GROUND WTR (ft)**
BORING NO. B12 SBL	**STATION** 146+05	**OFFSET** 17 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.4 ft	**TOTAL DEPTH** 80.0 ft	**NORTHING** 194,140	**EASTING** 2,283,673	**24 HR.** 3.1
DRILL RIG/HAMMER EFF./DATE MAD3964 CME-45C 83% 07/24/2012		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/12/12	**COMP. DATE** 11/12/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
	-37.1	78.5	5	6	49	55				DARK GRAY SAND, SAT. (PEEDEE FORMATION) *(continued)*
										-38.1 79.5 -38.6 80.0 LIMESTONE
										Boring Terminated at Elevation -38.6 ft IN LIMESTONE
										SHELBY TUBES COLLECTED AT -L- 146+10 17' LT
										Other Samples: ST-3 (3.0 - 5.0) ST-4 (9.0 - 11.0) ST-5 (14.0 - 16.0)

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WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX SEABOARD COAST LINE R.R.)				**GROUND WTR (ft)**
BORING NO. B13 SBL	**STATION** 147+16	**OFFSET** 64 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.6 ft	**TOTAL DEPTH** 70.0 ft	**NORTHING** 194,194	**EASTING** 2,283,781	**24 HR.** 2.2
DRILL RIG/HAMMER EFF./DATE MAD3964 CME-45C 83% 07/24/2012		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 11/05/12	**COMP. DATE** 11/05/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
										41.6 GROUND SURFACE	0.0
40	40.6	1.0	2	2	2	4				**UNDIVIDED COASTAL PLAIN** GRAY SAND, MOIST TO SAT.	
	38.1	3.5	2	3	2	5	SS-16				
35	35.6	6.0	1	1	2	3				35.6 **UNDIVIDED COASTAL PLAIN** GRAY SANDY CLAY, WET	6.0
	33.1	8.5	2	4	2	6					
30										30.6	11.0
	28.1	13.5	WOH	WOH	WOH	0	SS-17			**COASTAL PLAIN** DARK GRAY SILTY CLAY, WET (PEEDEE FORMATION)	
25											
	23.1	18.5	1	1	1	2					
20										17.6	24.0
	18.1	23.5	1	4	5	9				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)	
15											
	13.1	28.5	1	2	2	4	SS-18				
10											
	8.1	33.5	2	2	2	4					
5											
	3.1	38.5	3	3	3	6					
0											
	-1.9	43.5	5	4	4	8					
-5											
	-6.9	48.5	22	27	27	54					
-10										-10.4	52.0
	-11.9	53.5	22	35	42	77	SS-19				
-15											
	-16.9	58.5	5	8	6	14					
-20											
	-21.9	63.5	9	8	24	32					
	-24.4	66.0	19	14	9	23				-24.6 LIMESTONE	66.2
-25										-24.7	66.3
	-26.9	68.5	9	8	92/0.4	100/0.9				DARK GRAY SAND, SAT. (PEEDEE FORMATION)	
										-28.3 LIMESTONE	69.9
										-28.4	70.0
										Boring Terminated at Elevation -28.4 ft IN LIMESTONE	

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WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B14 SBL	**STATION** 147+75	**OFFSET** 61 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 40.8 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,195	**EASTING** 2,283,841	**24 HR.** 4.0
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/10/13	**COMP. DATE** 09/11/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
										GROUND SURFACE	40.8	0.0

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B14 SBL	**STATION** 147+75	**OFFSET** 61 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 40.8 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,195	**EASTING** 2,283,841	**24 HR.** 4.0
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/10/13	**COMP. DATE** 09/11/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
-35									Match Line		
	-42.7	83.5	3	3	3				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)		
-45											
	-47.7	88.5	6	6	8						
-50											
	-52.7	93.5	12	40	33					-53.2	94.0
-55									**COASTAL PLAIN** GRAY LIMESTONE (PEEDEE FORMATION)	-54.2	95.0
	-57.7	98.5	100/0.4						**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)	-57.2	98.0
-60										-58.2	99.0
	-62.7	103.5	5	4	4				**COASTAL PLAIN** GRAY LIMESTONE (PEEDEE FORMATION)		
-65									**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)		
	-67.7	108.5	4	4	6						
-70											
	-72.7	113.5	4	5	15						
-75										-75.2	116.0
	-77.7	118.5	4	5	6				**COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)		
-80											
	-82.7	123.5	13	15	13						
-85											
	-87.7	128.5	5	4	7						
-90											
	-92.7	133.5	5	6	21						
-95											
	-97.7	138.5	6	6	8						
-100											
	-102.7	143.5	11	9	11						
-105											
	-107.7	148.5	5	6	9						
-110											
	-112.7	153.5	7	7	10						
-115											

BLOWS PER FOOT: 16, 14, 73, 100/0.4, 8, 10, 20, 11, 28, 11, 27, 14, 20, 15, 17

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WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B14 SBL	**STATION** 147+75	**OFFSET** 61 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 40.8 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,195	**EASTING** 2,283,841	**24 HR.** 4.0
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/10/13	**COMP. DATE** 09/11/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
-115						Match Line					
	-117.7	158.5	7	8	12	20				**COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION) *(continued)*	
										-119.2	160.0
										Boring Terminated at Elevation -119.2 ft IN VERY STIFF SANDY CLAY	

NCDOT BORE DOUBLE R2633BA_LOVEREY6_ADDENDUM_BORINGS.GPJ NC_DOT.GDT 9/24/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B15 SBL	**STATION** 148+10	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.9 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,180	**EASTING** 2,283,877	**24 HR.** 4.2
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 09/05/13	**COMP. DATE** 09/06/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										41.9 GROUND SURFACE 0.0
40										
35										
30										
25										
20										
15										
10										
5										
0										
-5										
-10										
-15										
-20										
-25										
-30										
-35										

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B15 SBL	**STATION** 148+10	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.9 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,180	**EASTING** 2,283,877	**24 HR.** 4.2
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 09/05/13	**COMP. DATE** 09/06/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
-40	-41.6	83.5	5	4	4	8				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-45	-46.6	88.5	10	10	25	35				
-50	-51.6	93.5	4	8	16	24				
-55	-56.6	98.5	16	65	35/0.1	100/0.6				-57.1 99.0 -58.1 **COASTAL PLAIN** GRAY LIMESTONE (PEEDEE FORMATION) 100.0
-60	-61.6	103.5	4	3	5	8				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-65	-66.6	108.5	13	13	9	22				
-70	-71.6	113.5	5	5	12	17				
-75	-76.6	118.5	6	6	8	14				-73.8 115.7 **COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)
-80	-81.6	123.5	7	17	26	43				
-85	-86.6	128.5	6	6	7	13				
-90	-91.6	133.5	6	11	11	22				
-95	-96.6	138.5	5	6	7	13				
-100	-101.6	143.5	19	17	20	37				
-105	-106.6	148.5	6	7	8	15				
-110	-111.6	153.5	9	9	11	20				
-115										

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WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist	
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)				**GROUND WTR (ft)**
BORING NO. B15 SBL	**STATION** 148+10	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 41.9 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,180	**EASTING** 2,283,877	**24 HR.** 4.2
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 09/05/13	**COMP. DATE** 09/06/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
-115						Match Line					
	-116.6	158.5	7	9	11	20				-118.1	160.0
										Boring Terminated at Elevation -118.1 ft IN VERY STIFF SANDY CLAY	

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B16 SBL	**STATION** 148+70	**OFFSET** 28 ft LT	**ALIGNMENT** -L- / **0 HR.** 3.2
COLLAR ELEV. 41.2 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,165	**EASTING** 2,283,938 / **24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 09/06/13	**COMP. DATE** 09/10/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
										41.2 GROUND SURFACE 0.0
40										
35										
30										
25										
20										
15										
10										
5										
0										
-5										
-10										
-15										
-20										
-25										
-30										
-35										

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B16 SBL	**STATION** 148+70	**OFFSET** 28 ft LT	**ALIGNMENT** -L- / **0 HR.** 3.2
COLLAR ELEV. 41.2 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,165	**EASTING** 2,283,938 / **24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 09/06/13	**COMP. DATE** 09/10/13	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-35						Match Line				
-40										
	-42.3	83.5	3	2	3	5				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-45	-47.3	88.5	7	20	22	42				
-50	-52.3	93.5	26	46	30	76				
-55	-57.3	98.5	73	27/0.3		100/0.8				-56.8 98.0 **COASTAL PLAIN** GRAY LIMESTONE (PEEDEE FORMATION) -58.8 100.0
-60	-62.3	103.5	4	5	8	13				**COASTAL PLAIN** DARK GRAY SAND, SAT. (PEEDEE FORMATION)
-65	-67.3	108.5	5	5	7	12				
-70	-72.3	113.5	4	5	8	13				-71.8 113.0 **COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION)
-75	-77.3	118.5	5	6	6	12				
-80	-82.3	123.5	6	6	7	13				
-85	-87.3	128.5	6	6	8	14				
-90	-92.3	133.5	8	35	24	59				
-95	-97.3	138.5	6	5	8	13				
-100	-102.3	143.5	20	13	14	27				
-105	-107.3	148.5	7	12	23	35				
-110	-112.3	153.5	7	8	9	17				
-115										

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34491.1.2	**TIP** R-2633BA	**COUNTY** BRUNSWICK	**GEOLOGIST** Contract Geologist
SITE DESCRIPTION BRIDGE ON -L- (US 17 BYPASS) OVER -EY6- (CSX RR)			**GROUND WTR (ft)**
BORING NO. B16 SBL	**STATION** 148+70	**OFFSET** 28 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.2
COLLAR ELEV. 41.2 ft	**TOTAL DEPTH** 160.0 ft	**NORTHING** 194,165	**EASTING** 2,283,938	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 87% 07/30/2013		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 09/06/13	**COMP. DATE** 09/10/13	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
-115						Match Line				
	-117.3	158.5	8	8	12	20				**COASTAL PLAIN** DARK GRAY SANDY CLAY, WET (PEEDEE FORMATION) *(continued)*
										-118.8 160.0
										Boring Terminated at Elevation -118.8 ft IN VERY STIFF SANDY CLAY

PROJECT REFERENCE NO.	SHEET NO.
R-2633BA	31 OF 31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

34491.1.2 (R-2633BA)

BRIDGE(S) ON US 17 (WILMINGTON BYPASS) OVER CSX RAILROAD /SEABOARD COAST LINE RAILROAD BETWEEN US 74/76 AND SR 1426 AT -L- STA. 147+38.89

B11 SBL 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	60 LT	145+15	1.0-2.5	A-4(0)	17	NP	20.3	44.4	21.2	14.1	99	92	40	-	-
SS-2	60 LT	145+15	6.0-7.5	A-6(3)	26	12	16.7	36.4	22.8	24.1	100	94	55	-	-
SS-3	60 LT	145+15	13.5-15.0	A-2-4(0)	25	NP	52.7	31.5	7.8	8.0	99	68	16	-	-
SS-4	60 LT	145+15	18.5-20.0	A-4(0)	26	NP	23.0	41.7	14.2	21.1	100	92	36	-	-
SS-5	60 LT	145+15	23.5-25.0	A-2-4(0)	22	NP	54.1	30.9	7.0	8.0	100	78	16	-	-
SS-6	60 LT	145+15	43.5-45.0	A-2-4(0)	23	NP	1.5	86.5	8.9	3.0	100	100	15	-	-
SS-7	60 LT	145+15	58.5-60.0	A-2-4(0)	22	NP	6.6	72.8	14.6	6.0	91	87	25	-	-
SS-8	60 LT	145+15	73.5-75.0	A-2-4(0)	22	NP	1.6	76.8	13.6	8.0	100	99	30	-	-

B13 SBL 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-16	64 LT	147+16	3.5-5.0	A-2-4(0)	17	2	21.3	47.0	15.6	16.1	100	96	34	-	-
SS-17	64 LT	147+16	13.5-15.0	A-7-6(17)	49	22	15.9	11.1	42.9	30.2	100	90	75	-	-
SS-18	64 LT	147+16	28.5-30.0	A-3(0)	23	NP	15.6	78.6	1.8	4.0	100	97	8	-	-
SS-19	64 LT	147+16	53.5-55.0	A-2-4(0)	22	NP	1.0	84.6	8.3	6.0	100	100	20	-	-

B4 NBL 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-9	65 RT	147+84	1.0-2.5	A-4(0)	14	NP	20.1	45.0	24.8	10.1	100	96	38	-	-
SS-10	65 RT	147+84	6.0-7.5	A-7-6(29)	53	39	7.2	18.1	22.4	52.3	100	99	77	-	-
SS-11	65 RT	147+84	13.5-15.0	A-7-6(21)	49	21	3.4	11.3	51.2	34.2	100	99	87	-	-
SS-12	65 RT	147+84	24.5-25.0	A-2-4(0)	22	NP	45.4	36.7	9.8	8.0	100	80	19	-	-
SS-13	65 RT	147+84	33.5-35.0	A-3(0)	24	NP	8.2	85.4	4.3	2.0	100	100	8	-	-
SS-14	65 RT	147+84	58.5-60.0	A-2-4(0)	22	NP	1.8	80.8	11.4	6.0	100	99	22	-	-
SS-15	65 RT	147+84	73.5-75.0	A-2-4(0)	24	NP	0.5	79.2	12.3	8.0	100	100	29	-	-

B8 NBL 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-20	57 RT	150+01	3.5-5.0	A-4(0)	20	4	21.9	41.2	16.8	20.1	100	95	39	-	-
SS-21	57 RT	150+01	13.5-15.0	A-7-6(13)	48	20	21.1	15.9	40.9	22.1	100	86	66	-	-
SS-22	57 RT	150+01	28.5-30.0	A-2-4(0)	25	NP	14.2	77.2	2.6	6.0	99	96	11	-	-
SS-23	57 RT	150+01	48.5-50.0	A-2-4(0)	24	NP	3.1	84.5	6.3	6.0	99	98	16	-	-
SS-24	57 RT	150+01	63.5-65.0	A-2-4(0)	25	NP	1.1	80.1	10.8	8.0	100	100	23	-	-

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		
ST-3	17 LT	146+10	3.0-5.0	A-2-4(0)	18	4	31.9	41.7	9.3	17.1	100	91	29	-	1.6
ST-4, 1+2	17 LT	146+10	9.0-11.0	A-6(8)	33	14	16.7	35.6	21.5	26.2	100	95	68	-	2.4
ST-4, 3	17 LT	146+10	9.0-11.0	A-4(4)	32	10	25.6	24.5	29.8	20.1	100	80	62	-	1.6
ST-5, 1+2	17 LT	146+10	14.0-16.0	A-6(2)	27	11	22.7	39.4	17.8	20.1	100	91	49	-	3.3
ST-5, 3	17 LT	149+10	14.0-16.0	A-2-4(0)	24	NP	52.0	32.9	8.1	7.0	100	76	16	-	1.5
ST-8	17 RT	149+05	8.0-10.0	A-6(4)	32	11	13.6	41.0	21.0	24.4	100	98	59	-	2.7

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2633B	1	11

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34491.1.2 (R-2633B) F.A. PROJ. STPNHF-17(1)

COUNTY BRUNSWICK

PROJECT DESCRIPTION US 17 (WILMINGTON BYPASS) FROM 74-76 EAST OF MALMO IN BRUNSWICK COUNTY TO NORTH OF WILMINGTON IN NEW HANOVER COUNTY

SITE DESCRIPTION BRIDGE ON SR 1430 (CEDAR HILL ROAD) OVER CARTWHEEL BRANCH AT -Y8- STA. 48+79

THIS REPORT WAS ORIGINALLY DONE UNDER TIP R-2633B, BUT IS BEING LET UNDER TIP R-2633BA

CONTENTS

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PERSONNEL
S&ME, INC.

INVESTIGATED BY T.C. BOTTOMS

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE DECEMBER 2010

NORTH CAROLINA LICENSED SEAL 2240 GEOLOGIST TYLER C. BOTTOMS

12/13/10

ID: R-2633B

PROJECT: 34491.1.2

DRAWN BY: C.P. TURNER

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

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PROJECT REFERENCE NO.	SHEET NO.
R-2633B	2 OF 11

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/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BENCH MARK: BM 234: RR SPIKE IN BASE OF 18" PINE AT -BY8- STA. 39+96, 136' LT
ELEVATION: 11.46 FT.

NOTES:

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET
R-2633B	3 OF 11

SITE PLAN

0 50 100
FEET

N

45+00

50+00

SKEW = 110°

SR 1431 ROYSTER ROAD 18' BST

EB1 BENT LINE

B1 BENT LINE

B2 BENT LINE

B3 BENT LINE

EB2 BENT LINE

EB1-A

EB2-A

B1-B

B2-C

B3-B

TO SR 1431

TO SR 1432

-Y8-

SR 1430

CARTWHEEL BRANCH

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
R-2633B	4 OF 11
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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

PROFILE THROUGH BORINGS PROJECTED ALONG -Y8-

VE = 2.0

EBI-A	BI-B	B2-C	B3-B	EB2-A
47+25	47+94	48+76	49+51	50+63
16' LT	7' RT	CL	28' RT	28' LT

PAVEMENT

WATER SURFACE 4/08

VERY LOOSE TO MEDIUM DENSE GRAY, BROWN, AND TAN SAND, MOIST TO SATURATED, AND SOFT TO STIFF BROWN SANDY SILT, WET (UNDIVIDED COASTAL PLAIN)

VERY LOOSE AND TO VERY SOFT DENSE GRAY GRAY SAND WITH CEMENTED LAYERS, SATURATED SANDSTONE (PEEDEE FORMATION)

Ⓐ MEDIUM DENSE TO VERY DENSE GRAY SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
Ⓑ VERY SOFT BROWN MUCK, MOIST TO WET (ALLUVIAL)
Ⓒ SOFT GRAY SANDSTONE (PEEDEE FORMATION)

NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM BRIDGE SURVEY & HYDRAULIC REPORT DATED 4/29/08.

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

47+00 48+00 49+00 50+00 51+00

13-DEC-2010 15:09
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NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** Bradley, N.	
SITE DESCRIPTION BRIDGE ON -Y8- (CEDAR HILL RD.) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 47+25	**OFFSET** 16 ft LT	**ALIGNMENT** -Y8-	**0 HR.** N/A
COLLAR ELEV. 8.7 ft	**TOTAL DEPTH** 69.6 ft	**NORTHING** 190,188	**EASTING** 2,297,561	**24 HR.** 3.7
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER S&ME, INC	**START DATE** 10/07/10	**COMP. DATE** 10/07/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										8.7 GROUND SURFACE	0.0
										8.4 PAVEMENT	0.3
	7.7	1.0								ROADWAY EMBANKMENT	
			14	22	32	54	SS-24			GRAY SAND, MOIST	
5	5.2	3.5								5.7	3.0
			7	7	7	14	SS-25			UNDIVIDED COASTAL PLAIN	
	2.7	6.0				23				GRAY SAND WITH WOOD FRAGMENTS,	
			7	10	13		SS-26			MOIST TO SATURATED	
0	0.2	8.5									
			5	6	7	13					
-5	-4.8	13.5									
			3	4	5	9	SS-27				
-10	-9.8	18.5									
			2	1	2	3					
-15	-14.4	23.1								-13.3	22.0
			35	39	49	88	SS-28			COASTAL PLAIN	
-20	-19.4	28.1								GRAY SAND WITH CEMENTED LAYERS,	
			7	8	26	34				SATURATED (PEEDEE FORMATION)	
-25	-24.4	33.1									
			13	15	13	28	SS-29				
-30	-29.4	38.1									
			28	13	14	27					
-35	-34.4	43.1									
			7	5	10	15	SS-30				
-40	-39.4	48.1									
			8	10	17	27					
-45	-44.4	53.1									
			7	10	10	20					
-50	-49.4	58.1									
			7	7	11	18	SS-31				
-55	-54.4	63.1									
			14	12	9	21					
-60	-59.4	68.1								-60.9	69.6
			5	6	9	15				Boring Terminated at Elevation -60.9 ft In Medium Dense Sand	
-65											
-70											

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** Bradley, N.	
SITE DESCRIPTION BRIDGE ON -Y8- (CEDAR HILL RD.) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 47+94	**OFFSET** 7 ft RT	**ALIGNMENT** -Y8-	**0 HR.** N/A
COLLAR ELEV. 7.3 ft	**TOTAL DEPTH** 69.7 ft	**NORTHING** 190,116	**EASTING** 2,297,562	**24 HR.** 1.0
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER S&ME, INC	**START DATE** 10/06/10	**COMP. DATE** 10/06/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										7.3 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT
	6.3	1.0								GRAY SAND, MOIST TO SATURATED
5	3.8	3.5	6	5	7	12	SS-14			
			4	4	7	11	SS-15			1.8 5.5
	1.3	6.0								UNDIVIDED COASTAL PLAIN
0	-1.2	8.5	9	10	12	22	SS-16			GRAY AND BROWN SAND, SATURATED
			1	0	0	0				-3.7 11.0
-5	-5.9	13.2								
			3	2	3	5	SS-17			
-10	-10.9	18.2								
			WOH	WOH	WOH	0				
-15	-15.9	23.2								
			13	25	19	44	SS-18			
-20	-20.9	28.2								
			6	7	13	20				
-25	-25.9	33.2								
			7	17	17	34	SS-19			
-30	-30.9	38.2								
			5	4	18	22				
-35	-35.9	43.2								
			8	9	13	22	SS-20			
-40	-40.9	48.2								
			20	10	15	25				
-45	-45.9	53.2								
			8	14	14	28	SS-21			
-50	-50.9	58.2								
			10	11	13	24				
-55	-55.9	63.2								
			50	50/0.5		100/1.0	SS-22			
-60	-60.9	68.2								-62.4 69.7
			9	22	27	49	SS-23			Boring Terminated at Elevation -62.4 ft In Dense Sand
-65										
-70										

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** Bradley, N.	
SITE DESCRIPTION BRIDGE ON -Y8- (CEDAR HILL RD.) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. B2-C	**STATION** 48+76	**OFFSET** CL	**ALIGNMENT** -Y8-	**0 HR.** N/A
COLLAR ELEV. 4.0 ft	**TOTAL DEPTH** 59.7 ft	**NORTHING** 190,040	**EASTING** 2,297,596	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER S&ME, INC	**START DATE** 10/08/10	**COMP. DATE** 10/11/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
5										
	3.0	1.0								4.0 GROUND SURFACE 0.0
	0.5	3.5	WOH	WOH	WOH	0	SS-32			**ALLUVIAL** BROWN MUCK (40.1% ORGANIC), WET
0	-2.0	6.0	1	0	0	0 1				
	-4.5	8.5	1	0	1	1				-4.0 8.0
-5			3	1	0		SS-33			**UNDIVIDED COASTAL PLAIN** BROWN SAND, SATURATED
										-7.5 11.5
-10	-9.5	13.5	25	35	35	70	SS-34			**COASTAL PLAIN** GRAY SAND WITH CEMENTED LAYERS, SATURATED (PEEDEE FORMATION)
	-14.2	18.2	5	26	22	48				
-15										
	-19.2	23.2	28	21	20	41	SS-35			
-20										
	-24.2	28.2	5	7	14	21				
-25										
	-29.2	33.2	7	10	15	25				
-30										
	-34.2	38.2	8	12	15	27	SS-36			
-35										
	-39.2	43.2	8	11	44	55				
-40										
	-44.2	48.2	8	8	12	20				
-45										
	-49.2	53.2	6	8	16	24	SS-37			
-50										
	-54.2	58.2	7	7	10	17	SS-38			-55.7 59.7
-55										Boring Terminated at Elevation -55.7 ft In Medium Dense Sand
-60										
-65										
-70										
-75										

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** Bradley, N.	
SITE DESCRIPTION BRIDGE ON -Y8- (CEDAR HILL RD.) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. B3-B	**STATION** 49+51	**OFFSET** 28 ft RT	**ALIGNMENT** -Y8-	**0 HR.** N/A
COLLAR ELEV. 3.2 ft	**TOTAL DEPTH** 69.5 ft	**NORTHING** 189,960	**EASTING** 2,297,594	**24 HR.** 1.0
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER S&ME, INC	**START DATE** 10/12/10	**COMP. DATE** 10/12/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
5										
	2.2	1.0								3.2 GROUND SURFACE 0.0
	-0.3	3.5	WOH	WOH	WOH	0	SS-39			**ALLUVIAL** BROWN MUCK, MOIST TO WET
0	-2.8	6.0	1	2	2	4	SS-40			0.2 3.0
	-5.3	8.5	2	2	4	6	SS-41			**UNDIVIDED COASTAL PLAIN** GRAY SAND, SATURATED
-5			WOH	WOH	2	2				-1.8 5.0
	-10.3	13.5	3	8	21	29	SS-42			**COASTAL PLAIN** GRAY SAND WITH CEMENTED LAYERS, SATURATED (PEEDEE FORMATION)
-10										-9.8 13.0
	-17.3	20.5	3	6	25	31	SS-43			-15.3 18.5
-15	-19.8	23.0	24	18	25	43				-16.9 20.1
	-24.8	28.0	11	12	20	32	SS-44			**COASTAL PLAIN** SOFT GRAY SANDSTONE (PEEDEE FORMATION)
-20	-29.8	33.0	7	11	14	25				**COASTAL PLAIN** GRAY SAND WITH CEMENTED LAYERS, SATURATED (PEEDEE FORMATION)
-25	-34.8	38.0	5	7	10	17	SS-45			
-30	-39.8	43.0	12	17	20	37				
-35	-44.8	48.0	8	8	10	18	SS-46			
-40	-49.8	53.0	14	45	14	59				
-45	-54.8	58.0	5	6	10	16	SS-47			
-50	-59.8	63.0	5	8	12	20				
-55	-64.8	68.0	6	8	22	30				-66.3 69.5
-60										Boring Terminated at Elevation -66.3 ft In Medium Dense Sand
-65										
-70										
-75										

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** Bradley, N.
SITE DESCRIPTION BRIDGE ON -Y8- (CEDAR HILL RD.) OVER CARTWHEEL BRANCH			**GROUND WTR (ft)**
BORING NO. B3-B	**STATION** 49+51	**OFFSET** 28 ft RT	**ALIGNMENT** -Y8- **0 HR.** N/A
COLLAR ELEV. 3.2 ft	**TOTAL DEPTH** 69.5 ft	**NORTHING** 189,960	**EASTING** 2,297,594 **24 HR.** 1.0
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER S&ME, INC	**START DATE** 10/12/10	**COMP. DATE** 10/12/10	**SURFACE WATER DEPTH** N/A
CORE SIZE NQZ	**TOTAL RUN** 4.8 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
-12.54											Begin Coring @ 15.7 ft
	-12.5	15.7	4.8	0:10/0.8 0:08/1.0 0:11/1.0 0:25/1.0 0:15/1.0	(1.6) 33%	(0.0) 0%					**COASTAL PLAIN** GRAY SAND WITH CEMENTED LAYERS, SATURATED (PEEDEE FORMATION) *(continued)*
-15											-15.3 18.5
	-17.3	20.5						(1.6) 100%	(0.0) 0%		-16.9 20.1 **COASTAL PLAIN** SOFT GRAY SANDSTONE (PEEDEE FORMATION)
				N=31			SS-43				**COASTAL PLAIN** GRAY SAND WITH CEMENTED LAYERS, SATURATED (PEEDEE FORMATION)
-20				N=43							
-25				N=32			SS-44				
-30				N=25							
-35				N=17			SS-45				
-40				N=37							
-45				N=18							
-50				N=59			SS-46				
-55				N=16							
-60				N=20			SS-47				
-65				N=30							-66.3 69.5 Boring Terminated at Elevation -66.3 ft In Medium Dense Sand
-70											
-75											
-80											
-85											
-90											

NCDOT CORE DOUBLE R-2633B_GEO_BRDG_Y8.GPJ NC_DOT.GDT 12/13/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34491.1.2	**ID.** R-2633B	**COUNTY** BRUNSWICK	**GEOLOGIST** Bradley, N.	
SITE DESCRIPTION BRIDGE ON -Y8- (CEDAR HILL RD.) OVER CARTWHEEL BRANCH				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 50+63	**OFFSET** 28 ft LT	**ALIGNMENT** -Y8-	**0 HR.** N/A
COLLAR ELEV. 8.6 ft	**TOTAL DEPTH** 70.0 ft	**NORTHING** 189,873	**EASTING** 2,297,684	**24 HR.** 3.6
DRILL RIG/HAMMER EFF./DATE SME R-6 CME-550X 77% 00/00/0000		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER S&ME, INC	**START DATE** 09/28/10	**COMP. DATE** 10/05/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
10											
										8.6 GROUND SURFACE	0.0
	7.6	1.0								UNDIVIDED COASTAL PLAIN BROWN AND TAN SAND, MOIST TO SATURATED	
5	5.1	3.5	2	2	2	4	SS-1				
			3	3	6	9	SS-2				
	2.6	6.0								3.6	5.0
			2	6	8	14	SS-3				
0	0.1	8.5									
			4	4	6	10	SS-4				
-5	-4.9	13.5								-3.4	12.0
			2	3	3	6	SS-5				
-10	-9.9	18.5									
			1	2	1	3	SS-6				
-15	-14.9	23.5								-13.4	22.0
			2	1	3	4	SS-7			COASTAL PLAIN GRAY SAND WITH CEMENTED LAYERS, SATURATED (PEEDEE FORMATION)	
-20	-19.9	28.5									
			3	2	6	8	SS-8				
-25	-24.9	33.5								-23.4	32.0
			1	1	2	3	SS-9				
-30	-29.9	38.5								-28.4	37.0
			1	1	2	3	SS-10				
-35	-34.9	43.5									
			11	34	29	63	SS-11				
-40	-39.9	48.5	100/0.3			100/0.3	SS-12				
-45	-44.9	53.5									
			13	17	54	71					
-50	-49.9	58.5									
			22	12	14	26	SS-13				
-55	-54.9	63.5									
			8	12	15	27					
-60	-59.9	68.5									
			7	11	20	31				-61.4	70.0
-65										Boring Terminated at Elevation -61.4 ft In Dense Sand	
-70											

NCDOT BORE DOUBLE R-2633B_GEO_BRDG_Y8.GPJ NC_DOT.GDT 12/13/10

PROJECT REFERENCE NO.	SHEET
R-2633B	9 OF 11

34491.1.2
R-2633B
BRIDGE ON SR 1430 (CEDAR HILL ROAD) OVER CARTWHEEL BRANCH AT -Y8- STA. 48+79

EB1-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-24	16 LT	47+25	1.0-2.5	A-2-4(0)	16	NP	48.9	38.5	5.6	7.0	100	75	15	-	-
SS-25	16 LT	47+25	3.5-5.0	A-3(0)	22	NP	47.2	43.8	5.0	4.0	99	73	10	-	-
SS-26	16 LT	47+25	6.0-7.5	A-3(0)	23	NP	5.4	87.9	3.7	3.0	100	100	8	-	-
SS-27	16 LT	47+25	13.5-15.0	A-4(0)	23	NP	8.2	83.8	3.9	4.0	100	99	91	-	-
SS-28	16 LT	47+25	23.1-24.6	A-2-4(0)	15	NP	25.8	52.6	11.6	10.1	64	57	15	-	-
SS-29	16 LT	47+25	33.1-34.6	A-2-4(0)	19	NP	8.6	71.3	10.0	10.0	85	82	20	-	-
SS-30	16 LT	47+25	43.1-44.6	A-2-4(0)	21	NP	2.3	81.4	9.2	7.0	100	100	20	-	-
SS-31	16 LT	47+25	58.1-59.6	A-2-4(0)	21	NP	0.8	85.4	6.7	7.0	100	100	17	-	-

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-14	7 RT	47+94	1.0-2.5	A-1-a(0)	24	NP	55.2	23.9	14.9	6.0	33	19	8	-	-
SS-15	7 RT	47+94	3.5-5.0	A-1-b(0)	17	NP	55.0	29.9	7.0	8.0	56	35	10	-	-
SS-16	7 RT	47+94	6.0-7.5	A-3(0)	22	NP	62.7	34.1	3.2	0.0	98	58	4	-	-
SS-17	7 RT	47+94	13.2-14.7	A-2-4(0)	23	NP	11.6	77.3	9.0	2.0	100	99	12	-	-
SS-18	7 RT	47+94	23.2-24.7	A-2-4(0)	17	NP	25.1	57.2	9.6	8.0	81	74	16	-	-
SS-19	7 RT	47+94	33.2-34.7	A-2-4(0)	18	NP	7.2	65.9	12.9	14.1	99	96	30	-	-
SS-20	7 RT	47+94	43.2-44.7	A-2-4(0)	22	NP	1.8	79.3	14.9	4.0	100	100	22	-	-
SS-21	7 RT	47+94	53.2-54.7	A-2-4(0)	21	NP	2.8	83.5	7.6	6.0	96	95	16	-	-
SS-22	7 RT	47+94	63.2-64.2	A-2-4(0)	21	NP	3.0	77.1	10.8	9.0	100	98	24	-	-
SS-23	7 RT	47+94	68.2-69.7	A-2-4(0)	21	NP	6.2	73.3	13.5	7.0	95	91	24	-	-

B2-C 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-32	CL	48+76	1.0-2.5	-	-	-	-	-	-	-	-	-	-	-	40.1
SS-33	CL	48+76	8.5-10.0	-	-	-	58.0	40.2	1.8	0.0	99	59	2	-	-
SS-34	CL	48+76	13.5-15.0	A-2-4(0)	18	NP	20.3	60.6	11.0	8.1	76	70	16	-	-
SS-35	CL	48+76	23.2-24.7	A-2-4(0)	18	NP	16.2	57.8	11.8	14.2	94	89	27	-	-
SS-36	CL	48+76	38.2-39.7	A-2-4(0)	21	NP	4.1	85.1	5.8	5.1	100	99	14	-	-
SS-37	CL	48+76	53.2-54.7	A-2-4(0)	22	NP	1.9	84.3	7.7	6.1	100	100	18	-	-
SS-38	CL	48+76	58.2-59.7	A-2-4(0)	24	NP	0.8	84.0	9.1	6.1	100	100	19	-	-

B3-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-39	28 RT	49+51	1.0-2.5	-	-	-	23.5	33.7	26.6	16.2	79	68	36	-	-
SS-40	28 RT	49+51	3.5-5.0	A-2-4(0)	19	2	50.2	32.2	4.5	13.2	99	73	19	-	-
SS-41	28 RT	49+51	6.0-7.5	A-3(0)	24	NP	31.0	65.7	1.2	2.0	100	86	4	-	-
SS-42	28 RT	49+51	13.5-15.0	A-2-4(0)	15	NP	23.1	50.7	14.0	12.2	88	80	25	-	-
SS-43	28 RT	49+51	20.5-22.0	A-2-4(0)	18	NP	17.2	62.5	8.1	12.2	98	95	22	-	-
SS-44	28 RT	49+51	28.0-29.5	A-2-4(0)	20	NP	8.3	71.4	10.1	10.1	95	93	24	-	-
SS-45	28 RT	49+51	38.0-39.5	A-2-4(0)	21	NP	2.0	77.9	9.9	10.1	100	100	24	-	-
SS-46	28 RT	49+51	53.0-54.5	A-2-4(0)	18	NP	6.7	69.0	16.2	8.1	85	82	25	-	-
SS-47	28 RT	49+51	63.0-64.5	A-2-4(0)	22	NP	1.2	80.5	10.1	8.1	100	100	23	-	-

EB2-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-1	28 LT	50+63	1.0-2.5	A-2-4(0)	21	NP	9.6	74.9	3.4	12.0	100	99	17	-	-
SS-2	28 LT	50+63	3.5-5.0	A-2-4(0)	22	NP	8.0	80.4	3.5	8.0	100	100	13	-	-
SS-3	28 LT	50+63	6.0-7.5	A-3(0)	22	NP	11.2	83.1	5.6	0.0	100	99	7	-	-
SS-4	28 LT	50+63	8.5-10.0	A-3(0)	23	NP	6.4	88.4	5.2	0.0	100	100	6	-	-
SS-5	28 LT	50+63	13.5-15.0	A-2-4(0)	22	NP	3.6	84.5	5.8	6.0	100	100	14	-	-
SS-6	28 LT	50+63	18.5-20.0	A-2-4(0)	23	NP	19.7	68.5	5.8	6.0	100	98	14	-	-
SS-7	28 LT	50+63	23.5-25.0	A-2-4(0)	21	NP	13.3	69.1	7.6	10.0	100	98	20	-	-
SS-8	28 LT	50+63	28.5-30.0	A-2-4(0)	20	NP	16.1	71.4	6.5	6.0	100	98	14	-	-
SS-9	28 LT	50+63	33.5-35.0	A-3(0)	20	NP	15.7	76.9	5.4	2.0	100	98	9	-	-
SS-10	28 LT	50+63	38.5-40.0	A-2-4(0)	21	NP	5.3	80.0	8.6	6.0	100	100	17	-	-
SS-11	28 LT	50+63	43.5-45.0	A-2-4(0)	19	NP	9.0	72.4	9.5	9.0	71	68	16	-	-
SS-12	28 LT	50+63	48.5-48.8	-	-	-	24.5	52.6	12.9	10.0	58	48	15	-	-
SS-13	28 LT	50+63	58.5-60.0	A-2-4(0)	22	NP	1.6	85.1	7.2	6.0	100	100	16	-	-

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 34491.1.2 TIP: R-2633B COUNTY: BRUNSWICK

DESCRIPTION(1): BRIDGE ON -Y8- (CEDAR HILL RD.) OVER CARTWHEEL BRANCH

EXISTING BRIDGE

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

Bridge No.: NA Length: NA Total Bents: NA Bents in Channel: NA Bents in Floodplain: NA
Foundation Type: NA

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NONE NOTED

Interior Bents: NONE NOTED

Channel Bed: NONE NOTED

Channel Bank: MINOR EROSION ON NORTHEAST AND SOUTHWEST BANKS

EXISTING SCOUR PROTECTION

Type(3): NONE

Extent(4): NA

Effectiveness(5): NA

Obstructions(6): NA

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): MUCK

Channel Bank Material(8): SAND

Channel Bank Cover(9): TREES AND SHRUBS

Floodplain Width(10): APPROX. 300'+

Floodplain Cover(11): TREES AND SHRUBS

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

Channel Migration Tendency(13): SOUTHEAST TOWARD END BENT 2

Observations and Other Comments: ____

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

BENTS										
B1	B2	B3								
1.2	0.1	-1.4								

Comparison of DSE to Hydraulics Unit theoretical scour:
Design Scour Elevations agree with the Hydraulic Unit's theoretical scour elevations proposed in the Hydraulics report dated April 29, 2008.

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 Sheet 9,
"Soil Test Results",
for samples:
Channel Bed: SS-32
Channel Bank: SS-1, SS-16

Reported by: Tyler Bottoms Date: 12/13/2010

CORE PHOTOGRAPH
B3-B
BOX 1 OF 1 (15.7' TO 20.5')