

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

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# STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34416.1.1(R-2303B) F.A. PROJ. STPNHF-F-8-2(17)  
 COUNTY SAMPSON  
 PROJECT DESCRIPTION NC 24 FROM WEST OF SR 1853  
(JOHN NUNNERY ROAD) TO WEST OF SR 1404 (DOWDY ROAD)

SITE DESCRIPTION DUAL STRUCTURE (STRUCTURE #3 & 4)  
ON NC 24 OVER BIG SWAMP

## INVENTORY

**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  
**C. M. BRUINSMA**

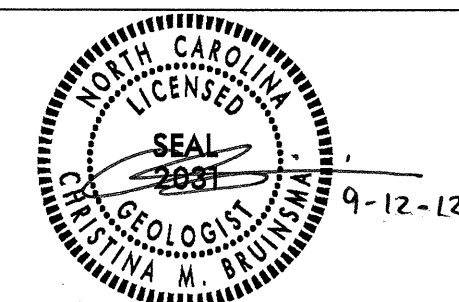
**F&H**

INVESTIGATED BY **C. M. BRUINSMA**

CHECKED BY **N.T. ROBERSON**

SUBMITTED BY **C.M. BRUINSMA**

DATE **AUGUST 2012**



**PROJECT: 34416.1.1 ID: R-2303B**

DRAWN BY: **T.T. WALKER, C.M. BRUINSMA**

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.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

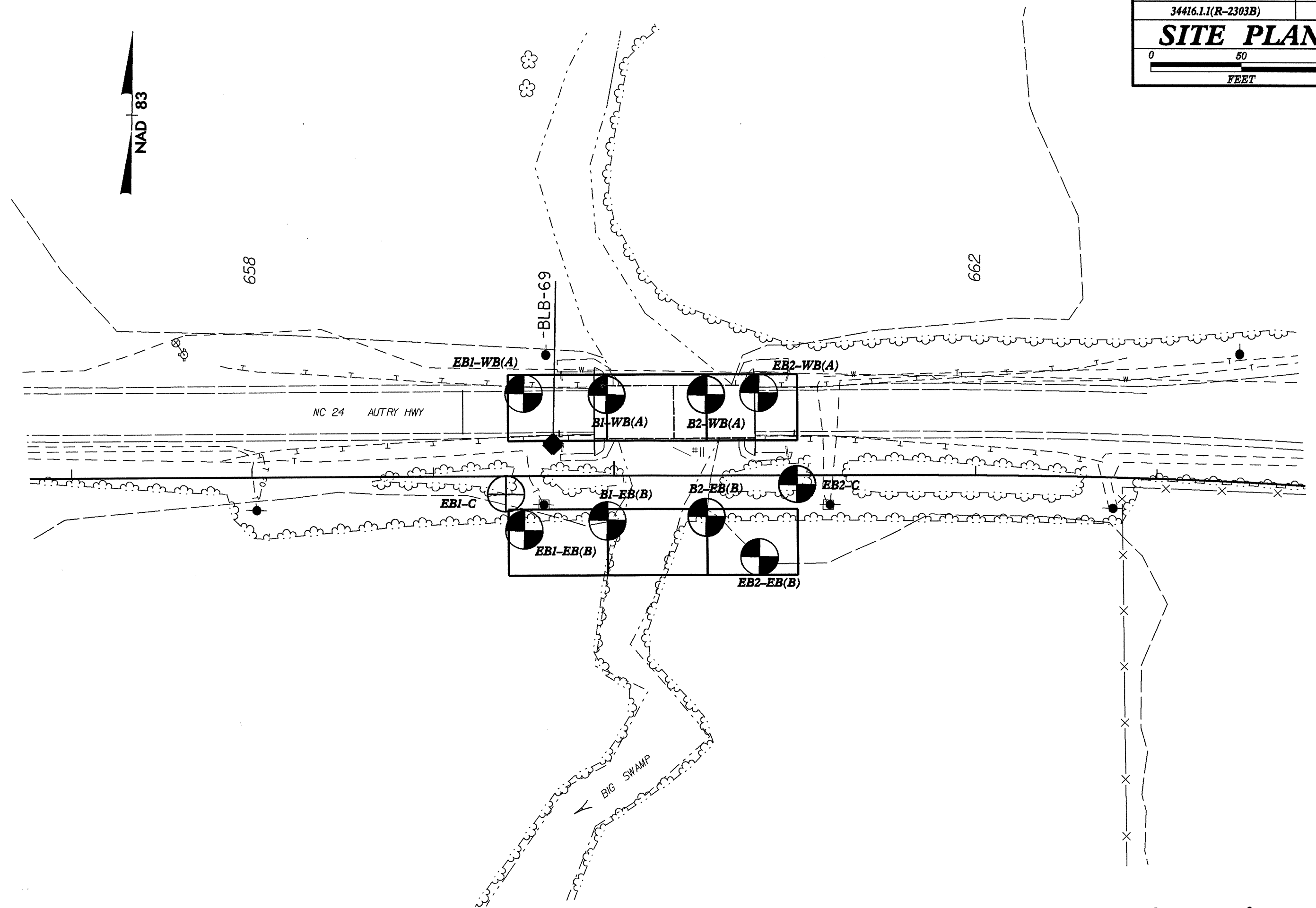
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

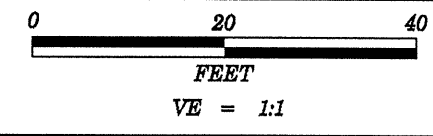
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO. 34416.I.(R-2303B)	SHEET NO. 2
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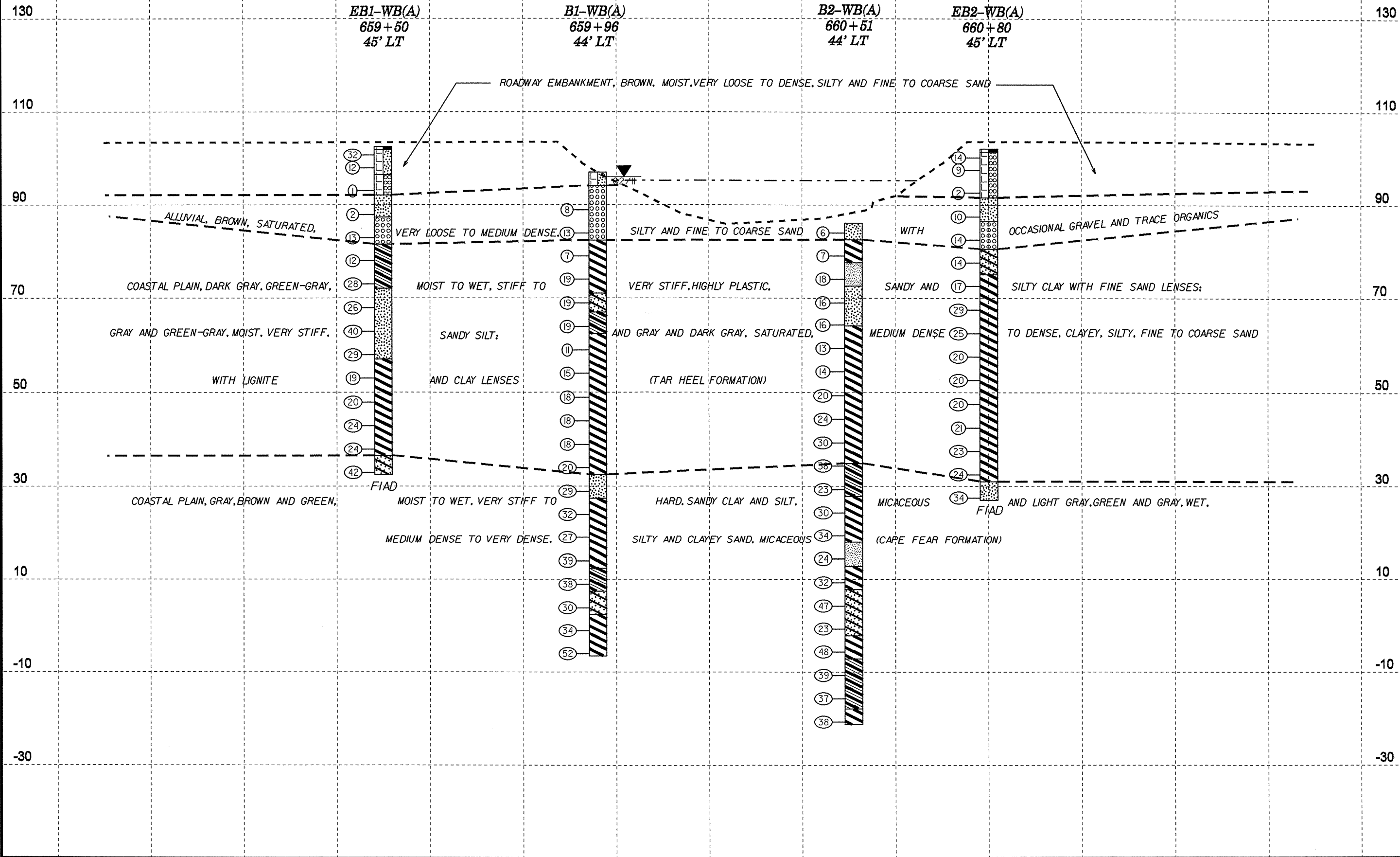
SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS					
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>		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. <b>ANGULARITY OF GRAINS</b> THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		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: <b>WEATHERED ROCK (WR)</b> <b>CRYSTALLINE ROCK (CR)</b> <b>NON-CRYSTALLINE ROCK (NCR)</b> <b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>		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 IN 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 (SCRC) - 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.					
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>		<b>MINERALOGICAL COMPOSITION</b>		<b>WEATHERING</b>							
GENERAL CLASS. GRANULAR MATERIALS (< 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS		MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) 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 (SL.) 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.		<b>COMPRESSIBILITY</b> SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		<b>WEATHERING</b>			
<b>PERCENTAGE OF MATERIAL</b>		<b>GROUND WATER</b>		<b>ROCK HARDNESS</b>							
ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY 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		WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP		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 GROUDED 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 GROUDED 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 FINGER NAIL.							
<b>CONSISTENCY OR DENSENESS</b>		<b>MISCELLANEOUS SYMBOLS</b>		<b>INDURATION</b>							
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES		TEST BORING W/ CORE SPT N-VALUE SPT REFUSAL MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD		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 REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.					
<b>TEXTURE OR GRAIN SIZE</b>		<b>ABBREVIATIONS</b>		<b>FRACTURE SPACING</b>		<b>BEDDING</b>					
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053		AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST V - 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 WGT. - UNIT WEIGHT WGT. - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO		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		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					
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>		<b>EQUIPMENT USED ON SUBJECT PROJECT</b>		<b>INDURATION</b>							
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST		ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE STEEL TEETH TRICONE TUNG-CARB. CORE BIT		HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST					
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT		- SATURATED - (SAT) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE									
<b>PLASTICITY</b>											
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											
<b>COLOR</b>											
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.											
						BENCH MARK: BLB-69, 658+46.36 NORTHING: 446852.867 EASTING: 2129168.328 ELEVATION: 102.24 FT. NOTES:					



**SKEW = 90°**



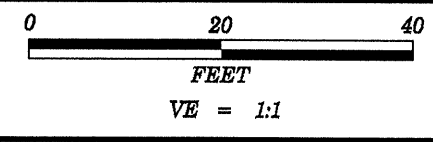
PROJECT REFERENCE NO.	SHEET
34416.1.1(R-2303B)	4
<b>BORINGS PROJECTED ALONG -LL- PROFILE</b>	



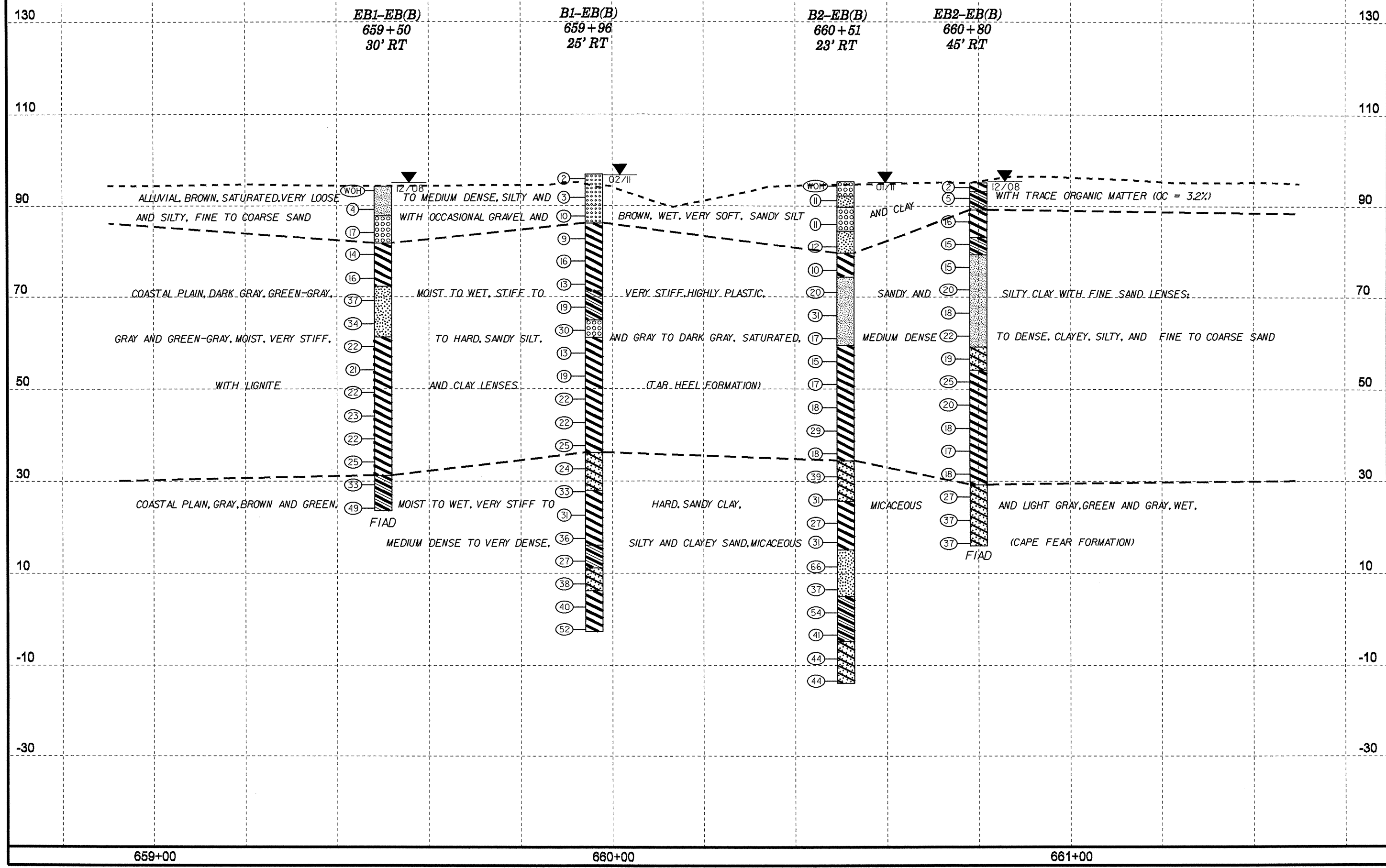
659+00

660+00

661+00



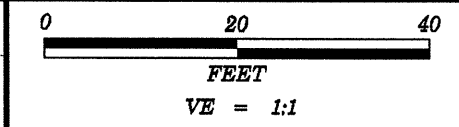
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34416.1.1(R-2303B)	5
<b>BORINGS PROJECTED ALONG -RL- PROFILE</b>	



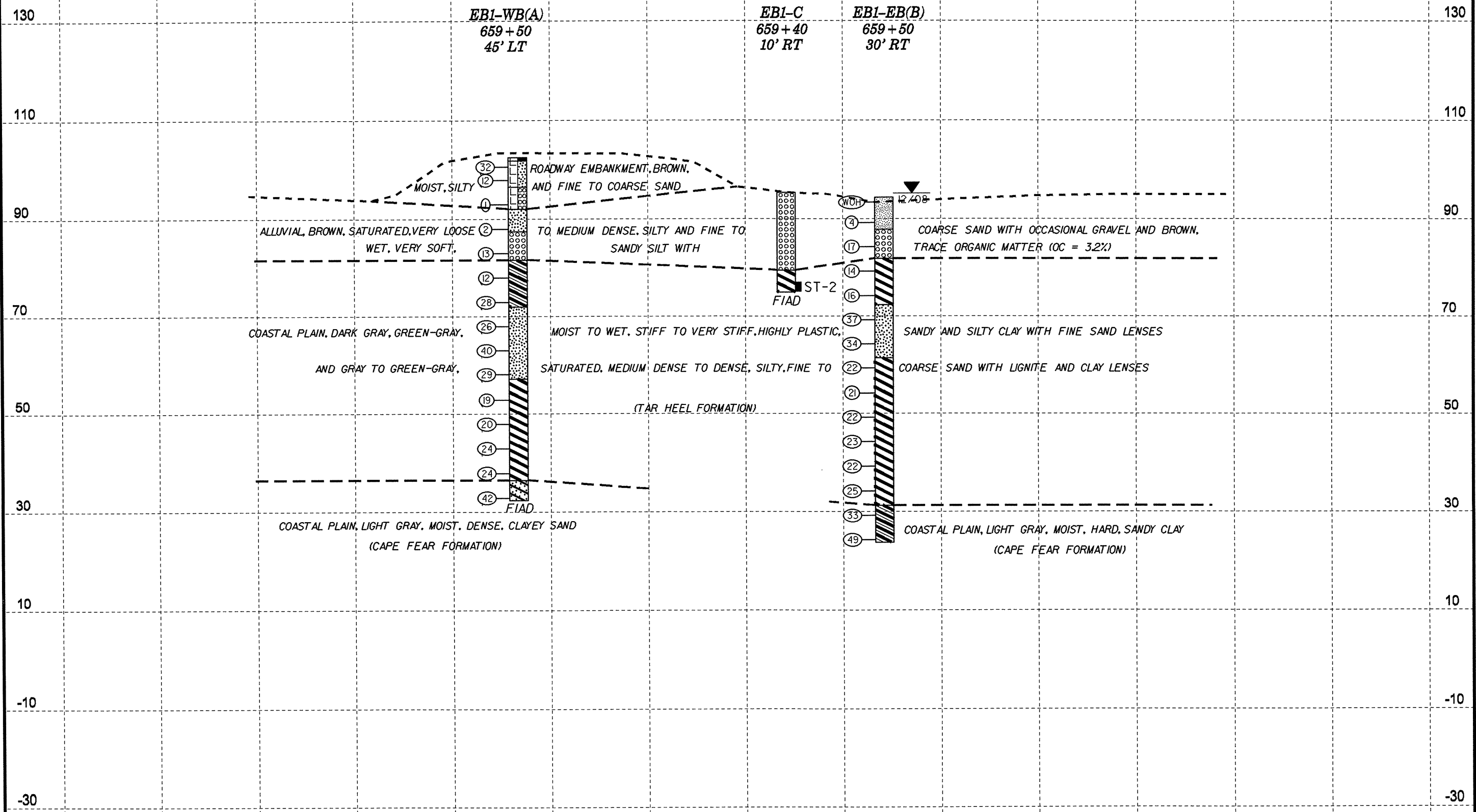
659+00

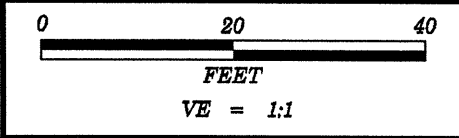
660+00

661+00



PROJECT REFERENCE NO.	SHEET
34416.1.I(R-2303B)	6
CROSS SECTION THROUGH END BENT 1	





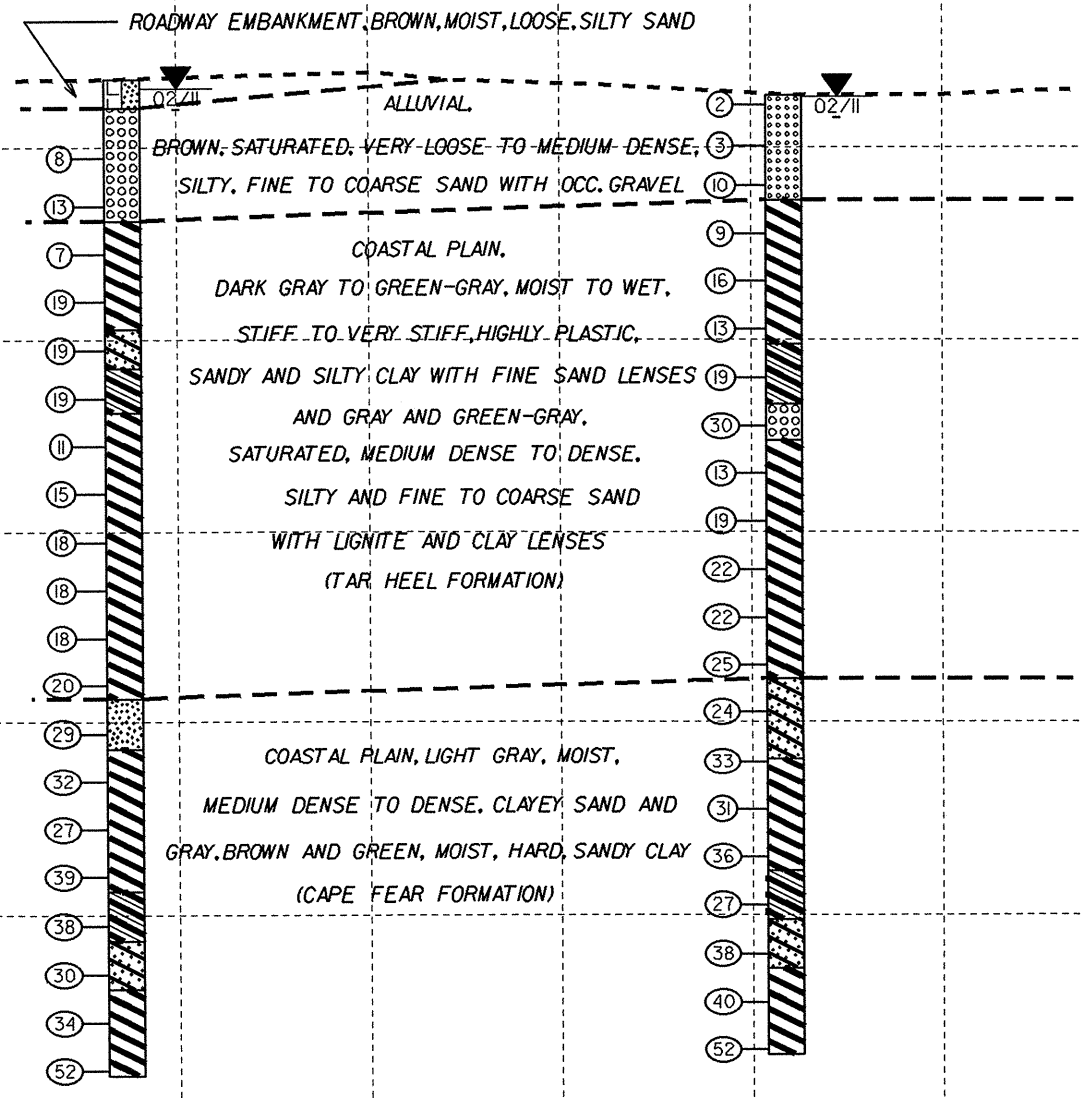
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34416.1.1(R-2303B)	7
CROSS SECTION THROUGH BENT 1	

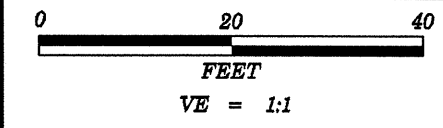
130  
110  
90  
70  
50  
30  
10  
-10  
-30

**B1-WB(A)**  
659+96  
44' LT

**B1-EB(B)**  
659+96  
25' RT

130  
110  
90  
70  
50  
30  
10  
-10  
-30



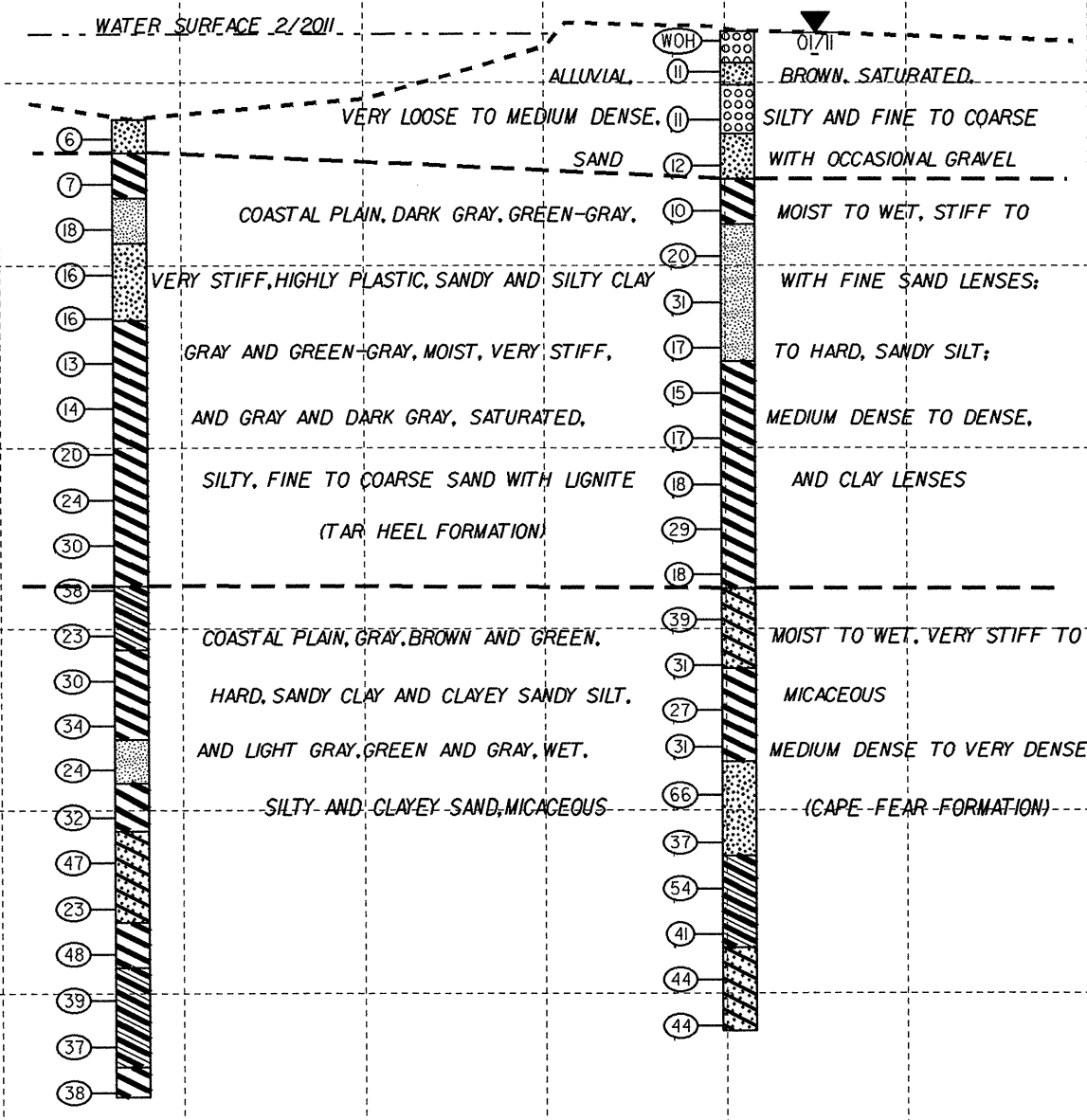


PROJECT REFERENCE NO.	SHEET
34416.1.1(R-2303B)	8
<b>CROSS SECTION THROUGH BENT 2</b>	

130  
110  
90  
70  
50  
30  
10  
-10  
-30

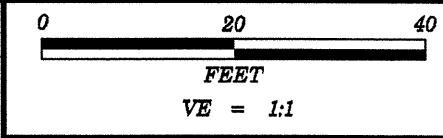
**B2-WB(A)**  
660 + 51  
44' LT

**B2-EB(B)**  
660 + 51  
23' RT

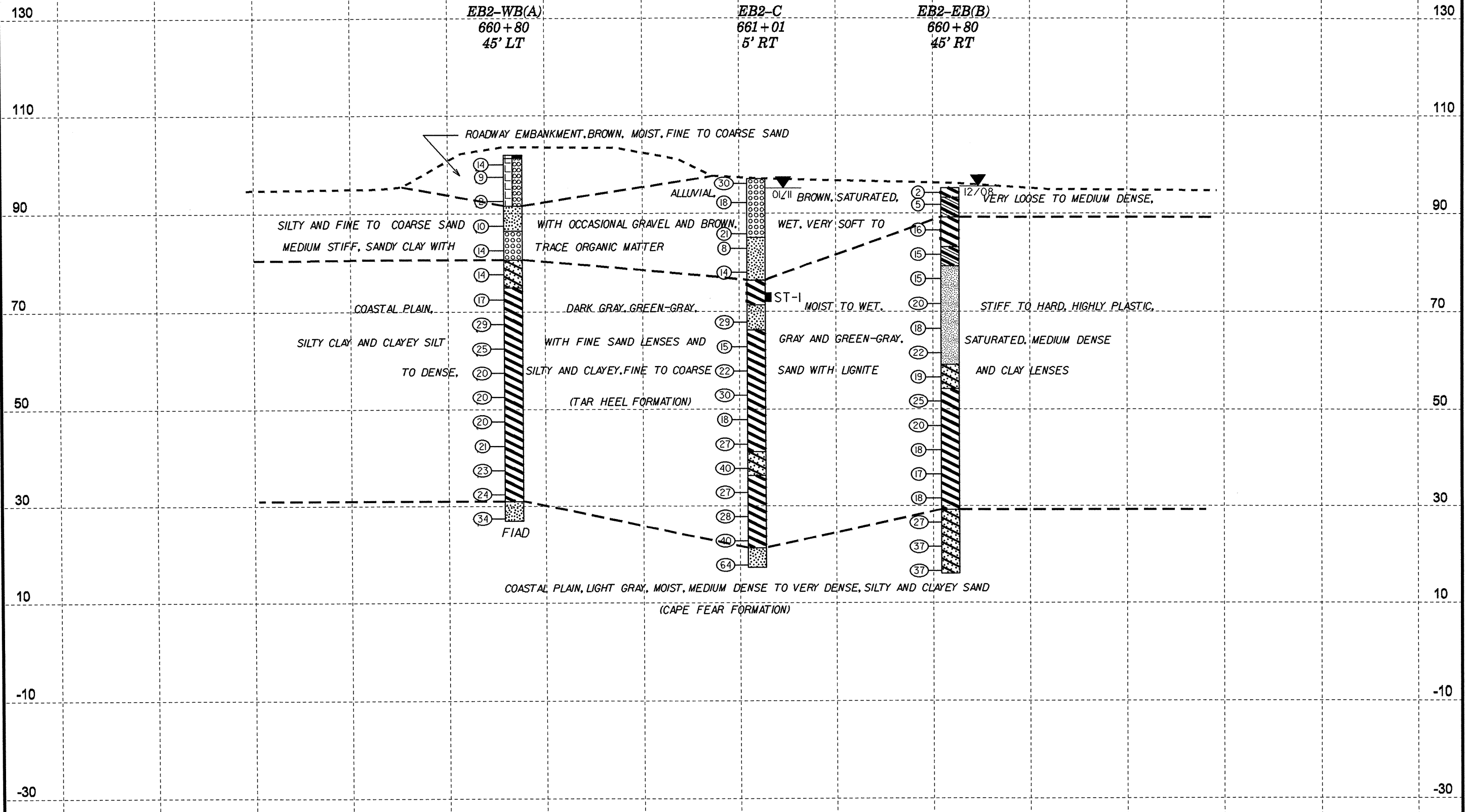


130  
110  
90  
70  
50  
30  
10  
-10  
-30





PROJECT REFERENCE NO.	SHEET
34416.1.1(R-2303B)	9
CROSS SECTION THROUGH END BENT 2	



WBS 34416.1.1			TIP R-2303B			COUNTY SAMPSON			GEOLOGIST BRADLEY, N.						
SITE DESCRIPTION DUAL STRUCTURES ON NC 24 OVER BIG SWAMP (STRUCTURE #3 & 4)									GROUND WTR (ft)						
BORING NO. EB1-WB(A)			STATION 659+50			OFFSET 45 ft LT			ALIGNMENT -L-						
COLLAR ELEV. 102.5 ft			TOTAL DEPTH 70.1 ft			NORTHING 446,850			EASTING 2,129,152						
DRILL RIG/HAMMER EFF./DATE SME R-11 CME-55 81% 00/00/0000			DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic									
DRILLER Contract Driller			START DATE 12/19/08			COMP. DATE 12/19/08			SURFACE WATER DEPTH N/A						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
105															
	101.6	0.9	19	13	19										
100	98.9	3.6	7	6	6										
	93.9	8.6	1	WOH	1										
90	88.9	13.6	1	1	1										
	83.9	18.6	7	6	7										
80	78.9	23.6	2	5	7										
	73.9	28.6	9	11	17										
70	68.9	33.6	7	11	15										
	63.9	38.6	10	18	22										
60	58.9	43.6	7	12	17										
	53.9	48.6	6	8	11										
50	48.9	53.6	6	8	12										
	43.9	58.6	7	10	14										
40	38.9	63.6	6	10	14										
	33.9	68.6	7	16	26										

WBS 34416.1.1			TIP R-2303B			COUNTY SAMPSON			GEOLOGIST SMITH, B.						
SITE DESCRIPTION DUAL STRUCTURES ON NC 24 OVER BIG SWAMP (STRUCTURE #3 & 4)									GROUND WTR (ft)						
BORING NO. EB1-C			STATION 659+40			OFFSET 10 ft RT			ALIGNMENT -L-						
COLLAR ELEV. 95.3 ft			TOTAL DEPTH 20.4 ft			NORTHING 446,825			EASTING 2,129,143						
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87% 10/06/2010			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic									
DRILLER Contract Driller			START DATE 02/02/11			COMP. DATE 02/02/11			SURFACE WATER DEPTH N/A						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
100															
	95.3														
95															
	90														
90															
	85														
85															
	80														
80															
	75														
75															
	70														
	65														
	60														
	55														
	50														
	45														
	40														
	35														

NCDOT BORE DOUBLE R2303B\_GEO\_BH\_STR2.GPJ\_NC\_DOT\_GDT\_9/5/12

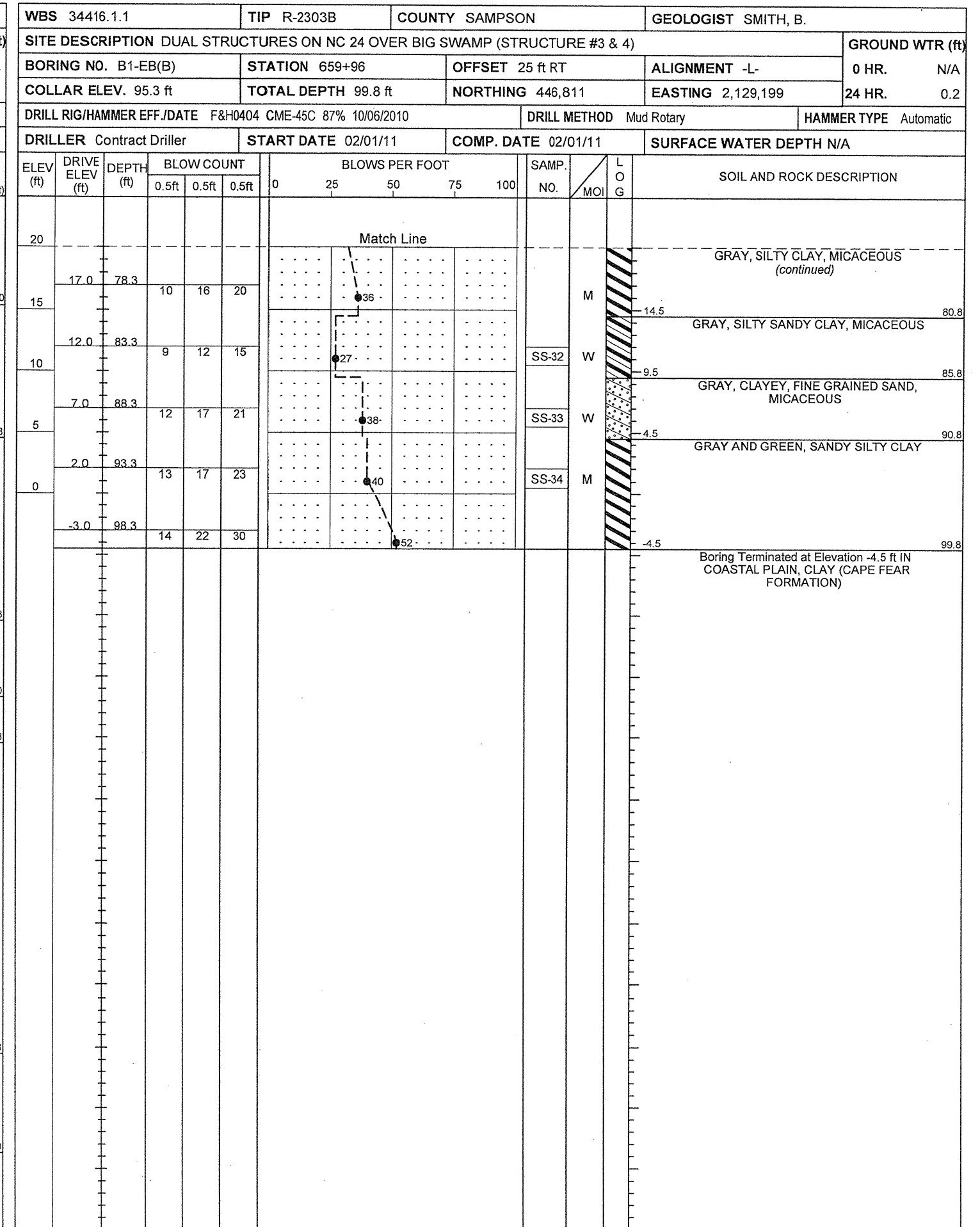
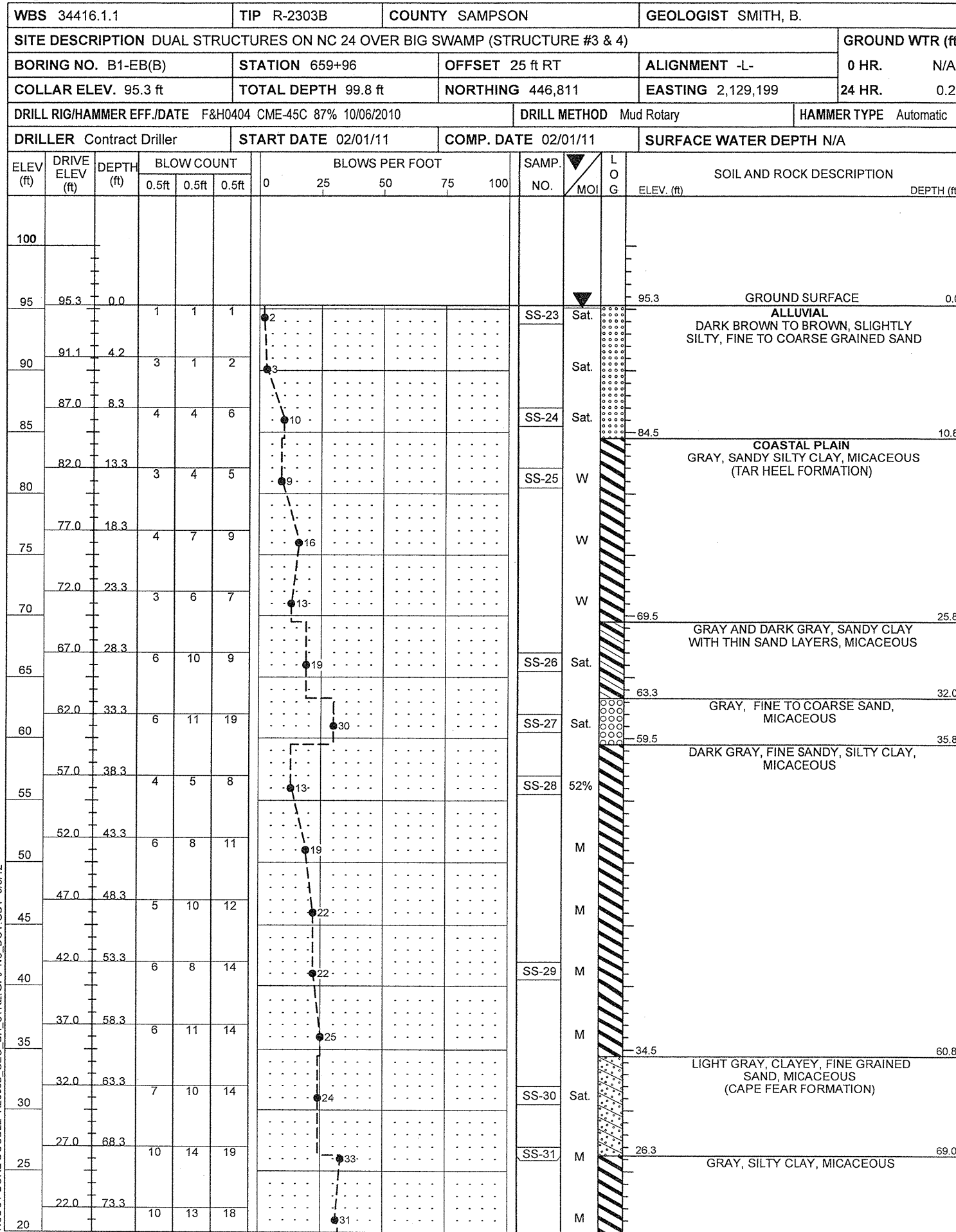
Other Samples:  
ST-2 (18.4 - 20.3)

WBS 34416.1.1		TIP R-2303B		COUNTY SAMPSON		GEOLOGIST BRADLEY, N.									
SITE DESCRIPTION DUAL STRUCTURES ON NC 24 OVER BIG SWAMP (STRUCTURE #3 & 4)							GROUND WTR (ft)								
BORING NO. EB1-EB(B)		STATION 659+50		OFFSET 30 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 94.3 ft		TOTAL DEPTH 70.6 ft		NORTHING 446,805		EASTING 2,129,153									
DRILL RIG/HAMMER EFF./DATE SME R-11 CME-55 81% 00/00/0000				DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 01/19/09		COMP. DATE 01/19/09		SURFACE WATER DEPTH 0.8ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
95	94.3	0.0												WATER SURFACE (01/19/09) GROUND SURFACE	
			WOH	WOH	WOH	0.						SS-202	W	94.3	ALLUVIAL BROWN, SANDY SILT WITH TRACE ORGANIC MATTER (ORGANIC CONTENT = 3.2%)
90	90.2	4.1	6	3	1	4.							Sat.	87.8	GRAY, FINE TO COARSE SAND WITH GRAVEL
85	85.2	9.1	6	8	9							SS-203	M	81.8	COASTAL PLAIN DARK GRAY, SANDY, SILTY CLAY, HIGHLY PLASTIC (PI = 26)
80	80.2	14.1	4	5	9							SS-204	M		
75	75.2	19.1	5	7	9								M		
70	70.2	24.1	9	12	25							SS-205	M	72.3	GREEN GRAY, SILTY, FINE TO COARSE SAND WITH LIGNITE AND CLAY LENSES
65	65.2	29.1	10	14	20							SS-206	M		
60	60.2	34.1	8	9	13								M	61.3	GREEN GRAY, SILTY CLAY, HIGHLY PLASTIC (PI = 63)
55	55.2	39.1	5	9	12							SS-207	M		
50	50.2	44.1	8	9	13								M		
45	45.2	49.1	7	9	14								M		
40	40.2	54.1	7	9	13								M		
35	35.2	59.1	8	10	15								M		
30	30.2	64.1	11	14	19							SS-208	M	31.3	COASTAL PLAIN LIGHT GRAY, SANDY CLAY (CAPE FEAR FORMATION)
25	25.2	69.1	15	21	28								M	23.7	Boring Terminated at Elevation 23.7 ft IN COASTAL PLAIN, SANDY CLAY (CAPE FEAR FORMATION)





**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**



NCDOT BORE DOUBLE R2303B.GEO\_BH\_STR2.GPJ NC\_DOT.GDT 9/5/12

WBS 34416.1.1		TIP R-2303B		COUNTY SAMPSON		GEOLOGIST SMITH, B.										
SITE DESCRIPTION DUAL STRUCTURES ON NC 24 OVER BIG SWAMP (STRUCTURE #3 & 4)							GROUND WTR (ft)									
BORING NO.	STATION		OFFSET		ALIGNMENT		0 HR. N/A									
B2-WB(A)	660+51		44 ft LT		-L-		N/A									
COLLAR ELEV. 86.1 ft		TOTAL DEPTH 107.3 ft		NORTHING 446,881		EASTING 2,129,253										
24 HR. N/A																
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87% 10/06/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Contract Driller		START DATE 02/07/11		COMP. DATE 02/09/11		SURFACE WATER DEPTH 8.2ft										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
90																
85	85.0	1.1	3	3	3						SS-47	Sat.	86.1	0.0	GROUND SURFACE	
80	80.0	6.1	2	3	4						SS-48	W	82.5	3.6	ALLUVIAL GRAY, SILTY SAND	
75	75.0	11.1	6	7	11						SS-49	W	77.5	8.6	COASTAL PLAIN GRAY AND DARK GRAY, SANDY SILTY CLAY, MICACEOUS (TAR HEEL FORMATION)	
70	70.0	16.1	6	7	9						SS-50	Sat.	72.5	13.6	DARK GREEN, CLAYEY SANDY SILT, MICACEOUS	
65	65.3	20.8	2	6	10						SS-51	Sat.	64.1	22.0	GRAY, SILTY, FINE GRAINED SAND, MICACEOUS	
60	60.3	25.8	4	6	7						SS-52	W			GRAY AND DARK GRAY, SANDY SILTY CLAY, MICACEOUS	
55	55.3	30.8	3	5	9						SS-53	W				
50	50.3	35.8	6	8	12						SS-54	W				
45	45.3	40.8	6	12	12						SS-55	M				
40	40.3	45.8	8	15	15						SS-56	M				
35	35.3	50.8	5	15	23						SS-57	M				
30	30.3	55.8	8	11	12						SS-58	M				
25	25.3	60.8	10	13	17						SS-59	M				
20	20.3	65.8	10	15	19						SS-60	M				
15	15.3	70.8	9	12	12							W				
10	10.3	75.8										W				

WBS 34416.1.1		TIP R-2303B		COUNTY SAMPSON		GEOLOGIST SMITH, B.										
SITE DESCRIPTION DUAL STRUCTURES ON NC 24 OVER BIG SWAMP (STRUCTURE #3 & 4)							GROUND WTR (ft)									
BORING NO.	STATION		OFFSET		ALIGNMENT		0 HR. N/A									
B2-WB(A)	660+51		44 ft LT		-L-		N/A									
COLLAR ELEV. 86.1 ft		TOTAL DEPTH 107.3 ft		NORTHING 446,881		EASTING 2,129,253										
24 HR. N/A																
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87% 10/06/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Contract Driller		START DATE 02/07/11		COMP. DATE 02/09/11		SURFACE WATER DEPTH 8.2ft										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
10																
5	5.3	80.8	17	25	22						SS-56	M	7.8	78.3	BROWN AND GRAY, SILTY CLAY (continued)	
0	0.3	85.8	8	10	13						SS-57	W			GRAY, CLAYEY SAND, MICACEOUS	
-5	-4.7	90.8	11	20	28						SS-58	W	-2.2	88.3	GRAY AND GREEN, SILTY CLAY, MICACEOUS	
-10	-9.7	95.8	16	17	22						SS-59	M	-7.2	93.3	GRAY AND GREEN, SILTY CLAY, MICACEOUS	
-15	-14.7	100.8	11	14	23						SS-60	W	-17.9	104.0	GRAY, BROWN AND GREEN, SANDY CLAY, MICACEOUS	
-20	-19.7	105.8	15	17	21							W	-21.2	107.3	GRAY AND GREEN SILTY CLAY WITH SAND LENSES, MICACEOUS	
															Boring Terminated at Elevation -21.2 ft IN COASTAL PLAIN, CLAY (CAPE FEAR FORMATION)	

NCDOT BORE DOUBLE R2303B\_GEO\_BH\_STR2.GPJ\_NC\_DOT\_GDT\_9/5/12

WBS 34416.1.1		TIP R-2303B		COUNTY SAMPSON		GEOLOGIST SMITH, B.									
SITE DESCRIPTION DUAL STRUCTURES ON NC 24 OVER BIG SWAMP (STRUCTURE #3 & 4)								GROUND WTR (ft)							
BORING NO. B2-EB(B)		STATION 660+51		OFFSET 23 ft RT		ALIGNMENT -L-		0 HR.	N/A						
COLLAR ELEV. 95.4 ft		TOTAL DEPTH 109.4 ft		NORTHING 446,814		EASTING 2,129,254		24 HR.	0.2						
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87% 10/06/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 01/23/11		COMP. DATE 01/26/11		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
100															
95	95.4	0.0	WOH	WOH	WOH									GROUND SURFACE	0.0
90	92.2	3.2	1	5	6							SS-12	Sat.	ALLUVIAL DARK BROWN, FINE TO COARSE SAND WITH SOME ORGANICS	3.2
85	87.0	8.4	3	4	7							SS-13	Sat.	BROWN, SILTY SAND	5.7
80	82.0	13.4	4	6	6								Sat.	BROWN, FINE TO COARSE SAND WITH GRAVEL	10.9
75	77.0	18.4	3	4	6							SS-14	51%	BROWN TO GRAY, SILTY SAND, MICACEOUS	15.9
70	72.0	23.4	5	8	12							SS-15	Sat.	COASTAL PLAIN DARK GRAY, SILTY CLAY WITH SAND LENSES, MICACEOUS (TAR HEEL FORMATION)	20.9
65	67.0	28.4	7	15	16								Sat.	GRAY, SANDY SILT, MICACEOUS	35.9
60	62.0	33.4	7	7	10								Sat.		
55	57.0	38.4	4	7	8							SS-16	W	GRAY, SILTY CLAY WITH FINE SAND LAYERS	60.9
50	52.0	43.4	5	7	10							SS-17	M		
45	47.0	48.4	5	8	10								M		
40	42.0	53.4	7	13	16								M		
35	37.0	58.4	6	7	11								M		
30	32.0	63.4	13	18	21							SS-18	M	GRAY AND GREEN, CLAYEY SAND, MICACEOUS (CAPE FEAR FORMATION)	69.7
25	27.0	68.4	11	14	17								W	GRAY AND GREEN, SILTY CLAY	
20	22.0	73.4	8	12	15							SS-19	M		

WBS 34416.1.1		TIP R-2303B		COUNTY SAMPSON		GEOLOGIST SMITH, B.									
SITE DESCRIPTION DUAL STRUCTURES ON NC 24 OVER BIG SWAMP (STRUCTURE #3 & 4)								GROUND WTR (ft)							
BORING NO. B2-EB(B)		STATION 660+51		OFFSET 23 ft RT		ALIGNMENT -L-		0 HR.	N/A						
COLLAR ELEV. 95.4 ft		TOTAL DEPTH 109.4 ft		NORTHING 446,814		EASTING 2,129,254		24 HR.	0.2						
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87% 10/06/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 01/23/11		COMP. DATE 01/26/11		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
20															
15	17.9	77.5	9	14	17									Match Line	
10	12.5	82.9	18	31	35							SS-20	Sat.	GRAY AND GREEN, SILTY CLAY (continued)	80.2
5	7.5	87.9	14	20	17								Sat.	LIGHT GRAY AND GREEN, CLAYEY SILTY SAND	90.4
0	2.5	92.9	16	22	32							SS-21		LIGHT GRAY, BROWN AND GREEN, SILTY SANDY CLAY	100.4
-5	-2.5	97.9	12	17	24								W		
-10	-7.5	102.9	15	20	24							SS-22		LIGHT GRAY AND GREEN, CLAYEY SAND	109.4
	-12.5	107.9	9	16	28								W		
														Boring Terminated at Elevation -14.0 ft in COASTAL PLAIN, CLAYEY SAND (CAPE FEAR FORMATION)	

WBS 34416.1.1		TIP R-2303B		COUNTY SAMPSON		GEOLOGIST BRADLEY, N.									
SITE DESCRIPTION DUAL STRUCTURES ON NC 24 OVER BIG SWAMP (STRUCTURE #3 & 4)							GROUND WTR (ft)								
BORING NO. EB2-WB(A)		STATION 660+80		OFFSET 45 ft LT		ALIGNMENT -L-		0 HR. N/A							
COLLAR ELEV. 102.0 ft		TOTAL DEPTH 75.0 ft		NORTHING 446,853		EASTING 2,129,282		24 HR. FIAD							
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 00/00/0000				DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 12/18/08		COMP. DATE 12/18/08		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
105															
100	101.1	0.9	10	7	7	14						SS-172	M	102.0 GROUND SURFACE 0.0 101.1 BITUMINOUS CONCRETE 0.9	
	98.5	3.5	6	5	4	9							M	ROADWAY EMBANKMENT BROWN, SLIGHTLY SILTY, FINE TO COARSE SAND	
95	93.5	8.5	1	1	1	2							M		
90	88.5	13.5	5	5	5	10						SS-173	Sat.	91.5 ALLUVIAL 10.5 GRAY, SILTY FINE SAND	
85	83.5	18.5	9	8	6	14						SS-174	Sat.	86.5 ALLUVIAL 15.5 GRAY, FINE TO COARSE SAND WITH GRAVEL	
80	78.5	23.5	5	7	7	14						SS-175	M	80.5 COASTAL PLAIN 21.5 DARK GRAY, CLAYEY SAND, HIGHLY PLASTIC (PI = 37) (TAR HEEL FORMATION)	
75	73.5	28.5	5	8	9	17						SS-176	M	75.0 DARK GRAY, SANDY SILTY CLAY, WITH 27.0 FINE SAND LAYERS, HIGHLY PLASTIC (PI = 37 TO 49)	
70	68.5	33.5	5	11	18	29							M		
65	63.5	38.5	12	12	13	25							M		
60	58.5	43.5	6	9	11	20							M		
55	53.5	48.5	7	9	11	20							M		
50	48.5	53.5	8	8	12	20							M		
45	43.5	58.5	13	9	12	21							M		
40	38.5	63.5	7	10	13	23						SS-178	M		
35	33.5	68.5	7	11	13	24							M		
30	28.5	73.5	9	15	19	34						SS-179	M	31.0 COASTAL PLAIN 71.0 LIGHT GREEN GRAY, SILTY FINE TO COARSE SAND (CAPE FEAR FORMATION) 27.0 Boring Terminated at Elevation 27.0 ft IN COASTAL PLAIN SAND (CAPE FEAR FM) 75.0	





# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1	TIP R-2303B	COUNTY SAMPSON	GEOLOGIST SMITH, B.
SITE DESCRIPTION DUAL STRUCTURES ON NC 24 OVER BIG SWAMP (STRUCTURE #3 & 4)			GROUND WTR (ft)
BORING NO. EB2-C	STATION 661+01	OFFSET 5 ft RT	ALIGNMENT -L-
COLLAR ELEV. 97.1 ft	TOTAL DEPTH 79.8 ft	NORTHING 446,833	EASTING 2,129,304
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87% 10/06/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 01/22/11	COMP. DATE 01/22/11	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
100														
97.1	97.1	0.0											GROUND SURFACE	0.0
95	93.1	4.0	12	15	15						SS-1	M	ALLUVIAL BROWN, FINE TO COARSE GRAINED SAND WITH TRACE ORGANICS AND GRAVEL	
90	86.8	10.3	4	8	10									
85	83.8	13.3	5	10	11						SS-2	Sat.	DARK BROWN TO GRAY, SILTY SAND	12.0
80	78.8	18.3	2	3	5						SS-3	Sat.		
75	76.3	20.8	3	7	7						SS-4	Sat.	COASTAL PLAIN DARK GRAY, SANDY SILTY CLAY (TAR HEEL FORMATION)	20.8
70	71.3	25.8											GRAY, SILTY SAND WITH LIGNITE	25.8
65	68.8	28.3	10	16	13						SS-5	M		
60	66.3	30.8	5	7	8						SS-6	M	DARK GRAY, SANDY SILTY CLAY, MICACEOUS	30.8
55	63.8	33.3	6	9	13									
50	58.8	38.3	7	15	15									
45	53.8	43.3	5	8	10						SS-7	51%		
40	48.8	48.3	7	11	16								COASTAL PLAIN GRAY, SILTY CLAYEY SAND MICACEOUS (CAPE FEAR FORMATION)	55.8
35	43.8	53.3	8	18	22						SS-8	M		60.8
30	38.8	58.3	10	12	15								GRAY, SANDY SILTY CLAY	
25	33.8	63.3	9	12	16						SS-9	31%		
20	28.8	68.3	10	18	22								GRAY, CLAYEY SILTY SAND	75.8

WBS 34416.1.1	TIP R-2303B	COUNTY SAMPSON	GEOLOGIST SMITH, B.
SITE DESCRIPTION DUAL STRUCTURES ON NC 24 OVER BIG SWAMP (STRUCTURE #3 & 4)			GROUND WTR (ft)
BORING NO. EB2-C	STATION 661+01	OFFSET 5 ft RT	ALIGNMENT -L-
COLLAR ELEV. 97.1 ft	TOTAL DEPTH 79.8 ft	NORTHING 446,833	EASTING 2,129,304
DRILL RIG/HAMMER EFF./DATE F&H0404 CME-45C 87% 10/06/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 01/22/11	COMP. DATE 01/22/11	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
20														
18.8	18.8	78.3											Match Line	
			18	30	34						SS-10	W	GRAY, CLAYEY SILTY SAND (continued)	79.8
													Boring Terminated at Elevation 17.3 ft IN COASTAL PLAIN, SILTY SAND (CAPE FEAR FORMATION)	
													Other Samples: ST-1 (23.3 - 25.3)	

NCDOT BORE DOUBLE R2303B\_GEO\_BH\_STR2.GPJ NC\_DOT\_GDT 9/5/12



# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS 34416.1.1				TIP R-2303B				COUNTY SAMPSON				GEOLOGIST BRADLEY, N.					
SITE DESCRIPTION DUAL STRUCTURES ON NC 24 OVER BIG SWAMP (STRUCTURE #3 & 4)													GROUND WTR (ft)				
BORING NO. EB2-EB(B)				STATION 660+80				OFFSET 45 ft RT				ALIGNMENT -L-				0 HR.	N/A
COLLAR ELEV. 95.2 ft				TOTAL DEPTH 79.1 ft				NORTHING 446,793				EASTING 2,129,283				24 HR.	N/A
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 00/00/0000						DRILL METHOD NW Casing w/ Advancer				HAMMER TYPE Automatic							
DRILLER Contract Driller				START DATE 12/30/08				COMP. DATE 12/30/08				SURFACE WATER DEPTH 0.4ft					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
100																	
95	95.2	0.0	1	1	1										95.2	0.0	
	92.7	2.5	1	2	3										93.2	2.0	
90															89.2	6.0	
	87.6	7.6	5	7	9										83.2	12.0	
85															79.2	16.0	
	82.6	12.6	4	7	8										79.2	16.0	
80																	
	77.6	17.6	4	6	9												
75																	
	72.6	22.6	5	9	11												
70																	
	67.6	27.6	6	7	11												
65																	
	62.6	32.6	8	10	12												
60																	
	57.6	37.6	5	9	10												
55																	
	52.6	42.6	9	12	13												
50																	
	47.6	47.6	6	8	12												
45																	
	42.6	52.6	6	8	10												
40																	
	37.6	57.6	6	8	9												
35																	
	32.6	62.6	7	8	10												
30																	
	27.6	67.6	10	13	14												
25																	
	22.6	72.6	9	16	21												
20																	

NCDOT BORE DOUBLE R2303B\_GEO\_BH\_STR2.GPJ NC\_DOT\_GDT 9/5/12

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			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
20																	
	17.6	77.6	8	15	22										16.1	79.1	

Match Line

COASTAL PLAIN  
LIGHT GRAY, CLAYEY SAND (CAPE FEAR FORMATION) (continued)

Boring Terminated at Elevation 16.1 ft IN  
COASTAL PLAIN, CLAYEY SAND (CAPE FEAR FORMATION)



**B2-EB (B)**

<b>SOIL TEST RESULTS</b>																
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-12	23 RT	660+51	3.2-4.7	A-2-4(0)	24	NP	39.0	50.4	5.6	5.1	100	96	14	-	-	
SS-13	23 RT	660+51	8.4-9.9	A-1-b(0)	19	NP	79.1	15.7	3.2	2.0	78	36	5	-	-	
SS-14	23 RT	660+51	18.4-19.9	A-7-6(40)	61	41	0.8	14.0	26.1	59.0	100	100	90	51	-	
SS-15	23 RT	660+51	23.4-24.9	A-4(0)	27	8	33.1	34.0	8.5	24.4	100	94	36	-	-	
SS-16	23 RT	660+51	58.4-59.9	A-7-6(63)	84	65	3.9	9.2	21.9	65.1	100	98	89	-	-	
SS-17	23 RT	660+51	43.4-44.9	A-7-6(71)	91	68	3.1	6.1	15.6	75.3	100	99	92	-	-	
SS-18	23 RT	660+51	63.4-64.9	A-2-6(1)	34	15	52.8	18.5	14.4	14.2	96	64	31	-	-	
SS-19	23 RT	660+51	73.4-74.9	A-7-6(32)	55	32	3.1	11.0	33.1	52.9	100	99	90	-	-	
SS-20	23 RT	660+51	82.9-84.4	A-2-4(0)	20	NP	30.5	53.7	10.7	5.1	100	88	20	-	-	
SS-21	23 RT	660+51	92.9-94.4	A-6(15)	39	21	6.3	25.4	45.9	22.4	100	98	77	-	-	
SS-22	23 RT	660+51	102.9-104.4	A-2-6(1)	29	15	48.2	25.8	13.7	12.2	97	71	27	-	-	

**EB2-EB (B)**

<b>SOIL TEST RESULTS</b>																
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-187	45 RT	660+80	0.0-1.5	A-7-6(14)	47	19	9.9	19.4	28.1	42.5	100	96	73	-	11.2	
SS-188	45 RT	660+80	2.5-4.0	A-6(10)	37	19	11.4	27.8	22.0	38.8	100	96	65	-	-	
SS-189	45 RT	660+80	7.6-9.1	A-7-5(33)	65	28	1.4	6.3	35.0	57.2	100	99	94	-	-	
SS-190	45 RT	660+80	12.6-14.1	A-6(1)	33	14	19.0	46.0	14.6	20.4	100	95	37	-	-	
SS-191	45 RT	660+80	17.6-19.1	A-4(0)	29	9	43.1	18.6	13.8	24.5	100	86	40	-	-	
SS-192	45 RT	660+80	37.6-39.1	A-2-6(2)	38	19	48.6	18.2	10.7	22.5	100	72	35	-	-	
SS-193	45 RT	660+80	42.6-44.1	A-7-6(8)	41	25	37.6	15.3	16.4	30.6	100	80	49	-	-	
SS-195	45 RT	660+80	67.6-69.1	A-2-6(0)	35	11	68.6	12.7	10.5	8.2	97	55	19	-	-	

**EB2-WB (A)**

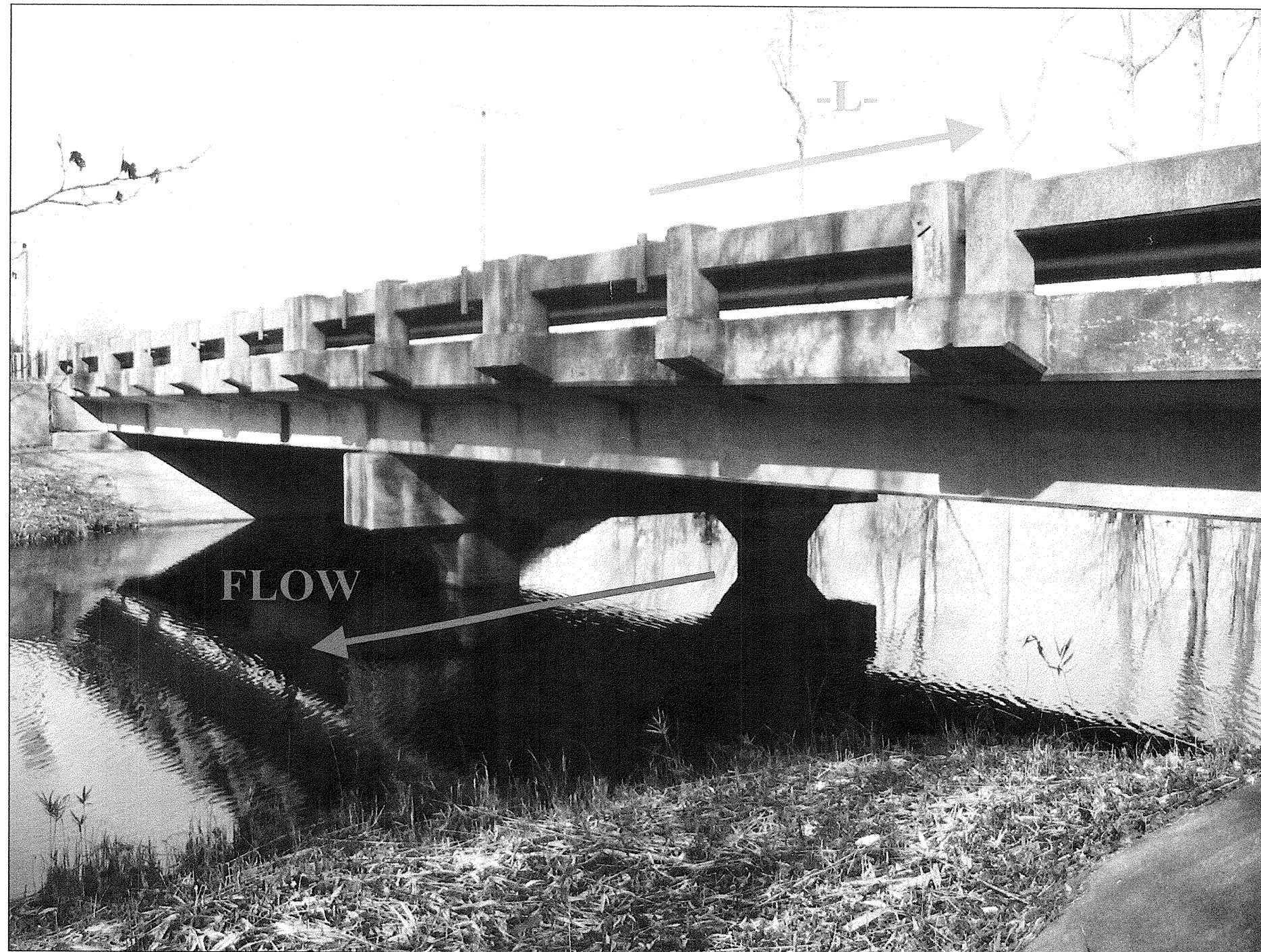
<b>SOIL TEST RESULTS</b>																
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C.SAND	F.SAND	SILT	CLAY	10	40	200			
SS-172	45 LT	660+80	0.9-2.4	A-1-b(0)	17	3	70.9	13.4	7.7	8.1	78	36	13	-	-	
SS-173	45 LT	660+80	13.5-15.0	A-2-4(0)	18	NP	28.3	59.7	7.9	4.0	100	97	16	-	-	
SS-174	45 LT	660+80	18.5-20.0	A-1-b(0)	18	NP	81.8	16.8	1.4	0.0	61	24	2	-	-	
SS-175	45 LT	660+80	23.5-25.0	A-2-7(2)	54	37	63.6	11.5	10.7	14.2	91	41	24	-	-	
SS-176	45 LT	660+80	28.5-30.0	A-7-6(30)	59	37	1.0	28.7	29.8	40.5	100	99	79	-	-	
SS-178	45 LT	660+80	63.5-65.0	A-7-6(45)	75	49	4.0	18.8	22.5	54.7	100	98	83	-	-	
SS-179	45 LT	660+80	73.5-75.0	A-2-4(0)	26	7	50.6	29.5	12.9	7.1	99	72	23	-	-	

**EB2-C**

<b>SOIL TEST RESULTS</b>																
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	5 RT	661+01	0.0-1.5	N/A	N/A	N/A	59.2	30.5	6.2	4.1	61	42	8	-	-	
SS-2	5 RT	661+01	10.3-11.8	A-1-b(0)	21	NP	69.8	24.8	5.4	0.0	68	44	5	-	-	
SS-3	5 RT	661+01	13.3-14.8	A-2-4(0)	23	NP	40.4	47.5	5.0	7.1	100	93	14	-	-	
SS-4	5 RT	661+01	18.3-19.8	A-2-4(0)	25	NP	43.2	39.1	6.5	11.2	96	72	18	-	-	
SS-5	5 RT	661+01	28.3-29.8	A-2-4(0)	22	NP	65.9	18.6	7.3	8.1	98	69	18	-	-	
SS-6	5 RT	661+01	33.3-34.8	A-7-6(48)	72	51	6.1	10.2	22.7	61.0	100	96	87	-	-	
SS-7	5 RT	661+01	53.3-54.8	A-7-6(76)	98	70	2.6	4.9	17.2	75.3	100	99	94	51	-	
SS-8	5 RT	661+01	58.3-59.8	A-2-6(2)	33	19	46.4	20.8	13.5	19.3	93	65	33	-	-	
SS-9	5 RT	661+01	68.3-69.8	A-7-6(19)	47	23	4.9	23.0	39.6	32.6	100	98	79	31	-	
SS-10	5 RT	661+01	78.3-79.8	A-2-4(0)	25	NP	11.7	61.6	15.5	11.2	100	98	33	-	-	

# SITE PHOTOGRAPH

Dual Structures on -L- (NC 24) Over Big Swamp (Structure #3 & 4)



Looking West towards End Bent 1 (Left Lane)

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 34416.1.1 (R-2303B) F.A. PROJ. NA  
 COUNTY CUMBERLAND/SAMPSON  
 PROJECT DESCRIPTION NC 24 FROM SR 1853 (JOHN NUNNERY RD)  
TO WEST OF SR 1404 (DOWDY RD)

SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1)  
ON -L- (NC 24 BYPASS) OVER SOUTH RIVER

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
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**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4096. 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.

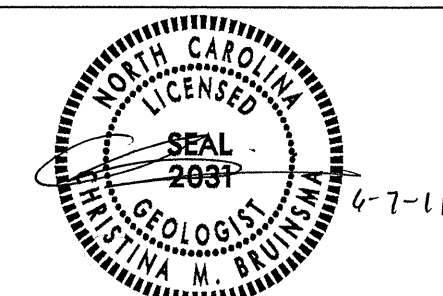
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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.

**PROJECT: 34416.1.1 ID: R-2303B**

PERSONNEL

- MACTEC
- S&ME
- O.B. OTI
- J.I. MILKOVITS
- C.M. BRUINSMA
- D.W. DIXON
- J.R. TURNAGE

INVESTIGATED BY C.M. BRUINSMA  
 CHECKED BY C.M. BRUINSMA  
 SUBMITTED BY N.T. ROBERSON  
 DATE JUNE 2011



DRAWN BY: C.M. BRUINSMA, W.D. FIELDS

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.


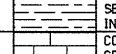
NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

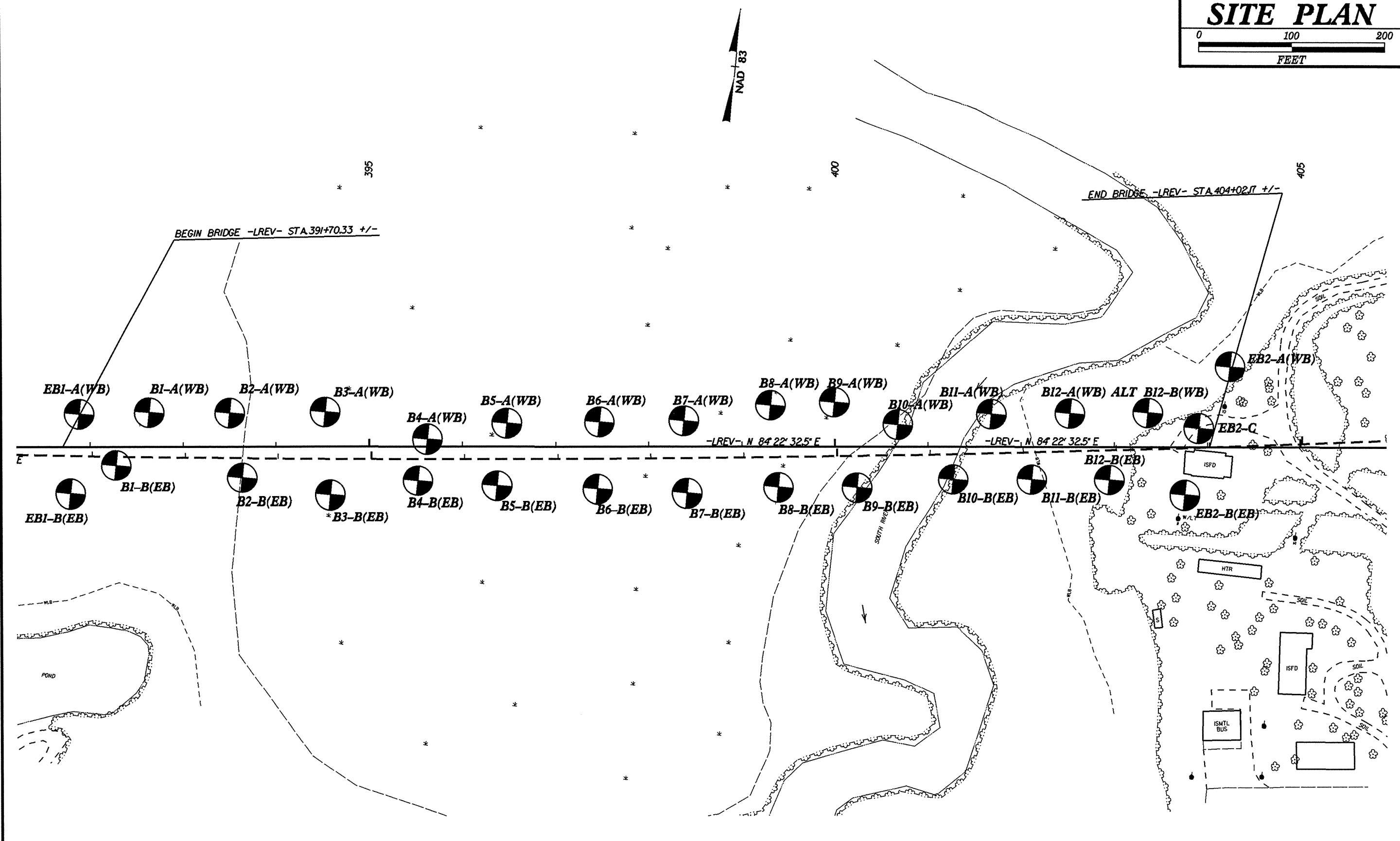
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT**

**SUBSURFACE INVESTIGATION**

**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

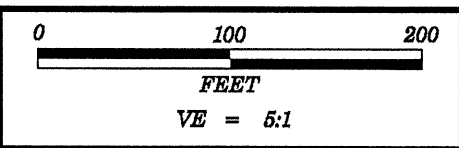
PROJECT REFERENCE NO. 34416.11 (R-2303B)	SHEET NO. 2
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SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS					
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH 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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>		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. <b>ANGULARITY OF GRAINS</b> THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		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:  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.		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 DISLOGGED 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 IN 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 (SCREC.) - 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.					
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING							
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS		MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		FRESH ROCK FRESH, CRYSTALLINE BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) 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 (SL.) 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i> 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. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i> 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.		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		WEATHERING FRESH ROCK FRESH, CRYSTALLINE BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) 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 (SL.) 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i> 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. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF</i> 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.			
PERCENTAGE OF MATERIAL		GROUND WATER		MISCELLANEOUS SYMBOLS							
SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES		SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD					
CONSISTENCY OR DENSENESS		TEXTURE OR GRAIN SIZE		ABBREVIATIONS							
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )		U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.75 2.00 0.42 0.25 0.075 0.053		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 - MICA MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TRC. - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED UNIT WEIGHT DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO							
SOIL MOISTURE - CORRELATION OF TERMS		EQUIPMENT USED ON SUBJECT PROJECT		FRACTURE SPACING		BEDDING					
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CORE SIZE: HAND TOOLS:		TERM SPACING TERM THICKNESS		TERM THICKNESS					
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SHRINKAGE LIMIT		<input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-550X <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> CME-55 <input checked="" type="checkbox"/> CME-750		<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/> -B- <input type="checkbox"/> -N- <input type="checkbox"/> -H- <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST		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 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					
PLASTICITY				INDURATION							
NON-PLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		PLASTICITY INDEX (PI) DRY STRENGTH		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.							
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.											

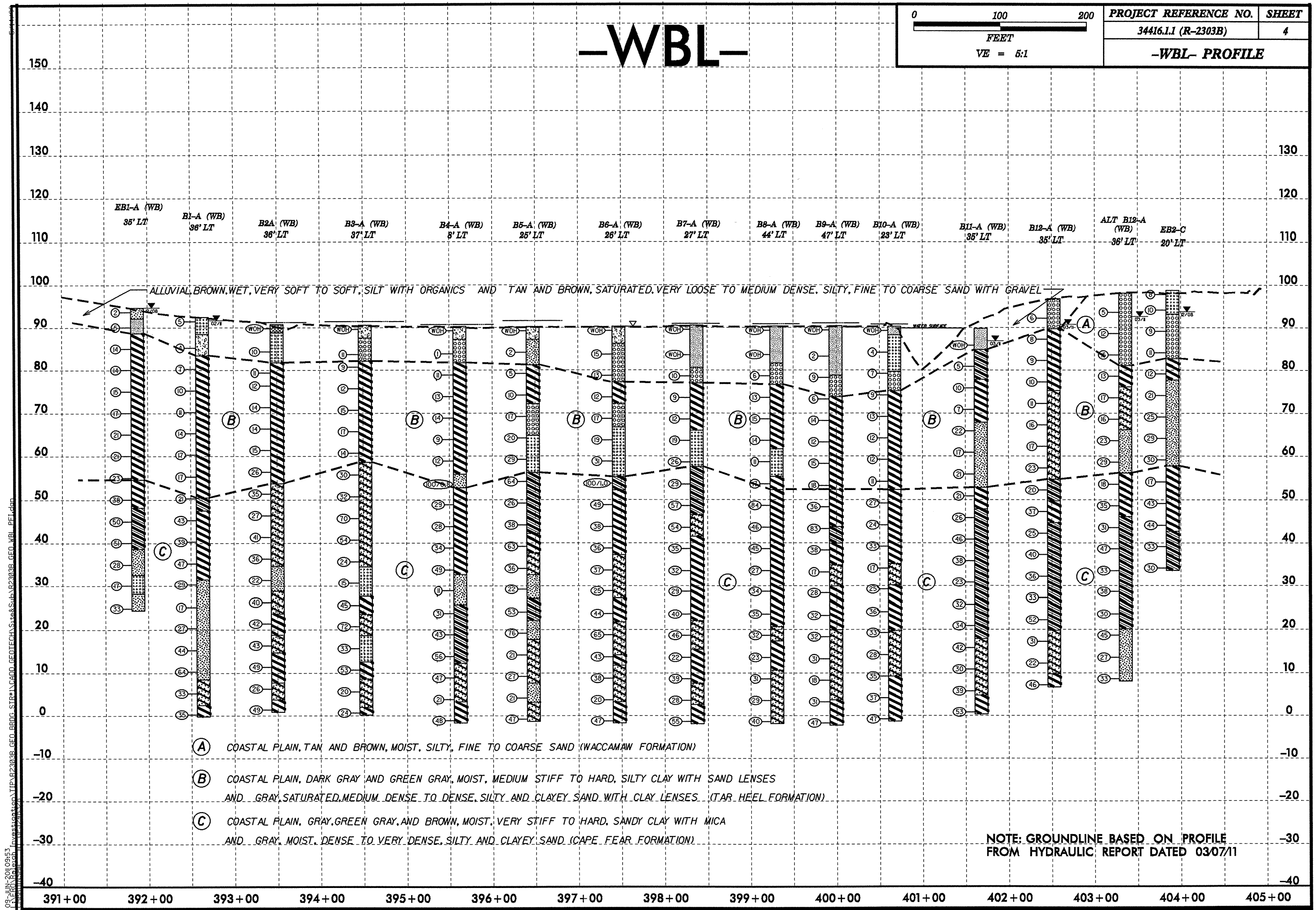




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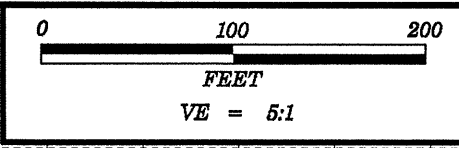
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34416.1.1 (R-2303B)	4
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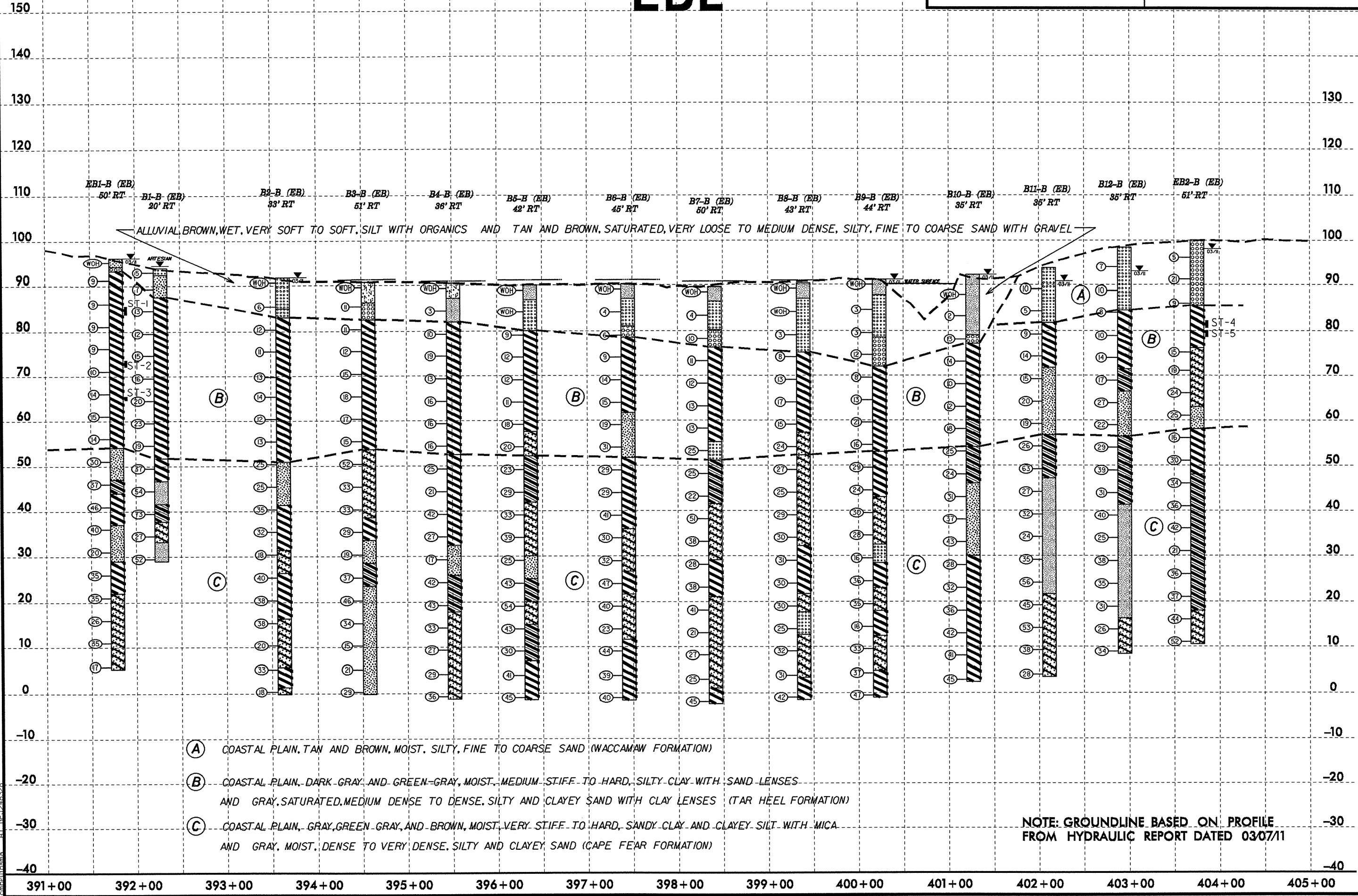
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5/14/99  
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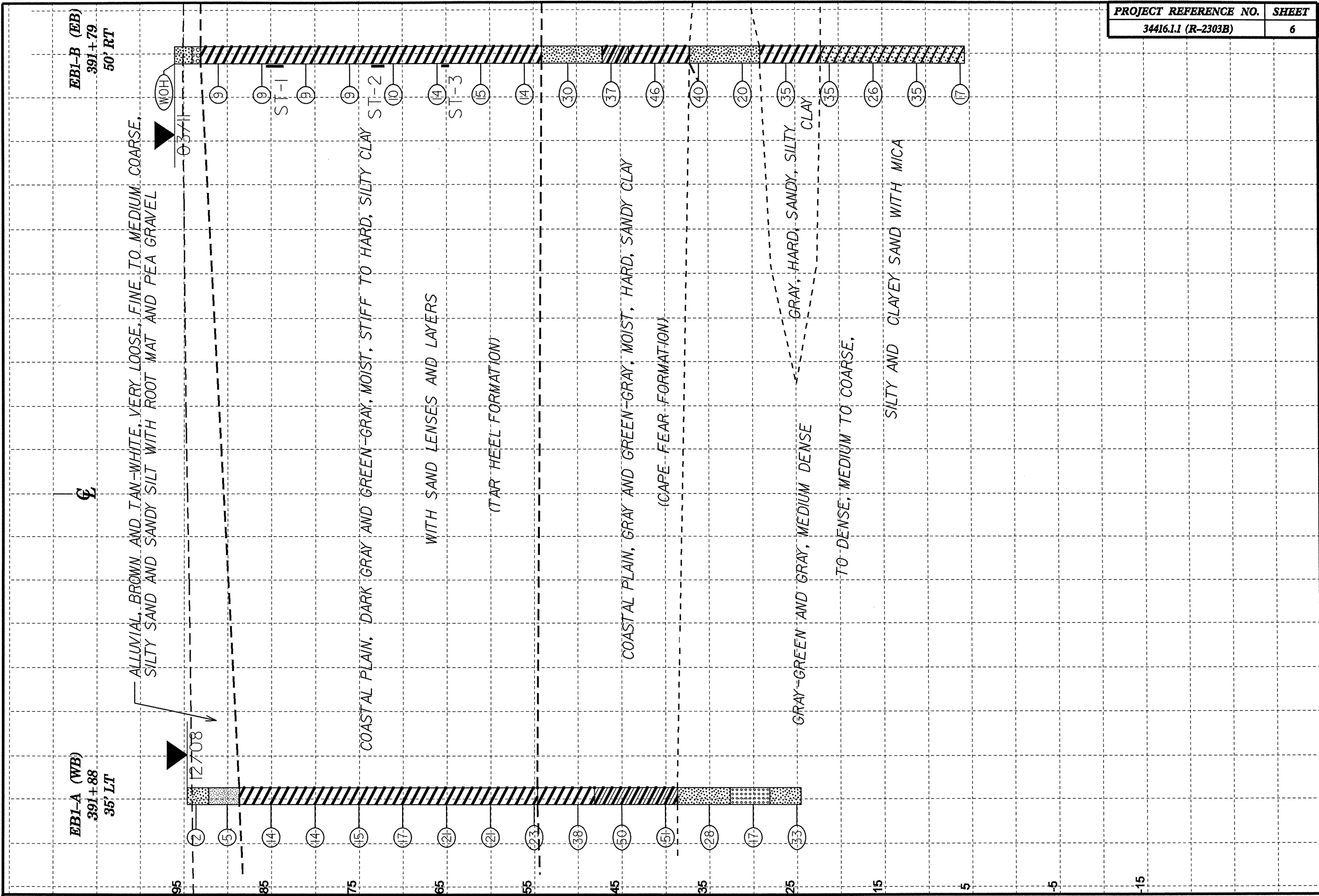


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34416.1.1 (R-2303B)	5
-EBL- PROFILE	



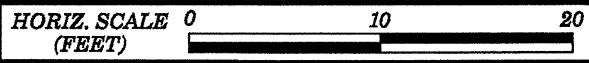
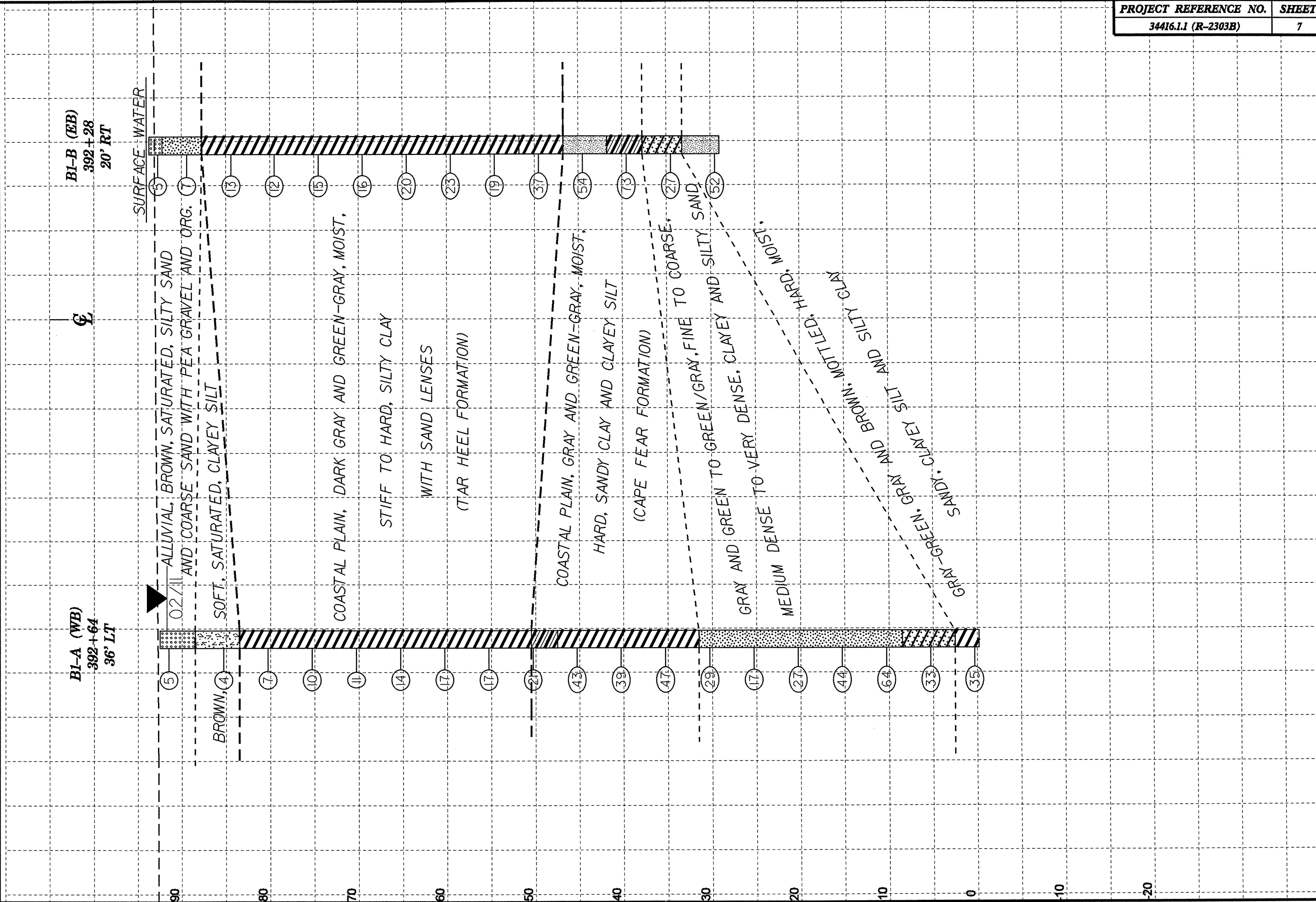
- (A) COASTAL PLAIN, TAN AND BROWN, MOIST, SILTY, FINE TO COARSE SAND (WACCAMAW FORMATION)
- (B) COASTAL PLAIN, DARK GRAY AND GREEN-GRAY, MOIST, MEDIUM STIFF TO HARD, SILTY CLAY WITH SAND LENSES AND GRAY, SATURATED, MEDIUM DENSE TO DENSE, SILTY AND CLAYEY SAND WITH CLAY LENSES (TAR HEEL FORMATION)
- (C) COASTAL PLAIN, GRAY, GREEN-GRAY, AND BROWN, MOIST, VERY STIFF TO HARD, SANDY CLAY AND CLAYEY SILT WITH MICA AND GRAY, MOIST, DENSE TO VERY DENSE, SILTY AND CLAYEY SAND (CAPE FEAR FORMATION)

NOTE: GROUNDLINE BASED ON PROFILE FROM HYDRAULIC REPORT DATED 03/07/11



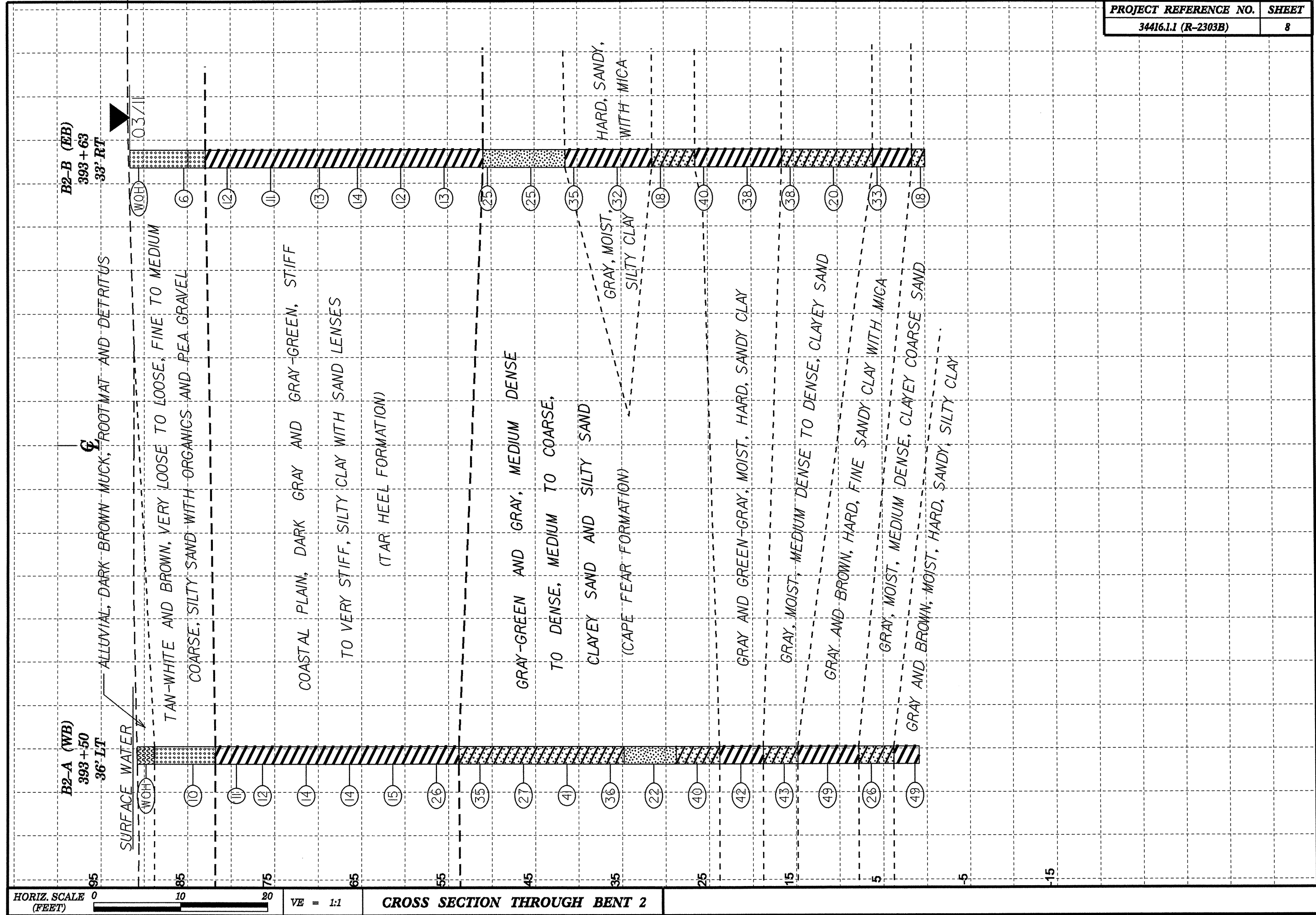
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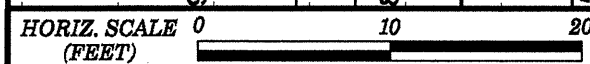
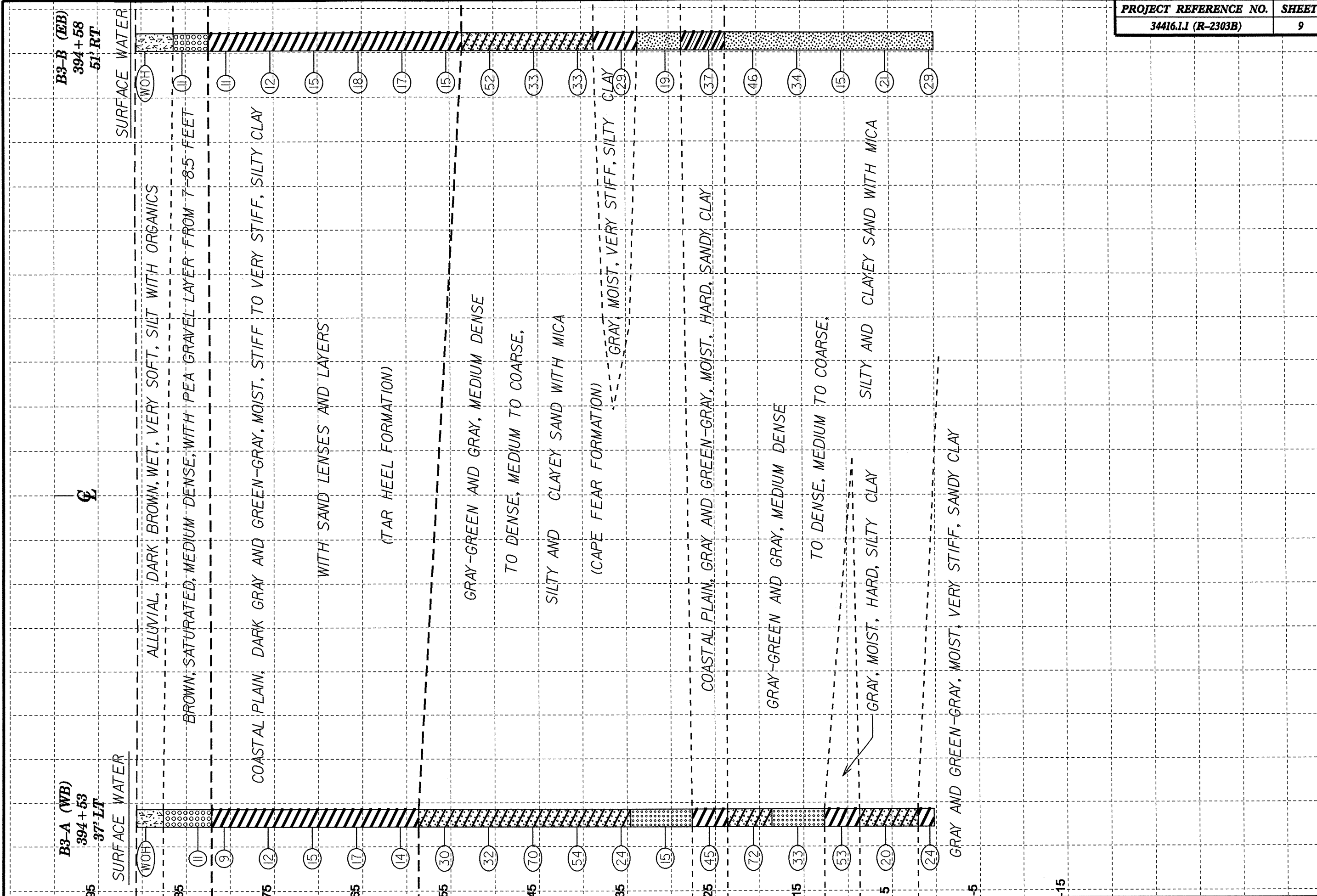
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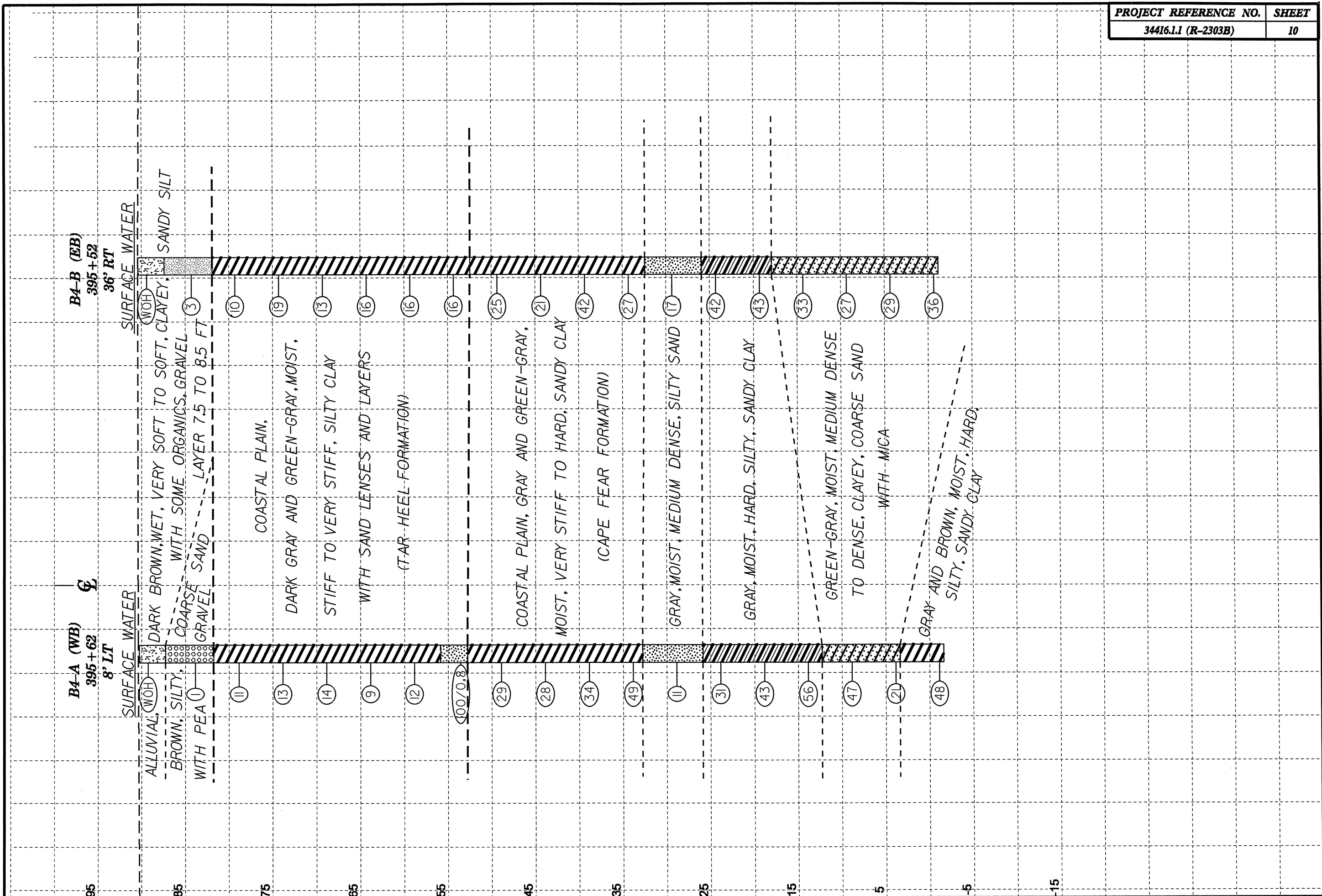
CROSS SECTION THROUGH BENT 1





VE = 1:1

CROSS SECTION THROUGH BENT 3



HORIZ. SCALE 0 10 20 (FEET)

VE = 1:1

CROSS SECTION THROUGH BENT 4

B4-A (WB)  
395 + 62  
8' LT

B4-B (EB)  
395 + 52  
36' RT

SURFACE WATER

SURFACE WATER

ALLUVIAL BROWN, SILTY, WITH PEAS WITH COARSE GRAVEL

(WOH) SANDY SILT

DARK BROWN, WET, VERY SOFT TO SOFT, CLAYEY, SANDY SILT

11

10

13

19

14

13

9

16

12

16

100/0.8

16

29

25

28

21

34

42

49

27

11

17

31

42

43

43

56

33

47

27

21

29

48

36

COASTAL PLAIN,

DARK GRAY AND GREEN-GRAY, MOIST,

STIFF TO VERY STIFF, SILTY CLAY

WITH SAND LENSES AND LAYERS

(TAR-HEEL FORMATION)

COASTAL PLAIN, GRAY AND GREEN-GRAY,

MOIST, VERY STIFF TO HARD, SANDY CLAY

(CAPE FEAR FORMATION)

GRAY, MOIST, MEDIUM DENSE, SILTY SAND

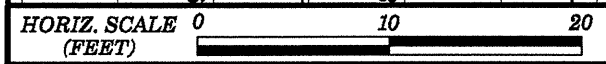
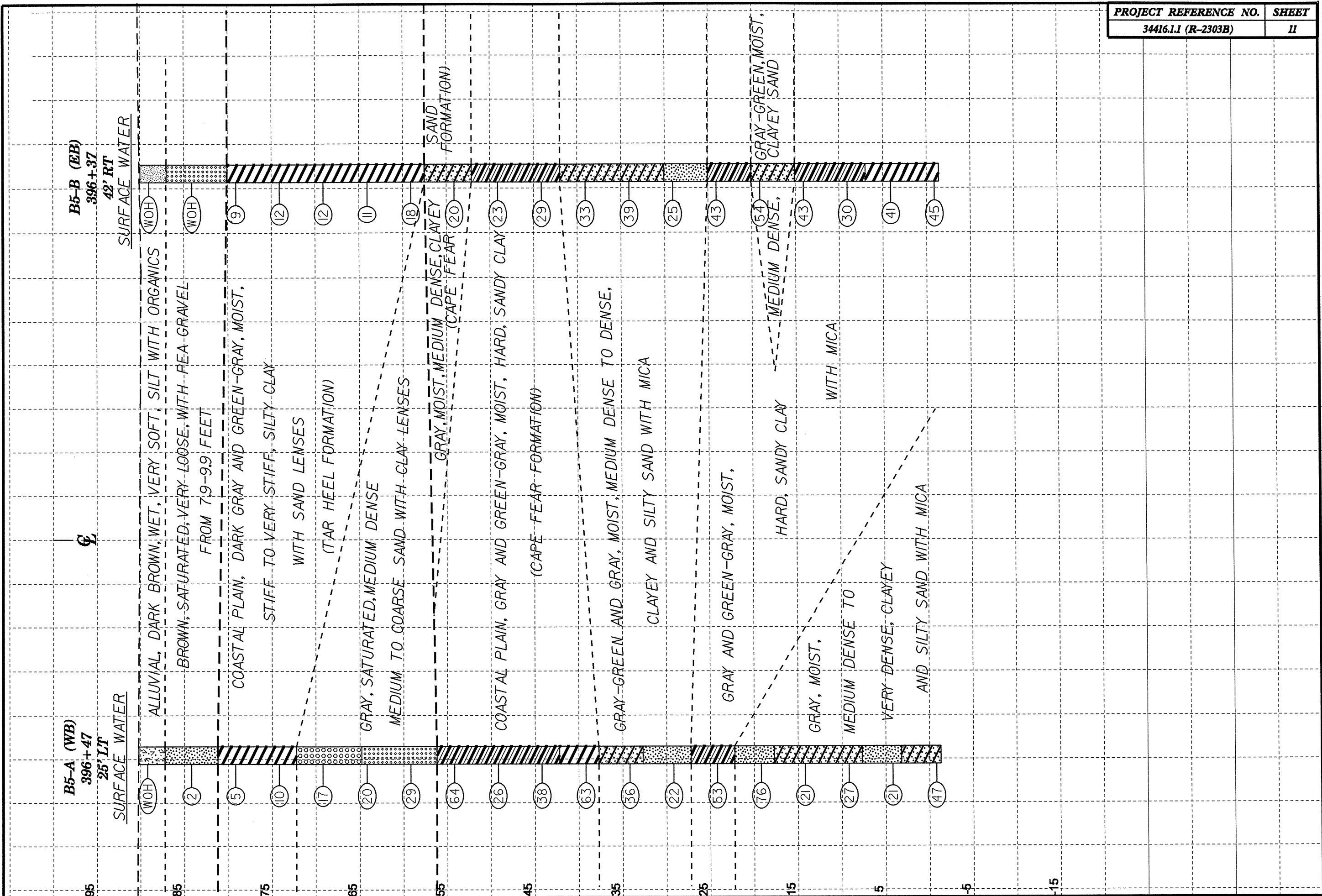
GRAY, MOIST, HARD, SILTY, SANDY CLAY

GREEN-GRAY, MOIST, MEDIUM DENSE

TO DENSE, CLAYEY, COARSE SAND

WITH MICA

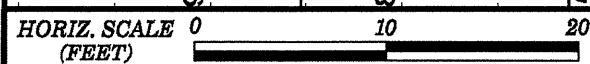
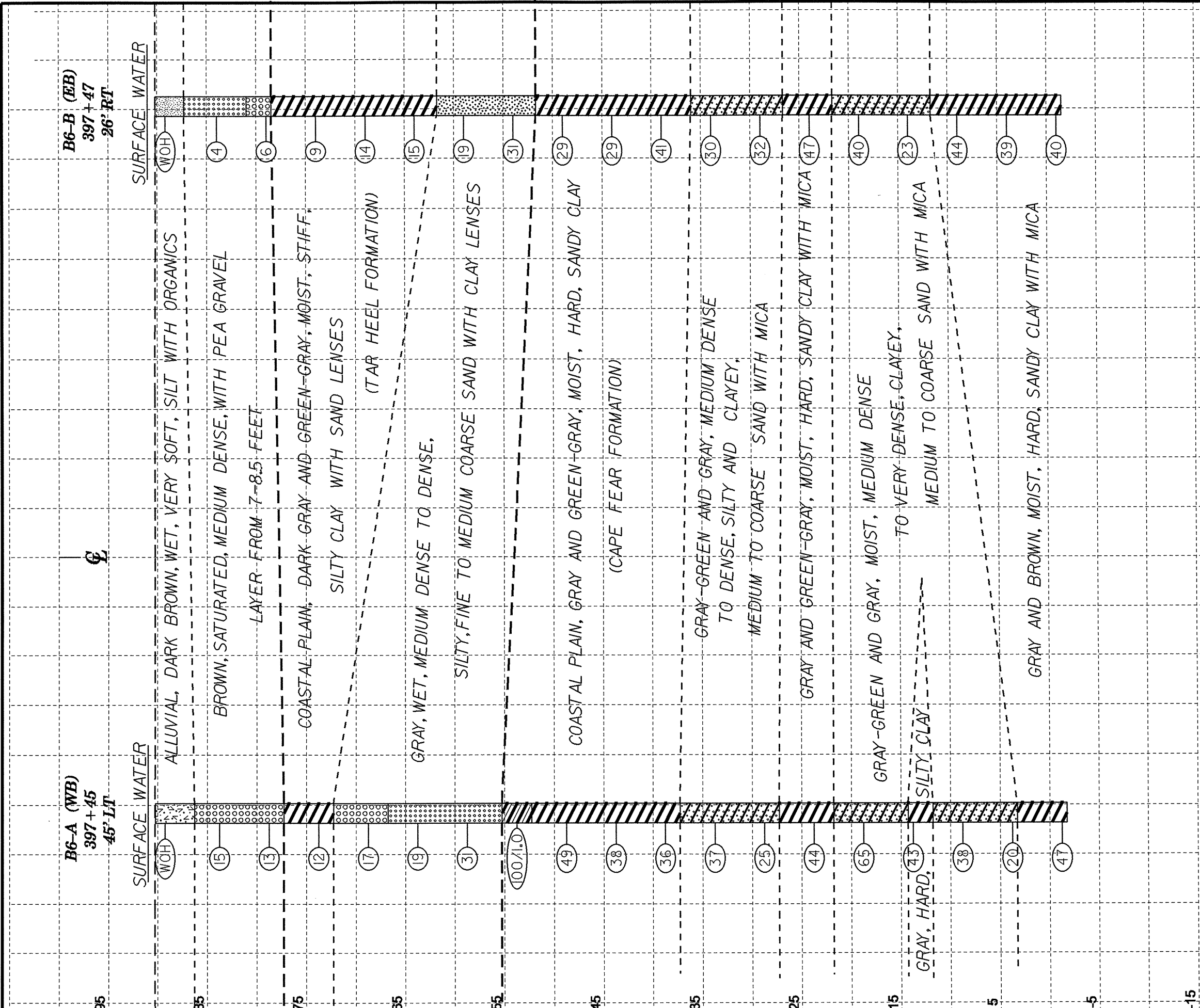
GRAY AND BROWN, MOIST, HARD, SILTY, SANDY CLAY



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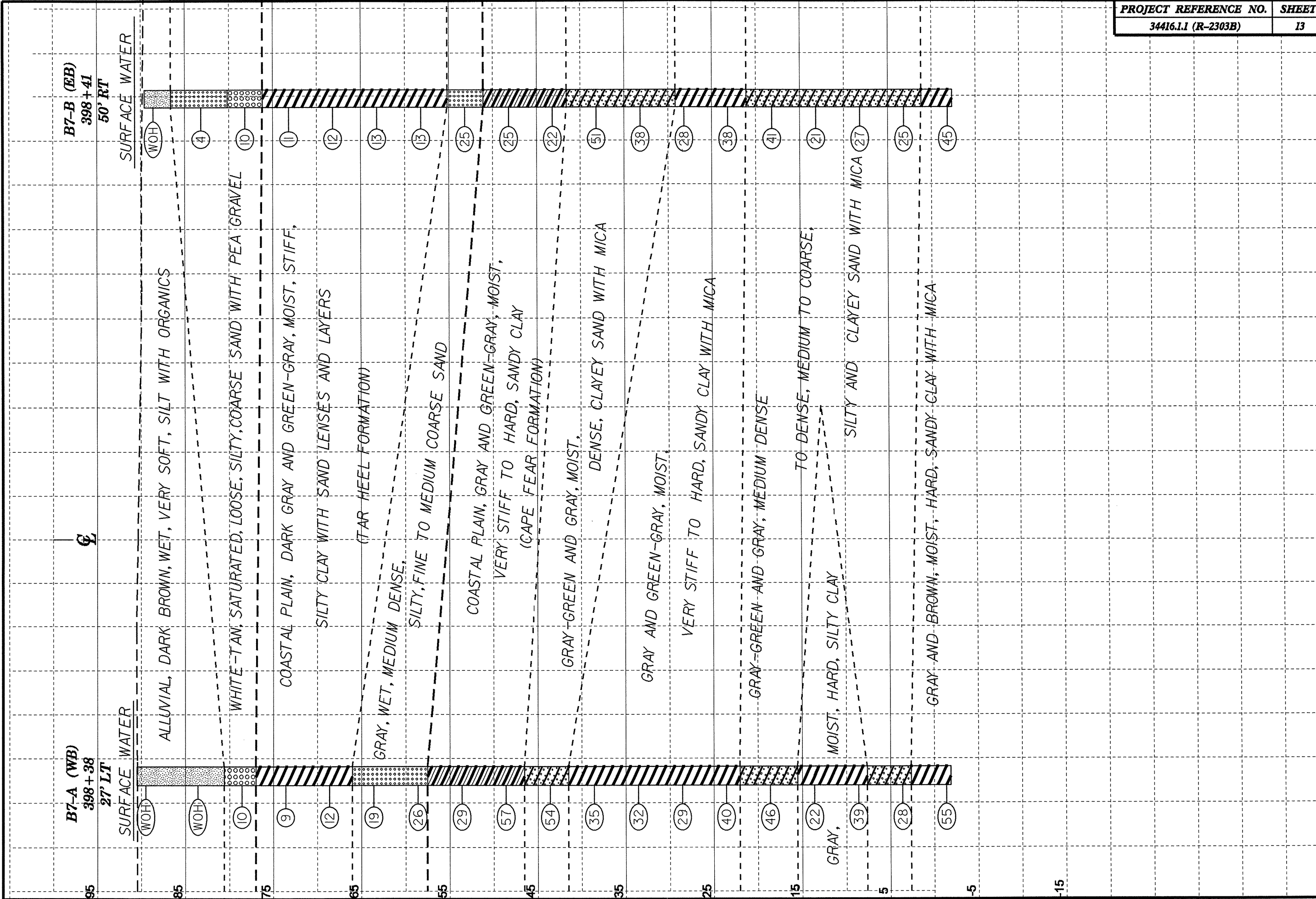
CROSS SECTION THROUGH BENT 5





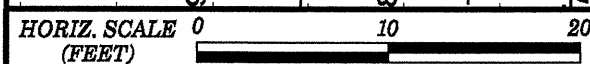
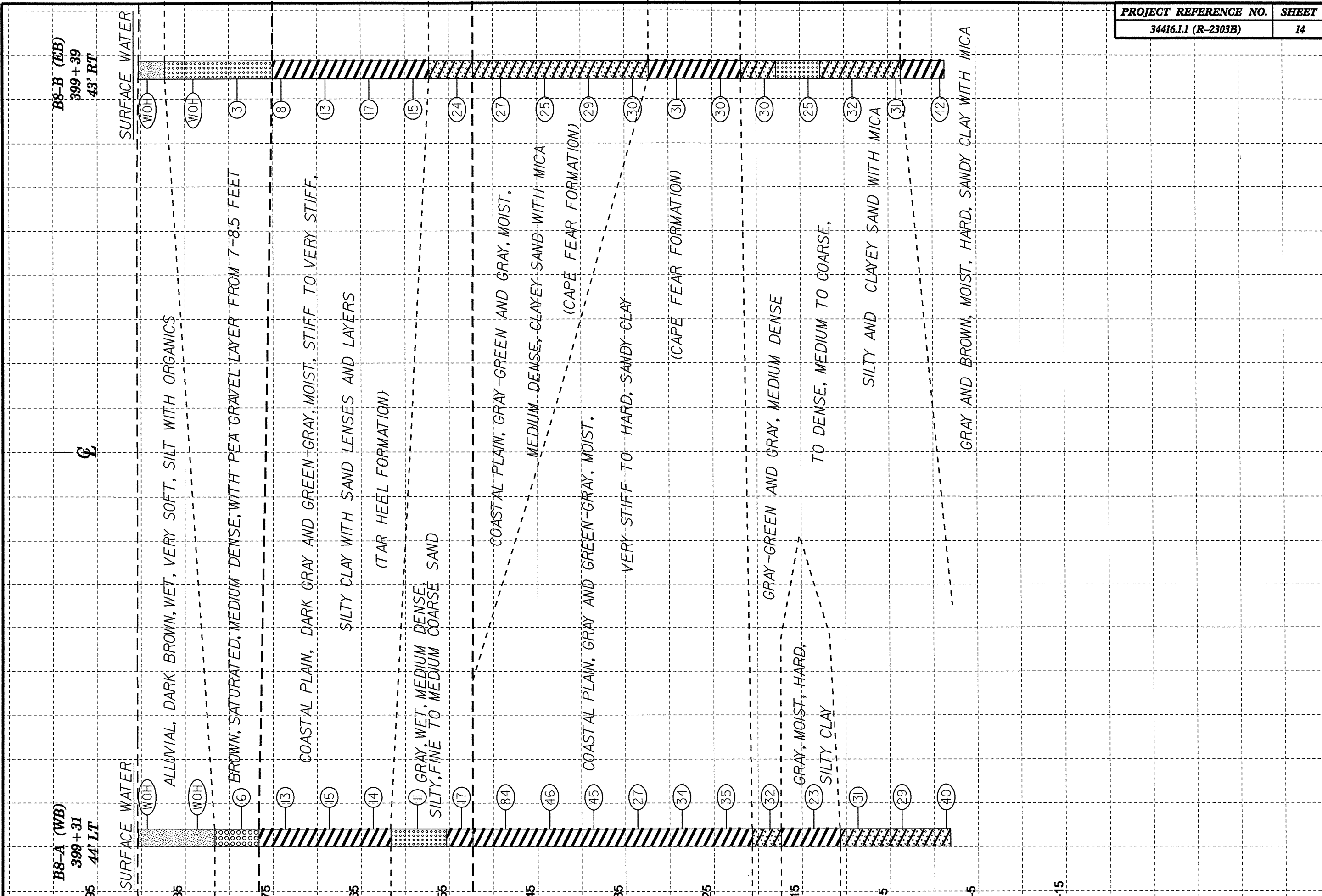
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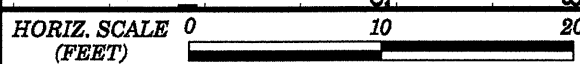
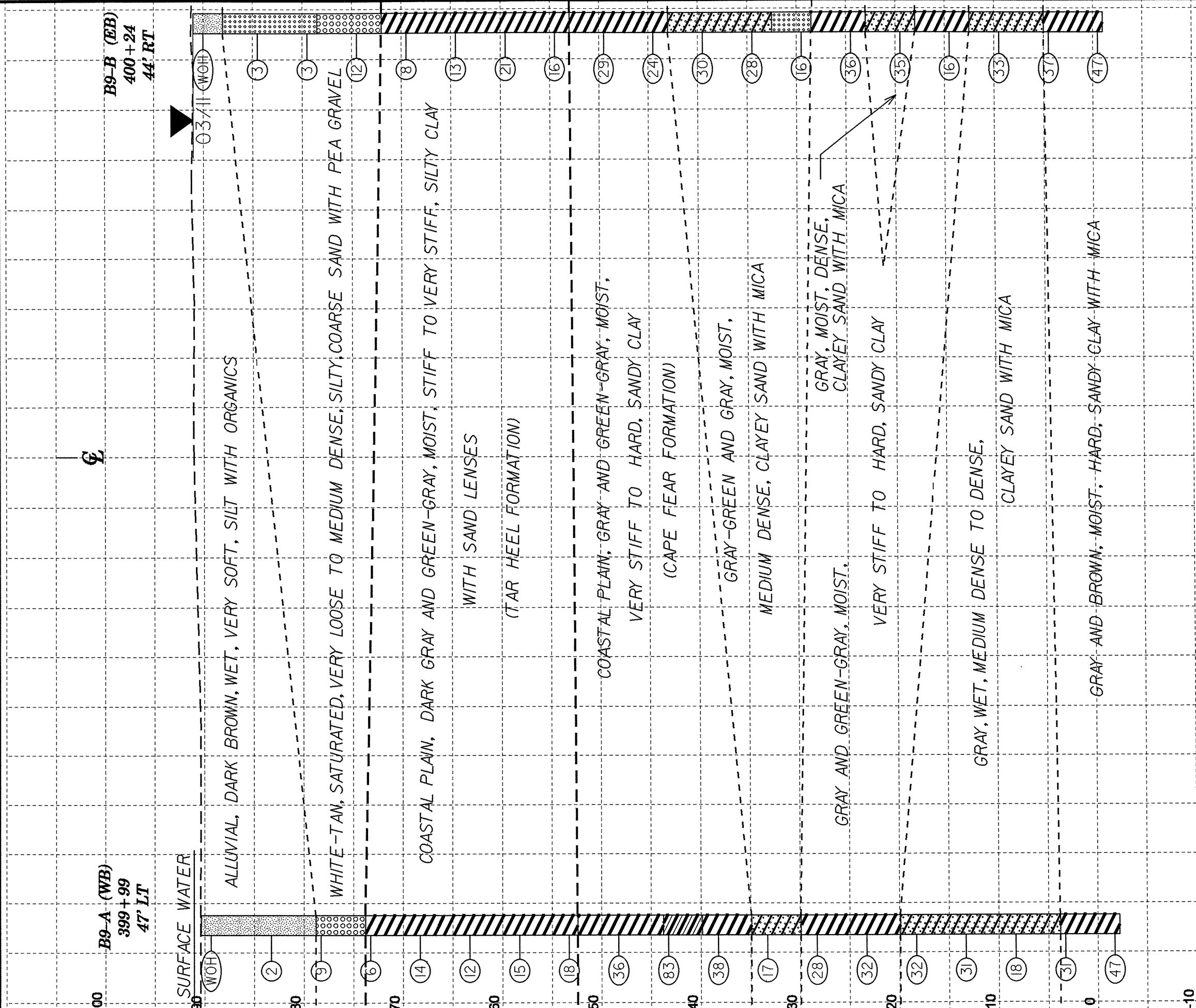
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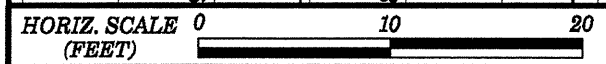
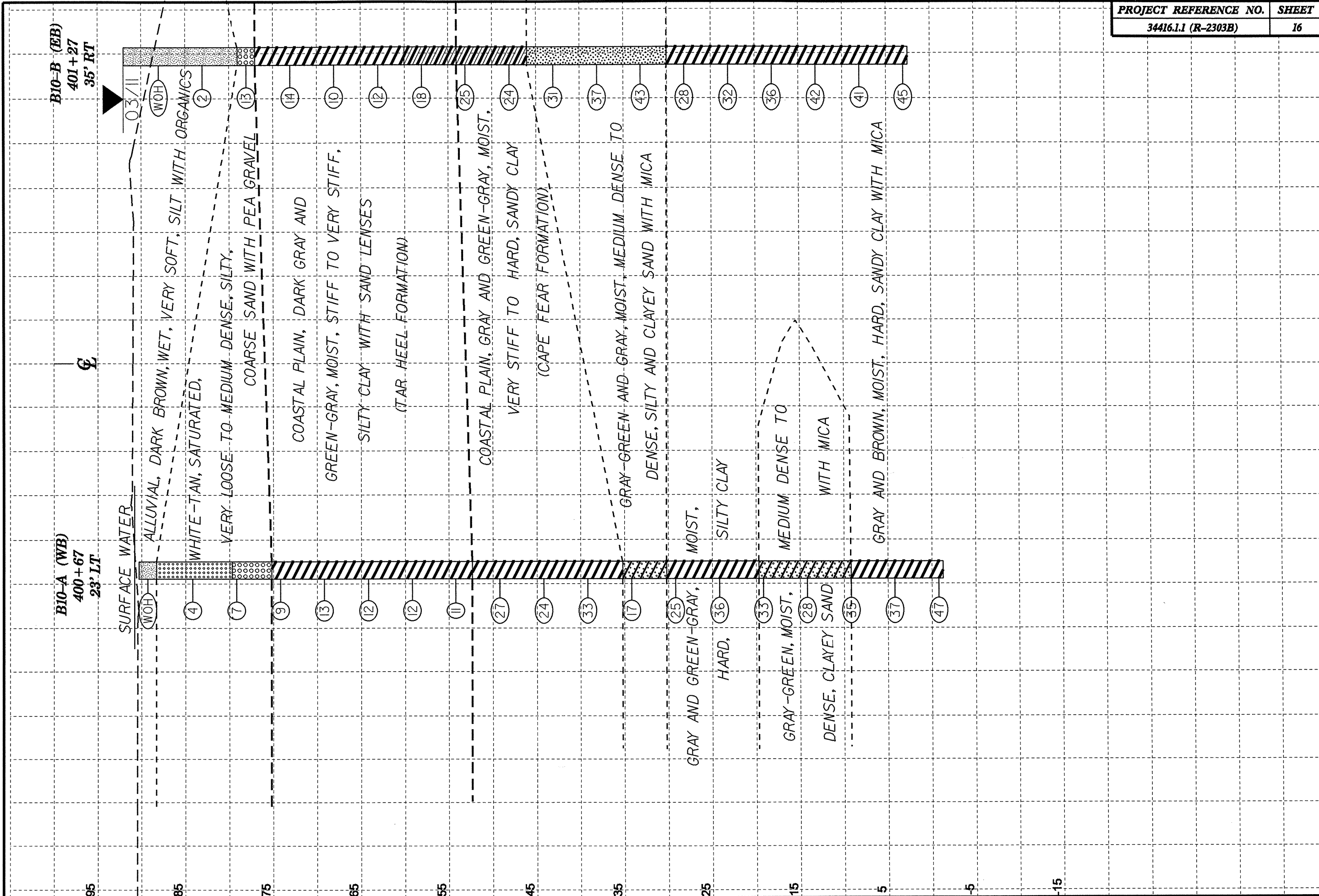
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CROSS SECTION THROUGH BENT 8



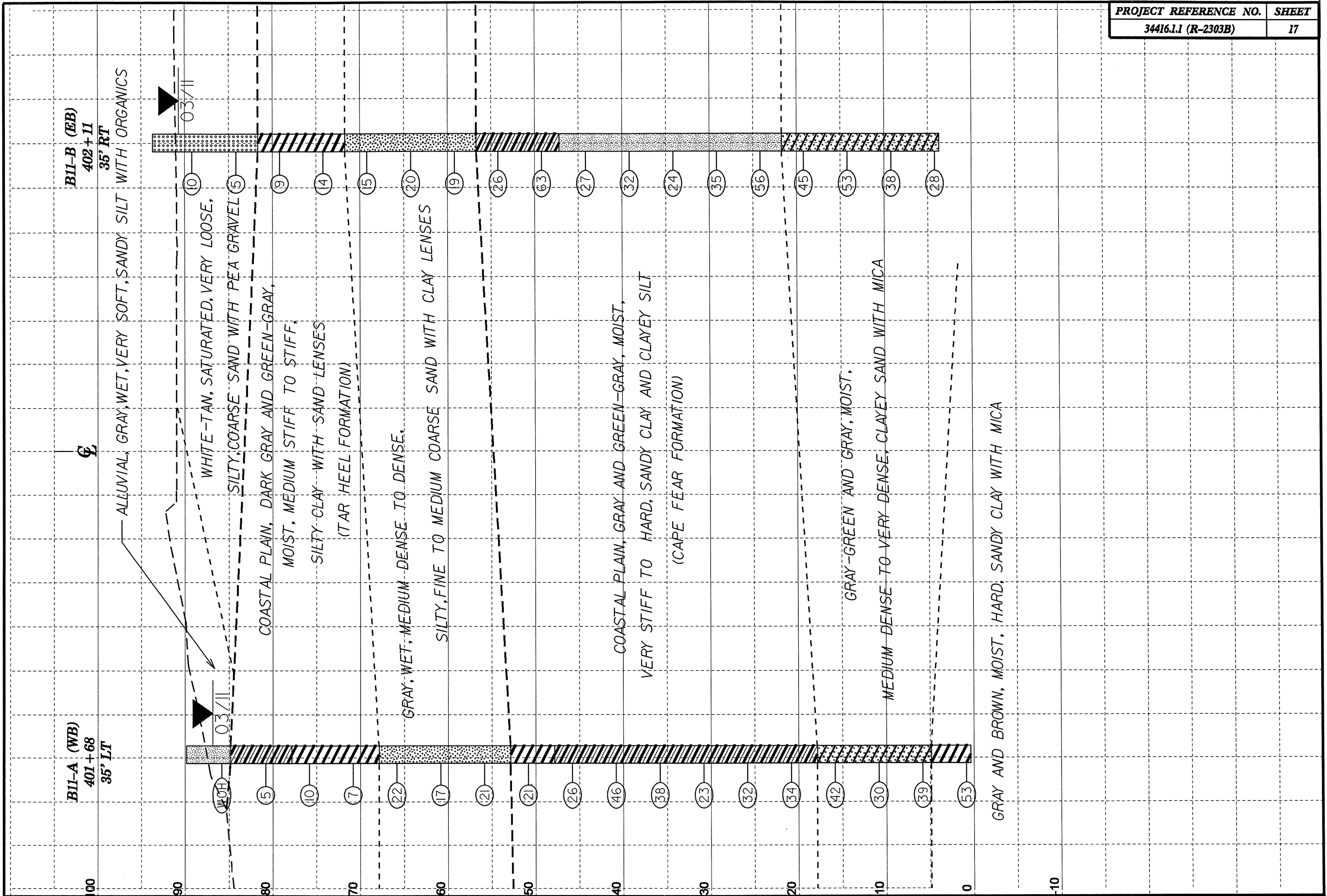
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CROSS SECTION THROUGH BENT 9



VE = 1:1

CROSS SECTION THROUGH BENT 10



BIL-A (WB)  
401+68  
35' LT

BIL-B (EB)  
402+11  
35' RT

ALLUVIAL GRAY, WET, VERY SOFT, SANDY SILT WITH ORGANICS

WHITE-TAN, SATURATED, VERY LOOSE,

SILTY, COARSE SAND WITH PEA GRAVEL

COASTAL PLAIN, DARK GRAY AND GREEN-GRAY,

MOIST, MEDIUM STIFF TO STIFF,

SILTY CLAY WITH SAND LENSES  
(TAR HEEL FORMATION)

GRAY, WET, MEDIUM-DENSE TO DENSE.

SILTY, FINE TO MEDIUM COARSE SAND WITH CLAY LENSES

COASTAL PLAIN, GRAY AND GREEN-GRAY, MOIST,

VERY STIFF TO HARD, SANDY CLAY AND CLAYEY SILT

(CAPE FEAR FORMATION)

GRAY-GREEN AND GRAY, MOIST,

MEDIUM DENSE TO VERY DENSE, CLAYEY SAND WITH MICA

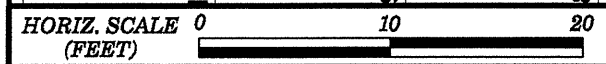
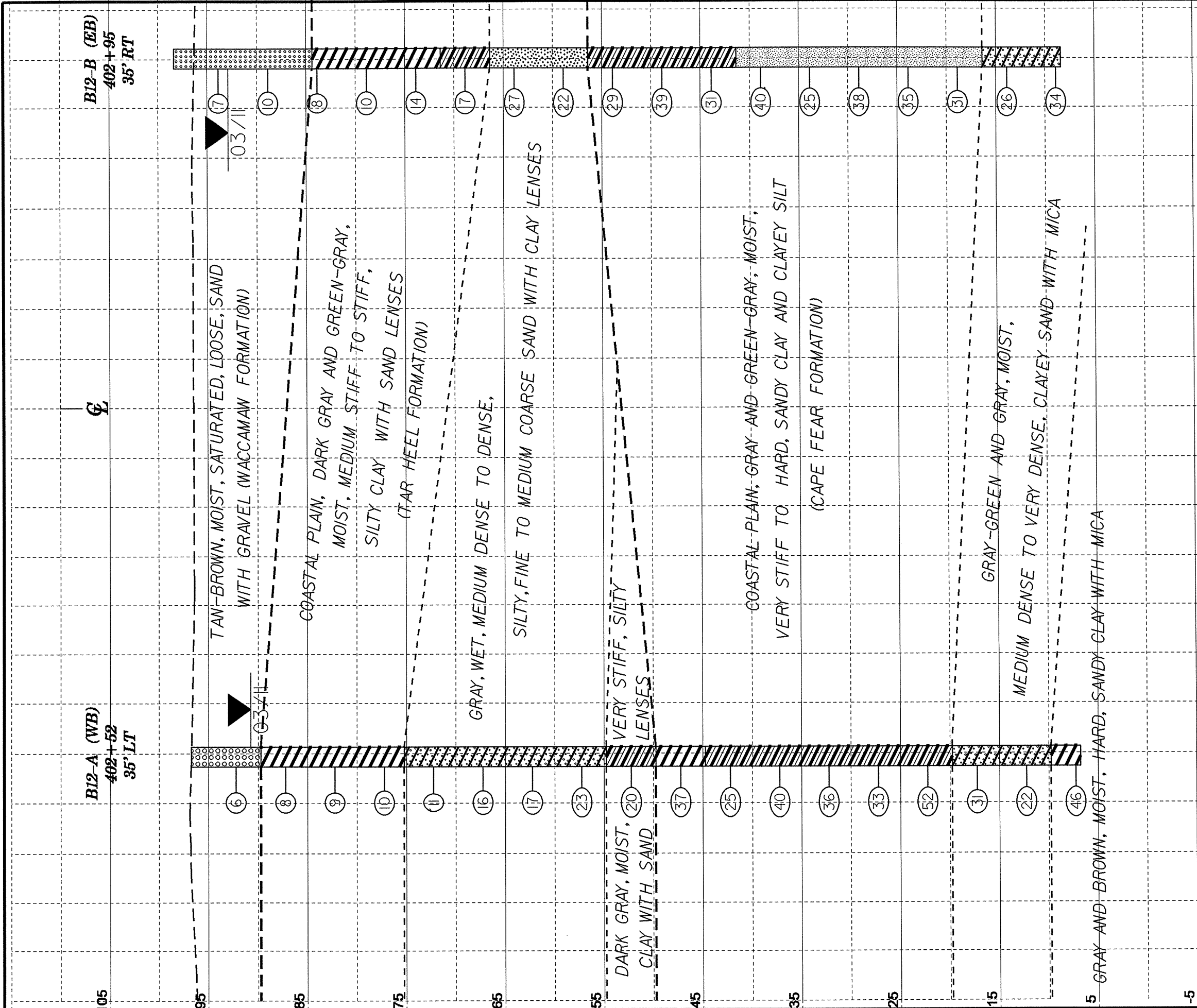
GRAY AND BROWN, MOIST, HARD, SANDY CLAY WITH MICA

HORIZ. SCALE 0 10 20 (FEET)

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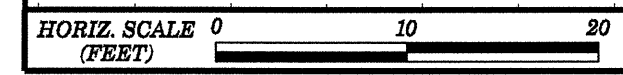
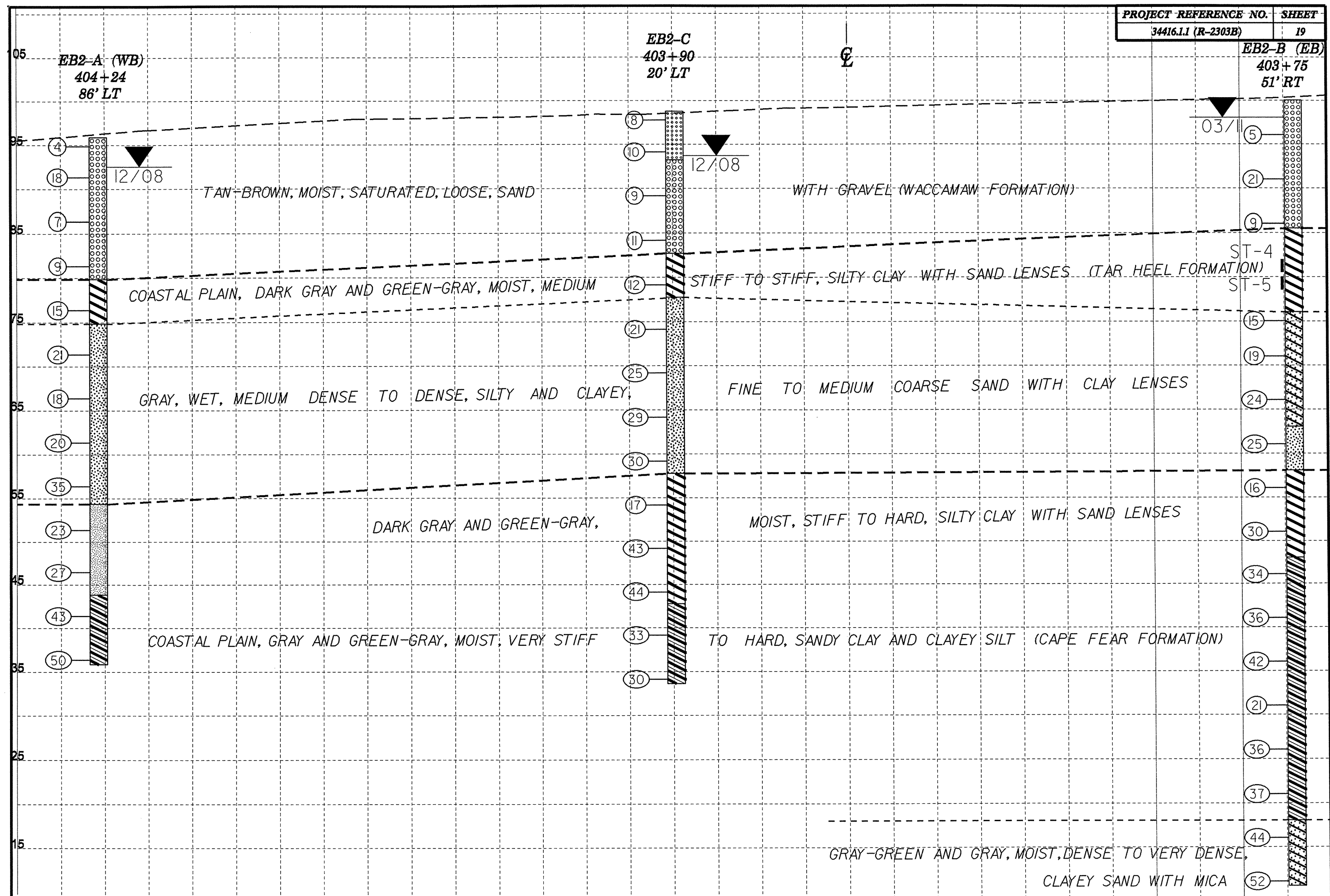
CROSS SECTION THROUGH BENT 11

-10



VE = 1:1

CROSS SECTION THROUGH BENT 12



VE = 1:1

CROSS SECTION THROUGH END BENT 2

EB2-B (EB)  
 403+75  
 51' RT

EB2-A (WB)  
 404+24  
 86' LT

EB2-C  
 403+90  
 20' LT

C

03/11

12/08

12/08

ST-4  
 ST-5

95  
90  
85  
75  
65  
55  
45  
35  
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36  
37  
44  
52

TAN-BROWN, MOIST, SATURATED, LOOSE, SAND

WITH GRAVEL (WACCAMAW FORMATION)

COASTAL PLAIN, DARK GRAY AND GREEN-GRAY, MOIST, MEDIUM

STIFF TO STIFF, SILTY CLAY WITH SAND LENSES (TAR HEEL FORMATION)

GRAY, WET, MEDIUM DENSE TO DENSE, SILTY AND CLAYEY,

FINE TO MEDIUM COARSE SAND WITH CLAY LENSES

DARK GRAY AND GREEN-GRAY,

MOIST, STIFF TO HARD, SILTY CLAY WITH SAND LENSES

COASTAL PLAIN, GRAY AND GREEN-GRAY, MOIST, VERY STIFF

TO HARD, SANDY CLAY AND CLAYEY SILT (CAPE FEAR FORMATION)

GRAY-GREEN AND GRAY, MOIST, DENSE TO VERY DENSE,  
 CLAYEY SAND WITH MICA



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Bradley, N											
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)										
BORING NO. EB1-A (WB)		STATION 391+88		OFFSET 35 ft LT		ALIGNMENT -LREV-		0 HR. N/A									
COLLAR ELEV. 94.7 ft		TOTAL DEPTH 70.1 ft		NORTHING 456,123		EASTING 2,104,915		24 HR. 0.0									
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 00/00/0000				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Contract Driller		START DATE 12/17/08		COMP. DATE 12/17/08		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
95	94.7	0.0	1	WOH	2									▼	94.7	GROUND SURFACE	0.0
90	91.1	3.6	2		3	2									92.2	ALLUVIAL BROWN, SILTY FINE SAND WITH LITTLE ORGANIC MATERIAL (ORGANIC CONTENT = 5.6%)	2.5
															88.7	BROWN, FINE SANDY SILT	6.0
85	86.1	8.6	3		6	8										COASTAL PLAIN DARK GRAY, SILTY CLAY, HIGHLY PLASTIC (TAR HEEL FORMATION)	
80	81.1	13.6	4		6	8											
75	76.1	18.6	4		6	9											
70	71.1	23.6	5		7	10											
65	66.1	28.6	6		9	12											
60	61.1	33.6	7		8	13											
55	56.1	38.6	7		8	15											
50	51.1	43.6	7		15	23									54.7	COASTAL PLAIN LIGHT GREEN-GRAY, SILTY CLAY, MICACEOUS (CAPE FEAR FORMATION)	40.0
45	46.1	48.6	17		23	27									48.2	GRAY, SANDY CLAY	46.5
40	41.1	53.6	21		27	24											
35	36.1	58.6	9		12	16									38.7	GRAY, CLAYEY SILTY SAND	56.0
30	31.1	63.6	6		8	9									32.7	GRAY, FINE TO COARSE SAND, MICACEOUS	62.0
															28.2	GREEN-GRAY, CLAYEY SILTY SAND	66.5
25	26.1	68.6	13		16	17									24.6	Boring Terminated at Elevation 24.6 ft IN COASTAL PLAIN, SILTY SAND (CAPE FEAR FORMATION)	70.1

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/7/11



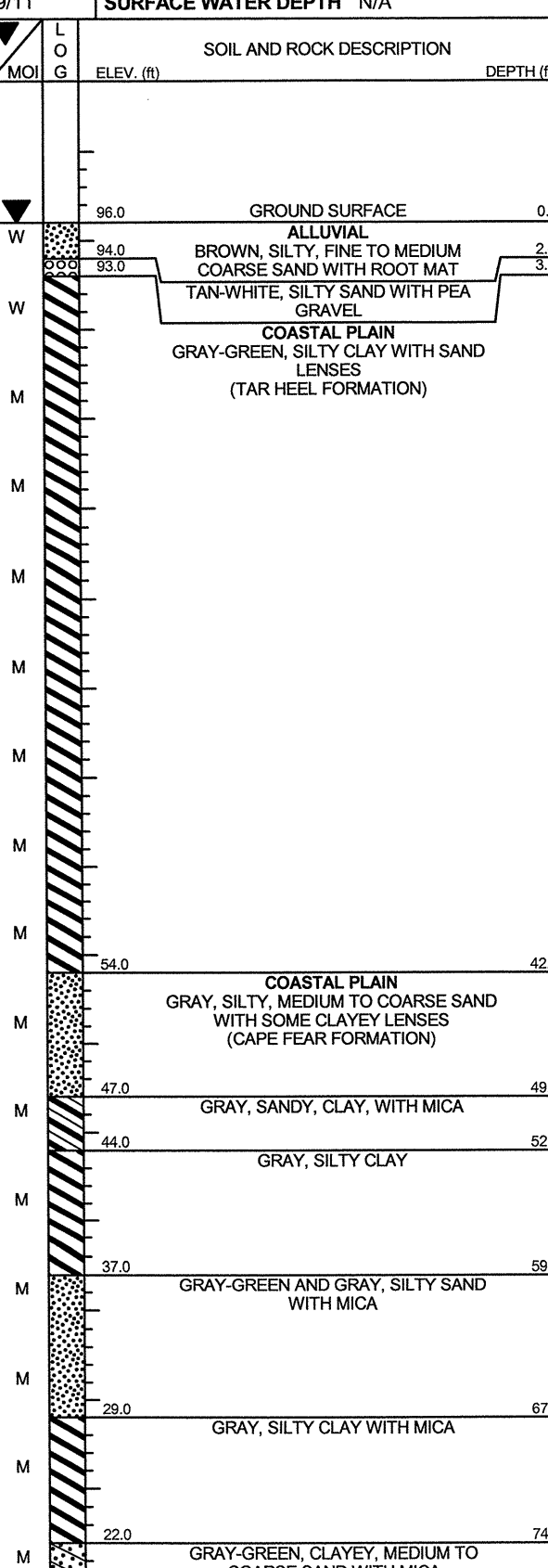
# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO. EB1-B (EB)	STATION 391+79	OFFSET 50 ft RT	ALIGNMENT -LREV-			0 HR. N/A									
COLLAR ELEV. 96.0 ft	TOTAL DEPTH 90.5 ft	NORTHING 456,038	EASTING 2,104,914			24 HR. 0.0									
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 03/08/11	COMP. DATE 03/09/11	SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
100															
95	96.0	0.0	WOH	WOH	WOH										
90	92.0	4.0	3	3	6										
85	87.0	9.0	2	4	5										
80	82.0	14.0	3	3	6										
75	77.0	19.0	2	4	5										
70	72.0	24.0	3	4	6										
65	67.0	29.0	3	6	8										
60	62.0	34.0	4	6	9										
55	57.0	39.0	4	6	8										
50	52.0	44.0	6	13	17										
45	47.0	49.0	14	16	21										
40	42.0	54.0	18	20	26										
35	37.0	59.0	14	18	22										
30	32.0	64.0	9	9	11										
25	27.0	69.0	11	14	21										
20	22.0	74.0	10	15	20										

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO. EB1-B (EB)	STATION 391+79	OFFSET 50 ft RT	ALIGNMENT -LREV-			0 HR. N/A									
COLLAR ELEV. 96.0 ft	TOTAL DEPTH 90.5 ft	NORTHING 456,038	EASTING 2,104,914			24 HR. 0.0									
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 03/08/11	COMP. DATE 03/09/11	SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
20															
15	17.0	79.0	13	13	13										
10	12.0	84.0	9	14	21										
	7.0	89.0	7	8	9										

NCDOT BORE DOUBLE R2303B.GEO\_STRUCTURE1.GPJ NC\_DOT.GDT 6/6/11



Match Line

GRAY-GREEN, CLAYEY, MEDIUM TO COARSE SAND WITH MICA (continued)

Boring Terminated at Elevation 5.5 ft IN COASTAL PLAIN, SANDY CLAY (CAPE FEAR FORMATION)

- Other Samples:  
 ST-1 (10.5 - 12.5)  
 ST-2 (22.5 - 24.0)  
 ST-3 (30.5 - 31.4)



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Bruinsma, C.										
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER																
BORING NO. B1-A (WB)		STATION 392+64		OFFSET 36 ft LT		ALIGNMENT -LREV-										
COLLAR ELEV. 92.5 ft		TOTAL DEPTH 92.7 ft		NORTHING 456,132		EASTING 2,104,990										
DRILL RIG/HAMMER EFF/DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Contract Driller		START DATE 02/10/11		COMP. DATE 02/10/11		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
95	92.5	0.0												GROUND SURFACE	0.0	
90	86.3	6.2	2	4	1							SS-1	Sat.	ALLUVIAL BROWN AND GRAY, SILTY SAND WITH SOME ORGANICS	4.0	
85	81.3	11.2	2	2	2								Sat.	BROWN, SANDY, CLAYEY SILT WITH ROOTS	9.0	
80	76.3	16.2	2	3	4							SS-2	M	COASTAL PLAIN DARK GRAY AND GREEN, SILTY, SANDY CLAY WITH FINE TO COARSE SAND LENSES (TAR HEEL FORMATION)		
75	71.3	21.2	3	5	6								M			
70	66.3	26.2	4	6	8								M			
65	61.3	31.2	5	8	9								M			
60	56.3	36.2	5	7	10								M			
55	51.3	41.2	6	9	12								M			
50	46.3	46.2	12	19	24							SS-3	52%			
45	41.3	51.2	17	18	21								M			
40	36.3	56.2	16	22	25								M			
35	31.3	61.2	10	14	15								M			
30	26.3	66.2	5	7	10							SS-4	M	GRAY-TAN, SILTY, SANDY CLAY (CAPE FEAR FORMATION)	42.0	
25	21.3	71.2	10	12	15								M	GREEN-GRAY, HARD, SILTY SANDY CLAY, MICACEOUS	45.0	
20	16.3	76.2	15	20	24								M			
15													M			

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/6/11

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Bruinsma, C.										
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER																
BORING NO. B1-A (WB)		STATION 392+64		OFFSET 36 ft LT		ALIGNMENT -LREV-										
COLLAR ELEV. 92.5 ft		TOTAL DEPTH 92.7 ft		NORTHING 456,132		EASTING 2,104,990										
DRILL RIG/HAMMER EFF/DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Contract Driller		START DATE 02/10/11		COMP. DATE 02/10/11		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
15	92.5	0.0														
10	88.5	4.0	16	28	36							M		GRAY AND GREEN, FINE TO COARSE, CLAYEY, SILTY SAND (continued)	8.5	
5	86.2	6.3	10	15	18							SS-9	M	GRAY, CLAYEY, COARSE SAND	84.0	
0	91.2	1.3	10	15	20								M	GRAY AND BROWN, MOTTLED, SANDY, SILTY CLAY	90.0	
													SS-10	M	Boring Terminated at Elevation -0.2 ft IN COASTAL PLAIN, CLAY (CAPE FEAR FORMATION)	92.7

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Bradley, N.								
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)							
BORING NO. B1-B (EB)		STATION 392+28		OFFSET 20 ft RT		ALIGNMENT -LREV-								
COLLAR ELEV. 93.7 ft		TOTAL DEPTH 64.7 ft		NORTHING 456,073		EASTING 2,104,960								
DRILL RIG/HAMMER EFF./DATE SME R-7 CME-750 88% 00/00/0000		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Contract Driller		START DATE 12/17/08		COMP. DATE 12/17/08		SURFACE WATER DEPTH 0.3ft								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
95	93.7	0.0	1	1	4									93.7 WATER SURFACE (12/17/08) 0.0
90	90.4	3.3	2	4	3									92.2 ALLUVIAL GRAY, FINE TO COARSE SAND BROWN, SILTY, FINE TO COARSE SAND
85	85.4	8.3	3	5	8									87.7 COASTAL PLAIN DARK GRAY, SANDY, SILTY CLAY WITH SAND LENSES (TAR HEEL FORMATION)
80	80.5	13.2	5	5	7									
75	75.5	18.2	4	7	8									
70	70.5	23.2	4	7	9									
65	65.5	28.2	6	8	12									
60	60.5	33.2	6	9	14									
55	55.5	38.2	7	8	11									
50	50.5	43.2	5	11	26									51.7 COASTAL PLAIN GREEN-GRAY, SANDY SILTY CLAY (CAPE FEAR FORMATION)
45	45.5	48.2	20	25	29									47.0 GRAY, SANDY CLAYEY SILT
40	40.5	53.2	17	28	45									46.7 GRAY, SANDY CLAY, MICACEOUS
35	35.5	58.2	8	14	13									41.7 GREEN GRAY, CLAYEY FINE TO COARSE SAND
30	30.5	63.2	20	24	28									37.7 GRAY GREEN, SANDY CLAYEY SILT
														33.2 Boring Terminated at Elevation 29.0 ft IN COASTAL PLAIN, SANDY CLAY (CAPE FEAR FORMATION)  ARTESIAN CONDITIONS ENCOUNTERED. APPROXIMATED H= 1.5'

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/6/11

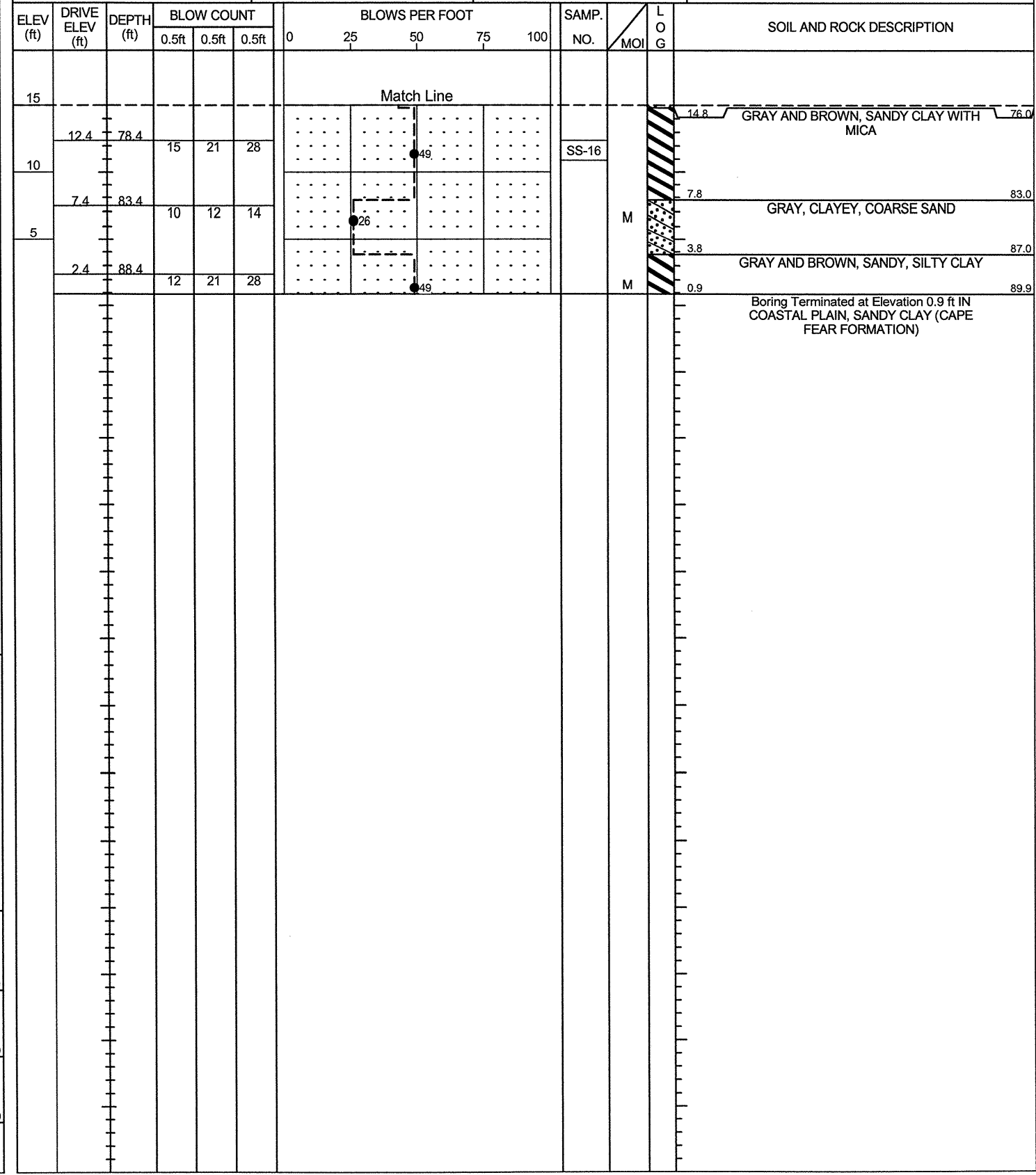
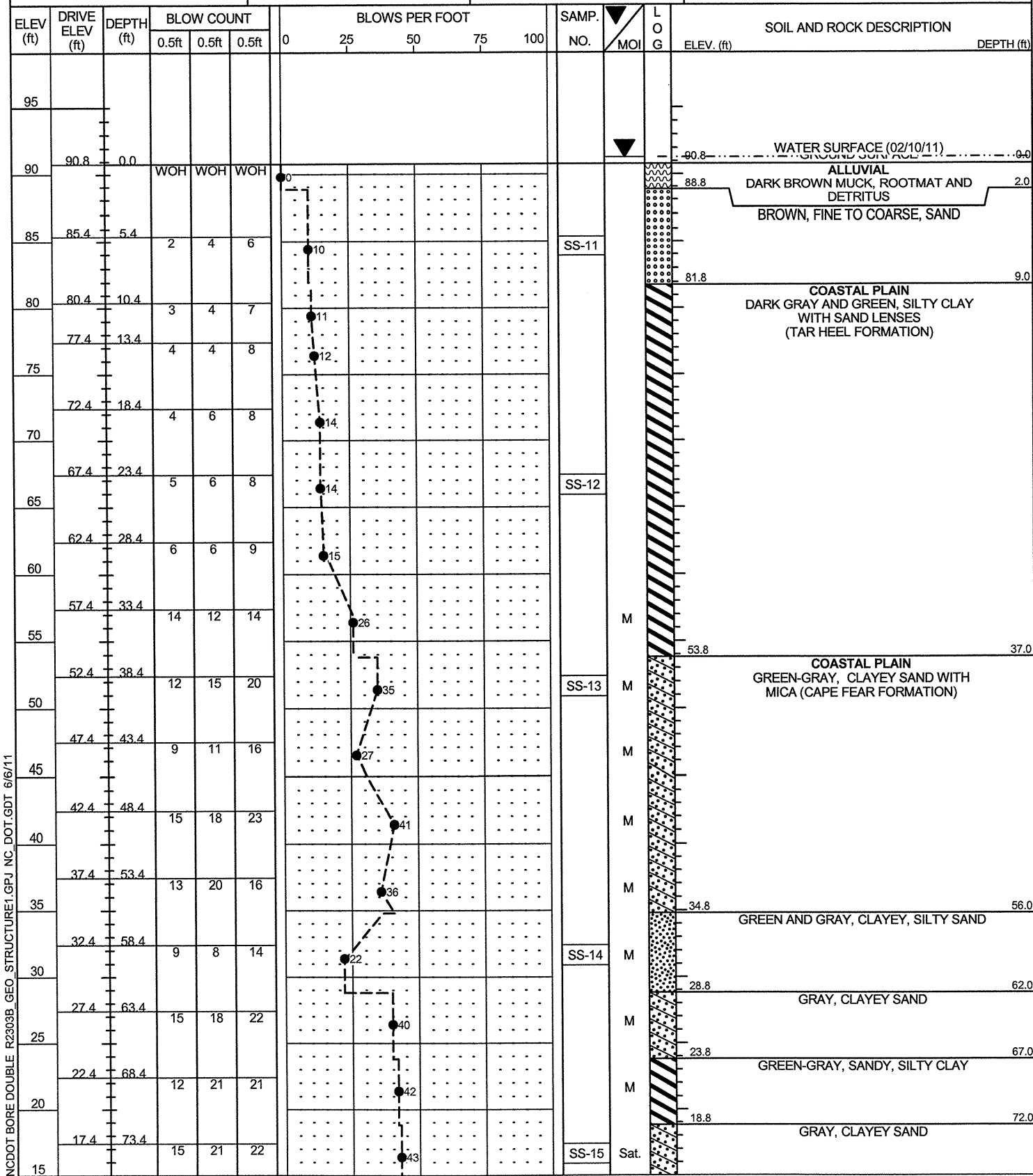


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B2A (WB)	STATION 393+50	OFFSET 36 ft LT	ALIGNMENT -LREV-
COLLAR ELEV. 90.8 ft	TOTAL DEPTH 89.9 ft	NORTHING 456,140	EASTING 2,105,076
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 02/10/11	COMP. DATE 02/10/11	SURFACE WATER DEPTH 0.5ft

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B2A (WB)	STATION 393+50	OFFSET 36 ft LT	ALIGNMENT -LREV-
COLLAR ELEV. 90.8 ft	TOTAL DEPTH 89.9 ft	NORTHING 456,140	EASTING 2,105,076
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 02/10/11	COMP. DATE 02/10/11	SURFACE WATER DEPTH 0.5ft



NCDOT BORE DOUBLE R2303B GEO STRUCTURE1.GPJ NC DOT.GDT 6/6/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.								
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)							
BORING NO. B2-B (EB)		STATION 393+63		OFFSET 33 ft RT		ALIGNMENT -LREV-								
COLLAR ELEV. 91.6 ft		TOTAL DEPTH 91.7 ft		NORTHING 456,073		EASTING 2,105,096								
DRILL RIG/HAMMER EFF/DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DRILLER Contract Driller		START DATE 03/07/11		COMP. DATE 03/07/11		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
95	91.6	0.0												GROUND SURFACE 0.0
90			WOH	WOH	WOH								W	ALLUVIAL BROWN, SILTY, FINE TO MEDIUM COARSE SAND WITH ROOTMAT
85	86.4	5.2	1	1	5								W	TAN-WHITE, SILTY SAND WITH PEA GRAVEL
80	81.4	10.2	4	5	7								W	COASTAL PLAIN GRAY-GREEN, SILTY CLAY WITH SAND LENSES (TAR HEEL FORMATION)
75	76.4	15.2	4	4	7								W	
70	70.8	20.8	4	6	7								M	
65	66.4	25.2	4	6	8								M	
60	61.4	30.2	5	5	7								M	
55	56.4	35.2	4	5	8								M	
50	51.4	40.2	6	12	13								M	COASTAL PLAIN GRAY, SILTY, MEDIUM TO COARSE SAND WITH SOME CLAY LENSES (CAPE FEAR FORMATION)
45	46.4	45.2	8	11	14								M	
40	41.4	50.2	17	16	19								M	DARK GRAY TO GRAY, SANDY, SILTY CLAY WITH MICA
35	36.4	55.2	10	12	20								M	
30	31.4	60.2	9	9	9								M	GRAY, MEDIUM TO COARSE, SAND WITH SOME CLAY LENSES
25	26.4	65.2	14	16	24								M	GRAY, SANDY CLAY WITH MICA
20	21.4	70.2	13	15	23								M	
15	16.4	75.2	13	17	21								M	

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.								
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)							
BORING NO. B2-B (EB)		STATION 393+63		OFFSET 33 ft RT		ALIGNMENT -LREV-								
COLLAR ELEV. 91.6 ft		TOTAL DEPTH 91.7 ft		NORTHING 456,073		EASTING 2,105,096								
DRILL RIG/HAMMER EFF/DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DRILLER Contract Driller		START DATE 03/07/11		COMP. DATE 03/07/11		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
15														
10	11.4	80.2	8	9	11								M	GRAY-GREEN, CLAYEY, MEDIUM TO COARSE SAND WITH SOME CLAY LENSES AND MICA (continued)
5	6.4	85.2	9	15	18								M	GRAY, SANDY CLAY WITH MICA
0	1.4	90.2	8	9	9								M	GRAY, SILTY, MEDIUM TO COARSE SAND WITH MICA AND SOME CLAY LENSES
														Boring Terminated at Elevation -0.1 ft IN COASTAL PLAIN, SANDY CLAY (CAPE FEAR FORMATION)

NCDOT BORE DOUBLE R2303B.GEO.STRUCTURE1.GPJ NC\_DOT.GDT 6/7/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Bruinsma, C. M.							
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)						
BORING NO. B3-A (WB)		STATION 394+53		OFFSET 37 ft LT		ALIGNMENT -LREV-							
COLLAR ELEV. 90.6 ft		TOTAL DEPTH 90.4 ft		NORTHING 456,151		EASTING 2,105,178							
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DRILLER Contract Driller		START DATE 02/11/11		COMP. DATE 02/11/11		SURFACE WATER DEPTH 0.9ft							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75				100
95													
90	90.6	0.0	WOH	WOH	WOH								
85	84.7	5.9	4	5	6								
80	81.7	8.9	2	3	6								
75	76.7	13.9	4	5	7								
70	71.7	18.9	4	6	9								
65	66.7	23.9	5	7	10								
60	61.7	28.9	5	6	8								
55	56.7	33.9	6	13	17								
50	51.7	38.9	13	14	18								
45	46.7	43.9	15	35	35								
40	41.7	48.9	25	21	33								
35	36.7	53.9	8	11	13								
30	31.7	58.9	6	7	8								
25	26.7	63.9	14	20	25								
20	21.7	68.9	19	32	40								
15	16.7	73.9	11	16	17								

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Bruinsma, C. M.							
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)						
BORING NO. B3-A (WB)		STATION 394+53		OFFSET 37 ft LT		ALIGNMENT -LREV-							
COLLAR ELEV. 90.6 ft		TOTAL DEPTH 90.4 ft		NORTHING 456,151		EASTING 2,105,178							
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DRILLER Contract Driller		START DATE 02/11/11		COMP. DATE 02/11/11		SURFACE WATER DEPTH 0.9ft							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75				100
15													
10	11.7	78.9	15	24	29								
5	6.7	83.9	9	10	10								
	1.7	88.9	8	11	13								

NCDOT BORE DOUBLE R2303B GEO STRUCTURE1.GPJ NC\_DOT.GDT 6/6/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B3-B (EB)	STATION 394+58	OFFSET 51 ft RT	ALIGNMENT -LREV-
COLLAR ELEV. 90.6 ft	TOTAL DEPTH 90.7 ft	NORTHING 456,064	EASTING 2,105,192
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 02/17/11	COMP. DATE 02/18/11	SURFACE WATER DEPTH 0.6ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			
95													
90	90.6	0.0											WATER SURFACE (02/17/11) GROUND SURFACE 90.6
85	86.4	4.2	1	3	8								ALLUVIAL DARK BROWN, SILT, MODERATELY ORGANIC
80	81.4	9.2	3	5	6								BROWN, SILTY SAND WITH PEA GRAVEL LAYER FROM 6.2 - 8.2 FT
75	76.4	14.2	4	5	7								COASTAL PLAIN DARK GRAY-GREEN, SILTY CLAY WITH SAND LENSES (TAR HEEL FORMATION)
70	71.4	19.2	4	7	8								
65	66.4	24.2	5	8	10								
60	61.4	29.2	5	7	10								
55	56.4	34.2	5	6	9								
50	51.4	39.2	17	25	27								
45	46.4	44.2	10	13	20								
40	41.4	49.2	12	17	16								
35	36.4	54.2	9	14	15								
30	31.4	59.2	6	9	10								
25	26.4	64.2	12	15	22								
20	21.4	69.2	12	20	26								
15	16.4	74.2	16	17	17								

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B3-B (EB)	STATION 394+58	OFFSET 51 ft RT	ALIGNMENT -LREV-
COLLAR ELEV. 90.6 ft	TOTAL DEPTH 90.7 ft	NORTHING 456,064	EASTING 2,105,192
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 02/17/11	COMP. DATE 02/18/11	SURFACE WATER DEPTH 0.6ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			
15													
10	11.4	79.2	8	8	7								Match Line
5	6.4	84.2	7	9	12								GREEN-GRAY, SILTY SAND WITH MICA (continued)
0	1.4	89.2	8	11	18								Boring Terminated at Elevation -0.1 ft IN COASTAL PLAIN, SILTY SAND (CAPE FEAR FORMATION)

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC DOT.GDT 6/6/11



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO. B4-A (WB)		STATION 395+62		OFFSET 8 ft LT		ALIGNMENT -LREV-									
COLLAR ELEV. 90.3 ft		TOTAL DEPTH 91.9 ft		NORTHING 456,133		EASTING 2,105,290									
DRILL RIG/HAMMER EFF/DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 02/14/11		COMP. DATE 02/15/11		SURFACE WATER DEPTH 0.5ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
95															
90	90.3	0.0													
85	84.9	5.4	WOH	WOH	WOH										
80	79.9	10.4													
75	74.9	15.4													
70	69.9	20.4													
65	64.9	25.4													
60	59.9	30.4													
55	54.9	35.4													
50	49.9	40.4													
45	44.9	45.4													
40	39.9	50.4													
35	34.9	55.4													
30	29.9	60.4													
25	24.9	65.4													
20	19.9	70.4													
15															

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO. B4-A (WB)		STATION 395+62		OFFSET 8 ft LT		ALIGNMENT -LREV-									
COLLAR ELEV. 90.3 ft		TOTAL DEPTH 91.9 ft		NORTHING 456,133		EASTING 2,105,290									
DRILL RIG/HAMMER EFF/DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 02/14/11		COMP. DATE 02/15/11		SURFACE WATER DEPTH 0.5ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
15															
10	9.9	80.4													
5	4.9	85.4													
0	-0.1	90.4													

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/6/11

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.								
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)							
BORING NO. B4-B (EB)		STATION 395+52		OFFSET 36 ft RT		ALIGNMENT -LREV-								
COLLAR ELEV. 90.4 ft		TOTAL DEPTH 91.6 ft		NORTHING 456,088		EASTING 2,105,284								
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic								
DRILLER Contract Driller		START DATE 02/17/11		COMP. DATE 02/17/11		SURFACE WATER DEPTH 0.4ft								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
95														
90	90.4	0.0												90.4 WATER SURFACE (02/17/11)
			WOH	WOH	WOH								Sat.	ALLUVIAL DARK BROWN, SILT, MODERATELY ORGANIC
85	85.3	5.1											SS-31	TAN-GRAY, CLAYEY, SANDY SILT WITH WOOD GRAVEL LAYER @ 7.5-8.5 FT
80	80.3	10.1											W	COASTAL PLAIN DARK GRAY-GREEN, SILTY CLAY WITH SAND LENSES (TAR HEEL FORMATION)
75	75.3	15.1											W	
70	70.3	20.1											W	
65	65.3	25.1											M	
60	60.3	30.1											M	
55	55.3	35.1											M	
50	50.3	40.1											M	
45	45.3	45.1											M	
40	40.3	50.1											M	
35	35.3	55.1											M	
30	30.3	60.1											M	
25	25.3	65.1											M	
20	20.3	70.1											M	
15	15.3	75.1											M	

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.								
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)							
BORING NO. B4-B (EB)		STATION 395+52		OFFSET 36 ft RT		ALIGNMENT -LREV-								
COLLAR ELEV. 90.4 ft		TOTAL DEPTH 91.6 ft		NORTHING 456,088		EASTING 2,105,284								
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic								
DRILLER Contract Driller		START DATE 02/17/11		COMP. DATE 02/17/11		SURFACE WATER DEPTH 0.4ft								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
15														
10	10.3	80.1												Match Line
													M	GREEN-GRAY, CLAYEY SAND WITH MICA (continued)
5	5.3	85.1											M	
0	0.3	90.1											M	
													SS-32	
													M	Boring Terminated at Elevation -1.2 ft IN COASTAL PLAIN, CLAYEY SAND (CAPE FEAR FORMATION)

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT.GDT 6/6/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.							
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)						
BORING NO.	STATION	OFFSET	ALIGNMENT			0 HR.	N/A						
B5-A (WB)	396+47	25 ft LT	-LREV-										
COLLAR ELEV.	TOTAL DEPTH	NORTHING	EASTING			24 HR.	N/A						
90.2 ft	91.5 ft	456,158	2,105,373										
DRILL RIG/HAMMER EFF/DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DRILLER Contract Driller		START DATE 02/15/11	COMP. DATE 02/16/11	SURFACE WATER DEPTH 1.4ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			
95													
90	90.2	0.0	WOH	WOH	WOH								90.2
													90.2
85	85.2	5.0											87.2
													87.2
80	80.2	10.0											81.2
													81.2
75	75.2	15.0											72.2
													72.2
70	70.2	20.0											64.8
													64.8
65	65.2	25.0											56.2
													56.2
60	60.2	30.0											42.2
													42.2
55	55.2	35.0											37.7
													37.7
50	50.2	40.0											32.7
													32.7
45	45.2	45.0											27.2
													27.2
40	40.2	50.0											22.2
													22.2
35	35.2	55.0											17.7
													17.7
30	30.2	60.0											
25	25.2	65.0											
20	20.2	70.0											
15	15.2	75.0											

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.							
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)						
BORING NO.	STATION	OFFSET	ALIGNMENT			0 HR.	N/A						
B5-A (WB)	396+47	25 ft LT	-LREV-										
COLLAR ELEV.	TOTAL DEPTH	NORTHING	EASTING			24 HR.	N/A						
90.2 ft	91.5 ft	456,158	2,105,373										
DRILL RIG/HAMMER EFF/DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic							
DRILLER Contract Driller		START DATE 02/15/11	COMP. DATE 02/16/11	SURFACE WATER DEPTH 1.4ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			
15													
10	10.2	80.0											82.5
													82.5
5	5.2	85.0											87.0
													87.0
0	0.2	90.0											91.5
													91.5

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT.GDT 6/6/11

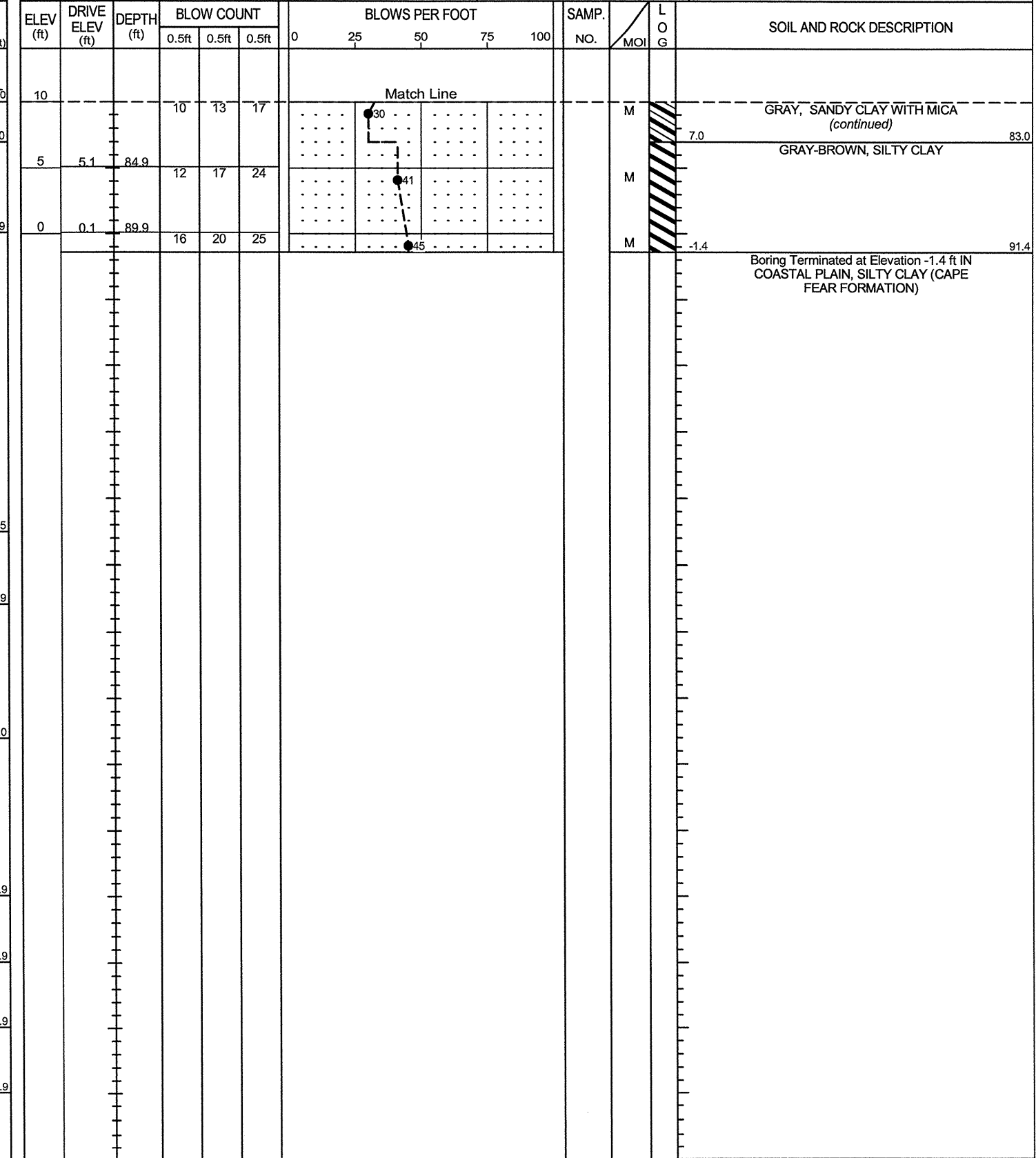
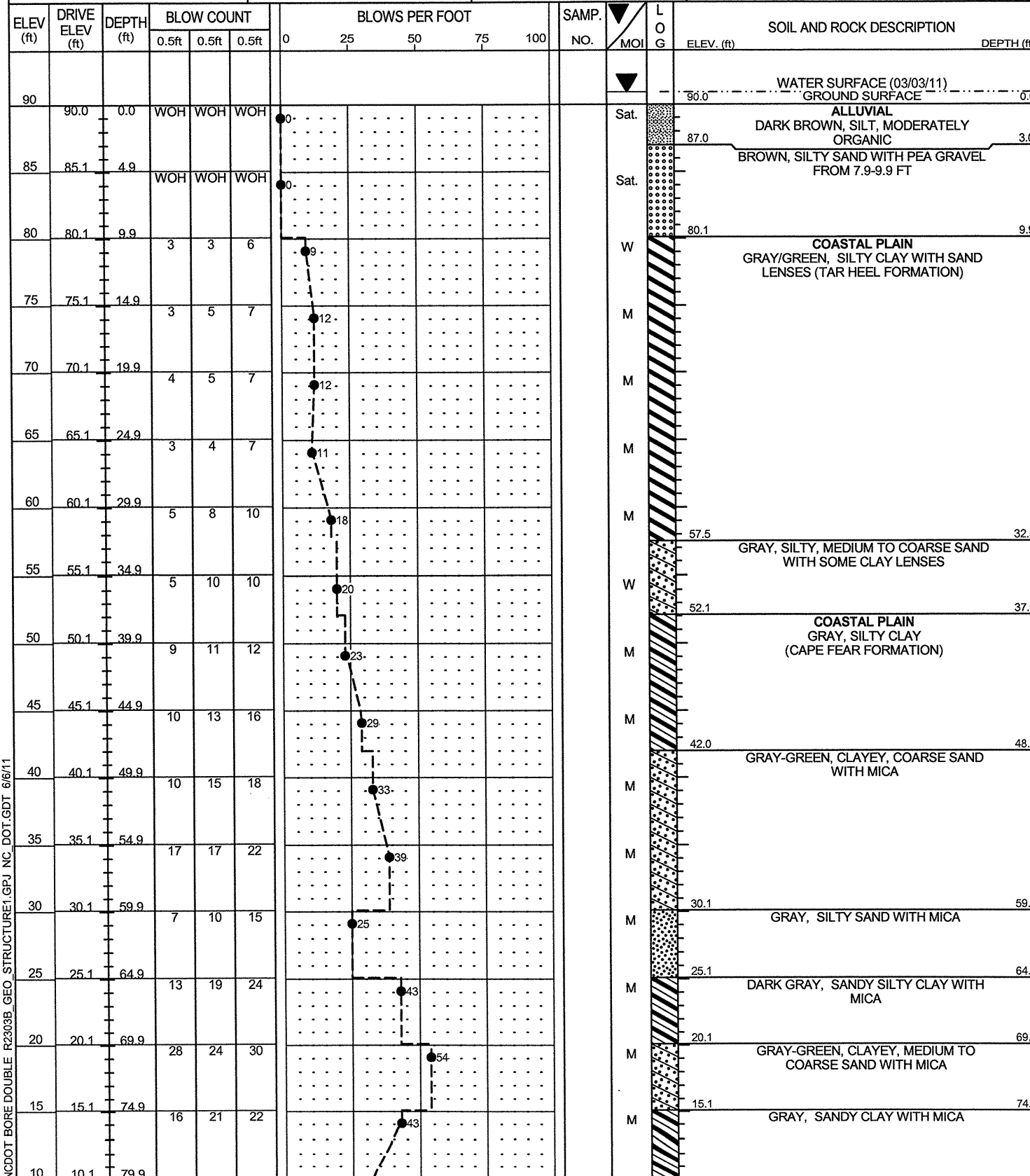


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B5-B (EB)	STATION 396+37	OFFSET 42 ft RT	ALIGNMENT -LREV-
COLLAR ELEV. 90.0 ft	TOTAL DEPTH 91.4 ft	NORTHING 456,091	EASTING 2,105,369
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 03/03/11	COMP. DATE 03/04/11	SURFACE WATER DEPTH 1.0ft

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B5-B (EB)	STATION 396+37	OFFSET 42 ft RT	ALIGNMENT -LREV-
COLLAR ELEV. 90.0 ft	TOTAL DEPTH 91.4 ft	NORTHING 456,091	EASTING 2,105,369
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 03/03/11	COMP. DATE 03/04/11	SURFACE WATER DEPTH 1.0ft



NCDOT BORE DOUBLE R2303B GEO STRUCTURE1.GPJ NC\_DOT.GDT 6/6/11

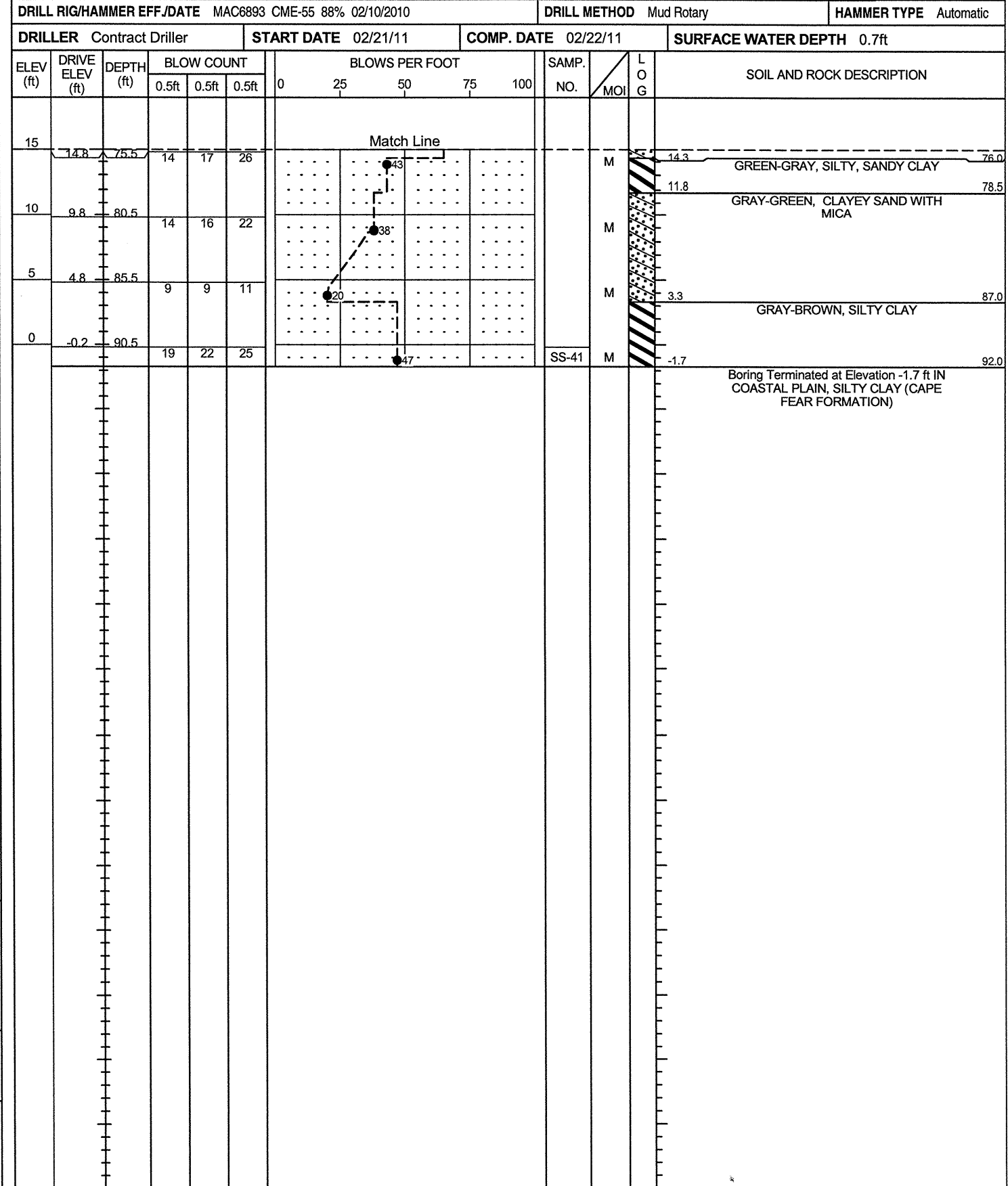
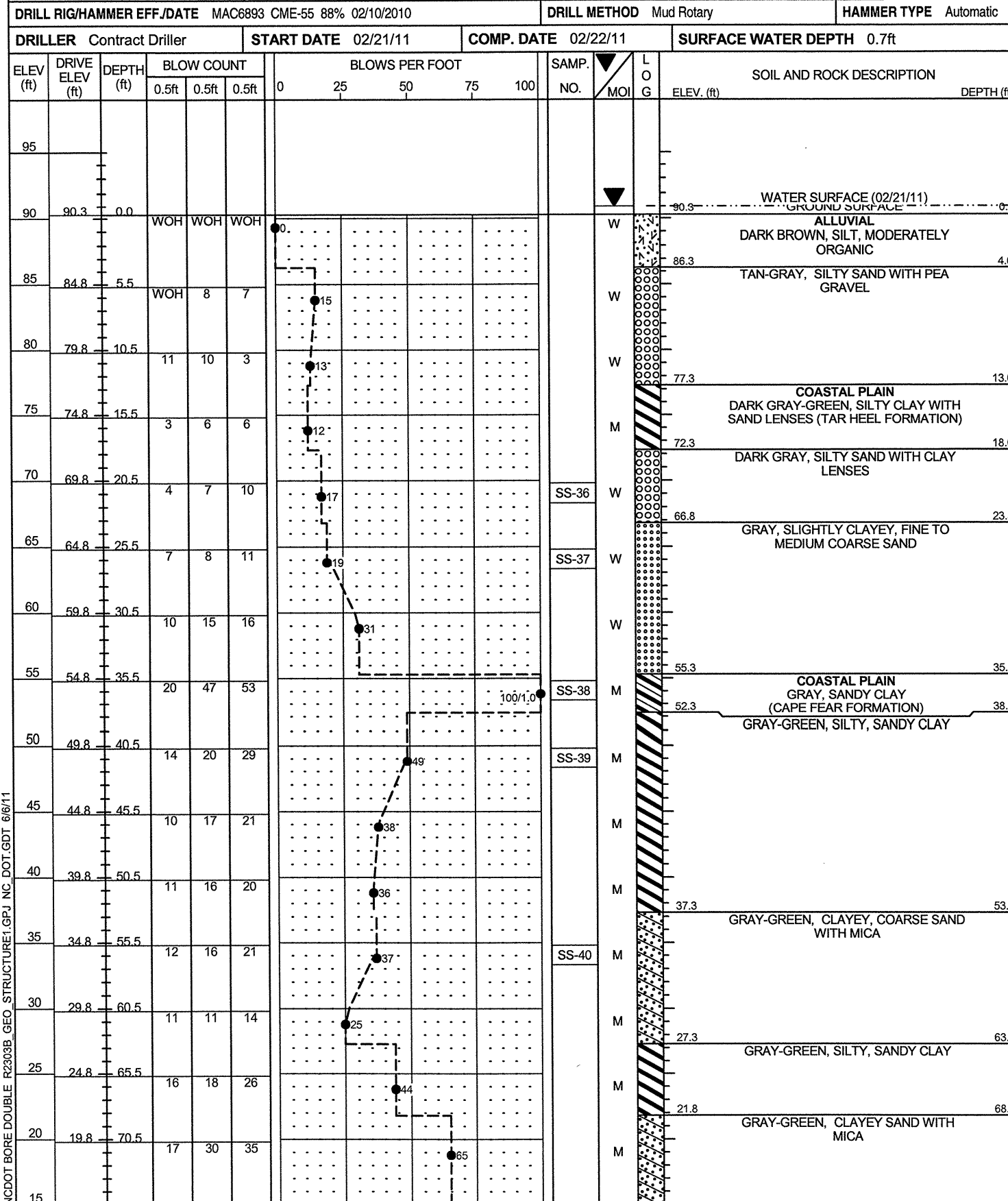


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B6-A (WB)	STATION 397+47	OFFSET 26 ft LT	ALIGNMENT -LREV-
COLLAR ELEV. 90.3 ft	TOTAL DEPTH 92.0 ft	NORTHING 456,169	EASTING 2,105,472
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 02/21/11	COMP. DATE 02/22/11	SURFACE WATER DEPTH 0.7ft

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B6-A (WB)	STATION 397+47	OFFSET 26 ft LT	ALIGNMENT -LREV-
COLLAR ELEV. 90.3 ft	TOTAL DEPTH 92.0 ft	NORTHING 456,169	EASTING 2,105,472
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 02/21/11	COMP. DATE 02/22/11	SURFACE WATER DEPTH 0.7ft



NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/6/11



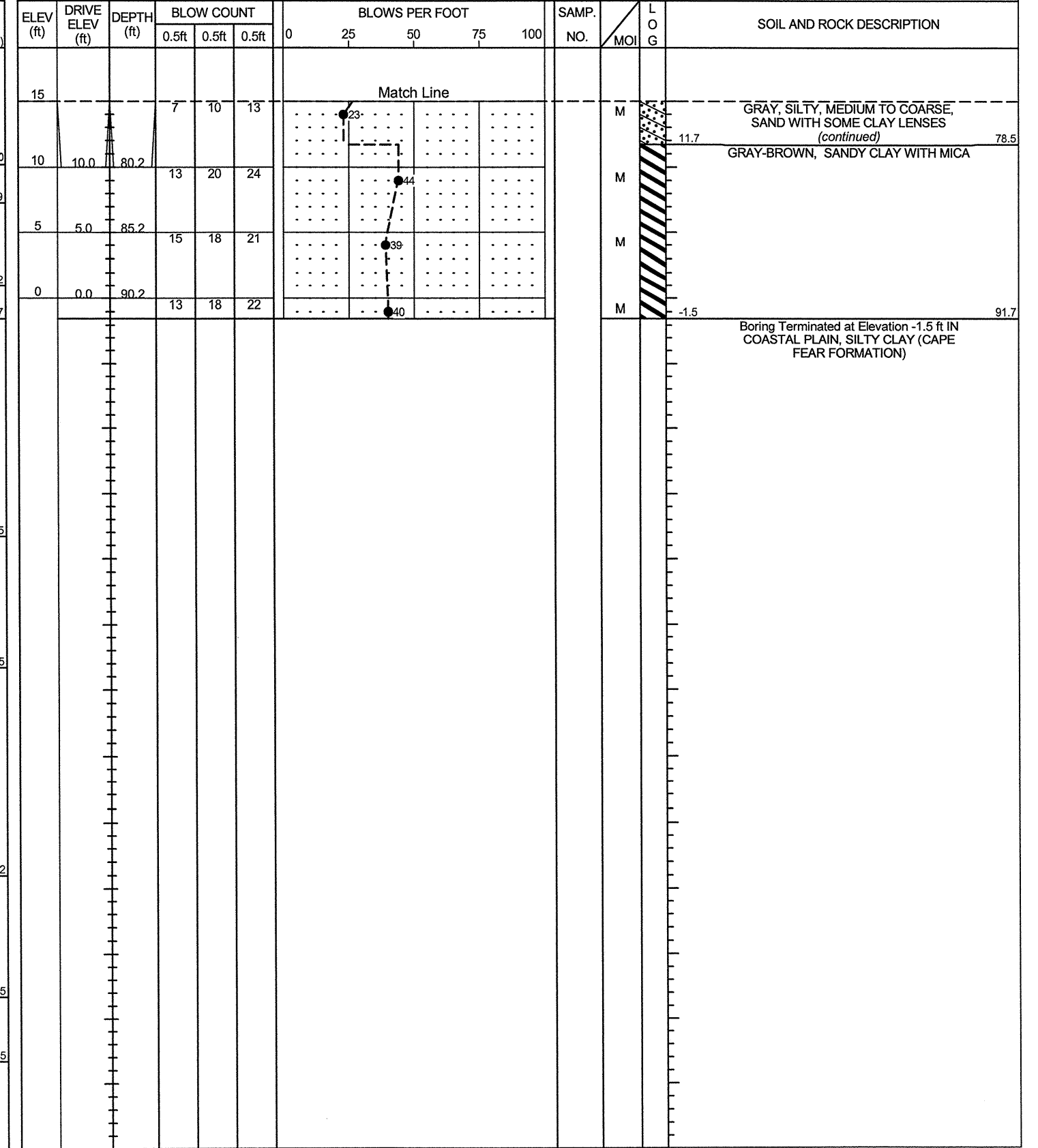
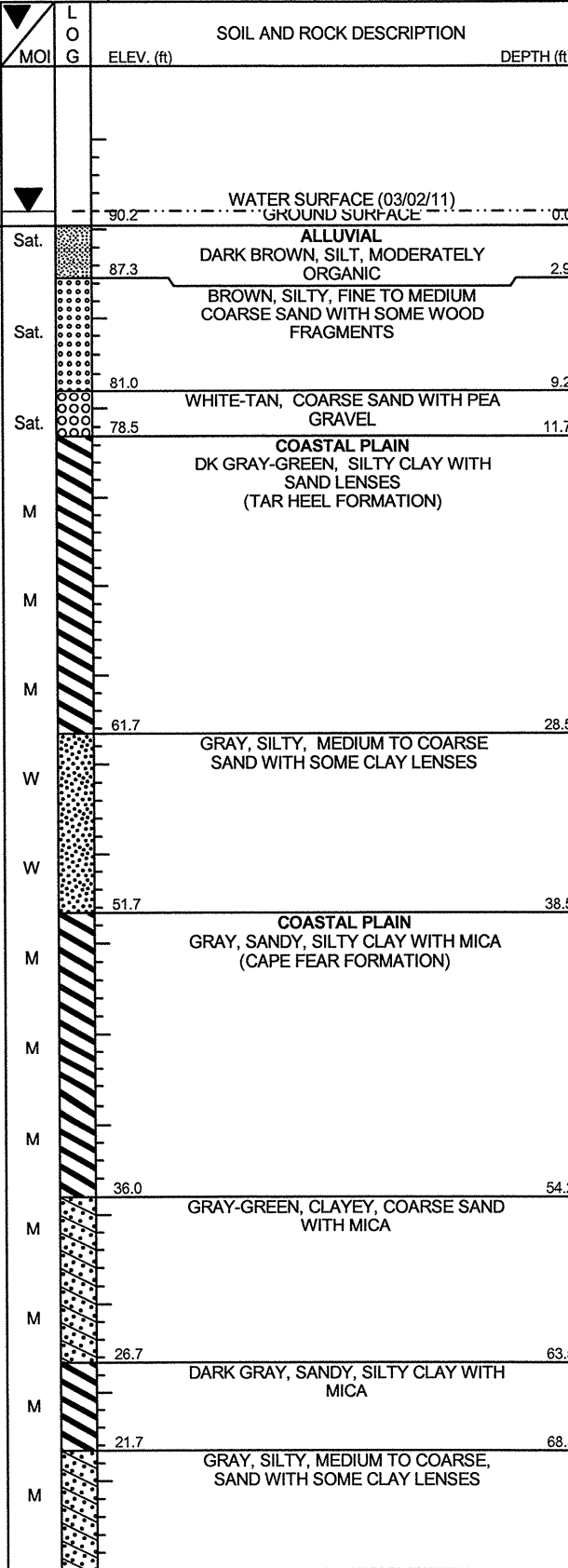
# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO.	STATION	OFFSET	ALIGNMENT			0 HR.	N/A								
B6-B (EB)	397+45	45 ft RT	-LREV-												
COLLAR ELEV.	TOTAL DEPTH	NORTHING	EASTING			24 HR.	N/A								
90.2 ft	91.7 ft	456,098	2,105,477												
DRILL RIG/HAMMER EFF/DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 03/02/11	COMP. DATE 03/03/11	SURFACE WATER DEPTH 0.8ft											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
95															
90	90.2	0.0	WOH	WOH	WOH										
85	85.0	5.2													
80	80.0	10.2													
75	75.0	15.2													
70	70.0	20.2													
65	65.0	25.2													
60	60.0	30.2													
55	55.0	35.2													
50	50.0	40.2													
45	45.0	45.2													
40	40.0	50.2													
35	35.0	55.2													
30	30.0	60.2													
25	25.0	65.2													
20	20.0	70.2													
15	15.0	75.2													

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO.	STATION	OFFSET	ALIGNMENT			0 HR.	N/A								
B6-B (EB)	397+45	45 ft RT	-LREV-												
COLLAR ELEV.	TOTAL DEPTH	NORTHING	EASTING			24 HR.	N/A								
90.2 ft	91.7 ft	456,098	2,105,477												
DRILL RIG/HAMMER EFF/DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 03/02/11	COMP. DATE 03/03/11	SURFACE WATER DEPTH 0.8ft											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
15															
10	10.0	80.2													
5	5.0	85.2													
0	0.0	90.2													

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT.GDT 6/6/11



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO. B7-A (WB)		STATION 398+38		OFFSET 27 ft LT		ALIGNMENT -LREV-									
COLLAR ELEV. 90.5 ft		TOTAL DEPTH 92.4 ft		NORTHING 456,179		EASTING 2,105,562									
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 02/22/11		COMP. DATE 02/22/11		SURFACE WATER DEPTH 0.4ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
95															
90	90.5	0.0	WOH	WOH	WOH							SS-42	Sat.	ALLUVIAL DARK BROWN TO GRAY, SILT, MODERATELY ORGANIC WITH SOME WOOD	
85	84.6	5.9	WOH	WOH	WOH							SS-43	Sat.		
80	79.6	10.9	6	5	5							SS-44	Sat.	WHITE-TAN, SILTY, COARSE SAND WITH PEA GRAVEL	
75	74.6	15.9	2	4	5								W	COASTAL PLAIN DARK-GRAY AND GREEN, SILTY CLAY WITH SAND LENSES (TAR HEEL FORMATION)	
70	69.6	20.9	4	5	7								M		
65	64.6	25.9	3	8	11								W	GRAY, SILTY, FINE TO MEDIUM COARSE SAND	
60	59.6	30.9	9	12	14								M		
55	54.6	35.9	9	12	17							SS-45	M	COASTAL PLAIN GRAY, SANDY CLAY (CAPE FEAR FORMATION)	
50	49.6	40.9	15	23	34								M		
45	44.6	45.9	22	23	31								M	GRAY-GREEN, CLAYEY, COARSE SAND WITH MICA	
40	39.6	50.9	11	15	20								M	GRAY-GREEN, SILTY, SANDY CLAY	
35	34.6	55.9	10	15	17								M		
30	29.6	60.9	8	12	17								M		
25	24.6	65.9	16	17	23								M		
20	19.6	70.9	13	18	28								M	GRAY-GREEN, CLAYEY SAND WITH MICA	
15															

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.								
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)							
BORING NO. B7-A (WB)		STATION 398+38		OFFSET 27 ft LT		ALIGNMENT -LREV-								
COLLAR ELEV. 90.5 ft		TOTAL DEPTH 92.4 ft		NORTHING 456,179		EASTING 2,105,562								
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DRILLER Contract Driller		START DATE 02/22/11		COMP. DATE 02/22/11		SURFACE WATER DEPTH 0.4ft								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
15														
10	9.6	80.9	11	18	21								M	GRAY-GREEN, SANDY CLAY WITH MICA (continued)
5	4.6	85.9	9	12	16								M	GRAY-GREEN, CLAYEY SAND WITH MICA
0	-0.4	90.9	16	22	33								M	GRAY-BROWN, SILTY CLAY
														Boring Terminated at Elevation -1.9 ft IN COASTAL PLAIN, SILTY CLAY (CAPE FEAR FORMATION)

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT.GDT 6/6/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.								
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)							
BORING NO. B7-B (EB)		STATION 398+41		OFFSET 50 ft RT		ALIGNMENT -LREV-								
COLLAR ELEV. 89.6 ft		TOTAL DEPTH 91.9 ft		NORTHING 456,103		EASTING 2,105,573								
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DRILLER Contract Driller		START DATE 03/01/11		COMP. DATE 03/02/11		SURFACE WATER DEPTH 1.1ft								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
90	89.6	0.0	WOH	WOH	WOH									WATER SURFACE (03/01/11) GROUND SURFACE
85	84.2	5.4	1	2	2							Sat.		ALLUVIAL DARK BROWN, SILT, MODERATELY ORGANIC
80	79.2	10.4	5	6	4							Sat.		BROWN, SILTY, FINE TO MEDIUM COARSE SAND
75	74.2	15.4	4	5	6							Sat.		WHITE-TAN, SILTY, COARSE SAND WITH PEA GRAVEL
70	69.2	20.4	3	5	7							M		COASTAL PLAIN DARK GRAY-GREEN, SILTY CLAY WITH SAND LENSES (TAR HEEL FORMATION)
65	64.2	25.4	4	5	8							M		
60	59.2	30.4	4	6	7							M		
55	54.2	35.4	3	12	13							W		GRAY, SILTY, FINE TO MEDIUM COARSE SAND
50	49.2	40.4	9	10	15							M		COASTAL PLAIN GRAY, SILTY CLAY (CAPE FEAR FORMATION)
45	44.2	45.4	8	9	13							M		
40	39.2	50.4	16	22	29							M		GRAY, CLAYEY SAND
35	34.2	55.4	12	16	22							M		
30	29.2	60.4	10	12	16							M		GRAY, SANDY, SILTY CLAY WITH MICA
25	24.2	65.4	14	17	21							M		
20	19.2	70.4	13	18	23							M		GRAY, CLAYEY SAND WITH MICA
15	14.2	75.4	10	11	10							M		
10														

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.								
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)							
BORING NO. B7-B (EB)		STATION 398+41		OFFSET 50 ft RT		ALIGNMENT -LREV-								
COLLAR ELEV. 89.6 ft		TOTAL DEPTH 91.9 ft		NORTHING 456,103		EASTING 2,105,573								
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic								
DRILLER Contract Driller		START DATE 03/01/11		COMP. DATE 03/02/11		SURFACE WATER DEPTH 1.1ft								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
10	9.2	80.4	9	13	14									Match Line
5	4.2	85.4	9	12	13							M		GRAY, CLAYEY SAND WITH MICA (continued)
0	-0.8	90.4	15	21	24							M		GRAY-BROWN, SILTY CLAY
												M		Boring Terminated at Elevation -2.3 ft IN COASTAL PLAIN, SILTY CLAY (CAPE FEAR FORMATION)

NCDOT BORE DOUBLE R2303B GEO\_STRUCTURE1.GPJ NC\_DOT.GDT 6/6/11





# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER								GROUND WTR (ft)							
BORING NO. B8-A (WB)		STATION 399+31		OFFSET 44 ft LT		ALIGNMENT -LREV-		0 HR. N/A							
COLLAR ELEV. 90.4 ft		TOTAL DEPTH 92.2 ft		NORTHING 456,205		EASTING 2,105,653		24 HR. N/A							
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 02/23/11		COMP. DATE 02/23/11		SURFACE WATER DEPTH 0.5ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
95															
90	90.4	0.0	WOH	WOH	WOH										
85	84.7	5.7	WOH	WOH	WOH										
80	79.7	10.7	2	3	3										
75	74.7	15.7	4	6	7										
70	69.7	20.7	4	6	9										
65	64.7	25.7	5	6	8										
60	59.7	30.7	4	4	7										
55	54.7	35.7	6	7	10										
50	49.7	40.7	16	30	54										
45	44.7	45.7	11	16	30										
40	39.7	50.7	15	20	25										
35	34.7	55.7	9	11	16										
30	29.7	60.7	13	15	19										
25	24.7	65.7	12	15	20										
20	19.7	70.7	15	13	19										
15															

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER								GROUND WTR (ft)							
BORING NO. B8-A (WB)		STATION 399+31		OFFSET 44 ft LT		ALIGNMENT -LREV-		0 HR. N/A							
COLLAR ELEV. 90.4 ft		TOTAL DEPTH 92.2 ft		NORTHING 456,205		EASTING 2,105,653		24 HR. N/A							
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 02/23/11		COMP. DATE 02/23/11		SURFACE WATER DEPTH 0.5ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
15															
10	9.7	80.7	14	14	17										
5	4.7	85.7	9	10	19										
0	-0.3	90.7	15	19	21										

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC DOT.GDT 6/6/11

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO. B8-B (EB)		STATION 399+39		OFFSET 43 ft RT		ALIGNMENT -LREV-									
COLLAR ELEV. 90.2 ft		TOTAL DEPTH 91.7 ft		NORTHING 456,119		EASTING 2,105,670									
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 03/01/11		COMP. DATE 03/01/11		SURFACE WATER DEPTH 0.6ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
95															
90	90.2	0.0													
85	85.0	5.2	WOH	WOH	WOH										
80	80.0	10.2													
75	75.0	15.2	2	2	1										
70	70.0	20.2	3	4	4										
65	65.0	25.2	4	5	8										
60	60.0	30.2	4	6	11										
55	55.0	35.2	5	6	9										
50	50.0	40.2	9	10	14										
45	45.0	45.2	10	12	15										
40	40.0	50.2	7	10	15										
35	35.0	55.2	11	13	16										
30	30.0	60.2	11	13	17										
25	25.0	65.2	10	12	19										
20	20.0	70.2	11	13	17										
15	15.0	75.2	17	15	15										

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO. B8-B (EB)		STATION 399+39		OFFSET 43 ft RT		ALIGNMENT -LREV-									
COLLAR ELEV. 90.2 ft		TOTAL DEPTH 91.7 ft		NORTHING 456,119		EASTING 2,105,670									
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 03/01/11		COMP. DATE 03/01/11		SURFACE WATER DEPTH 0.6ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
15															
10	10.0	80.2	11	9	16										
5	5.0	85.2	13	16	16										
0	0.0	90.2	11	15	16										
			13	16	26										

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC DOT.GDT 6/6/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO. B9-A (WB)		STATION 399+99		OFFSET 47 ft LT		ALIGNMENT -LREV-									
COLLAR ELEV. 90.4 ft		TOTAL DEPTH 92.6 ft		NORTHING 456,215		EASTING 2,105,721									
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 02/23/11		COMP. DATE 02/24/11		SURFACE WATER DEPTH 0.7ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
95															
90	90.4	0.0													
85	84.3	6.1	2	1	1										
80	79.3	11.1													
75	74.3	16.1	5	2	4										
70	69.3	21.1	5	6	8										
65	64.3	26.1	4	5	7										
60	59.3	31.1	4	6	9										
55	54.3	36.1	4	6	12										
50	49.3	41.1	10	14	22										
45	44.3	46.1	9	53	30										
40	39.3	51.1	14	17	21										
35	34.3	56.1	6	8	9										
30	29.3	61.1	10	12	16										
25	24.3	66.1	11	15	17										
20	19.3	71.1	12	15	17										
15															

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO. B9-A (WB)		STATION 399+99		OFFSET 47 ft LT		ALIGNMENT -LREV-									
COLLAR ELEV. 90.4 ft		TOTAL DEPTH 92.6 ft		NORTHING 456,215		EASTING 2,105,721									
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 02/23/11		COMP. DATE 02/24/11		SURFACE WATER DEPTH 0.7ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
15															
10	9.3	81.1	8	8	10										
5	4.3	86.1	6	14	17										
0	-0.7	91.1	16	20	27										

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/9/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

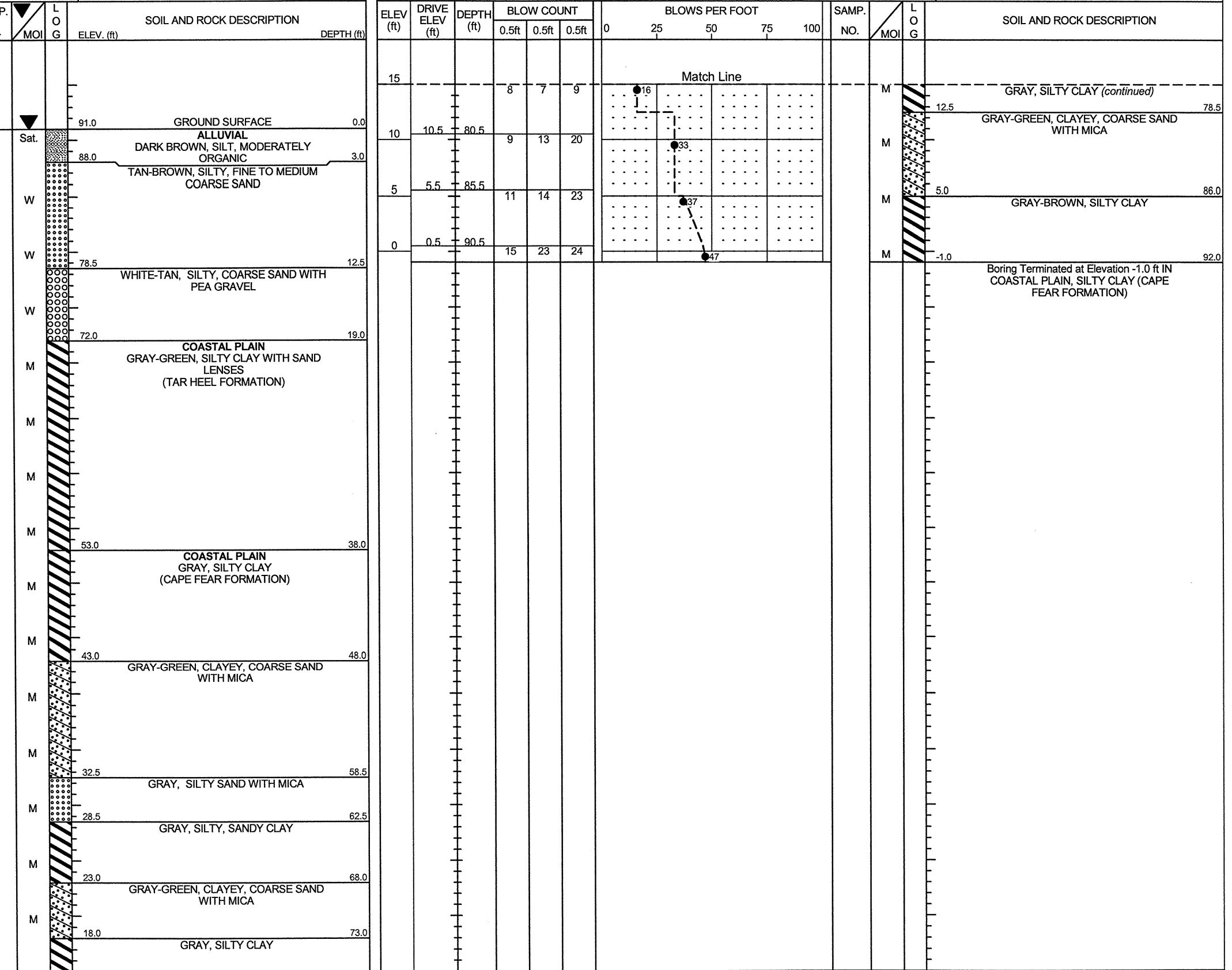
WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B9-B (EB)	STATION 400+24	OFFSET 44 ft RT	ALIGNMENT -LREV-
COLLAR ELEV. 91.0 ft			TOTAL DEPTH 92.0 ft
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010			DRILL METHOD Mud Rotary
DRILLER Contract Driller			START DATE 02/28/11
COMP. DATE 03/01/11			HAMMER TYPE Automatic
SURFACE WATER DEPTH N/A			

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Milkovits, J. I.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B9-B (EB)	STATION 400+24	OFFSET 44 ft RT	ALIGNMENT -LREV-
COLLAR ELEV. 91.0 ft			TOTAL DEPTH 92.0 ft
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010			DRILL METHOD Mud Rotary
DRILLER Contract Driller			START DATE 02/28/11
COMP. DATE 03/01/11			HAMMER TYPE Automatic
SURFACE WATER DEPTH N/A			

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
95															
91.0	91.0	0.0		WOH	WOH										
85	85.5	5.5		WOH	1	2									
80	80.5	10.5	2		1	2									
75	75.5	15.5	3		4	8									
70	70.5	20.5	3		3	5									
65	65.5	25.5	4		5	8									
60	60.5	30.5	5		9	12									
55	55.5	35.5	4		7	9									
50	50.5	40.5	8		13	16									
45	45.5	45.5	8		10	14									
40	40.5	50.5	10		12	18									
35	35.5	55.5	9		12	16									
30	30.5	60.5	7		8	8									
25	25.5	65.5	12		15	21									
20	20.5	70.5	11		15	20									
15	15.5	75.5													

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
15															
10	10.5	80.5	8	7	9										
5	5.5	85.5	11	14	23										
0	0.5	90.5	15	23	24										

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/6/11





# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO. B10-A (WB)		STATION 400+67		OFFSET 23 ft LT		ALIGNMENT -LREV-									
COLLAR ELEV. 90.3 ft		TOTAL DEPTH 91.6 ft		NORTHING 456,198		EASTING 2,105,791									
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 02/24/11		COMP. DATE 02/25/11		SURFACE WATER DEPTH 0.5ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
95															
90	90.3	0.0	WOH	WOH	WOH										
85	85.2	5.1	1	2	2										
80	80.2	10.1	WOH	3	4										
75	75.2	15.1	2	3	6										
70	70.2	20.1	4	6	7										
65	65.2	25.1	3	5	7										
60	60.2	30.1	3	4	8										
55	55.2	35.1	3	5	6										
50	50.2	40.1	9	12	15										
45	45.2	45.1	6	10	14										
40	40.2	50.1	14	15	18										
35	35.2	55.1	7	8	9										
30	30.2	60.1	10	10	15										
25	25.2	65.1	13	16	20										
20	20.2	70.1	9	16	17										
15	15.2	75.1													

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Milkovits, J. I.									
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)								
BORING NO. B10-A (WB)		STATION 400+67		OFFSET 23 ft LT		ALIGNMENT -LREV-									
COLLAR ELEV. 90.3 ft		TOTAL DEPTH 91.6 ft		NORTHING 456,198		EASTING 2,105,791									
DRILL RIG/HAMMER EFF./DATE MAC6893 CME-55 88% 02/10/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic									
DRILLER Contract Driller		START DATE 02/24/11		COMP. DATE 02/25/11		SURFACE WATER DEPTH 0.5ft									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
15															
10	10.2	80.1	12	15	20										
5	5.2	85.1	12	17	20										
0	0.2	90.1	14	20	27										

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC DOT.GDT 6/6/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Oti, O. B.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B10-B (EB)	STATION 401+27	OFFSET 35 ft RT	ALIGNMENT -LREV- 0 HR. N/A
COLLAR ELEV. 92.0 ft	TOTAL DEPTH 89.5 ft	NORTHING 456,146	EASTING 2,105,856 24 HR. 0.0

DRILL RIG/HAMMER EFF/DATE RFO0067 CME-550X 77% 03/15/2010	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Dixon, D. W.	START DATE 03/22/11	COMP. DATE 03/24/11
SURFACE WATER DEPTH N/A		

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
95														GROUND SURFACE	0.0
90	89.0	3.0	WOH	WOH	WOH									ALLUVIAL LIGHT GRAY, SANDY, CLAYEY SILT, MODERATELY ORGANIC	
85	84.0	8.0	1	1	1										
80	79.0	13.0	1	5	8									TAN-GRAY, COARSE SAND WITH GRAVEL	13.0
75	74.0	18.0	3	6	8									COASTAL PLAIN GREEN-GRAY, SILTY CLAY WITH SAND LENSES (TAR HEEL FORMATION)	15.0
70	69.0	23.0	3	4	6										
65	64.0	28.0	2	6	6										
60	59.0	33.0	2	7	11									DARK GRAY, SANDY CLAY	32.0
55	54.0	38.0	6	11	14									COASTAL PLAIN GRAY, SANDY CLAY (CAPE FEAR FORMATION)	38.0
50	49.0	43.0	6	11	13										
45	44.0	48.0	8	14	17									TAN-GRAY, CLAYEY, SILTY SAND	46.0
40	39.0	53.0	11	17	20										
35	34.0	58.0	10	22	21										
30	29.0	63.0	9	12	16									GRAY TO GREEN, SANDY CLAY	62.0
25	24.0	68.0	8	12	20										
20	19.0	73.0	6	14	22										

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Oti, O. B.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B10-B (EB)	STATION 401+27	OFFSET 35 ft RT	ALIGNMENT -LREV- 0 HR. N/A
COLLAR ELEV. 92.0 ft	TOTAL DEPTH 89.5 ft	NORTHING 456,146	EASTING 2,105,856 24 HR. 0.0

DRILL RIG/HAMMER EFF/DATE RFO0067 CME-550X 77% 03/15/2010	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Dixon, D. W.	START DATE 03/22/11	COMP. DATE 03/24/11
SURFACE WATER DEPTH N/A		

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
15															
	14.0	78.0	9	19	23									GRAY TO GREEN, SANDY CLAY (continued)	
	9.0	83.0	12	15	26										
	4.0	88.0	11	21	24										
														Boring Terminated at Elevation 2.5 ft IN COASTAL PLAIN, SANDY CLAY (CAPE FEAR FORMATION)	89.5

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/6/11

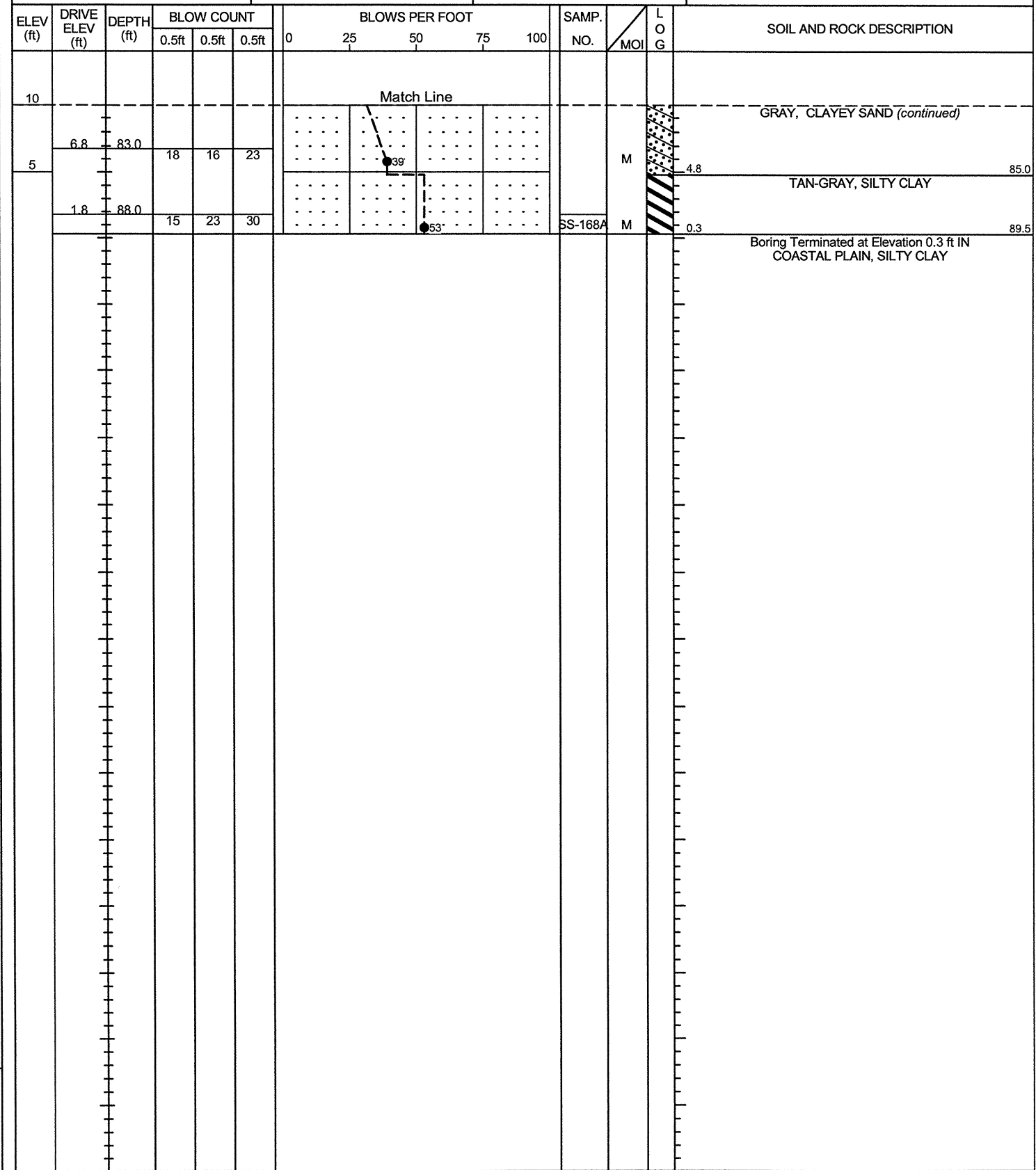
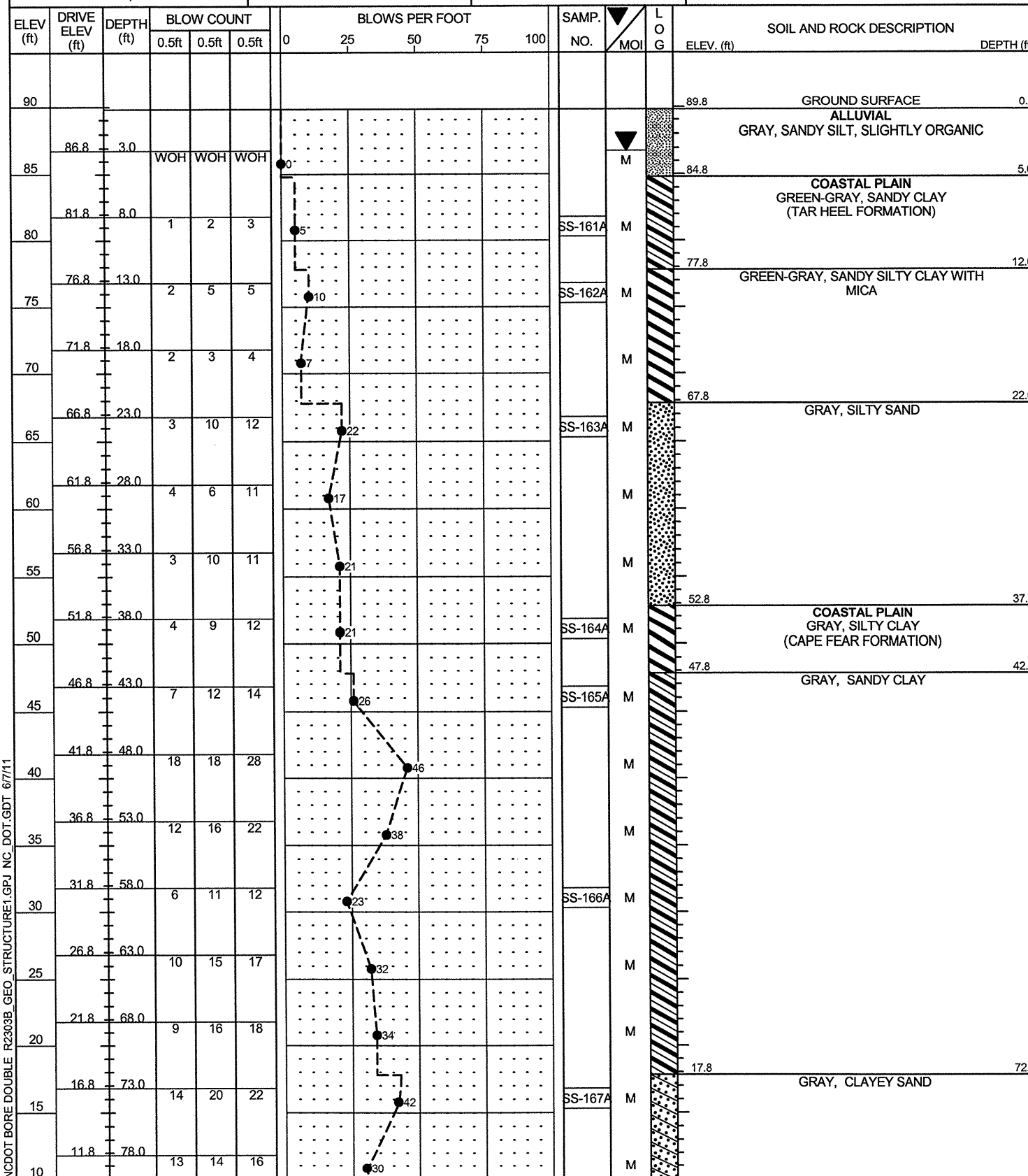


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Oti, O. B.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B11-A (WB)	STATION 401+68	OFFSET 35 ft LT	ALIGNMENT -LREV- 0 HR. N/A
COLLAR ELEV. 89.8 ft	TOTAL DEPTH 89.5 ft	NORTHING 456,219	EASTING 2,105,890 24 HR. 3.0
DRILL RIG/HAMMER EFF/DATE RFO0067 CME-550X 77% 03/15/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Dixon, D. W.	START DATE 03/14/11	COMP. DATE 03/16/11	SURFACE WATER DEPTH N/A

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Oti, O. B.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B11-A (WB)	STATION 401+68	OFFSET 35 ft LT	ALIGNMENT -LREV- 0 HR. N/A
COLLAR ELEV. 89.8 ft	TOTAL DEPTH 89.5 ft	NORTHING 456,219	EASTING 2,105,890 24 HR. 3.0
DRILL RIG/HAMMER EFF/DATE RFO0067 CME-550X 77% 03/15/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Dixon, D. W.	START DATE 03/14/11	COMP. DATE 03/16/11	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/7/11

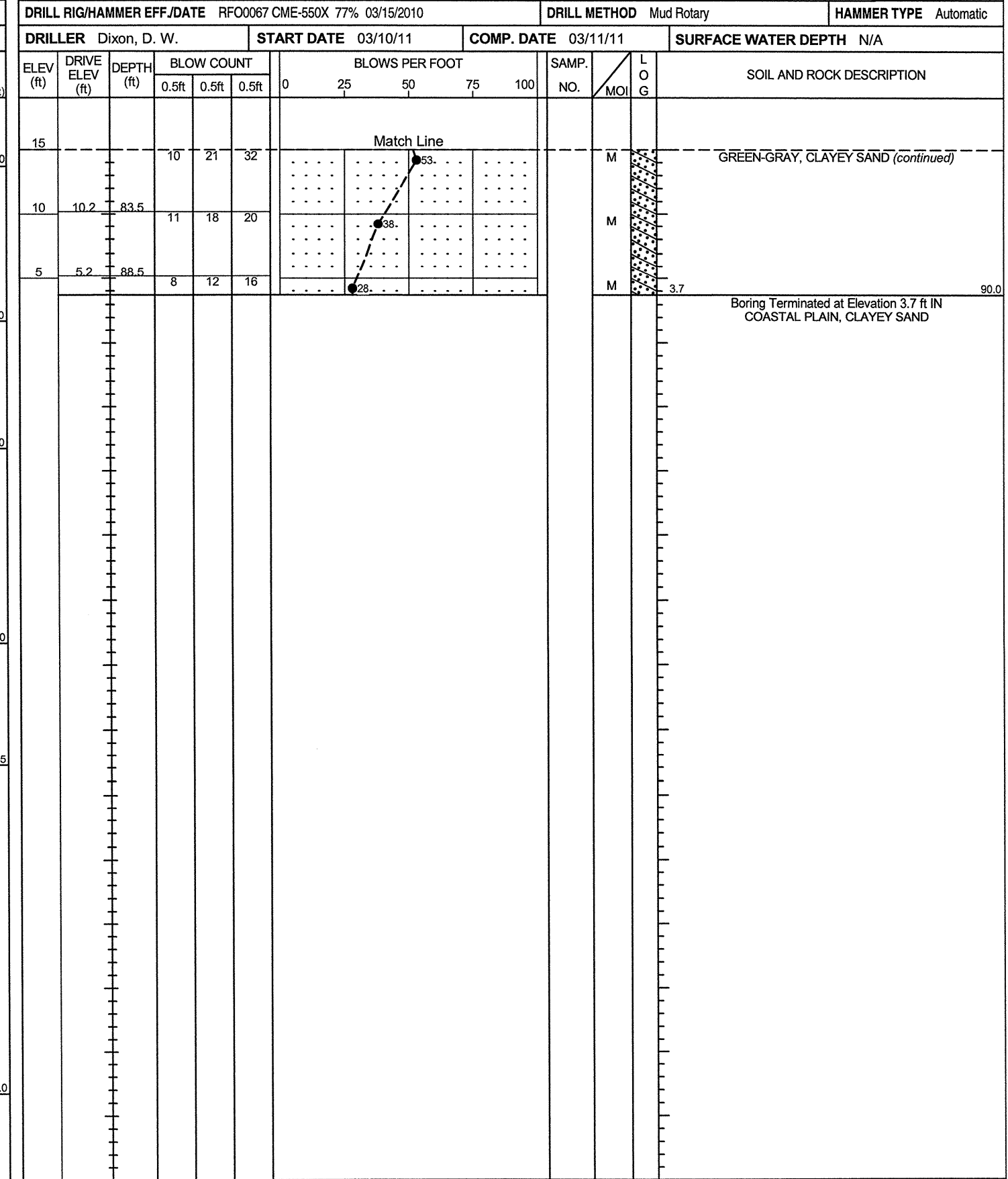
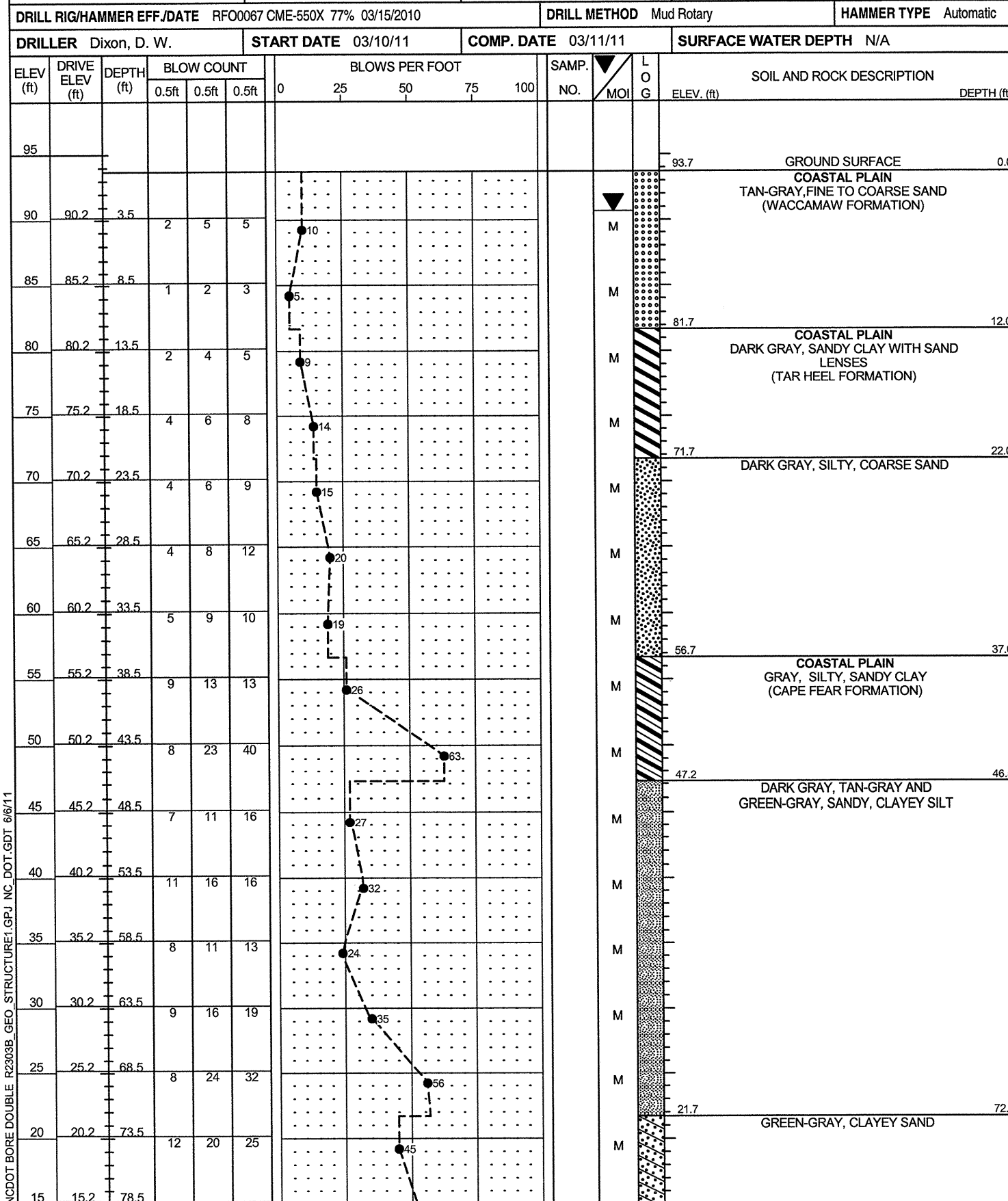


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Oti, O. B.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B11-B (EB)	STATION 402+11	OFFSET 35 ft RT	ALIGNMENT -LREV-
COLLAR ELEV. 93.7 ft	TOTAL DEPTH 90.0 ft	NORTHING 456,154	EASTING 2,105,940
DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 77% 03/15/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Dixon, D. W.	START DATE 03/10/11	COMP. DATE 03/11/11	SURFACE WATER DEPTH N/A

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Oti, O. B.
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. B11-B (EB)	STATION 402+11	OFFSET 35 ft RT	ALIGNMENT -LREV-
COLLAR ELEV. 93.7 ft	TOTAL DEPTH 90.0 ft	NORTHING 456,154	EASTING 2,105,940
DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 77% 03/15/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Dixon, D. W.	START DATE 03/10/11	COMP. DATE 03/11/11	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/6/11





# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Oti, O. B.										
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)									
BORING NO. B12-A (WB)		STATION 402+52		OFFSET 35 ft LT		ALIGNMENT -LREV-										
COLLAR ELEV. 96.7 ft		TOTAL DEPTH 90.0 ft		NORTHING 456,228		EASTING 2,105,974										
DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 77% 03/15/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Dixon, D. W.		START DATE 03/02/11		COMP. DATE 03/03/11		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
100																
95	93.2	3.5	2	3	3											96.7
90	88.2	8.5	2	3	5											89.7
85	83.2	13.5	4	4	5											75.2
80	78.2	18.5	3	5	5											54.7
75	73.2	23.5	3	5	6											49.7
70	68.2	28.5	4	7	9											44.7
65	63.2	33.5	4	7	10											42.0
60	58.2	38.5	4	10	13											47.0
55	53.2	43.5	6	9	11											52.0
50	48.2	48.5	13	20	17											
45	43.2	53.5	6	10	15											
40	38.2	58.5	11	18	22											
35	33.2	63.5	8	16	20											
30	28.2	68.5	10	16	17											
25	23.2	73.5	13	26	26											
20																

WBS 34416.1.1		TIP R-2303B		COUNTY CUMBERLAND/SAMPSON		GEOLOGIST Oti, O. B.										
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)									
BORING NO. B12-A (WB)		STATION 402+52		OFFSET 35 ft LT		ALIGNMENT -LREV-										
COLLAR ELEV. 96.7 ft		TOTAL DEPTH 90.0 ft		NORTHING 456,228		EASTING 2,105,974										
DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 77% 03/15/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Dixon, D. W.		START DATE 03/02/11		COMP. DATE 03/03/11		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
20																
15	18.2	78.5	10	13	18											19.7
10	13.2	83.5	8	10	12											77.0
	8.2	88.5	12	21	25											9.7
																87.0
																6.7
																90.0

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/6/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS		TIP		COUNTY		GEOLOGIST										
34416.1.1		R-2303B		CUMBERLAND/SAMPSON		Oti, O. B.										
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)									
							0 HR. N/A									
BORING NO. B12-B (EB)	STATION 402+95	OFFSET 35 ft RT	ALIGNMENT -LREV-													
COLLAR ELEV. 98.4 ft							24 HR. 5.5									
DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 77% 03/15/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Dixon, D. W.		START DATE 03/08/11		COMP. DATE 03/08/11		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
100																
															98.4	0.0
															GROUND SURFACE	
															COASTAL PLAIN TAN-BROWN, FINE TO COARSE SAND (WACCAMAW FORMATION)	
95	94.9	3.5	2	3	4	7					SS-153A	M				
90	89.9	8.5	6	5	5	10						M				
85	84.9	13.5	6	4	4	8					SS-154A	M			84.4	14.0
80	79.9	18.5	3	5	5	10						M			COASTAL PLAIN DARK GRAY, SILTY CLAY WITH SAND LENSES (TAR HEEL FORMATION)	
75	74.9	23.5	3	6	8	14						M				
70	69.9	28.5	4	6	11	17					SS-155A	M			71.4	27.0
65	64.9	33.5	5	13	14	27						M				
60	59.9	38.5	7	9	13	22						M			66.4	32.0
55	54.9	43.5	7	12	17	29						M				
50	49.9	48.5	10	18	21	39						M			56.4	42.0
45	44.9	53.5	9	12	19	31						M				
40	39.9	58.5	8	19	21	40						M			41.4	57.0
35	34.9	63.5	5	12	13	25						M				
30	29.9	68.5	8	14	24	38						M				
25	24.9	73.5	10	13	22	35						M				
20											SS-159A	M				

WBS		TIP		COUNTY		GEOLOGIST										
34416.1.1		R-2303B		CUMBERLAND/SAMPSON		Oti, O. B.										
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER							GROUND WTR (ft)									
							0 HR. N/A									
BORING NO. B12-B (EB)	STATION 402+95	OFFSET 35 ft RT	ALIGNMENT -LREV-													
COLLAR ELEV. 98.4 ft							24 HR. 5.5									
DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 77% 03/15/2010				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Dixon, D. W.		START DATE 03/08/11		COMP. DATE 03/08/11		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
20	19.9	78.5	10	14	17	31										
15	14.9	83.5	11	12	14	26									16.4	82.0
10	9.9	88.5	13	16	18	34									8.4	90.0

Match Line

Boring Terminated at Elevation 8.4 ft IN COASTAL PLAIN, CLAYEY SAND

NCDOT BORE DOUBLE R2303B GEO STRUCTURE1.GPJ NC\_DOT.GDT 6/9/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Oti, O. B.																
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)																
BORING NO. ALT B12-A (WB)	STATION 403+36	OFFSET 36 ft LT	ALIGNMENT -LREV-																
COLLAR ELEV. 98.1 ft	TOTAL DEPTH 90.0 ft	NORTHING 456,237	EASTING 2,106,057																
DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 77% 03/15/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic																
DRILLER Dixon, D. W.	START DATE 03/01/11	COMP. DATE 03/01/11	SURFACE WATER DEPTH N/A																
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION						
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)	DEPTH (ft)			
100																98.1	0.0	GROUND SURFACE	
95	94.6	3.5	2	2	3						SS-140A	M						COASTAL PLAIN TAN-BROWN, SAND WITH GRAVEL (WACCAMAW FORMATION)	
90	89.6	8.5	4	7	5							M							
85	84.6	13.5	2	7	8						SS-141A	M							
80	79.6	18.5	2	5	8						SS-142A	M					81.1	17.0	COASTAL PLAIN DARK GREEN-GRAY, SILTY SAND WITH MICA (TAR HEEL FORMATION)
75	74.6	23.5	5	8	9						SS-143A	M							DARK GRAY, COARSE SAND WITH INTERBEDDED CLAY
70	69.6	28.5	3	7	9							M							
65	64.6	33.5	5	10	13						SS-144A	M					66.1	32.0	DARK GRAY, SILTY, COARSE SAND WITH INTERBEDDED CLAY
60	59.6	38.5	7	13	16							M							
55	54.6	43.5	4	9	9						SS-145A	M					56.1	42.0	COASTAL PLAIN GRAY, SANDY, SILTY CLAY (CAPE FEAR FORMATION)
50	49.6	48.5	8	14	21							M							
45	44.6	53.5	8	13	18						SS-146A	M					46.1	52.0	GREEN-GRAY TO GRAY-BROWN, SANDY CLAY
40	39.6	58.5	11	20	27							M							
35	34.6	63.5	8	15	18						SS-147A	M							
30	29.6	68.5	10	16	22							M							
25	24.6	73.5	8	14	16						SS-148A	M							
20																	20.1	78.0	

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Oti, O. B.																
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)																
BORING NO. ALT B12-A (WB)	STATION 403+36	OFFSET 36 ft LT	ALIGNMENT -LREV-																
COLLAR ELEV. 98.1 ft	TOTAL DEPTH 90.0 ft	NORTHING 456,237	EASTING 2,106,057																
DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 77% 03/15/2010		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic																
DRILLER Dixon, D. W.	START DATE 03/01/11	COMP. DATE 03/01/11	SURFACE WATER DEPTH N/A																
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION						
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)	DEPTH (ft)			
20	19.6	78.5	10	17	28														
15	14.6	83.5	10	14	13						SS-149A	M							
10	9.6	88.5	11	16	17							M							
												M					8.1	90.0	Boring Terminated at Elevation 8.1 ft IN COASTAL PLAIN, CLAYEY SAND

NCDOT BORE DOUBLE R2303B GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/6/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Bradley, N
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. EB2-A	STATION 404+24	OFFSET 86 ft LT	ALIGNMENT -LREV- 0 HR. 4.5
COLLAR ELEV. 95.9 ft	TOTAL DEPTH 60.0 ft	NORTHING 456,295	EASTING 2,106,140 24 HR. 3.3
DRILL RIG/HAMMER EFF/DATE SME R-7 CME-750 88% 00/00/0000		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 12/15/08	COMP. DATE 12/15/08	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
100														GROUND SURFACE	0.0
95	95.9	0.0	1	2	2						SS-132	M		COASTAL PLAIN GRAY, FINE TO COARSE SAND (WACCAMAW FORMATION)	
90	92.4	3.5	8	8	10							M			
85	87.4	8.5	4	4	3						SS-133	Sat.			
80	82.4	13.5	3	5	4							Sat.			
75	77.4	18.5	3	6	9						SS-134	46%		COASTAL PLAIN DARK GRAY, SILTY CLAY (TAR HEEL FORMATION)	16.0
70	72.4	23.5	5	7	14						SS-135	Sat.		GRAY, SILTY FINE TO COARSE SAND WITH LIGNITE AND SILT AND CLAY LENSES	21.0
65	67.4	28.5	5	8	10							Sat.			
60	62.4	33.5	8	10	10						SS-136	Sat.			
55	57.4	38.5	7	13	22							Sat.			
50	52.4	43.5	6	9	14						SS-137	W		COASTAL PLAIN LT GRAY, CLAYEY SILT (CAPE FEAR FORMATION)	41.5
45	47.4	48.5	13	11	16							W			
40	42.4	53.5	12	18	25						SS-138	W		LT GRAY, SANDY CLAY, MICACEOUS	52.0
	37.4	58.5	16	20	30							W			
														Boring Terminated at Elevation 35.9 ft IN COASTAL PLAIN, SANDY CLAY (CAPE FEAR FORMATION)	60.0

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Bradley, N
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER			GROUND WTR (ft)
BORING NO. EB2-C	STATION 403+90	OFFSET 20 ft LT	ALIGNMENT -LREV- 0 HR. N/A
COLLAR ELEV. 98.8 ft	TOTAL DEPTH 65.1 ft	NORTHING 456,226	EASTING 2,106,113 24 HR. 5.0
DRILL RIG/HAMMER EFF/DATE SME R-7 CME-750 88% 00/00/0000		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Contract Driller	START DATE 12/16/08	COMP. DATE 12/16/08	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
100														GROUND SURFACE	0.0
95	98.8	0.0	2	5	3						SS-139	M		COASTAL PLAIN GRAY, SLIGHTLY SILTY, FINE TO COARSE SAND (WACCAMAW FORMATION)	
90	95.2	3.6	4	5	5							W		WHITE AND GRAY, GRAVEL	5.5
85	90.2	8.6	9	7	2							Sat.			
80	85.2	13.6	4	4	7							Sat.			
75	80.2	18.6	4	5	7						SS-141	58%		COASTAL PLAIN DARK GRAY, SILTY CLAY (TAR HEEL FORMATION)	16.0
70	75.2	23.6	2	8	13						SS-142	Sat.		GRAY, SILTY FINE TO COARSE SAND WITH LIGNITE AND SILT AND CLAY LENSES	21.0
65	70.2	28.6	6	10	15							Sat.			
60	65.2	33.6	7	12	17							Sat.			
55	60.2	38.6	9	11	19							Sat.			
50	55.2	43.6	5	8	9						SS-145	W		COASTAL PLAIN GRAY, SANDY, SILTY CLAY (CAPE FEAR FORMATION)	41.0
45	50.2	48.6	11	21	22							W			
40	45.2	53.6	11	19	25							W			
35	40.2	58.6	10	13	20						SS-146	W		GRAY, SANDY CLAY	56.0
	35.2	63.6	9	15	15							W			
														Boring Terminated at Elevation 33.7 ft IN COASTAL PLAIN, SANDY CLAY (CAPE FEAR FORMATION)	65.1

NCDOT BORE DOUBLE R2303B\_GEO\_STRUCTURE1.GPJ NC\_DOT\_GDT 6/6/11



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Oti, O. B.
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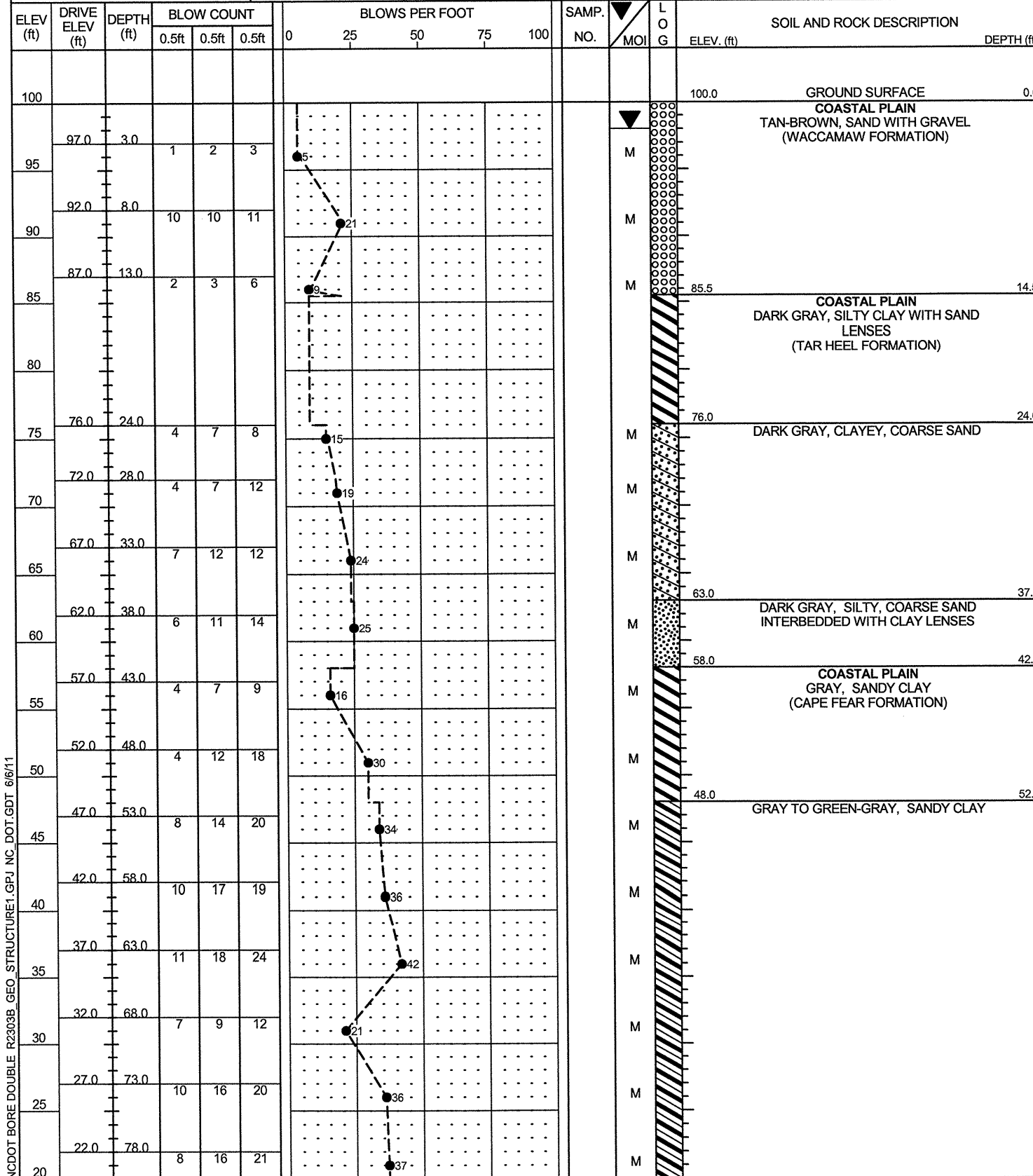
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER	GROUND WTR (ft) 0 HR. N/A 24 HR. 2.0
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BORING NO. EB2-B (EB)	STATION 403+76	OFFSET 51 ft RT	ALIGNMENT -LREV-		
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COLLAR ELEV. 100.0 ft	TOTAL DEPTH 89.5 ft	NORTHING 456,154	EASTING 2,106,105		
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DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 77% 03/15/2010	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
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DRILLER Dixon, D. W.	START DATE 03/16/11	COMP. DATE 03/18/11	SURFACE WATER DEPTH N/A
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NCDOT BORE DOUBLE R2303B GEO STRUCTURE1.GPJ NC DOT.GDT 6/6/11

WBS 34416.1.1	TIP R-2303B	COUNTY CUMBERLAND/SAMPSON	GEOLOGIST Oti, O. B.
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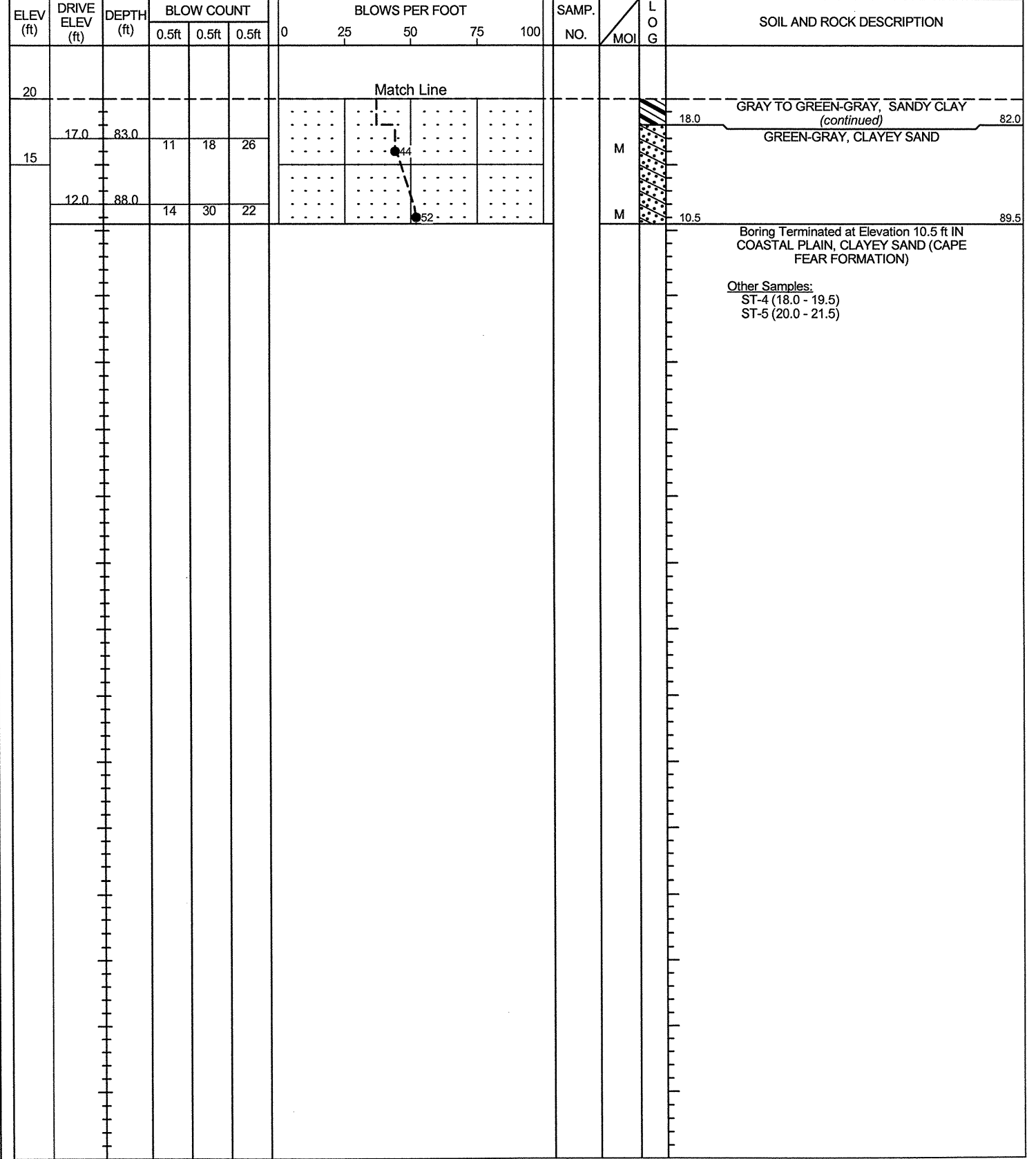
SITE DESCRIPTION DUAL STRUCTURES (STRUCTURE #1) ON -L- (NC 24 BYPASS) OVER SOUTH RIVER	GROUND WTR (ft) 0 HR. N/A 24 HR. 2.0
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BORING NO. EB2-B (EB)	STATION 403+76	OFFSET 51 ft RT	ALIGNMENT -LREV-		
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COLLAR ELEV. 100.0 ft	TOTAL DEPTH 89.5 ft	NORTHING 456,154	EASTING 2,106,105		
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DRILL RIG/HAMMER EFF./DATE RFO0067 CME-550X 77% 03/15/2010	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
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DRILLER Dixon, D. W.	START DATE 03/16/11	COMP. DATE 03/18/11	SURFACE WATER DEPTH N/A
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Other Samples:  
ST-4 (18.0 - 19.5)  
ST-5 (20.0 - 21.5)





**B12-A (WB)**

<b>SOIL TEST RESULTS</b>															
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-150A	35 LT	402+52	8.5-10.0	A-7-6(29)	59	30	3.6	17.9	38.4	40.1	100	98	85	-	-
SS-151A	35 LT	402+52	58.5-60.0	A-6(1)	30	13	11.2	54.2	26.6	8.0	100	96	38	-	-
SS-152A	35 LT	402+52	88.5-90.0	A-7-6(22)	50	29	5.0	27.9	47.0	20.1	100	98	77	-	-

**B12-B (EB)**

<b>SOIL TEST RESULTS</b>															
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-153A	35 RT	402+95	3.5-5.8	A-3(0)	23	NP	78.7	17.3	3.0	1.0	94	55	4	-	-
SS-154A	35 RT	402+95	14.0-15.0	A-7-6(23)	53	30	6.6	23.7	39.6	30.1	100	96	76	-	-
SS-155A	35 RT	402+95	28.5-30.8	A-6(5)	39	21	35.9	20.9	16.0	27.2	100	81	45	-	-
SS-156A	35 RT	402+95	33.5-35.0	A-2-4(0)	23	NP	55.3	30.2	5.4	9.1	100	86	16	-	-
SS-157A	35 RT	402+95	43.5-45.0	A-6(14)	36	18	4.4	28.6	52.9	14.1	100	97	82	-	-
SS-158A	35 RT	402+95	58.5-60.0	A-4(0)	25	10	28.4	41.9	21.7	8.0	100	87	36	-	-
SS-159A	35 RT	402+95	73.5-75.0	A-4(2)	34	7	4.6	53.9	33.4	8.0	100	98	54	-	-
SS-160A	35 RT	402+95	83.5-85.0	A-2-6(0)	31	12	71.5	12.5	11.0	5.0	100	50	18	-	-

**B13-A (WB)**

<b>SOIL TEST RESULTS</b>															
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-140A	36 LT	403+36	3.5-5.0	A-1-b(0)	18	NP	79.3	13.5	3.1	4.0	82	34	7	-	-
SS-141A	36 LT	403+36	13.5-15.0	A-1-b(0)	23	NP	83.9	9.3	3.8	3.0	96	25	8	-	-
SS-142A	36 LT	403+36	18.5-20.0	A-7-6(12)	42	19	7.6	32.1	42.2	18.1	100	96	69	-	-
SS-143A	36 LT	403+36	23.5-25.0	A-2-6(1)	39	23	70.3	7.8	8.8	13.0	100	44	23	-	-
SS-144A	36 LT	403+36	33.5-35.0	A-2-4(0)	25	6	73.4	10.3	7.2	9.0	99	53	17	-	-
SS-145A	36 LT	403+36	48.5-50.0	A-7-6(21)	44	27	10.3	14.7	38.8	36.3	100	93	80	-	-
SS-146A	36 LT	403+36	53.5-55.0	A-6(14)	36	21	8.7	22.6	48.6	20.1	100	95	77	-	-
SS-147A	36 LT	403+36	63.5-65.0	A-6(1)	31	15	37.1	32.0	26.9	4.0	100	83	37	-	-
SS-148A	36 LT	403+36	73.5-75.0	A-6(12)	36	21	4.6	40.1	41.2	14.1	100	98	69	-	-
SS-149A	36 LT	403+36	78.5-80.0	A-2-7(2)	46	27	66.2	8.3	16.5	9.1	98	41	27	-	-

**EB2-A (WB)**

<b>SOIL TEST RESULTS</b>															
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-132	86 LT	404+24	0.0-1.5	A-1-b(0)	28	NP	79.6	11.7	4.7	4.0	100	43	11	-	6.8
SS-133	86 LT	404+24	8.5-10.0	A-1-b(0)	23	NP	82.5	8.8	3.6	5.1	100	37	10	-	-
SS-134	86 LT	404+24	18.5-20.0	A-7-6(17)	50	22	12.1	18.4	41.1	28.3	100	94	74	45.7	-
SS-136	86 LT	404+24	33.5-35.0	A-2-4(0)	32	9	71.4	12.2	6.3	10.1	98	48	18	-	-
SS-137	86 LT	404+24	43.5-45.0	A-4(1)	25	6	16.2	42.3	27.3	14.2	100	96	51	-	-
SS-138	86 LT	404+24	53.5-55.0	A-6(4)	28	14	20.9	36.0	26.9	16.2	100	90	50	12	-

**EB2-C**

<b>SOIL TEST RESULTS</b>															
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-139	20 LT	403+90	0.0-1.5	A-3(0)	15	NP	83.0	11.1	3.8	2.0	100	56	7	-	-
SS-141	20 LT	403+90	18.6-20.1	A-7-6(29)	63	36	12.3	14.0	35.2	38.5	100	92	77	57.9	-
SS-142	20 LT	403+90	23.6-25.1	A-2-4(0)	26	8	78.3	9.7	3.8	8.1	96	39	13	-	-
SS-145	20 LT	403+90	43.6-45.1	A-7-5(48)	75	45	2.2	9.9	33.2	54.7	100	99	92	-	-
SS-146	20 LT	403+90	58.6-60.1	A-6(4)	37	17	25.7	33.6	26.5	14.2	100	88	47	-	-





**FIELD  
 SCOUR REPORT**

WBS: 34416.1.1 TIP: R-2303B COUNTY: SAMPSON

DESCRIPTION(1): DUAL STRUCTURES ON -L- (NC 24 BYPASS) OVER SOUTH RIVER - WEST BOUND LANE

**EXISTING BRIDGE**

Information from: Field Inspection  Microfilm \_\_\_\_\_ (reel \_\_\_\_\_ pos: \_\_\_\_\_)  
 Other (explain) \_\_\_\_\_

Bridge No.: N/A Length: N/A Total Bents: N/A Bents in Channel: N/A Bents in Floodplain: N/A  
 Foundation Type: N/A

**EVIDENCE OF SCOUR(2)**

Abutments or End Bent Slopes: NONE EVIDENT

Interior Bents: NONE EVIDENT

Channel Bed: NONE EVIDENT

Channel Bank: NONE VISABLE

**EXISTING SCOUR PROTECTION**

Type(3): N/A

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): N/A

**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 theoretical 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): COARSE SAND WITH GRAVEL  
 AND OVER-CONSOLIDATED CLAYS (TAR HEEL FORMATION)

Channel Bank Material(8): CLAYEY SILT AND SAND WITH ORGANICS

Channel Bank Cover(9): BRUSH, GRASSES, LARGE TREES (CYPRESS)

Floodplain Width(10): APPROXIMATELY 2000 FEET

Floodplain Cover(11): BRUSH, YOUNG TO OLD GROWTH TREES

Stream is(12): Aggrading \_\_\_\_\_ Degrading \_\_\_\_\_ Static

Channel Migration Tendency(13): WEST

Observations and Other Comments: FLOODPLAIN ON WESTERN BANK IS WELL DEVELOPED  
 CYPRESS SWAMP

**DESIGN SCOUR ELEVATIONS(14)**

Feet  Meters \_\_\_\_\_

		<b>BENTS</b>											
		<b>B1</b>	<b>B2</b>	<b>B3</b>	<b>B4</b>	<b>B5</b>	<b>B6</b>	<b>B7</b>	<b>B8</b>	<b>B9</b>	<b>B10</b>	<b>B11</b>	<b>B12</b>
WB		90.3	89.0	88.6	88.1	88.4	88.4	88.4	88.5	85.5	90.6	94.5	95.9

Comparison of DSE to Hydraulics Unit theoretical scour:  
 The Geotechnical Unit agrees with the Hydraulic Unit scour elevations for this structure.

**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 SOIL TEST RESULTS  
 SS-42  
 SS-44  
 SS-51  
 SS-140

Reported by:   
 CHRISTINA M. BRUINSMA, L.G.

Date: 5/20/2011



**FIELD  
 SCOUR REPORT**

WBS: 34416.1.1 TIP: R-2303B COUNTY: SAMPSON

DESCRIPTION(1): DUAL STRUCTURES ON -L- (NC 24 BYPASS) OVER SOUTH RIVER - EAST BOUND LANE

**EXISTING BRIDGE**

Information from: Field Inspection  Microfilm \_\_\_\_\_ (reel \_\_\_\_\_ pos: \_\_\_\_\_)  
 Other (explain) \_\_\_\_\_

Bridge No.: N/A Length: N/A Total Bents: N/A Bents in Channel: N/A Bents in Floodplain: N/A  
 Foundation Type: N/A

**EVIDENCE OF SCOUR(2)**

Abutments or End Bent Slopes: NONE EVIDENT

Interior Bents: NONE EVIDENT

Channel Bed: NONE EVIDENT

Channel Bank: NONE VISABLE

**EXISTING SCOUR PROTECTION**

Type(3): N/A

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): N/A

**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).
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- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
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Channel Migration Tendency(13): WEST

Observations and Other Comments: FLOODPLAIN ON WESTERN BANK IS WELL DEVELOPED  
 CYPRESS SWAMP

**DESIGN SCOUR ELEVATIONS(14)**

Feet  Meters \_\_\_\_\_

		<u>BENTS</u>											
		<u>B1</u>	<u>B2</u>	<u>B3</u>	<u>B4</u>	<u>B5</u>	<u>B6</u>	<u>B7</u>	<u>B8</u>	<u>B9</u>	<u>B10</u>	<u>B11</u>	<u>B12</u>
<u>EB</u>		90.8	89.0	88.7	88.3	88.1	88.0	88.5	89.2	87.1	89.2	84.2	96.0

Comparison of DSE to Hydraulics Unit theoretical scour:  
 The Geotechnical Unit agrees with the Hydraulic Unit scour elevations for this structure.

**SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL**

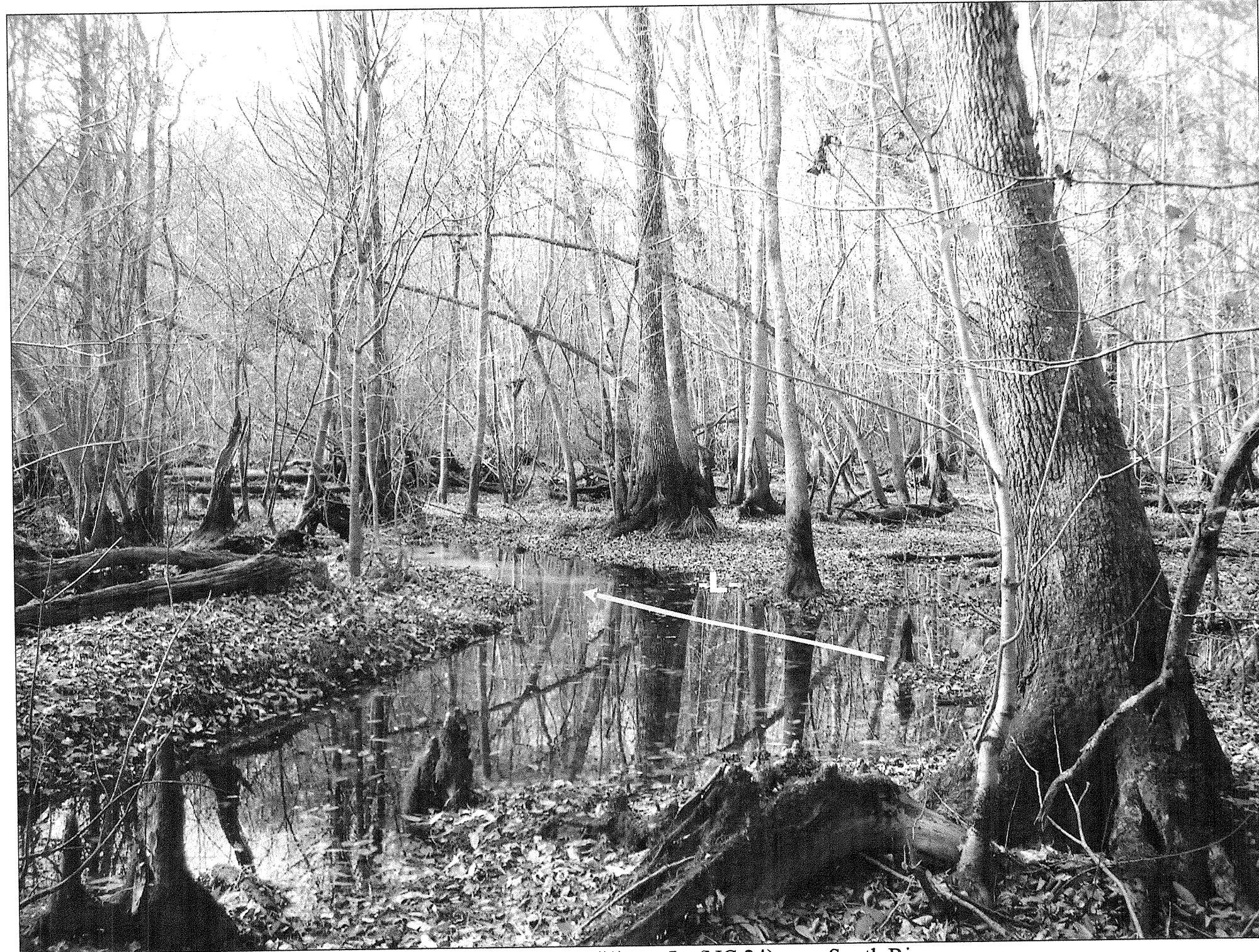
Bed or Bank													
Sample No.													
Retained #4													
Passed #10													
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Coarse Sand													
Fine Sand													
Silt													
Clay													
LL													
PI													
AASHTO													
Station						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

SEE SOIL TEST RESULTS  
 SS-169A  
 SS-170A  
 SS-157  
 SS-158

Reported by:   
 CHRISTINA M. BRUINSMA, L.G.

Date: 5/20/2011

## SITE PHOTOGRAPH



Dual Structure (Structure #1) on -L- (NC 24) over South River

Looking Southeast towards Bent 4, East Bound Lane