

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4413	1	10
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33690.1.1	BRSTP-0264(24)	P.E.	
		RW & UTIL.	

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33690.1.1 (B-4413) F.A. PROJ. BRSTP-0264(24)
COUNTY BEAUFORT
PROJECT DESCRIPTION BRIDGE NO. 51 ON US 264 OVER
BROAD CREEK CANAL AT -L- STA. 15+77

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 1919 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

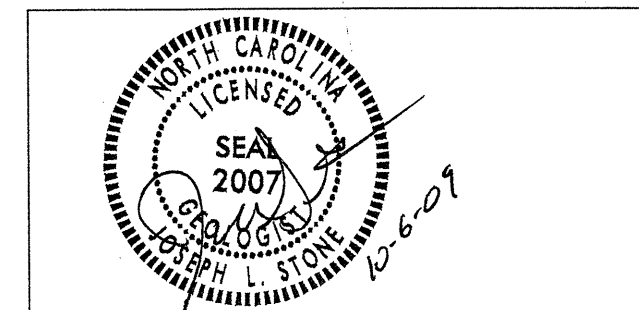
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (UN-PLACED) 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

JRS
RES
JME

INVESTIGATED BY J.L. STONE
CHECKED BY D.N. ARGENBRIGHT
SUBMITTED BY D.N. ARGENBRIGHT
DATE OCTOBER 2009



PROJECT: 33690.1.1 ID: B-4413

DRAWN BY: C.R. SUMNER, J.L. STONE

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT 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

PROJECT REFERENCE NO. B-4413
SHEET NO. 2 OF 10

SUBSURFACE INVESTIGATION

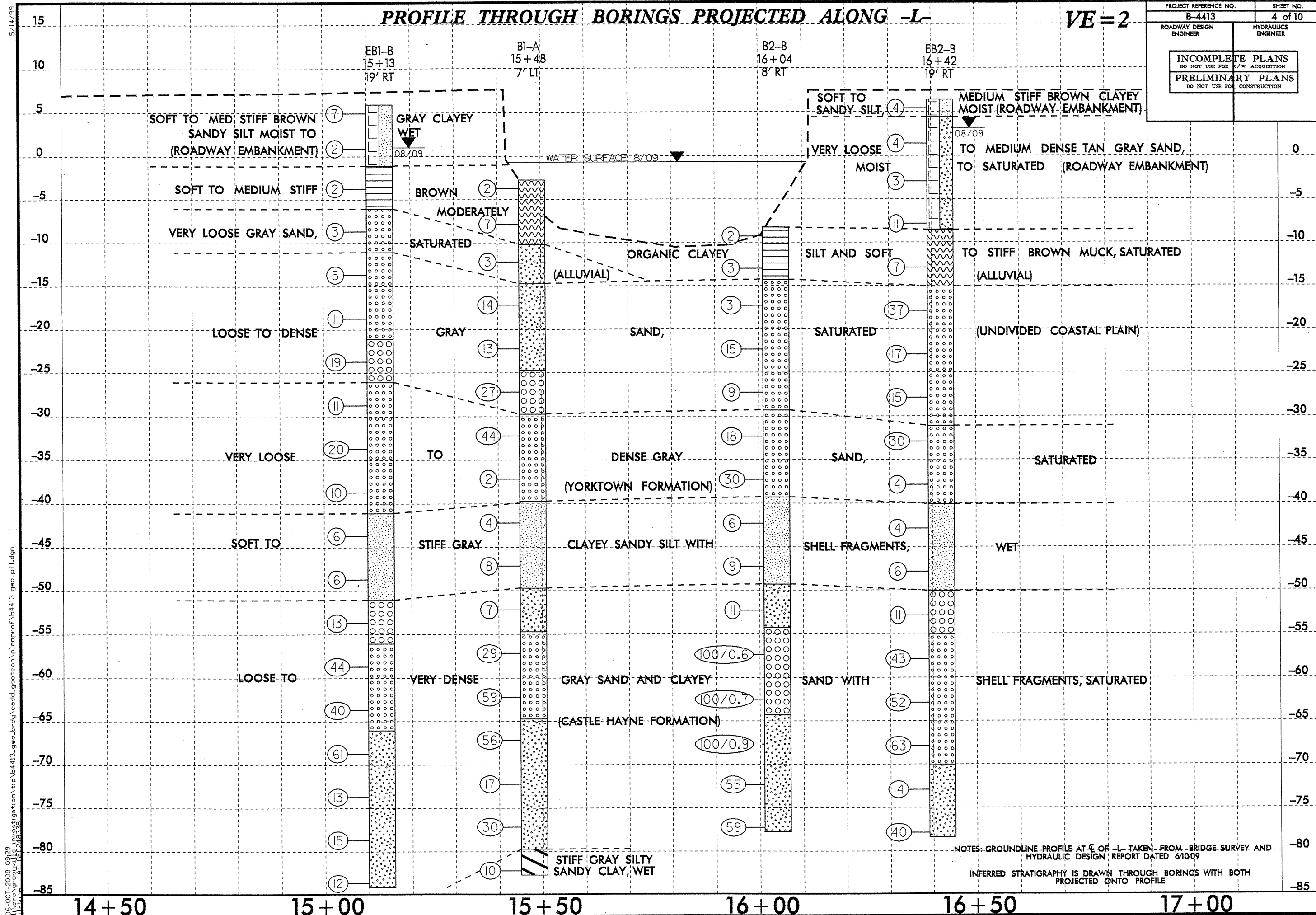
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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, DARK SKY 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.		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:		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 (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (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.					
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING		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, 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.		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		WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.		WEATHERING	
GROUP CLASS. A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 A-6, A-7		SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50		WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.		WEATHERING					
SYMBOL		PERCENTAGE OF MATERIAL		WEATHERING		WEATHERING					
% PASSING # 10 # 40 # 200		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		WEATHERING					
LIQUID LIMIT PLASTIC INDEX		GROUND WATER		WEATHERING		WEATHERING					
GROUP INDEX		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		WEATHERING		WEATHERING					
USUAL TYPES OF MAJOR MATERIALS		MISCELLANEOUS SYMBOLS		WEATHERING		WEATHERING					
GEN. RATING AS A SUBGRADE		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 SOUNDING ROD		WEATHERING		WEATHERING					
PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30		SOUNDING ROD		WEATHERING		WEATHERING					
CONSISTENCY OR DENSENESS		SOUNDING ROD		WEATHERING		WEATHERING					
PRIMARY SOIL TYPE		SOUNDING ROD		WEATHERING		WEATHERING					
COMPACTNESS OR CONSISTENCY		SOUNDING ROD		WEATHERING		WEATHERING					
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)		SOUNDING ROD		WEATHERING		WEATHERING					
RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		SOUNDING ROD		WEATHERING		WEATHERING					
TEXTURE OR GRAIN SIZE		SOUNDING ROD		WEATHERING		WEATHERING					
U.S. STD. SIEVE SIZE OPENING (MM)		SOUNDING ROD		WEATHERING		WEATHERING					
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE, SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)		SOUNDING ROD		WEATHERING		WEATHERING					
GRAIN SIZE MM IN.		SOUNDING ROD		WEATHERING		WEATHERING					
SOIL MOISTURE - CORRELATION OF TERMS		SOUNDING ROD		WEATHERING		WEATHERING					
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		SOUNDING ROD		WEATHERING		WEATHERING					
LL LIQUID LIMIT PLASTIC RANGE (PI) PL PLASTIC LIMIT		SOUNDING ROD		WEATHERING		WEATHERING					
OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT		SOUNDING ROD		WEATHERING		WEATHERING					
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH		SOUNDING ROD		WEATHERING		WEATHERING					
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		SOUNDING ROD		WEATHERING		WEATHERING					
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.		SOUNDING ROD		WEATHERING		WEATHERING					
EQUIPMENT USED ON SUBJECT PROJECT		SOUNDING ROD		WEATHERING		WEATHERING					
DRILL UNITS: MOBILE B- BK-51 CME-45B CME-750 PORTABLE HOIST		SOUNDING ROD		WEATHERING		WEATHERING					
ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 5/8" * STEEL TEETH TRICONE * TUNG-CARB. CORE BIT		SOUNDING ROD		WEATHERING		WEATHERING					
HAMMER TYPE: AUTOMATIC MANUAL		SOUNDING ROD		WEATHERING		WEATHERING					
CORE SIZE: B N H		SOUNDING ROD		WEATHERING		WEATHERING					
HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST		SOUNDING ROD		WEATHERING		WEATHERING					
FRACTURE SPACING TERM SPACING		SOUNDING ROD		WEATHERING		WEATHERING					
BEDDING TERM THICKNESS		SOUNDING ROD		WEATHERING		WEATHERING					
INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.		SOUNDING ROD		WEATHERING		WEATHERING					
FRIABLE MODERATELY INDURATED INDURATED EXTREMELY INDURATED		SOUNDING ROD		WEATHERING		WEATHERING					
BENCH MARK: BL-2 -L- STA. 15+16 19.8 RT		SOUNDING ROD		WEATHERING		WEATHERING					
ELEVATION: 5.87 FT.		SOUNDING ROD		WEATHERING		WEATHERING					
NOTES:		SOUNDING ROD		WEATHERING		WEATHERING					

PROFILE THROUGH BORINGS PROJECTED ALONG -L-

VE = 2

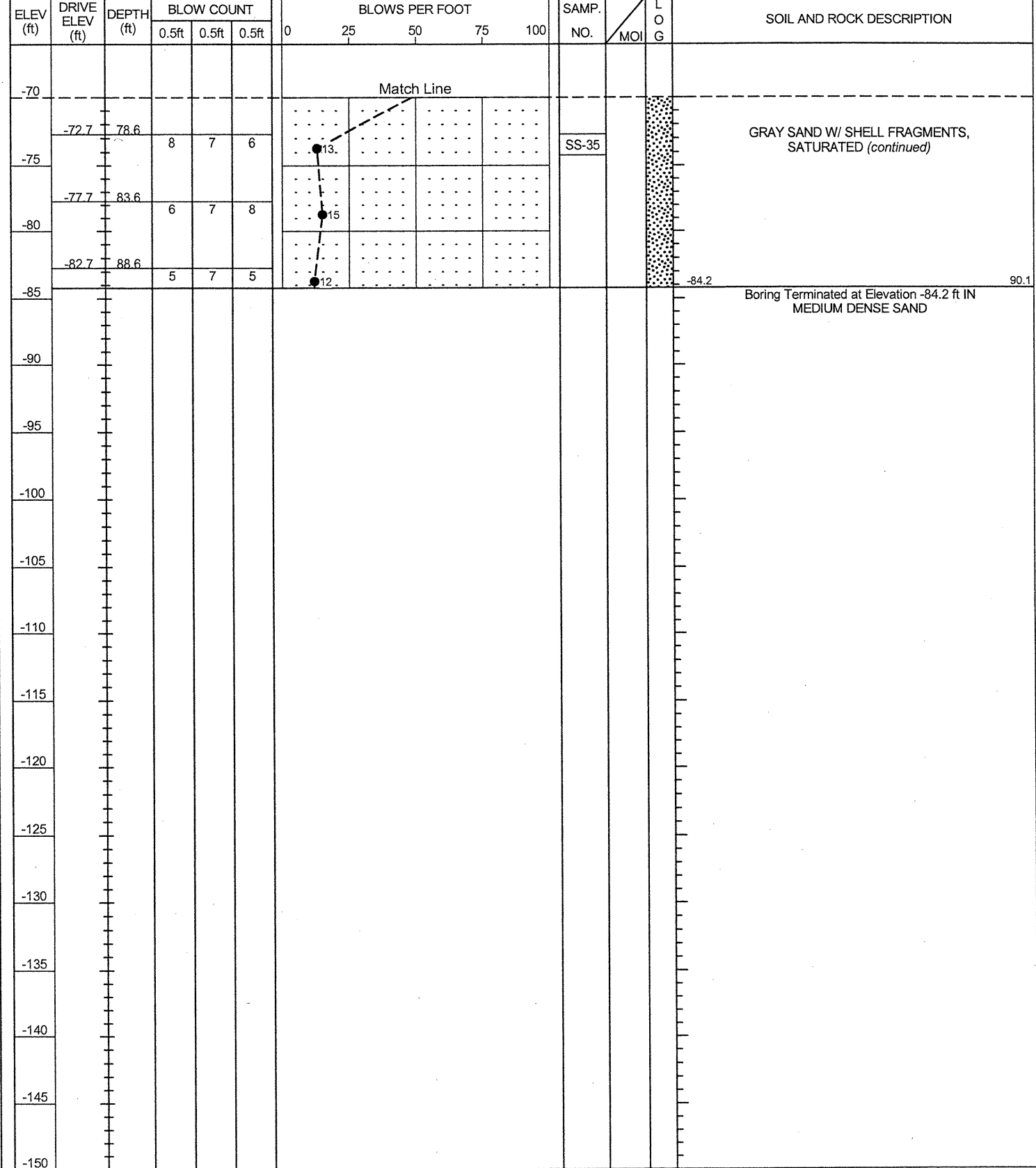
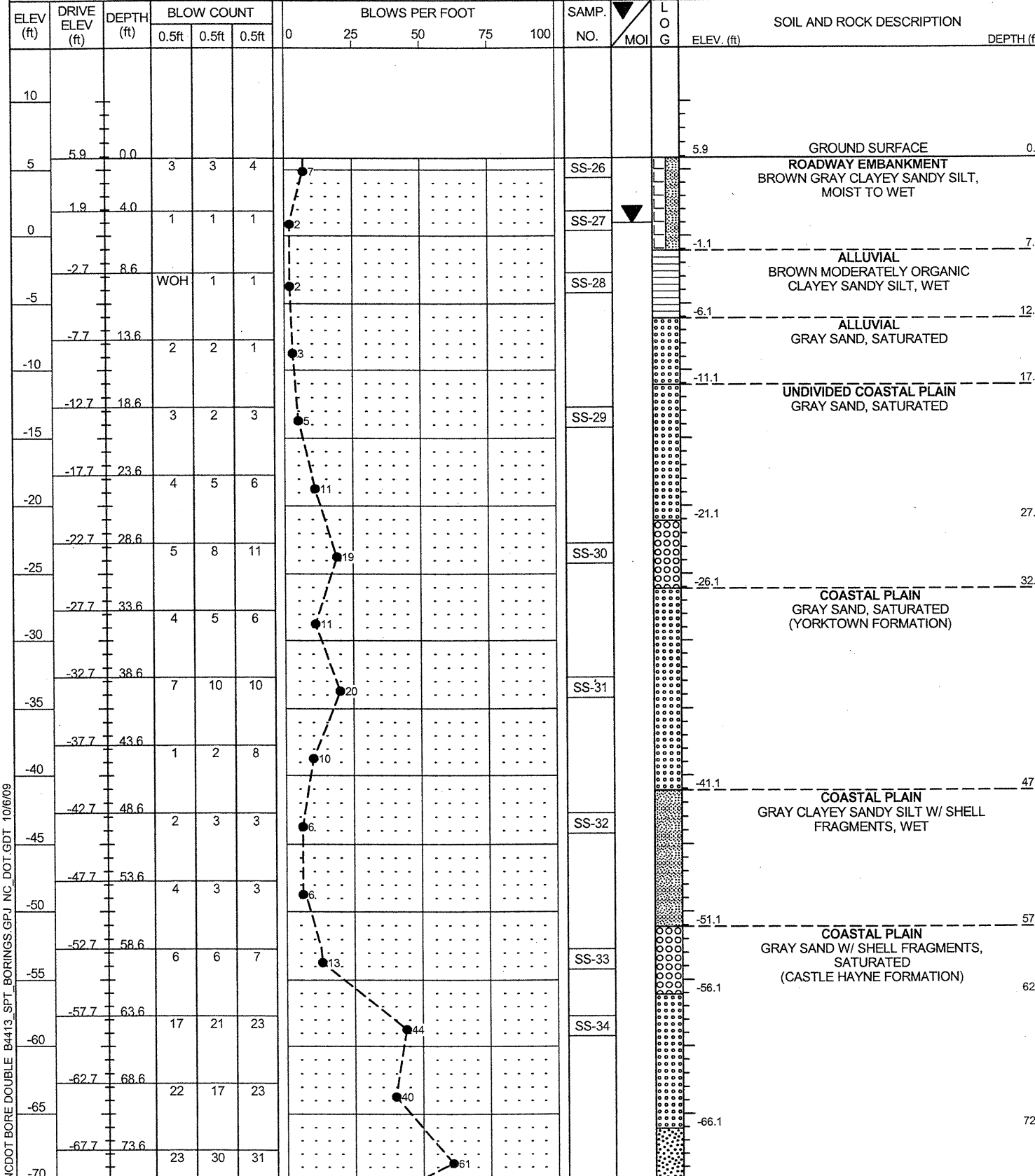
PROJECT REFERENCE NO. B-4413	SHEET NO. 4 of 10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



5/14/09
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PROJECT NO. 33690.1.1	ID. B-4413	COUNTY BEAUFORT	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 51 ON -L- (US 264) OVER BROAD CREEK CANAL			GROUND WTR (ft)
BORING NO. EB1-B	STATION 15+13	OFFSET 19ft RT	ALIGNMENT -L-
COLLAR ELEV. 5.9 ft	TOTAL DEPTH 90.1 ft	NORTHING 670,302	EASTING 2,685,948
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 08/20/09	COMP. DATE 08/20/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 33690.1.1	ID. B-4413	COUNTY BEAUFORT	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 51 ON -L- (US 264) OVER BROAD CREEK CANAL			GROUND WTR (ft)
BORING NO. EB1-B	STATION 15+13	OFFSET 19ft RT	ALIGNMENT -L-
COLLAR ELEV. 5.9 ft	TOTAL DEPTH 90.1 ft	NORTHING 670,302	EASTING 2,685,948
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 08/20/09	COMP. DATE 08/20/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE B4413_SPT_BORINGS.GPJ NC_DOT_GDT_10/6/09

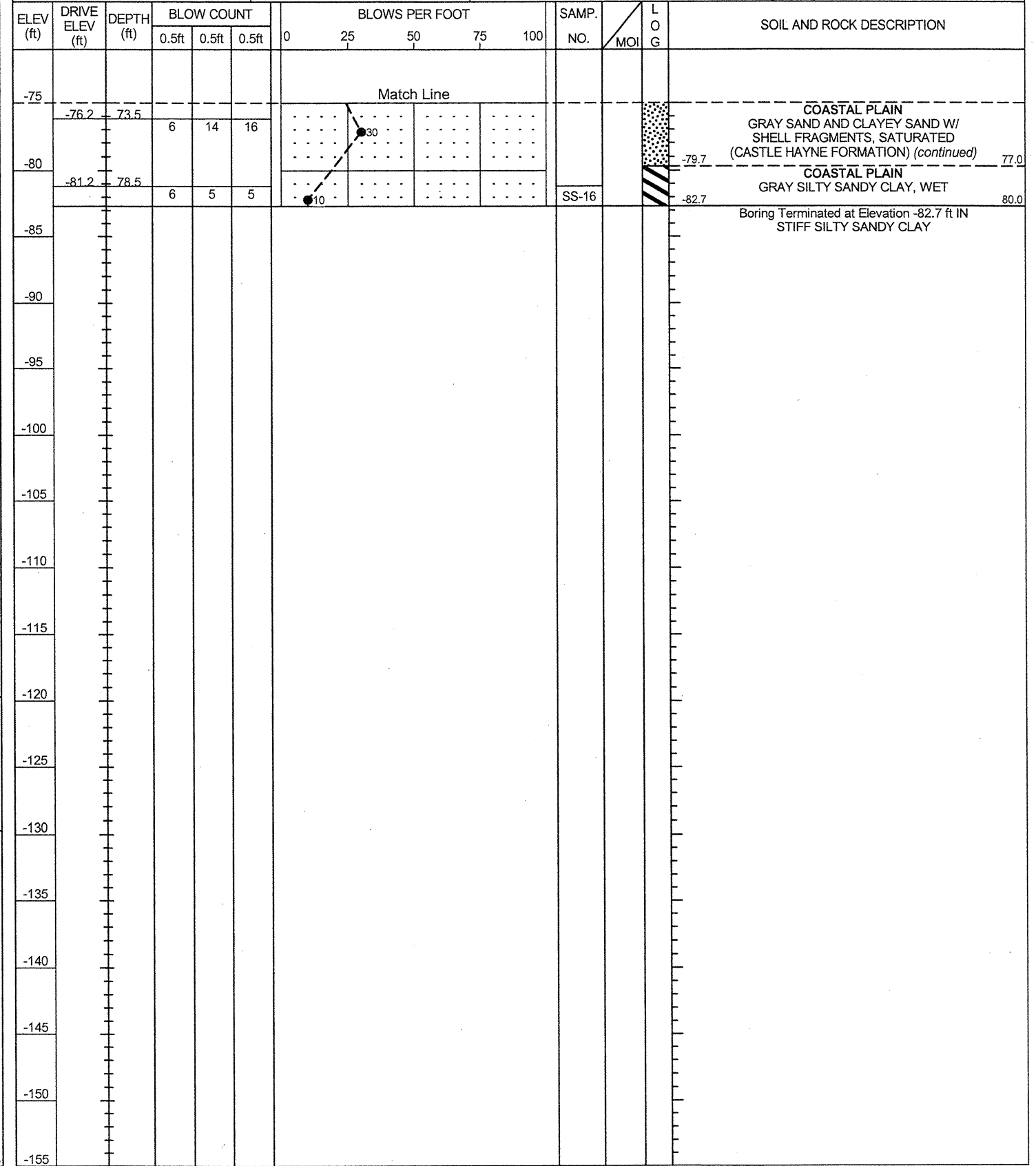
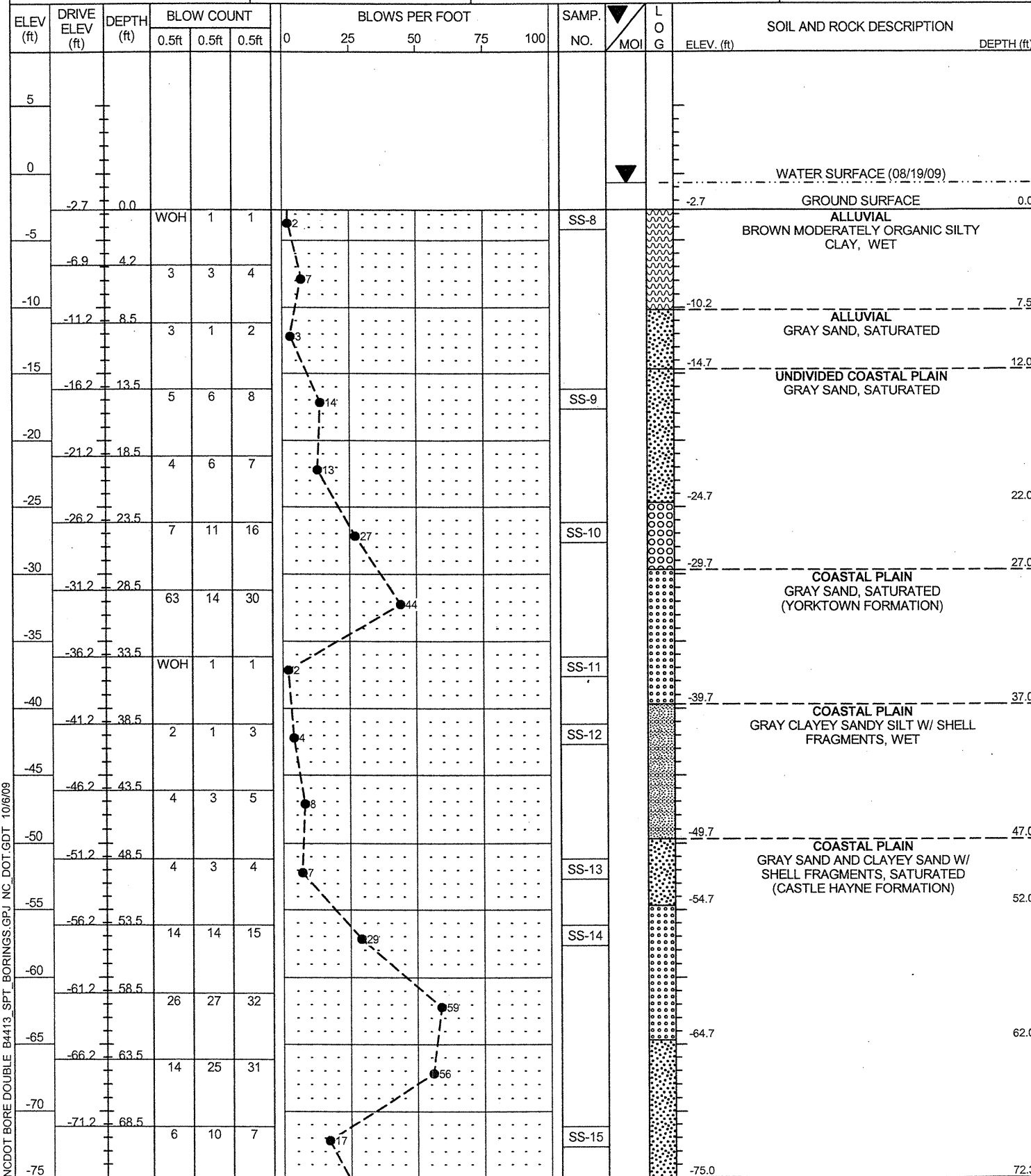


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 33690.1.1	ID. B-4413	COUNTY BEAUFORT	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 51 ON -L- (US 264) OVER BROAD CREEK CANAL			GROUND WTR (ft)
BORING NO. B1-A	STATION 15+48	OFFSET 7ft LT	ALIGNMENT -L-
COLLAR ELEV. -2.7 ft	TOTAL DEPTH 80.0 ft	NORTHING 670,343	EASTING 2,685,962
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 08/19/09	COMP. DATE 08/19/09	SURFACE WATER DEPTH 2.0ft	DEPTH TO ROCK N/A

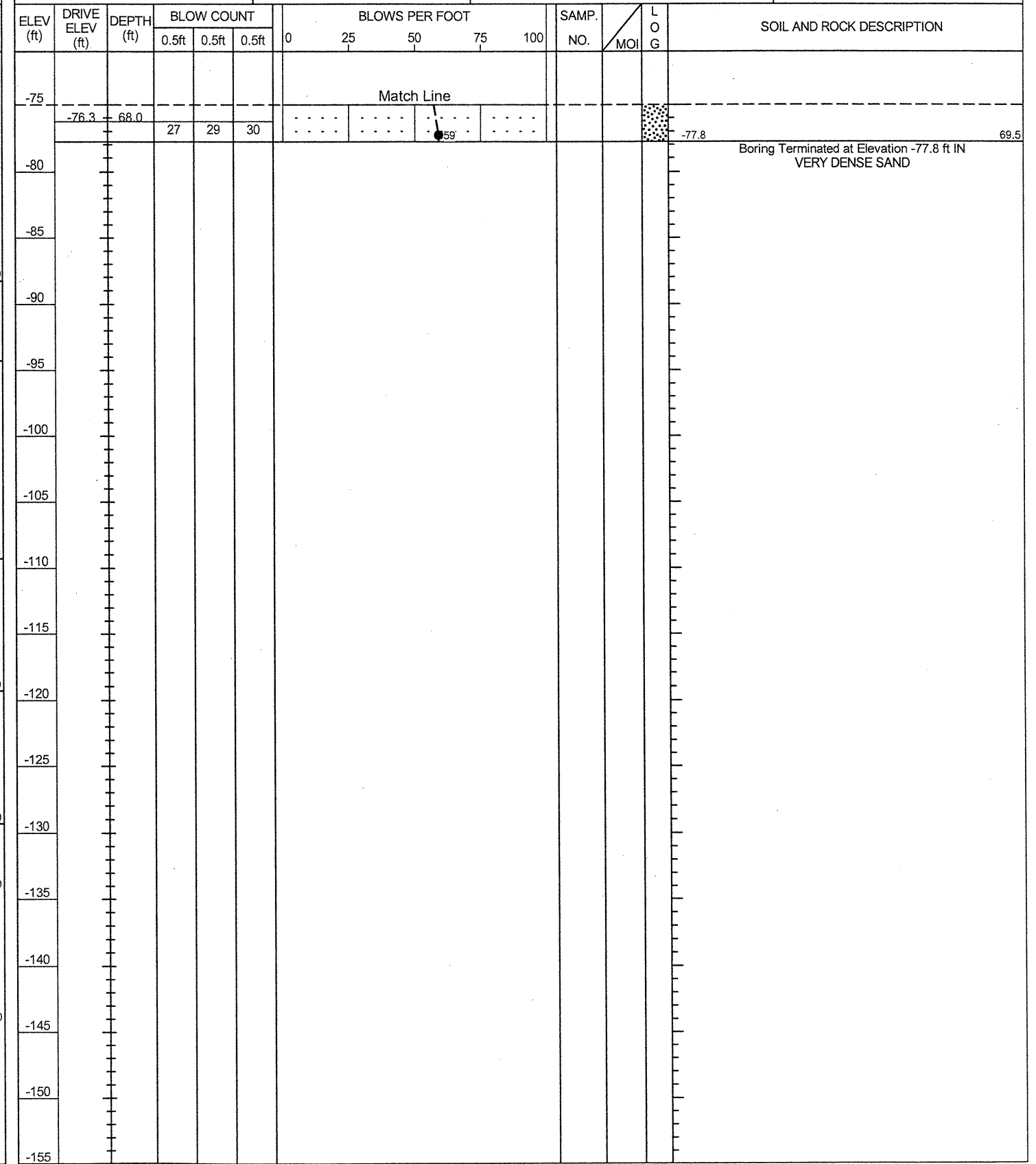
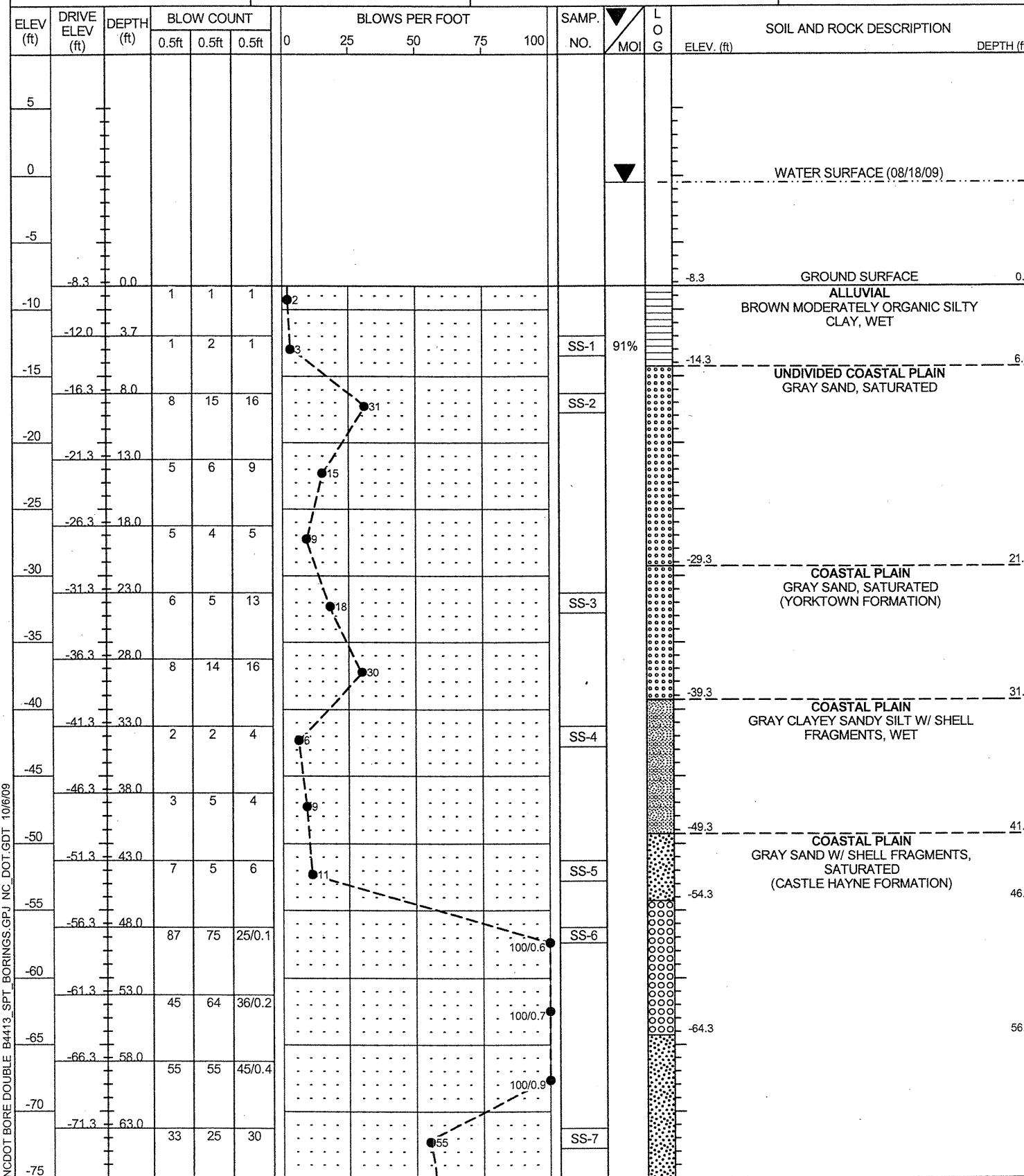
PROJECT NO. 33690.1.1	ID. B-4413	COUNTY BEAUFORT	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 51 ON -L- (US 264) OVER BROAD CREEK CANAL			GROUND WTR (ft)
BORING NO. B1-A	STATION 15+48	OFFSET 7ft LT	ALIGNMENT -L-
COLLAR ELEV. -2.7 ft	TOTAL DEPTH 80.0 ft	NORTHING 670,343	EASTING 2,685,962
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 08/19/09	COMP. DATE 08/19/09	SURFACE WATER DEPTH 2.0ft	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE B4413_SPT_BORINGS.GPJ NC_DOT.GDT 10/6/09

PROJECT NO. 33690.1.1	ID. B-4413	COUNTY BEAUFORT	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 51 ON -L- (US 264) OVER BROAD CREEK CANAL			GROUND WTR (ft)
BORING NO. B2-B	STATION 16+04	OFFSET 8ft RT	ALIGNMENT -L-
COLLAR ELEV. -8.3 ft	TOTAL DEPTH 69.5 ft	NORTHING 670,364	EASTING 2,686,016
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 08/18/09	COMP. DATE 08/18/09	SURFACE WATER DEPTH 7.8ft	DEPTH TO ROCK N/A

PROJECT NO. 33690.1.1	ID. B-4413	COUNTY BEAUFORT	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 51 ON -L- (US 264) OVER BROAD CREEK CANAL			GROUND WTR (ft)
BORING NO. B2-B	STATION 16+04	OFFSET 8ft RT	ALIGNMENT -L-
COLLAR ELEV. -8.3 ft	TOTAL DEPTH 69.5 ft	NORTHING 670,364	EASTING 2,686,016
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 08/18/09	COMP. DATE 08/18/09	SURFACE WATER DEPTH 7.8ft	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE B4413_SPT_BORINGS.GPJ NC_DOT_GDT_10/6/09

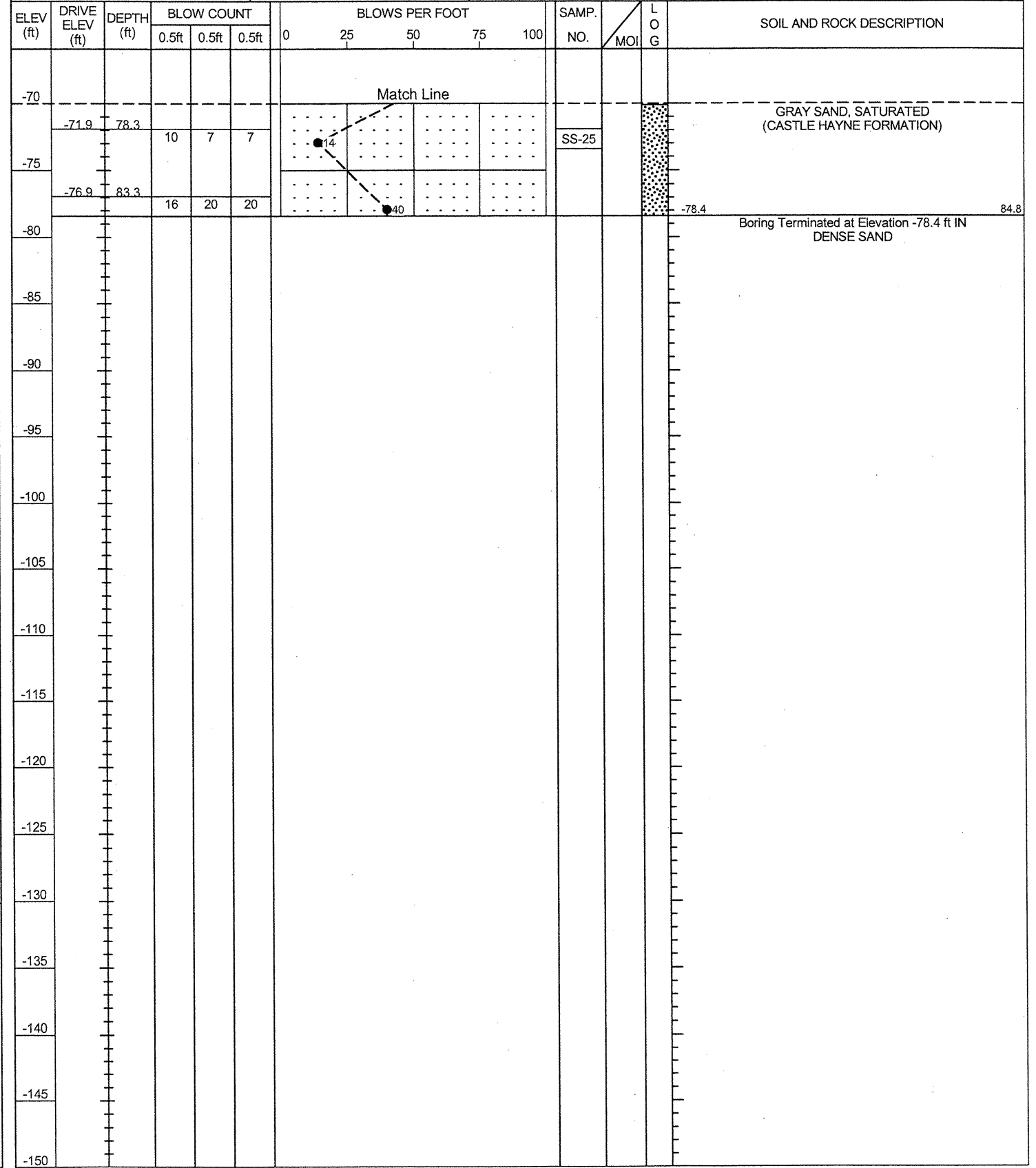
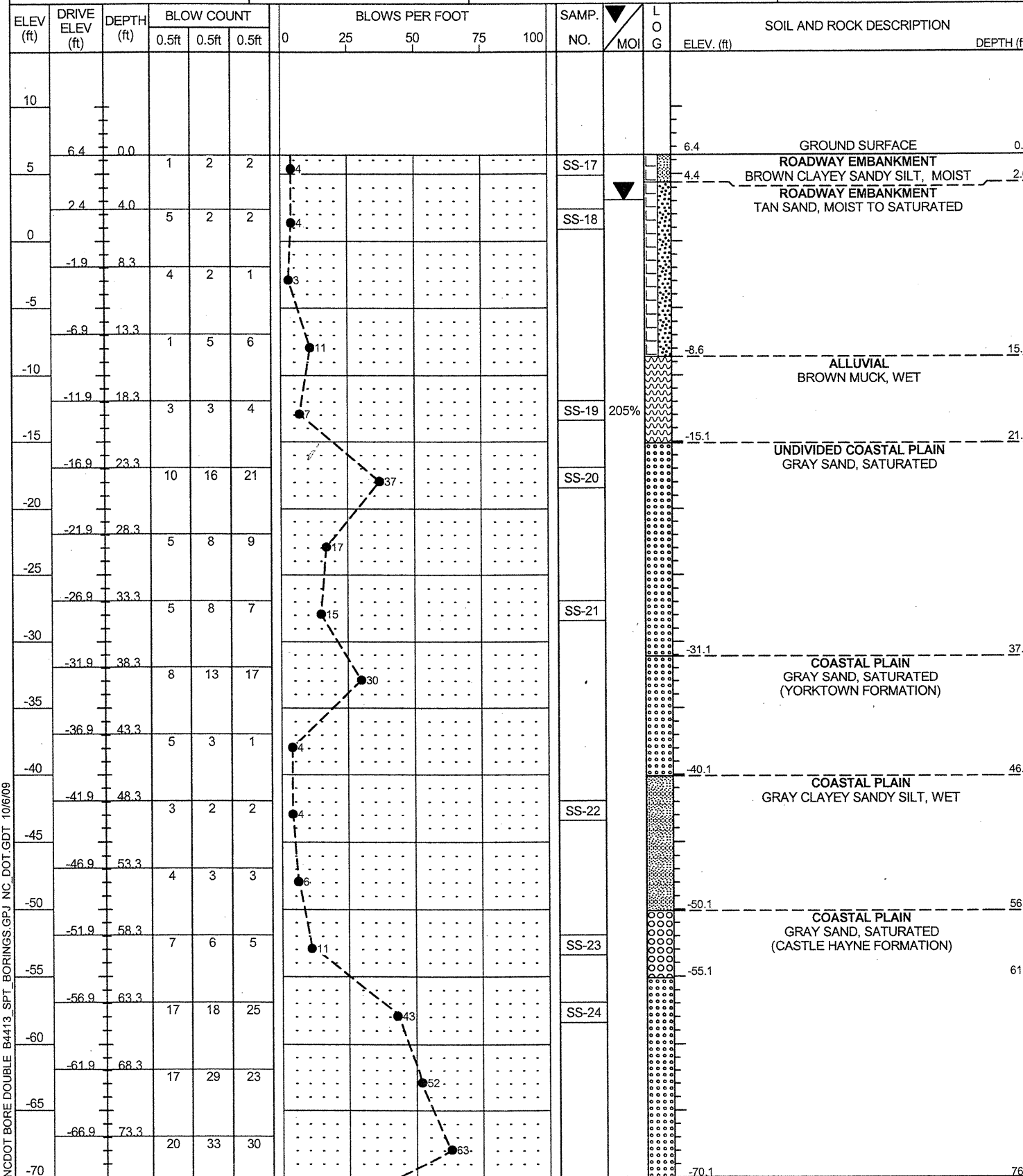


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 33690.1.1	ID. B-4413	COUNTY BEAUFORT	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 51 ON -L- (US 264) OVER BROAD CREEK CANAL			GROUND WTR (ft)
BORING NO. EB2-B	STATION 16+42	OFFSET 19ft RT	ALIGNMENT -L-
COLLAR ELEV. 6.4 ft	TOTAL DEPTH 84.8 ft	NORTHING 670,377	EASTING 2,686,053
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 08/20/09	COMP. DATE 08/20/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 33690.1.1	ID. B-4413	COUNTY BEAUFORT	GEOLOGIST Swartley, J. R.
SITE DESCRIPTION BRIDGE NO. 51 ON -L- (US 264) OVER BROAD CREEK CANAL			GROUND WTR (ft)
BORING NO. EB2-B	STATION 16+42	OFFSET 19ft RT	ALIGNMENT -L-
COLLAR ELEV. 6.4 ft	TOTAL DEPTH 84.8 ft	NORTHING 670,377	EASTING 2,686,053
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 08/20/09	COMP. DATE 08/20/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE B4413 SPT BORINGS.GPJ NC_DOT.GDT 10/6/09

B-4413

33690.1.1

BRIDGE NO. 51 ON US 264 OVER BROAD CREEK

SOIL TEST RESULTS EB1-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-26	19 RT	15+13	1.0-1.5	A-4(0)	21	3	12.4	43.8	23.6	20.3	91	87	43	-	-
SS-27	19 RT	15+13	4.0-5.5	A-4(0)	21	NP	1.6	27.2	42.9	28.4	100	100	75	-	-
SS-28	19 RT	15+13	8.6-10.1	A-5(5)	50	6	6.3	34.2	25.0	34.4	100	97	64	-	18.0
SS-29	19 RT	15+13	18.6-20.1	A-3(0)	19	NP	38.3	55.1	1.5	5.1	100	88	7	-	-
SS-30	19 RT	15+13	28.6-30.1	A-1-b(0)	21	NP	75.5	21.9	0.6	2.0	98	47	3	-	-
SS-31	19 RT	15+13	38.6-40.1	A-3(0)	18	NP	67.7	28.2	1.1	3.0	99	65	5	-	-
SS-32	19 RT	15+13	48.6-50.1	A-4(0)	29	7	21.3	40.1	14.3	24.3	87	73	38	-	-
SS-33	19 RT	15+13	58.6-60.1	A-1-b(0)	26	3	54.5	24.5	4.8	16.2	68	43	16	-	-
SS-34	19 RT	15+13	63.6-65.1	A-3(0)	19	NP	67.6	24.9	3.4	4.1	93	68	8	-	-
SS-35	19 RT	15+13	78.6-80.1	A-2-4(0)	23	NP	83.4	2.5	5.0	9.1	89	66	15	-	-

SOIL TEST RESULTS B1-A															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-8	7 LT	15+48	1.0-1.5				NOT ENOUGH SAMPLE							-	19.6
SS-9	7 LT	15+48	13.5-15.0	A-2-4(0)	19	NP	32.4	58.9	3.6	5.1	100	94	11	-	-
SS-10	7 LT	15+48	23.5-25.0	A-1-b(0)	19	NP	80.1	12.5	1.3	6.1	93	45	7	-	-
SS-11	7 LT	15+48	33.5-35.0	A-3(0)	21	NP	11.3	82.5	3.1	3.0	99	96	7	-	-
SS-12	7 LT	15+48	38.5-40.0	A-4(0)	31	9	28.6	36.3	10.8	24.3	89	69	36	-	-
SS-13	7 LT	15+48	48.5-50.0	A-2-4(0)	25	4	39.9	30.0	9.8	20.3	79	55	27	-	-
SS-14	7 LT	15+48	53.5-55.0	A-3(0)	18	NP	66.5	26.8	2.6	4.1	96	69	8	-	-
SS-15	7 LT	15+48	68.5-70.0	A-2-4(0)	23	NP	44.7	41.4	4.8	9.1	89	64	14	-	-
SS-16	7 LT	15+48	78.5-80.0	A-7-6(17)	42	25	9.1	24.3	28.1	38.5	98	93	74	-	-

SOIL TEST RESULTS B2-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	8 RT	16+04	3.7-5.2				NOT ENOUGH SAMPLE							90.8	12.6
SS-2	8 RT	16+04	8.0-9.5	A-3(0)	21	NP	18.0	74.1	3.9	4.1	100	99	10	-	-
SS-3	8 RT	16+04	23.0-24.5	A-3(0)	20	NP	49.7	43.9	1.3	5.1	99	79	7	-	-
SS-4	8 RT	16+04	33.0-34.5	A-4(0)	28	8	25.3	34.0	16.3	24.3	86	69	39	-	-
SS-5	8 RT	16+04	43.0-44.5	A-2-4(0)	28	NP	56.4	26.3	6.1	11.1	83	51	16	-	-
SS-6	8 RT	16+04	48.0-49.1	A-1-b(0)	21	NP	72.5	19.8	2.6	5.1	89	50	8	-	-
SS-7	8 RT	16+04	63.0-64.5	A-2-4(0)	24	NP	40.4	43.3	5.2	11.1	88	65	17	-	-

SOIL TEST RESULTS EB2-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-17	19 RT	16+42	1.0-1.5	A-4(0)	19	3	17.4	39.7	22.6	20.3	98	91	45	-	-
SS-18	19 RT	16+42	4.0-5.5	A-2-4(0)	18	NP	6.5	66.5	10.8	16.2	100	99	30	-	-
SS-19	19 RT	16+42	18.3-19.8				NOT ENOUGH SAMPLE							205.3	43.5
SS-20	19 RT	16+42	23.3-24.8	A-3(0)	20	NP	23.3	69.4	3.2	4.1	100	99	9	-	-
SS-21	19 RT	16+42	33.3-34.8	A-3(0)	19	NP	36.1	56.1	2.7	5.1	100	89	10	-	-
SS-22	19 RT	16+42	48.3-49.8	A-4(0)	29	7	23.3	38.9	15.5	22.3	87	71	37	-	-
SS-23	19 RT	16+42	58.3-59.8	A-1-b(0)	25	3	56.9	21.5	5.4	16.2	66	42	16	-	-
SS-24	19 RT	16+42	63.3-64.8	A-3(0)	21	NP	67.5	26.5	1.9	4.1	94	64	7	-	-
SS-25	19 RT	16+42	78.3-79.8	A-2-4(0)	23	NP	51.6	32.5	4.8	11.1	88	59	16	-	-



**FIELD
SCOUR REPORT**

WBS: 33690.1.1 TIP: B-4413 COUNTY: BEAUFORT

DESCRIPTION(1): BRIDGE NO. 51 ON US 264 OVER BROAD CREEK CANAL

EXISTING BRIDGE

Information from: Field Inspection Microfilm _____ (reel _____ pos: _____)
Other (explain) HYDRO REPORT

Bridge No.: 51 Length: 70 Total Bents: 7 Bents in Channel: 5 Bents in Floodplain: 2
Foundation Type: TIMBER AND CONCRETE PILES

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NONE NOTED

Interior Bents: NONE NOTED

Channel Bed: NONE NOTED

Channel Bank: SOME CUT BANK EROSION

EXISTING SCOUR PROTECTION

Type(3): WOODEN END WALLS AT BOTH END BENTS AND RIP RAP ON SIDE SLOPES

Extent(4): END WALLS EXTEND 10' OUTSIDE EDGE OF THE BRIDGE

Effectiveness(5): EFFECTIVE

Obstructions(6): NONE

INSTRUCTIONS

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit 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): MUCK AND MODERATLEY ORGANIC CLAYEY SILT

Channel Bank Material(8): MODERATELY ORGANIC CLAYEY SILT AND SAND

Channel Bank Cover(9): TREES AND SHRUBS

Floodplain Width(10): 500'

Floodplain Cover(11): TREES AND SHRUBS

Stream is(12): Aggrading Degrading _____ Static _____

Channel Migration Tendency(13): SLIGHTLY TO THE NORTH

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

BENTS

B1	B2												
-11.4	-11.8												

Comparison of DSE to Hydraulics Unit theoretical scour:
GEOTECHNICAL ANALYSIS AGREES WITH THE 100 YEAR MAXIMUM THEORETICAL SCOUR ELEVATIONS AS OUTLINED IN THE BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT.

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													

Reported by: *[Signature]* Date: 5/7/2008