

Bridge Inverts

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33560.1.1 (B-4214)	1	19

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-14	BORE LOGS
15-18	SOIL TEST RESULTS
19	SCOUR REPORT

PROJ. REFERENCE NO. 33560.1.1 (B-4214) F.A. PROJ. BRSTP-0017(34)  
 COUNTY ONSLOW  
 PROJECT DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER  
ON US 17 BUSINESS (MARINE BOULEVARD) AT -L- STA. 23+15

**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 1991 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.

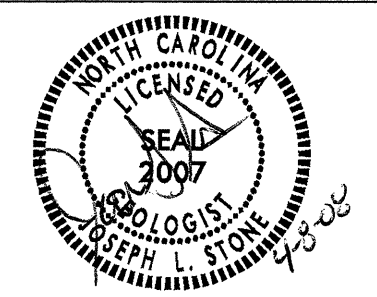
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT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

**PROJECT: 33560.1.1**  
**ID: B-4214**

PERSONNEL

- TCB
- S&ME
- WNC
- RES
- FMW

INVESTIGATED BY JL. STONE  
 CHECKED BY DN. ARGENBRIGHT  
 SUBMITTED BY DN. ARGENBRIGHT  
 DATE APRIL 2008



DRAWN BY: J. L. STONE

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

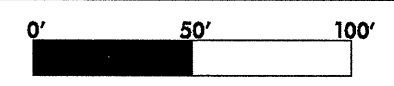
**SUBSURFACE INVESTIGATION**

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

PROJECT REFERENCE NO. 33560.II (B-4214)	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.  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 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 60 BLOWS, IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:  WEATHERED ROCK (WR)  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.  CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.  NON-CRYSTALLINE ROCK (NCR)  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD 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.	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. FLAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 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> GENERAL CLASS. GRANULAR MATERIALS (< 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-3, A-4, A-5, A-6, A-7 SYMBOL	<b>MINERALOGICAL COMPOSITION</b> MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.  <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>PERCENTAGE OF MATERIAL</b> 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	<b>WEATHERING</b> FRESH 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. <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.	<b>GROUND WATER</b> 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  <b>MISCELLANEOUS SYMBOLS</b> 
<b>CONSISTENCY OR DENSENESS</b> PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> ) GENERALLY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE, LOOSE, MEDIUM DENSE, DENSE, VERY DENSE <4, 4 TO 10, 10 TO 30, 30 TO 50, >50 N/A GENERALLY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT, SOFT, MEDIUM STIFF, STIFF, VERY STIFF, HARD <2, 2 TO 4, 4 TO 8, 8 TO 15, 15 TO 30, >30 <0.25, 0.25 TO 0.50, 0.5 TO 1.0, 1 TO 2, 2 TO 4, >4	<b>TEXTURE OR GRAIN SIZE</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 BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.) GRAIN SIZE MM 305, 75, 2.0, 0.25, 0.05, 0.005 IN. 12, 3	<b>ROCK HARDNESS</b> 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 GROVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	<b>ABBREVIATIONS</b> AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC - FRACTURED, FRACTURES FRAGS - FRAGMENTS HI - HIGHLY MED - MEDIUM MICA - MICACEOUS MOD - MODERATELY NP - NON PLASTIC ORG - ORGANIC PMT - PRESSUREMETER TEST SAP - SAPROLITIC SD - SAND, SANDY SL - SILT, SILTY SLI - SLIGHTLY TCR - TRICONE REFUSAL # - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST WEA - WEATHERED γ - UNIT WEIGHT γ <sub>d</sub> - DRY UNIT WEIGHT
<b>SOIL MOISTURE - CORRELATION OF TERMS</b> SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT - SATURATED - (SAT) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	<b>EQUIPMENT USED ON SUBJECT PROJECT</b> DRILL UNITS: MOBILE B-___, BK-51, CME-45C, CME-550, PORTABLE HOIST, CME 45B ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE 2 1/8" * 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	<b>ROCK HARDNESS</b> 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 GROVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	<b>FRACTURE SPACING</b> 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  <b>BEDDING</b> 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>PLASTICITY</b> NONPLASTIC PLASTICITY INDEX (PI) DRY STRENGTH LOW PLASTICITY 0-5 VERY LOW MED. PLASTICITY 6-15 SLIGHT HIGH PLASTICITY 16-25 MEDIUM 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.	<b>INDURATION</b> 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.	<b>BENCH MARK: BM #1 SQUARE CUT IN CONCRETE AT -BL- STA. 15+49 66.46' LT</b> ELEVATION: 9.67 FT.  NOTES:	

# SITE PLAN

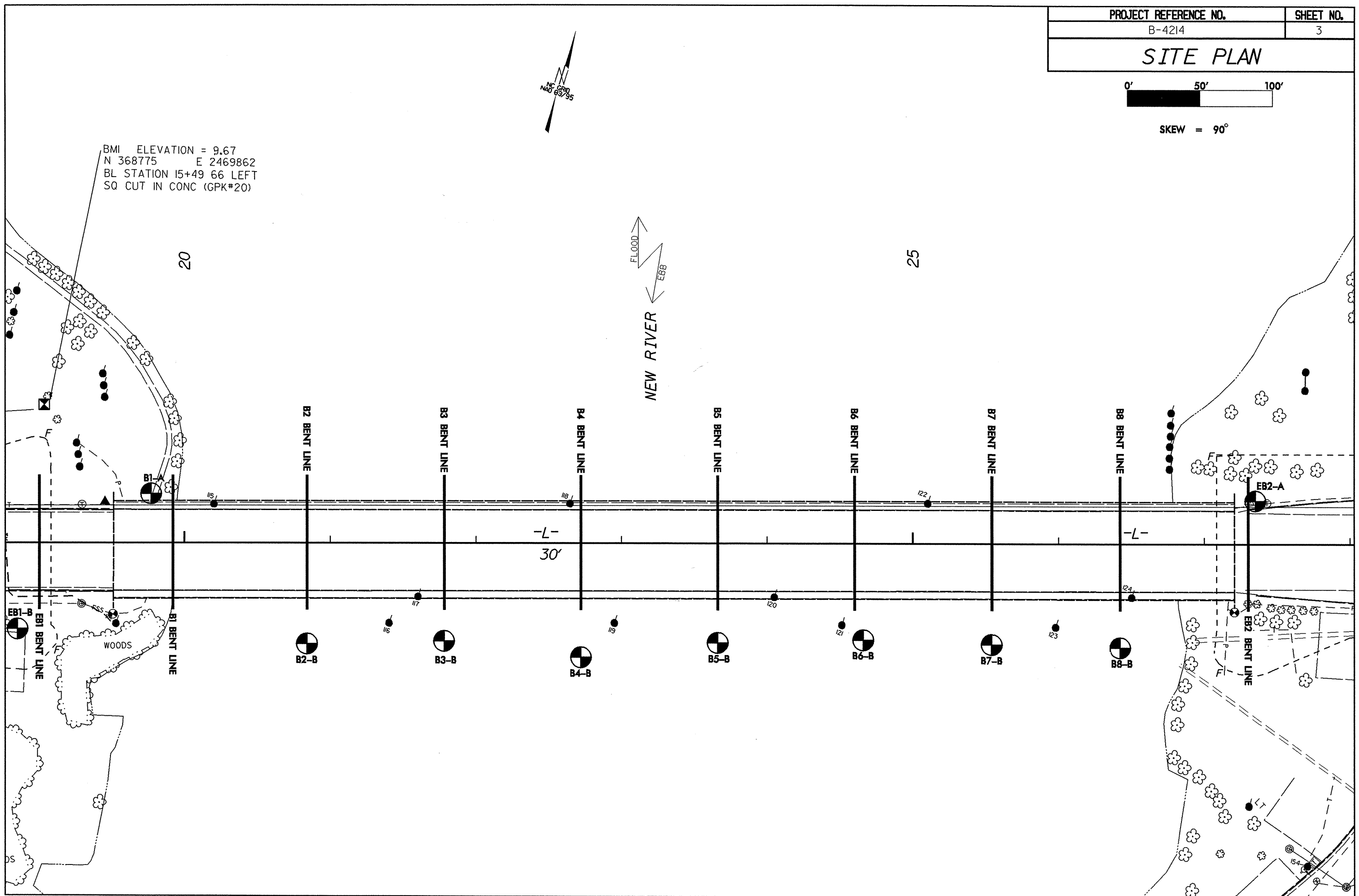


SKEW = 90°



BMI ELEVATION = 9.67  
 N 368775 E 2469862  
 BL STATION 15+49 66 LEFT  
 SQ CUT IN CONC (GPK#20)

FLOOD  
 NEW RIVER  
 EBB

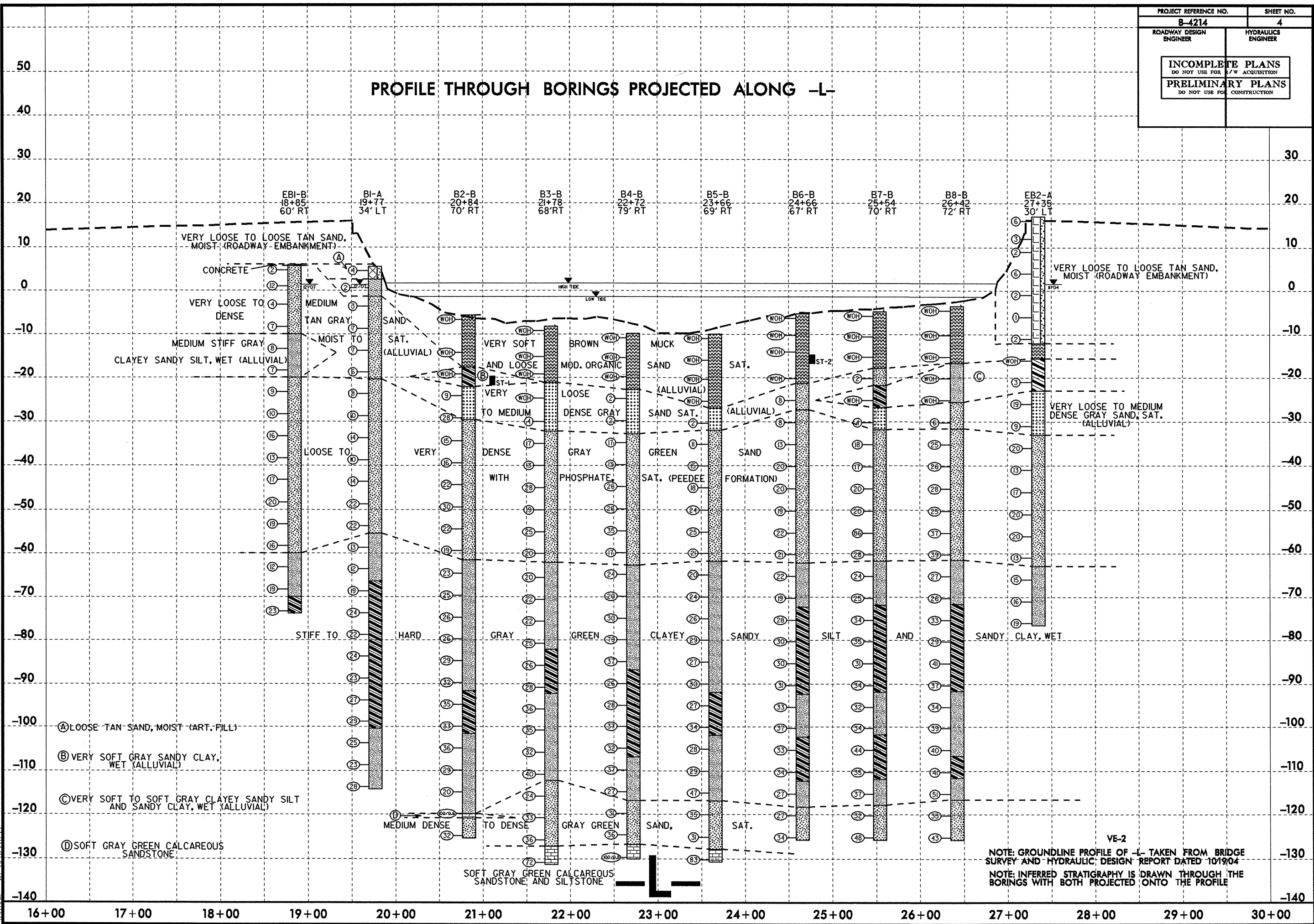


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PROJECT REFERENCE NO. <b>B-4214</b>	SHEET NO. <b>4</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR A/V ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

### PROFILE THROUGH BORINGS PROJECTED ALONG -L-



16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00

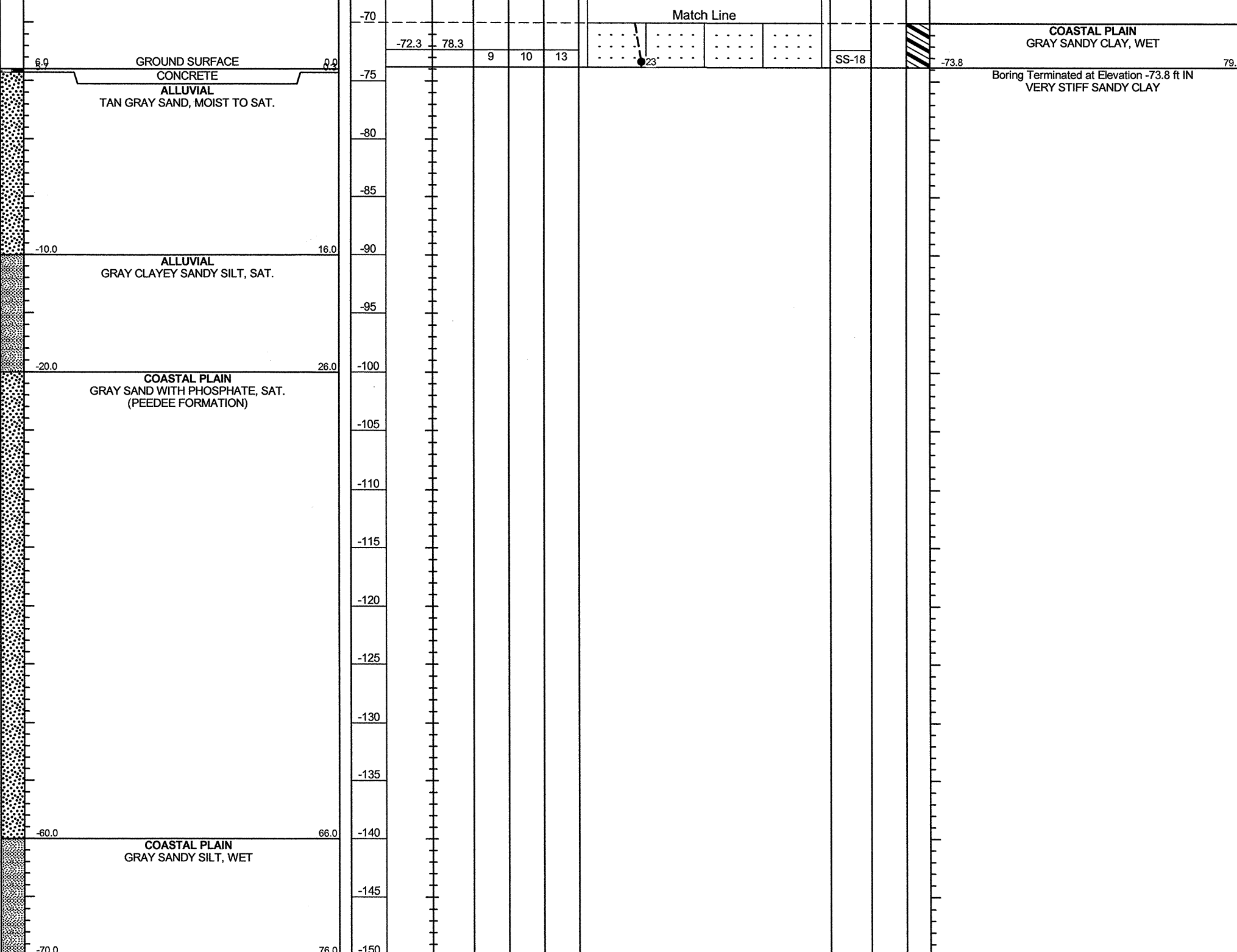
PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. EB1-B	STATION 18+85	OFFSET 60ft RT	ALIGNMENT -L-
COLLAR ELEV. 6.0 ft	TOTAL DEPTH 79.8 ft	NORTHING 368,613	EASTING 2,469,901
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/11/07	COMP. DATE 12/12/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. EB1-B	STATION 18+85	OFFSET 60ft RT	ALIGNMENT -L-
COLLAR ELEV. 6.0 ft	TOTAL DEPTH 79.8 ft	NORTHING 368,613	EASTING 2,469,901
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/11/07	COMP. DATE 12/12/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 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					
10															
5	5.7	0.3													
0	2.0	4.0	1	1	1										
-5	-2.3	8.3	2	6	6										
-10	-7.3	13.3	2	3	4										
-15	-12.3	18.3	3	4	4										
-20	-17.3	23.3	3	3	4										
-25	-22.3	28.3	3	4	5										
-30	-27.3	33.3	3	4	6										
-35	-32.3	38.3	3	6	10										
-40	-37.3	43.3	4	6	7										
-45	-42.3	48.3	3	7	10										
-50	-47.3	53.3	5	8	12										
-55	-52.3	58.3	6	7	12										
-60	-57.3	63.3	5	8	8										
-65	-62.3	68.3	6	5	7										
-70	-67.3	73.3	7	9	10										

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					
-70															
-75	-72.3	78.3	9	10	13										
-80															
-85															
-90															
-95															
-100															
-105															
-110															
-115															
-120															
-125															
-130															
-135															
-140															
-145															
-150															

NC DOT BORE DOUBLE B4214 GEO BRDG.GPJ NC DOT.GDT 04/09/08



PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B1-A	STATION 19+77	OFFSET 34ft LT	ALIGNMENT -L-
COLLAR ELEV. 5.6 ft	TOTAL DEPTH 119.8 ft	NORTHING 368,743	EASTING 2,469,955
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/12/07	COMP. DATE 12/13/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 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							
10																	
5	5.6	0.0	1	2	2										5.6	GROUND SURFACE	
															2.6	ARTIFICIAL FILL (ENGINEERED) TAN SAND, MOIST	
0	1.6	4.0	1	1	1											ALLUVIAL BROWN MODERATELY ORGANIC SAND, MOIST TO SAT.	
-5	-2.7	8.3	1	2	1												ALLUVIAL GRAY SAND, SAT.
-10	-7.7	13.3	2	4	3												
-15	-12.7	18.3	3	3	4												
-20	-17.7	23.3	3	3	3												
-25	-22.7	28.3	4	4	4												
-30	-27.7	33.3	4	4	6												
-35	-32.7	38.3	5	6	8												
-40	-37.7	43.3	4	4	6												
-45	-42.7	48.3	5	6	8												
-50	-47.7	53.3	6	9	13												
-55	-52.7	58.3	6	9	13												
-60	-57.7	63.3	5	7	6												
-65	-62.7	68.3	5	6	6												
-70	-67.7	73.3	7	9	10												

PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B1-A	STATION 19+77	OFFSET 34ft LT	ALIGNMENT -L-
COLLAR ELEV. 5.6 ft	TOTAL DEPTH 119.8 ft	NORTHING 368,743	EASTING 2,469,955
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 12/12/07	COMP. DATE 12/13/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

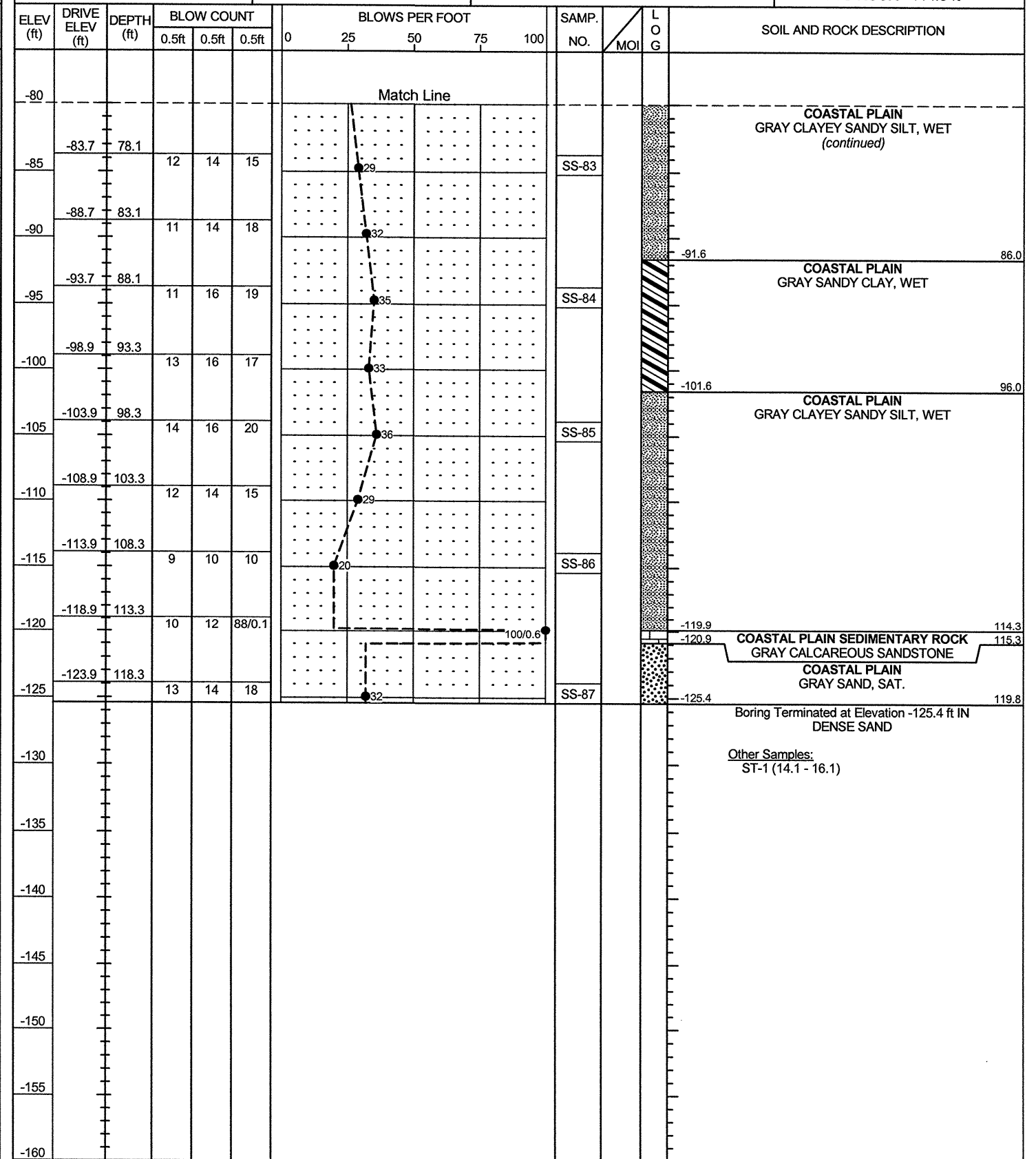
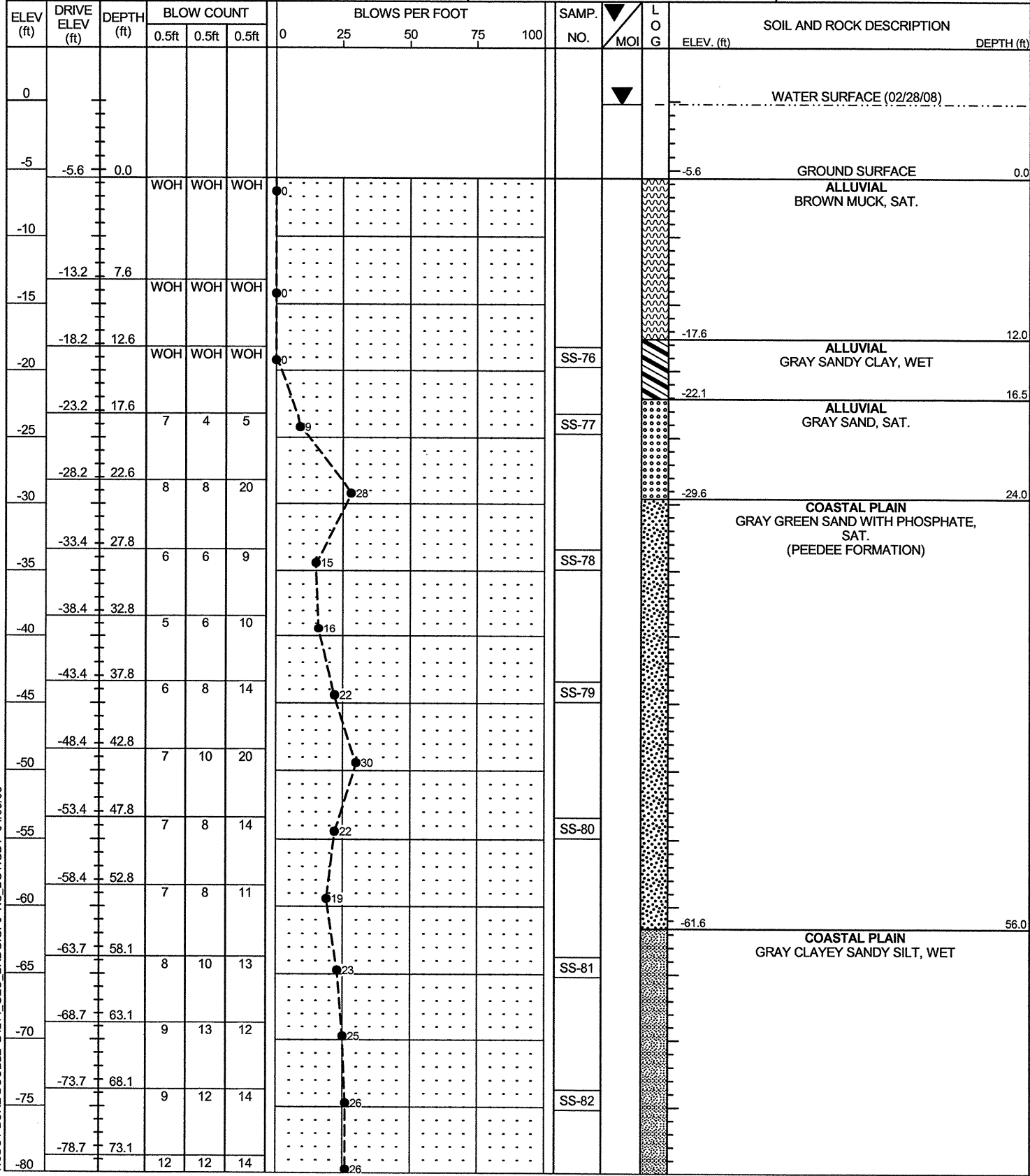
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-70																
-75	-72.7	78.3	9	11	13											
-80	-77.7	83.3	8	11	11											
-85	-82.7	88.3	10	12	12											
-90	-87.7	93.3	9	10	13											
-95	-92.7	98.3	10	13	14											
-100	-97.7	103.3	10	14	15											
-105	-102.7	108.3	10	11	14											
-110	-107.7	113.3	8	9	14											
-115	-112.7	118.3	8	10	18											
-120																
-125																
-130																
-135																
-140																
-145																
-150																

NC DOT BORE DOUBLE B4214, GEO. BRDG.GPJ, INC. DOT, GDT, 04/09/08



PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B2-B	STATION 20+84	OFFSET 70ft RT	ALIGNMENT -L-
COLLAR ELEV. -5.6 ft	TOTAL DEPTH 119.8 ft	NORTHING 368,677	EASTING 2,470,085
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 02/28/08	COMP. DATE 02/28/08	SURFACE WATER DEPTH 5.4ft	DEPTH TO ROCK 114.3 ft

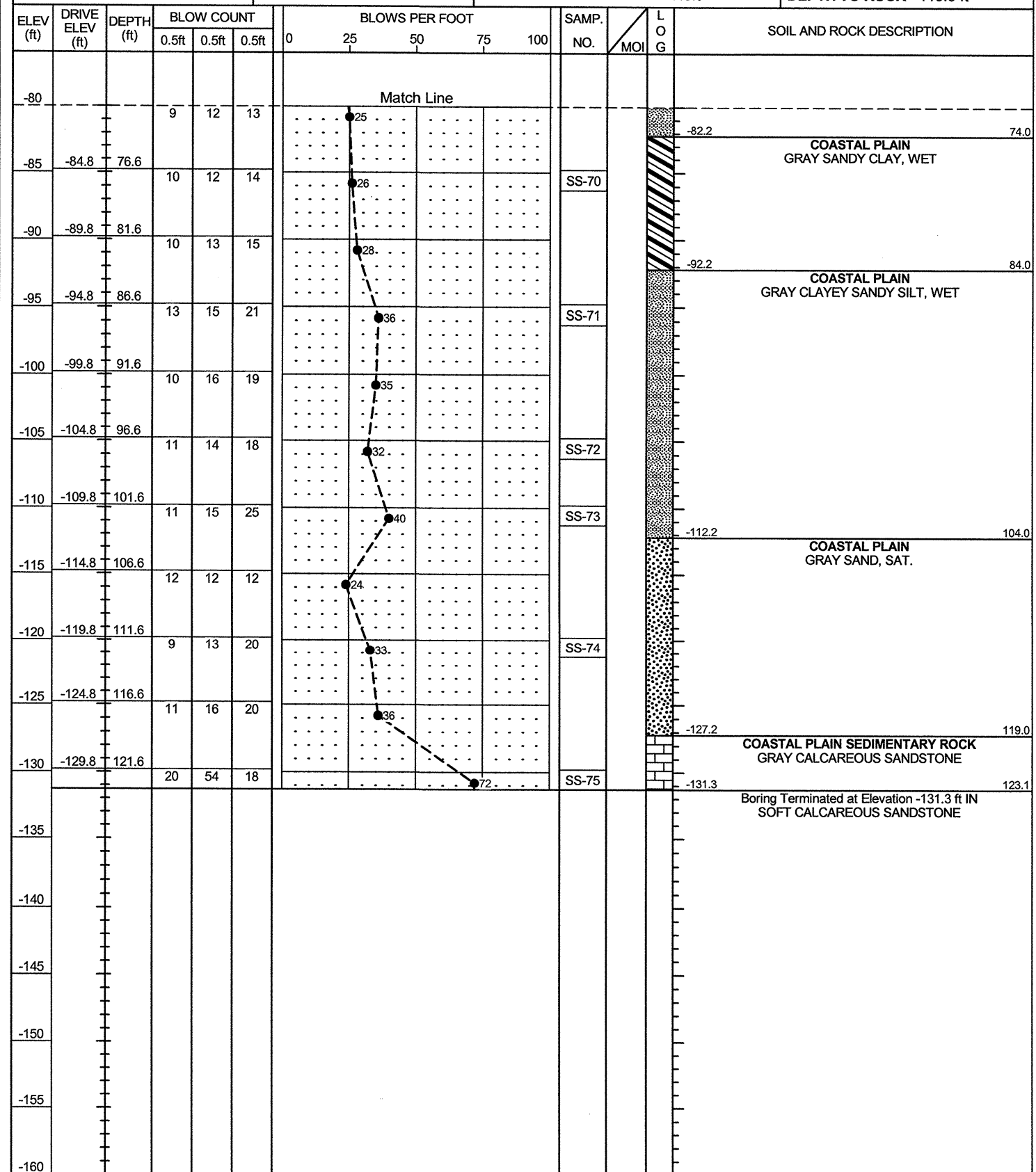
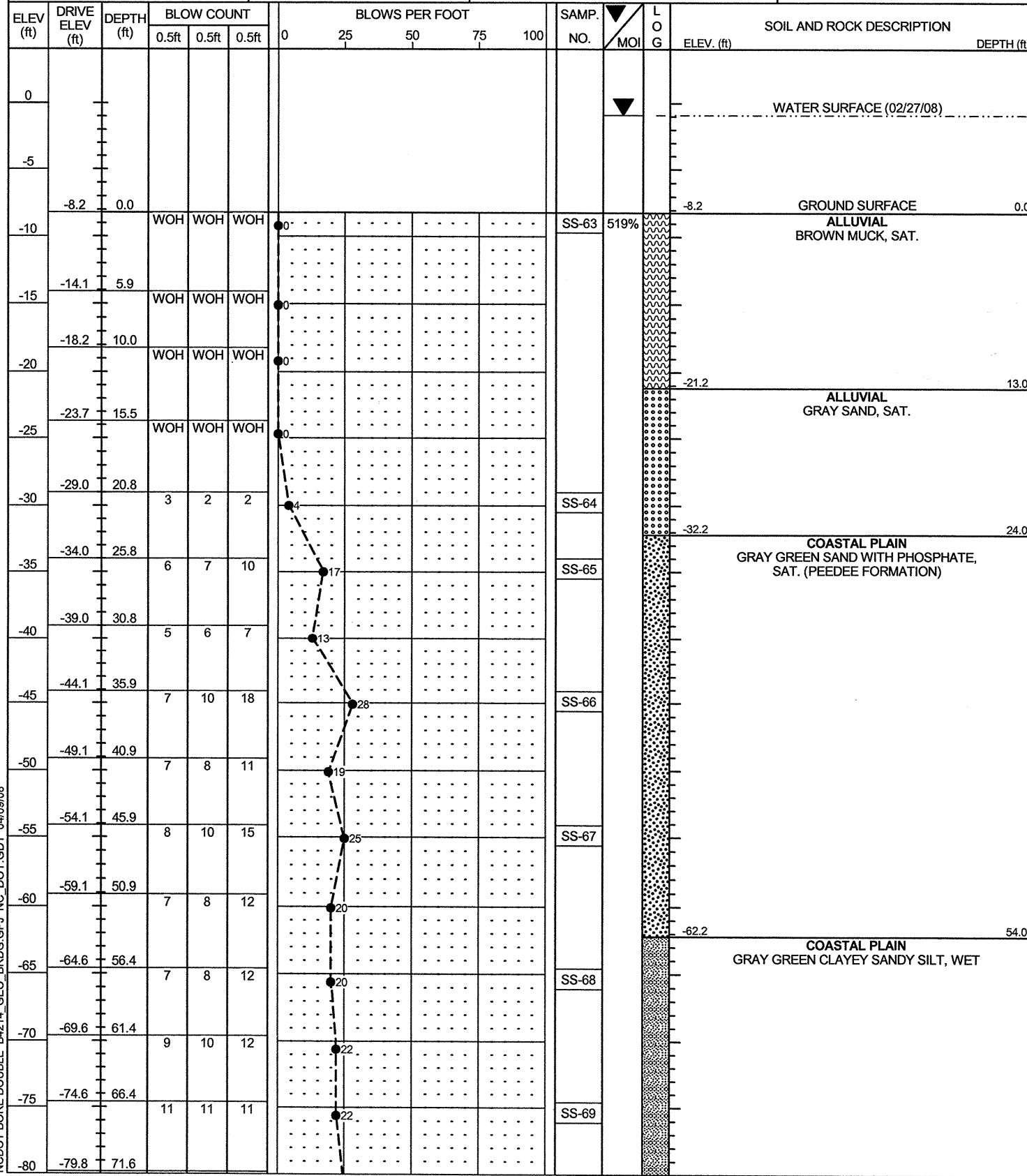
PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B2-B	STATION 20+84	OFFSET 70ft RT	ALIGNMENT -L-
COLLAR ELEV. -5.6 ft	TOTAL DEPTH 119.8 ft	NORTHING 368,677	EASTING 2,470,085
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 02/28/08	COMP. DATE 02/28/08	SURFACE WATER DEPTH 5.4ft	DEPTH TO ROCK 114.3 ft



NCDOT BORE DOUBLE B4214 GEO\_BRDG.GPJ NC\_DOT.GDT 04/09/08

PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B3-B	STATION 21+78	OFFSET 68ft RT	ALIGNMENT -L-
COLLAR ELEV. -8.2 ft	TOTAL DEPTH 123.1 ft	NORTHING 368,704	EASTING 2,470,175
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 02/27/08	COMP. DATE 02/27/08	SURFACE WATER DEPTH 7.3ft	DEPTH TO ROCK 119.0 ft

PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B3-B	STATION 21+78	OFFSET 68ft RT	ALIGNMENT -L-
COLLAR ELEV. -8.2 ft	TOTAL DEPTH 123.1 ft	NORTHING 368,704	EASTING 2,470,175
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 02/27/08	COMP. DATE 02/27/08	SURFACE WATER DEPTH 7.3ft	DEPTH TO ROCK 119.0 ft



NC DOT BORE DOUBLE B4214 GEO. BRDG. GPJ NC\_DOT.GDT 04/09/08





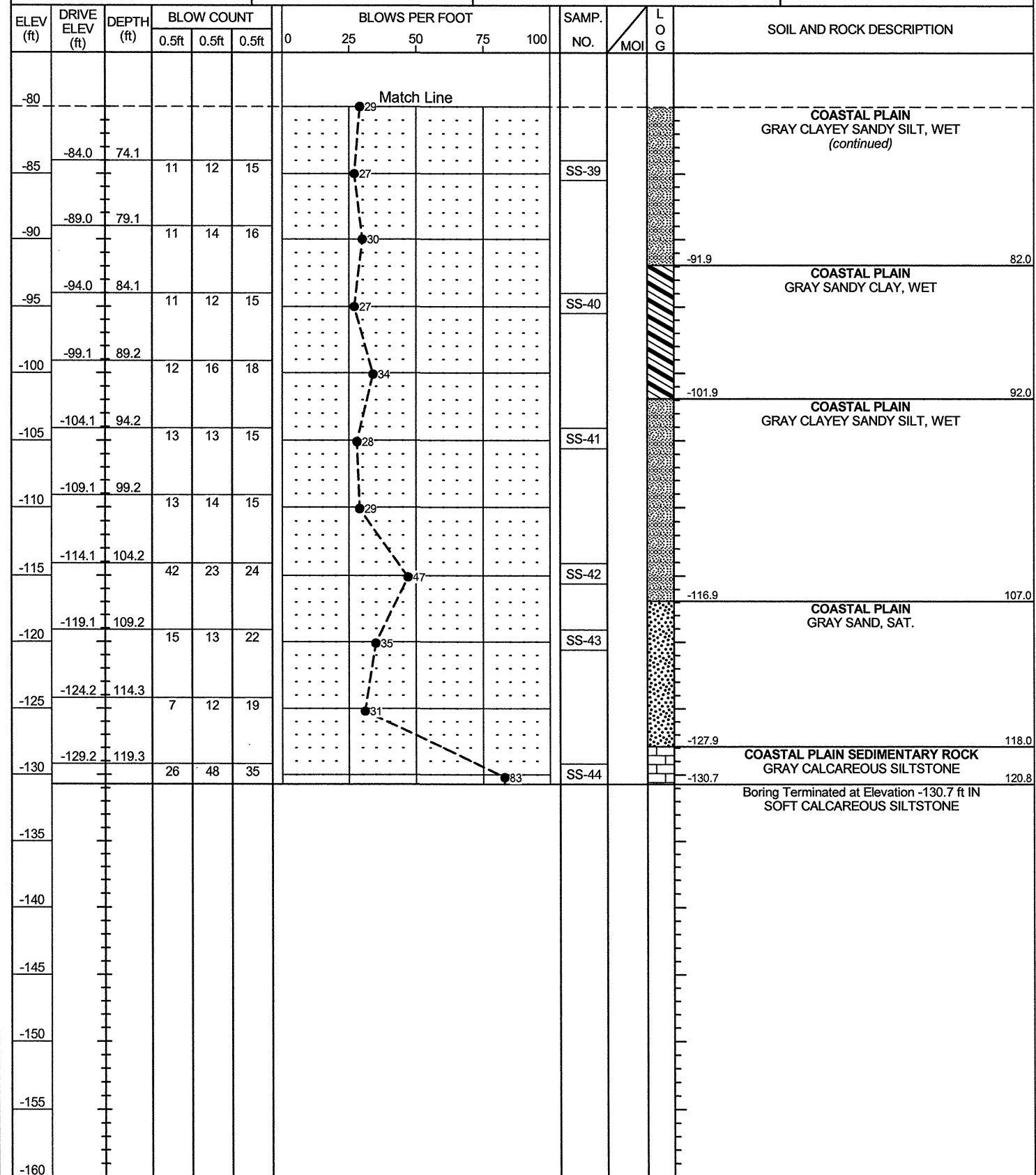
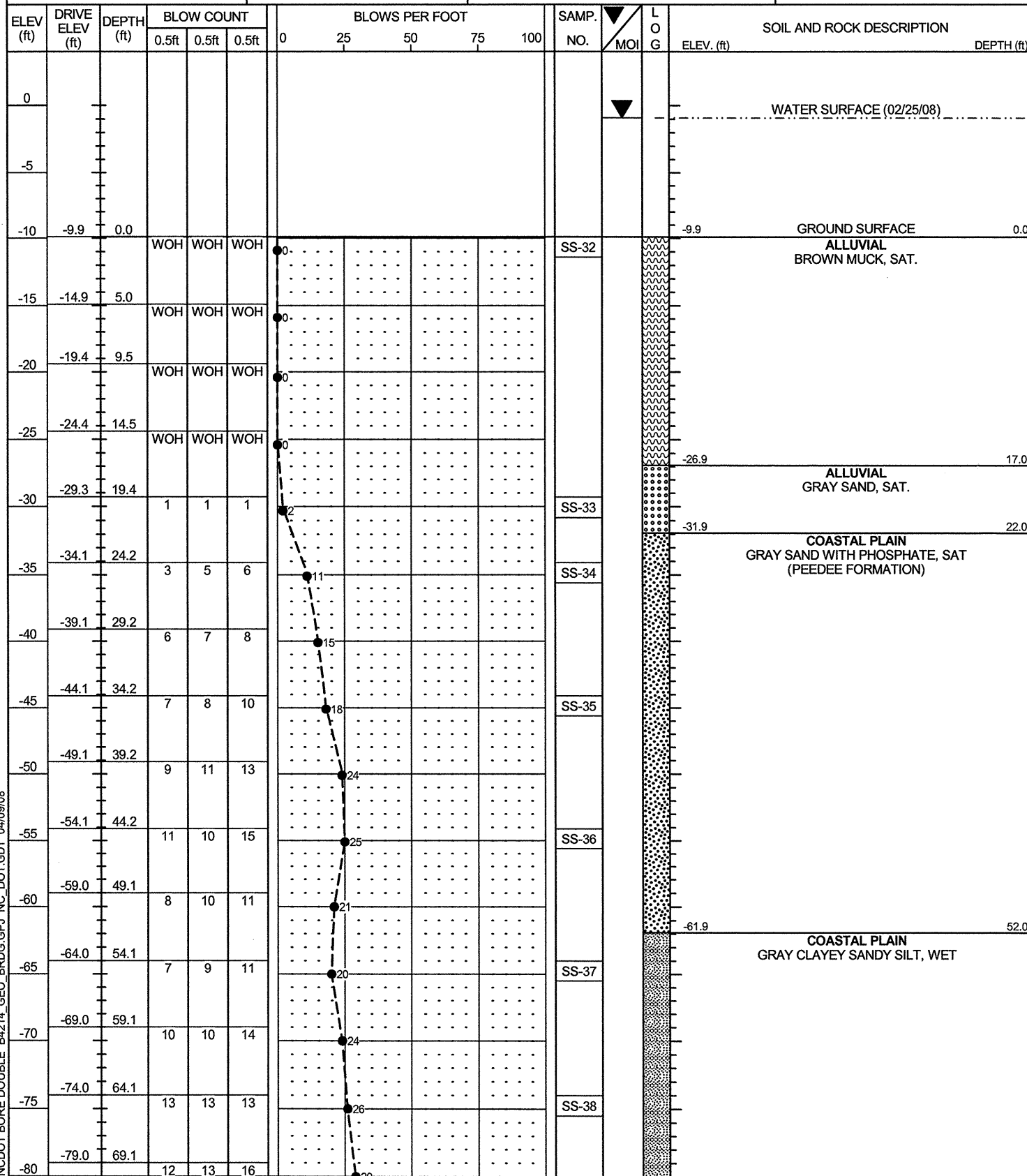


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.	
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)				GROUND WTR (ft)
BORING NO. B5-B	STATION 23+66	OFFSET 69ft RT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. -9.9 ft	TOTAL DEPTH 120.8 ft	NORTHING 368,772	EASTING 2,470,355	24 HR. N/A
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic		
START DATE 02/25/08	COMP. DATE 02/25/08	SURFACE WATER DEPTH 9.0ft	DEPTH TO ROCK 118.0 ft	

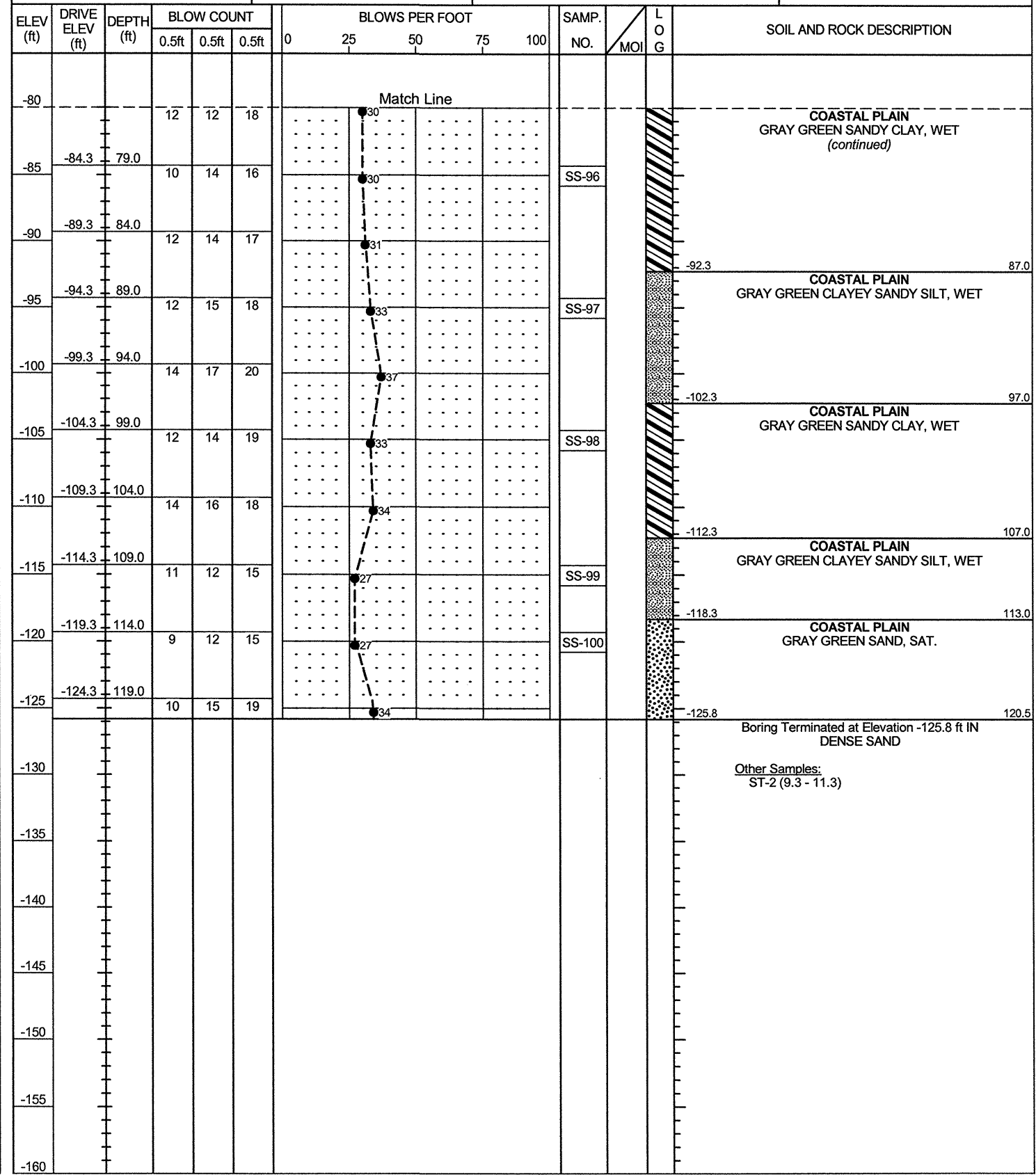
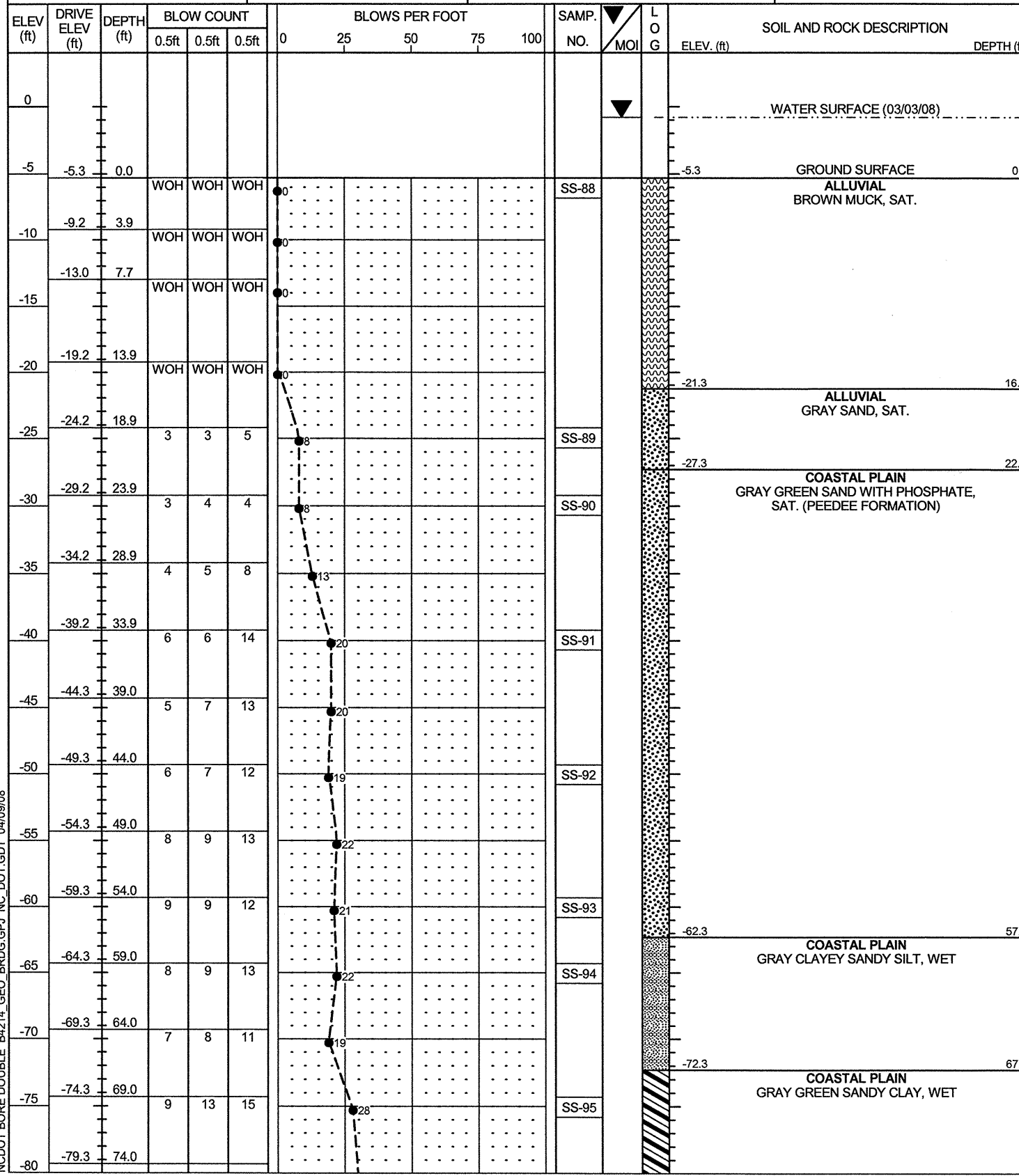
PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.	
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)				GROUND WTR (ft)
BORING NO. B5-B	STATION 23+66	OFFSET 69ft RT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. -9.9 ft	TOTAL DEPTH 120.8 ft	NORTHING 368,772	EASTING 2,470,355	24 HR. N/A
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic		
START DATE 02/25/08	COMP. DATE 02/25/08	SURFACE WATER DEPTH 9.0ft	DEPTH TO ROCK 118.0 ft	



NCDOT BORE DOUBLE B4214\_GEO\_BRDG.GPJ NC\_DOT.GDT 04/09/08

PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B6-B	STATION 24+66	OFFSET 67ft RT	ALIGNMENT -L-
COLLAR ELEV. -5.3 ft	TOTAL DEPTH 120.5 ft	NORTHING 368,793	EASTING 2,470,447
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 03/03/08	COMP. DATE 03/03/08	SURFACE WATER DEPTH 4.5ft	DEPTH TO ROCK N/A

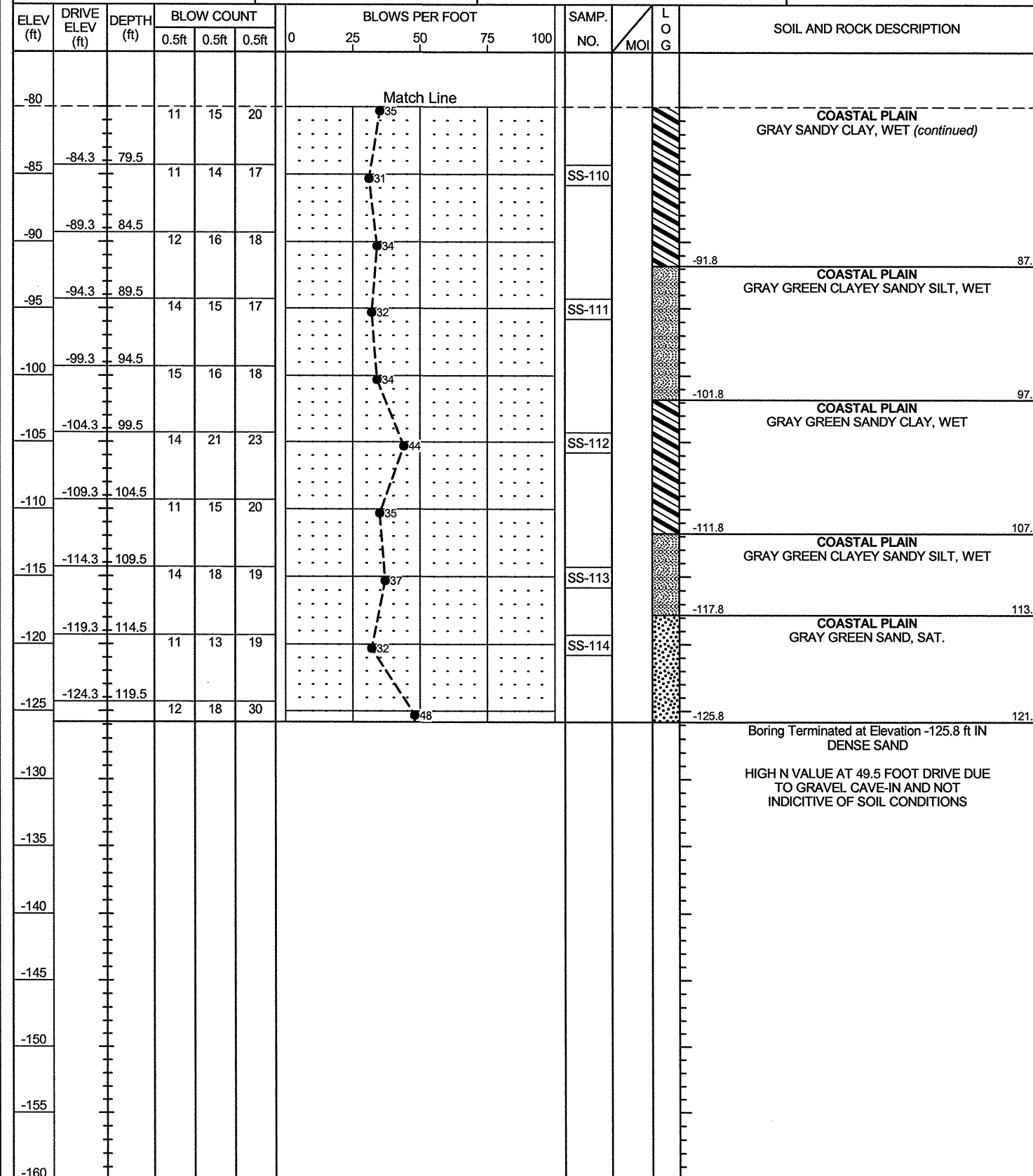
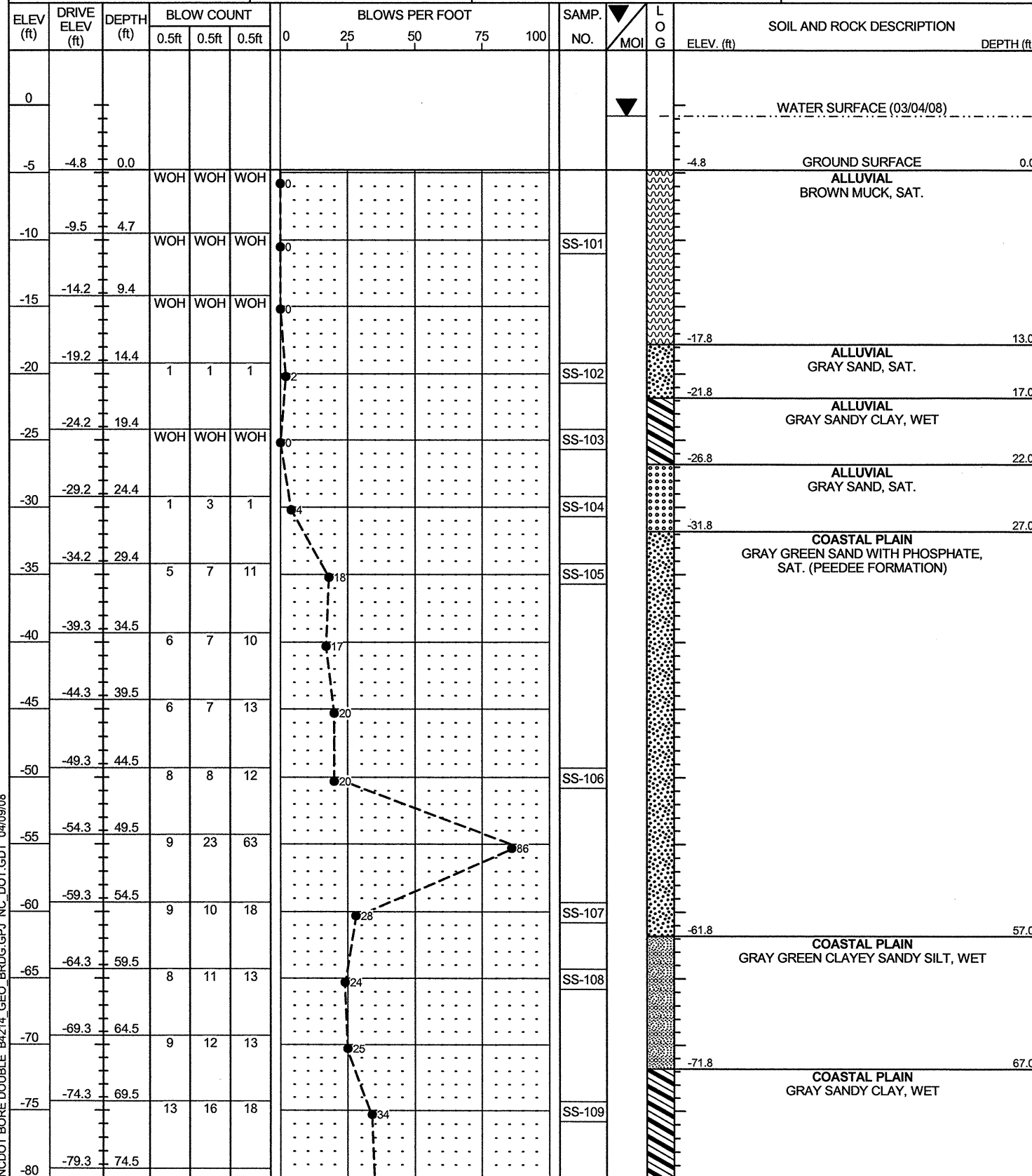
PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B6-B	STATION 24+66	OFFSET 67ft RT	ALIGNMENT -L-
COLLAR ELEV. -5.3 ft	TOTAL DEPTH 120.5 ft	NORTHING 368,793	EASTING 2,470,447
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 03/03/08	COMP. DATE 03/03/08	SURFACE WATER DEPTH 4.5ft	DEPTH TO ROCK N/A



NC DOT BORE DOUBLE B4214 GEO BRDG.GPJ NC\_DOT.GDT 04/09/08

PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B7-B	STATION 25+54	OFFSET 70ft RT	ALIGNMENT -L-
COLLAR ELEV. -4.8 ft	TOTAL DEPTH 121.0 ft	NORTHING 368,816	EASTING 2,470,531
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 03/04/08	COMP. DATE 03/04/08	SURFACE WATER DEPTH 4.0ft	DEPTH TO ROCK N/A

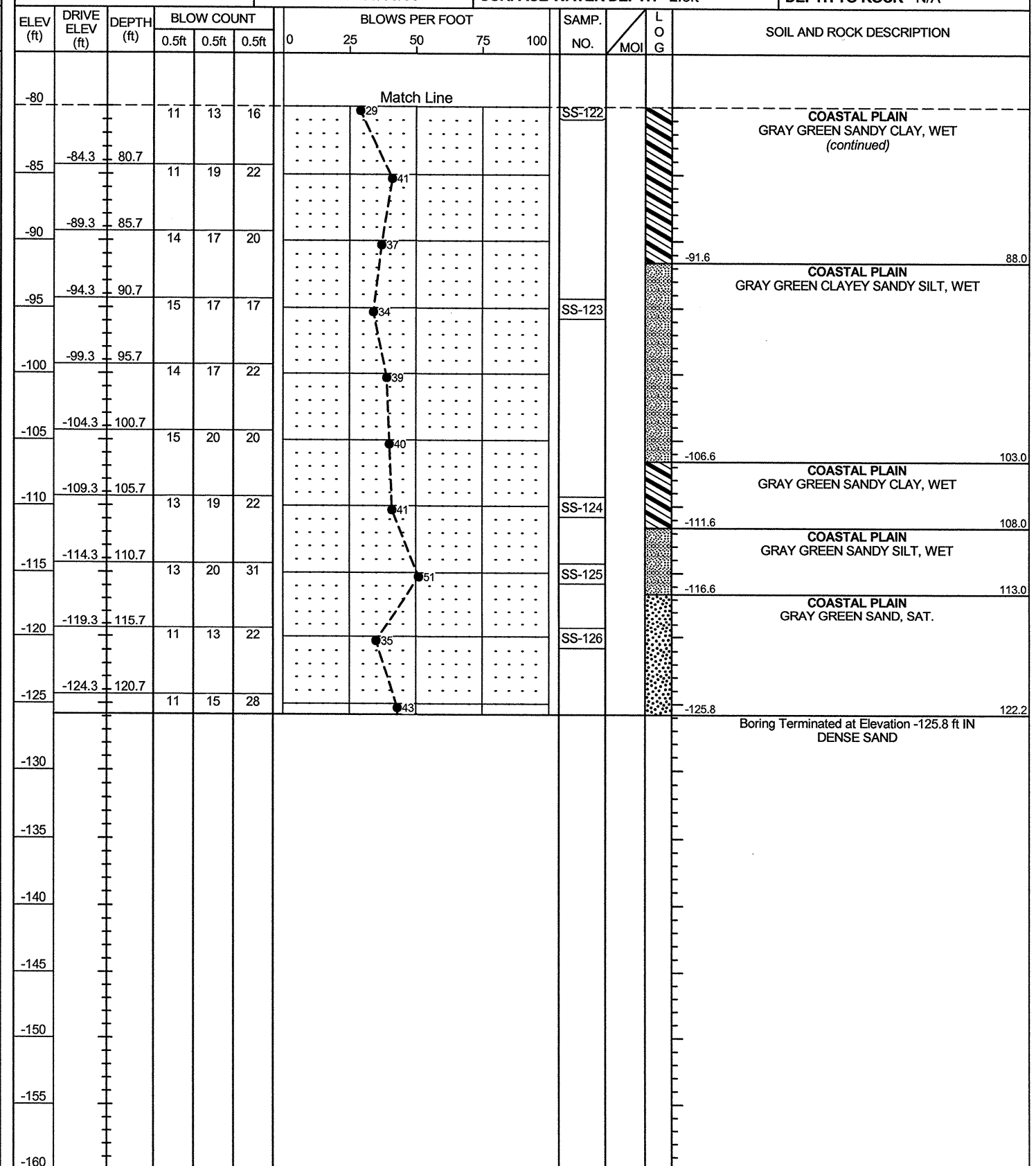
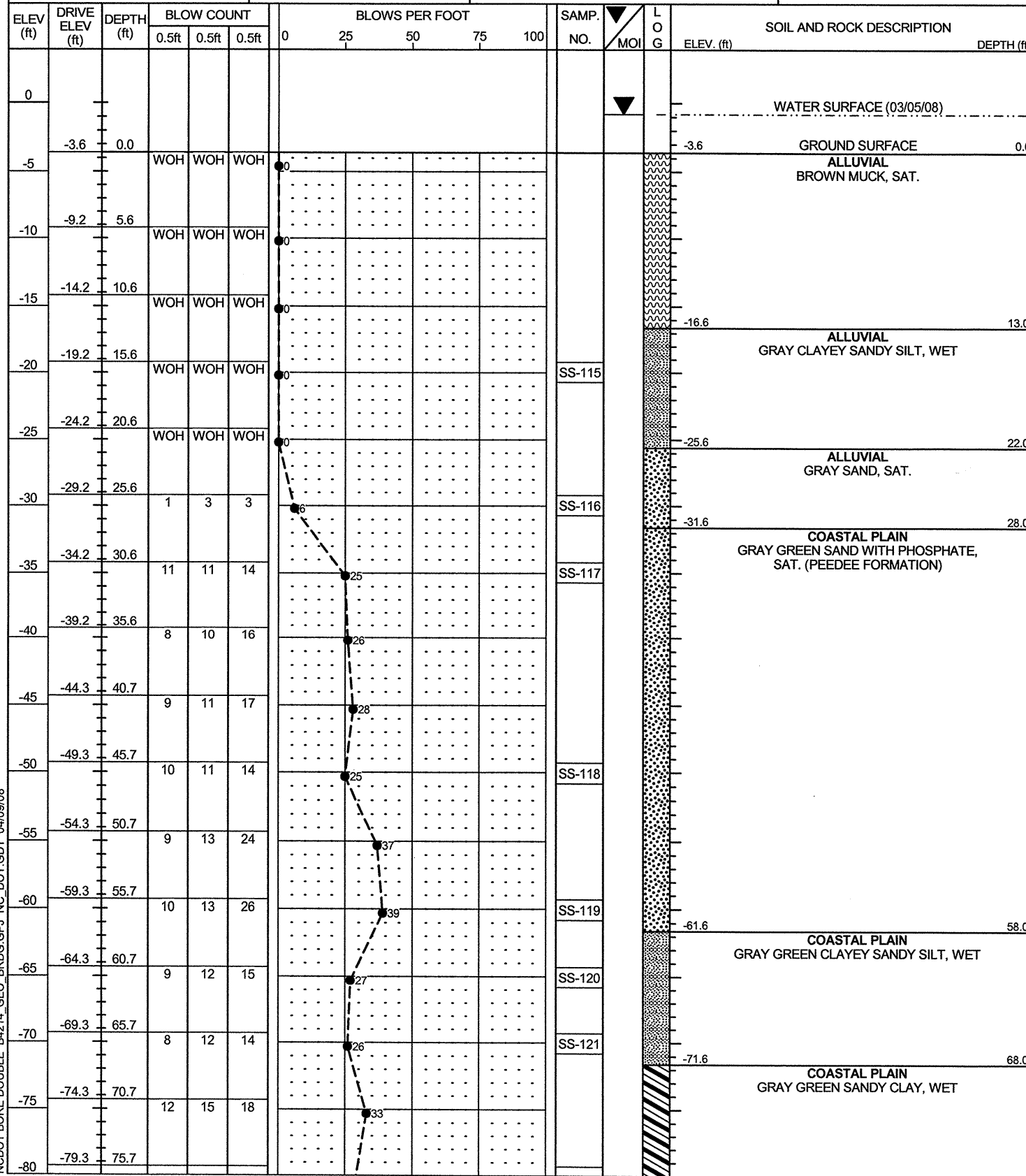
PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B7-B	STATION 25+54	OFFSET 70ft RT	ALIGNMENT -L-
COLLAR ELEV. -4.8 ft	TOTAL DEPTH 121.0 ft	NORTHING 368,816	EASTING 2,470,531
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 03/04/08	COMP. DATE 03/04/08	SURFACE WATER DEPTH 4.0ft	DEPTH TO ROCK N/A



NC DOT BORE DOUBLE B4214\_GEO\_BRDG.GPJ NC\_DOT\_GDT 04/09/08

PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B8-B	STATION 26+42	OFFSET 72ft RT	ALIGNMENT -L-
COLLAR ELEV. -3.6 ft	TOTAL DEPTH 122.2 ft	NORTHING 368,833	EASTING 2,470,614
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 03/05/08	COMP. DATE 03/05/08	SURFACE WATER DEPTH 2.8ft	DEPTH TO ROCK N/A

PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Bottoms, T. C.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. B8-B	STATION 26+42	OFFSET 72ft RT	ALIGNMENT -L-
COLLAR ELEV. -3.6 ft	TOTAL DEPTH 122.2 ft	NORTHING 368,833	EASTING 2,470,614
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 03/05/08	COMP. DATE 03/05/08	SURFACE WATER DEPTH 2.8ft	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE B4214\_GEO\_BRDG.GPJ NC\_DOT\_GDT 04/09/08

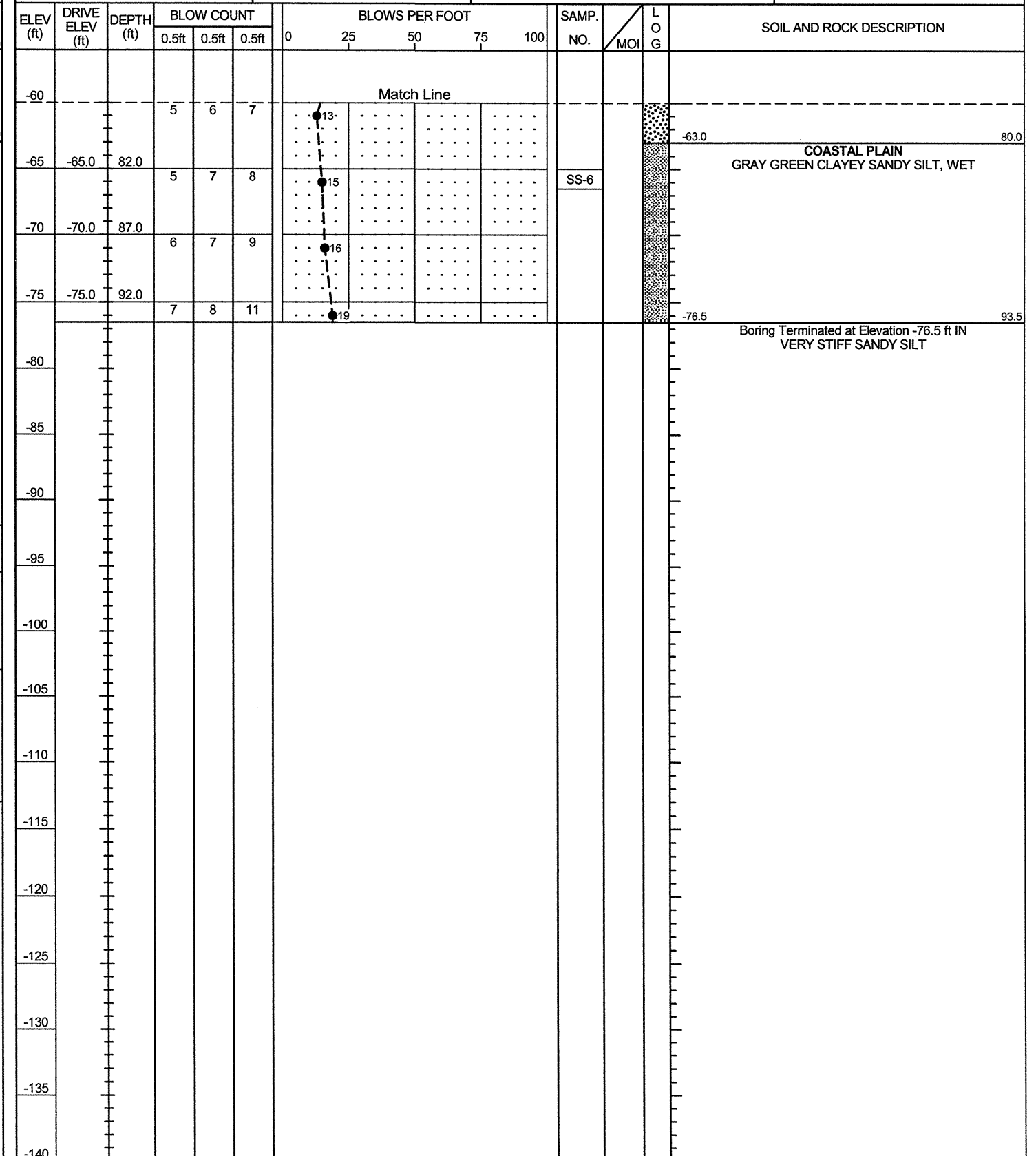
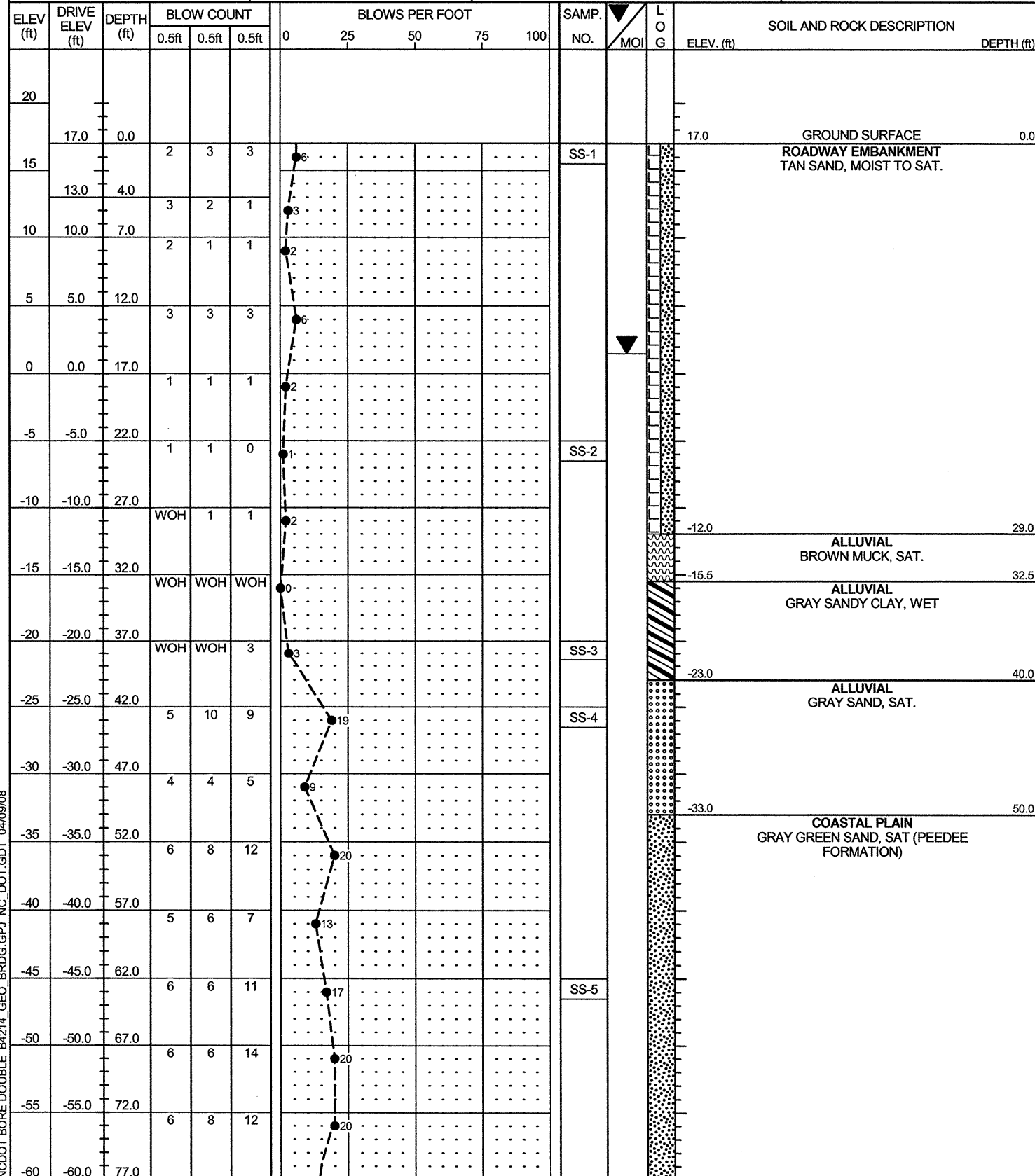


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Wescott, F. M.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. EB2-A	STATION 27+35	OFFSET 30ft LT	ALIGNMENT -L-
COLLAR ELEV. 17.0 ft	TOTAL DEPTH 93.5 ft	NORTHING 368,963	EASTING 2,470,674
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 11/04/04	COMP. DATE 11/04/04	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 33560.1.1	ID. B-4214	COUNTY ONSLOW	GEOLOGIST Wescott, F. M.
SITE DESCRIPTION BRIDGE NO. 24 OVER NEW RIVER ON US 17 (BUSINESS)			GROUND WTR (ft)
BORING NO. EB2-A	STATION 27+35	OFFSET 30ft LT	ALIGNMENT -L-
COLLAR ELEV. 17.0 ft	TOTAL DEPTH 93.5 ft	NORTHING 368,963	EASTING 2,470,674
DRILL MACHINE CME-45B	DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
START DATE 11/04/04	COMP. DATE 11/04/04	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE B4214 GEO BRDG.GPJ NC.DOT.GDT 04/09/08

BRIDGE NO. 24 OVER NEW RIVER ON US 17

(B-4214)  
SHEET 15 OF 19

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
EB2-A	SS-1	94	85	16	20.7	65.6	5.7	8.0	16	NP	A-2-4(0)	1.00-1.50		
	SS-2	98	80	15	68.8	16.4	2.7	12.0	19	NP	A-2-4(0)	22.00-23.50		
	SS-3	100	99	64	28.1	12.2	25.6	34.1	23	11	A-6(4)	37.00-38.50		
	SS-4	100	74	9	38.7	54.6	2.7	4.0	21	NP	A-3(0)	42.00-43.50		
	SS-5	100	99	26	4.2	75.8	5.9	14.0	23	NP	A-2-4(0)	62.00-63.50		
	SS-6	100	99	59	16.9	45.5	17.6	20.1	26	3	A-4(0)	82.00-83.50		
EB1-B	SS-10	100	98	16	6.2	83.7	4.1	6.0	24	NP	A-2-4(0)	0.30-1.80		
	SS-11	100	99	27	0.8	75.0	6.1	18.1	24	NP	A-2-4(0)	8.30-9.80		
	SS-12	100	100	36	0.4	69.2	10.3	20.1	22	1	A-4(0)	18.30-19.80		
	SS-13	100	100	31	0.6	73.6	11.7	14.0	20	NP	A-2-4(0)	28.30-29.80		
	SS-14	100	99	30	4.4	73.2	12.3	10.0	22	NP	A-2-4(0)	38.30-39.80		
	SS-15	100	99	25	2.2	78.8	8.9	10.0	25	NP	A-2-4(0)	48.30-49.80		
	SS-16	100	99	27	2.0	80.0	7.9	10.0	25	NP	A-2-4(0)	58.30-59.80		
	SS-17	100	100	52	0.6	65.6	15.7	18.1	24	1	A-4(0)	68.30-69.80		
SS-18	100	100	72	0.6	45.1	26.2	28.1	34	12	A-6(7)	78.30-79.80			
B1-A	SS-19	95	90	17	7.8	79.0	7.1	6.0	23	NP	A-2-4(0)	1.00-1.50		
	SS-20	96	93	16	12.2	74.4	11.3	2.0	38	NP	A-2-4(0)	4.00-5.50	76.00%	7.10%
	SS-21	100	99	23	1.2	80.8	7.9	10.0	27	NP	A-2-4(0)	8.30-9.80		
	SS-22	100	99	34	1.0	69.4	13.5	16.0	22	NP	A-2-4(0)	18.30-19.80	27.00%	
	SS-23	100	100	26	1.2	75.8	10.9	12.0	19	NP	A-2-4(0)	28.30-29.80		
	SS-24	100	99	25	42.1	33.5	10.3	14.0	22	NP	A-2-4(0)	43.30-44.80		
	SS-25	100	98	22	38.5	40.5	10.9	10.0	23	NP	A-2-4(0)	53.30-54.80		
	SS-26	100	100	42	0.6	69.0	12.3	18.1	24	NP	A-4(0)	63.30-64.80		
	SS-27	100	99	61	0.8	52.2	21.0	26.1	31	11	A-6(4)	73.30-74.80		
	SS-28	100	99	78	0.6	39.9	29.4	30.1	36	16	A-6(12)	78.30-79.80		
	SS-29	100	99	79	0.8	42.7	32.4	24.1	35	11	A-6-(8)	93.30-94.80		
	SS-30	100	99	71	0.8	43.5	31.6	24.1	31	6	A-4(3)	108.30-109.80		
	SS-31	100	99	41	2.4	63.0	16.5	18.1	22	3	A-4(0)	113.30-114.80		
B5-B	SS-32	100	87	68	20.1	13.3	38.5	28.1	93	20	A-7-5(21)	1.00-1.50		25.80%
	SS-33	100	89	6	35.4	59.5	3.1	2.0	22	NP	A-3(0)	19.40-20.90		
	SS-34	100	99	25	3.6	76.1	8.2	12.1	23	NP	A-2-4(0)	24.20-25.70		
	SS-35	100	100	28	3.1	74.1	9.7	13.1	21	NP	A-2-4(0)	34.20-35.70		
	SS-36	100	99	28	4.8	75.4	7.7	12.1	23	NP	A-2-4(0)	44.20-45.70		
	SS-37	100	100	55	0.2	62.1	17.6	20.1	25	3	A-4(0)	54.10-55.60		
	SS-38	100	100	62	0.2	51.3	22.4	26.1	31	9	A-4(0)	64.10-65.60		

BRIDGE NO. 24 OVER NEW RIVER ON US 17

(B-4214)  
SHEET 16 OF 19

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
<b>B5-B CONT.</b>	SS-39	100	100	72	0.0	46.2	29.6	24.1	35	10	A-4(6)	74.10-75.60		
	SS-40	100	100	80	0.0	39.4	34.5	26.1	34	12	A-6(9)	84.10-85.60		
	SS-41	100	100	74	0.0	39.4	36.5	24.1	34	10	A-4(7)	94.20-95.70		
	SS-42	100	100	51	1.6	52.7	23.6	22.1	23	5	A-4(0)	104.20-105.70		
	SS-43	100	99	30	2.0	71.0	13.0	14.1	20	NP	A-2-4(0)	109.20-110.70		
	SS-44	100	98	55	5.8	53.3	18.8	22.1	21	3	A-4(0)	119.30-120.80		
<b>B4-B</b>	SS-50	100	92	77	12.2	11.4	38.2	38.2	109	39	A-7-5(41)	4.50-6.00		24.40%
	SS-51	100	93	8	18.5	74.5	5.0	2.0	22	NP	A-3(0)	19.00-20.50		
	SS-52	100	100	29	2.8	75.1	12.0	10.0	22	NP	A-2-4(0)	24.00-25.50		
	SS-53	100	100	29	2.8	74.5	12.7	10.0	23	NP	A-2-4(0)	34.00-35.50		
	SS-54	100	100	27	2.2	76.9	10.8	10.0	23	NP	A-2-4(0)	44.00-45.50		
	SS-55	98	97	55	1.2	61.4	19.3	18.1	24	5	A-4(0)	54.10-55.60		
	SS-56	100	100	54	0.2	59.2	20.5	20.1	25	3	A-4(0)	59.10-60.60		
	SS-57	100	100	74	0.2	42.4	33.3	24.1	33	10	A-4(6)	69.10-70.60		
	SS-58	100	100	79	0.0	42.2	35.7	22.1	32	12	A-6(8)	79.10-80.60		
	SS-59	100	100	85	0.8	32.1	43.0	24.1	36	12	A-6(10)	89.10-90.60		
	SS-60	100	100	60	0.6	48.6	28.7	22.1	28	7	A-4(2)	99.00-100.50		
	SS-61	100	99	28	2.2	72.5	13.3	12.0	21	NP	A-2-4(0)	109.00-110.50		
	SS-62	99	99	41	4.0	62.4	13.5	20.1	25	NP	A-4(0)	118.90-120.20		
<b>B3-B</b>	SS-63	100	86	59	22.9	21.3	27.6	28.2	84	30	A-7-5(19)	1.00-1.50		519.00%
	SS-64	100	100	5	1.4	95.1	1.5	2.0	15	NP	A-3(0)	20.80-22.30		
	SS-65	100	99	29	3.4	73.8	10.7	12.1	23	NP	A-2-4(0)	25.80-27.30		
	SS-66	100	99	28	3.0	74.8	10.1	12.1	24	NP	A-2-4(0)	35.90-37.40		
	SS-67	100	99	31	2.6	76.7	8.7	12.1	24	NP	A-2-4(0)	45.90-47.40		
	SS-68	100	100	51	0.6	62.4	16.9	20.1	24	2	A-4(0)	56.40-57.90		
	SS-69	100	100	66	0.4	47.7	23.7	28.2	30	9	A-4(4)	66.40-67.90		
	SS-70	100	100	76	0.2	43.5	32.2	24.1	34	11	A-6(8)	76.60-78.10		
	SS-71	100	100	81	0.2	37.4	36.2	26.2	32	8	A-4(6)	86.60-88.10		
	SS-72	100	100	72	0.2	41.9	33.8	24.1	31	8	A-4(5)	96.60-98.10		
	SS-73	100	100	49	1.0	59.6	19.3	20.1	23	3	A-4(0)	101.60-103.10		
	SS-74	100	100	27	1.6	74.2	8.0	16.1	22	NP	A-2-4(0)	111.60-113.10		
	SS-75	100	93	39	16.9	50.7	12.3	20.1	20	NP	A-4(0)	121.60-123.10		
<b>B2-B</b>	SS-76	100	100	68	0.6	39.6	27.6	32.2	31	17	A-6(9)	12.60-14.10		
	SS-77	100	100	8	7.7	85.7	4.5	2.0	19	NP	A-3(0)	17.60-19.10		
	SS-78	100	100	31	3.4	72.0	12.6	12.1	21	NP	A-2-4(0)	27.80-29.30		
	SS-79	100	99	27	5.4	74.4	8.1	12.1	22	NP	A-2-4(0)	37.80-39.30		



## BRIDGE NO. 24 OVER NEW RIVER ON US 17

(B-4214)  
SHEET 17 OF 19

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
B2-B CONT.	SS-80	100	94	21	15.1	70.6	5.3	9.0	22	NP	A-2-4(0)	47.80-49.30		
	SS-81	100	100	48	0.2	63.9	15.8	20.1	25	2	A-4(0)	58.10-59.60		
	SS-82	100	100	72	0.4	43.2	28.2	28.1	34	10	A-4(6)	68.10-69.60		
	SS-83	100	100	79	0.2	39.8	35.9	24.1	32	9	A-4(6)	78.10-79.60		
	SS-84	100	100	82	0.2	37.2	38.5	24.1	34	11	A-6(9)	88.10-89.60		
	SS-85	100	100	70	0.2	43.6	32.1	24.1	30	7	A-4(4)	98.30-99.80		
	SS-86	100	100	36	0.8	66.5	12.6	20.1	23	3	A-4(0)	108.30-109.80		
	SS-87	100	99	23	3.2	76.8	5.9	14.1	24	NP	A-2-4(0)	118.30-119.80		
B6-B	SS-88	100	92	47	17.1	40.0	22.7	20.1	78	15	A-7-5(6)	1.00-1.50		
	SS-89	100	100	13	0.6	90.1	4.2	5.0	22	NP	A-2-4(0)	18.90-20.40		
	SS-90	100	100	23	0.9	79.2	5.8	14.1	23	NP	A-2-4(0)	23.90-25.40		
	SS-91	100	99	35	3.5	71.3	11.1	14.1	22	NP	A-2-4(0)	33.90-35.40		
	SS-92	100	98	26	4.1	74.8	7.9	13.1	23	NP	A-2-4(0)	44.00-45.50		
	SS-93	100	100	29	1.8	77.1	7.0	14.1	23	NP	A-2-4(0)	54.00-55.50		
	SS-94	100	100	55	0.2	61.2	16.5	22.1	25	6	A-4(1)	59.00-60.50		
	SS-95	100	100	67	0.2	47.9	23.7	28.2	33	16	A-6(8)	69.00-70.50		
	SS-96	100	100	71	0.2	46.5	29.2	24.1	34	12	A-6(7)	79.00-80.50		
	SS-97	100	100	76	0.0	39.6	36.2	24.1	31	6	A-4(4)	89.00-90.50		
	SS-98	100	100	76	0.0	39.0	34.8	26.2	33	11	A-6(7)	99.00-100.50		
	SS-99	100	100	43	0.6	60.8	16.5	22.1	25	6	A-4(0)	109.00-110.50		
	SS-100	100	99	20	2.0	80.7	4.2	13.1	24	NP	A-2-4(0)	114.00-115.50		
B7-B	SS-101	100	96	33	9.9	62.0	18.1	10.1	45	5	A-2-5(0)	4.70-6.20		
	SS-102	100	100	23	2.2	81.1	4.6	12.1	20	NP	A-2-4(0)	14.40-15.90		
	SS-103	100	100	75	1.0	31.4	27.4	40.2	31	12	A-6(7)	19.40-20.90		
	SS-104	90	61	5	47.8	47.5	1.7	3.0	16	NP	A-3(0)	24.40-25.90		
	SS-105	100	99	23	1.8	78.5	7.6	12.1	22	NP	A-2-4(0)	29.40-30.90		
	SS-106	99	98	32	3.3	70.0	13.6	13.1	22	NP	A-2-4(0)	44.50-46.00		
	SS-107	97	97	28	2.0	77.1	8.9	12.1	24	NP	A-2-4(0)	54.50-56.00		
	SS-108	100	100	52	0.2	62.8	14.9	22.1	25	NP	A-4(0)	59.50-61.00		
	SS-109	100	100	67	0.2	48.1	23.5	28.2	31	11	A-6(5)	69.50-71.00		
	SS-110	100	100	75	0.4	39.6	31.8	28.2	35	12	A-6(8)	79.50-81.00		
	SS-111	100	99	77	0.8	40.7	34.3	24.2	33	9	A-4(6)	89.50-91.00		
	SS-112	100	99	81	1.0	33.2	37.6	28.2	36	14	A-6(11)	99.50-101.00		
	SS-113	100	100	45	1.0	58.4	18.4	22.2	22	NP	A-4(0)	109.50-111.00		
	SS-114	100	99	28	2.0	72.5	9.4	16.1	21	NP	A-2-4(0)	114.50-116.00		

BRIDGE NO. 24 OVER NEW RIVER ON US 17

(B-4214)  
SHEET 18 OF 19

HOLE #	SAMPLE #	PASS 10	PASS 40	PASS 200	CSESAND	FINESAND	SI	CL	LL	PI	CLASS	DEPTH	MOIST.	ORG.
B8-B	SS-115	100	100	60	0.2	46.5	19.0	34.2	23	9	A-4(2)	15.60-17.10		
	SS-116	100	97	14	4.2	85.4	5.3	5.0	23	NP	A-2-4(0)	25.60-27.10		
	SS-117	100	100	33	1.4	69.3	15.2	14.1	19	NP	A-2-4(0)	30.60-32.10		
	SS-118	100	99	30	3.0	73.7	9.2	14.1	22	NP	A-2-4(0)	45.70-47.20		
	SS-119	100	97	27	5.2	74.5	8.2	12.1	23	NP	A-2-4(0)	55.70-57.20		
	SS-120	100	99	40	1.0	71.5	9.4	18.1	22	NP	A-4(0)	60.70-62.20		
	SS-121	100	99	50	0.8	63.6	15.4	20.1	23	2	A-4(0)	65.70-67.20		
	SS-122	100	100	70	0.4	44.1	25.3	30.2	34	11	A-6(7)	75.70-77.20		
	SS-123	100	100	72	0.4	42.1	33.3	24.2	31	10	A-4(6)	90.70-92.20		
	SS-124	100	100	77	0.2	40.7	34.9	24.2	37	13	A-6(10)	105.70-107.20		
	SS-125	100	100	40	1.6	63.4	16.8	18.1	23	NP	A-4(0)	110.70-112.20		
	SS-126	100	99	30	1.8	71.5	10.6	16.1	21	NP	A-2-4(0)	115.70-117.20		



## FIELD SCOUR REPORT

WBS: 33560.1.1 TIP: B-4214 COUNTY: Onslow

DESCRIPTION(1): BRIDGE NO. 24 ON US 17 OVER NEW RIVER

### EXISTING BRIDGE

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

Bridge No.: 24 Length: 766 Total Bents: 23 Bents in Channel: 21 Bents in Floodplain: 2  
 Foundation Type: CONCRETE PILES

#### EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: NONE NOTED

Interior Bents: NONE NOTED

Channel Bed: NONE NOTED

Channel Bank: NONE NOTED

#### EXISTING SCOUR PROTECTION

Type(3): CONCRETE END WALLS

Extent(4): 4' OUTSIDE EDGE OF BRIDGE

Effectiveness(5): EFFECTIVE

Obstructions(6): NONE NOTED

#### 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 (SS-63)

Channel Bank Material(8): MODERATELY ORGANIC SAND (SS-20) AND MUCK

Channel Bank Cover(9): GRASS AND SHRUBS

Floodplain Width(10): APPROX. 900'

Floodplain Cover(11): URBAN DEVELOPMENT AND MARSH

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

Channel Migration Tendency(13): SLIGHT TO THE EAST TOWARD END BENT 2

Observations and Other Comments: \_\_\_\_\_

#### DESIGN SCOUR ELEVATIONS(14)

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

	BENTS									
	B1	B2	B3	B4	B5	B6	B7	B8		
HURRICANE SCOUR	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0	-25.0		

Comparison of DSE to Hydraulics Unit theoretical scour:

Geotechnical analysis agrees with the maximum theoretical scour elevation of -25.0 feet for all of the interior bents as outlined on the Bridge Survey and Hydraulic Design Report.

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

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

See Sheet 15 AND 16  
 "Soil Test Results",  
 for samples:  
 SS-63 (CHANNEL BED)  
 SS-20 (CHANNEK BANK)

Reported by: *[Signature]* Date: 4-8-08