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REFERENCE: B-5236

PROJECT: 42840

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY New Hanover  
 PROJECT DESCRIPTION Bridge No. 19 over Lords Creek on  
SR 1100 at -L- Station 15+60.59

SITE DESCRIPTION \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**CONTENTS**

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-7	CROSS SECTIONS
8-15	BORE LOG REPORTS, CORE BORING REPORT & CORE PHOTOGRAPH
16	SOIL LABORATORY TESTS RESULTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5236	1	16

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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.

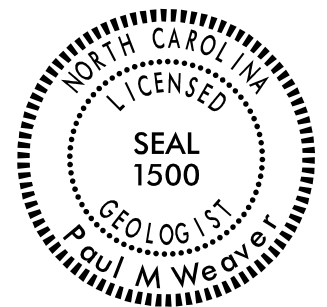
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT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

- NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
  2. 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.

PERSONNEL

B. Fowler  
M. Small  
P. Weaver

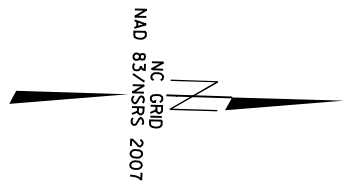
INVESTIGATED BY P. Weaver  
 DRAWN BY P. Petrucci  
 CHECKED BY P. Weaver  
 SUBMITTED BY ESP Associates, PA  
 DATE April, 2015



DocuSigned by:  
Paul Weaver 5/15/2015  
 01847D3739AD49C...  
 SIGNATURE DATE

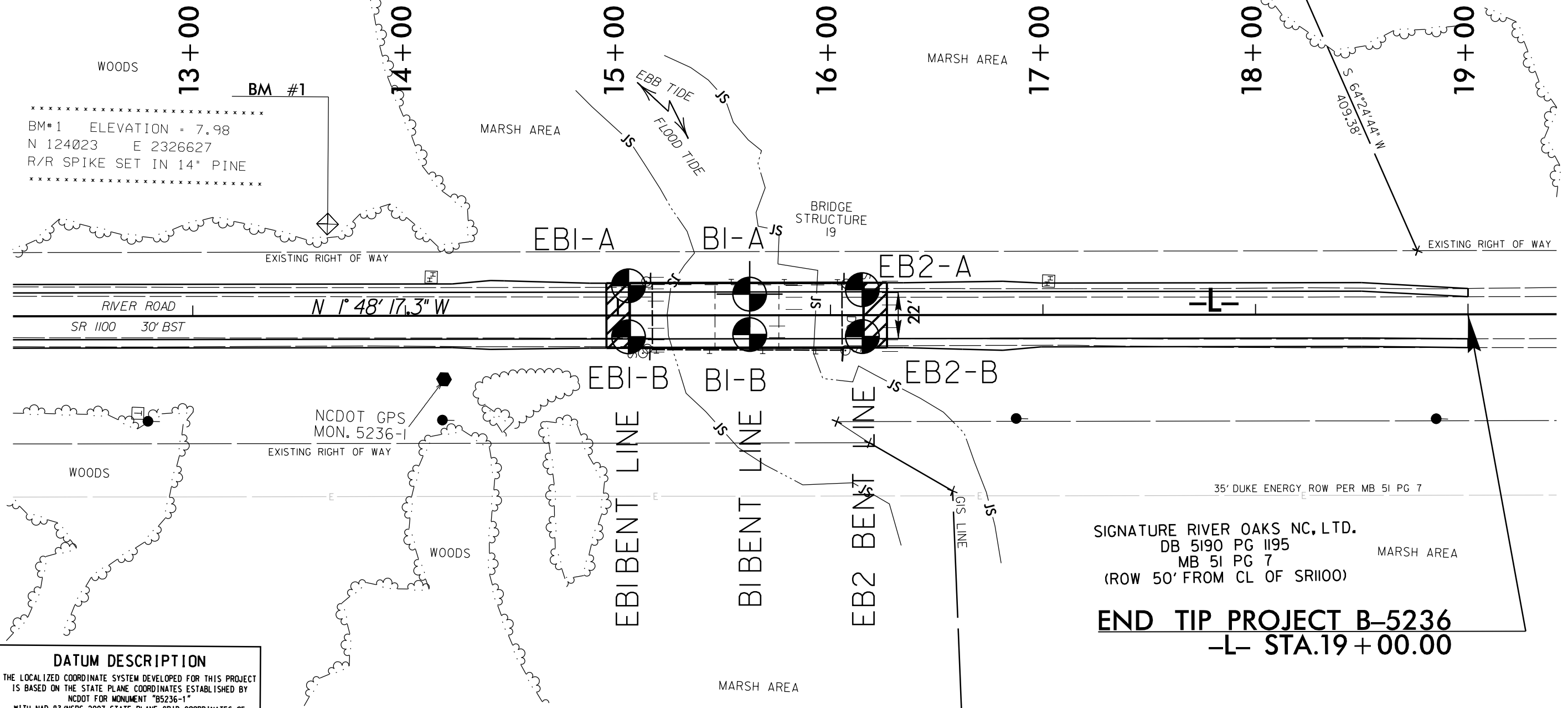
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT  
SUBSURFACE INVESTIGATION  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																			
SOIL IS CONSIDERED 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 THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, 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, SUCH 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 (ROD) - 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. SLICKENISES - 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 (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - 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>ANGULARITY OF GRAINS</b>										<b>WEATHERED ROCK (WR)</b>										<b>CRYSTALLINE ROCK (CR)</b>																			
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										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.																			
<b>MINERALOGICAL COMPOSITION</b>										<b>MINERALOGICAL COMPOSITION</b>										<b>NON-CRYSTALLINE ROCK (NCR)</b>										<b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>																			
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										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.																			
<b>COMPRESSION</b>										<b>COMPRESSION</b>										<b>WEATHERING</b>										<b>WEATHERING</b>																			
SLIGHTLY COMPRESSIBLE LL < 31										SLIGHTLY COMPRESSIBLE LL < 31										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.										VERY SLIGHT (IV SLI.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.																			
<b>PERCENTAGE OF MATERIAL</b>										<b>PERCENTAGE OF MATERIAL</b>										SLIGHT (SLI.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.										MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.																			
ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL										ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL										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, WOULD YIELD SPT N VALUES > 100 BPF																			
<b>GROUND WATER</b>										<b>GROUND WATER</b>										VERY SEVERE (IV SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD 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.																			
WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING										<b>MISCELLANEOUS SYMBOLS</b>										<b>MISCELLANEOUS SYMBOLS</b>																			
STATIC WATER LEVEL AFTER 24 HOURS										STATIC WATER LEVEL AFTER 24 HOURS										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION										DIP & DIP DIRECTION OF ROCK STRUCTURES																			
PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA										PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA										SOIL SYMBOL										SLOPE INDICATOR INSTALLATION																			
SPRING OR SEEP										SPRING OR SEEP										ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT										AUGER BORING																			
																				INFERRED SOIL BOUNDARY										CORE BORING																			
																				INFERRED ROCK LINE										MONITORING WELL																			
																				ALLUVIAL SOIL BOUNDARY										PIEZOMETER INSTALLATION																			
																														SPT N-VALUE																			
<b>TEXTURE OR GRAIN SIZE</b>										<b>TEXTURE OR GRAIN SIZE</b>										<b>RECOMMENDATION SYMBOLS</b>										<b>RECOMMENDATION SYMBOLS</b>																			
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270										U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270										UNDERCUT EXCAVATION										UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE																			
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)										BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)										SHALLOW UNDERCUT										UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK																			
GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005										GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005										AR - AUGER REFUSAL										MED. - MEDIUM																			
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>										<b>SOIL MOISTURE - CORRELATION OF TERMS</b>										BT - BORING TERMINATED										MICA - MICACEOUS																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										CL - CLAY										MOD. - MODERATELY																			
LL - LIQUID LIMIT										LL - LIQUID LIMIT										CPT - CONE PENETRATION TEST										NP - NON PLASTIC																			
PL - PLASTIC LIMIT										PL - PLASTIC LIMIT										CSE - COARSE										ORG. - ORGANIC																			
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT										OM - OPTIMUM MOISTURE SHRINKAGE LIMIT										DPT - DILATOMETER TEST										PMT - PRESSUREMETER TEST																			
																				e - VOID RATIO										SAP. - SAPROLITIC																			
																				F - FINE										SD. - SAND, SANDY																			
																				FOSS. - FOSSILIFEROUS										SL. - SILT, SILTY																			
																				FRAC. - FRACTURED, FRACTURES										SLI. - SLIGHTLY																			
																				FRAG. - FRAGMENTS										TCR - TRICONE REFUSAL																			
																				HI. - HIGHLY										w - MOISTURE CONTENT																			
																														V - VERY																			
<b>PLASTICITY</b>										<b>PLASTICITY</b>										<b>EQUIPMENT USED ON SUBJECT PROJECT</b>										<b>EQUIPMENT USED ON SUBJECT PROJECT</b>																			
NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC										NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC										DRILL UNITS: CME-45C CME-55 CME-550 VANE SHEAR TEST PORTABLE HOIST										ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 7/8" STEEL TEETH TRICONE TUNG-CARB. CORE BIT										HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B H N Q HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST									
<b>COLOR</b>										<b>COLOR</b>																																							
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																																							
																				<b>FRACATURE SPACING</b>										<b>FRACATURE SPACING</b>																			
VERY WIDE MORE THAN 10 FEET										VERY WIDE MORE THAN 10 FEET										TERM THICKNESS VERY THICKLY BEDDED 4 FEET										TERM THICKNESS VERY THICKLY BEDDED 4 FEET																			
WIDE 3 TO 10 FEET										WIDE 3 TO 10 FEET										MODERATELY BEDDED 1.5 - 4 FEET										MODERATELY BEDDED 1.5 - 4 FEET																			
MODERATELY CLOSE 1 TO 3 FEET										MODERATELY CLOSE 1 TO 3 FEET										THINLY BEDDED 0.16 - 1.5 FEET										THINLY BEDDED 0.16 - 1.5 FEET																			
CLOSE 0.16 TO 1 FOOT										CLOSE 0.16 TO 1 FOOT										VERY THINLY BEDDED 0.03 - 0.16 FEET										VERY THINLY BEDDED 0.03 - 0.16 FEET																			
VERY CLOSE LESS THAN 0.16 FEET										VERY CLOSE LESS THAN 0.16 FEET										THICKLY LAMINATED 0.008 - 0.03 FEET										THICKLY LAMINATED 0.008 - 0.03 FEET																			
																				<b>INDURATION</b>										<b>INDURATION</b>																			
																				FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.																			
																				FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.										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.										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.										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.										EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																			
																				ELEVATION: 7.98 FEET										ELEVATION: 7.98 FEET																			
																				<b>NOTES:</b>										<b>NOTES:</b>																			
																				FIAD = Filled Immediately After Drilling										FIAD = Filled Immediately After Drilling																			

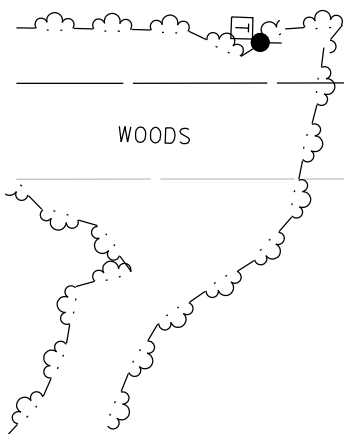


BURNETT ENTERPRISES, INCORPORATED  
DB 1000 PG 265  
(ROW 30' FROM CL SRI100)

RUTH B. PHILLIPS REVOCABLE TRUST  
FIRST TRACT  
DB 3911 PG 389  
(ROW 30' FROM CL SRI100)



\*\*\*\*\*  
BM #1 ELEVATION = 7.98  
N 124023 E 2326627  
R/R SPIKE SET IN 14" PINE  
\*\*\*\*\*



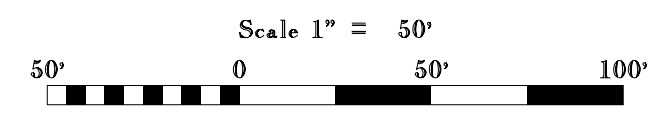
**DATUM DESCRIPTION**  
THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5236-1"  
WITH NAD 83/NSRS 2007 STATE PLANE GRID COORDINATES OF NORTHING: 2326698.694(fft) EASTING: 124079.711(fft) ELEVATION: 6.616(fft)  
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999173520  
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM TO -L- STATION IS

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES  
VERTICAL DATUM USED IS NAVD 88

SIGNATURE RIVER OAKS NC, LTD.  
DB 5694 PG 1007  
(ROW 60' FROM CL SRI100)

SIGNATURE RIVER OAKS NC, LTD.  
DB 5190 PG 1195  
MB 51 PG 7  
(ROW 50' FROM CL OF SRI100)

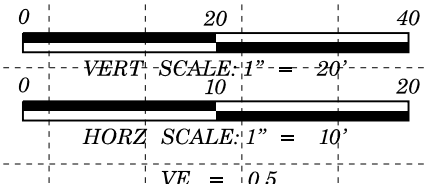
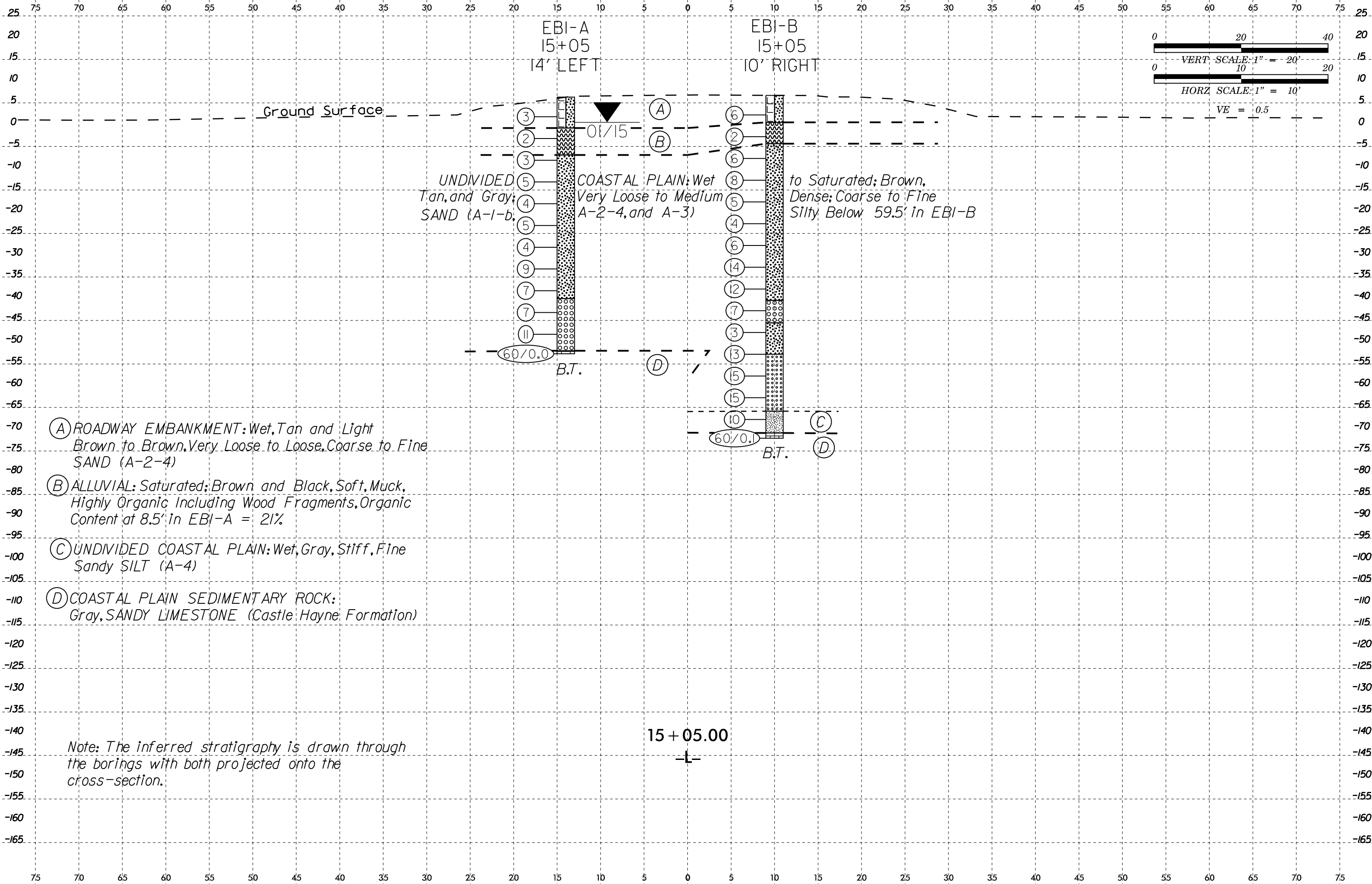
**END TIP PROJECT B-5236**  
**-L- STA.19 + 00.00**





8/23/99

# CROSS SECTION ALONG END BENT I



- (A) ROADWAY EMBANKMENT: Wet, Tan and Light Brown to Brown, Very Loose to Loose, Coarse to Fine SAND (A-2-4)
- (B) ALLUVIAL: Saturated; Brown and Black, Soft, Muck, Highly Organic Including Wood Fragments, Organic Content at 8.5' in EBI-A = 21%
- (C) UNDIVIDED COASTAL PLAIN: Wet, Gray, Stiff, Fine Sandy SILT (A-4)
- (D) COASTAL PLAIN SEDIMENTARY ROCK: Gray, SANDY LIMESTONE (Castle Hayne Formation)

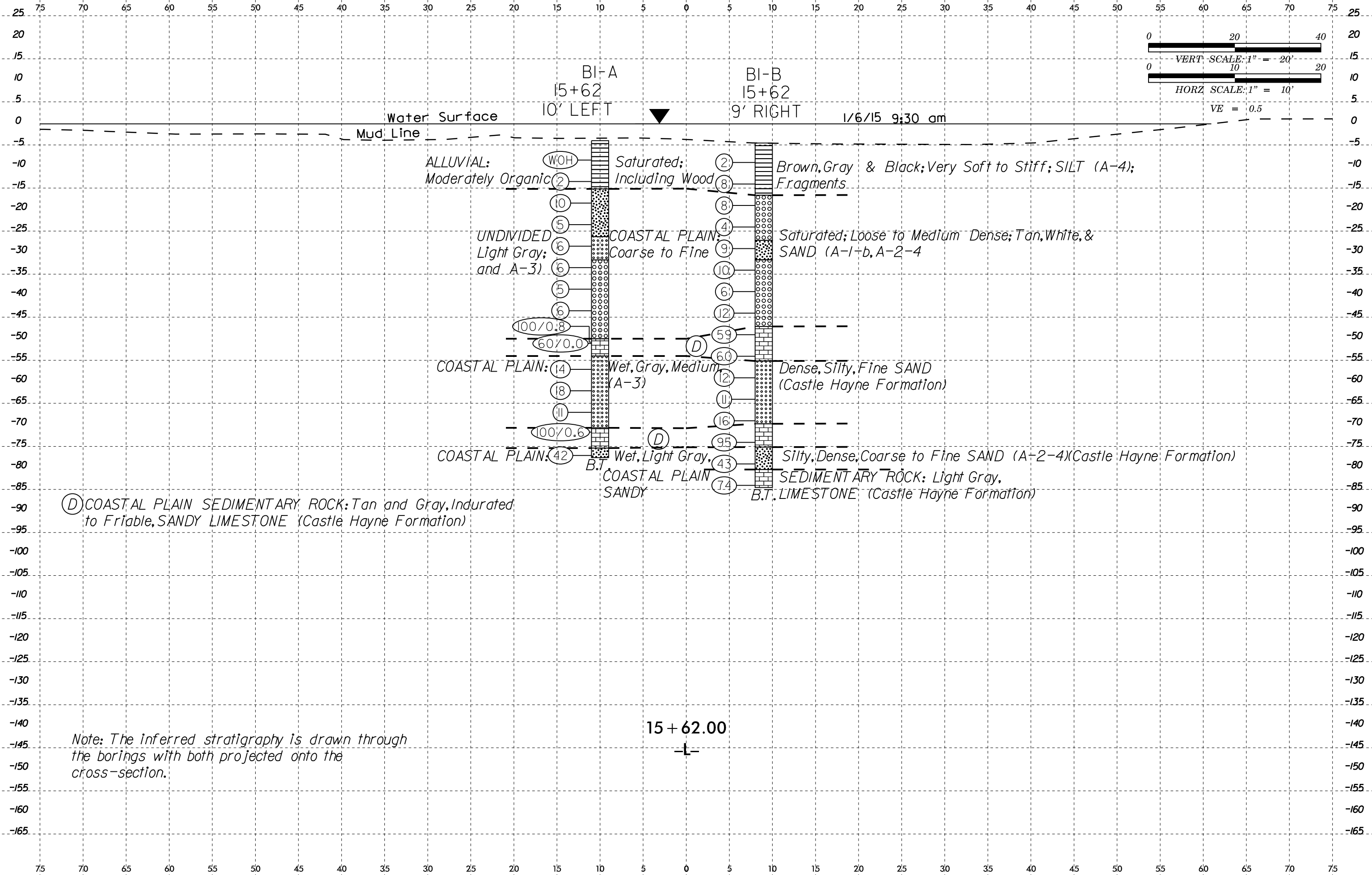
Note: The inferred stratigraphy is drawn through the borings with both projected onto the cross-section.

15 + 05.00  
 -L-

SYSTEMATIC SECTION  
 CASTLE HAYNE FORMATION

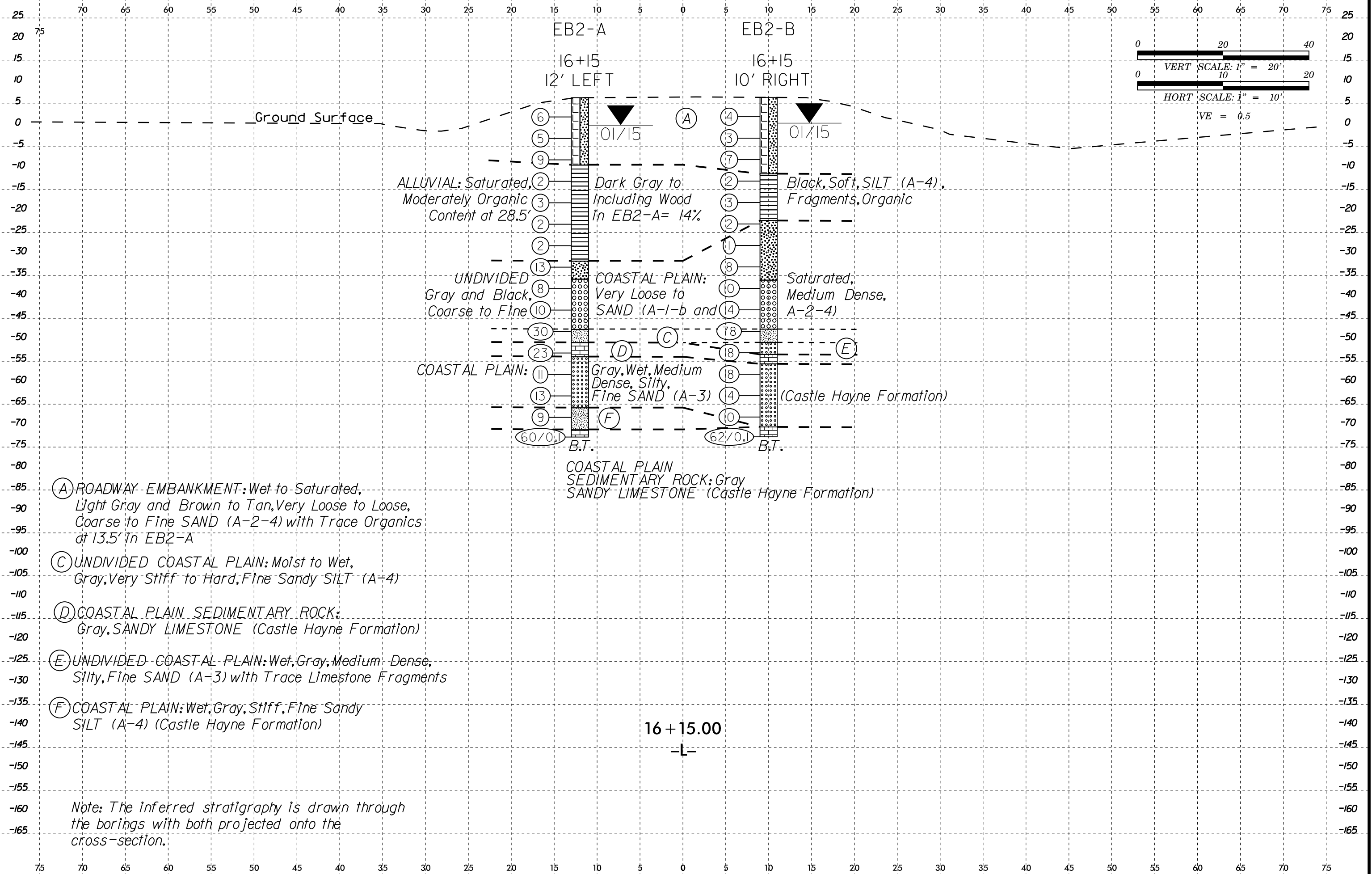
8/23/99

# CROSS SECTION ALONG BENT I



SYTIME  
SECTION  
SURNAME

CROSS SECTION ALONG END BENT 2



ALLUVIAL: Saturated,  
Moderately Organic  
Content at 28.5'

Dark Gray to  
Including Wood  
in EB2-A= 14%

Black, Soft, SILT (A-4),  
Frdgments, Organic

UNDIVIDED  
Gray and Black,  
Coarse to Fine

Saturated,  
Medium Dense,  
A-2-4

COASTAL PLAIN:  
Gray, Wet, Medium  
Dense, Silty,  
Fine SAND (A-3)

(Castle Hayne Formation)

COASTAL PLAIN  
SEDIMENTARY ROCK: Gray  
SANDY LIMESTONE (Castle Hayne Formation)

(A) ROADWAY EMBANKMENT: Wet to Saturated,  
Light Gray and Brown to Tan, Very Loose to Loose,  
Coarse to Fine SAND (A-2-4) with Trace Organics  
at 13.5' in EB2-A

(C) UNDIVIDED COASTAL PLAIN: Moist to Wet,  
Gray, Very Stiff to Hard, Fine Sandy SILT (A-4)

(D) COASTAL PLAIN SEDIMENTARY ROCK:  
Gray, SANDY LIMESTONE (Castle Hayne Formation)

(E) UNDIVIDED COASTAL PLAIN: Wet, Gray, Medium Dense,  
Silty, Fine SAND (A-3) with Trace Limestone Fragments

(F) COASTAL PLAIN: Wet, Gray, Stiff, Fine Sandy  
SILT (A-4) (Castle Hayne Formation)

16 + 15.00

Note: The inferred stratigraphy is drawn through  
the borings with both projected onto the  
cross-section.











# NCDOT GEOTECHNICAL ENGINEERING UNIT

## CORE BORING REPORT

WBS 42840.1.1		TIP B-5236		COUNTY NEW HANOVER		GEOLOGIST Weaver, P.M.					
SITE DESCRIPTION Replace Bridge No. 19 over Lords Creek on SR 1100 (River Road)							GROUND WTR (ft)				
BORING NO. B1-A		STATION 15+62		OFFSET 10 ft LT		ALIGNMENT -L-					
COLLAR ELEV. -4.0 ft		TOTAL DEPTH 73.6 ft		NORTHING 124,165		EASTING 2,326,652					
DRILL RIG/HAMMER EFF./DATE MID5464 CME-45C 86% 08/07/2014				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic					
DRILLER Fowler, B.		START DATE 01/06/15		COMP. DATE 01/07/15		SURFACE WATER DEPTH 3.9ft					
CORE SIZE NQ		TOTAL RUN 5.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
-51.1	-51.1	47.1	5.0	5:23 N=60/0.0	(3.3) 66%	N/A				Begin Coring @ 47.1 ft	
				5:23 9:12						COASTAL PLAIN SEDIMENTARY ROCK (continued)	
-55	-56.1	52.1		:59 :13 :08 N=14						COASTAL PLAIN Gray, Silty, Fine SAND (A-3) (Castle Hayne Formation)	50.0
-60				N=18							
-65				N=11							
-70				N=100/0.6						COASTAL PLAIN SEDIMENTARY ROCK Dark Gray, SANDY LIMESTONE (Castle Hayne Formation)	66.7
-75				N=42						COASTAL PLAIN Light Gray, Coarse to Fine SAND (A-2-4) (Castle Hayne Formation)	71.4
										Boring Terminated at Elevation -77.6 ft in Coastal Plain Material: SAND	73.6

NCDOT CORE DOUBLE B5236\_GEO\_BRDG0019\_GINTFILES.GPJ NC\_DOT.GDT 4/23/15

**CORE PHOTOGRAPH**

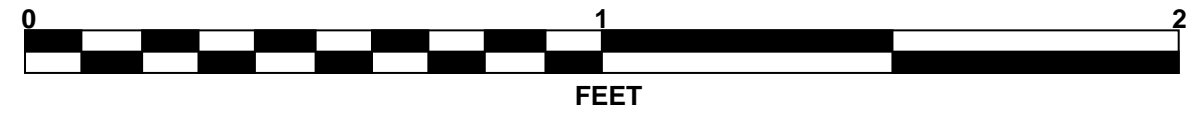
WBS No. 42840.1.1

TIP No. B-5236

**Project Description: Replace Bridge No. 19 over Lords Creek on SR 1100 (River Road)  
New Hanover County, North Carolina**

**B1- A**

**47.1 Feet to 52.1 Feet**





# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 42840.1.1		TIP B-5236		COUNTY NEW HANOVER		GEOLOGIST Weaver, P.M.									
SITE DESCRIPTION Replace Bridge No. 19 over Lords Creek on SR 1100 (River Road)							GROUND WTR (ft)								
BORING NO. B1-B		STATION 15+62		OFFSET 9 ft RT		ALIGNMENT -L-									
COLLAR ELEV. -4.6 ft		TOTAL DEPTH 80.0 ft		NORTHING 124,166		EASTING 2,326,676									
DRILL RIG/HAMMER EFF./DATE MID5464 CME-45C 86% 08/07/2014			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Fowler, B.		START DATE 01/05/15		COMP. DATE 01/06/15		SURFACE WATER DEPTH 4.4ft									
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					
10															
5															
0															
-5															
-10	-8.1	3.5			WOH	1	1								
-15	-13.1	8.5			2	4	4								
-20	-18.1	13.5			3	4	4								
-25	-23.1	18.5			2	2	2								
-30	-28.1	23.5			4	4	5								
-35	-33.1	28.5			4	5	5								
-40	-38.1	33.5			3	3	3								
-45	-43.1	38.5			5	6	6								
-50	-48.1	43.5			19	29	30								
-55	-53.1	48.5			11	37	23								
-60	-58.1	53.5			5	6	6								
-65	-63.1	58.5			4	5	6								
-70	-68.1	63.5			4	4	12								

WBS 42840.1.1		TIP B-5236		COUNTY NEW HANOVER		GEOLOGIST Weaver, P.M.									
SITE DESCRIPTION Replace Bridge No. 19 over Lords Creek on SR 1100 (River Road)							GROUND WTR (ft)								
BORING NO. B1-B		STATION 15+62		OFFSET 9 ft RT		ALIGNMENT -L-									
COLLAR ELEV. -4.6 ft		TOTAL DEPTH 80.0 ft		NORTHING 124,166		EASTING 2,326,676									
DRILL RIG/HAMMER EFF./DATE MID5464 CME-45C 86% 08/07/2014			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Fowler, B.		START DATE 01/05/15		COMP. DATE 01/06/15		SURFACE WATER DEPTH 4.4ft									
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					
-70															
-75	-73.1	68.5			52	39	56								
-80	-78.1	73.5			18	21	22								
	-83.1	78.5			10	42	32								

NCDOT BORE DOUBLE B5236\_GEO\_BRDG0019\_GINTFILES.GPJ\_NC\_DOT\_GDT 4/21/15



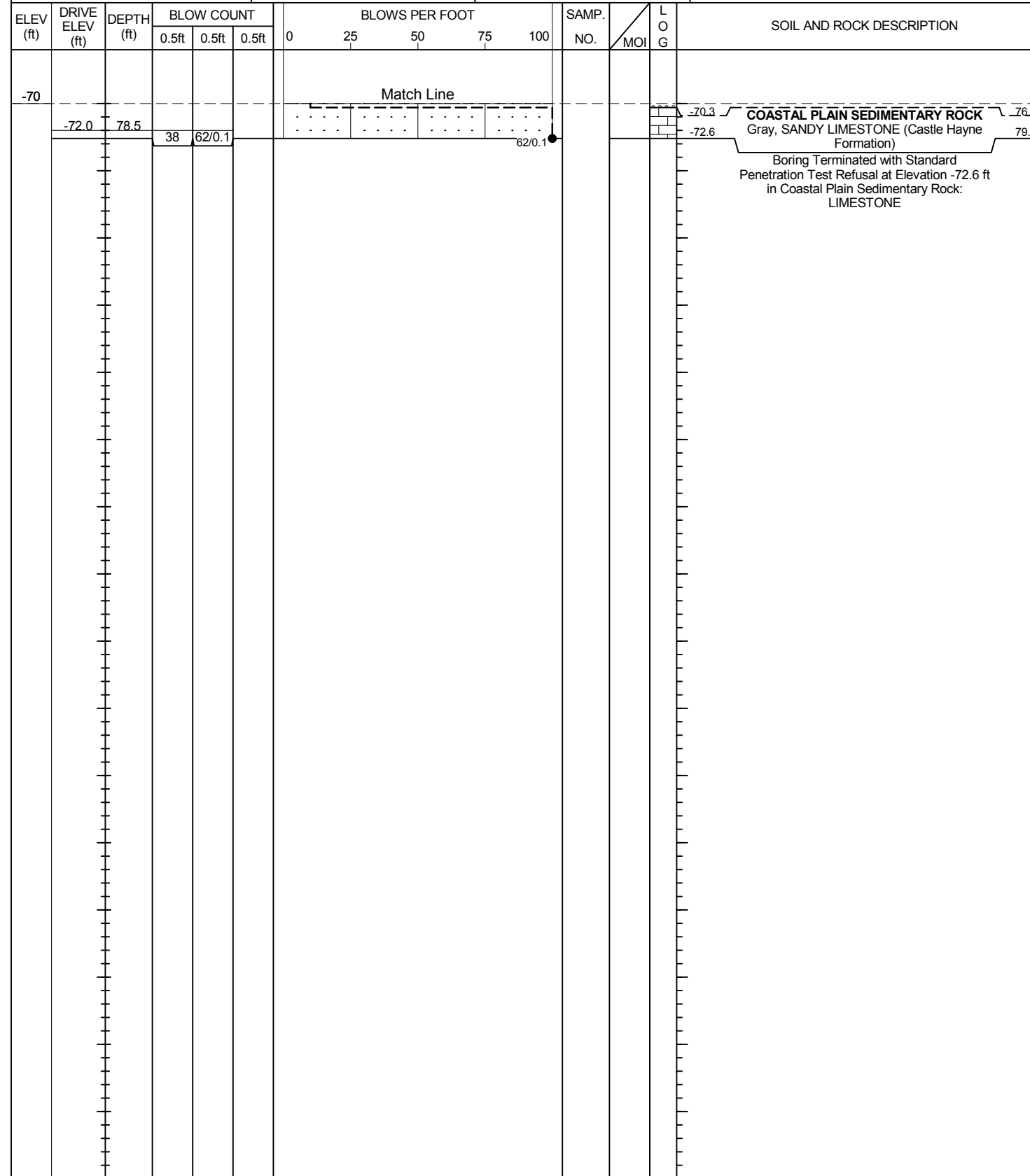
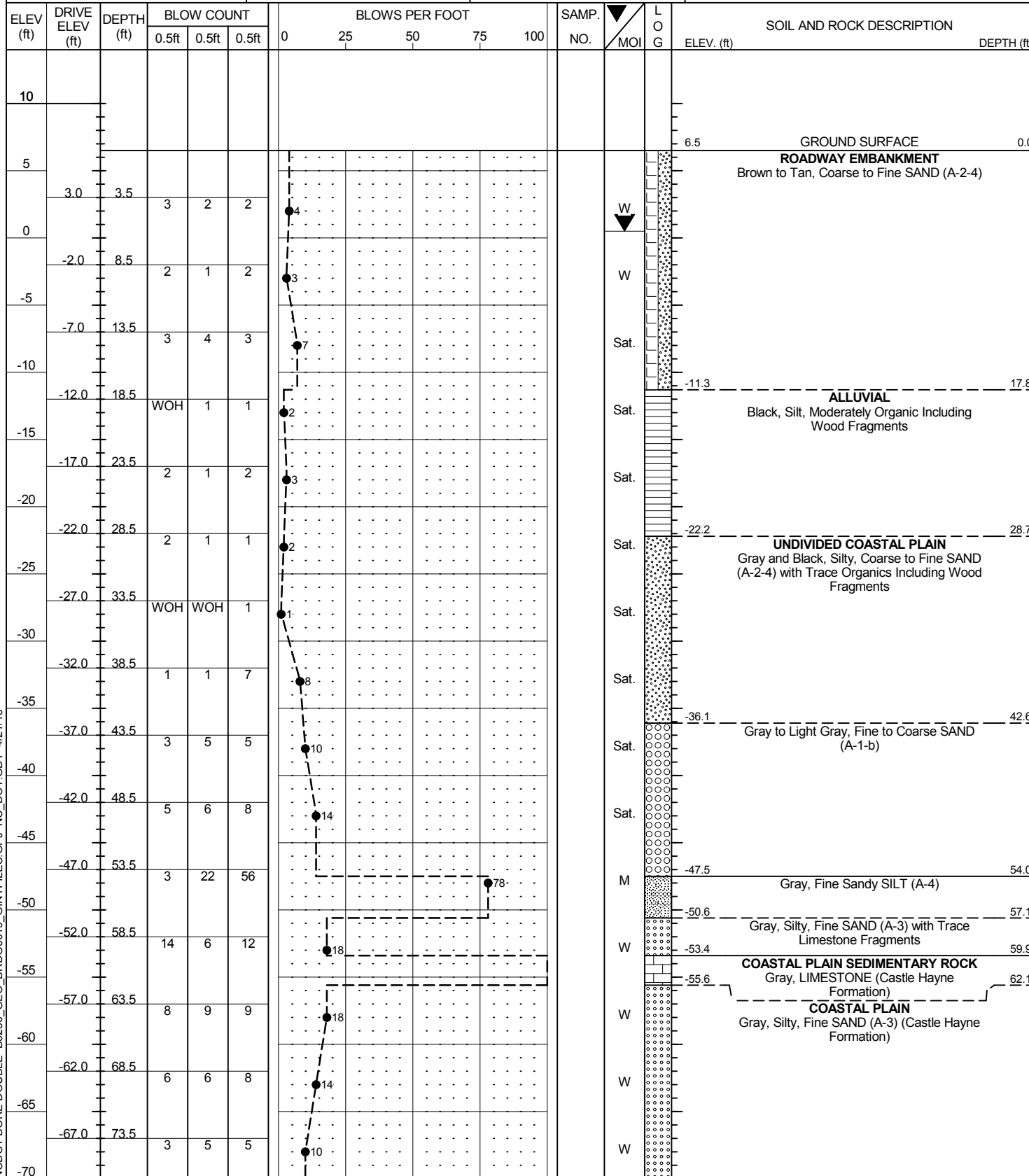


# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 42840.1.1	TIP B-5236	COUNTY NEW HANOVER	GEOLOGIST Weaver, P.M.
SITE DESCRIPTION Replace Bridge No. 19 over Lords Creek on SR 1100 (River Road)			GROUND WTR (ft)
BORING NO. EB2-B	STATION 16+15	OFFSET 10 ft RT	ALIGNMENT -L-
COLLAR ELEV. 6.5 ft	TOTAL DEPTH 79.1 ft	NORTHING 124,276	EASTING 2,326,673
DRILL RIG/HAMMER EFF./DATE MID5464 CME-45C 86% 08/07/2014		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Fowler, B.	START DATE 01/09/15	COMP. DATE 01/09/15	SURFACE WATER DEPTH N/A

WBS 42840.1.1	TIP B-5236	COUNTY NEW HANOVER	GEOLOGIST Weaver, P.M.
SITE DESCRIPTION Replace Bridge No. 19 over Lords Creek on SR 1100 (River Road)			GROUND WTR (ft)
BORING NO. EB2-B	STATION 16+15	OFFSET 10 ft RT	ALIGNMENT -L-
COLLAR ELEV. 6.5 ft	TOTAL DEPTH 79.1 ft	NORTHING 124,276	EASTING 2,326,673
DRILL RIG/HAMMER EFF./DATE MID5464 CME-45C 86% 08/07/2014		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Fowler, B.	START DATE 01/09/15	COMP. DATE 01/09/15	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE B5236\_GEO\_BRDG0019\_GINTFILES.GPJ\_NC\_DOT.GDT 4/21/15



## SOILS LABORATORY TESTS RESULTS

WBS NO.: 42840.1.1

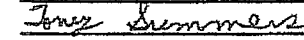
TIP NO.: B-5236

COUNTY: New Hanover

SITE DESCRIPTION: Replace Bridge No. 19 over Lords Creek on SR 1100 (River Road)

SAMPLE NO.	Boring	DEPTH INTERVAL (FT)	AASHTO CLASS	N	L.L	P.I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							CSE. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	EB1-A	8.5-10.0	-	-	-	-	-	-	-	-	-	-	-	-	21.1
SS-2	EB2-A	28.5-30.0	-	-	-	-	-	-	-	-	-	-	-	-	14.1

Tony Summers



Certification No. 121-01-1108