

REFERENCE: B-4929

PROJECT: 40233

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4929	1	70

**STRUCTURE
SUBSURFACE INVESTIGATION**

COUNTY PENDER
PROJECT DESCRIPTION BRIDGE OVER INTRACOASTAL
WATERWAY ON NC50210 BETWEEN US 17 AND
TOPSAIL BEACH

CONTENTS

SHEET NO.	DESCRIPTION
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CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 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 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

- D. RACEY
- C. WANG
- M. ELLIS
- D. TIGNOR
- P. FAHEY
- M. RENZA
- MID-ATLANTIC

INVESTIGATED BY F&R, Inc.
 DRAWN BY T.T. WALKER
 CHECKED BY P. ALTON
 SUBMITTED BY P. ALTON
 DATE FEBRUARY 2016

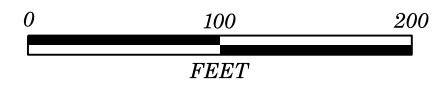
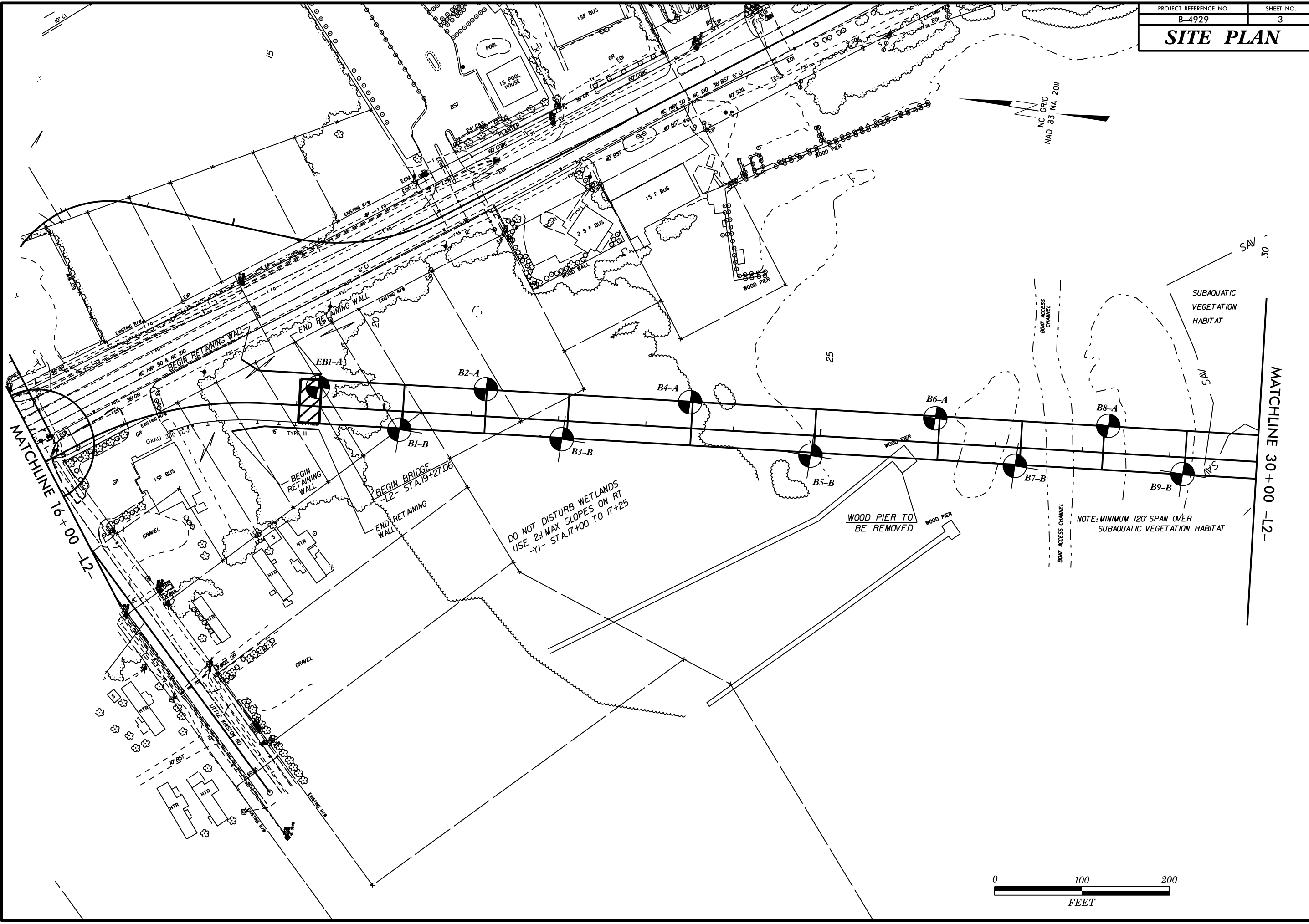


DocuSigned by:
W. Patrick Alton 3/16/2016
 AZ70EF78A0DF412 SIGNATURE DATE

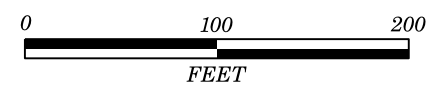
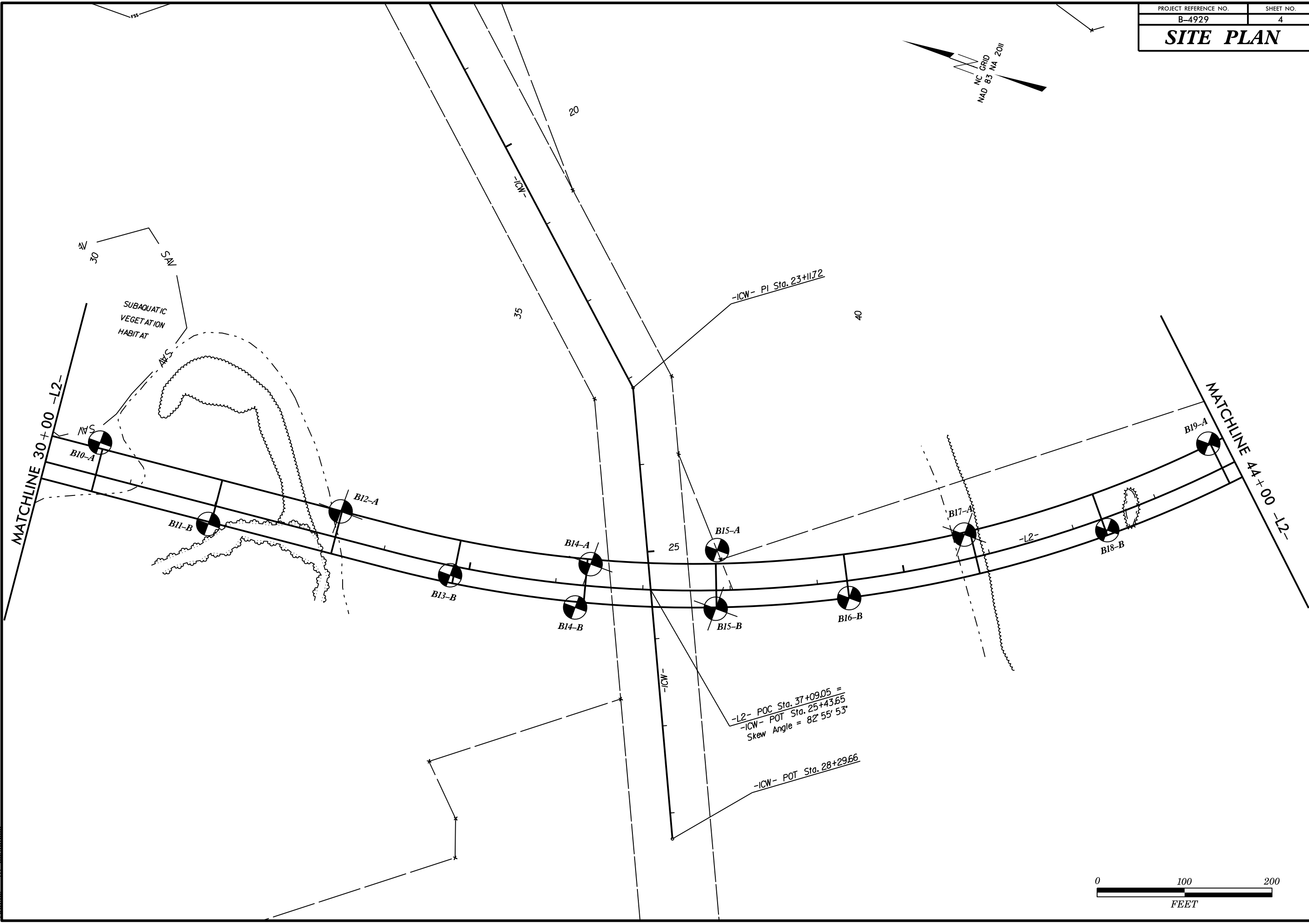
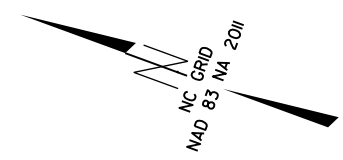
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

SITE PLAN

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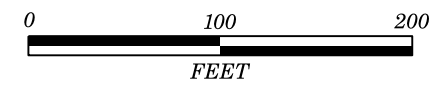
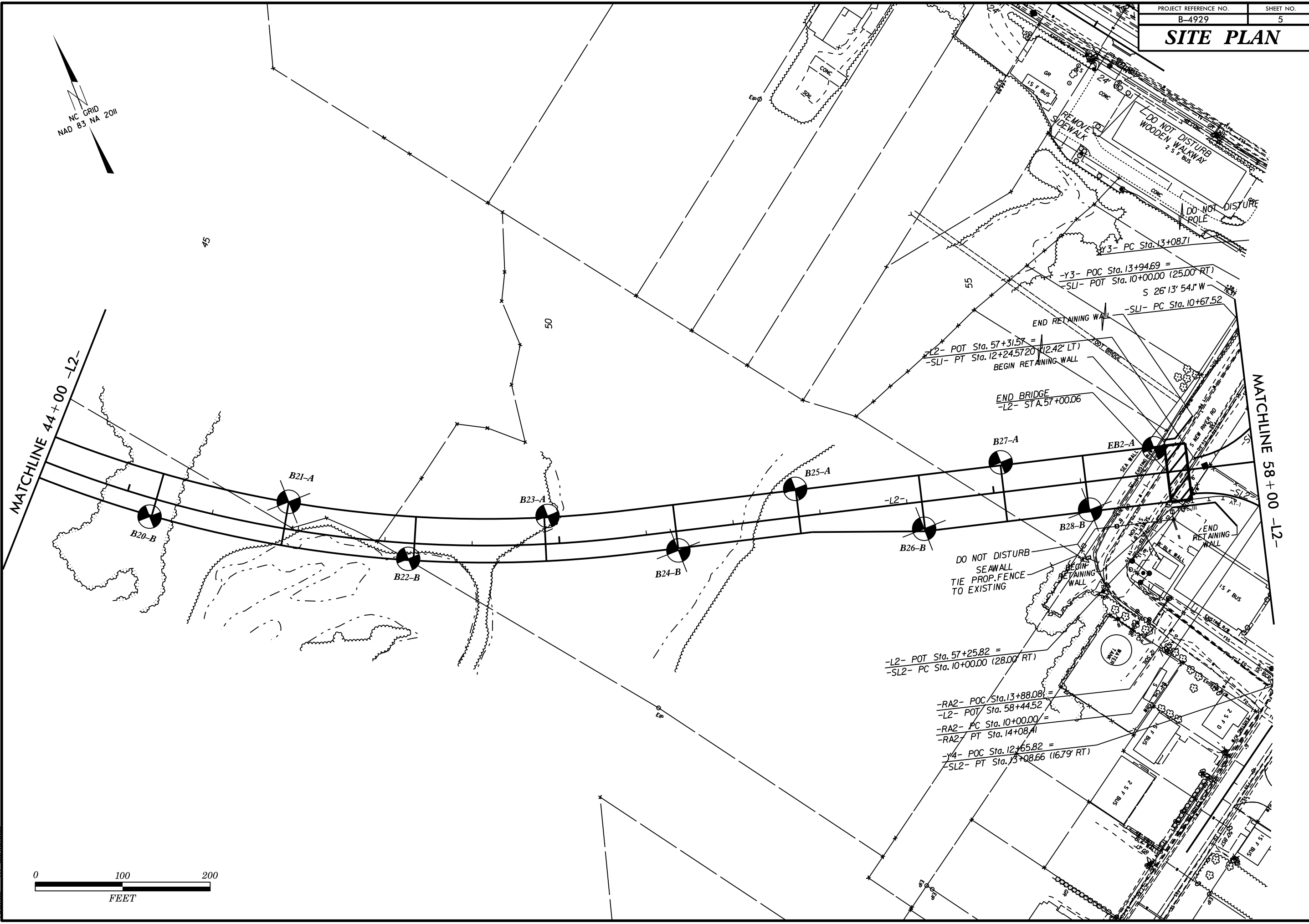
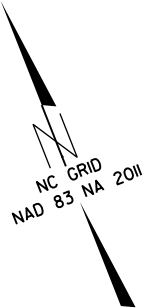


SITE PLAN



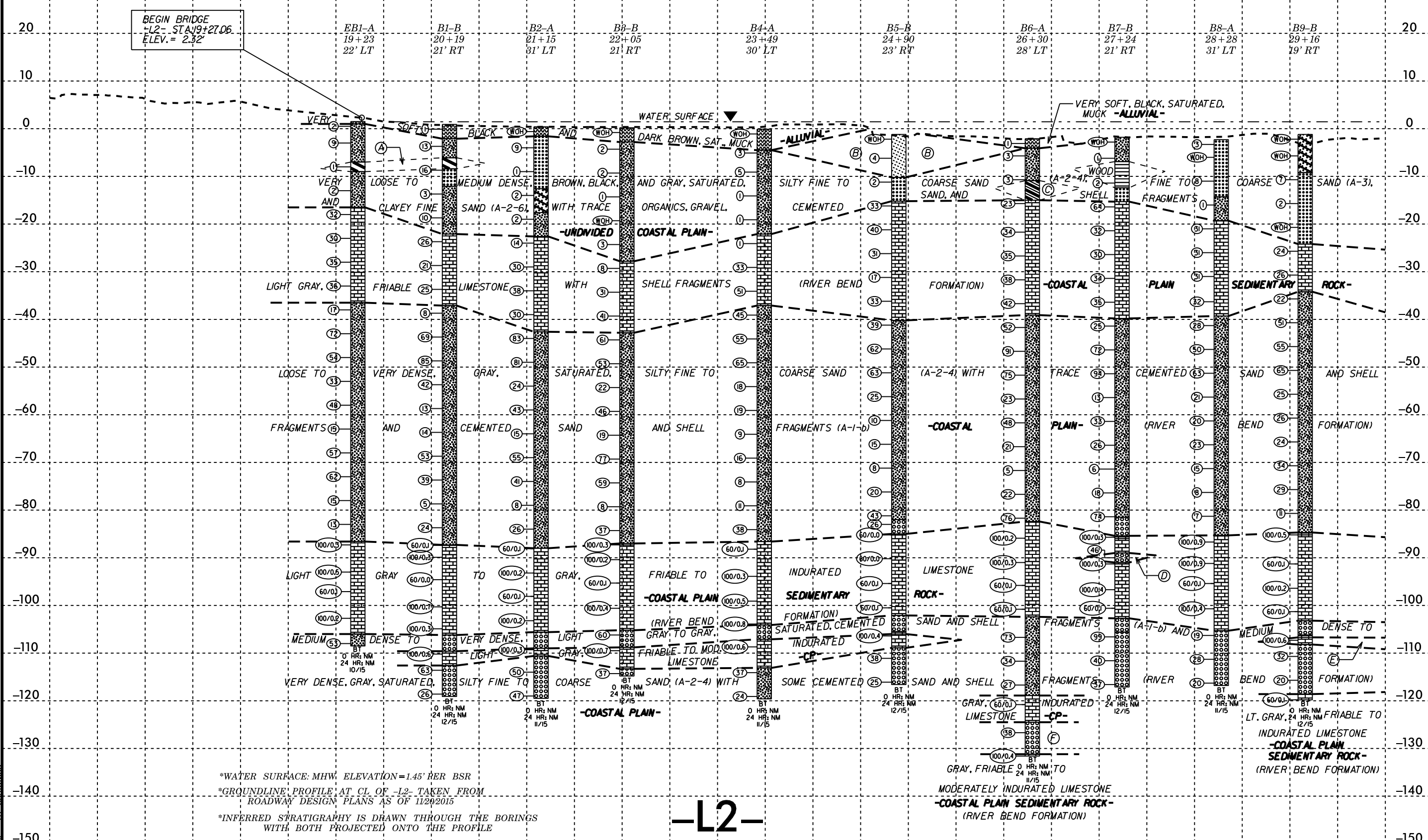
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SITE PLAN



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- (A) VERY SOFT TO SOFT, DARK GRAY, SATURATED, SILTY CLAY (A-7-6) WITH TRACE FINE SAND -UNDIVIDED COASTAL PLAIN-
- (B) VERY LOOSE, DARK BROWN, SATURATED, SILTY FINE TO COARSE SAND (A-2-4) WITH LITTLE ORGANICS -UNDIVIDED COASTAL PLAIN-
- (C) SOFT, DARK GRAY, SATURATED, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE TO SOME SHELL FRAGMENTS -UNDIVIDED COASTAL PLAIN-
- (D) DENSE, LIGHT GRAY, SATURATED, CEMENTED SAND AND SHELL FRAGMENTS (A-7-6) -COASTAL PLAIN- (RIVER BEND FORMATION)
- (E) GRAY, FRIABLE TO MODERATELY INDURATED LIMESTONE -COASTAL PLAIN SEDIMENTARY ROCK- (RIVER BEND FORMATION)
- (F) DENSE, LIGHT GRAY, SATURATED, SILTY FINE TO COARSE SAND (A-1-b) WITH SOME CEMENTED SAND FRAGMENTS -COASTAL PLAIN- (RIVER BEND FORMATION)



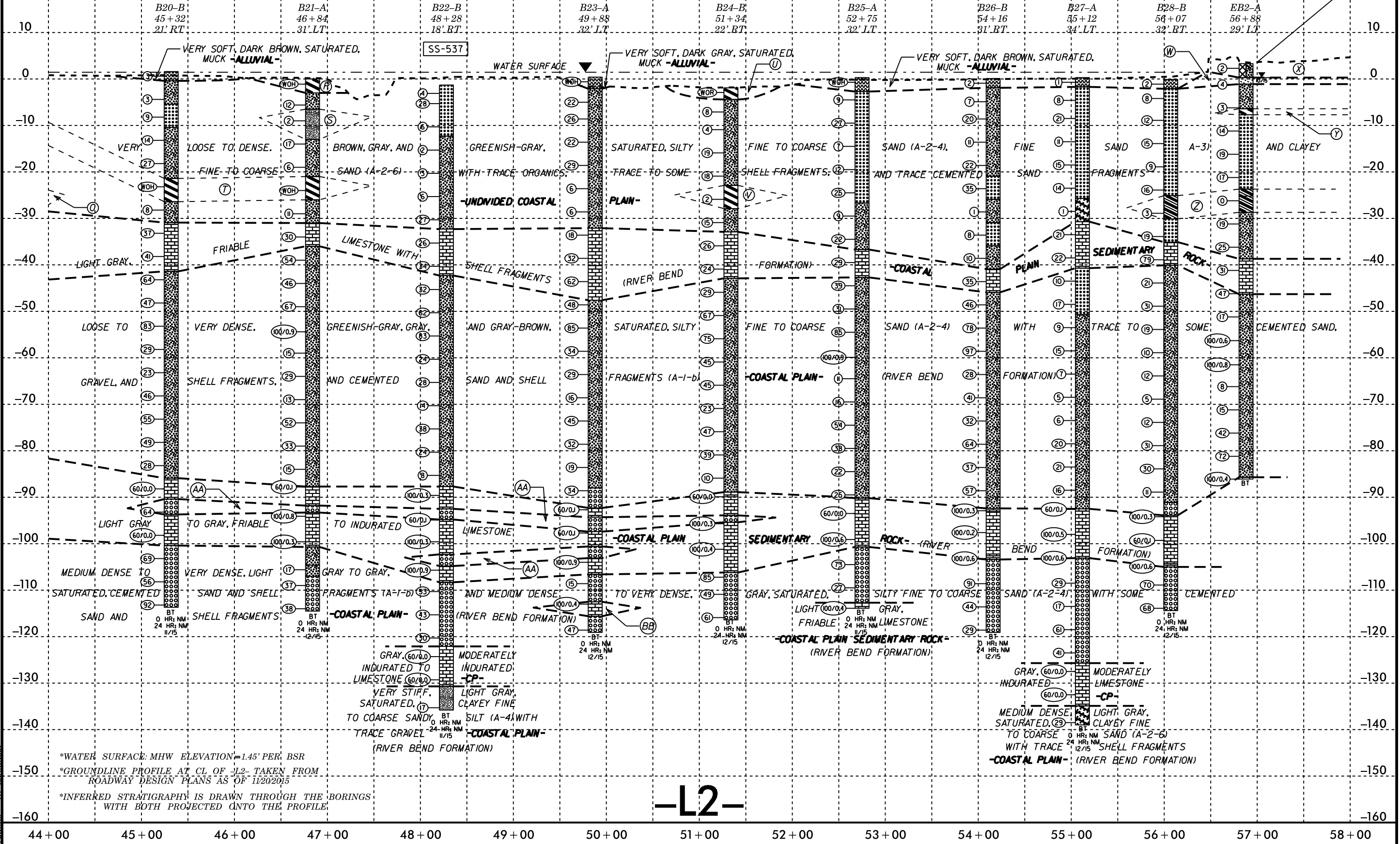
*WATER SURFACE: MHW ELEVATION=1.45' PER BSR
 *GROUNDLINE PROFILE AT CL OF -L2- TAKEN FROM ROADWAY DESIGN PLANS AS OF 11/20/2015
 *INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

-L2-

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 11/15/15

- Q VERY SOFT TO SOFT, DARK GRAY, SATURATED, FINE SANDY SILT (A-4) WITH SOME CLAY -UNDIVIDED COASTAL PLAIN-
- R VERY SOFT, DARK BROWN, SATURATED, SILTY CLAY (A-7-5) -UNDIVIDED COASTAL PLAIN-
- S SOFT, DARK GRAY, SATURATED, CLAYEY FINE SANDY SILT (A-4) WITH TRACE SHELL FRAGMENTS -UNDIVIDED COASTAL PLAIN-
- T VERY SOFT, DARK GRAY AND GREENISH GRAY, SATURATED, FINE SANDY SILTY CLAY (A-7-5) WITH TRACE SHELL FRAGMENTS -UNDIVIDED COASTAL PLAIN-
- U VERY SOFT, DARK GRAY, SATURATED, SILTY CLAY (A-7-5) WITH TRACE ORGANICS -UNDIVIDED COASTAL PLAIN-
- V SOFT, DARK GRAY, SATURATED, FINE SANDY SILTY CLAY (A-7-5) WITH TRACE SHELL FRAGMENTS -UNDIVIDED COASTAL PLAIN-
- W VERY LOOSE, BROWN, SATURATED, SILTY FINE SAND (A-2-4) WITH LITTLE ORGANICS -UNDIVIDED COASTAL PLAIN-

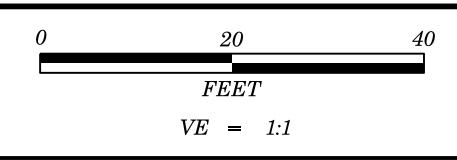
- X VERY LOOSE, BROWN, WET, SILTY FINE SAND (A-2-4) WITH TRACE SHELL FRAGMENTS AND ORGANICS -ARTIFICIAL FILL-
- Y MEDIUM STIFF, DARK GRAY, SATURATED, SILTY CLAY (A-7-6) -UNDIVIDED COASTAL PLAIN-
- Z VERY SOFT, DARK GRAY, SATURATED, FINE SANDY SILTY CLAY (A-6) WITH TRACE SHELL FRAGMENTS -UNDIVIDED COASTAL PLAIN-
- AA VERY DENSE, LIGHT GRAY, SATURATED, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) -COASTAL PLAIN- (RIVER BEND FORMATION)
- BB GRAY, FRIABLE TO MODERATELY INDURATED LIMESTONE -COASTAL PLAIN SEDIMENTARY ROCK-



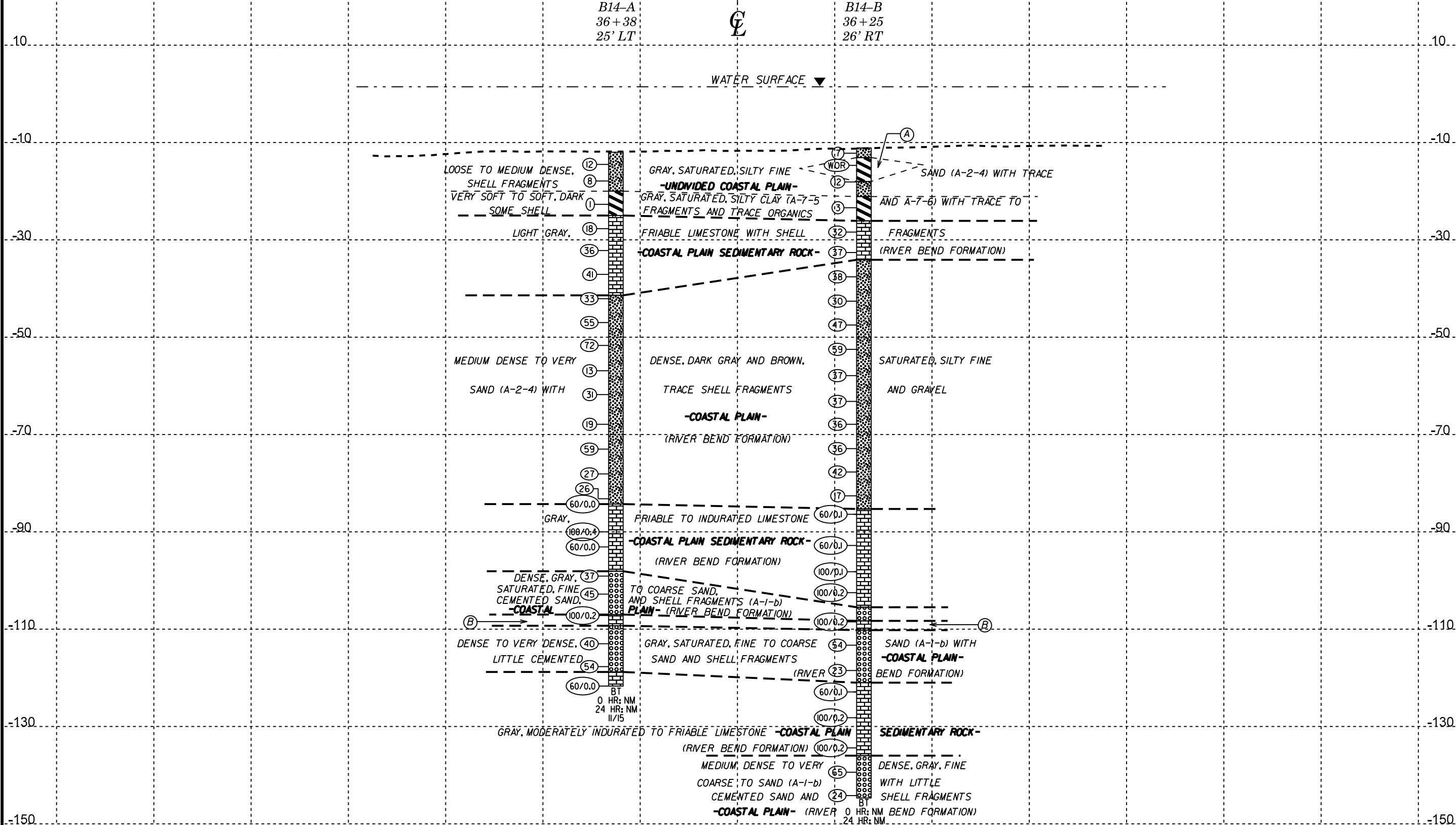
*WATER SURFACE: MHW ELEVATION=1.45' PER BSR
 *GROUNDLINE PROFILE AT CL OF L2- TAKEN FROM ROADWAY DESIGN PLANS AS OF 11/20/2015
 *INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

-L2-

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PROJECT REFERENCE NO.	SHEET NO.
B-4929	9
CROSS SECTION THROUGH BENT 14	

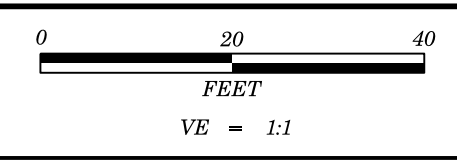


- (A) VERY SOFT, DARK GRAY, SATURATED, SILTY CLAY (A-7-6) WITH TRACE SHELL FRAGMENTS -UNDIVIDED COASTAL PLAIN-
- (B) GRAY, MODERATELY INDURATED TO INDURATED LIMESTONE -COASTAL PLAIN SEDIMENTARY ROCK- (RIVER BEND FORMATION)

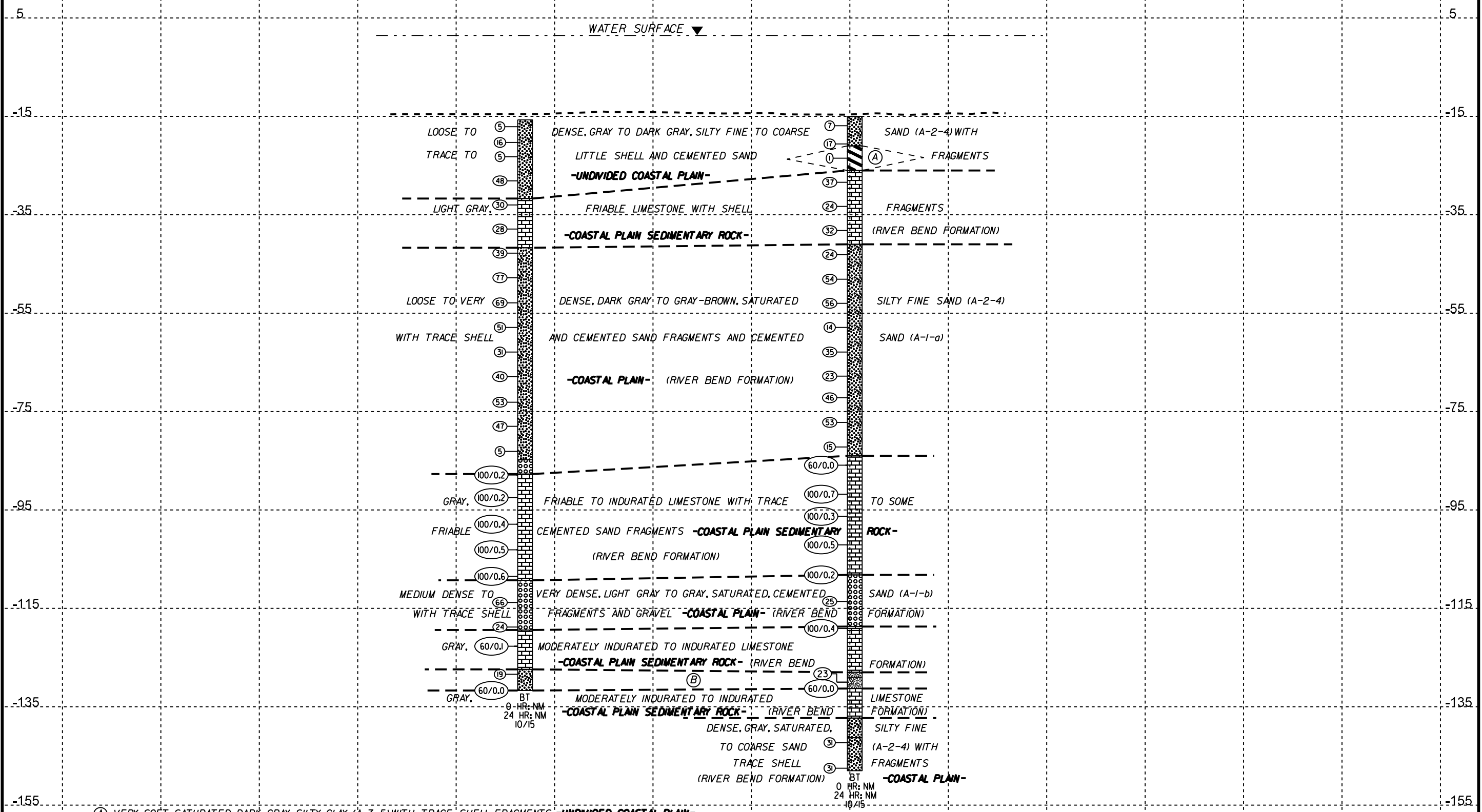
*WATER SURFACE: MHW ELEVATION = 1.45' PER BSR

*CROSS SECTION GROUNDLINE TAKEN FROM ROADWAY TIN FILE DATED 08/03/2015

*INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION



PROJECT REFERENCE NO.	SHEET NO.
B-4929	10
CROSS SECTION THROUGH BENT 15	

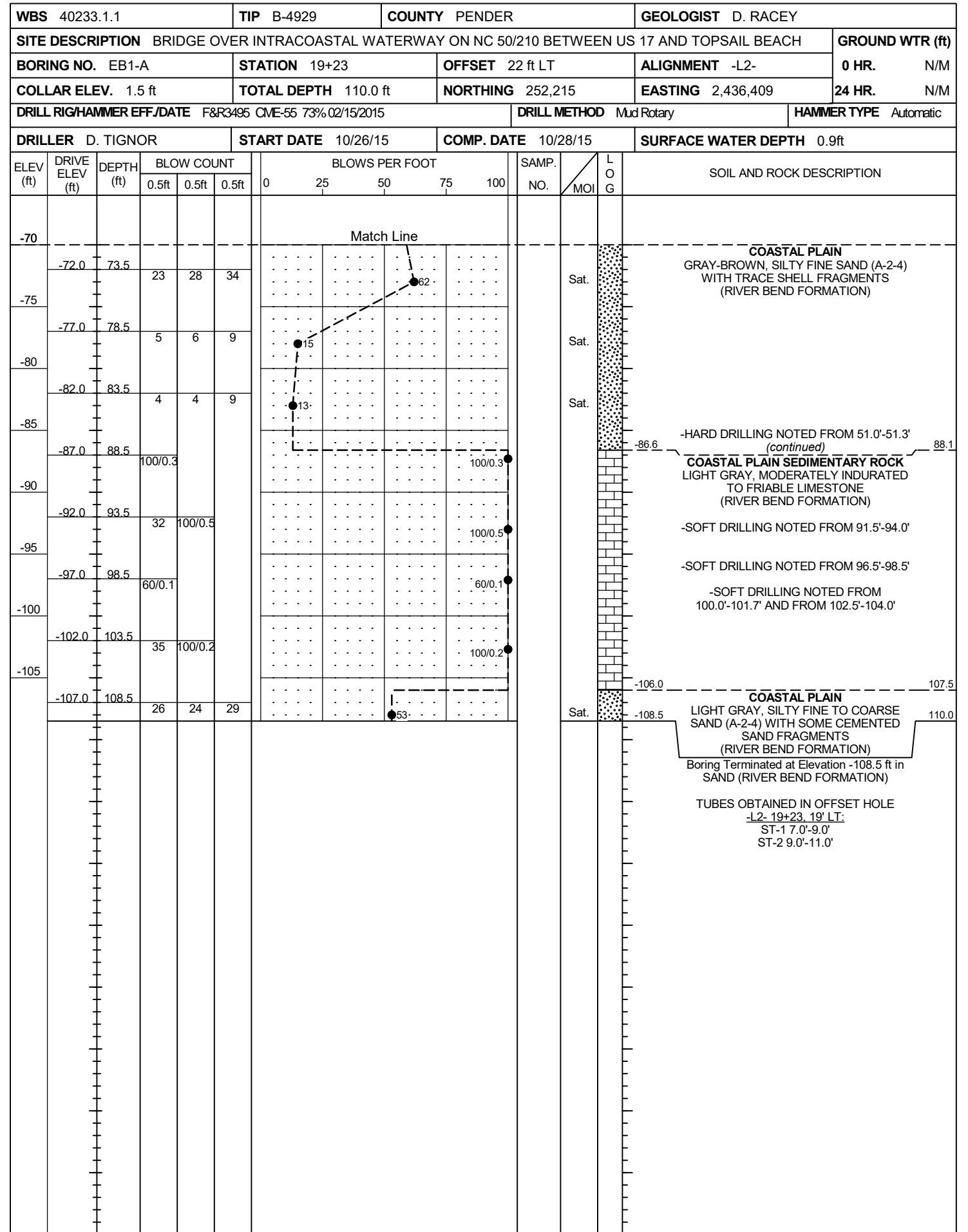
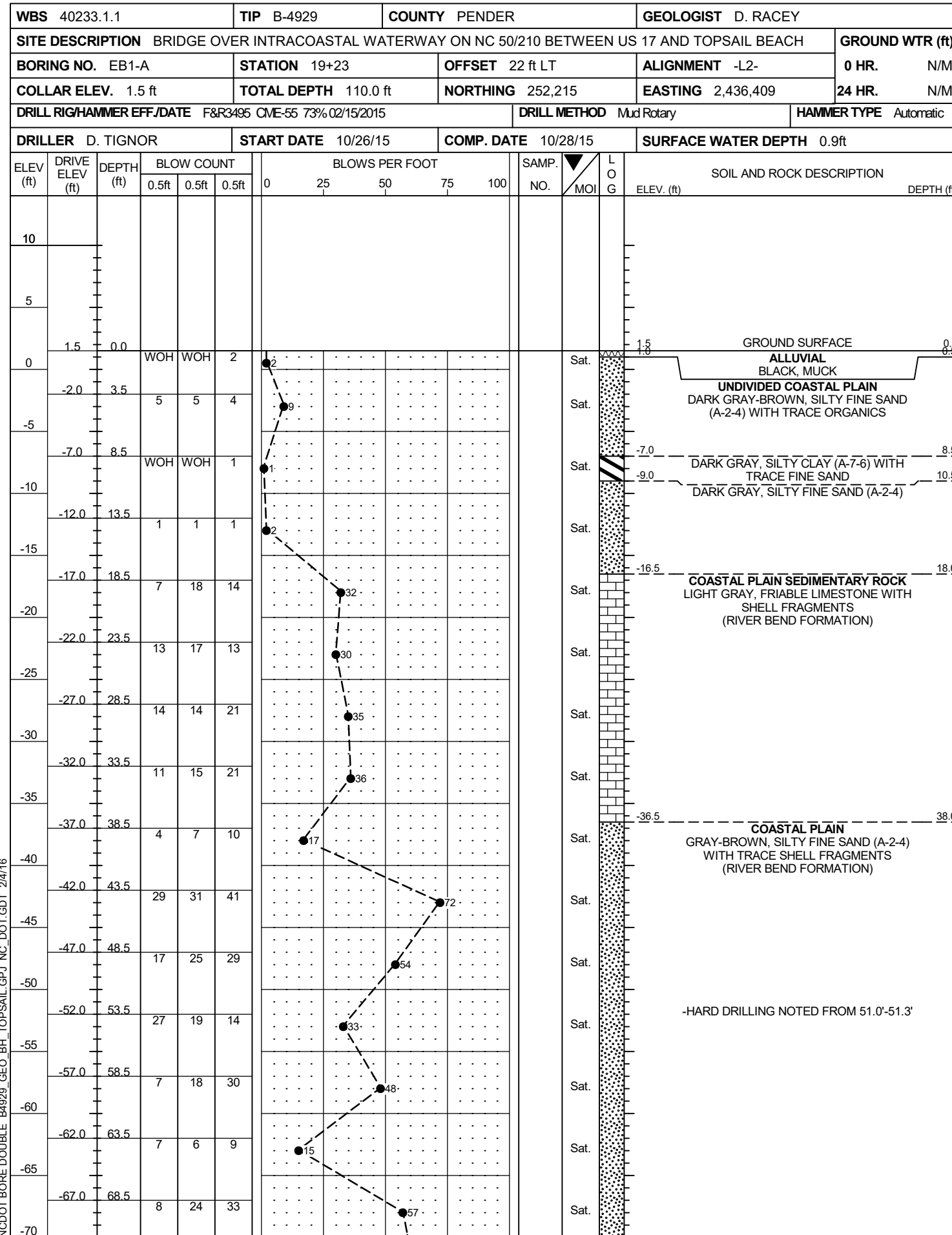


- (A) VERY SOFT, SATURATED, DARK GRAY, SILTY CLAY (A-7-5) WITH TRACE SHELL FRAGMENTS -UNDIVIDED COASTAL PLAIN-
- (B) MEDIUM DENSE, LIGHT GRAY, SATURATED, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE CEMENTED SAND FRAGMENTS AND VERY STIFF, GRAY, SATURATED, CLAYEY FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL AND SHELL FRAGMENTS -COASTAL PLAIN- (RIVER BEND FORMATION)

*WATER SURFACE: MHW ELEVATION=1.45' PER BSR
 *CROSS SECTION GROUNDLINE TAKEN FROM ROADWAY .TIN FILE DATED 08/03/2015
 *INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION

GEOTECHNICAL BORING REPORT

BORE LOG



NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B1-B		STATION 20+19		OFFSET 21 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. 0.9 ft		TOTAL DEPTH 120.0 ft		NORTHING 252,116		EASTING 2,436,375	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER J. STEWART		START DATE 11/30/15		COMP. DATE 12/02/15		SURFACE WATER DEPTH 0.5ft	

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					
5															
0	0.9	0.0													
-5	-2.7	3.6	3	7	6										
-10	-7.7	8.6	3	8	8										
-15	-12.7	13.6	1	1	2										
-20	-17.7	18.6	5	6	4										
-25	-22.7	23.6	8	13	13										
-30	-27.7	28.6	6	10	11										
-35	-32.7	33.6	2	12	13										
-40	-37.7	38.6	4	3	5										
-45	-42.7	43.6	33	28	41										
-50	-47.7	48.6	20	40	45										
-55	-52.7	53.6	27	23	19										
-60	-57.7	58.6	13	6	7										
-65	-62.7	63.6	5	6	8										
-70	-67.7	68.6	10	20	33										
-75	-72.7	73.6	13	16	23										

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B1-B		STATION 20+19		OFFSET 21 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. 0.9 ft		TOTAL DEPTH 120.0 ft		NORTHING 252,116		EASTING 2,436,375	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER J. STEWART		START DATE 11/30/15		COMP. DATE 12/02/15		SURFACE WATER DEPTH 0.5ft	

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					
-75															
-80	-77.7	78.6	3	2	3										
-85	-82.7	83.6	4	9	15										
-90	-87.3	88.2	60/0.1												
-95	-89.6	90.5	100/0.3												
-100	-94.6	95.5	60/0.0												
-105	-99.6	100.5	72	28/0.2											
-110	-104.6	105.5	100/0.3												
-115	-109.6	110.5	83	17/0.1											
	-112.6	113.5	56	32	31										
	-117.6	118.5	12	11	15										

NCDOT BORE DOUBLE B4929_GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

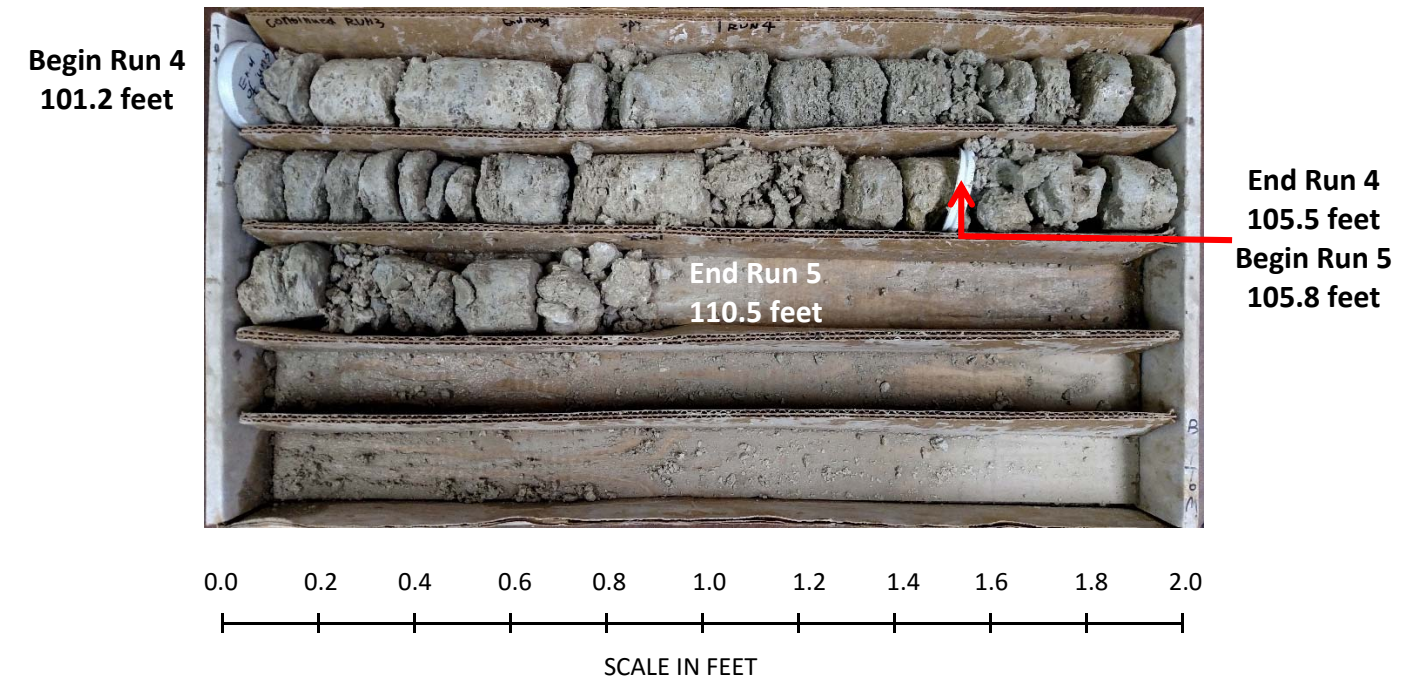
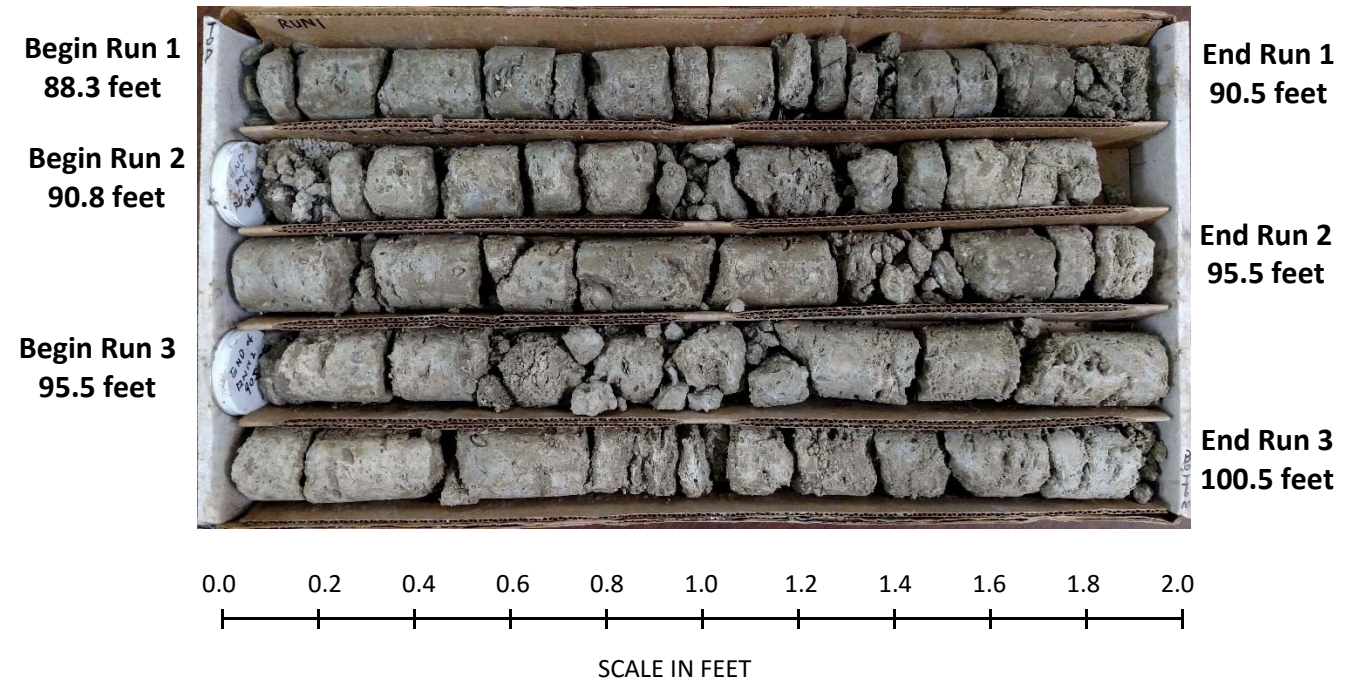
CORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG						
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)					
BORING NO. B1-B		STATION 20+19		OFFSET 21 ft RT		ALIGNMENT -L2-						
COLLAR ELEV. 0.9 ft		TOTAL DEPTH 120.0 ft		NORTHING 252,116		EASTING 2,436,375						
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic						
DRILLER J. STEWART		START DATE 11/30/15		COMP. DATE 12/02/15		SURFACE WATER DEPTH 0.5ft						
CORE SIZE NQ2		TOTAL RUN 20.9 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
-87.4											Begin Coring @ 88.3 ft	
-90	-87.4 -89.6 -89.9	88.3 90.5 90.8	2.2	3:15/1.0 2:32/1.0 0:25/0.2	(2.0) 91%	(0.0) 0%		(14.8) 79%	(0.0) 0%		COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, FRIABLE TO INDURATED LIMESTONE (RIVER BEND FORMATION)	88.3
-95	-94.6	95.5	4.7	N=100/0.3 3:18/0.7 1:50/1.0 2:06/1.0 2:42/1.0	(3.8) 81%	(0.0) 0%						
-100	-99.6 -100.3	100.5 101.2	5.0	N=60/0.0 1:57/1.0 1:44/1.0 2:55/1.0 1:15/1.0 1:13/1.0	(4.1) 82%	(0.0) 0%						
-105	-104.6 -104.8	105.5 105.8	4.3	N=100/0.7 0:15/0.3 1:15/1.0 1:20/1.0 2:32/1.0 1:36/1.0	(3.6) 84%	(0.0) 0%						
-110	-109.6	110.5	4.7	N=100/0.3 1:18/0.7 0:50/1.0 0:05/1.0 0:04/1.0 0:20/1.0	(1.3) 28%	(0.0) 0%		(0.0) 0%	(0.0) 0%		COASTAL PLAIN LIGHT GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	107.1
-115				N=63 N=26							COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, FRIABLE LIMESTONE (RIVER BEND FORMATION)	110.5
											COASTAL PLAIN LIGHT GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	113.5
											Boring Terminated at Elevation -119.1 ft in CEMENTED SAND AND SHELL FRAGMENTS (RIVER BEND FORMATION)	120.0

NCDOT CORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ NC_DOT.GDT 2/4/16



CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B1-B: -L2- Station 20+19, 21' RT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG/D. RACEY	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B2-A		STATION 21+15		OFFSET 31 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 0.4 ft		TOTAL DEPTH 119.9 ft		NORTHING 252,025		EASTING 2,436,436	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. DOOGAN/J. STEW.		START DATE 11/20/15		COMP. DATE 11/25/15		SURFACE WATER DEPTH 0.1ft	

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					
5															
0	0.4	0.0													
-5	-3.0	3.4	4	4	5										
-10	-8.0	8.4	WOH	WOH	1										
-15	-13.0	13.4	WOH	1	1										
-20	-18.0	18.4	1	1	1										
-25	-23.0	23.4	3	5	9										
-30	-28.0	28.4	8	16	14										
-35	-33.0	33.4	19	20	18										
-40	-38.0	38.4	10	13	17										
-45	-43.0	43.4	26	39	44										
-50	-48.0	48.4	26	34	47										
-55	-53.0	53.4	9	12	12										
-60	-58.0	58.4	6	17	26										
-65	-63.0	63.4	4	6	9										
-70	-68.0	68.4	9	25	30										
-75	-73.0	73.4	9	17	24										

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG/D. RACEY	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B2-A		STATION 21+15		OFFSET 31 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 0.4 ft		TOTAL DEPTH 119.9 ft		NORTHING 252,025		EASTING 2,436,436	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. DOOGAN/J. STEW.		START DATE 11/20/15		COMP. DATE 11/25/15		SURFACE WATER DEPTH 0.1ft	

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					
-75															
-80	-78.0	78.4	4	5	3										
-85	-83.0	83.4	7	11	15										
-90	-88.0	88.4	60/0.1												
-95	-93.0	93.4	100/0.2												
-100	-98.0	98.4	60/0.1												
-105	-103.0	103.4	100/0.2												
-110	-108.0	108.4	19	24	100/0.3										
-115	-113.0	113.4	13	29	21										
	-118.0	118.4	15	19	28										

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG								
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)							
BORING NO. B3-B		STATION 22+05		OFFSET 21 ft RT		ALIGNMENT -L2-								
COLLAR ELEV. 0.2 ft		TOTAL DEPTH 115.0 ft		NORTHING 251,931		EASTING 2,436,393								
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic								
DRILLER J. STEWART		START DATE 12/02/15		COMP. DATE 12/04/15		SURFACE WATER DEPTH 0.2ft								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
5														
0	0.2	0.0	WOH	WOH	WOH									0.2 GROUND SURFACE 0.0
-5	-3.3	3.5	1	1	1									-2.8 ALLUVIAL MUCK 3.0
-10	-8.3	8.5	WOH	1	1									
-15	-13.3	13.5	WOH	WOH	1									
-20	-18.3	18.5	WOH	WOH	WOH									
-25	-23.3	23.5	WOH	1	2									
-30	-28.3	28.5	6	4	4									-27.8 COASTAL PLAIN SEDIMENTARY ROCK 28.0
-35	-33.3	33.5	15	13	18									
-40	-38.3	38.5	18	19	22									
-45	-43.3	43.5	25	30	31									
-50	-48.3	48.5	18	21	32									
-55	-53.3	53.5	7	13	9									
-60	-58.3	58.5	13	18	28									
-65	-63.3	63.5	5	5	14									
-70	-68.3	68.5	18	32	45									
-75	-73.3	73.5	21	25	34									-42.8 COASTAL PLAIN 43.0

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG								
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)							
BORING NO. B3-B		STATION 22+05		OFFSET 21 ft RT		ALIGNMENT -L2-								
COLLAR ELEV. 0.2 ft		TOTAL DEPTH 115.0 ft		NORTHING 251,931		EASTING 2,436,393								
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic								
DRILLER J. STEWART		START DATE 12/02/15		COMP. DATE 12/04/15		SURFACE WATER DEPTH 0.2ft								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
-75														
-80	-78.3	78.5	5	4	4									Match Line
-85	-83.3	83.5	18	19	18									
-90	-87.0	87.2	100/0.3											
-95	-90.2	90.4	100/0.2											
-100	-95.2	95.4	60/0.1											
-105	-100.2	100.4	100/0.4											
-110	-105.2	105.4	31	45	15									
	-108.3	108.5	16	45	55/0.2									
	-113.3	113.5	14	20	17									

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/4/16

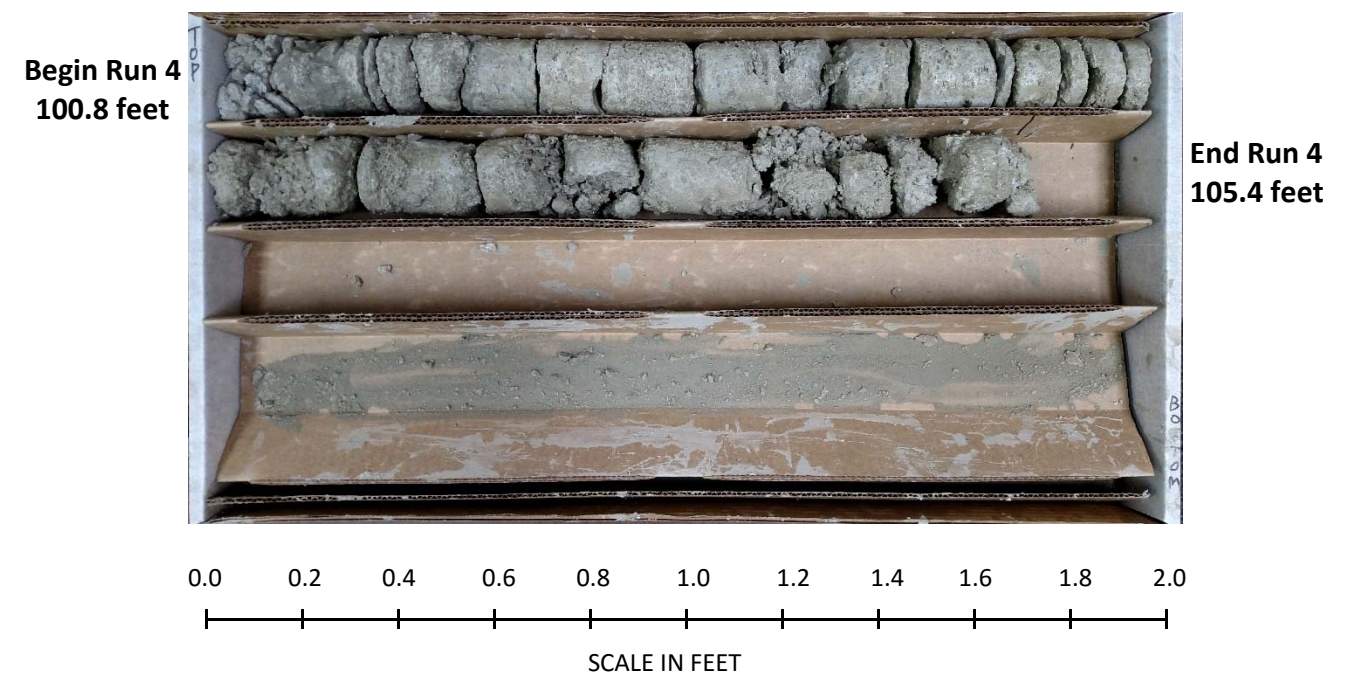
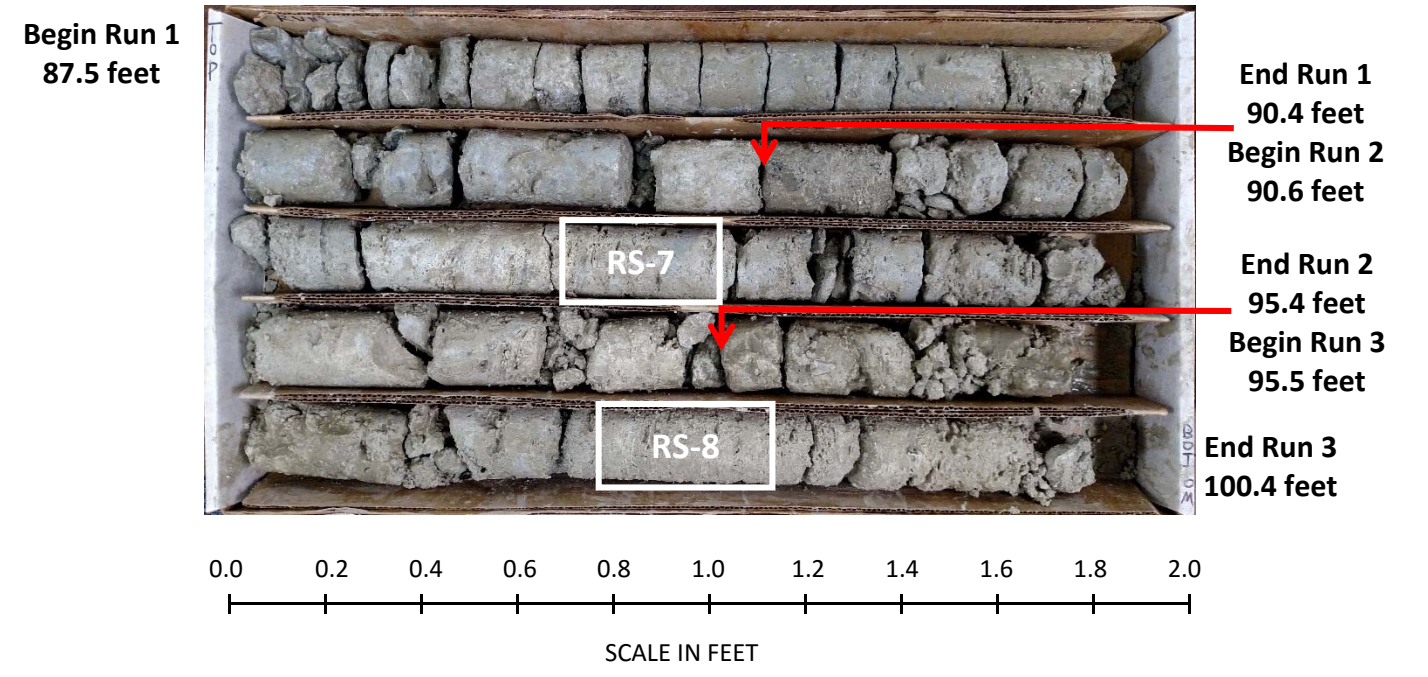
GEOTECHNICAL BORING REPORT

CORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG					
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)				
BORING NO. B3-B		STATION 22+05		OFFSET 21 ft RT		ALIGNMENT -L2-					
COLLAR ELEV. 0.2 ft		TOTAL DEPTH 115.0 ft		NORTHING 251,931		EASTING 2,436,393					
DRILL RIG/HAMMER EFF/DATE MD5152 D-25 79% 07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic					
DRILLER J. STEWART		START DATE 12/02/15		COMP. DATE 12/04/15		SURFACE WATER DEPTH 0.2ft					
CORE SIZE NQ2		TOTAL RUN 17.2 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)			
-87.3	-87.3	87.5	2.9	3:05/0.9	(2.9)	(0.3)	(13.0)	(2.0)		Begin Coring @ 87.5 ft	87.5
-90	-90.2 -90.4	90.4 90.6	4.8	2:56/1.0 3:58/1.0	100%	10%	73%	11%		COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, FRIABLE TO INDURATED LIMESTONE (RIVER BEND FORMATION)	
-95	-95.2 -95.3	95.4 95.5	4.8	N=100/0.4 0:58/0.8 2:17/1.0 4:06/1.0 3:30/1.0 5:04/1.0	(3.7)	(0.8)			RS-7	RS-7: 92.1'-92.4', qu=1,667 psi, RMR=10 RS-8: 95.5'-95.8', qu=660 psi, RMR=9	
-100	-100.2 -100.6	100.4 100.8	4.9	N=60/0.1 1:17/0.9 0:39/1.0 2:02/1.0 1:11/1.0 0:18/1.0	(2.6)	(0.9)			RS-8		
-105	-105.2	105.4	4.6	N=100/0.4 1:02/0.6 1:59/1.0 1:55/1.0 0:58/1.0	(3.7)	(0.0)					
-110				N=60 N=100/0.7 N=37						COASTAL PLAIN LIGHT GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	105.4
										COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, FRIABLE TO MODERATELY INDURATED LIMESTONE (RIVER BEND FORMATION)	109.0
										COASTAL PLAIN LIGHT GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	113.5
										Boring Terminated at Elevation -114.8 ft in CEMENTED SAND AND SHELL FRAGMENTS (RIVER BEND FORMATION)	115.0

NCDOT CORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ NC_DOT_GDT 2/4/16

CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B3-B: -L2- Station 22+05, 21' RT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B4-A		STATION 23+49		OFFSET 30 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. -0.1 ft		TOTAL DEPTH 119.5 ft		NORTHING 251,792		EASTING 2,436,457	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER J. STEWART		START DATE 10/30/15		COMP. DATE 11/05/15		SURFACE WATER DEPTH 0.2ft	

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						
5																
0	-0.1	0.0	WOH	WOH	WOH									-0.1	GROUND SURFACE	0.0
-5	-4.1	4.0	1	3	0									-4.5	ALLUVIAL DARK BROWN-BLACK, MUCK	4.4
-10	-8.1	8.0	4	3	2										UNDIVIDED COASTAL PLAIN GRAY AND BROWN AND LIGHT GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE ORGANICS, CEMENTED SAND FRAGMENTS, AND CLAY	
-15	-13.1	13.0	1	0	1											
-20	-18.1	18.0	WOH	WOH	1										-HARD DRILLING NOTED FROM 21.8'-22.9'	
-25	-23.1	23.0	3	0	1										COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, FRIABLE LIMESTONE WITH SHELL FRAGMENTS (RIVER BEND FORMATION)	22.0
-30	-28.1	28.0	12	15	18											
-35	-33.1	33.0	6	14	37											
-40	-38.1	38.0	11	24	21										COASTAL PLAIN GRAY TO DARK GRAY, SILTY FINE SAND (A-2-4) WITH TRACE CEMENTED SAND FRAGMENTS (RIVER BEND FORMATION)	37.0
-45	-43.1	43.0	12	22	33											
-50	-48.1	48.0	19	28	37											
-55	-53.1	53.0	9	5	13											
-60	-58.1	58.0	5	6	13											
-65	-63.1	63.0	7	5	4											
-70	-68.1	68.0	5	7	9											
-75	-73.1	73.0	5	4	4										-HARD DRILLING NOTED FROM 85.5'-85.7'	

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B4-A		STATION 23+49		OFFSET 30 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. -0.1 ft		TOTAL DEPTH 119.5 ft		NORTHING 251,792		EASTING 2,436,457	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER J. STEWART		START DATE 10/30/15		COMP. DATE 11/05/15		SURFACE WATER DEPTH 0.2ft	

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					
-75															
-80	-78.1	78.0	5	4	7										Match Line
-85	-83.1	83.0	7	16	22										
-90	-88.1	88.0	60/0.1												
-95	-93.1	93.0	38	100/0.3											
-100	-98.1	98.0	23	100/0.5											
-105	-103.1	103.0	60	40/0.3											
-110	-108.1	108.0	70	30/0.1											
-115	-113.1	113.0	18	21	16										
-119.6	-118.1	118.0	13	12	12										

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						
-86.6																
-86.6															COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE TO MODERATELY INDURATED, LIMESTONE (RIVER BEND FORMATION)	86.5
-104.1															COASTAL PLAIN LIGHT GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	104.0
-107.1															COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE LIMESTONE (RIVER BEND FORMATION)	107.0
-113.1															COASTAL PLAIN LIGHT GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH SOME CEMENTED SAND AND SHELL FRAGMENTS (RIVER BEND FORMATION)	113.0
-119.6															Boring Terminated at Elevation -119.6 ft in SAND (RIVER BEND FORMATION)	119.5

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG & D. RACEY	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B5-B		STATION 24+90		OFFSET 23 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -1.2 ft		TOTAL DEPTH 115.4 ft		NORTHING 251,647		EASTING 2,436,418	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER B. FOWLER/ J. STEW.		START DATE 12/04/15		COMP. DATE 12/09/15		SURFACE WATER DEPTH 2.2ft	

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					
5															
0	-1.2	0.0													
-5	-5.2	4.0	1	2	2										
-10	-10.2	9.0	1	1	1										
-15	-15.2	14.0	2	16	17										
-20	-20.2	19.0	12	18	22										
-25	-25.2	24.0	12	15	16										
-30	-30.2	29.0	7	9	8										
-35	-35.2	34.0	14	18	15										
-40	-40.2	39.0	12	18	21										
-45	-45.2	44.0	20	31	31										
-50	-50.2	49.0	21	33	30										
-55	-55.2	54.0	5	7	18										
-60	-60.2	59.0	3	6	4										
-65	-65.2	64.0	5	6	9										
-70	-70.2	69.0	3	3	5										
-75															

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG & D. RACEY	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B5-B		STATION 24+90		OFFSET 23 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -1.2 ft		TOTAL DEPTH 115.4 ft		NORTHING 251,647		EASTING 2,436,418	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER B. FOWLER/ J. STEW.		START DATE 12/04/15		COMP. DATE 12/09/15		SURFACE WATER DEPTH 2.2ft	

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					
-75	-75.2	74.0	9	9	11										
-80	-80.2	79.0	9	18	25										
-85	-85.2	84.0	15	14	12										
-90	-90.2	89.0	60	0	0										
-95	-95.3	94.1	60	0	1										
-100	-100.4	99.2	60	0	1										
-105	-105.5	104.3	25	100	0.4										
-110	-110.1	108.9	22	20	18										
-115	-115.1	113.9	16	13	12										

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ NC_DOT_GDT 2/4/16

GEOTECHNICAL BORING REPORT

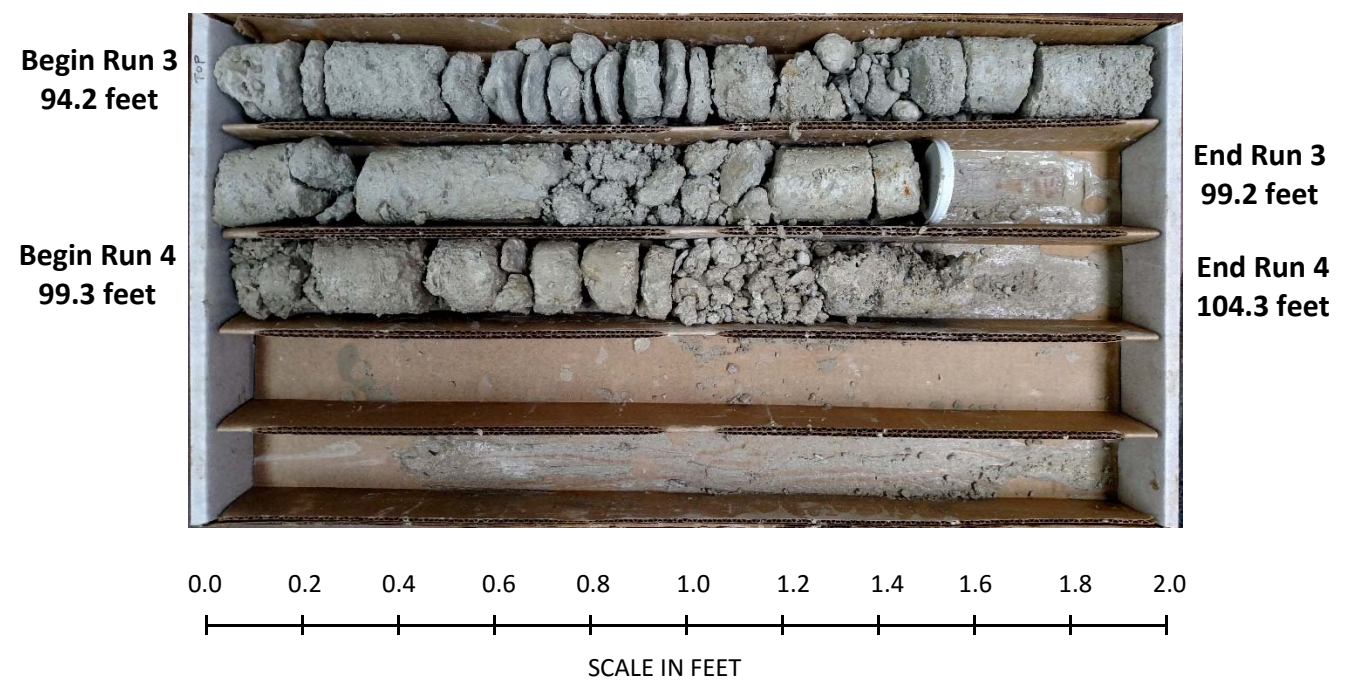
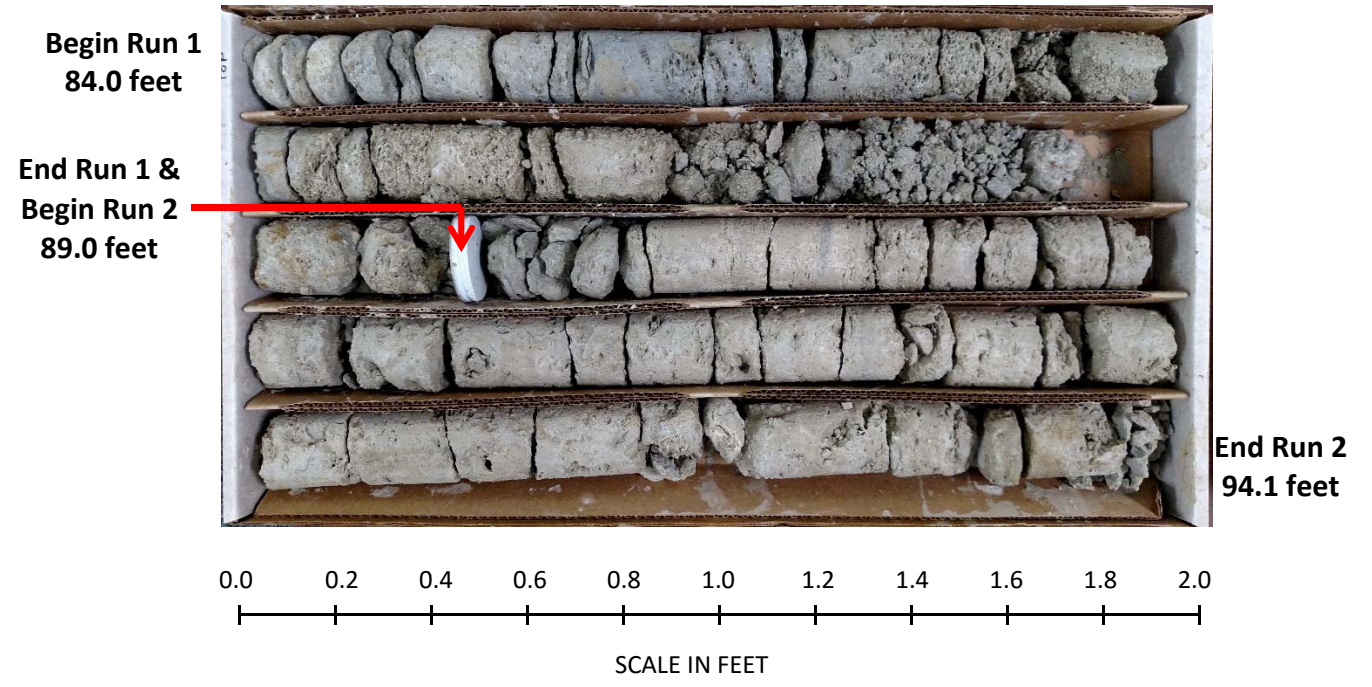
CORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG & D. RACEY						
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)					
BORING NO. B5-B		STATION 24+90		OFFSET 23 ft RT		ALIGNMENT -L2-						
COLLAR ELEV. -1.2 ft		TOTAL DEPTH 115.4 ft		NORTHING 251,647		EASTING 2,436,418						
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic						
DRILLER B. FOWLER/ J. STEW.		START DATE 12/04/15		COMP. DATE 12/09/15		SURFACE WATER DEPTH 2.2ft						
CORE SIZE NQ2		TOTAL RUN 20.1 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
-85.2	-85.2	84.0	5.0	N=60/0.0 4:53/1.0 3:49/1.0 1:22/1.0 0:40/1.0 1:09/1.0	(4.2) 84%	(0.3) 6%		(14.4) 85%	(0.7) 4%		Begin Coring @ 84.0 ft	84.0
-90	-90.2	89.0	5.1	N=60/0.0 2:24/1.0 3:16/1.0 3:46/1.0 2:27/1.0 1:58/1.1	(5.1) 100%	(0.0) 0%					COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, INDURATED TO MODERATELY INDURATED LIMESTONE (RIVER BEND FORMATION)	
-95	-95.3 -95.4	94.1 94.2	5.0	N=60/0.1 1:33/1.0 0:49/1.0 2:19/1.0 0:35/1.0 3:41/1.0	(3.5) 70%	(0.4) 8%						
-100	-100.4 -100.5	99.2 99.3	5.0	N=60/0.1 1:13/1.0 0:28/1.0 0:13/1.0 0:19/1.0 0:54/1.0	(1.6) 32%	(0.0) 0%		(0.0) 0%	(0.0) 0%			
-105	-105.5	104.3		N=100/0.4							COASTAL PLAIN LIGHT GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	104.3
-110				N=38							COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, FRIABLE LIMESTONE (RIVER BEND FORMATION)	104.8
-115				N=25							COASTAL PLAIN LIGHT GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	107.7
											Boring Terminated at Elevation -116.6 ft in CEMENTED SAND AND SHELL FRAGMENTS (RIVER BEND FORMATION)	115.4

NCDOT CORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ NC_DOT.GDT 2/4/16

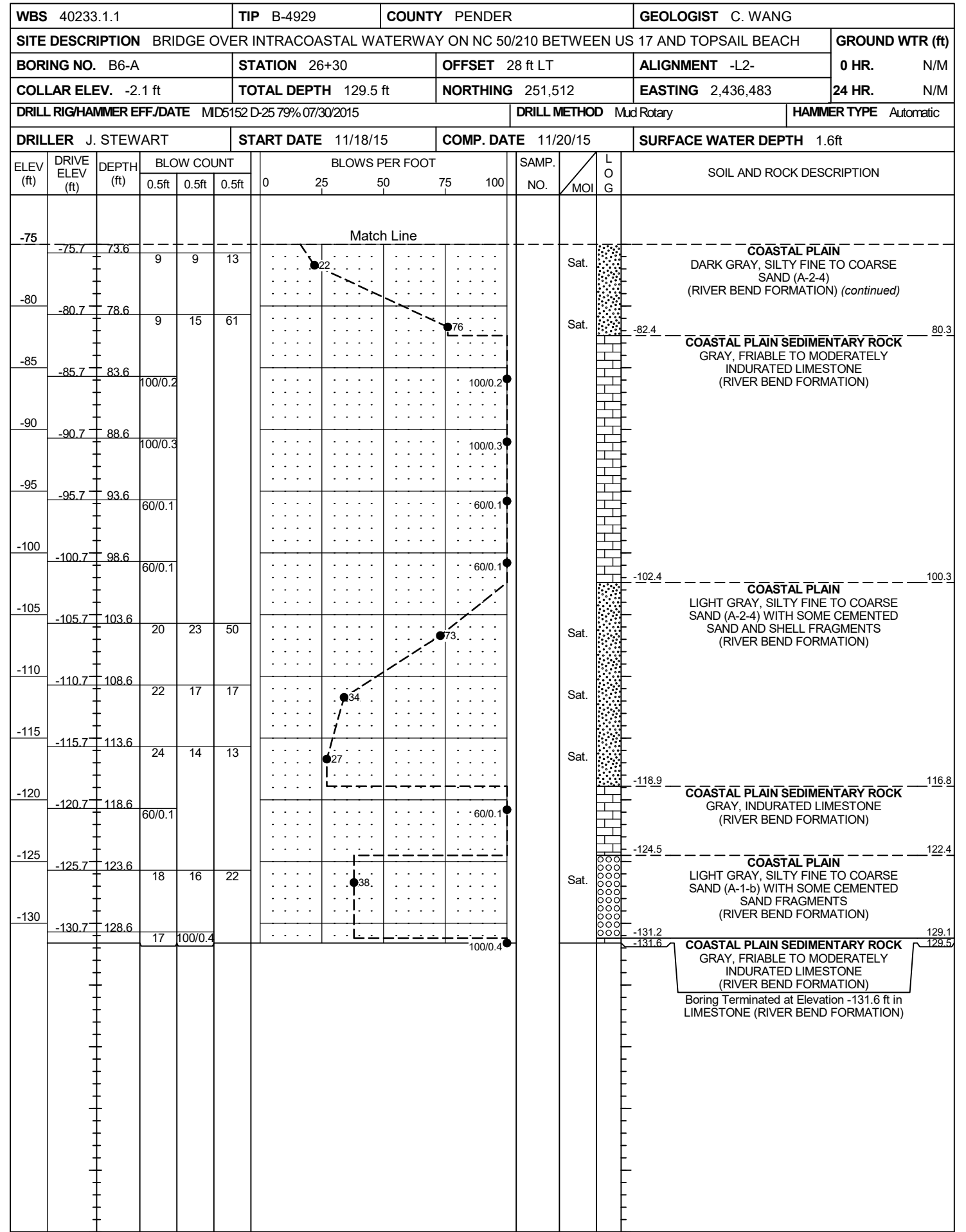
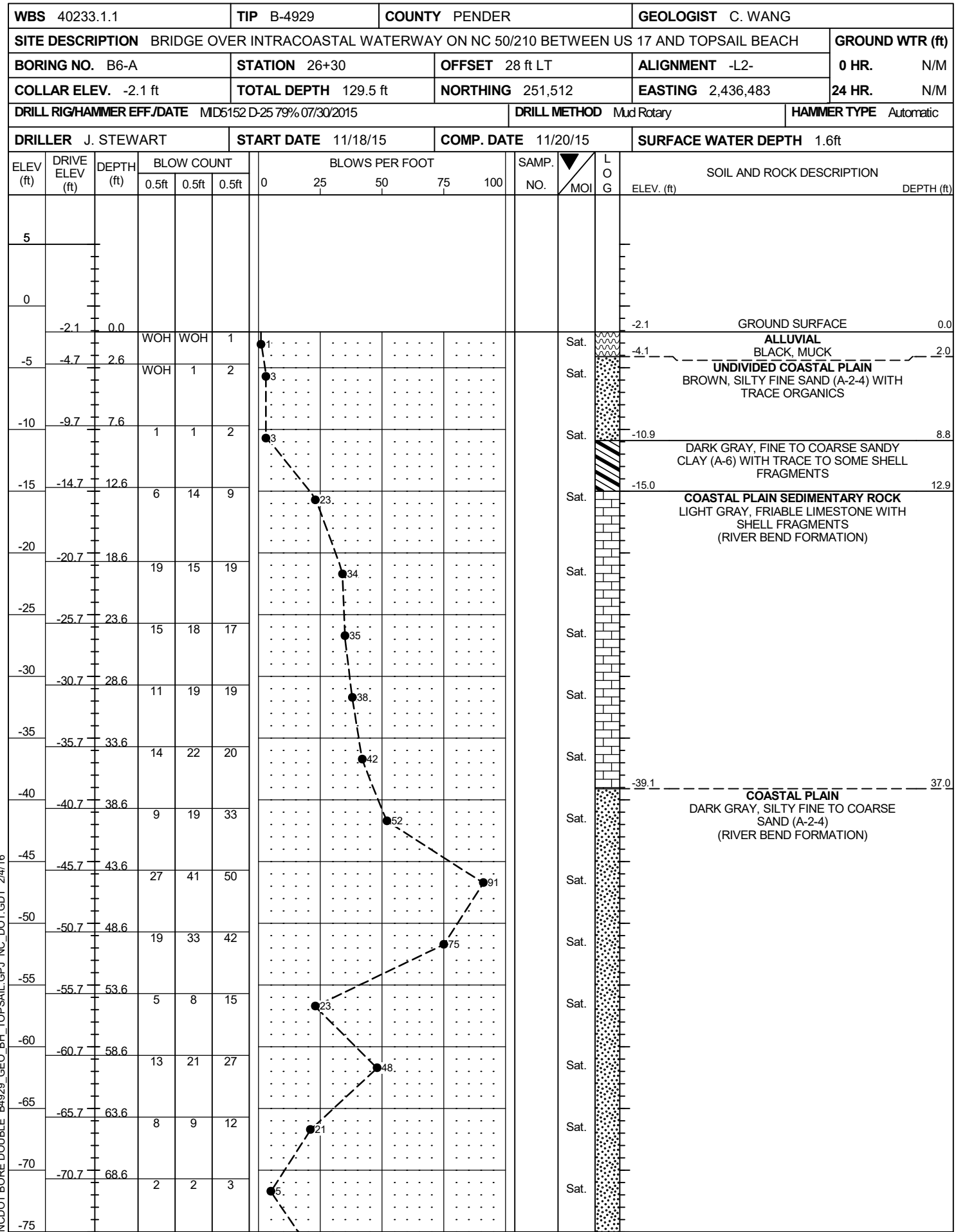


CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B5-B: -L2- Station 24+90, 23' RT



GEOTECHNICAL BORING REPORT

BORE LOG



NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/4/16

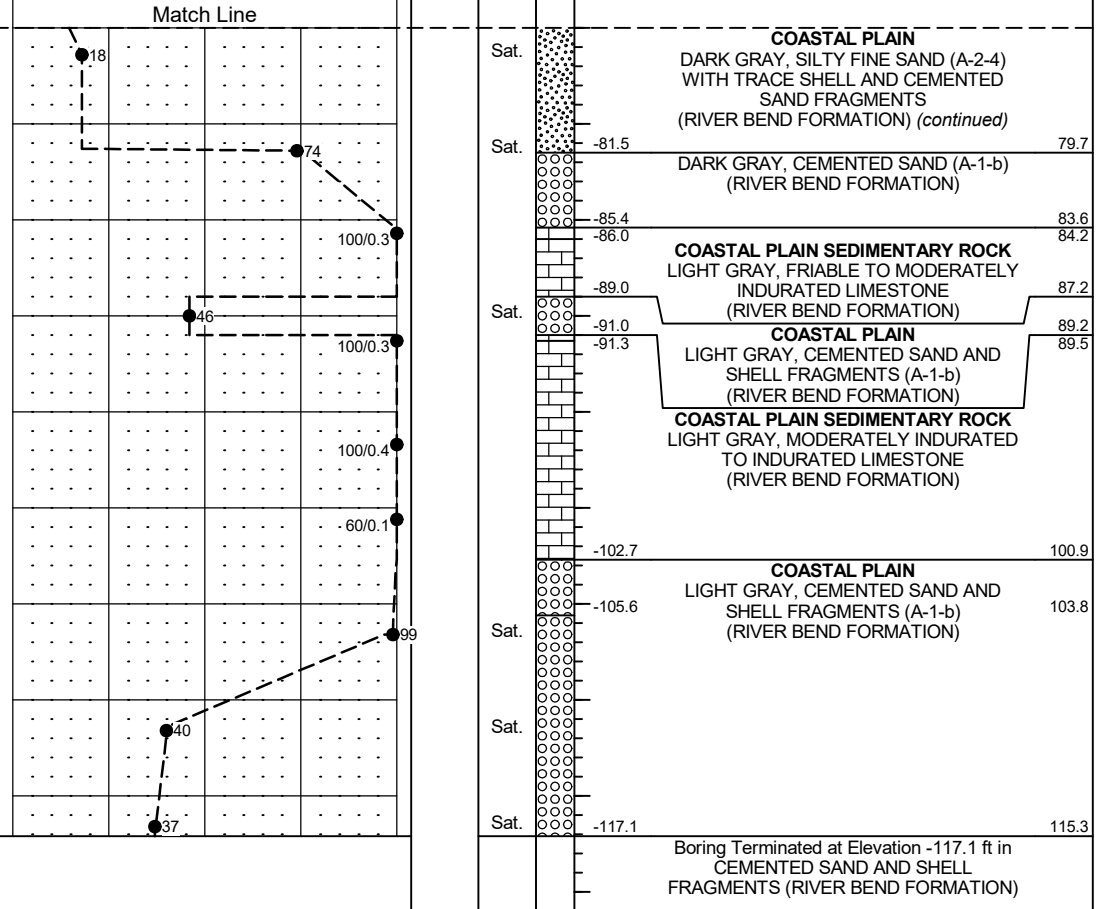
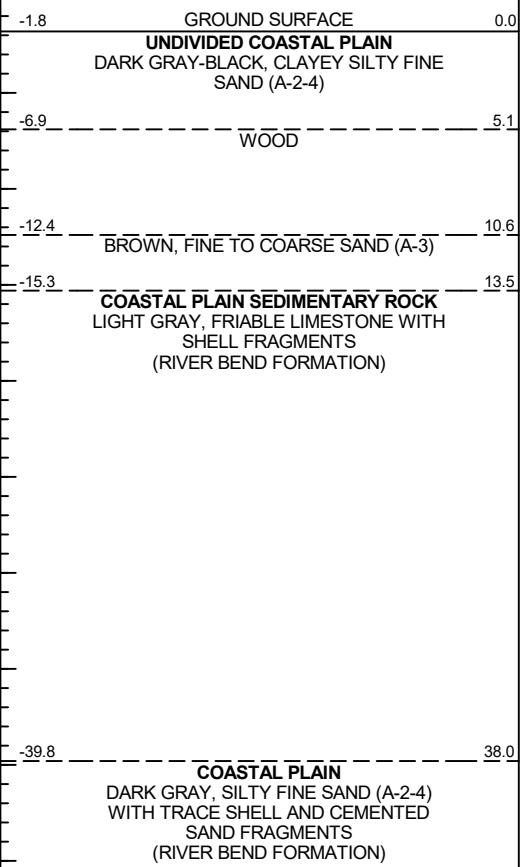
GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST D. RACEY										
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)										
BORING NO. B7-B		STATION 27+24		OFFSET 21 ft RT		ALIGNMENT -L2-										
COLLAR ELEV. -1.8 ft		TOTAL DEPTH 115.3 ft		NORTHING 251,414		EASTING 2,436,443										
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER B. FOWLER/ M. WIGG		START DATE 12/09/15		COMP. DATE 12/11/15		SURFACE WATER DEPTH 2.0ft										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
5																
0																
-5	-1.8	0.0	WOH	WOH	WOH											
-10	-5.2	3.4	WOH	1	0											
-15	-10.4	8.6	WOH	1	1											
-20	-15.4	13.6														
-25	-20.4	18.6														
-30	-25.4	23.6														
-35	-30.4	28.6														
-40	-35.4	33.6														
-45	-40.4	38.6														
-50	-45.4	43.6														
-55	-50.4	48.6														
-60	-55.4	53.6														
-65	-60.4	58.6														
-70	-65.4	63.6														
-75	-70.4	68.6														

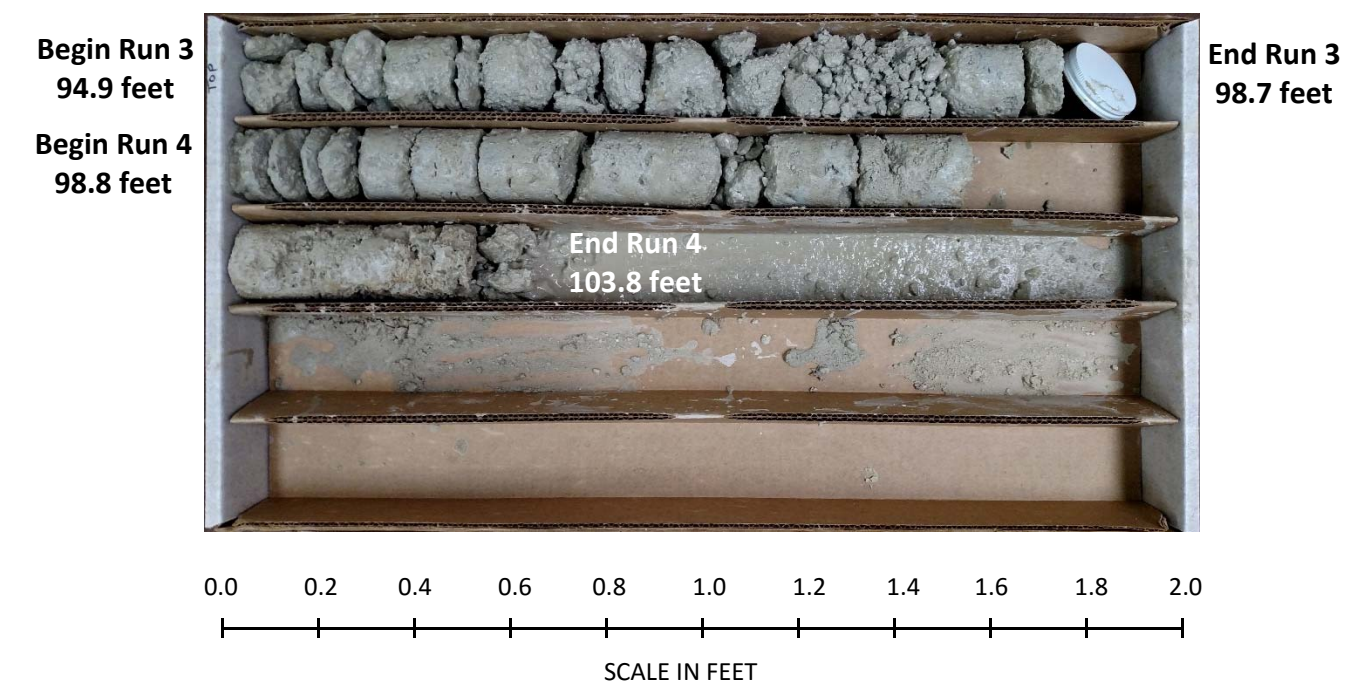
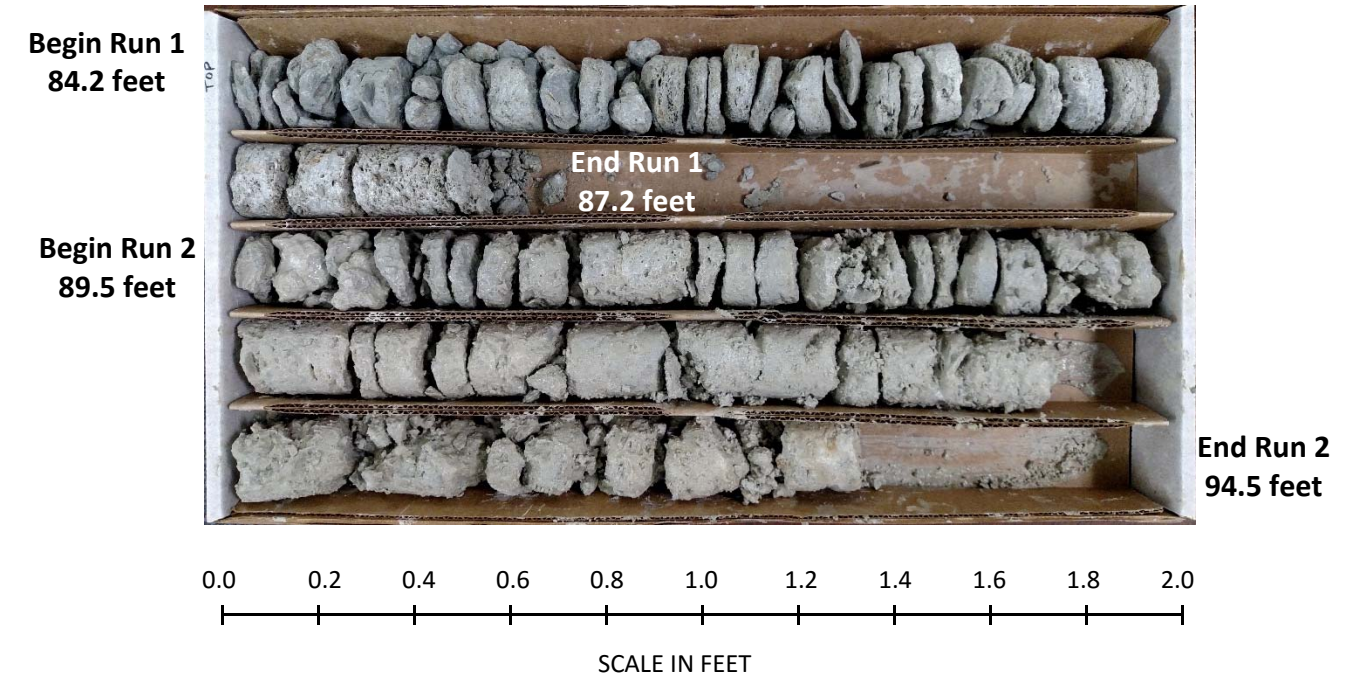
WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST D. RACEY										
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)										
BORING NO. B7-B		STATION 27+24		OFFSET 21 ft RT		ALIGNMENT -L2-										
COLLAR ELEV. -1.8 ft		TOTAL DEPTH 115.3 ft		NORTHING 251,414		EASTING 2,436,443										
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER B. FOWLER/ M. WIGG		START DATE 12/09/15		COMP. DATE 12/11/15		SURFACE WATER DEPTH 2.0ft										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-75	-75.4	73.6														
-80	-80.4	78.6														
-85	-85.4	83.6														
-90	-89.0	87.2														
-95	-90.5	88.7														
-100	-96.3	94.5														
-105	-100.5	98.7														
-110	-105.6	103.8														
-115	-110.6	108.8														
	-115.6	113.8														

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT_GDT_2/4/16





CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B7-B: -L2- Station 27+24, 21' RT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG										
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)										
BORING NO. B8-A		STATION 28+28		OFFSET 31 ft LT		ALIGNMENT -L2-										
COLLAR ELEV. -2.3 ft		TOTAL DEPTH 114.5 ft		NORTHING 251,316		EASTING 2,436,505										
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER J. STEWART		START DATE 11/06/15		COMP. DATE 11/17/15		SURFACE WATER DEPTH 2.3ft										
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						
0																
	-2.3	0.0	1	1	2											
	-5.0	2.7	1	WOH	WOH											
	-10.0	7.7	2													
	-15.0	12.7	WOH	1	WOH											
	-20.0	17.7														
	-25.0	22.7	13	13	18											
	-30.0	27.7	12	21	10											
	-35.3	33.0	9	16	15											
	-40.3	38.0	5	15	17											
	-45.3	43.0	17	14	14											
	-50.3	48.0	18	20	30											
	-55.3	53.0	14	30	33											
	-60.3	58.0	17	11	10											
	-65.3	63.0	8	11	9											
	-70.3	68.0	9	11	12											
	-75.3	73.0	6	7	8											
			3	4	4											

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG										
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)										
BORING NO. B8-A		STATION 28+28		OFFSET 31 ft LT		ALIGNMENT -L2-										
COLLAR ELEV. -2.3 ft		TOTAL DEPTH 114.5 ft		NORTHING 251,316		EASTING 2,436,505										
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER J. STEWART		START DATE 11/06/15		COMP. DATE 11/17/15		SURFACE WATER DEPTH 2.3ft										
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						
	-80.3	78.0	3	3	4											
	-85.3	83.0	18	49	51/0.4											
	-90.3	88.0	57	43/0.4												
	-95.3	93.0	60/0.1													
	-100.3	98.0	100/0.4													
	-105.3	103.0	7	7	12											
	-110.3	108.0	9	10	18											
	-115.3	113.0	9	11	9											

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B9-B		STATION 29+16		OFFSET 19 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -1.2 ft		TOTAL DEPTH 118.6 ft		NORTHING 251,223		EASTING 2,436,463	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER J. STEWART		START DATE 12/16/15		COMP. DATE 12/18/15		SURFACE WATER DEPTH 2.0ft	

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						
0	-1.2	0.0	WOH	WOH	WOH									-1.2	GROUND SURFACE	0.0
-5	-4.7	3.5	WOH	WOH	WOH									-1.2	UNDIVIDED COASTAL PLAIN DARK GRAY, CLAYEY FINE SAND (A-2-6)	
-10	-9.7	8.5	2	3	4									-9.2	BROWN, FINE TO COARSE SAND (A-3) WITH TRACE SHELL FRAGMENTS, ORGANICS, AND GRAVEL	8.0
-15	-14.7	13.5	1	1	1									-24.2	COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, FRIABLE LIMESTONE WITH SHELL FRAGMENTS (RIVER BEND FORMATION)	23.0
-20	-19.7	18.5	WOH	WOH	WOH									-34.2	COASTAL PLAIN GRAY, SILTY FINE TO COARSE SAND (A-2-4) (RIVER BEND FORMATION)	33.0
-25	-24.7	23.5	7	10	14											
-30	-29.7	28.5	11	12	14											
-35	-34.7	33.5	6	10	12											
-40	-39.7	38.5	20	25	26											
-45	-44.7	43.5	14	22	33											
-50	-49.7	48.5	23	31	34											
-55	-54.7	53.5	17	9	16											
-60	-59.7	58.5	8	9	17											
-65	-64.7	63.5	6	9	15											
-70	-69.7	68.5	11	12	22											
-75	-74.7	73.5	10	12	17											
-80	-79.7	78.5														

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT.GDT 2/4/16

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B9-B		STATION 29+16		OFFSET 19 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -1.2 ft		TOTAL DEPTH 118.6 ft		NORTHING 251,223		EASTING 2,436,463	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER J. STEWART		START DATE 12/16/15		COMP. DATE 12/18/15		SURFACE WATER DEPTH 2.0ft	

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					
-80															
-85	-84.7	83.5													
-90	-91.2	90.0													
-95	-96.2	95.0													
-100	-101.2	100.0													
-105	-106.2	105.0	14	40	60/0.1										
-110	-109.7	108.5	37	15	17										
-115	-114.7	113.5	12	10	10										
-119.7	-118.5														

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-80															
-85	-84.7	83.5													
-90	-91.2	90.0													
-95	-96.2	95.0													
-100	-101.2	100.0													
-105	-106.2	105.0	14	40	60/0.1										
-110	-109.7	108.5	37	15	17										
-115	-114.7	113.5	12	10	10										
-119.7	-118.5														

Match Line

COASTAL PLAIN
GRAY, SILTY FINE TO COARSE SAND
(A-2-4)
(RIVER BEND FORMATION) (continued)

COASTAL PLAIN SEDIMENTARY ROCK
LIGHT GRAY, FRIABLE TO MODERATELY
INDURATED LIMESTONE
(RIVER BEND FORMATION)

COASTAL PLAIN
LIGHT GRAY, CEMENTED SAND AND
SHELL FRAGMENTS (A-1-b)
(RIVER BEND FORMATION)

COASTAL PLAIN SEDIMENTARY ROCK
LIGHT GRAY, FRIABLE LIMESTONE
(RIVER BEND FORMATION)

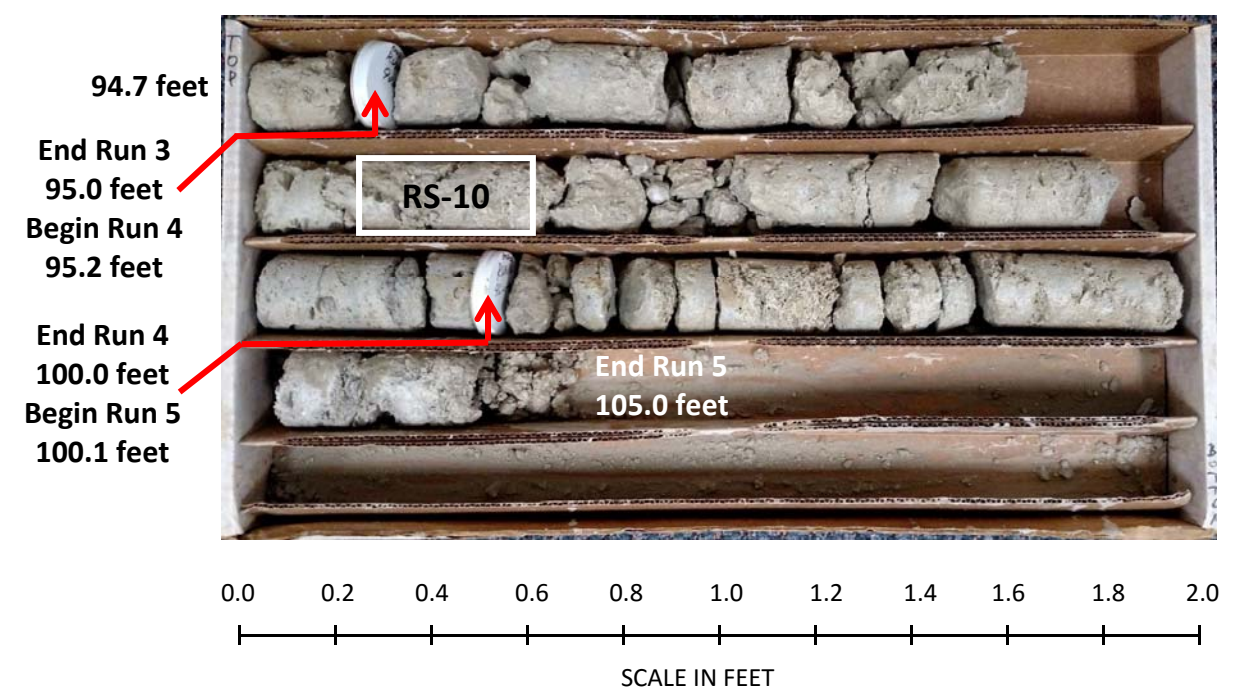
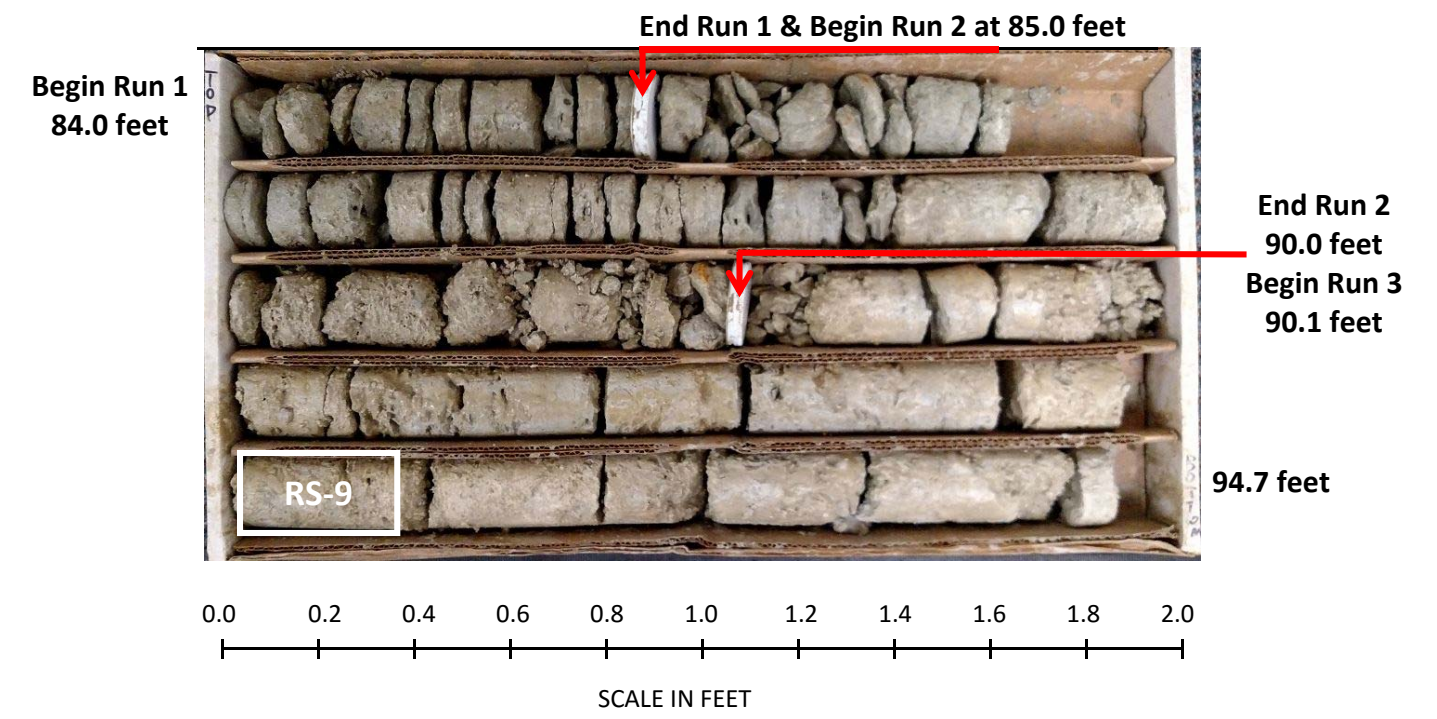
COASTAL PLAIN
LIGHT GRAY, SILTY FINE TO COARSE
SAND (A-1-b) WITH SOME CEMENTED
SAND AND SHELL FRAGMENTS
(RIVER BEND FORMATION)

COASTAL PLAIN SEDIMENTARY ROCK
LIGHT GRAY INDURATED LIMESTONE
(RIVER BEND FORMATION)

Boring Terminated with Standard
Penetration Test Refusal at Elevation -119.8
ft in LIMESTONE (RIVER BEND
FORMATION)



CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B9-B: -L2- Station 29+16, 19' RT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B10-A		STATION 30+55		OFFSET 37 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. -2.2 ft		TOTAL DEPTH 121.6 ft		NORTHING 251,090		EASTING 2,436,533	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 11/16/15		COMP. DATE 11/17/15		SURFACE WATER DEPTH 2.4ft	

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				
0														0.0
-2.3	-2.3	0.1											GROUND SURFACE	
-5			WOH	WOH	WOH								ALLUVIAL DARK GRAY AND BLACK MUCK	3.0
-6.9		4.7	1	3	2								UNDIVIDED COASTAL PLAIN GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE TO SOME SHELL FRAGMENTS AND GRAVEL	
-11.6		9.4	2	3	4									
-16.6		14.4	1	1	2									
-21.6		19.4	1	2	2									
-26.6		24.4	11	15	14								COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, FRIABLE LIMESTONE WITH SHELL FRAGMENTS (RIVER BEND FORMATION)	23.9
-31.7		29.5	12	20	23									
-36.7		34.5	9	9	12									
-41.8		39.6	13	15	19								COASTAL PLAIN GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE SHELL FRAGMENTS (RIVER BEND FORMATION)	39.0
-46.9		44.7	27	30	39									
-52.0		49.8	24	31	45									
-57.0		54.8	11	10	10									
-62.0		59.8	12	14	32									
-67.1		64.9	6	11	11									
-72.1		69.9	15	18	26									
-77.1		74.9	11	16	20									
-80														

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ NC_DOT.GDT 2/4/16

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B10-A		STATION 30+55		OFFSET 37 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. -2.2 ft		TOTAL DEPTH 121.6 ft		NORTHING 251,090		EASTING 2,436,533	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 11/16/15		COMP. DATE 11/17/15		SURFACE WATER DEPTH 2.4ft	

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				
-80														
-82.2		80.0	3	4	5								Match Line	
-85														
-87.2		85.0	60	0	1								COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE TO INDURATED LIMESTONE (RIVER BEND FORMATION)	84.1
-90														
-92.2		90.0	100	0	2									
-95														
-97.5		95.3	100	0	5									
-100														
-102.5		100.3	60	0	1									
-105														
-107.4		105.2	50	50	0	4							COASTAL PLAIN GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	104.6
-110													COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE LIMESTONE (RIVER BEND FORMATION)	107.6
-112.4		110.2	21	18	23								COASTAL PLAIN GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	115.7
-115														
-117.4		115.2	33	60	0	0							COASTAL PLAIN SEDIMENTARY ROCK GRAY, MODERATELY INDURATED LIMESTONE (RIVER BEND FORMATION)	117.1
-120														
-122.3		120.1	23	27	19								COASTAL PLAIN GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH SOME CEMENTED SAND AND SHELL FRAGMENTS (RIVER BEND FORMATION)	121.6

-SOFT DRILLING NOTED FROM 88.4'-89.1', 92.4'-93.1', AND FROM 97.3'-98.3'

Boring Terminated at Elevation -123.8 ft in SAND (RIVER BEND FORMATION)

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B11-B		STATION 31+98		OFFSET 22 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. 0.6 ft		TOTAL DEPTH 123.8 ft		NORTHING 250,942		EASTING 2,436,488	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER J. STEWART		START DATE 12/14/15		COMP. DATE 12/16/15		SURFACE WATER DEPTH 0.6ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
5																
0	0.6	0.0	WOH	WOH	2									0.6	GROUND SURFACE	0.0
-5	-3.2	3.8	1	1	4									-1.4	ALLUVIAL PEAT	2.9
-10	-8.2	8.8	1	3	4										UNDIVIDED COASTAL PLAIN GRAY, SILTY FINE SAND (A-2-4) WITH TRACE SHELL FRAGMENTS AND ORGANICS	
-15	-13.2	13.8	2	7	11											
-20	-19.2	19.8	WOH	WOH	WOH											
-25	-23.2	23.8	9	7	4									-22.4	COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, FRIABLE LIMESTONE WITH SHELL FRAGMENTS (RIVER BEND FORMATION)	23.9
-30	-28.2	28.8	5	3	1											
-35	-33.2	33.8	13	18	16											
-40	-38.2	38.8	17	12	12											
-45	-43.2	43.8	9	15	22											
-50	-48.2	48.8	20	27	36											
-55	-53.2	53.8	27	45	55/0.3											
-60	-58.2	58.8	7	8	11											
-65	-63.2	63.8	10	10	13											
-70	-68.2	68.8	8	8	10											
-75	-73.2	73.8	5	3	4											

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST C. WANG	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B11-B		STATION 31+98		OFFSET 22 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. 0.6 ft		TOTAL DEPTH 123.8 ft		NORTHING 250,942		EASTING 2,436,488	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER J. STEWART		START DATE 12/14/15		COMP. DATE 12/16/15		SURFACE WATER DEPTH 0.6ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-75															
-80	-78.2	78.8	3	2	4										
-85	-83.2	83.8	4	10	15										
-90	-88.2	88.8	32	80	20/0.4										
-95	-93.2	93.8	60/0.1												
-100	-98.2	98.8	16	12	11										
-105	-103.2	103.8	7	6	6										
-110	-108.2	108.8	60/0.1												
-115	-113.2	113.8	26	20	14										
-120	-118.2	118.8	100/0.4												
-123.2	-123.2	123.8	60/0.0												

Match Line

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					
-75															
-80	-78.2	78.8	3	2	4										
-85	-83.2	83.8	4	10	15										
-90	-88.2	88.8	32	80	20/0.4										
-95	-93.2	93.8	60/0.1												
-100	-98.2	98.8	16	12	11										
-105	-103.2	103.8	7	6	6										
-110	-108.2	108.8	60/0.1												
-115	-113.2	113.8	26	20	14										
-120	-118.2	118.8	100/0.4												
-123.2	-123.2	123.8	60/0.0												

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B12-A		STATION 33+41		OFFSET 30 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. -1.5 ft		TOTAL DEPTH 116.8 ft		NORTHING 250,805		EASTING 2,436,553	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic		
DRILLER B. FOWLER		START DATE 11/11/15		COMP. DATE 11/13/15		SURFACE WATER DEPTH 1.9ft	

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					
0															
-1.8	-0.3		WOH	WOH	WOH										
-5	-6.5	5.0	3	4	5										
-10	-11.6	10.1	5	2	1										
-15	-16.6	15.1	2	1	1										
-20	-21.6	20.1	1	1	4										
-25	-26.7	25.2	7	10	16										
-30	-31.7	30.2	8	13	17										
-35	-36.7	35.2	19	17	26										
-40	-41.7	40.2	12	14	10										
-45	-46.8	45.3	25	26	33										
-50	-51.8	50.3	24	38	46										
-55	-56.8	55.3	6	6	8										
-60	-61.8	60.3	8	14	16										
-65	-66.9	65.4	11	12	27										
-70	-71.9	70.4	13	20	36										
-75	-76.9	75.4	13	13	15										
-80															

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B12-A		STATION 33+41		OFFSET 30 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. -1.5 ft		TOTAL DEPTH 116.8 ft		NORTHING 250,805		EASTING 2,436,553	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic		
DRILLER B. FOWLER		START DATE 11/11/15		COMP. DATE 11/13/15		SURFACE WATER DEPTH 1.9ft	

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					
-80															
-81.9	80.4		4	4	5										
-85	-85.5	84.0	60/0.0												
-90	-90.9	89.4	100/0.2												
-95	-96.4	94.9	60/0.0												
-100	-101.6	100.1	60/0.1												
-105	-106.9	105.4	50	50	0.2										
-110	-112.9	111.4	52	38	35										
-115	-117.9	116.4	100/0.4												

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ NC_DOT.GDT 2/4/16

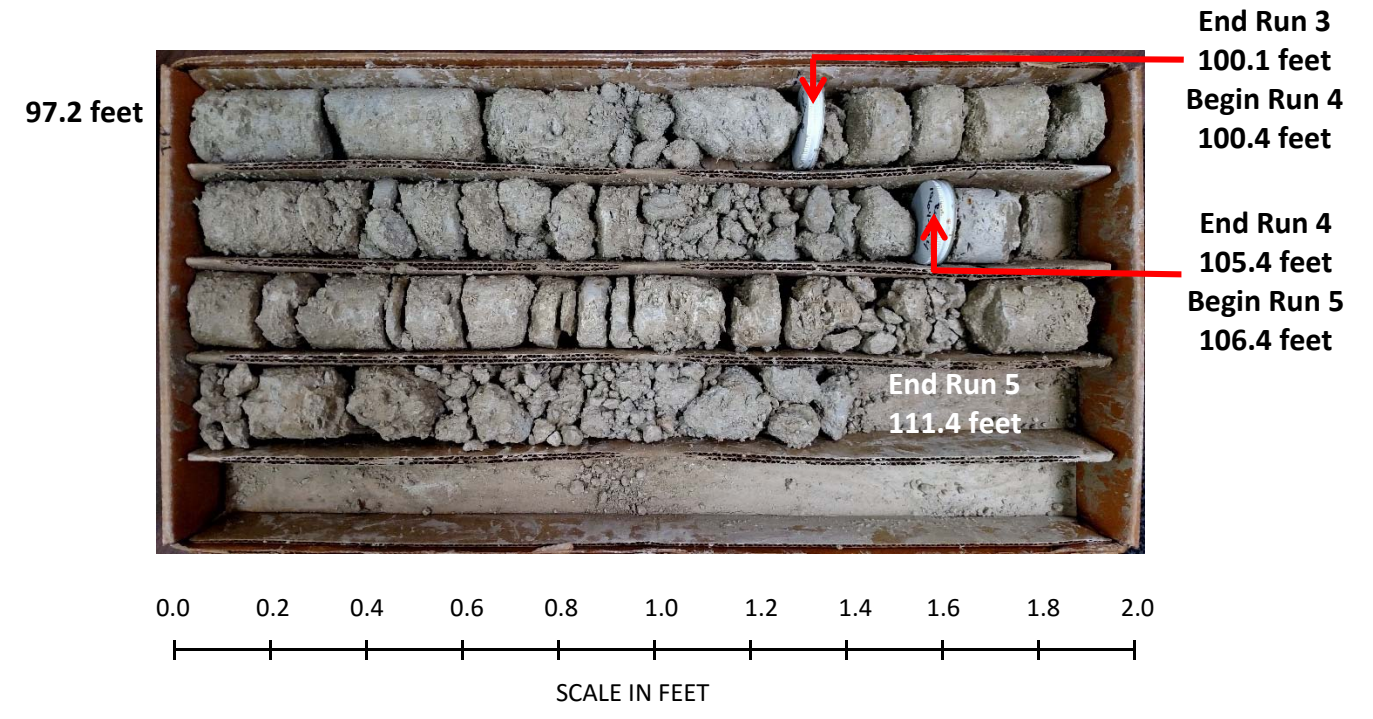
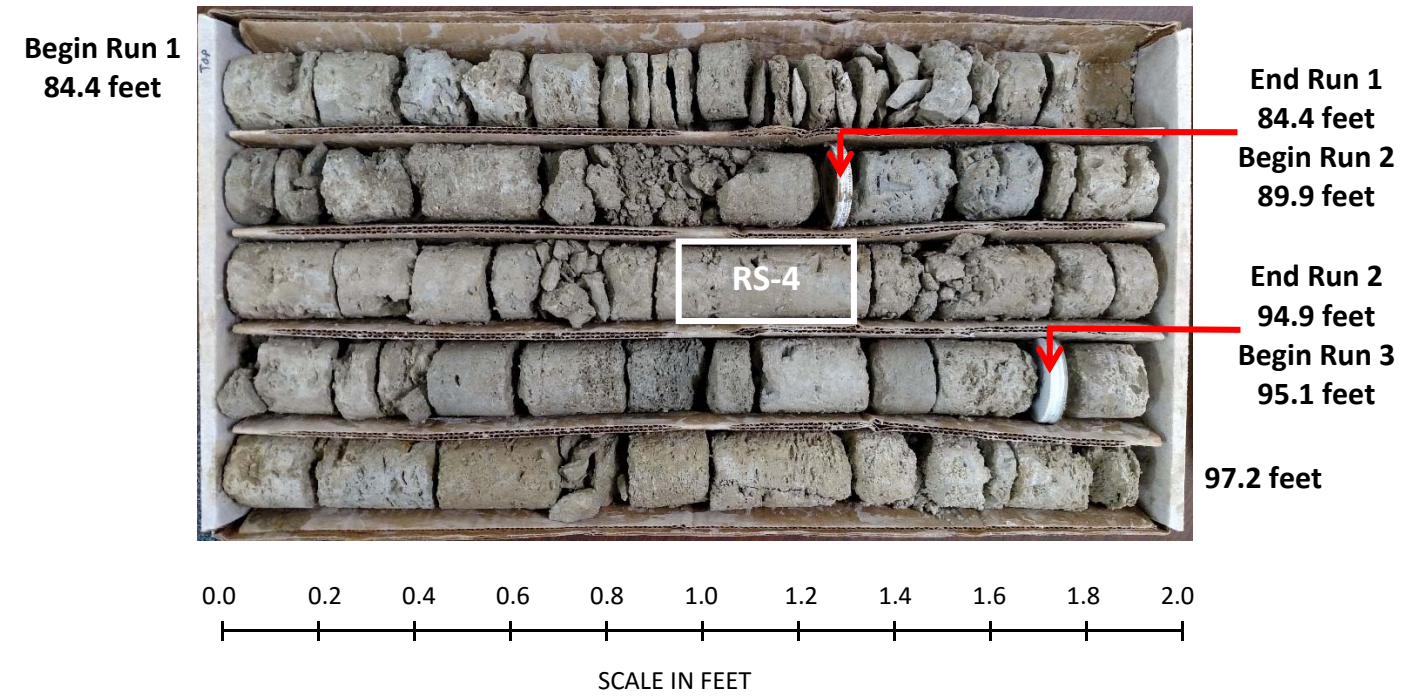
GEOTECHNICAL BORING REPORT CORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS					
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)				
BORING NO. B12-A		STATION 33+41		OFFSET 30 ft LT		ALIGNMENT -L2-					
COLLAR ELEV. -1.5 ft		TOTAL DEPTH 116.8 ft		NORTHING 250,805		EASTING 2,436,553					
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic					
DRILLER B. FOWLER		START DATE 11/11/15		COMP. DATE 11/13/15		SURFACE WATER DEPTH 1.9ft					
CORE SIZE NQ2		TOTAL RUN 25.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
-85.9	-85.9	84.4	5.0	4:25/1.0 1:58/1.0 2:09/1.0 0:43/1.0 1:17/1.0	(3.1) 62%	(0.0) 0%	(16.7) 97%	(0.8) 5%		Begin Coring @ 84.4 ft	84.4
-90	-90.9 -91.4	89.4 89.9	5.0	N=100/0.2 1:59/1.0 1:54/1.0 2:18/1.0 2:10/1.0 2:46/1.0	(4.5) 90%	(0.5) 10%			RS-4	GRAY, FRIABLE TO INDURATED LIMESTONE (RIVER BEND FORMATION) RS-4: 91.6'-91.9', qu=1,472 psi, RMR=10	
-95	-96.4 -96.6	94.9 95.1	5.0	N=60/0.0 1:16/1.0 0:32/1.0 0:13/1.0 0:36/1.0 2:23/1.0	(3.4) 68%	(0.3) 6%					
-100	-101.8	100.1	5.0	N=60/0.1 1:32/1.0 0:14/1.0 0:06/1.0 0:09/1.0 0:40/1.0	(2.2) 44%	(0.0) 0%					101.6
-105	-106.9 -107.9	105.4 106.4	5.0	N=100/0.7 1:39/1.0 1:07/1.0 0:35/1.0 0:18/1.0 1:10/1.0	(3.5) 70%	(0.0) 0%	(0.0) 0%	(0.0) 0%		COASTAL PLAIN GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	104.4
-110	-106.9 -107.9	105.4 106.4	5.0	N=100/0.7 1:39/1.0 1:07/1.0 0:35/1.0 0:18/1.0 1:10/1.0	(3.5) 70%	(0.0) 0%	(4.5) 61%	(0.0) 0%		COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE TO MODERATELY INDURATED LIMESTONE (RIVER BEND FORMATION)	111.8
-115	-112.9	111.4		N=73						COASTAL PLAIN GRAY, FINE TO COARSE SANDY GRAVEL (A-1-b) WITH TRACE SILT (FRIABLE LIMESTONE) (RIVER BEND FORMATION)	116.0
				N=100/0.4						COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE AND MODERATELY INDURATED LIMESTONE (RIVER BEND FORMATION) Boring Terminated at Elevation -118.3 ft in LIMESTONE (RIVER BEND FORMATION)	116.8

NCDOT CORE DOUBLE B4929 GEO_BH_TOPSAIL.GPJ NC_DOT.GDT 2/4/16



CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B12-A: -L2- Station 33+41, 30' LT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B13-B		STATION 34+80		OFFSET 11 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -2.4 ft		TOTAL DEPTH 114.3 ft		NORTHING 250,662		EASTING 2,436,528	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 11/10/15		COMP. DATE 11/11/15		SURFACE WATER DEPTH 4.3ft	

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					
0															0.0
-2.7	-2.7	0.3	WOH	2	2										
-6.3	-6.3	3.9		6	11										
-9.9	-9.9	7.5		5	3										
-14.9	-14.9	12.5	WOH	WOH	2										
-19.9	-19.9	17.5		6	6										
-24.9	-24.9	22.5		20	26										
-30.0	-30.0	27.6		15	14										
-35.0	-35.0	32.6		12	15										
-40.2	-40.2	37.8		9	8										
-45.6	-45.6	43.2		19	26										
-50.6	-50.6	48.2		16	26										
-55.7	-55.7	53.3		11	11										
-60.7	-60.7	58.3		6	6										
-65.8	-65.8	63.4		13	16										
-70.8	-70.8	68.4		12	15										
-75.8	-75.8	73.4		12	14										
-80															

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B13-B		STATION 34+80		OFFSET 11 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -2.4 ft		TOTAL DEPTH 114.3 ft		NORTHING 250,662		EASTING 2,436,528	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 11/10/15		COMP. DATE 11/11/15		SURFACE WATER DEPTH 4.3ft	

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					
-80	-80.9	78.5													
-85	-85.9	83.5													
-90	-91.0	88.6													
-95	-96.1	93.7													
-100	-100.5	98.1													
-105	-105.4	103.0													
-110	-110.3	107.9													
-115	-115.2	112.8													

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B14-A		STATION 36+38		OFFSET 25 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. -12.0 ft		TOTAL DEPTH 109.7 ft		NORTHING 250,516		EASTING 2,436,595	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 11/04/15		COMP. DATE 11/06/15		SURFACE WATER DEPTH 12.5ft	

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					
0															
-5															
-10															
-13.5	-13.5	1.5	5	6	6										
-15	-16.9	4.9	5	5	3										
-20	-21.7	9.7	WOH	WOH	1										
-25	-26.7	14.7	13	6	12										
-30	-31.2	19.2	23	17	19										
-35	-36.1	24.1	12	22	19										
-40	-41.1	29.1	10	16	17										
-45	-46.0	34.0	15	23	32										
-50	-50.7	38.7	21	31	41										
-55	-55.9	43.9	1	7	6										
-60	-60.8	48.8	8	12	19										
-65	-66.9	54.9	10	6	13										
-70	-72.0	60.0	14	27	32										
-75	-77.1	65.1	10	12	15										
-80															

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B14-A		STATION 36+38		OFFSET 25 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. -12.0 ft		TOTAL DEPTH 109.7 ft		NORTHING 250,516		EASTING 2,436,595	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 11/04/15		COMP. DATE 11/06/15		SURFACE WATER DEPTH 12.5ft	

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					
-80															
-82.2	-82.2	70.2	3	4	22										
-85	-84.3	72.3	60/0.0												
-90	-89.6	77.6	100/0.4												
-95	-93.1	81.1	60/0.0												
-100	-98.1	86.1	45	18	19										
-105	-101.8	89.8	25	30	15										
-110	-107.0	95.0	100/0.2												
-115	-112.0	100.0	28	22	18										
-120	-116.7	104.7	13	12	42										
-121.7	-121.7	109.7	60/0.0												

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

CORE LOG

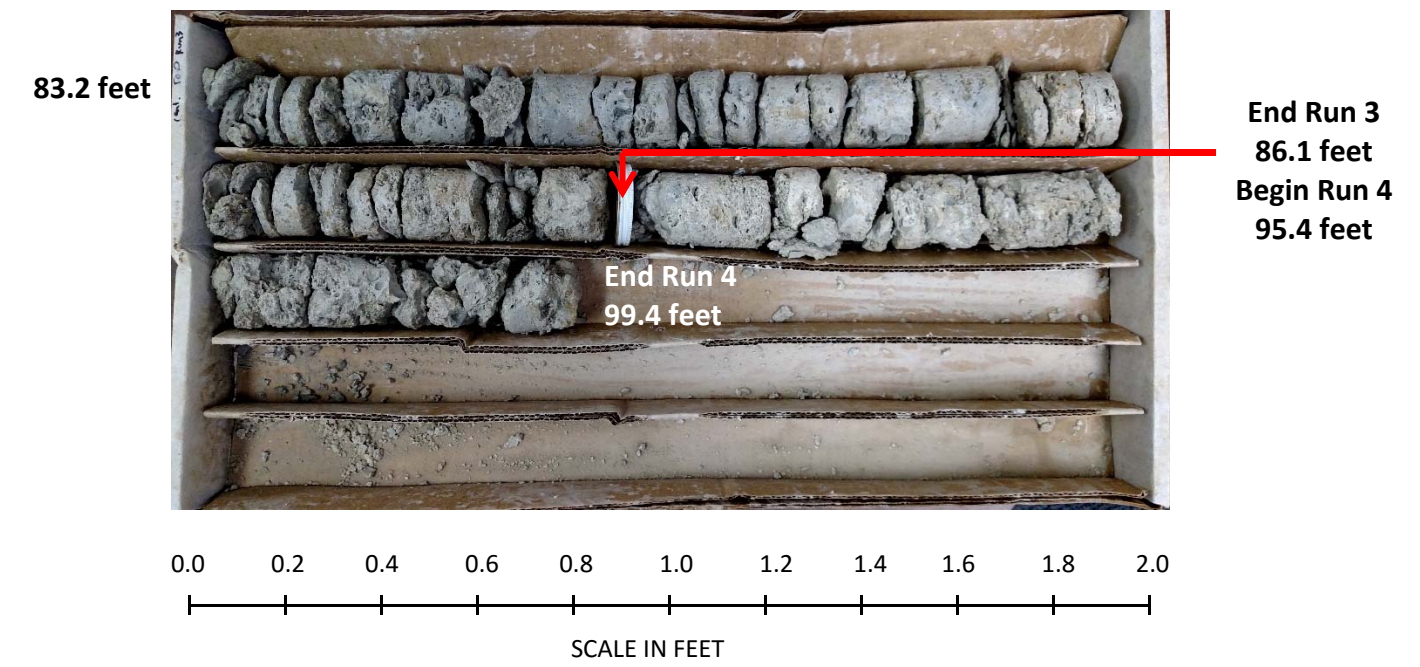
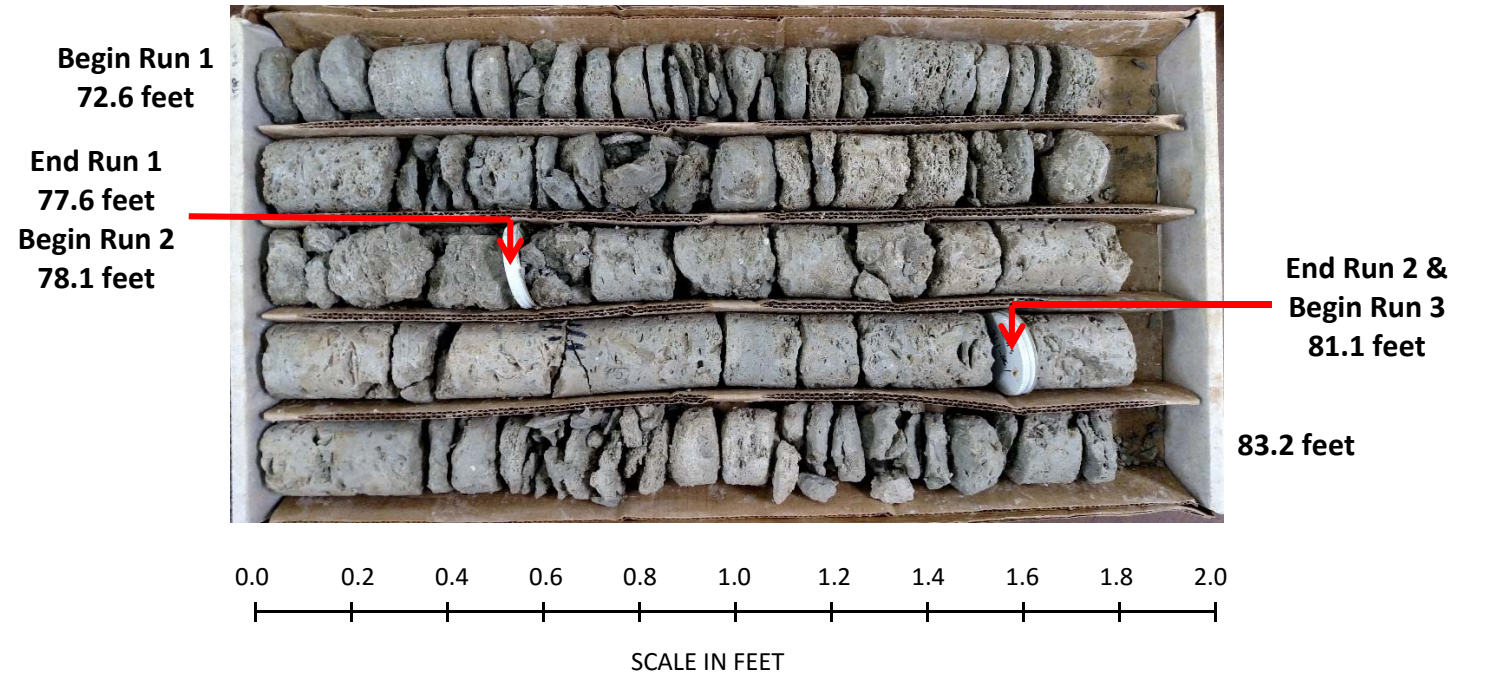
WBS 40233.1.1	TIP B-4929	COUNTY PENDER	GEOLOGIST M. ELLIS
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH			GROUND WTR (ft)
BORING NO. B14-A	STATION 36+38	OFFSET 25 ft LT	ALIGNMENT -L2-
COLLAR ELEV. -12.0 ft	TOTAL DEPTH 109.7 ft	NORTHING 250,516	EASTING 2,436,595
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER M. WIGGINS	START DATE 11/04/15	COMP. DATE 11/06/15	SURFACE WATER DEPTH 12.5ft

CORE SIZE NQ				TOTAL RUN 17.0 ft				STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %			
-84.6	-84.6	72.6	5.0	2:24/1.0 3:05/1.0 2:10/1.0 0:55/1.0 0:39/1.0	(4.2) 84%	(0.0) 0%		(11.9) 88%	(0.6) 4%		Begin Coring @ 72.6 ft	72.6
-90	-89.6 -90.1	77.6 78.1	3.0	N=100/0.9 1:07/1.0 2:13/1.0 2:16/1.0	(2.9) 97%	(0.6) 20%					COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE TO INDURATED LIMESTONE (RIVER BEND FORMATION)	
-95	-93.1	81.1	5.0	N=60/0.0 2:01/1.0 1:15/1.0 1:47/1.0 1:57/1.0 1:31/1.0	(4.8) 96%	(0.0) 0%						
-100	-98.1	86.1		N=37							COASTAL PLAIN GRAY, FINE TO COARSE SAND (A-1-b) (RIVER BEND FORMATION)	86.1
-105				N=45								
-110	-107.4	95.4	4.0	N=100/0.2 0:51/1.0 0:40/1.0 0:37/1.0 1:25/1.0	(1.9) 48%	(0.0) 0%		(1.9) 100%	(0.0) 0%		COASTAL PLAIN SEDIMENTARY ROCK GRAY, MODERATELY INDURATED TO INDURATED LIMESTONE (RIVER BEND FORMATION)	95.0 95.4 97.3
-115	-111.4	99.4		N=40				(0.0) 0%	(0.0) 0%		COASTAL PLAIN GRAY, FINE TO COARSE SAND (A-1-b) (RIVER BEND FORMATION)	99.4
-120				N=54								
				N=60/0.0							COASTAL PLAIN SEDIMENTARY ROCK GRAY, MODERATELY INDURATED LIMESTONE (RIVER BEND FORMATION)	106.8 109.7
											Boring Terminated with Standard Penetration Test Refusal at Elevation -121.7 ft in LIMESTONE (RIVER BEND FORMATION)	

NCDOT CORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ NC_DOT.GDT 2/4/16



CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B14-A: -L2- Station 36+38, 25' LT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B14-B		STATION 36+25		OFFSET 26 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -11.1 ft		TOTAL DEPTH 133.6 ft		NORTHING 250,515		EASTING 2,436,542	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 10/26/15		COMP. DATE 10/30/15		SURFACE WATER DEPTH 11.4ft	

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				
0														
-5														
-10	-11.2	0.1												
-15	-13.7	2.6	WOR	WOR	WOR									
-20	-17.1	6.0												
-25	-22.4	11.3												
-30	-27.4	16.3												
-35	-31.6	20.5												
-40	-36.6	25.5												
-45	-41.6	30.5												
-50	-46.5	35.4												
-55	-51.5	40.4												
-60	-56.9	45.8												
-65	-62.2	51.1												
-70	-66.9	55.8												
-75	-71.9	60.8												
-80	-76.7	65.6												

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B14-B		STATION 36+25		OFFSET 26 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -11.1 ft		TOTAL DEPTH 133.6 ft		NORTHING 250,515		EASTING 2,436,542	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 10/26/15		COMP. DATE 10/30/15		SURFACE WATER DEPTH 11.4ft	

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				
-80														
-85	-81.6	70.5												
-90	-86.3	75.2												
-95	-92.7	81.6												
-100	-97.6	86.5												
-105	-102.4	91.3												
-110	-107.3	96.2												
-115	-112.3	101.2												
-120	-117.5	106.4												
-125	-122.8	111.7												
-130	-128.0	116.9												
-135	-133.7	122.6												
-140	-138.4	127.3												
-144.7	-143.2	132.1												

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS										
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)									
BORING NO. B15-A		STATION 37+86		OFFSET 46 ft LT		ALIGNMENT -L2-										
COLLAR ELEV. -15.7 ft		TOTAL DEPTH 116.0 ft		NORTHING 250,385		EASTING 2,436,660										
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic										
DRILLER B. FOWLER		START DATE 10/15/15		COMP. DATE 10/16/15		SURFACE WATER DEPTH 15.4ft										
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						
-5																
-10																
-15	-16.1	0.4	4	3	2											
-20	-19.3	3.6	3	6	10											
-25	-22.2	6.5	7	4	1											
-30	-27.1	11.4	31	28	20											
-35	-32.0	16.3	18	15	15											
-40	-36.9	21.2	11	15	13											
-45	-41.8	26.1	11	16	23											
-50	-46.8	31.1	22	32	45											
-55	-51.9	36.2	22	33	36											
-60	-56.9	41.2	26	26	25											
-65	-61.9	46.2	12	12	19											
-70	-66.9	51.2	10	17	23											
-75	-72.1	56.4	16	23	30											
-80	-77.0	61.3	16	22	25											
-85	-82.1	66.4	3	2	3											

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS										
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)									
BORING NO. B15-A		STATION 37+86		OFFSET 46 ft LT		ALIGNMENT -L2-										
COLLAR ELEV. -15.7 ft		TOTAL DEPTH 116.0 ft		NORTHING 250,385		EASTING 2,436,660										
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79% 07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic										
DRILLER B. FOWLER		START DATE 10/15/15		COMP. DATE 10/16/15		SURFACE WATER DEPTH 15.4ft										
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						
-85																
-90	-87.2	71.5	41	100/0.2												
-95	-92.3	76.6	100/0.2													
-100	-97.5	81.8	100/0.4													
-105	-102.6	86.9	100/0.5													
-110	-107.9	92.2	57	43/0.1												
-115	-112.8	97.1	44	34	32											
-120	-117.8	102.1	14	10	14											
-125	-122.6	106.9	60/0.1													
-130	-127.4	111.7	14	9	10											
-135	-131.7	116.0	60/0.0													

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B15-B		STATION 37+83		OFFSET 21 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -15.0 ft		TOTAL DEPTH 133.0 ft		NORTHING 250,364		EASTING 2,436,596	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 10/19/15		COMP. DATE 10/22/15		SURFACE WATER DEPTH 14.5ft	

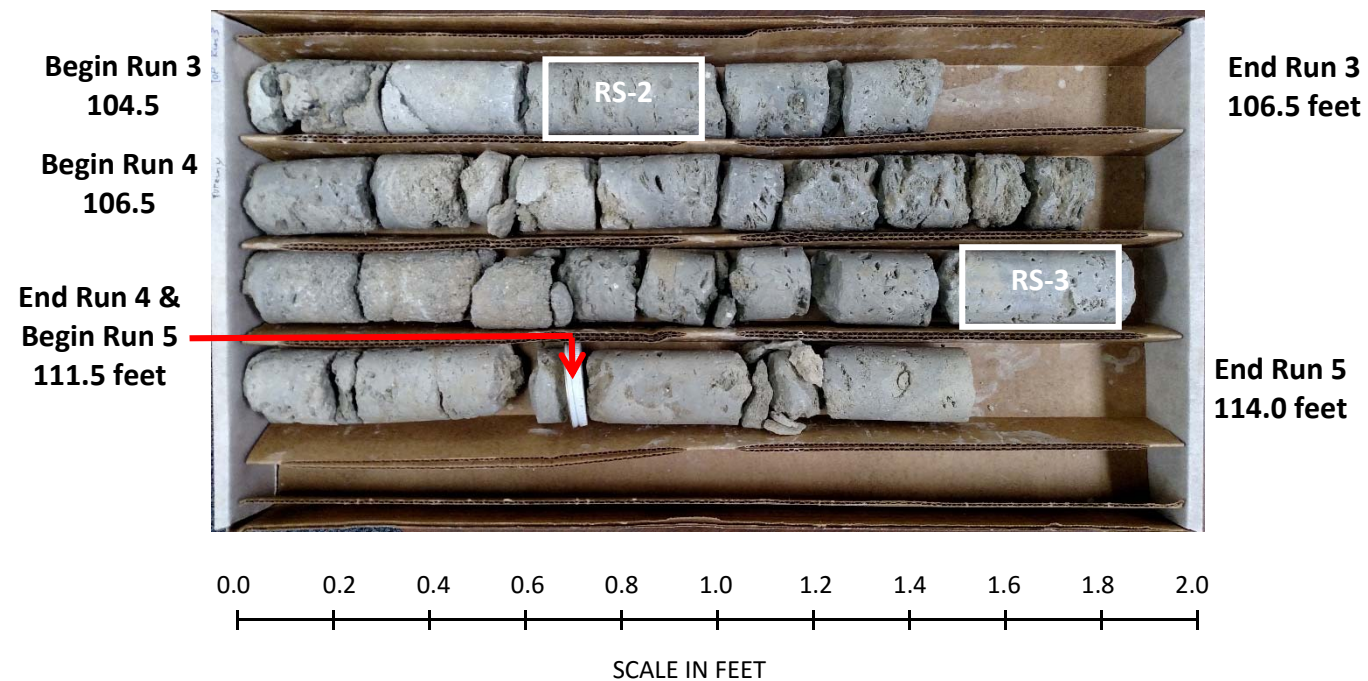
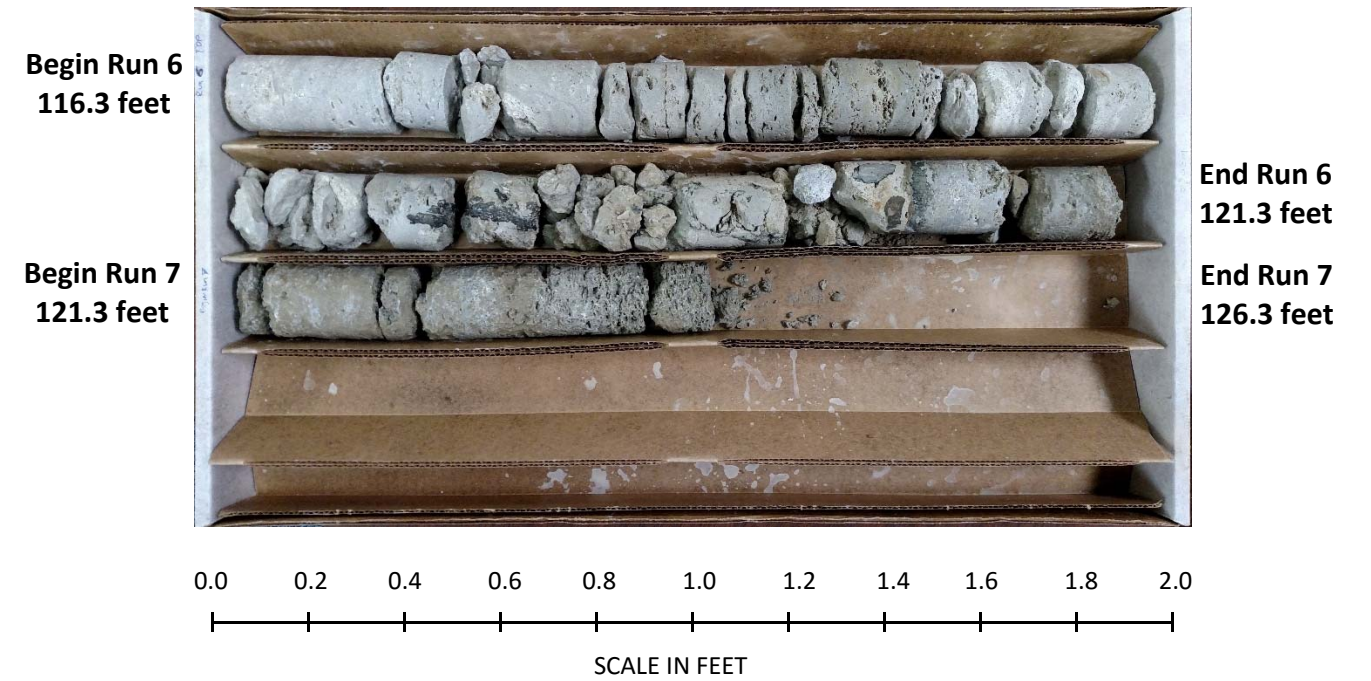
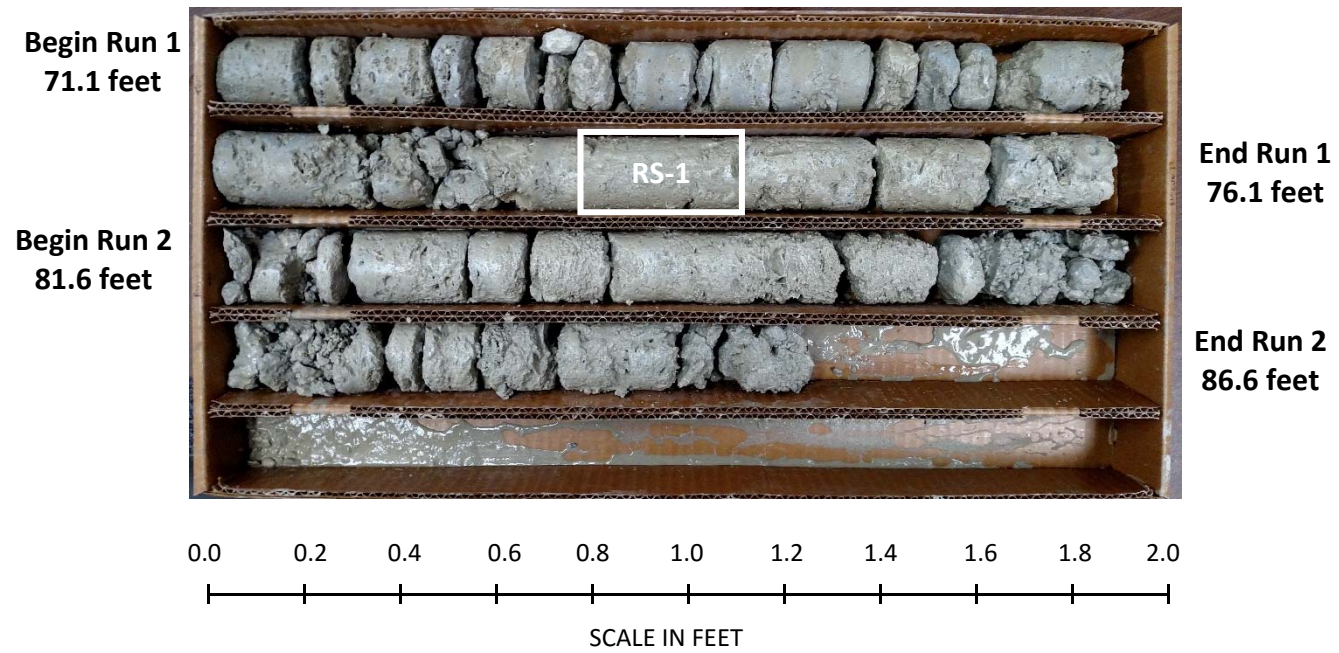
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-15	-15.9	0.9	3	5	2									-15.0	GROUND SURFACE	0.0
-20	-19.6	4.6	4	7	10									-21.0	UNDIVIDED COASTAL PLAIN DARK GRAY, SILTY FINE SAND (A-2-4) WITH LITTLE SHELL FRAGMENTS	6.0
-25	-22.5	7.5	WOH	WOH	1									-26.0	DARK GRAY, SILTY CLAY (A-7-5) WITH TRACE SHELL FRAGMENTS	11.0
-30	-27.4	12.4	26	16	21									-26.0	COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, FRIABLE LIMESTONE WITH SHELL FRAGMENTS (RIVER BEND FORMATION)	11.0
-35	-32.3	17.3	17	12	12									-41.0	COASTAL PLAIN GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE SHELL AND CEMENTED SAND FRAGMENTS (RIVER BEND FORMATION)	26.0
-40	-37.2	22.2	11	14	18											
-45	-42.1	27.1	6	11	13											
-50	-47.1	32.1	17	25	29											
-55	-52.0	37.0	15	25	31											
-60	-56.9	41.9	7	6	8											
-65	-61.9	46.9	10	15	20											
-70	-66.8	51.8	5	11	12											
-75	-71.2	56.2	8	20	26											
-80	-76.2	61.2	17	23	30											
-85	-81.2	66.2	4	5	10											
-90	-85.9	70.9	60/0.0													
-95	-91.1	76.1	66	34/0.2												

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B15-B		STATION 37+83		OFFSET 21 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -15.0 ft		TOTAL DEPTH 133.0 ft		NORTHING 250,364		EASTING 2,436,596	
DRILL RIG/HAMMER EFF./DATE MD5152 D-25 79%/07/30/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 10/19/15		COMP. DATE 10/22/15		SURFACE WATER DEPTH 14.5ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-95	-96.0	81.0												-95	Match Line
-100	-101.6	86.6	100/0.3											-101.6	COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE TO INDURATED LIMESTONE (RIVER BEND FORMATION) <i>(continued)</i>
-105	-107.5	92.5	100/0.5											-108.2	
-110	-112.6	97.6	30	100/0.2										-108.2	COASTAL PLAIN GRAY, FINE TO COARSE SAND (A-1-b) WITH TRACE GRAVEL AND SHELL FRAGMENTS (RIVER BEND FORMATION)
-115	-117.7	102.7	17	14	11									-118.7	
-120	-129.0	114.0	12	18	100/0.4									-119.5	COASTAL PLAIN SEDIMENTARY ROCK GRAY, MODERATELY INDURATED TO INDURATED LIMESTONE (RIVER BEND FORMATION)
-125	-131.3	116.3												-128.0	
-130	-146.5	131.5	2	6	17									-129.0	COASTAL PLAIN GRAY, CLAYEY FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL AND SHELL FRAGMENTS (RIVER BEND FORMATION)
-135			60/0.0											-131.3	COASTAL PLAIN SEDIMENTARY ROCK GRAY, MODERATELY INDURATED TO INDURATED LIMESTONE (RIVER BEND FORMATION)
-140														-137.3	
-145														-141.3	COASTAL PLAIN GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE SHELL FRAGMENTS (RIVER BEND FORMATION)
														-148.0	Boring Terminated at Elevation -148.0 ft in SAND (RIVER BEND FORMATION)

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/4/16

CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B15-B: -L2- Station 37+83, 21' RT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B16-B		STATION 39+34		OFFSET 20 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -2.7 ft		TOTAL DEPTH 115.2 ft		NORTHING 250,225		EASTING 2,436,660	
DRILL RIG/HAMMER EFF/DATE MD5152 D-25 79% 07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 10/12/15		COMP. DATE 10/14/15		SURFACE WATER DEPTH 3.8ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
5															
0															
-2.8	0.1														
-5	-6.2	3.5	WOH	WOH	WOH										
-10	-12.1	9.4													
-15	-16.3	13.6	1	7	10										
-20	-21.3	18.6	3	3	7										
-25	-26.6	23.9	5	5	6										
-30	-31.1	28.4	1	1	46										
-35	-36.1	33.4	12	14	16										
-40	-41.2	38.5	18	22	24										
-45	-46.1	43.4	13	9	16										
-50	-51.0	48.3	18	29	32										
-55	-56.0	53.3	17	29	35										
-60	-61.0	58.3	19	12	16										
-65	-66.0	63.3	15	21	18										
-70	-70.9	68.2	3	5	13										
-75			11	15	21										

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B16-B		STATION 39+34		OFFSET 20 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -2.7 ft		TOTAL DEPTH 115.2 ft		NORTHING 250,225		EASTING 2,436,660	
DRILL RIG/HAMMER EFF/DATE MD5152 D-25 79% 07/30/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 10/12/15		COMP. DATE 10/14/15		SURFACE WATER DEPTH 3.8ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-75	-75.9	73.2													
-80	-81.0	78.3													
-85	-85.9	83.2													
-90	-91.8	89.1													
-95	-96.9	94.2													
-100	-101.9	99.2													
-105	-106.9	104.2													
-110	-112.6	109.9													
-115	-116.4	113.7													

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B17-A		STATION 40+77		OFFSET 28 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. -1.4 ft		TOTAL DEPTH 115.6 ft		NORTHING 250,126		EASTING 2,436,774	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 11/17/15		COMP. DATE 11/18/15		SURFACE WATER DEPTH 1.4ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
5															
0	-1.4	0.0	WOH	WOH	WOH										-1.4
-5	-5.2	3.8	WOH	WOH	WOH										0.0
-10	-11.7	10.3	2	5	11										10.9
-15	-16.7	15.3	1	2	1										18.5
-20	-21.7	20.3	10	5	4										20.8
-25	-26.7	25.3	2	3	5										23.5
-30	-31.7	30.3	13	19	23										39.0
-35	-36.5	35.1	16	18	18										
-40	-41.4	40.0	20	22	21										
-45	-46.4	45.0	16	27	38										
-50	-51.4	50.0	25	45	55/0.4										
-55	-56.4	55.0	18	13	13										
-60	-61.5	60.1	12	17	27										
-65	-66.5	65.1	12	22	24										
-70	-71.6	70.2	15	17	24										
-75															

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B17-A		STATION 40+77		OFFSET 28 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. -1.4 ft		TOTAL DEPTH 115.6 ft		NORTHING 250,126		EASTING 2,436,774	
DRILL RIG/HAMMER EFF./DATE MD6214 CME-45C 81% 07/31/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 11/17/15		COMP. DATE 11/18/15		SURFACE WATER DEPTH 1.4ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-75															
-80	-76.6	75.2	11	13	17										
-85	-81.6	80.2	8	8	15										
-90	-84.1	82.7	60/0.1												
-95	-89.3	87.9	100/0.5												
-100	-94.8	93.4	60/0.1												
-105	-99.9	98.5	100/0.3												
-110	-105.2	103.8	12	15	16										
-115	-110.3	108.9	62	38/0.4											
	-115.5	114.1	12	10	9										

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT_GDT 2/4/16

GEOTECHNICAL BORING REPORT CORE LOG

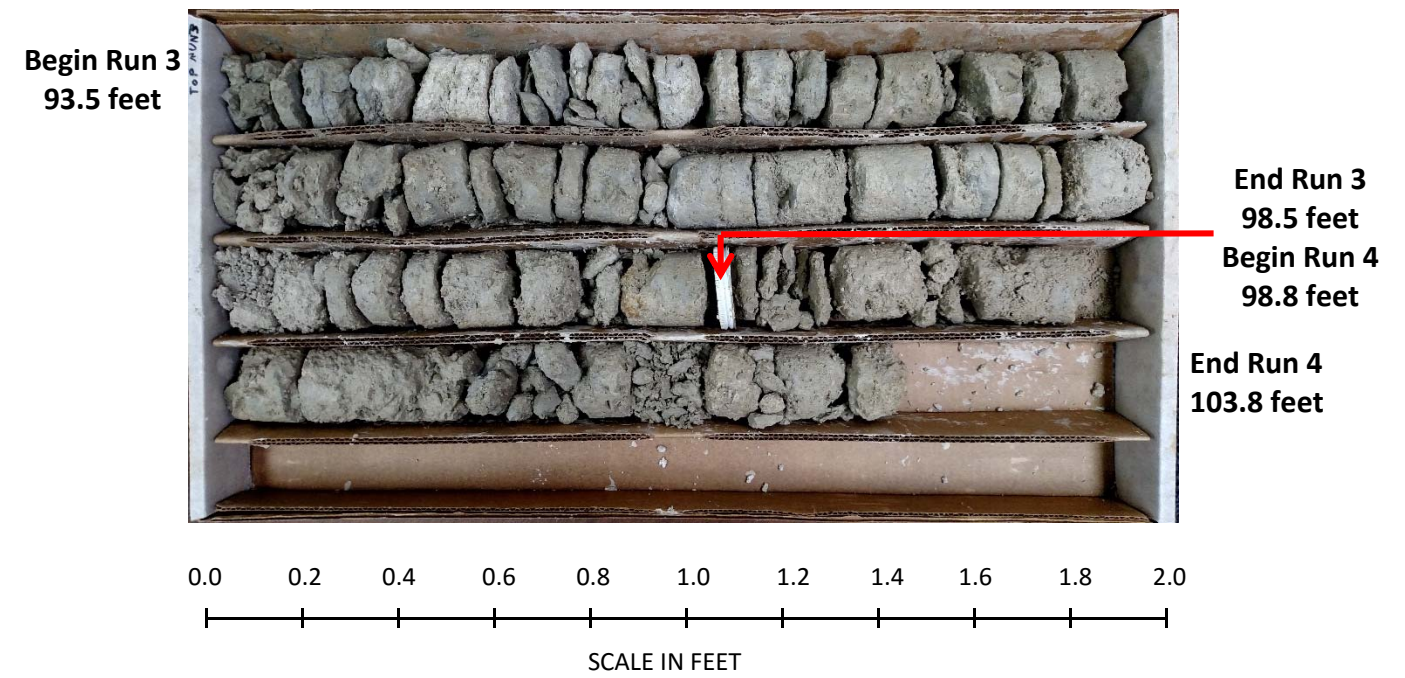
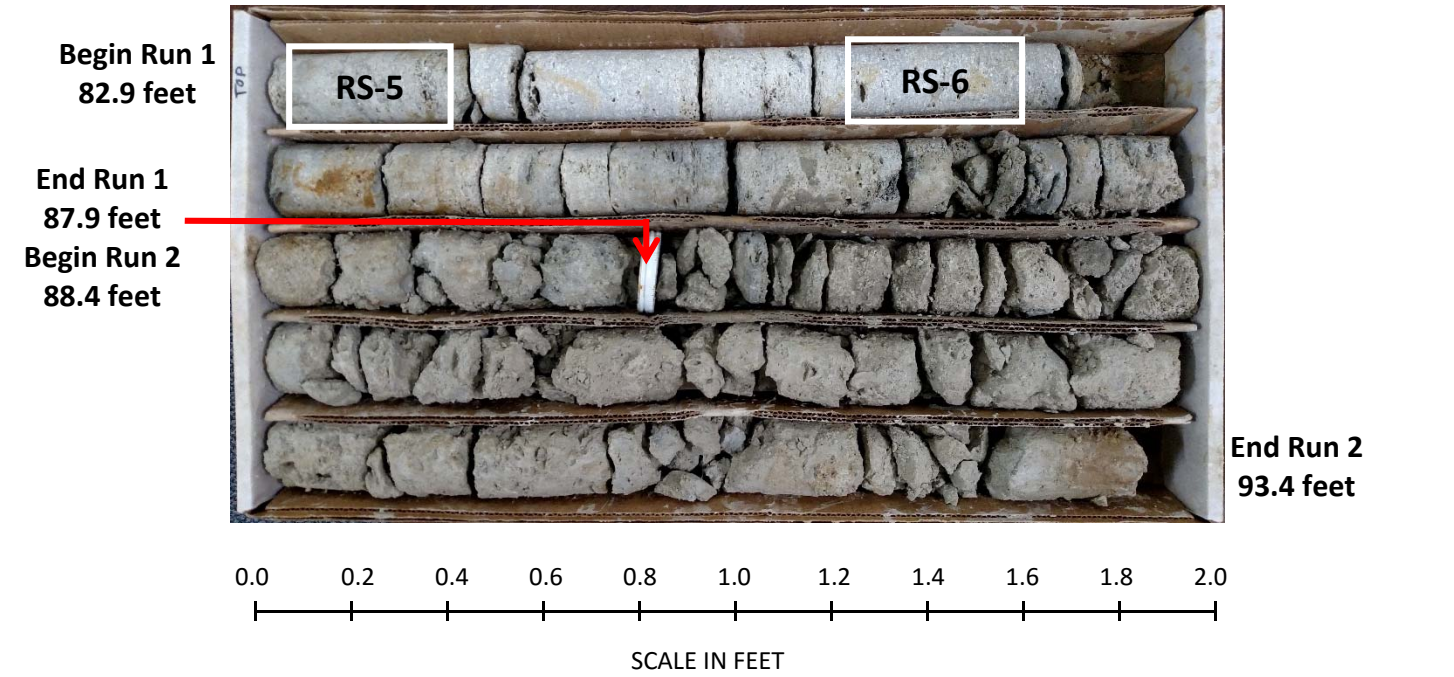
WBS 40233.1.1	TIP B-4929	COUNTY PENDER	GEOLOGIST M. ELLIS
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH			GROUND WTR (ft)
BORING NO. B17-A	STATION 40+77	OFFSET 28 ft LT	ALIGNMENT -L2-
COLLAR ELEV. -1.4 ft	TOTAL DEPTH 115.6 ft	NORTHING 250,126	EASTING 2,436,774
DRILL RIG/HAMMER EFF/DATE MD6214 CME-45C 81% 07/31/2015		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER B. FOWLER	START DATE 11/17/15	COMP. DATE 11/18/15	SURFACE WATER DEPTH 1.4ft
CORE SIZE NQ	TOTAL RUN 20.0 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
-84.3	-84.3	82.9	5.0	4:35/1.0 5:14/1.0 3:29/1.0 2:22/1.0 1:04/1.0	(4.6)	(1.6)	RS-5 RS-6	(16.8)	(1.6)		Begin Coring @ 82.9 ft	82.9
-85	-85										COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE TO INDURATED LIMESTONE (RIVER BEND FORMATION) RS-5: 83.0'-83.3', qu=3,920 psi, RMR=12 RS-6: 84.2'-84.5', qu=8,292 psi, RMR=15	
-90	-89.3 -89.8	87.9 86.4	5.0	N=100/0.5 1:02/1.0 0:59/1.0 1:18/1.0 1:10/1.0 2:28/1.0	(5.0)	(0.0)						
-95	-94.8 -94.9	93.4 93.5	5.0	N=60/0.1 0:57/1.0 2:25/1.0 2:17/1.0 1:52/1.0 1:55/1.0	(5.0)	(0.0)						
-100	-99.9 -100.2	98.5 98.8	5.0	N=100/0.3 1:23/1.0 0:30/1.0 1:00/1.0 1:04/1.0 0:14/1.0	(2.2)	(0.0)						
-105	-105.2	103.8		N=31				(0.0)	(0.0)		COASTAL PLAIN GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	103.8
-110				N=100/0.9							COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE AND MODERATELY INDURATED LIMESTONE (RIVER BEND FORMATION)	107.2
-115				N=19							COASTAL PLAIN GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL (RIVER BEND FORMATION)	112.0
											Boring Terminated at Elevation -117.0 ft in SAND (RIVER BEND FORMATION)	115.6

NCDOT CORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ NC_DOT.GDT 2/4/16

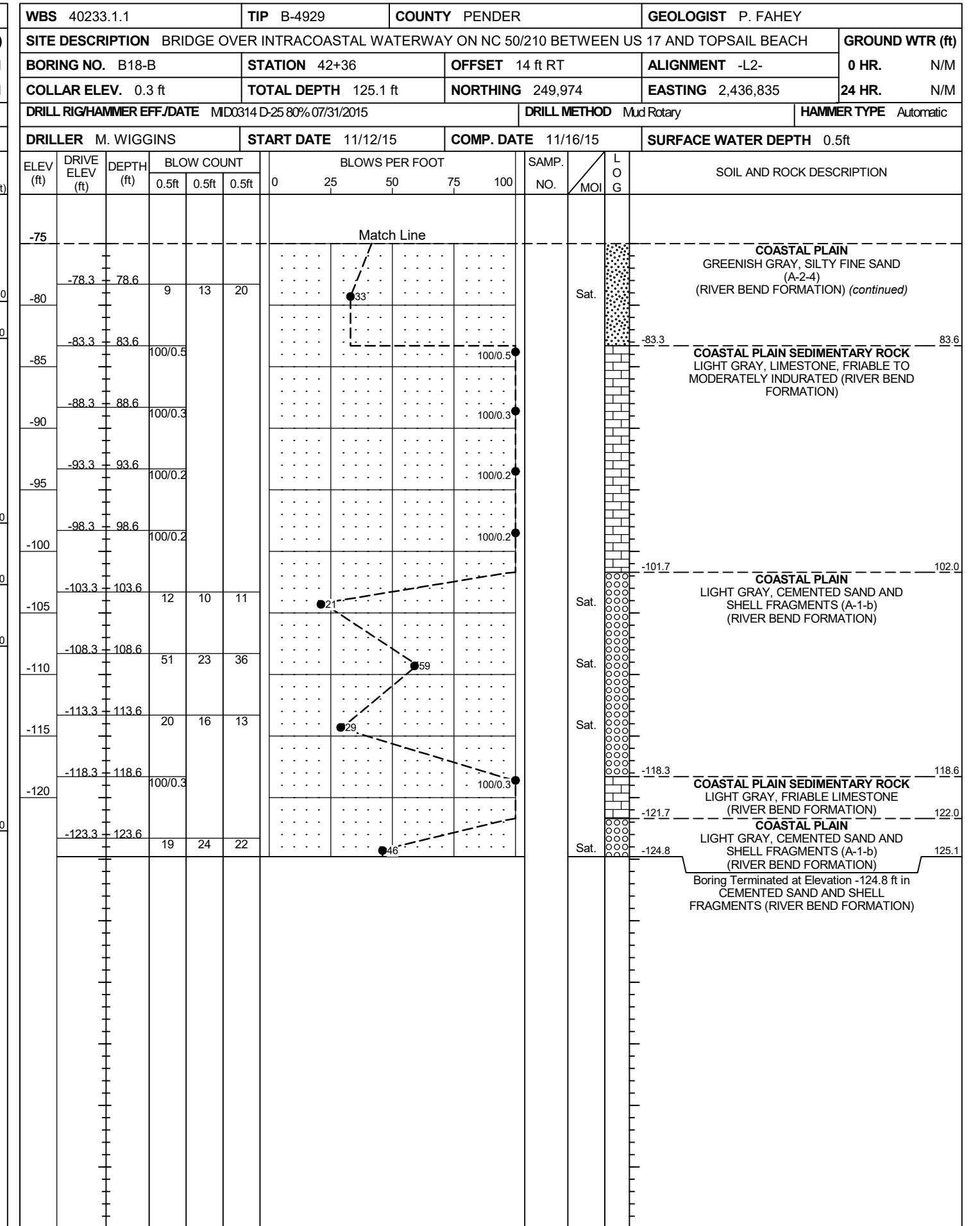
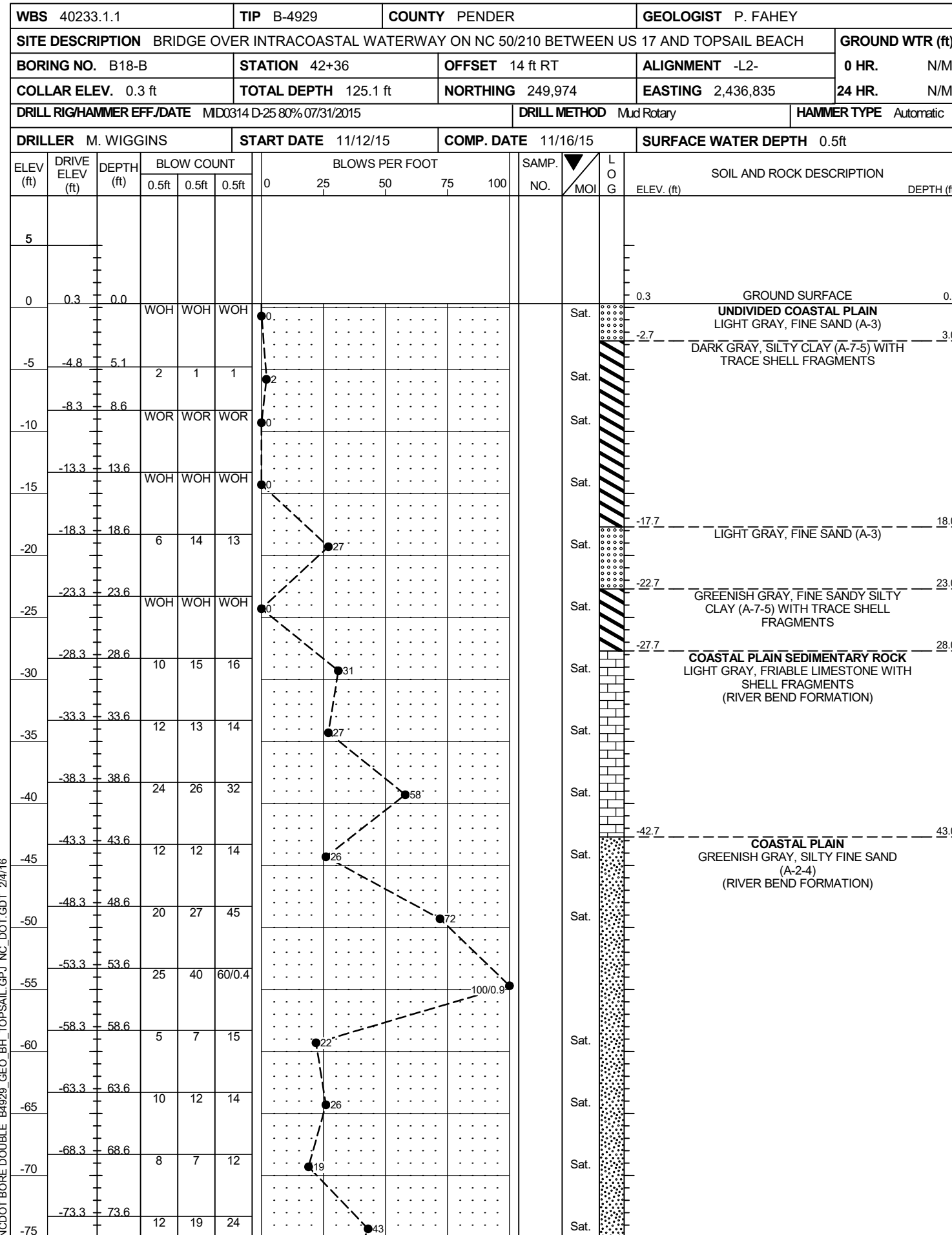


CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B17-A: -L2- Station 40+77, 28' LT



GEOTECHNICAL BORING REPORT

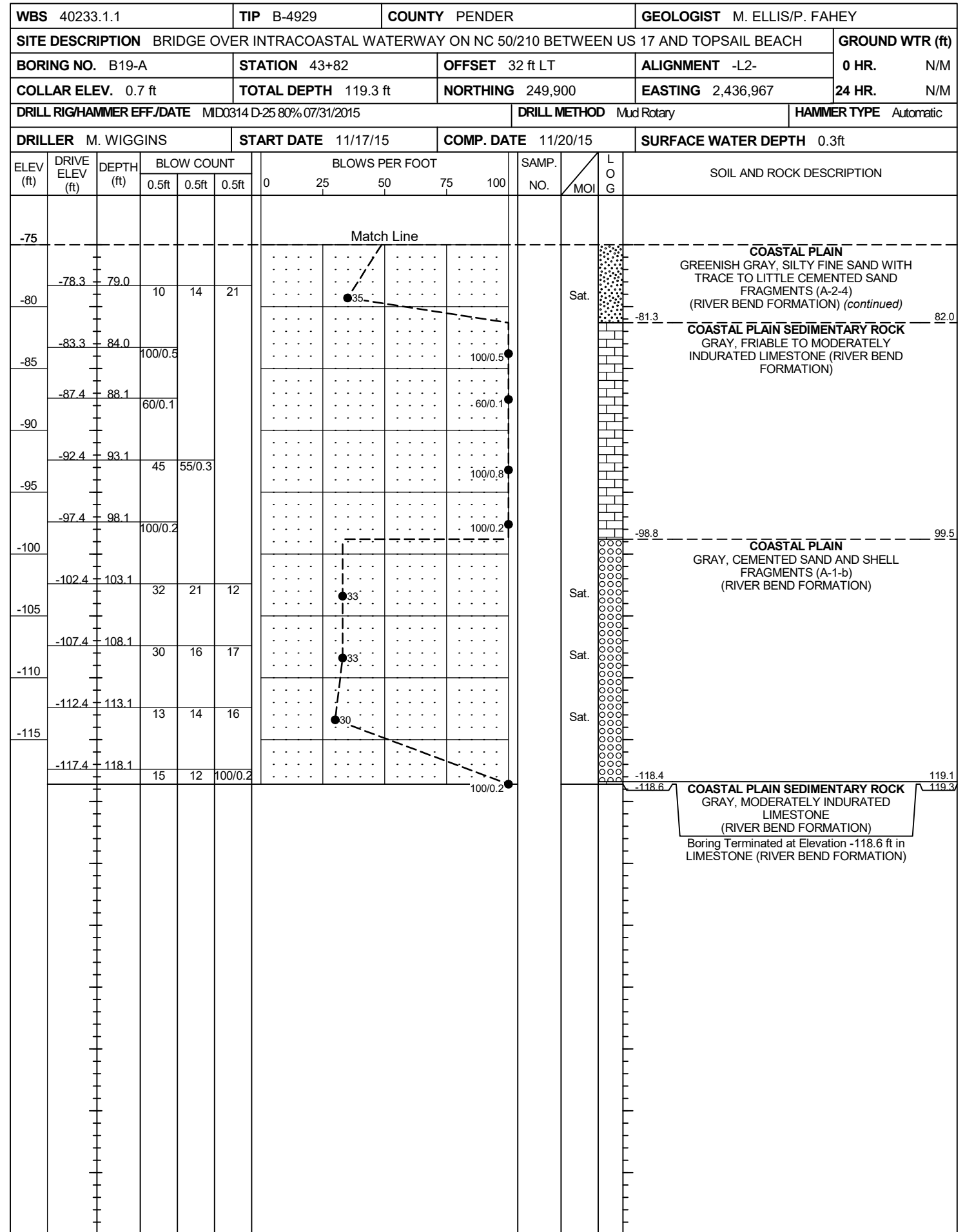
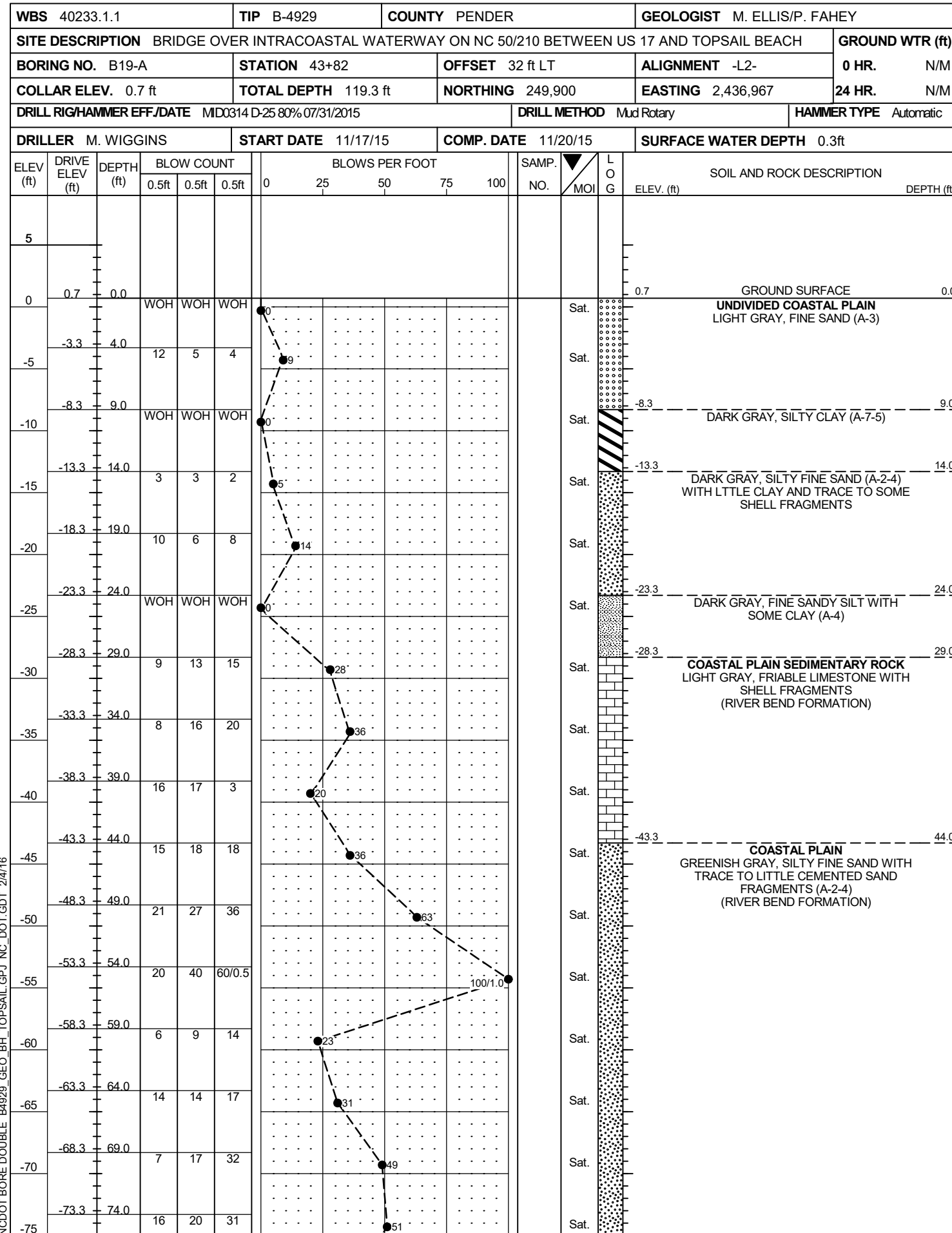
BORE LOG



NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG



NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B21-A		STATION 46+84		OFFSET 31 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 0.0 ft		TOTAL DEPTH 114.5 ft		NORTHING 249,720		EASTING 2,437,200	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 11/30/15		COMP. DATE 12/02/15		SURFACE WATER DEPTH 0.1ft	

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						
0														0.0	GROUND SURFACE	0.0
-5	-4.6	4.6	4	5	7									-3.0	UNDIVIDED COASTAL PLAIN DARK BROWN, SILTY CLAY (A-7-5)	-3.0
-10	-8.0	8.0	2	1	1									-6.5	DARK GRAY, SILTY FINE SAND (A-2-4)	-6.5
-15	-13.0	13.0	5	9	8									-13.0	DARK GRAY, CLAYEY FINE SANDY SILT (A-4) WITH TRACE SHELL FRAGMENTS	-13.0
-20	-18.0	18.0	6	3	3									-21.0	DARK GRAY, SILTY FINE SAND (A-2-4)	-21.0
-25	-23.0	23.0	WOH	WOH	WOH									-26.0	DARK GRAY, SILTY CLAY (A-7-5) WITH TRACE SHELL FRAGMENTS	-26.0
-30	-28.0	28.0	5	4	7									-31.0	GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE SHELL AND CEMENTED SAND FRAGMENTS	-31.0
-35	-33.0	33.0	13	14	16									-36.0	COASTAL PLAIN SEDIMENTARY ROCK LIGHT GRAY, FRIABLE LIMESTONE WITH SHELL FRAGMENTS (RIVER BEND FORMATION)	-36.0
-40	-38.0	38.0	14	16	38										COASTAL PLAIN GRAY, SILTY FINE SAND (A-2-4) WITH TRACE TO LITTLE CEMENTED SAND FRAGMENTS (RIVER BEND FORMATION)	
-45	-43.0	43.0	15	20	26											
-50	-48.0	48.0	22	34	33											
-55	-53.0	53.0	35	49	51/0.4											
-60	-58.0	58.0	5	7	8											
-65	-63.0	63.0	5	8	21											
-70	-68.0	68.0	6	6	7											
-75	-73.0	73.0	15	21	31											
-80	-78.0	78.0	10	13	20											

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B21-A		STATION 46+84		OFFSET 31 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 0.0 ft		TOTAL DEPTH 114.5 ft		NORTHING 249,720		EASTING 2,437,200	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 11/30/15		COMP. DATE 12/02/15		SURFACE WATER DEPTH 0.1ft	

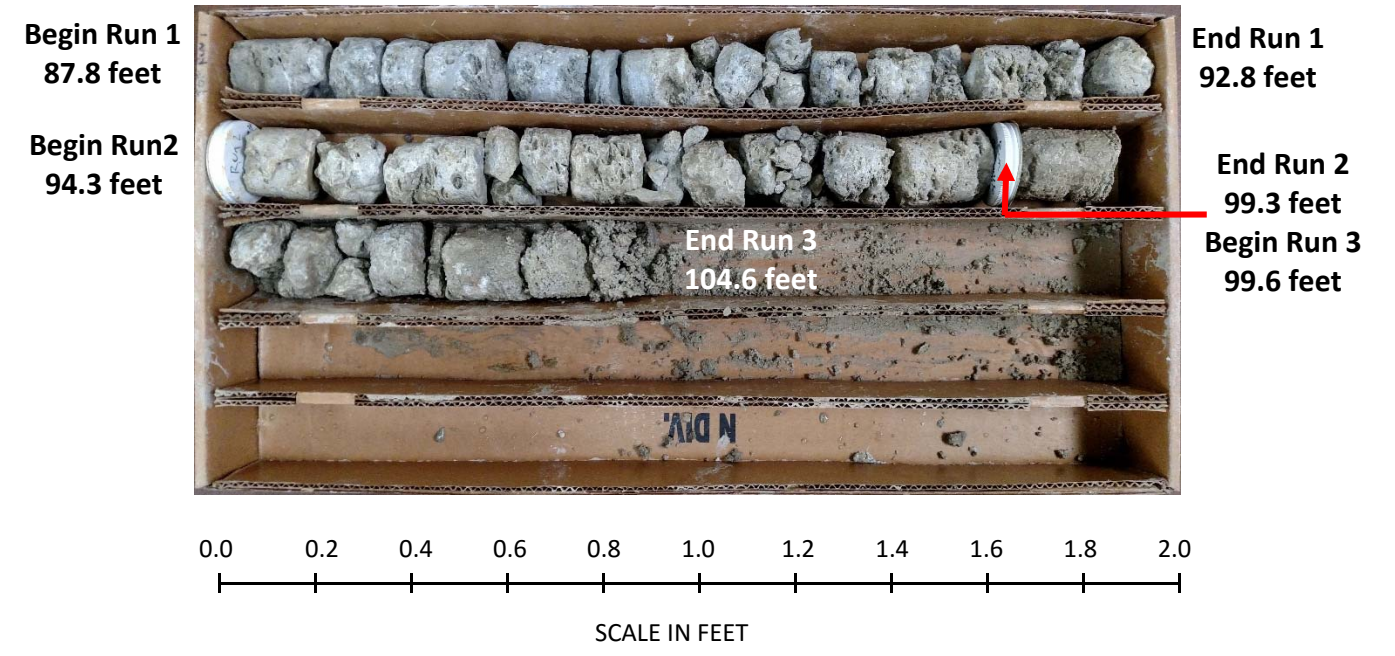
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-80																
-85	-83.0	83.0	8	7	8											
-90	-87.7	87.7	60/0.1													
-95	-92.8	92.8	36	51	49/0.3											
-100	-99.3	99.3	100/0.3													
-105	-104.6	104.6	11	8	9											
-110	-108.0	108.0	9	17	20											
	-113.0	113.0	14	19	19											

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						
-80																
-85																
-90																
-95																
-100																
-105																
-110																
-114.5																

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT_GDT_2/4/16



CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B21-A: -L2- Station 46+84, 31' LT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B22-B		STATION 48+28		OFFSET 18 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -1.3 ft		TOTAL DEPTH 134.5 ft		NORTHING 249,609		EASTING 2,437,303	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 11/23/15		COMP. DATE 11/25/15		SURFACE WATER DEPTH 2.5ft	

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						
0														-1.3	GROUND SURFACE	0.0
-5	-2.1	0.8	1	2	2										UNDIVIDED COASTAL PLAIN GRAY, FINE SAND (A-3) WITH TRACE SHELL FRAGMENTS	
-10	-4.3	3.0	8	12	16											
-15	-9.3	8.0	7	4	2											
-20	-14.3	13.0	WOH	WOH	2											
-25	-19.3	18.0	3	2	1											
-30	-24.3	23.0	3	4	2											
-35	-29.3	28.0	6	8	19											
-40	-34.3	33.0	9	13	13											
-45	-39.3	38.0	12	16	18											
-50	-44.3	43.0	17	14	18											
-55	-49.3	48.0	15	28	34											
-60	-54.3	53.0	22	36	47											
-65	-59.3	58.0	5	11	13											
-70	-64.3	63.0	13	6	22											
-75	-69.3	68.0	6	8	6											
-80	-74.3	73.0	12	16	22											
-85	-79.3	78.0														

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B22-B		STATION 48+28		OFFSET 18 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -1.3 ft		TOTAL DEPTH 134.5 ft		NORTHING 249,609		EASTING 2,437,303	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 11/23/15		COMP. DATE 11/25/15		SURFACE WATER DEPTH 2.5ft	

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						
-80														-80	Match Line	
-85	-84.3	83.0	3	3	5										COASTAL PLAIN GRAY-BROWN, SILTY FINE SAND WITH TRACE TO LITTLE GRAVEL (A-2-4) (RIVER BEND FORMATION) (continued)	
-90	-89.3	88.0	100/0.3													
-95	-94.3	93.0	30	60/0.1												
-100	-99.3	98.0	100/0.3													
-105	-104.3	103.0	31	73	27/0.4											
-110	-109.3	108.0	16	27	26											
-115	-114.3	113.0	18	21	22											
-120	-119.3	118.0	10	16	14											
-125	-124.3	123.0	60/0.0													
-130	-129.3	128.0	60/0.0													
-135	-134.3	133.0	6	7	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						
-87.7																
-92.5																
-94.8																
-102.3																
-104.8																
-108.3																
-122.1																
-130.7																
-135.8																

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ NC_DOT_GDT_2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B23-A		STATION 49+88		OFFSET 32 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 0.4 ft		TOTAL DEPTH 119.5 ft		NORTHING 249,596		EASTING 2,437,469	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 12/03/15		COMP. DATE 12/04/15		SURFACE WATER DEPTH 0.1ft	

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					
5															
0	0.4	0.0												0.4	GROUND SURFACE
-5	-4.0	4.4	7	10	12									-2.1	ALLUVIAL DARK GRAY, MUCK UNDIVIDED COASTAL PLAIN GRAY, SILTY FINE SAND (A-2-4) WITH TRACE TO LITTLE SHELL FRAGMENTS
-10	-7.6	8.0	7	11	15										
-15	-12.6	13.0	7	9	13										
-20	-17.6	18.0	6	12	17										
-25	-22.6	23.0	1	2	4										
-30	-27.6	28.0	3	2	4										
-35	-32.6	33.0	9	6	12										
-40	-37.6	38.0	9	15	17										
-45	-42.6	43.0	15	23	39										
-50	-47.6	48.0	10	19	29										
-55	-52.6	53.0	21	34	51										
-60	-57.6	58.0	37	21	13										
-65	-62.6	63.0	10	13	16										
-70	-67.6	68.0	5	7	9										
-75	-72.6	73.0	14	20	25										

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B23-A		STATION 49+88		OFFSET 32 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 0.4 ft		TOTAL DEPTH 119.5 ft		NORTHING 249,596		EASTING 2,437,469	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 12/03/15		COMP. DATE 12/04/15		SURFACE WATER DEPTH 0.1ft	

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					
-75															
-80	-77.6	78.0	13	13	19										
-85	-82.6	83.0	6	8	11										
-90	-87.6	88.0	8	18	16										
-95	-92.6	93.0	60/0.1												
-100	-97.6	98.0	60/0.1												
-105	-102.6	103.0	38	48	52/0.4										
-110	-107.6	108.0	12	9	6										
-115	-112.6	113.0	100/0.4												
	-117.6	118.0	13	13	34										

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/4/16

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B24-B		STATION 51+34		OFFSET 22 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -1.9 ft		TOTAL DEPTH 114.5 ft		NORTHING 249,505		EASTING 2,437,594	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 12/08/15		COMP. DATE 12/09/15		SURFACE WATER DEPTH 3.4ft	

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					
0															
-1.9	-1.9	0.0													
-5	-6.1	4.2	5	4	4										
-10	-9.9	8.0	2	2	2										
-15	-14.9	13.0	7	8	11										
-20	-19.9	18.0	6	8	10										
-25	-24.9	23.0	2	1	1										
-30	-29.9	28.0	6	8	7										
-35	-34.9	33.0	13	14	12										
-40	-39.9	38.0	8	12	12										
-45	-44.9	43.0	12	18	11										
-50	-49.9	48.0	17	31	36										
-55	-54.9	53.0	28	35	40										
-60	-59.9	58.0	16	15	30										
-65	-64.9	63.0	11	17	28										
-70	-69.9	68.0	8	11	12										
-75	-74.9	73.0	15	20	27										
-80	-79.9	78.0													

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B24-B		STATION 51+34		OFFSET 22 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -1.9 ft		TOTAL DEPTH 114.5 ft		NORTHING 249,505		EASTING 2,437,594	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 12/08/15		COMP. DATE 12/09/15		SURFACE WATER DEPTH 3.4ft	

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					
-80															
-85	-84.9	83.0	5	5	5										
-90	-89.9	88.0	60/0.0												
-95	-94.9	93.0	14 100/0.3												
-100	-100.8	98.9	100/0.4												
-105	-106.2	104.3	54	44	41										
-110	-109.9	108.0	16	25	24										
-115	-114.9	113.0	16	38	23										

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT_GDT_2/4/16

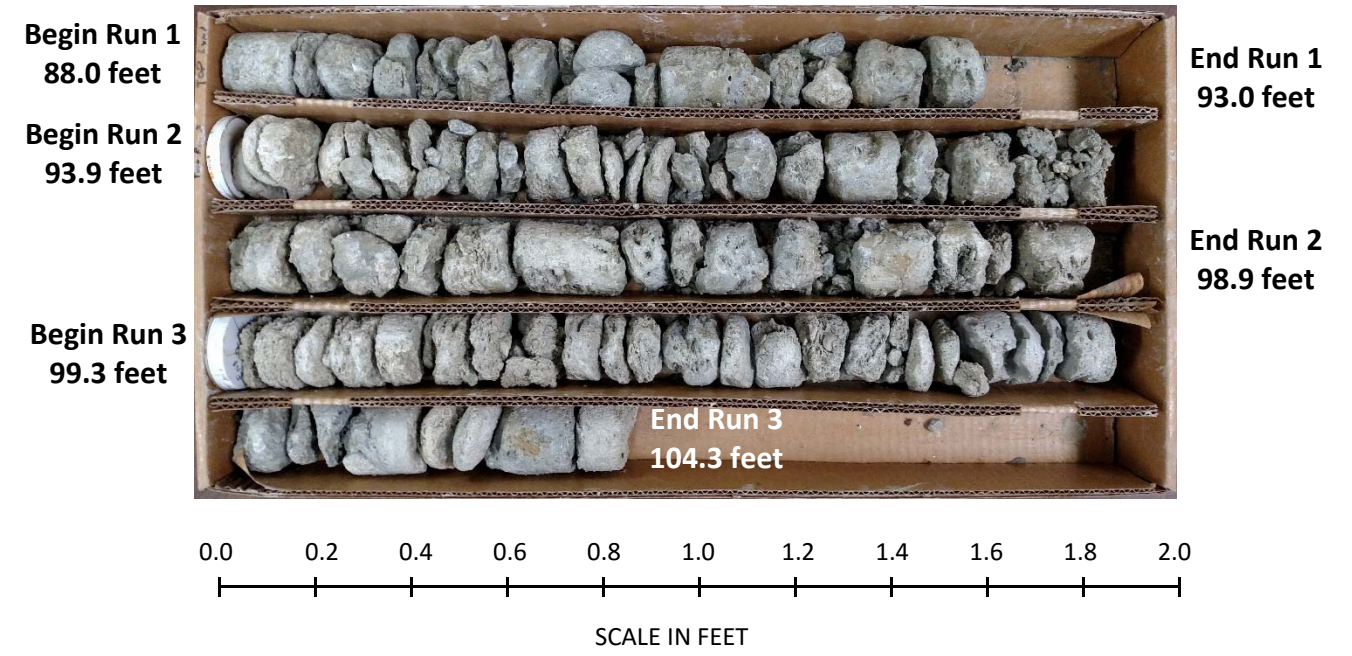
GEOTECHNICAL BORING REPORT CORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS						
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)					
BORING NO. B24-B		STATION 51+34		OFFSET 22 ft RT		ALIGNMENT -L2-						
COLLAR ELEV. -1.9 ft		TOTAL DEPTH 114.5 ft		NORTHING 249,505		EASTING 2,437,594						
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic						
DRILLER M. WIGGINS		START DATE 12/08/15		COMP. DATE 12/09/15		SURFACE WATER DEPTH 3.4ft						
CORE SIZE NQ3		TOTAL RUN 15.0 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
-89.9	-89.9	88.0	5.0	N=60/0.0 1:10/1.0 1:41/1.0 1:52/1.0 3:14/1.0 1:49/1.0	(1.8) 36%	(0.0) 0%		(1.8) 45%	(0.0) 0%		Begin Coring @ 88.0 ft	88.0
											COASTAL PLAIN SEDIMENTARY ROCK GRAY, MODERATELY INDURATED LIMESTONE (RIVER BEND FORMATION)	
-95	-94.9 -95.8	93.0 93.9						(0.0) 0%	(0.0) 0%			92.0
			5.0	N=100/0.3 1:34/1.0 1:59/1.0 1:27/1.0 1:39/1.0 1:46/1.0	(3.8) 76%	(0.0) 0%		(6.6) 61%	(0.0) 0%		COASTAL PLAIN GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	93.5
											COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE TO MODERATELY INDURATED LIMESTONE (RIVER BEND FORMATION)	
-100	-100.8 -101.2	98.9 99.3										
			5.0	N=100/0.4 1:24/1.0 1:19/1.0 1:52/1.0 1:59/1.0 1:47/1.0	(2.8) 56%	(0.0) 0%						
-105	-106.2	104.3										
				N=85							COASTAL PLAIN GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	104.3
-110				N=49								
-115				N=61								
											Boring Terminated at Elevation -116.4 ft in CEMENTED SAND AND SHELL FRAGMENTS (RIVER BEND FORMATION)	114.5

NCDOT CORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ NC_DOT.GDT 2/4/16



CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B24-B: -L2- Station 51+34, 22' RT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST P. FAHEY	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B25-A		STATION 52+75		OFFSET 32 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 0.3 ft		TOTAL DEPTH 114.2 ft		NORTHING 249,521		EASTING 2,437,744	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 11/06/15		COMP. DATE 11/06/15		SURFACE WATER DEPTH 0.3ft	

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						
5																
0	0.3	0.0												0.3	GROUND SURFACE	0.0
-5	-3.5	3.8	6	5	4									-2.7	ALLUVIAL DARK BROWN, MUCK	3.0
-10	-8.5	8.8	12	14	13										UNDIVIDED COASTAL PLAIN GRAY, FINE SAND (A-3) WITH TRACE TO SOME SHELL FRAGMENTS	
-15	-13.5	13.8	3	3	4											
-20	-18.5	18.8	5	5	7											
-25	-23.5	23.8	8	12	13											
-30	-28.5	28.8	3	3	6											
-35	-33.5	33.8	9	11	11											
-40	-38.5	38.8	9	14	15											
-45	-43.5	43.8	11	15	24											
-50	-48.5	48.8	8	11	20											
-55	-53.5	53.8	25	32	53											
-60	-58.5	58.8	20	40	60/0.4											
-65	-63.5	63.8	5	6	5											
-70	-68.5	68.8	5	7	9											
-75	-73.5	73.8	11	24	30											

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST P. FAHEY	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B25-A		STATION 52+75		OFFSET 32 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 0.3 ft		TOTAL DEPTH 114.2 ft		NORTHING 249,521		EASTING 2,437,744	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER B. FOWLER		START DATE 11/06/15		COMP. DATE 11/06/15		SURFACE WATER DEPTH 0.3ft	

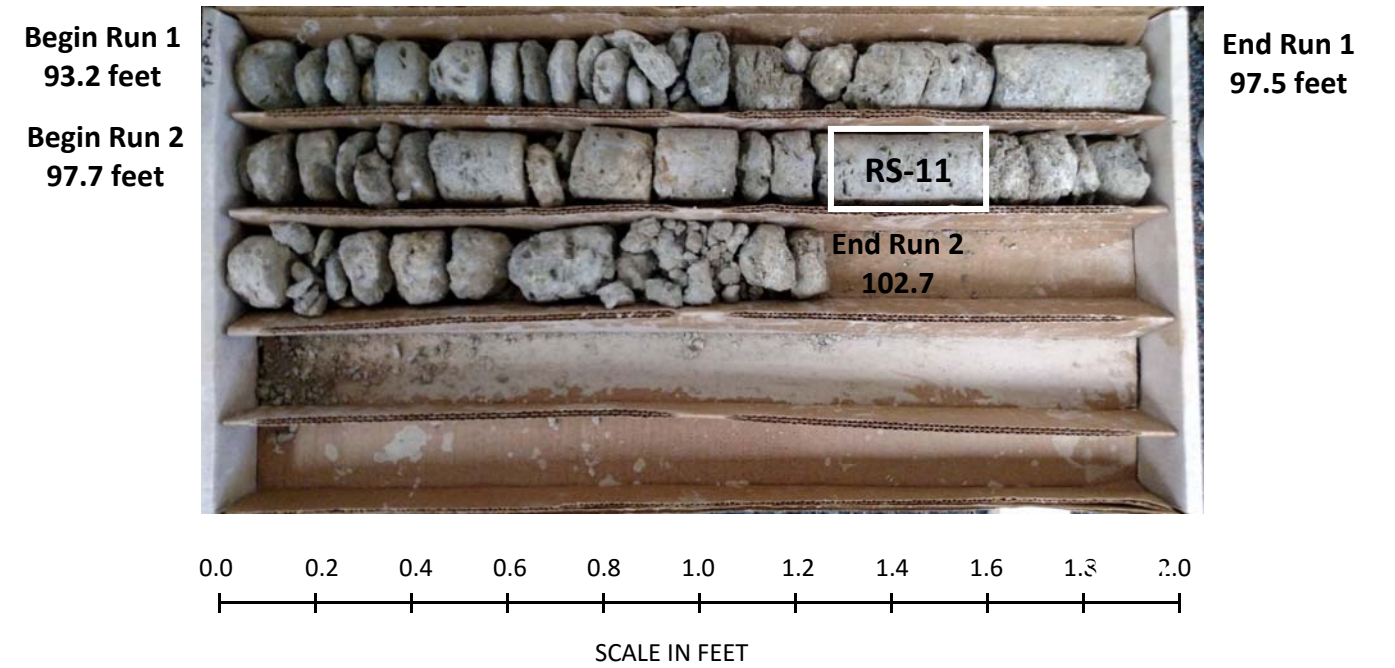
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
-75															
-80	-78.5	78.8	13	15	23										
-85	-83.5	83.8	7	10	12										
-90	-88.5	88.8	6	5	20										
-95	-93.5	93.8	60/0.0												
-100	-98.5	98.8	70	30/0.1											
-105	-103.5	103.8	63	46	27										
-110	-108.5	108.8	11	13	14										
	-113.5	113.8	100/0.4												

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					
-75															
-80	-78.5	78.8	13	15	23										
-85	-83.5	83.8	7	10	12										
-90	-88.5	88.8	6	5	20										
-95	-93.5	93.8	60/0.0												
-100	-98.5	98.8	70	30/0.1											
-105	-103.5	103.8	63	46	27										
-110	-108.5	108.8	11	13	14										
	-113.5	113.8	100/0.4												

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/4/16



CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B26-B: -L2- Station 54+16, 31' RT



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B27-A		STATION 55+12		OFFSET 34 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 0.3 ft		TOTAL DEPTH 139.3 ft		NORTHING 249,463		EASTING 2,437,974	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 12/16/15		COMP. DATE 12/17/15		SURFACE WATER DEPTH 0.0ft	

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					
5															
0	0.3	0.0													
-5	-3.6	3.9	6	4	4										
-10	-7.5	7.8	8	10	11										
-15	-12.5	12.8	5	5	6										
-20	-17.5	17.8	6	8	7										
-25	-22.5	22.8	7	7	7										
-30	-27.5	27.8	1	1	WOH										
-35	-32.5	32.8	7	8	13										
-40	-37.5	37.8	7	10	12										
-45	-42.5	42.8	4	5	5										
-50	-47.5	47.8	7	7	10										
-55	-52.5	52.8	4	4	5										
-60	-57.5	57.8	6	5	10										
-65	-62.5	62.8	3	3	4										
-70	-67.5	67.8	3	2	3										
-75	-72.5	72.8	3	2	4										

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. B27-A		STATION 55+12		OFFSET 34 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 0.3 ft		TOTAL DEPTH 139.3 ft		NORTHING 249,463		EASTING 2,437,974	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 12/16/15		COMP. DATE 12/17/15		SURFACE WATER DEPTH 0.0ft	

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					
-75															
-80	-77.5	77.8	4	7	13										
-85	-82.5	82.8	8	8	13										
-90	-87.5	87.8	5	7	9										
-95	-92.5	92.8	60/0.1												
-100	-97.5	97.8	100/0.5												
-105	-102.5	102.8	89	11/0.1											
-110	-107.5	107.8	43	18	11										
-115	-112.5	112.8	19	8	9										
-120	-117.5	117.8	27	36	25										
-125	-122.5	122.8	10	16	25										
-130	-127.5	127.8	60/0.0												
-135	-132.5	132.8	60/0.0												
	-137.5	137.8	7	9	20										

NCDOT BORE DOUBLE_B4929_GEO_BH_TOPSAIL.GPJ_NC_DOT.GDT 2/5/16

GEOTECHNICAL BORING REPORT BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B28-B		STATION 56+07		OFFSET 32 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -0.1 ft		TOTAL DEPTH 114.3 ft		NORTHING 249,375		EASTING 2,438,049	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 12/18/15		COMP. DATE 12/21/15		SURFACE WATER DEPTH 0.1ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
0	-0.1	0.0	1	1	1									-0.1	GROUND SURFACE	0.0
-5	-3.2	3.1	5	3	5									-2.1	ALLUVIAL DARK BROWN, MUCK UNDIVIDED COASTAL PLAIN GRAY, FINE SAND (A-3) WITH TRACE TO LITTLE SHELL FRAGMENTS AND TRACE ORGANICS	2.9
-10	-7.9	7.8	3	4	8											
-15	-12.9	12.8	8	8	7											
-20	-17.9	17.8	4	4	5											
-25	-22.9	22.8	5	6	10											
-30	-27.9	27.8	WOH	2	1											
-35	-32.9	32.8	5	7	12											
-40	-37.9	37.8	12	27	52											
-45	-42.9	42.8	8	8	13											
-50	-47.9	47.8	8	14	17											
-55	-52.9	52.8	6	7	12											
-60	-57.9	57.8	3	4	6											
-65	-62.9	62.8	5	5	7											
-70	-67.9	67.8	2	1	4											
-75	-72.9	72.8	6	6	6											
-80	-77.9	77.8	11	14	17											

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST M. ELLIS	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH							GROUND WTR (ft)
BORING NO. B28-B		STATION 56+07		OFFSET 32 ft RT		ALIGNMENT -L2-	
COLLAR ELEV. -0.1 ft		TOTAL DEPTH 114.3 ft		NORTHING 249,375		EASTING 2,438,049	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER M. WIGGINS		START DATE 12/18/15		COMP. DATE 12/21/15		SURFACE WATER DEPTH 0.1ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-80																
-85	-82.9	82.8	9	13	17											
-90	-87.9	87.8	4	4	7											
-95	-92.9	92.8	12	21	100/0.3											
-100	-99.2	99.1	60/0.1													
-105	-104.3	104.2	71	29/0.1												
-110	-107.9	107.8	26	40	30											
	-112.9	112.8	32	29	39											

Match Line

ELEV (ft)	DESCRIPTION	DEPTH (ft)
91.0	COASTAL PLAIN GRAY, SILTY FINE SAND (A-2-4) (RIVER BEND FORMATION) (continued)	91.0
93.8	GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	93.8
94.1	COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE TO INDURATED LIMESTONE (RIVER BEND FORMATION)	94.1
104.2	COASTAL PLAIN GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	104.2
104.9		104.9
114.3	Boring Terminated at Elevation -114.4 ft in CEMENTED SAND AND SHELL FRAGMENTS (RIVER BEND FORMATION)	114.3

NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT_GDT_2/4/16

GEOTECHNICAL BORING REPORT CORE LOG

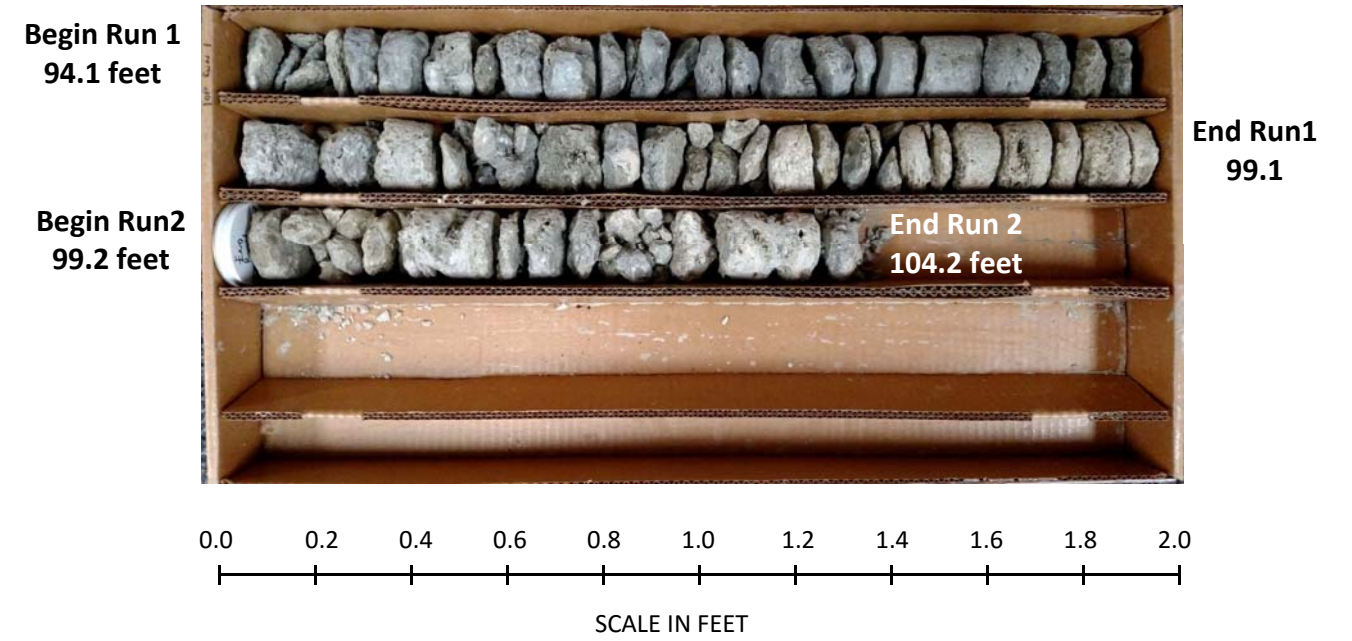
WBS 40233.1.1	TIP B-4929	COUNTY PENDER	GEOLOGIST M. ELLIS
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH			GROUND WTR (ft)
BORING NO. B28-B	STATION 56+07	OFFSET 32 ft RT	ALIGNMENT -L2-
COLLAR ELEV. -0.1 ft	TOTAL DEPTH 114.3 ft	NORTHING 249,375	EASTING 2,438,049
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER M. WIGGINS	START DATE 12/18/15	COMP. DATE 12/21/15	SURFACE WATER DEPTH 0.1ft
CORE SIZE NQ2	TOTAL RUN 10.0 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
-94.2											Begin Coring @ 94.1 ft	
-95	-94.2	94.1	5.0	1:41/1.0 2:12/1.0 1:37/1.0 3:02/1.0 1:39/1.0	(3.9)	(0.0)		(5.2)	(0.0)		COASTAL PLAIN SEDIMENTARY ROCK GRAY, FRIABLE TO INDURATED LIMESTONE (RIVER BEND FORMATION)	94.1
-100	-99.2 -99.3	99.1 99.2	5.0	N=60/0.7 1:12/1.0 1:12/1.0 1:20/1.0 1:22/1.0 1:43/1.0	(1.3)	(0.0)						
-105	-104.3	104.2		N=100/0.6							COASTAL PLAIN GRAY, CEMENTED SAND AND SHELL FRAGMENTS (A-1-b) (RIVER BEND FORMATION)	104.2 104.9
-110				N=70 N=68								
											Boring Terminated at Elevation -114.4 ft in CEMENTED SAND AND SHELL FRAGMENTS (RIVER BEND FORMATION)	114.3

NCDOT CORE DOUBLE B4929 GEO_BH_TOPSAIL.GPJ NC_DOT.GDT 2/4/16



CORE PHOTOGRAPHS: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach, B28-B: -L2- Station 56+07, 32' RT

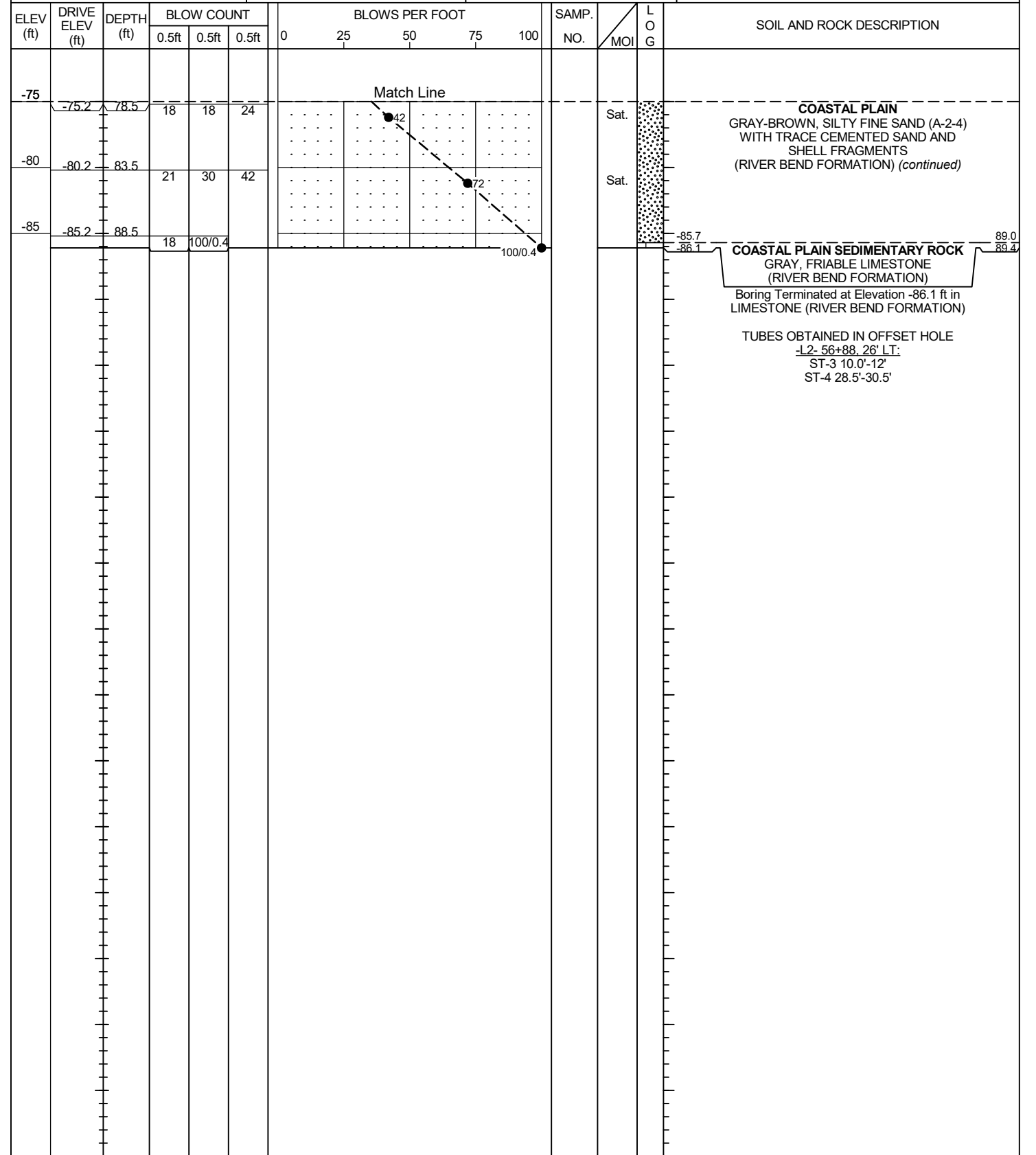
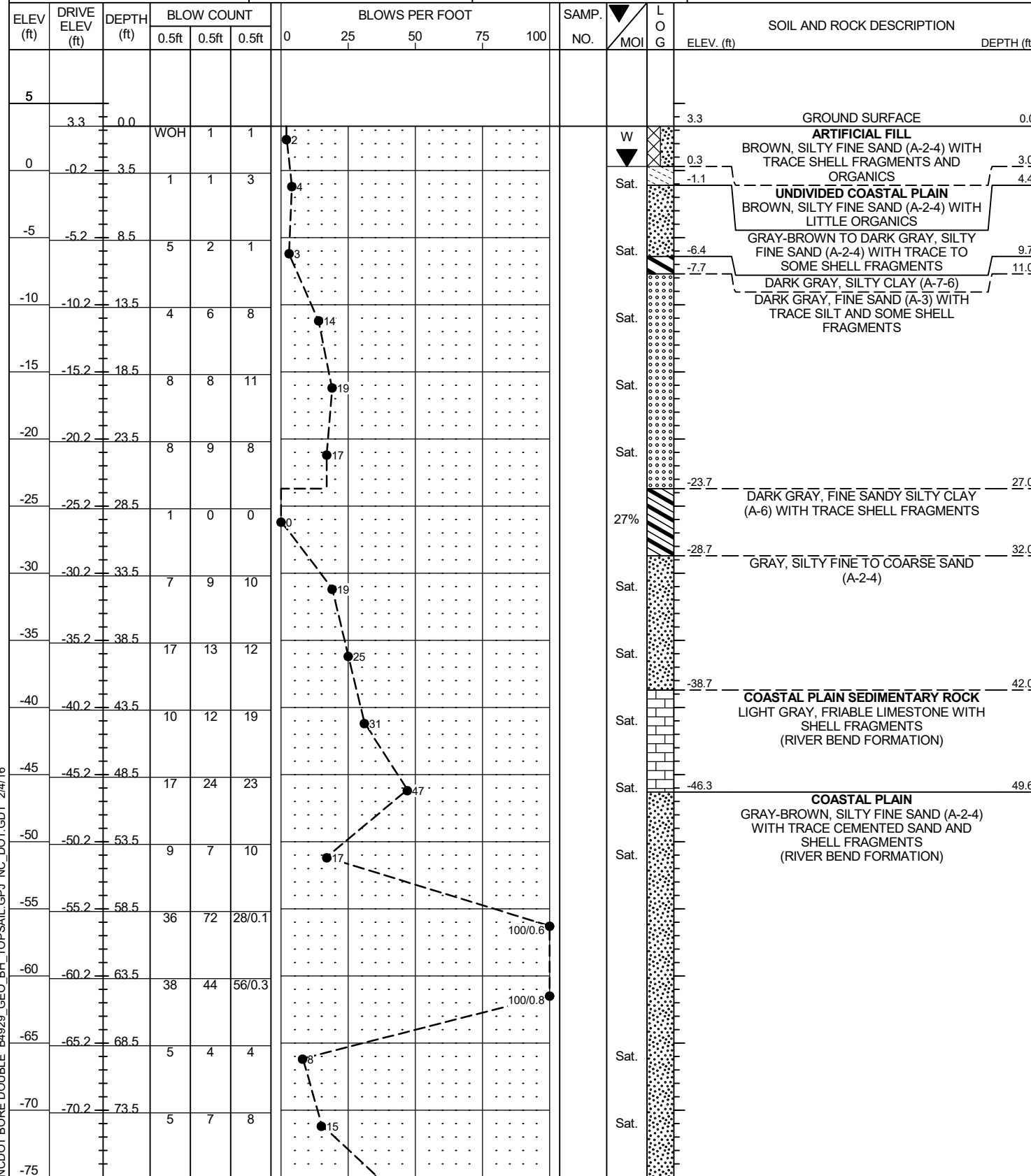


GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST D. RACEY	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. EB2-A		STATION 56+88		OFFSET 29 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 3.3 ft		TOTAL DEPTH 89.4 ft		NORTHING 249,414		EASTING 2,438,143	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic			
DRILLER D. TIGNOR		START DATE 10/29/15		COMP. DATE 10/29/15		SURFACE WATER DEPTH N/A	

WBS 40233.1.1		TIP B-4929		COUNTY PENDER		GEOLOGIST D. RACEY	
SITE DESCRIPTION BRIDGE OVER INTRACOASTAL WATERWAY ON NC 50/210 BETWEEN US 17 AND TOPSAIL BEACH						GROUND WTR (ft)	
BORING NO. EB2-A		STATION 56+88		OFFSET 29 ft LT		ALIGNMENT -L2-	
COLLAR ELEV. 3.3 ft		TOTAL DEPTH 89.4 ft		NORTHING 249,414		EASTING 2,438,143	
DRILL RIG/HAMMER EFF./DATE MD0314 D-25 80% 07/31/2015		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic			
DRILLER D. TIGNOR		START DATE 10/29/15		COMP. DATE 10/29/15		SURFACE WATER DEPTH N/A	



NCDOT BORE DOUBLE B4929_GEO_BH_TOPSAIL_GPJ_NC_DOT.GDT 2/4/16

**North Carolina Department of Transportation
Division of Highways
Materials and Test Unit
Soils Laboratory**

T.I.P. ID NO.: B-4929
DESCRIPTION: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach

REPORT ON SAMPLES OF: SOIL FOR QUALITY

PROJECT:	<u>40233.1.1</u>	COUNTY:	<u>Pender</u>
DATE SAMPLED:	<u>10/15 to 12/15</u>	RECEIVED:	<u>11/15 to 12/15</u>
SAMPLED FROM:	<u>-L2-</u>	REPORTED:	<u>11/15 to 12/15</u>
SUBMITTED BY:	<u>P. Alton, PE</u>	BY:	<u>D. Jenks</u> Cert No. 101-02-0603

TEST RESULTS

PROJ. SAMPLE NO.	ST-2	SS-31	SS-537	ST-4											
BORING NO.	EB1-A	B15-B	B22-B	EB2-A											
Retained #4 Sieve %	0.0	4.9	0.0	0.0											
Passing #10 Sieve %	100.0	92.2	99.4	100.0											
Passing #40 Sieve %	100.0	73.6	85.9	98.5											
Passing #200 Sieve %	92.3	50.4	58.6	75.9											

SOIL MORTAR - 100%															
Coarse Sand Ret - #60 %	0.2	30.0	21.6	5.4											
Fine Sand Ret - #270 %	8.4	17.4	22.6	19.8											
Silt 0.053 - 0.010 mm %	30.7	24.5	24.9	41.1											
Clay < 0.010 mm %	60.7	28.1	30.9	33.7											
L.L.	53	20	26	31											
P.L.	28	NP	22	16											
P.I.	25	NP	4	15											
AASHTO Classification	A-7-6 (26)	A-4 (0)	A-4 (0)	A-6 (10)											
Station (-L2-)	19+23	37+83	48+28	56+88											
Offset	19' Lt.	21' Rt.	18' Rt.	26' Lt.											
Depth (ft)	9.8	114.0	133.0	28.5											
to	10.4	115.5	134.5	29.0											
Moisture Content (%)	60.1	28.9	30.8	26.8											
Organic Content (%)	NT	NT	NT	NT											
Specific Gravity	NT	NT	NT	NT											

NP=Not plastic
NT=Not tested
ND = Not Determined
CL = Centerline

W.P. Alton, PE
Soils Engineer

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 40233.1.1
TIP NO.: B-4929
COUNTY: Pender
DESCRIPTION: Bridge over Intracoastal Waterway on NC 50/210 between US 17 and Topsail Beach

Sample #	Boring #	Alignment	Station	Offset	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)	Young's Modulus, E (ksf)	RMR
RS-1	B15-B	-L2-	37+83	21' Rt.	73.9 - 74.2	Limestone	Qp	16%	4.11	1.98	140.2	1,403	26,443	9
RS-2	B15-B	-L2-	37+83	21' Rt.	105.1 - 105.4	Limestone	Qp	20%	4.02	1.97	150.4	2,717	92,974	10
RS-3	B15-B	-L2-	37+83	21' Rt.	109.9 - 110.2	Limestone	Qp	8%	3.79	1.98	155.9	5,422	184,241	12
RS-4	B12-A	-L2-	33+41	30' Lt.	91.6 - 91.9	Limestone	Qp	10%	4.40	1.99	137.4	1,472	66,916	10
RS-5	B17-A	-L2-	40+77	28' Lt.	83.0 - 83.3	Limestone	Qp	32%	3.87	1.99	143.5	3,920	77,383	12
RS-6	B17-A	-L2-	40+77	28' Lt.	84.2 - 84.5	Limestone	Qp	32%	4.34	2.00	158.6	8,292	170,955	15
RS-7	B3-B	-L2-	22+05	21' Rt.	92.1 - 92.4	Limestone	QP	17%	3.95	2.00	136.8	1,667	30,708	10
RS-8	B3-B	-L2-	22+05	21' Rt.	97.5- 97.8	Limestone	QP	18%	3.99	1.99	124.4	660	12,896	9
RS-9	B9-B	-L2-	29+16	19' Rt.	92.7 - 93.0	Limestone	QP	45%	3.75	2.01	133.6	1,149	14,854	19
RS-10	B9-B	-L2-	29+16	19' Rt.	96.7 - 97.0	Limestone	QP	27%	3.93	2.00	117.3	538	5,972	14
RS-11	B26-B	-L2-	54+16	31' Rt.	99.0 - 99.3	Limestone	QP	8%	3.75	2.00	142.6	2,593	77,706	10

ND = Not Determined

- *Note: Length to diameter ratio of sample RS-3 is 1.91, which is below the minimum requirement of 2.0.
- *Note: Length to diameter ratio of sample RS-5 is 1.94, which is below the minimum requirement of 2.0.
- *Note: Length to diameter ratio of sample RS-7 is 1.98, which is below the minimum requirement of 2.0.
- *Note: Length to diameter ratio of sample RS-9 is 1.87, which is below the minimum requirement of 2.0.
- *Note: Length to diameter ratio of sample RS-10 is 1.97, which is below the minimum requirement of 2.0.
- *Note: Length to diameter ratio of sample RS-11 is 1.88, which is below the minimum requirement of 2.0.