

REFERENCE: R-5021

PROJECT: 41582

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK
PROJECT DESCRIPTION NC 211 FROM SR 1500
(MIDWAY RD) TO NC 87

SITE DESCRIPTION BRIDGE OVER CP&L CANAL ON
NC 211 BETWEEN NC 133 AND NC 87
LEFT LANE AND RIGHT LANE

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
7-14	BORE LOGS
15-16	SOIL TEST RESULTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5021	1	16

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 SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON 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

HUNSBERGER, W. S.

MID-ATLANTIC DRILLING

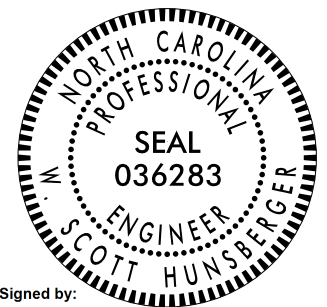
INVESTIGATED BY HUNSBERGER, W. S.

DRAWN BY HUNSBERGER, W. S.

CHECKED BY HAMM, J. R.

SUBMITTED BY FALCON

DATE AUGUST 2017



DocuSigned by:
W. Scott Hunsberger 8/16/2017

SIGNATURE DATE
EA39AB9EDF5845A...

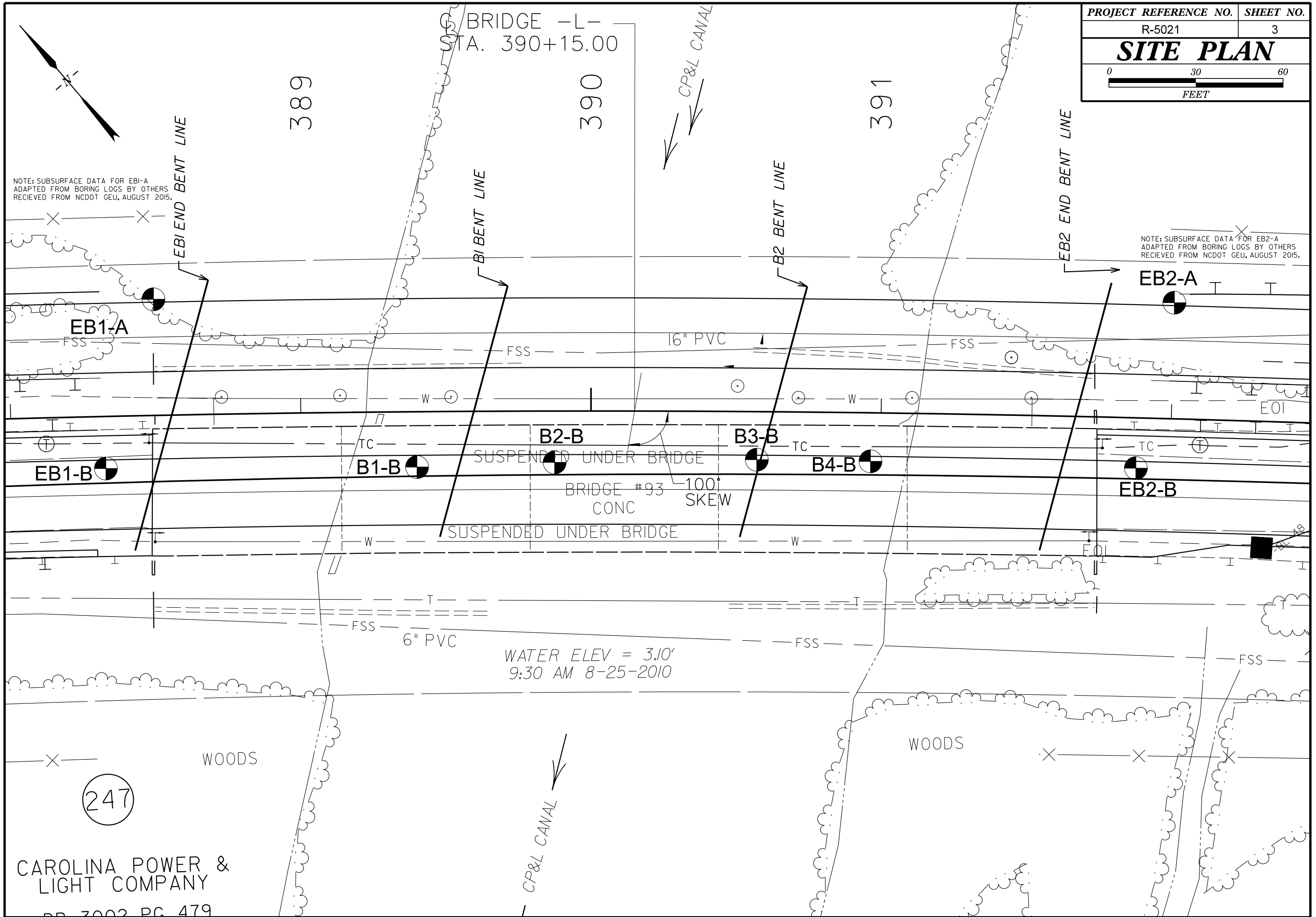
**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

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

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																																
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																																																																																																																
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										CALCAREOUS (CALC.)																																																																																																																																																
<table border="1"> <tr> <th>GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-2-4</th> <th>A-2-5</th> <th>A-2-6</th> <th>A-2-7</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th></th> </tr> <tr> <th>SYMBOL</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX</td> <td>51 MN 35 MX 35 MX</td> <td>40 MX 35 MX</td> <td>41 MN 35 MX</td> <td>41 MN 35 MX</td> <td>41 MN 35 MX</td> <td>40 MX 36 MN</td> <td>41 MN 36 MN</td> <td>40 MX 36 MN</td> <td>41 MN 36 MN</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td colspan="2">-</td> <td>NP</td> <td>40 MX 10 MX</td> <td>41 MN 10 MX</td> <td>41 MN 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 10 MX</td> <td>41 MN 10 MX</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>GROUP INDEX</th> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>NO MX</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="2">STONE FRAGS. GRAVEL, AND SAND</td> <td>FINE SAND</td> <td colspan="3">SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> <td></td> <td></td> <td></td> </tr> </table>										GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					GROUP CLASS.	A-1	A-3	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7		SYMBOL																	% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 35 MX 35 MX	40 MX 35 MX	41 MN 35 MX	41 MN 35 MX	41 MN 35 MX	40 MX 36 MN	41 MN 36 MN	40 MX 36 MN	41 MN 36 MN						MATERIAL PASSING #40 LL PI	-		NP	40 MX 10 MX	41 MN 10 MX	41 MN 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN						GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX									USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND			SILTY SOILS	CLAYEY SOILS									GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD					FAIR TO POOR					FAIR TO POOR	POOR	UNSATURABLE				THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.										FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.									
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS																																																																																																																																																																			
GROUP CLASS.	A-1	A-3	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7																																																																																																																																																															
SYMBOL																																																																																																																																																																														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 35 MX 35 MX	40 MX 35 MX	41 MN 35 MX	41 MN 35 MX	41 MN 35 MX	40 MX 36 MN	41 MN 36 MN	40 MX 36 MN	41 MN 36 MN																																																																																																																																																																			
MATERIAL PASSING #40 LL PI	-		NP	40 MX 10 MX	41 MN 10 MX	41 MN 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN																																																																																																																																																																			
GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX																																																																																																																																																																						
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND			SILTY SOILS	CLAYEY SOILS																																																																																																																																																																						
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD					FAIR TO POOR					FAIR TO POOR	POOR	UNSATURABLE																																																																																																																																																																	
CONSISTENCY OR DENSENESS										MINERALOGICAL COMPOSITION										NON-CRYSTALLINE ROCK (NCR)										COASTAL PLAIN SEDIMENTARY ROCK (CP)																																																																																																																																																
<table border="1"> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </table>										PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A	GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.										COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.																																																																																																																																				
PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)																																																																																																																																																																											
GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A																																																																																																																																																																											
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4																																																																																																																																																																											
TEXTURE OR GRAIN SIZE										COMPRESSION										WEATHERING										GROUND WATER																																																																																																																																																
<table border="1"> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> <tr> <td></td> <td>4.76</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE. SD.)</th> <th>FINE SAND (F SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>GRAIN SIZE</th> <th>MM</th> <th>305</th> <th>75</th> <th>2.0</th> <th>0.25</th> <th>0.05</th> <th>0.005</th> </tr> <tr> <td></td> <td>IN.</td> <td>12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270		4.76	2.00	0.42	0.25	0.075	0.053	BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)								GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005		IN.	12	3					SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP																																																																																																				
U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270																																																																																																																																																																								
	4.76	2.00	0.42	0.25	0.075	0.053																																																																																																																																																																								
BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)																																																																																																																																																																								
GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005																																																																																																																																																																							
	IN.	12	3																																																																																																																																																																											
SOIL MOISTURE - CORRELATION OF TERMS										PERCENTAGE OF MATERIAL										MISCELLANEOUS SYMBOLS										RECOMMENDATION SYMBOLS																																																																																																																																																
<table border="1"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PLASTIC RANGE (PI)</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table>										SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	<table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>										ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY										DIP & DIP DIRECTION OF ROCK STRUCTURES TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION										UNDERCUT EXCAVATION SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL																																																																																																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION																																																																																																																																																																												
LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																																																																																																																																												
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																												
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE																																																																																																																																																																												
SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																												
ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL																																																																																																																																																																											
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%																																																																																																																																																																											
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%																																																																																																																																																																											
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%																																																																																																																																																																											
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE																																																																																																																																																																											
PLASTICITY										ABBREVIATIONS										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING																																																																																																																																																
<table border="1"> <tr> <th>NON PLASTIC</th> <th colspan="2">PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td></td> <td>0-5</td> <td>6-15</td> <td>VERY LOW</td> </tr> <tr> <td>SLIGHTLY PLASTIC</td> <td>6-15</td> <td>16-25</td> <td>SLIGHT</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>16-25</td> <td>26 OR MORE</td> <td>MEDIUM</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>26 OR MORE</td> <td></td> <td>HIGH</td> </tr> </table>										NON PLASTIC	PLASTICITY INDEX (PI)		DRY STRENGTH		0-5	6-15	VERY LOW	SLIGHTLY PLASTIC	6-15	16-25	SLIGHT	MODERATELY PLASTIC	16-25	26 OR MORE	MEDIUM	HIGHLY PLASTIC	26 OR MORE		HIGH	AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED γ _u - UNIT WEIGHT γ _d - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO										DRILL UNITS: <input checked="" type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST ADVANCING TOOLS: <input checked="" type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST										<table border="1"> <tr> <th>TERM</th> <th>SPACING</th> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td></td> <td></td> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table>										TERM	SPACING	TERM	THICKNESS	VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	4 FEET	WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET	MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET	CLOSE	0.16 TO 1 FOOT	VERY THINLY BEDDED	0.03 - 0.16 FEET	VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET			THINLY LAMINATED	< 0.008 FEET																																																																																							
NON PLASTIC	PLASTICITY INDEX (PI)		DRY STRENGTH																																																																																																																																																																											
	0-5	6-15	VERY LOW																																																																																																																																																																											
SLIGHTLY PLASTIC	6-15	16-25	SLIGHT																																																																																																																																																																											
MODERATELY PLASTIC	16-25	26 OR MORE	MEDIUM																																																																																																																																																																											
HIGHLY PLASTIC	26 OR MORE		HIGH																																																																																																																																																																											
TERM	SPACING	TERM	THICKNESS																																																																																																																																																																											
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	4 FEET																																																																																																																																																																											
WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET																																																																																																																																																																											
MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET																																																																																																																																																																											
CLOSE	0.16 TO 1 FOOT	VERY THINLY BEDDED	0.03 - 0.16 FEET																																																																																																																																																																											
VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET																																																																																																																																																																											
		THINLY LAMINATED	< 0.008 FEET																																																																																																																																																																											
COLOR										INDURATION										BENCH MARK: BM48 -BYI- STA. 369+26, 73' RT, RR SPIKE IN 17" PINE N: 72776 E: 2293529										ELEVATION: 29.77 FEET																																																																																																																																																
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.										NOTES: FIAD - FILLED IMMEDIATELY AFTER DRILLING LT. - LIGHT DK. - DARK UCP - UNDIVIDED COASTAL PLAIN																																																																																																																																																										

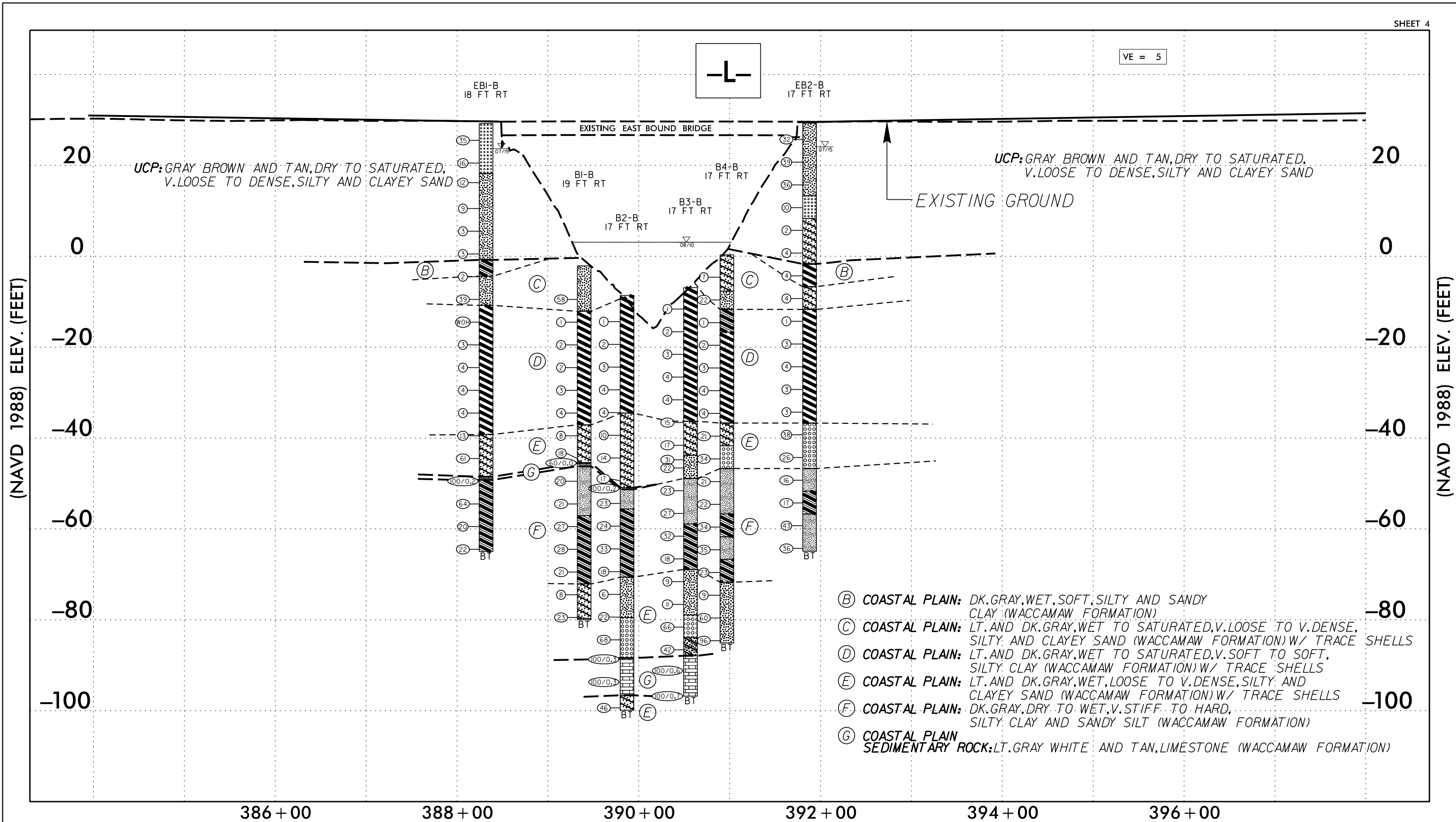
NOTE: SUBSURFACE DATA FOR EB1-A
ADAPTED FROM BORING LOGS BY OTHERS
RECIEVED FROM NCDOT GEU, AUGUST 2015.

NOTE: SUBSURFACE DATA FOR EB2-A
ADAPTED FROM BORING LOGS BY OTHERS
RECIEVED FROM NCDOT GEU, AUGUST 2015.



CAROLINA POWER &
LIGHT COMPANY

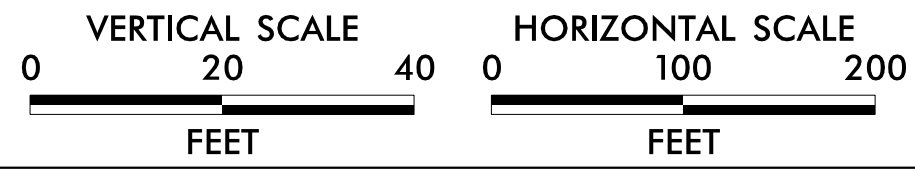
PP 3002 PG 479



- (B) COASTAL PLAIN: DK. GRAY, WET, SOFT, SILTY AND SANDY CLAY (WACCAMAW FORMATION)
- (C) COASTAL PLAIN: LT. AND DK. GRAY, WET TO SATURATED, V. LOOSE TO V. DENSE, SILTY AND CLAYEY SAND (WACCAMAW FORMATION) W/ TRACE SHELLS
- (D) COASTAL PLAIN: LT. AND DK. GRAY, WET TO SATURATED, V. SOFT TO SOFT, SILTY CLAY (WACCAMAW FORMATION) W/ TRACE SHELLS
- (E) COASTAL PLAIN: LT. AND DK. GRAY, WET, LOOSE TO V. DENSE, SILTY AND CLAYEY SAND (WACCAMAW FORMATION) W/ TRACE SHELLS
- (F) COASTAL PLAIN: DK. GRAY, DRY TO WET, V. STIFF TO HARD, SILTY CLAY AND SANDY SILT (WACCAMAW FORMATION)
- (G) COASTAL PLAIN SEDIMENTARY ROCK: LT. GRAY WHITE AND TAN, LIMESTONE (WACCAMAW FORMATION)

NOTES:

- SUBSURFACE PROFILE AT -L- TAKEN FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU IN SEPTEMBER 2015.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- VERTICAL EXAGGERATION = 5



FALCON ENGINEERING

FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
RALEIGH, NC 27607

PHONE: 919.871.0800
FAX: 919.871.0803

SUBSURFACE PROFILE AT CENTERLINE

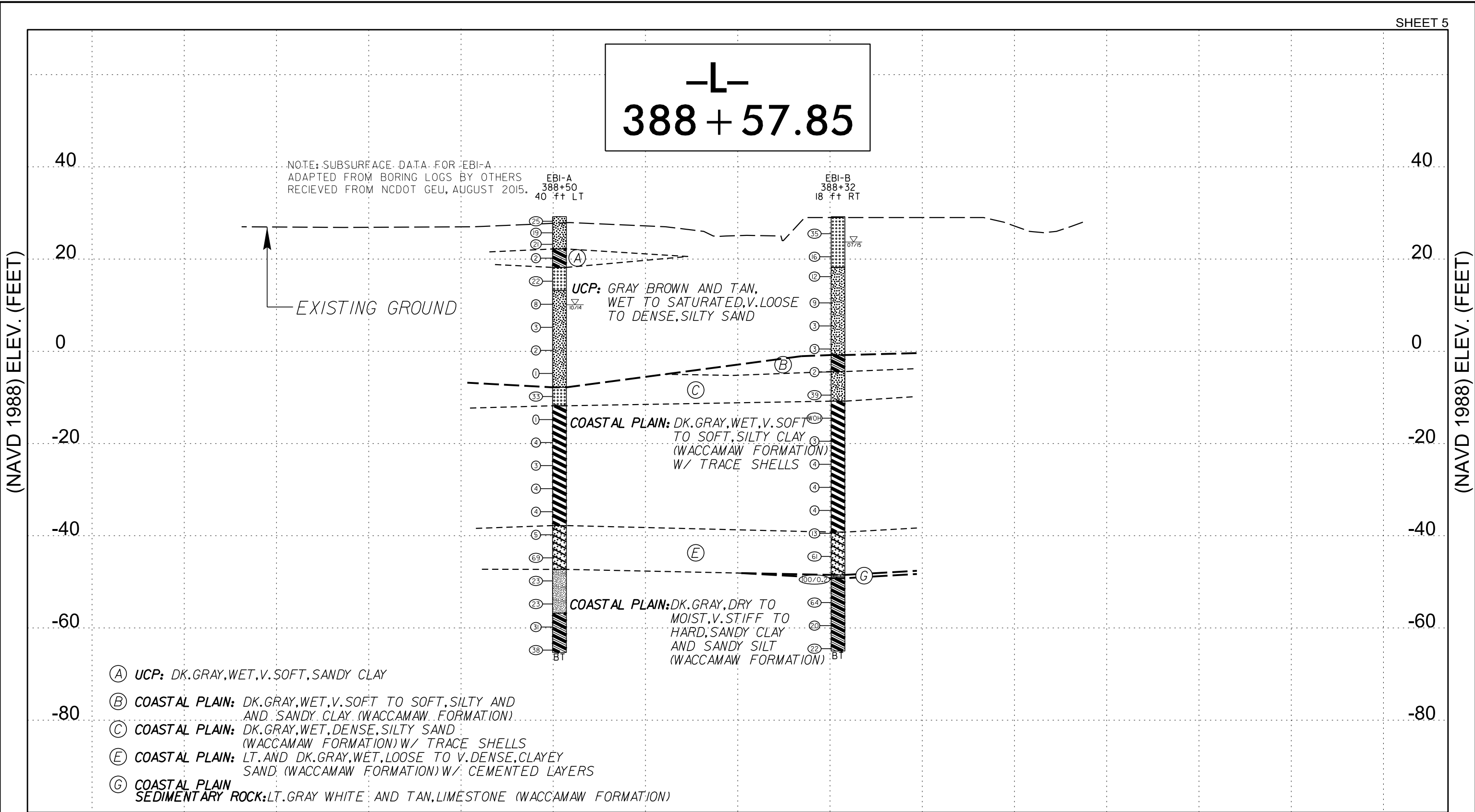
BRIDGE ON NC 211 OVER CP&L OUTFALL CANAL
BRUNSWICK COUNTY, NORTH CAROLINA
WBS.: 41582.1.1, TIP.: R-5021

-L-
388 + 57.85

NOTE: SUBSURFACE DATA FOR EBI-A
ADAPTED FROM BORING LOGS BY OTHERS
RECEIVED FROM NCDOT GEU, AUGUST 2015.

(NAVD 1988) ELEV. (FEET)

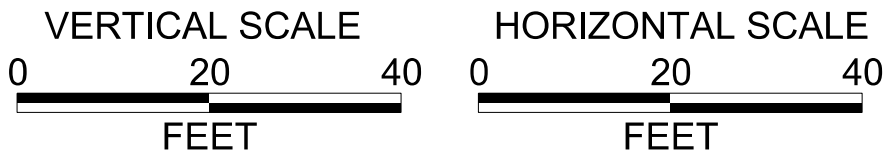
(NAVD 1988) ELEV. (FEET)



- Ⓐ UCP: DK. GRAY, WET, V. SOFT, SANDY CLAY
- Ⓑ COASTAL PLAIN: DK. GRAY, WET, V. SOFT TO SOFT, SILTY AND SANDY CLAY (WACCAMAW FORMATION)
- Ⓒ COASTAL PLAIN: DK. GRAY, WET, DENSE, SILTY SAND (WACCAMAW FORMATION) W/ TRACE SHELLS
- Ⓔ COASTAL PLAIN: LT. AND DK. GRAY, WET, LOOSE TO V. DENSE, CLAYEY SAND (WACCAMAW FORMATION) W/ CEMENTED LAYERS
- Ⓖ COASTAL PLAIN SEDIMENTARY ROCK: LT. GRAY WHITE AND TAN, LIMESTONE (WACCAMAW FORMATION)

NOTES:

- GROUNDLINE CROSS SECTION ALONG BENT TAKEN FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU, DATED AUGUST 2015.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.
- BENT SKEW: 101° 12' 02" TAN. TO CURVE



FALCON ENGINEERING

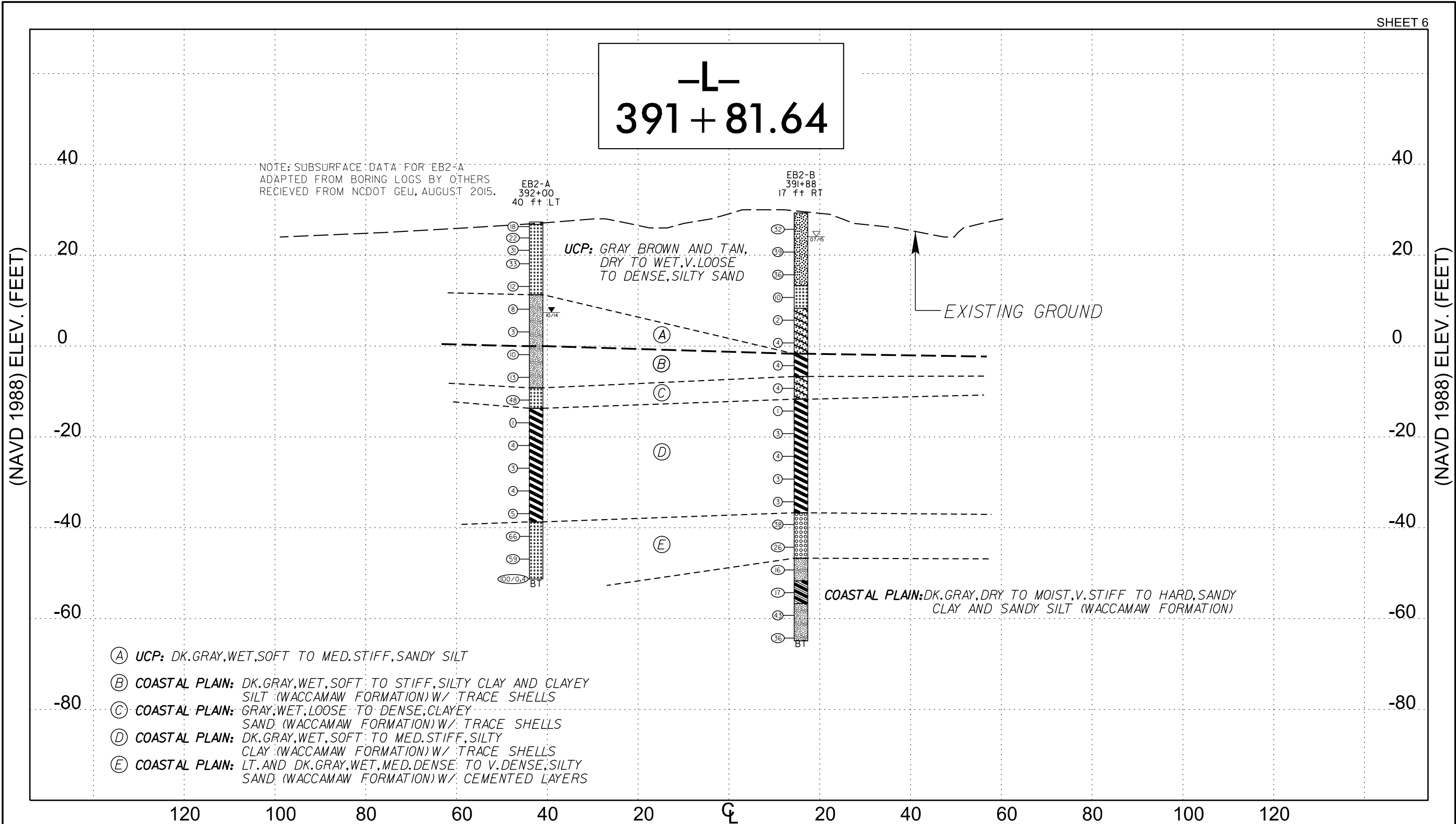
FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
RALEIGH, NC 27607

PHONE: 919.871.0800
FAX: 919.871.0803

-L - SUBSURFACE CROSS SECTION (END BENT 1)

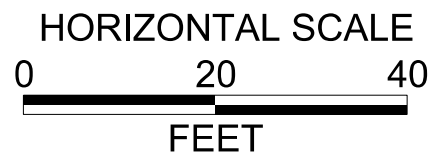
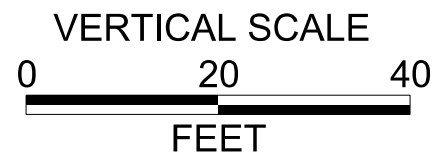
BRIDGE ON NC 211 OVER CP&L CANAL
BRUNSWICK COUNTY, NC
WBS: 41582.1-1, TIP: R-5021
FALCON PROJECT NO. G15019.00

-L-
391 + 81.64



NOTES:

- GROUNDLINE CROSS SECTION ALONG BENT TAKEN FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU, DATED AUGUST 2015.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.
- BENT SKEW: 98° 43' 37" TAN. TO CURVE



FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
RALEIGH, NC 27607
PHONE: 919.871.0800
FAX: 919.871.0803

-L - SUBSURFACE CROSS SECTION (END BENT 2)

BRIDGE ON NC 211 OVER CP&L CANAL
BRUNSWICK COUNTY, NC
WBS: 41582.1-1, TIP: R-5021
FALCON PROJECT NO. G15019.00

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 41582.1.1		TIP R-5021		COUNTY BRUNSWICK		GEOLOGIST FUTRAL, C.										
SITE DESCRIPTION BRIDGE ON NC 211 OVER CP&L CANAL							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 388+50		OFFSET 40 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 29.3 ft		TOTAL DEPTH 94.5 ft		NORTHING 73,173		EASTING 2,293,320										
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 77.2% 01/09/2014			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Contract Driller		START DATE 10/13/14		COMP. DATE 10/14/14		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
30	29.3	0.0												29.3	GROUND SURFACE	0.0
	26.8	2.5	3	10	15										UNDIVIDED COASTAL PLAIN	
	24.3	5.0	11	10	9										Light tan to brown, f. SAND	
25	24.3	5.0														
	21.3	8.0	7	10	11											
20	21.3	8.0	1	1	1											
	16.3	13.0	1	1	1											
15	16.3	13.0	7	10	12											
	11.3	18.0	4	4	4											
10	11.3	18.0	2	1	2											
5	6.3	23.0	2	1	2											
0	1.3	28.0	1	1	1											
-5	-3.7	33.0	1	0	1											
-10	-8.7	38.0	20	19	14											
-15	-13.7	43.0	WOH	WOH	1											
-20	-18.7	48.0	WOH	2	2											
-25	-23.7	53.0	1	2	1											
-30	-28.7	58.0	1	2	2											
-35	-33.7	63.0	1	2	2											
-40	-38.7	68.0	2	3	2											
-45	-43.7	73.0	9	10	59											
-50	-48.7	78.0	4	8	15											

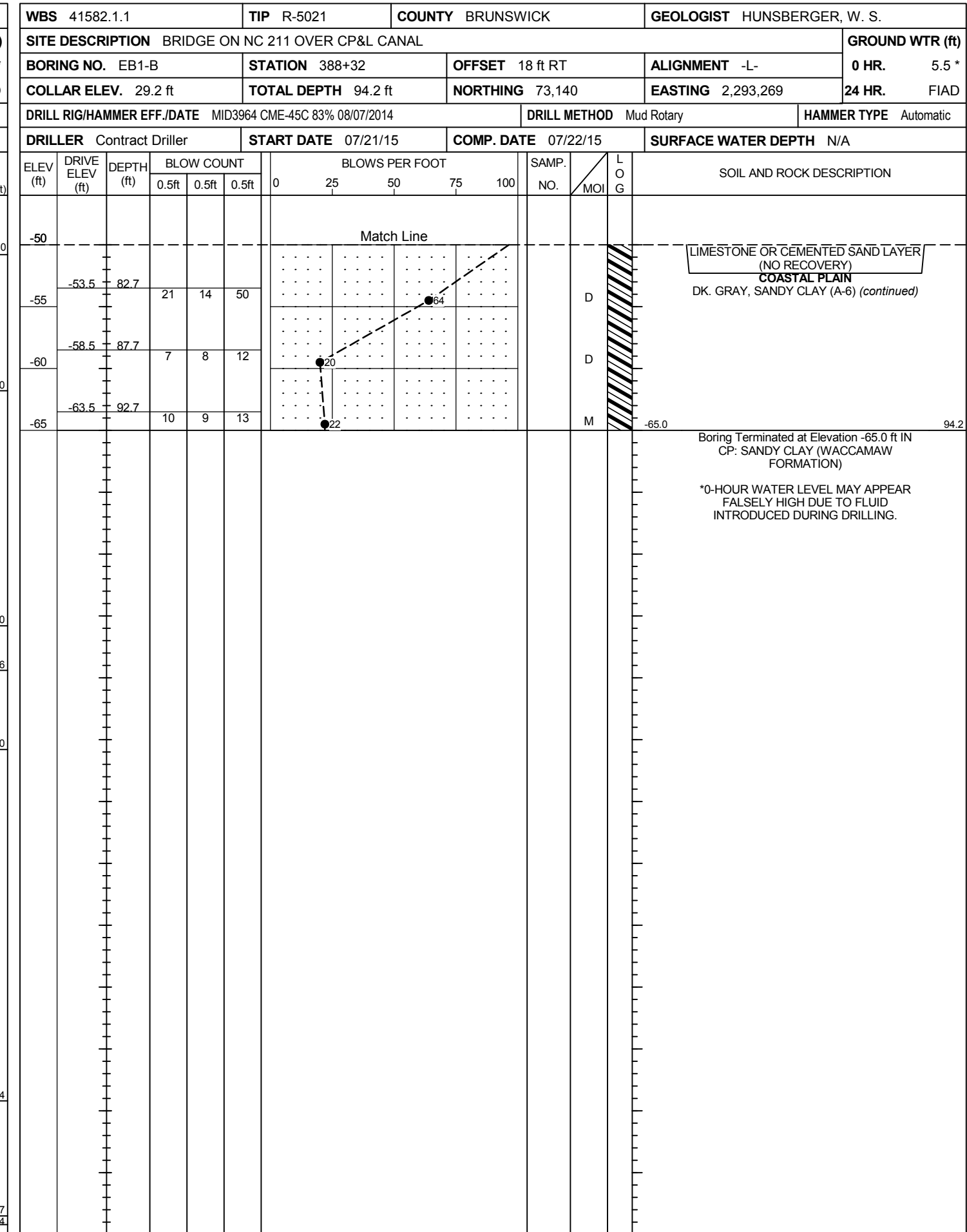
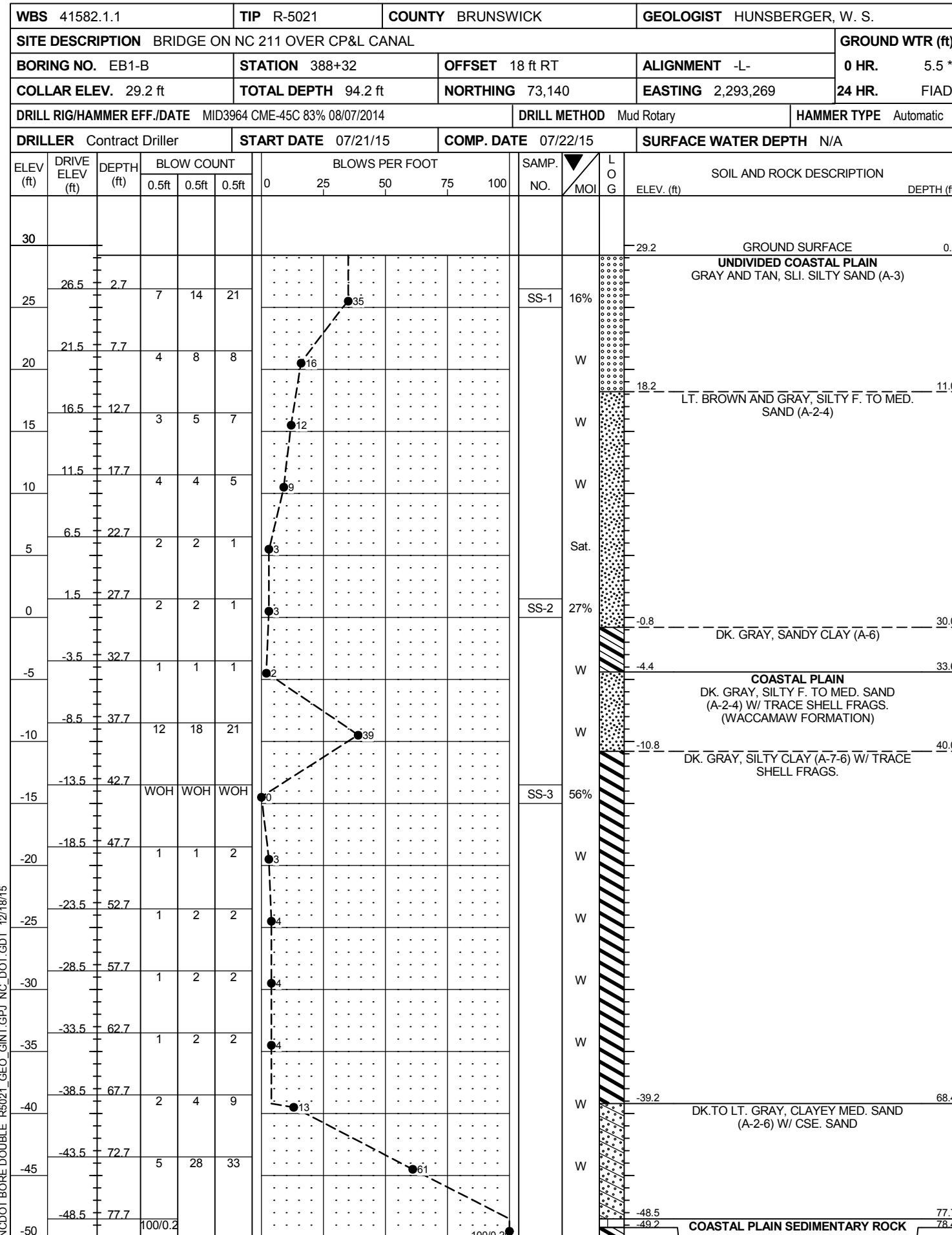
WBS 41582.1.1		TIP R-5021		COUNTY BRUNSWICK		GEOLOGIST FUTRAL, C.										
SITE DESCRIPTION BRIDGE ON NC 211 OVER CP&L CANAL							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 388+50		OFFSET 40 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 29.3 ft		TOTAL DEPTH 94.5 ft		NORTHING 73,173		EASTING 2,293,320										
DRILL RIG/HAMMER EFF./DATE CAT1303 CME-550 77.2% 01/09/2014			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Contract Driller		START DATE 10/13/14		COMP. DATE 10/14/14		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-50																
	-53.7	83.0	10	10	13											
-55	-53.7	83.0														
	-58.7	88.0	8	13	18											
-60	-58.7	88.0														
	-63.7	93.0	11	18	20											
-65	-63.7	93.0														

NCDOT BORE DOUBLE R5021_GEO_GINT.GPJ NC_DOT.GDT 12/15/15

NOTE: SUBSURFACE DATA FOR EB1-A ADAPTED FROM BORING LOGS BY OTHERS RECEIVED FROM NCDOT GEU, AUGUST 2015.

GEOTECHNICAL BORING REPORT

BORE LOG



NCDOT BORE DOUBLE R5021_GEO_GINT.GPJ NC_DOT.GDT 12/18/15

LIMESTONE OR CEMENTED SAND LAYER
(NO RECOVERY)
COASTAL PLAIN
DK. GRAY, SANDY CLAY (A-6) (continued)

Boring Terminated at Elevation -65.0 ft IN
CP: SANDY CLAY (WACCAMAW
FORMATION)

*0-HOUR WATER LEVEL MAY APPEAR
FALSELY HIGH DUE TO FLUID
INTRODUCED DURING DRILLING.

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 41582.1.1		TIP R-5021		COUNTY BRUNSWICK		GEOLOGIST HUNSBERGER, W. S.										
SITE DESCRIPTION BRIDGE ON NC 211 OVER CP&L CANAL							GROUND WTR (ft)									
BORING NO. B2-B		STATION 389+87		OFFSET 17 ft RT		ALIGNMENT -L-										
COLLAR ELEV. -8.6 ft		TOTAL DEPTH 91.3 ft		NORTHING 73,040		EASTING 2,293,387										
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/07/2014			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Contract Driller		START DATE 07/26/15		COMP. DATE 07/27/15		SURFACE WATER DEPTH 12.9ft										
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						
-5																
-10																
-15	-13.4	4.8	WOH	WOH	1											
-20	-18.4	9.8	WOH	1	1											
-25	-23.4	14.8	1	1	2											
-30	-28.4	19.8	1	2	2											
-35	-33.4	24.8	1	2	2											
-40	-38.4	29.8	2	4	6											
-45	-43.4	34.8	9	6	8											
-50	-48.4	39.8	5	9	8											
-55	-50.9	42.3	100/0.2													
-55	-53.4	44.8	5	11	12											
-60	-58.4	49.8	5	6	18											
-65	-63.4	54.8	6	11	22											
-70	-68.4	59.8	6	8	10											
-75	-73.4	64.8	3	2	4											
-80	-78.4	69.8	4	4	18											
-85	-83.4	74.8	24	36	32											

WBS 41582.1.1		TIP R-5021		COUNTY BRUNSWICK		GEOLOGIST HUNSBERGER, W. S.										
SITE DESCRIPTION BRIDGE ON NC 211 OVER CP&L CANAL							GROUND WTR (ft)									
BORING NO. B2-B		STATION 389+87		OFFSET 17 ft RT		ALIGNMENT -L-										
COLLAR ELEV. -8.6 ft		TOTAL DEPTH 91.3 ft		NORTHING 73,040		EASTING 2,293,387										
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/07/2014			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Contract Driller		START DATE 07/26/15		COMP. DATE 07/27/15		SURFACE WATER DEPTH 12.9ft										
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						
-85																
-90	-88.4	79.8	100/0.3													
-95	-93.4	84.8	100/0.3													
	-98.4	89.8	40	16	30											

NCDOT BORE DOUBLE R5021_GEO_GINT.GPJ NC_DOT.GDT 12/15/15

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 41582.1.1		TIP R-5021		COUNTY BRUNSWICK		GEOLOGIST HUNSBERGER, W. S.	
SITE DESCRIPTION BRIDGE ON NC 211 OVER CP&L CANAL						GROUND WTR (ft)	
BORING NO. B4-B		STATION 390+97		OFFSET 17 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 0.3 ft		TOTAL DEPTH 85.4 ft		NORTHING 72,969		EASTING 2,293,469	
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/07/2014				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER Contract Driller		START DATE 07/28/15		COMP. DATE 07/29/15		SURFACE WATER DEPTH 3.6ft	

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															
-5	-3.6	3.9	2	3	4										
-10	-8.6	8.9	3	9	13										
-15	-13.6	13.9	WOH	WOH	1										
-20	-18.6	18.9	1	1	1										
-25	-23.6	23.9	1	1	2										
-30	-28.6	28.9	1	2	2										
-35	-33.6	33.9	1	2	2										
-40	-38.6	38.9	7	10	11										
-45	-43.6	43.9	10	15	19										
-50	-48.6	48.9	4	7	14										
-55	-53.6	53.9	15	10	12										
-60	-58.6	58.9	11	15	19										
-65	-63.6	63.9	16	14	21										
-70	-68.6	68.9	8	10	13										
-75	-73.6	73.9	4	4	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					
-75															
-80	-78.6	78.9	6	7	53										
-85	-83.6	83.9	46	34	62										

WBS 41582.1.1		TIP R-5021		COUNTY BRUNSWICK		GEOLOGIST HUNSBERGER, W. S.	
SITE DESCRIPTION BRIDGE ON NC 211 OVER CP&L CANAL						GROUND WTR (ft)	
BORING NO. B4-B		STATION 390+97		OFFSET 17 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 0.3 ft		TOTAL DEPTH 85.4 ft		NORTHING 72,969		EASTING 2,293,469	
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/07/2014				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER Contract Driller		START DATE 07/28/15		COMP. DATE 07/29/15		SURFACE WATER DEPTH 3.6ft	

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	-78.6	78.9	6	7	53										
-85	-83.6	83.9	46	34	62										

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	-78.6	78.9	6	7	53										
-85	-83.6	83.9	46	34	62										

NCDOT BORE DOUBLE R5021_GEO_GINT.GPJ NC_DOT.GDT 12/15/15

Falcon Engineering, Inc. **1210 Trinity Road, Suite 110, Raleigh, NC 27607**

LABORATORY TEST RESULTS
BRIDGE ON NC 211 OVER CP&L CANAL
BRUNSWICK COUNTY, NORTH CAROLINA
Project: 41582.1.1 (R-5021)
Falcon Engineering Project No.: G15019.00

SAMPLE			DEPTH	AASHTO	ATTERBERG LIMITS		% BY WEIGHT				% PASSING (SIEVES)			%
NO.	STATION	OFFSET	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE
SS-1	388+32	18 ft RT	2.7-4.2	A-3	17	NP	25	68	4	3	100	96	8	16.0
SS-2	388+32	18 ft RT	27.7-29.2	A-2-4	26	NP	1	88	0	11	100	100	34	27.3
SS-3	388+32	18 ft RT	42.7-44.2	A-7-6	47	22	1	22	45	32	100	100	86	55.8
SS-4	389+40	19 ft RT	21.4-23.9	A-7-6	68	28	0	4	46	50	100	100	98	75.0
SS-5	389+40	19 ft RT	41.4-43.9	A-2-6	30	15	37	30	9	24	100	78	34	34.8
SS-6	389+87	17 ft RT	74.8-76.3	A-1-a	17	NP	64	15	15	6	41	19	9	15.6
SS-7	390+57	17 ft RT	33.7-35.2	A-2-6	38	16	70	6	9	15	92	35	22	18.6
SS-8	390+97	17 ft RT	48.9-50.4	A-4	39	30	2	43	30	25	100	99	74	41.8
SS-9	391+88	17 ft RT	17.6-19.1	A-3	18	NP	39	57	4	0	100	83	5	19.9
SS-10	391+88	17 ft RT	47.6-49.1	A-7-6	49	27	1	11	54	34	100	100	94	63.3

Signature: 

NCDOT No.: 123-01-0509

Notes: LL = Liquid Limit
 PL = Plastic Limit
 PI = Plasticity Index = LL - PL
 * Classification based only on field classification

Laboratory test data prepared by Catlin provided to Falcon by NCDOT GEU in December 2015.

LABORATORY SUMMARY SHEET

AASHTO Standard Specifications (As modified by NCDOT, Material and Tests Unit, 2000.)

TEST RESULTS

Proj. Sample Number	SS-16	SS-17	SS-18	SS-19	SS-20									
Lab Sample Number	SS-16	SS-17	SS-18	SS-19	SS-20									
Retained #4 Sieve %	0	0	0	0	2.6									
Passing #10 Sieve %	99.9	100	100	99.2	96.8									
Passing #40 Sieve %	92	96	100	99	75									
Passing #200 Sieve %	20	36	26	84	31									
MINUS NUMBER 10 FRACTION														
SOIL MORTAR - 100%														
Coarse Sand Ret.-#60 %	18.0	17.0	0.6	1.0	63.0									
Fine Sand Ret.-#270 %	64.8	49.5	87.5	23.3	6.9									
Silt 0.05 - 0.005mm %	9.8	11.0	5.6	42.6	12.2									
Clay <0.005mm %	7.3	22.5	6.3	33.1	17.9									
Liquid Limit (LL)	19	26	25	51	27									
Plasticity Index (PI)	NP	11	NP	28	13									
AASHTO Classification /Group Index	A-2-4(0)	A-6(0)	A-2-4(0)	A-7-6(25)	A-2-6(0)									
Organic Content %	N/A	N/A	N/A	N/A	N/A									
Station	388+50	388+50	388+50	388+50	388+50									
Offset	40ft LT	40ft LT	40ft LT	40ft LT	40ft LT									
Alignment	-L-	-L-	-L-	-L-	-L-									
Boring Identification	EB1-A	EB1-A	EB1-A	EB1-A	EB1-A									
Depth (FT)	2.5	8.0	23.0	43.0	68.0									
to	4.0	9.5	24.5	44.5	69.5									
Field Moisture Content	10	35	35	63	45									
Tested By	M. Mason	M. Mason	M. Mason	M. Mason	M. Mason									
Submitted By	S. Hudson	S. Hudson	S. Hudson	S. Hudson	S. Hudson									
Date Submitted	10/15/14	10/15/14	10/15/14	10/15/14	10/15/14									

NP = Non-Plastic
N/A = Not Applicable / Not Analyzed

Laboratory Manager

Report Date: 12/11/2015
Laboratory Report Page 1 of 1