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REFERENCE: B-4440

PROJECT: 38367.1.1

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-4440	1	6

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BRUNSWICK
PROJECT DESCRIPTION BRIDGE NO. 163 ON SR 1349
(BRIDGERS RD.) OVER MULBERRY BRANCH AT
-L- STA. 18 + 90.36

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
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5-6	BORE LOGS

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 BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 TOT-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

JKC

JRS

DGP

RES

INVESTIGATED BY J.L. STONE

DRAWN BY J.L. STONE

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE OCTOBER 2014



DocuSigned by:
Joseph L. Stone 2/20/2015
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SIGNATURE DATE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

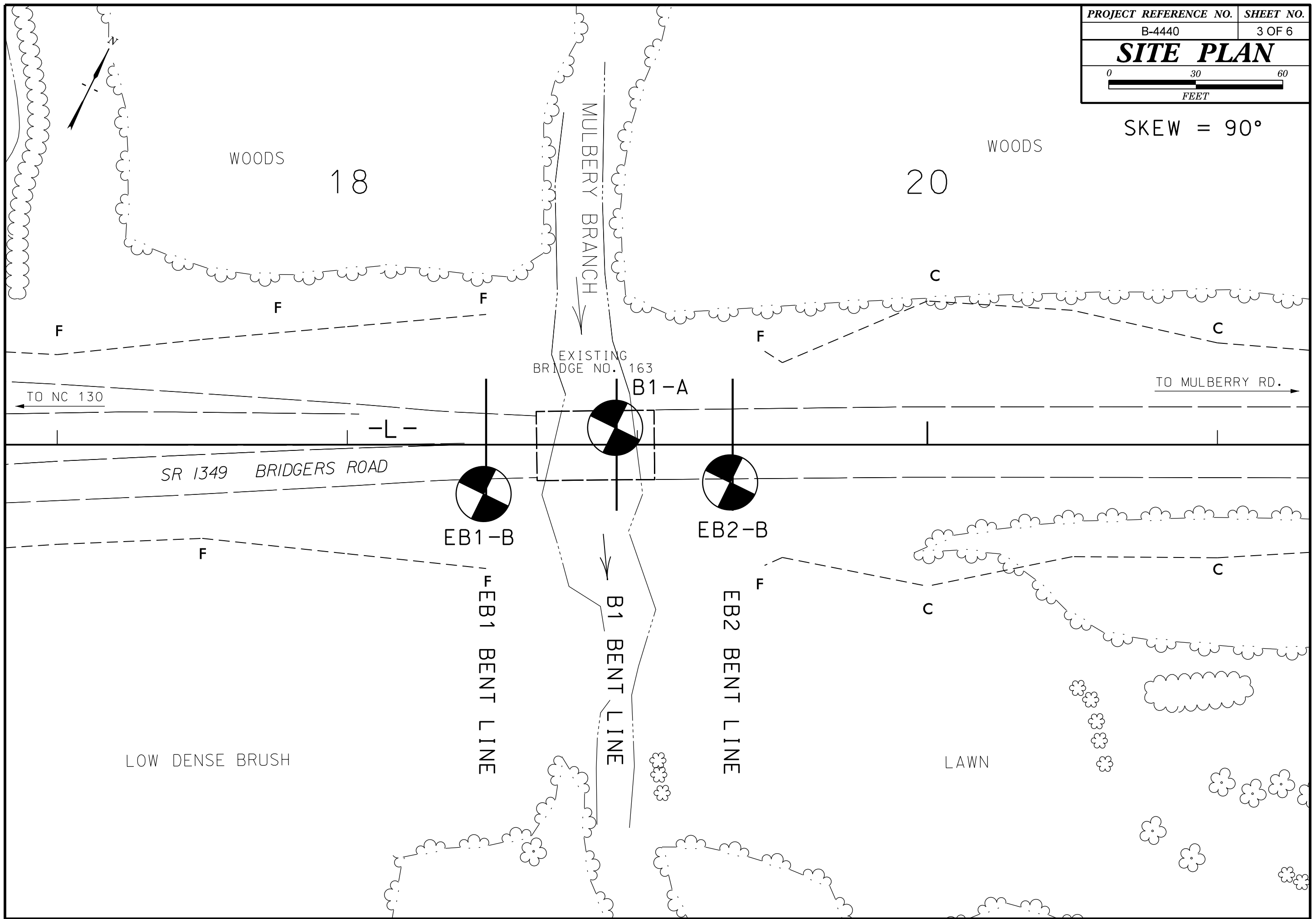
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION					ROCK DESCRIPTION					TERMS AND DEFINITIONS				
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 209, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.					HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:					ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCREC.) - 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					WEATHERING									
MINERALOGICAL COMPOSITION										PERCENTAGE OF MATERIAL					FRESH					DIP				
COMPRESSION										GROUND WATER					VERY SLIGHT (V SL.)					DIP DIRECTION (DIP AZIMUTH)				
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS					SLIGHT (SL.)					FAULT				
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS					MODERATE (MOD.)					FISSILE				
SOIL MOISTURE - CORRELATION OF TERMS										ABBREVIATIONS					SEVERE (MOD. SEV.)					FLOOD PLAIN (FP)				
PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT					SEVERE (SEV.)					FORMATION (FM)				
COLOR															VERY SEVERE (V SEV.)					JOINT				
															COMPLETE					LEDGE				
															VERY HARD					LENS				
															HARD					MOTTLED (MOT.)				
															MODERATELY HARD					PERCHED WATER				
															MEDIUM HARD					RESIDUAL (RES.) SOIL				
															SOFT					ROCK QUALITY DESIGNATION (RQD)				
															VERY SOFT					SAPROLITE (SAP.)				
															FRACTURE SPACING					SILL				
															BEDDING					SLICKENSIDE				
															INDURATION					STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)				
																				STRATA CORE RECOVERY (SCREC.)				
																				STRATA ROCK QUALITY DESIGNATION (SROD)				
																				TOPSOIL (TS.)				
																				BENCH MARK: RAILROAD SPIKE IN 18" GUM AT -L- 18+46.2, 140.2' RT				
																				N 83085, E 2182192				
																				ELEVATION: 8.08 FEET				
																				NOTES:				

SKEW = 90°

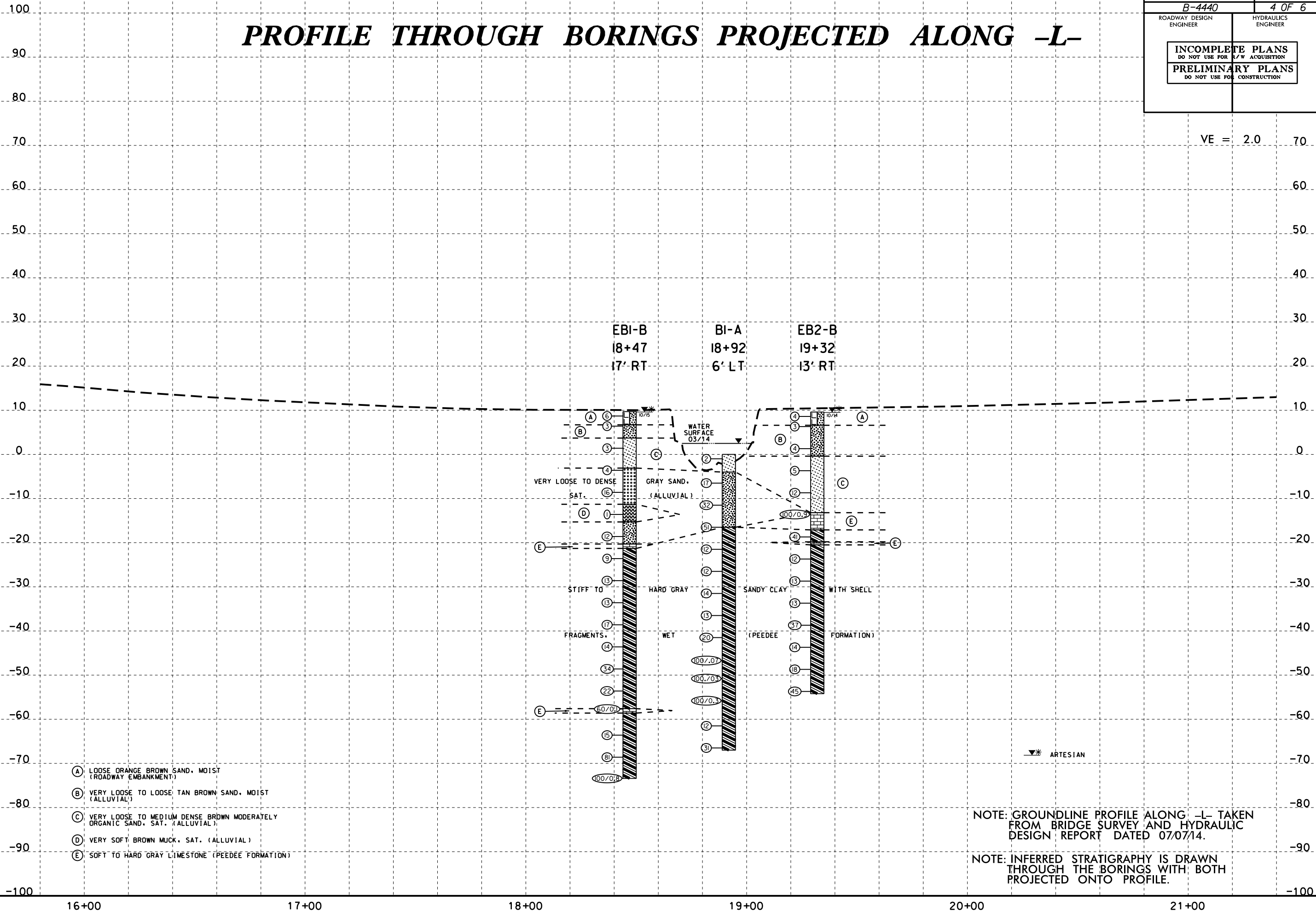


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PROJECT REFERENCE NO. B-4440	SHEET NO. 4 OF 6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

PROFILE THROUGH BORINGS PROJECTED ALONG -L-

VE = 2.0 70



- (A) LOOSE ORANGE BROWN SAND, MOIST (ROADWAY EMBANKMENT)
- (B) VERY LOOSE TO LOOSE TAN BROWN SAND, MOIST (ALLUVIAL)
- (C) VERY LOOSE TO MEDIUM DENSE BROWN MODERATELY ORGANIC SAND, SAT. (ALLUVIAL)
- (D) VERY SOFT BROWN MUCK, SAT. (ALLUVIAL)
- (E) SOFT TO HARD GRAY LIMESTONE (PEEDEE FORMATION)

NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 07/07/14.

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

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 At 11/17/2014

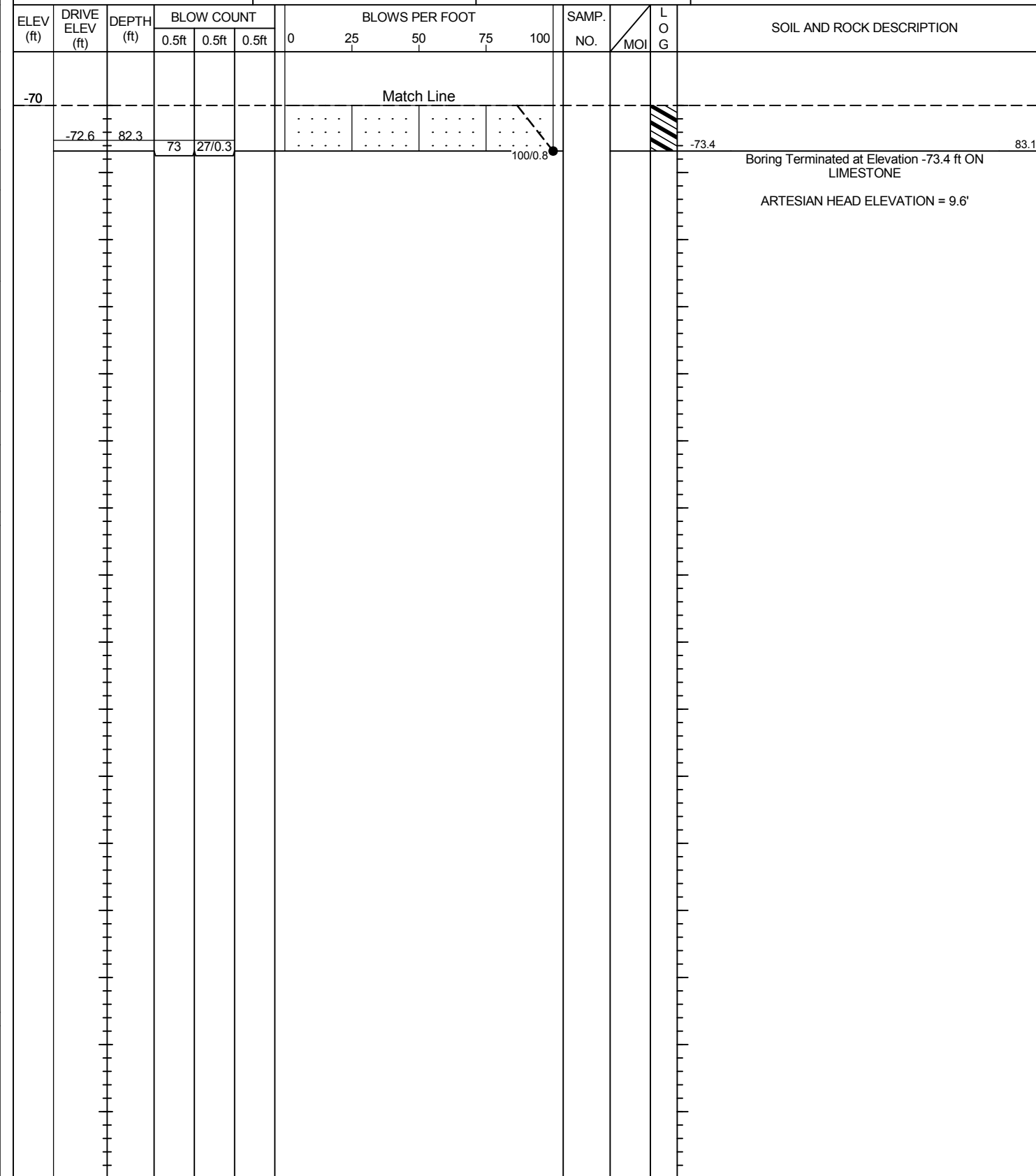
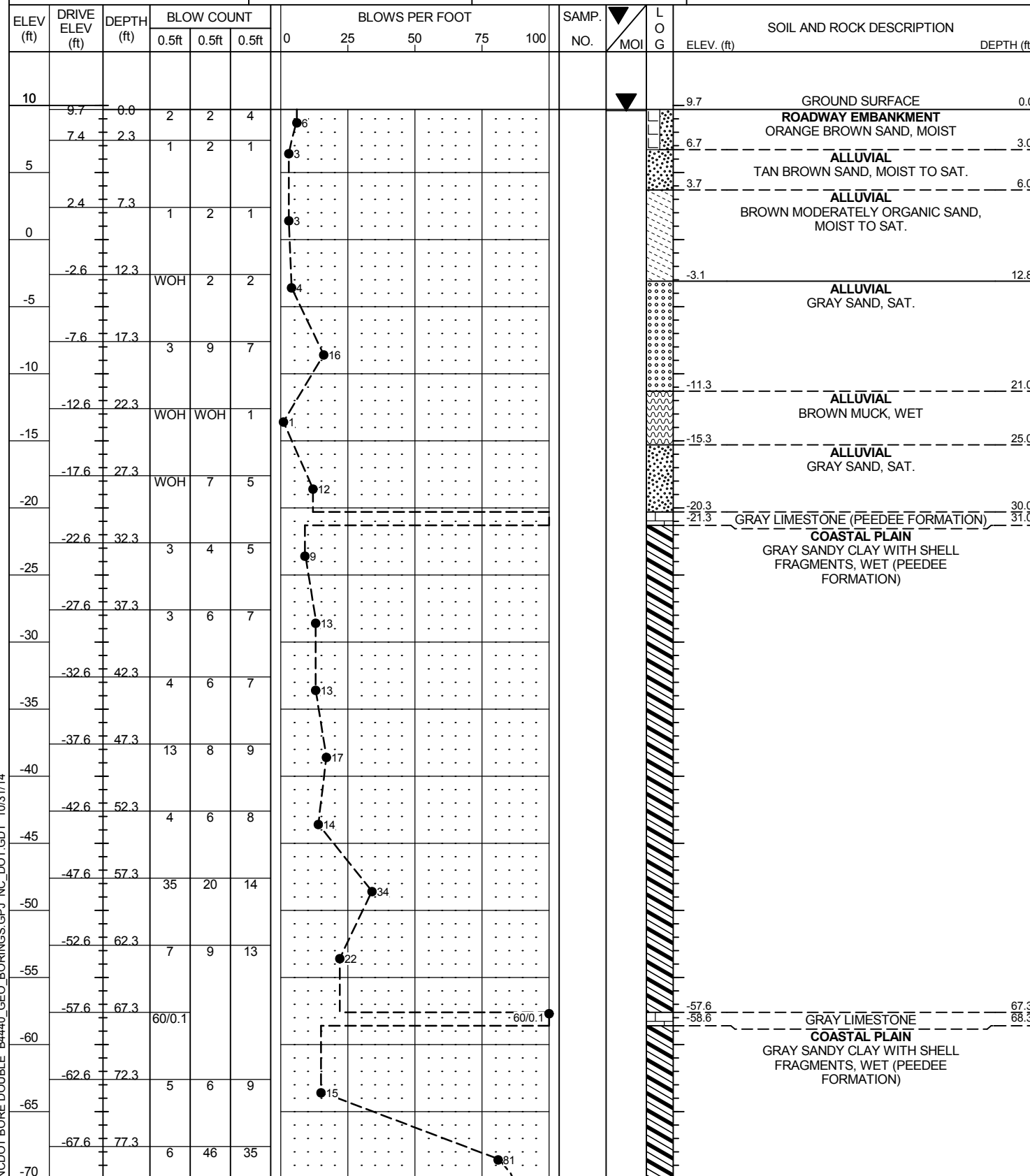


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 38367.1.1	TIP B-4440	COUNTY BRUNSWICK	GEOLOGIST Crenshaw, J. K.
SITE DESCRIPTION BRIDGE NO. 163 ON -L- (SR 1349) OVER MULBERRY BRANCH			GROUND WTR (ft)
BORING NO. EB1-B	STATION 18+47	OFFSET 17 ft RT	ALIGNMENT -L-
COLLAR ELEV. 9.7 ft	TOTAL DEPTH 83.1 ft	NORTHING 83,187	EASTING 2,182,122
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Pinter, D. G.		START DATE 10/14/14	COMP. DATE 10/14/15
SURFACE WATER DEPTH N/A			

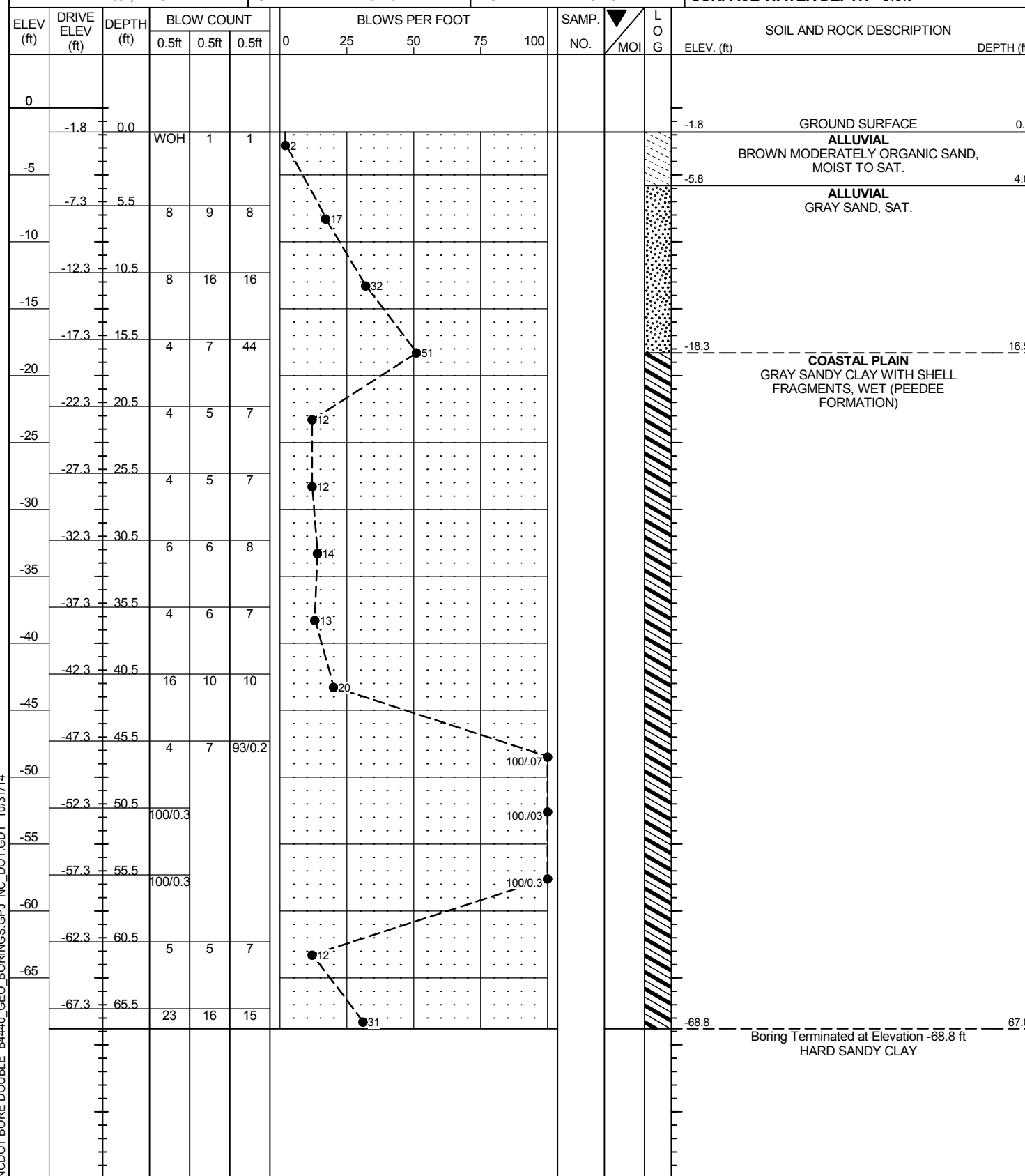
WBS 38367.1.1	TIP B-4440	COUNTY BRUNSWICK	GEOLOGIST Crenshaw, J. K.
SITE DESCRIPTION BRIDGE NO. 163 ON -L- (SR 1349) OVER MULBERRY BRANCH			GROUND WTR (ft)
BORING NO. EB1-B	STATION 18+47	OFFSET 17 ft RT	ALIGNMENT -L-
COLLAR ELEV. 9.7 ft	TOTAL DEPTH 83.1 ft	NORTHING 83,187	EASTING 2,182,122
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Pinter, D. G.		START DATE 10/14/14	COMP. DATE 10/14/15
SURFACE WATER DEPTH N/A			



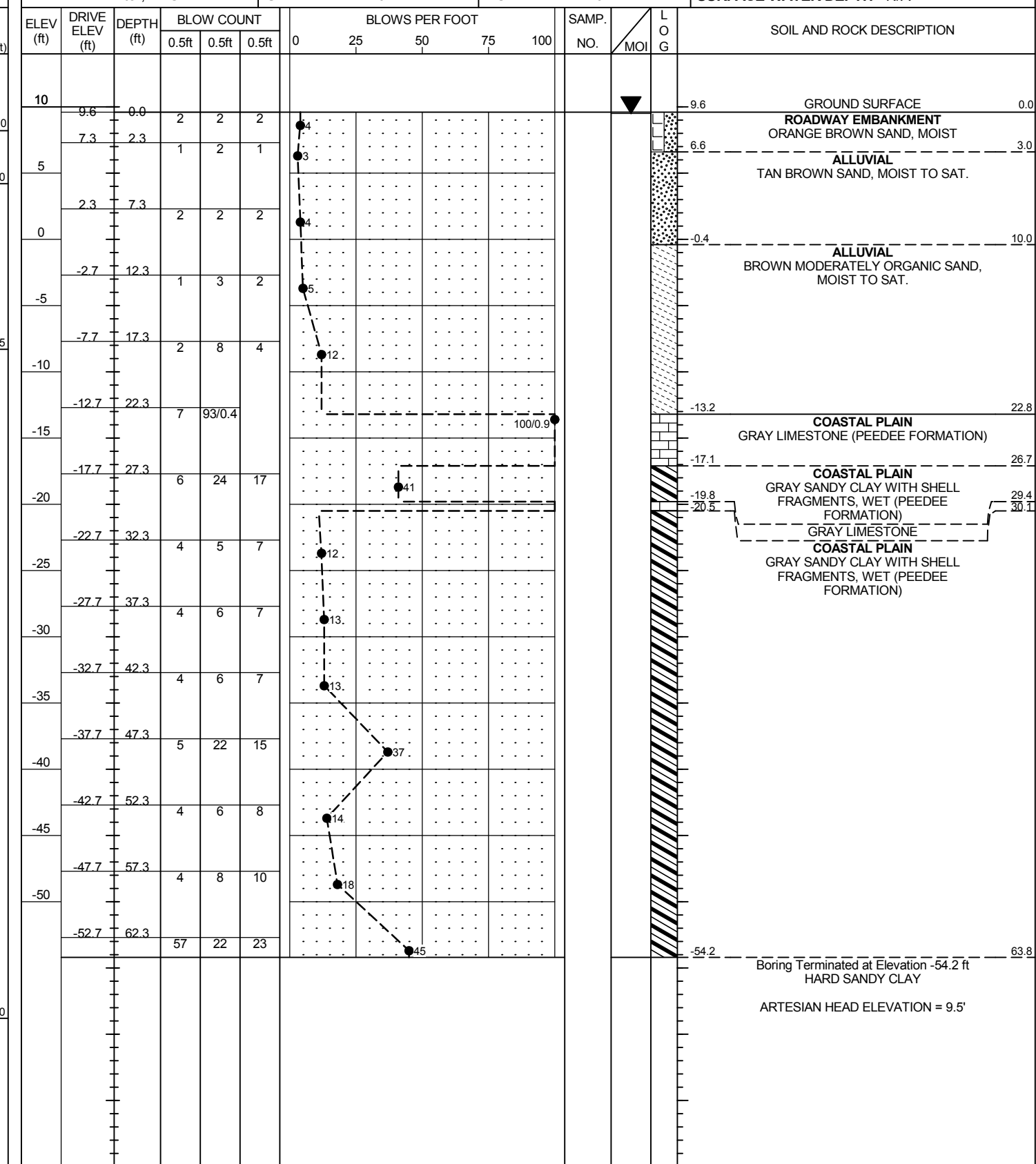
NCDOT BORE DOUBLE B4440_GEO BORINGS.GPJ NC_DOT.GDT 10/31/14

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 38367.1.1	TIP B-4440	COUNTY BRUNSWICK	GEOLOGIST Crenshaw, J. K.
SITE DESCRIPTION BRIDGE NO. 163 ON -L- (SR 1349) OVER MULBERRY BRANCH			GROUND WTR (ft)
BORING NO. B1-A	STATION 18+92	OFFSET 6 ft LT	ALIGNMENT -L-
COLLAR ELEV. -1.8 ft	TOTAL DEPTH 67.0 ft	NORTHING 83,228	EASTING 2,182,152
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 10/16/14	COMP. DATE 10/16/14	SURFACE WATER DEPTH 3.9ft



WBS 38367.1.1	TIP B-4440	COUNTY BRUNSWICK	GEOLOGIST Crenshaw, J. K.
SITE DESCRIPTION BRIDGE NO. 163 ON -L- (SR 1349) OVER MULBERRY BRANCH			GROUND WTR (ft)
BORING NO. EB2-B	STATION 19+32	OFFSET 13 ft RT	ALIGNMENT -L-
COLLAR ELEV. 9.6 ft	TOTAL DEPTH 63.8 ft	NORTHING 83,228	EASTING 2,182,197
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 92% 07/12/2011		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 10/17/14	COMP. DATE 10/17/14	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE B4440_GEO BORINGS.GPJ NC_DOT.GDT 10/31/14