

REFERENCE: B-4598

PROJECT: 38426

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

STRUCTURE  
SUBSURFACE INVESTIGATION

COUNTY PAMLICO  
PROJECT DESCRIPTION REPLACE BRIDGE 16 OVER  
MASON CREEK ON SR 1324

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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4598	1	9

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.

TRIGON EXP

INVESTIGATED BY HAMM, J. R.

DRAWN BY HUNSBERGER, W. S.

CHECKED BY HAMM, J. R.

SUBMITTED BY FALCON

DATE DECEMBER 2015




DocuSigned by  
Jeremy R. Hamm 12/9/2015  
ED7938089E22487

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

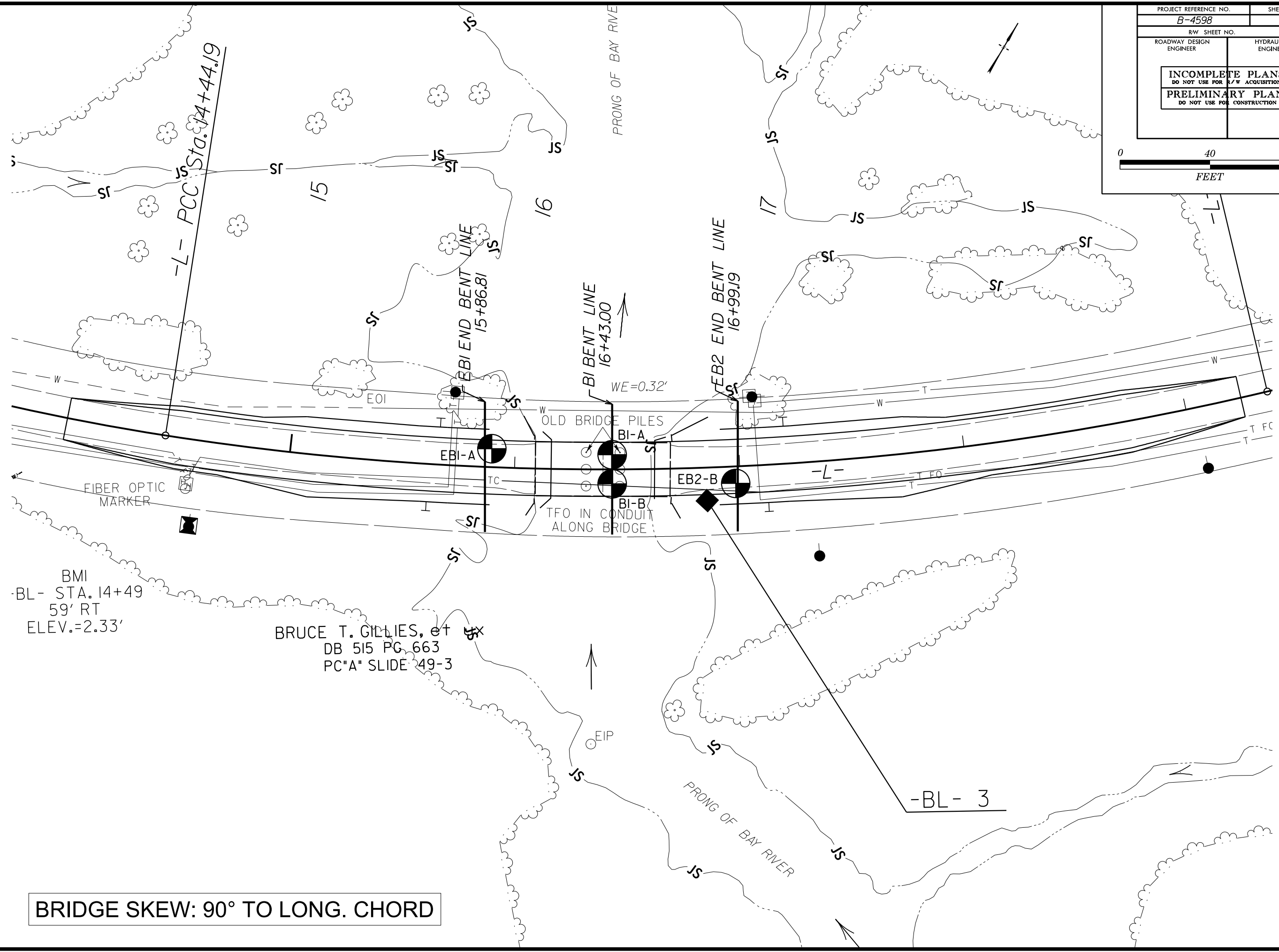
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT  
**SUBSURFACE INVESTIGATION**  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>																																				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: 																																				<u>ALLUVIUM (ALLUV.)</u> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <u>AQUIFER</u> - A WATER BEARING FORMATION OR STRATA. <u>ARENACEOUS</u> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <u>ARGILLACEOUS</u> - 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. <u>ARTESIAN</u> - 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. <u>CALCAREOUS (CALC.)</u> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <u>CORE RECOVERY (REC.)</u> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <u>DIKE</u> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <u>FAULT</u> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <u>FISSILE</u> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <u>FLOAT</u> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL. <u>FLOOD PLAIN (FP)</u> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <u>FORMATION (FM)</u> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <u>JOINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <u>LEDGE</u> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <u>LENS</u> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <u>MOTTLED (MOT.)</u> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <u>RESIDUAL (RES.) SOIL</u> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <u>ROCK QUALITY DESIGNATION (ROQ)</u> - 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. <u>SAPROLITE (SAP.)</u> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <u>SILL</u> - 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. <u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <u>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</u> - 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. <u>STRATA CORE RECOVERY (SREC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <u>STRATA ROCK QUALITY DESIGNATION (SROQ)</u> - 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. <u>TOPSOIL (TS.)</u> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																			
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>												<b>ANGULARITY OF GRAINS</b>												<b>WEATHERED ROCK (WR)</b>												<b>CRYSTALLINE ROCK (CR)</b>																																																																																																											
<b>MINERALOGICAL COMPRESSION</b>												<b>WEATHERED ROCK (WR)</b>												<b>NON-CRYSTALLINE ROCK (NCR)</b>												<b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>																																																																																																											
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<b>SOIL MOISTURE - CORRELATION OF TERMS</b>												<b>ABBREVIATIONS</b>												<b>HARD</b>												<b>HARD</b>																																																																																																											
<b>PLASTICITY</b>												<b>EQUIPMENT USED ON SUBJECT PROJECT</b>												<b>MODERATELY HARD</b>												<b>MODERATELY HARD</b>																																																																																																											
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B.17/99

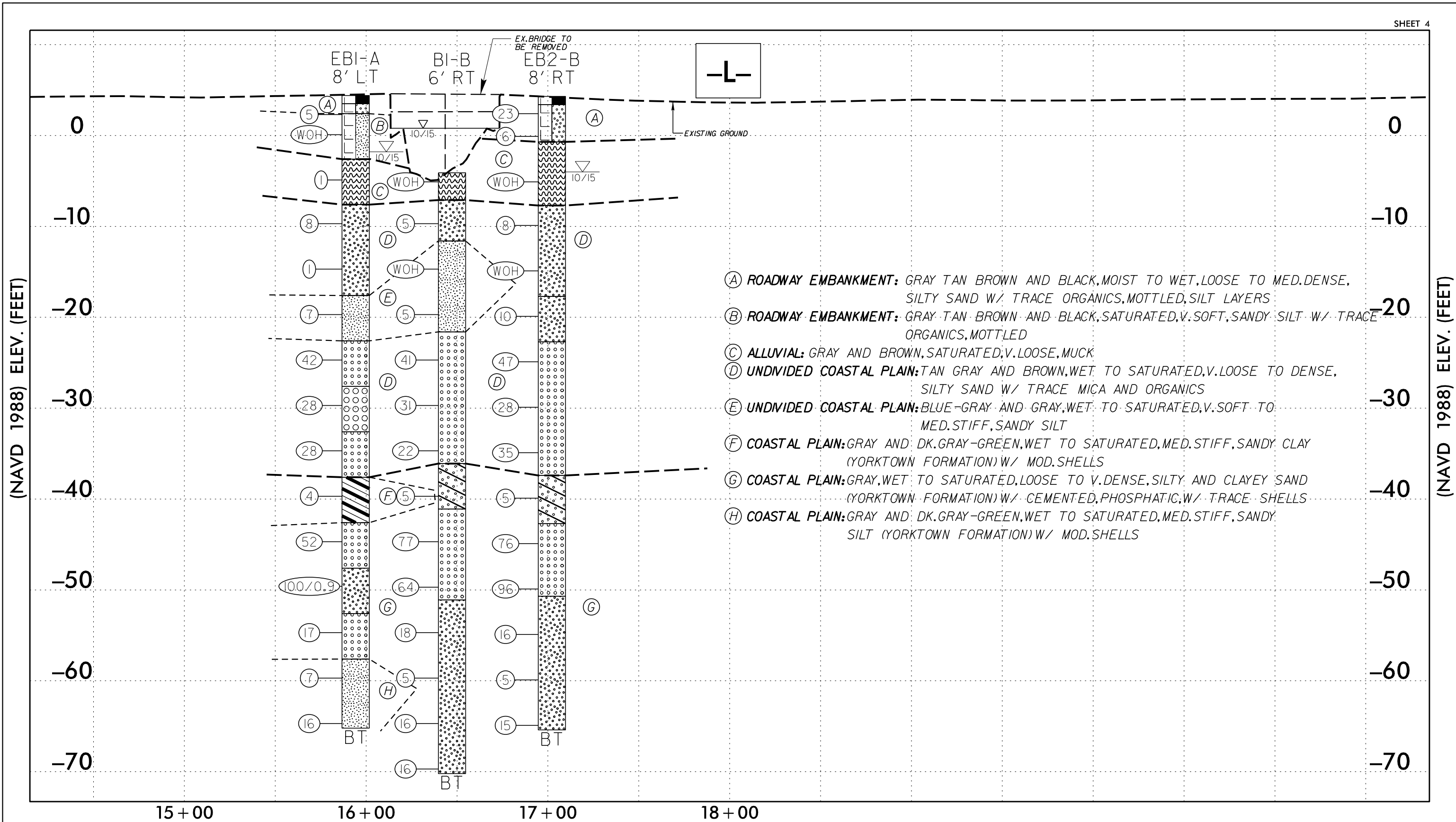
PROJECT REFERENCE NO. <i>B-4598</i>	SHEET NO. <i>3</i>
RW SHEET NO. ROADWAY DESIGN ENGINEER	
HYDRAULICS ENGINEER	
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
0      40      80 <hr/> FEET	

REVISIONS



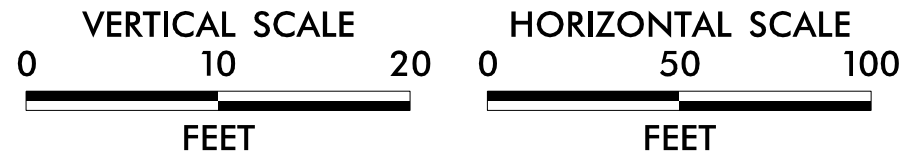
BRUCE T. GILLIES, et al  
 DB 515 PG. 663  
 PC "A" SLIDE 49-3

BRIDGE SKEW: 90° TO LONG. CHORD



**NOTES:**

- SUBSURFACE PROFILE AT -L- TAKEN FROM B-5498\_Rdy\_pfl.dgn RECEIVED FROM NCDOT GEU IN SEPTEMBER 2015.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
- BRIDGE SKEW: 90° TO LONG CHORD



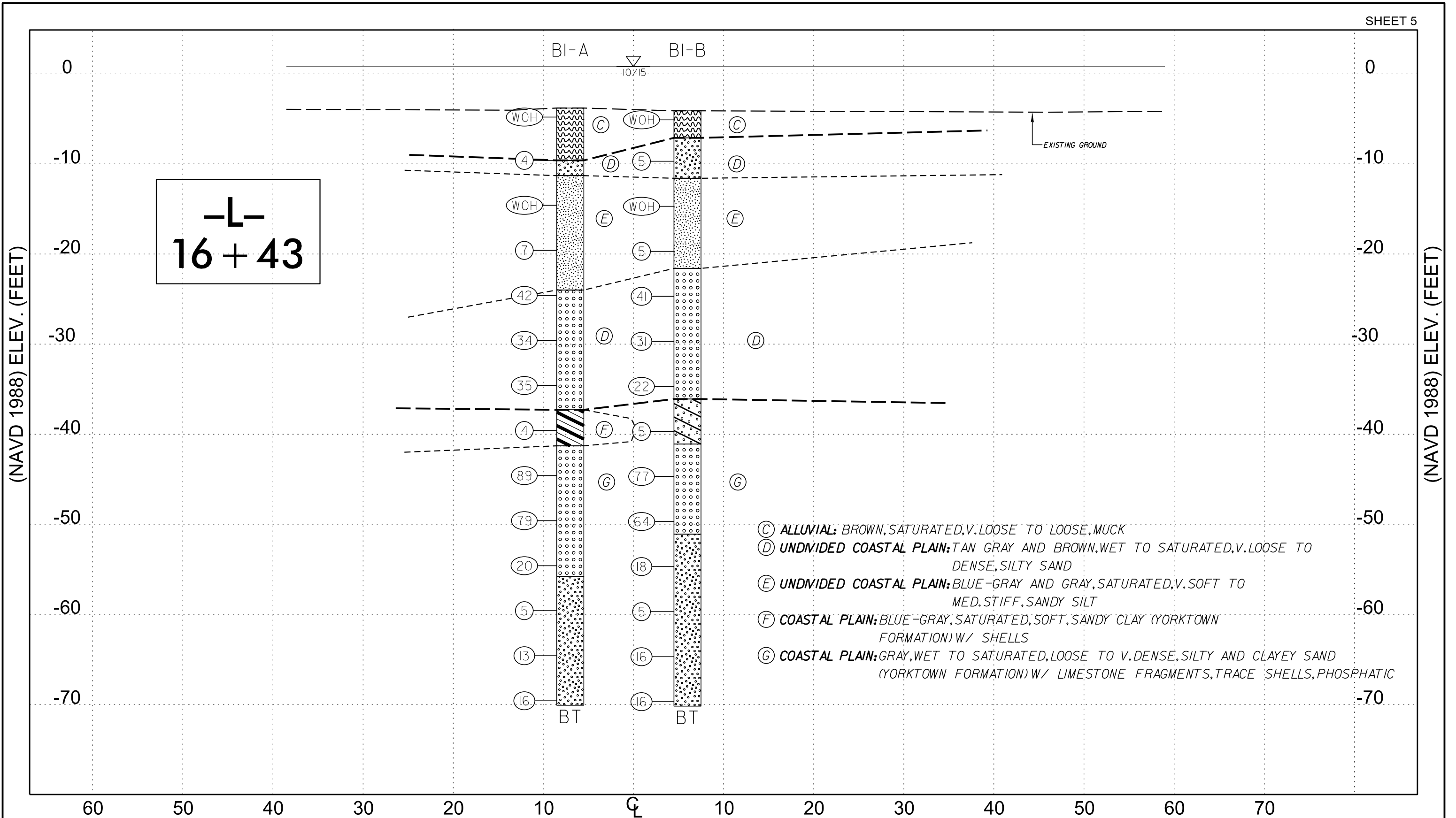
**FALCON ENGINEERING**

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

PHONE: 919.871.0800  
FAX: 919.871.0803

SUBSURFACE PROFILE AT CENTERLINE -L-

REPLACE BRIDGE 16 OVER MASON CREEK ON SR 1324  
PAMLICO COUNTY, NORTH CAROLINA  
WBS.: 38426.1.2, TIP.: B-4598

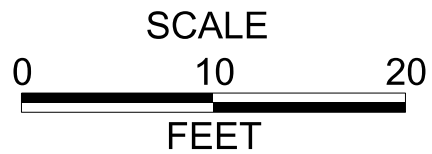


**-L-**  
**16+43**

- Ⓒ **ALLUVIAL:** BROWN, SATURATED, V. LOOSE TO LOOSE, MUCK
- Ⓓ **UNDIVIDED COASTAL PLAIN:** TAN GRAY AND BROWN, WET TO SATURATED, V. LOOSE TO DENSE, SILTY SAND
- Ⓔ **UNDIVIDED COASTAL PLAIN:** BLUE-GRAY AND GRAY, SATURATED, V. SOFT TO MED. STIFF, SANDY SILT
- Ⓕ **COASTAL PLAIN:** BLUE-GRAY, SATURATED, SOFT, SANDY CLAY (YORKTOWN FORMATION) W/ SHELLS
- Ⓖ **COASTAL PLAIN:** GRAY, WET TO SATURATED, LOOSE TO V. DENSE, SILTY AND CLAYEY SAND (YORKTOWN FORMATION) W/ LIMESTONE FRAGMENTS, TRACE SHELLS, PHOSPHATIC

**NOTES:**

- GROUNDLINE CROSS SECTION ALONG BENT DRAWN USING \*.TIN FILE RECEIVED FROM NCDOT GEU, DATED JULY 2015.
- INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.
- SKEW: 90°



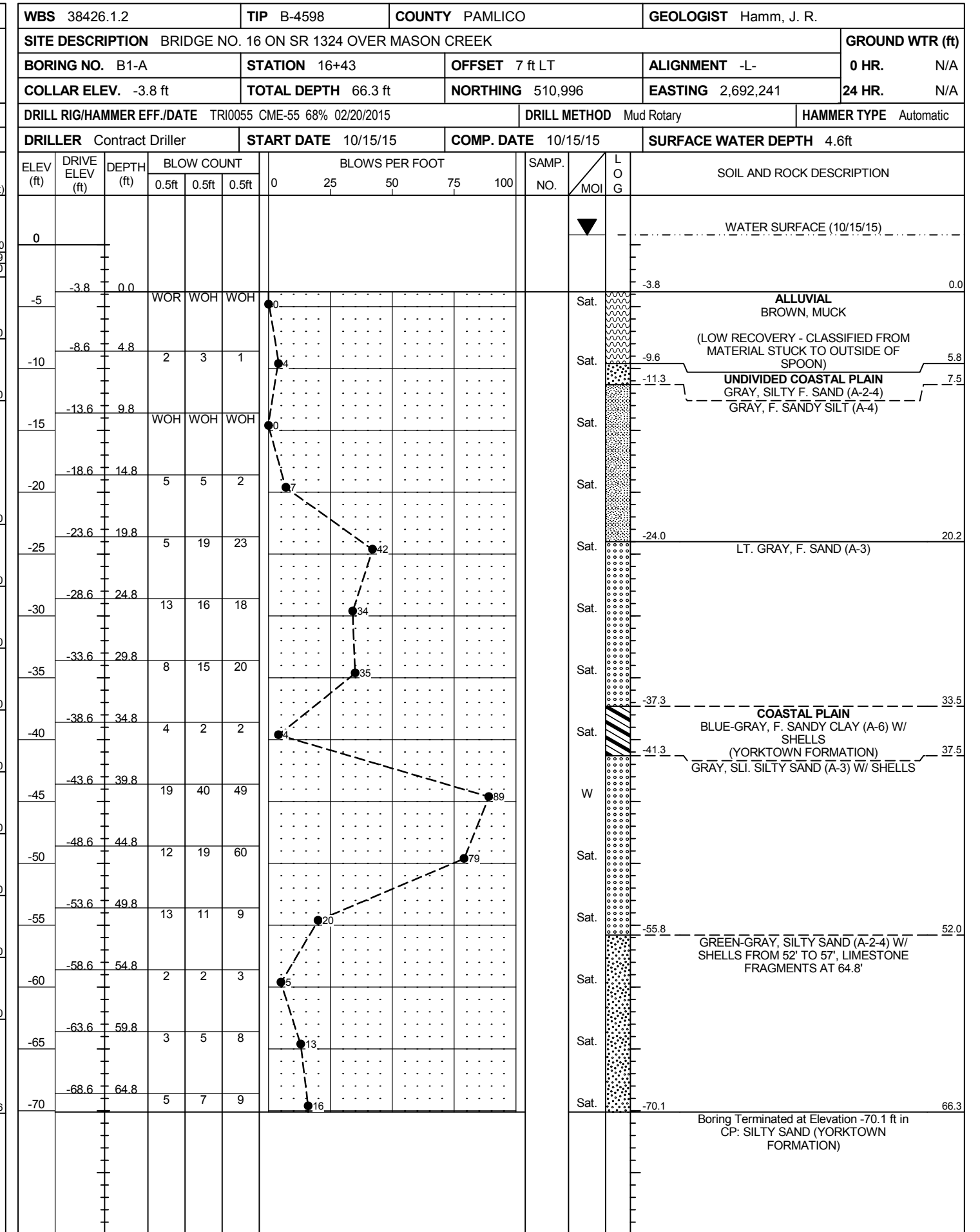
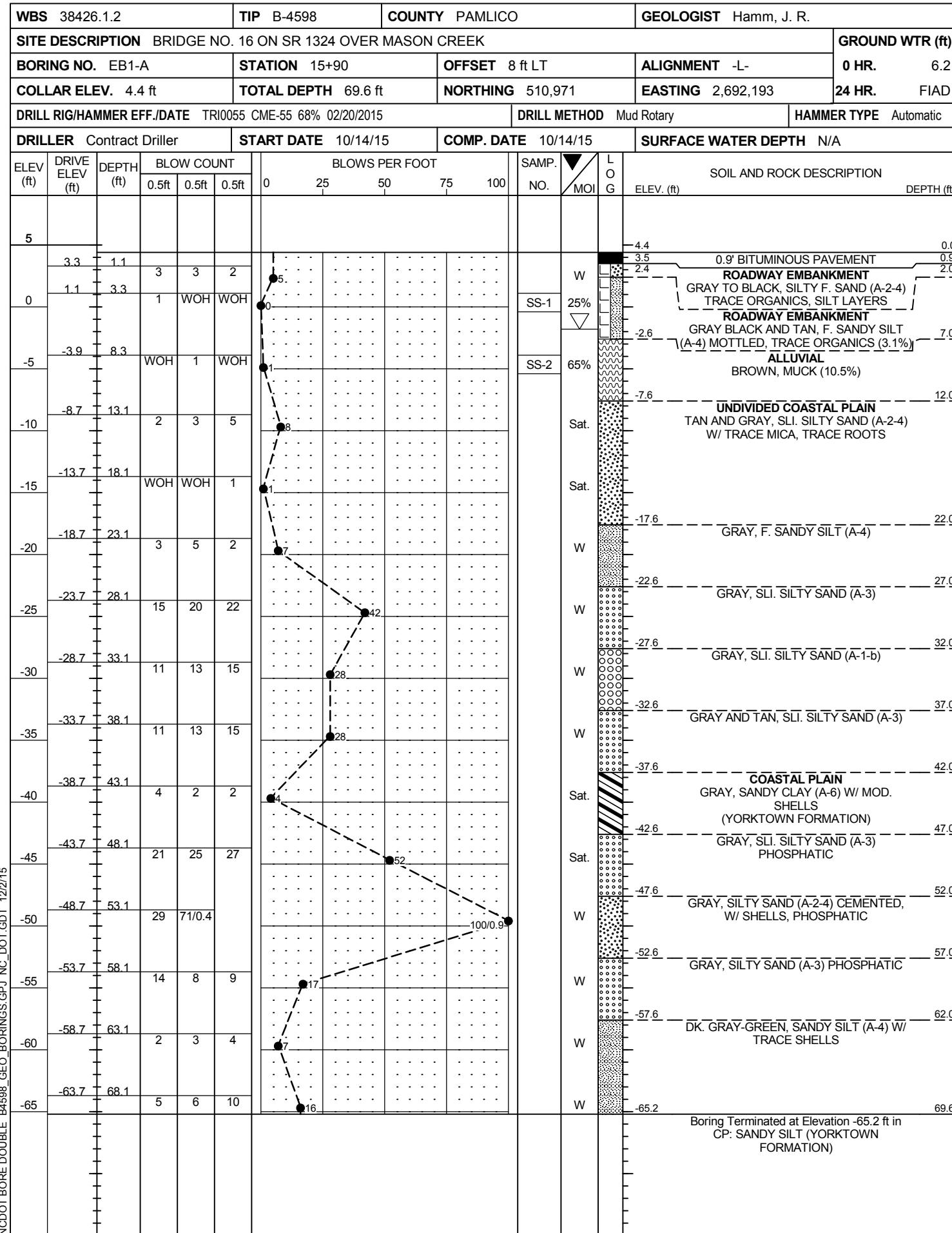
**FALCON**  
 ENGINEERING  
 PHONE: 919.871.0800  
 FAX: 919.871.0803

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

**-L - SUBSURFACE CROSS SECTION (BENT 1)**  
 BRIDGE NO. 16 ON SR 1324 OVER MASON CREEK  
 PAMLICO COUNTY, NC  
 WBS: 38426.1.2, TIP: B-4598

# GEOTECHNICAL BORING REPORT

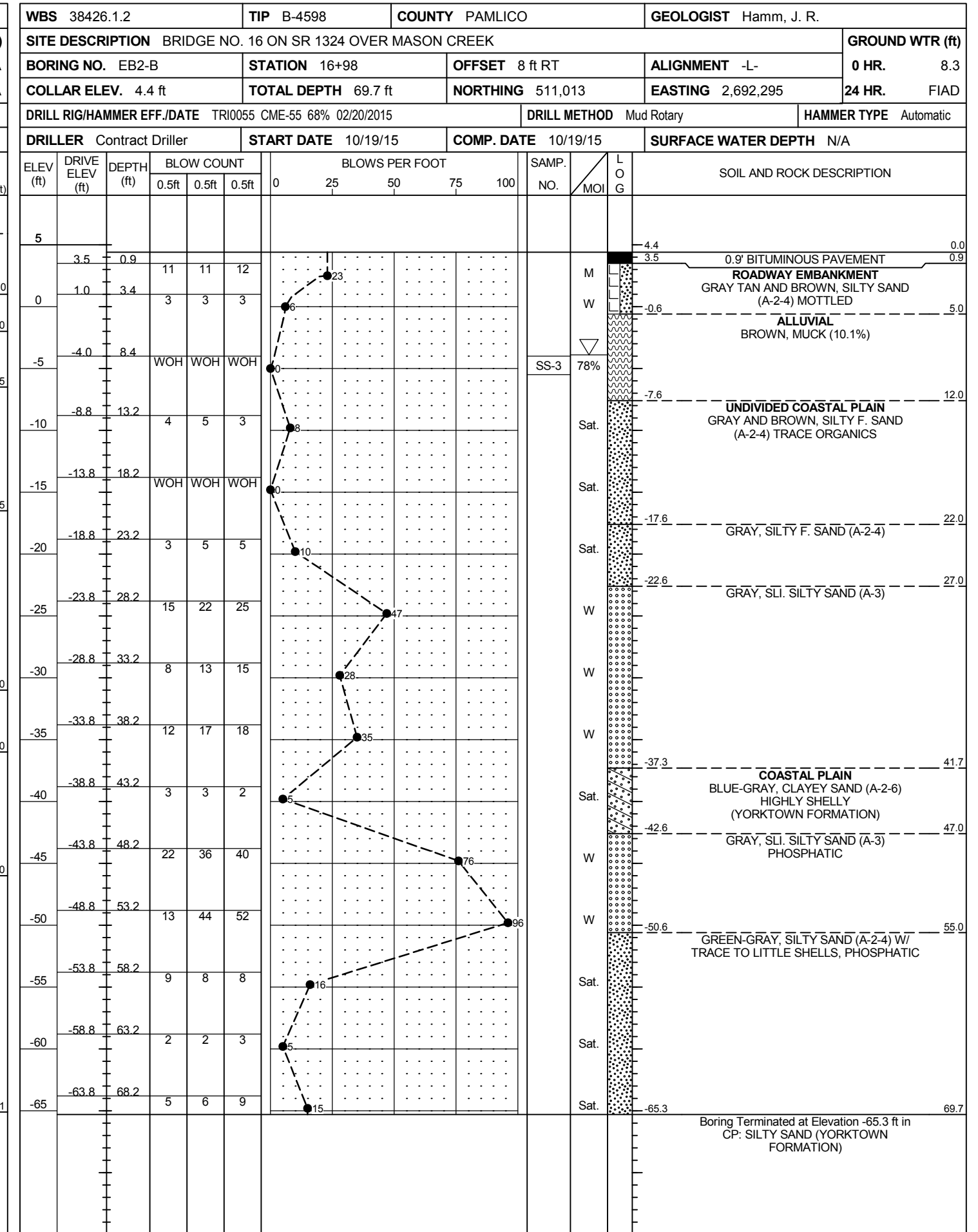
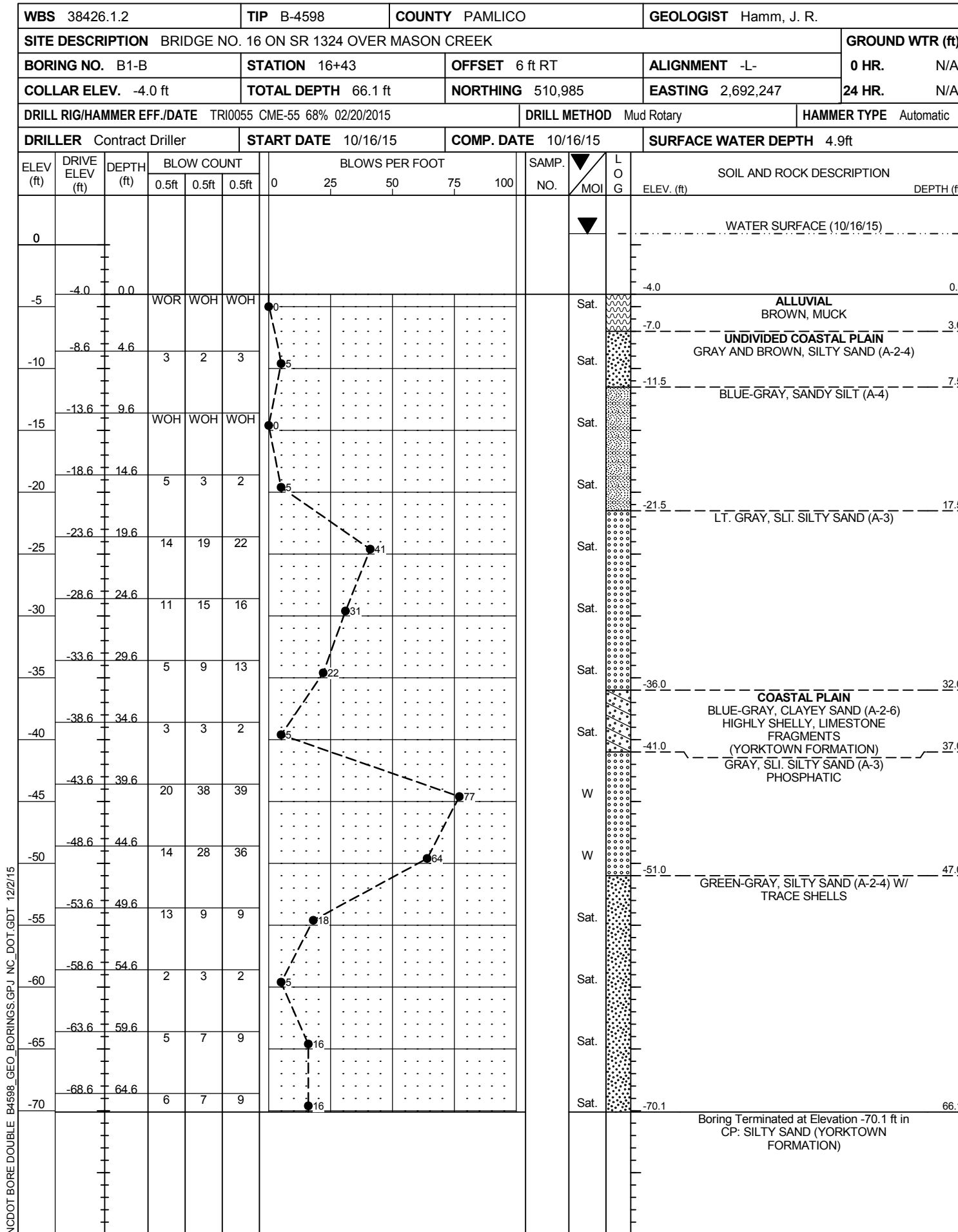
## BORE LOG



NCDOT BORE DOUBLE B4598\_GEO BORINGS.GPJ NC\_DOT\_GDT\_12/2/15

# GEOTECHNICAL BORING REPORT

## BORE LOG



NCDOT BORE DOUBLE B4598\_GEO BORINGS.GPJ NC\_DOT\_GDT\_12/2/15

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

**LABORATORY TEST RESULTS**  
**REPLACE BRIDGE NO. 16 OVER MASON CREEK ON SR 1324**  
**PAMLICO COUNTY, NORTH CAROLINA**  
**Project: 38426.1.2 (B-4598)**  
**Falcon Engineering Project No.: G15039.00**

SAMPLE				DEPTH	AASHTO	ATTERBERG LIMITS		% BY WEIGHT				% PASSING (SIEVES)			%	%
NO.	BORING	STATION	OFFSET	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANICS
SS-1	EB1-A	15+90	8 ft LT	3.3-4.8	A-4	19	NP	4	55	27	14	100	100	47	25.0	3.1
SS-2	EB1-A	15+90	8 ft LT	8.3-9.8	A-2-4	39	NP	14	72	8	6	100	90	18	65.0	10.5
SS-3	EB2-B	16+98	8 ft RT	8.4-9.9	A-2-5	48	NP	22	64	6	8	100	84	18	77.5	10.1

**Signature:**  **NCDOT No.:** 123-01-0509

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





LOOKING DOWNSTREAM (LEFT) ALONG MASON CREEK FROM EXISTING END BENT 2



LOOKING UPSTATION ALONG -L-. DRILL RIG SETUP ON B1-B.  
EB1-A COMPLETED AND VISIBLE FOREGROUND LEFT.



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1210 TRINITY ROAD, SUITE 110  
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FAX: 919.871.0803

**SITE PHOTOGRAPHS**

REPLACE BRIDGE 16 OVER MASON CREEK ON SR 1324  
PAMLICO COUNTY, STATE  
WBS: 38426.1.2 & TIP: B-4598  
FALCON PROJECT NO. G15039.00