STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	N/A	1	47

REFERENCE: N/A

PROJECT: 48793

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *BLADEN*

PROJECT DESCRIPTION *US 701 OVER CAPE FEAR RIVER*

SITE DESCRIPTION *REPLACE BRIDGE NOS. 16 & 17 ON US 701 OVER CAPE FEAR RIVER*

CONTENTS

CAUTION NOTICE

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PERSONNEL

C. MCILROY

M. STANBURY

SUBTERRA EXP.

INVESTIGATED BY *N. MOHS, LG*

DRAWN BY *N. MOHS, LG*

CHECKED BY *M. SNYDER, PE*

SUBMITTED BY *N. MOHS, LG*

DATE *AUGUST 2020*

Prepared in the Office of:

ICE of CAROLINAS, PLLC

NORTH CAROLINA LICENSED SEAL 2124 GEOLOGIST NATHAN DANIEL MOHS

DocuSigned by:
Nathan Mohs 8/11/2020
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SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
N/A	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
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	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	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

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	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

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

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.

GRADATION

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.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

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

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT / DPT DMT / VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- 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

ABBREVIATIONS

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 - 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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [X] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] D-50
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [ ] -N _____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

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:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
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.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

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.

TERMS AND DEFINITIONS

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 DISLODGED 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 (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - 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.

BENCH MARK: BL-2; N: 321926.08 E: 2119730.57

ELEVATION: 75.05 FEET

NOTES:

* ARTESIAN WATER ELEVATION MEASURED TO ELEVATION 26.1 FEET AT B5-A ON 5/15/20.

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
N/A	3

SITE PLAN

0 100 200

FEET

SKEW=105°0'0"

WELL 9 WELL 8 WELL 7

B-5 B-4 B-2 B-1 B-3 B-3B

CPT-1 CPT-5 CPT-9 CPT-6 CPT-12 CPT-7 CPT-4 CPT-8

B1-A B2-A B3-A B4-A B5-A B6-A B7-A

EB1-B EB2-B

115+00 120+00 125+00

US 701 HWY SBL VAR WIDTH

US 701 HWY NBL VAR WIDTH

US 701 Bridge 17

Bridge 16

PROPOSED BRIDGE

DOLPHINS

CAPE FEAR RIVER

END BENT 1 LINE

BENT 1 LINE

BENT 2 LINE

BENT 3 LINE

BENT 4 LINE

BENT 5 LINE

BENT 6 LINE

BENT 7 LINE

END BENT 2 LINE

WOODS

GRASS

ASPHALT

CONC.

SOIL

SILT FENCE

RIPRAP

END NOT FOUND

36" RCP

18" CMP

15" CMP

12" HDPE

8" HDPE

36" HDPE

15" HDPE

INV=54.34'

INV=54.85'

PROJECT REFERENCE NO.	SHEET NO.
N/A	4

0 100 200
FEET
VE = 5

PROFILE OF BORINGS ALONG –L–

SKEW=105°

EB1–B
112+83
7' RT

B1–A
114+04
3' LT

B2–A
115+67
7' LT

B3–A
117+14
3' LT

B4–A
118+61
3' LT

ROADWAY EMBANKMENT, ORANGE AND BROWN, MOIST TO WET, VERY LOOSE TO MEDIUM DENSE, SILTY SAND WITH TRACE GRAVEL AND ASPHALT

EXISTING GROUNDLINE

ARTESIAN

05/20

06/20

07/20

05/20

CAPE FEAR RIVER
NWSE=22'

MATCHLINE 119+50

TOP OF BLACK CREEK FORMATION

BT

(A) ROADWAY EMBK., BLACK AND BROWN, WET, MEDIUM TO VERY STIFF, SANDY SILT WITH SOME CONCRETE PIECES

(B) ALLUVIAL, ORANGE, BROWN, WHTIE, AND GRAY, MOIST TO WET, VERY LOOSE TO MEDIUM DENSE, SILTY SAND, CLAYEY SAND, COARSE AND FINE SAND WITH TRACE ORGANICS AND CLAY

(C) ALLUVIAL, BROWN, GRAY, TAN, WHITE, AND ORANGE, MOIST TO WET, VERY SOFT TO STIFF, SANDY CLAY AND SILTY CLAY WITH TRACE ORGANICS AND SAND

(D) COASTAL PLAIN, DARK GRAY TO GRAY AND GREEN, MOIST TO WET, LOOSE TO VERY DENSE, FINE TO SILTY SAND, AND CLAYEY SAND WITH TRACE ORGANICS AND THINLY BEDDED SILTY CLAY (BLACK CREEK FORMATION)

(E) COASTAL PLAIN, DARK GRAY TO GRAY AND GREEN, MOIST TO WET, MEDIUM STIFF TO HARD, SILTY CLAY, SANDY CLAY, CLAYEY SILT, AND SANDY SILT WITH TRACE ORGANICS AND THINLY BEDDED SILTY CLAY (BLACK CREEK FORMATION)

110+00 111+00 112+00 113+00 114+00 115+00 116+00 117+00 118+00 119+00

0 100 200
FEET
VE = 5

PROJECT REFERENCE NO.	SHEET NO.
N/A	5

PROFILE OF BORINGS
ALONG –L–

SKEW=105°

MATCHLINE 119+50

ARTESIAN

CAPE FEAR RIVER

B5–A
120+20
5' LT
05/20
NWSE=22'

B6–A
121+94
3' LT
04/20

B7–A
123+57
2' LT
04/20

EB2–B
124+94
8' RT
04/20

EXISTING GROUNDLINE

ROADWAY EMBANKMENT, ORANGE , MOIST TO WET, LOOSE TO MEDIUM DENSE, SILTY SAND WITH TRACE CLAY

ROADWAY EMBANKMENT, DARK GRAY, BLACK, ORANGE, AND TAN, MOIST TO WET, VERY SOFT TO SOFT, CLAYEY SILT AND SANDY CLAY WITH SOME GRAVEL

ALLUVIAL, ORANGE, GRAY AND BROWN, MOIST TO WET, SOFT TO MEDIUM STIFF, SILTY CLAY AND SANDY CLAY

TOP OF BLACK CREEK FORMATION

BT

(A) ARTIFICIAL FILL, BROWN AND GRAY, MOIST, MEDIUM DENSE, SILTY SAND WITH TRACE ORGANICS AND GRAVEL

(B) ALLUVIAL, ORANGE, BROWN, AND GRAY, MOIST TO WET, VERY LOOSE TO MEDIUM DENSE, SILTY SAND, CLAYEY SAND, FINE SAND WITH TRACE ORGANICS AND CLAY

(C) ALLUVIAL, LIGHT BROWN AND GRAY, WET, VERY SOFT TO SOFT, FINE SANDY SILT AND SANDY CLAY WITH SOME ORGANICS

(D) COASTAL PLAIN, DARK GRAY TO GRAY AND GREEN, MOIST TO WET, VERY SOFT TO HARD, SILTY CLAY, SANDY CLAY, CLAYEY SILT, AND SANDY SILT WITH TRACE ORGANICS AND THINLY BEDDED SILTY CLAY (BLACK CREEK FORMATION)

(E) COASTAL PLAIN, DARK GRAY TO GRAY AND GREEN, MOIST TO WET, MEDIUM TO VERY DENSE, FINE TO SILTY SAND, AND CLAYEY SAND WITH TRACE ORGANICS AND THINLY BEDDED SILTY CLAY (BLACK CREEK FORMATION)

90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170

120+00 121+00 122+00 123+00 124+00 125+00 126+00 127+00 128+00

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 112+83	**OFFSET** 7 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 79.0 ft	**TOTAL DEPTH** 124.8 ft	**NORTHING** 320,915	**EASTING** 2,119,103	**24 HR.** 42.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER M. Brown	**START DATE** 04/30/20	**COMP. DATE** 05/01/20	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
80										
	79.0	0.0	5	5	6	11		M		79.0 0.0 GROUND SURFACE **ROADWAY EMBANKMENT** Orange and Brown, Silty Sand with Trace Gravel and Asphalt
75	75.5	3.5	4	4	7	11		M		
70	70.6	8.4	WOH	1	2	3		W		
65	65.4	13.6	1	WOR	1	1		W		
60	60.4	18.6	1	2	2	4		W		
55	55.4	23.6	2	2	4	6		W		53.0 26.0 Gray, Black, and Brown, Sandy Silt with Some Concrete Pieces
50	50.4	28.6	1	3	4	7		W		
45	45.4	33.6	13	13	14	27		W		
40	40.4	38.6	2	4	8	12		W		42.0 37.0 **ALLUVIAL** Gray and Tan, Sandy Clay
35	35.4	43.6	3	4	6	10		W		37.0 42.0 Tan, Well Sorted Fine Sand
30	30.4	48.6	1	6	8	14		W		32.0 47.0 Gray, Sandy Clay
25	25.4	53.6	4	6	8	14		W		29.9 49.1 Orange and Brown, Poorly Sorted Silty Sand with Trace Rounded Gravel
20	20.4	58.6	5	6	11	17		W		
15	15.4	63.6	8	7	8	15		W		
10	10.4	68.6	5	9	13	22		W		11.0 68.0 **COASTAL PLAIN** Dark Gray-Green, Sandy Silt with Trace Thinly Bedded Silty Clay (Black Creek Formation)
5	5.7	73.3	5	7	10	17		W		
0	0.7	78.3								

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 112+83	**OFFSET** 7 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 79.0 ft	**TOTAL DEPTH** 124.8 ft	**NORTHING** 320,915	**EASTING** 2,119,103	**24 HR.** 42.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER M. Brown	**START DATE** 04/30/20	**COMP. DATE** 05/01/20	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
0						Match Line				
-5	-4.3	83.3	6	7	9	16		W		**COASTAL PLAIN** Dark Gray-Green, Sandy Silt with Trace Thinly Bedded Silty Clay (Black Creek Formation) *(continued)*
-10	-9.3	88.3	6	8	11	19		W		
-15	-14.3	93.3	6	8	13	21		W		
-20	-19.3	98.3	9	14	19	33		W		-13.0 92.0 Gray to Dark Gray, Well Sorted Fine Sand with Trace Thinly Bedded Silty Clay
-25	-24.3	103.3	6	9	13	22		W		-18.0 97.0 Gray to Dark Gray, Sandy Silt with Trace Thinly Bedded Silty Clay
-30	-29.3	108.3	6	11	20	31		W		-23.0 102.0 Gray-Green, Well Sorted Silty Sand with Trace Organics
-35	-34.3	113.3	18	37	39	76		W		
-40	-39.3	118.3	17	25	21	46		W		-38.0 117.0 Gray to Dark Gray, Sandy Silt with Trace Thinly Bedded Silty Clay
-45	-44.3	123.3	9	11	14	25		W		-43.0 122.0 Gray to Dark Gray, Silty Sand with Trace Thinly Bedded Silty Clay
			7	13	16	29		W		-45.8 124.8 Boring Terminated at Elevation -45.8 ft in Silty Sand (Black Creek Formation)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 114+04	**OFFSET** 3 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 35.2 ft	**TOTAL DEPTH** 155.6 ft	**NORTHING** 321,021	**EASTING** 2,119,162	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 06/09/20	**COMP. DATE** 06/10/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
40											
35	35.2	0.0	WOH	2	1	3		M		35.2 GROUND SURFACE	0.0
										ALLUVIAL Brown to Gray, Well Sorted, Silty Sand with Little Clay and Trace Organics	
	31.7	3.5	1	WOR	1	1		M			
30											
	26.2	9.0	1	WOR	1	1		W			
25										23.2 Light Brown to Gray, Poorly Sorted Sand with Trace Gravel and Organics	12.0
	21.2	14.0	2	3	4	7		W			
20										18.2 Brown to Orange, Silty Fine Sand	17.0
	16.2	19.0	3	5	5	10		W			
15											
	11.2	24.0	3	8	8	16		W		10.2 **COASTAL PLAIN** Dark Gray, Silty Clay with Trace Thinly Bedded Fine Sand (Black Creek Formation)	25.0
10										7.2 Dark Gray, Clayey Silt with Trace Thinly Bedded Fine Sand	28.0
	6.2	29.0	3	6	8	14		W			
5											
	1.2	34.0	5	6	10	16	SS-163	47% W		2.2 Dark Gray, Silty Clay	33.0
0											
	-3.8	39.0	7	8	9	17		W			
-5											
	-8.8	44.0	7	10	13	23		W			
-10											
	-13.8	49.0	4	6	10	16		W		-12.8 Gray to Dark Gray, Silty Fine Sand with Trace Thinly Bedded Clay and Trace to Some Organics	48.0
-15											
	-18.8	54.0	6	9	9	18		W			
-20											
	-23.8	59.0	5	12	15	27		W			
-25											
	-28.9	64.1	6	22	31	53		W			
-30											
	-33.9	69.1	16	27	49	76		W		-32.8 Gray, Well Sorted Fine Sand with Trace Silt and Trace Organics	68.0
-35											
	-38.9	74.1	12	13	22		SS-167	31% W		-36.8 Dark Gray, Poorly Sorted, Clayey Sand with LIttle Organics and Silty Clay	72.0
-40											

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 114+04	**OFFSET** 3 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 35.2 ft	**TOTAL DEPTH** 155.6 ft	**NORTHING** 321,021	**EASTING** 2,119,162	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 06/09/20	**COMP. DATE** 06/10/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-40						Match Line		W		-41.8 Dark Gray, Silty Clay with Thinly Bedded Fine Sand 77.0
	-43.9	79.1	8	12	20	32		W		
-45										
	-48.9	84.1	7	11	14	25		W		-51.8 Dark Gray to Green, Silty Sand with Thinly Bedded Clay, Trace Organics and Shell Fragments 87.0
-50										
	-53.9	89.1	8	11	15	26		W		
-55										
	-58.9	94.1	10	18	22	40		W		-56.8 Dark Gray to Green, Silt with Thinly Bedded Clay and Trace Sand 92.0
-60										
	-63.9	99.1	9	18	41	59		W		-61.8 Gray to Green, Well Sorted, Silty Fine Sand with Thinly Bedded Clay 97.0
-65										
	-68.9	104.1	9	12	15	27		W		-66.8 Dark Gray to Green, Fine Sandy Silt with Thinly Bedded Clay 102.0
-70										
	-73.9	109.1	9	13	16	29		W		-71.8 Dark Gray, Silty Clay with Thinly Bedded Fine Sand, Organics and Shell Fragments 107.0
-75										
	-78.9	114.1	7	14	18	32	SS-173	43% W		
-80										
	-83.9	119.1	11	12	18	30		W		-86.8 Gray to Green, Well Sorted, Silty Fine Sand with Thinly Bedded Clay 122.0
-85										
	-88.9	124.1	11	25	45	70		W		
-90										
	-93.9	129.1	30	46	52	98		W		-96.8 Gray to Green, Fine Sand with Trace Organics and Thinly Bedded Clay 132.0
-95										
	-98.9	134.1	22	34	34	68		W		
-100										
	-103.9	139.1	25	28	38	66		W		-106.8 Gray, Poorly Sorted, Silty Sand with Little Organics 142.0
-105										
	-108.9	144.1	23	29	41	70	SS-176	30% W		
-110										
	-113.9	149.1	18	32	52	84		W		-116.8 Dark Gray, Sandy Clay with Thinly Bedded Silty Fine Sand 152.0
-115										
	-118.9	154.1	9	13	17	30		W		
-120										

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 114+04	**OFFSET** 3 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 35.2 ft	**TOTAL DEPTH** 155.6 ft	**NORTHING** 321,021	**EASTING** 2,119,162	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 06/09/20	**COMP. DATE** 06/10/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
-120						Match Line				
										-120.4 155.6 Boring Terminated at Elevation -120.4 ft in Sandy Clay (Black Creek Formation)
										Weak Artesian Water Flow to Ground Surface

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 115+67	**OFFSET** 7 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 28.0 ft	**TOTAL DEPTH** 153.5 ft	**NORTHING** 321,159	**EASTING** 2,119,249	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 06/29/20	**COMP. DATE** 07/01/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
30										
	28.0	0.0	WOR	WOR	WOH	0		W		28.0 0.0 GROUND SURFACE **ALLUVIAL** Brown, Gray, and Orange, Silty Clay with Trace Organics and Sand
25	25.0	3.0	W	O	H			W		
	21.3	6.7	WOH	WOH	1	1	SS-180	35% W		ST-2: 5.0' - 7.0' ST-3: 11.0' - 13.0' ST-4: 13.0' - 15.0'
20										
	16.5	11.5	WOH	2	3	5		W		
15										
	11.5	16.5	3	WOR	WOR	0		W		12.0 16.0 Gray, White, and Tan, Poorly Sorted Coarse Sand with Some Rounded Gravel 9.9 18.1 **COASTAL PLAIN** Gray to Dark Gray, Silty Fine Sand with Trace Thinly Bedded Clay (Black Creek Formation)
10										
	6.5	21.5	3	4	5	9		W		
5										
	1.5	26.5	3	4	6	10		W		
0										
	-3.5	31.5	7	8	12	20	SS-184	41% W		-2.0 30.0 Dark Gray to Gray, Silty Clay
-5										
	-8.5	36.5	5	5	8	13		W		-12.0 40.0 Gray to Dark Gray, Silty Fine Sand with Trace Thinly Bedded Clay (Black Creek Formation)
-10										
	-13.5	41.5	3	7	8	15		W		
-15										
	-18.5	46.5	4	6	8	14		W		-17.0 45.0 Dark Gray to Dark Brown, Silty Clay with Trace Thinly Bedded Fine Sand
-20										
	-23.5	51.5	8	8	16	24		W		-22.0 50.0 Gray to Dark Gray, Silty Fine Sand with Trace Thinly Bedded Clay and Wood Fragments
-25										
	-28.5	56.5	8	15	24	39		W		
-30										
	-33.5	61.5	7	7	11	18		W		-34.0 62.0 Dark Gray, Silty Clay with Trace Thinly Bedded Fine Sand and Organics
-35										
	-39.0	67.0	6	8	10	18		W		
-40										
	-44.0	72.0	6	8	9	17		W		
-45										
	-49.0	77.0	8	16	25	41				-49.5 77.5

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-50						Match Line		W		Gray and Green, Well Sorted Sand with Trace Thinly Bedded Clay and Organics *(continued)*
	-54.0	82.0	8	17	27	44	SS-191	22% W		-57.5 85.5 Gray and Green, Sandy Silt with Trace Thinly Bedded Clay
-55										
	-59.0	87.0	10	16	31	47		M		
-60										
	-64.0	92.0	9	17	26	43		M		
-65										
	-69.0	97.0	10	11	15	26		W		-68.0 96.0 Gray to Dark Gray, Silty Clay with Trace Thinly Bedded Sandy Silt, Organics, and Shell Fragments
-70							SS-193	51% W		
	-74.0	102.0	8	10	15	25		W		
-75										
	-79.0	107.0	7	9	14	23		W		
-80										
	-84.0	112.0	8	11	16	27		W		-83.0 111.0 Dark Gray and Green, Sandy Silt with Trace Thinly Bedded Clay and Coarse Sand
-85										
	-89.0	117.0	17	37	63/0.4	100/0.9		W		-88.0 116.0 Gray to Green, Well Sorted Silty Fine Sand with Trace Thinly Bedded Clay
-90										
	-94.0	122.0	11	15	22	37		W		-93.0 121.0 Dark Gray and Green, Silty Clay with Trace Organics
-95							SS-196	37% W		
	-99.0	127.0	12	18	20	38		W		
-100										
	-104.0	132.0	10	28	43	71		W		-103.0 131.0 Gray, Silty Fine Sand with Trace Thinly Bedded Clay, Organics, and Shell Fragments
-105										
	-109.0	137.0	20	24	31	55		W		
-110										
	-114.0	142.0	14	40	59	99		W		
-115										
	-119.0	147.0	16	21	66	87		W		-123.0 151.0 Dark Gray, Silty Clay with Trace Thinly Bedded Fine Sand and Organics
-120										
	-124.0	152.0	8	12	20	32		W		-125.5 153.5 Boring Terminated at Elevation -125.5 ft in Silty Clay (Black Creek Formation) Weak Artesian Water Flow to Ground Surface
-125										

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 115+67	**OFFSET** 7 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 28.0 ft	**TOTAL DEPTH** 153.5 ft	**NORTHING** 321,159	**EASTING** 2,119,249	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 06/29/20	**COMP. DATE** 07/01/20	**SURFACE WATER DEPTH** N/A	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River			**GROUND WTR (ft)**
BORING NO. B3-A	**STATION** 117+14	**OFFSET** 3 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 30.0 ft	**TOTAL DEPTH** 168.8 ft	**NORTHING** 321,279	**EASTING** 2,119,334	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER M. Brown	**START DATE** 05/18/20	**COMP. DATE** 05/21/20	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
30										
	30.0	0.0	1	2	3	5		M		30.0 / 0.0 GROUND SURFACE
	27.5	2.5	1	2	3	5		M		**ALLUVIAL**
25										28.0 / 2.0 Brown, Silty Sand with Little Clay; Brown to Light Gray, Sandy Clay
	22.1	7.9	WOH	WOH	WOH	WOH 0	SS-134	39% W		
20										
	17.1	12.9	WOR	WOR	WOR	WOR 0		W		
15										
	11.9	18.1	WOH	WOH	WOH	WOH 0		W		
10										
	6.9	23.1	WOH	WOH	WOH	WOH 0	SS-136	32% W		
5										4.0 / 26.0 Light Gray, Clayey Fine Sand with Organics
	1.9	28.1	WOH	WOH	WOH	WOH 0		W		
0										-1.0 / 31.0 Light Gray, Silty Sand with Trace Clay and Organics
	-3.1	33.1	WOR	5	7	12		M		
-5										-6.0 / 36.0 Gray, Poorly Sorted Sand with Trace Gravel
	-8.1	38.1	5	11	16	27		W		
-10										-11.0 / 41.0 **COASTAL PLAIN**
	-13.1	43.1	2	4	5	9		M		Dark Gray, Fine Sandy Silt with Trace Thinly Bedded Silty Clay (Black Creek Formation)
-15										
	-18.0	48.0	2	3	4	7		M		
-20										-21.0 / 51.0 Dark Gray, Clayey Sand with Trace Thinly Bedded Silty Clay and Silty Sand
	-23.0	53.0	4	8	14	22		M		
-25										-26.0 / 56.0 Dark Gray, Poorly Sorted, Silty Sand
	-28.0	58.0	6	8	10	18		M		
-30										-31.0 / 61.0 Dark Gray, Silty Clay with Trace Fine Sand and Organics
	-32.3	62.3	4	6	8	14		M		
-35										
	-37.3	67.3	5	6	12	18	SS-144	46% W		
-40										
	-42.3	72.3	6	7	15	22		M		
-45										
	-47.3	77.3	6	9	12	21		W		
-50										

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River			**GROUND WTR (ft)**
BORING NO. B3-A	**STATION** 117+14	**OFFSET** 3 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 30.0 ft	**TOTAL DEPTH** 168.8 ft	**NORTHING** 321,279	**EASTING** 2,119,334	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER M. Brown	**START DATE** 05/18/20	**COMP. DATE** 05/21/20	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-50						Match Line				
	-52.3	82.3	9	16	17	33		W		-51.0 / 81.0 Dark Gray to Green, Silty Sand with Trace Thinly Bedded Silty Clay and Organics
-55										
	-57.3	87.3	8	11	19	30		M		-56.0 / 86.0 Brown to Dark Gray, Silty Clay with Trace Thinly Bedded Silt, Fine Sand and Organics
-60										
	-62.3	92.3	7	12	21	33		M		
-65										
	-67.3	97.3	8	12	20	32		M		
-70										
	-72.3	102.3	8	10	13	23	SS-147	51% M		
-75										
	-77.3	107.3	7	9	13	22		M		
-80										
	-82.3	112.3	6	8	11	19		M		
-85										
	-87.3	117.3	7	11	15	26		M		
-90										
	-92.3	122.3	36	45	55/0.3	100/0.8		W		-91.0 / 121.0 Green, Well Sorted, Silty Fine Sand with Trace Organics
-95										
	-97.3	127.3	9	20	27	47		W		-96.0 / 126.0 Dark Gray, Silty Clay with Trace Thinly Bedded Silt
-100										
	-102.3	132.3	7	12	16	28	SS-151	40% W		
-105										
	-107.3	137.3	12	24	26	50		W		-106.0 / 136.0 Gray, Poorly Sorted, Silty Sand with Little Clay
-110										
	-112.3	142.3	8	11	17	28		W		-111.0 / 141.0 Dark Gray, Silty Clay with Trace Thinly Bedded Silt, Sand and Organics
-115										
	-117.3	147.3	17	30	45	75	SS-153	29% W		-116.0 / 146.0 Gray, Clayey Sand with Trace Thinly Bedded Clay and Organics
-120										
	-122.3	152.3	10	19	28	47		W		
-125										
	-127.3	157.3	25	51	49/0.4	100/0.9		W		
-130										

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B3-A	**STATION** 117+14	**OFFSET** 3 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 30.0 ft	**TOTAL DEPTH** 168.8 ft	**NORTHING** 321,279	**EASTING** 2,119,334	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 05/18/20	**COMP. DATE** 05/21/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
-130						Match Line					
	-132.3	162.3	6	29	44	73		W		-131.0 Dark Gray, Sandy Clay with Trace Organics	161.0
-135										-136.0 Gray, Silty Fine Sand with Trace Thinly Bedded Clay and Organics	166.0
	-137.3	167.3	16	37	50	87		W		-138.8 Boring Terminated at Elevation -138.8 ft in Silty Sand (Black Creek Formation) Weak Artesian Water Flow to Ground Surface	168.8

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B4-A	**STATION** 118+61	**OFFSET** 3 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 6.7 ft	**TOTAL DEPTH** 174.4 ft	**NORTHING** 321,402	**EASTING** 2,119,415	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 05/05/20	**COMP. DATE** 05/07/20	**SURFACE WATER DEPTH** 13.6ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
10										
	6.7	0.0	WOR	WOR	WOR	0		W		6.7 GROUND SURFACE 0.0 **ALLUVIAL** Gray and Light Brown, Poorly Sorted Silty Sand with Trace Wood Fragments and Rounded Gravel
5	4.2	2.5	1	WOR	WOR	0		W		
0	-1.2	7.9	1	1	2	3		W		
-5	-6.2	12.9	5	6	7	13		W		
-10	-11.2	17.9	2	4	6	10		W		-14.3 21.0 **COASTAL PLAIN** Gray to Dark Gray, Fine, Sandy Silt with Trace Thinly Bedded Silty Clay (Black Creek Formation)
-15	-16.2	22.9	5	5	7	12		W		
-20	-21.2	27.9	5	9	15	24		W		-19.3 26.0 Dark Gray to Green, Silty Fine Sand with Trace Silty Clay
-25	-26.2	32.9	6	8	10	18		W		
-30	-31.2	37.9	3	6	9	15		W		
-35	-36.2	42.9	6	10	12	22		W		-34.3 41.0 Dark Gray, Clayey Silt with Trace Fine Sand
-40	-41.2	47.9	7	12	18	30	SS-89	44% W		-39.3 46.0 Green-Gray, Silty Fine Sand with Little Thinly Bedded Silty Clay and Organics
-45	-46.2	52.9	6	11	11	22		W		
-50	-51.2	57.9	7	17	18	35		W		
-55	-56.2	62.9	9	13	17	30		W		
-60	-61.2	67.9	7	14	20	34		W		-59.3 66.0 Dark Gray-Green, Sandy Silt with Trace Thinly Bedded Silty Clay and Organics
-65	-66.2	72.9	9	14	17	31		W		
-70										

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B4-A	**STATION** 118+61	**OFFSET** 3 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 6.7 ft	**TOTAL DEPTH** 174.4 ft	**NORTHING** 321,402	**EASTING** 2,119,415	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 05/05/20	**COMP. DATE** 05/07/20	**SURFACE WATER DEPTH** 13.6ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-70						Match Line				
	-71.2	77.9	7	14	20	34		W		Dark Gray-Green, Sandy Silt with Trace Thinly Bedded Silty Clay and Organics *(continued)*
-75	-76.2	82.9	8	13	16	29		W		
-80	-81.2	87.9	8	12	14	26		M		
-85								W		
-90	-91.2	97.9	15	33	66	99		W		-89.3 96.0 Gray-Green, Well to Poorly Sorted, Silty Sand with Trace Thinly Bedded Silty Clay
-95	-96.2	102.9	18	25	62	87		W		
-100	-101.2	107.9	7	12	15	27		W		
-105	-106.2	112.9	7	13	15	28		W		-104.3 111.0 Dark Gray-Green, Clayey Sand with Some Wood Fragments
-110	-111.2	117.9	7	14	23	37		W		
-115	-116.2	122.9	13	20	20	40	SS-99	42% W		-114.3 121.0 Gray, Fine Sandy Silt with Trace Thinly Bedded Silty Clay
-120	-121.2	127.9	28	57	43/0.3	100/0.8		W		
-125	-126.2	132.9	26	35	21	56		W		-129.3 136.0 Dark Gray to Brown, Silty Clay with Some Thinly Bedded Sand
-130	-131.2	137.9	9	11	16	27		W		
-135	-136.2	142.9	5	19	19	38		W		-134.3 141.0 Gray, Poorly Sorted, Silty Sand with Trace Silty Clay
-140	-141.2	147.9	16	25	41	66	SS-103	43% W		
-145	-146.2	152.9	18	31	43	74		W		
-150										-149.3 156.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B4-A	**STATION** 118+61	**OFFSET** 3 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 6.7 ft	**TOTAL DEPTH** 174.4 ft	**NORTHING** 321,402	**EASTING** 2,119,415	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 05/05/20	**COMP. DATE** 05/07/20	**SURFACE WATER DEPTH** 13.6ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
-150						Match Line					
	-151.2	157.9	9	13	19	32		W		Gray, Silty Clay with Trace Fine Sand *(continued)*	
-155											
	-156.2	162.9	11	19	27	46		W			
-160										-159.3	166.0
	-161.2	167.9	17	23	28	51		W		Gray, Well Sorted Clayey Sand	
-165											
	-166.2	172.9	14	16	21	37		W		-167.7	174.4
										Boring Terminated at Elevation -167.7 ft in Clayey Sand (Black Creek Formation)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B5-A	**STATION** 120+20	**OFFSET** 5 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -3.4 ft	**TOTAL DEPTH** 169.1 ft	**NORTHING** 321,535	**EASTING** 2,119,502	**24 HR.** Elev. 26.1
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 05/11/20	**COMP. DATE** 05/15/20	**SURFACE WATER DEPTH** 23.7ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
0											
	-3.4	0.0	WOR	WOR	WOR WOR	0		W		-3.4 GROUND SURFACE	0.0
-5	-5.9	2.5	WOH	WOH	WOH WOH	0		W		**ALLUVIAL** Light Gray, Sandy Silt with Some Organics	
-10	-10.9	7.5	1	1	1	2		W		-9.4 Gray, Sandy Clay	6.0
-15	-15.9	12.5	5	9	10	19		W		-13.4 **COASTAL PLAIN** Gray to Dark Gray, Fine, Sandy Silt with Trace Thinly Bedded Silty Clay (Black Creek Formation)	10.0
-20	-20.9	17.5	7	9	14	23		W		-19.4 Dark Gray to Green, Fine, Silty Sand with Trace Thinly Bedded Silty Clay and Organics	16.0
-25	-26.2	22.8	7	15	19	34		W			
-30	-31.2	27.8	6	11	16	27		W			
-35	-36.2	32.8	6	10	18	28		W			
-40	-41.2	37.8	5	8	17	25		W			
-45	-46.2	42.8	6	15	28	43		W			
-50	-51.2	47.8	7	13	23	36		W			
-55	-56.2	52.8	8	14	22	36		W		-54.4 Dark Gray, Silty Clay with Thinly Bedded Sand	51.0
-60	-61.2	57.8	7	14	26	40		W			
-65	-66.2	62.8	9	15	27	42	SS-115	37%			
-70	-71.2	67.8	8	13	18	31		W			
-75	-76.2	72.8	8	11	17	28		W			
-80											

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B5-A	**STATION** 120+20	**OFFSET** 5 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -3.4 ft	**TOTAL DEPTH** 169.1 ft	**NORTHING** 321,535	**EASTING** 2,119,502	**24 HR.** Elev. 26.1
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 05/11/20	**COMP. DATE** 05/15/20	**SURFACE WATER DEPTH** 23.7ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-80						Match Line				
	-81.2	77.8	8	12	18	30		W		Dark Gray, Silty Clay with Thinly Bedded Sand *(continued)*
-85	-86.2	82.8	10	11	19	30		W		
-90	-91.2	87.8	12	19	32	51		W		-89.4 Green-Gray, Silty Fine Sand with Trace Thinly Bedded Silty Clay, Shells, and Organics 86.0
-95	-96.2	92.8	14	36	35	71	SS-119	24%		
-100	-101.2	97.8	7	10	16	26		W		-99.4 Dark Gray-Green, Sandy Silt with Trace Thinly Bedded Silty Clay and Organics 96.0
-105	-106.2	102.8	16	28	54	82		W		-104.4 Gray-Green, Silty Sand with Trace Thinly Bedded Silty Clay and Organics 101.0
-110	-111.2	107.8	15	19	24	43		M		
-115	-116.2	112.8	13	33	41	74		W		-119.4 Dark Gray-Green, Fine Sandy Clay with Some Thinly Bedded Silty Sand 116.0
-120	-121.2	117.8	6	10	19	29		W		
-125	-126.2	122.8	18	28	21	49		W		
-130	-131.2	127.8	10	12	18	30		W		-134.4 Gray, Silty Fine Sand with Trace Thinly Bedded Silty Clay 131.0
-135	-136.2	132.8	24	28	54	82		W		
-140	-141.2	137.8	9	12	16	28		W		-139.4 Dark Gray to Brown, Sandy Clay with Some Thinly Bedded Sand 136.0
-145	-146.2	142.8	18	30	42	72		W		-144.4 Gray, Poorly Sorted, Silty Sand with Trace Silty Clay and Organics 141.0
-150	-151.2	147.8	17	24	37	61	SS-128	18%		-149.4 Gray, Silty Clay 146.0
-155	-156.2	152.8	22	32	43	75		M		
-160										-159.4 156.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B5-A	**STATION** 120+20	**OFFSET** 5 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. -3.4 ft	**TOTAL DEPTH** 169.1 ft	**NORTHING** 321,535	**EASTING** 2,119,502	**24 HR.** Elev. 26.1
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 05/11/20	**COMP. DATE** 05/15/20	**SURFACE WATER DEPTH** 23.7ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
-160						Match Line					
	-161.2	157.8	14	18	32	50	SS-129	19%		Gray, Clayey Fine Sand *(continued)*	
-165										-164.4	161.0
	-166.2	162.8	20	36	51	87		M		Gray, Fine Sandy Clay	
-170										-169.4	166.0
	-171.2	167.8	27	50	50/0.3	100/0.8		M		Gray, Clayey Fine Sand	
										-172.5	169.1
										Boring Terminated at Elevation -172.5 ft in Clayey Sand (Black Creek Formation)	
										Artesian Water Elevation Measured to 26.1 Feet on 5/15/20	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B6-A	**STATION** 121+94	**OFFSET** 3 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 35.0 ft	**TOTAL DEPTH** 156.0 ft	**NORTHING** 321,679	**EASTING** 2,119,600	**24 HR.** 8.5
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 04/27/20	**COMP. DATE** 04/29/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
35										
	35.0	0.0	1	1	5	6		M		35.0 / 0.0 GROUND SURFACE **ALLUVIAL** Brown and Gray, Silty Sand with Trace Organics
	31.5	3.5	2	1	2	3		W		
30										
	26.6	8.4	2	1	2	3		W		
25										
	20.8	14.2	1	WOR	1	1		W		20.0 / 15.0 Tan, Clayey Fine Sand
20										
	15.8	19.2	WOH	WOH	WOH	0		W		
15										
	10.8	24.2	WOH	WOH	WOH	0		W		
10										
	5.8	29.2	WOH	1	2	3		27% W		7.5 / 27.5 Light Brown, Fine Sandy Silt ST-1: 28.0' - 30.0'
5										
	0.8	34.2	1	WOR	1	1		W		2.0 / 33.0 **COASTAL PLAIN** Dark Gray, Silty Clay with Trace Organics (Black Creek Formation)
0										
	-4.2	39.2	2	2	3	5	SS-51	55% W		
-5										
	-9.2	44.2	4	8	9	17		W		
-10										
	-14.6	49.6	6	7	11	18		W		
-15										
	-19.6	54.6	7	8	26	34		W		
-20										
	-24.6	59.6	8	12	20	32		W		-27.0 / 62.0 Green-Gray, Silty Fine Sand with Little Thinly Bedded Silty Clay
-25										
	-29.6	64.6	7	9	14	23		W		
-30										
	-34.6	69.6	6	10	11	21		W		
-35										
	-39.6	74.6	10	10	14	24		W		
-40										
-45	-44.6	79.6								

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-45						Match Line				
	-49.6	84.6	9	17	30	47	SS-55	37%		Green-Gray, Silty Fine Sand with Little Thinly Bedded Silty Clay *(continued)*
-50										
	-54.6	89.6	10	18	38	56		W		
-55										-53.0 / 88.0 Green-Gray, Fine Sandy Silt with Trace Organics
	-59.6	94.6	11	18	28	46		W		
-60										
	-64.6	99.6	9	15	22	37		W		
-65										
	-69.6	104.6	8	16	20	36		W		
-70										
	-74.6	109.6	9	17	26	43	SS-58	44%		
-75										
	-79.6	114.6	8	15	20	35		W		
-80										
	-84.6	119.6	9	11	14	25		W		
-85										
	-89.6	124.6	12	24	48	72		W		
-90										
	-94.6	129.6	14	29	33	62		W		
-95										
	-99.6	134.6	12	20	43	63		W		
-100										
	-104.6	139.6	24	23	34	57	SS-62	33%		-103.0 / 138.0 Green-Gray, Silty Fine Sand with Some Thinly Bedded Silty Clay and Trace Organics
-105										
	-109.6	144.6	13	20	34	54		W		
-110										
	-114.6	149.6	21	38	39	77		W		
-115										
	-119.6	154.6	16	34	43	77		W		
-120										
			23	33	67/0.4	100/0.9		W		-121.0 / 156.0 Boring Terminated at Elevation -121.0 ft in Silty Sand (Black Creek Formation)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B7-A	**STATION** 123+57	**OFFSET** 2 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 39.6 ft	**TOTAL DEPTH** 161.2 ft	**NORTHING** 321,814	**EASTING** 2,119,691	**24 HR.** 9.8
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 04/21/20	**COMP. DATE** 04/23/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
40											
	39.6	0.0	1	6	8	14		M		39.6 GROUND SURFACE	0.0
										38.6 **ARTIFICIAL FILL** Brown and Gray, Silty Sand with Trace Organics and Gravel	1.0
35	36.1	3.5	1	1	1	2		W		**ALLUVIAL** Gray, Orange, and Tan, Silty Fine Sand with Trace Silty Clay	
30	30.5	9.1	2	2	4	6		W			
										27.6 Orange and Tan, Fine Sandy Clay	12.0
25	25.5	14.1	WOH	1	3	4		M			
20	20.5	19.1	1	WOR	1	1		W		21.6 Orange, Gray, and Tan, Silty Sand with Trace Silty Clay and Wood Fragments	18.0
15	15.5	24.1	1	WOR	1	1		W			
10	10.5	29.1	1	3	6	9		W			
5	5.5	34.1	6	12	18	30		W		6.6 **COASTAL PLAIN** Dark Gray, Silty Sand with Trace Organics and Wood Fragments (Black Creek Formation)	33.0
0	0.5	39.1	5	5	8	13		M		1.1 Dark Gray, Sandy Silt	38.5
-5	-5.1	44.7	4	6	10	16		W		-3.4 Dark Gray, Silty Fine Sand	43.0
-10	-10.1	49.7	4	9	17	26		W		-8.4 Dark Gray, Clayey Silt with Trace Sand	48.0
-15	-15.1	54.7	7	12	14	26	SS-29	38%		-11.3 Gray, Well Sorted Sand	50.9
-20	-20.1	59.7	11	17	16	33		W		-13.9 Gray, Fine Silty Clay	53.5
-25	-25.1	64.7	6	5	7	12		W		-20.4 Gray to Dark Gray, Well Sorted Silty Sand with Thinly Bedded Silty Clay	60.0
-30	-30.1	69.7	5	9	13	22		W			
-35	-35.1	74.7	10	15	20	35		W		-38.9 Green-Gray, Well Sorted Fine Sand	78.5
-40											

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-40						Match Line				
	-40.1	79.7	19	28	37	65	SS-33	25%		Green-Gray, Well Sorted Fine Sand *(continued)*
-45	-45.1	84.7	13	30	26	56		W		
-50	-50.1	89.7	6	9	18	27		W		-48.9 Green-Gray, Silty Sand with Thinly Bedded Silty Clay and Trace Wood Fragments 88.5
-55	-55.1	94.7	7	11	17	28		W		
-60	-60.1	99.7	11	23	36	59		W		
-65	-65.1	104.7	9	28	44	72	SS-36	44%		
-70	-70.1	109.7	27	38	35	73		W		
-75	-75.1	114.7	29	70	29/0.2	100/0.7		W		
-80	-80.1	119.7	18	30	50	80		W		
-85	-85.1	124.7	33	47	53/0.4	100/0.9		W		
-90	-90.1	129.7	20	26	29	55		W		
-95	-95.1	134.7	29	20	28	48		W		
-100	-100.1	139.7	13	21	43	64		W		-99.4 Green-Gray, Sandy Silt with Thinly Bedded Silty Clay and Trace Organics 139.0
-105	-105.1	144.7	15	22	48	70		W		
-110	-110.1	149.7	16	30	47	77		W		
-115	-115.1	154.7	15	33	67		SS-43	30%		-113.4 Green-Gray, Silty Fine Sand with Thinly Bedded Silty Clay and Trace Organics 153.0
-120										

WBS 48793.3.1 | TIP N/A | COUNTY BLADEN | GEOLOGIST C. McIlroy
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River | GROUND WTR (ft)
BORING NO. B7-A | STATION 123+57 | OFFSET 2 ft LT | ALIGNMENT -L- | 0 HR. N/A
COLLAR ELEV. 39.6 ft | TOTAL DEPTH 161.2 ft | NORTHING 321,814 | EASTING 2,119,691 | 24 HR. 9.8
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019 | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic
DRILLER M. Brown | START DATE 04/21/20 | COMP. DATE 04/23/20 | SURFACE WATER DEPTH N/A

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B7-A	**STATION** 123+57	**OFFSET** 2 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 39.6 ft	**TOTAL DEPTH** 161.2 ft	**NORTHING** 321,814	**EASTING** 2,119,691	**24 HR.** 9.8
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER M. Brown	**START DATE** 04/21/20	**COMP. DATE** 04/23/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
-120						Match Line					
	-120.1	159.7	10	21	25	46		M		-121.6	161.2
										Boring Terminated at Elevation -121.6 ft in Silty Sand (Black Creek Formation)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 124+94	**OFFSET** 8 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 76.0 ft	**TOTAL DEPTH** 125.0 ft	**NORTHING** 321,922	**EASTING** 2,119,776	**24 HR.** 31.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 04/16/20	**COMP. DATE** 04/17/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
80										
75	76.0	0.0	5	10	9	19		M		76.0 GROUND SURFACE 0.0 **ROADWAY EMBANKMENT** Orange, Silty Sand with Trace Clay
	72.5	3.5	3	4	3	7		W		
70	67.5	8.5	4	7	5	12		W		
65	62.5	13.5	3	4	2	6		W		
60	57.5	18.5	1	1	2	3		W		59.0 17.0 Dark Gray to Black, Clayey Silt with Some Gravel
55	52.5	23.5	1	WOR	1	1		M		
50	47.5	28.5	WOH	WOH	1	1		W		47.5 28.5 Orange, Tan, and Gray, Sandy Clay
45	42.5	33.5	WOH	WOH	2	2		W		39.0 37.0 **ALLUVIAL** Gray, Clayey Sand with Trace Wood Fragments
40	37.4	38.6	1	1	2	3		Sat.		
35	32.5	43.5	WOH	1	2	3		W		31.5 44.5 Gray and Brown, Sandy Clay with Trace Wood Fragments
30	27.5	48.5	1	4	4	8		W		
25	22.5	53.5	2	2	4	6		W		24.0 52.0 Gray and Brown, Silty Clay with Trace Wood Fragments
20	17.5	58.5	3	1	3	4		W		19.0 57.0 Gray, and Brown, Fine Sand with Some Silty Clay and Trace Wood Fragments
15	12.5	63.5	5	13	20	33		W		13.0 63.0 **COASTAL PLAIN** Dark Gray, Fine Silty Sand with Trace Wood Fragments (Black Creek Formation)
10	7.5	68.5	14	17	22	39		W		
5	2.5	73.5	10	14	21	35		W		
0										

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** C. McIlroy	
SITE DESCRIPTION Replace Bridge Nos. 16 & 17 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 124+94	**OFFSET** 8 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 76.0 ft	**TOTAL DEPTH** 125.0 ft	**NORTHING** 321,922	**EASTING** 2,119,776	**24 HR.** 31.0
DRILL RIG/HAMMER EFF./DATE SEL1975 DIEDRICH D-50 93% 09/06/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Brown	**START DATE** 04/16/20	**COMP. DATE** 04/17/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
0						Match Line				
-5	-2.5	78.5	5	8	10	18		W		**COASTAL PLAIN** Dark Gray, Fine Silty Sand with Trace Wood Fragments (Black Creek Formation) *(continued)*
-10	-7.5	83.5	6	10	20	30		M		-7.0 83.0 Dark Gray and Black, Sandy Silt with Trace Organic Seams
-15	-12.5	88.5	10	20	25	45		M		-11.0 87.0 Gray, Well Sorted Fine Sand with Trace Silt
-20	-17.5	93.5	11	24	28	52		W		-20.0 96.0 Dark Gray, Very Fine Sandy Silt
-25	-22.5	98.5	7	12	12	24		W		
-30	-27.5	103.5	6	8	12	20		W		
-35	-32.5	108.5	5	9	14	23		W		-36.0 112.0 Green-Gray, Well Sorted Fine Sand
-40	-37.5	113.5	12	26	45	71		W		
-45	-42.5	118.5	20	29	29	58		W		
	-47.5	123.5	25	33	35	68		W		-49.0 125.0 Boring Terminated at Elevation -49.0 ft in Fine Sand (Black Creek Formation)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** N. Mohs/M. Stanbury	
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B-1	**STATION** 121+58	**OFFSET** 28 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 32.2 ft	**TOTAL DEPTH** 81.2 ft	**NORTHING** 321,663	**EASTING** 2,119,559	**24 HR.** 8.3
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 90% 11/18/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Moseley	**START DATE** 11/25/19	**COMP. DATE** 11/26/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) — DEPTH (ft)
35										
	32.2	0.0								GROUND SURFACE
30	31.2	1.0	3	2	3	5		M		**ARTIFICIAL FILL** Brown, Sandy Clay with Gravel
	29.7	2.5								29.7 — 2.5
	28.7	3.5	2	1	1	2		M		**ALLUVIAL** Brown and Gray, Sandy Clay with Gravel
25			WOH	WOH	1	1		M		
	23.7	8.5	1	1	1	2	SS-4	M		
20										
	19.2	13.0								Brown and Gray, Sandy Silt
	17.5	14.7	WOH	1	0	1		W		
15										
	12.5	19.7	WOH	WOH	WOH	0	SS-6	W		
10										
	8.2	24.0								Brown and Gray, Mottled, Sandy Clay
	7.5	24.7	WOH	WOH	WOH	0		W		
5										
	2.5	29.7	WOH	1	2	3	SS-8	W		
0										
	-1.8	34.0								Brown and Gray, Mottled, Clayey Sand
-5	-2.5	34.7	1	2	2	4		W		
	-6.8	39.0								**COASTAL PLAIN** Gray and Black, Clayey Silt (Black Creek Formation)
-10	-7.5	39.7	5	7	10	17		M		
	-12.5	44.7	6	8	10	18		M		
-15										
	-16.8	49.0								Dark Gray, Silty Sand
	-17.5	49.7	6	12	17	29		M		
-20										
	-21.8	54.0								Gray and Black, Clayey Silt
	-22.5	54.7	9	12	17	29		M		
-25										
	-26.8	59.0								Dark Gray, Sandy Clay
	-27.5	59.7	10	12	15	27		M		
-30										
	-32.5	64.7	6	9	11	20		M		
-35										
	-37.5	69.7	10	13	15	28		M		
-40										
	-41.8	74.0								Dark Gray, Silty Sand
	-42.5	74.7	14	30	36	66		M		
-45										

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** N. Mohs/M. Stanbury	
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B-1	**STATION** 121+58	**OFFSET** 28 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 32.2 ft	**TOTAL DEPTH** 81.2 ft	**NORTHING** 321,663	**EASTING** 2,119,559	**24 HR.** 8.3
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 90% 11/18/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Moseley	**START DATE** 11/25/19	**COMP. DATE** 11/26/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-45						Match Line				
	-47.5	79.7	8	14	35	49		M		Dark Gray, Silty Sand *(continued)* -46.8 — 79.0 Dark Gray, Clayey Sand -49.0 — 81.2 Boring Terminated at Elevation -49.0 ft in Clayey Sand (Black Creek Formation) Slope Inclinometer Installed to 77 Feet

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** M. Stanbury
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River			**GROUND WTR (ft)**
BORING NO. B-2	**STATION** 121+77	**OFFSET** 66 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 29.1 ft	**TOTAL DEPTH** 139.9 ft	**NORTHING** 321,700	**EASTING** 2,119,538	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 90% 11/18/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER M. Moseley	**START DATE** 12/05/19	**COMP. DATE** 12/06/19	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
30											
	29.1	0.0	1	1	1	2		M		29.1 GROUND SURFACE	0.0
										ALLUVIAL	
										Brown, Silty Sand	
25	26.1	3.0	2	2	2	4	SS-49	M			
	21.1	8.0	2	1	1	2		W			
20											
	16.1	13.0	2	2	2	4		W			
15								W			
	11.1	18.0	3	3	2	5	SS-52	W		12.1 Brown and Gray, Mottled, Sandy Silt	17.0
10											
	6.1	23.0	2	2	3	5		W		4.1 Gray, Sandy Clay	25.0
5								W			
	1.1	28.0	WOH	2	3	5		M			
0											
	-3.9	33.0	5	7	10	17		M		-3.9 **COASTAL PLAIN**	33.0
-5										Gray, Dark Gray, and Black, Sandy Silt	
	-8.9	38.0	6	8	12	20		M		(Black Creek Formation)	
-10											
	-13.9	43.0	8	16	13	29		M			
-15											
	-18.9	48.0	6	8	12	20		M			
-20											
	-23.9	53.0	9	15	16	31		M			
-25											
	-28.9	58.0	11	15	27	42		M		-28.9 Dark Gray, Silty Sand	58.0
-30										-30.9 Dark Gray, Clayey Sand	60.0
	-34.4	63.5	12	15	22	37		M			
-35											
	-39.4	68.5	7	12	60	72		M			
-40											
	-44.4	73.5	17	25	26	51		M			
-45											
	-49.4	78.5									
-50											

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** M. Stanbury
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River			**GROUND WTR (ft)**
BORING NO. B-2	**STATION** 121+77	**OFFSET** 66 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 29.1 ft	**TOTAL DEPTH** 139.9 ft	**NORTHING** 321,700	**EASTING** 2,119,538	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 90% 11/18/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER M. Moseley	**START DATE** 12/05/19	**COMP. DATE** 12/06/19	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-50						Match Line				
	-54.4	83.5	10	12	18	30		M		Dark Gray, Clayey Sand *(continued)*
-55										-52.9 Dark Gray, Sandy Silt 82.0
	-59.4	88.5	12	16	28	44		M		
-60										
	-64.4	93.5	10	14	21	35		M		
-65										
	-69.4	98.5	10	15	20	35		M		
-70										
	-74.4	103.5	9	14	20	34		M		
-75										
	-79.4	108.5	9	14	16	30		M		
-80										
	-84.4	113.5	9	12	23	35		M		-82.9 Dark Gray, Silty Sand 112.0
-85										
	-89.4	118.5	21	32	40	72		M		
-90										
	-94.4	123.5	17	25	34	59		W		
-95										
	-99.4	128.5	18	21	21	42		M		-97.9 Dark Gray, Sandy Silt 127.0
-100										
	-104.4	133.5	10	13	19	32		M		
-105										
	-109.4	138.5	12	25	32	57		M		
-110			25	35	65/0.4	100/0.9		M		-110.8 Boring Terminated at Elevation -110.8 ft in Sandy Silt (Black Creek Formation) 139.9
										Slope Inclinometer Installed to 58 Feet
										Other Samples:
										ST-3 (12.6 - 14.6)
										ST-4 (22.8 - 24.8)
										ST-5 (24.8 - 26.8)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** M. Stanbury	
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B-3	**STATION** 121+24	**OFFSET** 72 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 31.0 ft	**TOTAL DEPTH** 78.9 ft	**NORTHING** 321,579	**EASTING** 2,119,624	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 90% 11/18/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Moseley	**START DATE** 11/26/19	**COMP. DATE** 11/27/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) — DEPTH (ft)
35										
30	30.0	1.0								31.0 — 0.0 GROUND SURFACE
	28.5	2.5	1	1	3	4		M		**ARTIFICIAL FILL**
	27.5	3.5	1	1	1	2		M		29.0 — 2.0 Brown, Sandy Clay with Organics
25			1	0	1	1		W		28.0 — 3.0 **ALLUVIAL**
	22.5	8.5								Brown, Sandy Clay Brown, Silty Sand
20			WOH	1	1	2	SS-22	26%		
	18.6	12.4								19.0 — 12.0
			2	2	2	4		M		Brown, Sandy Clay
15										
	13.6	17.4	WOH	2	1	3	SS-24	27%		
10										
	8.6	22.4	1	1	1	2	SS-25	22%		9.0 — 22.0 Brown and Gray, Sandy Silt
5										6.5 — 24.5 Gray, Sandy Clay
	3.6	27.4	WOH	WOH	1	1		W		
0										
	-1.4	32.4	WOH	1	1	2		W		
-5										
	-6.4	37.4	3	6	10	16	SS-28	49%		-6.0 — 37.0 **COASTAL PLAIN**
-10										Black and Gray, Silty Clay (Black Creek Formation)
	-11.4	42.4	6	10	12	22		M		
-15										
	-16.4	47.4	8	11	16	27		M		
-20										
	-21.4	52.4	11	18	17	35		M		-21.0 — 52.0 Dark Gray, Silty Sand
-25										
	-26.4	57.4	8	13	13	26		M		
-30										
	-31.4	62.4	8	13	16	29		M		
-35										
	-36.4	67.4	7	15	20	35		M		-36.0 — 67.0 Dark Gray, Clayey Sand
-40										
	-41.4	72.4	11	14	20	34		M		
-45										

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** M. Stanbury	
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B-3	**STATION** 121+24	**OFFSET** 72 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 31.0 ft	**TOTAL DEPTH** 78.9 ft	**NORTHING** 321,579	**EASTING** 2,119,624	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 90% 11/18/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Moseley	**START DATE** 11/26/19	**COMP. DATE** 11/27/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-45						Match Line				
	-46.4	77.4	19	23	43	66		M		-46.0 — 77.0 Dark Gray, Silty Sand
										-47.9 — 78.9 Boring Terminated at Elevation -47.9 ft in Sandy Silt (Black Creek Formation)
										Slope Inclinometer Installed to 40 Feet

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** M. Stanbury	
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B-3B	**STATION** 121+30	**OFFSET** 72 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 31.0 ft	**TOTAL DEPTH** 135.0 ft	**NORTHING** 321,584	**EASTING** 2,119,627	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 90% 11/18/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Moseley	**START DATE** 12/03/19	**COMP. DATE** 12/04/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
35										
30										31.0 GROUND SURFACE 0.0 Continuous Drilling with No Sampling
25										
20										
15										
10										
5										
0										
-5										
-10										
-15										
-20										
-25										
-30										
-35										
-40										
-45										

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** M. Stanbury	
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B-3B	**STATION** 121+30	**OFFSET** 72 ft RT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 31.0 ft	**TOTAL DEPTH** 135.0 ft	**NORTHING** 321,584	**EASTING** 2,119,627	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 90% 11/18/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Moseley	**START DATE** 12/03/19	**COMP. DATE** 12/04/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-45						Match Line				
		-47.5	6	5	4	9		M		-47.5 78.5 Continuous Drilling with No Sampling *(continued)*
-50		78.5								**COASTAL PLAIN** Dark Gray, Silty Sand (Black Creek Formation)
		-52.5	2	2	2	4		M		
-55		83.5								-56.0 87.0 Dark Gray, Sandy Silt
		-57.5	10	14	20	34		M		
-60		88.5								
		-62.5	12	12	23	35		M		
-65		93.5								
		-67.5	10	14	18	32		M		
-70		98.5								
		-72.5	7	11	17	28		M		
-75		103.5								
		-77.5	8	12	14	26		M		
-80		108.5								
		-82.5	8	12	14	26		M		
-85		113.5								
		-87.5	20	35	42	77		M		-86.0 117.0 Dark Gray, Silty Sand
-90		118.5								
		-92.5	25	60	40/0.3	100/0.8		M		-91.0 122.0 Dark Gray, Coarse Sand
-95		123.5								
		-97.5	20	25	21	46		M		-96.0 127.0 Dark Gray, Sandy Silt
-100		128.5								
		-102.5	12	18	20	38		M		-104.0 135.0 Boring Terminated at Elevation -104.0 ft in Sandy Silt (Black Creek Formation)
		133.5								<u>Other Samples:</u> ST-1 (25.0 - 27.0) ST-2 (27.3 - 29.3)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** M. Stanbury	
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B-4	**STATION** 117+39	**OFFSET** 113 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 30.7 ft	**TOTAL DEPTH** 60.1 ft	**NORTHING** 321,361	**EASTING** 2,119,256	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 90% 11/18/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Moseley	**START DATE** 12/15/19	**COMP. DATE** 12/12/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
35										
30	30.7	0.0	4	5	5	10		M		30.7 0.0 GROUND SURFACE
	27.1	3.6	6	11	8	19		M		**ARTIFICIAL FILL** Brown, Sandy Silt with Gravel 27.7 3.0
25	22.1	8.6	2	2	2	4	SS-79	34%		**ALLUVIAL** Brown, Clayey Sand 22.7 8.0
20	17.1	13.6	1	1	2	3		M		Gray, Silty Clay with Trace Organics
15	12.1	18.6	WOH	1	1	2	SS-81	36%		
10	7.1	23.6	WOH	1	2	3		M		
5	2.1	28.6	1	1	2	3	SS-83	33%		2.7 28.0 Gray, Sandy Clay with Trace Organics
0	-2.9	33.6	2	4	3	7		M		-2.3 33.0 Gray, Clayey Sand with Trace Organics and Gravel
-5	-7.9	38.6	2	2	4	6		M		-7.3 38.0 Gray, Sandy Clay
-10	-12.9	43.6	7	5	4	9		M		-12.3 43.0 **COASTAL PLAIN** Gray, Silty Sand (Black Creek Formation)
-15	-17.9	48.6	6	8	10	18		M		-17.3 48.0 Black and Gray, Sandy Silt
-20	-22.9	53.6	6	9	12	21		M		-22.3 53.0 Black and Gray, Silty Sand
-25	-27.9	58.6	6	7	10	17		M		-27.3 58.0 Black, Sandy Silt -29.4 60.1 Boring Terminated at Elevation -29.4 ft in Sandy Silt (Black Creek Formation) Slope Inclinometer Installed to 60 Feet

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** M. Stanbury	
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. B-5	**STATION** 117+05	**OFFSET** 47 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 31.9 ft	**TOTAL DEPTH** 59.5 ft	**NORTHING** 321,296	**EASTING** 2,119,292	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE SUM2603 CME-550X 90% 11/18/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER M. Moseley	**START DATE** 12/12/19	**COMP. DATE** 12/12/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
35										
30	31.9	0.0	2	2	2	4		M		31.9 0.0 GROUND SURFACE
	28.9	3.0	1	2	2	4				**ARTIFICIAL FILL** Black, Sandy Clay with Trace Organics and Gravel 28.9 3.0
25	23.9	8.0	WOH	WOH	WOH	0	SS-91	39%		**ALLUVIAL** Gray, Silty Clay with Trace Organics
20	18.9	13.0	WOH	WOH	WOH	0		M		
15	13.9	18.0	WOH	WOH	WOH	0	SS-93	29%		13.9 18.0 Gray and Brown, Mottled, Sandy Clay
10	8.9	23.0	WOH	WOH	WOH	0		M		
5	3.9	28.0	WOH	WOH	WOH	0	SS-95	25%		
0	-1.1	33.0	2	2	6	8		M		-1.1 33.0 Gray, Clayey Sand with Trace Organics
-5	-6.1	38.0	WOH	WOH	3	3		M		-6.1 38.0 Gray, Sandy Clay
-10	-11.1	43.0	5	10	13	23		W		-11.1 43.0 Brown, Coarse Sand with Trace Gravel
-15	-16.1	48.0	6	6	6	12		M		-16.1 48.0 **COASTAL PLAIN** Gray and Black, Sandy Silt
-20	-21.1	53.0	6	9	11	20		M		
-25	-26.1	58.0	8	9	11	20		M		-27.6 59.5 Boring Terminated at Elevation -27.6 ft in Sandy Silt (Black Creek Formation) Estimated Elevation Based on B-4 Slope Inclinometer Installed to 60 Feet

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** M. Snyder	
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. Well 7	**STATION** 117+32	**OFFSET** 103 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 31.2 ft	**TOTAL DEPTH** 55.2 ft	**NORTHING** 321,351	**EASTING** 2,119,261	**24 HR.** 10.0
DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 87% 01/16/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Edmondson	**START DATE** 12/05/19	**COMP. DATE** 12/05/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
35										
30	31.2	0.0	4	6	8	14		D		31.2 GROUND SURFACE 0.0 **ARTIFICIAL FILL** Brown and Gray, Sandy Silt with Trace Gravel
	27.5	3.7	4	4	6	10		M		28.2 3.0 Brown, Sandy Clay
25	22.5	8.7	WOH	1	2	3		W		25.2 6.0 **ALLUVIAL** Gray, Silty Clay Little Sand and Wood Fragments at 28.7'
20	17.5	13.7	WOH	WOH	WOH	0		W		
15	12.5	18.7	WOH	WOH	WOH	0		W		
10	7.5	23.7	WOH	WOH	WOH	0		W		
5	2.5	28.7	WOH	WOH	4	4		W		
0	-2.5	33.7	2	3	4	7		W		
-5	-7.5	38.7	WOH	WOH	WOH	0		W		
-10	-12.5	43.7	WOH	WOH	WOH	0		W		
-15	-17.5	48.7	1	4	5	9		M		-17.8 49.0 **COASTAL PLAIN** Gray and Black, Clayey Silt with Some Sand (Black Creek Formation)
-20	-22.5	53.7	5	9	8	17		M		-24.0 55.2 Boring Terminated at Elevation -24.0 ft in Clayey Silt (Black Creek Formation) Piezometer Pipe Installed to 53 Feet

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** M. Snyder	
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. Well 8	**STATION** 115+10	**OFFSET** 33 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 32.0 ft	**TOTAL DEPTH** 39.9 ft	**NORTHING** 321,126	**EASTING** 2,119,196	**24 HR.** 6.8
DRILL RIG/HAMMER EFF./DATE CAT4425 CME-55 87% 01/16/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Edmondson	**START DATE** 12/05/19	**COMP. DATE** 12/05/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
35										
30	32.0	0.0	1	2	1	3		M		32.0 GROUND SURFACE 0.0 **ARTIFICIAL FILL** Brown, Clayey Sand
	28.6	3.4	WOH	WOH	WOH	0		M		29.0 3.0 **ALLUVIAL** Gray, Silty Clay with Trace to Little Organics
25	23.6	8.4	1	1	1	2		W		
20	18.6	13.4	WOH	WOH	WOH	0		W		
15	13.6	18.4	WOH	WOH	WOH	0		W		
10	8.6	23.4	3	4	7	11		M		10.0 22.0 **COASTAL PLAIN** Gray and Black, Clayey Silt (Black Creek Formation)
5	3.6	28.4	3	7	8	15		M		
0	-1.4	33.4	4	7	10	17		M		
-5	-6.4	38.4	4	6	10	16		M		-7.9 39.9 Boring Terminated at Elevation -7.9 ft in Clayey Silt (Black Creek Formation) Piezometer Pipe Installed to 38 Feet

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 48793.3.1	**TIP** N/A	**COUNTY** BLADEN	**GEOLOGIST** N. Mohs	
SITE DESCRIPTION Bridge No. 16 on US 701 Over Cape Fear River				**GROUND WTR (ft)**
BORING NO. Well 9	**STATION** 113+82	**OFFSET** 58 ft LT	**ALIGNMENT** N/A	**0 HR.** N/A
COLLAR ELEV. 38.6 ft	**TOTAL DEPTH** 40.2 ft	**NORTHING** 321,033	**EASTING** 2,119,104	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE CAT1314 CME-45B 94% 09/26/2018		**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
DRILLER T. Chalmers	**START DATE** 12/05/19	**COMP. DATE** 12/05/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
40										38.6 GROUND SURFACE	0.0
35	35.1	3.5	3	2	1	3		M		**ARTIFICIAL FILL** Brown, Clayey Sand with Trace Gravel and Wood Fragments	
										34.6	4.0
30	29.9	8.7	1	1	1	2		W		**ALLUVIAL** Gray and Brown, Silty Sand	
										30.6	8.0
25	24.9	13.7	2	2	2	4		Sat.		Gray, Sandy Clay with Trace Roots and Leaves	
										26.6	12.0
20	19.9	18.7	2	2	7	9		M		Orange, Brown and Gray, Silty Rounded Coarse Sand	
										18.7	19.9
15	14.9	23.7	5	6	9	15		M		**COASTAL PLAIN** Orange and Brown, Silty Sand, Thinnly Bedded with Clay Lenses (Black Creek Formation)	
										11.1	27.5
10	9.9	28.7	4	5	8	13		M		Dark Gray, Clayey Silt	
										6.1	32.5
5	4.9	33.7	3	6	7	13		M		Dark Gray, Sandy Silt	
0	-0.1	38.7	5	7	9	16		M		-1.6	40.2
										Boring Terminated at Elevation -1.6 ft in Sandy Silt (Black Creek Formation)	
										Piezometer Pipe Installed to 38 Feet	

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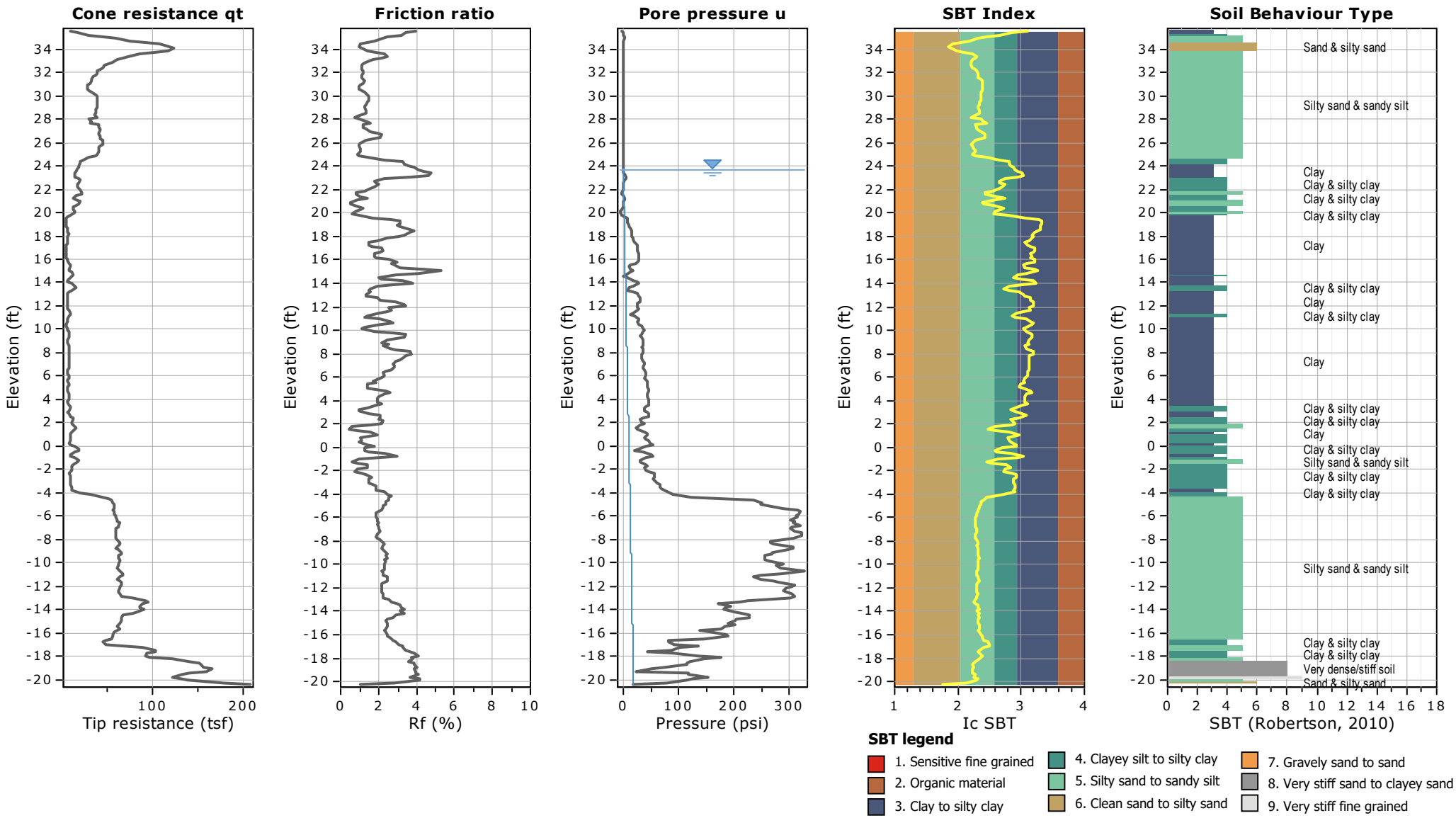
Project: US 701 over Cape Fear River
Location: Bladen County

CPT: CPT-1
Total depth: 56.10 ft, Date: 11/27/2019
Surface Elevation: 35.70 ft
Coords: X:2119516.00, Y:321755.00



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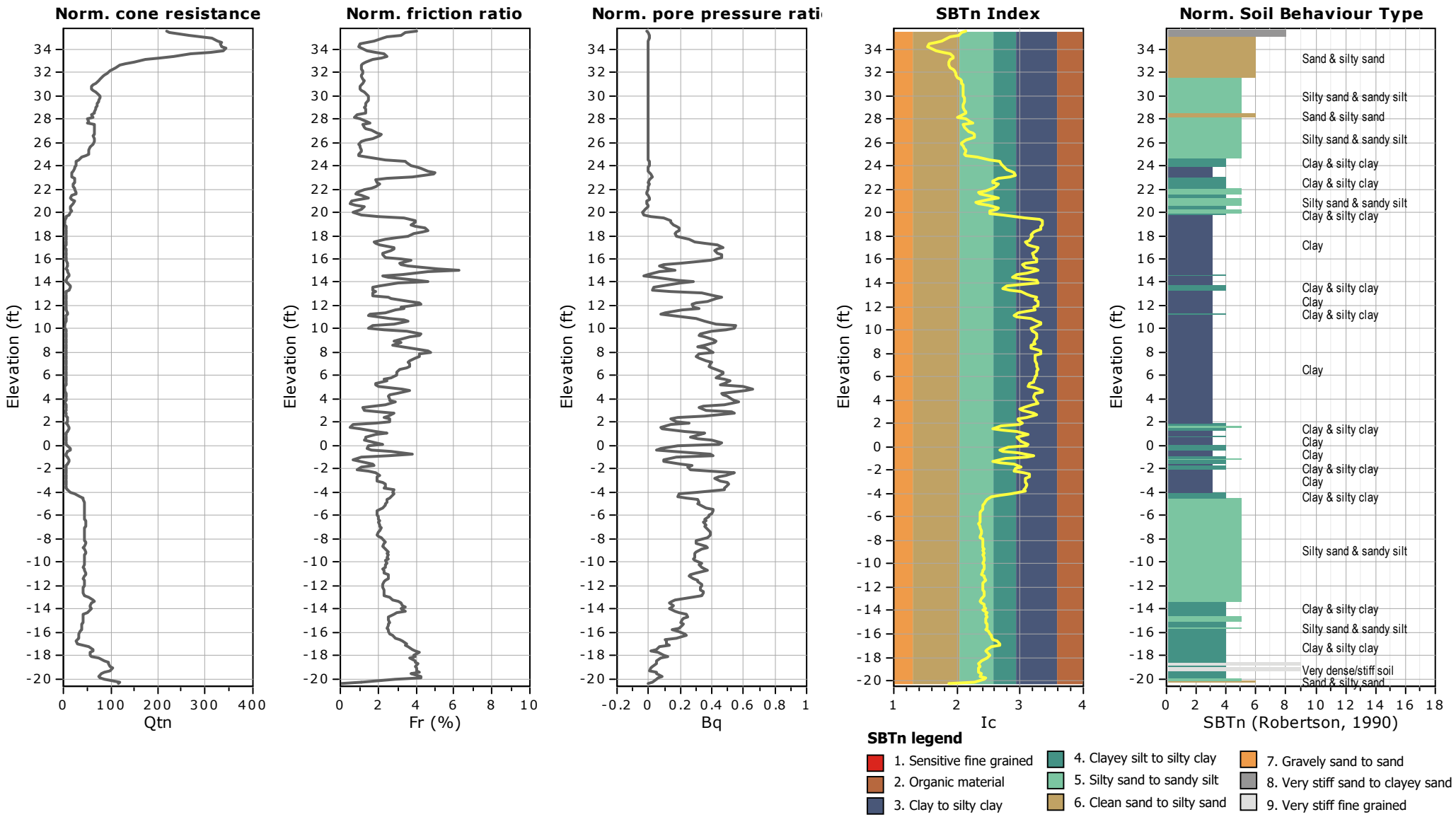
Project: **US 701 over Cape Fear River**
Location: **Bladen County**

CPT: CPT-1
Total depth: 56.10 ft, Date: 11/27/2019
Surface Elevation: 35.70 ft
Coords: X:2119516.00, Y:321755.00



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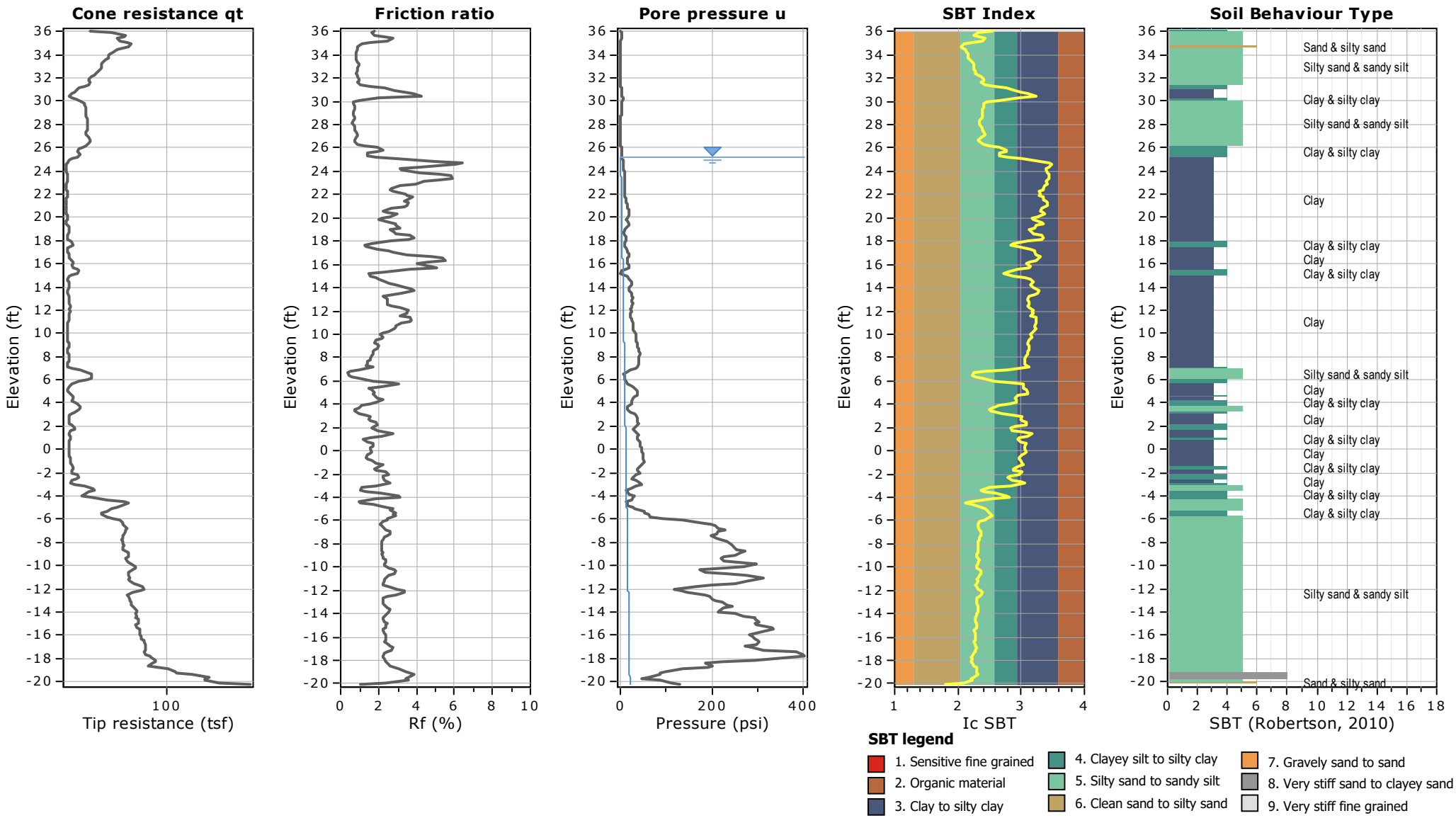
CPT: CPT-3
Total depth: 56.43 ft, Date: 11/27/2019
Surface Elevation: 36.20 ft
Coords: X:2119603.00, Y:321644.00

Project: **US 701 over Cape Fear River**
Location: **Bladen County**



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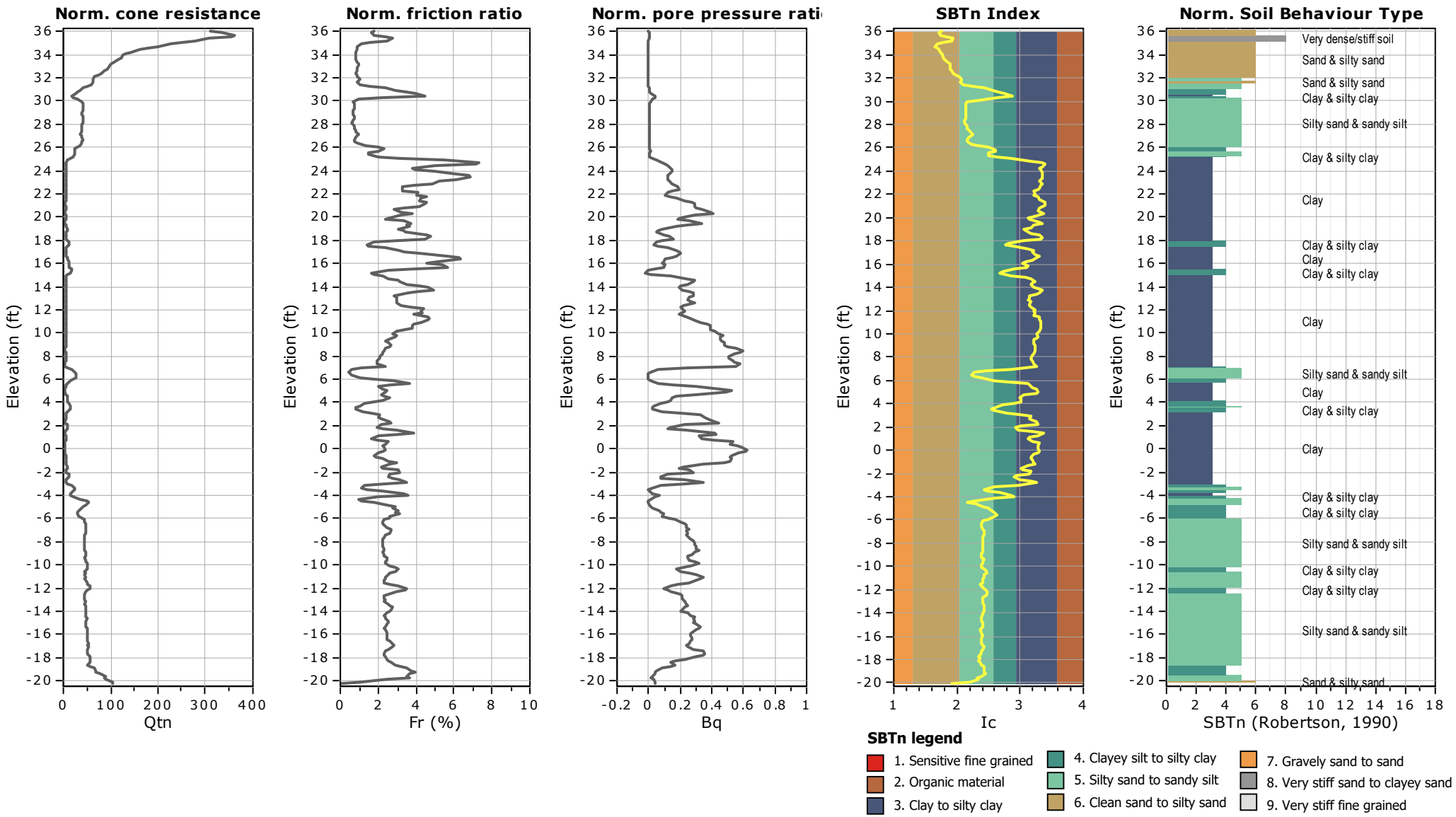
CPT: CPT-3
Total depth: 56.43 ft, Date: 11/27/2019
Surface Elevation: 36.20 ft
Coords: X:2119603.00, Y:321644.00

Project: **US 701 over Cape Fear River**
Location: **Bladen County**



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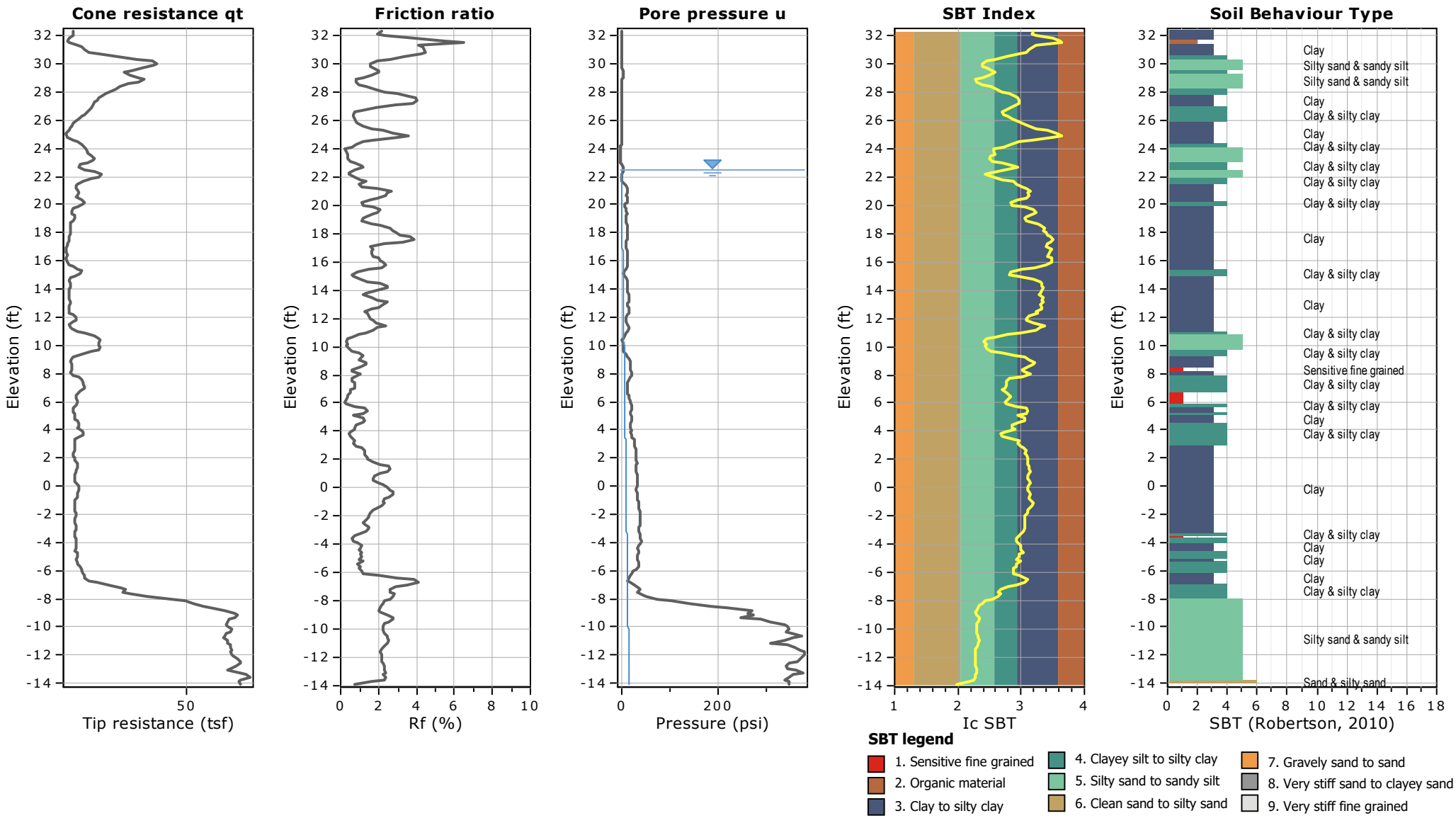
CPT: CPT-4
Total depth: 46.59 ft, Date: 11/26/2019
Surface Elevation: 32.50 ft
Coords: X:2119633.00, Y:321583.00

Project: **US 701 over Cape Fear River**
Location: **Bladen County**



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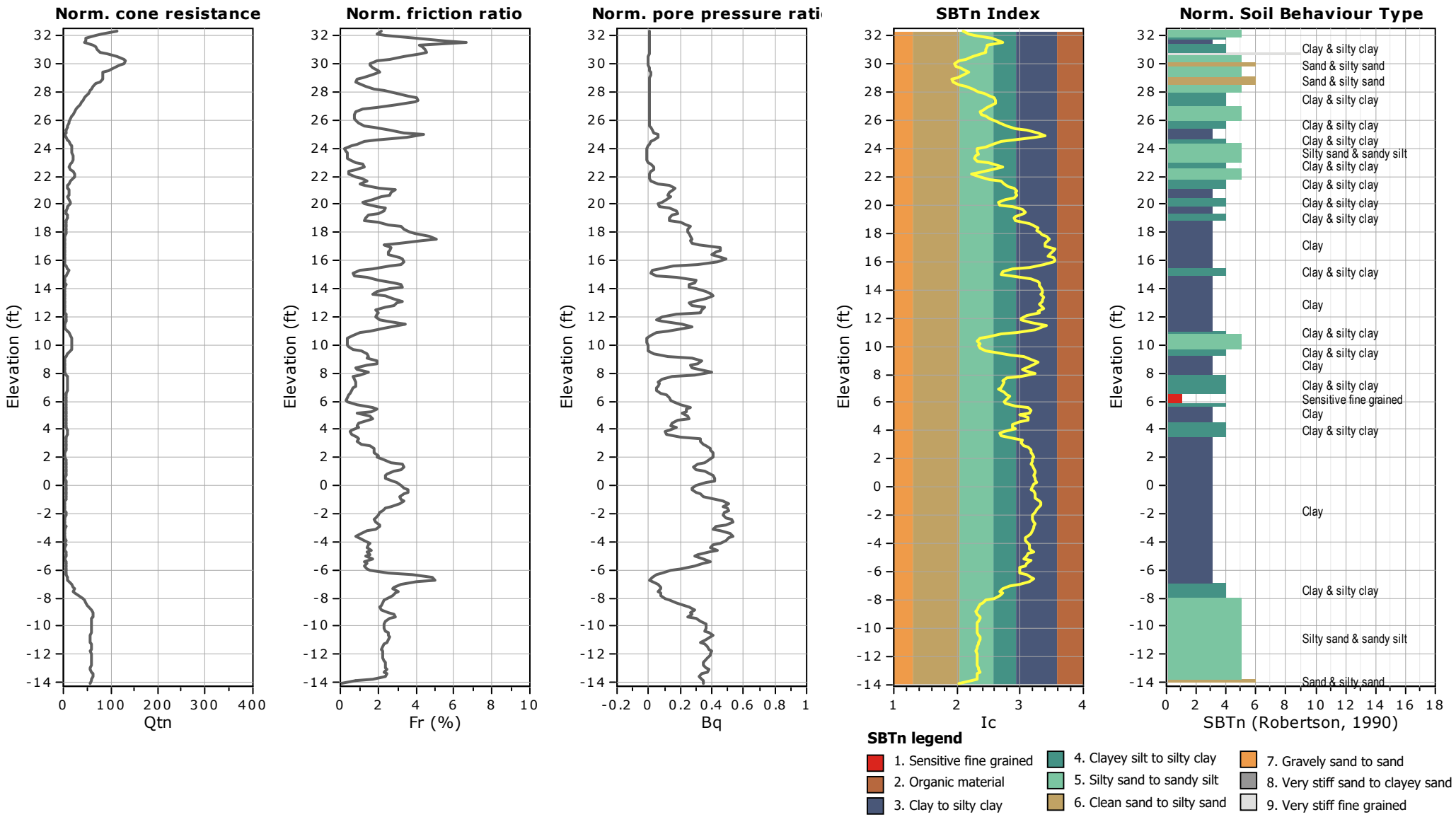
CPT: CPT-4
Total depth: 46.59 ft, Date: 11/26/2019
Surface Elevation: 32.50 ft
Coords: X:2119633.00, Y:321583.00

Project: **US 701 over Cape Fear River**
Location: **Bladen County**



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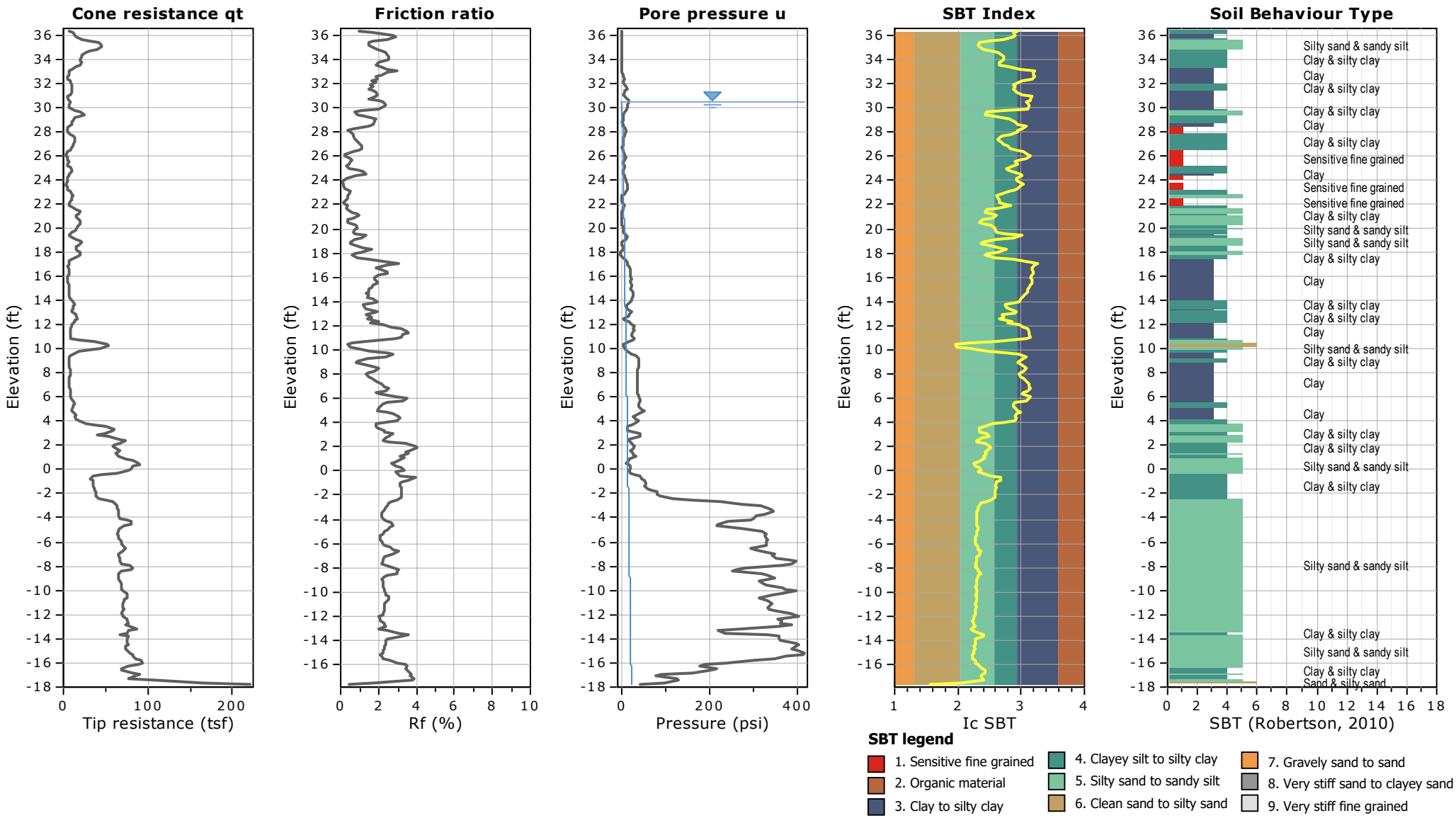
CPT: CPT-5
Total depth: 54.30 ft, Date: 11/27/2019
Surface Elevation: 36.50 ft
Coords: X:2119569.00, Y:321729.00

Project: US 701 over Cape Fear River
Location: Bladen County



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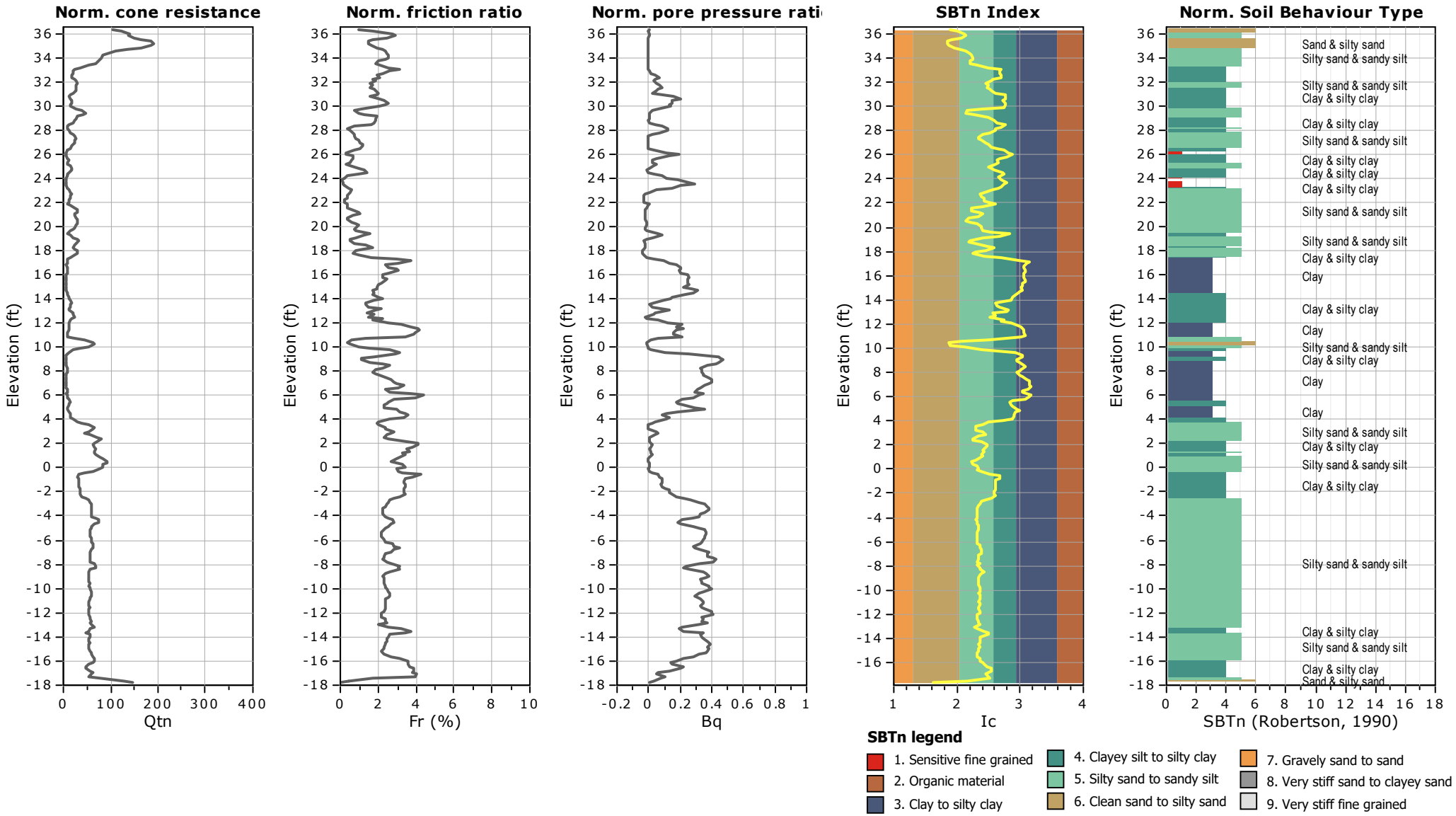
CPT: CPT-5
Total depth: 54.30 ft, Date: 11/27/2019
Surface Elevation: 36.50 ft
Coords: X:2119569.00, Y:321729.00

Project: US 701 over Cape Fear River
Location: Bladen County



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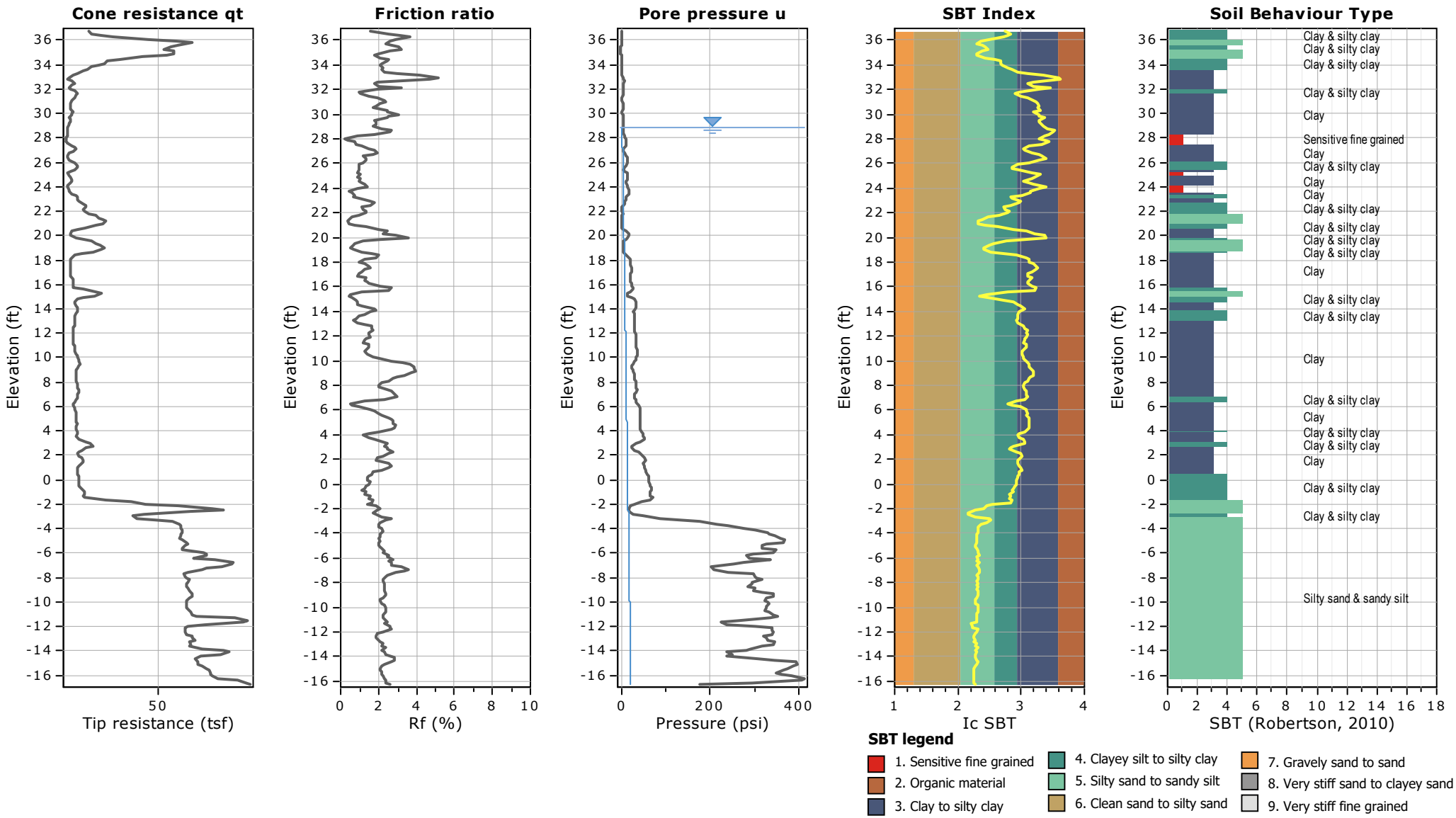
CPT: CPT-6
Total depth: 53.64 ft, Date: 11/26/2019
Surface Elevation: 36.90 ft
Coords: X:2119587.00, Y:321717.00

Project: **US 701 over Cape Fear River**
Location: **Bladen County**



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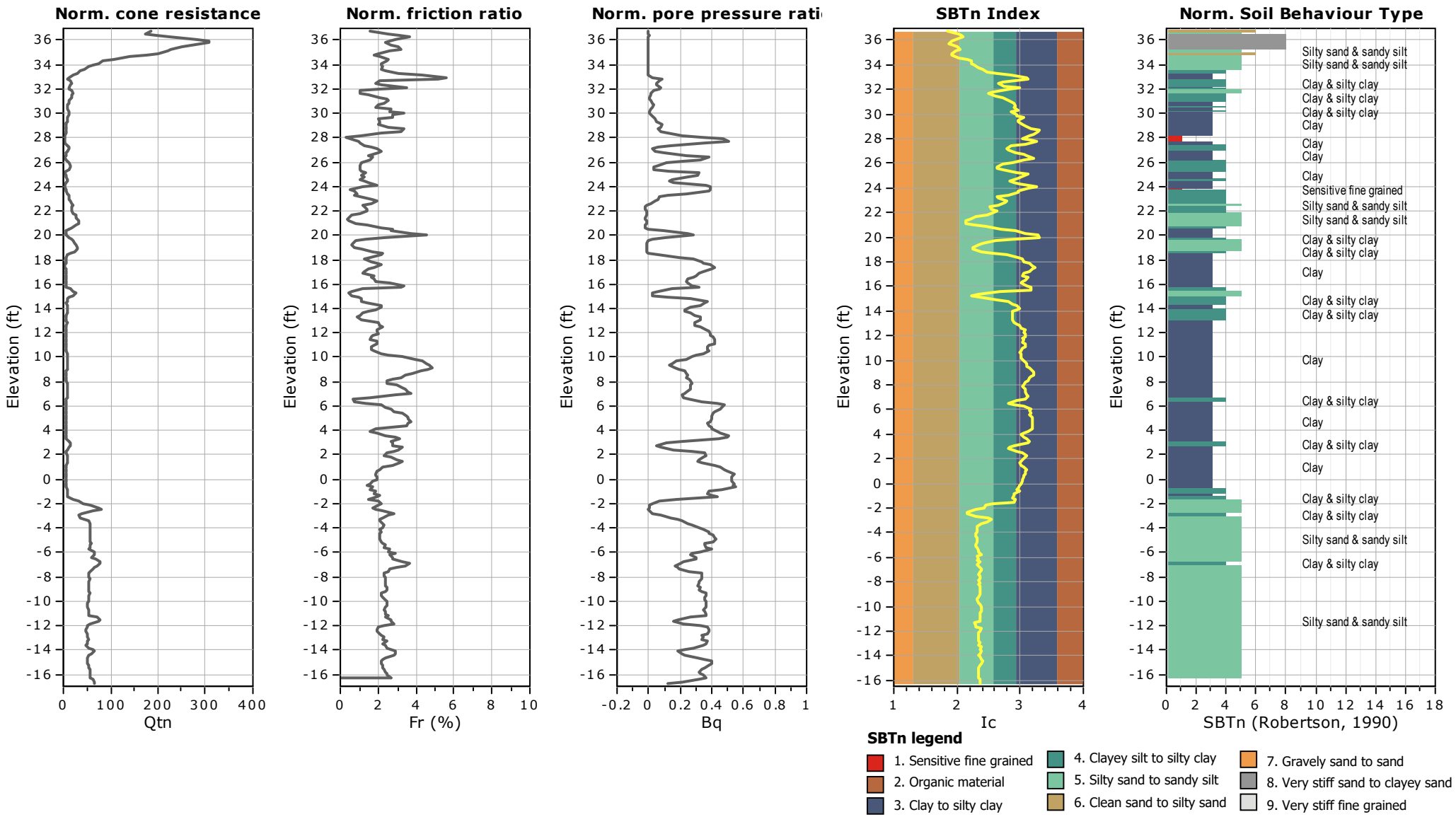
CPT: CPT-6
Total depth: 53.64 ft, Date: 11/26/2019
Surface Elevation: 36.90 ft
Coords: X:2119587.00, Y:321717.00

Project: US 701 over Cape Fear River
Location: Bladen County



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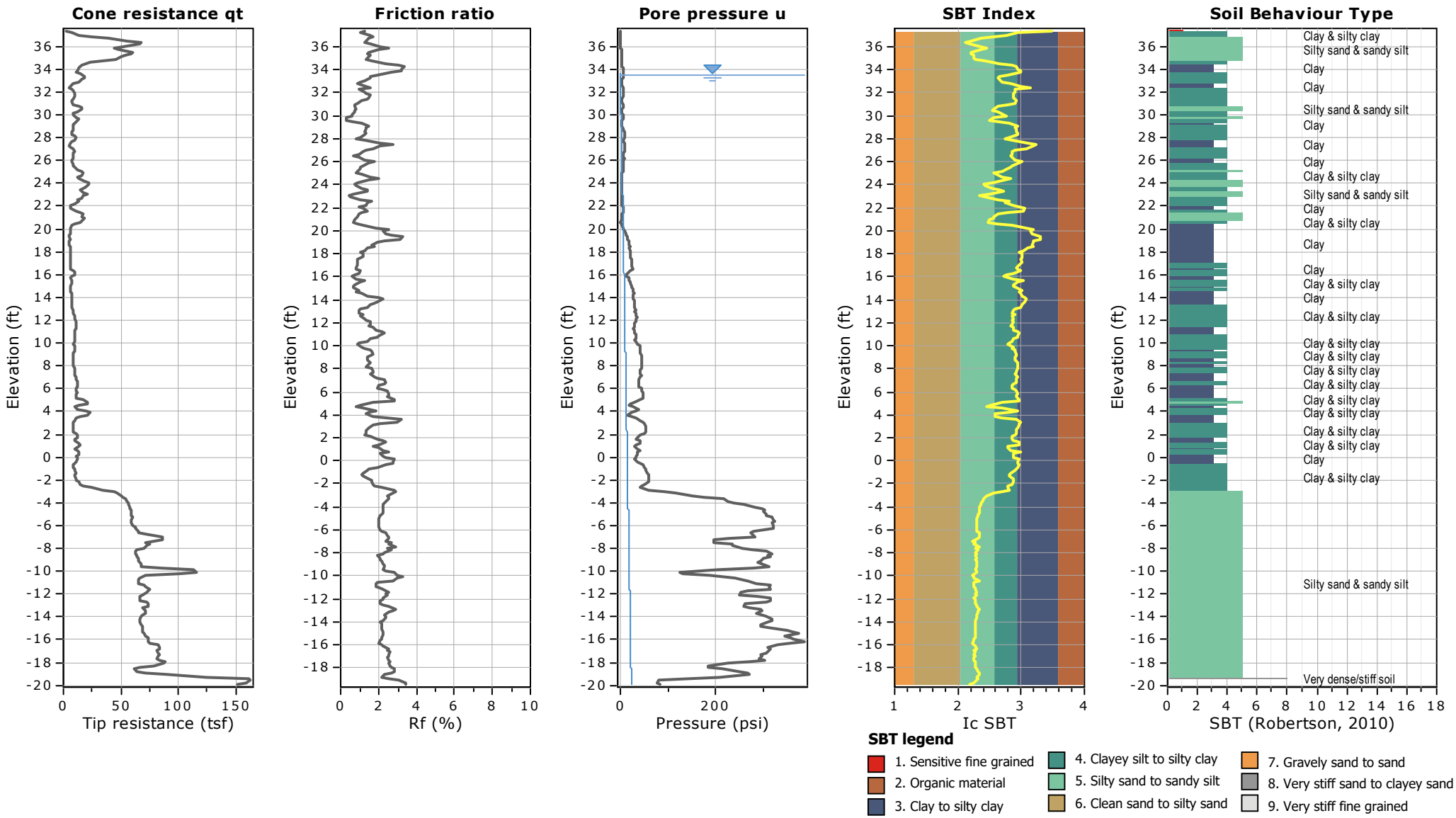
CPT: CPT-7
Total depth: 57.42 ft, Date: 11/26/2019
Surface Elevation: 37.50 ft
Coords: X:2119643.00, Y:321669.00

Project: **US 701 over Cape Fear River**
Location: **Bladen County**



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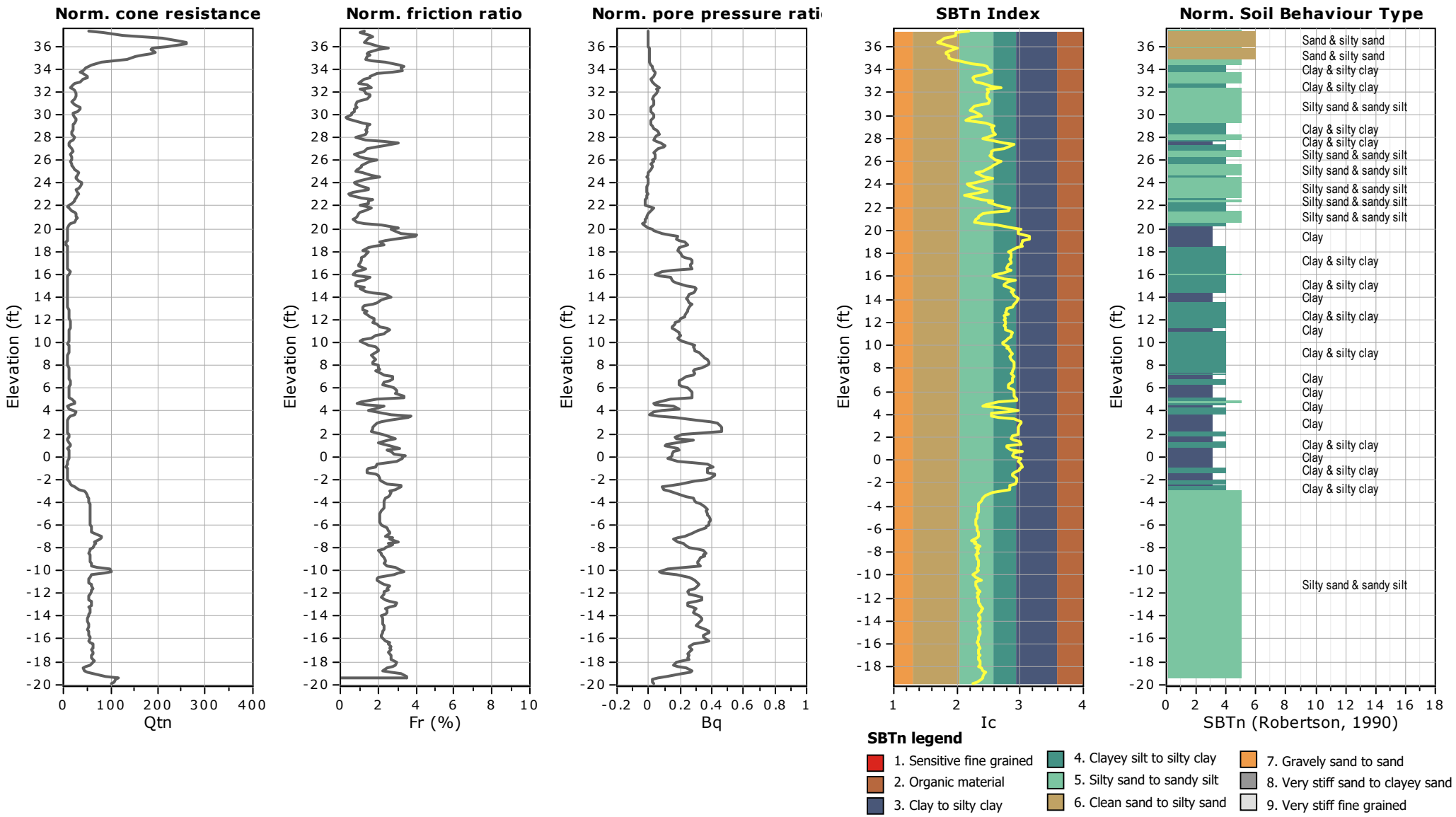
CPT: CPT-7
Total depth: 57.42 ft, Date: 11/26/2019
Surface Elevation: 37.50 ft
Coords: X:2119643.00, Y:321669.00

Project: **US 701 over Cape Fear River**
Location: **Bladen County**



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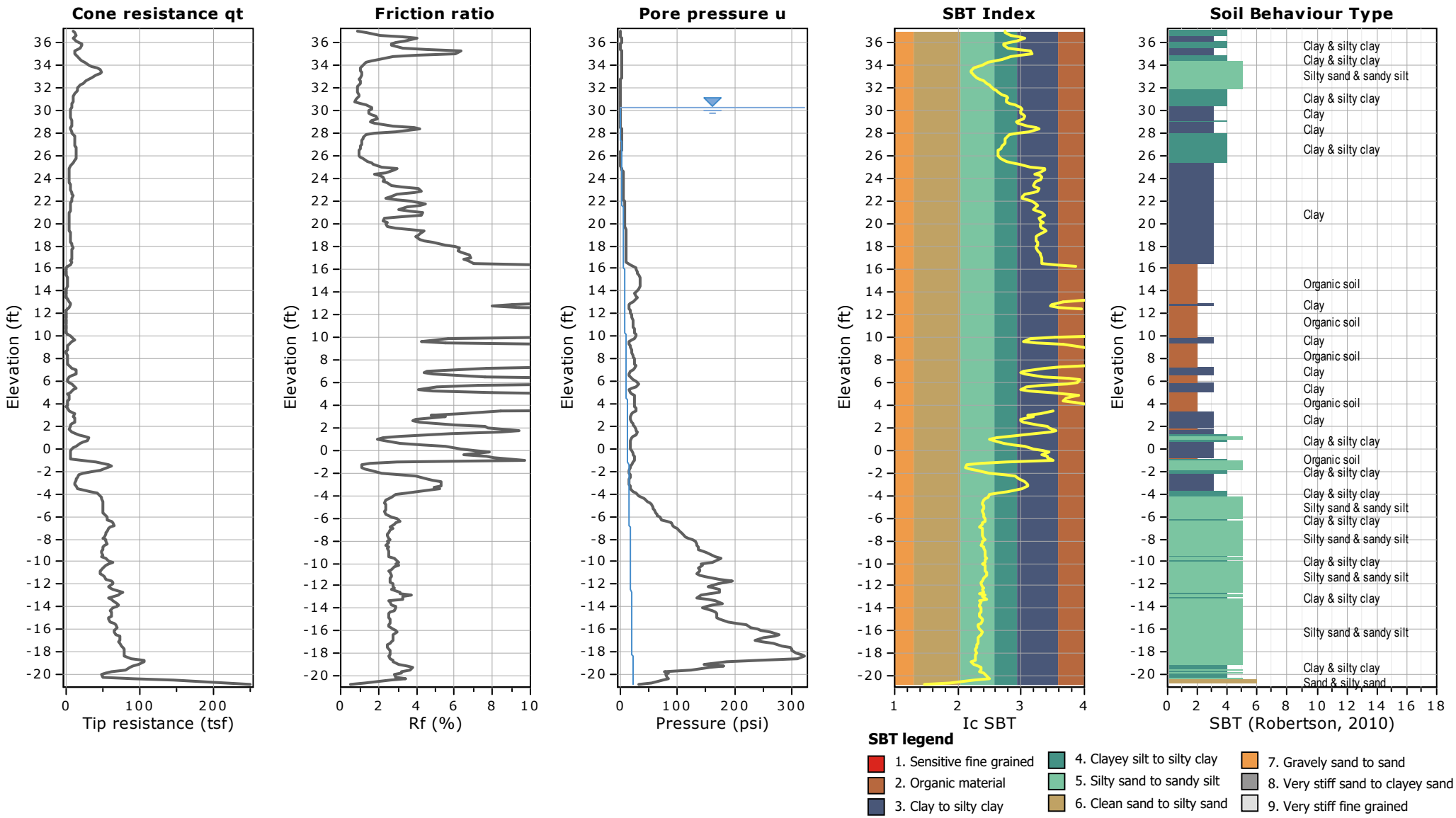
CPT: CPT-8
Total depth: 58.07 ft, Date: 11/26/2019
Surface Elevation: 37.20 ft
Coords: X:2119678.00, Y:321635.00

Project: US 701 over Cape Fear River
Location: Bladen County



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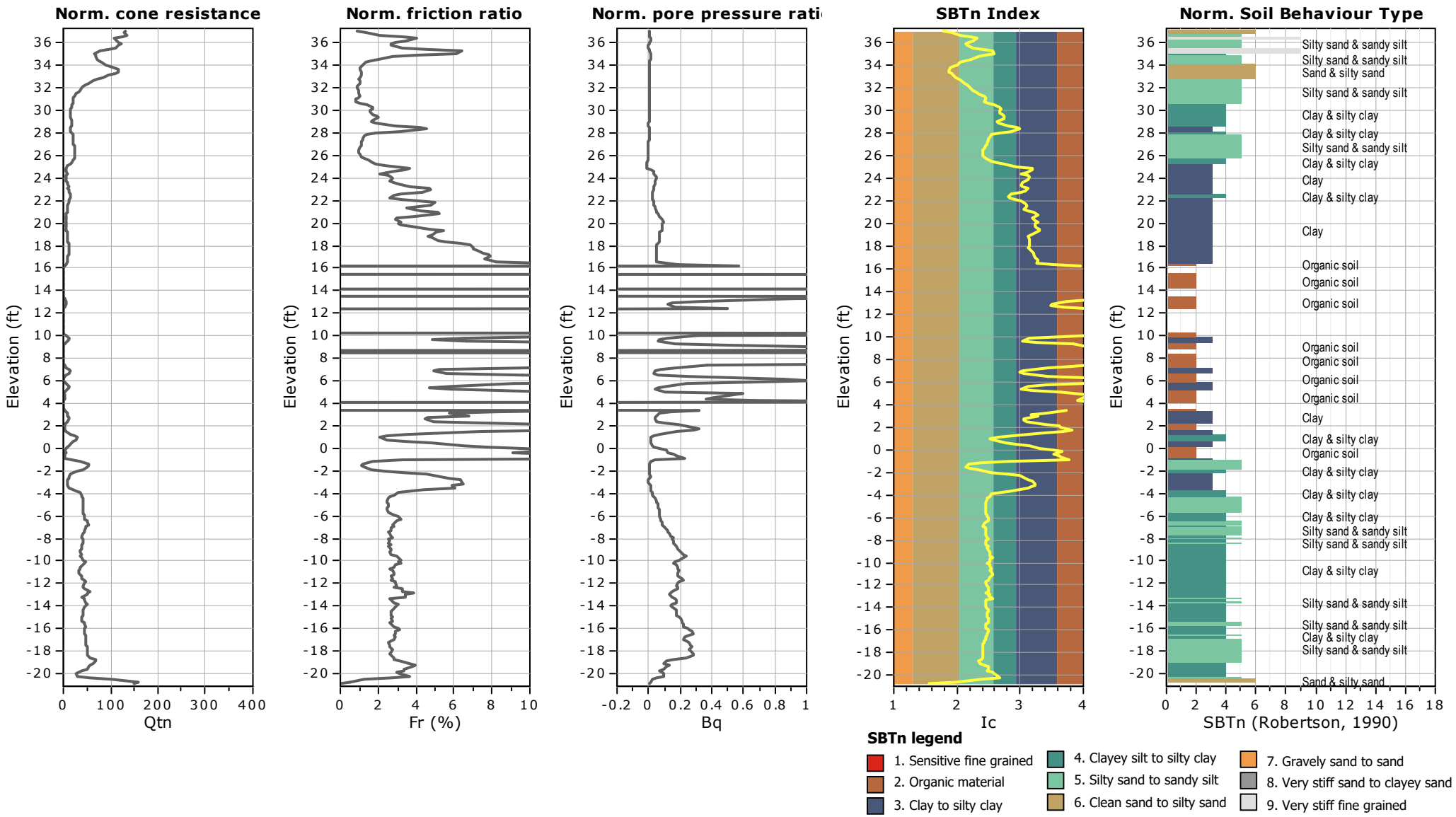
CPT: CPT-8
Total depth: 58.07 ft, Date: 11/26/2019
Surface Elevation: 37.20 ft
Coords: X:2119678.00, Y:321635.00

Project: **US 701 over Cape Fear River**
Location: **Bladen County**



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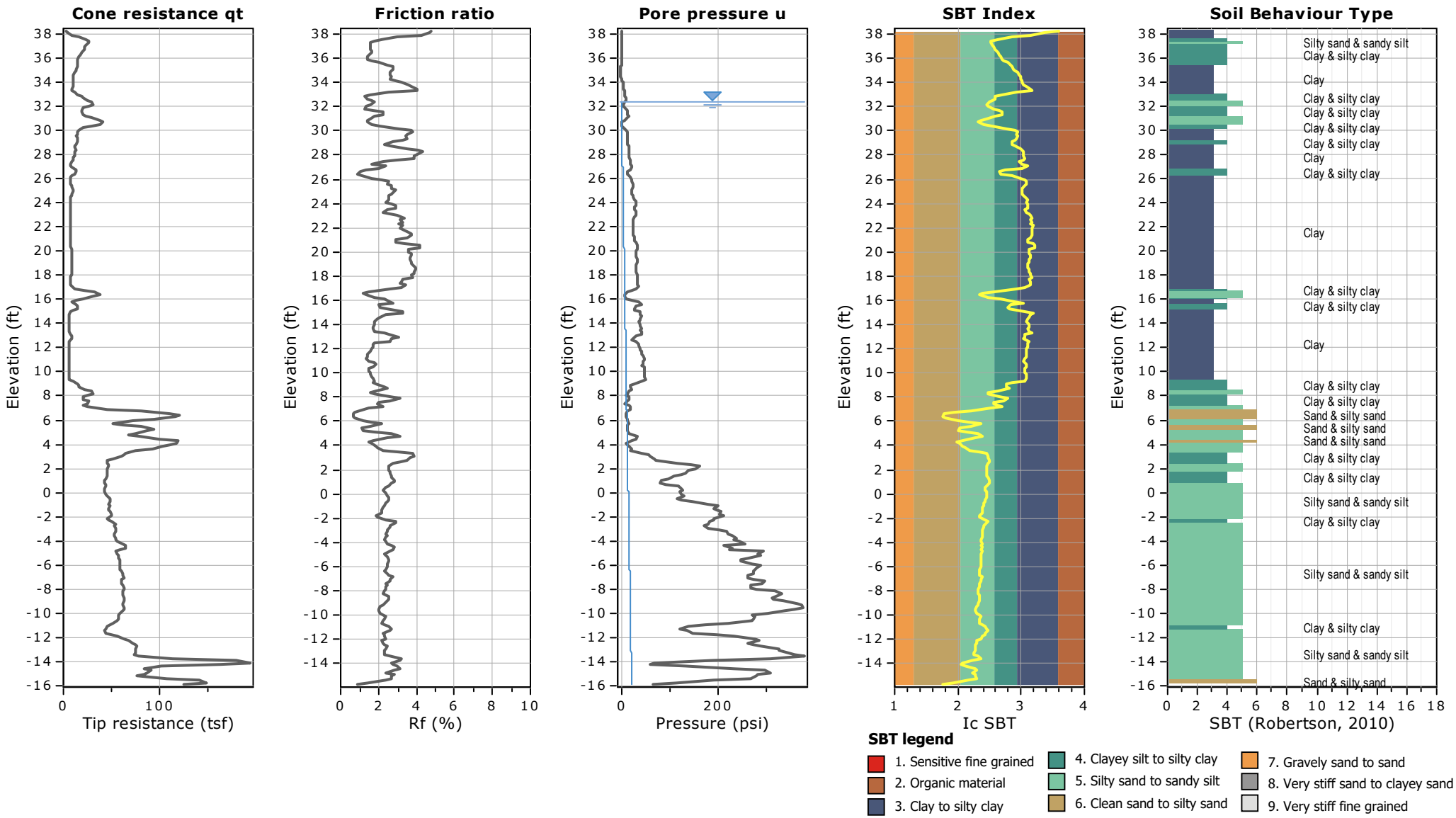
Project: **US 701 over Cape Fear River**
Location: **Bladen County**

CPT: CPT-9
Total depth: 54.30 ft, Date: 11/27/2019
Surface Elevation: 38.40 ft
Coords: X:2119612.00, Y:321797.00



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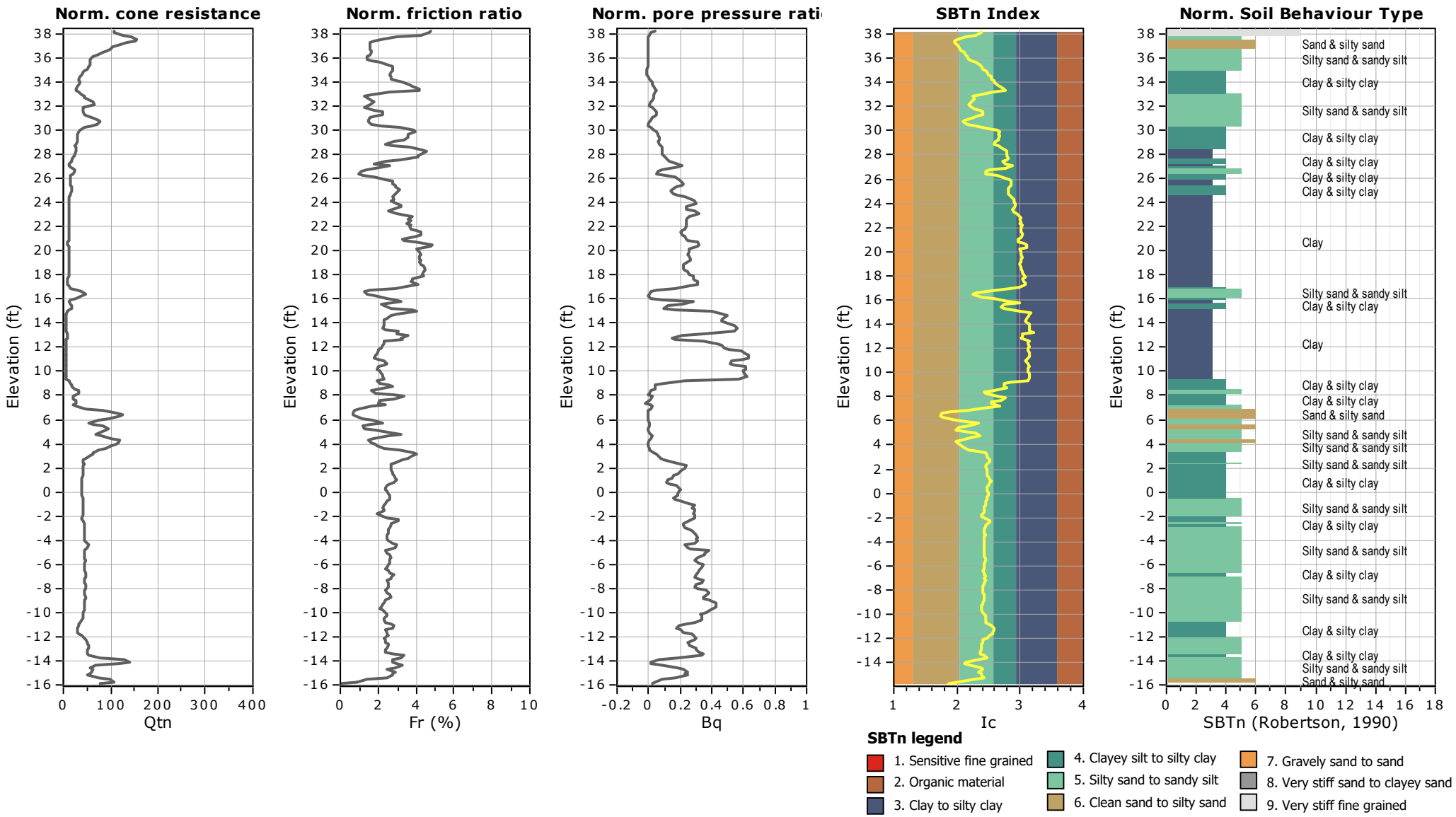
CPT: CPT-9
Total depth: 54.30 ft, Date: 11/27/2019
Surface Elevation: 38.40 ft
Coords: X:2119612.00, Y:321797.00

Project: **US 701 over Cape Fear River**
Location: **Bladen County**



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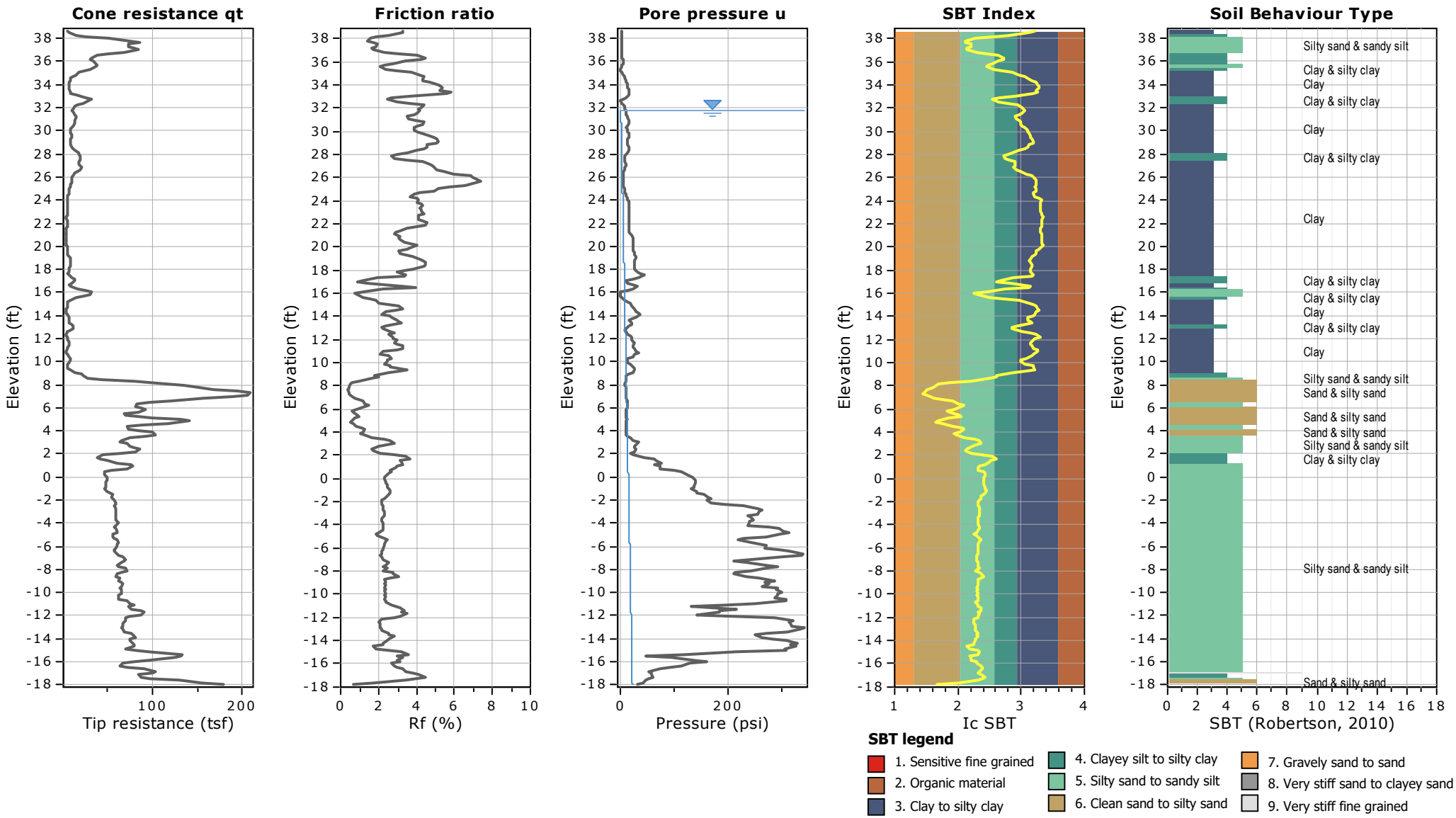
CPT: CPT-12
Total depth: 56.76 ft, Date: 11/27/2019
Surface Elevation: 38.80 ft
Coords: X:2119680.00, Y:321729.00

Project: **US 701 over Cape Fear River**
Location: **Bladen County**



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4505 Falls of Neuse Rd., Suite 110
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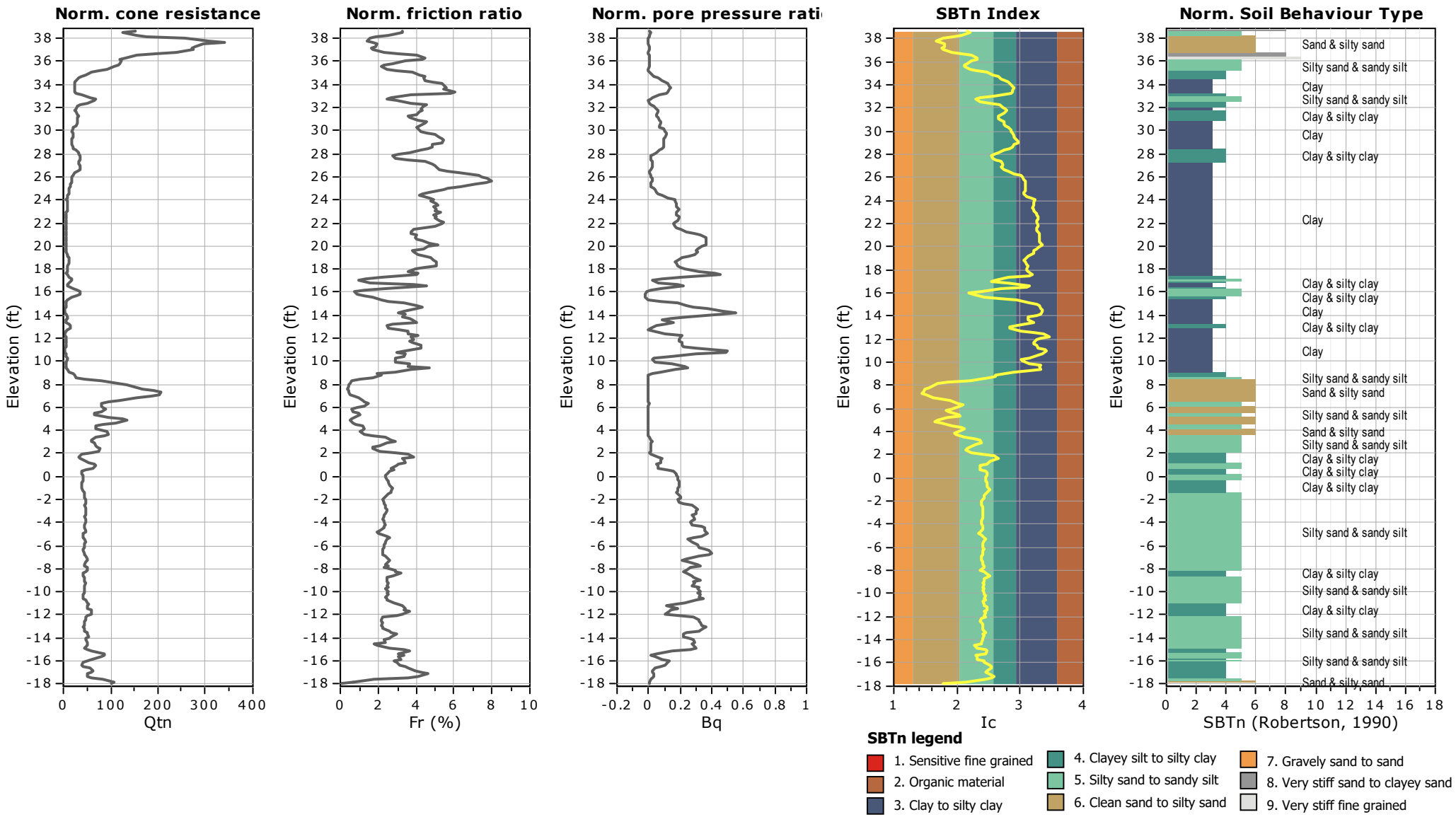
CPT: CPT-12
Total depth: 56.76 ft, Date: 11/27/2019
Surface Elevation: 38.80 ft
Coords: X:2119680.00, Y:321729.00

Project: **US 701 over Cape Fear River**
Location: **Bladen County**



LABORATORY TESTING SUMMARY

PROJECT NUMBER: 48793.3.1 **TIP:** N/A **COUNTY:** Bladen

DESCRIPTION: Replace Bridge Nos. 16 & 17 on US 701 over Cape Fear River

Boring No.	Sample No.	Alignment	Station	Offset (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Retained #4 Sieve	% Passing (sieves)			% Moisture	% Organic
									Coarse Sand	Fine Sand	Silt	Clay		#10	#40	#200		
B1-A	SS-163	-L-	114+04	3' LT	34 - 35.5	A-7-6 (40)	70	48	0.2	40.5	21.8	37.5	0	100	100	80	46.7	--
B1-A	SS-167	-L-	114+04	3' LT	74.1 - 75.6	A-2-7 (0)	54	32	58.2	15.8	5.6	20.4	1	96	52	26	31.4	--
B1-A	SS-173	-L-	114+04	3' LT	114.1 - 114.6	A-7-6 (18)	72	48	1.8	58.9	12.8	26.5	0	99	98	50	42.7	--
B1-A	SS-176	-L-	114+04	3' LT	144.1 - 145.6	A-2-4 (0)	29	8	77.0	13.3	2.7	7.1	0	98	46	11	30.0	--
B2-A	SS-180	-L-	115+67	7' LT	6.7 - 8.2	A-7-6 (21)	43	19	0.8	4.0	67.4	27.8	0	100	99	97	35.1	--
B2-A	SS-184	-L-	115+67	7' LT	31.5 - 33	A-7-6 (24)	56	36	0.4	47.6	20.6	31.5	0	100	100	70	41.4	--
B2-A	SS-191	-L-	115+67	7' LT	82 - 83.5	A-3 (1)	0	0	83.7	10.0	0.4	5.9	0	100	67	7	22.1	--
B2-A	SS-193	-L-	115+67	7' LT	97 - 98.5	A-7-6 (38)	72	47	1.0	32.1	19.9	46.9	0	100	99	77	50.8	--
B2-A	SS-196	-L-	115+67	7' LT	122 - 123.5	A-7-6 (12)	56	36	9.3	49.0	11.1	30.6	1	99	94	47	36.9	--
B3-A	SS-134	-L-	117+41	3' LT	7.9 - 9.4	A-6 (15)	40	17	0.4	18.2	34.8	46.6	0	100	100	86	38.5	--
B3-A	SS-136	-L-	117+41	3' LT	23.1 - 24.6	A-6 (8)	34	16	0.8	41.4	24.5	33.2	0	100	100	65	31.9	--
B3-A	SS-144	-L-	117+41	3' LT	67.3 - 68.8	A-7-6 (16)	65	41	15.4	34.8	11.8	38.1	1	98	95	50	45.9	--
B3-A	SS-147	-L-	117+41	3' LT	102.3 - 103.8	A-7-6 (35)	68	46	1.1	35.5	18.2	45.2	0	100	99	75	50.8	--
B3-A	SS-151	-L-	117+41	3' LT	132.3 - 133.8	A-7-6 (41)	101	73	16.5	24.5	8.2	50.9	0	100	83	60	40.1	--
B3-A	SS-153	-L-	117+41	3' LT	147.3 - 148.8	A-2-6 (0)	35	18	65.3	20.7	2.6	11.4	0	100	69	15	29.3	--
B4-A	SS-89	-L-	118+61	3' LT	47.9 - 49.4	A-2-4 (0)	28	7	14.6	55.6	5.8	24.0	0	100	99	32	43.5	--
B4-A	SS-99	-L-	118+61	3' LT	122.9 - 124.4	A-4 (0)	NP	NP	12.1	54.4	4.9	28.6	0	99	96	38	41.6	--
B4-A	SS-103	-L-	118+61	3' LT	147.9 - 149.4	A-2-4 (0)	NP	NP	28.9	46.8	4.8	19.5	0	99	94	26	43.0	--
B5-A	SS-115	-L-	120+20	5' LT	62.8 - 64.3	A-7-6 (12)	43	21	1.5	47.6	18.8	32.1	0	99	99	67	37.1	--
B5-A	SS-119	-L-	120+20	5' LT	92.8 - 94.3	A-2-4 (0)	25	7	61.9	20.3	3.3	14.5	0	98	58	21	24.3	--
B5-A	SS-128	-L-	120+20	5' LT	147.8 - 149.3	A-7-6 (17)	46	28	2.0	37.1	14.8	46.1	0	100	98	69	18.3	--
B5-A	SS-129	-L-	120+20	5' LT	157.8 - 159.3	A-2-6 (0)	28	13	28.6	40.1	5.6	25.7	0	100	88	35	19.0	--
B6-A	SS-51	-L-	121+94	3' LT	39.2 - 40.7	A-7-6 (11)	70	48	45.8	22.0	8.9	23.3	0	99	91	39	55.1	--
B6-A	SS-55	-L-	121+94	3' LT	79.6 - 81.1	A-2-4 (0)	NP	NP	54.1	30.3	2.1	13.5	0	100	92	17	37.4	--
B6-A	SS-58	-L-	121+94	3' LT	104.6 - 106.1	A-4 (3)	36	7	1.5	60.1	13.8	24.6	0	100	99	61	43.8	--
B6-A	SS-62	-L-	121+94	3' LT	134.6 - 136.1	A-4 (5)	36	7	5.8	25.3	18.6	50.3	0	99	96	72	32.6	--
B6-A	ST-1	-L-	121+94	3' LT	28.0 - 30.0	A-4 (1)	22	8	3.8	49.6	18.9	27.7	0	100	99	55	26.8	--
B7-A	SS-29	-L-	123+57	2' LT	54.7 - 56.2	A-7-6 (26)	55	38	8.4	24.4	34.3	32.9	0	99	96	71	37.7	--
B7-A	SS-33	-L-	123+57	2' LT	79.7 - 81.2	A-3 (1)	NP	NP	47.1	45.0	0.6	7.3	0	100	97	9	24.5	--
B7-A	SS-36	-L-	123+57	2' LT	104.7 - 106.2	A-2-4 (0)	26	6	28.8	46.2	6.6	18.4	0	99	91	28	44.0	--
B7-A	SS-43	-L-	123+57	2' LT	154.7 - 156.2	A-2-4 (0)	NP	NP	1.4	80.7	7.0	10.9	0	100	99	28	30.2	--

LABORATORY TESTING SUMMARY

PROJECT NUMBER: 48793.3.1 **TIP:** N/A **COUNTY:** Bladen

DESCRIPTION: Replace Bridge Nos. 16 & 17 on US 701 over Cape Fear River

Boring No.	Sample No.	Alignment	Station	Offset (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Retained #4 Sieve	% Passing (sieves)			% Moisture	% Organic
									Coarse Sand	Fine Sand	Silt	Clay		#10	#40	#200		
B-1	SS-4	-L-	121+58	28' LT	8.5 - 10.0	A-6 (4)	28	15	15.6	29.0	22.3	33.1	0	100	99	58	--	--
B-1	SS-6	-L-	121+58	28' LT	19.7 - 21.2	A-4 (0)	23	17	10.6	51.9	16.1	21.4	0	100	100	41	--	--
B-1	SS-8	-L-	121+58	28' LT	29.7 - 31.2	A-6 (10)	35	18	1.6	33.5	29.5	35.4	0	100	100	72	--	--
B-2	SS-49	-L-	121+77	66' LT	3.0 - 4.5	A-2-4 (0)	0	0	31.7	43.5	10.1	14.7	0	100	96	28	--	--
B-2	SS-52	-L-	121+77	66' LT	18.0 - 19.5	A-4 (0)	23	16	10.2	53.5	16.7	19.7	0	100	100	41	--	--
B-3	SS-22	-L-	121+24	72' RT	8.5 - 10.0	A-2-4 (0)	0	0	20.4	59.2	9.3	11.1	0	100	99	25	25.6	--
B-3	SS-24	-L-	121+24	72' RT	13.6 - 15.1	A-6 (4)	33	17	7.1	48.3	19.8	24.9	0	100	100	49	27.3	--
B-3	SS-25	-L-	121+24	72' RT	22.4 - 23.9	A-4 (0)	21	17	7.6	63.2	15.2	14.0	0	100	100	36	22.1	--
B-3	SS-28	-L-	121+24	72' RT	37.4 - 38.9	A-7-6 (45)	72	20	0.9	25.2	19.9	54.0	0	100	100	82	49.2	--
B-4	SS-79	-L-	117+39	113' LT	8.6 - 10.1	A-7-6 (33)	53	22	1.0	7.1	39.0	52.9	0	100	99	95	33.6	--
B-4	SS-81	-L-	117+39	113' LT	18.6 - 20.1	A-7-6 (19)	45	21	1.0	23.6	34.6	40.8	0	100	99	81	35.5	--
B-4	SS-83	-L-	117+39	113' LT	28.6 - 30.1	A-6 (13)	39	17	8.2	30.3	29.3	32.3	0	100	97	68	32.9	--
B-5	SS-91	-L-	117+05	47' LT	8.0 - 9.5	A-7-6 (18)	43	22	2.7	15.5	38.9	42.9	0	100	98	85	39.0	--
B-5	SS-93	-L-	117+05	47' LT	18.0 - 19.5	A-6 (8)	35	17	1.1	44.5	24.4	30.0	0	100	100	61	29.3	--
B-5	SS-95	-L-	117+05	47' LT	28.0 - 29.5	A-6 (6)	33	17	2.4	49.1	23.1	25.4	0	100	100	56	25.3	--

SITE PHOTOGRAPH

Bridge Nos. 16 & 17on US 701 over Cape Fear River

Looking South from End Bent 2