B REFERENCE **CONTENTS**

DESCRIPTION

TITLE SHEET

PROFILE (-L-) PROFILE (-DET-)

BORE LOGS SITE PHOTOGRAPH

LEGEND SITE PLAN

SHEET NO.

6-8

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY HALIFAX

PROJECT DESCRIPTION BRIDGE NO. 93 ON NC 561 OVER CONOCONNARA SWAMP AT -L- STA. 15+61

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5662	1	9

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-680. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNOS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIBBILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS WITH THE ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- IES:
 THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT
 OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS
 OR CONTRACT FOR THE PROJECT.
 BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS
 FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE
 CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

S. WOODS, GIT

F&R (DRILLING)

S. DAVIS

T. BEARD

INVESTIGATED BY S. WOODS, GIT

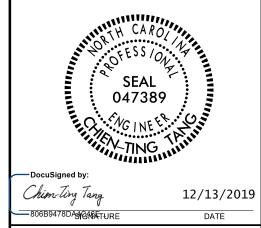
DRAWN BY __C.T. TANG, PE

SUBMITTED BY __C.T. TANG, PE

DATE _NOVEMBER 2019



STEWART



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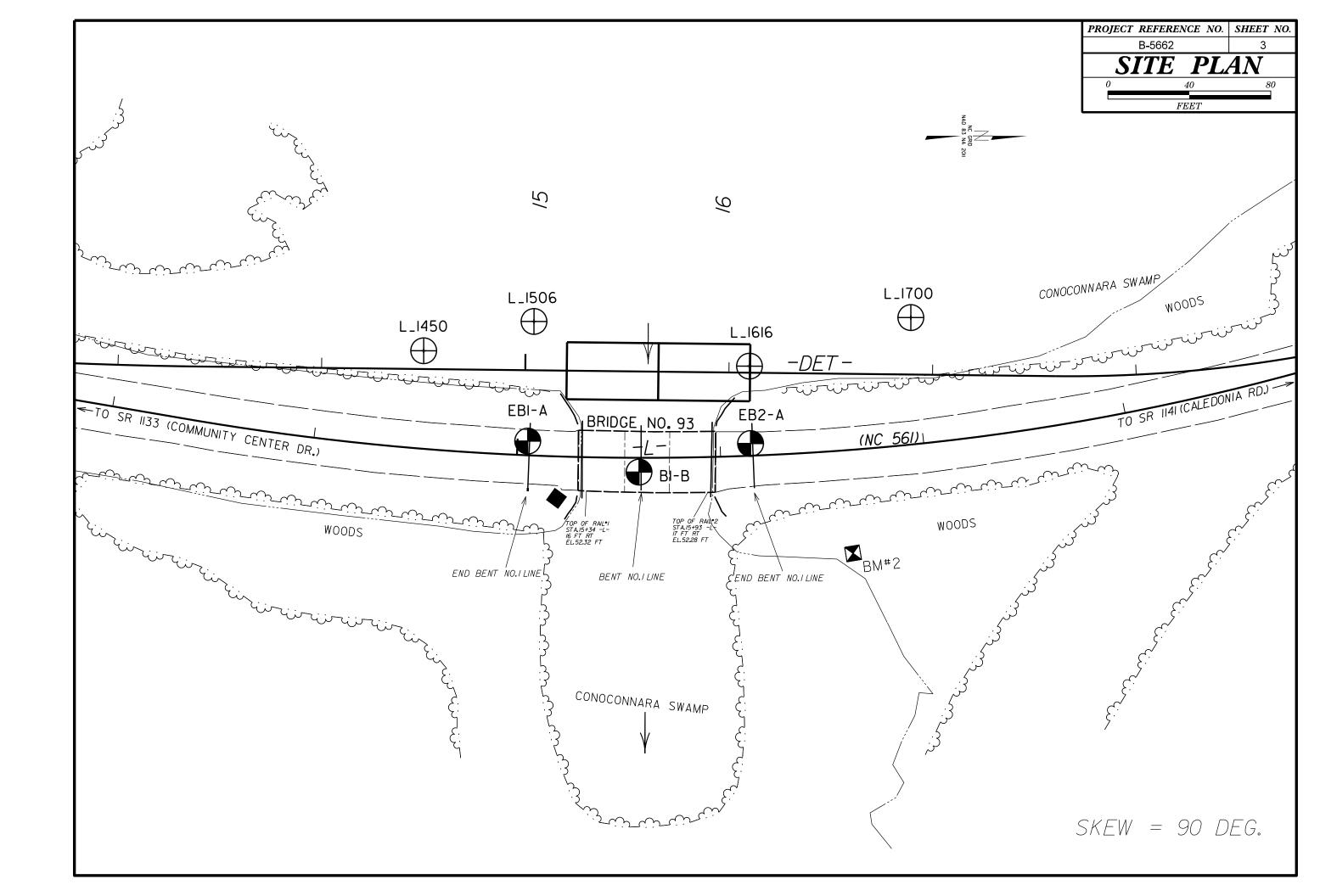
PROJECT REFERENCE NO. SHEET NO. 2

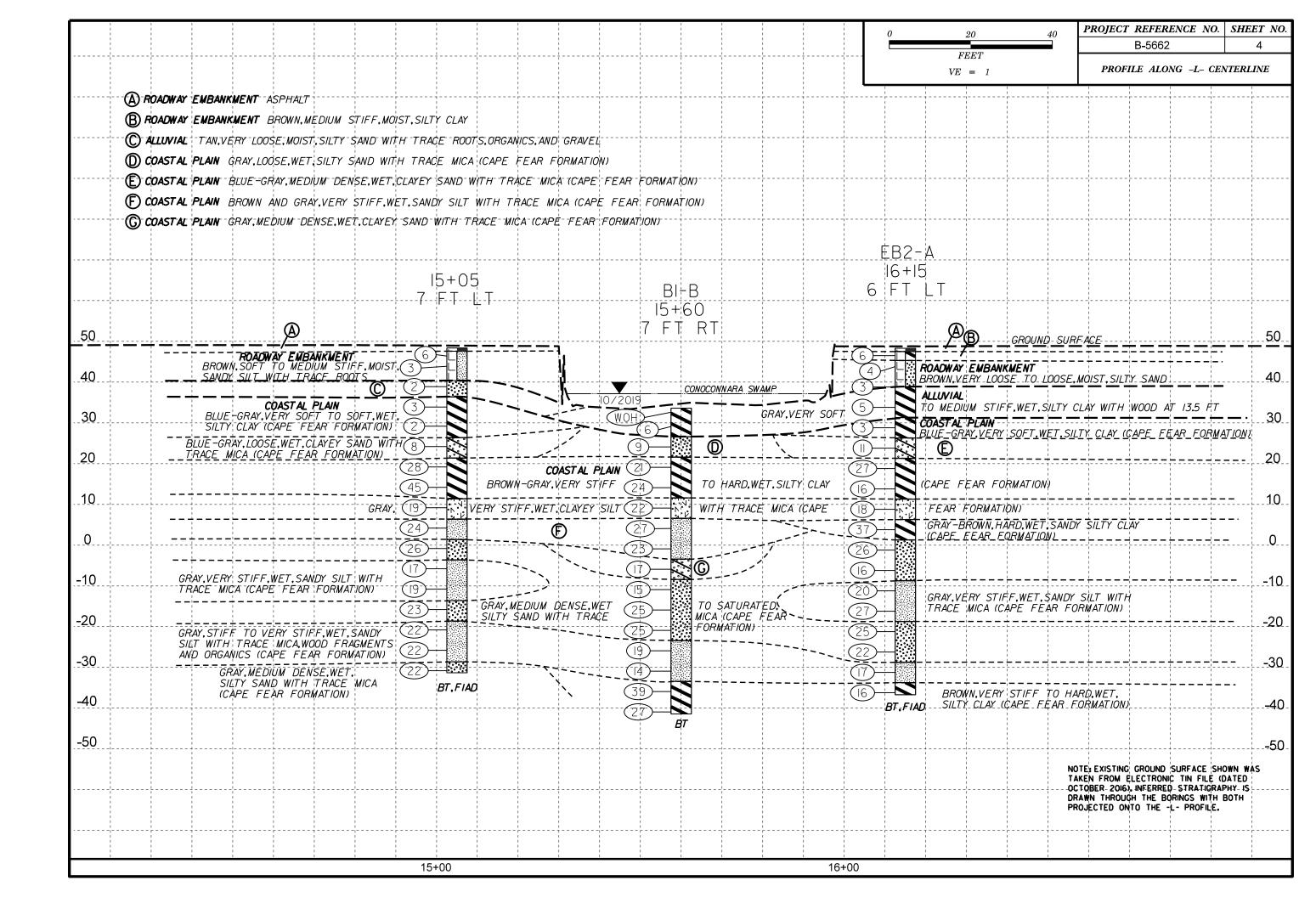
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

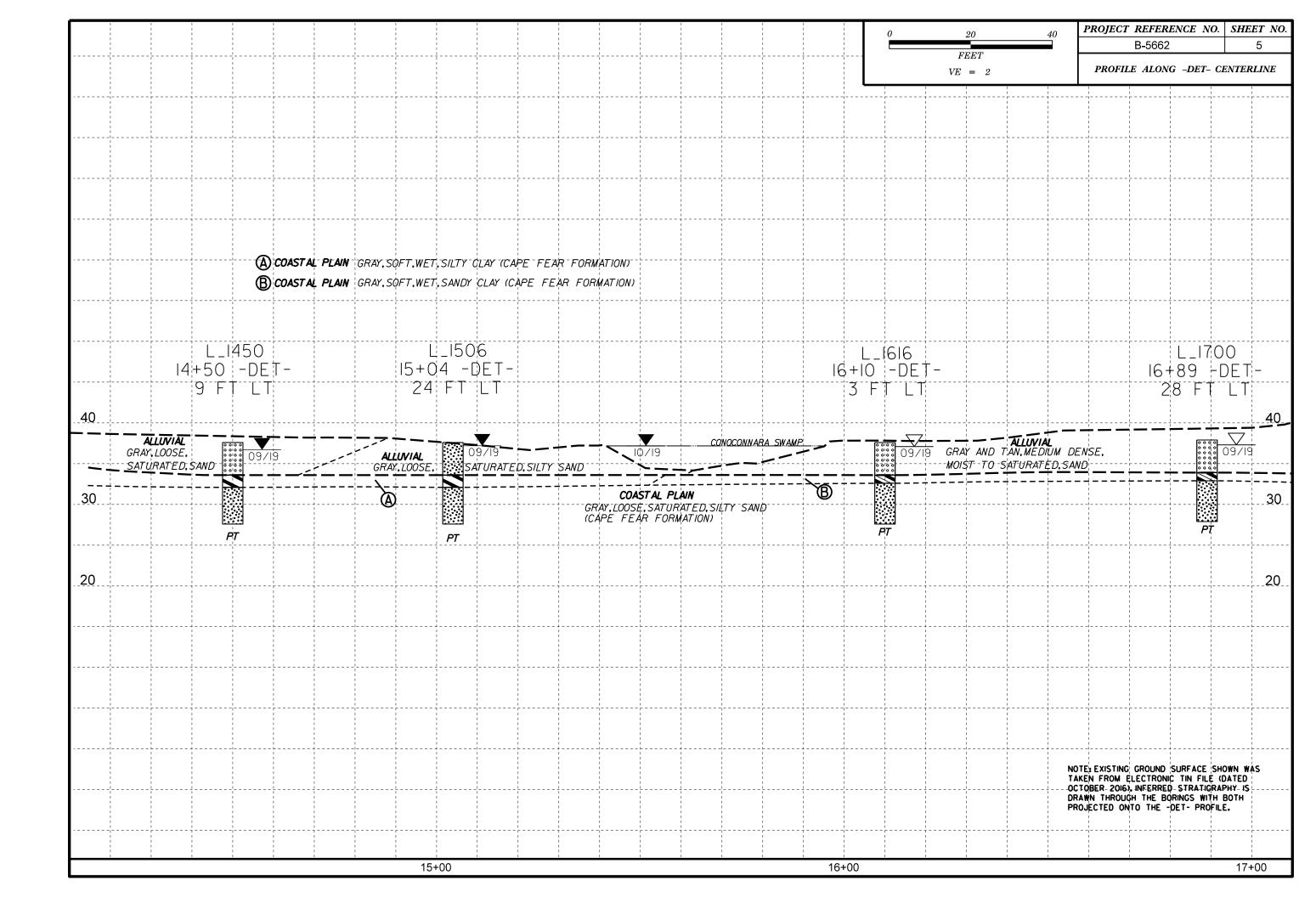
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

COUL DESCRIPTION	CDADATION	I DOCK DECEDIATION	TEDMC AND DEFINITIONS	
SOIL DESCRIPTION SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	GRADATION WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	ROCK DESCRIPTION HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	TERMS AND DEFINITIONS	
BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND VIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586), SOIL CLASSIFICATION	UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	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	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA.	
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.	
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING	
VERY STIFF,GRAY,SILTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.	
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	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	
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAQLIN, ETC.	CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	SURFACE.	
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.	
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-6	COMPRESSIBILITY	NON-CHTSTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM	
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED	
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.	
*10 50 MX GRANULAR SILS MUCK, ** *40 30 MX 50 MX 51 MN SOILS CLAY PEAT	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT	
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE	
MATERIAL PASSING *40	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	HORIZONTAL.	
LL - 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 10 LITTLE OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE	
PI 6 MX NP IW MX IW MX II MN II MN IW MX II MN II MN II MN MODERATE ORGANIC	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE GROUND WATER	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH, FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE	
CHOUP INJEX U U U 4 MX 8 MX 12 MX 16 MX NU MX AMUUNIS UF SOILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.	
USUAL TYPES STONE FRAGS. OF MAJOR GRAPEL, AND SAND GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.	
MATERIALS SANU	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS ∇PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.	
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR UNSUITABLE		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.	
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	WITH FRESH ROCK. MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE	
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.	
PRIMARY SOIL TYPE COMPACTNESS OR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.	
CONSISTENCY PENEIRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT ²)	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.	
GENERALLY VERY LOOSE 4 TO 12	SOIL SYMBOL SOIL SYMBOL SOIL SYMBOL SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.	
GRANULAR LOUSE 4 10 10 MATERIAL MEDIUM DENSE 10 TO 30 N/A	I M	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS	
MATERIAL DENSE 30 TO 50 (NON-COHESIVE) VERY DENSE > 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE	
VERY DENSE	INFERRED SOIL BOUNDARY CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.	
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	TECT DODING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.	
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2	SINE INFERRED ROCK LINE O MUNITURING WELL WITH CORE	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	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE	
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	→▼→→→ ALLUVIAL SOIL BOUNDARY △ PIEZOMETER → SPT N-VALUE	ALSO AN EXAMPLE.	RULK SEUMENTS EUDAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE	
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT	
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	THE INCIDENCE EVENUATION OF UNION ACCIFIED EVENUATION	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND	
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNSUITABLE WASTE	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO	
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TUP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.	
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.	
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF	
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM 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	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	
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{\sf d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.	
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION (ATTERBERG LIMITS) DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	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	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.	
	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN A INCHES DIVIDED BY	
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	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.	
PLASTIC LIQUID LIMIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
RANGE - WET - (W) SEMISULID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS ω - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: BM#2: RR SPIKE IN BASE OF 16* SYCAMORE 50.8' RT OF -L-	
(PI) PL PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	STA. 16+61.37	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 42.33 FEET	
SL _ SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C X CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:	
- DRY - (D) REQUIRES ADDITIONAL WATER TO	CH CONTINUOUS SUIGUT AUSED	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	PROBE DATA FOR -DET- BRIDGE PROVIDED BY NCDOT; GROUND SURFACE	
ATTAIN UPTIMUM MUISTURE	X CME-55 G* CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	ELEVATIONS OF PROBE LOCATION GENERATED FROM FILE B5662_IS_TNL.T	
PLASTICITY	B. HOLLOW AUGERS -B -H	INDURATION	PT: PROBE TERMINATION	
PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC 0-5 VERY LOW	CME-550 HARD FACED FINGER BITS -N	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. RUBBING WITH FINGER FREES NUMEROUS GRAINS:		
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST VANE SHEAR TEST HAND TOOLS:	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.		
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	X CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;		
COLOR	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.		
CULUN	TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.		
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.	CORE BIT VANE SHEAR TEST	SHARP HAMMER BLOWS REQUIRED TO RREAK SAMPLE.		
MODIFIERS SOUR HS LIURI, DHAR, STREHKED, ETC. ARE USED TO DESCRIBE AFFEARANCE.	X PROBE (NCDOT)	EXTREMELY INDURATED SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-	







GEOTECHNICAL BORING REPORT BORE LOG

WD0 45047.4.4		BURE LUG	OFOLOGIST O Weeds	WD0 45047.4.4	TID D 5000	ITV HALIFAY	OFOLOGIST O Westle
WBS 45617.1.1		INTY HALIFAX	GEOLOGIST S. Woods	WBS 45617.1.1		ITY HALIFAX	GEOLOGIST S. Woods
	lo. 93 on NC 561 over Conoconnar		GROUND WTR (ft)	SITE DESCRIPTION Bridge No.			GROUND WTR (ft)
BORING NO. EB1-A	STATION 15+05	OFFSET 7 ft LT	ALIGNMENT -L- 0 HR. N/A	BORING NO. EB1-A	STATION 15+05	OFFSET 7 ft LT	ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 48.4 ft	TOTAL DEPTH 79.7 ft	NORTHING 920,250	EASTING 2,446,972 24 HR. FIAD	COLLAR ELEV. 48.4 ft	TOTAL DEPTH 79.7 ft	NORTHING 920,250	EASTING 2,446,972 24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE		DRILL METHOD M	, , , , , , , , , , , , , , , , , , , 	DRILL RIG/HAMMER EFF./DATE F&F	_	DRILL METHOD	
DRILLER S. Davis	START DATE 10/10/19	COMP. DATE 10/10/19	SURFACE WATER DEPTH N/A	DRILLER S. Davis	START DATE 10/10/19	COMP. DATE 10/10/19	SURFACE WATER DEPTH N/A
ELEV DRIVE DEPTH BLOW (75 400	SOIL AND NOON DESCRIPTION	ELEV DRIVE DEPTH BLOW COUL			SOIL AND ROCK DESCRIPTION
(ft) (ft) (ft) 0.5ft 0.5	t 0.5ft 0 25 50	75 100 NO. MOI G	ELEV. (ft) DEPTH (ft)	(ft) (ft) (ft) 0.5ft 0.5ft	0.5ft 0 25 50	75 100 NO. MOI C	3
50			_	-30	Match Line		Gray, Silty Sand, with Trace Mica 79.7
47.4 1.0	1 1		- 48.4 GROUND SURFACE 0.0 - 47.6 Asphalt 0.8		13	.	[Cape Fear Formation] (continued)
	3 6	:: :::: M L	ROADWAY EMBANKMENT				Boring Terminated at Elevation -31.3 ft In Silty Sand [Cape Fear Formation]
45 44.9 3.5 2 2	1 43		Brown, Sandy Silt, with Trace roots and Creosote Odor				
							<u> </u>
40 39.9 \pm 8.5	<u> </u> i		<u>- 40.4 8.0 </u>	±			Ł
1 2 1	1 •2 · · · · · · · · · ·	M	ALLUVIAL Tan, Silty Sand, with Trace Roots, organics				F
			and gravel 12.0				F
35 34.9 13.5		·· ····	COASTAL PLAIN Blue-Gray, Silty Clay (Petroleum Odor)				<u> </u>
	2 •3 · · · · · · · · · ·	:: :::: w	[Cape Fear Formation]				<u> </u>
							į.
30 30.2 18.2	1 2	 w 🖺	<u>-</u>	±			-
±							-
25 25.2 23.2			Blue-Gray, Silty Clayey Sand, with Trace				-
7 2 4	4	W	Mica (Petroleum Odor) [Cape Fear Formation]				F
			- 21.4 27.0				ţ.
20 20.2 28.2 9 12	16		Brown-Gray, Silty Clay [Cape Fear Formation]				<u> </u>
	28		- [Oape Fear Formation]				į.
+			-				-
15 15.2 7 33.2			-				-
‡			[F I
10 10.2 38.2			T 11.4 37.0 Gray, Clayey Silt, with Trace Mica				Ę I
7 8	11 • 19	w h ½	[Cape Fear Formation]				F
			- - 6.4 42.0				ţ
5 5.2 43.2	10		Brown-Gray, Sandy Silt, with Trace Mica [Cape Fear Formation]				<u> </u>
	16	W	Cape real romation	±			t
6 4		· · · · · · ·					-
0 0.2 +48.2 9 1	15		Gray, Silty Fine Sand, with Trace Mica [Cape Fear Formation]				<u>-</u>
	26		·				F
0 5 -5 -4.8 + 53.2			3.6 52.0 Gray, Sandy Silt, with Trace Mica				F
<u> </u>	11	w	[Cape Fear Formation]	‡			<u> </u>
			<u> </u>				ţ
<u>9</u> -10 -9.8 + 58.2	10	<u> </u>	<u>-</u>				<u> </u>
$\frac{9}{60}$ $\frac{1}{2}$ $\frac{5}{2}$ $\frac{9}{2}$	10 19	W	-	±			Ł
00 		· · · · · ·	13.662.0	+			-
-15 -14.8 T 63.2 8 10	!		Gray, Silty Sand, with Trace Mica [Cape Fear Formation]				F
· 기	23						F
7999 -20 -19.8 68.2			18.6 67.0				ţ.
<u>В</u> -20 -19.8 + 66.2 10 9	13	w	[Cape Fear Formation]	‡			<u> </u>
			į l				ţ
-25 -24.8 73.2	12	·· · · · ·	<u>-</u>				<u>L</u>
	13	W	-				Ł l
			- <u>-28.6</u>				-
S -30 -29.8 T 78.2							

GEOTECHNICAL BORING REPORT BORE LOG

							E LUG	1	
WBS	45617	'.1.1			TI	B-5662 COUNTY HA	LIFAX	GEOLOGIST S. Woods	
SITE	DESCR	IPTION	Brid	ge No.	93 o	NC 561 over Conoconnara Swamp			GROUND WTR (ft)
BOR	ING NO.	B1-B			S.	ATION 15+60 OFF	SET 7 ft RT	ALIGNMENT -L-	0 HR. N/A
COL	LAR ELE	EV . 33	.6 ft		T	TAL DEPTH 75.0 ft NOR	THING 920,305	EASTING 2,446,987	24 HR . N/A
DRILI	- RIG/HAI	MMER E	FF./DA	TE F&	_ R2175	CME-55 84% 03/01/2019	DRILL METHOD Mu	d Rotary HAMM	ER TYPE Automatic
DRIL	LER S	Davis			S	ART DATE 10/11/19 CON	P. DATE 10/14/19	SURFACE WATER DEPTH 3.0	
	ם ווער	DEPTH	BI C	W COL		BLOWS PER FOOT	SAMP. V	CONTACE WATER DEF TIT 5.5	OIL .
ELEV (ft)	ELEV (ft)	(ft)	0.5ft		0.5ft	0 25 50 75	100 NO. MOI G	SOIL AND ROCK DESC	
	(11)						THE PROPERTY	ELEV. (ft) WATER SURFACE (1	DEPTH (ft)
								WATEN SONTAGE (I	0/11/19)
35		L						. 33.6 MUD LINE	0.0
	33.6 -	- 0.0 -	WOH	WOH	WOH	0 .	· · Sat.	ALLUVIAL	
20								Gray, Silty Clay, with Trac Organics	e Roots and
30	30.1	3.5	2	3	3	6	Sat.		
	-	-				$\mid rac{1}{4} \cdot \cdot \cdot \cdot \mid \cdot \cdot \cdot \cdot \cdot \mid \cdot \mid \cdot \mid \cdot \mid$	·· 	26.6	7.0
25	25.1	8.5				5: : : : : : : : : : : :		COASTAL PLA	IN
		- 0.0	5	4	5	. • 9	w	Gray, Silty Sand, with T [Cape Fear Forma	
	-							21.6	12.0
20	20.1	13.5						Gray, Silty Cla [Cape Fear Forma	y
	-	-	5	9	12	21	W	Cape i eai i oima	luonj
	_	-							
15	15.1	18.5	9	10	14		<u> </u>		
	-		9	10	14	· · · · • ²⁴ · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · · ·	:: w		
	-							11.6 Crov Clavey S	<u> 22.0</u>
10	10.1	23.5	6	8	14			Gray, Clayey S [Cape Fear Forma	ition]
	-	-				.			
_						::::\:::: :::: :		6.6 Gray, Sandy Si	<u>27.0</u>
5	5.1	28.5	9	12	15	27	w 	[Cape Fear Forma	
	_	-				: : : : 72/ : : : : : : : :	· ·		
0	0.1	33.5				: : : : : : : : : : : : :			
	U.I _	_ 33.5	10	9	14	•23	w <u>-</u>		
	-	-				::::/ :::: :::: :		-3.4	37.0
-5	-4.9	38.5				$ \cdot\cdot\cdot '$		Gray, Clayey Sand, with	Trace Mica
			6	6	11	•17	w	[Cape Fear Forma	luonj
	_	-						-8.4	42.0
-10	-9.9	43.5						Gray, Clayey Silty Sand, wi Cape Fear Forma	th Trace Mica
	-	<u> </u>	4	7	8		· ·	[Oupo I our I office	
	-	-					··		
-15	-14.9	48.5	10	11	14				
	-	 	.5	''	.,	· · · · · • • 25 · · · · · · · · · · · · · · · ·			
	-	t							
-20	-19.9	_ 53.5	7	11	14	25	w		
	_	-						22.4	F7.0
-25	-24.9	58.5						Gray, Sandy Silt, with Trace	e Mica, Wood
-23	-24.9_	_ 56.5	6	8	11	• 19	w <u></u>	Fragments and Org [Cape Fear Forma	panics
	-	<u> </u>				: : :/: : : : : : : : : :		[Oupo I our I office	
-30	-29.9	63.5				$ \cdots $			
	-	F	8	7	7	• 14	w E	•	
	-					: : : :		-33.4	67.0
-35	-34.9	68.5			00			Brown, Silty Cla [Cape Fear Forma	ay
	-	<u> </u>	11	16	23	39	:: w 🔂	[Oupe i ear i Oillia	
	-								
-40	-39.9	73.5	8	11	16	· · · · / · · · · · · ·	<u> </u>		
	-			''	10	· · · · · ● 27 · · · · · · · ·	W	-41.4 Boring Terminated at Eleva	75.0 tion -41.4 ft In
	l _	L I						Silty Clay [Cape Fear F	ormation



GEOTECHNICAL BORING REPORT BORE LOG

WD0 45047.4.4		W HALIFAY	OFOLOGIST O Wests	WD9 45047.4.4	TID D 5000	TV HALIFAY	OFOLOGIST O Wester
WBS 45617.1.1		1	GEOLOGIST S. Woods			TY HALIFAX	GEOLOGIST S. Woods
	93 on NC 561 over Conoconnara S	, 		SITE DESCRIPTION Bridge No. 93		· · · · · · · · · · · · · · · · · · ·	GROUND WTR (ft)
BORING NO. EB2-A					STATION 16+15	OFFSET 6 ft LT	ALIGNMENT -L- 0 HR. N/A
COLLAR ELEV. 48.3 ft	TOTAL DEPTH 85.0 ft	<u> </u>			TOTAL DEPTH 85.0 ft	NORTHING 920,360	EASTING 2,446,973 24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE F&		DRILL METHOD Mud	•	DRILL RIG/HAMMER EFF./DATE F&R21		DRILL METHOD N	-
DRILLER S. Davis	START DATE 10/10/19		SURFACE WATER DEPTH N/A		START DATE 10/10/19	COMP. DATE 10/11/19	SURFACE WATER DEPTH N/A
ELEV DRIVE DEPTH BLOW COU	I		SOIL AND ROCK DESCRIPTION	ELEV DRIVE DEPTH BLOW COUNT			SOIL AND ROCK DESCRIPTION
(ft) (ft) (ft) 0.5ft 0.5ft	0.5ft 0 25 50	75 100 NO. MOI G E	ELEV. (ft) DEPTH (ft)	(ft) (ft) (ft) 0.5ft 0.5ft 0.5ft	5ft 0 25 50	75 100 NO. MOI G	
50				30.2 78.5 6 7 10	Match Line		
47.5 + 0.8			18.3 GROUND SURFACE 0.0 17.5 Asphalt 0.8	-30.2 178.5 6 7 10	0 • 17	· · · · · ·	Gray, Sandy Silt, with Trace Mica [Cape Fear Formation] (continued)
6 3	3 6	· · · · · · м - - 	ROADWAY EMBANKMENT				-33.7
45 44.8 1 3.5 3 2	2 1	- 	15.3 Srown, Silty Clay Silty Sand	-35 -35.2 83.5 6 7 9	9 16		[Cape Fear Formation]
			District, Strip State		□ 16	"	-36.7 85.0 Boring Terminated at Elevation -36.7 ft In
40 39.8 - 8.5							Silty Clay [Cape Fear Formation]
39.6 = 6.5	1 43	м 📙 з	9.4 ALLUVIAL				F
			White-Red, Silty Clay				-
35 34.8 13.5	1	· ···· 	Wood in Spoon at 13.5 feet				- -
	3 •5	: : : : :	Wood III Spool at 13.3 leet				_
±		: ::::	31.3				<u> </u>
30 29.8 18.5	2	 	COASTAL PLAIN Blue-Gray, Silty Clay				_
	- • • • • • • • • • • • • • • • • •	: : : : :	[Cape Fear Formation]				-
25 24 8 23 5		· · · · · · 2	22.0 Blue-Gray, Clayey Sand, with Trace Mica				-
25 24.8 23.5 4 4	7		[Cape Fear Formation]				- -
			07.0				_
20 19.8 - 28.5		· · · · ·	21.3 27.0 Gray-Brown, Silty Clay 27.0				-
13.0 = 20.3	18	- w	[Cape Fear Formation]				F
							-
15 14.8 - 33.5							- -
5 6	10	: ::::					-
		: ::::	11.3	±			<u> </u>
10 9.8 $\frac{1}{2}$ 38.5 5 7	11		Gray-Brown, Clayey Silt [Cape Fear Formation]				-
							F
5 48 435			Gray-Brown, Sandy Silty Clay				-
5 4.8 43.5 8 15	22		[Cape Fear Formation]				- -
		: ::::	1.3 47.0				- -
0 -0.2 + 48.5		· · · · · ·	Gray, Silty Sand, with Trace Mica	±			<u>L</u>
= 9 12	14	- · · · · · Sat.	[Cape Fear Formation]	±			<u> </u>
1.GD							<u> </u>
5.2 53.5 6 7	9			+			-
	16	· · · · · ·		‡			-
변 발 -10 =10.2 = 58.5		· · · · · ·	8.7 57.0 Gray, Sandy Silt, with Trace Mica				-
-10 -10.2 -10.2 + 58.5 7 9 	11	- w =	[Cape Fear Formation]				- -
		: ::::		‡			<u> </u>
<u>S</u> -15 -15.2 -63.5		· · · · · 					<u>-</u>
9 11	Q 2/	- w - -					-
			18.7 67.0	‡			<u>[</u>
-20 -20.2 - 68.5	12		Gray, Silty Sand, with Trace Mica [Cape Fear Formation]	‡			-
10 12	13 •25	· · · · · ·	[Super our continuent]				
							<u> </u>
-25 -25.2 73.5 9 10	12			‡			-
	□ □ · · · · • • • · · · · · · · · · · ·						<u> </u>
30 -30			28.777.0	‡			F
							-

B-5662 9

SITE PHOTOGRAPH

BRIDGE 93



VIEW LOOKING SOUTHEAST