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REFERENCE

#### STATE OF NORTH CAROLINA

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

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1	TITLE SHEET
2	LEGEND
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## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY New Hanover
PROJECT DESCRIPTION SR 1409 (Military Cutoff Rd.) to
US 17 in Wilmington
SITE DESCRIPTION Noise Wall 1B at -L- Sta. 18+00 Right

STATE PROJECT REFERENCE NO. U-4751

#### **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 LOOS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEGICH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

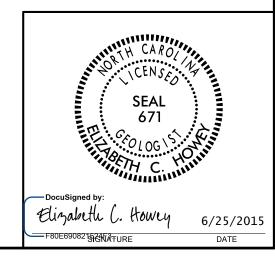
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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 THE SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR IS ALL! HAVE NO CLAIM FOR ADDITIONS 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.

D. Tignor W. Shenberger CHECKED BY B. Howey, PG, PE SUBMITTED BY \_HDR, Inc. DATE \_\_April 2015

D. Racey

**PERSONNEL** 



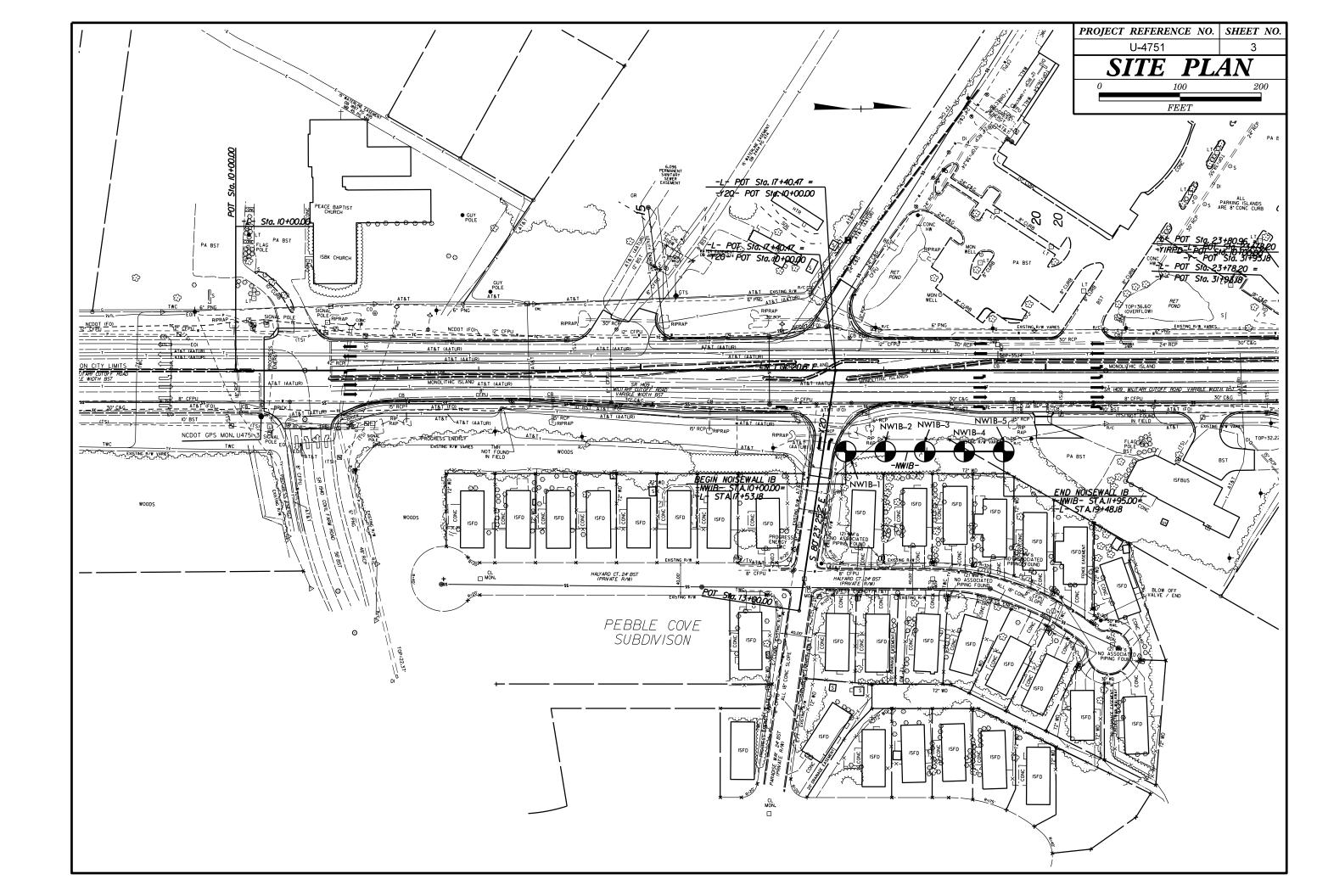
U-4751 SHEET NO.

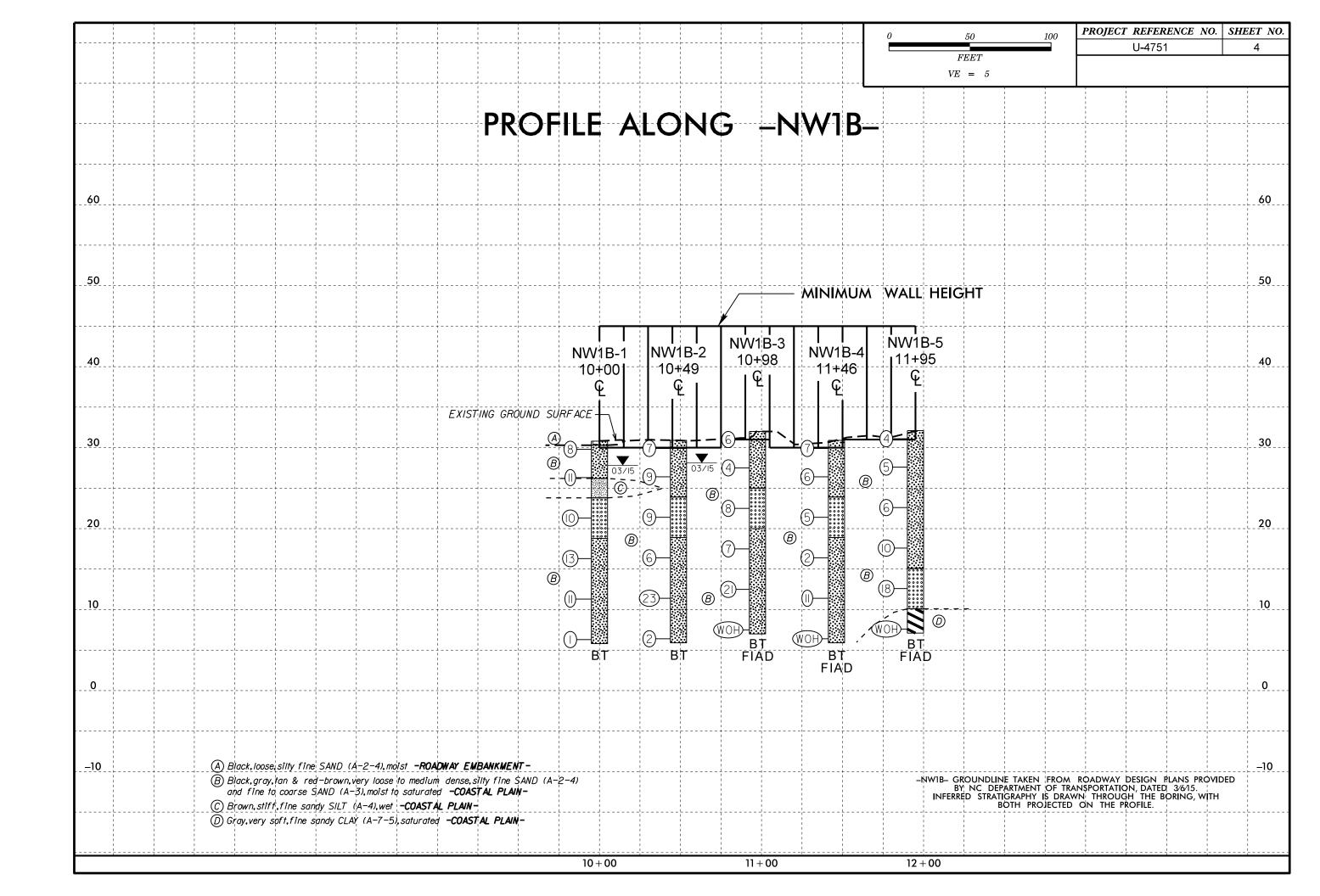
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

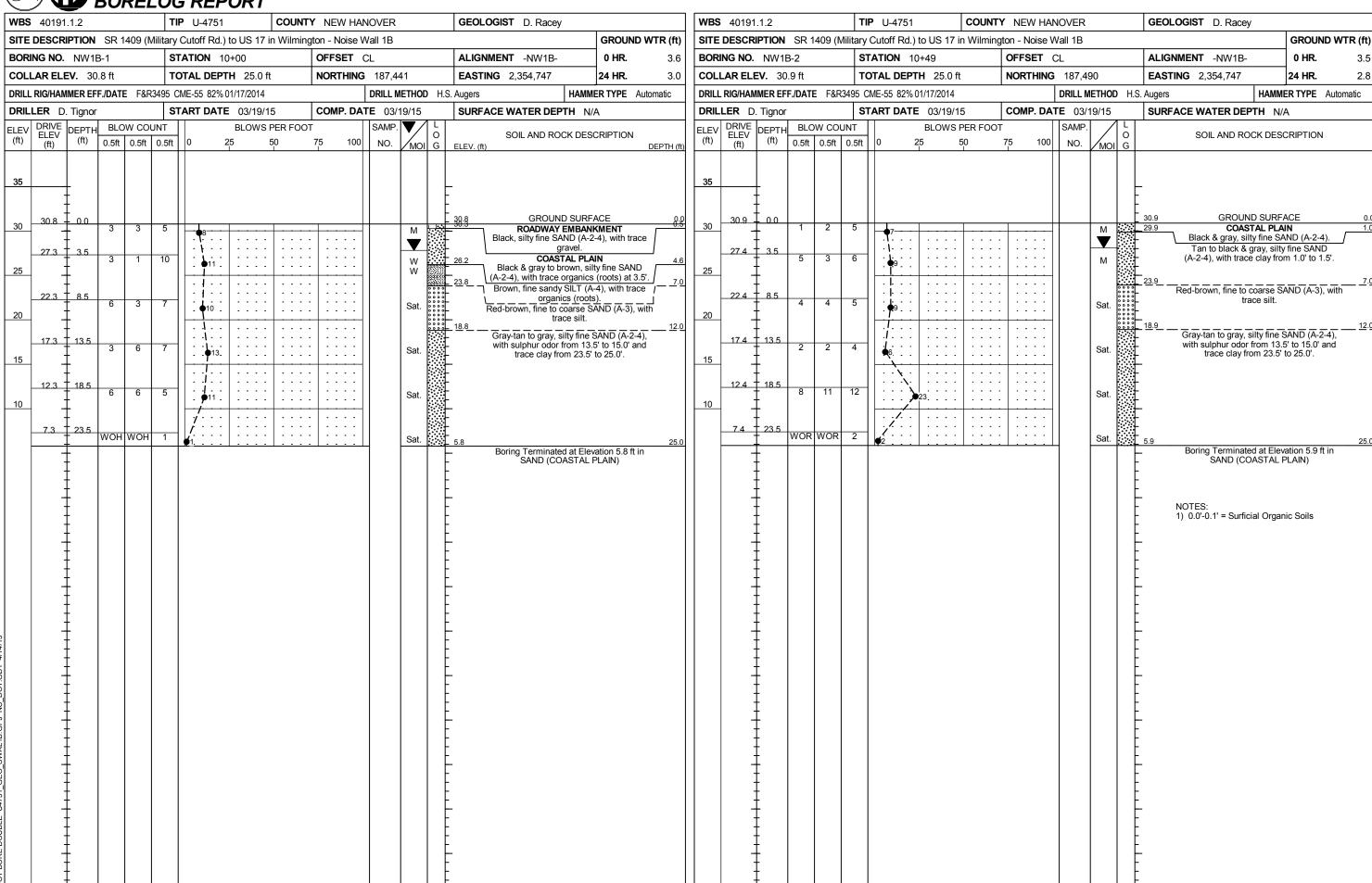
# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586), SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANDULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.  GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.  ANGULARITY OF GRAINS  THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:  ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	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 PERETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 01.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  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	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.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION  MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.  COMPRESSIBILITY	ROCK (WR)  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, ONEISS, GABBRO, SCHIST, ETC.  NON-CRYSTALLINE SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL 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 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
SYMBOL	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50  PERCENTAGE OF MATERIAL  GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS OTHER MATERIAL	ROCK (NCR)  ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN SEDIMENTARY ROCK SEDIMENTARY ROCK (CP) SHELL BEDS, ETC.  WEATHERING  FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	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.
MATERIAL PASSING *40  LL  PI 6 MX NP 18 MX 10 MX 11 MN 18 MX 41 MN 48 MX 41 MN 48 MX 41 MN LITTLE OR GROUP INDEX 8 8 8 8 4 MX 8 MX 12 MX 15 MX 10 MX 1	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	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 OF A CRYSTALLINE NATURE.  SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	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
USUAL TYPES STONE FRAGS. OF MAJOR GRAYEL, AND SAND SAND GRAYEL AND SAND SOILS  GEN. RATING GS. SUBGRADE  EXCELLENT TO GOOD FAIR TO POOR POOR POOR UNSUITABLE	■ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING     ■ STATIC WATER LEVEL AFTER 24 HOURS      □ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  MODERATE  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 FEESH ROCK.	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.
PI OF A-7-5 SUBGROUP IS \$\leq 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 (TOMS/FT2) (TOMS/FT2) (TOMS/FT2)	SPRING OR SEEP  MISCELLANEOUS SYMBOLS  ROADWAY EMBANKMENT (RE) 25/0275 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAQLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.  IF TESTED, WOULD YIELD SPI REFUSAL  SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	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.
GENERALLY VERY LOOSE ( 4 TO 10 GRANULAR LOOSE 4 TO 10 TO 30 N/A MATERIAL DENSE 30 TO 50 VERY DENSE > 50	SOIL SYMBOL  ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT  SOIL SYMBOL  ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT  AUGER BORING  CONE PENETROMETER TEST	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 SYT N YALUES > 100 BFF  VERY ALL ROCK EXCEPT OUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	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 ALCK OF GOOD DRAINAGE.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
VERY SOFT	INFERRED SOIL BOUNDARY  CORE BORING  SOUNDING ROD  TEST BORING WITH CORE  TEST BORING WITH CORE  PIEZOMETER INSTALLATION  SPI N-VALUE	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> 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.	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK,  ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS  VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
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 COBBLE (GR.) COARSE SAND SAND (CSL.) (CL.)  (CSL.) (CSL.)	UNDERCUT UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE UNCLASSIFIED EXCAVATION - ACCEPTABLE OF DEMANAMENT OR BACKFILL  ABBREVIATIONS  UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	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  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	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.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 <sub>d</sub> - DRY UNIT WEIGHT CSC COARSE ORG ORGANIC	BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I 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	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
CATTERBERG LIMITS)  DESCRIPTION  - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE  PLASTIC  PLASTIC  CEMISOLID, BEQUIPEE DRYING TO	DMT - DILATOMETER TEST	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  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.	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO ON GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE (PI) PLASTIC LIMIT  OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT  OKATTAIN OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	FRAGS FRAGMENTS HI HIGHLY  EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS:  ADVANCING TOOLS:  HAMMER TYPE:	FRACTURE         SPACING         BEDDING	BENCH MARK: N/A  ELEVATION: N/A FEET
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  PLASTICITY	CME-45C         CLAY BITS         X AUTOMATIC         MANUAL           X CME-55         6° CONTINUOUS FLIGHT AUGER         CORE SIZE:         -8        H            CME-550         HARD FACED FINGER BITS         -N         -N         -N         -N	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET THINLY LAMINATED < 0.008 FEET THINLY LAMINATED < 0.008 FEET THINLY LAMINATED SOURCE FEET THINLY LAMINATED SOURCE FEET TO SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	NOTES: BORING AND GROUND SURFACE ELEVATIONS OBTAINED FROM NCDOT-PROVIDED DTM FILE FIAD - FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY INDEX (PI)   DRY STRENGTH	CME-550	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.  GRAINS ARE DIESICULT TO SERAPATE WITH STEEL PROBE.	
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 SOUNDING ROU  VANE SHEAR TEST  X 2 15/16 * DRAG BIT	INDURATED DIFFICULT TO BREAK WITH HAMMER.  EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:  SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14







Wide   1961   2   19	BOREL				14/20 1010110	TID	<b>5</b> / 1/5/1/10/15	05010005 0 0
SCHILLAR PLAN   STATION   10-98   OFFSET C.   ALIGNMENT - AWYS.   0 HR. FIAD   COLLAR ELEV. 32 0 ft   TOTAL DEPTH 25 0 ft   NORTHING 167-509   EASTING 2.545-43   24 HR. FIAD   COLLAR ELEV. 30 9 ft   TOTAL DEPTH 25 0 ft   NORTHING 167-509   EASTING 2.545-43   24 HR. FIAD   COLLAR ELEV. 30 9 ft   TOTAL DEPTH 25 0 ft   NORTHING 167-509   EASTING 2.545-43   24 HR. FIAD   COLLAR ELEV. 30 9 ft   TOTAL DEPTH 25 0 ft   NORTHING 167-509   EASTING 2.545-43   24 HR. FIAD   COLLAR ELEV. 30 9 ft   TOTAL DEPTH 25 0 ft   NORTHING 167-509   EASTING 2.545-43   24 HR. FIAD   COLLAR ELEV. 30 9 ft   TOTAL DEPTH 25 0 ft   NORTHING 167-509   EASTING 2.545-43   24 HR. FIAD   COLLAR ELEV. 30 9 ft   TOTAL DEPTH 25 0 ft   NORTHING 167-509   EASTING 2.545-43   24 HR. FIAD   COLLAR ELEV. 30 9 ft   TOTAL DEPTH 25 0 ft   NORTHING 167-509   EASTING 2.545-43   24 HR. FIAD   COLLAR ELEV. 30 9 ft   TOTAL DEPTH 25 0 ft   NORTHING 167-509   EASTING 2.545-43   24 HR. FIAD   COLLAR ELEV. 30 9 ft   TOTAL DEPTH 25 0 ft   NORTHING 167-509   EASTING 2.545-43   24 HR. FIAD   COLLAR ELEV. 30 9 ft   TOTAL DEPTH 25 0 ft   NORTHING 167-509   EASTING 2.545-43   24 HR. FIAD   EASTING	WBS 40191.1.2			ODOLIND WITD (6)	WBS 40191.1.2			GEOLOGIST D. Racey
COLLAR ELEV. 3.0 ft   TOTAL DEPTH 25 0ft   SOFT	· · · · · · · · · · · · · · · · · · ·	<u> </u>		<b>⊣</b> ``1		<del>`   '</del>	<del>-</del>	
DRILLER D. Tigror   START DATE 1920015   COMP. DATE 0320015   COMP. DATE 0320015   SURFACE WATER DEPTH NA				_				
DRILLER D. Tignor   START DATE   03/2015   COMP. DATE   03/2015   SURFACE WATER DEPTH   NA							<del></del>	
ELEY   ONN   ELEY   ONN   ELEY   ONN   OUNT   ELOWS PER FOOT   SAMP   V   C   SOL AND ROCK DESCRIPTION   OUNT							<del> </del>	
10    (h)				N/A			<del></del>	SURFACE WATER DEPTH N/A
35			SOIL AND ROCK DES			ft 0.5ft 0 25 50	/	
30 0 0 0 1 4 3 3 0 0 0 1 4 3 3 0 0 0 1 4 3 3 0 0 0 1 4 3 3 0 0 0 1 4 3 3 0 0 0 0 1 4 3 3 0 0 0 0 1 4 3 3 0 0 0 0 1 4 3 3 0 0 0 0 1 4 3 3 0 0 0 0 1 4 3 3 0 0 0 0 1 4 3 3 0 0 0 0 0 1 4 3 3 0 0 0 0 1 4 3 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(ii) Sion Sion		MOI G ELEV. (π)	DEPTH (ft)	(it) Sion sion		, wor more	
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30 2 2 2 4 6 6 9 8 1 1 10 21 1 8 5 1 1 10 8 1 10 8 1 10 8 1 10 8	35				35 +			-
Black, gray, and total silly fine SAND (A-2-4), with trace organics (rocts) from 3.5 to 5.0								- CROLIND SUBFACE
2 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	30	4	Black, gray, and tan, sil	ilty fine SAND	30 30.9 + 0.0 1 4	3 47	M	COASTAL PLAIN
25 23.5 8.5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	28.5 + 3.5   2   2		2 5' to 5 0'	ics (roots) from '.	27.4 + 3.5			Black & gray, silty fine SAND (A-2-4), with trace organics (roots) from 0.0' to 1.5'.
23.5 8.5 4 4 4 4 4	1 1 1		-	7.0	†  2 2	4   •6	I II I MI	
18.5	235 + 85	1	Red-brown, fine to coarse	SAND (A-3) with	25		<del>  </del>	23.9
18.5	4 4	·     •8	Sat. Sat. trace silt.		22.4 + 8.5   3   2			
18.5	20 +		20.0	12.0				0000
15   13.5   18.5   8   11   10   10   10   10   10   10	18.5 + 13.5   3   4		with sulphur odor from 13	3.5' to 15.0' and	174 + 135			Gray-tan to gray, silty fine SAND (A-2-4),
10			-     Some day nom 25.5	5' to 25.0'.	†   1   0		I II ISAT I	with sulphur odor from 13.5' to 15.0' and some clay from 23.5' to 25.0'.
Sat.   10   124   185   3   5   6   11   10     124   185   3   5   6   11   10     124   185   3   5   6   11   10     124   185   3   5   6   11   10     124   185   3   5   6   11   10     124   185   3   5   6   11   10     124   185   3   5   6   11   10     124   185   3   5   6   11   10   124   185   3   5   6   11   10   124   185   3   5   6   11   124   185   3   5   6   11   124   185   3   5   6   11   124   185   3   5   6   11   124   185   3   5   6   11   124   185   3   5   6   11   124   185   3   5   6   11   124   185   3   5   6   11   124   185   3   5   6   11   124   185   3   5   6   11   124   185   3   5   6   11   124   185   3   5   6   124   124   185   124   124   124   125   124   124   125   124   125   124   125					15			
Sat. 7,0  Sat. 7,0  South Work Work Work Work Work Work Work Work	13.3 10.3 8 11		Sat.		12.4 18.5 3 5			
Sat. 37.0	10 +	/ .	<u>.</u>					
Boring Terminated at Elevation 7.0 ft in SAND (COASTAL PLAIN)  NOTES:  1) 0.0°-0.2′ = Surficial Organic Soils  2 Filled immediately after drilling  NOTES:  1) 0.0°-0.4′ = Surficial Organic Soils	8.5 23.5 WOR WOH	WOH						
SAND (COASTAL PLAIN)	1 1 1 1 1 1	<b>Q</b> 0			7.4 23.5 WOH WO	и woн 🎷 · · · ·   · · · ·   · · · ·	Sat.	
NOTES: - 1) 0.0'-0.2' = Surficial Organic Soils - 2) Filled immediately after drilling - 1) 0.0'-0.4' = Surficial Organic Soils			SAND (COASTAL	L PLAIN)	1 1			Boring Terminated at Elevation 5.9 ft in SAND (COASTAL PLAIN)
+ 1) 0.0'-0.2' = Surficial Organic Soils + NOTES: - 2) Filled immediately after drilling + 1 0.0'-0.4' = Surficial Organic Soils								<u> </u>
+ 1) 0.0'-0.2' = Surficial Organic Soils + NOTES: - 2) Filled immediately after drilling + 1 0.0'-0.4' = Surficial Organic Soils			NOTES:					<u> </u>
			- 1) 0.0'-0.2' = Surficial Orga	anic Soils				- NOTES:
				ummg				2) Filled immediately after drilling
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	91.1.2			'''	<b>P</b> U-4751	COUNT	Y NEW HAI	NOVER			GEOLOGIST D. Racey		
SITE DESC	RIPTIO	N SR	1409 (N	Military	Cutoff Rd.) to US 17 in	n Wilming	ton - Noise V	Vall 1B				GROUND WT	R (ft
BORING N	O. NW	1B-5		S	<b>TATION</b> 11+95		OFFSET	CL			ALIGNMENT -NW1B-	0 HR.	FIAD
OLLAR E	LEV.	32.1 ft		TO	OTAL DEPTH 25.0 ft		NORTHING	187,6	36		<b>EASTING</b> 2,354,750	24 HR.	FIAD
RILL RIG/H	AMMER I	FF./DAT	E F&F	R3495 C	CME-55 82% 01/17/2014			DRILL N	METHOE	) H.S	S. Augers HAI	MMER TYPE Autom	atic
RILLER	D. Tign	or		S	TART DATE 03/20/1	5	COMP. DA	TE 03/	20/15		SURFACE WATER DEPTH	N/A	
LEV DRIV	, 1051	H BLC	ow co	UNT	BLOWS	PER FOOT		SAMP.		LO	SOIL AND ROCK D	SCRIPTION	
(ft) (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25 5	50	75 100	NO.	MOI		ELEV. (ft)		PTH (
35										-		REACE	0
32.1	+ 0.0	WOH	1	3	4				М		COASTAL F	LAIN	
28.6	+ 3.5										Black & gray to gray-tar (A-2-4), with trace orga	nics (roots) from	
	Ţ	1	1	4	5:				W		0.0' to 5.0', trace clay fro sulphur odor from	m 3.5' to 5.0', and 3.5' to 15.0'.	
25	<u></u>										- -		
23.6	8.5	2	2	4					Sat.		<u>-</u>		
	ł	-	-	·	¶ <sup>6</sup>				Sat.		<u>-</u> -		
20	Ŧ	.			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1				- -		
18.6	13.5	5	5	5	10				Sat.		- -		
15	Ŧ										- - 15.1		17
13.6	18.5	1_		11	\ .					0000	Light gray, fine S	ND (A-3).	
	‡	7	7	11	18				W	0000	<del>-</del> -		
10	‡				- / -					0000		AV (A 7 5) — — —	22
8.6	23.5	WOH	WOH	WOH					Sat.		_ Gray, fille saridy C	AT (A-7-5).	2
	+				<b>Q</b> 0			1			Boring Terminated at E	levation 7.1 ft in	
											NOTES: 1) 0.0'-0.4' = Surficial Or 2) Filled immediately afte		



# **FDS**

#### **SITE PHOTOGRAPHS**



Photograph No. 1: View looking north along Military Cutoff Rd



Photograph No. 2: View looking North along Military Cutoff Road from Paradise Way



Photograph No. 3: View looking North along Military Cutoff Road from near middle of NW1B



Photograph No. 4: View looking South along Military Cutoff Road from near middle of NW1B

#### STATE OF NORTH CAROLINA

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

#### **CONTENTS**

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4-5	PROFILE
6-23	BORE LOG REPORTS
24	SITE PHOTOGRAPHS

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY New Hanover
PROJECT DESCRIPTION SR 1409 (Military Cutoff Rd.) to
US 17 in Wilmington
SITE DESCRIPTION Noise Wall 6 at -L- Sta. 84+50 Left

STATE PROJECT REFERENCE NO. U-4751

#### **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 1919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE THE SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR IS ALL! HAVE NO CLAIM FOR ADDITIONS 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.

S. Davis M. Renza CHECKED BY <u>B. Howey</u>, PG, PE SUBMITTED BY \_HDR, Inc. 

PERSONNEL

D. Racey



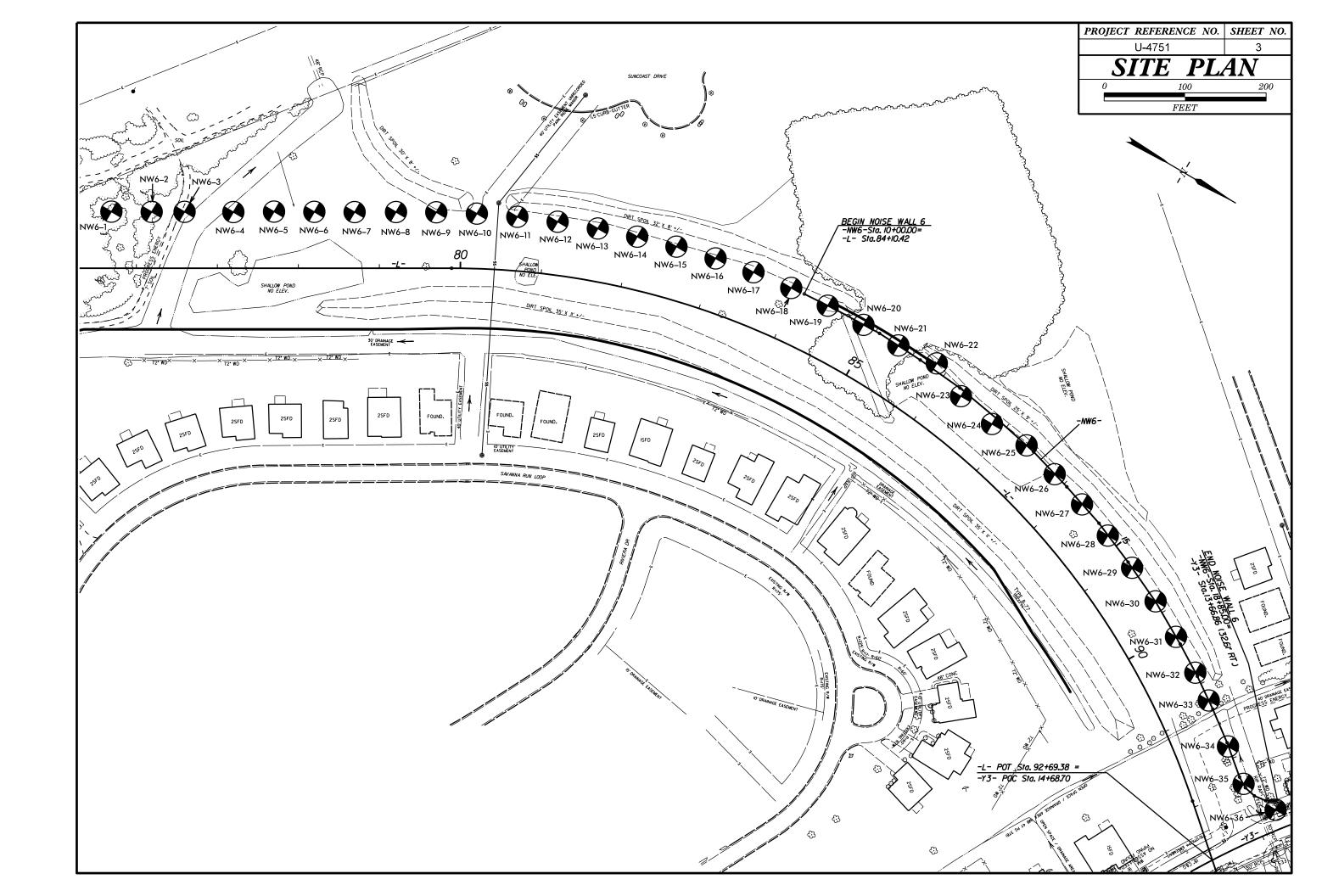
U-4751 SHEET NO.

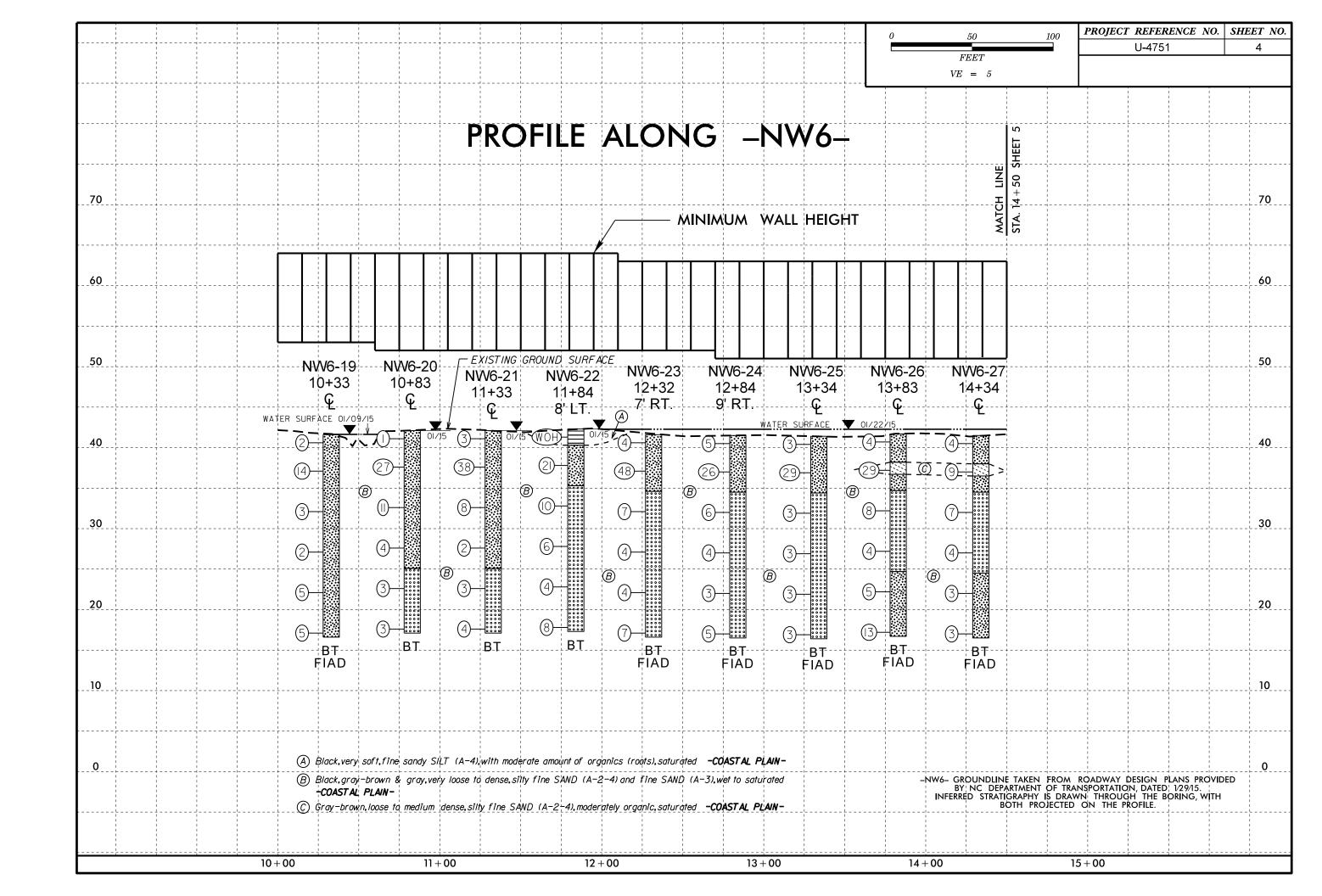
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

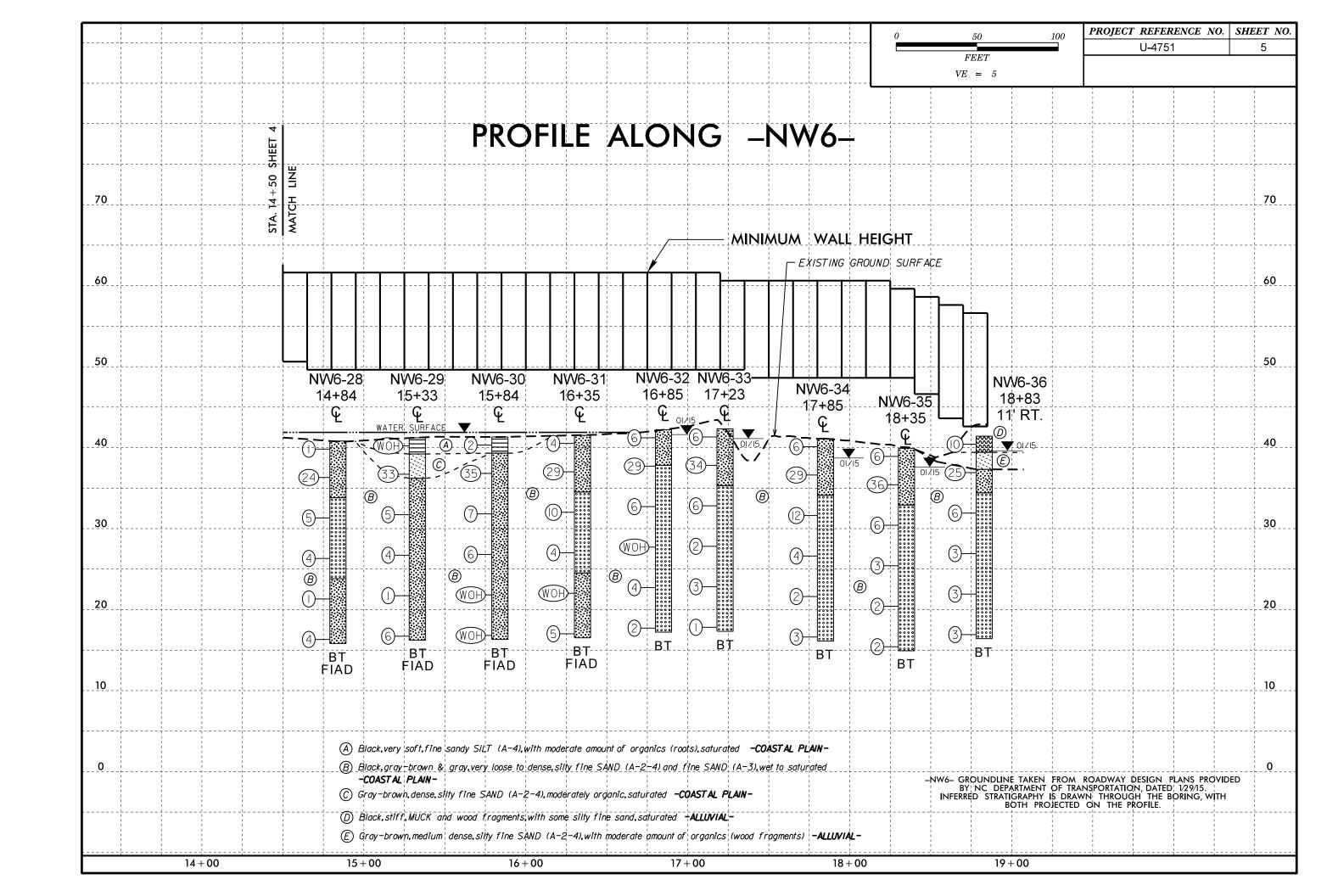
## SUBSURFACE INVESTIGATION

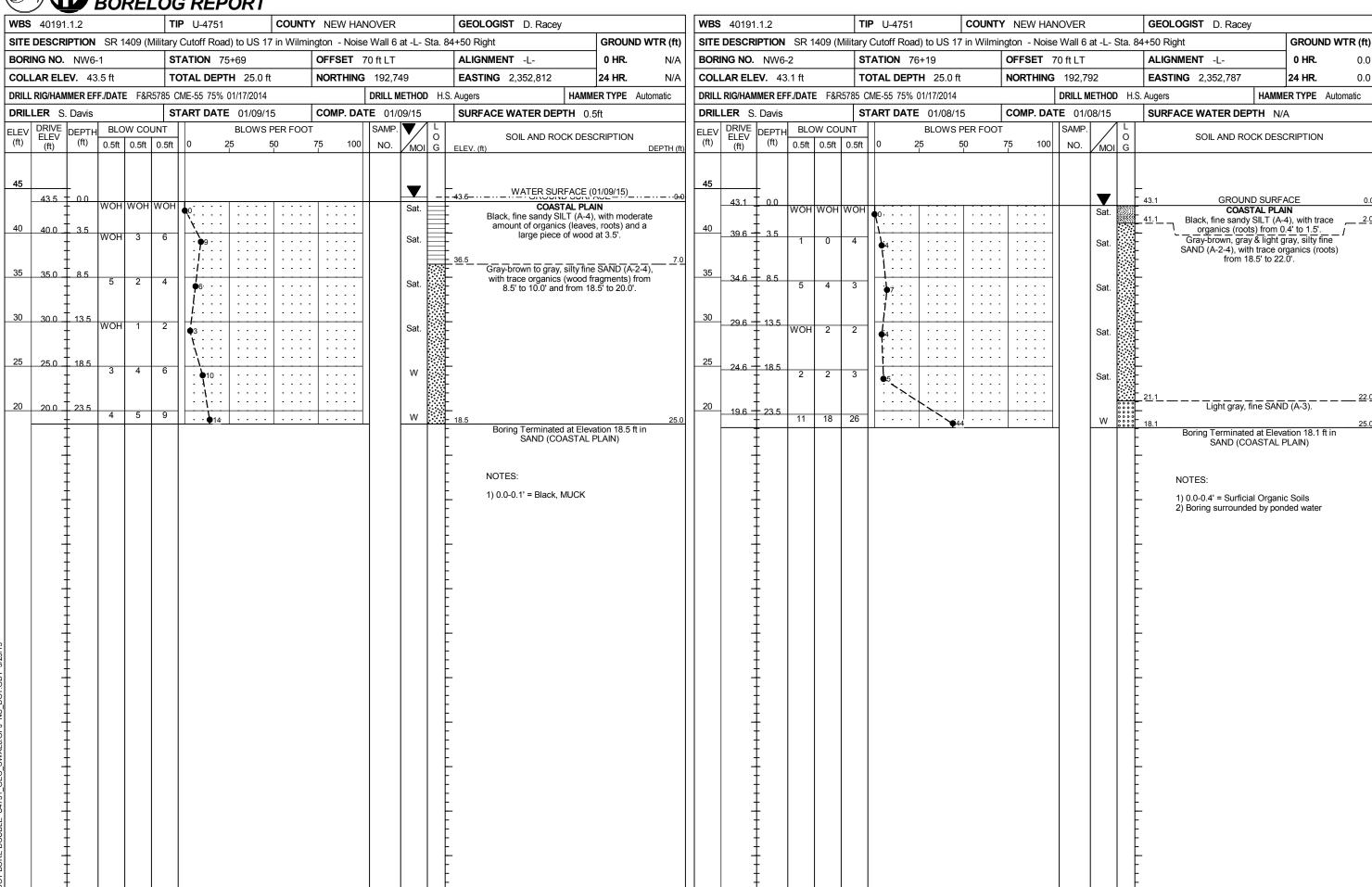
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

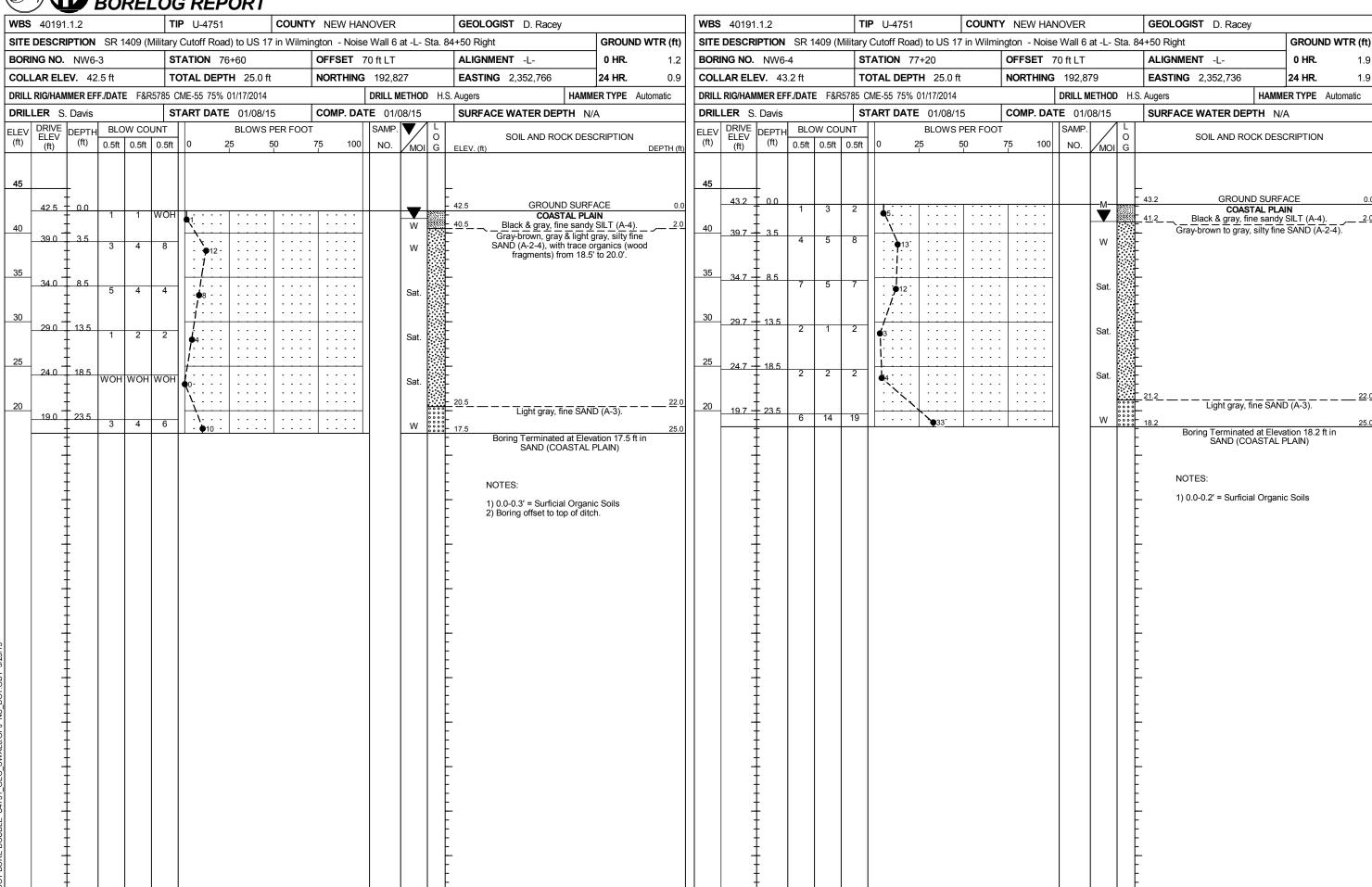
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
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	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.  GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	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 INTERBEDOED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	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
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
LLASS. (\$\(\sigma\) 9% PASSING "200) (\$\(\sigma\) 3% PASSING "200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAQLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE. <u>CALCAREOUS (CALC.)</u> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1, a-1 A-1, a-2 A-4, A-5 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN 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	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
7 PASSING	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN SEDIMENTARY ROCK COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	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.
"10 50 MX GRANULAR CLAY MUCK,	PERCENTAGE OF MATERIAL	CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 30 MX   50 MX   51 MN   15 MN   35 MX   35 MX   35 MX   35 MX   35 MX   36 MN   36	GRANULAR SILT - CLAY 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.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%  LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 48 MX 41 MN 40 MX 41 MN LITTLE OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	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 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE OPENALS	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
GROUP INDEX 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF 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.
OF MAJOR GRAVEL, AND SAND CAND COLD COLD COLD	▼ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING  ▼ STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND	→ STATIC WATER LEVEL AFTER 24 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 AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK,	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	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 (MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	FIELD.   <u>JOINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(N-VALUE) (TUNS/FT-)	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL, IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4 TO 10 GRANULAR LOOSE 4 TO 10 TO 20	SOIL SYMBOL  SOIL SYMBOL  SUPE INDICATOR INSTALLATION	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.
MATERIAL MEDIUM DENSE 10 10 30 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF  VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	THAN ROADWAY EMBANKMENT THAN AUGER BURING TEST	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5	— INFERRED SOIL BOUNDARY — CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.  RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY PIEZOMETER INSTALLATION - SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK,
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	EXCAVATION UNSUITABLE WASTE ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.  HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	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
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - SALE IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK  SHALLOW UNDERCUT  UNCLASSIFIED EXCAVATION - SALE IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (SE. 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 0.005 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 I 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  SOIL MOISTURE SCALE FIELD MOISTURE CAUGE FOR THE REPORT OF THE	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{d}^{-}$ DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.  STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS)  DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	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	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC   SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
(PI) PL PLASTIC LIMIT	FRAGS FRAGMENTS $\omega$ - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	FRACTURE SPACING BEDDING  TERM SPACING TERM THICKNESS	BENCH MARK: TBM: BL-I2 DISK N: 194319.9492 E: 2352785.5298
- MOICT - (M) COLID. AT OR MEAR ORTIMIN MOICTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: 42.71 FEET
OM OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE         3 TO 10 FEET         THICKLY BEDDED         1.5 - 4 FEET           MODERATELY CLOSE         1 TO 3 FEET         THINLY BEDDED         0.16 - 1.5 FEET	NOTES:
REQUIRES ADDITIONAL WATER TO	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	BORING AND GROUND SURFACE ELEVATIONS OBTAINED FROM NCDOT-PROVIDED DTM FILE
ATTAIN OPTIMUM MOISTURE	CME-55  6° CONTINUOUS FLIGHT AUGER  CORE SIZE:	THINLY LAMINATED < 0.008 FEET	NCDOT-PROVIDED DTM FILE
PLASTICITY	X 8' HOLLOW AUGERS	INDURATION  FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	FIAD - FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY INDEX (PI) DRY STRENGTH  NON PLASTIC 0-5 VERY LOW	X CME-550 HARD FACED FINGER BITS TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST CASING WY ADVANCER HAND TOOLS:	GENILE BLUW BY HAMMER DISINIEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE:  BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNGCARB. SOUNDING ROD	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT SOUNDING ROD VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED  SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;  SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14











WBS 40						U-4751				NEW H					LOGIST	D. Racey			<b>↓                                    </b>	<b>3</b> 4019					<b>P</b> U-475				Y NEW HA					LOGIST D. Ra	acey	_	
SITE DES				09 (M	<u> </u>			S 17 ir					-L- Sta					ROUND WTR (ft)	1 -				1409 (					in Wilmi	ington - Noi			- Sta.				GROUNE	WTR (f
BORING N	IO. N	IW6-5			+-	ATION 7				OFFSET					SNMENT		0	HR. N/A	l —		<b>).</b> NW6				TATION				OFFSET					SNMENT -L-		0 HR.	3.
COLLAR						TAL DEP				NORTHI					<b>TING</b> 2,3	· ·	24		┨ ├──		<b>_EV</b> . 42				OTAL DE				NORTHIN					<b>TING</b> 2,352,68		24 HR.	2.
DRILL RIG/I	IAMME	R EFF.	DATE	F&R5	785 CN	IE-55 75%	01/17/2	2014			D	RILL ME	THOD	H.S. Augers				YPE Automatic	DRILI	L RIG/HA	MMER E	FF./DAT	E F&F	R5785 C	CME-55 75	5% 01/	17/2014			DRILL	METHO	OD H	I.S. Augers	<b>i</b>	HAM	MER TYPE /	Automatic
DRILLER						ART DAT				COMP. I					FACE WA	TER DEPT	<b>H</b> 0.2ft				S. Davis				TART DA				COMP. DA			5	SUR	FACE WATER I	DEPTH N	I/A	
ELEV DRIV	VE DE	PTH (ft) (	BLOV			0			R FOOT			SAMP.	<b>'</b> /   (	)		AND ROC	K DESCRIP	TION	ELEV (ft)	, DRIVE	DEPTH (ft)	H BLC	OW CO					ER FOO		SAMP	1 /			SOIL AND	ROCK DE	SCRIPTION	
(II) (ft	<u> </u>	(11)	0.5ft	0.5ft	0.5ft	U	25	50		75 1	00	NO.	MOI	G ELEV.	(ft)			DEPTH (f	) (11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	5	0	75 100	NO.	/MC	OI G					
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42.	<del>, ‡</del> (	0.0	1	1	2	1				1				<u>42.7</u>	W	TER SURF	ACE (01/07	<u>7/15)                                    </u>	<u> </u>	42.7	1 0.0	3	3	4							1,44		42.7	GRO	OUND SUR	FACE	
40	Ŧ		'	'		•3 · · ·							Sat.		Black	& gray, silty		(A-2-4).	40		Ŧ	"	"	~	7				<b>I</b>		W	<u>-</u>	:	Black & gray to	gray-browi	n, silty fine SA	ND
39.	2 🕇 :	3.5	1	1	1	1					-		Sat.							39.2	3.5	1	1	1	1:	-   -					W		<b>:</b>	Black & gray to (A-2-4), with t	race organ 0.2' to 1.5	ics (roots) tro '.	m
	Ŧ					Ţ	: :				-							7.			Ŧ					:   :					"		<u> </u>				
35 34	2 ‡ ;	8.5				<del> </del>					41			35.7	Black, fin	e sandy SILT	$\overline{\Gamma}$ (A-4), with	moderate	35	34.2	‡ <sub>8.5</sub>									-			<u>;</u>				
	Ŧ		1	2	1	3					1 1		Sat.	#	amoun	t of organics	s (wood frag	jments).			‡	1	1	0	1						Sat.	i.	<u>;</u>				
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	2 <del>†</del> 1	3.5	3	1	2	<u> </u>				1	-		Sat.	- 28.6				14.	1 1	29.2	13.5	2	2	3	1	-   -					Sat		-				
	‡					<b>P</b> <sup>3</sup> · · ·					1 1		Sal.		Gray	-tan, silty fir	ne SAND (A	2-4).			‡					:   :			<b>I</b>	1 1	Jai		‡				
25	2 + 1	9.5				<u> </u>	ļ · ·		· · · ·					<b>::-</b>					25	24.2	† 18.5				† · · ·					_			‡				
		0.5 V	VOR	1	2	<b>1</b>					:		Sat.	<b>::</b> -						24.2	1 18.3	1	2	2	4	:   :					Sat		‡				
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	+	+			-		. 🍑	36				H	Sat.	17.7	Boring 7	erminated a	at Elevation	17.7 ft in	4		+	┿	+ -	10		23.				Н	Sat	i	17.7	Boring Termir	nated at Ele	evation 17.7 ft	in 2
	‡													Ļ	- 5	SAND (COA	STAL PLAII	N)			‡												<u> </u>	SAND	(COASTAI	PLAIN)	
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	‡													ţ	NOTES:						‡												L	NOTES:			
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WBS 4						<b>P</b> U-475				Y NEW H				GEOLOGIS	D. Racey			┨ ├───	<b>S</b> 4019					P U-4751		l	Y NEW HA				EOLOGIST D. Racey	
				1409 (					in Wilmir	ngton - No							OUND WTR (ft)	I -				1409 (N			·	' in Wilmir	ngton - Nois		t -L- \$			GROUND WT
BORING	NO.	NW6	-7		S	TATION	78+70	)		OFFSET	69 ft L	.T		ALIGNMEN <sup>*</sup>		0 H	<b>IR.</b> 7.2	BOF	RING NO	). NW6	8-8		_	ATION 7			OFFSET				IGNMENT -L-	0 HR.
COLLAF						OTAL DE				NORTHII				EASTING 2	<del></del>	24 F		┥ ├──		.EV. 42				TAL DEPT			NORTHING				<b>ASTING</b> 2,352,634	24 HR.
DRILL RIG	HAMI)	MER EF	F./DAT	E F&	R5785 (	CME-55 75	% 01/17	7/2014			DRIL	L METH	DD H.S.	Augers		HAMMER TY	PE Automatic	DRIL	L RIG/HA	MMER E	FF./DAT	E F&R	R5785 C	ME-55 75%	01/17/2014			DRILL ME	THOD	H.S. Aug	ers	HAMMER TYPE Autom
DRILLER						TART DA				COMP. D				SURFACE V	VATER DEPT	TH N/A				S. Davis				ART DATE			COMP. DA		7/15	SU	IRFACE WATER DEF	TH N/A
ELEV DF (ft) El	LEV L	DEPTH (ft)	BLC	DW CC					ER FOOT			/IP.	0	S	OIL AND ROC	K DESCRIPT	ION	ELEV (ft)	/ DRIVE	DEPTH (ft)	BLC	OW CO				PER FOOT		SAMP.		O	SOIL AND RO	CK DESCRIPTION
(11) (	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50	J	75 10	00 NC	). / <sub>M</sub> (	OI G	ELEV. (ft)			DEPTH (ft	) (11)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0 .	25 !	50	75 100	NO.	<u>MOI</u>	G		
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_4	3.0	0.0	3	3	2	H <sub>1-</sub>						<del> </del> w		43.0		SURFACE AL PLAIN	0.0	2	42.5	7 0.0										42.5		D SURFACE
40	Ŧ				-	<b>1</b>					1 1	\\	::::L	Black	& gray to gray-	brown, silty fi	ne SAND	40		‡	3	2	3	5					M	-	Black & gray, sil	Г <b>AL PLAIN</b> y fine SAND (A-2-4).
3	9.5	3.5	2	2	2	1 1					.	W	⊣∷∷⊏	(F	A-2-4), with trac fragments)	from 0.0'-8.8'	vood	1		3.5	5	8	8	\				11		39.0		ne SAND (A-2-4), with
	‡					7	: :				-	''								‡	"	°		· · • 16					W	<u>-</u> 37.5	− ¬ moderate amou	nt of organics (wood /-
35	4.5	- 85				/ : : :	-   -				-							35		‡				· ·/· ·						-	ι fraç Light gray, silty	ments). fine SAND (A-2-4).
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	4.5 <del> </del>	18.5	2	2	3	Ţ					-	Sat								18.5	1 2	3	3	1					Cot			
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			6	6	7	1:	3 .				Щ	Sat		18.0		. =	25.0	1	19.0	23.5	2	3	4	•7 • •					Sat.	- 17.5		
	<u> </u>													Borir	ng Terminated SAND (COA	at Elevation 1 ASTAL PLAIN	8.0 ft in )			<u> </u>					1	•		7			Boring Terminate	at Elevation 17.5 ft in ASTAL PLAIN)
	$\pm$	•											1 -		•					$\pm$										<u> </u>	SAND (CC	ASTAL PLAIN)
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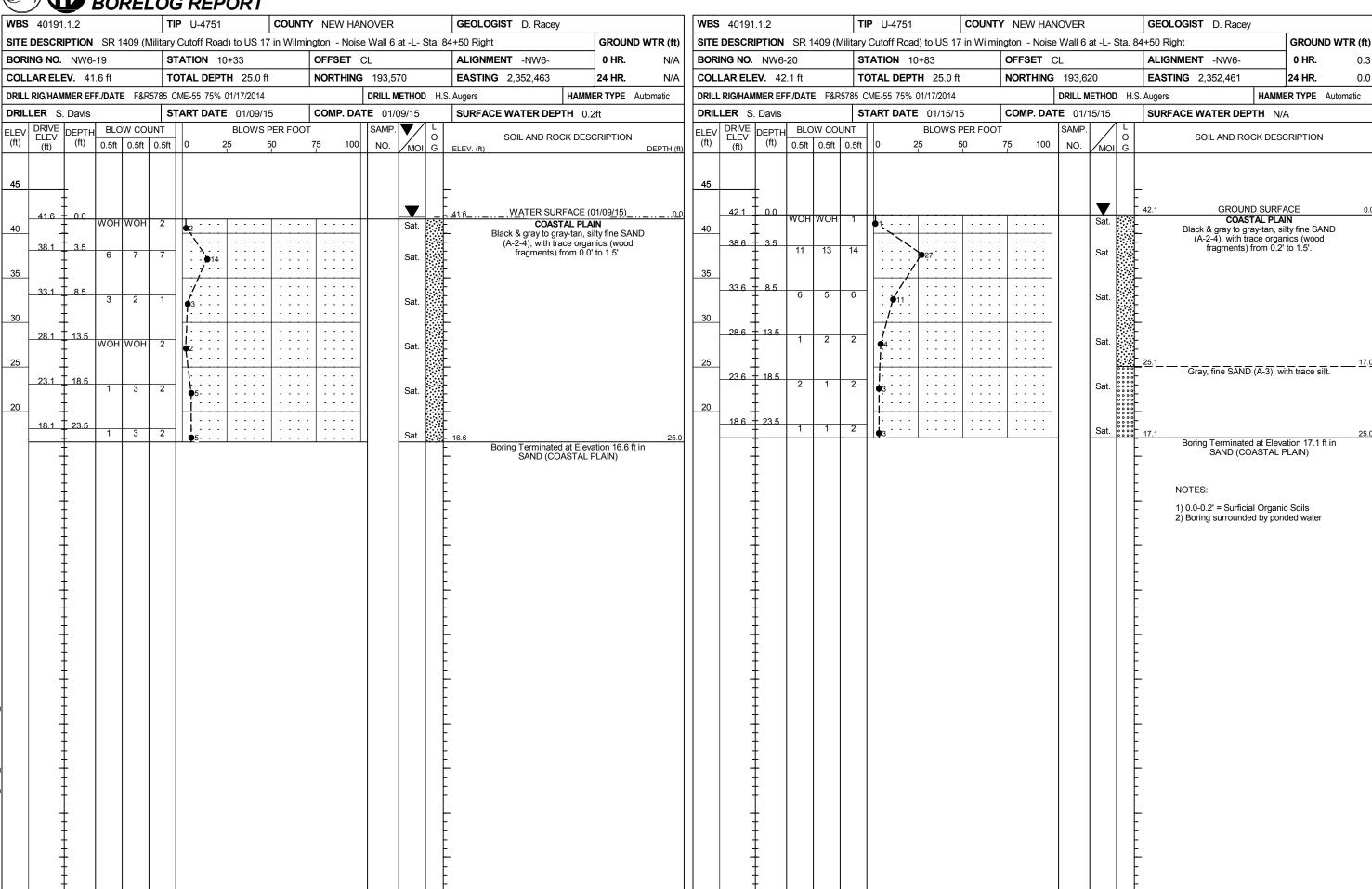
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				1409 (					in Wilmir				L- Sta.	84+50 Rig			-	D WTR (ft)					409 (N		Cutoff Road		3 17 in \	<del></del>				- Sta. 8				UND WTR
BORIN	IG NO.	NW6	-9		-	TATION				OFFSET					MENT -L-		0 HR.	3.7			. NW6				ATION 80				DFFSET					IMENT -L-	0 HF	
	AR ELE					OTAL DEP				NORTHI					NG 2,352,609		24 HR.	3.2			. <b>EV</b> . 43				TAL DEPT			N	NORTHING					<b>NG</b> 2,352,585	24 HF	
DRILL I	RIG/HAM	MER EF	F./DAT	E F&	R5785 (	ME-55 75%	6 01/17	7/2014			DRII	LL MET	HOD H.	S. Augers		HAMM	ER TYPE	Automatic	DRILL	RIG/HA	MMER EF	F./DATI	E F&R		ME-55 75%					DRILL	METHO	DD H.	.S. Augers		HAMMER TYP	E Automation
	ER S.					TART DAT				COMP. D				SURFA	CE WATER D	EPTH N/	A				S. Davis				ART DATE				COMP. DA			5	SURF	ACE WATER DE	PTH N/A	
ELEV (ft)	DRIVE ELEV	DEPTH (ft)	BLO	OW CO					ER F001			1	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		SOIL AND I	ROCK DES	CRIPTION		ELEV (ft)	ELEV	DEPTH	BLC	W COL				VS PER		F 100	SAMP	1 /	\		SOIL AND RO	OCK DESCRIPTI	NC
(11)	(ft)	(11)	0.5π	0.511	0.5ft	0	25	50	,	75 10	JO N	IO. /	MOI G	ELEV. (ft)				DEPTH (ft)	(11)	(ft)	(10)	0.5π	0.5ft	0.5π	0 2	25 	50	75	5 100	NO.	MC	OI G				
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ı	42.8	- 0.0	2	6	7	<del>                                     </del>					$\perp$			42.8		UND SURF		0.0		43.0	7 0.0	5	6	5	1					+	N		43.0		ID SURFACE TAL PLAIN	
40	- 1	-	-		'	13						1	at. M	F	Black & gray-br	rown to light	gray, silty fi	ine	40		Ŧ				1 11 1						M		‡	Black & gray-brov	n to light gray, s D (A-2-4).	Ity fine
-	39.3	3.5	4	4	5	· <b>,</b>					7		N	F	5/	AND (A-2-4)	).			39.5	+ 3.5 +	7	8	6	14					1	l w		<b>;</b>	OAIN	D (A-2-4).	
	1	-				: <b> ;</b> ": :	.							F							Ŧ				: /	: : :							‡			
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-		-	۳	<u> </u>	╫	<u> </u>	.						at.	_ 17.8	Boring Termina	ated at Elev	ation 17.8 ft	25.0 t in			‡	$\vdash$			<u> </u>	<u> </u>				+	Out		18.0	Boring Terminate	d at Elevation 18	.0 ft in
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<b>WBS</b> 40						<b>U</b> -4751				NEW H					OGIST D. Rad	cey		—		)191.1.2					U-4751			JNTY NE					<b>GEOLOGIST</b> D. F	acey	1	
SITE DES				109 (N	<u> </u>			JS 17 ir					-L- Sta.		<u> </u>		GROUND WTR	` ′					9 (Milit				7 in W	ilmington			at -L-				GROUND V	•
BORING N						ATION 8				OFFSET					NMENT -L-					NO. NV				+	TION 81					66 ft LT			ALIGNMENT -L-		0 HR.	2.
COLLAR						TAL DEP				NORTHI					ING 2,352,563					ELEV.					AL DEPT			NOR		193,23			<b>EASTING</b> 2,352,5		24 HR.	3.
DRILL RIG/I			DATE	F&R							_			H.S. Augers			R TYPE Automatic	— I —				ATE	F&R578	1	E-55 75% (					DRILL M					IMER TYPE Aut	omatic
DRILLER						ART DAT				COMP. D					ACE WATER D	DEPTH N/A	4			S. Davi					RT DATE				P. DAT	TE 01/0	06/15		SURFACE WATER	DEPTH I	V/A	
ELEV DRI		PTH (ft) (	BLO\		JNT 0.5ft	0	BLO 25	WS PE 50	ER FOOT		11	- 1	\   c		SOIL AND I	ROCK DESC				IVE DEP	TH	SLOW 0.			0 3	BLOWS		OOT 75	100	SAMP.		ō	SOIL AN	O ROCK DE	SCRIPTION	
(II) (ft	)	(10)	J.5π	0.5π	0.5π	0	25	50	,	75 10	1 00	NO.	MOI G	ELEV. (ft	t)		DEPT	H (ft)	(1	(II)	, 0.	5π υ.:	5π 0.	).5π	0 2	.5 	50	/5	100	NO.	<u>/moi</u>	G				
45	<del>_</del>													43.5	CPO	UND SURFA	VCE	0.0		<del>_</del>													43.5 GF	OUND SUF	DEACE	
43.	5 + 1	0 V	VOH	1	7	- 8							w	<u>:</u>	CO	ASTAL PLA	N	0.0	43	3.5 + 0.0	<del>\</del>	1 3	3	2	5						М	list i	(	OASTAL PI	_AIN	
40 40	٠ Ī :	3.5				: \ : :					1 1		M	¥	Black & red-brow silty fir	wn, gray-brov ne SAND (A-	vn to light gray, 2-4).	40	40	).0 I 3.5	,				1:::				::				with trace org	gray, silty fir anics (roots	ne SAND (A-2-4) ) from 0.2' to 1.5'	
10.	<del>-</del>		5	6	8	14						-;	Sat.	-						+		4 4	4	4	. 8						Sat.	F				
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35 35	0 井 i		3	2	2	<i>i</i> /····	ļ : :						Sat.	-				35	35	5.0 + 8.5		2 2	2	1	1		<b>.</b>				Sat.					
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30 30.	, ‡,										:			<u></u>				30		),0 ± 13.5	_				: : : :				- :			-				
30	<u>'</u>	3.5 V	VOH	2	1	<b>•</b> 3 · · ·					-		Sat.						30	<del>7.0 + 13.</del> :	5 W	OH 2	2	1 ,	<b>4</b> 3 · · ·		: :				Sat.					
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25 25	0 ‡ 1	8.5	VOLL	1		į · · · · ·							_	<u>}</u> _				25	25	5.0 ‡ 18.5	5	OH W		_	· · · ·		ļ:-					<u> </u>				
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20 20	0 + 2	3.5	6	6	7	· ·•13·	+						w	 				25.0	20	0.0 \(\frac{1}{2}\)23.5	5 2	2 (	3	3	•6		+				Sat.	_	18 5			2
	Ŧ					<u> </u>				1				10.0	Boring Termina	ated at Eleva	tion 18.5 ft in	20.0		1					<u> </u>							Ë	Boring Term	inated at Ele COASTA	evation 18.5 ft in	
	1													Ł	SAND (	(COASTAL F	LAIN)			<u>±</u>												l E	SAIN	(COASTA	L FLAIIN)	
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WBS 40191.1.2		Y NEW HANOVER	GEOLOGIST D. Racey	WBS 40191.1.2 TIP U	U-4751 <b>COUNTY</b> N	NEW HANOVER	GEOLOGIST D. Racey	
SITE DESCRIPTION SR 1409 (Mi	litary Cutoff Road) to US 17 in Wilmin	ngton - Noise Wall 6 at -L- Sta. 8	4+50 Right GROUND WTR (ft)	SITE DESCRIPTION SR 1409 (Military Cuto	toff Road) to US 17 in Wilmingto	on - Noise Wall 6 at -L- Sta. 84	+50 Right	GROUND WTR (ft)
BORING NO. NW6-13	STATION 81+59	OFFSET 65 ft LT	ALIGNMENT -L- 0 HR. 3.6	BORING NO. NW6-14 STATI	TION 82+06 OF	FFSET 65 ft LT	ALIGNMENT -L-	<b>0 HR.</b> 3.7
COLLAR ELEV. 43.5 ft	TOTAL DEPTH 25.0 ft	<b>NORTHING</b> 193,277	<b>EASTING</b> 2,352,525 <b>24 HR.</b> 3.2	COLLAR ELEV. 44.1 ft TOTA	AL DEPTH 25.0 ft NC		<b>EASTING</b> 2,352,509	<b>24 HR.</b> 3.7
DRILL RIG/HAMMER EFF./DATE F&R57	785 CME-55 75% 01/17/2014	DRILL METHOD H.S	S. Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE F&R5785 CME-	-55 75% 01/17/2014	DRILL METHOD H.S.	Augers HAI	MMER TYPE Automatic
DRILLER S. Davis	<b>START DATE</b> 01/06/15	COMP. DATE 01/06/15	SURFACE WATER DEPTH N/A		RT DATE 01/06/15 CO		SURFACE WATER DEPTH	N/A
ELEV (ft) DEPTH BLOW COUNTY (ft) 0.5ft 0.5ft (	NT BLOWS PER FOOT 0.5ft 0 25 50	75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION  ELEV. (ft) DEPTH (ft)	ELEV (ft) DEPTH BLOW COUNT (ft) 0.5ft 0.5ft 0.5ft 0	BLOWS PER FOOT 25 50 75	100 NO. MOI G	SOIL AND ROCK DE	ESCRIPTION
45 43.5 = 0.0 1 2 40 40.0 3.5 7 8 35 35.0 8.5 4 5 30 30.0 13.5	2	M   W   W   W   W   W   W   W   W   W	ELEV. (ft)  DEPTH (ft)  43.5  GROUND SURFACE  COASTAL PLAIN  Black & gray-brown to light gray, silty fine SAND (A-2-4), with trace organics from 0.7'  to 1.5'.	45	6	y Wioi O	GROUND SUI  COASTAL P  Black, brown & gray, s  (A-2-4).	RFACE 0.0 PLAIN silty fine SAND .  25.0  Ievation 19.1 ft in AL PLAIN)

<b>WBS</b> 40191.1.2			TIP U-47				NEW H				EOLOGIST D. Racey			→ -		191.1.2				<b>ΓΙΡ</b> U-47				NEW HA				GEOLOGIST D. Racey		
SITE DESCRIPTION		109 (Mil	<del>,                                    </del>				<u> </u>						GROUND WTR	` ' I <del> </del>										gton - Nois					GROUND \	
BORING NO. NW6-			STATION				OFFSET				LIGNMENT -L-					NO. NW				STATION				OFFSET				ALIGNMENT -L-	0 HR.	3.
COLLAR ELEV. 44			TOTAL D				NORTHIN				<b>ASTING</b> 2,352,495			_		ELEV.				TOTAL DI				NORTHING				<b>EASTING</b> 2,352,483	24 HR.	2.
DRILL RIG/HAMMER EF	F./DATE	F&R57	85 CME-55 7	75% 01/1	17/2014			DRILL	METHOD	H.S. Aug	gers	HAMMER	R TYPE Automatic	DRII	LL RIG/	HAMMER	EFF./D	ATE F	&R5785	CME-55 7	'5% 01/ <sup>-</sup>	17/2014			DRILL I	METHO	D H.S. A	Augers	HAMMER TYPE Aut	tomatic
DRILLER S. Davis			START D	ATE (	01/06/15	,	COMP. D				URFACE WATER DEP	PTH N/A				S. Davi				START DA	ATE	01/06/15		COMP. DA				SURFACE WATER DEP	TH N/A	
ELEV DRIVE DEPTH	BLO	N COUN				ER FOOT			P. 🔻	0	SOIL AND RO	OCK DESCR	RIPTION	ELE'	V DRI	VE DEPT	TH B	BLOW C		11.		BLOWS PE		400	SAMP	/		SOIL AND ROO	K DESCRIPTION	
(ft) CELLV (ft)	0.5ft	0.5ft (	.5ft 0	25	50	0	75 100	O NO.	· /MOI	G ELE	EV. (ft)		DEPTI	(ft)	(f	(ft)	0.5	5ft 0.5f	ft   0.5ft	1 0	25	50	)	75 100	NO.	/MO	I G			
45 44.3 0.0										44.3	GROUN	ND SURFAC	Œ	0.0 45													L			
77.3	WOH	1	5						М		COAS	STAL PLAIN			43	.2 ‡ 0.0	)   1	1 2	1 2	<del>                                      </del>					-	٠,,	43		SURFACE AL PLAIN	(
40.8 + 3.5			: ``								Black & gray, gray-l fine SA	-brown to lig AND (A-2-4)	Jili gray, Silly I.			‡	'	^	2	• • • • • • • • • • • • • • • • • •						M		Black.gray & tan-b	rown to light gray and	
40 40.8 7 3.3	8	10	9	19		<del></del>		+	W_					40	39	.7 🛨 3.5	5 6	3 7	6	$\frac{1}{2}$					-	_	-	brown, silty fine SA organics fro	ND (A-2-4), with trace om 0.1' to 1.5'.	Э
1 +			::/	<i>:</i>						-						+				: : <b>?</b> :	13.					**	-``+			
35.8	5	5	3						0-4	F				35	0.4	.7 <del>-</del> 8.5	.			:;;:	:   :						-			
<u> </u>		Ĭ	·/*					11	Sat.						34	. <del>/ + 8.5</del> +	4	1 4	3	- <del>                                    </del>					11	Sat.				
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30 30.8 + 13.5	WOH	WOH	1 /						Sat.					30		.7 <del>+</del> 13.5	5			]   <i>                                  </i>					1					
				.												‡	WC	OH 1	1	<b>•</b> 2 · ·	:					Sat.				
25.8 + 18.5				-						±.						±					.									
25 25.6 = 16.5	WOH	WOH	1 1				1	+	Sat.					25	24	.7 + 18.5	5	OH 1	1	_    <del> </del>				<del> </del>	-		<u> </u>			
‡				:   :												Ţ	\\	)   I	'	2	:   :					Sat.				
20.8 23.5	144011			-										20		‡				<u>   </u>	:   :		: : : :							
20 +	WOH	1	2 3				<b></b>	4	Sat.	19.3	Boring Terminated	nd at Elevation		25.0	19	7 + 23.5	5 1	1 1	2	$ \begin{vmatrix} 1 & \cdots \\ 1 & 3 & \cdots \end{vmatrix}$					1	Sat.	18	0.0		0.0
<u> </u>											SAND (CO	DASTAL PL	AIN)							1199				1				Donnig Terrinialed	at Elevation 18.2 ft in	1
1 ±																<u>±</u>											l E	SAND (CO	ASTAL PLAIN)	
Ţ										l F	NOTES:					Ŧ											1 F			
										-	1) 0.0-0.2' = Surficia	ial Organia 9	Poilo			‡											F	NOTES:		
‡											1) 0.0-0.2 = Surficia	al Organic (	Solis			‡												1) 0.0-0.1' = Surficia	Organic Soils	
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<b>WBS</b> 40191.1.2	TIP U-4751 COUNTY NEW HA			<b>WBS</b> 40191.1.2			NTY NEW HANOVER	GEOLOGIST D. Racey
<u>`</u>	Military Cutoff Road) to US 17 in Wilmington - Noi		GROUND WTR (ft)			(Military Cutoff Road) to US 17 in Will		
BORING NO. NW6-17	STATION 83+47 OFFSET		0 HR. N/A	BORING NO. NW6		STATION 83+94	OFFSET 65 ft LT	ALIGNMENT -L- 0 HR. N
COLLAR ELEV. 42.2 ft		NG 193,470 EASTING 2,352,474	<b>24 HR.</b> N/A	COLLAR ELEV. 4		TOTAL DEPTH 25.0 ft	NORTHING 193,520	<b>EASTING</b> 2,352,467 <b>24 HR.</b> N
<b>DRILL RIG/HAMMER EFF./DATE</b> F&R		<del>'</del>	HAMMER TYPE Automatic			R5785 CME-55 75% 01/17/2014	DRILL METHO	
DRILLER S. Davis	1 11 1	DATE 01/09/15 SURFACE WATER DEPT	<b>H</b> 0.2ft	<b>DRILLER</b> S. Davis		START DATE 01/09/15	COMP. DATE 01/09/15	SURFACE WATER DEPTH 0.1ft
ELEV DRIVE DEPTH BLOW COU	<del></del>	SAMP. L O SOIL AND ROCK	K DESCRIPTION	ELEV DRIVE DEPTH	BLOW CO	<del></del>	/	O SOIL AND ROCK DESCRIPTION
(II) (ft) (II) 0.5ft 0.5ft	0.5ft 0 25 50 75 100	NO. MOI G ELEV. (ft)	DEPTH (ft)	(it) (ft) (it)	0.5ft 0.5ft	t 0.5ft 0 25 50	75 100 NO. MO	G
45				45				-
$\begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 $		WATER SURF	ACE (01/09/15)0_0	42.1 1 0.0				42.1 WATER SURFACE (01/09/15)
40 WOH 2	2   4	Sat. Black & gray to gray	AL PLAIN brown and light gray	40	WOH 2	2 4	Sat.	COASTAL PLAIN Gray-brown to light gray, silty fine SAND
38.7 + 3.5 4 5	6	silty fine SAND (A-2-	4), with trace clay and pents) from 3.5' to 5.0'	38.6 + 3.5	12 10	10 10 10 10 10 10 10 10 10 10 10 10 10 1		(A-2-4), with trace clay and organics (wood
		and trace organics (v	vood fragments) from 20.0'.	1 1 ‡	12 10	12	Sat.	- maginarita) nom olo ta 1.0
35	-	-	5 <b>2</b> 0.0 .	35				<u></u>
33.7 + 8.5   2   2	3   1	Sat. Sat.		33.6 + 8.5	4 5		Jai.	
30				30 ±				
287 + 135	<u> </u>			28.6 + 13.5		<u>/  </u>		
WOH 1		Sat.			woн woн	<sup>+</sup>   <sup>1</sup>   <del> </del>  1:::: ::: ::: :::	Jai.	
25				25				
23.7 + 18.5   WOH WOH	1	Sat		23.6 + 18.5	WOH 1	+ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$		
						\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		
18.7 + 23.5	<u> </u>			18.6 + 23.5				——————————————————————————————————————
+ 1 1	4 5		25.0 at Elevation 17.2 ft in	+	WOH 3	4 7	Sat.	
		SAND (COA	STAL PLAIN)					Boring Terminated at Elevation 17.1 ft in SAND (COASTAL PLAIN)
		NOTES:		‡				NOTES:
		1) 0.0-0.3' = Black, Mi	JCK	‡				1) 0.0-0.3' = Black, MUCK
				‡				
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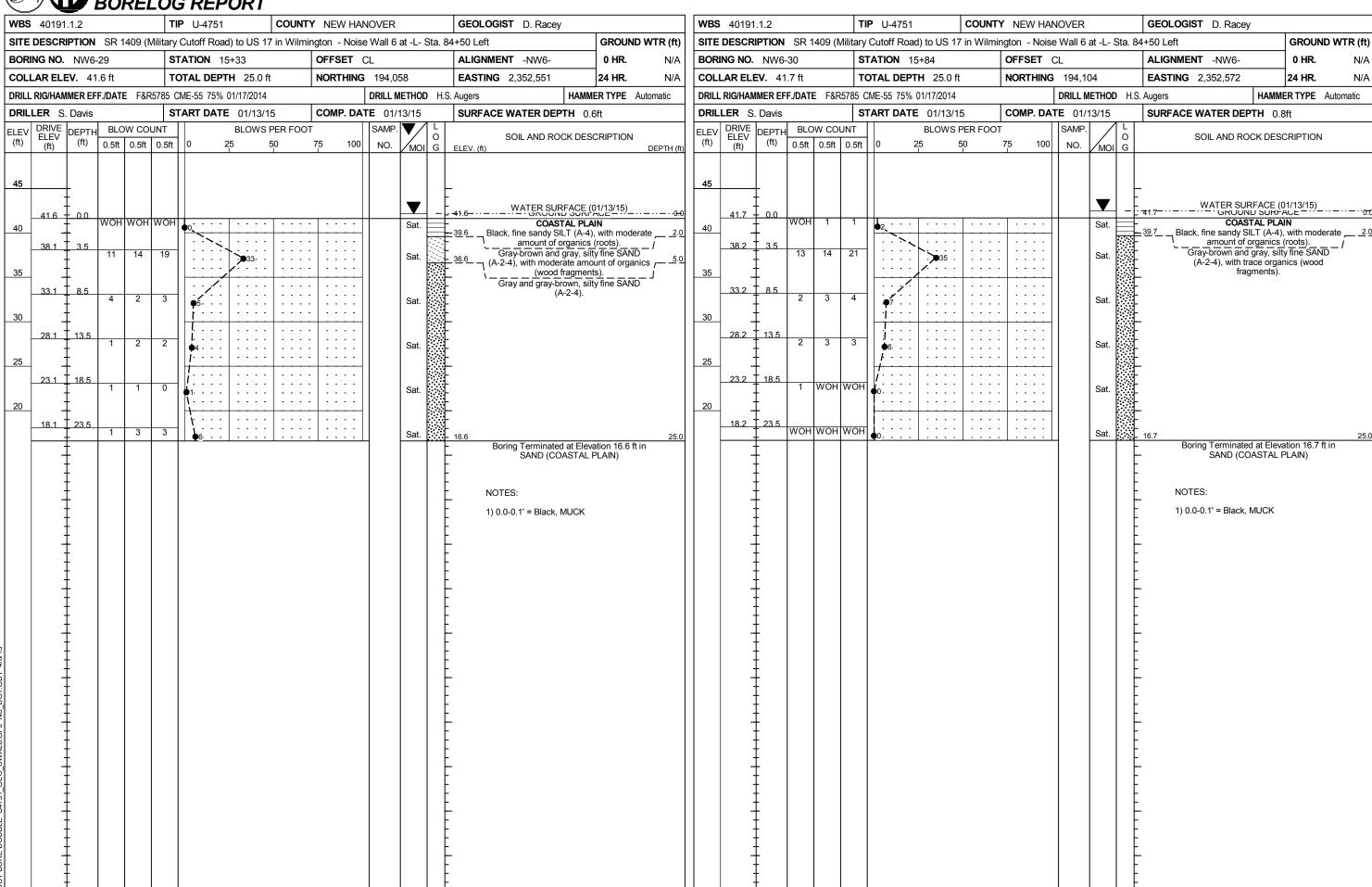


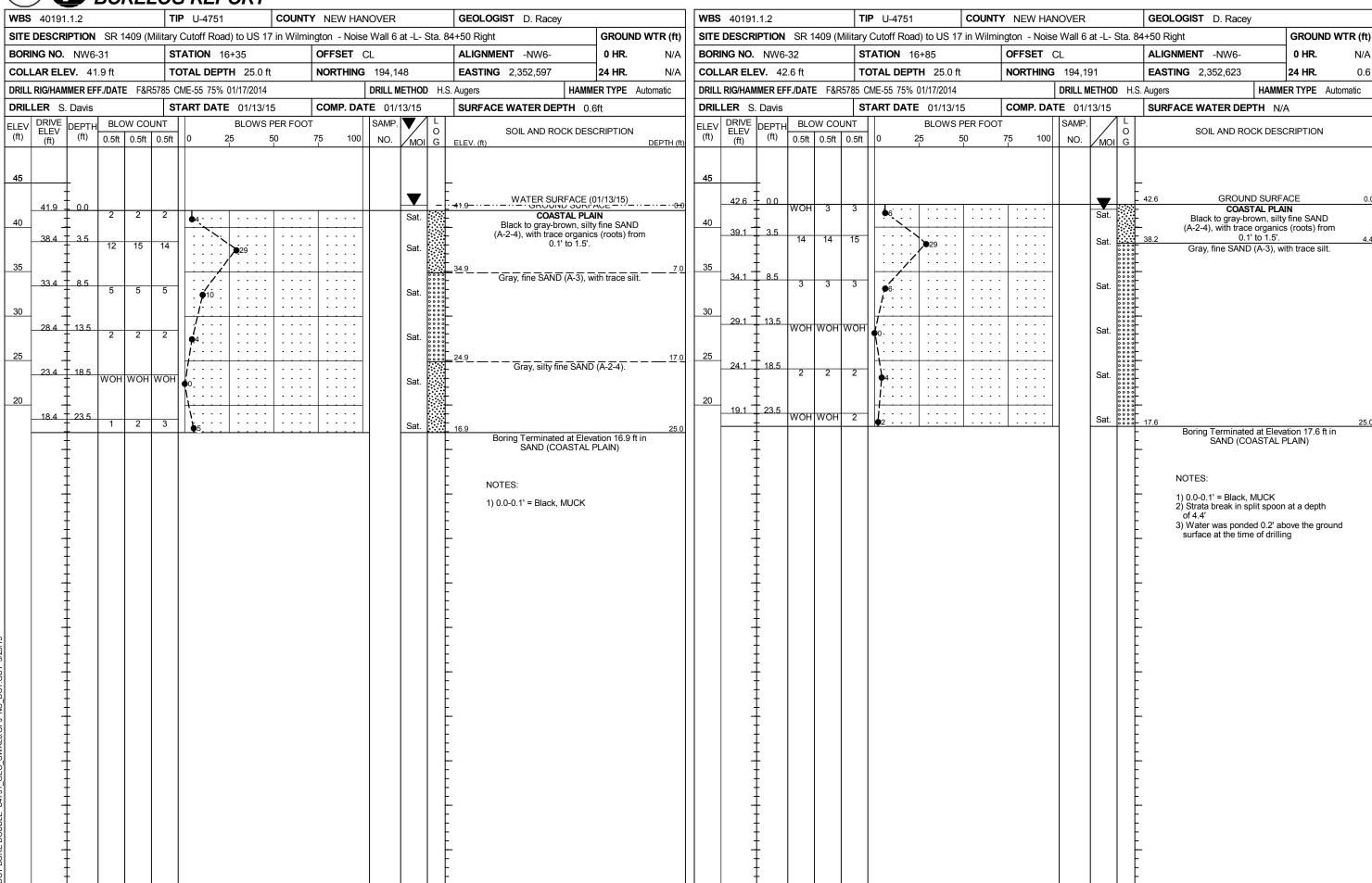
WBS	<b>3</b> 4019	1.1.2			<b>TIP</b> U-4751		COUNT	Y NEW H	ANOVER		GI	EOLOGIST D. Racey			WBS	4019 <sup>-</sup>	1.1.2			TIP	U-4751		COUNTY NEW H	ANOVER		GEOLOGIS <sup>*</sup>	T D. Racey	
SITE	DESC	RIPTION	SR 140	9 (Milita	ry Cutoff Roa	d) to US 1	17 in Wilm	ington - Noi	se Wall 6	at -L- Sta	a. 84+50	0 Right	GROUND	WTR (ft)	SITE	DESCR	RIPTION	SR 1	409 (Mil	litary C	Cutoff Road)	to US 17	in Wilmington - No	se Wall 6	at -L- Sta	84+50 Right		GROUND WTR
BOR	RING NO	<b>).</b> NW6-	-21		STATION 1	1+33		OFFSET	CL		AL	LIGNMENT -NW6-	0 HR.	8.0	BOR	ING NO	NW6	-22		STA	ATION 11+	-84	OFFSET	8 ft LT		ALIGNMEN <sup>*</sup>	T -NW6-	0 HR.
COL	LAR EL	<b>LEV</b> . 42	2.1 ft		TOTAL DEP	<b>FH</b> 25.0	ft	NORTHIN	<b>G</b> 193,6	70	EA	<b>ASTING</b> 2,352,461	24 HR.	0.0	COL	LAR EL	<b>EV</b> . 42	2.3 ft		TO	TAL DEPTH	25.0 ft	NORTHIN	<b>G</b> 193,7	722	EASTING	2,352,456	24 HR.
DRIL	L RIG/HA	MMER EF	F./DATE	-&R5785	CME-55 75%	01/17/2014	1		DRILL N	IETHOD	H.S. Aug	gers	HAMMER TYPE AL	utomatic	l				F&R57	785 CM	ME-55 75% 01	1/17/2014		DRILL	METHOD	I.S. Augers		HAMMER TYPE Automatic
		S. Davis			START DAT	E 01/15/	15	COMP. D			SU	URFACE WATER DEP	TH N/A		DRIL	LER S					ART DATE	01/15/15	COMP. D	<b>ATE</b> 01.	/15/15	SURFACE V	VATER DEPT	H N/A
ELEV (ft)	DRIVE	DEPTH (ft)	0.5ft 0.		+		S PER FOO 50				5		CK DESCRIPTION		ELEV (ft)		DEPTH (ft)	BLO	W COUN			BLOWS P		SAMP	1/10	s	SOIL AND ROC	K DESCRIPTION
(11)	(ft)	(10)	υ.5π υ.	οπ   0.5	1 0	25	30	75 10	NO.	MOI C	G ELE	EV. (ft)		DEPTH (ft)	(11)	(ft)	(,	υ.5π	0.511	0.5π	0 25	3	0 75 10	NO.	MOI G			
45		$\pm$									F				45		$\pm$									-		
	42.1	Ŧ 0.0									42.1		SURFACE	0.0		42.3	T 0.0								$\blacksquare$	42.3		SURFACE
40		Ŧ	WOH	2	3,					Sat.	F	COAST Black & gray to gray	AL PLAIN av-tan, silty fine SAND	)	40		Ŧ	WOH	WOH W	VOH	0				Sat.	40.3 Black,	fine sandy SIL	AL PLAIN Γ (A-4), with moderate
	38.6	3.5	10 1	5 23	<del> </del>							(A-2-4), with trace	ay-tan, silty fine SANE organics (roots, wood rom 0.3' to 1.5'.	b		38.8	3.5	5	7	14						: T	amount of org	ganics (roots)
		Ŧ	10   1	5   23		●38				Sat.	: F	magments)	10111 0.0 10 1.0 .				Ŧ			'	· · · · <b>/</b> ·				Sat.	:	ay brown, only	me 0/110 (/12 4).
35		‡				<u> </u>			41		<u>.</u>				35	╡.	‡							41	0 0 0	35.3 Gr	av fine SAND (	A-3), with trace silt.
	33.6	8.5	3 ;	3 5	-  : <u>;</u> ;'.		.			Sat.	**					33.8	8.5	5	5	5	: ¼'. :				W		ay, mic or and (	( o), with trace sit.
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30		Ŧ				+					<u> </u>				30	28.8	I - 13.5						<del>   </del>		000	-		
	28.6	13.5	WOR W	OH 2						Sat.	<b>::</b>  -					20.0	<del>†</del> 13.5 †	3	3	3	•6			1 1	W	-		
25		‡									25.1	1		17.0	25		‡								000	<u> </u>		
20_	23.6	18.5			<del>                                  </del>				1	000	20.1	Gray, fine SAND	(A-3), with trace silt.	17.0_		23.8	+ + 18.5				!			11	W			
	20.0	Ī	1	2			:   : : :	:   : : : :		Sat.							1	3	1	3	4:::			1 1	W			
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	18.6	23.5			]				11	0 0						18.8	23.5	2	3	_	1			71	000	-		
		‡	1 2	2 2	<b>1</b> •4 · · ·				Щ	Sat.	17.1	Daring Tarminates	at Elevation 17.1 ft in	25.0			‡—	-	3	5	. ∳8			4	W	17.3 Boris	ng Terminated :	at Elevation 17.3 ft in
		‡									Ė	SAND (CO	ASTAL PLAIN)	1			‡											STAL PLAIN)
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		Ŧ									F	1) 0.0-0.3' = Black, I	ALICK			-	Ŧ									F 1)00	-0.1' = Surficial	Organic Soils
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				<del></del>	Cutoff Road)					at -L- Sta.			GROUND WTR (f	`   ├─				1409 (I				17 in Wilm	ington - Nois		at -L-	Sta. 8	_ <del>,</del>		OUND WTR (ft)
	ING NO.				TATION 12+			OFFSET			ALIGNMENT -NW6		<b>0 HR</b> . N/		ORING NO				-	TATION			OFFSET				ALIGNMENT -NW6-	0 H	
	LAR ELE				OTAL DEPTH			NORTHING	· ·		<b>EASTING</b> 2,352,47		<b>24 HR.</b> N/		OLLAR E					OTAL DEP			NORTHING	· ·			<b>EASTING</b> 2,352,486	24 H	
			F./DATE F&		CME-55 75% 01/					METHOD H.			MER TYPE Automatic	$\dashv \vdash$				E F&F		CME-55 75%			T				S. Augers		PE Automatic
	LER S.				TART DATE			COMP. DA			SURFACE WATER D	DEPTH 1	.9ft		RILLER					TART DAT			COMP. DA			<del>/                                      </del>	SURFACE WATER DEP	<b>PTH</b> 1.9ft	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft 0.5ft		1 1		ER FOOT	75 100		MOI G	SOIL AND ELEV. (ft)	ROCK DES	SCRIPTION DEPTH		EV DRIVE ELEV (ft)	DEPTI (ft)	0.5ft	0.5ft	0.5ft	0	25	S PER FOO 50	75 100	SAMP NO.		O I G	SOIL AND RO	CK DESCRIPT	ION
45		_										011054.05	(0.1.15.115)	4	15	_											<u></u>		
1	1440	0.0								<b>-</b>	F	SURFACE : DUND SURF		0.0		‡										┨-	F - · · - · · - · · - · · - · · - · ·	RFACE (01/15/ D SURFACE	15)
40	41.6	- 0.0	1 1	3	4.					Sat :::	- cc	DASTAL PL		-1	10	+ 0.0	WOH	1	4	<b>6</b> 5					Sat.		- COAS	TAL PLAIN	0.0
	38.1	3.5	17 24	24		· · · · · ·	  48			Sat. W	trace organics		ments) from 0.3'		38.0	3.5	12	12	14		26				Sat.		Gray-brown, silty fr trace organics		
35		-				·			-	0 0 0 0	- 34.6 - Gray, fine SA	ND (A-3)	with trace silt	.0 3	35	‡				/	/ · · · · · · · · · · · · · · · · · · ·			-		0 0 0 0	L <u>34.5</u> Gray, fine SAND	. (A 3) with tra	
	33.1	8.5	3 3	4	<b>1</b>					W 0000	- Gray, fille of	AND (A-0), 1	with trace sitt.		33.0	8.5	1	3	3	⁄   <b>√</b> 6 · ·					Sat.	2000	Gray, line SAND	(A-3), Willi lia	Le siit.
30									-	0000	-			3	30	‡								-		0000	- F		
	28.1	13.5	3 2	2	4					W 0000	- -				28.0	13.5	1	2	2	4					Sat.	0000	-  -		
25	00.4	105							-	0000	_			2	25	‡								-		0000	<u>-</u> <del>-</del>		
	23.1	18.5	2 2	2	4					W 0000	-				23.0	18.5	1	2	1	3					Sat.	0000	<i>-</i> Г		
20					1				-	0000	_			2	20	Ŧ								-		0000	<u>-</u> F		
	18.1	23.5	2 4	3						W	_ - 16.6		25	.0	18.0	23.5	1	2	3	· · · ·					Sat.	0000	- - 16.5		25.0
		-									<ul> <li>Boring Termin</li> </ul>	ated at Ele (COASTAL	vation 16.6 ft in PLAIN)			-					•						<ul> <li>Boring Terminated</li> </ul>	d at Elevation 1 DASTAL PLAIN	6.5 ft in
		-									-					†											-  -		
											NOTES:	al MUCK				Ŧ											NOTES:	MUOK	
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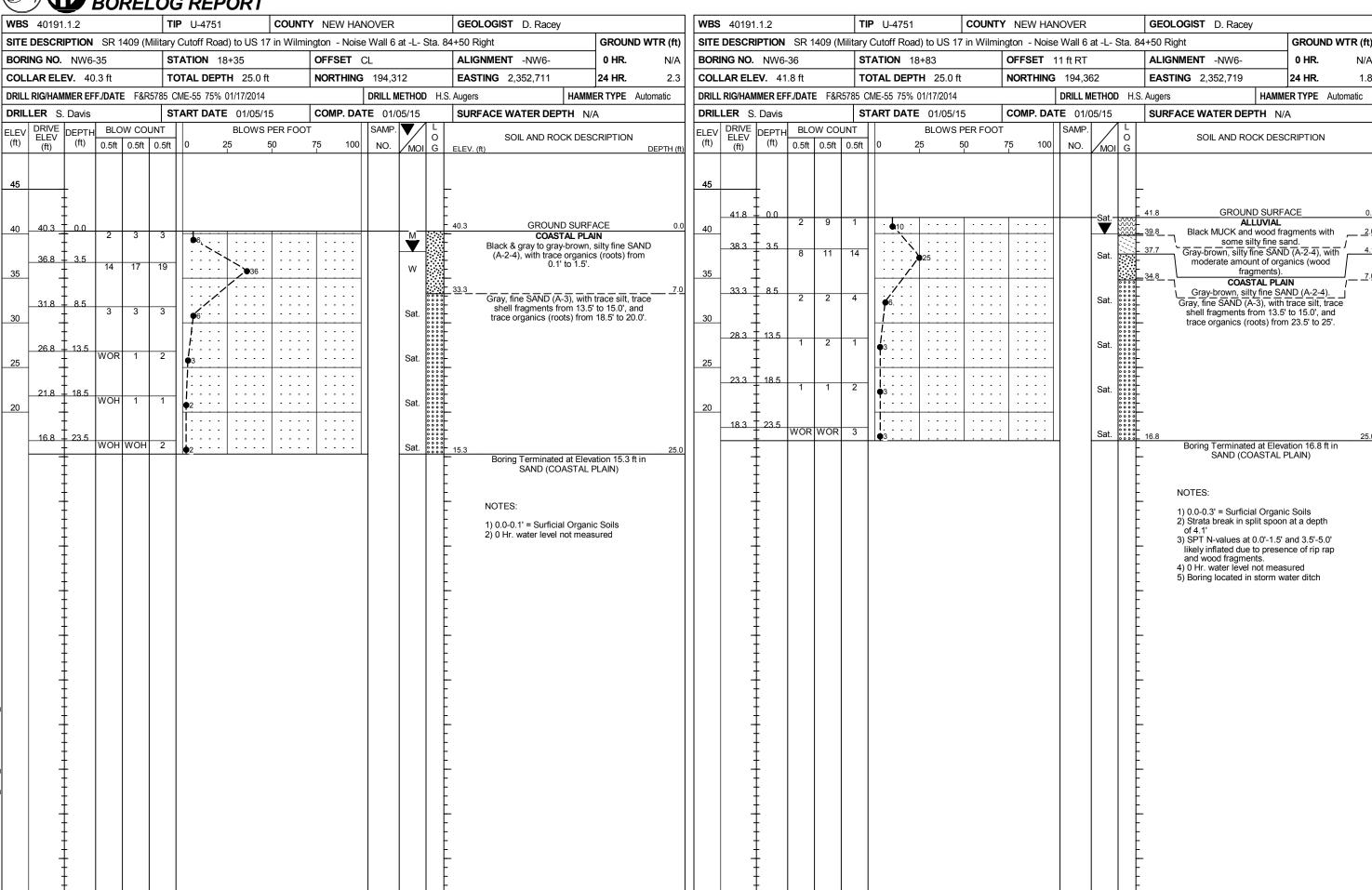
VBS 40191.1.2		ITY NEW HANOVER	GEOLOGIST D. Racey		<b>WBS</b> 40191.1.2			UNTY NEW HANOVER	GEOLOGIST D. Racey	
SITE DESCRIPTION SR 1409 (	Military Cutoff Road) to US 17 in Will			GROUND WTR (ft)			(Military Cutoff Road) to US 17 in W		1	GROUND WTR
BORING NO. NW6-25	STATION 13+34	OFFSET CL	ALIGNMENT -NW6-	<b>0 HR.</b> N/A	BORING NO. N	/6-26	STATION 13+83	OFFSET CL	ALIGNMENT -NW6-	0 HR. N
COLLAR ELEV. 41.4 ft	TOTAL DEPTH 25.0 ft	<b>NORTHING</b> 193,869	<b>EASTING</b> 2,352,487	<b>24 HR</b> . N/A	COLLAR ELEV.	41.7 ft	TOTAL DEPTH 25.0 ft	NORTHING 193,917	<b>EASTING</b> 2,352,500	24 HR. N
PRILL RIG/HAMMER EFF./DATE F&	R5785 CME-55 75% 01/17/2014	DRILL METHOD	H.S. Augers H.	AMMER TYPE Automatic	DRILL RIG/HAMMER	EFF./DATE F	&R5785 CME-55 75% 01/17/2014	DRILL METH	HOD H.S. Augers	HAMMER TYPE Automatic
DRILLER S. Davis	<b>START DATE</b> 01/14/15	COMP. DATE 01/14/15	SURFACE WATER DEPTH	0.6ft	DRILLER S. Da		<b>START DATE</b> 01/14/15	COMP. DATE 01/14/1	SURFACE WATER DEPT	<b>FH</b> 0.6ft
LEV DRIVE DEPTH BLOW CO			O SOIL AND ROCK	DESCRIPTION	ELEV DRIVE DEF	TH BLOW C	<del></del>	/	O SOIL AND ROC	CK DESCRIPTION
(ft) (ft) (ft) 0.5ft 0.5ft	0.5ft 0 25 50	75 100 NO. MOI	G ELEV. (ft)	DEPTH (ft)	(ft) (ft) (f	0.5ft 0.5f	oft 0.5ft 0 25 50	75 100 NO. M	101 G	
45					45					
			- WATER CUREA	OF (04/44/45)	‡				WATER SUR!	FACE (01/14/15)
41.4 + 0.0	2 1 2	Cot	WATER SURFA		41.7 + 0	1 2	2 4,	· · · · · · · · · Sa	T TIN CROOKE	TAL PLAIN
40	3,	Sat.	Gray-brown, silty fin		40				Gray-brown, silty	y fine SAND (A-2-4).
37.9 3.5 9 13	16				38.2 7 3	13 16	3 13		at. 38.2 Gray-brown, silty fin	ne SAND (A-2-4), with
35		· ·   · · · ·			35				inoderate amount	nt of organics (wood /-ments).
32.9 4 8.5			Gray, fine SAND (A-	-3), with trace silt.	33.2 7 8.	,				y fine SAND (A-2-4).
32.9 + 8.5 WOH WOF	3 3		Gray, fine SAND (A-			4 4	1 4 1 1 1	Sa	<sup>at.</sup>   8.5' to 10.0', a 0.2' th	-3), with trace silt from thick black clay layer at
30			000		30 ‡				13.5', and trace orga	anics (wood fragments)
27.9 + 13.5	:::: ::: :::		000		28.2 13	5			0 0 0 0	0 10 10.0 .
77.9 T 19.5 WOH 1	2     •3 · · ·   · · · ·   · · ·	Sat.	0 0 0 0 0 0 0 0 0			2 2		Sa		
25			000		25				24.7 Gray, silty fine SAN	ND (A-2-4), with trace
22.9 18.5 1 2	<u>                                     </u>		000		23.2 18	5 3 2		۰۰۰ ۰۰۰۰     و	lesse Arganics (WA	ood fragments).
		· ·   · · · ·     Sat.	0 0 0 _ 0 0 0 0 _ 0 0 0 0 _		20					
I I I			000			_				
17.9 <u>23.5</u> WOH 2	1		000	25.0	18.2 7 23	5 5	8	Sa	at	

SITE DESCRIPTION SR 1409 (	4""					<u> </u>
	Allitary Cutoff Road) to US 17 in Wilm	ington - Noise Wall 6 at -L- Sta. 8	4+50 Left GROUND WTR (ft)	SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilr	mington - Noise Wall 6 at -L- Sta. 8	84+50 Left GROUND WTR (ft)
BORING NO. NW6-27	STATION 14+34	OFFSET CL	ALIGNMENT -NW6- 0 HR. N/A	BORING NO. NW6-28 STATION 14+84	OFFSET CL	ALIGNMENT -NW6- 0 HR. N/A
COLLAR ELEV. 41.5 ft	TOTAL DEPTH 25.0 ft	<b>NORTHING</b> 193,965	<b>EASTING</b> 2,352,515 <b>24 HR.</b> N/A	COLLAR ELEV. 41.2 ft TOTAL DEPTH 25.0 ft	<b>NORTHING</b> 194,012	<b>EASTING</b> 2,352,532 <b>24 HR.</b> N/A
DRILL RIG/HAMMER EFF./DATE F&F	25785 CME-55 75% 01/17/2014	DRILL METHOD H.S	S. Augers HAMMER TYPE Automatic	<b>DRILL RIG/HAMMER EFF./DATE</b> F&R5785 CME-55 75% 01/17/2014	DRILL METHOD H.	S. Augers HAMMER TYPE Automatic
DRILLER S. Davis	<b>START DATE</b> 01/14/15	<b>COMP. DATE</b> 01/14/15	SURFACE WATER DEPTH 1.9ft	DRILLER S. Davis START DATE 01/14/15	<b>COMP. DATE</b> 01/14/15	SURFACE WATER DEPTH 1.9ft
ELEV (ft) $\begin{array}{c} DRIVE \\ ELEV \\ (ft) \end{array}$ $\begin{array}{c} DEPTH \\ (ft) \end{array}$ $\begin{array}{c} BLOW CO \\ 0.5ft \end{array}$		75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION  ELEV. (ft) DEPTH (ft)	ELEV   DRIVE   DEPTH   BLOW COUNT   BLOWS PER FOR	OT SAMP. L O NO. MOI G	SOIL AND ROCK DESCRIPTION
(ft)   ELEV   (ft)	0.5ft 0 25 50	75 100 NO. MOI G  W  Sat.  Sat.  Sat.  Sat.  Sat.  Sat.  Sat.  Sat.	WATER SURFACE (01/14/15)	45 40 41.2 0.0 WOH WOH 1 37.7 3.5 17 13 11 12 124 1 1 12 12 12 12 12 12 12 12 12 12 12 12	75 100 NO. MOI G  W  Sat.  Sat.  Sat.  Sat.  Sat.  Sat.  Sat.  Sat.	WATER SURFACE (01/14/15)  41.2 GROUND SURFACE 0.0  COASTAL PLAIN  Gray-brown to gray, silty fine SAND (A-2-4), with trace organics (wood fragments) from 0.3' to 1.5'.  34.2 Gray, fine SAND (A-3), with trace silt.
			- - - - - - - - - - - -			- - - - - - - - -





<b>WBS</b> 40191.1.2	TIP U-4751 COUN	ITY NEW HANOVER	GEOLOGIST D. Racey		<b>WBS</b> 40191.1.2	TIP U-4751 COUN	ITY NEW HANOVER	GEOLOGIST D. Racey	
SITE DESCRIPTION SR 1409 (M	filitary Cutoff Road) to US 17 in Wili	mington - Noise Wall 6 at -L- Sta.	84+50 Right	GROUND WTR (ft)	SITE DESCRIPTION SR 1409 (M	Military Cutoff Road) to US 17 in Wilr	mington - Noise Wall 6 at -L- Sta.	. 84+50 Right	GROUND WTR (ft)
BORING NO. NW6-33	STATION 17+23	OFFSET CL	ALIGNMENT -NW6-	<b>0 HR.</b> 2.9	BORING NO. NW6-34	STATION 17+85	OFFSET CL	ALIGNMENT -NW6-	<b>0 HR.</b> 5.3
COLLAR ELEV. 42.7 ft	TOTAL DEPTH 25.0 ft	<b>NORTHING</b> 194,223	<b>EASTING</b> 2,352,644	<b>24 HR.</b> 1.2	COLLAR ELEV. 41.5 ft	TOTAL DEPTH 25.0 ft	<b>NORTHING</b> 194,272	<b>EASTING</b> 2,352,681	<b>24 HR.</b> 2.4
DRILL RIG/HAMMER EFF./DATE F&R	5785 CME-55 75% 01/17/2014	DRILL METHOD H.	S. Augers HAI	MMER TYPE Automatic	<b>DRILL RIG/HAMMER EFF./DATE</b> F&R		DRILL METHOD	H.S. Augers	HAMMER TYPE Automatic
DRILLER S. Davis	<b>START DATE</b> 01/13/15	COMP. DATE 01/13/15	SURFACE WATER DEPTH	N/A	DRILLER S. Davis	<b>START DATE</b> 01/06/15	COMP. DATE 01/06/15	SURFACE WATER DEPT	TH N/A
ELEV CRIPTION OF COLUMN (ft) CRIPTION OF C	JNT         BLOWS PER FO           0.5ft         0         25         50	OT   SAMP.   L O O NO.   MOI G	SOIL AND ROCK DI	ESCRIPTION  DEPTH (ft)	ELEV CHI CHI CHI CHI CHI CHI CHI CHI CHI CHI		OT SAMP. L O NO. MOI G	SOIL AND ROC	K DESCRIPTION
42.7 = 0.0 1 3 40 39.2 3.5 14 16	3 •6,	<u> </u>	42.7 GROUND SUI  COASTAL F Black and gray to gray- SAND (A-2-4), with trace wood fragments) fro	PLAIN	45 41.5 0.0 1 3 38.0 3.5 11 15	3 6	M M	Black to gray-brov	SURFACE 0.0 wn, silty fine SAND organics (roots, wood om 0.2' to 1.5'.
35 34.2 8.5 5 4 30 29.2 13.5	2	Sat	Gray, lifte SAND (A-3)	o, with trace silt.	35 33.0 8.5 6 6	6	Sat.	34.5 Gray, fine SAND (	A-3), with trace silt.
25 24.2 18.5 1 1	2 3	Sat.	- - - - -		28.0 13.5 WOH 2 25 23.0 18.5 WOH 1	1	Sat.	0 - 0 - 0 -	
20 19.2 23.5 WOH WOH	1 1	Sat.	- - 17.7 - Boring Terminated at E - SAND (COASTA	25.0 levation 17.7 ft in AL PLAIN)	20 18.0 23.5 WOH 1	2	000	- 16.5 Boring Terminated	at Elevation 16.5 ft in
			NOTES:  1) 0.0'-0.3' = Surficial Org 2) Boring offset to top of c	ganic Soils ditch				SAND (COA   NOTES:   1) 0.0-0.2' = Surficial	STAL PLAIN) Organic Soils
								- - - - - - - -	
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Sheet 24 of 24
SITE PHOTOGRAPHS



Photograph No. 1: View looking North along proposed Military Cutoff Rd - Proposed NW6 on left



Photograph No. 2: View looking South along proposed Military Cutoff Road – Proposed NW6 on right



Photograph No. 3: View looking East along swale at end of NW6

REFERENCE

#### STATE OF NORTH CAROLINA

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

#### **CONTENTS**

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3-4	SITE PLAN
5-7	PROFILE
8-28	BORE LOG REPORTS
29	SITE PHOTOGRAPHS

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY New Hanover
PROJECT DESCRIPTION SR 1409 (Military Cutoff Rd.) to
US 17 in Wilmington
SITE DESCRIPTION Noise Wall 7 at -L- Sta. 71 + 50 Right

STATE PROJECT REFERENCE NO. U-4751 29

#### **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 LOOS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEGICH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE THE SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR IS ALL! HAVE NO CLAIM FOR ADDITIONS 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.

D. Racey C. Wang S. Davis M. Renza CHECKED BY <u>B. Howey</u>, PG, PE SUBMITTED BY \_HDR, Inc. 

**PERSONNEL** 



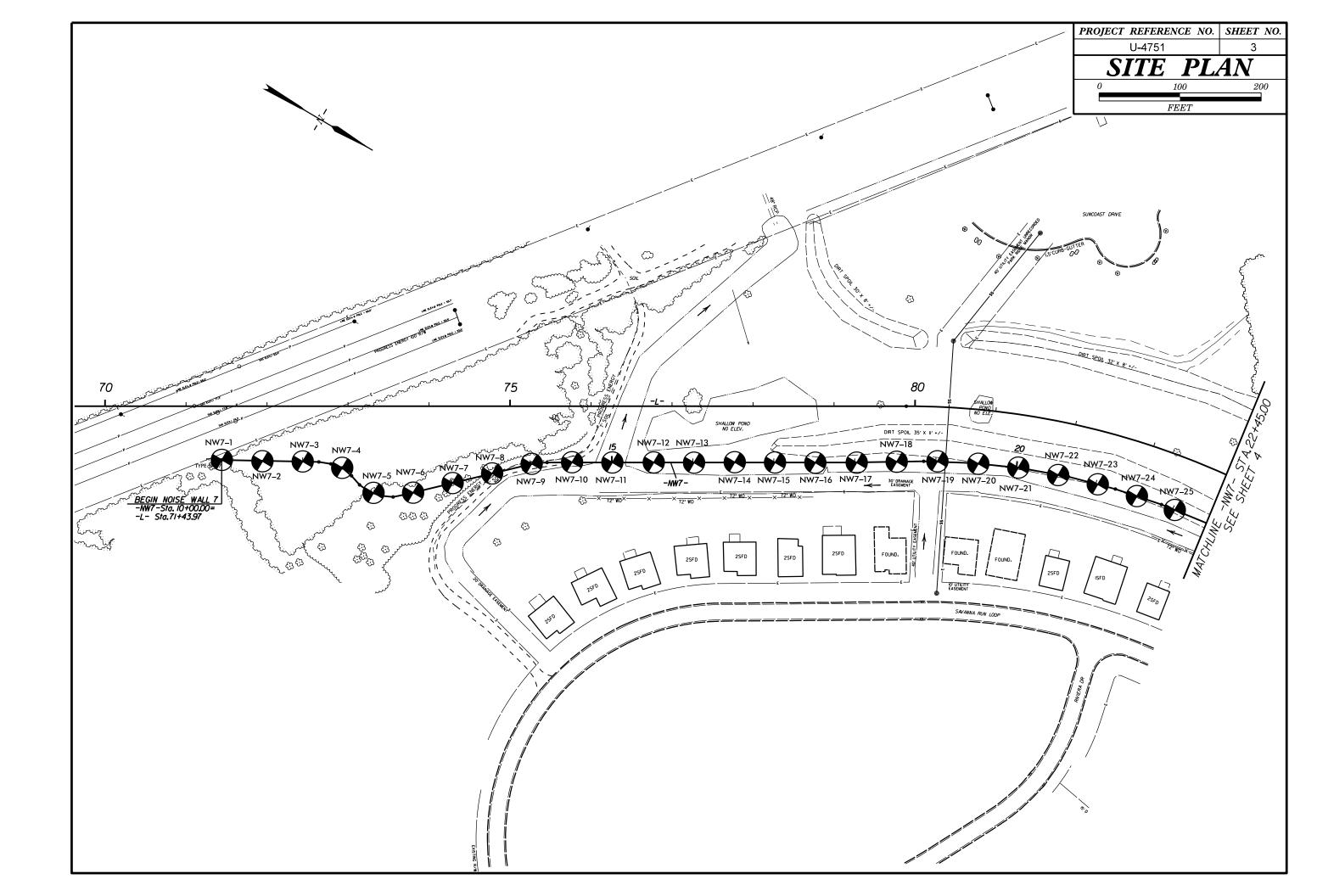
U-4751 SHEET NO.

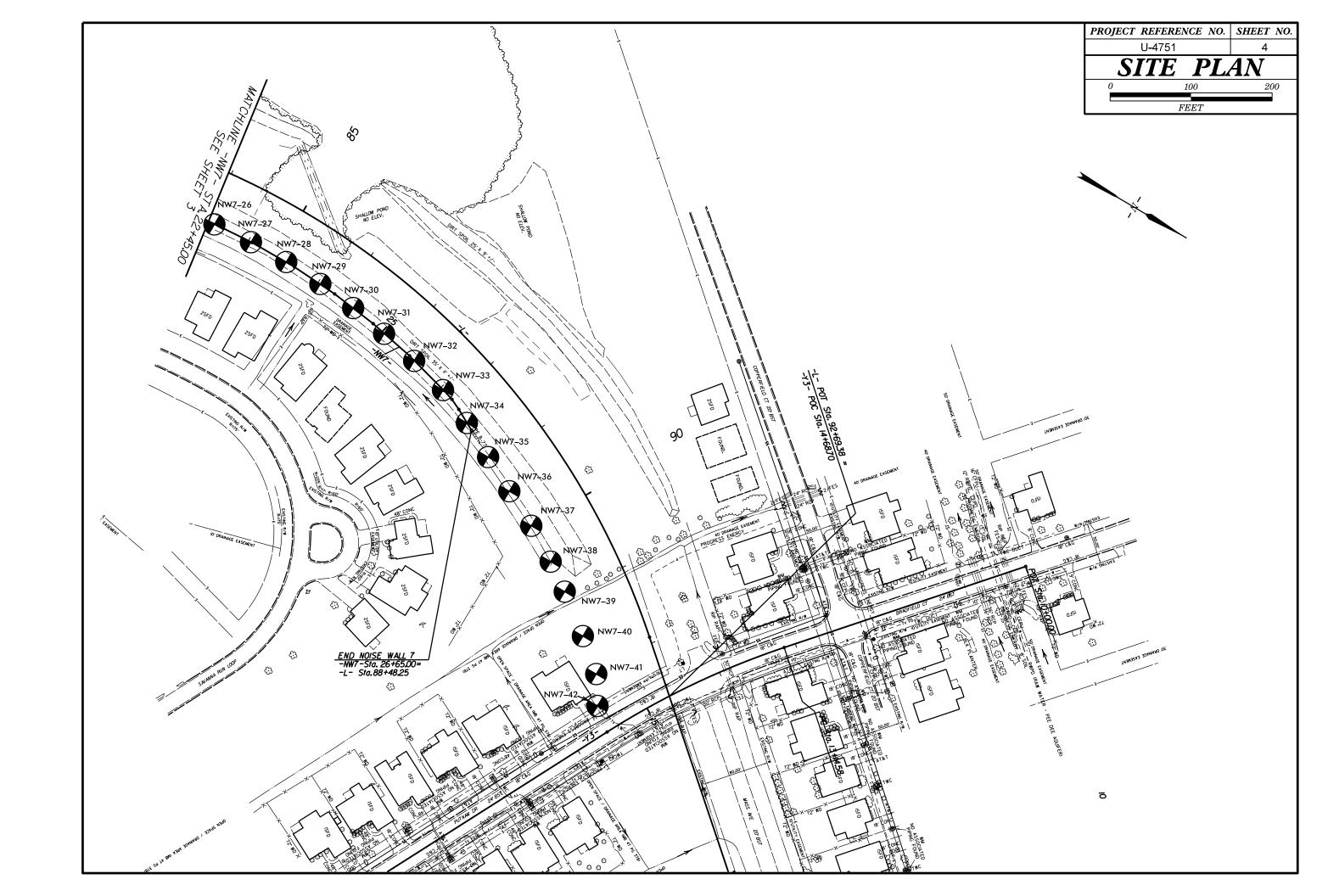
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

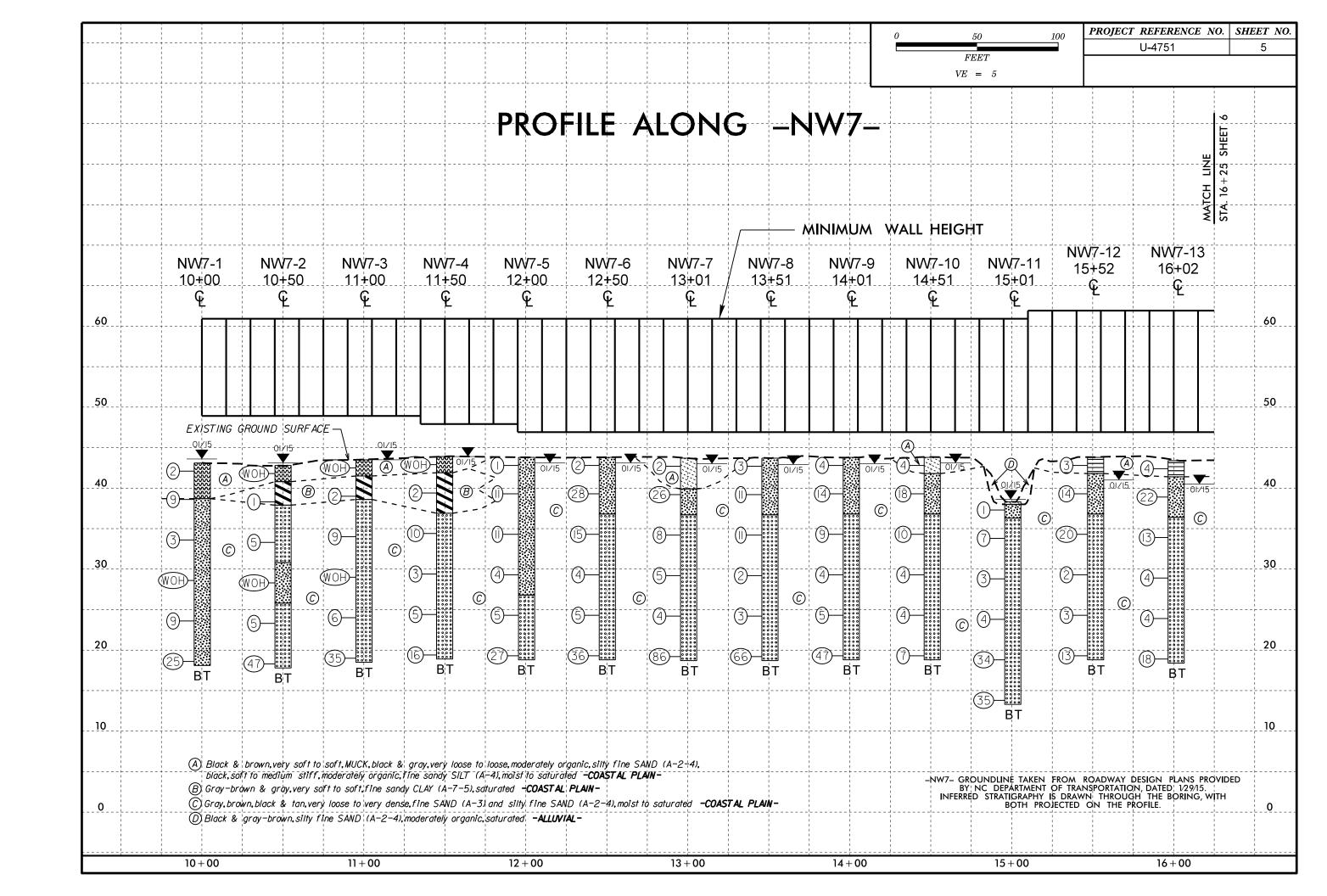
# SUBSURFACE INVESTIGATION

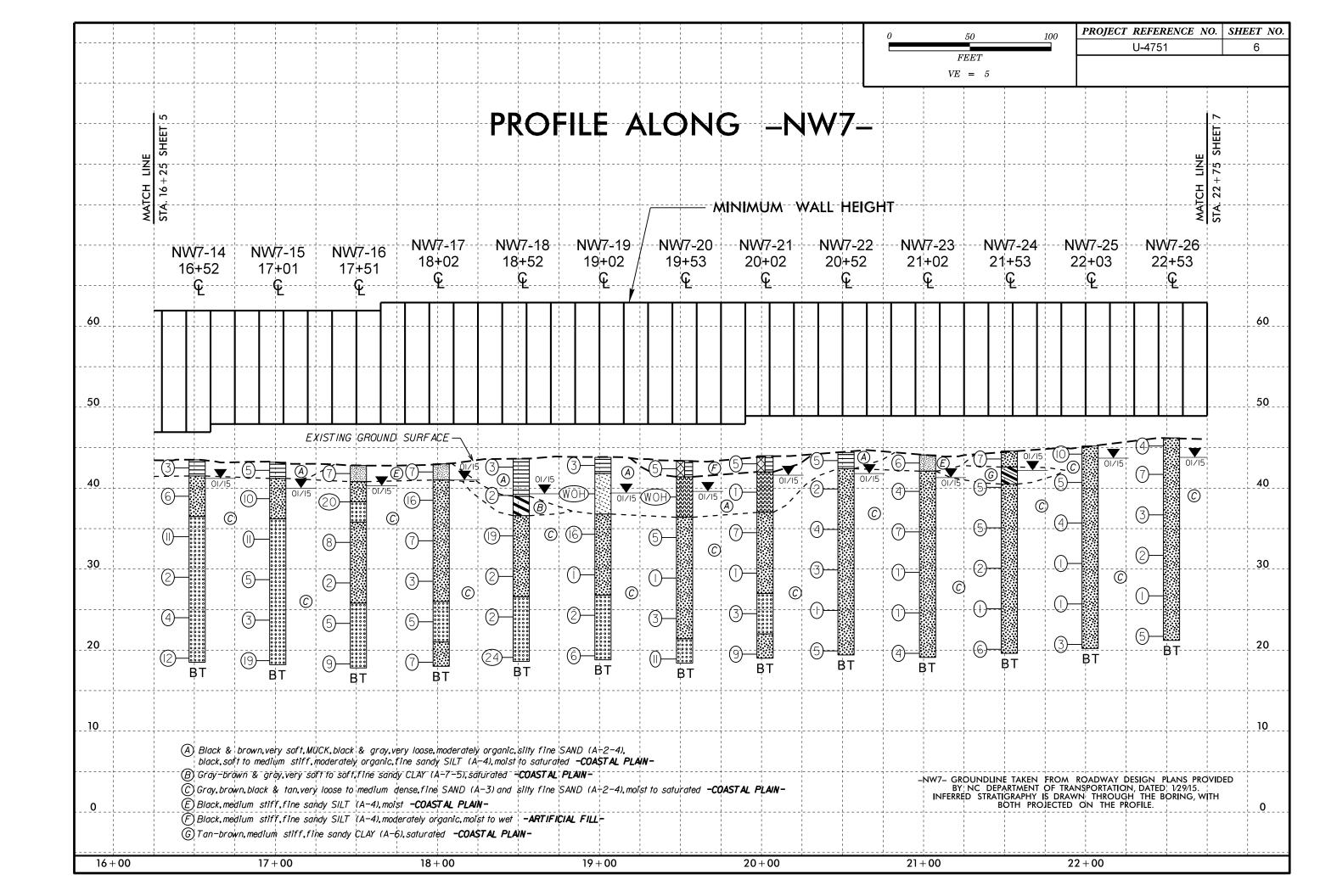
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

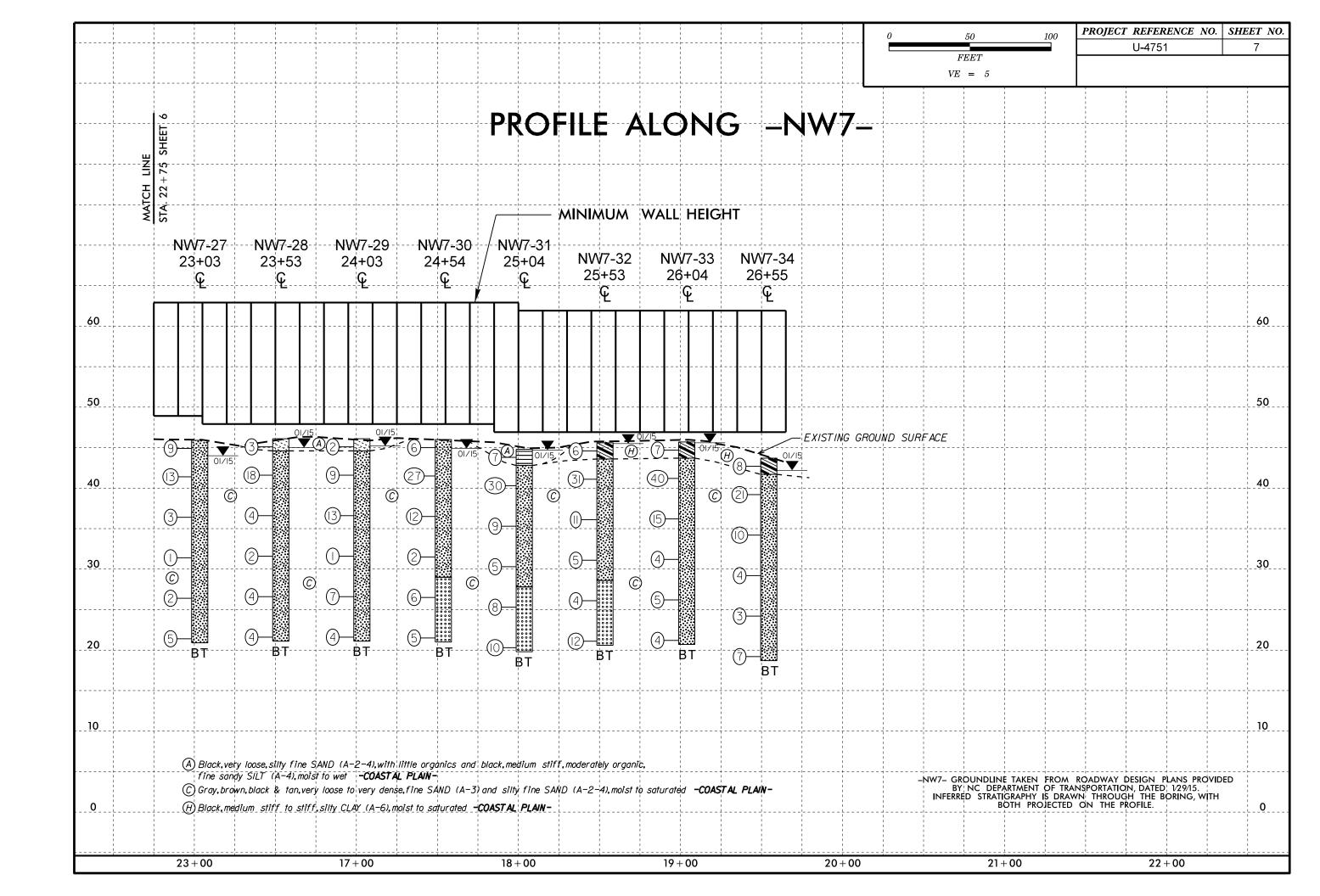
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLORT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST IGASHIOT I 206, ASTM DISBAS, SATM DISBAS, LCLASSIFICATION 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, ANDULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.  GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.  ANGULARITY OF GRAINS  THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:  ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	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 PERETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 01.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  NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	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.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION  MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.  COMPRESSIBILITY	ROCK (WR)  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, ONEISS, GABBRO, SCHIST, ETC.  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN  FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	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.
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE   LL < 31   MODERATELY COMPRESSIBLE   LL = 31 - 50   HIGHLY COMPRESSIBLE   LL > 50   PERCENTAGE OF MATERIAL GRANULAR SILT - CLAY	ROCK (NCR)  SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED.  ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD  SEDIMENTARY ROCK  SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED  WEATHERING	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.
MATERIAL PASSING *40 LL	ORGANIC MATERIAL   SOILS   SOILS   OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.  VERY SLIGHT 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.	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
USUAL TYPES STONE FRACS. OF MAJOR GRAVEL, AND MATERIALS SAND  GEN. RATING  FINE SILTY OR CLAYEY SILTY CLAYEY SOILS  GRAVEL AND SAND SAND SAND SAND SAND SAND SAND		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO  (SLI,) I INCH, OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR  CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  MODERATE 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	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.
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 OR DENERATION RESISTENCE (N-VALUE) COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )	SPRING OR SEEP  MISCELLANEOUS SYMBOLS  ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	WITH FRESH ROCK.  MODERATELY 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  OF THE PROPERTY OF THE PROPERT	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
GENERALLY VERY LOOSE 4 TO 10 GRANULAR LOOSE 4 TO 10 GRANULAR MEDIUM DENSE 10 TO 30 N/A MATERIAL DENSE 30 TO 50 VERY DENSE > 50	SOIL SYMBOL  ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT  SOIL SYMBOL  SPT ONT POPT ONT POPT ONT POPT ONT POPT ONT POPT ONT POPT ONT POPT ONT INSTALLATION  AUGER BORING  CONE PENETROMETER TEST	SEVERE 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 FRADMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF  VERY  ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRADMENTS OF STRONG ROCK	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
VERY SOFT ( 2 ( 0.25  GENERALLY SOFT 2 TO 4 0.25 TO 0.5  SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0  MATERIAL STIFF 8 TO 15 1 TO 2  (COHESIVE) VERY STIFF 15 TO 30 2 TO 4  HARD > 30 > 4	INFERRED SOIL BOUNDARY	(V SEV.) REMAINING. SAPPOLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> 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, SAPPOLITE IS ALSO AN EXAMPLE.	OF AN INTERVENING IMPERVIOUS STRATUM.  RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL  ABBRE VIATIONS  UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	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 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	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.  SILKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	BY MODERATE BLOWS.  MEDIUM  CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  HARD  CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I 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	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 I 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.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE  PLASTIC RANGE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	DPT - DYNAMIC PENETRATION TEST   SAP SAPROLITIC   S - BULK	PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY 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  BEDDING	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.  BENCH MARK: N/A
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT  PEQUIPES ADDITIONAL WATER TO	HI HIGHLY	TERM         SPACING         TERM         THICKNESS           VERY WIDE         MORE THAN 10 FEET         VERY THICKLY BEDDED         4 FEET           WIDE         3 TO 10 FEET         THICKLY BEDDED         1.5 - 4 FEET           MODERATELY CLOSE         1 TO 3 FEET         THINLY BEDDED         0.16 - 1.5 FEET           CLOSE         0.16 TO 1 FOOT         VERY THINLY BEDDED         0.03 - 0.16 FEET	ELEVATION: N/A FEET NOTES:
- DRY - (D) REGUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  PLASTICITY  PLASTICITY INDEX (PI) DRY STRENGTH  NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	X CME-55	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED C 0.008 FEET  INDURATION  FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  RUBBING WITH FINGER FREES NUMEROUS GRAINS:  GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	BORING AND GROUND SURFACE ELEVATIONS OBTAINED FROM NCDOT-PROVIDED DTM FILE  FIAD - FILLED IMMEDIATELY AFTER DRILLING
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.	CASING W/ ADVANCER POST HOLE DIGGER  PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER  TRICONE TRICONE SOUNDING ROD  CORE BIT VANE SHEAR TEST	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.	DATE: 8-15-14

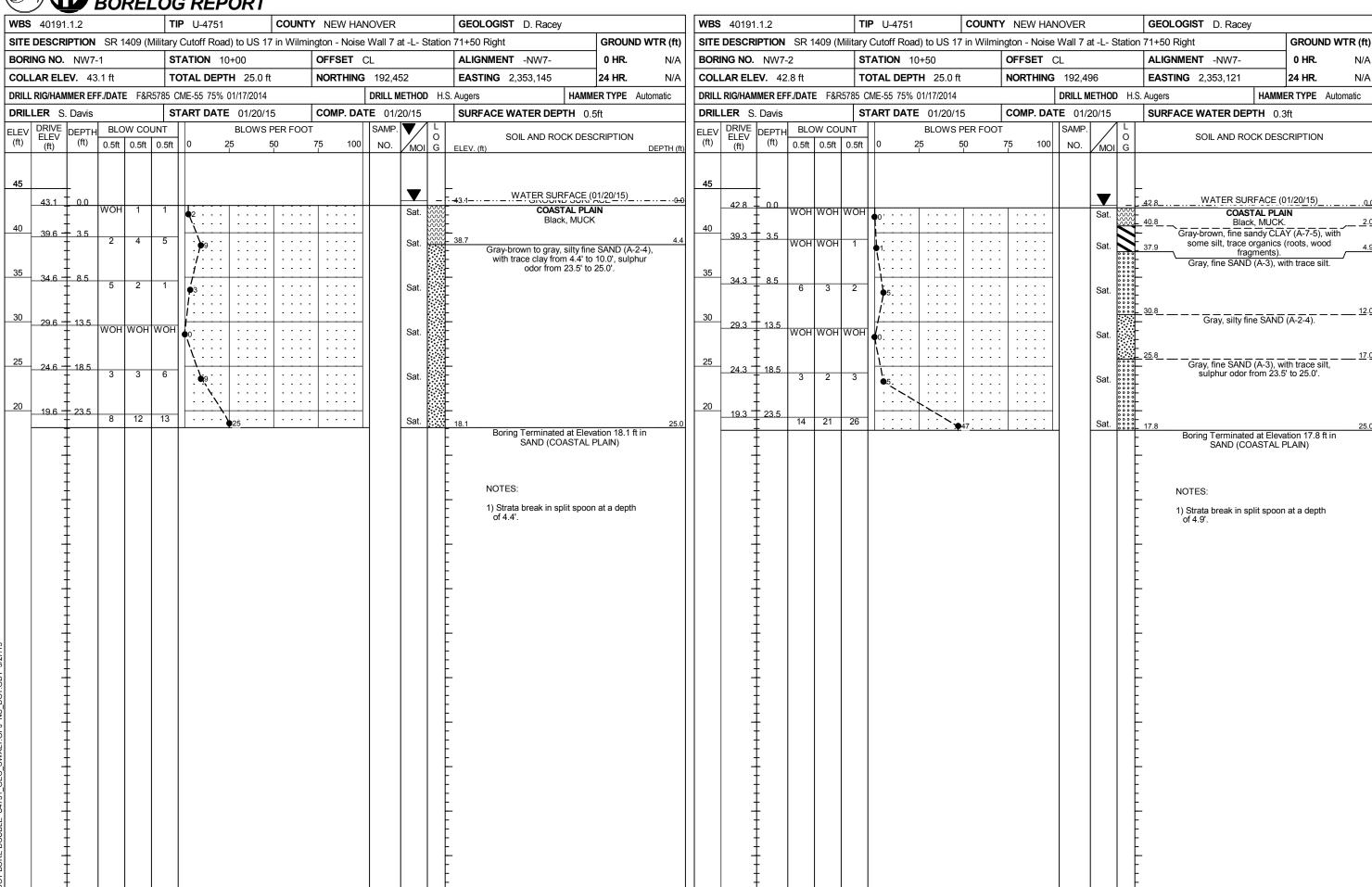






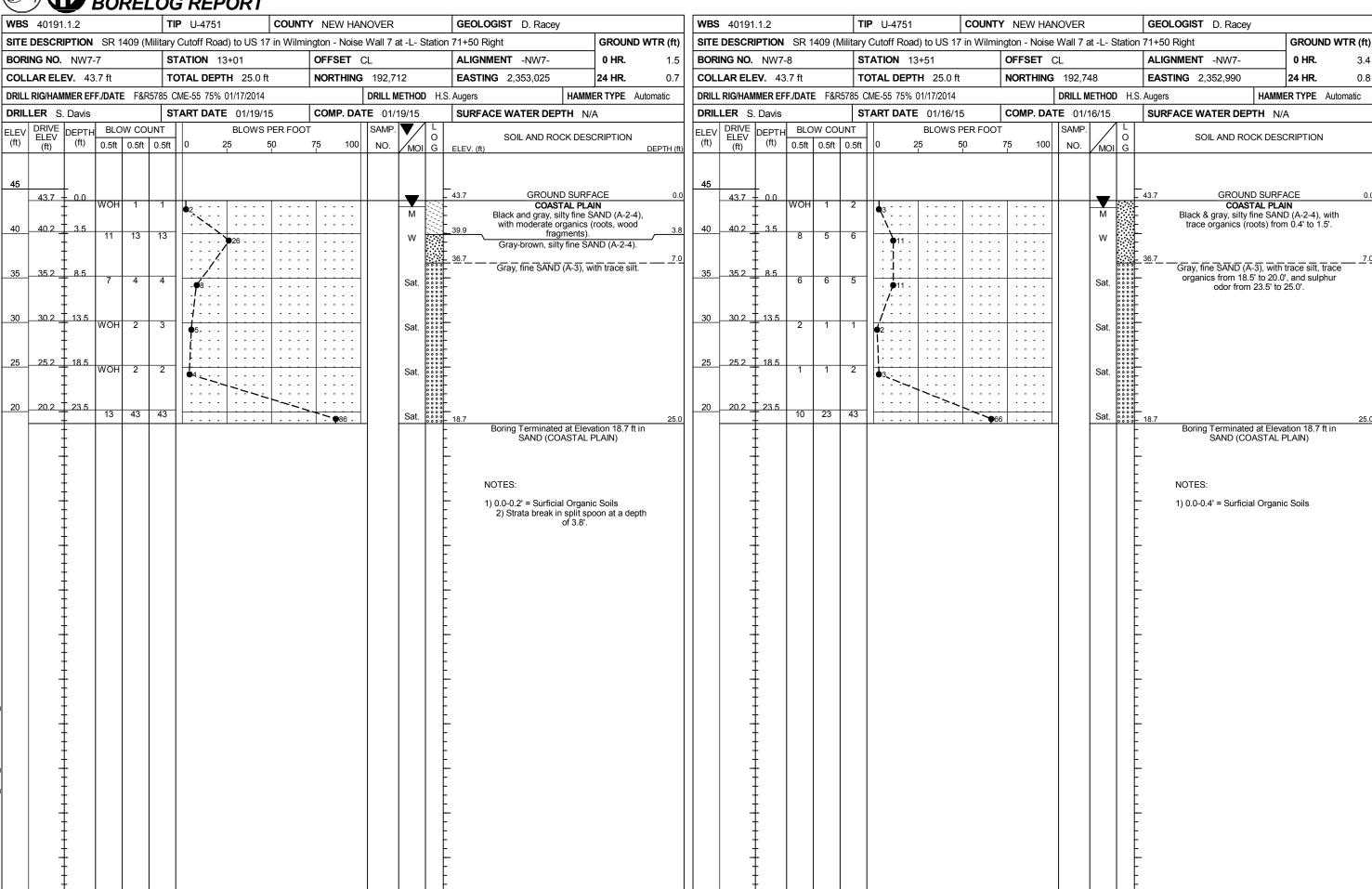






<b>WBS</b> 40191.1.2	TIP U-4751 COUNT	Y NEW HANOVER	GEOLOGIST D. Racey	WBS 40191.1.2 TIP U-4751 COUN	ITY NEW HANOVER	GEOLOGIST D. Racey
SITE DESCRIPTION SR 1409 (Milli	tary Cutoff Road) to US 17 in Wilm	ngton - Noise Wall 7 at -L- Station	71+50 Right GROUND WTR (ft)	SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilm	nington - Noise Wall 7 at -L- Statio	on 71+50 Right GROUND WTR (ft
BORING NO. NW7-3	STATION 11+00	OFFSET CL	<b>ALIGNMENT</b> -NW7- <b>0 HR.</b> 0.0	BORING NO. NW7-4 STATION 11+50	OFFSET CL	ALIGNMENT -NW7- 0 HR. 0.3
COLLAR ELEV. 43.5 ft	TOTAL DEPTH 25.0 ft	NORTHING 192,539	<b>EASTING</b> 2,353,096 <b>24 HR.</b> 0.0	COLLAR ELEV. 43.9 ft TOTAL DEPTH 25.0 ft	NORTHING 192,585	<b>EASTING</b> 2,353,078 <b>24 HR.</b> 0.0
DRILL RIG/HAMMER EFF./DATE F&R578	85 CME-55 75% 01/17/2014	DRILL METHOD H.S	. Augers HAMMER TYPE Automatic	<b>DRILL RIG/HAMMER EFF./DATE</b> F&R5785 CME-55 75% 01/17/2014	DRILL METHOD H.	S. Augers HAMMER TYPE Automatic
DRILLER S. Davis	START DATE 01/20/15	COMP. DATE 01/20/15	SURFACE WATER DEPTH 0.0ft	DRILLER S. Davis START DATE 01/20/15	COMP. DATE 01/20/15	SURFACE WATER DEPTH N/A
ELEV CRIVE CHARACTER (Ft) DEPTH BLOW COUNTY (ft) 0.5ft	BLOWS PER FOO   .5ft	75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION  ELEV. (ft) DEPTH (ft)	ELEV (ft)	OT SAMP. L O NO. MOI G	SOIL AND ROCK DESCRIPTION
45	7OH 00:	Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	43.5 GROUND SURFACE 0.0  COASTAL PLAIN Black, MUCK. 2.0  Gray-brown, fine sandy CLAY (A-7-5), with some silt, trace organics (roots, wood fragments). 4.9	45 WOH WOH WOH	Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	organics (wood fragments) from 8.5' to 15.0', and sulphur odor from 18.5' to 25.0'.

WBS 4						<b>U</b> -4751			NEW H				OGIST D. Racey			<b>→                                    </b>	<b>S</b> 401					<b>P</b> U-4751			NEW HA				DLOGIST D. Race	·	
				1409 (1			<u> </u>				at -L- S	tation 71+50			ROUND WTR (ft)	I -				1409 (N	<u> </u>		<u>′</u>		•		at -L- S	station 71+5		GROUND W	•
BORING					_	ATION 12			OFFSET				NMENT -NW7-		<b>HR.</b> 0.8	l <del></del>		<b>)</b> . NW7			_	TATION 12			OFFSET				GNMENT -NW7-	0 HR.	2.
COLLA						TAL DEPT			NORTHIN	<u> </u>			<b>ING</b> 2,353,085	24		┨ ├──		L <b>EV</b> . 4				OTAL DEPT			NORTHING	· ·			<b>STING</b> 2,353,060	24 HR.	0
			F./DAT	E F&F		ME-55 75%						H.S. Augers			YPE Automatic	┨ ├──				E F&R		ME-55 75%						H.S. Auger		HAMMER TYPE Autor	matic
DRILLE		Davis				ART DATE			COMP. D				ACE WATER DEP	TH N/A				S. Davis				TART DATE			COMP. DA		19/15	SUF	RFACE WATER DEI	PTH N/A	
ELEV DI		OEPTH (ft)		0.5ft				PER FOOT 50			·   🗸	0	SOIL AND ROO	CK DESCRIP			V ELEV	DEPTH	H BLO	0.5ft		/ ا	BLOWS P		5 100	SAMP.		o	SOIL AND RO	OCK DESCRIPTION	
(11)	(ft)	(10)	υ.5π	0.5π	υ.5π	10 4	23 	50	75 10	0 NO.	MOI	G ELEV. (ft	2)		DEPTH (f	) (11)	(ft)	110	υ.5π	0.5π	0.511	10 4	25 50	, ,	5 100	NO.	/MOI	G			
45	3.8 -										_	43.8	GROUNE	D SURFACE	0.	45	43.8	$\pm$									_	43.8	GROUN	ID SURFACE	
	3.0	0.0	1	0	1	1				1 1	W		COAST	TAL PLAIN			45.0	Ŧ 0.0	WOH	WOH	2	2					W		COAS	TAL PLAIN o gray-brown, silty fine	
40 4	0.3	3.5				\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.	: : : :	: : : :	l l			-	Black and gray to SAND (A-2-4), with	trace organi	ics (roots)	40	40.3	3.5							: : : :			-	SAND (A-2-4), wit	th trace organics (roots)	
	7	·	6	4	7	. •11 .				1	Sat.		from U.	.2' to 10.0'.				Ŧ	11	14	14		28			]	W		trom	0.2' to 1.5'.	
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25 2	5.3	18.5	2	2	3	1		<u> </u>				0000	Gray, fine SAND (A	A-3), with trac hur odor.	ce silt and		25.3	18.5	1	2	3	<u>                                   </u>						0000			
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	1						14					-	Boring Terminated	at Elevation ASTAL PLAIN	18.8 ft in			Ŧ					. 🕶					-	Boring Terminate	d at Elevation 18.8 ft in DASTAL PLAIN)	
	7											F	SAND (CO)	ASTALFLAII	(N)			Ŧ										F	SAND (CC	DASTAL FLAIN)	
	7	.										-						‡													
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												F	1) 0.0-0.2' = Surficial	al Organic Soi	ile			‡											1) 0.0-0.2' = Surfici	al Organic Soils	
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WBS 40						U-4751			Y NEW H				OGIST D. Racey			→		191.1.2				<b>P</b> U-4751		COUNTY					OLOGIST D. Race	<u> </u>	
				409 (N	<u> </u>			17 in Wilmi	·		at -L- St	tation 71+50			ROUND WTR (	´ I —				1409 (I			·	in Wilmingt			at -L- S			GROUNI	
BORING					_	ATION 1			OFFSET				NMENT -NW7-					NO. NW			_	TATION 1			FFSET				IGNMENT -NW7-	0 HR.	;
COLLAR						TAL DEP			NORTHIN	<u> </u>			ING 2,352,955					ELEV. 4				OTAL DEP		N	ORTHING	· ·			<b>STING</b> 2,352,928	24 HR.	(
			/DATI	F&R	_	/IE-55 75%			_			H.S. Augers			TYPE Automatic	$\dashv \vdash$				TE F&F		ME-55 75%						H.S. Auge		HAMMER TYPE	Automatio
DRILLER						ART DATI			COMP. D				ACE WATER DEP	TH N/A				S. Davis				TART DATI			OMP. DA		16/15	SU	RFACE WATER DE	PTH N/A	
ELEV DR (ft) EL		EPTH (ft)	BLC	W COU		0		S PER FOO 50	T 7 <u>5</u> 10		₽. ▼/	0	SOIL AND RO	CK DESCRI		1 (11)		VE DEPT	H BL	OW CO			BLOWS P	PER FOOT 0 75	5 100	SAMP.	/	0	SOIL AND R	OCK DESCRIPTION	
(1.1)	ft)	(,	0.511	บ.ธน	0.511		25	30	75 10	0 NO.	MOI	G ELEV. (fi	t)		DEPTH	(ft)	) (ft	(1)	0.511	0.511	0.511		3 3	73	100	NO.	/MOI	G			
45	3.8	00									_	43.8	GROUN	D SURFACE	<b>=</b>	0.0		.8 + 0.0									_	43.8	GROU	ND SURFACE	
	<del> </del>	0.0	1	2	2	4		I		1 1	M			TAL PLAIN			43.	.o <u> </u>	1	2	2	4					M	41.8	COA	STAL PLAIN silty fine SAND (A-2-4)	),
40 40	0.3	3.5					: : : :					F	trace organics (ro	oots) from 0.	.1' to 1.5'.	40	40.	.3 7 3.5									""		moder	rately organic.	
	Ŧ		8	7	7	. • 14.					M							Ŧ	9	9	9	)				]	М		Gray, silty	fine SAND (A-2-4).	
	Ŧ					: :/: :			.			36.8		7.7.5		7.0		Ŧ				::;						36.8		ID (A-3), with trace sil	
35 35	5.3 +	8.5	5	4	5	· j · ·				_	l <sub>w</sub>	0000	Gray, fine SAND sulphur odor f	from 23.5' to	25.0'.	35	35.	.3 ‡ 8.5	6	5	5	1 - 1 -				11	l w	0000	Gray, fine SAN	iD (A-3), with trace sii	II.
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30 30	, , ‡	12.5				-/						0000					20	.3 13.5				½:::						0000			
30 31	··· +	13.5	WOH	2	2	<b>4</b> 4					Sat.	18.8				30	30.	.3 + 13.5	2	2	2	<b>4</b> 4				11	Sat.	0000			
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20 20	0.3	23.5	6	13	34			<b>1</b> 47		_	Sat.	18.8			2	5.0		.3 ‡ 23.5	2	2	5	7					Sat.	18.8			
	Ŧ						1	<u> </u>			1	- 10.0	Boring Terminated	d at Elevation	n 18.8 ft in	3.0		#				<b>— •</b> · · ·			<del></del>			- 10.0	Boring Terminat	ed at Elevation 18.8 ft	t in
	Ŧ											F	SAND (CO	ASTAL FLA	airi)			Ŧ										F	SAND (C	OASTAL PLAIN)	
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	‡											F	1) 0.0-0.1' = Surficia	al Organic S	oils			#											1) 0.0-0.3' = Surfic	cial Organic Soils	
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WBS 40191.1.2		Y NEW HANOVER	GEOLOGIST D. Racey	<b>WBS</b> 40191.1.2 <b>TIP</b> U-475	COUNTY NEW HA	NOVER	GEOLOGIST D. Racey	
SITE DESCRIPTION SR 1409 (Mili	tary Cutoff Road) to US 17 in Wilm	ington - Noise Wall 7 at -L- Statio	n 71+50 Right GROUND WTR (ft)	SITE DESCRIPTION SR 1409 (Military Cutoff Roa	oad) to US 17 in Wilmington - Noise	Wall 7 at -L- Station	n 71+50 Right	GROUND WTR (ft)
BORING NO. NW7-11	STATION 15+01	OFFSET CL	ALIGNMENT -NW7- 0 HR. N/A	BORING NO. NW7-12 STATION	15+52 <b>OFFSET</b>	CL	ALIGNMENT -NW7-	<b>0 HR.</b> 4.0
COLLAR ELEV. 38.3 ft	TOTAL DEPTH 25.0 ft	<b>NORTHING</b> 192,869	<b>EASTING</b> 2,352,903 <b>24 HR.</b> N/A	COLLAR ELEV. 43.8 ft TOTAL DEP	PTH 25.0 ft NORTHING	192,913	<b>EASTING</b> 2,352,877	<b>24 HR.</b> 2.8
DRILL RIG/HAMMER EFF./DATE F&R57	85 CME-55 75% 01/17/2014	DRILL METHOD H.S	S. Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75%	% 01/17/2014	DRILL METHOD H.S	S. Augers	HAMMER TYPE Automatic
DRILLER S. Davis	<b>START DATE</b> 01/21/15	<b>COMP. DATE</b> 01/21/15	SURFACE WATER DEPTH 0.3ft		TE 01/21/15 COMP. DA	<b>TE</b> 01/21/15	SURFACE WATER DEPT	H N/A
ELEV (ft)         DRIVE ELEV (ft)         DEPTH (ft)         BLOW COUNTY           0.5ft         0.5ft         0		T SAMP. L O NO. MOI G	SOIL AND ROCK DESCRIPTION  ELEV. (ft)  DEPTH (ft)	ELEV CRIP CRIP CRIP CRIP CRIP CRIP CRIP CRIP	BLOWS PER FOOT 25 50 75 100	SAMP. L O MOI G	SOIL AND ROCK	K DESCRIPTION
383 00 1 0 35 348 35 4 3 3 30 298 85 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3	20	Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	(A-2-4), with moder are amount of organics (grass, roots).  COASTAL PLAIN  Gray, silty fine SAND (A-2-4).  Gray, fine SAND (A-3), with trace silt, trace organics (wood fragments) from 18.5' to 25.0', and sulphur odor from 23.5' to 25.0'.	45	4	Sat.	Black, fine sandy SII  Gray-brown, silty f  Gray-brown, silty f  Gray, fine SAND (A-3  organics (roots) fi	ine SAND (A-2-4).  7.  7.  7.  7.  7.  7.  7.  7.  7.

<b>3S</b> 40191.	.1.2			Т	<b>P</b> U-4751		co	UNTY	NEW H	ANOV	ER		G	EOLOGIST D. Rad	еу			WBS	<b>3</b> 401	91.1.2			TII	<b>P</b> U-4751		COUNT	Y NEW HAI	NOVER		GEO	LOGIST D. Race	<u> </u>	
TE DESCRI	PTION	I SR	1409 (	Military	Cutoff Roa	nd) to US	3 17 in V	Wilming	ton - Nois	se Wal	II 7 at	-L- St	ation 71	+50 Right		GROUND W	/TR (ft)	SITE	DES	CRIPTION	N SI	R 1409 (N	Military	Cutoff Roa	d) to US 17	in Wilmir	ngton - Noise	Wall 7	at -L- Sta	tion 71+50	Right	GRO	JND W1
RING NO.	NW7	'-13		s	TATION 1	6+02		(	OFFSET	CL			Α	LIGNMENT -NW7-		0 HR.	4.6	BOR	RING N	O. NW	7-14		ST	TATION 1	6+52		OFFSET (	CL		ALIG	NMENT -NW7-	0 HF	<b>L</b> .
LLAR ELE	<b>V.</b> 4	3.4 ft		Т	OTAL DEP	<b>TH</b> 25.	.0 ft	1	NORTHIN	<b>G</b> 19	92,956	3	E	<b>ASTING</b> 2,352,852		24 HR.	2.9	COL	LAR E	LEV. 4	3.5 f	t	TC	OTAL DEP	<b>TH</b> 25.0 ft		NORTHING	192,9	99	EAS	<b>TING</b> 2,352,826	24 HF	2.
ILL RIG/HAM	MER E	FF./DAT	ΓE F&l	R5785 (	CME-55 75%	01/17/20	)14			DRI	LL ME	THOD	H.S. Au	gers	HAM	IMER TYPE Auto	omatic	DRIL	L RIG/H	AMMER E	FF./D	ATE F&R	R5785 C	ME-55 75%	01/17/2014			DRILL N	IETHOD	H.S. Augers		HAMMER TYP	E Auton
RILLER S.	Davis			s	TART DAT	<b>E</b> 01/2	1/15	(	COMP. DA	ATE	01/21	/15	S	URFACE WATER D	EPTH N	N/A		DRIL	LER	S. Davis	3		SI	TART DAT	E 01/21/15		COMP. DA	<b>TE</b> 01/	21/15	SURI	FACE WATER DE	PTH N/A	
DRIVE ELEV	DEPTI	BLO	OW CC	UNT			VS PER		- 400		MP.	<b>'</b> /	L O	SOIL AND F	ROCK DE	SCRIPTION		ELEV			НЕ	BLOW CO	UNT		BLOWS PI			SAMP.			SOIL AND R	OCK DESCRIPTION	ON
) (ft)	(11)	0.5ft	0.5ft	0.5ft	0	25	50	7:	5 100	0 N	10.	MOI	G ELE	EV. (ft)		]	DEPTH (ft)	(ft)	(ft)	(11)	0.5	5ft 0.5ft	0.5ft	0	25 50	)	75 100	NO.	MOI (	3			
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43.4	0.0	WOF	1 2	2	1	· · · ·	.	• • • •				М	- 43.4	COA	JND SUR <b>ASTAL PL</b>	LAIN	0.0	1	43.	5 † 00		OH 1	2	3 · · ·					M	- 43.5	COA	ND SURFACE STAL PLAIN	
39.9	-											<b>V</b>	41.4	V	organic.	A-4), moderately		40	40.0	1 3.5				7° : : :						41.5 	Black, fine sandy	organic.	i
39.9	- 3.5 -	8	9	13	1	22				11		W		Gray-brown,	silty fine S	SAND (A-2-4).	1	40	40.9	7 + 3.5		2 3	3	6	1		1		w	<b>:</b>	Gray-brown, si	Ity fine SAND (A-2	<del>2</del> -4). — 1
‡	<b>-</b> -				:::/.	T:::	.						- 36.4	4			7.0			‡										- - 36.5			
34.9	- - 8.5				]  /.				<u> </u>			0		Gray, fine SAND	O (A-3), w	vith trace silt and		35	35.0	8.5				· <u>i</u> · ·					0 0	000	Gray, fine SAND trace organics (wo	(A-3), with trace s	silt and
-	-	9	7	6	· • 13·							Sat.	0000	trace organics (v	to 25.0'.	ments) from 23.5				<u> </u>	6	6	5	11 -					Sat.	000	trace organics (wo	o 25.0'.	0.01
7	-				:,;::		-					0	18.4							Ŧ				:/: : :					0 0	000			
29.9	13.5	  WOF	1 2	2	1 7	+				+		Cot						30	30.0	13.5	l w	OR 1	1	<i></i>	<del>   </del>				Sat.				
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24.9	<u>    18.5                                </u>	WOF	1 2	2	<u>                                   </u>	+				-		Sat.						25	25.0	18.5	+1	1 2	2	4					Sat.				
1	-				7							0	0000							±				$  \tilde{j}\cdots$									
19.9	- 22.5				: \; : :	: : :						o o	000					20	20.0	$\frac{1}{23.5}$				:\; : :					0 0				
19.9	- 23.5 -	3	5	13		8						Sat.	18.4	4			25.0		20.	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	3	3 5	7	· •12					Sat.	18.5			
1	-												ļ	Boring Termina SAND (	ated at Ele	evation 18.4 ft in L PLAIN)				‡										ļ.	Boring Terminate SAND (C	ed at Elevation 18 OASTAL PLAIN)	.5 ft in
	-												L	3, 1112 (1	00/10//1					‡										Ł		,	
1	-												Ł							±										Ł			
+	-												-	NOTES:						+										-	NOTES:		
7	-												F	1) 0.0-0.3' = Surfi	icial Orna	anic Soils				Ŧ										F	1) 0.0-0.2' = Surfic	ial Organic Soils	
‡	-												F	1) 0.0 0.0 – 0411	iciai Orga	31110 00113				‡										ļ.	., 0.0 0.2	.a. 0.ga0 000	
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DRILLER S. Davis   START DATE   01/22/15   COMP. DATE   01/22/15   SURFACE WATER DEPTH   N/A	L- Station 71+50 Right
COLLAR ELEV. 43.2 ft TOTAL DEPTH 25.0 ft NORTHING 193.042  DRILL MISHAMMER EFF,DATE F86795 CMES-5795 0117/2014  DRILL METHOD HS. Augers HAMMER TF,DATE 519275 CMES-5795 0117/2014  ELEV DRILL RS. Davis START DATE 011/22/15  ELEV DRIVE DEPTH 010 0.06 0.06 0.06 0.07 0.75 100 NO. Mool GEV. (In the property of the property	ALIGNMENT -NW7- 0 HR. 3.0
DRILLER'S DAVIS   START DATE 01/22/15   COMP. DATE 01/22/15   SURFACE WATER DEPTH NIA	
DRILLER S. Davis   START DATE 01/22/15   COMP. DATE 01/22/15   SURFACE WATER DEPTH N/A	<b>EASTING</b> 2,352,776 <b>24 HR</b> . 2.9
DRILLER S. Davis   START DATE 01/22/15   COMP. DATE 01/22/15   SURFACE WATER DEPTH N/A	HOD H.S. Augers HAMMER TYPE Automatic
ELEV   PREV   DEPTH   BLOW COUNT   BLOWS PER FOOT   SAMP.	
(ft) (ft) 0.5ft 0.5ft 0.5ft 0.5ft 0.25 50 75 100 NO. MOI G ELEV.(ft) 0.05ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.25 50 75 100 NO. MOI G ELEV.(ft) 0.05ft 0.5ft 0	L CON AND DOO'S PEOPLIPTION
432 0.0 1 2 3 4 6	O SOIL AND ROCK DESCRIPTION  MOI G
43.2 GROUND SUFFACE 0.0 COASTAL FLAN 40 39.7 3.5 2 4 6 10 10 2 3 4 12 18.5 6 6 6 5 10 11 2 3 3 4 17 8.5 6 6 6 5 10 11 2 3 10 10 10 10 10 10 10 10 10 10 10 10 10	
43.2 GROUND SUFFACE 0.0 COASTAL FLAN 40 39.7 3.5 2 4 6 10 10 2 3 4 12 18.5 6 6 6 5 10 11 2 3 3 4 17 8.5 6 6 6 5 10 11 2 3 10 10 10 10 10 10 10 10 10 10 10 10 10	
40 39.7 3.5 2 4 6 10 W Gray-brown, silly fine SAND (A-24).  35 34.7 8.5 6 6 5 10 Sat Sat Sat Sat Sat Sat Sat Sat Sat Sat	42.8 GROUND SURFACE
39.7 3.5 2 4 6 3 10 30.3 3.5 7 11 9 32.3 35 34.7 8.5 6 6 5 3 11 3 30 29.7 13.5 WOH 2 3 3 13.5 WOH 2 3 3 13.5 WOH 1 2 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	M COASTAL PLAIN
35 347 85 6 6 5 111 Sat Sat Sat Sat Sat Sat Sat Sat Sat Sat	organics (roots).
30 297 13.5 WOH 2 3	N Gray-brown, silty fine SAND (A-2-4). 4
Sat. Sulphur odor from 18.5 to 25.0.  Sat. Sulphur odor from 18.5 to 25.0.  Sat. Sat. Sulphur odor from 18.5 to 25.0.  Sat. Sat. Sulphur odor from 18.5 to 25.0.  Sat. Sat. Sat. Sat. Sulphur odor from 18.5 to 25.0.  Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	[888
30 29.7 13.5 WOH 2 3	Gray, silty fine SAND (A-2-4), with trace organics from 13.5' to 15.0'.
30	at
Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	
25 24.7 18.5 WOH 1 2 3 Sat. Sat. Sat. Sat. Sat. Sat. Sat.	at.
Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	
20 19.7 23.5 5 8 11	Gray, fine SAND (A-3), with trace silt and
20 19.7 23.5 5 8 11	at.
Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	0000- 0000- 0000- 0000-
Boring Terminated at Elevation 18.2 ft in SAND (COASTAL PLAIN)  NOTES:	at. [ ] 17.8 25
	Boring Terminated at Elevation 17.8 ft in SAND (COASTAL PLAIN)
	SAND (COASTAL FLAIN)
1) 0.0-0.1' = Surficial Organic Soils	NOTES:
	1) 0.0-0.3' = Surficial Organic Soils
	2) Strata break in split spoon at a depth of 4.5'.
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WB	<b>S</b> 4019	91.1.2		Т	<b>G REP</b> IP U-4751		COUN	TY NEW H				GEOLOGIST D. Racey		l —	<b>BS</b> 40191					P U-4751			Y NEW HA				<b>GEOLOGIST</b> D. Racey		
						-	7 in Wilm	nington - Nois		at -L- Stat			GROUND WTR (ft)	l —				1409 (N	<u>_</u>		<u> </u>				at -L-	Station	71+50 Right	GROUND WTR	(ft)
-		<b>)</b> . NW7			TATION 1			OFFSET				ALIGNMENT -NW7-	<b>0 HR.</b> 2.5	l	DRING NO.					ATION 18			OFFSET				ALIGNMENT -NW7-		4.4
		L <b>EV</b> . 43			OTAL DEP			NORTHIN				<b>EASTING</b> 2,352,750	<b>24 HR.</b> 2.0	l	DLLAR EL					TAL DEPT			NORTHING				<b>EASTING</b> 2,352,724		4.3
					CME-55 75%					METHOD		-	MER TYPE Automatic	l —				E F&R		ME-55 75%				DRILL			•	HAMMER TYPE Automatic	С
DRII		S. Davis			TART DAT			COMP. D				SURFACE WATER DEPTH N	/A		RILLER S					ART DATE			COMP. DA			4	SURFACE WATER DEPTI	H N/A	
ELEV (ft)	/ DRIVE ELEV (ft)	DEPTH (ft)	0.5ft 0.5		0		PER FOO	OT 75 100		MOI G	)	SOIL AND ROCK DES	SCRIPTION DEPTH (ft)	ELE (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft	0 2	BLOWS F		75 100	SAMP.		0 I G	SOIL AND ROCK	DESCRIPTION	
45		$\pm$									-			45		- 00										-	43.6 GROUND	SURFACE	0.0
	43.0	1 0.0	1 2	5	7	T	T				43.	COASTAL PL	AIN		43.0	<u> </u>	WOH	2	1	93			1		W		COASTA Black, fine sandy SIL	L PLAIN	
40		Ŧ									41.	.0_ \( \) Black, fine sandy SILT (A	1-4), with trace2.0_	40	40.1	I I 3.5				:::::	: : : :	: : : :	1		_	F	orga	nic.	
	39.5	3.5	6 8	8	16					W	₩.	organics (root Gray-brown to gray, silty fin	e SAND (A-2-4).			Ŧ	1	1	1	2			1		Sat.	F	39.0 Gray, fine sandy	/ CLAY (A-7-5).	4.6
		Ŧ			::/::											Ŧ						: : : :					36.6		<u>7.0</u>
35	34.5	+ 8.5			]   - /				41					35	35.1	8.5	7	9	10				<b></b>	-	Sat.		Gray, silty fine	SAND (A-2-4).	
		‡	5 4	3	<b>. 7</b>					Sat.						‡	'			1: 1:	9				Jai.				
30		‡												30	30.1	‡ 42.5				: <i>i'</i> : :									
30	29.5	<u>+ 13.5</u>	WOH 1	2	<u> </u>				1	Sat.				30	30.1	13.5	WOH	1	1	<b>©</b> 2 · · ·				-	Sat.				
		‡								Oat	<u>-</u> 2 <u>6</u> .	_				‡											26.6		<u>17.0</u>
25	24.5	+ + 18.5			1							.0Gray, fine SAND (A-3), v	<u>17</u> . <u>0</u> with trace silt.	25	5 25.1	18.5	lwou			j · · · ·						0000	Gray, fine SAND (A	A-3), with trace silt,	
	24.5	1 10.3	1 3	2	5: :					Sat.						ŧ	WOH	1	1	2					Sat.	0000	·	. 0001.	
		+			¦ · · ·					00000	21.	.0	22.0			+				- /						0000			
20	19.5	¥ 23.5			1		<b>.</b>				:: <u> </u>	Gray, silty fine SANI	O (A-2-4).	20	20.1	23.5	8	11	13		24		· · · · ·		Sat.	0000	10.6		25.0
		┼	3 4	3	<u>-</u> ∳	1				Sat.	18.	.0 Boring Terminated at Elev	25.0 vation 18 0 ft in			<del>†                                      </del>					124	1	1		Jun	-	Boring Terminated a	t Elevation 18.6 ft in	25.0
		Ŧ									F	SAND (COASTAL	PLAIN)			Ŧ										F	SAND (COAS	STAL PLAIN)	
		‡									F				-	‡										-			
		‡									-					‡											NOTES:		
		Ţ									Ł	NOTES:			_	ŧ										ΙŁ			
		+									-	1) 0.0-0.3' = Surficial Organ	nic Soils			+										F	<ol> <li>Strata break in split of 4.6'.</li> </ol>	spoon at a depth	
		Ŧ									F					Ŧ										1 F			
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RING NO		ON S	SR 14	100 (1	liliton (	Cutoff Doo									ı		1 1															ı
LLAR EL				+09 (IV				17 in \				at -L- S	tation 71+50 F			ROUND WTR (fi	`								<u> </u>		ngton - Nois		at -L-			GROUND V
	). N	W7-19	9		ST	ATION 1	9+02			OFFSET				IMENT -NW7-	(	) HR. 4.8	BOF	RING I	<b>10</b> . NW	/7-20				TION 19			OFFSET				ALIGNMENT -NW7-	0 HR.
L RIG/HA	EV.	43.8	ft		TC	TAL DEPT	<b>TH</b> 25.0	O ft	1	NORTHIN				<b>NG</b> 2,352,698		HR. 4.4	⊣		ELEV. 4				<u> </u>		<b>H</b> 25.0 ft		NORTHING	· ·			<b>EASTING</b> 2,352,675	24 HR.
	MMEF	R EFF./	DATE	F&R	5785 C	ME-55 75%	01/17/20	14			DRILL	METHOD	H.S. Augers		HAMMER	TYPE Automatic	→				ATE F	F&R578	35 CME	-55 75% (	1/17/2014			DRILL	METHO	D H.S. Au	igers	HAMMER TYPE Aut
ILLER S						ART DATE				COMP. DA				ACE WATER DEP	PTH N/A				S. Davi				L	RT DATE	01/22/1		COMP. DA			s	SURFACE WATER DEF	PTH N/A
CLCV	DEF	· · · · · —		N COL					FOOT	F 100		· 🔻	0	SOIL AND ROO	CK DESCR	PTION	ELE\		VE DEPT	гн В		COUNT			BLOWS F			SAMP.	1 /	0	SOIL AND RO	OCK DESCRIPTION
(ft)	+ '	11)	).5ft	0.5ft	0.5ft	0 .	25	50	7:	5 100	NO.	MOI	G ELEV. (ft)	)		DEPTH (	ft) (11)	(fi	) (11)	0.5	5π   0.t	5ft 0.	.5ft   U	) 2	5 5	50 	75 100	NO.	/MO	I G		
43.8	$+$ $^{\circ}$												43.8	GROUNE	ID SURFACI	Ξ (	.0 45		<del> -</del> -												, ODOLIN	
43.0	+ "	.0	1	2	1	<b>4</b> 3 · · ·					1 1	W	41.8		TAL PLAIN			43	4 ‡ 0.0	wc	OH 2	2 3	3	5			1	+	W	43	ARTIF	ID SURFACE FICIAL FILL
40.3	‡ <sub>3</sub>	.5				/::::							≅ख7	ord	rganic	i	40		.9 I 3.5				-     /	7						41	organic, v	SILT (A-4), moderately with some clay.
1	Ŧ	l <sub>w</sub>	/OH	WOH	WOH	0					11	Sat.		Black, silty fine SAN organic, wi	ND (A-2-4), vith some cla	moderately ay.			<del>9 + 3.3</del>	wc	OH WO	OH W	он 🌓	)			1	1	Sat.		COAS	TAL PLAIN ck, MUCK
	Ŧ					<u>``</u> ;::::							36.8	Gray, silty fine SAN			<u>o</u>		ļ											36	4	
35.3	<del>‡</del> 8	.5	6	8	8	16					41	Sat.		organics (roots)	s) from 13.5'	to 15.0'.	35	34	9 ‡ 8.5	4	1 3	3 2	\	<del>/                                    </del>	· · · ·			-			Tan, silty fine SAI sulphur odor	ND (A-2-4), with strong from 13.5' to 20.0'.
	‡											Joan							‡	"	†   `	,		<b>?</b> 5					Sat.		•	
30.3	‡ <sub>12</sub>	3.5				:/: : :				: : : :							30		. ‡				-  i	/ 								
	‡	v v	/OR	WOH	1	<b>1</b> 1					1	Sat.						29	9 + 13.5	, MC	эн ж	он 1	1	1				1	Sat.			
	‡												26.8				0		‡				<u> </u>									
25.3	18	3.5 N	/OH	WOH	2	<u> </u>						Sat.	0000	Gray, fine SAND (A sulph	A-3), with tra hur odor.	ace silt and	25	24	.9 $\frac{1}{4}$ 18.5	5			_	· · · ·	· · · ·							
	‡	'			-	<b>●</b> 2						Sal.	00000						‡	Iwc	OH 1	1 2	2     •	3					Sat.			
20.2	‡ ,,	, _				<del> </del>							0000 <u>-</u>						‡					<u>)</u> ::::						21	.4Gray fine SAND	O (A-3), with trace silt,
20.3	+	5.5	2	3	3	6					$\blacksquare$	Sat.	18.8			25	0 20	19	9 + 23.5	5 4	1 5	5 6	6	. 11 .			<del>                                     </del>	1	Sat.	18		hur odor.
	Ī					•							E	Boring Terminated SAND (CO	d at Elevatio	n 18.8 ft in			Ŧ					<u> </u>				-		- 10	Boring Terminate	d at Elevation 18.4 ft in
	Ī												Ł	,		,			土											ΙŁ	SAND (CC	DASTAL PLAIN)
	+												-						+											1 E		
	Ŧ												F						Ŧ											1 F	NOTES:	
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WBS 4						IP U-4751			Y NEW HA				OGIST D. Racey			1	40191					<b>U</b> -4751			NEW HA				GEOLOGIST D. Racey		
				1409 (				7 in Wilmir			at -L- Stati	ion 71+50 Ri	<u> </u>		ROUND WTR (ft)	I				409 (N				17 in Wilmir			at -L-			GROUND WT	ΓR (ft
BORING	G NO.	NW7	-21			TATION 2			OFFSET			_	MENT -NW7-	0	<b>HR.</b> 3.7	BORII	NG NO.	NW7-	22			ATION 2			OFFSET				ALIGNMENT -NW7-	0 HR.	4.0
COLLA	R ELE	<b>V</b> . 44	4.0 ft		Т	OTAL DEP	<b>TH</b> 25.0	ft	NORTHIN				<b>IG</b> 2,352,654		HR. 2.4	<b></b>	AR ELE					TAL DEP			NORTHING				<b>EASTING</b> 2,352,637	24 HR.	2.0
DRILL RI	IG/HAM	MER EF	F./DAT	E F&	R5785 (	CME-55 75%	01/17/2014		<b>-</b>	DRILL M	ETHOD	H.S. Augers		HAMMER T	TYPE Automatic	DRILL	RIG/HAM	MER EF	F./DATE	F&R		ME-55 75%				DRILL I	METHO	D H.S. A	ugers	HAMMER TYPE Autom	natic
DRILLE						TART DAT	E 01/23/	15	COMP. DA				CE WATER DEP	PTH N/A			LER S.					ART DAT	E 01/23	/15	COMP. DA			!	SURFACE WATER DE	PTH N/A	
ELEV D		DEPTH	BL	OW CC				PER FOOT			O L		SOIL AND ROO	CK DESCRIF	PTION	ELEV	DRIVE ELEV	DEPTH	BLO\	W COL				S PER FOOT		SAMP	1 /	0	SOIL AND RO	OCK DESCRIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	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.	MO	I G			
1																															
45	11.0	- 00										44.0	GROUNI	ID SURFACE	: or	45	44.4	- 00										<u>-4</u>	4.4 GROUN	ID SURFACE	С
	44.0	- 0.0	1	2	3	<b>\$</b> 5	T	T			M	_	ARTIFI	ICIAL FILL		1		-	1	3	2	5					M	42	COAS 2.4 Black, fine sandy	TAL PLAIN SILT (A-4), moderately	2
40	40.5	- 35				<i> :</i> ::::					<del> </del>	42.0	Black, fine sandy S	with some cla	10derately2. <u>u</u> 1 <u>y.</u> <i>J</i>	40	40.9	- - 3.5	MOLL			<i>İ</i> ::::				1 1			organic, v	with some clay.	i
40	-	-	WOF	WOF	1	<del>    1</del>	<del> </del>	<u> </u>		-	Sat.	<u>}</u>		TAL PLAIN d black, MUC	K	40	-	_	WOH	1	1	2	1		<del> </del>	1	Sat.		(A-2-4), sulphur	n to gray, silty fine SAND odor from 8.5' to 20.0'.	
	1	_				\::::					3555	37.0			7.0	<u>.</u>	-					<u>i</u> : : : :									
35	35.5	8.5	4	4	3	\						<u>.</u>	Tan, silty fine	ne SAND (A-2	2-4).	35	35.9 -	- 8.5	3	2	2	\\\					Sat.	<u> </u>			
	7	-	"	"		77					Sat.	<u>:</u>					-					1					) Out.	F			
	7	-					: : : :	: : : :				<u>}</u>					30.9	125				:::::	: : :	.				<u> </u>			
30	30.5	- 13.5 -	WOF	WOF	1	<u> </u>		ļ			Sat.	<u>.</u>				30	30.9 -	- 13.5	WOH	1	2	<b>\$</b> 3	<b> </b>		<u> </u>	-	Sat.	-			
	‡	-													47.0		-					: : : :									
25	25.5	- - 18.5				<u> </u>  :::::					000	27.0	Gray, fine SAND (A-	A-3), with trac	e silt and a		25.9	- - 18.5				:::::		:   : : : :							
25	23.5	-	WOF	1	2	<b>1</b>	<del> </del>	<del> </del>	<del> </del>	-	Sat.		0.2 thick layer of m	moderately or clav.	ganic silty	25	-	_	WOR	1	0	1	<del> </del>	<del>-  </del>	+		Sat.				
	+	-				`\					000	22.0		,	22.0		-	-				<u> </u>						-			
20	20.5	23.5		<u> </u>		:\: : :	: : : :					F	Gray, silty fine SAN	AND (A-2-4), v	with trace	]   20	20.9	23.5	WOH	2	3	<del>                                    </del>	: : :	.	<b>I</b>		Cot	III.			
			3	4	5	9				1	Sat.	19.0	Boring Terminated	ga	25.0			-	W 011	_		<b>5</b>	1		1	4	Sat.	19 		d at Elevation 19.4 ft in DASTAL PLAIN)	<u>25</u> .
	1	-										F	SAND (CO	DASTAL PLAI	IN)		-												SAND (CO	DASTAL PLAIN)	
	4	-										Ļ					_	_													
	1	-										_					-														
	1	_										E					-											1 E	NOTES:		
	+	-										-					_	-										<del> </del>	1) 0.0-0.2' = Surfici	al Organic Soils	
	1	-										F					-											l F			
	‡	-										<u> </u>					-														
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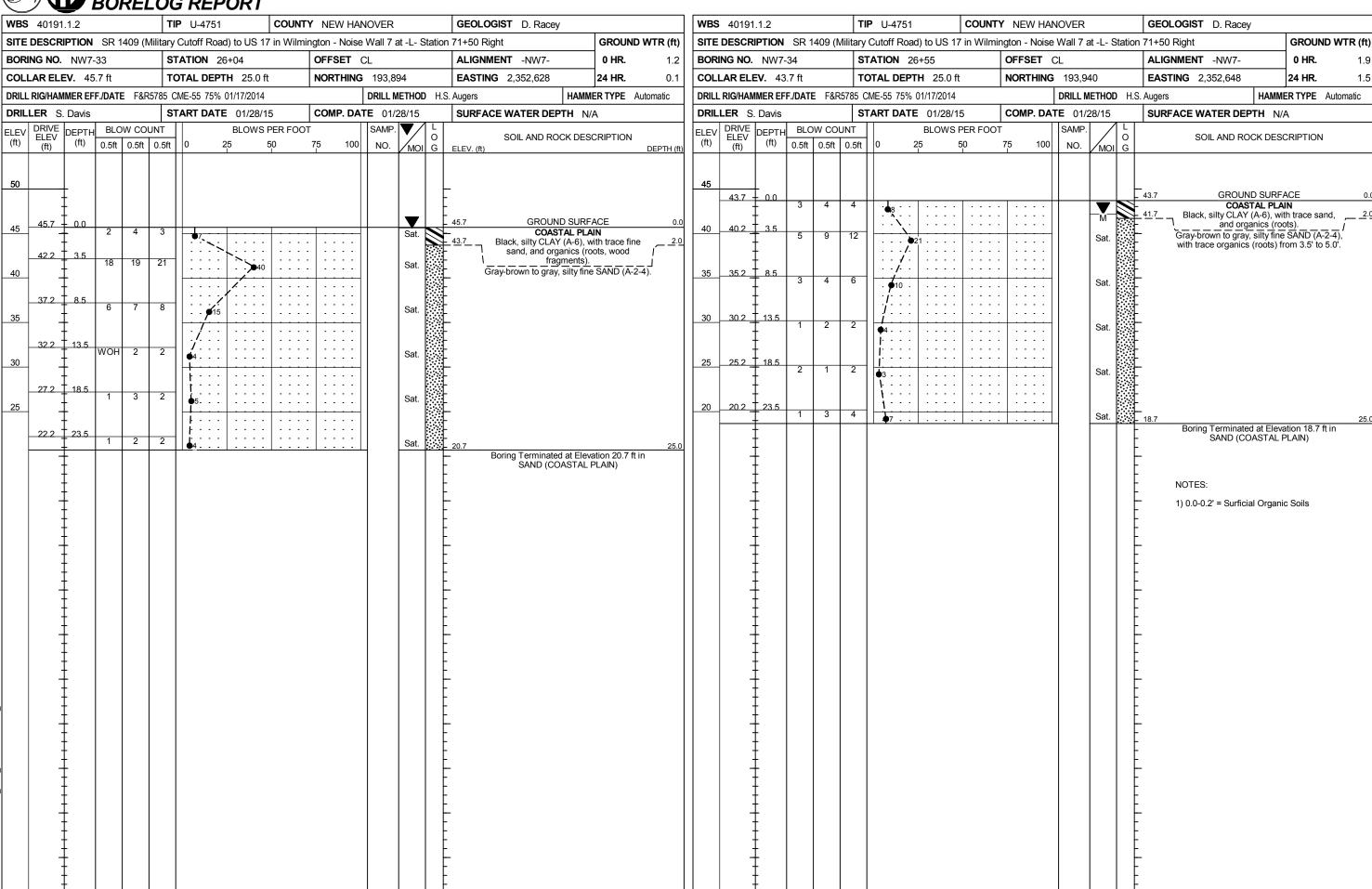
<b>WBS</b> 40						<b>P</b> U-4751			Y NEW H				OLOGIST D. Race	еу	1	— ⊢		40191.1					<b>P</b> U-4751				NEW HA				GEOLOGIST D. Ra	icey	_	
				409 (N				17 in Wilm	ington - Nois		at -L- Sta				GROUND WTR	` ´ I <b>⊢</b>					409 (N	<u>·</u>			JS 17 i				at -L-	Statio	on 71+50 Right		GROUND	WTR (1
BORING I					_	ATION 2			OFFSET				IGNMENT -NW7-			- 1 ⊢		3 NO. 1				_	ATION 2				OFFSET				ALIGNMENT -NW		0 HR.	2
COLLAR						TAL DEP			NORTHIN				<b>STING</b> 2,352,622		l			R ELEV					TAL DEP				NORTHING	<del></del>			<b>EASTING</b> 2,352,61		24 HR.	2
DRILL RIG/I	HAMM	ER EFF	./DATE	F&R	5785 C	ME-55 75%	01/17/2014	1		DRILL	METHOD	H.S. Auge	ers	HAMME	ER TYPE Automat	ic	DRILL RI	G/HAMMI	ER EFF	./DATE	F&R	15785 CI	ME-55 75%	01/17/	2014			DRILL	METHO	OD H	I.S. Augers	HAMN	ER TYPE A	utomatic
DRILLER						ART DATI	E 01/23/	15	COMP. D				RFACE WATER DE	EPTH N/	Α			R S.D					ART DAT	<b>E</b> 01	/26/15		COMP. DA			5	SURFACE WATER	DEPTH N	'A	
ELEV DRI		EPTH		W CO				PER FOC				0	SOIL AND R	ROCK DESC	CRIPTION	E		RIVE DI	EPTH	BLO\	W COL					ER FOOT		SAMP	1 /			ROCK DES	CRIPTION	
(ft) (ft	t)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 10	NO.	MOI	G ELE	/. (ft)		DEP	TH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	)	75 100	NO.	MC	OI G				
45												44.1	GROU	JND SURF	ACE	0.0	45	44.6														OUND SURF		
44	.1	0.0	1	3	3	6					М		COA	ASTAL PLA	IN			TT.0	0.0	2	4	3	7 :						W	,	Control Black and graduate with transfer	DASTAL PLA		,
40	.6 +	3.5							-			42.1	and organics (r	roots wood	I fragments)			41.1	3.5				<u>                                   </u>						_		with tra	ce organics	(roots).	
40 40	* <del>†</del>	0.0	1	2	2	4	<del> </del>	<del>                                     </del>			W		Gray-brown to tar with sulphur o	n, silty fine	SAND (A-2-4), 5' to 25.0'		40	$\pm$		2	2	3	5	+				+	Sat		Black and gra			 e
	Ŧ							.	.				with sulphur c	odor from o	.0 10 20.0 .			Ŧ						.							ý <u> </u>	SAND (A-2-4	).	
35 35	. <u>6</u> —	8.5	_	4		1	: : : :					:::F					35	36.1 📙	8.5	3	3	2					: : : :		Sat		<b>F</b>			
	+		5	4	3	7					Sat.							‡					7.5					11	Joan		-			
	‡					/ : : :												‡	40.5				; ; ; ;								<u>.</u>			
30 30	6 🛨	13.5	WOR	WOR	1	<i>i</i>					Sat.	<u> </u>					30	31.1	13.5	WOH	1	1	2	: :		· · · ·			Sat	t.	_			
	İ					<b>P</b> <sup>1</sup>		.			Joan.	::: <u>†</u>						İ					:::::	: :	::						<u>:</u>			
0.5	<u>,</u> +	40.5						.				-						26.1	18.5												<u>.</u>			
25 25	6 +	18.5	WOR	WOH	1	<b>1</b>				-	Sat.						25	Ŧ	,	WOH	WOH	1	1	+			<b> </b>	-	Sat	t.	<u>-</u>			
	‡					[::::						::: <b>‡</b>						‡					\'. : : :								-			
20 20	.6 +	23.5				1		:   : : :				<u> </u>					20	21.1 🙏 2	23.5	2	3	3	; : : :								<u> </u>			
20	_‡		WOH	2	2	<b>4</b>				Щ	Sat.	19.1	Boring Terminat		10.4.61	25.0	20	_‡	-		<del>-</del>		<u></u> 6	+			<b>+</b> · · · ·	4	Sat		19.6 Boring Termi	nated at Elev	ation 19.6 ft i	2 n
	‡											ļ.	SAND (C	COASTAL F	PLAIN)			‡													SAND	(COASTAL	PLAIN)	
	1											E						1													Ł			
	Ŧ											F						Ŧ													-			
	Ŧ											F	NOTES:					Ŧ													NOTES:			
	‡											F	1) 0.0-0.2' = Surfic	cial Organi	c Soils			‡													1) 0.0-0.2' = Su 2) Strata bre	rficial Organ	ic Soils	th
	‡											ļ.						‡														of 4.1'.	oon at a dopt	
	<u> </u>											Ė						‡													<u> </u>			
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WBS 40191.1.2	TIP U-4751 COUNTY NEW			WBS 40191.1.		<b>TIP</b> U-4751	COUNTY NEW		GEOLOGIST D. Racey
	Ailitary Cutoff Road) to US 17 in Wilmington - No		GROUND WTR (ft)			<del></del>	) to US 17 in Wilmington - N		
BORING NO. NW7-25	STATION 22+03 OFFSET		0 HR. 3.2	BORING NO. N		STATION 22			ALIGNMENT -NW7- 0 HR.
COLLAR ELEV. 45.2 ft		IING 193,497 EASTING 2,352,601	<b>24 HR.</b> 1.5	COLLAR ELEV.		TOTAL DEPTI		<b>ING</b> 193,547	<b>EASTING</b> 2,352,595 <b>24 HR.</b>
DRILL RIG/HAMMER EFF./DATE F&R	5785 CME-55 75% 01/17/2014	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	DRILL RIG/HAMME	R EFF./DATE F	F&R5785 CME-55 75% 0		DRILL METHOD H.S.	Augers HAMMER TYPE Automat
DRILLER S. Davis		DATE 01/26/15 SURFACE WATER DEPTI	H N/A	DRILLER S. D.		START DATE		<b>DATE</b> 01/26/15	SURFACE WATER DEPTH N/A
ELEV DRIVE DEPTH BLOW COU		SAMP. L O SOIL AND ROCK	( DESCRIPTION	ELEV DRIVE ELEV	PTH BLOW C		BLOWS PER FOOT	SAMP.	SOIL AND ROCK DESCRIPTION
(ft) (ft) (ft) 0.5ft 0.5ft	0.5ft 0 25 50 75 1	100 NO. MOI G ELEV. (ft)	DEPTH (ft)	(II) (ft)	(ft) 0.5ft 0.5	5ft 0.5ft 0 2	5 50 75	00 NO. MOI G	
50				50					-
45 45.2 0.0		45.2 GROUND			0.0 1 2	2 1 1	• • • • • • • • • • • • • • • • • • • •		46.2 GROUND SURFACE  COASTAL PLAIN
2 5	5 . • 10	COASTA Black to tan and gr		I T	_	7			Black to gray and brown, silty fine SAND (A-2-4), with trace organics (roots, wood
41.7 + 3.5		(A-2-4), with trace or	ganics (roots, wood	42.7 + 3	3.5 3 4	3 7		Sat. Sat.	fragments) from 0.4' to 1.5'.
40 2 2	3 65	Sat. fragments) from 0.0' from 3.5	' to 5.0'.	40					_
				37.7	3.5	; : : :			
36.7 + 8.5   2   2	2	-			2 1	2		Out.   •••••	
35	<del>  [  </del>	<del></del>		35					-
31.7 + 13.5				32.7 + 1	3.5 WOH 1	1 1 1 1 1			
30 WOR WOH	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Sat. Sat.		30		<b>Y</b> <sup>2</sup> ····			_
				27.7 + 1	9.5	::::			
26.7 + 18.5   1 0		-			WOR WO	DH 1		Sat.	
25				25			<del></del>		-
		-		22.7 - 2	3.5				
21.7 + 23.5	2		25.0		1 2	3   •5		Sat. Sat.	21.2 Boring Terminated at Flevation 21.2 ft in
+		Boring Terminated a SAND (COAS	t Elevation 20.2 ft in						Boring Terminated at Elevation 21.2 ft in SAND (COASTAL PLAIN)
		SAND (COAS	STAL FLAIN)						
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								F	1) 0.0-0.4' = Surficial Organic Soils
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<b>WBS</b> 40191.1					U-4751			ry new h				EOLOGIST D. Racey			<b>→                                    </b>	<b>S</b> 401					P U-4751		COUNTY					DLOGIST D. Race	<del></del>	
SITE DESCRIP			109 (M			<u> </u>	17 in Wilm	<del>-</del>		7 at -L- S				OUND WTR (ft)	I				1409 (1			-	7 in Wilmingto			t -L- S				OUND WT
BORING NO.	NW7-2	27			TION 23			OFFSET				IGNMENT -NW7-	0 H	<b>IR.</b> 3.5	BOI	RING N	O. NW	7-28			ATION 2			FFSET				GNMENT -NW7-		HR.
COLLAR ELEV	<b>/.</b> 45.9	9 ft		тот	AL DEPT	<b>H</b> 25.01	ft	NORTHIN	_,			<b>ASTING</b> 2,352,591	24 H		COI	LLAR E	LEV. 4	16.1 ft		тс	OTAL DEP	<b>H</b> 25.0 f	t NO	ORTHING	<b>3</b> 193,64	7	EAS	<b>STING</b> 2,352,590		
DRILL RIG/HAMN	ER EFF	./DATE	F&R	785 CMI	E-55 75%	01/17/2014	ļ.	_	DRILL	METHO	H.S. Aug	ers	HAMMER TY	PE Automatic	DRIL	LL RIG/H	AMMER E	FF./DA1	E F&F	R5785 C	ME-55 75%	01/17/2014			DRILL MI	ETHOD	H.S. Auger	s	HAMMER T	PE Automa
DRILLER S. I					RT DATE	01/27/	15	COMP. D	ATE 01	1/27/15	SL	JRFACE WATER DEP	PTH N/A				S. Davis			ST	ART DATI	01/27/1	5 <b>C</b> C	OMP. DA	TE 01/2	7/15	SUF	FACE WATER DE	EPTH N/A	
ELEV DRIVE ELEV	EPTH	BLOV					PER FOO			P. 🔻		SOIL AND RO	CK DESCRIPT	ΓΙΟΝ	ELE\	V DRIV	E DEPT	H BL	ow co				PER FOOT		SAMP.		L	SOIL AND R	ROCK DESCRIP	TION
(ft) (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25	50	75 10	0 NO.	. /моі	G ELE			DEPTH (fi		(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25 	50 75	100	NO.	/MOI				
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45.9	0.0										45.9	GROUNI	D SURFACE	0.		46.1	1 + 0.0									_	46.1		JND SURFACE	
45		4	5	4	9					_		COAST Black, brown, and	TAL PLAIN	SAND	45	_	Ŧ	WOF	1 1	2	3					W	44.6	<ul> <li>Black, silty fine</li> </ul>	SAND (A-2-4).	with little r
42.4	3.5				. /	: : : :						(A-2-4), with trace of	organics and r	oots from		42.6	3 + 3.5	<u> </u>			1.77.							organics (roo Gray-brown to gra	ots, wood fragm	ents). <i>i</i>
40		5	6	7	13					W		0.2	' to 1.5'.		40		‡	'	9	9		3				Sat.	-	Gray-brown to gra	ay, siity fine SAr	ID (A-2-4).
†					<del>./</del>				-						40	_	‡				1./				1					
37.4	8.5	2	2	_	1											37.6	8.5	2	2	2	/: : :					Sat				
35			_	'	<b>•</b> 3					Sat.					35		+	-	-	-	<b>∮</b> 4					Sat.	-			
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32.4	13.5	WOR	WOH	1						Sat.						32.6	3 <u>+ 13.5</u> +	WOF	1 1	1	2					Sat.				
30 ‡					,, 				_	Out.					30		‡				Ţ <sup>2</sup>				1					
1 07.4	40.5															27 (	+ 3 + 18.5													
27.4	18.5	WOH	1	1	2					Sat.							+ 10.5	WOF	1 2	2	<b>4</b> · · ·					Sat.				
25 ‡					<u> </u>						<u> </u>				25	_	Ŧ								-					
22.4	23.5				- · · ·											22.6	+ 3 + 23.5													
	\	WOH	3	2	<b>6</b> 5		<u> </u>	<u> </u>	Щ	Sat.	20.9	<u> </u>		25.0	<u> </u>		_‡	2	2	2	4				ЦЦ	Sat.	21.1	Davis a Tauraia a	tad at Flavatian	04.4.# :
												Boring Terminated SAND (CO.	d at Elevation 2 DASTAL PLAIN	20.9 ft in )			†										-	Boring Termina SAND (C	COASTAL PLAI	∠1.1 π in √)
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<b>WBS</b> 40191.1.2	TIP U-4751 COUN	NTY NEW HANOVER	GEOLOGIST D. Racey		WBS 40191.1.2		<b>TIP</b> U-4751 <b>CO</b>	UNTY NEW HA	NOVER	GEOLOGIST D. Racey	
SITE DESCRIPTION SR 1409 (Mi	ilitary Cutoff Road) to US 17 in Wilr	mington - Noise Wall 7 at -L- Statio	n 71+50 Right	GROUND WTR (ft)	SITE DESCRIPTION	<b>ON</b> SR 1409 (Mil	litary Cutoff Road) to US 17 in V	Vilmington - Noise	Wall 7 at -L- St	tation 71+50 Right	GROUND WTR (ft
BORING NO. NW7-29	STATION 24+03	OFFSET CL	ALIGNMENT -NW7-	<b>0 HR.</b> 2.0	BORING NO. NV	V7-30	STATION 24+54	OFFSET	CL	ALIGNMENT -NW7-	<b>0 HR.</b> 1.8
COLLAR ELEV. 46.1 ft	TOTAL DEPTH 25.0 ft	<b>NORTHING</b> 193,697	<b>EASTING</b> 2,352,592	<b>24 HR.</b> 0.9	COLLAR ELEV.	46.0 ft	TOTAL DEPTH 25.0 ft	NORTHING	193,747	<b>EASTING</b> 2,352,597	<b>24 HR.</b> 1.1
DRILL RIG/HAMMER EFF./DATE F&R5	785 CME-55 75% 01/17/2014	DRILL METHOD H.	S. Augers HAMI	MER TYPE Automatic	DRILL RIG/HAMMER	EFF./DATE F&R57	785 CME-55 75% 01/17/2014		DRILL METHOD	H.S. Augers	HAMMER TYPE Automatic
DRILLER S. Davis	<b>START DATE</b> 01/27/15	COMP. DATE 01/27/15	SURFACE WATER DEPTH N		DRILLER S. Dav	<i>i</i> is	<b>START DATE</b> 01/27/15	COMP. DA	TE 01/27/15	SURFACE WATER DEP	
ELEV DRIVE DEPTH BLOW COU	NT BLOWS PER FO	OOT SAMP.	SOIL AND ROCK DE	CODIDITION	ELEV DRIVE DEF	TH BLOW COUN	NT BLOWS PER I	FOOT	SAMP.	L SOIL AND RO	CK DESCRIPTION
(ft) (ft) (ft) 0.5ft 0.5ft	0.5ft 0 25 50	75 100 NO. MOI G		DEPTH (ft)	(ft) ELEV (ft)	0.5ft 0.5ft 0	0.5ft 0 25 50	75 100	NO. MOI		CK DESCRIPTION
50			_		50					_	
			- -		‡					-	
46.1 0.0 WOH WOH			46.1 GROUND SUR		46.0 0						SURFACE 0
45 WOH WOH	2 2		COASTAL PL Black, silty fine SAND (A	ر-2-4), with little <i>r</i> — الــــــــــــــــــــــــــــــــــــ	45	2 3	3		W W	Black-brown to gra	TAL PLAIN ny-tan, silty fine SAND -2-4).
42.6 + 3.5   2   2	7	· ·   · · · ·		gray, silty fine	42.5 + 3.	5 9 13	14		Sat.	(A	-2-4).
40 +	· ¶* · · · · · · · · ·		- SAND (A-2-	4).	40 ‡		,			<u></u>	
37.6 + 8.5	:: :::: :::: ::::		-		37.5 + 8.	5					
	6	· ·   · · · ·     Sat.	<del>-</del> -		†	6 6	6     .		Sat.		
	/		<del>-</del> •		35		1			<b>301</b> − 301−	
32.6 + 13.5   WOH WOH	<u> </u>	· ·   · · · ·	• •		32.5 + 13	.5 WOH WOH	$\frac{1}{2}$		Sat.	<u>}</u>	
30 +	7		<del>-</del> <del>-</del>		30		7			29.0 Croy fine SAND	17
27.6 + 18.5			<del>.</del> -		27.5 + 18	.5				Gray, fine SAND	(A-3), with trace silt.
25 1 3	4   7	Sat.	- -		25	2 2	4   6     .		Sat.	0 0 0 0 <u> </u>	
			<del>-</del> -							0000	
22.6 + 23.5 WOH 1	3	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	- - 21.1	25.0	22.5 + 23	.5 WOH 2	3		Sat.	21.0	25
	1,4,-		Boring Terminated at Ele SAND (COASTAL	evation 21.1 ft in			1 \$			Boring Terminated	at Elevation 21.0 ft in ASTAL PLAIN)
			-	- 1 - 2 4)	1 1 ‡					- SAND (OO.	AOTALT LAIN)
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WBS	4019	1.1.2			<b>TIP</b> U-47	51		COUNT	Y NEW	/ HANG	OVER			GEOLOGIST D. Racey		WB	<b>S</b> 4019	91.1.2			TIP	<b>COUNT</b>	Y NEW HA	NOVER		GEOLOGIST D. Racey	,
SITE	DESCR	RIPTION	SR 140	9 (Milita	ary Cutoff F	Road) to	o US 17	in Wilmi	ngton - N	Noise V	Vall 7 a	at -L- St	ation 7	71+50 Right	GROUND WTR (fi	) SITI	E DESC	RIPTION	N SR	1409 (Milit	tary C	Cutoff Road) to US 17 in Wilmi	<u> </u>		at -L- Stat	on 71+50 Right	GROUND WTR
BOR	NG NO.	. NW7-	31		STATION	25+0	)4		OFFSE	ET CI	_			ALIGNMENT -NW7-	<b>0 HR.</b> 0.	BOF	RING NO	<b>D.</b> NW7	7-32		STA	<b>ATION</b> 25+53	OFFSET	CL		ALIGNMENT -NW7-	0 HR.
COLI	AR EL	<b>EV</b> . 44	.8 ft		TOTAL D	EPTH	25.0 ft		NORTH	HING	193,79	96		<b>EASTING</b> 2,352,605	<b>24 HR.</b> 0.	COL	LAR E	LEV. 4	5.6 ft		TO	TAL DEPTH 25.0 ft	NORTHING	<b>3</b> 193,8	345	<b>EASTING</b> 2,352,615	24 HR.
DRILL	RIG/HAI	MMER EF	F./DATE	F&R578	5 CME-55 7	5% 01/	17/2014					IETHOD	H.S. <i>A</i>	Augers	HAMMER TYPE Automatic	DRIL	L RIG/HA	AMMER E	FF./DAT	E F&R578	85 CN	ME-55 75% 01/17/2014		DRILL I	METHOD	H.S. Augers	HAMMER TYPE Automat
		3. Davis			START D	ATE (	01/27/15	j	COMP.	. DATI	E 01/2	27/15		SURFACE WATER DEP	TH N/A	DRI		S. Davis				<b>ART DATE</b> 01/28/15	COMP. DA	<b>TE</b> 01/	28/15	SURFACE WATER DEF	<b>PTH</b> 0.2ft
LEV	DRIVE ELEV	: · · ·	BLOW				BLOWS P						0	SOIL AND RO	CK DESCRIPTION	ELE\	/ DRIVE	DEPTI	H BLC	OW COUN	Т	BLOWS PER FOO		SAMP	1/10	SOIL AND RO	CK DESCRIPTION
(ft)	(ft)	(ft)	0.5ft 0.	5ft 0.5	Sft 0	25	5	0	75	100	NO.	MOI	G E	ELEV. (ft)	DEPTH	ft) (ft)	(ft)	(π)	0.5ft	0.5ft 0.	.5ft	0 25 50	75 100	NO.	MOI G		
45	44.8	0.0	_	,						$-\Box$			4			.0 50		4								_	
		‡ "	2	3   4	•7				.	: :		l W	4	Black, fine sandy	AL PLAIN SILT (A-4), with little2	<u>o</u>		‡								-	
40	41.3	† 3.5 †	6 1	3 1	7				.			Sat.		<u>organics (roots</u> Brown to gray, si	SILT (A-4), with little2 wood fragments)	45	45.6	+ 0.0									D SURFACE_
40	-	‡				.,/	30					J Sat.		3 7		45		‡	2	3	3	•6		1	W	COAS 43.6 _ Black, silty CLAY (A	TAL PLAIN A-6), with trace fine sand
	36.3	+ + 8.5				/ <u>.</u>   :			·   · · · ·	: :							42.1	3.5	8	14 1	17						ots, wood fragments). j
35		+ 0.5	4	4 5		-   -						Sat.				40		‡	"	'*   '	''	31			W	Clay blown to gray	, only line of the (112 4).
		‡			-    :j: :				.   .	: :								‡				: : : // : : : :   : : :				-	
	31.3	13.5	WOH	2 2		:   :			.   .								37.1	8.5	6	5	6	. •11			Sat.	-	
30	-	<u>†</u>	WOH	2   3	5					-		Sat.	∷⊢			35	-	$\pm$						$\  \cdot \ $		<u>-</u>	
		+			1				.				2	Grav fine SAND	(A-3), with trace silt.	0	32.1	13.5				/:				-	
25	26.3	18.5	3	4 4	-   1.	-   -						Sat.	000	3.ay, 3. a. a.	( · · •), mar a a • • • • • • • • • • • • • • • • •	30		Ŧ	1	2	3	<b>6</b> 5			Sat.	-	
	_	Ŧ			1 . 1.							000						Ŧ							000	- 28.6 - 28.6	(A 0) = (E = = = = = = = = = = = = = = = = =
	21.3	23.5							.	: :		0000					27.1	18.5	1	2	2				Sat.	Gray, fine SANL	(A-3), with trace silt.
20		‡	3	6 4	10							Sat.	1	19.8	25	0 25		‡				4		1	000	-	
		‡											F	SAND (CC	at Elevation 19.8 ft in ASTAL PLAIN)		22.1	23.5				./			0 0 0	- -	
		‡											ļ.					23.5	2	5	7	12.			Sat.	- 20.6	
	-	‡																‡								Boring Terminate	d at Elevation 20.6 ft in DASTAL PLAIN)
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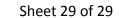


	40191.					U-4751			Y NEW H				OLOGIST D. Racey				40191					<b>P</b> U-4751				NOVER			OLOGIST D. Racey	
SITE	ESCRI	PTION	SR 1	409 (M	ilitary (	Cutoff Road	l) to US 1	7 in Wiln	ington - Noi	se Wall 7	7 at -L- S	tation 71+	50 Right	GROUN	ND WTR (ft)	SITE	DESCR	IPTION	SR 1	409 (N	/lilitary (	Cutoff Roa	d) to US 17	in Wilmin	ngton - Nois	e Wall 7 at	t -L- S	Station 71+	50 Right	GROUND W
BORIN	G NO.	NW7-	35		ST	ATION 88	+90		OFFSET	75 ft R	Т	AL	IGNMENT -L-	0 HR.	1.5	BOR	ING NO.	NW7-	36		ST	ATION 8	9+45		OFFSET	77 ft RT		AL	IGNMENT -L-	0 HR.
COLL	AR ELE	<b>V.</b> 42.	2 ft		TO	TAL DEPT	<b>H</b> 25.0 f	t	NORTHIN		·		STING 2,352,671	24 HR.	1.5	COLI	LAR ELI	<b>EV</b> . 42	.2 ft		то	TAL DEP	<b>H</b> 25.0 ft		NORTHING	. , .			<b>STING</b> 2,352,694	24 HR.
DRILL F	RIG/HAMI	MER EFF	./DATE	F&R	785 CN	1E-55 75%	01/17/2014			DRILL	. METHOD	H.S. Auge	ers	HAMMER TYPE	Automatic	DRILL	RIG/HAN	IMER EF	F./DATE	F&R	5785 CN	ME-55 75%	01/17/2014			DRILL ME	ETHOD	H.S. Auge	rs	HAMMER TYPE Autor
	ER S.					ART DATE	01/28/1	15	COMP. D	ATE 0	1/28/15	SU	RFACE WATER DEP	TH N/A			LER S					ART DAT	01/29/1	5	COMP. DA	TE 01/2	9/15	SU	RFACE WATER DEP	TH N/A
ELEV	DRIVE   ELEV		BLO	N COL			BLOWS				P. <b>V</b>	0	SOIL AND RO	CK DESCRIPTION	I	ELEV	DRIVE ELEV	DEPTH	BLO	W COL	JNT			PER FOOT		SAMP.		0	SOIL AND RO	CK DESCRIPTION
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	.5 	50	75 10	0 NO.	· /MOI	G ELE	/. (ft)		DEPTH (ft)	(ft)	(ft)	(11)	0.5ft	0.5ft	0.5ft	0	25 5	50	75 100	NO.	/MOI	G		
45		-										L				45												<u> </u>		
	42.2	- 00										42.2	GROUN	D SURFACE	0.0		42.2	0.0										42.2	GROUN	D SURFACE
40	76.6	- 0.0	1	2	2	4								ΓAL PLAIN (Δ-6) with trace sa	and,2.0	40	-72.2	- 0.0	1	3	3	6					<b>T</b>	sacces -		TAL PLAIN andy SILT (A-4).
40	38.7	- - 3.5						1		1	_w_		and orga	anics (roots).	i	40	38.7	3.5					1		1	1	•		Gray-brown to ta	in & gray, fine SAND
	‡	:	2	7	13		h				Sat.		Gray-brown to gray,	silty fine SAND (A	2-4).				2	8	13	: : : <i>)</i> =	21 · · · · · · · · · · · · · · · · · · ·				Sat.		(4	n-2-4).
35	‡	-				/ .				_		<u> </u>				35	-					/				1		<u> </u>		
	33.7	- 8.5 -	4	5	4	/					Sat.						33.7	8.5	3	3	2	<i>√</i>					Sat.			
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30	28.7	- - 13.5				<del>                                     </del>				$\dashv$						30	28.7	13.5				<del>                                      </del>			1	1				
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25	1	-				<u> </u>										25	_					<u>j</u>				]		Ł		
	23.7	- 18.5	WOH	2	1						Sat.						23.7	18.5	1	2	3	i : : : i					Sat.			
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20	18.7	- 22 5				1				+		<u></u>				20	10.7	23.5				ļ				-				
	10.7	- 23.5	1	2	3	<b>6</b> 5				1 1	Sat.	17.2			25.0		10.7	23.5	WOH	1	3	<b>∮</b> 4 · · ·					Sat.	17.2		
	Ŧ	-										F	Boring Terminated SAND (CO	d at Elevation 17.2 ASTAL PLAIN)	ft in		-	F										F	Boring Terminated SAND (CC	d at Elevation 17.2 ft in ASTAL PLAIN)
	7	-										F	,	,			-	F										F	`	,
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	‡	-										F	NOTES:				-	-											NOTES:	
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<b>WBS</b> 4019					<b>P</b> U-4751			Y NEW H				DGIST D. Racey			┨ ├───	40191					<b>P</b> U-4751		l	NEW HA				OLOGIST D. Racey	T T
			1409	<u> </u>			7 in Wilmi	·			ation 71+50 F		GF	ROUND WTR (ft)	I -				409 (N					ngton - Noise		t -L- S			GROUND WTR
BORING NO	D. NV	V7-37		S <sup>-</sup>	TATION 8	9+99		OFFSET	77 ft R	Γ	ALIGN	MENT -L-	0	<b>HR.</b> 1.9	BORI	ING NO.	NW7	-38		ST	ATION 9	0+54		OFFSET	77 ft RT			IGNMENT -L-	0 HR.
COLLAR EL	LEV.	42.1 ft		T	OTAL DEP	<b>TH</b> 25.0 f	t	NORTHIN	<b>G</b> 194,	073	EASTI	NG 2,352,717	24	<b>HR.</b> 1.9	COLI	LAR EL	<b>EV</b> . 42	2.4 ft		то	TAL DEP	<b>TH</b> 24.9 f	t	NORTHING	194,11	6	EA	<b>STING</b> 2,352,743	24 HR.
DRILL RIG/HA	AMMER	EFF./DA	TE F8	R5785 C	ME-55 75%	01/17/2014			DRILL	METHOD	H.S. Augers		HAMMER T	YPE Automatic	DRILL	RIG/HAI	MER EF	F./DATE	E F&R	85785 CN	ME-55 75%	01/17/2014			DRILL M	ETHOD	H.S. Auge	ers	HAMMER TYPE Automat
DRILLER :	S. Dav	<i>i</i> s		S	TART DATI	E 01/29/1	15	COMP. D	<b>ATE</b> 01	/29/15	SURFA	CE WATER DEP	PTH N/A		DRIL	LER S	. Davis			ST	ART DAT	E 01/29/1	5	COMP. DA	TE 01/2	9/15	SU	RFACE WATER DEP	TH N/A
ELEV DRIVE	DEP	TH BL		OUNT			PER FOO			°.  ▼/	L   O	SOIL AND RO	CK DESCRIP	TION	ELEV	DRIVE ELEV	DEPTH	BLO	W COL				PER FOOT		SAMP.		L	SOIL AND RO	CK DESCRIPTION
(ft) (ft)	(ft	0.5f	t 0.5f	t 0.5ft	0	25	50	75 10	NO.	MOI	G ELEV. (ft)			DEPTH (fi		(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25 	50	75 100	NO.	<u>/MOI</u>			
45	$\perp$										L				45		1										L		
	‡										<u> </u>	CDOLIN				40.4	‡ ,,										- - 42.4	GROUN	O SURFACE
42.1	100	1	2	4	6	T : : : :	T				T 42.1	COAS	D SURFACE TAL PLAIN	0.	11	42.4	± ""	WOH	2	2	4					V		COAS	AL PLAIN
40	+	_			1		+		-	<b>       </b>	40.1	Black, fine s Gray-brown, silt	andy SILT (A	<u>-4).</u>	40	39.0	3.4				<del>   </del>			<del> </del>	-	W		(A-2-4), with trace	own, silty fine SAND organics (roots, wood
38.6	+ 3.5	3	4	5		: : : :		.		w	37.1	madara	talicaraania `	*			Ŧ	2	3	3	6					Sat.	::::F	fragments)	rom 0.1' to 5.0'.
35	‡				::[:::::							Gray-tan to gray, s with trace organic	silty fine SAND	O (A-2-4),	35		‡				: : :						<u>::::</u>		
33.6	± 8.5	5			1		1		1			with trace organic	C3 IIOIII 10.5	10 25.0 .		34.0	8.4	2	2	2	ļ				11				
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23.6	18.	5 2	3	2	::: <u>:</u> i					Sat.						24.0	18.4	WOR	WOR	WOH .	0					Sat.			
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18.6	<u>+ 23</u>	5 3	4	6	- <b>\</b>					Sat.	17.1			25.0		10.0	1 20.3	WOR	2	4	<b>•</b> 6· · ·				Ш	Sat.	17.5		
	1				¥	·				ľ		Boring Terminated	d at Elevation DASTAL PLAIN	17.1 ft in			‡											Boring Terminated SAND (CC	l at Elevation 17.5 ft in ASTAL PLAIN)
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	+										+						+										-	NOTES:	
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		)191.1.2				<b>REP</b> U-4751			NEW HA	ANOVER			GEOLOGIST D. Racey			WB	<b>S</b> 4019	1.1.2			TIF	IP U	J-4751 (	COUNTY	NEW HA	NOVER		GI	EOLOGIST D. Racey	,	
SI	TE DES	SCRIPTIC	N SR	1409 (	(Military	Cutoff Roa	d) to US 1	7 in Wilmir	ngton - Nois	e Wall 7	at -L- St	tation	71+50 Right	GROU	ND WTR (ft)	SITE	E DESCF	RIPTION	N SR	1409 (N	Military	Cuto	off Road) to US 17 in	n Wilming	ton - Noise	e Wall 7 a	at -L- S	Station 71+	-50 Right	GROUND	WTR (ft)
ВС	ORING	NO. NV	7-39		SI	ATION 9	0+98		OFFSET	77 ft RT	-		ALIGNMENT -L-	0 HR.	2.6	BOF	RING NO	. NW7	7-40		ST	TATIO	ION 91+62		OFFSET	77 ft RT		AL	LIGNMENT -L-	0 HR.	3.6
CC	DLLAR	ELEV.	42.1 ft		TO	TAL DEP	<b>ΓH</b> 25.0 f	t	NORTHIN	<b>G</b> 194,1	150		<b>EASTING</b> 2,352,766	24 HR.	2.2	COL	LAR EL	. <b>EV</b> . 4	3.9 ft		тс	OTAL	L DEPTH 25.0 ft	ı	NORTHING	<b>3</b> 194,19	97	E/	<b>ASTING</b> 2,352,802	24 HR.	3.4
DR	ILL RIG	HAMMER	EFF./DAT	<b>E</b> F&	R5785 C	ME-55 75%	01/17/2014	-		DRILL	METHOD	H.S.	Augers HAM	MER TYPE	Automatic	DRIL	L RIG/HAI	MMER EI	FF./DAT	E F&R	R5785 C	CME-5	55 75% 01/17/2014			DRILL N	IETHOE	1 H.S. Aug	ers	HAMMER TYPE A	utomatic
DF	RILLER	S. Davi	s		S	ART DATI	E 01/29/1	15	COMP. DA	ATE 01/	/29/15		SURFACE WATER DEPTH	N/A		DRII	LLER S	S. Davis	i		ST	TART	T DATE 01/29/15		COMP. DA	TE 01/2	29/15	sı	JRFACE WATER DEF	TH N/A	
ELE	V DR	IVE DEP	TH BLO	OW CO	TNUC		BLOWS	PER FOOT	•	SAMP	. <b>V</b> /	L	SOIL AND ROCK DE	CODIDTIO	NI.	ELE\	/ DRIVE ELEV	DEPTH	H BLC	OW CO	UNT		BLOWS PE	ER FOOT		SAMP.		161	SOIL AND DO	CK DESCRIPTION	
(ft			0.5ft	0.5ft	t 0.5ft	0	25	50	75 100	NO.		- 1	ELEV. (ft)	ESCRIPTIO	DEPTH (ft	(ft)	(ft)	(ft)		0.5ft	0.5ft	0	25 50	7	5 100	NO.	MOI		SOIL AND RC	CK DESCRIPTION	
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		ł										E	ODOLIND OLD	25405			43.9	10.0	2	4	4	H .	•			$\vdash$	W	43.9	COAS	D SURFACE TAL PLAIN	0.0
		2.1 1 0.0		1 1	2	3		T : : : :	T		<u>w</u>		42.1 GROUND SUR COASTAL PL	LAIN	0.0	1	40.4	<u> </u>				?	<b>7</b> °				<b>\</b>		Black to gray-bro SAND (A-2-4), wit	wn and gray, silty fine h trace organics (root and from 18.5' to 20.0'	e s)
40		<del>.</del>				7				+		[-	Black, silty fine SAND (A organics (roots, wood			40	40.4	3.5	3	1	2	<b>3</b>	3			-	Sat.		from 0.1' to 1.5' a	and from 18.5' to 20.0'	
	38	3.6 + 3.5	5	6	7	13					Sat.	N. N.	····			<u> </u>		Ŧ													
35	5	Ŧ				: ;; : :						F	Gray, silty fine Some Sand (A- organics (roots) from	ganic. -2-4), with	J trace	35	35.4	8.5				(									
		8.6 + 8.5	1	<u> </u>		./				1		::F	organics (roots) from	18.5' to 25.	0'.		] '	Ŧ	2	2	3	<b>•</b> 5	)5			]	Sat.				
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		3.6 + 18.5	5			<u> </u>				1						25		‡	WOR	WOR	1	1.				1	Sat.				
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	18	3.6 + 23.5	5 1	3	4	7:::					Sat.	**	47.4		05.0			‡	+-			•	<u> </u>		L	4	Sal.		Boring Terminate	d at Elevation 18.9 ft i	25.0 n
						<u> </u>				+	Jun 1	_	Boring Terminated at Ele	evation 17.	25.0 1 ft in	1		‡											SAND (CC	ASTAL PLAIN)	
		+										F	SAND (COASTAI	L PLAIN)				‡													
		1										E						<u> </u>										E	NOTES:		
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		İ										F	1) 0.0-0.2' = Surficial Orga	anic Soils				İ										l	1) 0.0-0.1 – 3011101	ai Organic dolla	
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WBS 4						<b>P</b> U-4751		J	NEW HA			GEOLOGIS	T D. Racey				40191					U-4751			NEW HA				GEOLOGIST D. Racey		
				1409 (	<u>_</u>		·				at -L- Sta	ation 71+50 Right		GROUND V	NTR (ft)					409 (N	<u> </u>		-	-	ngton - Nois					GROUND W	/TR (f
BORING						TATION 9			OFFSET			ALIGNMEN		0 HR.	4.1		NG NO.					ATION 92			OFFSET				ALIGNMENT -L-	0 HR.	4.0
COLLA						OTAL DEP			NORTHIN			EASTING		24 HR.	FIAD		AR ELE					TAL DEPT			NORTHING				<b>EASTING</b> 2,352,867	24 HR.	FIAI
DRILL RI	IG/HAN	MER E	FF./DA	ΓE F&	R5785 C	ME-55 75%	01/17/2014			DRILL I	IETHOD	H.S. Augers	H/	MMER TYPE Aut	tomatic				F./DATE	F&R	5785 CN	ME-55 75%	01/17/2014			DRILL	METHO	D H.S. A	ugers	HAMMER TYPE Auto	matic
DRILLE						TART DATI	E 01/30/1	15	COMP. DA				WATER DEPTH	N/A			LER S.					ART DATE	01/30/1	5	COMP. DA			!	SURFACE WATER DEP	TH N/A	
ELEV D	DRIVE ELEV	DEPTH	·	ow co				PER FOOT				0	SOIL AND ROCK [	DESCRIPTION		ELEV	DRIVE ELEV	DEPTH	BLO'	W COL				PER FOOT		SAMP	1 /		SOIL AND RO	CK DESCRIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	MOI (	G ELEV. (ft)			DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25 :	50	75 100	NO.	/MO	I G			
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-	44.0	- 0.0	2	4	6	- 10 -	T	T	T		W	:: <u> </u>	COASTAL	PLAIN			43.5	- 00	2	5	6	. 1					w	- 43 - 43		D SURFACE FAL PLAIN	
	40.5	2.5										Gray- (A-2	brown to tan and g -4), with trace orga	ray, silty fine SANI anics (roots, wood 0.1' to 1.5'.	D		-	_				11							Black to tan-gray,	silty fine SAND (A-2-4),	
40 -	40.5	3.5	5	4	4	8		<del> </del>		+1	-W-		fragments) from	0.1' to 1.5'.		40	40.0	3.5	2	2	1	<b>4</b> 3 · · ·				+1	Sat.		from (	(roots, wood fragments) .1' to 1.5'.	,
	-	Ŧ										<b>∷</b> [ ∴]					-	-				73					"	F			
35	35.5 <sup>-</sup>	8.5				: :::										35	35.0	8.5				1/1   1									
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## **FDS**

#### **SITE PHOTOGRAPHS**



Photograph No. 1: View looking North along proposed Military Cutoff Rd - Proposed NW7 on right



**Photograph No. 2:** View looking South along proposed Military Cutoff Road – Proposed NW7 on left



Photograph No. 3: View looking North along proposed Military Cutoff Road – Proposed NW7 on right



Photograph No. 4: View looking Northeast toward Proposed NW7

475 REFERENCE

APPENDIX I

CPT LOGS

SHEET 1-5

40191

#### STATE OF NORTH CAROLINA

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

#### **CONTENTS** SHEET NO. **DESCRIPTION**

TITLE SHEET LEGEND 3-3A SITE PLANS WALL ENVELOPE

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY NEW HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON

SITE DESCRIPTION NOISE WALL 8 AT -L- STA. 93 + 00 LEFT

**CAUTION NOTICE** 

STATE PROJECT REFERENCE NO.

U-4751

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 1999 707-6805. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MELANDARD THE THE PROPERTY OF THE PR 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 SATISTY 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 FOR 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** 

4

M. BAHIRADHAN

J. WHITT

S. BUCHANAN

MIDATLANTIC DR.

INVESTIGATED BY M. BAHIRADHAN

DRAWN BY \_S. BUCHANAN

CHECKED BY M. BAHIRADHAN

SUBMITTED BY SCHNABEL ENG.

DATE APRIL 2015

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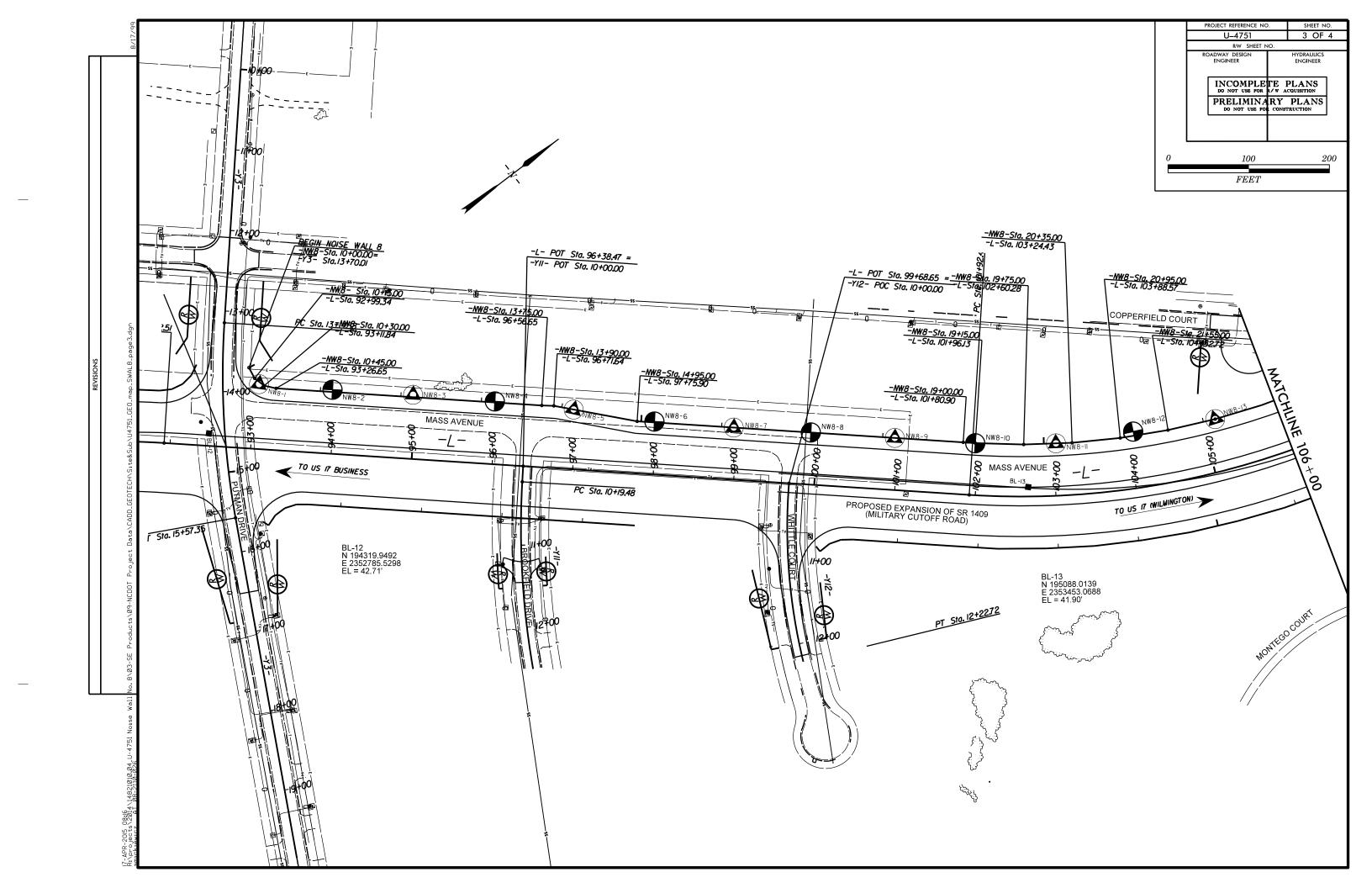
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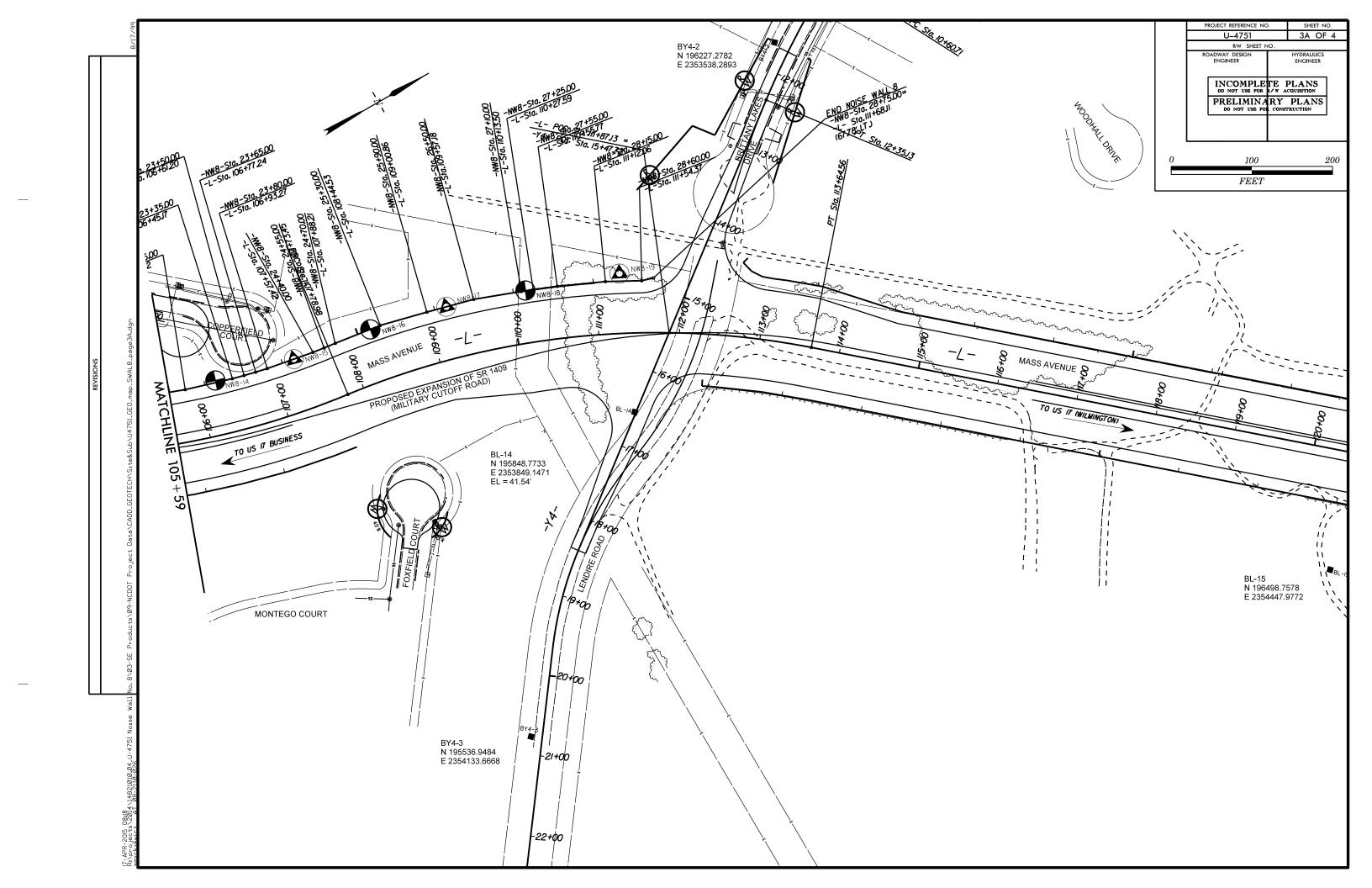
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

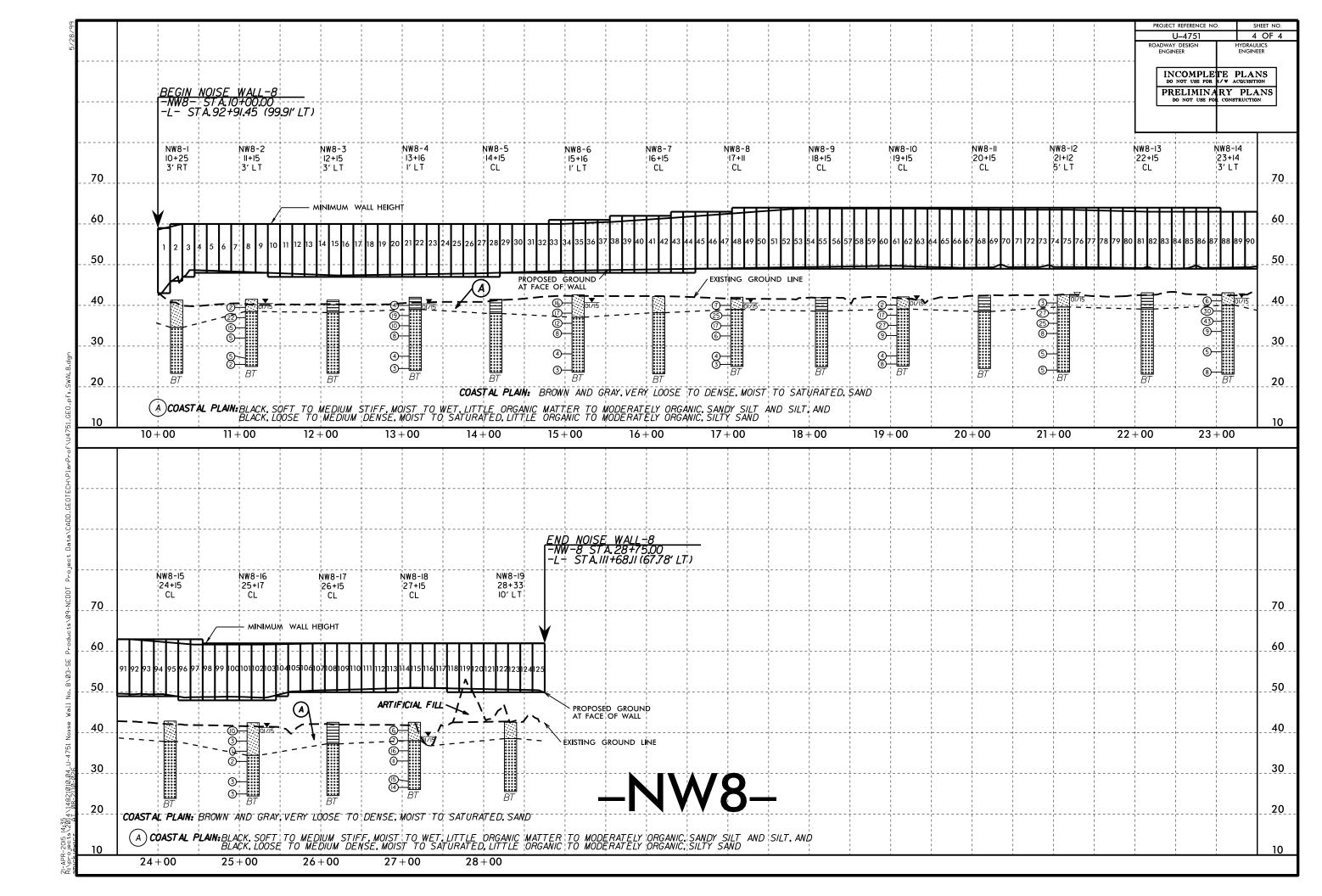
## SUBSURFACE INVESTIGATION

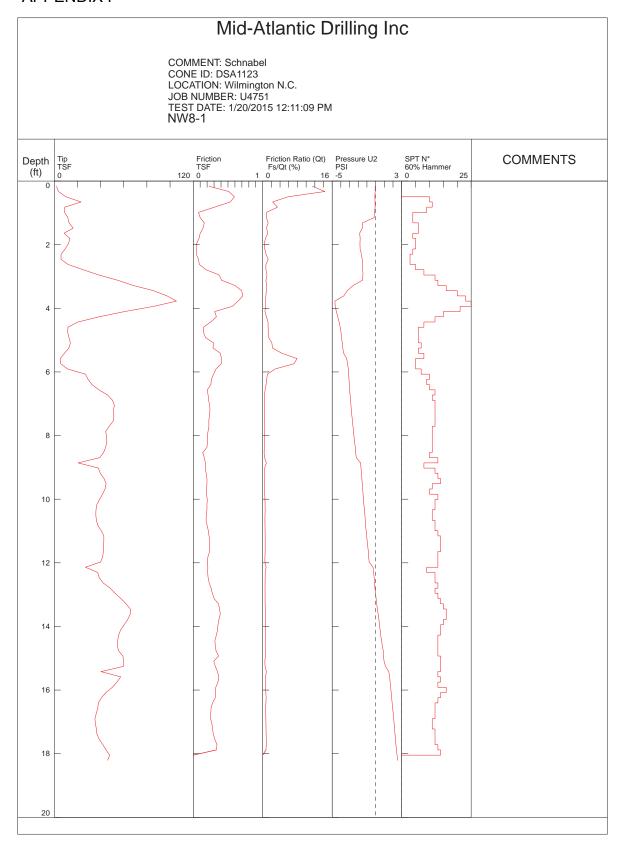
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	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.	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,  VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERREDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	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.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, <u>SUBANGULAR</u> , <u>SUBROUNDED</u> , OR <u>ROUNDED</u> .	WEATHERED /// NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS ORGANIC MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
LLASS. (\$\(\sigma\) 30/ PASSING "200) (> 30/ PASSING "200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-0 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-4, A-5 A-6, A-7	COMPRESSIBILITY	NON COVETALLING FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL COCCOCOCCO	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
5555005550	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING "10 50 MX GRANULAR SILT- CLAY MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	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
*40 30 MX 50 MX 51 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	WEATHERING	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL MATERIAL	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL  TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL — — 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 41 MN 41 MN 41 MN LITTLE OR LICEUY	MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         > 10%         > 20%         HIGHLY         35%         AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CROUP INDEX A A A MY 8 MY 12 MY IS MY NO MY AMOUNTS OF ORGANIC	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRACS ORGANIC SUILS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
CEN RATING FAIR TO	——───────────────────────────────────	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	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	STRING OR SEEP	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 (MOD, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK,	FIELD.   <u>JOINT</u> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	₩ITH SOIL DESCRIPTION → OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE 4 TO 10	SOIL SYMBOL  SOIL SYMBOL  SUPE 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.	<u>LENS</u> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MEDIUM DENSE 10 TO 30 N/A	I 附	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) DENSE 30 TO 50  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	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	— 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 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BFF</u> COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2	A DIEZOMETED	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	TTTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS  VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	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	USED IN THE TOP 3 FEET OF	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 THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNCLASSIFIED EXCAVATION - UNDERCUT  UNDERCUT  UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.  MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
	CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE FIELD MOISTURE OURSE SO SITE A MOISTURE OF SCALES OF SCALE	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 <sub>d</sub> - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
(ATTERBERG LIMITS)  DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	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.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	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 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC CEMICOL ID DECULIDES DRIVING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: B-12, N 194319.9492, E 2352785.5298, EL 42.71'
	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	BL-I3, N 195088.0139, E 2353453.0688, EL 4I.90' BL-I4, N 195848.7733, E 2353849.1471, EL 4I.54 ELEVATION: FEET
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE	BL-I4, N 195848.7733, E 2353849.1471, EL 41.54 ELEVATION: FEET
SL _ SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6* CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	NM = NOT MEASURED
PLASTICITY	CME-55   CORE SIZE:	INDURATION	]
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS; FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST CASING W/ ADVANCER HAND TOOLS:  POST HOLE DIGGER	CDAING CAN BE CEPARATED FROM CAMPLE WITH CTEEL PROPE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST X TRICONE 2.94 STEEL TEETH HAND AUGER	MODERATELY INDURATED  MODERATELY INDURATED  BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG,-CARB, COUNDING POR	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X CME 45B CORE BIT SUDMINION RUD  VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X GEOPROBE X DSAII23 CPT	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14
		•	

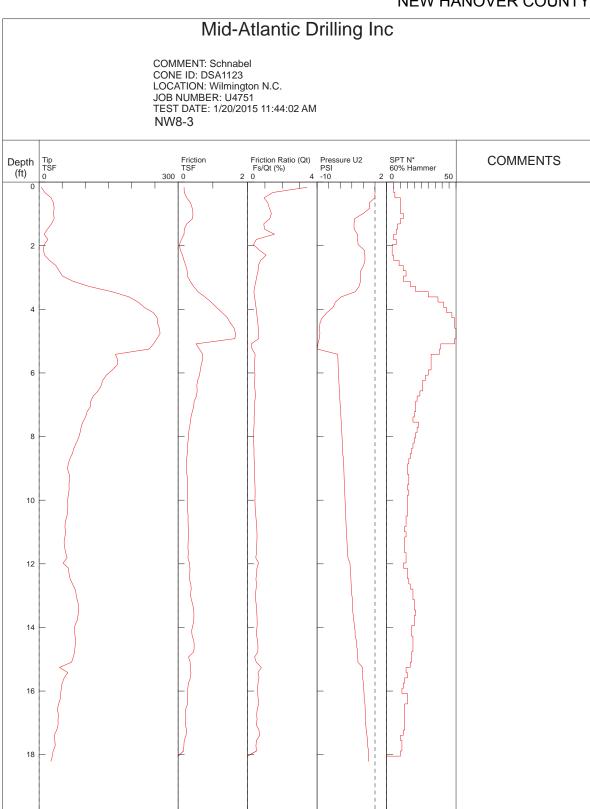


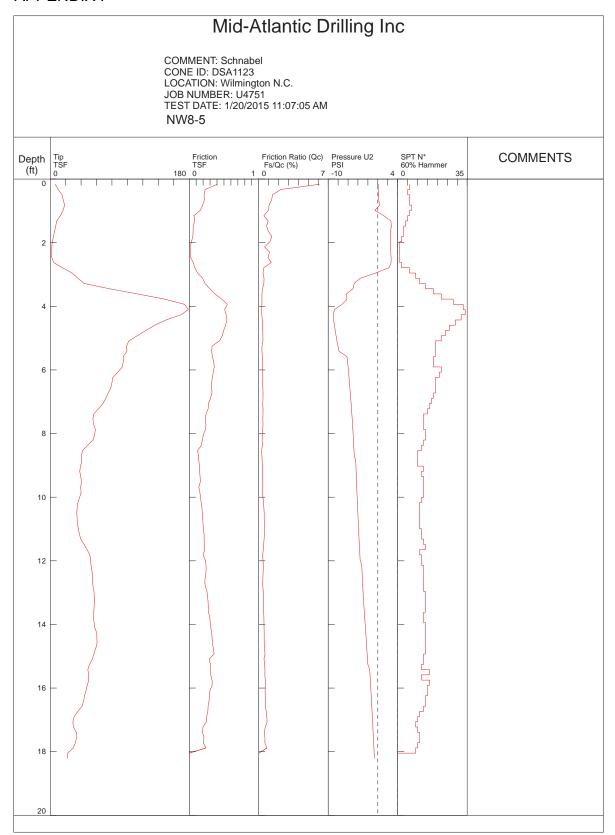






SHEET NO. 1 OF 5 40191 (U-4751) NEW HANOVER COUNTY



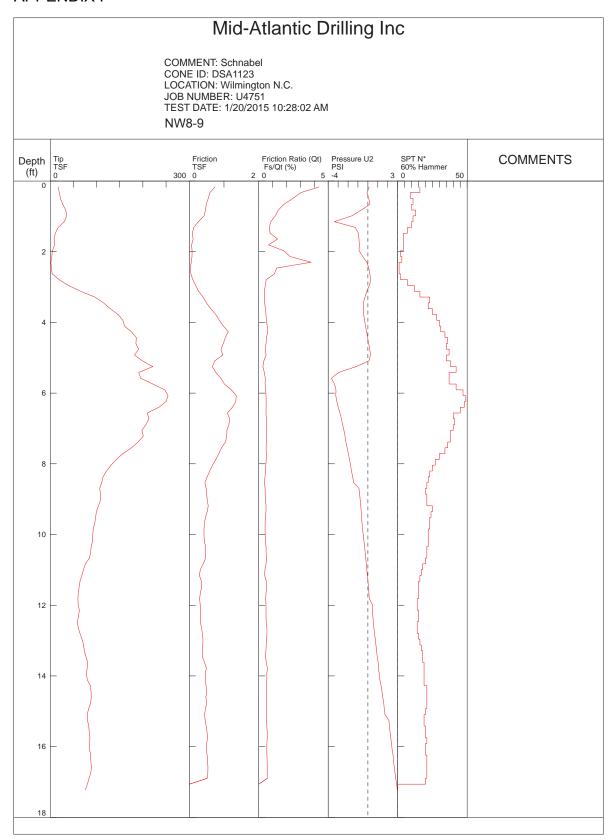


#### SHEET NO. 2 OF 5 40191 (U-4751) NEW HANOVER COUNTY

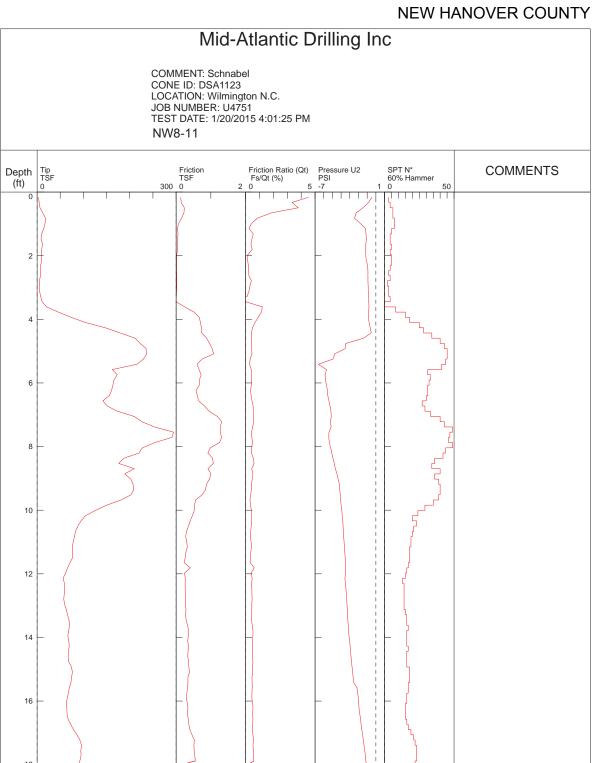
### Mid-Atlantic Drilling Inc

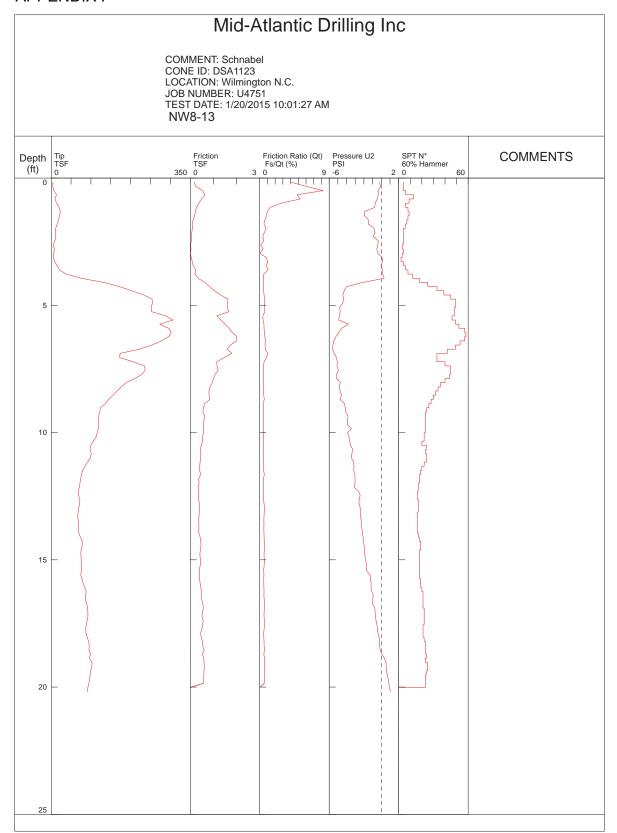
COMMENT: Schnabel
CONE ID: DSA1123
LOCATION: Wilmington N.C.
JOB NUMBER: U4751
TEST DATE: 1/20/2015 10:46:35 AN

Depth (ft)	Tip TSF	Friction TSF	Friction Ratio (Qt) Fs/Qt (%)	Pressure U2 PSI	SPT N* 60% Hammer	COMMENTS
Depth (ft) 0 2 2 4 4 6 6 8 8 10 12		Friction TSF 00 0 2	Friction Ratio (Qt) Fs/Qt (%) 5	Pressure U2 PSI -8 1	SPT N* 60% Hammer 0 60	COMMENTS
14 16 18				-		

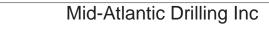


#### SHEET NO. 3 OF 5 40191 (U-4751) NEW HANOVER COUNTY



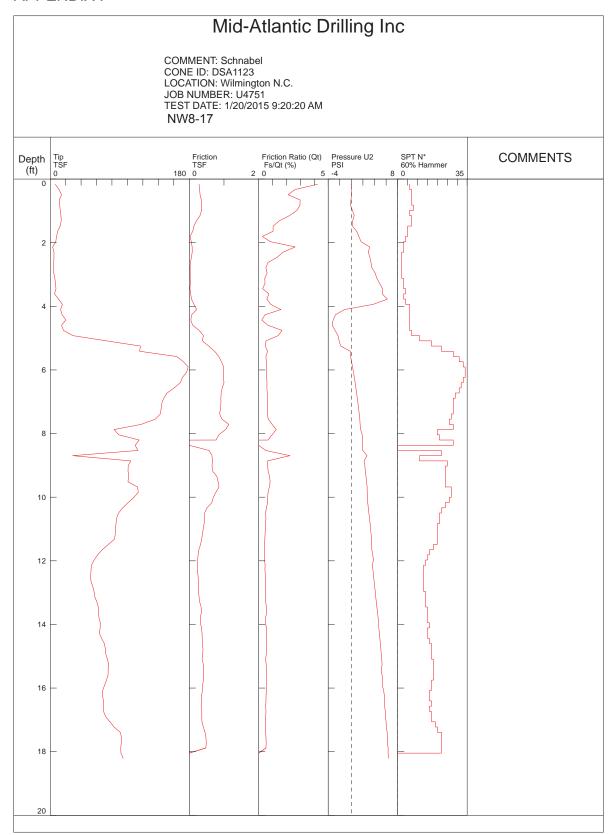


#### SHEET NO. 4 OF 5 40191 (U-4751) **NEW HANOVER COUNTY**



COMMENT: Schnabel CONE ID: DSA1123

oth Tip TSF 0	Friction TSF 140 0	Friction Ra Fs/Qt (%) 2 0	atio (Qt) Pressure U2 PSI 3 -4	SPT N* 60% Hammer 8 0 30	COMMENTS
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18 —					



SHEET NO. 5 OF 5 40191 (U-4751) NEW HANOVER COUNTY

#### Mid-Atlantic Drilling Inc

COMMENT: Schnabel CONE ID: DSA1123 LOCATION: Wilmington N.C. JOB NUMBER: U4751 TEST DATE: 1/20/2015 8:36:29

Depth (ft)	Tip TSF 0	Friction TSF 180 0 2	Friction Ratio (Qt) Fs/Qt (%) 2 0 7	Pressure U2 PSI -3 6	SPT N* 60% Hammer 0 40	COMMENTS
2				_		
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16					_ (	

475 REFERENCE

40191

### STATE OF NORTH CAROLINA

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

#### **CONTENTS**

APPENDIX I

CPT LOGS

SHEET I-2

SHEET NO. **DESCRIPTION** TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE BORE LOG REPORTS

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY NEW HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON

SITE DESCRIPTION NOISE WALL 9 AT -L-STA. 93 + 50 RIGHT

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 1999 707-6805. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

**CAUTION NOTICE** 

STATE PROJECT REFERENCE NO.

U-4751

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MELANDARD THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTY OF THE PROPERTIMENT OF THE PROPERTY OF THE PROPER 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 SATISTY 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 FOR 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** M. BAHIRADHAN J. WHITT

5

S. BUCHANAN

MID-ATLANTIC DR.

INVESTIGATED BY M. BAHIRADHAN

DRAWN BY \_S. BUCHANAN

CHECKED BY M. BAHIRADHAN

SUBMITTED BY SCHNABEL ENG.

DATE *MAY 2015* 



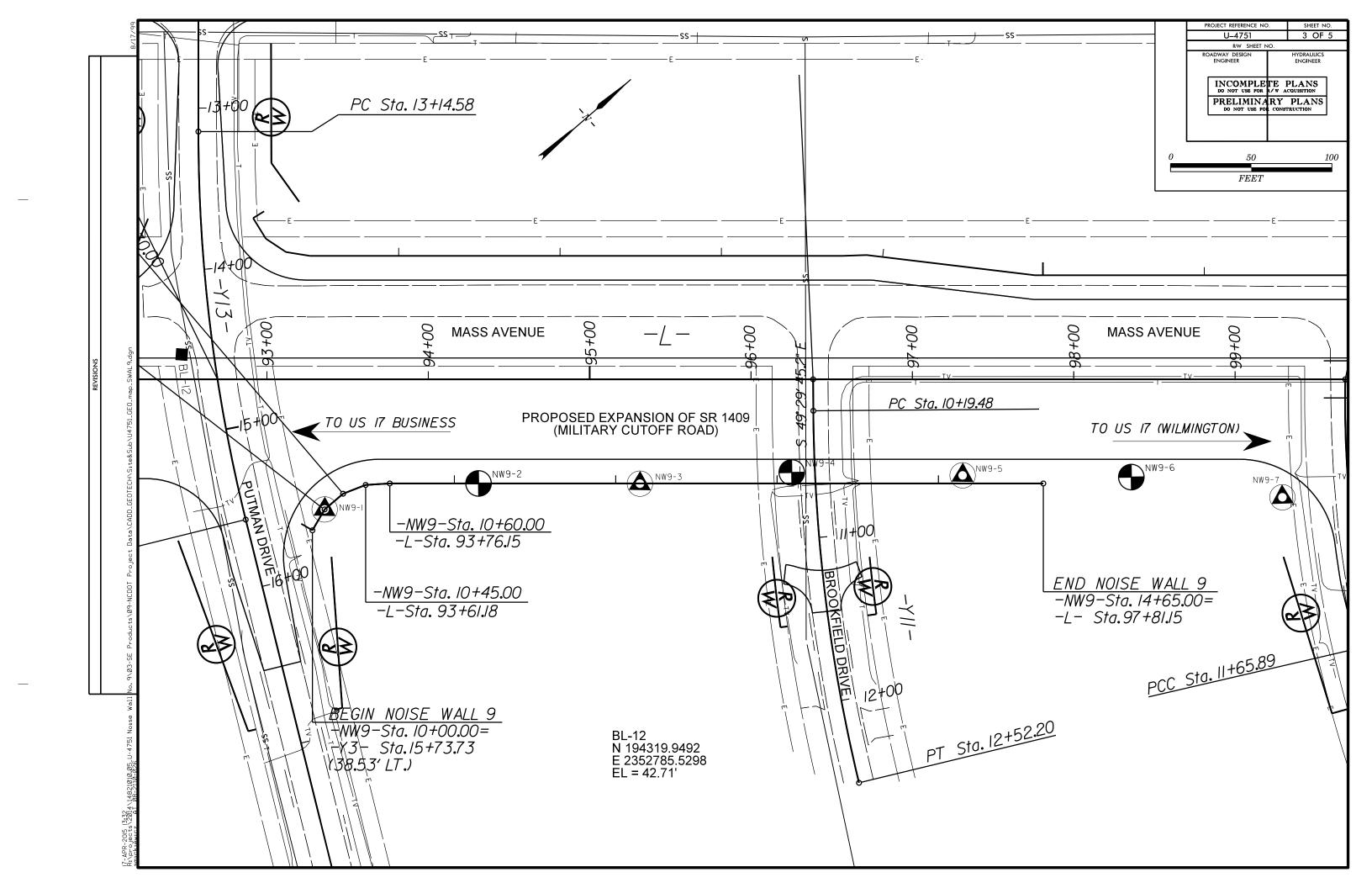
ROJECT REFERENCE	NO.		SHEET NO.	
U-475	1	2	OF	5

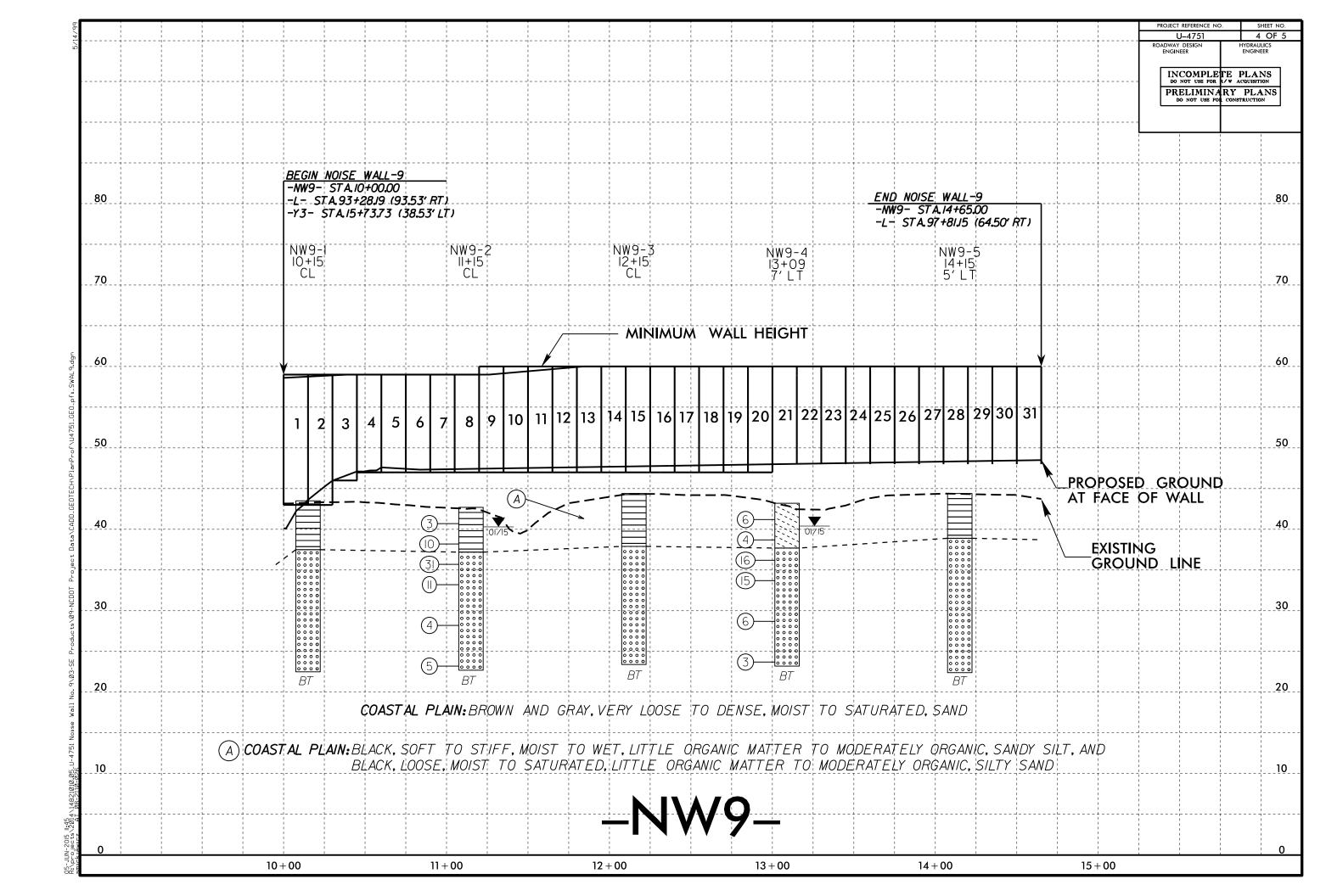
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

## SUBSURFACE INVESTIGATION

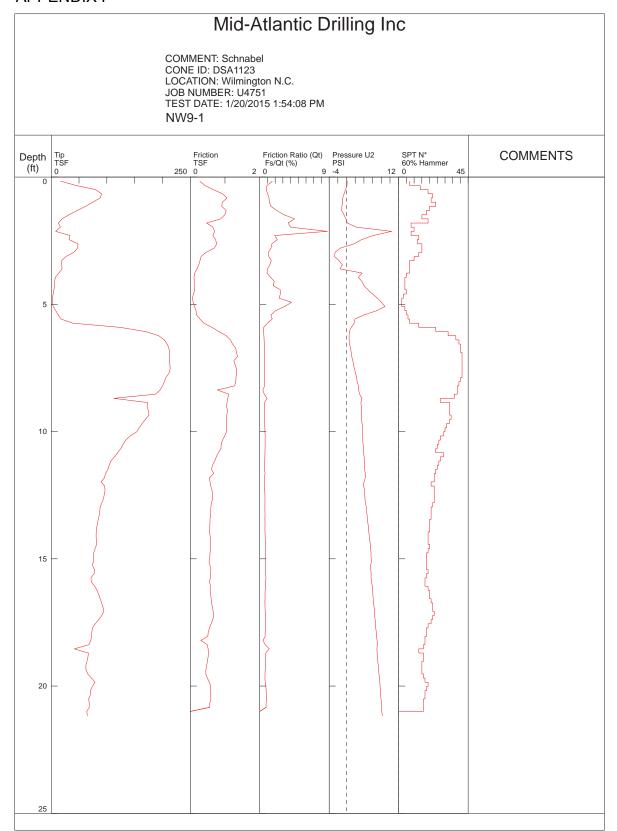
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	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.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	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 SOIL LEGEND AND AASHTO CLASSIFICATION	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.
	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 ORGANIC MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, 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.	UNCLES, GABBRU, SURISI, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-8 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CATSTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 00000d00000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	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.
*10 50 MX GRANULAR SILI- MUCK,	PERCENTAGE OF MATERIAL	CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
#40 38 MX 58 MX 51 MN S0 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY 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.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.  DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
LL — — 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR LITTLE OR LITTLE OR	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CROND INDEX A A A MY R MY 12 MY 16 MY MO MY AMOUNTS OF ORGANIC	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
HIGHAL TYPES CTONE EPACS ORGANIC SUILS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAMD SAMD SOLIC SOLIC SOLIC	▼ STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SANU		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 FAIR TO POOR UNSUITABLE	∇PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	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.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED	ET	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK,	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )  PRIMARY SOIL TYPE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  OF ROCK STRUCTURES  ROADWAY EMBANKMENT (RE)  OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VERY LOOSE < 4	SPT C SURPE INDICATOR	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY LOOSE 4 TO 10	SOIL SYMBOL  OPT ONT TEST BORING  INSTALLATION  SECTION  INSTALLATION	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.  MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 10 10 30 N/A	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF  VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	THAN ROADWAY EMBANKMENT TEST	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	── INFERRED SOIL BOUNDARY — CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY   SOFT   2 TO 4   0.25 TO 0.5     SILT-CLAY   MEDIUM STIFF   4 TO 8   0.5 TO 1.0	INFERRED ROCK LINE MW MONITORING WELL TEST BORING	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2	WITH CURE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	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
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTTTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	- ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION TO BE	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	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	USED IN THE TOP 3 EFET OF	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 UNDERCUT UNCLASSIFIED EXCAVATION - 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	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY  MOD MODERATELY  7 - UNIT WEIGHT  CPT - CONE PENETRATION TEST  NP - NON PLASTIC  7 - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE CHIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GOIDE FOR FIELD MOISTONE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS  DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.  VERY  CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	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 SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC CEMICOL ID DEGUTOES DOVING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACT - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS $w$ - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: BL-12, N 194319.9492, E 2352785.5298
"" PL L + PLASTIC LIMIT	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 42.71 FEET
SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:  CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO	<u> </u>	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	NM = NOT MEASURED
ATTAIN OPTIMUM MOISTURE	CME-55 CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	
PLASTICITY	8' HOLLOW AUGERS	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST UNGCARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	CASING W/ ADVANCER POST HOLE DIGGER	CRAINC CAN BE CEDARATED FROM CAMPLE WITH CIFEL PROPE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST X TRICONE 2.94 STEEL TEETH HAND AUGER	MODERATELY INDURATED  MODERATELY INDURATED  MODERATELY INDURATED  BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG,-CARB, COUNDING DOD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X CME-45B SOUNDING ROD VANE SHEAR TEST	DIFFICULI TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X GEOPROBE X DASII23 CPT	EXTREMELY INDURATED  SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;  SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1
		SHIFFE DRENG HURUSS UNHING.	DATE: 8-10-14





<b>WBS</b> 40191	<b>TIP</b> U-4751 <b>CO</b>	UNTY NEW HAN	IOVER	GEOLOGIST Whitt, J. W		<b>WBS</b> 40191		TIP U	J-4751 <b>COUN</b>	TY NEW HA	NOVER		GEOLOGIST Whitt, J. W	
SITE DESCRIPTION SOUND BAR	RRIER WALL #9, SR 1409 (MII	LITARY CUTOFF	ROAD) TO US	17 IN WILMINGTON	GROUND WTR (ft)	SITE DESCRI	PTION SOUND E	BARRIER W	VALL #9, SR 1409 (MILIT	ARY CUTOF	F ROAD)	TO US 17	7 IN WILMINGTON	GROUND WTR (ft)
BORING NO. NW9-6	STATION 98+36	OFFSET 6	1 ft RT	ALIGNMENT -L-	<b>0 HR.</b> 3.2	BORING NO.	NW9-7	STATI	ION 99+29	OFFSET	73 ft RT		ALIGNMENT -L-	0 HR. NM
COLLAR ELEV. 43.9 ft	TOTAL DEPTH 20.0 ft	NORTHING	194,715	<b>EASTING</b> 2,353,229	<b>24 HR.</b> 3.2	COLLAR ELE	<b>V.</b> 43.9 ft	ТОТА	<b>L DEPTH</b> 21.0 ft	NORTHIN	<b>G</b> 194,77	77	<b>EASTING</b> 2,353,299	<b>24 HR.</b> NM
DRILL RIG/HAMMER EFF./DATE MID19	904 CME-45B 80% 10/14/2014		DRILL METHOD	Mud Rotary I	HAMMER TYPE Automatic	DRILL RIG/HAMI	MER EFF./DATE MI	D3793 DSA11	123 GEOPROBE 10/16/2014		DRILL M	ETHOD CF	PT / DPT	HAMMER TYPE N/A
DRILLER Wiggins, M.	<b>START DATE</b> 01/21/15	COMP. DAT	<b>TE</b> 01/21/15	SURFACE WATER DEPT	TH N/A	DRILLER Ste	*	STAR	T DATE 01/20/15	COMP. DA	<b>ATE</b> 01/2	20/15	SURFACE WATER DEP	Γ <b>H</b> N/A
ELEV CHI DEPTH BLOW COUNTY (ft) DEPTH 0.5ft 0.5ft 0.5ft 0.5ft		75 100	NO. MOI	SOIL AND ROCK	C DESCRIPTION  DEPTH (ft)	ELEV DRIVE ELEV (ft)	EPTH BLOW CO (ft) 0.5ft 0.5ft		BLOWS PER FOO	OT 75 100	SAMP. NO.	MOI G	SOIL AND ROC	C DESCRIPTION
40 40.4 7 3.5 WOH WOH V 37.9 6.0 13 12 35 35.4 8.5 9 11	VOH  11  10  23  21  3  66.		W Sat. Sat. Sat.	43.9 GROUND COASTA BLACK, LITTLE ORG MODERATELY ORG 39.7 SAND GRAINE BROWNISH GRA GRAINE  23.9 Boring Terminated a Loose	AL PLAIN  GANIC MATTER TO  ANIC, FINE GRAINED  / SILT  4.2  GANIC MATTER TO  GANIC, SILTY FINE  D SAND  / TO GRAY, FINE  D SAND  20.0  t Elevation 23.9 ft in	35 30 25							SOFT TO VERY STIF	RATELY ORGANIC, Y SILT  VERY DENSE, SAND ND TRACE GRAVEL  21.0 at Elevation 22.9 ft in ense Sand of measured. Pore tion test was not

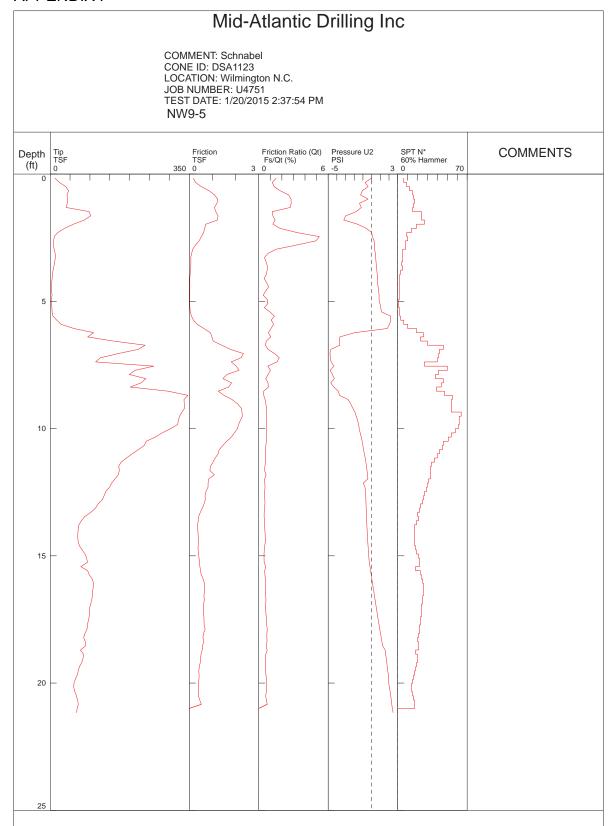


### SHEET NO. 1 OF 2 40191 (U-4751) **NEW HANOVER COUNTY**



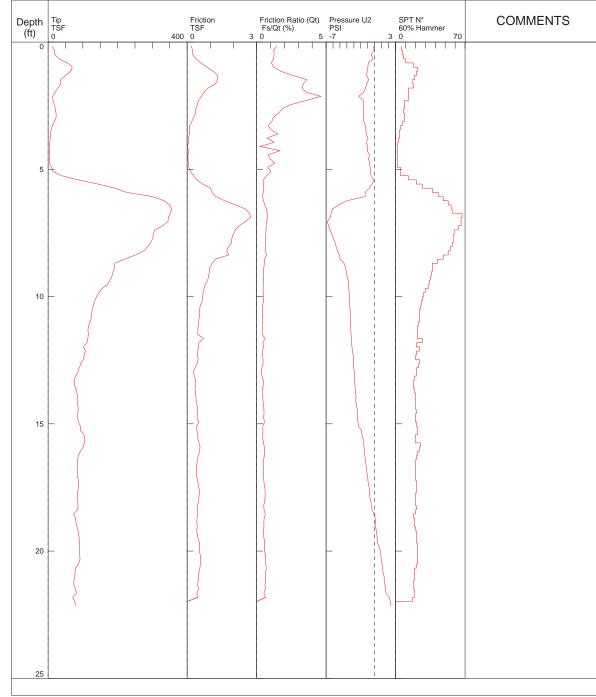
COMMENT: Schnabel CONE ID: DSA1123

LOCATION: Wilmington N.C. JOB NUMBER: U4751 TEST DATE: 1/20/2015 2:16:31 PM NW9-3 Depth (ft) Tip TSF 0 Friction Ratio (Qt) Pressure U2 Fs/Qt (%) PSI 4 0 5 -2 SPT N\* 60% Hammer 8 0 COMMENTS



### SHEET NO. 2 OF 2 40191 (U-4751) NEW HANOVER COUNTY

## 



S REFERENCE

40191

### STATE OF NORTH CAROLINA

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

#### **CONTENTS**

APPENDIX I CPT LOGS

SHEET NO. **DESCRIPTION** TITLE SHEET LEGEND SITE PLAN WALL ENVELOPE 5-6 BORE LOG REPORTS

SHEET I-3

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY NEW HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON

SITE DESCRIPTION NOISE WALL 10 AT -L-STA. 100 + 50 RIGHT

**PERSONNEL** 

6

M. BAHIRADHAN

MID-ATLANTIC DR.

INVESTIGATED BY M. BAHIRADHAN

SUBMITTED BY SCHNABEL ENG.

Mahalingam Bahiradleggy2015

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 SATISTY 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 FOR 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.

STATE PROJECT REFERENCE NO.

U-4751

**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 1999 707-6805. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MELANDARD THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTIMENT OF THE PROPERTY OF THE PROPERTIMENT OF THE PROPERTY OF THE PROPER

INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

J. WHITT

S. BUCHANAN

DRAWN BY \_S. BUCHANAN

CHECKED BY M. BAHIRADHAN

DATE *MAY 2015* 

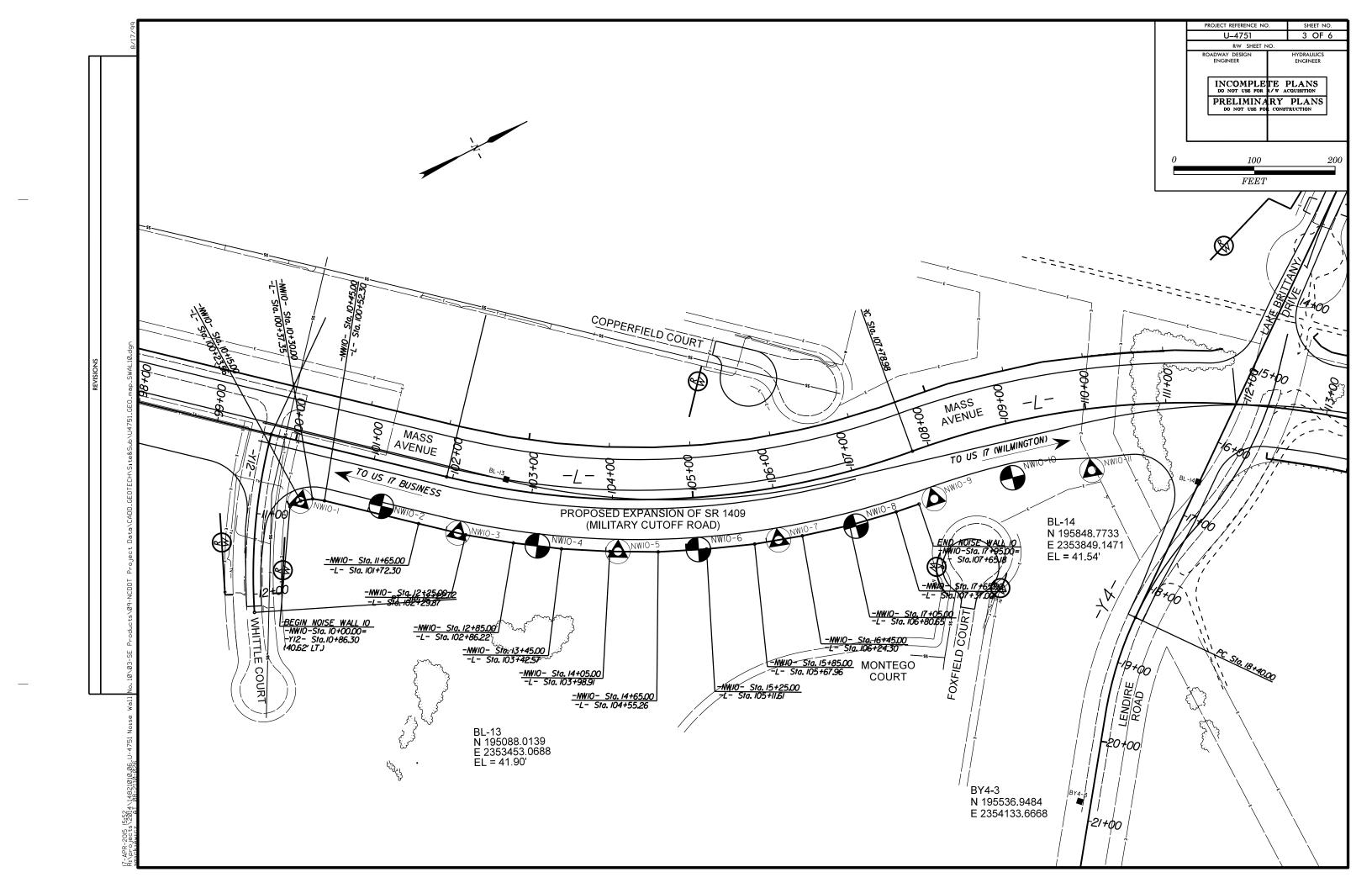
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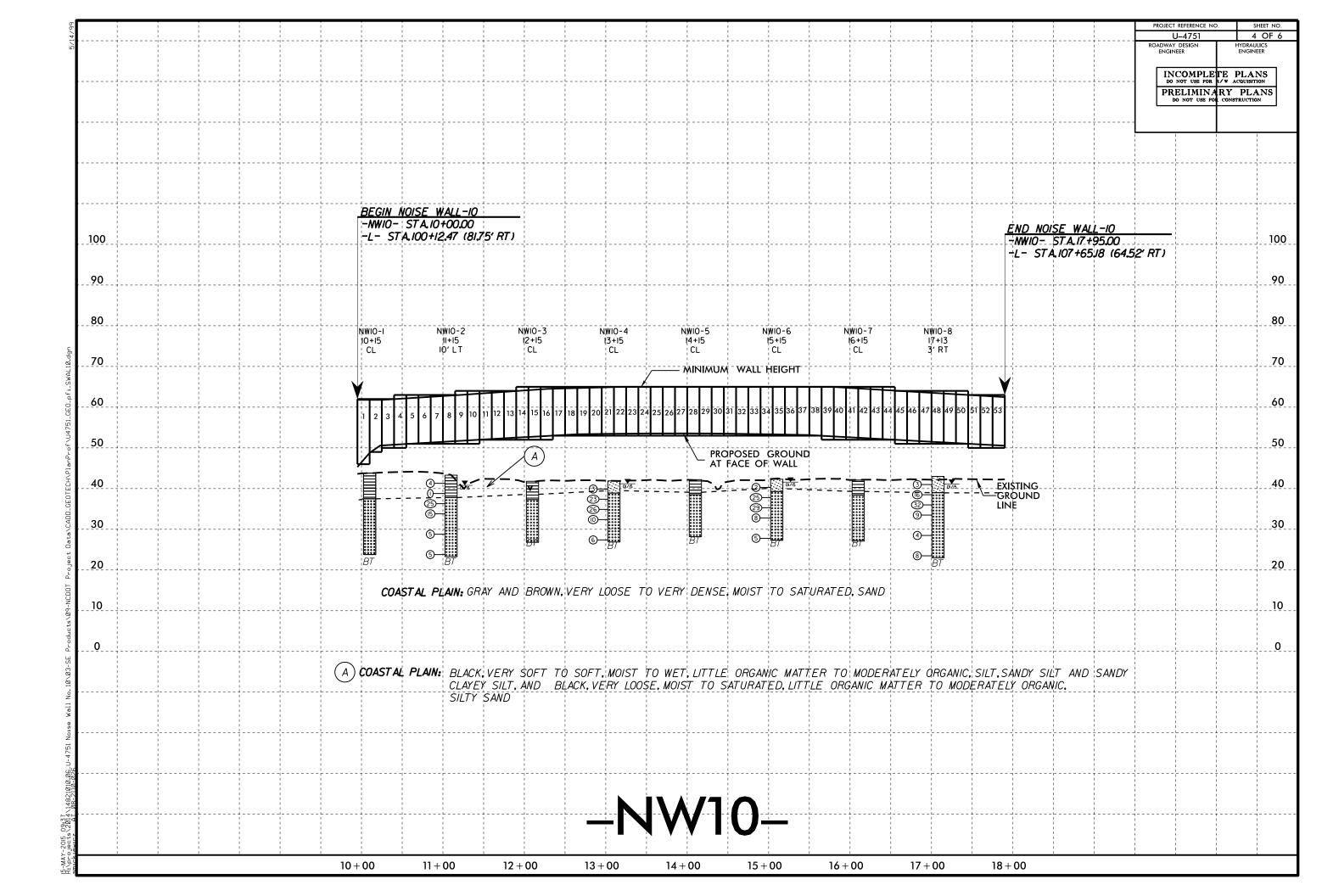
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

## SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	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.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	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 SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
CENEDAL CRANIII AD MATERIAL C CILTUCI AV MATERIAL C	MINERALOGICAL COMPOSITION	FINE TO COARSE CRAIN ICNEOUS AND METAMORPHIC POCK THAT	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
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	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.	UNCISS, GHOBRU, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-6 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE,
SYMBOL   00000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	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 (CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*10 50 MX GRANULAR GLAY PEAT SOILS CLAY PEAT	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	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 40 MX 41 MN LITTLE OR	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	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 IU MX IU MX II MN II MN IU MX IU MX II MN II MN MODERATE ORGANIC	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GRUUP INUEX 0 0 4 MX 8 MX 12 MX 16 MX NU MX AMUUN 15 UF SOILS	GROUND WATER	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	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL AND FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	<u> </u>	(MOD.) 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	PARENT MATERIAL.
AS SUBGRADE P1 OF A-7-5 SUBGROUP IS ≤ LL - 30 :P1 OF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	WITH FRESH ROCK.	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
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
DANCE OF STANDARD BANCE OF UNCONFINED	TI SOCCESTICOUS STREETS	(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  25/825  DIP & DIP DIRECTION  WITH SOIL DESCRIPTION  OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VERY LOOSE 4 4	SPT CHOPE INDICATOR	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY LOOSE 4 TO 10	SOIL SYMBOL DIPTOMT TEST BORING SCOTE INDICATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	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
MATERIAL DENSE 10 TO 30 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	TIME TO ADMINISTRATE EMBRINAMENT	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5	— INFERRED SOIL BOUNDARY —— CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE  MM  MONITORING WELL  TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL	A ALLINIAL COTI BOUNDARY A PIEZOMETER	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
HARD > 30 > 4	INSTALLATION OF NOTHER	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	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	USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER	UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL  ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
	CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE SCALE FIELD MOISTURE CAUSE FOR STATE AMORE AND ASSESSMENT OF A STATE AMORE	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
(ATTERBERG LIMITS)  DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	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.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	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 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	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 SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC COMMITTED COMMITTE	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (W) SEMISOCIDE REGULATION TO	FRAGS FRAGMENTS $\omega$ - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: BL-13, N 195088.0139, E 2353453.0688, EL 41.90'
(PI) PL PLASTIC LIMIT	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	BL-I4, N 195848.7733, E 2353849.1471, EL 41.54'
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	■ WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: FEET
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	CI CONTINUOUS ELICIT AUGED	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	NM = NOT MEASURED
	CME-55	THINLY LAMINATED < 0.008 FEET  INDURATION	1
PLASTICITY	<b>-</b>	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1
PLASTICITY INDEX (PI) ORY STRENGTH  NON PLASTIC 0-5 VERY LOW	CME-550 HARD FACED FINGER BITS TUNG,-CARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST CASING W/ ADVANCER HAND TOOLS:	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	POST HOLE DIGGER	MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	- I TOLOGUE - TOLOGUE - HAND AUGER		
	X CME 45B 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	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
Sold tell South to Eloth, bring Streemed, Elothic Cold to Describe ALTERNANCE.	X GEOPROBE X DSAII23 CPT	SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

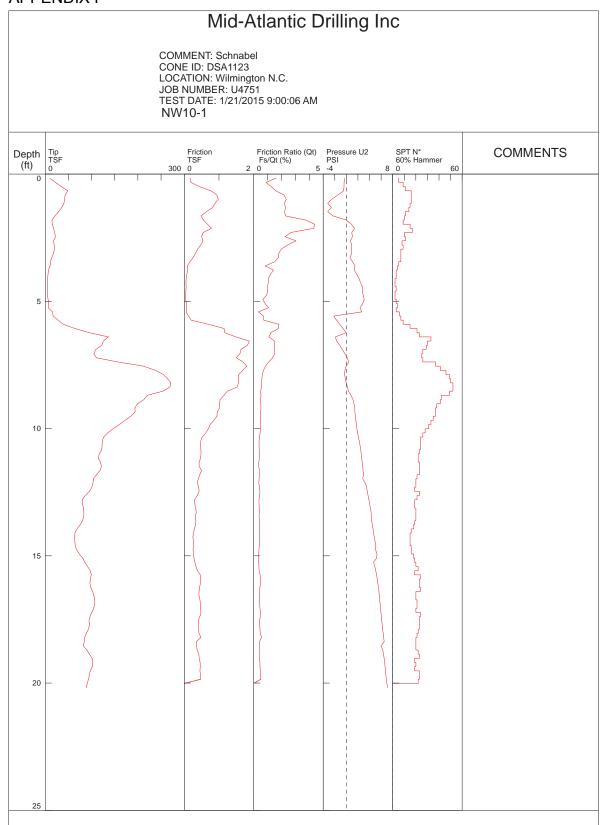




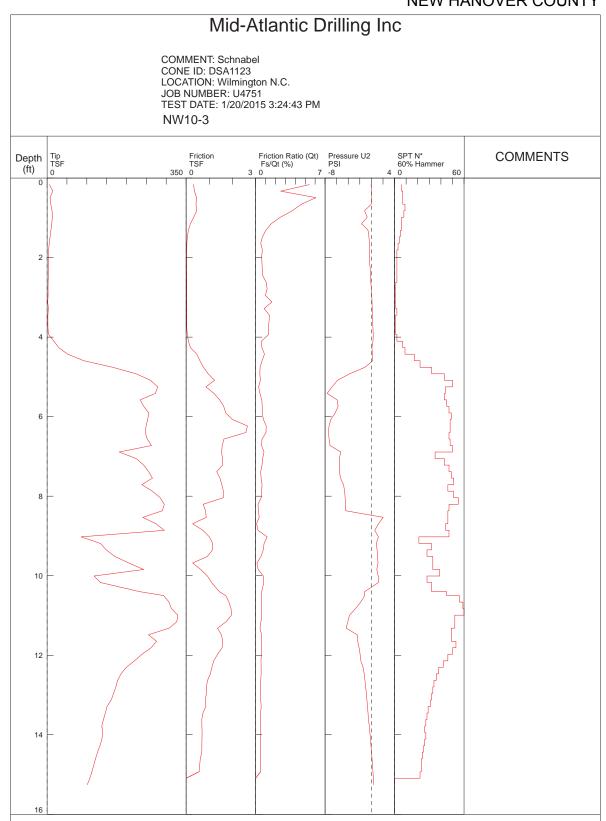
<b>WBS</b> 40191		TY NEW HANOVER	GEOLOGIST Whitt, J. W.		<b>WBS</b> 40191		<b>TIP</b> U-4751 <b>C</b> C	DUNTY NEW HANOVER	GEOLOGIST Whitt, J. W.	
	ARRIER WALL #10, SR 1409 (MILI			GROUND WTR (ft)		TION SOUND	BARRIER WALL #10, SR 1409 (I			GROUND WTR (ft)
BORING NO. NW10-9	STATION 107+85	OFFSET 65 ft RT	ALIGNMENT -L-	OHR. NM	BORING NO.		<b>STATION</b> 108+92	OFFSET 67 ft RT	ALIGNMENT -L-	0 HR. NM
COLLAR ELEV. 43.2 ft	TOTAL DEPTH 18.0 ft	NORTHING 195,549	<b>EASTING</b> 2,353,718	24 HR. NM	COLLAR ELEV	. 43.2 ft	TOTAL DEPTH 20.0 ft	NORTHING 195,647	<b>EASTING</b> 2,353,739	<b>24 HR.</b> 3.5
DRILL RIG/HAMMER EFF./DATE MID:	3793 DSA1123 GEOPROBE 10/16/2014	DRILL METHOD CF	PT / DPT HAMI	MER TYPE N/A	DRILL RIG/HAMN	ER EFF./DATE M	MID1904 CME-45B 80% 10/14/2014	DRILL METHOD	Mud Rotary H	AMMER TYPE Automatic
DRILLER Stewart, R.	<b>START DATE</b> 01/21/15	COMP. DATE 01/21/15	SURFACE WATER DEPTH N	I/A	DRILLER Wig	gins, M.	<b>START DATE</b> 01/21/15	COMP. DATE 01/21/15	SURFACE WATER DEPTH	I N/A
ELEV DRIVE DEPTH BLOW COL	INT BLOWS PER FOO		SOIL AND ROCK DE	SCRIPTION	ELEV DRIVE D	PTH BLOW C	COUNT BLOWS PER		L SOIL AND ROCK	DESCRIPTION
(ft) ELEV (ft) 0.5ft 0.5ft	0.5ft 0 25 50	75 100 NO. MOI G	ELEV. (ft)	DEPTH (ft)	(ft) ELEV (ft)	(ft) 0.5ft 0.5	5ft 0.5ft 0 25 50	75 100 NO. MOI	<u>G</u>	
45				VEA.05	45				-	UDEAGE
			- 43.2 GROUND SUR COASTAL P	LAIN	42.2	1.0			+ 43.2 GROUND SI	PLAIN
40			LOOSE TO MEDIUM DEN	ISE, SILTY SAND	40 39.7	3.5	$m{2}$ $m{1}$ $m{2}$ $m{1}$ $m{1}$ $m{1}$ $m{1}$	M	BLACK, LITTLE ORG. MODERATELY ORG	ANIC, SILTY FINE3.0
			- 38.7 - MEDIUM DENSE TO DEN	NSE, SAND WITH		2 3	1 1 <b>9</b> 6 1	Sat.	GRAINED  BROWNISH GRAY TO	O LIGHT GRAYISH'
		0000 0000 0000	MEDIUM DENSE TO DEN LITTLE SIL LI	.т		6.0 3 4	+   0     <b>\</b> _	Sat.	BROWN, FINE GF	RAINED SAND
35		0000	<del>-</del> •		35 34.7	8.5 3 4	3 7		, , , , , , , , , , , , , , , , , , ,	
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30 +			- <del>-</del>		30 29.7	13.5	<del>   </del>		) 0 0 0 0 0 0 0	
		0000 0000 0000 0000	- -					Sat.	> 0 0 <b>-</b> 0 0 0 <b>-</b> 0 0 0 0	
‡			- - 25.2	18.0	25 24 7				, o o - , o o o - , o o o -	
‡			Boring Terminated at Ele Medium Dense	evation 25.2 ft In Sand	25 24.7 -	3 4	5	Sat.	23.2	20.0
			Water level was not me						Boring Terminated at Loose S	
			pressure dissipation performed	test was not I.					-	
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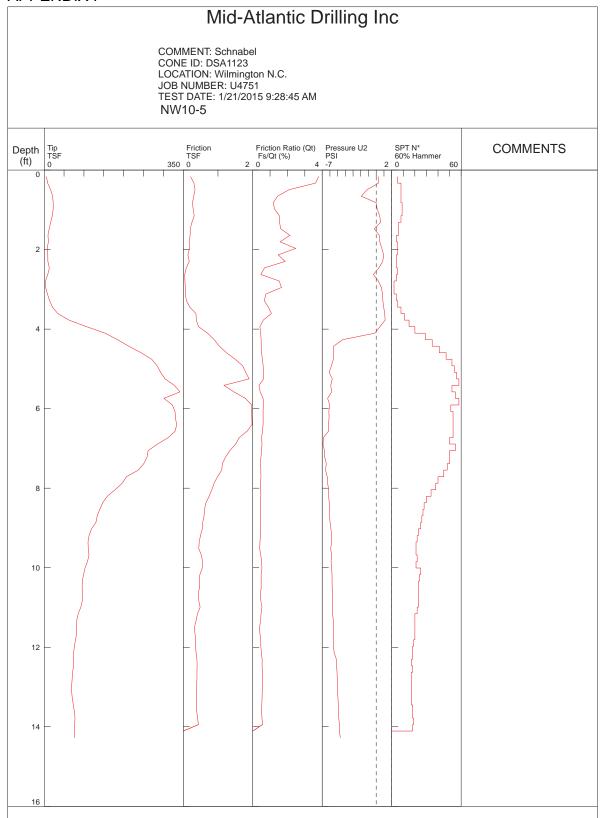
SHEET 6 OF 6

<b>BS</b> 40191	<b>TIP</b> U-4751 <b>COU</b>	ITY NEW HANOVER	GEOLOGIST Whitt, J. W.	
TE DESCRIPTION SOUND BAR	RRIER WALL #10, SR 1409 (MIL	TARY CUTOFF ROAD) TO US 1	7 IN WILMINGTON	GROUND WTR (f
ORING NO. NW10-11	<b>STATION</b> 109+98	OFFSET 76 ft RT	ALIGNMENT -L-	0 HR. NA
OLLAR ELEV. 42.4 ft	TOTAL DEPTH 20.0 ft	NORTHING 195,738	<b>EASTING</b> 2,353,776	24 HR. NN
RILL RIG/HAMMER EFF./DATE MID37		DRILL METHOD CF		J MER TYPE N/A
RILLER Stewart, R.	START DATE 01/21/15	COMP. DATE 01/21/15	SURFACE WATER DEPTH N/	
DDIVE	1 1		SORFACE WATER DEFTH IN	/A
	0.5ft 0 25 50	75 100 NO. MOI G	SOIL AND ROCK DES	
5		· · · · · ·	ELEV. (ft)  - 42.4 GROUND SURF - COASTAL PL - SOFT TO STIFF, SANDY	AIN
5 -			- - - - - - - - - -	11
5			- 30.4 MEDIUM DENSE TO DENS - LITTLE SILT 	Г
			<ul><li>22.4</li><li>Boring Terminated at Elev</li></ul>	vation 22.4 ft In
			Medium Dense S	Sand



### SHEET NO. 1 OF 3 40191 (U-4751) NEW HANOVER COUNTY

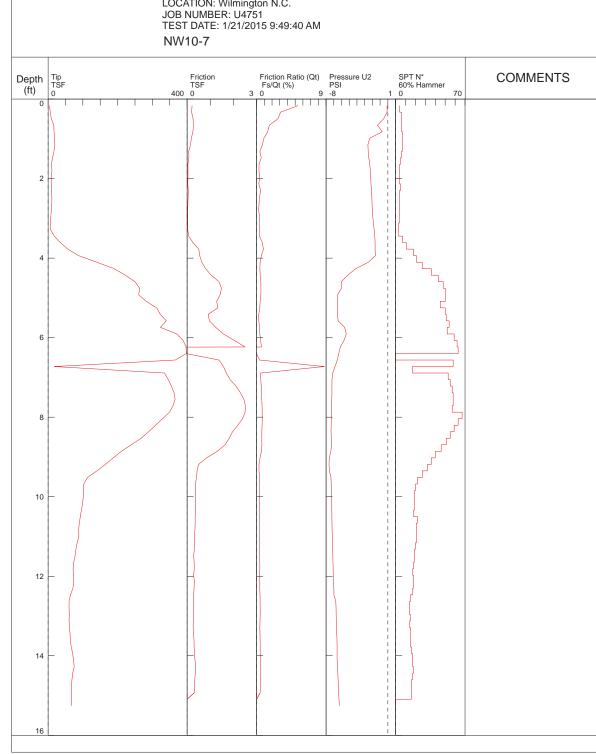


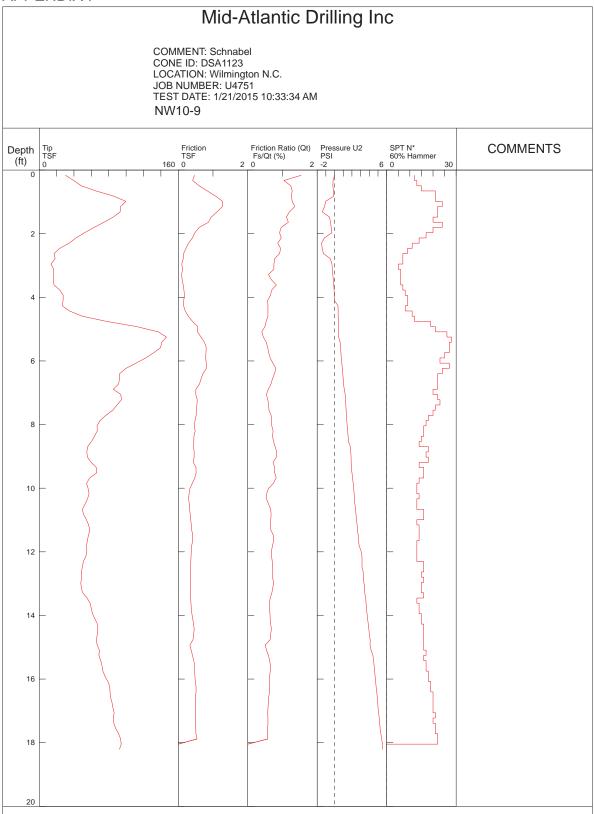


### SHEET NO. 2 OF 3 40191 (U-4751) **NEW HANOVER COUNTY**



COMMENT: Schnabel CONE ID: DSA1123 LOCATION: Wilmington N.C. JOB NUMBER: U4751 TEST DATE: 1/21/2015 9:49:40 AM





### SHEET NO. 3 OF 3 40191 (U-4751) NEW HANOVER COUNTY

### Mid-Atlantic Drilling Inc

COMMENT: Schnabel
CONE ID: DSA1123
LOCATION: Wilmington N.C.
JOB NUMBER: U4751
TEST DATE: 1/21/2015 10:49:11 AM

	JOB TEST	ATION: Wilmingt NUMBER: U475 DATE: 1/21/20 10-11	51	I		
Depth (ft)	120	Friction TSF 0 1	Friction Ratio (Qt) Fs/Qt (%) 0 6	Pressure U2 PSI -3 6	SPT N* 60% Hammer 0 25	COMMENTS
10 -						
25				<u>l</u>		

475 REFERENCE

40191

STATE OF NORTH CAROLINA

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

#### **CONTENTS**

SHEET NO. **DESCRIPTION** TITLE SHEET LEGEND 3-4 SITE PLAN PROFILE APPENDIX A - CPT LOGS

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY NEW HANOVER PROJECT DESCRIPTION SR 1409 (MILITARY CUT-OFF ROAD) TO US 17 IN WILMINGTON

SITE DESCRIPTION NOISE WALL NO. 11 AT -L-STA. 113 + 00, LEFT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAI SHEET
N.C.	U-4751	1	14

#### **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 1999 707-6805. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

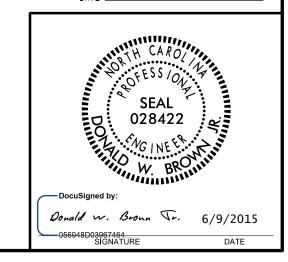
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MEDICATED REPORTATIONS AND AS RECORDED AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATIONS AND ASSOCIATION AND ASSOCIATION ASSOCIATIONS AND ASSOCIATION ASSOCIATION ASSOCIATION AND ASSOCIATION 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 CUARANTEE 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 SATISTY 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.

- ES:
  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** J. MUESSEN, EI MID-ATLANTIC A. FOWLER M. WIGGINS M. LOOGAN

INVESTIGATED BY \_\_D. BROWN, PE DRAWN BY \_\_D. BROWN, PE CHECKED BY E. MAYR, PE SUBMITTED BY D. BROWN, PE 



PROJECT REFERENCE NO. SHEET NO.

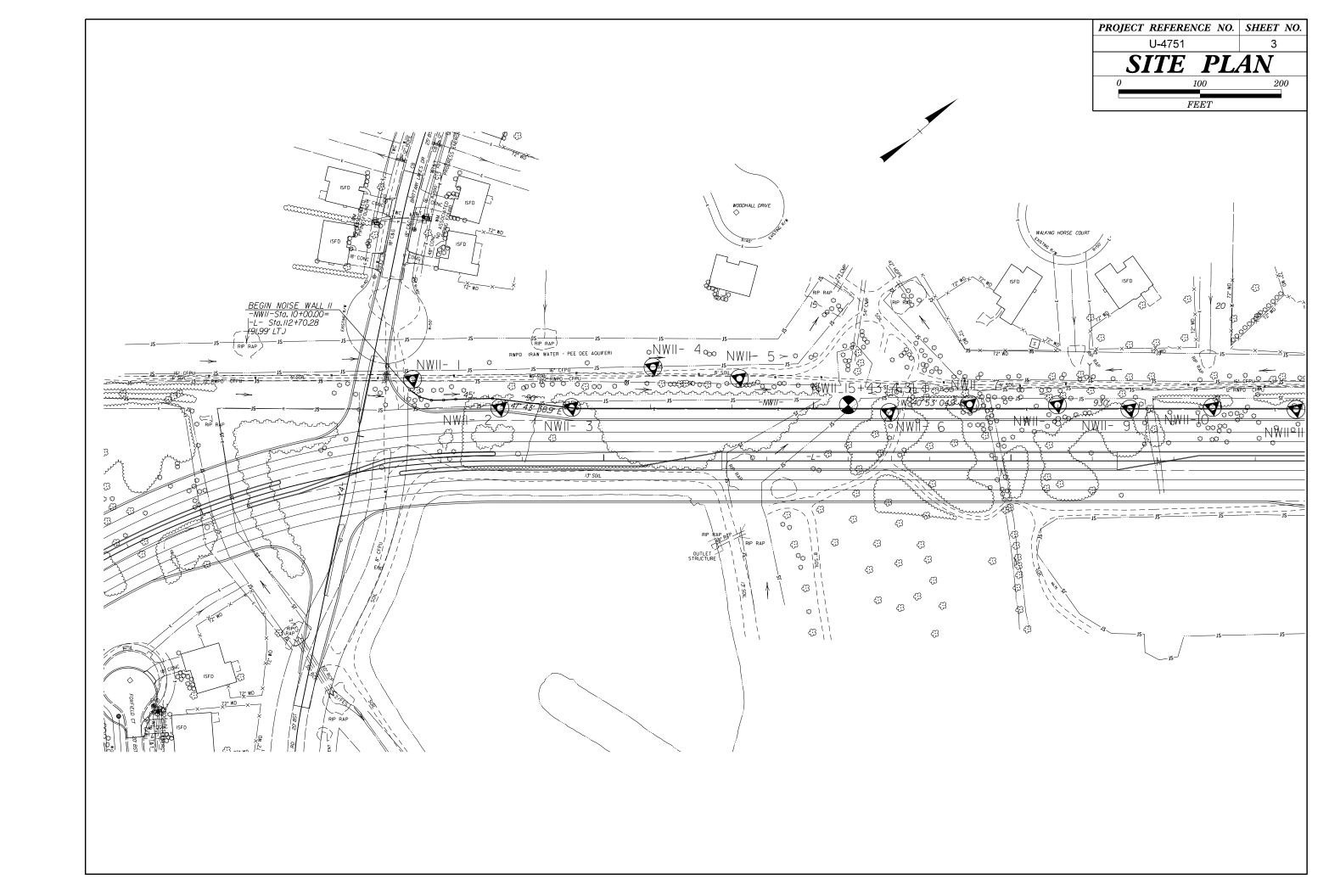
U-4751
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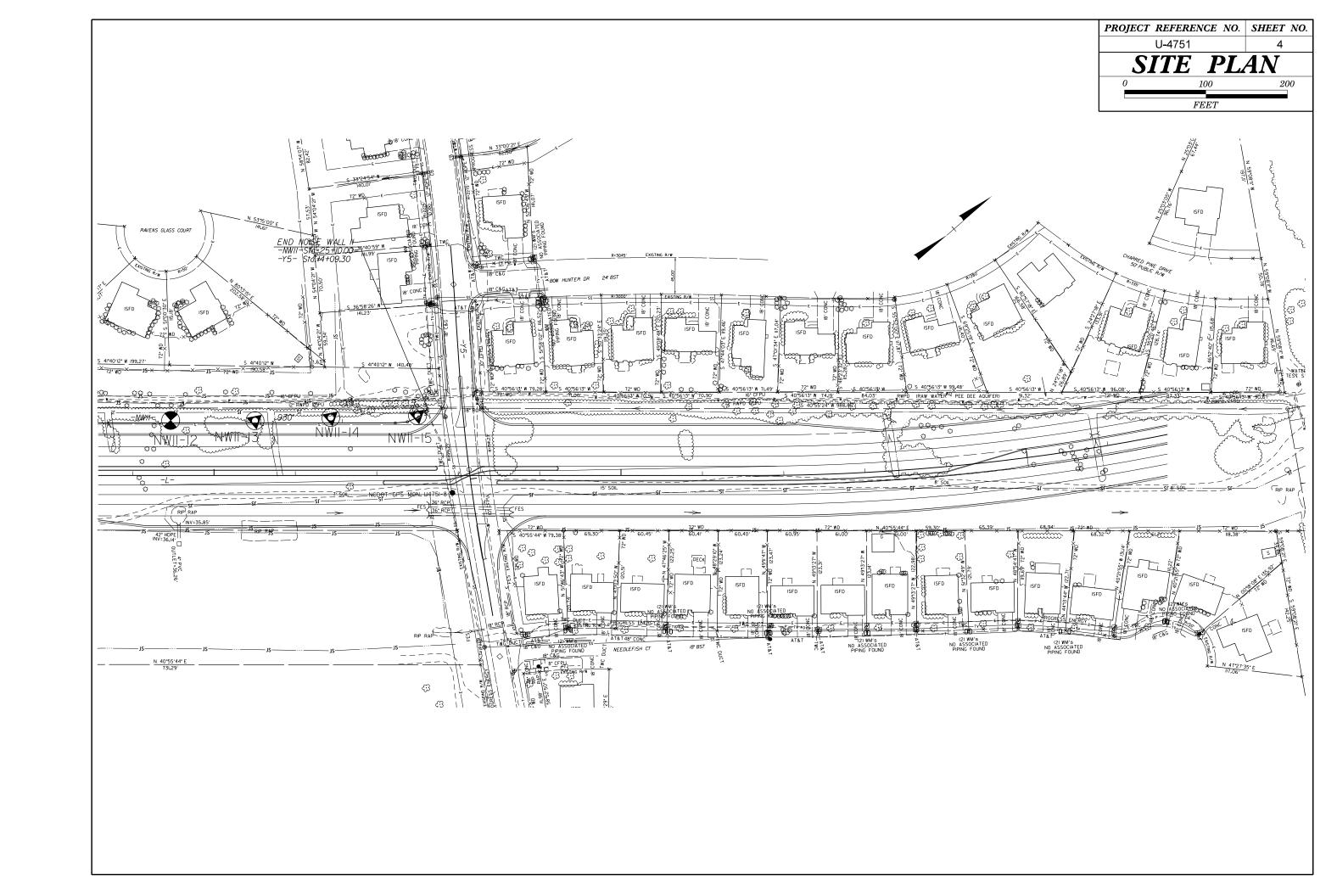
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

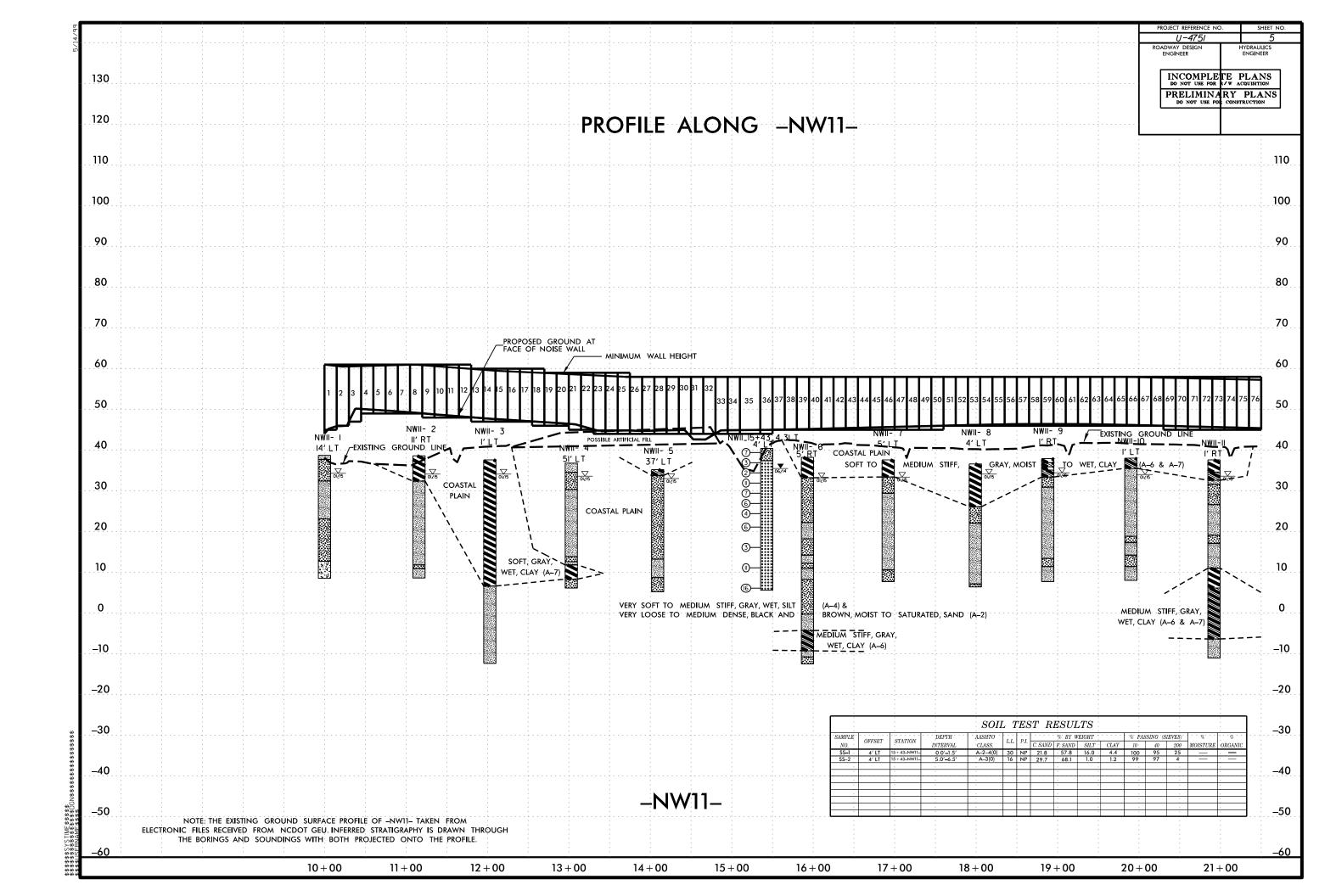
## SUBSURFACE INVESTIGATION

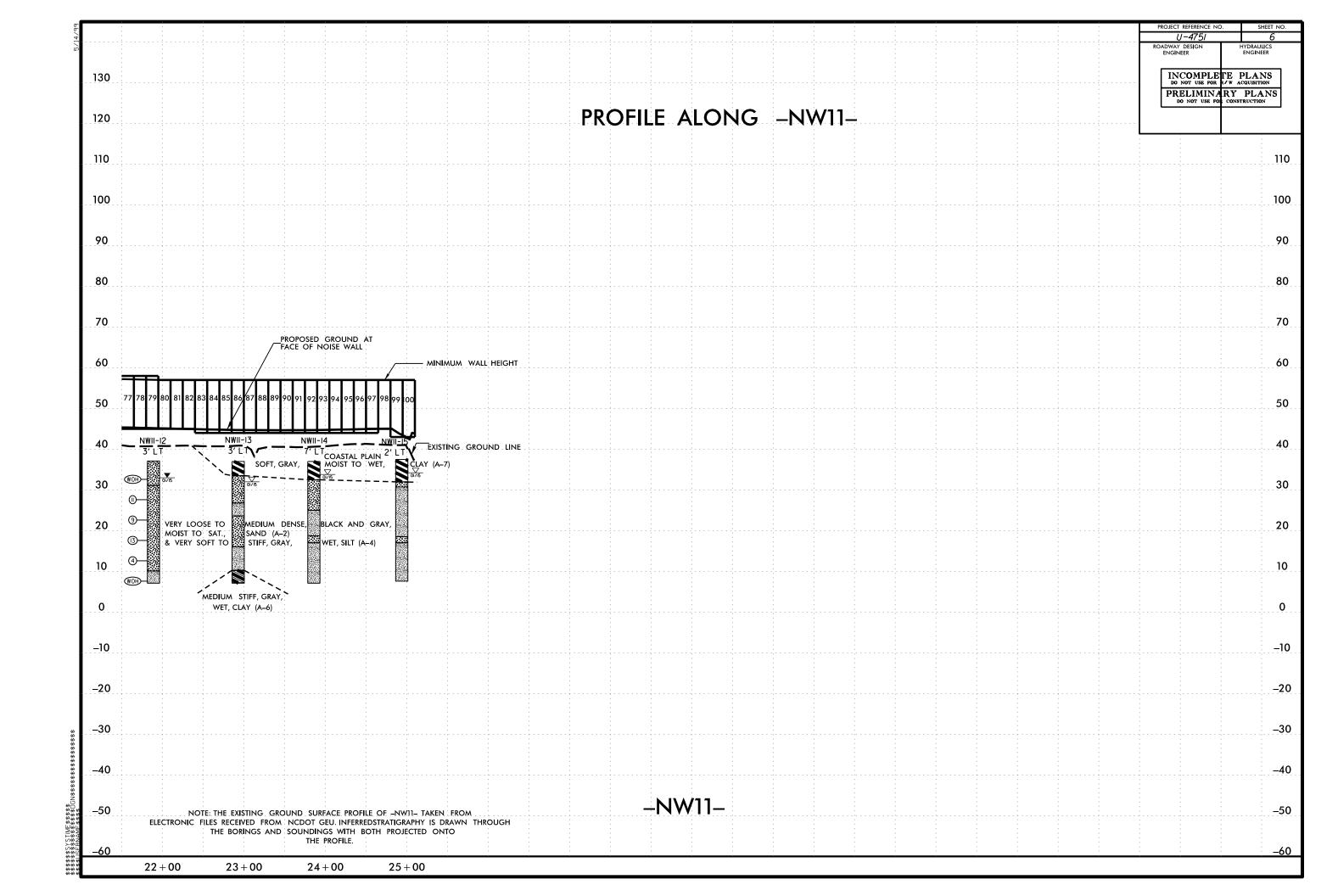
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

The part of the				
The content of the	SOIL DESCRIPTION	GRADATION		TERMS AND DEFINITIONS
Application   Company	BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT		ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	
The content of the			BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	
### Company of the Co				
The content of the			201720172	
## 1.00   1.00			ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - CROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
April			URISTALLINE WOULD VIELD OFF DEFICAL TE TESTED POOR TYPE INCLUDES CRANITE	
Control   Cont			GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
March			NON-CRYSTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
### SECOND CONTROL OF THE PROPERTY OF THE PROP	SYMBOL 000000000000000000000000000000000000		ROCK TIPE INCLUDES PHILLITE, SLATE, SANDSTONE, ETC.	
March   Marc				
Company   Comp	#40 20 MV E0 MV E1 MN			DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
Section   Process   Proc		ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL		
	PASSING #40			
Part   1	LL 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN 11 MN 11 MN 18 MX 18 MX 11 MN		(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 LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
Winter   Carlot   C	GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF CHICANIL	GROUND WATER		FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
Part   March	USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER			
The content of the		▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
## 3 TO SHAPE IN LANGE OF HEAD OF SHAPE		<u> </u>		
MINISTER   SOUTH   S	AS SUBLIKALE PUUK	SPRING OR SEEP		
March   Marc		MISCELL ANEOUS SYMBOLS		
Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Constitute   Virgin   Virgin   Constitute   Virgin   Virgin   Constitute   Virgin   Virgin   Constitute   Virgin   Virgin   Constitute   Virgin   V	PANCE OF CTANDARD PANCE OF UNICONSTINED	т.	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
Part   1	PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH			LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
## ## ## ## ## ## ## ## ## ## ## ## ##	VEDY LODGE / A	SUPPE INDICATOR	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	
## AND DESCRIPTION OF STATE AND ADDRESS OF STATE AN	GRANIII AP LOOSE 4 TO 10			MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
Column   C	MATERIAL (MDN-COHESIVE) DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST		USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
Section   Process   Control   Cont	VERT DENSE > 5 W			PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
STATE OF   10   10   10   10   10   10   10   1		Y		
Part				ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
RECOMMENDATION STREET	(COHESIVE) VERY STIFF 15 TO 30 2 TO 4			ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
TEACHER OF CHINA SIZE		INSTALLATION -	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
BOLLET CORREL TO SHAPE STATE OF THE PROJECT OF THE				
Supplier   Code   Cod		EXCAVATION UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE		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
SOIL MOSTURE - CORRELATION OF TERMS   SOLD AND STREET   SOUTH FEMALES   SOLD AND STREET   SOUTH FEMALES   SOLD AND STREET   SOLD AND STR	COARSE FINE	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL		
MAY 10   10   10   10   10   10   10   10	(BLDB.) (CDB.) (CB.) SANU SANU (SL.) (CL.)			SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE - CORRELATION OF TERMS  SOIL MOISTURE COVER.  SOIL MOISTUR				
SOL MOISTURE - CORREL ATION OF TERMS  SOL MOISTURE - CORREL ATION OF TERMS  SOL MOISTURE - CORREL ATION OF TERMS  SOL MOISTURE - CORREL ATION OF TERMS  SOL MOISTURE - CORREL ATION OF TERMS  SOL MOISTURE - CORREL ATION OF TERMS  UNDER PRIED MOISTURE DESCRIPTION  UNDER PRIED MOISTURE DESCRIPTION  UNDER PRIED MOISTURE DESCRIPTION  UNDER PRIED MOISTURE DESCRIPTION  SOL MOISTURE - CORREL BEST OF THE CROWN WATER TRANS.  SOL MOISTURE - CORREL BEST OF THE CROWN WATER TRANS.  L LIDUID LIMIT  FROM BELOW THE GROUN WATER TRANS.  SEMSOLID REQUIRES DRIVING TO  ATTAIN OF THEM MOISTURE  S. SEMSOLID REQUIRES DRIVING TO  ATTAIN OF THEM MOISTURE  S. SEMSOLID REQUIRES DRIVING TO  ATTAIN OF THEM MOISTURE  S. SEMSOLID REQUIRES DRIVING TO  ATTAIN OF THEM MOISTURE  S. SEMSOLID REQUIRES DRIVING TO  ATTAIN OF THEM MOISTURE  S. SEMSOLID REQUIRES DRIVING TO  ATTAIN OF THE REPORT OF THE CROWN MICH MOISTURE  S. SEMSOLID REQUIRES DRIVING TO  ATTAIN OF THE REPORT OF THE CROWN MICH MOISTURE  S. SEMSOLID REQUIRES DRIVING TO  ATTAIN OF THE REPORT OF THE CROWN MICH MOISTURE  S. SEMSOLID REQUIRES DRIVING TO  ATTAIN OF THE REPORT OF THE CROWN MICH MOISTURE  S. SEMSOLID REQUIRES DRIVING TO  SEMSO		BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED		A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
OSL MOISTURE SALE FILL MOISTURE SALE FILL MOISTURE DESCRIPTION OF PIECE MOISTURE DESCRIPTION OF PIECE SCANE OF	SOIL MOISTURE - CORRELATION OF TERMS			
SETURN DESCRIPTION  - Seturn England water 1-able  - Seturn En	SOIL MOISTURE SCALE FIELD MOISTURE CHIEF OF SCRIPTION	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
SATURNITED - USUALLY LIDUID VERY MET, USUALLY FORD VERY MET, USUALLY FORD WATER TABLE    SCAT J FIRM BELOW THE GROUND WATER TABLE    FORD FIRM MOISTURE OF PLASTICITY    ON OPTIMUM MOISTURE SHRING FIRM MOISTURE SHRING FI	(ATTEMBERG LIMITS) DESCRIPTION			
LL LIDUID LIMIT  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SEMSOL(D) REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE  - WET - (v) SOL(D) AT OR NEAR OPTIMUM MOISTURE  - WIST - (v) SOL(D) AT OR NEAR OPTIMUM MOISTURE  - WET - (v) SOL(D) AT OR NEAR OPTIMUM MOISTURE  - WIST - (v) SOL(D) AT OR NEAR OPTIMUM MOISTURE  - WET - (v) SOL(D		e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	
RACE - WET - (N) SEMSOLID, REQUIRES GRYING TO ATTAIN OPTIMUM MOISTURE - WET - (N) SEMSOLID, REQUIRES GRYING TO ATTAIN OPTIMUM MOISTURE - WET - (N) SEMSOLID, REQUIRES GRYING TO ATTAIN OPTIMUM MOISTURE - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WED - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WED - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM MOISTURE - SHRINKAGE LIMIT - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMUM - WET - (N) SOLID, AT OR NEAR OPTIMU	LL LIQUID LIMIT			
HI. HIGHLY V - VERY BATIO TERM SECUND WAS SECUND SUBJECT PROJECT VERY MODE ATTAIN POTIMUM MOISTURE SL. SHEW ATTAIN POTIMUM MOISTURE	BANGE / SEMISULID; REQUIRES DRYING TO			
OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT - MOIST - MO SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT: - MOIST - MO SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT: - MOIST	(PI) PL _ PLASTIC LIMIT		TERM SPACING TERM THICKNESS	
ONL OF IMM MOISTINE SHRINKAGE LIMIT  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTINE  - CORE SIZE:  - DRY - (D) - MAD FACED FINGER BITS  - DRY - (D) - MAD FACED FINGER BITS  - DRY - (D) - MAD FACED FINGER BITS  - DRY - (D) - MAD FACED FINGER BITS  - DRY - (D) - MAD FACED FINGER BITS  - DRY - (D) - MAD FACED FINGER BITS  - DRY - (D) - MODERATELY LOSE  - LESS THAN 0.16 FEET - THINLY LAWINATED - CORE SIZE: - DRY - (LOSE - LESS THAN 0.16 FEET - THINLY LAWINATED - CORE SIZE: - DRY - (LOSE - MEDIUM - LOSE SIZE: - DRY - (LOSE - MEDIUM - LOSE SIZE: - DRY - (LOSE - MODERATELY CLOSE - LESS THAN 0.16 FEET - THINLY LAWINATED - CORE SIZE: - DRY - (LOSE - MODERATELY CLOSE - LESS THAN 0.16 FEET - THINLY LAWINATED - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE SIZE: - DRY - CORE S	- MOTOT - (M) COLID. AT OR NEAR ORTIMIN MOTOTURE			ELEVATION: 45.01 FEET
REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ALLOW ADVANCE THINK OF ATTAIN OPTIMUM MOISTURE  - DRY - (D)  REQUIRES ADDITIONAL WATER TO ALLOW ADVANCE THINK OF A TEACH OF A MANUAL CLOSE  - B - HAD FACED FINGER BITS  - N - HAD FACED FINGER BITS  - N - HAD FACED FINGER BITS  - N - HAD FACED FINGER BITS  - N - N - HAD FORMED BY THE NCDOT  FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  - N - HAD FACED FINGER BITS  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  - N - HAD TOOLS:  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  - N - HAD TOOLS:  - PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT  - N - HAD TOOLS:  - N - HAD TOOLS:  - N - HAD TOOLS:  - N - HAD TOOLS:  -	OM OPTIMOM MOISTORE		MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTES:
PLASTICITY  PLASTICITY INDEX (PI) DRY STRENGTH  NON PLASTIC  NON PLASTIC  SLIGHT  SLIGHT  PLASTIC  O-5  VERY LOW  SLIGHT  MODERATELY PLASTIC  O-5  MEDIUM  MODERATELY PLASTIC  O-6  O-7  MEDIUM  MODERATELY PLASTIC  O-7  MEDIUM  MODERATELY PLASTIC  O-8  MEDIUM  MODERATELY PLASTIC  O-9  MEDIUM  MODERATELY PLASTIC  O-9  MEDIUM  MODERATELY PLASTIC  O-9  MEDIUM  MODERATELY PLASTIC  O-9  MEDIUM  MODERATELY PLASTIC  O-9  MEDIUM  MODERATELY INDURATED  ORAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;  BREAKS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;  MODERATELY INDURATED  ORAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;  BREAKS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;  ORAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;  OVER SAMPLE WITH SAMPLE WITH STEEL PROBE;  OVER SAMPLE WITH SAMPLE WITH STEEL PROBE;  OVER SAMPLE WITH SAMPLE WITH STEEL PROBE;  OVER SAMPLE WITH SAMPLE WITH STEEL PROBE;  OVER SAMPLE WITH SAMPLE WITH SAMPLE WITH STEEL PROBE;  OVER SAMPLE WITH SAMPLE WITH SA	REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	
PLASTICITY  POST ABLE HAND TOOLS:  PLASTICITY  POST ABLE HAND TOOLS:  PLASTICITY  POST ABLE HAND TOOLS:  PLASTICITY  POST ABLE HAND TOOLS:  PLASTICITY  POST ABLE HAND TOOLS:  PLASTICITY  POST ABLE HAND TOOLS:  POST ABLE HAND TOOLS  POST ABLE HAND TOOLS  POST ABLE HAND TOOLS  POST ABLE HAN	ATTAIN OPTIMUM MOISTURE	CME-55	THINLY LAMINATED < 0.008 FEET	│ PREVIOUS INVESTIGATION PERFORMED BY THE NCOOT ├─ GEU IN JUNE 2014.
NON PLASTIC SLIGHTLY PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC MODERATELY PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC SLIGHTLY PLASTIC SLIGH	PLASTICITY			-
SLIGHTLY PLASTIC  SLIGHT  SLIGHT  VANE SHEAR TEST  VANE S		U - N	RUBRING WITH FINGER ERES NUMBEROUS CRAINS.	•
HIGHLY PLASTIC 26 OR MORE HIGH PORTABLE HOIST X TRICONE 2 15/6* STEEL TEETH HAND AUGER  COLOR  DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).  MODIFIERS SUCH AS LIGHT DARK STREAKED FTC ARE USED TO DESCRIBE APPEABANCE.  VANE SHEAR TEST  POST HOLE DIGGER MODERATELY INDURATED BREAK SEASILY WHEN HIT WITH HAMMER.  SOUNDING ROD INDURATED SHARP LIGHT DARK STREAKED FTC ARE USED TO DESCRIBE APPEABANCE.  SOUNDING ROD SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST   □ □   HAND TOOLS•		
COLOR    Stream End of the Color of Col				
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).    VANC SHEAR TEST   CORE BIT   CORE BIT   CORE BIT   SUDDINGEROUS   CORE BIT   CORE B		HAID HOUER	BREAKS EASILY WHEN HIT WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).  WONDELERS SUCH AS LIGHT DARK STREAMED FTC ARE USED TO DESCRIBE APPEARANCE.  SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;		X   DIEDRICH D-25		
		CORE BIT VANE SHEAR TEST	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
SAMPLE BREAKS ACROSS GRAINS.	1610 30011 A3 E10111, DAINS, STILENED, E10. HRE USED 10 DESCRIBE HEFEHRHNUE.	X HOG. IOT CPT	SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14





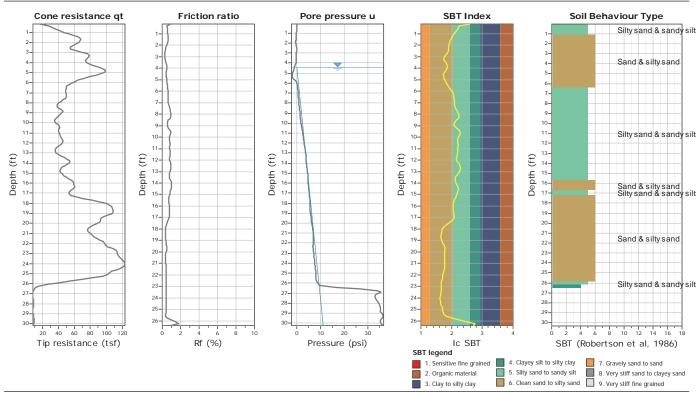




		PROJECT REFERENCE NO.	prinom
			SHEET NO.
		U-4751	7
	APPENDIX A		
	APPENDIX A CPT LOGS		
	CPI LUGS		
		— DB N	MAY 2015
I		INITIALS	DATE



Total depth: 30.18 ft, Date: 1/7/2015 Cone Type: Hogentogler 10 Ton Cone Operator: Mid-Atlantic Drilling

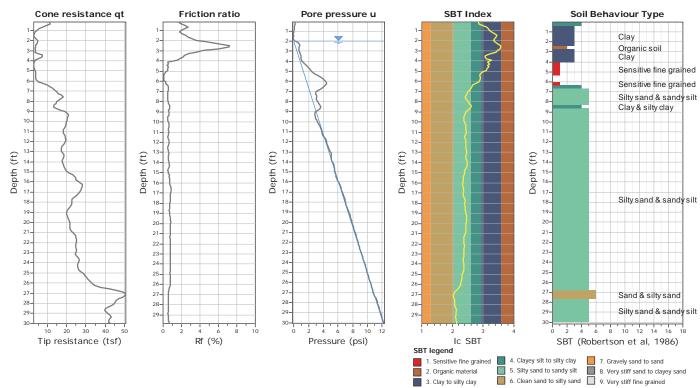


CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:40 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Logs\U-4751\_GEO\_SWAL11\_CPT.cpt

#### SHEET 8



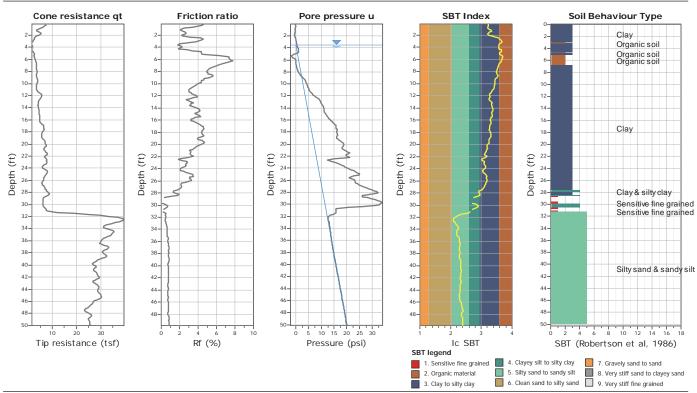
CPT: NW11- 2
Total depth: 30.02 ft, Date: 1/7/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:40 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Log\U-4751\_GEO\_SWAL11\_CPT.cpt



CPT: NW11- 3
Total depth: 50.03 ft, Date: 1/7/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling

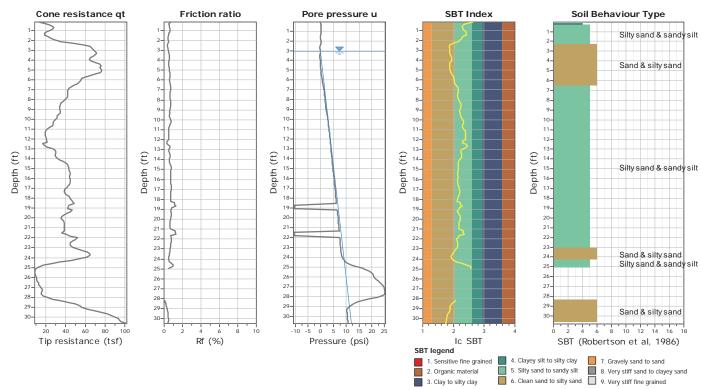


CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:40 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Logs\U-4751\_GEO\_SWAL11\_CPT.cpt

#### SHEET 9



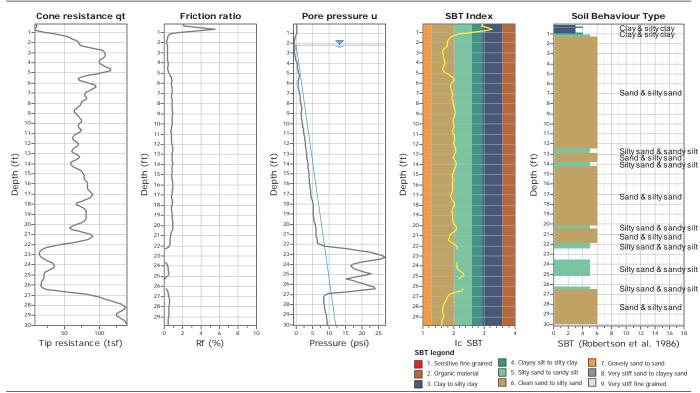
# CPT: NW11- 4 Total depth: 30.68 ft, Date: 1/7/2015 Cone Type: Hogentogler 10 Ton Cone Operator: Mid-Atlantic Drilling



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CPT: NW11- 5
Total depth: 30.02 ft, Date: 1/7/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling

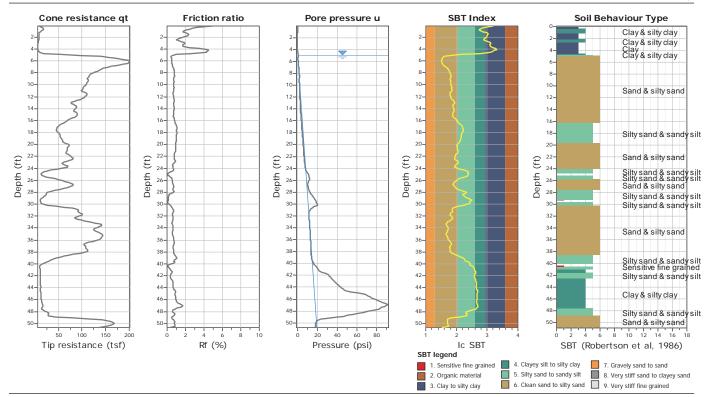


CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:41 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Logs\U-4751\_GEO\_SWAL11\_CPT.cpt

SHEET 10



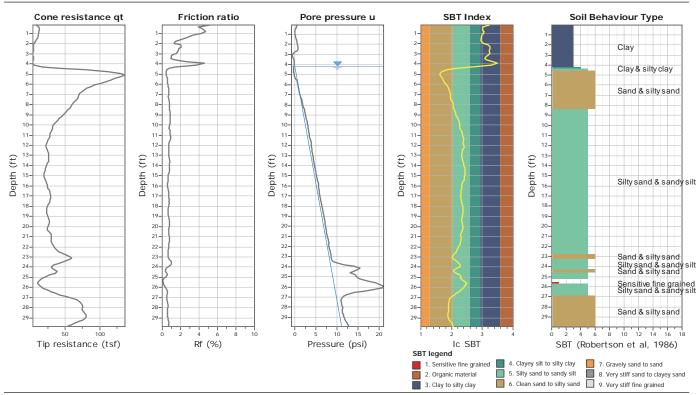
# CPT: NW11- 6 Total depth: 50.69 ft, Date: 1/6/2015 Cone Type: Hogentogler 10 Ton Cone Operator: Mid-Atlantic Drilling



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CPT: NW11- 7
Total depth: 29.86 ft, Date: 1/6/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling

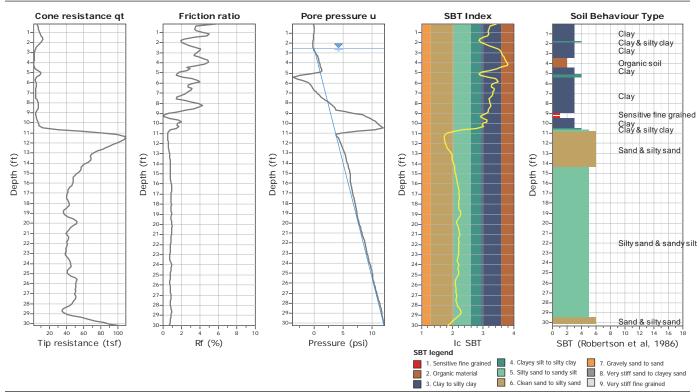


CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:41 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Logs\U-4751\_GEO\_SWAL11\_CPT.cpt

#### SHEET 11



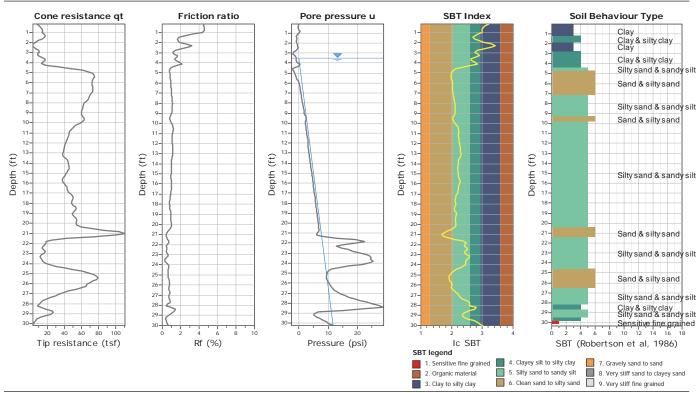
# CPT: NW11- 8 Total depth: 30.18 ft, Date: 1/6/2015 Cone Type: Hogentogler 10 Ton Cone Operator: Mid-Atlantic Drilling



CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:41 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Logs\U-4751\_GEO\_SWAL11\_CPT.cpt



Total depth: 30.18 ft, Date: 1/6/2015 Cone Type: Hogentogler 10 Ton Cone Operator: Mid-Atlantic Drilling



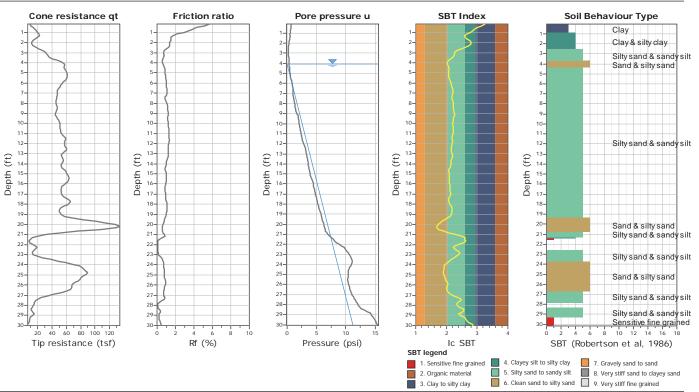
CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:42 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Logs\U-4751\_GEO\_SWAL11\_CPT.cpt

SHEET 12



## **CPT: NW11-10**Total depth: 30.02 ft, Date: 1/6/2015

Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling

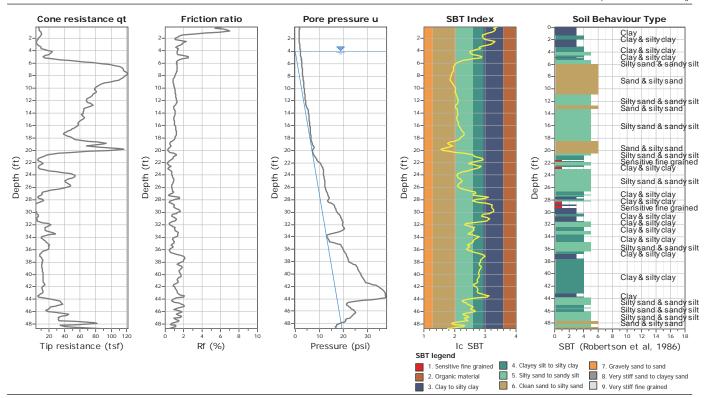


CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:42 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Logs\U-4751\_GEO\_SWAL11\_CPT.cpt

1



Total depth: 48.72 ft, Date: 1/6/2015 Cone Type: Hogentogler 10 Ton Cone Operator: Mid-Atlantic Drilling

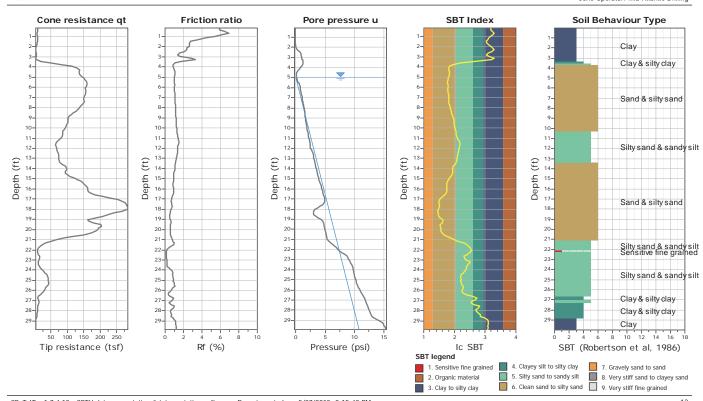


CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:42 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Logs\U-4751\_GEO\_SWAL11\_CPT.cpt

SHEET 13



# CPT: NW11-13 Total depth: 29.86 ft, Date: 1/6/2015 Cone Type: Hogentogler 10 Ton Cone Operator: Mid-Atlantic Drilling

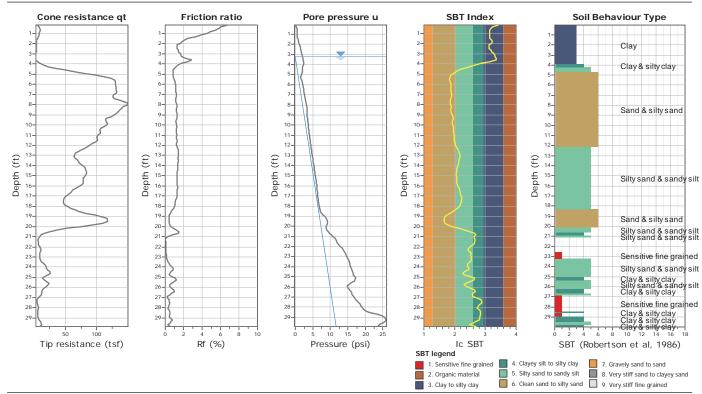


CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:42 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Logs\U-4751\_GEO\_SWAL11\_CPT.cpt

12



Total depth: 29.86 ft, Date: 1/6/2015 Cone Type: Hogentogler 10 Ton Cone Operator: Mid-Atlantic Drilling

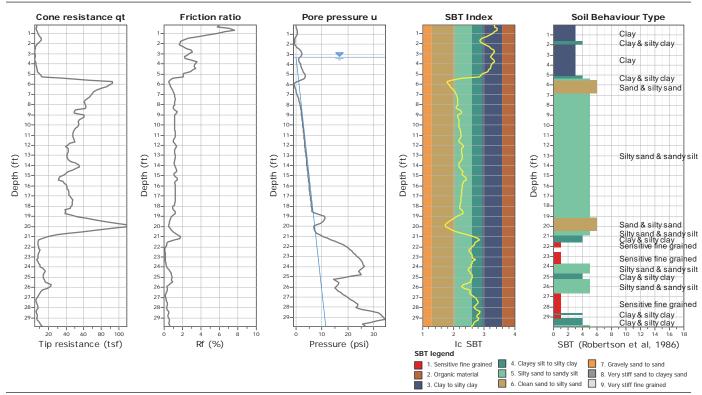


CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:43 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Logs\U-4751\_GEO\_SWAL11\_CPT.cpt

SHEET 14



# CPT: NW11-15 Total depth: 29.86 ft, Date: 1/6/2015 Cone Type: Hogentogler 10 Ton Cone Operator: Mid-Atlantic Drilling



CPeT-IT v.1.7.4.13 - CPTU data presentation & interpretation software - Report created on: 5/27/2015, 2:15:43 PM Project file: G:\PROJECTS\2014\F14020.01 U-4751 Sound Wall 11\05 - Logs\U-4751\_GEO\_SWAL11\_CPT.cpt

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