

REFERENCE: U-4751

PROJECT: 40191

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

**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

**CONTENTS**

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-7	BORE LOG REPORTS
8	SITE PHOTOGRAPHS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4751	1	8

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

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

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

PERSONNEL

D. Racey

D. Tignor

W. Shenberger

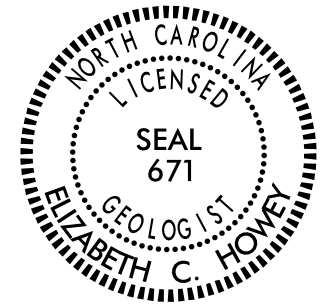
INVESTIGATED BY F&R, Inc.

DRAWN BY D. Racey

CHECKED BY B. Howey, PG, PE

SUBMITTED BY HDR, Inc.

DATE April 2015



DocuSigned by:  
Elizabeth C. Howey 6/25/2015

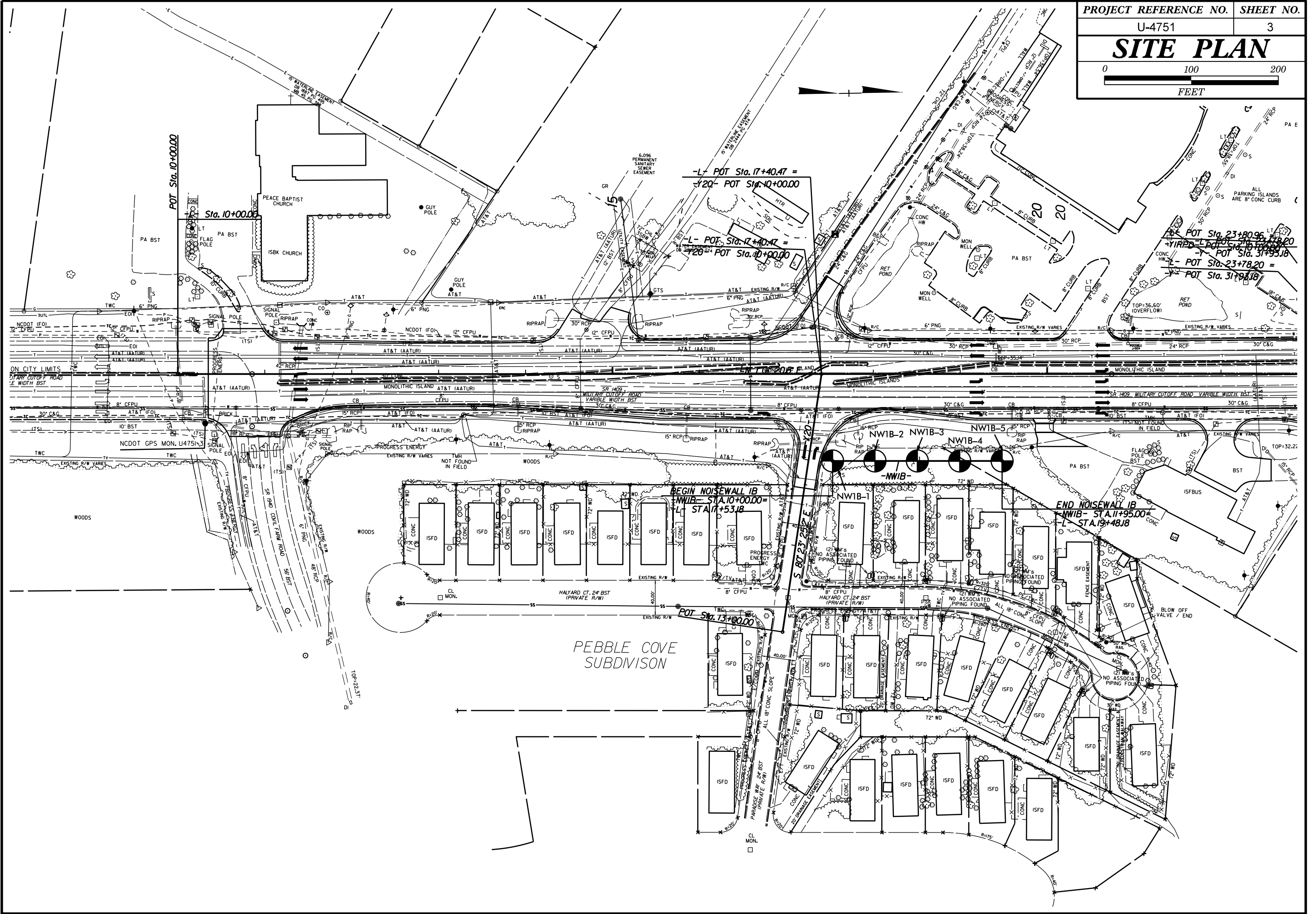
F80E69082 SIGNATURE DATE

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

## SUBSURFACE INVESTIGATION

### SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION			GRADATION			ROCK DESCRIPTION			TERMS AND DEFINITIONS																																			
<p>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 (ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</p>			<p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORMLY GRADED</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>			<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>			<p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - 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. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM.)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (RQD)</b> - 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. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - 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. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SRQD)</b> - 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. <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																			
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>			<b>ANGULARITY OF GRAINS</b>			<b>WEATHERED ROCK (WR)</b>			<b>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</b>																																			
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<p><b>GROUND WATER</b></p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p> STATIC WATER LEVEL AFTER 24 HOURS</p> <p> PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p> SPRING OR SEEP</p>			<b>COMPRESSION</b>			<b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>			<b>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</b>																																			
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<p><b>SOIL MOISTURE - CORRELATION OF TERMS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PLASTIC RANGE (PI)</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table>			SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	<b>RECOMMENDATION SYMBOLS</b>			<b>ROCK HARDNESS</b>			<b>MEDIUM HARD</b>																				
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<p><b>PLASTICITY</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NON PLASTIC</th> <th>SLIGHTLY PLASTIC</th> <th>MODERATELY PLASTIC</th> <th>HIGHLY PLASTIC</th> </tr> <tr> <td>0-5</td> <td>6-15</td> <td>16-25</td> <td>26 OR MORE</td> </tr> <tr> <th>VERY LOW</th> <th>LOW</th> <th>MEDIUM</th> <th>HIGH</th> </tr> <tr> <td>VERY LOW</td> <td>LOW</td> <td>MEDIUM</td> <td>HIGH</td> </tr> </table>			NON PLASTIC	SLIGHTLY PLASTIC	MODERATELY PLASTIC	HIGHLY PLASTIC	0-5	6-15	16-25	26 OR MORE	VERY LOW	LOW	MEDIUM	HIGH	VERY LOW	LOW	MEDIUM	HIGH	<p> UNDERCUT EXCAVATION</p> <p> SHALLOW UNDERCUT</p> <p> UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p> <p> UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>			<p>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.</p> <p>MEDIUM HARD CAN BE GROUDED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p> <p>SOFT CAN BE GROUDED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.</p> <p>VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>																						
NON PLASTIC	SLIGHTLY PLASTIC	MODERATELY PLASTIC	HIGHLY PLASTIC																																									
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<p><b>COLOR</b></p> <p>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.</p>			<b>ABBREVIATIONS</b>			<b>VERY HARD</b>			<b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</b>																																			
<p><b>EQUIPMENT USED ON SUBJECT PROJECT</b></p> <p>DRILL UNITS:</p> <p><input type="checkbox"/> CME-45C</p> <p><input checked="" type="checkbox"/> CME-55</p> <p><input type="checkbox"/> CME-550</p> <p><input type="checkbox"/> VANE SHEAR TEST</p> <p><input type="checkbox"/> PORTABLE HOIST</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>			<p>ADVANCING TOOLS:</p> <p><input type="checkbox"/> CLAY BITS</p> <p><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</p> <p><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</p> <p><input type="checkbox"/> HARD FACED FINGER BITS</p> <p><input type="checkbox"/> TUNG-CARBIDE INSERTS</p> <p><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</p> <p><input type="checkbox"/> TRICONE <input type="checkbox"/> *STEEL TEETH</p> <p><input type="checkbox"/> TRICONE <input type="checkbox"/> *TUNG-CARB.</p> <p><input type="checkbox"/> CORE BIT</p> <p><input checked="" type="checkbox"/> 2 1/8" *DRAG BIT</p>			<p>HAMMER TYPE:</p> <p><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE:</p> <p><input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N</p> <p>HAND TOOLS:</p> <p><input type="checkbox"/> POST HOLE DIGGER</p> <p><input type="checkbox"/> HAND AUGER</p> <p><input type="checkbox"/> SOUNDING ROD</p> <p><input type="checkbox"/> VANE SHEAR TEST</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>			<p>VERY HARD</p> <p>HARD</p> <p>MODERATELY HARD</p> <p>MEDIUM HARD</p> <p>SOFT</p> <p>VERY SOFT</p>			<p><b>FRACTURE SPACING</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>			TERM	SPACING	VERY WIDE	MORE THAN 10 FEET	WIDE	3 TO 10 FEET	MODERATELY CLOSE	1 TO 3 FEET	CLOSE	0.16 TO 1 FOOT	VERY CLOSE	LESS THAN 0.16 FEET	<p><b>BEDDING</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>&lt; 0.008 FEET</td> </tr> </table>			TERM	THICKNESS	VERY THICKLY BEDDED	4 FEET	THICKLY BEDDED	1.5 - 4 FEET	THINLY BEDDED	0.16 - 1.5 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	THINLY LAMINATED	< 0.008 FEET	
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<p><b>INDURATION</b></p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>			<b>NOTE</b>			<b>DIKE - FILLED IMMEDIATELY AFTER DRILLING</b>			<b>FIAD - FILLED IMMEDIATELY AFTER DRILLING</b>																																			
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Sta. 10+00.00

-L- POT Sta. 17+40.47 =  
-Y2Q- POT Sta. 10+00.00

-L- POT Sta. 17+40.47 =  
-Y2Q- POT Sta. 10+00.00

POT Sta. 23+80.96  
YIPD - L - POT Sta. 10+00.00  
-Y POT Sta. 31+93.18  
-L- POT Sta. 23+78.20 =  
-Y POT Sta. 31+98.18

BEGIN NOISEWALL 1B  
-NWIB- STA. 10+00.00 =  
-L- STA. 17+53.18

END NOISEWALL 1B  
-NWIB- STA. 11+95.00 =  
-L- STA. 19+48.18

PEBBLE COVE  
SUBDIVISON

POT Sta. 13+80.00



**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 40191.1.2	TIP U-4751	COUNTY NEW HANOVER	GEOLOGIST D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Rd.) to US 17 in Wilmington - Noise Wall 1B			GROUND WTR (ft)
BORING NO. NW1B-1	STATION 10+00	OFFSET CL	ALIGNMENT -NW1B-
COLLAR ELEV. 30.8 ft	TOTAL DEPTH 25.0 ft	NORTHING 187,441	EASTING 2,354,747
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 01/17/2014		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER D. Tignor	START DATE 03/19/15	COMP. DATE 03/19/15	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
35															
30	30.8	0.0	3	3	5									30.8	GROUND SURFACE
														30.9	ROADWAY EMBANKMENT Black, silty fine SAND (A-2-4), with trace gravel.
25	27.3	3.5	3	1	10									26.2	COASTAL PLAIN Black & gray to brown, silty fine SAND (A-2-4), with trace organics (roots) at 3.5'
														23.8	Brown, fine sandy SILT (A-4), with trace organics (roots).
20	22.3	8.5	6	3	7									18.8	Red-brown, fine to coarse SAND (A-3), with trace silt.
														12.0	Gray-tan to gray, silty fine SAND (A-2-4), with sulphur odor from 13.5' to 15.0' and trace clay from 23.5' to 25.0'.
15	17.3	13.5	3	6	7										
10	12.3	18.5	6	6	5										
	7.3	23.5	WOH	WOH	1									5.8	Boring Terminated at Elevation 5.8 ft in SAND (COASTAL PLAIN)

WBS 40191.1.2	TIP U-4751	COUNTY NEW HANOVER	GEOLOGIST D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Rd.) to US 17 in Wilmington - Noise Wall 1B			GROUND WTR (ft)
BORING NO. NW1B-2	STATION 10+49	OFFSET CL	ALIGNMENT -NW1B-
COLLAR ELEV. 30.9 ft	TOTAL DEPTH 25.0 ft	NORTHING 187,490	EASTING 2,354,747
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 01/17/2014		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER D. Tignor	START DATE 03/19/15	COMP. DATE 03/19/15	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
35															
30	30.9	0.0	1	2	5									30.9	GROUND SURFACE
														29.9	COASTAL PLAIN Black & gray, silty fine SAND (A-2-4). Tan to black & gray, silty fine SAND (A-2-4), with trace clay from 1.0' to 1.5'.
25	27.4	3.5	5	3	6									23.9	Red-brown, fine to coarse SAND (A-3), with trace silt.
														7.0	
20	22.4	8.5	4	4	5									18.9	Gray-tan to gray, silty fine SAND (A-2-4), with sulphur odor from 13.5' to 15.0' and trace clay from 23.5' to 25.0'.
														12.0	
15	17.4	13.5	2	2	4										
10	12.4	18.5	8	11	12										
	7.4	23.5	WOR	WOR	2									5.9	Boring Terminated at Elevation 5.9 ft in SAND (COASTAL PLAIN)

NOTES:  
1) 0.0'-0.1' = Surficial Organic Soils

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 40191.1.2	TIP U-4751	COUNTY NEW HANOVER	GEOLOGIST D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Rd.) to US 17 in Wilmington - Noise Wall 1B			GROUND WTR (ft)
BORING NO. NW1B-3	STATION 10+98	OFFSET CL	ALIGNMENT -NW1B-
COLLAR ELEV. 32.0 ft	TOTAL DEPTH 25.0 ft	NORTHING 187,539	EASTING 2,354,748
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 01/17/2014		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER D. Tignor	START DATE 03/20/15	COMP. DATE 03/20/15	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
35																
	32.0	0.0												32.0	GROUND SURFACE	0.0
30	28.5	3.5	2	2	4							M		COASTAL PLAIN Black, gray, and tan, silty fine SAND (A-2-4), with trace organics (roots) from 3.5' to 5.0'.		
25	23.5	8.5	4	4	4							M				
20	18.5	13.5	3	4	3							Sat.		Red-brown, fine to coarse SAND (A-3) with trace silt.	7.0	
15	13.5	18.5	8	11	10							Sat.		Gray-tan to gray, silty fine SAND (A-2-4), with sulphur odor from 13.5' to 15.0' and some clay from 23.5' to 25.0'.	12.0	
10	8.5	23.5										Sat.				
			WOR	WOH	WOH							Sat.				

NOTES:  
 1) 0.0'-0.2' = Surficial Organic Soils  
 2) Filled immediately after drilling

WBS 40191.1.2	TIP U-4751	COUNTY NEW HANOVER	GEOLOGIST D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Rd.) to US 17 in Wilmington - Noise Wall 1B			GROUND WTR (ft)
BORING NO. NW1B-4	STATION 11+46	OFFSET CL	ALIGNMENT -NW1B-
COLLAR ELEV. 30.9 ft	TOTAL DEPTH 25.0 ft	NORTHING 187,587	EASTING 2,354,749
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 01/17/2014		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER D. Tignor	START DATE 03/20/15	COMP. DATE 03/20/15	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
35																
	30.9	0.0												30.9	GROUND SURFACE	0.0
30	27.4	3.5	1	4	3							M		COASTAL PLAIN Black & gray, silty fine SAND (A-2-4), with trace organics (roots) from 0.0' to 1.5'.		
25	22.4	8.5	2	2	4							M				
20	17.4	13.5	3	2	3							Sat.		Red-brown, fine to coarse SAND (A-3), with trace silt.	7.0	
15	12.4	18.5	1	0	2							Sat.		Gray-tan to gray, silty fine SAND (A-2-4), with sulphur odor from 13.5' to 15.0' and some clay from 23.5' to 25.0'.	12.0	
10	7.4	23.5	3	5	6							Sat.				
			WOH	WOH	WOH							Sat.				

NOTES:  
 1) 0.0'-0.4' = Surficial Organic Soils  
 2) Filled immediately after drilling



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 40191.1.2		TIP U-4751		COUNTY NEW HANOVER		GEOLOGIST D. Racey									
SITE DESCRIPTION SR 1409 (Military Cutoff Rd.) to US 17 in Wilmington - Noise Wall 1B							GROUND WTR (ft)								
BORING NO. NW1B-5		STATION 11+95		OFFSET CL		ALIGNMENT -NW1B-	0 HR. FIAD								
COLLAR ELEV. 32.1 ft		TOTAL DEPTH 25.0 ft		NORTHING 187,636		EASTING 2,354,750	24 HR. FIAD								
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 01/17/2014				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER D. Tignor		START DATE 03/20/15		COMP. DATE 03/20/15		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
35															
	32.1	0.0	WOH	1	3									32.1	0.0
30	28.6	3.5	1	1	4										
25	23.6	8.5	2	2	4										
20	18.6	13.5	5	5	5										
15	13.6	18.5	7	7	11									15.1	17.0
10	8.6	23.5	WOH	WOH	WOH									10.1	22.0
														7.1	25.0
<p>Boring Terminated at Elevation 7.1 ft in CLAY (COASTAL PLAIN)</p> <p>NOTES:            1) 0.0'-0.4' = Surficial Organic Soils            2) Filled immediately after drilling</p>															

NCDOT BORE DOUBLE U4751\_GEO\_SWAL1B.GPJ NC\_DOT.GDT 4/14/15

**SITE PHOTOGRAPHS**



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



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



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



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