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

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*

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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.

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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*

NORTH CAROLINA LICENSED SEAL 671 GEOLOGIST ELIZABETH C. HOWEY

DocuSigned by:
Elizabeth C. Howey 6/25/2015
F80E690821524F2...
SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
U-4751	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

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

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: N/A

ELEVATION: N/A FEET

NOTES:

BORING AND GROUND SURFACE ELEVATIONS OBTAINED FROM NCDOT-PROVIDED DTM FILE

FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-4751	3

SITE PLAN

0 100 200

FEET

PEACE BAPTIST CHURCH

ISBK CHURCH

PA BST

PA E

ALL PARKING ISLANDS ARE 8" CONC CURB

6,096 PERMANENT SANITARY SEWER EASEMENT

6' WATERLINE EASEMENT DB 2496 PG 344

POT Sta. 10+00.00

-L- Sta. 10+00.00

-L- POT Sta. 17+40.47 = -Y20- POT Sta. 10+00.00

-L- POT Sta. 17+40.47 = -Y20 POT Sta. 10+00.00

-L- POT Sta. 23+80.96 = -Y20 POT Sta. 16+78.20

-Y1RPD- POT Sta. 16+78.20 = -Y- POT Sta. 31+95.18

-L- POT Sta. 23+78.20 = -Y- POT Sta. 31+93.18

ON CITY LIMITS

SR 1409 MILITARY CUTOFF ROAD VARIABLE WIDTH BST

NCDOT GPS MON. U4751-3

SR 1940 COVIL FARM ROAD 56' BST

PROGRESS ENERGY EXISTING R/W VARIES

WOODS

TMH NOT FOUND IN FIELD

MONOLITHIC ISLAND

MONOLITHIC ISLANDS

RET POND

TOP=36.60' (OVERFLOW)

TOP=35.14

TOP=22.37'

TOP=32.22

BEGIN NOISEWALL IB -NW1B- STA.10+00.00= -L- STA.11+53.18

END NOISEWALL IB -NW1B- STA.11+95.00= -L- STA.19+48.18

-NW1B-

NW1B-1

NW1B-2

NW1B-3

NW1B-4

NW1B-5

(2) NM's NO ASSOCIATED PIPING FOUND

ISFD

ISFBUS

BLOW OFF VALVE / END

HALYARD CT. 24' BST (PRIVATE R/W)

PARADISE WAY 24' BST (PRIVATE R/W)

PEBBLE COVE SUBDIVISON

POT Sta. 13+00.00

CL MON.

20' DRAINAGE EASEMENT

FENCE EASEMENT

ALL 18" CONC SLOPE

S 80°23'25" E

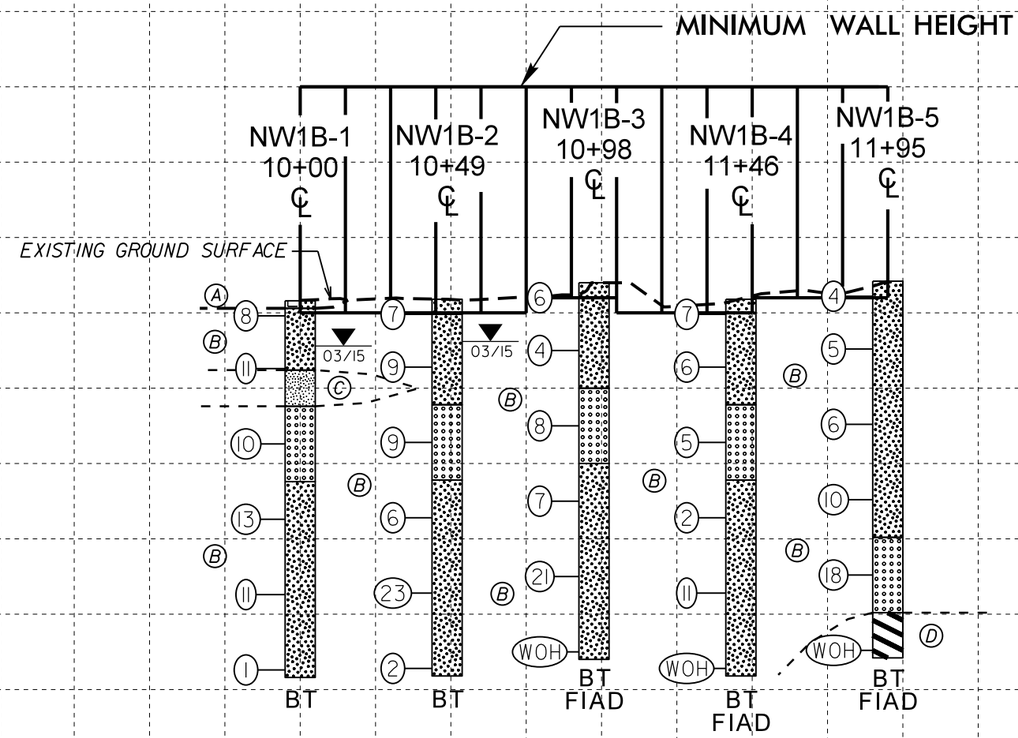
0	50	100

FEET

VE = 5

PROJECT REFERENCE NO.	SHEET NO.
U-4751	4

PROFILE ALONG –NW1B–



(A) Black, loose, silty fine SAND (A-2-4), moist **-ROADWAY EMBANKMENT-**

(B) Black, gray, tan & red-brown, very loose to medium dense, silty fine SAND (A-2-4) and fine to coarse SAND (A-3), moist to saturated **-COASTAL PLAIN-**

(C) Brown, stiff, fine sandy SILT (A-4), wet **-COASTAL PLAIN-**

(D) Gray, very soft, fine sandy CLAY (A-7-5), saturated **-COASTAL PLAIN-**

–NW1B– GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NC DEPARTMENT OF TRANSPORTATION, DATED 3/6/15. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

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-	**0 HR.** 3.6
COLLAR ELEV. 30.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 187,441	**EASTING** 2,354,747	**24 HR.** 3.0
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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
35										
30	30.8	0.0	3	3	5	8		M		30.8 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT 30.3 0.5
	27.3	3.5								Black, silty fine SAND (A-2-4), with trace gravel.
25			3	1	10	11		W		**COASTAL PLAIN** 26.2 4.6
										Black & gray to brown, silty fine SAND (A-2-4), with trace organics (roots) at 3.5'.
	22.3	8.5								23.8 7.0
20			6	3	7	10		Sat.		Brown, fine sandy SILT (A-4), with trace organics (roots).
										Red-brown, fine to coarse SAND (A-3), with trace silt.
	17.3	13.5								18.8 12.0
15			3	6	7	13		Sat.		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'.
	12.3	18.5								
10			6	6	5	11		Sat.		
	7.3	23.5	WOH	WOH	1	1		Sat.		5.8 25.0
										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-	**0 HR.** 3.5
COLLAR ELEV. 30.9 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 187,490	**EASTING** 2,354,747	**24 HR.** 2.8
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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
35										
30	30.9	0.0	1	2	5	7		M		30.9 GROUND SURFACE 0.0
										COASTAL PLAIN 29.9 1.0
	27.4	3.5								Black & gray, silty fine SAND (A-2-4).
25			5	3	6	9		M		Tan to black & gray, silty fine SAND (A-2-4), with trace clay from 1.0' to 1.5'.
										23.9 7.0
	22.4	8.5								Red-brown, fine to coarse SAND (A-3), with trace silt.
20			4	4	5	9		Sat.		
										18.9 12.0
	17.4	13.5								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			2	2	4	6		Sat.		
	12.4	18.5								
10			8	11	12	23		Sat.		
	7.4	23.5	WOR	WOR	2	2		Sat.		5.9 25.0
										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-	**0 HR.** FIAD
COLLAR ELEV. 32.0 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 187,539	**EASTING** 2,354,748	**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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
35										
	32.0	0.0								32.0 GROUND SURFACE 0.0
30			2	2	4	6		M		**COASTAL PLAIN** Black, gray, and tan, silty fine SAND (A-2-4), with trace organics (roots) from 3.5' to 5.0'.
	28.5	3.5	2	2	2	4		M		
25										25.0 Red-brown, fine to coarse SAND (A-3) with trace silt. 7.0
	23.5	8.5	4	4	4	8		Sat.		
20										20.0 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
	18.5	13.5	3	4	3	7		Sat.		
15										
	13.5	18.5	8	11	10	21		Sat.		
10										
	8.5	23.5	WOR	WOH	WOH	0		Sat.		7.0 25.0 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

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-	**0 HR.** FIAD
COLLAR ELEV. 30.9 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 187,587	**EASTING** 2,354,749	**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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
35										
	30.9	0.0								30.9 GROUND SURFACE 0.0
30			1	4	3	7		M		**COASTAL PLAIN** Black & gray, silty fine SAND (A-2-4), with trace organics (roots) from 0.0' to 1.5'.
	27.4	3.5	2	2	4	6		M		
25										23.9 Red-brown, fine to coarse SAND (A-3), with trace silt. 7.0
	22.4	8.5	3	2	3	5		Sat.		
20										18.9 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
	17.4	13.5	1	0	2	2		Sat.		
15										
	12.4	18.5	3	5	6	11		Sat.		
10										
	7.4	23.5	WOH	WOH	WOH	0		Sat.		5.9 25.0 Boring Terminated at Elevation 5.9 ft in SAND (COASTAL PLAIN)

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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
35										
	32.1	0.0	WOH	1	3	4		M		32.1 GROUND SURFACE 0.0
30	28.6	3.5	1	1	4	5		W		**COASTAL PLAIN** Black & gray to gray-tan, silty fine SAND (A-2-4), with trace organics (roots) from 0.0' to 5.0', trace clay from 3.5' to 5.0', and sulphur odor from 8.5' to 15.0'.
25	23.6	8.5	2	2	4	6		Sat.		
20	18.6	13.5	5	5	5	10		Sat.		
15	13.6	18.5	7	7	11	18		W		15.1 17.0 Light gray, fine SAND (A-3).
10	8.6	23.5	WOH	WOH	WOH	0		Sat.		10.1 22.0 Gray, fine sandy CLAY (A-7-5). 7.1 25.0 Boring Terminated at Elevation 7.1 ft in CLAY (COASTAL PLAIN)

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

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	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4751	1	24

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 6 at -L- Sta. 84+50 Left*

CONTENTS

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.

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NOTES:
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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

S. Davis

M. Renza

INVESTIGATED BY *F&R, Inc.*

DRAWN BY *D. Racey*

CHECKED BY *B. Howey, PG, PE*

SUBMITTED BY *HDR, Inc.*

DATE *March 2015*

NORTH CAROLINA LICENSED SEAL 671 GEOLOGIST ELIZABETH C. HOWEY

DocuSigned by:
Elizabeth C. Howey
F80E690821524F3...
SIGNATURE

6/25/2015
DATE

PROJECT REFERENCE NO.	SHEET NO.
U-4751	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	25 MX	50 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX			— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0	0	4 MX		8 MX	12 MX	16 MX	NO MX				
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS					
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR		UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

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

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: TBM: BL-12 DISK
N: 194319.9492 E: 2352785.5298
ELEVATION: 42.71 FEET

NOTES:

BORING AND GROUND SURFACE ELEVATIONS OBTAINED FROM NCDOT-PROVIDED DTM FILE

FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-4751	3

SITE PLAN

0 100 200

FEET

BEGIN NOISE WALL 6
-NW6- Sta. 10+00.00=
-L- Sta. 84+10.42

END NOISE WALL 6
-NW6- Sta. 18+85.00=
-Y3- Sta. 13+66.86 (326' RT.)

-L- POT Sta. 92+69.38 =
-Y3- POC Sta. 14+68.70

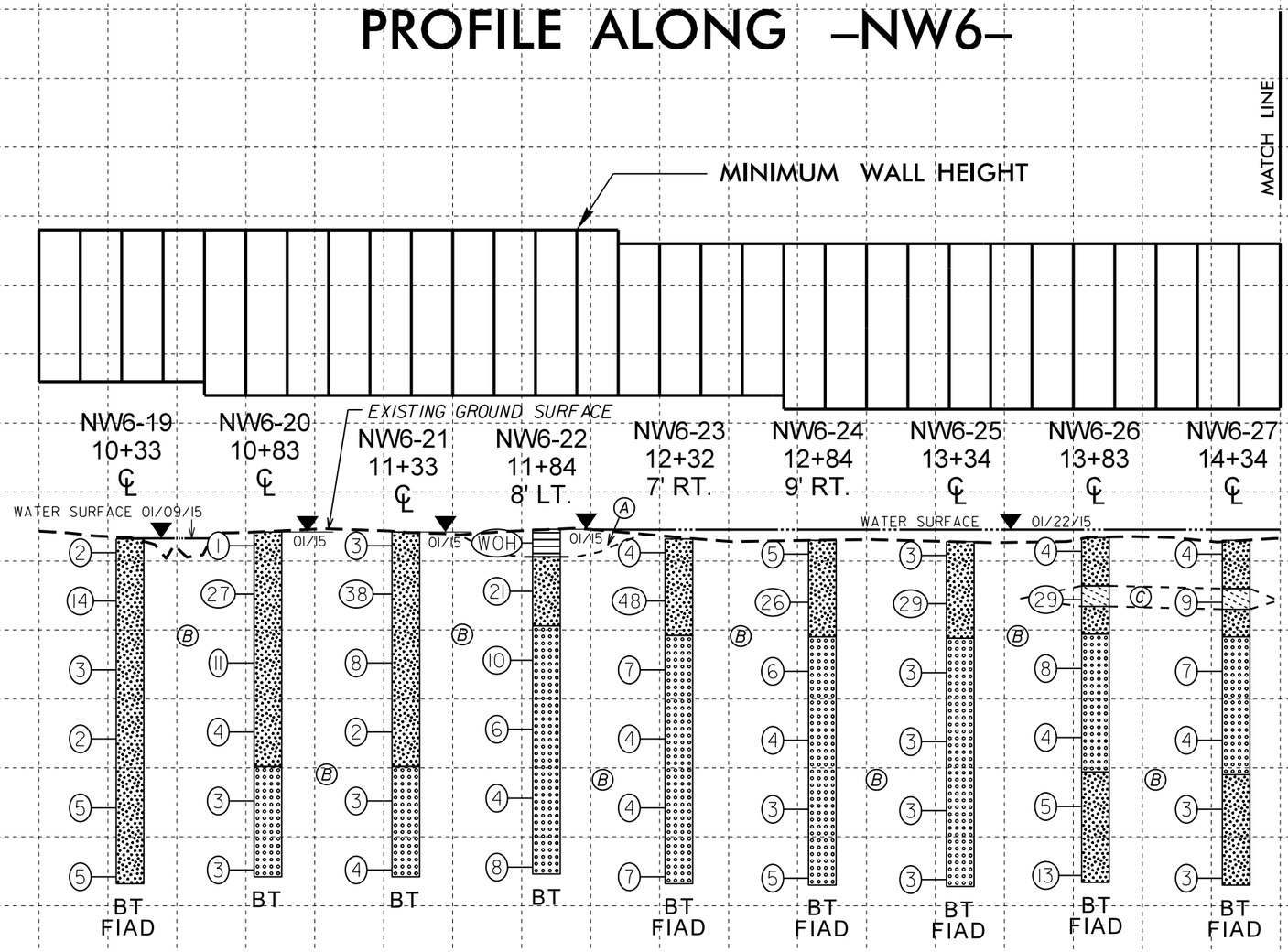
NW6-1 NW6-2 NW6-3 NW6-4 NW6-5 NW6-6 NW6-7 NW6-8 NW6-9 NW6-10 NW6-11 NW6-12 NW6-13 NW6-14 NW6-15 NW6-16 NW6-17 NW6-18 NW6-19 NW6-20 NW6-21 NW6-22 NW6-23 NW6-24 NW6-25 NW6-26 NW6-27 NW6-28 NW6-29 NW6-30 NW6-31 NW6-32 NW6-33 NW6-34 NW6-35 NW6-36

SUNCOAST DRIVE
SAVANNA RUN LOOP
RIVIERA DR
PROGRESS ENERGY
SHALLOW POND NO ELEV.
DIRT SPOIL 30' X 8' +/-
DIRT SPOIL 32' X 8' +/-
DIRT SPOIL 35' X 11' +/-
DIRT SPOIL 25' X 9' +/-
DIRT SPOIL 35' X 11' +/-
40' UTILITY EASEMENT (UNRECORDED PARK ISLE MANOR)
15' CURB-GUTTER
30' DRAINAGE EASEMENT
40' UTILITY EASEMENT
10' UTILITY EASEMENT
15' DRAINAGE EASEMENT
10' DRAINAGE EASEMENT
40' DRAINAGE EASEMENT
72" WD
48" RCP
48" CONC
2SFD
1SFD
FOUND.
EXISTING R/W
R=25' UNIT R=60'
R=60'
TYPE B-77
-L-
-Y3-
-NW6-

0	50	100
FEET		
VE = 5		

PROJECT REFERENCE NO.	SHEET NO.
U-4751	4

PROFILE ALONG –NW6–



(A) Black, very soft, fine sandy SILT (A-4), with moderate amount of organics (roots), saturated **-COASTAL PLAIN-**

(B) Black, gray-brown & gray, very loose to dense, silty fine SAND (A-2-4) and fine SAND (A-3), wet to saturated **-COASTAL PLAIN-**

(C) Gray-brown, loose to medium dense, silty fine SAND (A-2-4), moderately organic, saturated **-COASTAL PLAIN-**

-NW6- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NC DEPARTMENT OF TRANSPORTATION, DATED 1/29/15. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

10+00 11+00 12+00 13+00 14+00 15+00

0	50	100
FEET		

VE = 5

PROJECT REFERENCE NO.	SHEET NO.
U-4751	5

PROFILE ALONG –NW6–

STA. 14+50 SHEET 4
MATCH LINE

MINIMUM WALL HEIGHT

EXISTING GROUND SURFACE

WATER SURFACE

NW6-28 14+84 ℄ — BT FIAD
NW6-29 15+33 ℄ — BT FIAD
NW6-30 15+84 ℄ — BT FIAD
NW6-31 16+35 ℄ — BT FIAD
NW6-32 16+85 ℄ — BT
NW6-33 17+23 ℄ — BT
NW6-34 17+85 ℄ — BT
NW6-35 18+35 ℄ — BT
NW6-36 18+83 11' RT. — BT

01/15

70 60 50 40 30 20 10 0

14+00 15+00 16+00 17+00 18+00 19+00

(A) Black, very soft, fine sandy SILT (A-4), with moderate amount of organics (roots), saturated **-COASTAL PLAIN-**

(B) Black, gray-brown & gray, very loose to dense, silty fine SAND (A-2-4) and fine SAND (A-3), wet to saturated **-COASTAL PLAIN-**

(C) Gray-brown, dense, silty fine SAND (A-2-4), moderately organic, saturated **-COASTAL PLAIN-**

(D) Black, stiff, MUCK and wood fragments, with some silty fine sand, saturated **-ALLUVIAL-**

(E) Gray-brown, medium dense, silty fine SAND (A-2-4), with moderate amount of organics (wood fragments) **-ALLUVIAL-**

-NW6- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NC DEPARTMENT OF TRANSPORTATION, DATED 1/29/15. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

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 Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-1	**STATION** 75+69	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 43.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,749	**EASTING** 2,352,812	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/09/15	**COMP. DATE** 01/09/15	**SURFACE WATER DEPTH** 0.5ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
45										
	43.5	0.0	WOH	WOH	WOH	0				WATER SURFACE (01/09/15) 43.5 / 0.0
40	40.0	3.5	WOH	3	6	9		Sat.		**COASTAL PLAIN** Black, fine sandy SILT (A-4), with moderate amount of organics (leaves, roots) and a large piece of wood at 3.5'.
								Sat.		36.5 / 7.0
35	35.0	8.5	5	2	4	6		Sat.		Gray-brown to gray, silty fine SAND (A-2-4), with trace organics (wood fragments) from 8.5' to 10.0' and from 18.5' to 20.0'.
30	30.0	13.5	WOH	1	2	3		Sat.		
25	25.0	18.5	3	4	6	10		W		18.5 / 25.0
20	20.0	23.5	4	5	9	14		W		Boring Terminated at Elevation 18.5 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.1' = Black, MUCK

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-2	**STATION** 76+19	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** 0.0
COLLAR ELEV. 43.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,792	**EASTING** 2,352,787	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/08/15	**COMP. DATE** 01/08/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	43.1	0.0	WOH	WOH	WOH	0		Sat.		43.1 GROUND SURFACE 0.0 **COASTAL PLAIN**
40	39.6	3.5	1	0	4	4		Sat.		41.1 / 2.0 Black, fine sandy SILT (A-4), with trace organics (roots) from 0.4' to 1.5'. Gray-brown, gray & light gray, silty fine SAND (A-2-4), with trace organics (roots) from 18.5' to 22.0'.
35	34.6	8.5	5	4	3	7		Sat.		
30	29.6	13.5	WOH	2	2	4		Sat.		
25	24.6	18.5	2	2	3	5		Sat.		21.1 / 22.0 Light gray, fine SAND (A-3).
20	19.6	23.5	11	18	26	44		W		18.1 / 25.0 Boring Terminated at Elevation 18.1 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.4' = Surficial Organic Soils
2) Boring surrounded by ponded water

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 Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-3	**STATION** 76+60	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** 1.2
COLLAR ELEV. 42.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,827	**EASTING** 2,352,766	**24 HR.** 0.9
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/08/15	**COMP. DATE** 01/08/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
	42.5	0.0	1	1	WOH	1		W		42.5 GROUND SURFACE 0.0
40	39.0	3.5	3	4	8	12		W		**COASTAL PLAIN** 40.5 Black & gray, fine sandy SILT (A-4). 2.0
35	34.0	8.5	5	4	4	8		Sat.		Gray-brown, gray & light gray, silty fine SAND (A-2-4), with trace organics (wood fragments) from 18.5' to 20.0'.
30	29.0	13.5	1	2	2	4		Sat.		
25	24.0	18.5	WOH	WOH	WOH	0		Sat.		20.5 Light gray, fine SAND (A-3). 22.0
20	19.0	23.5	3	4	6	10		W		17.5 Boring Terminated at Elevation 17.5 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) 0.0-0.3' = Surficial Organic Soils
2) Boring offset to top of ditch.

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-4	**STATION** 77+20	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** 1.9
COLLAR ELEV. 43.2 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,879	**EASTING** 2,352,736	**24 HR.** 1.9
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/08/15	**COMP. DATE** 01/08/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	43.2	0.0	1	3	2	5		M		43.2 GROUND SURFACE 0.0
40	39.7	3.5	4	5	8	13		W		**COASTAL PLAIN** 41.2 Black & gray, fine sandy SILT (A-4). 2.0
35	34.7	8.5	7	5	7	12		Sat.		Gray-brown to gray, silty fine SAND (A-2-4).
30	29.7	13.5	2	1	2	3		Sat.		
25	24.7	18.5	2	2	2	4		Sat.		21.2 Light gray, fine SAND (A-3). 22.0
20	19.7	23.5	6	14	19	33		W		18.2 Boring Terminated at Elevation 18.2 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-5	**STATION** 77+70	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 42.7 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,922	**EASTING** 2,352,710	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/07/15	**COMP. DATE** 01/07/15	**SURFACE WATER DEPTH** 0.2ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
45										
	42.7	0.0								42.7 WATER SURFACE (01/07/15) 0.0
40	39.2	3.5	1	1	2	3		Sat.		**COASTAL PLAIN** Black & gray, silty fine SAND (A-2-4).
			1	1	1	2		Sat.		
35	34.2	8.5								35.7 Black, fine sandy SILT (A-4), with moderate amount of organics (wood fragments). 7.0
			1	2	1	3		Sat.		
30	29.2	13.5								28.6 Gray-tan, silty fine SAND (A-2-4). 14.1
			3	1	2	3		Sat.		
25	24.2	18.5								
			WOR	1	2	3		Sat.		
20	19.2	23.5								17.7 Boring Terminated at Elevation 17.7 ft in SAND (COASTAL PLAIN) 25.0
			11	16	20	36		Sat.		

NOTES:

1) Strata break in split spoon at a depth of 14.1'

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-6	**STATION** 78+20	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.2
COLLAR ELEV. 42.7 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,965	**EASTING** 2,352,685	**24 HR.** 2.5
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/07/15	**COMP. DATE** 01/07/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	42.7	0.0								42.7 GROUND SURFACE 0.0
40	39.2	3.5	3	3	4	7		W		**COASTAL PLAIN** Black & gray to gray-brown, silty fine SAND (A-2-4), with trace organics (roots) from 0.2' to 1.5'.
			1	1	1	2		W		
35	34.2	8.5								
			1	1	0	1		Sat.		
30	29.2	13.5								
			2	2	3	5		Sat.		
25	24.2	18.5								
			1	2	2	4		Sat.		
20	19.2	23.5								17.7 Boring Terminated at Elevation 17.7 ft in SAND (COASTAL PLAIN) 25.0
			4	8	15	23		Sat.		

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Left				**GROUND WTR (ft)**
BORING NO. NW6-7	**STATION** 78+70	**OFFSET** 69 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.2
COLLAR ELEV. 43.0 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,008	**EASTING** 2,352,660	**24 HR.** 3.4
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/07/15	**COMP. DATE** 01/07/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45	43.0	0.0	3	3	2	5		W		43.0 GROUND SURFACE 0.0
40	39.5	3.5	2	2	2	4		W		**COASTAL PLAIN** Black & gray to gray-brown, silty fine SAND (A-2-4), with trace organics (wood fragments) from 0.0'-8.8'.
35	34.5	8.5	WOH	WOH	WOH	0		Sat.		
30	29.5	13.5	1	1	1	2		Sat.		
25	24.5	18.5	2	2	3	5		Sat.		
20	19.5	23.5	6	6	7	13		Sat.		18.0 25.0 Boring Terminated at Elevation 18.0 ft in SAND (COASTAL PLAIN)

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Left				**GROUND WTR (ft)**
BORING NO. NW6-8	**STATION** 79+20	**OFFSET** 69 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.7
COLLAR ELEV. 42.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,052	**EASTING** 2,352,634	**24 HR.** 2.8
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/07/15	**COMP. DATE** 01/07/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45	42.5	0.0	3	2	3	5		M		42.5 GROUND SURFACE 0.0
40	39.0	3.5	5	8	8	16		W		**COASTAL PLAIN** Black & gray, silty fine SAND (A-2-4). 39.0 3.5
35	34.0	8.5	5	4	4	8		Sat.		37.5 5.0 Gray-brown, silty fine SAND (A-2-4), with moderate amount of organics (wood fragments). Light gray, silty fine SAND (A-2-4).
30	29.0	13.5	WOH	1	1	2		Sat.		
25	24.0	18.5	2	3	3	6		Sat.		
20	19.0	23.5	2	3	4	7		Sat.		17.5 25.0 Boring Terminated at Elevation 17.5 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right			**GROUND WTR (ft)**
BORING NO. NW6-9	**STATION** 79+70	**OFFSET** 69 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.7
COLLAR ELEV. 42.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,095	**EASTING** 2,352,609	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/07/15	**COMP. DATE** 01/07/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
	42.8	0.0	2	6	7	13		Sat. M		42.8 GROUND SURFACE 0.0
40	39.3	3.5	4	4	5	9		W		**COASTAL PLAIN** Black & gray-brown to light gray, silty fine SAND (A-2-4).
35	34.3	8.5	4	4	2	6		Sat.		
30	29.3	13.5	WOH	WOH	2	2		Sat.		
25	24.3	18.5	4	4	4	8		Sat.		
20	19.3	23.5	5	4	3	7		Sat.		17.8 25.0 Boring Terminated at Elevation 17.8 ft in SAND (COASTAL PLAIN)

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right			**GROUND WTR (ft)**
BORING NO. NW6-10	**STATION** 80+18	**OFFSET** 68 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.2
COLLAR ELEV. 43.0 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,139	**EASTING** 2,352,585	**24 HR.** 2.6
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/07/15	**COMP. DATE** 01/07/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	43.0	0.0	5	6	5	11		M		43.0 GROUND SURFACE 0.0
40	39.5	3.5	7	8	6	14		W		**COASTAL PLAIN** Black & gray-brown to light gray, silty fine SAND (A-2-4).
35	34.5	8.5	2	2	2	4		Sat.		
30	29.5	13.5	WOH	WOH	1	1		Sat.		
25	24.5	18.5	1	2	2	4		Sat.		
20	19.5	23.5	4	4	6	10		Sat.		18.0 25.0 Boring Terminated at Elevation 18.0 ft in SAND (COASTAL PLAIN)

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right			**GROUND WTR (ft)**
BORING NO. NW6-11	**STATION** 80+65	**OFFSET** 67 ft LT	**ALIGNMENT** -L-	**0 HR.** 4.8
COLLAR ELEV. 43.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,184	**EASTING** 2,352,563	**24 HR.** 3.9
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/06/15	**COMP. DATE** 01/06/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
	43.5	0.0								43.5 GROUND SURFACE 0.0
			WOH	1	7	8		W		**COASTAL PLAIN**
								M		Black & red-brown, gray-brown to light gray,
40	40.0	3.5						▼		silty fine SAND (A-2-4).
			5	6	8	14		Sat.		
35	35.0	8.5								
			3	2	2	4		Sat.		
30	30.0	13.5								
			WOH	2	1	3		Sat.		
25	25.0	18.5								
			WOH	1	1	2		Sat.		
20	20.0	23.5								
			6	6	7	13		W		18.5 25.0
										Boring Terminated at Elevation 18.5 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right			**GROUND WTR (ft)**
BORING NO. NW6-12	**STATION** 81+12	**OFFSET** 66 ft LT	**ALIGNMENT** -L-	**0 HR.** 2.9
COLLAR ELEV. 43.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,230	**EASTING** 2,352,543	**24 HR.** 3.3
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/06/15	**COMP. DATE** 01/06/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	43.5	0.0								43.5 GROUND SURFACE 0.0
			1	3	2	5		M		**COASTAL PLAIN**
								▼		Black to light gray, silty fine SAND (A-2-4),
40	40.0	3.5								with trace organics (roots) from 0.2' to 1.5'.
			4	4	4	8		Sat.		
35	35.0	8.5								
			2	2	1	3		Sat.		
30	30.0	13.5								
			WOH	2	1	3		Sat.		
25	25.0	18.5								
			WOH	WOH	1	1		Sat.		
20	20.0	23.5								
			2	3	3	6		Sat.		18.5 25.0
										Boring Terminated at Elevation 18.5 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - 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
COLLAR ELEV. 43.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,277	**EASTING** 2,352,525	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/06/15	**COMP. DATE** 01/06/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	43.5	0.0	1	2	2	4		M		43.5 GROUND SURFACE	0.0
40	40.0	3.5	7	8	9	17		W		**COASTAL PLAIN** Black & gray-brown to light gray, silty fine SAND (A-2-4), with trace organics from 0.7' to 1.5'.	
35	35.0	8.5	4	5	5	10		Sat.			
30	30.0	13.5	2	3	2	5		Sat.			
25	25.0	18.5	WOH	WOH	1	1		Sat.			
20	20.0	23.5	2	2	2	4		Sat.		18.5 Boring Terminated at Elevation 18.5 ft in SAND (COASTAL PLAIN)	25.0

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-14	**STATION** 82+06	**OFFSET** 65 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.7
COLLAR ELEV. 44.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,324	**EASTING** 2,352,509	**24 HR.** 3.7
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/06/15	**COMP. DATE** 01/06/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
45											
	44.1	0.0	WOH	2	4	6		M		44.1 GROUND SURFACE	0.0
40	40.6	3.5	4	5	7	12		W		**COASTAL PLAIN** Black, brown & gray, silty fine SAND (A-2-4).	
35	35.6	8.5	4	5	3	8		Sat.			
30	30.6	13.5	WOH	1	1	2		Sat.			
25	25.6	18.5	WOR	WOH	WOH	0		Sat.			
20	20.6	23.5	WOH	1	2	3		Sat.		19.1 Boring Terminated at Elevation 19.1 ft in SAND (COASTAL PLAIN)	25.0

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-15	**STATION** 82+53	**OFFSET** 65 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.3
COLLAR ELEV. 44.3 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,372	**EASTING** 2,352,495	**24 HR.** 3.7
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/06/15	**COMP. DATE** 01/06/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	44.3	0.0								44.3 GROUND SURFACE	0.0
			WOH	1	5	6 19		M		**COASTAL PLAIN** Black & gray, gray-brown to light gray, silty fine SAND (A-2-4).	
40	40.8	3.5	8	10	9			W			
35	35.8	8.5	5	5	3	8		Sat.			
30	30.8	13.5	WOH	WOH	1	1		Sat.			
25	25.8	18.5	WOH	WOH	1	1		Sat.			
20	20.8	23.5	WOH	1	2	3		Sat.		19.3 Boring Terminated at Elevation 19.3 ft in SAND (COASTAL PLAIN)	25.0

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-16	**STATION** 83+00	**OFFSET** 65 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.3
COLLAR ELEV. 43.2 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,421	**EASTING** 2,352,483	**24 HR.** 2.8
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/06/15	**COMP. DATE** 01/06/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	43.2	0.0								43.2 GROUND SURFACE 0.0
			1	2	2	4		M		**COASTAL PLAIN** Black,gray & tan-brown to light gray and brown, silty fine SAND (A-2-4), with trace organics from 0.1' to 1.5'.
40	39.7	3.5	6	7	6	13		W		
35	34.7	8.5	4	4	3	7		Sat.		
30	29.7	13.5	WOH	1	1	2		Sat.		
25	24.7	18.5	WOH	1	1	2		Sat.		
20	19.7	23.5	1	1	2	3		Sat.		18.2 Boring Terminated at Elevation 18.2 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) 0.0-0.1' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-17	**STATION** 83+47	**OFFSET** 65 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 42.2 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,470	**EASTING** 2,352,474	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/09/15	**COMP. DATE** 01/09/15	**SURFACE WATER DEPTH** 0.2ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
45										
	42.2	0.0	WOH	2	2	4		Sat.		42.2 WATER SURFACE (01/09/15) 0.0
40	38.7	3.5	4	5	6	11		Sat.		**COASTAL PLAIN** Black & gray to gray-brown and light gray, silty fine SAND (A-2-4), with trace clay and organics (wood fragments) from 3.5' to 5.0' and trace organics (wood fragments) from 18.5' to 20.0'.
35	33.7	8.5	2	2	3	5		Sat.		
30	28.7	13.5	WOH	1	1	2		Sat.		
25	23.7	18.5	WOH	WOH	1	1		Sat.		
20	18.7	23.5	1	1	4	5		W		17.2 25.0 Boring Terminated at Elevation 17.2 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.3' = Black, MUCK

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-18	**STATION** 83+94	**OFFSET** 65 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 42.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,520	**EASTING** 2,352,467	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/09/15	**COMP. DATE** 01/09/15	**SURFACE WATER DEPTH** 0.1ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	42.1	0.0	WOH	2	2	4		Sat.		42.1 WATER SURFACE (01/09/15) 0.0
40	38.6	3.5	12	10	12	22		Sat.		**COASTAL PLAIN** Gray-brown to light gray, silty fine SAND (A-2-4), with trace clay and organics (wood fragments) from 0.3' to 1.5'.
35	33.6	8.5	4	5	6	11		Sat.		
30	28.6	13.5	WOH	WOH	1	1		Sat.		
25	23.6	18.5	WOH	1	1	2		Sat.		
20	18.6	23.5	WOH	3	4	7		Sat.		17.1 25.0 Boring Terminated at Elevation 17.1 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.3' = Black, MUCK

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-19	**STATION** 10+33	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 41.6 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,570	**EASTING** 2,352,463	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/09/15	**COMP. DATE** 01/09/15	**SURFACE WATER DEPTH** 0.2ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
45										
	41.6	0.0	WOH	WOH	2	2		Sat.		41.6 WATER SURFACE (01/09/15) 0.0
40	38.1	3.5	6	7	7	14		Sat.		**COASTAL PLAIN** Black & gray to gray-tan, silty fine SAND (A-2-4), with trace organics (wood fragments) from 0.0' to 1.5'.
35	33.1	8.5	3	2	1	3		Sat.		
30	28.1	13.5	WOH	WOH	2	2		Sat.		
25	23.1	18.5	1	3	2	5		Sat.		
20	18.1	23.5	1	3	2	5		Sat.		16.6 25.0 Boring Terminated at Elevation 16.6 ft in SAND (COASTAL PLAIN)

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-20	**STATION** 10+83	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** 0.3
COLLAR ELEV. 42.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,620	**EASTING** 2,352,461	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/15/15	**COMP. DATE** 01/15/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	42.1	0.0	WOH	WOH	1	1		Sat.		42.1 GROUND SURFACE 0.0
40	38.6	3.5	11	13	14	27		Sat.		**COASTAL PLAIN** Black & gray to gray-tan, silty fine SAND (A-2-4), with trace organics (wood fragments) from 0.2' to 1.5'.
35	33.6	8.5	6	5	6	11		Sat.		
30	28.6	13.5	1	2	2	4		Sat.		
25	23.6	18.5	2	1	2	3		Sat.		25.1 17.0 Gray, fine SAND (A-3), with trace silt.
20	18.6	23.5	1	1	2	3		Sat.		17.1 25.0 Boring Terminated at Elevation 17.1 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.2' = Surficial Organic Soils
2) Boring surrounded by ponded water

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-21	**STATION** 11+33	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** 0.8
COLLAR ELEV. 42.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,670	**EASTING** 2,352,461	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/15/15	**COMP. DATE** 01/15/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
	42.1	0.0	WOH	1	2	3		Sat.		42.1 GROUND SURFACE 0.0
40	38.6	3.5	10	15	23	38		Sat.		**COASTAL PLAIN** Black & gray to gray-tan, silty fine SAND (A-2-4), with trace organics (roots, wood fragments) from 0.3' to 1.5'.
35	33.6	8.5	3	3	5	8		Sat.		
30	28.6	13.5	WOR	WOH	2	2		Sat.		25.1 Gray, fine SAND (A-3), with trace silt. 17.0
25	23.6	18.5	1	1	2	3		Sat.		
20	18.6	23.5	1	2	2	4		Sat.		17.1 Boring Terminated at Elevation 17.1 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) 0.0-0.3' = Black, MUCK
2) Boring surrounded by ponded water

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-22	**STATION** 11+84	**OFFSET** 8 ft LT	**ALIGNMENT** -NW6-	**0 HR.** 0.7
COLLAR ELEV. 42.3 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,722	**EASTING** 2,352,456	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/15/15	**COMP. DATE** 01/15/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	42.3	0.0	WOH	WOH	WOH	0		Sat.		42.3 GROUND SURFACE 0.0
40	38.8	3.5	5	7	14	21		Sat.		40.3 **COASTAL PLAIN** Black, fine sandy SILT (A-4), with moderate amount of organics (roots). 2.0 Gray-brown, silty fine SAND (A-2-4).
35	33.8	8.5	5	5	5	10		W		35.3 Gray, fine SAND (A-3), with trace silt. 7.0
30	28.8	13.5	3	3	3	6		W		
25	23.8	18.5	3	1	3	4		W		
20	18.8	23.5	2	3	5	8		W		17.3 Boring Terminated at Elevation 17.3 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) 0.0-0.1' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-23	**STATION** 12+32	**OFFSET** 7 ft RT	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 41.6 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,768	**EASTING** 2,352,476	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/15/15	**COMP. DATE** 01/15/15	**SURFACE WATER DEPTH** 1.9ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										WATER SURFACE (01/15/15)
	41.6	0.0								41.6 GROUND SURFACE 0.0
40			1	1	3	4		Sat.		**COASTAL PLAIN** Gray-brown, silty fine SAND (A-2-4), with trace organics (wood fragments) from 0.3' to 1.5'.
	38.1	3.5	17	24	24	48		Sat.		
35										34.6 7.0
	33.1	8.5	3	3	4	7		W		Gray, fine SAND (A-3), with trace silt.
30										
	28.1	13.5	3	2	2	4		W		
25										
	23.1	18.5	2	2	2	4		W		
20										
	18.1	23.5	2	4	3	7		W		16.6 25.0
										Boring Terminated at Elevation 16.6 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.3' = Black, MUCK

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-24	**STATION** 12+84	**OFFSET** 9 ft RT	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 41.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,819	**EASTING** 2,352,486	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/15/15	**COMP. DATE** 01/15/15	**SURFACE WATER DEPTH** 1.9ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										WATER SURFACE (01/15/15)
	41.5	0.0								41.5 GROUND SURFACE 0.0
40			WOH	1	4	5		Sat.		**COASTAL PLAIN** Gray-brown, silty fine SAND (A-2-4), with trace organics (wood fragments).
	38.0	3.5	12	12	14	26		Sat.		
35										34.5 7.0
	33.0	8.5	1	3	3	6		Sat.		Gray, fine SAND (A-3), with trace silt.
30										
	28.0	13.5	1	2	2	4		Sat.		
25										
	23.0	18.5	1	2	1	3		Sat.		
20										
	18.0	23.5	1	2	3	5		Sat.		16.5 25.0
										Boring Terminated at Elevation 16.5 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.3' = Black, MUCK

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Left				**GROUND WTR (ft)**
BORING NO. NW6-25	**STATION** 13+34	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 41.4 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,869	**EASTING** 2,352,487	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/14/15	**COMP. DATE** 01/14/15	**SURFACE WATER DEPTH** 0.6ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
	41.4	0.0								WATER SURFACE (01/14/15)
										41.4 GROUND SURFACE 0.0
40			1	1	2	3		Sat.		**COASTAL PLAIN** Gray-brown, silty fine SAND (A-2-4).
	37.9	3.5								
			9	13	16	29		Sat.		
35										34.4 7.0
	32.9	8.5								Gray, fine SAND (A-3), with trace silt.
			WOH	WOH	3	3		Sat.		
30										
	27.9	13.5								
			WOH	1	2	3		Sat.		
25										
	22.9	18.5								
			1	2	1	3		Sat.		
20										
	17.9	23.5								
			WOH	2	1	3		Sat.		16.4 25.0
										Boring Terminated at Elevation 16.4 ft in SAND (COASTAL PLAIN)

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Left				**GROUND WTR (ft)**
BORING NO. NW6-26	**STATION** 13+83	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 41.7 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,917	**EASTING** 2,352,500	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/14/15	**COMP. DATE** 01/14/15	**SURFACE WATER DEPTH** 0.6ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	41.7	0.0								WATER SURFACE (01/14/15)
										41.7 GROUND SURFACE 0.0
40			1	2	2	4		Sat.		**COASTAL PLAIN** Gray-brown, silty fine SAND (A-2-4).
	38.2	3.5								38.2 3.5
			13	16	13	29		Sat.		36.7 5.0 Gray-brown, silty fine SAND (A-2-4), with moderate amount of organics (wood fragments).
35										34.7 7.0 Gray-brown, silty fine SAND (A-2-4).
	33.2	8.5								Gray, fine SAND (A-3), with trace silt from 8.5' to 10.0', a 0.2' thick black clay layer at 13.5', and trace organics (wood fragments) from 13.5' to 15.0'.
			4	4	4	8		Sat.		
30										
	28.2	13.5								
			2	2	2	4		Sat.		
25										
	23.2	18.5								24.7 17.0
			3	2	3	5		Sat.		Gray, silty fine SAND (A-2-4), with trace organics (wood fragments).
20										
	18.2	23.5								
			5	5	8	13		Sat.		16.7 25.0
										Boring Terminated at Elevation 16.7 ft in SAND (COASTAL PLAIN)

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Left				**GROUND WTR (ft)**
BORING NO. NW6-27	**STATION** 14+34	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 41.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,965	**EASTING** 2,352,515	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/14/15	**COMP. DATE** 01/14/15	**SURFACE WATER DEPTH** 1.9ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										WATER SURFACE (01/14/15)
	41.5	0.0								41.5 GROUND SURFACE 0.0
40			WOH	1	3	4		Sat.		**COASTAL PLAIN** Gray-brown, silty fine SAND (A-2-4), with trace organics (wood fragments).
	38.0	3.5								38.0 3.5
			2	3	6	9		Sat.		Gray-brown, silty fine SAND (A-2-4), with moderate amount of organics (wood fragments).
35										36.5 5.0
	33.0	8.5								34.5 7.0
			1	3	4	7		Sat.		Gray-brown, silty fine SAND (A-2-4). Gray, fine SAND (A-3), with trace silt.
30										
	28.0	13.5								
			2	2	2	4		Sat.		
25										24.5 17.0
	23.0	18.5								Gray, silty fine SAND (A-2-4).
			WOH	1	2	3		Sat.		
20										
	18.0	23.5								
			WOR	1	2	3		Sat.		16.5 25.0 Boring Terminated at Elevation 16.5 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.3' = Black, MUCK

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Left				**GROUND WTR (ft)**
BORING NO. NW6-28	**STATION** 14+84	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 41.2 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,012	**EASTING** 2,352,532	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/14/15	**COMP. DATE** 01/14/15	**SURFACE WATER DEPTH** 1.9ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										WATER SURFACE (01/14/15)
	41.2	0.0								41.2 GROUND SURFACE 0.0
40			WOH	WOH	1	1		Sat.		**COASTAL PLAIN** Gray-brown to gray, silty fine SAND (A-2-4), with trace organics (wood fragments) from 0.3' to 1.5'.
	37.7	3.5								
			17	13	11	24		Sat.		
35										34.2 7.0
	32.7	8.5								Gray, fine SAND (A-3), with trace silt.
			2	2	3	5		Sat.		
30										
	27.7	13.5								
			2	2	2	4		Sat.		
25										24.2 17.0
	22.7	18.5								Gray, silty fine SAND (A-2-4), with trace organics (wood fragments).
			WOH	WOH	1	1		Sat.		
20										
	17.7	23.5								
			WOR	2	2	4		Sat.		16.2 25.0 Boring Terminated at Elevation 16.2 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.3' = Black, MUCK

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Left				**GROUND WTR (ft)**
BORING NO. NW6-29	**STATION** 15+33	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 41.6 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,058	**EASTING** 2,352,551	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/13/15	**COMP. DATE** 01/13/15	**SURFACE WATER DEPTH** 0.6ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
45										
	41.6	0.0	WOH	WOH	WOH	0				WATER SURFACE (01/13/15) 41.6 GROUND SURFACE 0.0
40	38.1	3.5	11	14	19	33		Sat.		**COASTAL PLAIN** 39.6 Black, fine sandy SILT (A-4), with moderate amount of organics (roots). 2.0
35	33.1	8.5	4	2	3	5		Sat.		36.6 Gray-brown and gray, silty fine SAND (A-2-4), with moderate amount of organics (wood fragments). 5.0
30	28.1	13.5	1	2	2	4		Sat.		Gray and gray-brown, silty fine SAND (A-2-4).
25	23.1	18.5	1	1	0	1		Sat.		
20	18.1	23.5	1	3	3	6		Sat.		16.6 25.0 Boring Terminated at Elevation 16.6 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.1' = Black, MUCK

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Left				**GROUND WTR (ft)**
BORING NO. NW6-30	**STATION** 15+84	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 41.7 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,104	**EASTING** 2,352,572	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/13/15	**COMP. DATE** 01/13/15	**SURFACE WATER DEPTH** 0.8ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	41.7	0.0	WOH	1	1	2				WATER SURFACE (01/13/15) 41.7 GROUND SURFACE 0.0
40	38.2	3.5	13	14	21	35		Sat.		**COASTAL PLAIN** 39.7 Black, fine sandy SILT (A-4), with moderate amount of organics (roots). 2.0
35	33.2	8.5	2	3	4	7		Sat.		Gray-brown and gray, silty fine SAND (A-2-4), with trace organics (wood fragments).
30	28.2	13.5	2	3	3	6		Sat.		
25	23.2	18.5	1	WOH	WOH	0		Sat.		
20	18.2	23.5	WOH	WOH	WOH	0		Sat.		16.7 25.0 Boring Terminated at Elevation 16.7 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.1' = Black, MUCK

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 Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right			**GROUND WTR (ft)**
BORING NO. NW6-31	**STATION** 16+35	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 41.9 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,148	**EASTING** 2,352,597	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 01/13/15	**COMP. DATE** 01/13/15	**SURFACE WATER DEPTH** 0.6ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
	41.9	0.0								WATER SURFACE (01/13/15)
										41.9 GROUND SURFACE 0.0
40	38.4	3.5	2	2	2	4		Sat.		**COASTAL PLAIN** Black to gray-brown, silty fine SAND (A-2-4), with trace organics (roots) from 0.1' to 1.5'.
			12	15	14	29		Sat.		
35	33.4	8.5	5	5	5	10				34.9 7.0 Gray, fine SAND (A-3), with trace silt.
30	28.4	13.5	2	2	2	4		Sat.		
25	23.4	18.5	WOH	WOH	WOH	0		Sat.		24.9 17.0 Gray, silty fine SAND (A-2-4).
20	18.4	23.5	1	2	3	5		Sat.		16.9 25.0 Boring Terminated at Elevation 16.9 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.1' = Black, MUCK

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right			**GROUND WTR (ft)**
BORING NO. NW6-32	**STATION** 16+85	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 42.6 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,191	**EASTING** 2,352,623	**24 HR.** 0.6
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 01/13/15	**COMP. DATE** 01/13/15	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	42.6	0.0	WOH	3	3	6		Sat.		42.6 GROUND SURFACE 0.0
40	39.1	3.5	14	14	15	29		Sat.		**COASTAL PLAIN** Black to gray-brown, silty fine SAND (A-2-4), with trace organics (roots) from 0.1' to 1.5'. 38.2 4.4
35	34.1	8.5	3	3	3	6				Gray, fine SAND (A-3), with trace silt.
30	29.1	13.5	WOH	WOH	WOH	0		Sat.		
25	24.1	18.5	2	2	2	4		Sat.		
20	19.1	23.5	WOH	WOH	2	2		Sat.		17.6 25.0 Boring Terminated at Elevation 17.6 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.1' = Black, MUCK
2) Strata break in split spoon at a depth of 4.4'
3) Water was ponded 0.2' above the ground surface at the time of 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 Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-33	**STATION** 17+23	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** 2.9
COLLAR ELEV. 42.7 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,223	**EASTING** 2,352,644	**24 HR.** 1.2
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/13/15	**COMP. DATE** 01/13/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
45										
	42.7	0.0	1	3	3	6		W		42.7 GROUND SURFACE 0.0
40	39.2	3.5	14	16	18	34		W		**COASTAL PLAIN** Black and gray to gray-brown, silty fine SAND (A-2-4), with trace organics (roots, wood fragments) from 0.3' to 1.5'.
35	34.2	8.5	5	4	2	6		Sat.		35.7 7.0 Gray, fine SAND (A-3), with trace silt.
30	29.2	13.5	WOR	WOR	2	2		Sat.		
25	24.2	18.5	1	1	2	3		Sat.		
20	19.2	23.5	WOH	WOH	1	1		Sat.		17.7 25.0 Boring Terminated at Elevation 17.7 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0'-0.3' = Surficial Organic Soils
2) Boring offset to top of ditch

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-34	**STATION** 17+85	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** 5.3
COLLAR ELEV. 41.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,272	**EASTING** 2,352,681	**24 HR.** 2.4
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/06/15	**COMP. DATE** 01/06/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
45										
	41.5	0.0	1	3	3	6		M		41.5 GROUND SURFACE 0.0
40	38.0	3.5	11	15	14	29		Sat.		Black to gray-brown, silty fine SAND (A-2-4), with trace organics (roots, wood fragments) from 0.2' to 1.5'.
35	33.0	8.5	6	6	6	12		Sat.		34.5 7.0 Gray, fine SAND (A-3), with trace silt.
30	28.0	13.5	WOH	2	2	4		Sat.		
25	23.0	18.5	WOH	1	1	2		Sat.		
20	18.0	23.5	WOH	1	2	3		Sat.		16.5 25.0 Boring Terminated at Elevation 16.5 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.2' = 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 Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-35	**STATION** 18+35	**OFFSET** CL	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 40.3 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,312	**EASTING** 2,352,711	**24 HR.** 2.3
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/05/15	**COMP. DATE** 01/05/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
40	40.3	0.0	2	3	3	6, 36		M		40.3 GROUND SURFACE 0.0
	36.8	3.5	14	17	19			W		**COASTAL PLAIN** Black & gray to gray-brown, silty fine SAND (A-2-4), with trace organics (roots) from 0.1' to 1.5'.
35										33.3 7.0
	31.8	8.5	3	3	3	6		Sat.		Gray, fine SAND (A-3), with trace silt, trace shell fragments from 13.5' to 15.0', and trace organics (roots) from 18.5' to 20.0'.
30										
	26.8	13.5	WOR	1	2	3		Sat.		
25										
	21.8	18.5	WOH	1	1	2		Sat.		
20										
	16.8	23.5	WOH	WOH	2	2		Sat.		15.3 25.0
										Boring Terminated at Elevation 15.3 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.1' = Surficial Organic Soils
2) 0 Hr. water level not measured

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 6 at -L- Sta. 84+50 Right				**GROUND WTR (ft)**
BORING NO. NW6-36	**STATION** 18+83	**OFFSET** 11 ft RT	**ALIGNMENT** -NW6-	**0 HR.** N/A
COLLAR ELEV. 41.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,362	**EASTING** 2,352,719	**24 HR.** 1.8
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/05/15	**COMP. DATE** 01/05/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	41.8	0.0	2	9	1	10		Sat.		41.8 GROUND SURFACE 0.0
40										**ALLUVIAL** Black MUCK and wood fragments with some silty fine sand. 39.8 2.0
	38.3	3.5	8	11	14	25		Sat.		Gray-brown, silty fine SAND (A-2-4), with moderate amount of organics (wood fragments). 37.7 4.1
35										**COASTAL PLAIN** Gray-brown, silty fine SAND (A-2-4). 34.8 7.0
	33.3	8.5	2	2	4	6		Sat.		Gray, fine SAND (A-3), with trace silt, trace shell fragments from 13.5' to 15.0', and trace organics (roots) from 23.5' to 25'.
30										
	28.3	13.5	1	2	1	3		Sat.		
25										
	23.3	18.5	1	1	2	3		Sat.		
20										
	18.3	23.5	WOR	WOR	3	3		Sat.		16.8 25.0
										Boring Terminated at Elevation 16.8 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.3' = Surficial Organic Soils
2) Strata break in split spoon at a depth of 4.1'
3) SPT N-values at 0.0'-1.5' and 3.5'-5.0' likely inflated due to presence of rip rap and wood fragments.
4) 0 Hr. water level not measured
5) Boring located in storm water ditch

SITE PHOTOGRAPHS

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

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

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4751	1	29

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 7 at -L- Sta. 71+50 Right*

CONTENTS

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PERSONNEL

D. Racey

C. Wang

S. Davis

M. Renza

INVESTIGATED BY *F&R, Inc.*

DRAWN BY *D. Racey*

CHECKED BY *B. Howey, PG, PE*

SUBMITTED BY *HDR, Inc.*

DATE *March 2015*

NORTH CAROLINA LICENSED SEAL 671 GEOLOGIST ELIZABETH C. HOWEY

DocuSigned by:
Elizabeth C. Howey
F80E690821524F3...
SIGNATURE

6/25/2015
DATE

PROJECT REFERENCE NO.	SHEET NO.
U-4751	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP		40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0		0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND					SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD								FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

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

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: N/A

ELEVATION: N/A FEET

NOTES:

BORING AND GROUND SURFACE ELEVATIONS OBTAINED FROM NCDOT-PROVIDED DTM FILE

FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-4751	3

SITE PLAN

0 100 200

FEET

70 75 -L- 80

NW7-1 NW7-2 NW7-3 NW7-4 NW7-5 NW7-6 NW7-7 NW7-8 NW7-9 NW7-10 NW7-11 NW7-12 NW7-13 NW7-14 NW7-15 NW7-16 NW7-17 NW7-18 NW7-19 NW7-20 NW7-21 NW7-22 NW7-23 NW7-24 NW7-25

15 20

-NW7-

TYPE 8 WALL

BEGIN NOISE WALL 7
-NW7- Sta. 10+00.00=
-L- Sta. 71+43.97

MATCHLINE -NW7- STA. 22+45.00
SEE SHEET 4

SUNCOAST DRIVE

48" RCP

PROGRESS ENERGY 100' R/W

PROGRESS ENERGY

SOIL

DIRT SPOIL 30' X 8' +/-

DIRT SPOIL 32' X 8' +/-

DIRT SPOIL 35' X 11' +/-

40' UTILITY & DRAINAGE EASEMENT UNRECORDED PARK HOMES MANOR

1.5' CURB-GUTTER

SHALLOW POND NO ELEV.

SHALLOW POND NO ELEV.

72" WD

30' DRAINAGE EASEMENT

40' UTILITY EASEMENT

10' UTILITY EASEMENT

20' DRAINAGE EASEMENT

2SFD

FOUND.

1SFD

SAVANNA RUN LOOP

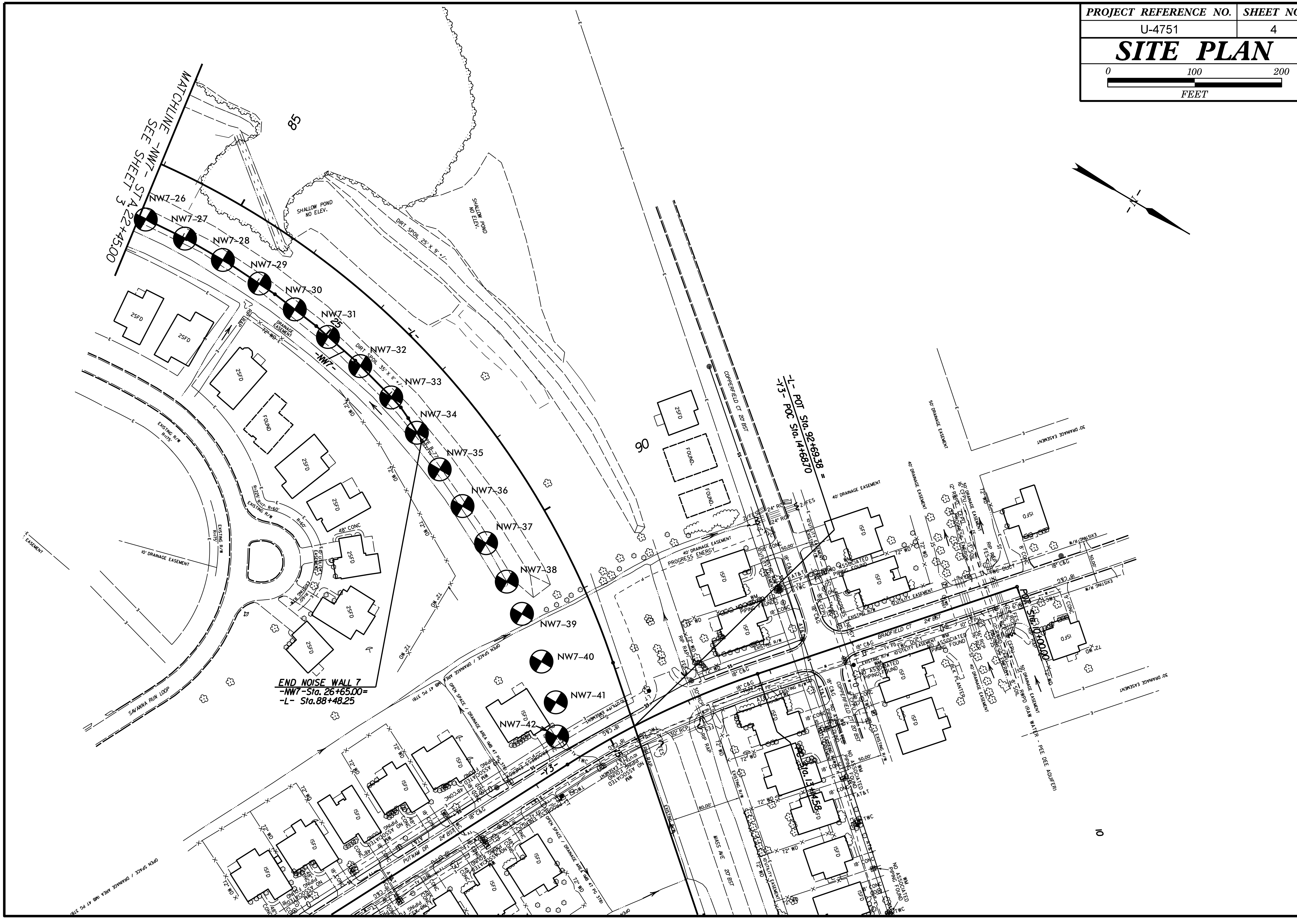
RIVIERA DR

EXISTING R/W

PROJECT REFERENCE NO.	SHEET NO.
U-4751	4

SITE PLAN

0 100 200
FEET



0	50	100
FEET		

VE = 5

PROJECT REFERENCE NO.	SHEET NO.
U-4751	5

PROFILE ALONG –NW7–

MATCH LINE STA. 16+25 SHEET 6

MINIMUM WALL HEIGHT

NW7-1	NW7-2	NW7-3	NW7-4	NW7-5	NW7-6	NW7-7	NW7-8	NW7-9	NW7-10	NW7-11	NW7-12	NW7-13
10+00	10+50	11+00	11+50	12+00	12+50	13+01	13+51	14+01	14+51	15+01	15+52	16+02

EXISTING GROUND SURFACE

60 50 40 30 20 10 0

10+00 11+00 12+00 13+00 14+00 15+00 16+00

Ⓐ Black & brown, very soft to soft, MUCK, black & gray, very loose to loose, moderately organic, silty fine SAND (A-2-4), black, soft to medium stiff, moderately organic, fine sandy SILT (A-4), moist to saturated **-COASTAL PLAIN-**

Ⓑ Gray-brown & gray, very soft to soft, fine sandy CLAY (A-7-5), saturated **-COASTAL PLAIN-**

Ⓒ Gray, brown, black & tan, very loose to very dense, fine SAND (A-3) and silty fine SAND (A-2-4), moist to saturated **-COASTAL PLAIN-**

Ⓓ Black & gray-brown, silty fine SAND (A-2-4), moderately organic, saturated **-ALLUVIAL-**

–NW7– GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NC DEPARTMENT OF TRANSPORTATION, DATED 1/29/15. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

0	50	100

FEET

VE = 5

PROJECT REFERENCE NO.	SHEET NO.
U-4751	6

PROFILE ALONG –NW7–

MATCH LINE STA. 16+25 SHEET 5

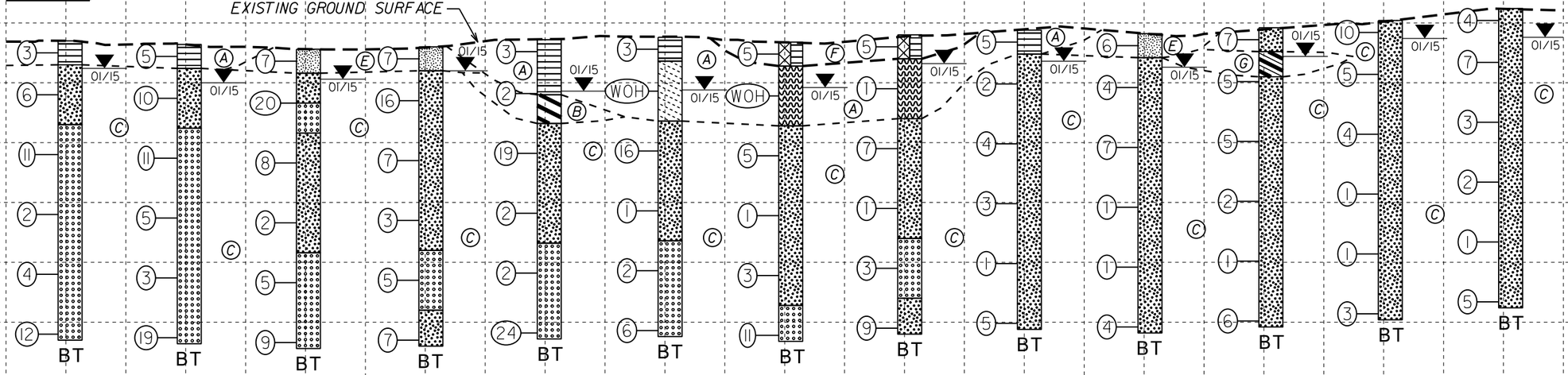
MATCH LINE STA. 22+75 SHEET 7

MINIMUM WALL HEIGHT

NW7-14	NW7-15	NW7-16	NW7-17	NW7-18	NW7-19	NW7-20	NW7-21	NW7-22	NW7-23	NW7-24	NW7-25	NW7-26
16+52	17+01	17+51	18+02	18+52	19+02	19+53	20+02	20+52	21+02	21+53	22+03	22+53
℄	℄	℄	℄	℄	℄	℄	℄	℄	℄	℄	℄	℄

EXISTING GROUND SURFACE

60 50 40 30 20 10 0



(A) Black & brown, very soft, MUCK, black & gray, very loose, moderately organic, silty fine SAND (A-2-4), black, soft to medium stiff, moderately organic, fine sandy SILT (A-4), moist to saturated **-COASTAL PLAIN-**

(B) Gray-brown & gray, very soft to soft, fine sandy CLAY (A-7-5), saturated **-COASTAL PLAIN-**

(C) Gray, brown, black & tan, very loose to medium dense, fine SAND (A-3) and silty fine SAND (A-2-4), moist to saturated **-COASTAL PLAIN-**

(E) Black, medium stiff, fine sandy SILT (A-4), moist **-COASTAL PLAIN-**

(F) Black, medium stiff, fine sandy SILT (A-4), moderately organic, moist to wet **-ARTIFICIAL FILL-**

(G) Tan-brown, medium stiff, fine sandy CLAY (A-6), saturated **-COASTAL PLAIN-**

–NW7– GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NC DEPARTMENT OF TRANSPORTATION, DATED 1/29/15. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

16+00 17+00 18+00 19+00 20+00 21+00 22+00

0	50	100

FEET

VE = 5

PROJECT REFERENCE NO.	SHEET NO.
U-4751	7

PROFILE ALONG –NW7–

MATCH LINE
STA. 22+75 SHEET 6

MINIMUM WALL HEIGHT

NW7-27	NW7-28	NW7-29	NW7-30	NW7-31	NW7-32	NW7-33	NW7-34
23+03	23+53	24+03	24+54	25+04	25+53	26+04	26+55
℄	℄	℄	℄	℄	℄	℄	℄

EXISTING GROUND SURFACE

60 50 40 30 20 10 0

01/15

BT

Ⓐ Black, very loose, silty fine SAND (A-2-4), with little organics and black, medium stiff, moderately organic, fine sandy SILT (A-4), moist to wet **-COASTAL PLAIN-**

Ⓒ Gray, brown, black & tan, very loose to very dense, fine SAND (A-3) and silty fine SAND (A-2-4), moist to saturated **-COASTAL PLAIN-**

Ⓗ Black, medium stiff to stiff, silty CLAY (A-6), moist to saturated **-COASTAL PLAIN-**

–NW7– GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NC DEPARTMENT OF TRANSPORTATION, DATED 1/29/15. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.

23+00 17+00 18+00 19+00 20+00 21+00 22+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 Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-1	**STATION** 10+00	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** N/A
COLLAR ELEV. 43.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,452	**EASTING** 2,353,145	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE 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** 0.5ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
45										
	43.1	0.0	WOH	1	1	2				WATER SURFACE (01/20/15) 43.1 / 0.0
								Sat.		**COASTAL PLAIN** Black, MUCK
40	39.6	3.5	2	4	5	9		Sat.		38.7 / 4.4 Gray-brown to gray, silty fine SAND (A-2-4), with trace clay from 4.4' to 10.0', sulphur odor from 23.5' to 25.0'.
35	34.6	8.5	5	2	1	3		Sat.		
30	29.6	13.5	WOH	WOH	WOH	0		Sat.		
25	24.6	18.5	3	3	6	9		Sat.		
20	19.6	23.5	8	12	13	25		Sat.		18.1 / 25.0 Boring Terminated at Elevation 18.1 ft in SAND (COASTAL PLAIN)

NOTES:

1) Strata break in split spoon at a depth of 4.4'.

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-2	**STATION** 10+50	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** N/A
COLLAR ELEV. 42.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,496	**EASTING** 2,353,121	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE 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** 0.3ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	42.8	0.0	WOH	WOH	WOH	0				WATER SURFACE (01/20/15) 42.8 / 0.0
								Sat.		**COASTAL PLAIN** Black, MUCK. 40.8 / 2.0
40	39.3	3.5	WOH	WOH	1	1		Sat.		Gray-brown, fine sandy CLAY (A-7-5), with some silt, trace organics (roots, wood fragments). 37.9 / 4.9 Gray, fine SAND (A-3), with trace silt.
35	34.3	8.5	6	3	2	5		Sat.		
30	29.3	13.5	WOH	WOH	WOH	0		Sat.		30.8 / 12.0 Gray, silty fine SAND (A-2-4).
25	24.3	18.5	3	2	3	5		Sat.		25.8 / 17.0 Gray, fine SAND (A-3), with trace silt, sulphur odor from 23.5' to 25.0'.
20	19.3	23.5	14	21	26	47		Sat.		17.8 / 25.0 Boring Terminated at Elevation 17.8 ft in SAND (COASTAL PLAIN)

NOTES:

1) Strata break in split spoon at a depth of 4.9'.

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-3	**STATION** 11+00	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 0.0
COLLAR ELEV. 43.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,539	**EASTING** 2,353,096	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE 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	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	43.5	0.0	WOH	WOH	WOH	0		Sat.		43.5 GROUND SURFACE	0.0
										COASTAL PLAIN	
40	40.0	3.5	WOH	WOH	2	2		Sat.		41.5 Black, MUCK.	2.0
										Gray-brown, fine sandy CLAY (A-7-5), with some silt, trace organics (roots, wood fragments).	
35	35.0	8.5	5	5	4	9		Sat.		38.6	4.9
										Gray, fine SAND (A-3), with trace silt, sulphur odor from 23.5' to 25.0'.	
30	30.0	13.5	WOR	WOR	WOH	0		Sat.			
25	25.0	18.5	2	3	3	6		Sat.			
20	20.0	23.5	6	16	19	35		Sat.		18.5	25.0
										Boring Terminated at Elevation 18.5 ft in SAND (COASTAL PLAIN)	

NOTES:

1) Strata break in split spoon at a depth of 4.9'.

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-4	**STATION** 11+50	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 0.3
COLLAR ELEV. 43.9 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,585	**EASTING** 2,353,078	**24 HR.** 0.0
DRILL RIG/HAMMER EFF./DATE 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** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	43.9	0.0	WOH	WOH	WOH	0		Sat.		43.9 GROUND SURFACE 0.0
										COASTAL PLAIN
40	40.4	3.5	1	1	1	2		Sat.		41.9 Black, MUCK. 2.0
										Gray-brown, fine sandy CLAY (A-7-5), with some silt, trace organics (wood fragments).
35	35.4	8.5	6	5	5	10		Sat.		36.9 7.0
										Gray, fine SAND (A-3), with trace silt, trace organics (wood fragments) from 8.5' to 15.0', and sulphur odor from 18.5' to 25.0'.
30	30.4	13.5	WOH	2	1	3		Sat.		
25	25.4	18.5	2	2	3	5		Sat.		
20	20.4	23.5	3	7	9	16		Sat.		18.9 25.0
										Boring Terminated at Elevation 18.9 ft in SAND (COASTAL PLAIN)

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-5	**STATION** 12+00	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 0.8
COLLAR ELEV. 43.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,634	**EASTING** 2,353,085	**24 HR.** 0.7
DRILL RIG/HAMMER EFF./DATE 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** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	43.8	0.0	1	0	1	1		W		43.8 GROUND SURFACE	0.0
40	40.3	3.5	6	4	7	11		Sat.		**COASTAL PLAIN** Black and gray to gray-brown, silty fine SAND (A-2-4), with trace organics (roots) from 0.2' to 10.0'.	
35	35.3	8.5	9	6	5	11		Sat.			
30	30.3	13.5	1	2	2	4		Sat.		26.8 Gray, fine SAND (A-3), with trace silt and sulphur odor.	17.0
25	25.3	18.5	2	2	3	5		Sat.			
20	20.3	23.5	6	12	15	27		Sat.		18.8 Boring Terminated at Elevation 18.8 ft in SAND (COASTAL PLAIN)	25.0

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-6	**STATION** 12+50	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 2.0
COLLAR ELEV. 43.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,676	**EASTING** 2,353,060	**24 HR.** 0.7
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/19/15	**COMP. DATE** 01/19/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	43.8	0.0	WOH	WOH	2	2		W		43.8 GROUND SURFACE 0.0
40	40.3	3.5	11	14	14	28		W		**COASTAL PLAIN** Black and gray to gray-brown, silty fine SAND (A-2-4), with trace organics (roots) from 0.2' to 1.5'.
35	35.3	8.5	9	8	7	15		Sat.		36.8 Gray, fine SAND (A-3), with trace silt, sulphur odor from 23.5' to 25.0'. 7.0
30	30.3	13.5	1	2	2	4		Sat.		
25	25.3	18.5	1	2	3	5		Sat.		
20	20.3	23.5	10	18	18	36		Sat.		18.8 Boring Terminated at Elevation 18.8 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-7	**STATION** 13+01	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 1.5
COLLAR ELEV. 43.7 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,712	**EASTING** 2,353,025	**24 HR.** 0.7
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/19/15	**COMP. DATE** 01/19/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	43.7	0.0	WOH	1	1	2				43.7 GROUND SURFACE	0.0
								M		**COASTAL PLAIN** Black and gray, silty fine SAND (A-2-4), with moderate organics (roots, wood fragments).	
40	40.2	3.5	11	13	13	26		W		39.9 Gray-brown, silty fine SAND (A-2-4).	3.8
										36.7	7.0
35	35.2	8.5	7	4	4	8		Sat.		Gray, fine SAND (A-3), with trace silt.	
30	30.2	13.5	WOH	2	3	5		Sat.			
25	25.2	18.5	WOH	2	2	4		Sat.			
20	20.2	23.5	13	43	43	86		Sat.		18.7	25.0
										Boring Terminated at Elevation 18.7 ft in SAND (COASTAL PLAIN)	

NOTES:

1) 0.0-0.2' = Surficial Organic Soils
2) Strata break in split spoon at a depth of 3.8'.

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-8	**STATION** 13+51	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 3.4
COLLAR ELEV. 43.7 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,748	**EASTING** 2,352,990	**24 HR.** 0.8
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/16/15	**COMP. DATE** 01/16/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	43.7	0.0	WOH	1	2	3				43.7 GROUND SURFACE	0.0
								M		**COASTAL PLAIN** Black & gray, silty fine SAND (A-2-4), with trace organics (roots) from 0.4' to 1.5'.	
40	40.2	3.5	8	5	6	11		W			
										36.7	7.0
35	35.2	8.5	6	6	5	11		Sat.		Gray, fine SAND (A-3), with trace silt, trace organics from 18.5' to 20.0', and sulphur odor from 23.5' to 25.0'.	
30	30.2	13.5	2	1	1	2		Sat.			
25	25.2	18.5	1	1	2	3		Sat.			
20	20.2	23.5	10	23	43	66		Sat.		18.7	25.0
										Boring Terminated at Elevation 18.7 ft in SAND (COASTAL PLAIN)	

NOTES:

1) 0.0-0.4' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-9	**STATION** 14+01	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 3.4
COLLAR ELEV. 43.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,784	**EASTING** 2,352,955	**24 HR.** 0.8
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/16/15	**COMP. DATE** 01/16/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	43.8	0.0	1	2	2	4		M		43.8 GROUND SURFACE	0.0
										COASTAL PLAIN Black & gray, silty fine SAND (A-2-4), with trace organics (roots) from 0.1' to 1.5'.	
40	40.3	3.5	8	7	7	14		M			
										36.8 Gray, fine SAND (A-3), with trace silt, sulphur odor from 23.5' to 25.0'.	7.0
35	35.3	8.5	5	4	5	9		W			
30	30.3	13.5	WOH	2	2	4		Sat.			
25	25.3	18.5	1	2	3	5		Sat.			
20	20.3	23.5	6	13	34	47		Sat.		18.8 Boring Terminated at Elevation 18.8 ft in SAND (COASTAL PLAIN)	25.0

NOTES:

1) 0.0-0.1' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-10	**STATION** 14+51	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 3.3
COLLAR ELEV. 43.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,826	**EASTING** 2,352,928	**24 HR.** 0.7
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/16/15	**COMP. DATE** 01/16/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	43.8	0.0	1	2	2	4		M		43.8 GROUND SURFACE	0.0
										COASTAL PLAIN	
										41.8 Black & gray, silty fine SAND (A-2-4), moderately organic.	2.0
40	40.3	3.5	9	9	9	18		M		Gray, silty fine SAND (A-2-4).	
										36.8 Gray, fine SAND (A-3), with trace silt.	7.0
35	35.3	8.5	6	5	5	10		W			
30	30.3	13.5	2	2	2	4		Sat.			
25	25.3	18.5	2	1	3	4		Sat.			
20	20.3	23.5	2	2	5	7		Sat.		18.8 Boring Terminated at Elevation 18.8 ft in SAND (COASTAL PLAIN)	25.0

NOTES:

1) 0.0-0.3' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-11	**STATION** 15+01	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** N/A
COLLAR ELEV. 38.3 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,869	**EASTING** 2,352,903	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/21/15	**COMP. DATE** 01/21/15	**SURFACE WATER DEPTH** 0.3ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
40	38.3	0.0								WATER SURFACE (01/21/15) 38.3 0.0
			1	0	1	1		Sat.		38.0 0.3 **ALLUVIAL** Black and gray-brown, silty fine SAND (A-2-4), with moderate amount of organics (grass, roots).
35	34.8	3.5	4	3	4	7		Sat.		36.3 2.0 **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'.
30	29.8	8.5	2	2	1	3		Sat.		
25	24.8	13.5	1	2	2	4		Sat.		
20	19.8	18.5	9	14	20	34		Sat.		
15	14.8	23.5	9	14	21	35		Sat.		13.3 25.0 Boring Terminated at Elevation 13.3 ft in SAND (COASTAL PLAIN)

NOTES:

1) Boring located in drainage ditch

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-12	**STATION** 15+52	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 4.0
COLLAR ELEV. 43.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,913	**EASTING** 2,352,877	**24 HR.** 2.8
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/21/15	**COMP. DATE** 01/21/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45	43.8	0.0	WOH	2	1	3		M		43.8 GROUND SURFACE 0.0
40	40.3	3.5	3	5	9	14		W		**COASTAL PLAIN** 41.8 2.0 Black, fine sandy SILT (A-4), moderately organic. Gray-brown, silty fine SAND (A-2-4).
35	35.3	8.5	11	10	10	20		Sat.		36.8 7.0 Gray, fine SAND (A-3), with trace silt, trace organics (roots) from 13.5' to 20.0'.
30	30.3	13.5	WOR	1	1	2		Sat.		
25	25.3	18.5	WOH	1	2	3		Sat.		
20	20.3	23.5	1	4	9	13		Sat.		18.8 25.0 Boring Terminated at Elevation 18.8 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-13	**STATION** 16+02	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 4.6
COLLAR ELEV. 43.4 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,956	**EASTING** 2,352,852	**24 HR.** 2.9
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/21/15	**COMP. DATE** 01/21/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	43.4	0.0	WOH	2	2	4		M		43.4 GROUND SURFACE	0.0
40	39.9	3.5	8	9	13	22		W		**COASTAL PLAIN** 41.4 Black, fine sandy SILT (A-4), moderately organic. Gray-brown, silty fine SAND (A-2-4).	2.0
35	34.9	8.5	9	7	6	13		Sat.		36.4 Gray, fine SAND (A-3), with trace silt and trace organics (wood fragments) from 23.5' to 25.0'.	7.0
30	29.9	13.5	WOH	2	2	4		Sat.			
25	24.9	18.5	WOH	2	2	4		Sat.			
20	19.9	23.5	3	5	13	18		Sat.		18.4 Boring Terminated at Elevation 18.4 ft in SAND (COASTAL PLAIN)	25.0

NOTES:

1) 0.0-0.3' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-14	**STATION** 16+52	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 8.3
COLLAR ELEV. 43.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 192,999	**EASTING** 2,352,826	**24 HR.** 2.3
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/21/15	**COMP. DATE** 01/21/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	43.5	0.0	WOH	1	2	3		M		43.5 GROUND SURFACE	0.0
40	40.0	3.5	2	3	3	6		W		**COASTAL PLAIN** 41.5 Black, fine sandy SILT (A-4), moderately organic. Gray-brown, silty fine SAND (A-2-4).	2.0
35	35.0	8.5	6	6	5	11		Sat.		36.5 Gray, fine SAND (A-3), with trace silt and trace organics (wood fragments) from 18.5' to 25.0'.	7.0
30	30.0	13.5	WOR	1	1	2		Sat.			
25	25.0	18.5	1	2	2	4		Sat.			
20	20.0	23.5	3	5	7	12		Sat.		18.5 Boring Terminated at Elevation 18.5 ft in SAND (COASTAL PLAIN)	25.0

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-15	**STATION** 17+01	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 3.9
COLLAR ELEV. 43.2 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,042	**EASTING** 2,352,801	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/22/15	**COMP. DATE** 01/22/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45										
	43.2	0.0	1	2	3	5		M		43.2 GROUND SURFACE 0.0
40										**COASTAL PLAIN**
	39.7	3.5	2	4	6	10		W		41.2 Black, fine sandy SILT (A-4), moderately organic. 2.0
35										Gray-brown, silty fine SAND (A-2-4).
	34.7	8.5	6	6	5	11		Sat.		36.2 Gray, fine SAND (A-3), with trace silt and sulphur odor from 18.5' to 25.0'. 7.0
30										
	29.7	13.5	WOH	2	3	5		Sat.		
25										
	24.7	18.5	WOH	1	2	3		Sat.		
20										
	19.7	23.5	5	8	11	19		Sat.		18.2 Boring Terminated at Elevation 18.2 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) 0.0-0.1' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-16	**STATION** 17+51	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 3.6
COLLAR ELEV. 42.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,085	**EASTING** 2,352,776	**24 HR.** 2.5
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/22/15	**COMP. DATE** 01/22/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	42.8	0.0	2	3	4	7		M		42.8 GROUND SURFACE 0.0
40										**COASTAL PLAIN**
	39.3	3.5	7	11	9	20		W		40.8 Black, fine sandy SILT (A-4), with trace organics (roots). 2.0
35										38.3 Gray-brown, silty fine SAND (A-2-4). 4.5
	34.3	8.5	5	5	3	8		Sat.		Gray, fine SAND (A-3), with trace silt.
30										35.8 Gray, silty fine SAND (A-2-4), with trace organics from 13.5' to 15.0'. 7.0
	29.3	13.5	1	1	1	2		Sat.		
25										
	24.3	18.5	2	2	3	5		Sat.		25.8 Gray, fine SAND (A-3), with trace silt and sulphur odor. 17.0
20										
	19.3	23.5	3	2	7	9		Sat.		17.8 Boring Terminated at Elevation 17.8 ft in SAND (COASTAL PLAIN) 25.0

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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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-17	**STATION** 18+02	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 2.5
COLLAR ELEV. 43.0 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,129	**EASTING** 2,352,750	**24 HR.** 2.0
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/22/15	**COMP. DATE** 01/22/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	43.0	0.0	1	2	5	7				43.0 GROUND SURFACE	0.0
40	39.5	3.5	6	8	8	16		W		**COASTAL PLAIN** Black, fine sandy SILT (A-4), with trace organics (roots).	2.0
										41.0 Gray-brown to gray, silty fine SAND (A-2-4).	
35	34.5	8.5	5	4	3	7		Sat.			
30	29.5	13.5	WOH	1	2	3		Sat.			
										26.0 Gray, fine SAND (A-3), with trace silt.	17.0
25	24.5	18.5	1	3	2	5		Sat.			
										21.0 Gray, silty fine SAND (A-2-4).	22.0
20	19.5	23.5	3	4	3	7		Sat.		18.0 Boring Terminated at Elevation 18.0 ft in SAND (COASTAL PLAIN)	25.0

NOTES:

1) 0.0-0.3' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-18	**STATION** 18+52	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 4.4
COLLAR ELEV. 43.6 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,171	**EASTING** 2,352,724	**24 HR.** 4.3
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/22/15	**COMP. DATE** 01/22/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	43.6	0.0	WOH	2	1	3		W		43.6 GROUND SURFACE	0.0
40	40.1	3.5	1	1	1	2		Sat.		**COASTAL PLAIN** Black, fine sandy SILT (A-4), moderately organic.	4.6
										39.0 Gray, fine sandy CLAY (A-7-5).	7.0
35	35.1	8.5	7	9	10	19		Sat.		36.6 Gray, silty fine SAND (A-2-4).	
30	30.1	13.5	WOH	1	1	2		Sat.			
										26.6 Gray, fine SAND (A-3), with trace silt, sulphur odor.	17.0
25	25.1	18.5	WOH	1	1	2		Sat.			
20	20.1	23.5	8	11	13	24		Sat.		18.6 Boring Terminated at Elevation 18.6 ft in SAND (COASTAL PLAIN)	25.0

NOTES:

1) Strata break in split spoon at a depth of 4.6'.

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-19	**STATION** 19+02	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 4.8
COLLAR ELEV. 43.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,214	**EASTING** 2,352,698	**24 HR.** 4.4
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/22/15	**COMP. DATE** 01/22/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
45										
	43.8	0.0	1	2	1	3		W		43.8 GROUND SURFACE 0.0 **COASTAL PLAIN**
40	40.3	3.5	WOH	WOH	WOH	0		Sat.		41.8 Black, fine sandy SILT (A-4), moderately organic. 2.0 Black, silty fine SAND (A-2-4), moderately organic, with some clay.
35	35.3	8.5	6	8	8	16		Sat.		36.8 Gray, silty fine SAND (A-2-4), with trace organics (roots) from 13.5' to 15.0'. 7.0
30	30.3	13.5	WOR	WOH	1	1		Sat.		
25	25.3	18.5	WOH	WOH	2	2		Sat.		26.8 Gray, fine SAND (A-3), with trace silt and sulphur odor. 17.0
20	20.3	23.5	2	3	3	6		Sat.		18.8 Boring Terminated at Elevation 18.8 ft in SAND (COASTAL PLAIN) 25.0

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-20	**STATION** 19+53	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 4.4
COLLAR ELEV. 43.4 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,259	**EASTING** 2,352,675	**24 HR.** 3.8
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/22/15	**COMP. DATE** 01/22/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	43.4	0.0	WOH	2	3	5		W		43.4 GROUND SURFACE 0.0 **ARTIFICIAL FILL**
40	39.9	3.5	WOH	WOH	WOH	0		Sat.		41.4 Black, fine sandy SILT (A-4), moderately organic, with some clay. 2.0 **COASTAL PLAIN** Black, MUCK
35	34.9	8.5	4	3	2	5		Sat.		36.4 Tan, silty fine SAND (A-2-4), with strong sulphur odor from 13.5' to 20.0'. 7.0
30	29.9	13.5	WOH	WOH	1	1		Sat.		
25	24.9	18.5	WOH	1	2	3		Sat.		21.4 Gray, fine SAND (A-3), with trace silt, sulphur odor. 22.0
20	19.9	23.5	4	5	6	11		Sat.		18.4 Boring Terminated at Elevation 18.4 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) Small pond located beside boring on the other side of berm

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-21	**STATION** 20+02	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 3.7
COLLAR ELEV. 44.0 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,304	**EASTING** 2,352,654	**24 HR.** 2.4
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/23/15	**COMP. DATE** 01/23/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
45										
	44.0	0.0	1	2	3	5		M		44.0 GROUND SURFACE 0.0
40	40.5	3.5	WOH	WOH	1	1		Sat.		42.0 **ARTIFICIAL FILL** Black, fine sandy SILT (A-4), moderately organic, with some clay. 2.0 **COASTAL PLAIN** Brown and black, MUCK
35	35.5	8.5	4	4	3	7		Sat.		37.0 Tan, silty fine SAND (A-2-4). 7.0
30	30.5	13.5	WOR	WOH	1	1		Sat.		
25	25.5	18.5	WOH	1	2	3		Sat.		27.0 Gray, fine SAND (A-3), with trace silt and a 0.2' thick layer of moderately organic silty clay. 17.0
20	20.5	23.5	3	4	5	9		Sat.		22.0 Gray, silty fine SAND (A-2-4), with trace organics. 22.0 19.0 Boring Terminated at Elevation 19.0 ft in SAND (COASTAL PLAIN) 25.0

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-22	**STATION** 20+52	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 4.0
COLLAR ELEV. 44.4 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,351	**EASTING** 2,352,637	**24 HR.** 2.6
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/23/15	**COMP. DATE** 01/23/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	44.4	0.0	1	3	2	5		M		44.4 GROUND SURFACE 0.0
40	40.9	3.5	WOH	1	1	2		Sat.		42.4 **COASTAL PLAIN** Black, fine sandy SILT (A-4), moderately organic, with some clay. 2.0 Gray-brown and tan to gray, silty fine SAND (A-2-4), sulphur odor from 8.5' to 20.0'.
35	35.9	8.5	3	2	2	4		Sat.		
30	30.9	13.5	WOH	1	2	3		Sat.		
25	25.9	18.5	WOR	1	0	1		Sat.		
20	20.9	23.5	WOH	2	3	5		Sat.		19.4 Boring Terminated at Elevation 19.4 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-23	**STATION** 21+02	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 3.8
COLLAR ELEV. 44.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,399	**EASTING** 2,352,622	**24 HR.** 2.8
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/23/15	**COMP. DATE** 01/23/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
45										
	44.1	0.0	1	3	3	6		M		44.1 GROUND SURFACE 0.0
40	40.6	3.5	1	2	2	4		W		**COASTAL PLAIN** 42.1 Black, fine sandy SILT (A-4), with trace clay and organics (roots, wood fragments). 2.0 Gray-brown to tan, silty fine SAND (A-2-4), with sulphur odor from 8.5' to 25.0'.
35	35.6	8.5	5	4	3	7		Sat.		
30	30.6	13.5	WOR	WOR	1	1		Sat.		
25	25.6	18.5	WOR	WOH	1	1		Sat.		
20	20.6	23.5	WOH	2	2	4		Sat.		19.1 Boring Terminated at Elevation 19.1 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-24	**STATION** 21+53	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 2.6
COLLAR ELEV. 44.6 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,448	**EASTING** 2,352,610	**24 HR.** 2.4
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/26/15	**COMP. DATE** 01/26/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	44.6	0.0	2	4	3	7		W		44.6 GROUND SURFACE 0.0
40	41.1	3.5	2	2	3	5		Sat.		**COASTAL PLAIN** 42.6 Black and gray, silty fine SAND (A-2-4), with trace organics (roots). 2.0 40.5 Tan-brown, fine sandy CLAY (A-6). 4.1
35	36.1	8.5	3	3	2	5		Sat.		Black and gray to tan and gray, silty fine SAND (A-2-4).
30	31.1	13.5	WOH	1	1	2		Sat.		
25	26.1	18.5	WOH	WOH	1	1		Sat.		
20	21.1	23.5	2	3	3	6		Sat.		19.6 Boring Terminated at Elevation 19.6 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) 0.0-0.2' = Surficial Organic Soils
2) Strata break in split spoon at a depth of 4.1'.

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-25	**STATION** 22+03	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 3.2
COLLAR ELEV. 45.2 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,497	**EASTING** 2,352,601	**24 HR.** 1.5
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/26/15	**COMP. DATE** 01/26/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
50										
45	45.2	0.0	2	5	5	10		W		45.2 GROUND SURFACE 0.0
	41.7	3.5	2	2	3	5		Sat.		**COASTAL PLAIN** Black to tan and gray, silty fine SAND (A-2-4), with trace organics (roots, wood fragments) from 0.0' to 1.5' and trace clay from 3.5' to 5.0'.
40										
	36.7	8.5	2	2	2	4		Sat.		
35										
	31.7	13.5	WOR	WOH	1	1		Sat.		
30										
	26.7	18.5	1	0	1	1		Sat.		
25										
	21.7	23.5	1	1	2	3		Sat.		20.2 25.0 Boring Terminated at Elevation 20.2 ft in SAND (COASTAL PLAIN)

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-26	**STATION** 22+53	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 2.8
COLLAR ELEV. 46.2 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,547	**EASTING** 2,352,595	**24 HR.** 2.4
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/26/15	**COMP. DATE** 01/26/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
50										
	46.2	0.0								46.2 GROUND SURFACE 0.0
45			1	2	2	4		W		**COASTAL PLAIN** Black to gray and brown, silty fine SAND (A-2-4), with trace organics (roots, wood fragments) from 0.4' to 1.5'.
	42.7	3.5	3	4	3	7		Sat.		
40										
	37.7	8.5	2	1	2	3		Sat.		
35										
	32.7	13.5	WOH	1	1	2		Sat.		
30										
	27.7	18.5	WOR	WOH	1	1		Sat.		
25										
	22.7	23.5	1	2	3	5		Sat.		21.2 25.0 Boring Terminated at Elevation 21.2 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.4' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-27	**STATION** 23+03	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 3.5
COLLAR ELEV. 45.9 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,597	**EASTING** 2,352,591	**24 HR.** 1.9
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/27/15	**COMP. DATE** 01/27/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
50											
45	45.9	0.0	4	5	4	9				45.9 GROUND SURFACE	0.0
	42.4	3.5	5	6	7	13		W		**COASTAL PLAIN** Black, brown, and gray, silty fine SAND (A-2-4), with trace organics and roots from 0.2' to 1.5'.	
40											
	37.4	8.5	2	2	1	3		Sat.			
35											
	32.4	13.5	WOR	WOH	1	1		Sat.			
30											
	27.4	18.5	WOH	1	1	2		Sat.			
25											
	22.4	23.5	WOH	3	2	5		Sat.		20.9	25.0
										Boring Terminated at Elevation 20.9 ft in SAND (COASTAL PLAIN)	

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-28	**STATION** 23+53	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 1.5
COLLAR ELEV. 46.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,647	**EASTING** 2,352,590	**24 HR.** 1.1
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/27/15	**COMP. DATE** 01/27/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
50										
45	46.1	0.0	WOH	1	2	3				46.1 GROUND SURFACE 0.0
	42.6	3.5	7	9	9	18		W		44.6 **COASTAL PLAIN** Black, silty fine SAND (A-2-4), with little organics (roots, wood fragments). 1.5
40										Gray-brown to gray, silty fine SAND (A-2-4).
	37.6	8.5	2	2	2	4		Sat.		
35										
	32.6	13.5	WOH	1	1	2		Sat.		
30										
	27.6	18.5	WOH	2	2	4		Sat.		
25										
	22.6	23.5	2	2	2	4		Sat.		21.1 25.0
										Boring Terminated at Elevation 21.1 ft in SAND (COASTAL PLAIN)

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-29	**STATION** 24+03	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 2.0
COLLAR ELEV. 46.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,697	**EASTING** 2,352,592	**24 HR.** 0.9
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/27/15	**COMP. DATE** 01/27/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
50										
45	46.1	0.0	WOH	WOH	2	2		W		46.1 GROUND SURFACE 0.0
										44.6 **COASTAL PLAIN** 1.5
	42.6	3.5	2	2	7	9		Sat.		Black, silty fine SAND (A-2-4), with little organics (roots, wood fragments).
40										Gray-brown, tan-gray & gray, silty fine SAND (A-2-4).
	37.6	8.5	5	7	6	13		Sat.		
35										
	32.6	13.5	WOH	WOH	1	1		Sat.		
30										
	27.6	18.5	1	3	4	7		Sat.		
25										
	22.6	23.5	WOH	1	3	4		Sat.		21.1 25.0
										Boring Terminated at Elevation 21.1 ft in SAND (COASTAL PLAIN)

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-30	**STATION** 24+54	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 1.8
COLLAR ELEV. 46.0 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,747	**EASTING** 2,352,597	**24 HR.** 1.1
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/27/15	**COMP. DATE** 01/27/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
50										
45	46.0	0.0	2	3	3	6		W		46.0 GROUND SURFACE 0.0
										COASTAL PLAIN
	42.5	3.5	9	13	14	27		Sat.		Black-brown to gray-tan, silty fine SAND (A-2-4).
40										
	37.5	8.5	6	6	6	12		Sat.		
35										
	32.5	13.5	WOH	WOH	2	2		Sat.		
30										29.0 17.0
	27.5	18.5	2	2	4	6		Sat.		Gray, fine SAND (A-3), with trace silt.
25										
	22.5	23.5	WOH	2	3	5		Sat.		21.0 25.0
										Boring Terminated at Elevation 21.0 ft in SAND (COASTAL PLAIN)

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-31	**STATION** 25+04	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 0.1
COLLAR ELEV. 44.8 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,796	**EASTING** 2,352,605	**24 HR.** 0.1
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/27/15	**COMP. DATE** 01/27/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
	44.8	0.0	2	3	4	7 30		W		44.8 GROUND SURFACE	0.0
40	41.3	3.5	6	13	17			Sat.		**COASTAL PLAIN** Black, fine sandy SILT (A-4), with little organics (roots, wood fragments). 42.8	2.0
	36.3	8.5	4	4	5	9		Sat.		Brown to gray, silty fine SAND (A-2-4).	
35											
	31.3	13.5	WOH	2	3	5		Sat.			
30											
	26.3	18.5	3	4	4	8		Sat.		27.8 Gray, fine SAND (A-3), with trace silt.	17.0
25											
	21.3	23.5	3	6	4	10		Sat.		19.8 Boring Terminated at Elevation 19.8 ft in SAND (COASTAL PLAIN)	25.0
20											

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-32	**STATION** 25+53	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 1.4
COLLAR ELEV. 45.6 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,845	**EASTING** 2,352,615	**24 HR.** 0.1
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/28/15	**COMP. DATE** 01/28/15	**SURFACE WATER DEPTH** 0.2ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
50										
	45.6	0.0	2	3	3	6		W		45.6 GROUND SURFACE 0.0
45										
	42.1	3.5	8	14	17	31		W		**COASTAL PLAIN** 43.6 Black, silty CLAY (A-6), with trace fine sand and organics (roots, wood fragments). 2.0
40										Gray-brown to gray, silty fine SAND (A-2-4).
	37.1	8.5	6	5	6	11		Sat.		
35										
	32.1	13.5	1	2	3	5		Sat.		28.6 Gray, fine SAND (A-3), with trace silt. 17.0
30										
	27.1	18.5	1	2	2	4		Sat.		
25										
	22.1	23.5	2	5	7	12		Sat.		20.6 Boring Terminated at Elevation 20.6 ft in SAND (COASTAL PLAIN) 25.0

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-33	**STATION** 26+04	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 1.2
COLLAR ELEV. 45.7 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,894	**EASTING** 2,352,628	**24 HR.** 0.1
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/28/15	**COMP. DATE** 01/28/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										45.7 GROUND SURFACE	0.0
45	45.7	0.0	2	4	3	7 40		Sat.		**COASTAL PLAIN**	
	42.2	3.5								43.7 Black, silty CLAY (A-6), with trace fine sand, and organics (roots, wood fragments).	2.0
40			18	19	21			Sat.		Gray-brown to gray, silty fine SAND (A-2-4).	
	37.2	8.5									
35			6	7	8	15		Sat.			
	32.2	13.5									
30			WOH	2	2	4		Sat.			
	27.2	18.5									
25			1	3	2	5		Sat.			
	22.2	23.5									
			1	2	2	4		Sat.		20.7	25.0
										Boring Terminated at Elevation 20.7 ft in SAND (COASTAL PLAIN)	

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-34	**STATION** 26+55	**OFFSET** CL	**ALIGNMENT** -NW7-	**0 HR.** 1.9
COLLAR ELEV. 43.7 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,940	**EASTING** 2,352,648	**24 HR.** 1.5
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/28/15	**COMP. DATE** 01/28/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
45										43.7 GROUND SURFACE	0.0
	43.7	0.0	3	4	4	8		M		**COASTAL PLAIN**	
40	40.2	3.5	5	9	12	21		Sat.		41.7 Black, silty CLAY (A-6), with trace sand, and organics (roots).	2.0
										Gray-brown to gray, silty fine SAND (A-2-4), with trace organics (roots) from 3.5' to 5.0'.	
35	35.2	8.5	3	4	6	10		Sat.			
30	30.2	13.5	1	2	2	4		Sat.			
25	25.2	18.5	2	1	2	3		Sat.			
20	20.2	23.5	1	3	4	7		Sat.		18.7	25.0
										Boring Terminated at Elevation 18.7 ft in SAND (COASTAL PLAIN)	

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-35	**STATION** 88+90	**OFFSET** 75 ft RT	**ALIGNMENT** -L-	**0 HR.** 1.5
COLLAR ELEV. 42.2 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 193,984	**EASTING** 2,352,671	**24 HR.** 1.5
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/28/15	**COMP. DATE** 01/28/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
45										
	42.2	0.0	1	2	2	4		W		42.2 GROUND SURFACE 0.0
40										**COASTAL PLAIN**
	38.7	3.5	2	7	13	20		Sat.		40.2 Black, silty CLAY (A-6), with trace sand, and organics (roots). 2.0
35										Gray-brown to gray, silty fine SAND (A-2-4).
	33.7	8.5	4	5	4	9		Sat.		
30										
	28.7	13.5	WOH	1	2	3		Sat.		
25										
	23.7	18.5	WOH	2	1	3		Sat.		
20										
	18.7	23.5	1	2	3	5		Sat.		17.2 25.0
										Boring Terminated at Elevation 17.2 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.3' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-36	**STATION** 89+45	**OFFSET** 77 ft RT	**ALIGNMENT** -L-	**0 HR.** 2.2
COLLAR ELEV. 42.2 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,028	**EASTING** 2,352,694	**24 HR.** 1.9
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/29/15	**COMP. DATE** 01/29/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
45										
	42.2	0.0	1	3	3	6				42.2 GROUND SURFACE 0.0
40										**COASTAL PLAIN**
	38.7	3.5	2	8	13	21		Sat.		40.2 Black, fine sandy SILT (A-4). 2.0
35										Gray-brown to tan & gray, fine SAND (A-2-4).
	33.7	8.5	3	3	2	5		Sat.		
30										
	28.7	13.5	WOH	1	1	2		Sat.		
25										
	23.7	18.5	1	2	3	5		Sat.		
20										
	18.7	23.5	WOH	1	3	4		Sat.		17.2 25.0
										Boring Terminated at Elevation 17.2 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.2' = Surficial Organic Soils

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WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right			**GROUND WTR (ft)**
BORING NO. NW7-37	**STATION** 89+99	**OFFSET** 77 ft RT	**ALIGNMENT** -L-	**0 HR.** 1.9
COLLAR ELEV. 42.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,073	**EASTING** 2,352,717	**24 HR.** 1.9
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/29/15	**COMP. DATE** 01/29/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
45										
	42.1	0.0	1	2	4	6				42.1 GROUND SURFACE 0.0 **COASTAL PLAIN**
40	38.6	3.5	3	4	5	9		W		40.1 Black, fine sandy SILT (A-4). 2.0 Gray-brown, silty fine SAND (A-2-4), moderately organic.
35	33.6	8.5	4	3	2	5		Sat.		37.1 Gray-tan to gray, silty fine SAND (A-2-4), with trace organics from 18.5' to 25.0'. 5.0
30	28.6	13.5	WOH	1	2	3		Sat.		
25	23.6	18.5	2	3	2	5		Sat.		
20	18.6	23.5	3	4	6	10		Sat.		17.1 25.0 Boring Terminated at Elevation 17.1 ft in SAND (COASTAL PLAIN)

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right			**GROUND WTR (ft)**
BORING NO. NW7-38	**STATION** 90+54	**OFFSET** 77 ft RT	**ALIGNMENT** -L-	**0 HR.** 1.3
COLLAR ELEV. 42.4 ft	**TOTAL DEPTH** 24.9 ft	**NORTHING** 194,116	**EASTING** 2,352,743	**24 HR.** 1.2
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/29/15	**COMP. DATE** 01/29/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										
	42.4	0.0	WOH	2	2	4				42.4 GROUND SURFACE 0.0 **COASTAL PLAIN**
40	39.0	3.4	2	3	3	6		W		Black to gray-brown, silty fine SAND (A-2-4), with trace organics (roots, wood fragments) from 0.1' to 5.0'.
35	34.0	8.4	2	2	2	4		Sat.		
30	29.0	13.4	WOR	WOH	1	1		Sat.		
25	24.0	18.4	WOR	WOR	WOH	0		Sat.		
20	19.0	23.4	WOR	2	4	6		Sat.		17.5 24.9 Boring Terminated at Elevation 17.5 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 Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right			**GROUND WTR (ft)**
BORING NO. NW7-39	**STATION** 90+98	**OFFSET** 77 ft RT	**ALIGNMENT** -L-	**0 HR.** 2.6
COLLAR ELEV. 42.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,150	**EASTING** 2,352,766	**24 HR.** 2.2
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/29/15	**COMP. DATE** 01/29/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
45										
	42.1	0.0	WOH	1	2	3		W		42.1 GROUND SURFACE 0.0
40	38.6	3.5	5	6	7	13		Sat.		**COASTAL PLAIN** Black, silty fine SAND (A-2-4), with trace organics (roots, wood fragments). 38.6 3.5
										Gray-brown, silty fine SAND (A-2-4), moderately organic. 37.1 5.0
35	33.6	8.5	2	2	4	6		Sat.		Gray, silty fine SAND (A-2-4), with trace organics (roots) from 18.5' to 25.0'.
30	28.6	13.5	2	1	1	2		Sat.		
25	23.6	18.5	1	1	2	3		Sat.		
20	18.6	23.5	1	3	4	7		Sat.		17.1 25.0 Boring Terminated at Elevation 17.1 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.2' = Surficial Organic Soils
2) Boring offset to top of ditch.

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right			**GROUND WTR (ft)**
BORING NO. NW7-40	**STATION** 91+62	**OFFSET** 77 ft RT	**ALIGNMENT** -L-	**0 HR.** 3.6
COLLAR ELEV. 43.9 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,197	**EASTING** 2,352,802	**24 HR.** 3.4
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/29/15	**COMP. DATE** 01/29/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
45										
	43.9	0.0	2	4	4	8		W		43.9 GROUND SURFACE 0.0
40	40.4	3.5	3	1	2	3		Sat.		**COASTAL PLAIN** Black to gray-brown and gray, silty fine SAND (A-2-4), with trace organics (roots) from 0.1' to 1.5' and from 18.5' to 20.0'.
35	35.4	8.5	2	2	3	5		Sat.		
30	30.4	13.5	2	1	2	3		Sat.		
25	25.4	18.5	WOR	WOR	1	1		Sat.		
20	20.4	23.5	2	2	3	5		Sat.		18.9 25.0 Boring Terminated at Elevation 18.9 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 Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-41	**STATION** 92+15	**OFFSET** 77 ft RT	**ALIGNMENT** -L-	**0 HR.** 4.1
COLLAR ELEV. 44.0 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,235	**EASTING** 2,352,834	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/30/15	**COMP. DATE** 01/30/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
45	44.0	0.0	2	4	6	10		W		44.0 GROUND SURFACE 0.0
										COASTAL PLAIN
40	40.5	3.5	5	4	4	8		W		Gray-brown to tan and gray, silty fine SAND (A-2-4), with trace organics (roots, wood fragments) from 0.1' to 1.5'.
35	35.5	8.5	3	5	6	11		Sat.		
30	30.5	13.5	WOH	WOH	1	1		Sat.		
25	25.5	18.5	WOR	WOH	1	1		Sat.		
20	20.5	23.5	WOR	1	3	4		Sat.		19.0 25.0
										Boring Terminated at Elevation 19.0 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.1' = Surficial Organic Soils

WBS 40191.1.2	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** D. Racey	
SITE DESCRIPTION SR 1409 (Military Cutoff Road) to US 17 in Wilmington - Noise Wall 7 at -L- Station 71+50 Right				**GROUND WTR (ft)**
BORING NO. NW7-42	**STATION** 92+53	**OFFSET** 88 ft RT	**ALIGNMENT** -L-	**0 HR.** 4.0
COLLAR ELEV. 43.5 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 194,256	**EASTING** 2,352,867	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R5785 CME-55 75% 01/17/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 01/30/15	**COMP. DATE** 01/30/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45	43.5	0.0	2	5	6	11		W		43.5 GROUND SURFACE 0.0
										COASTAL PLAIN
40	40.0	3.5	2	2	1	3		Sat.		Black to tan-gray, silty fine SAND (A-2-4), with trace organics (roots, wood fragments) from 0.1' to 1.5'.
35	35.0	8.5	4	5	5	10		Sat.		
30	30.0	13.5	WOR	WOH	1	1		Sat.		
25	25.0	18.5	WOR	WOH	1	1		Sat.		
20	20.0	23.5	WOR	1	2	3		Sat.		18.5 25.0
										Boring Terminated at Elevation 18.5 ft in SAND (COASTAL PLAIN)

NOTES:

1) 0.0-0.1' = Surficial Organic Soils
2) Boring offset beside driveway.

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4751	1	4

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 ROAD) TO US 17 IN WILMINGTON*

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

REFERENCE: U-4751

PROJECT: 40191

CONTENTS

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

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*

NORTH CAROLINA PROFESSIONAL SEAL 036072 ENGINEER MAHALINGAM BAHIRADHAN

DocuSigned by:
Mahalingam Bahiradhan 6/9/2015
4DEAD345...
SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
U-4751	2 OF 4

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX			— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0		0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND					SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD								FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CME 45B
- [X] GEOPROBE

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [X] TRICONE 2.94 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [X] DSA123 CPT

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

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

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: B-12, N 194319.9492, E 2352785.5298, EL 42.71'
BL-13, N 195088.0139, E 2353453.0688, EL 41.90'
BL-14, N 195848.7733, E 2353849.1471, EL 41.54'ELEVATION: FEET

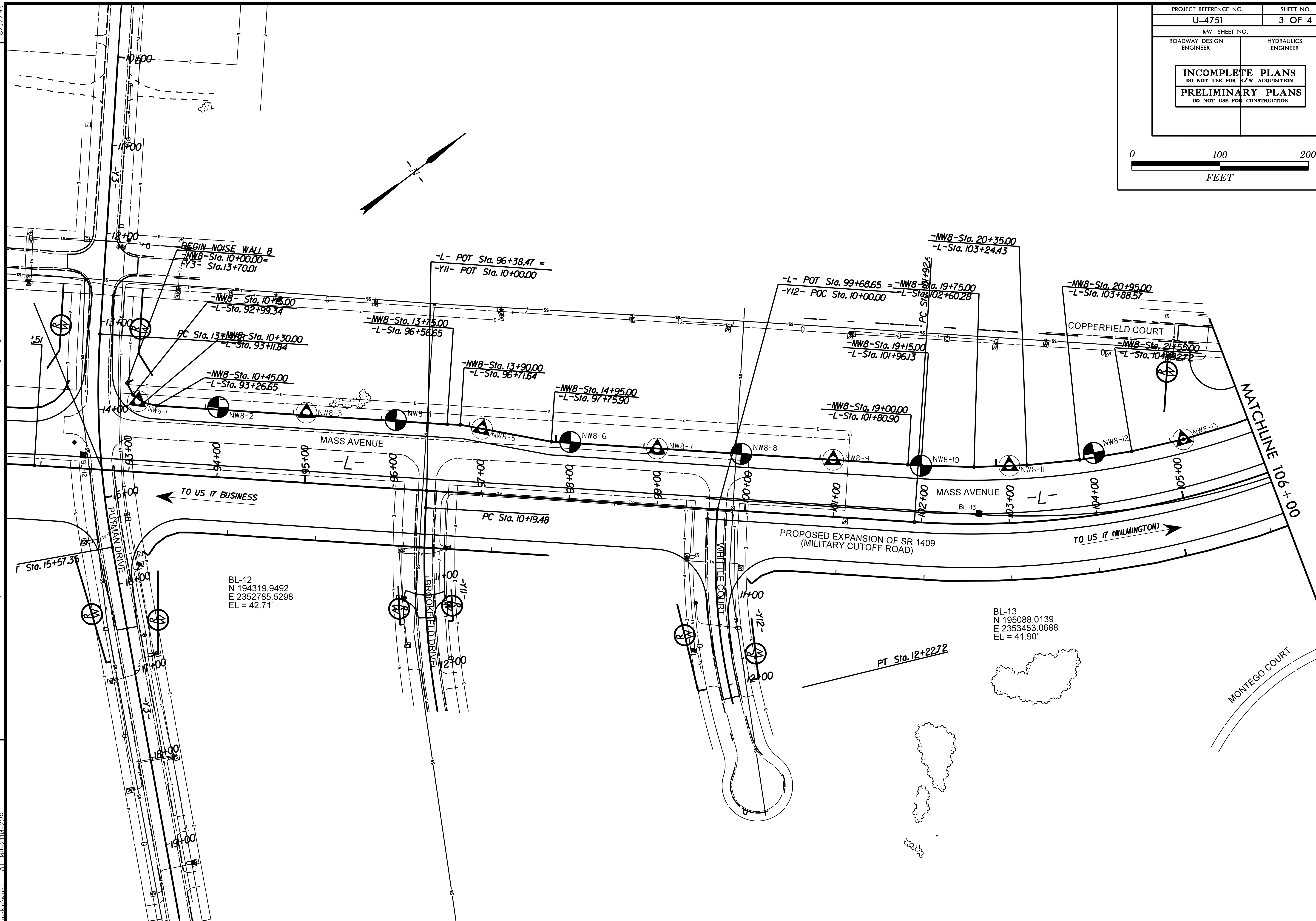
NOTES:
NM = NOT MEASURED

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-4751	3 OF 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



0
100
200
FEET
BEGIN NOISE WALL 8
-NW8-Sta. 10+00.00=
-Y3- Sta.13+70.01
-NW8- Sta. 10+15.00
-L-Sta. 92+99.34
PC Sta. 13+
-NW8-Sta. 10+30.00
-L-Sta. 93+11.84
-NW8-Sta. 10+45.00
-L-Sta. 93+26.65
-L- POT Sta. 96+38.47 =
-Y11- POT Sta. 10+00.00
-NW8-Sta. 13+75.00
-L-Sta. 96+56.65
-NW8-Sta. 13+90.00
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-NW8-Sta. 14+95.00
-L-Sta. 97+75.90
-L- POT Sta. 99+68.65 =
-Y12- POC Sta. 10+00.00
-NW8-Sta. 19+75.00
-L-Sta. 102+60.28
-NW8-Sta. 20+35.00
-L-Sta. 103+24.43
-NW8-Sta. 19+15.00
-L-Sta. 101+96.13
-NW8-Sta. 19+00.00
-L-Sta. 101+80.90
-NW8-Sta. 20+95.00
-L-Sta. 103+88.57
-NW8-Sta. 21+55.00
COPPERFIELD COURT
NW8-1
NW8-2
NW8-3
NW8-4
NW8-5
NW8-6
NW8-7
NW8-8
NW8-9
NW8-10
NW8-11
NW8-12
NW8-13
MASS AVENUE
-L-
MATCHLINE 106+00
TO US 17 BUSINESS
TO US 17 (WILMINGTON)
PROPOSED EXPANSION OF SR 1409
(MILITARY CUTOFF ROAD)
PC Sta. 10+19.48
PT Sta. 15+57.36
PT Sta. 12+22.72
PUTNAM DRIVE
BROOKFIELD DRIVE
WHITTLE COURT
MONTEGO COURT
-Y3-
-Y11-
-Y12-
BL-12
N 194319.9492
E 2352785.5298
EL = 42.71'
BL-13
N 195088.0139
E 2353453.0688
EL = 41.90'

REVISIONS

8/17/99

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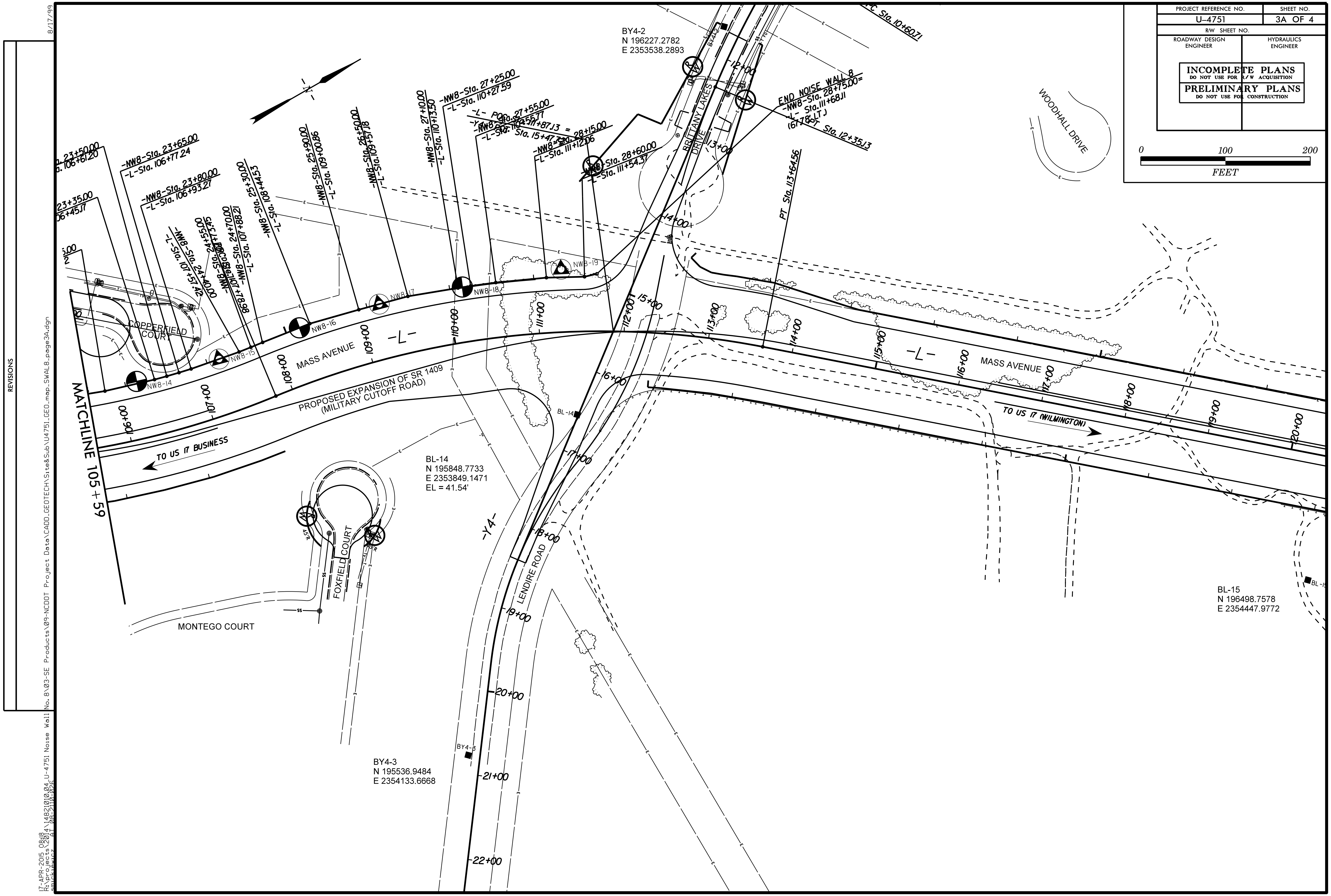

PROJECT REFERENCE NO.
U-4751
SHEET NO.
3A OF 4
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
0
100
200
FEET
BY4-2
N 196227.2782
E 2353538.2893
END NOISE WALL 8
BRITTANY LAKES DRIVE
WOODHALL DRIVE
PT Sta. 113+64.56
COPPERFIELD COURT
MASS AVENUE
PROPOSED EXPANSION OF SR 1409
(MILITARY CUTOFF ROAD)
MATCHLINE 105+59
TO US 17 BUSINESS
TO US 17 (WILMINGTON)
BL-14
N 195848.7733
E 2353849.1471
EL = 41.54'
FOXFIELD COURT
MONTEGO COURT
LENDIRE ROAD
BL-15
N 196498.7578
E 2354447.9772
BY4-3
N 195536.9484
E 2354133.6668
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
U-4751	4 OF 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

BEGIN NOISE WALL-8
-NW8- STA.10+00.00
-L- STA.92+91.45 (99.91' LT)

NW8-1 10+25 3' RT | NW8-2 11+15 3' LT | NW8-3 12+15 3' LT | NW8-4 13+16 1' LT | NW8-5 14+15 CL | NW8-6 15+16 1' LT | NW8-7 16+15 CL | NW8-8 17+11 CL | NW8-9 18+15 CL | NW8-10 19+15 CL | NW8-11 20+15 CL | NW8-12 21+12 5' LT | NW8-13 22+15 CL | NW8-14 23+14 3' LT

MINIMUM WALL HEIGHT

PROPOSED GROUND AT FACE OF WALL

EXISTING GROUND LINE

70 60 50 40 30 20 10

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00

COASTAL PLAIN: *BROWN AND GRAY, VERY LOOSE TO DENSE, MOIST TO SATURATED, SAND*

(A) **COASTAL PLAIN:** *BLACK, SOFT TO MEDIUM STIFF, MOIST TO WET, LITTLE ORGANIC MATTER TO MODERATELY ORGANIC, SANDY SILT AND SILT, AND BLACK, LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, LITTLE ORGANIC TO MODERATELY ORGANIC, SILTY SAND*

END NOISE WALL-8
-NW-8 STA.28+75.00
-L- STA.111+68.11 (67.78' LT)

NW8-15 24+15 CL | NW8-16 25+17 CL | NW8-17 26+15 CL | NW8-18 27+15 CL | NW8-19 28+33 10' LT

MINIMUM WALL HEIGHT

ARTIFICIAL FILL

PROPOSED GROUND AT FACE OF WALL

EXISTING GROUND LINE

70 60 50 40 30 20 10

24+00 25+00 26+00 27+00 28+00

COASTAL PLAIN: *BROWN AND GRAY, VERY LOOSE TO DENSE, MOIST TO SATURATED, SAND*

(A) **COASTAL PLAIN:** *BLACK, SOFT TO MEDIUM STIFF, MOIST TO WET, LITTLE ORGANIC MATTER TO MODERATELY ORGANIC, SANDY SILT AND SILT, AND BLACK, LOOSE TO MEDIUM DENSE, MOIST TO SATURATED, LITTLE ORGANIC TO MODERATELY ORGANIC, SILTY SAND*

-NW8-

5/28/99

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APPENDIX I

Mid-Atlantic Drilling Inc

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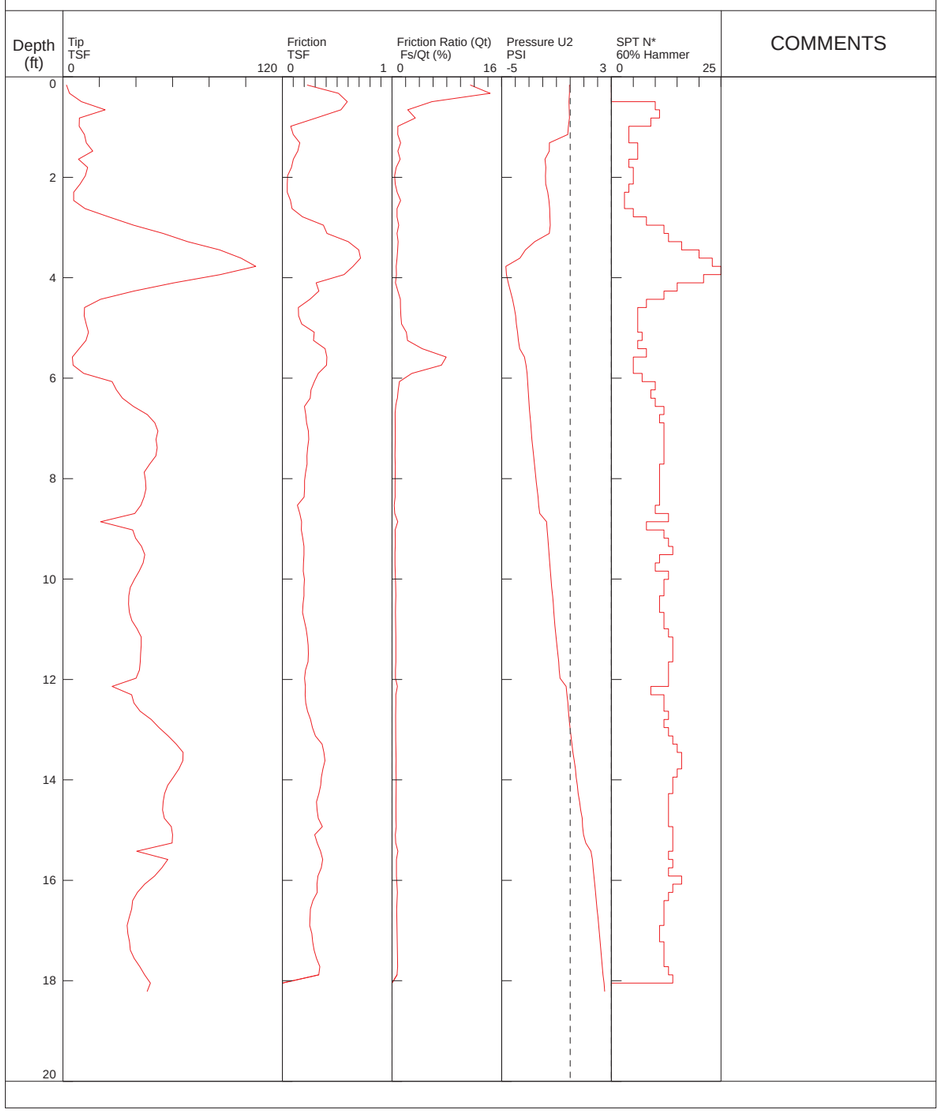

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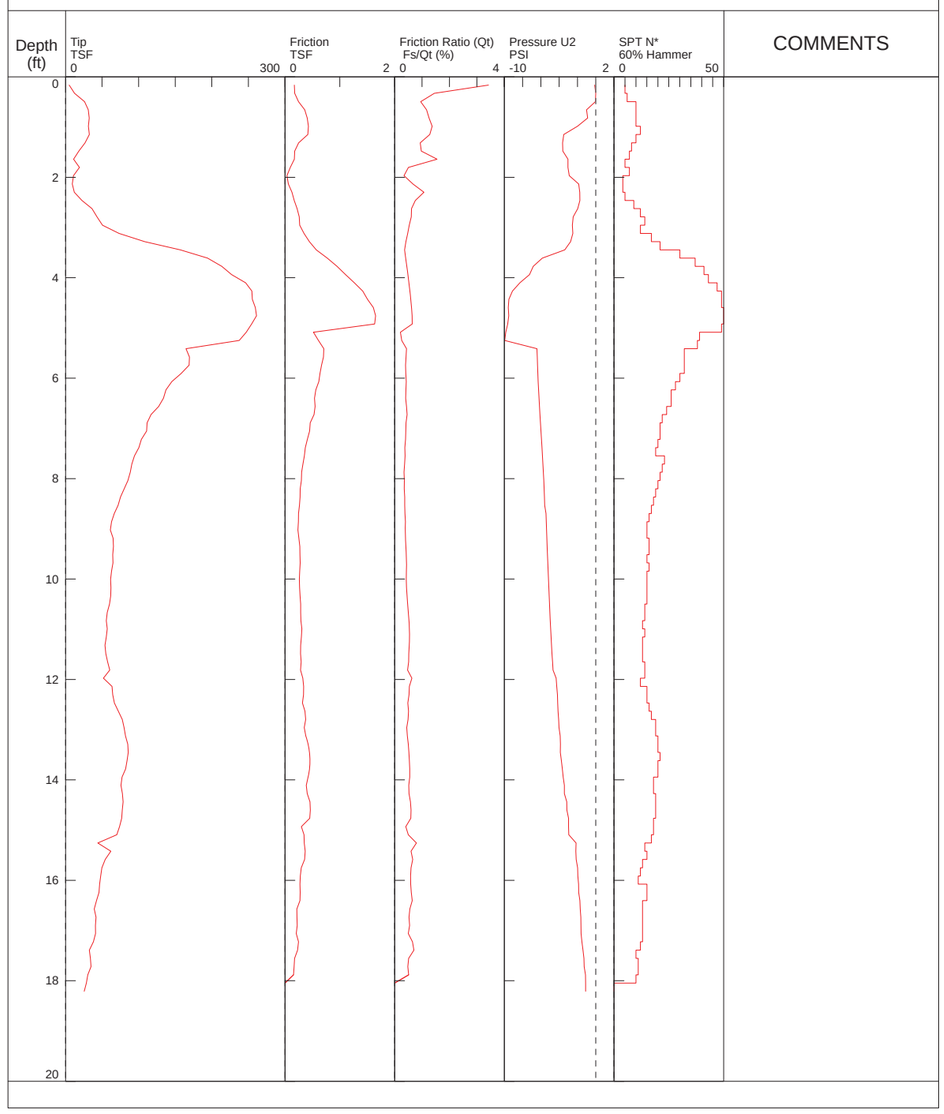

APPENDIX I

Mid-Atlantic Drilling Inc

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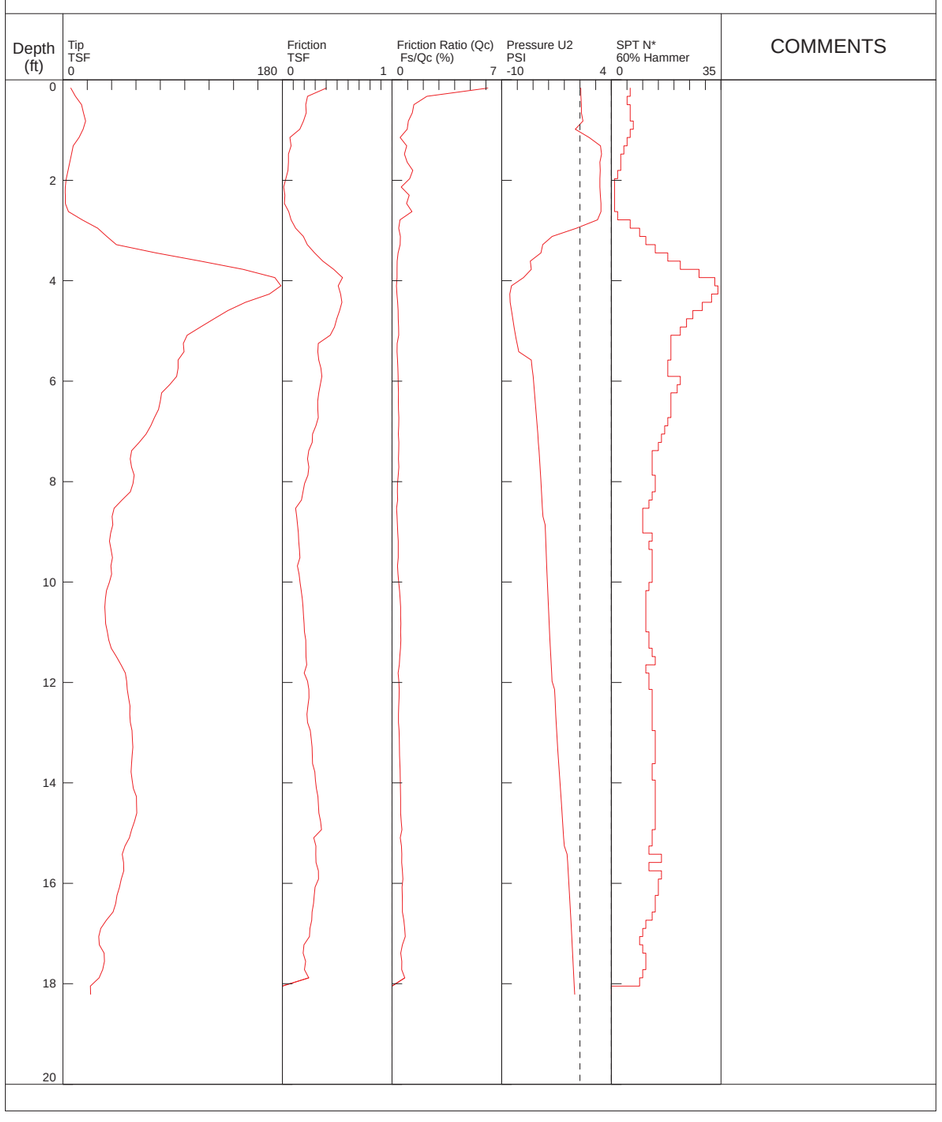

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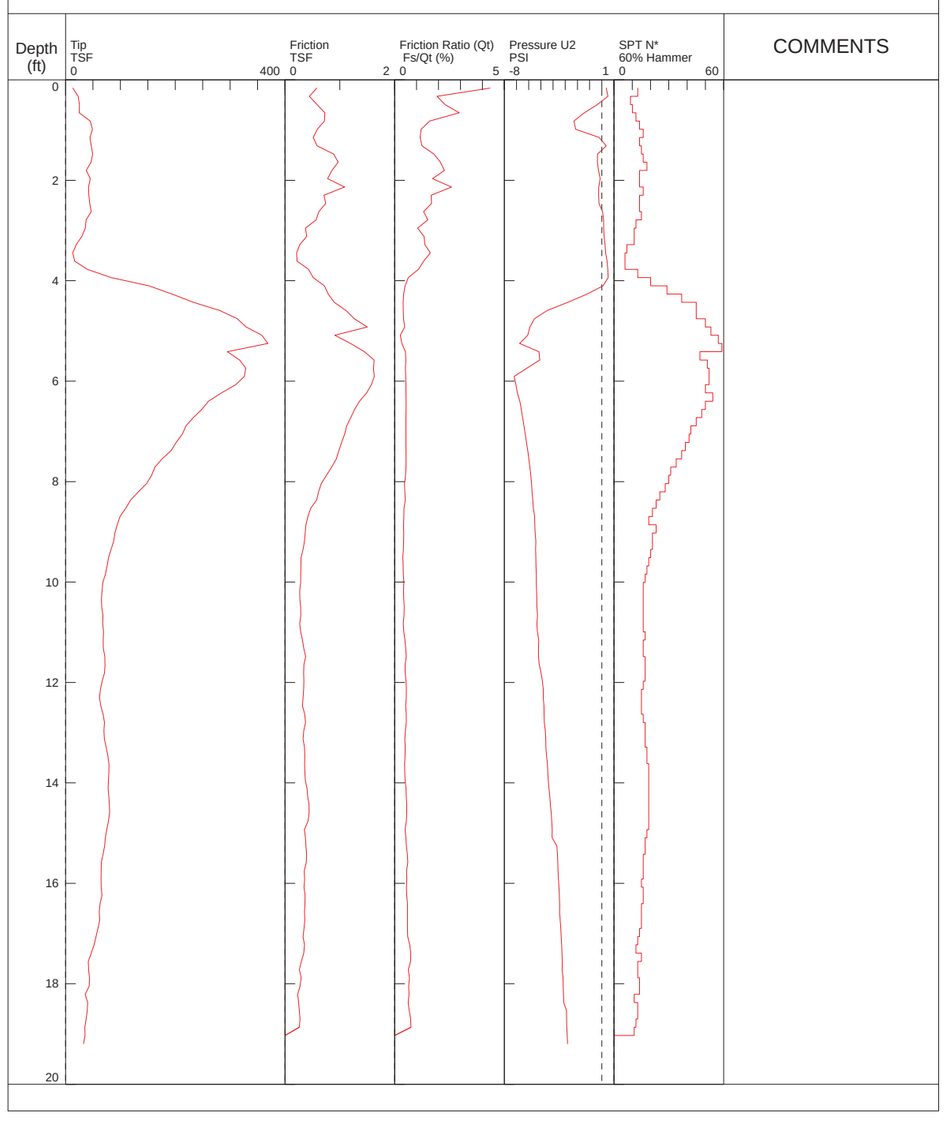

APPENDIX I

Mid-Atlantic Drilling Inc

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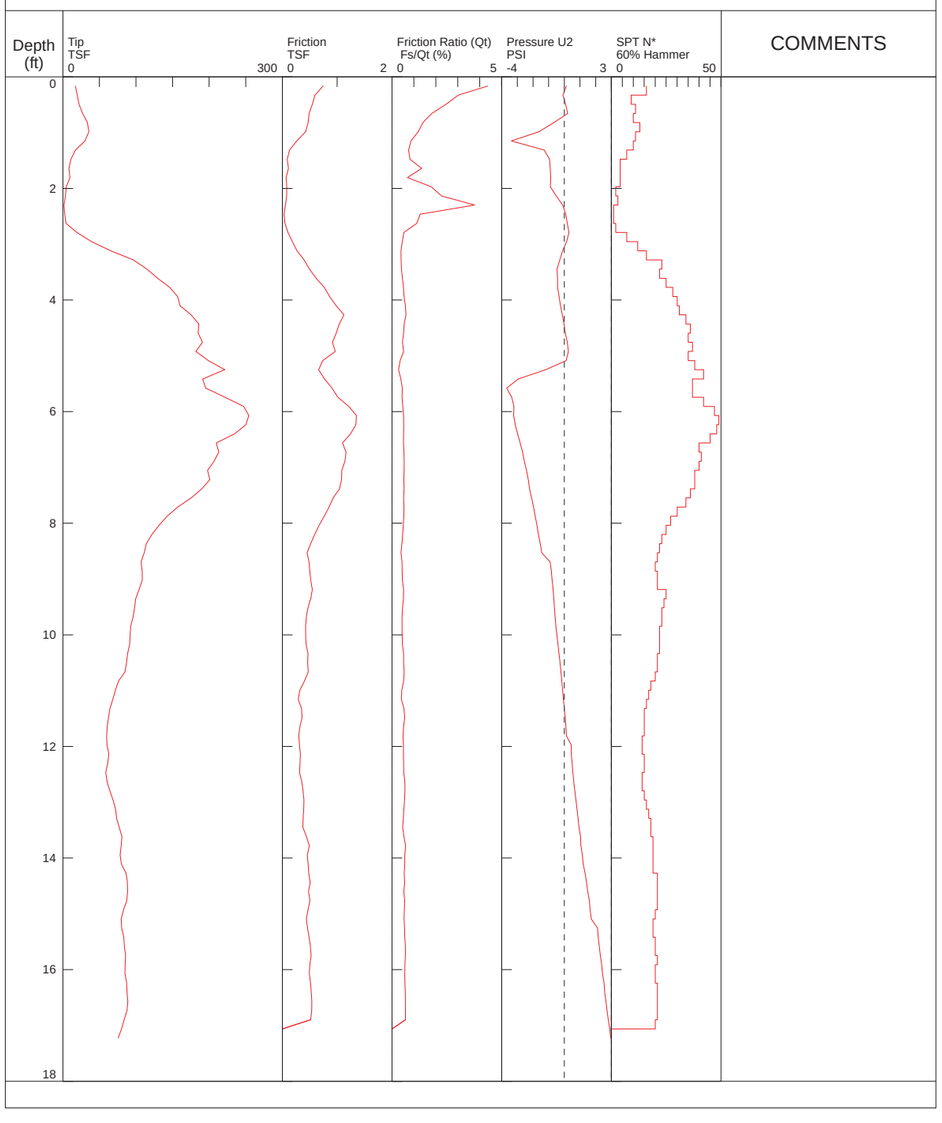

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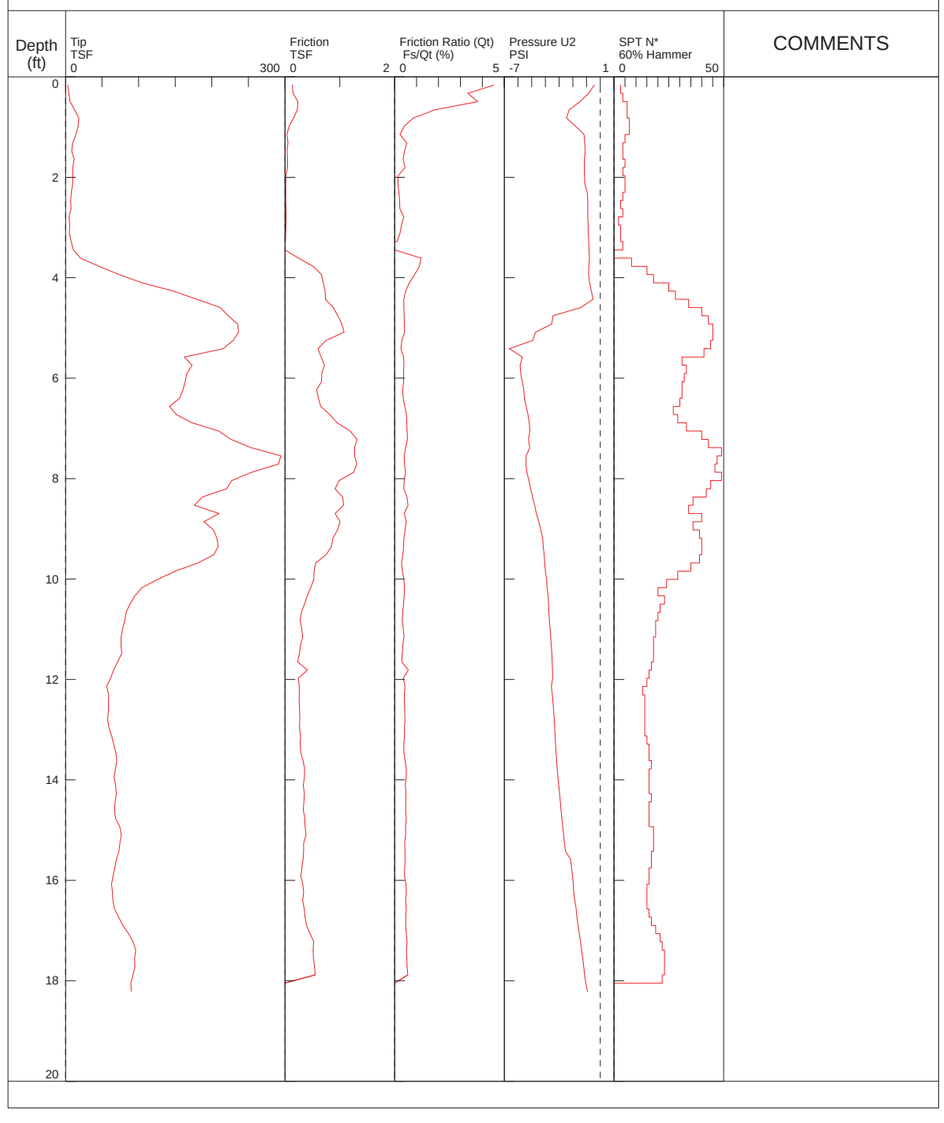

APPENDIX I

Mid-Atlantic Drilling Inc

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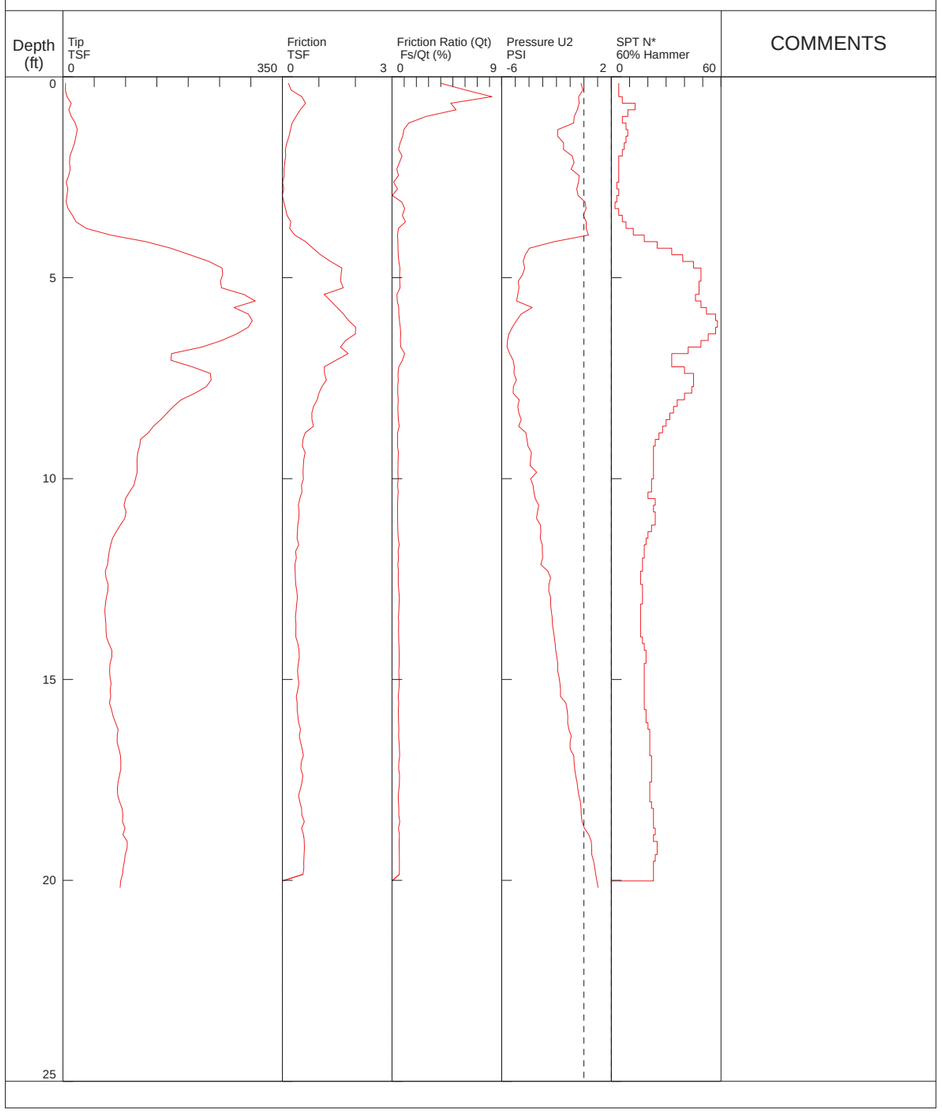

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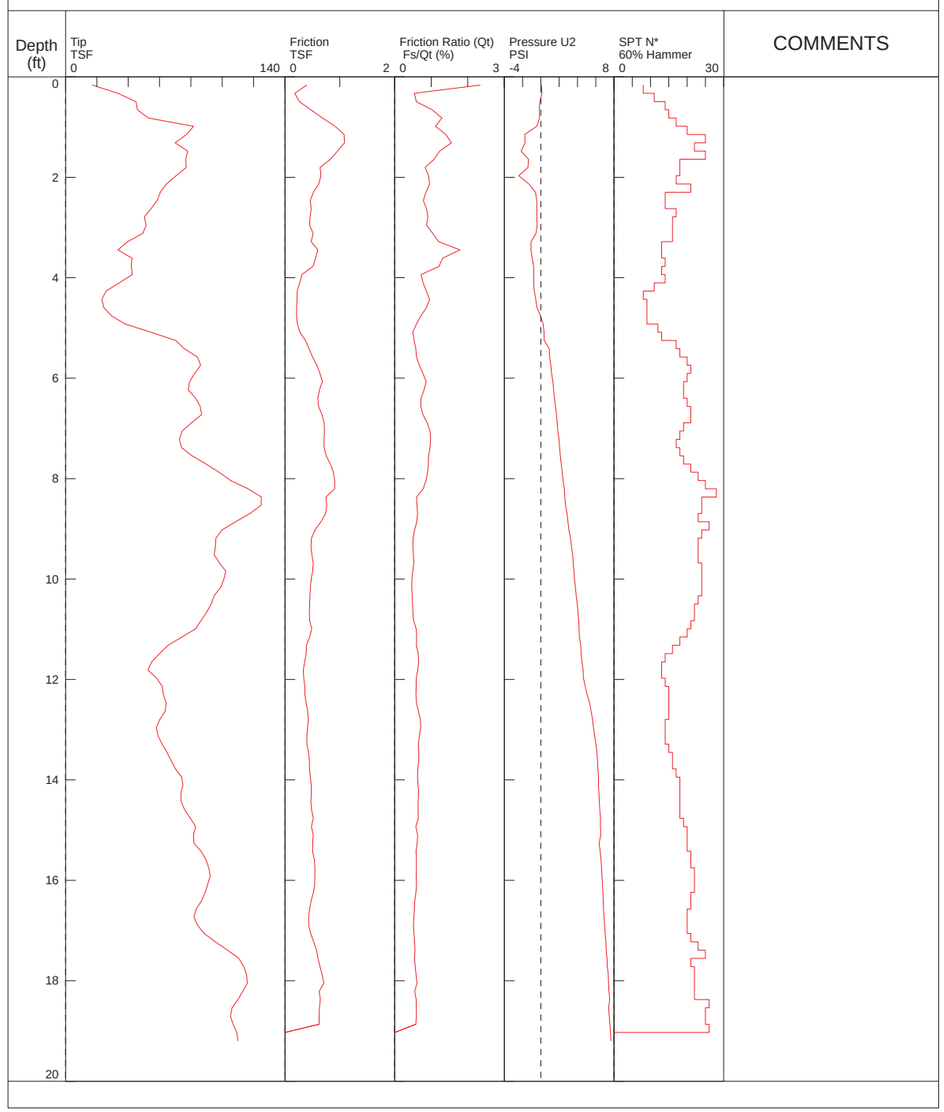

APPENDIX I

Mid-Atlantic Drilling Inc

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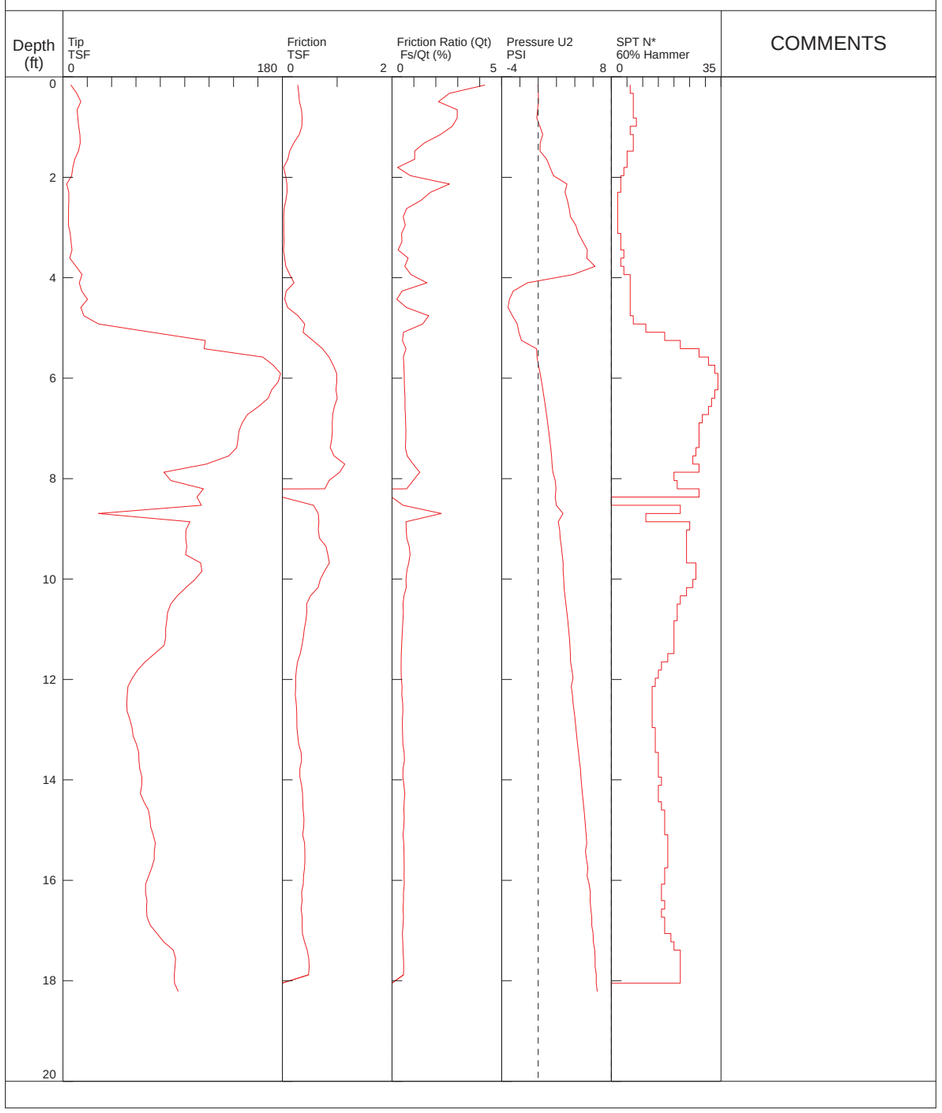

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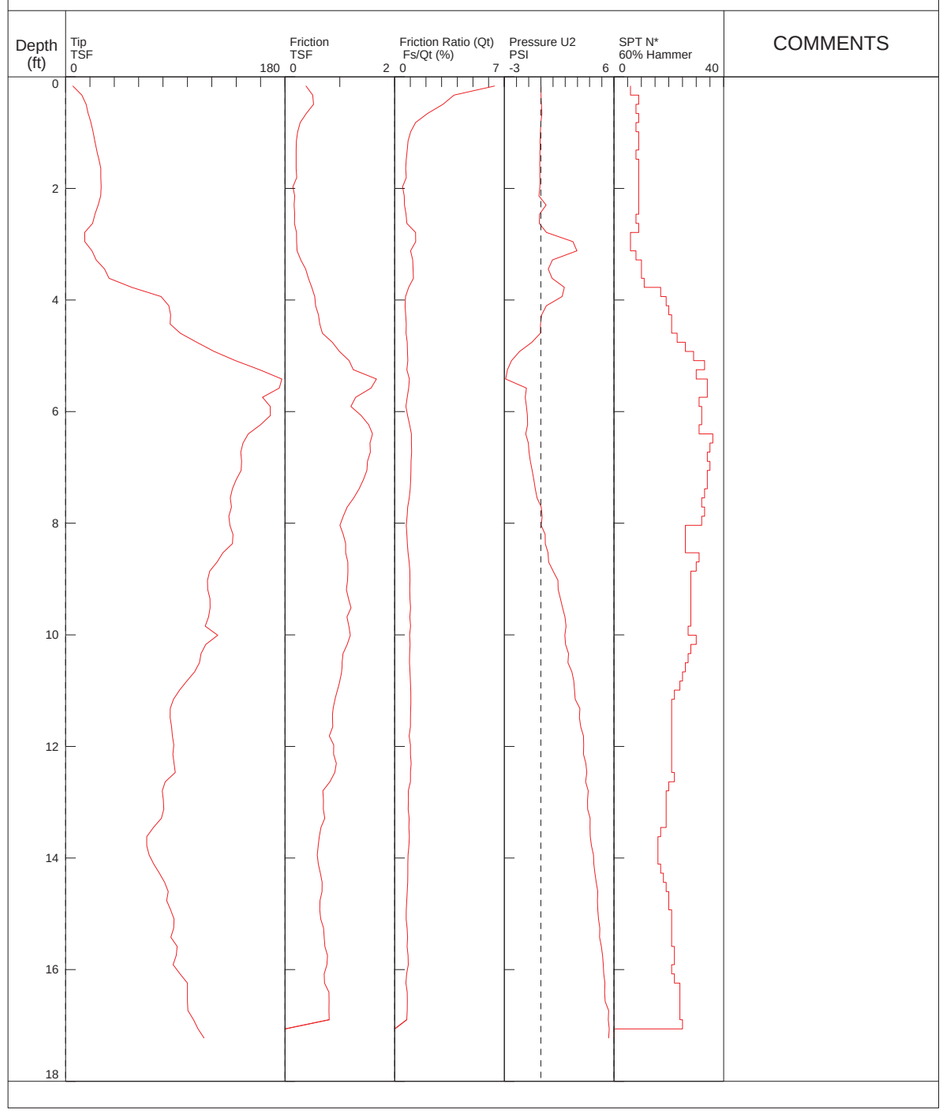

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4751	1	5

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 ROAD) TO US 17 IN WILMINGTON

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

CONTENTS

APPENDIX I

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

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J. WHITT

S. BUCHANAN

MID-ATLANTIC DR.

INVESTIGATED BY M. BAHIRADHAN

DRAWN BY S. BUCHANAN

CHECKED BY M. BAHIRADHAN

SUBMITTED BY SCHNABEL ENG.

DATE MAY 2015

NORTH CAROLINA PROFESSIONAL SEAL 036072 ENGINEER MAHALINGAM BAHIRADHAN

DocuSigned by:
Mahalingam Bahiradhan
4DEAD345C9264A2...

6/9/2015

SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
U-4751	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

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX			— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0			0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND					SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD								FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CME-45B
- [X] GEOPROBE

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [X] TRICONE 2.94 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [X] DASI123 CPT

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

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

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

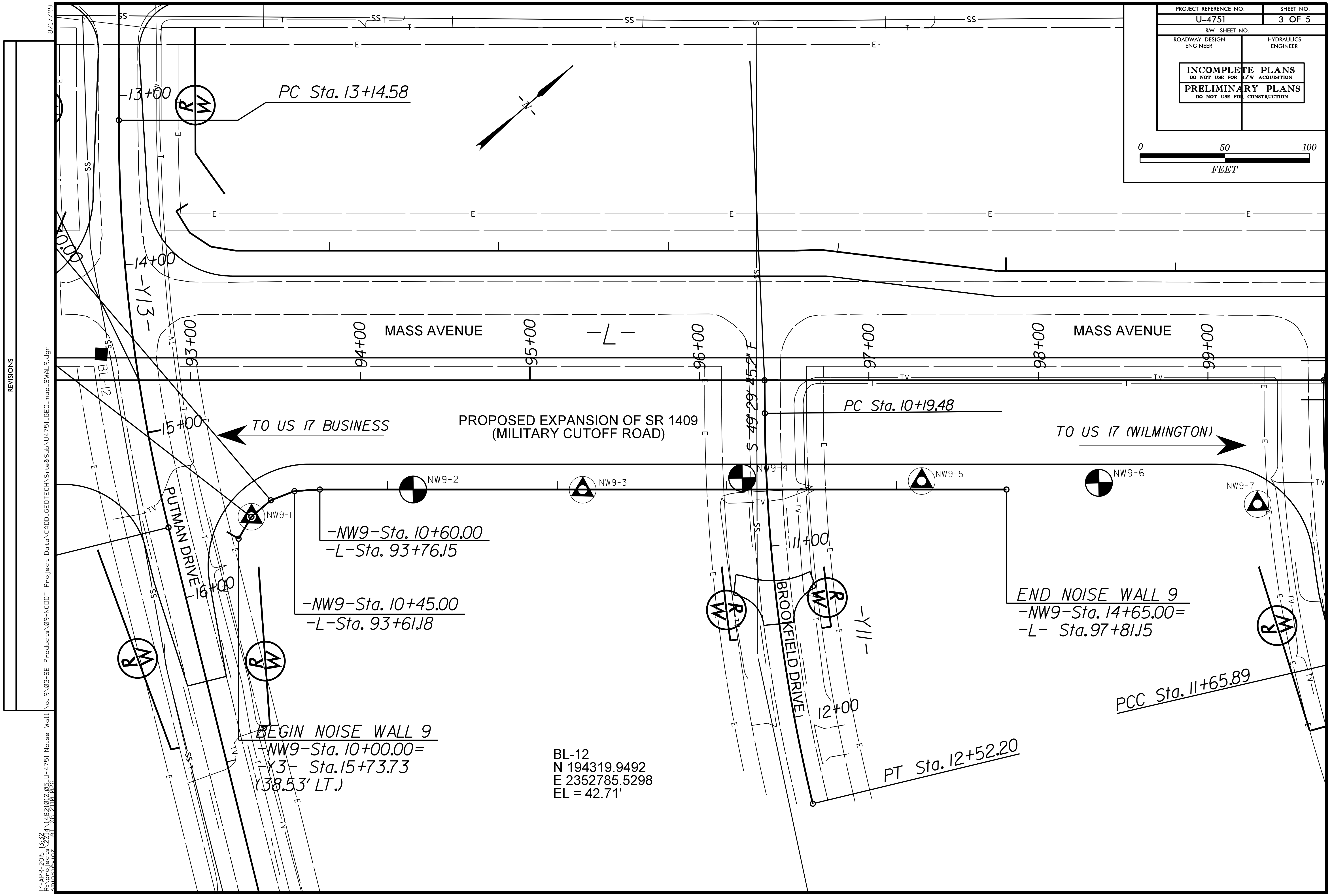
BENCH MARK: BL-12, N 194319.9492, E 2352785.5298

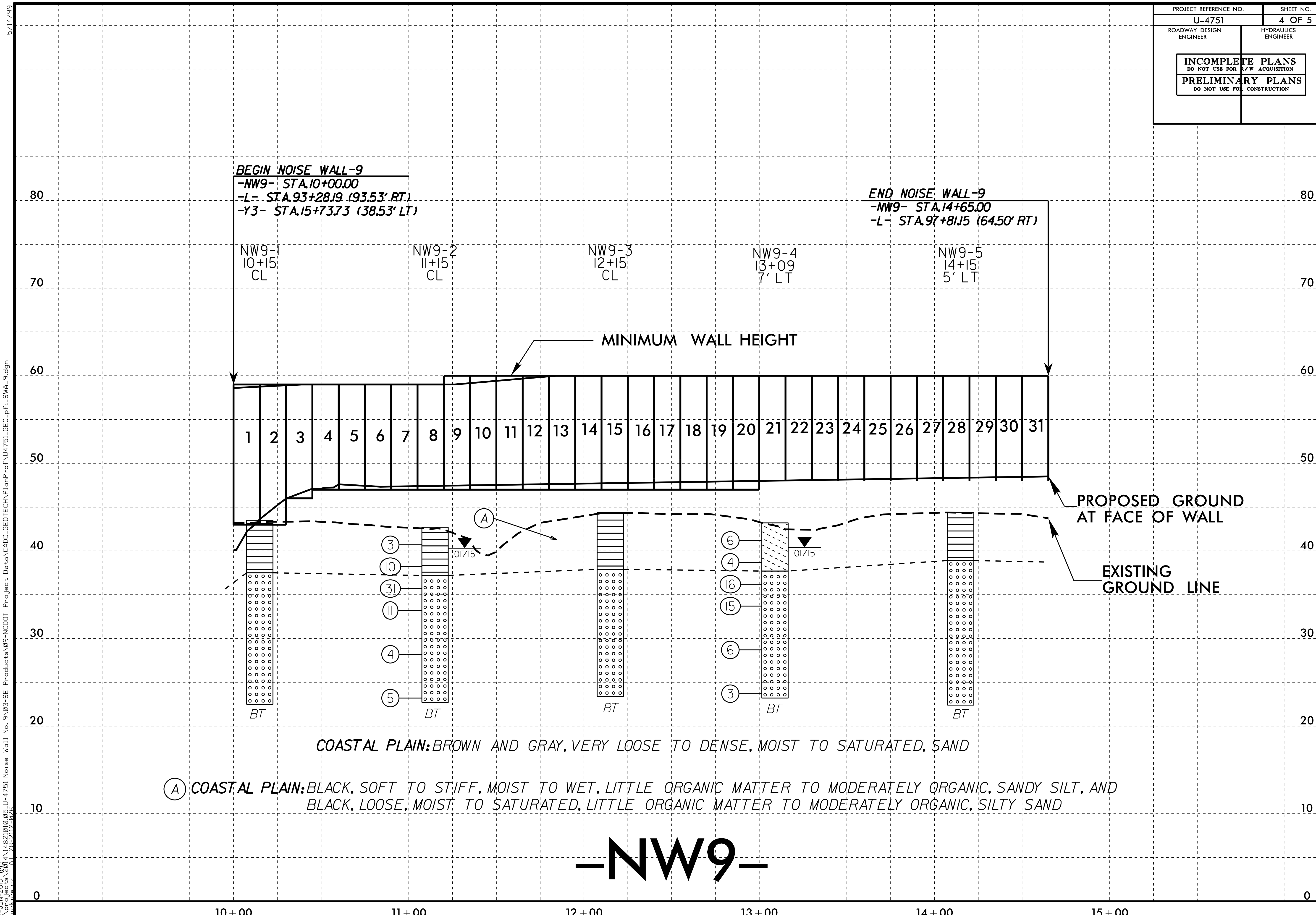
ELEVATION: 42.71 FEET

NOTES:

NM = NOT MEASURED

DATE: 8-15-14


PROJECT REFERENCE NO.
U-4751
SHEET NO.
3 OF 5
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
0
50
100
FEET
REVISIONS
PC Sta. 13+14.58
MASS AVENUE
-L-
MASS AVENUE
PROPOSED EXPANSION OF SR 1409
(MILITARY CUTOFF ROAD)
TO US 17 BUSINESS
TO US 17 (WILMINGTON)
PC Sta. 10+19.48
S 49°29'45.2" E
NW9-1
NW9-2
NW9-3
NW9-4
NW9-5
NW9-6
NW9-7
-NW9-Sta. 10+60.00
-L-Sta. 93+76.15
-NW9-Sta. 10+45.00
-L-Sta. 93+61.18
END NOISE WALL 9
-NW9-Sta. 14+65.00=
-L- Sta. 97+81.15
BEGIN NOISE WALL 9
-NW9-Sta. 10+00.00=
-Y3- Sta. 15+73.73
(38.53' LT.)
BL-12
N 194319.9492
E 2352785.5298
EL = 42.71'
PUTMAN DRIVE
BROOKFIELD DRIVE
-Y13-
-Y11-
PCC Sta. 11+65.89
PT Sta. 12+52.20
8/17/99


PROJECT REFERENCE NO.
U-4751
SHEET NO.
4 OF 5
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
BEGIN NOISE WALL-9
-NW9- STA.10+00.00
-L- STA.93+28.19 (93.53' RT)
-Y3- STA.15+73.73 (38.53' LT)
END NOISE WALL-9
-NW9- STA.14+65.00
-L- STA.97+81.15 (64.50' RT)
NW9-1
10+15
CL
NW9-2
11+15
CL
NW9-3
12+15
CL
NW9-4
13+09
7' LT
NW9-5
14+15
5' LT
MINIMUM WALL HEIGHT
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
PROPOSED GROUND AT FACE OF WALL
EXISTING GROUND LINE
01/15
BT
COASTAL PLAIN: BROWN AND GRAY, VERY LOOSE TO DENSE, MOIST TO SATURATED, SAND
A COASTAL PLAIN: BLACK, SOFT TO STIFF, MOIST TO WET, LITTLE ORGANIC MATTER TO MODERATELY ORGANIC, SANDY SILT, AND BLACK, LOOSE, MOIST TO SATURATED, LITTLE ORGANIC MATTER TO MODERATELY ORGANIC, SILTY SAND
-NW9-
10+00
11+00
12+00
13+00
14+00
15+00
80
70
60
50
40
30
20
10
0
5/14/99
05-JUN-2015 11:45

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 40191	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** Whitt, J. W.	
SITE DESCRIPTION SOUND BARRIER WALL #9, SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON				**GROUND WTR (ft)**
BORING NO. NW9-6	**STATION** 98+36	**OFFSET** 61 ft RT	**ALIGNMENT** -L-	**0 HR.** 3.2
COLLAR ELEV. 43.9 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 194,715	**EASTING** 2,353,229	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 80% 10/14/2014		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
DRILLER Wiggins, M.	**START DATE** 01/21/15	**COMP. DATE** 01/21/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
45										43.9 GROUND SURFACE 0.0
	42.9	1.0	2	2	2	4				**COASTAL PLAIN** BLACK, LITTLE ORGANIC MATTER TO MODERATELY ORGANIC, FINE GRAINED SANDY SILT
40	40.4	3.5	WOH	WOH	WOH	0		W		39.7 4.2
	37.9	6.0	13	12	11	23		Sat.		38.4 BLACK, LITTLE ORGANIC MATTER TO MODERATELY ORGANIC, SILTY FINE GRAINED SAND 5.5
35	35.4	8.5	9	11	10	21		Sat.		BROWNISH GRAY TO GRAY, FINE GRAINED SAND
30	30.4	13.5	3	3	3	6		Sat.		
25	25.4	18.5	2	2	2	4		Sat.		23.9 20.0 Boring Terminated at Elevation 23.9 ft in Loose Sand

WBS 40191	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** Whitt, J. W.	
SITE DESCRIPTION SOUND BARRIER WALL #9, SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON				**GROUND WTR (ft)**
BORING NO. NW9-7	**STATION** 99+29	**OFFSET** 73 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 43.9 ft	**TOTAL DEPTH** 21.0 ft	**NORTHING** 194,777	**EASTING** 2,353,299	**24 HR.** NM
DRILL RIG/HAMMER EFF./DATE MID3793 DSA1123 GEOPROBE 10/16/2014		DRILL METHOD CPT / DPT	HAMMER TYPE N/A	
DRILLER Stewart, R.	**START DATE** 01/20/15	**COMP. DATE** 01/20/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										43.9 GROUND SURFACE 0.0
										COASTAL PLAIN SOFT TO VERY STIFF, LITTLE ORGANIC MATTER TO MODERATELY ORGANIC, SANDY SILT
40										37.9 6.0
										MEDIUM DENSE TO VERY DENSE, SAND WITH LITTLE SILT AND TRACE GRAVEL
35										
30										
25										22.9 21.0 Boring Terminated at Elevation 22.9 ft in Medium Dense Sand

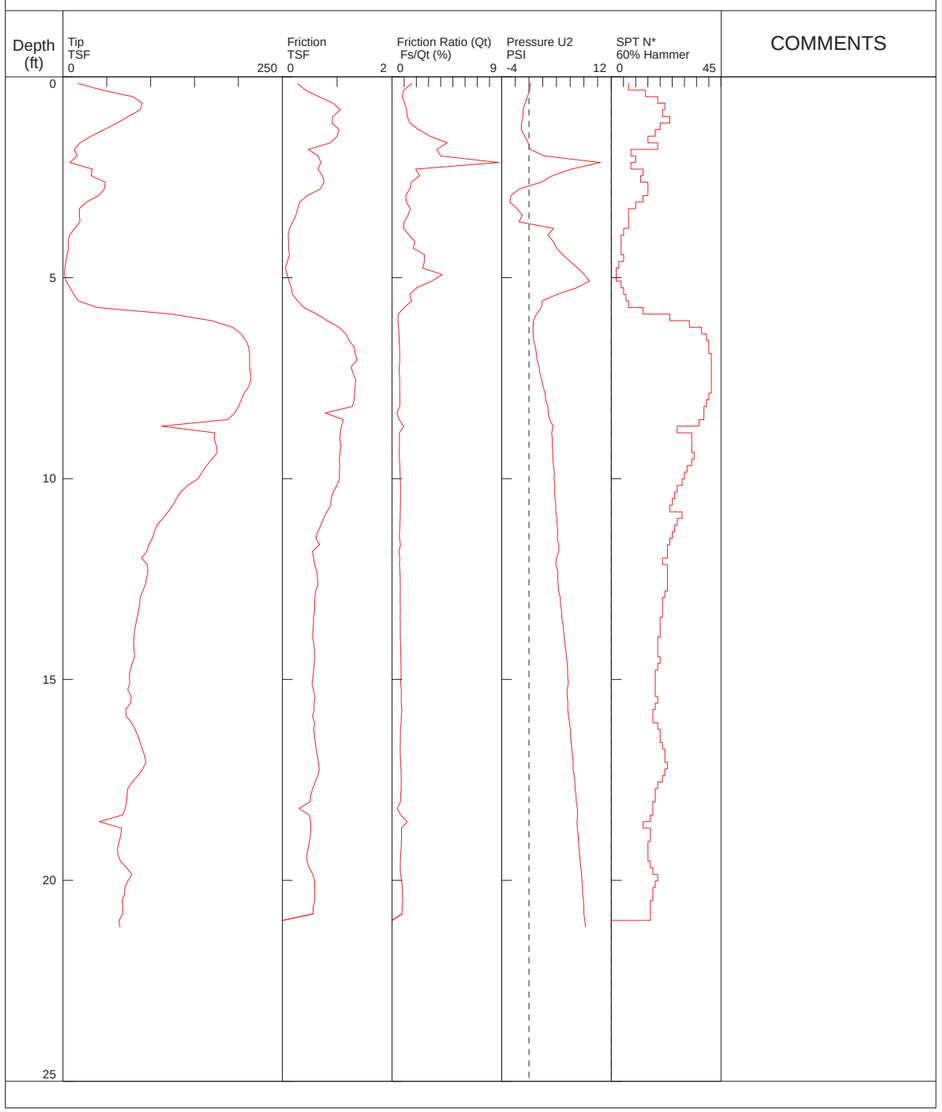
Water level was not measured. Pore pressure dissipation test was not performed.

APPENDIX I

Mid-Atlantic Drilling Inc

COMMENT: Schnabel
CONE ID: DSA1123
LOCATION: Wilmington N.C.
JOB NUMBER: U4751
TEST DATE: 1/20/2015 1:54:08 PM

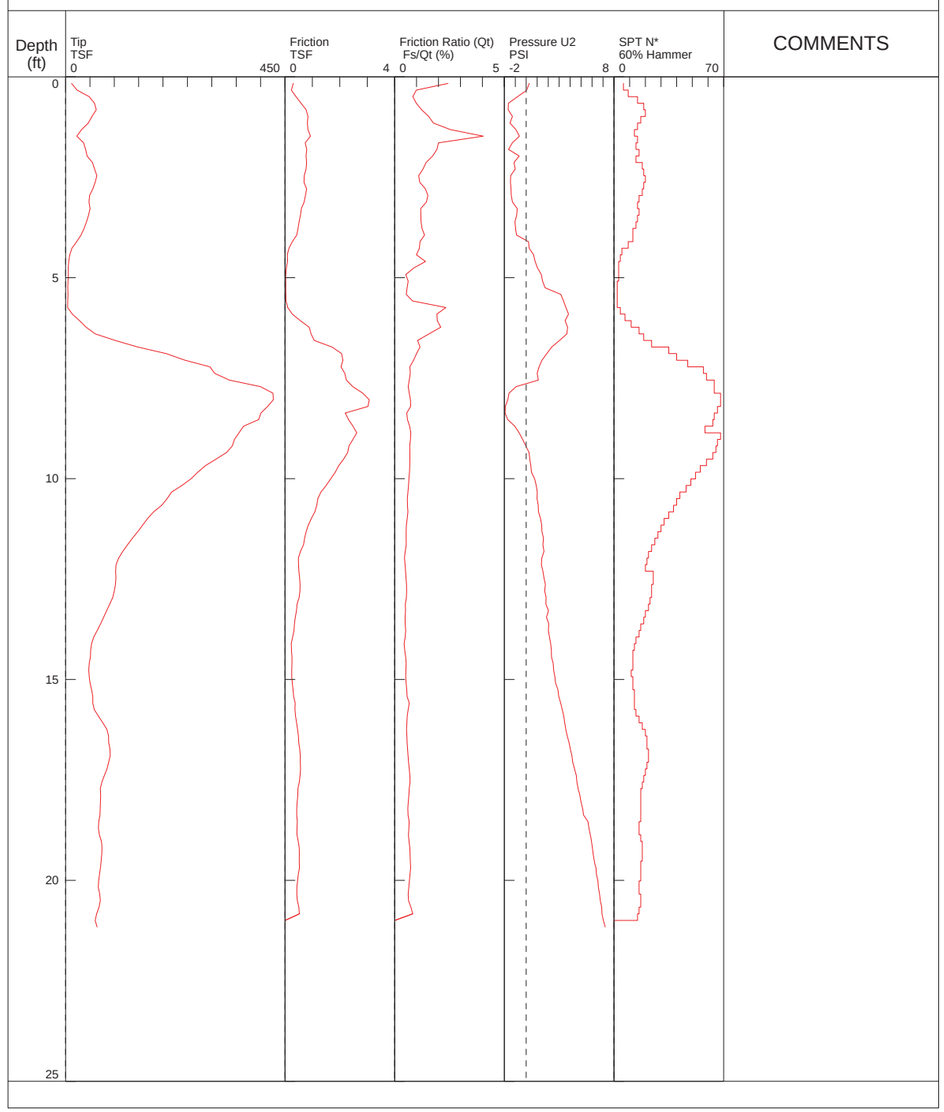
NW9-1



Mid-Atlantic Drilling Inc

COMMENT: Schnabel
CONE ID: DSA1123
LOCATION: Wilmington N.C.
JOB NUMBER: U4751
TEST DATE: 1/20/2015 2:16:31 PM

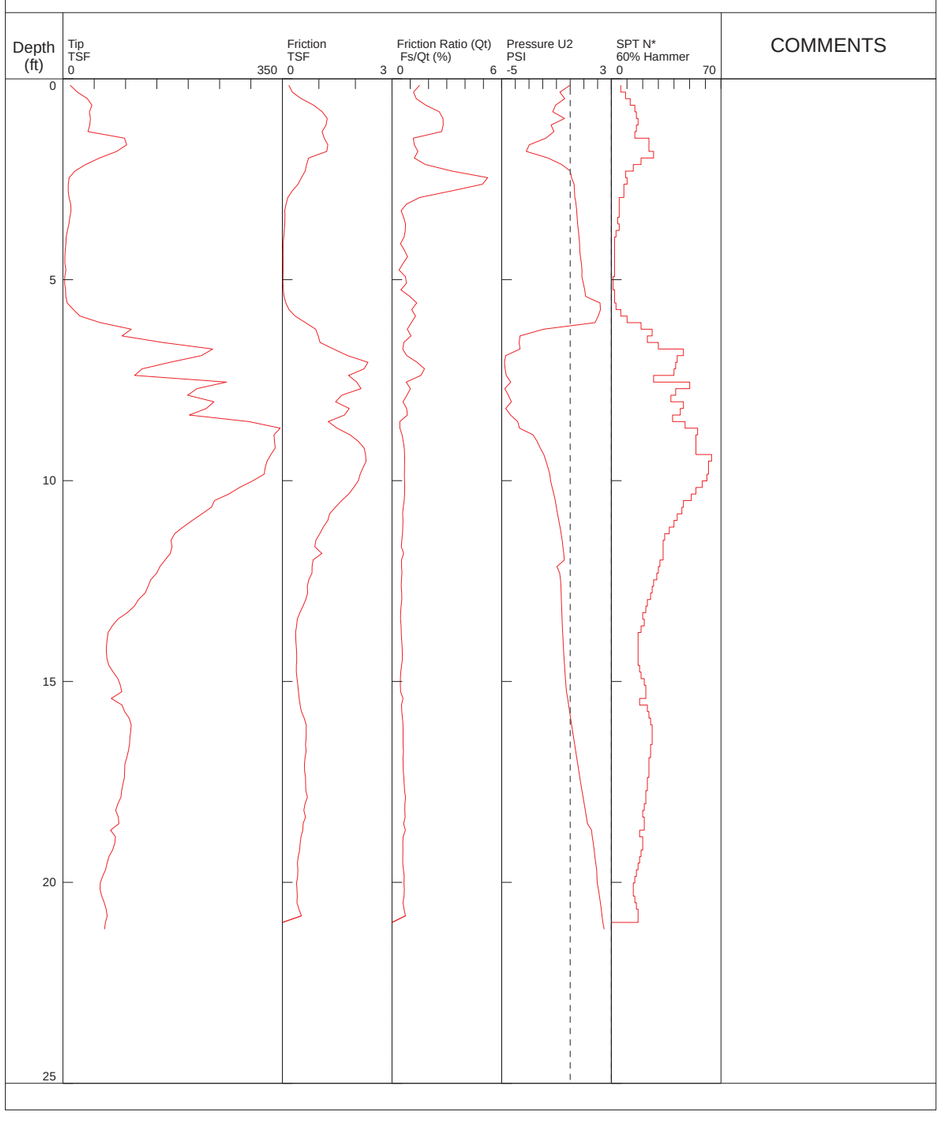
NW9-3



APPENDIX I

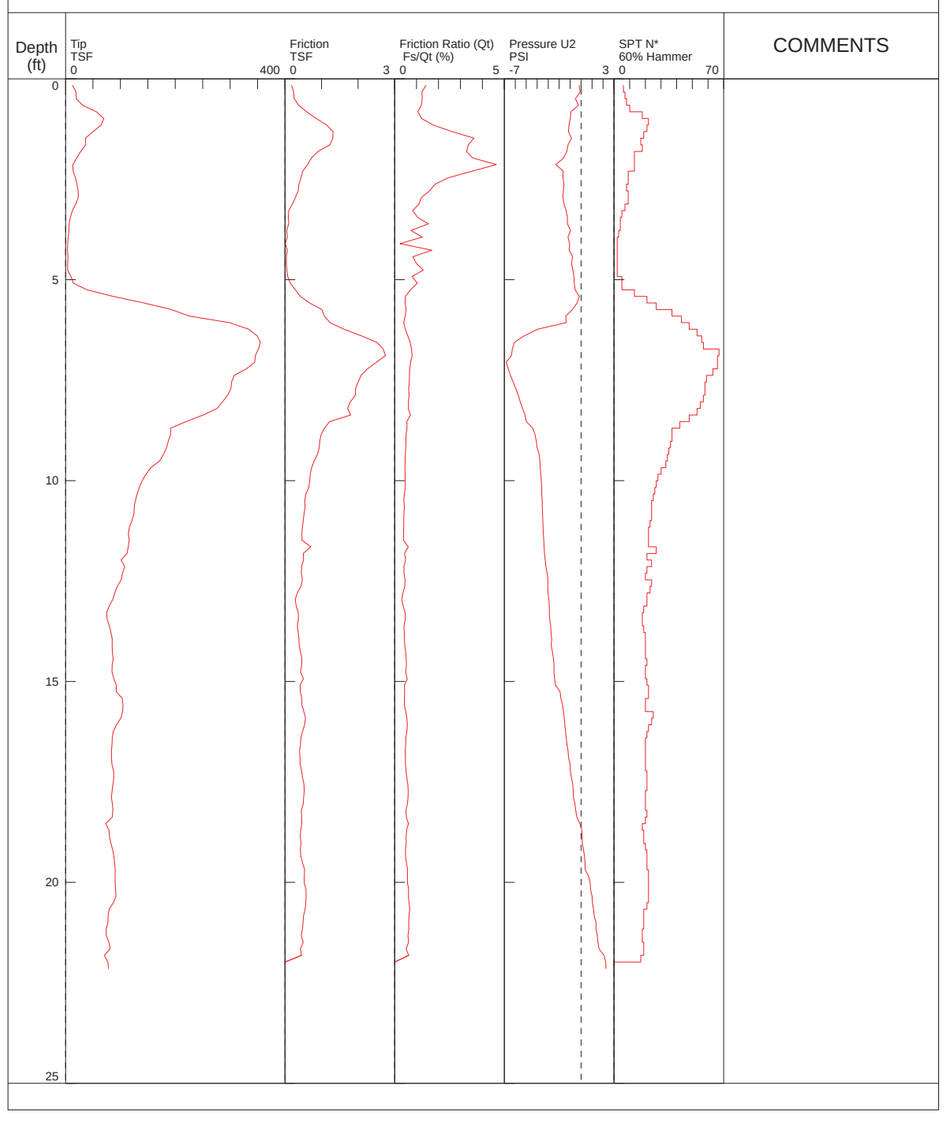
Mid-Atlantic Drilling Inc

COMMENT: Schnabel
CONE ID: DSA1123
LOCATION: Wilmington N.C.
JOB NUMBER: U4751
TEST DATE: 1/20/2015 2:37:54 PM
NW9-5



Mid-Atlantic Drilling Inc

COMMENT: Schnabel
CONE ID: DSA1123
LOCATION: Wilmington N.C.
JOB NUMBER: U4751
TEST DATE: 1/20/2015 3:01:17 PM
NW9-7



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4751	1	6

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 ROAD) TO US 17 IN WILMINGTON

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

CONTENTS

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.

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NOTES:
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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

M. BAHIRADHAN

J. WHITT

S. BUCHANAN

MID-ATLANTIC DR.

INVESTIGATED BY M. BAHIRADHAN

DRAWN BY S. BUCHANAN

CHECKED BY M. BAHIRADHAN

SUBMITTED BY SCHNABEL ENG.

DATE MAY 2015

NORTH CAROLINA PROFESSIONAL SEAL 036072 ENGINEER MAHALINGAM BAHIRADHAN

DocuSigned by:
Mahalingam Bahiradhan 6/9/2015
4DEAD345C9264A2...
SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
U-4751	2 OF 6

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX			— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0		0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND					SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD								FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CME 45B
- [X] GEOPROBE

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [X] TRICONE 2.94 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [X] DSAII23 CPT

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

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

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BL-13, N 195088.0139, E 2353453.0688, EL 41.90'
BL-14, N 195848.7733, E 2353849.1471, EL 41.54'

ELEVATION: FEET

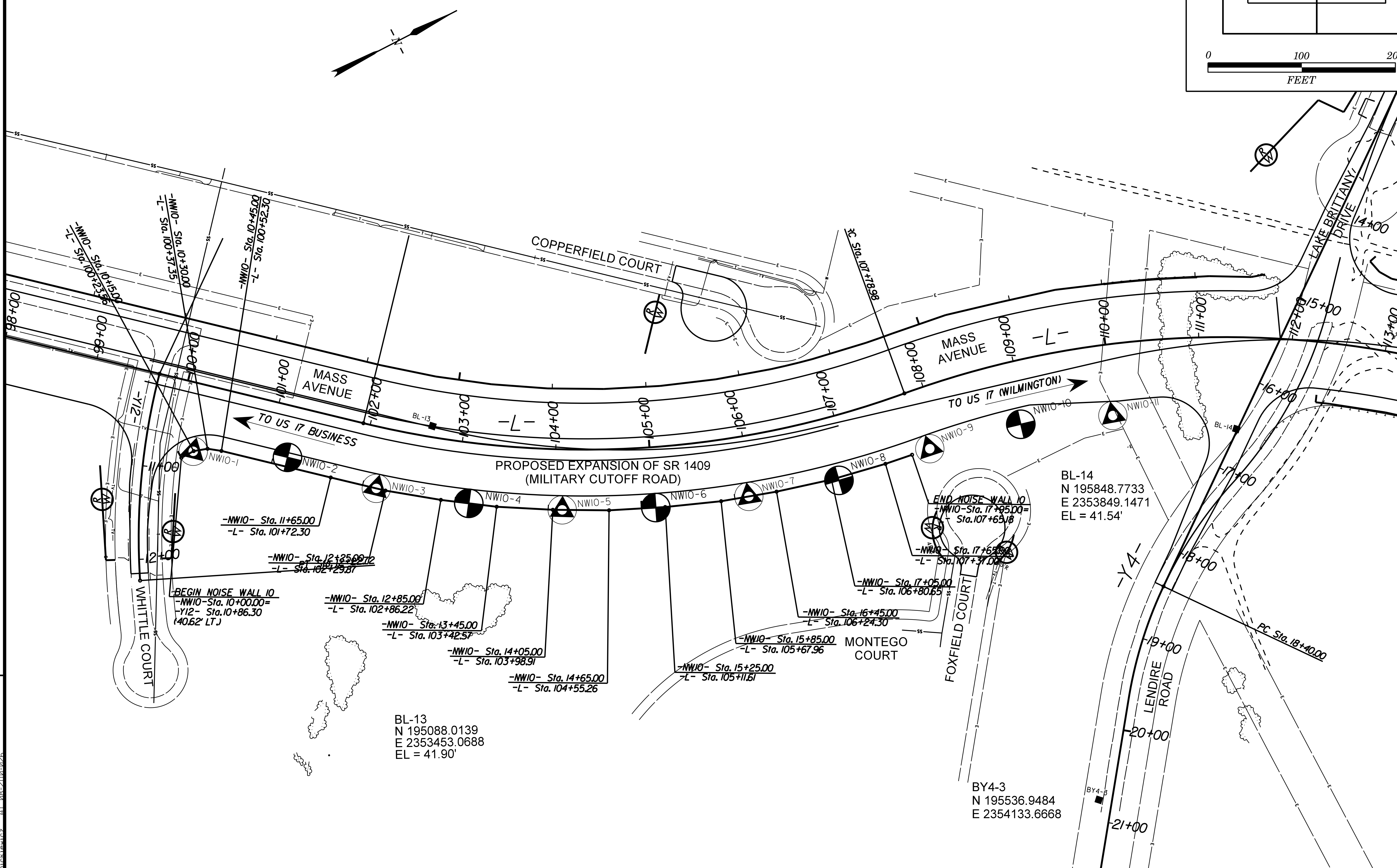
NOTES:
NM = NOT MEASURED

DATE: 8-15-14

RW SHEET NO.

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION


0 100 200
FEET
COPPERFIELD COURT
MASS AVENUE
-L-
TO US 17 BUSINESS
TO US 17 (WILMINGTON)
PROPOSED EXPANSION OF SR 1409
(MILITARY CUTOFF ROAD)
WHITTLE COURT
-Y12-
MONTEGO COURT
FOXFIELD COURT
LAKE BRITTANY DRIVE
LENDIRE ROAD
-Y4-
BEGIN NOISE WALL 10
-NW10- Sta. 10+00.00=
-Y12- Sta. 10+86.30
(40.62' LT.)
END NOISE WALL 10
-NW10- Sta. 17+95.00=
-L- Sta. 107+65.18
-NW10- Sta. 11+65.00
-L- Sta. 101+72.30
-NW10- Sta. 12+85.00
-L- Sta. 102+86.22
-NW10- Sta. 13+45.00
-L- Sta. 103+42.57
-NW10- Sta. 14+05.00
-L- Sta. 103+98.91
-NW10- Sta. 14+65.00
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-NW10- Sta. 10+15.00
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-NW10- Sta. 10+45.00
-L- Sta. 100+52.30
PC Sta. 107+78.98
PC Sta. 18+40.00
NW10-1
NW10-2
NW10-3
NW10-4
NW10-5
NW10-6
NW10-7
NW10-8
NW10-9
NW10-10
NW10-11
BL-13
N 195088.0139
E 2353453.0688
EL = 41.90'
BL-14
N 195848.7733
E 2353849.1471
EL = 41.54'
BY4-3
N 195536.9484
E 2354133.6668
98+00
99+00
101+00
102+00
103+00
104+00
105+00
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107+00
108+00
109+00
110+00
111+00
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16+00
17+00
18+00
19+00
20+00
21+00

REVISIONS

17-APR-2015 15:52
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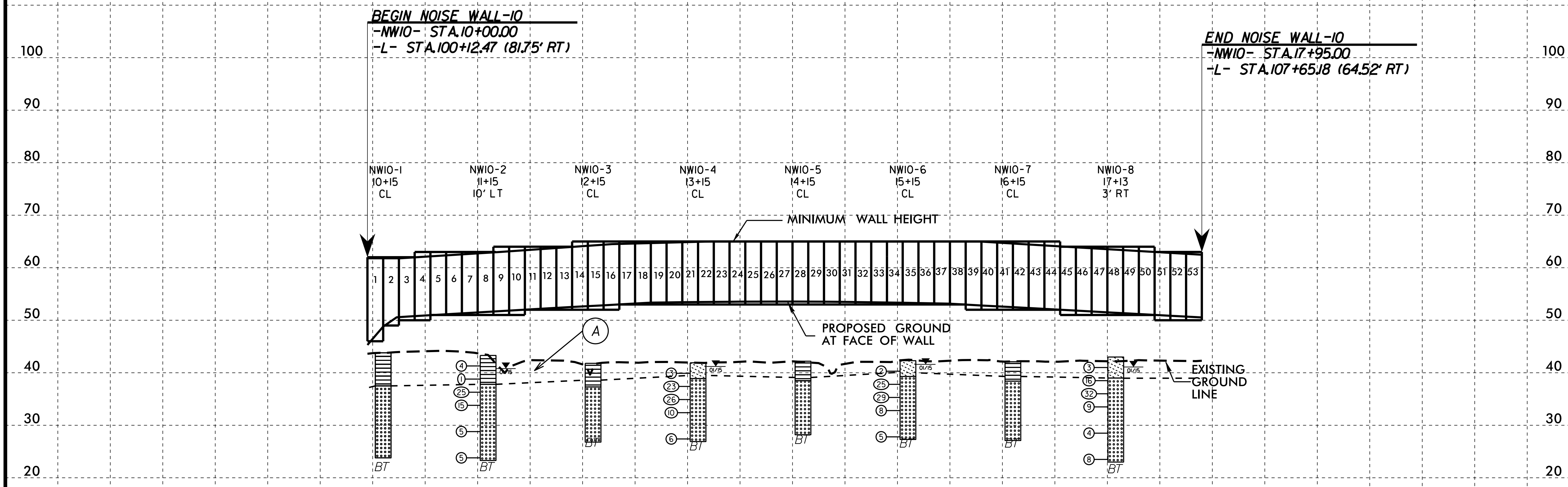
8/17/99

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



COASTAL PLAIN: *GRAY AND BROWN, VERY LOOSE TO VERY DENSE, MOIST TO SATURATED, SAND*

(A) **COASTAL PLAIN:** *BLACK, VERY SOFT TO SOFT, MOIST TO WET, LITTLE ORGANIC MATTER TO MODERATELY ORGANIC, SILT, SANDY SILT AND SANDY CLAYEY SILT, AND BLACK, VERY LOOSE, MOIST TO SATURATED, LITTLE ORGANIC MATTER TO MODERATELY ORGANIC, SILTY SAND*

-NW10-

5/14/99

15-MAY-2015 09:37
R:\projects\...\U4751_GEO_pfl_SWAL10.dgn

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 40191	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** Whitt, J. W.	
SITE DESCRIPTION SOUND BARRIER WALL #10, SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON				**GROUND WTR (ft)**
BORING NO. NW10-9	**STATION** 107+85	**OFFSET** 65 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 43.2 ft	**TOTAL DEPTH** 18.0 ft	**NORTHING** 195,549	**EASTING** 2,353,718	**24 HR.** NM
DRILL RIG/HAMMER EFF./DATE MID3793 DSA1123 GEOPROBE 10/16/2014		DRILL METHOD CPT / DPT	HAMMER TYPE N/A	
DRILLER Stewart, R.	**START DATE** 01/21/15	**COMP. DATE** 01/21/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
45										43.2 GROUND SURFACE 0.0
										COASTAL PLAIN LOOSE TO MEDIUM DENSE, SILTY SAND
40										38.7 4.5
										MEDIUM DENSE TO DENSE, SAND WITH LITTLE SILT
35										
30										25.2 18.0
										Boring Terminated at Elevation 25.2 ft In Medium Dense Sand Water level was not measured. Pore pressure dissipation test was not performed.

WBS 40191	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** Whitt, J. W.	
SITE DESCRIPTION SOUND BARRIER WALL #10, SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON				**GROUND WTR (ft)**
BORING NO. NW10-10	**STATION** 108+92	**OFFSET** 67 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 43.2 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 195,647	**EASTING** 2,353,739	**24 HR.** 3.5
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 80% 10/14/2014		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
DRILLER Wiggins, M.	**START DATE** 01/21/15	**COMP. DATE** 01/21/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
45										43.2 GROUND SURFACE 0.0
	42.2	1.0	2	2	2	4		M		**COASTAL PLAIN**
40	39.7	3.5	2	3	3	6		Sat.		40.2 BLACK, LITTLE ORGANIC MATTER TO MODERATELY ORGANIC, SILTY FINE GRAINED SAND 3.0
	37.2	6.0	3	4	5	9		Sat.		BROWNISH GRAY TO LIGHT GRAYISH BROWN, FINE GRAINED SAND
35	34.7	8.5	3	4	3	7		Sat.		
30	29.7	13.5	2	1	1	2		Sat.		
25	24.7	18.5	3	4	5	9		Sat.		23.2 20.0
										Boring Terminated at Elevation 23.2 ft In Loose Sand

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

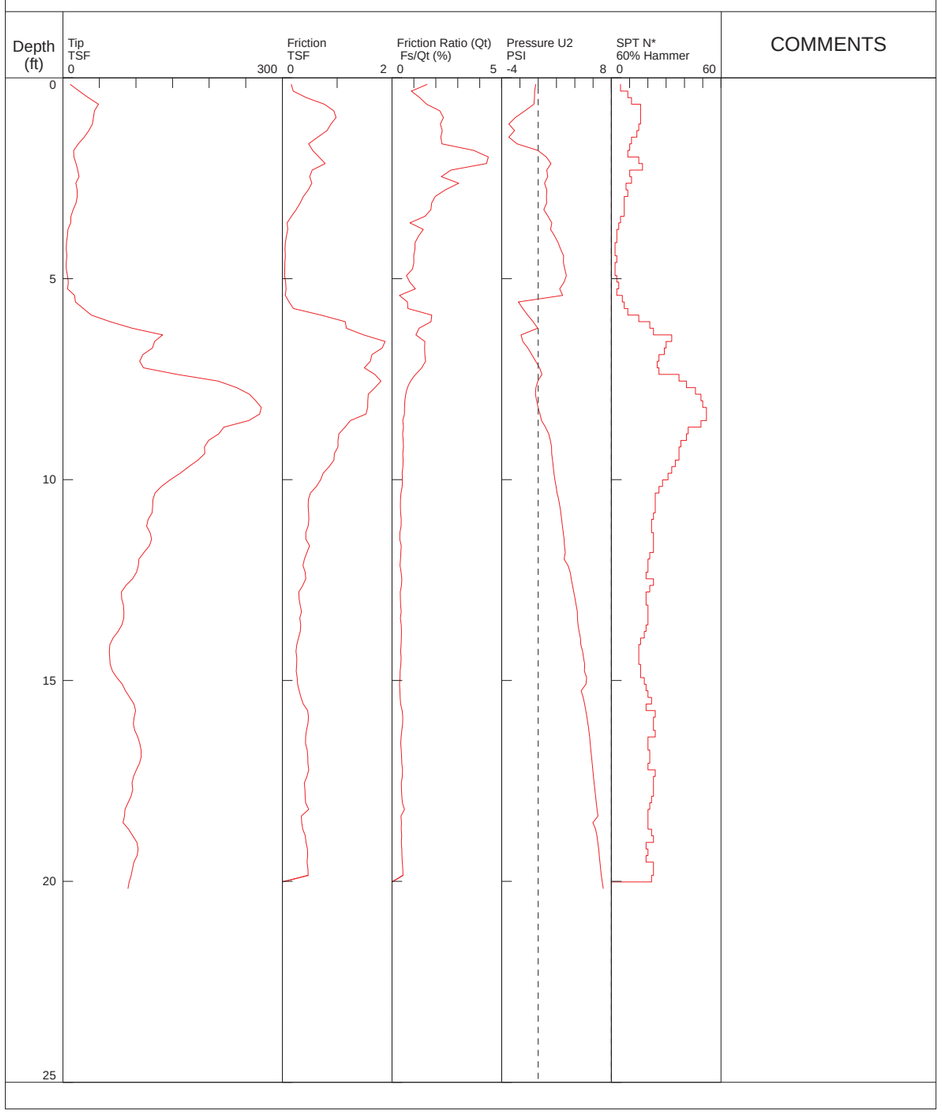
WBS 40191	**TIP** U-4751	**COUNTY** NEW HANOVER	**GEOLOGIST** Whitt, J. W.	
SITE DESCRIPTION SOUND BARRIER WALL #10, SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON				**GROUND WTR (ft)**
BORING NO. NW10-11	**STATION** 109+98	**OFFSET** 76 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 42.4 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 195,738	**EASTING** 2,353,776	**24 HR.** NM
DRILL RIG/HAMMER EFF./DATE MID3793 DSA1123 GEOPROBE 10/16/2014		DRILL METHOD CPT / DPT	HAMMER TYPE N/A	
DRILLER Stewart, R.	**START DATE** 01/21/15	**COMP. DATE** 01/21/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
45											
										42.4 GROUND SURFACE	0.0
40										**COASTAL PLAIN** SOFT TO STIFF, SANDY CLAYEY SILT	
35											
30										30.4	12.0
25										MEDIUM DENSE TO DENSE, SAND WITH LITTLE SILT	
										22.4	20.0
										Boring Terminated at Elevation 22.4 ft In Medium Dense Sand Water level was not measured. Pore pressure dissipation test was not performed.	

APPENDIX I

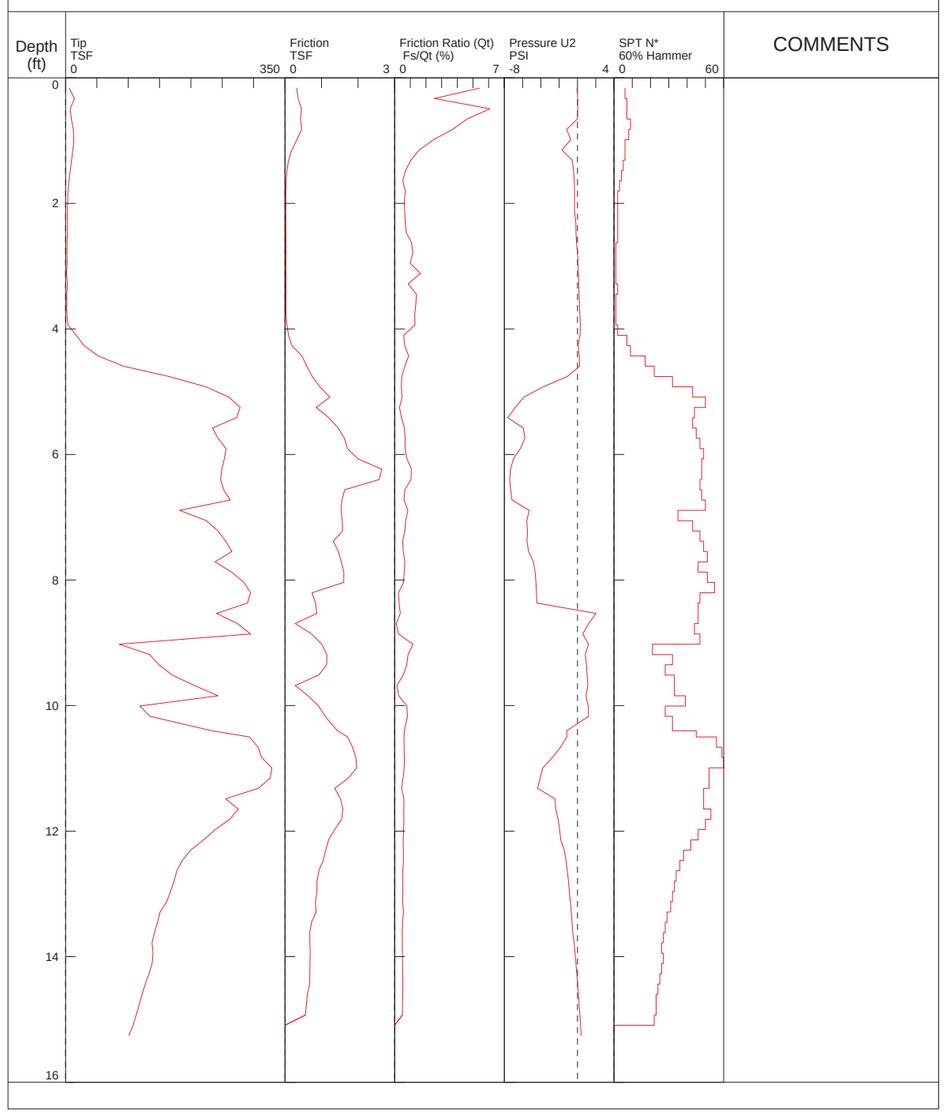
Mid-Atlantic Drilling Inc

COMMENT: Schnabel
CONE ID: DSA1123
LOCATION: Wilmington N.C.
JOB NUMBER: U4751
TEST DATE: 1/21/2015 9:00:06 AM
NW10-1



Mid-Atlantic Drilling Inc

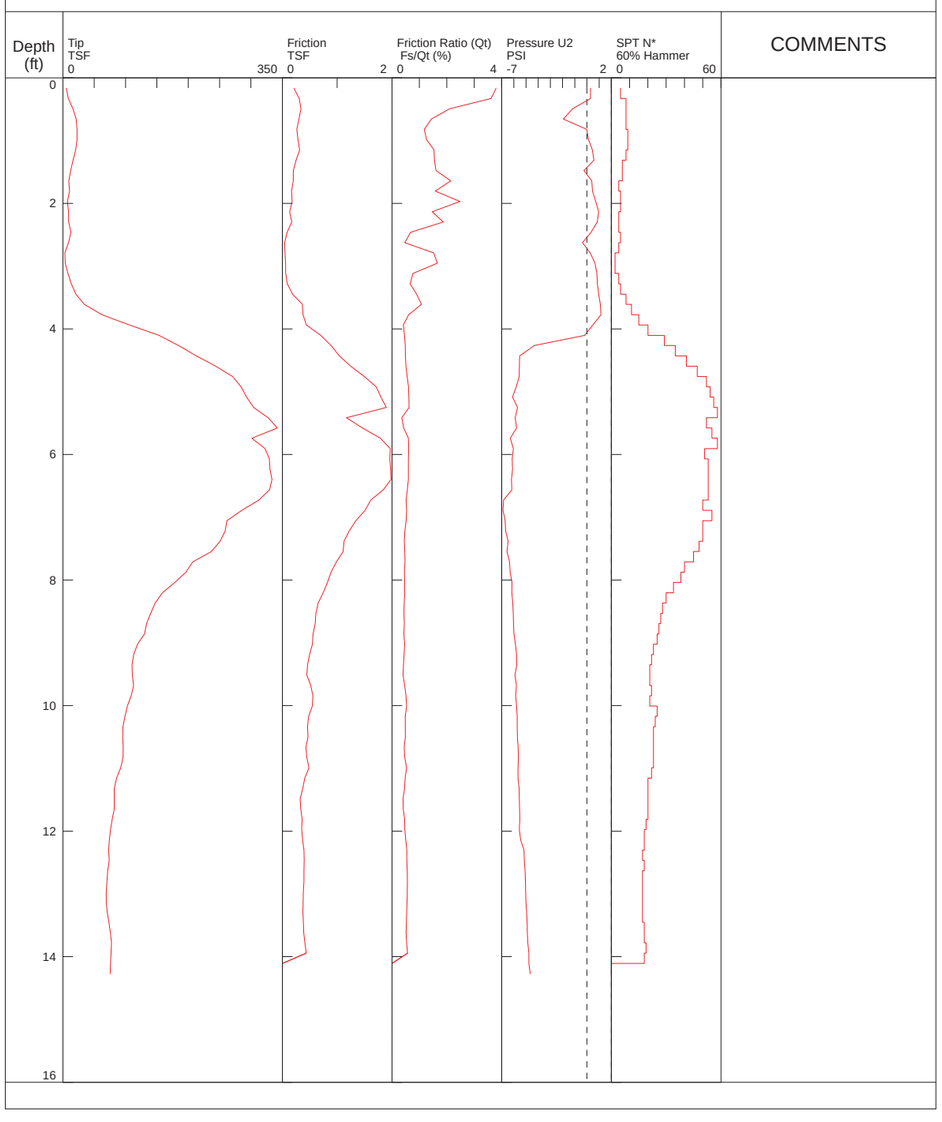
COMMENT: Schnabel
CONE ID: DSA1123
LOCATION: Wilmington N.C.
JOB NUMBER: U4751
TEST DATE: 1/20/2015 3:24:43 PM
NW10-3



APPENDIX I

Mid-Atlantic Drilling Inc

COMMENT: Schnabel
CONE ID: DSA1123
LOCATION: Wilmington N.C.
JOB NUMBER: U4751
TEST DATE: 1/21/2015 9:28:45 AM
NW10-5



Mid-Atlantic Drilling Inc

COMMENT: Schnabel
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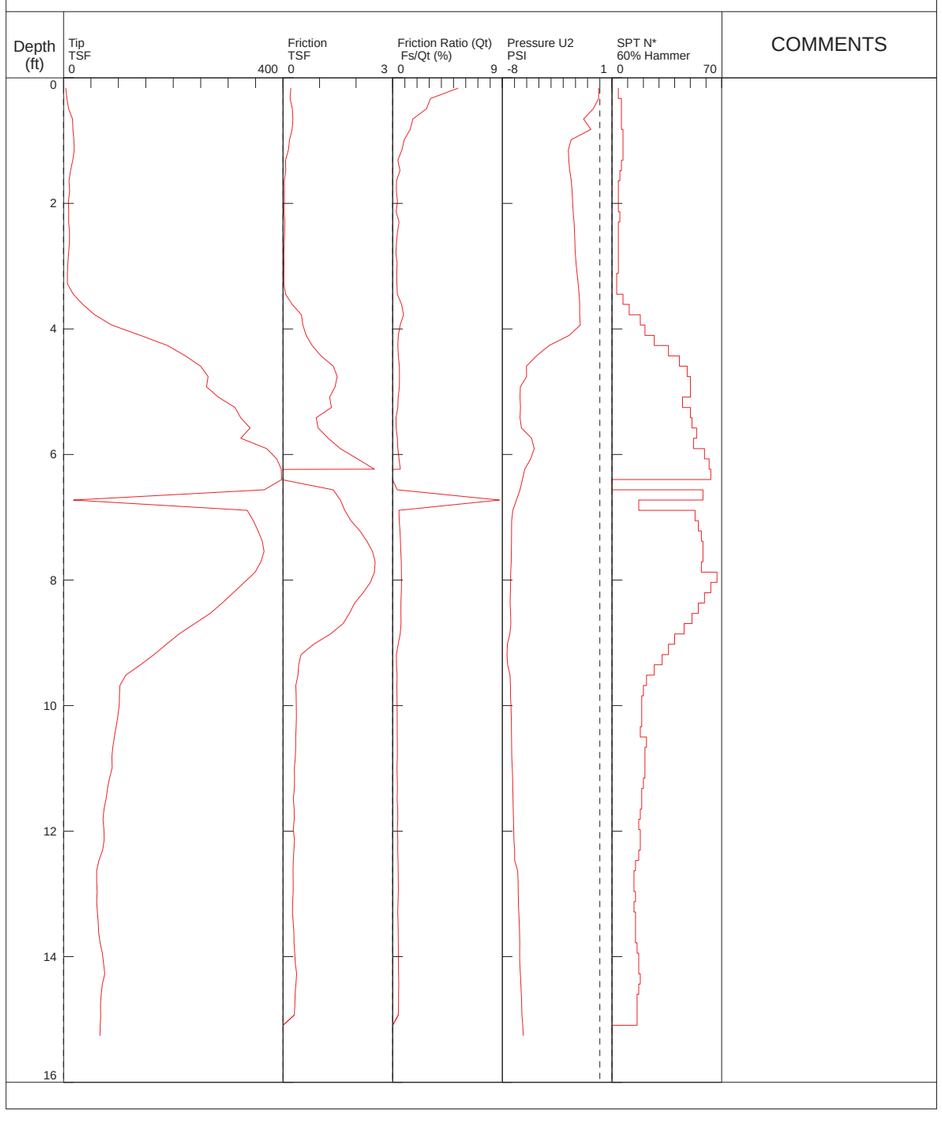
JOB NUMBER: U4751
TEST DATE: 1/21/2015 9:49:40 AM
NW10-7



APPENDIX I

Mid-Atlantic Drilling Inc

COMMENT: Schnabel
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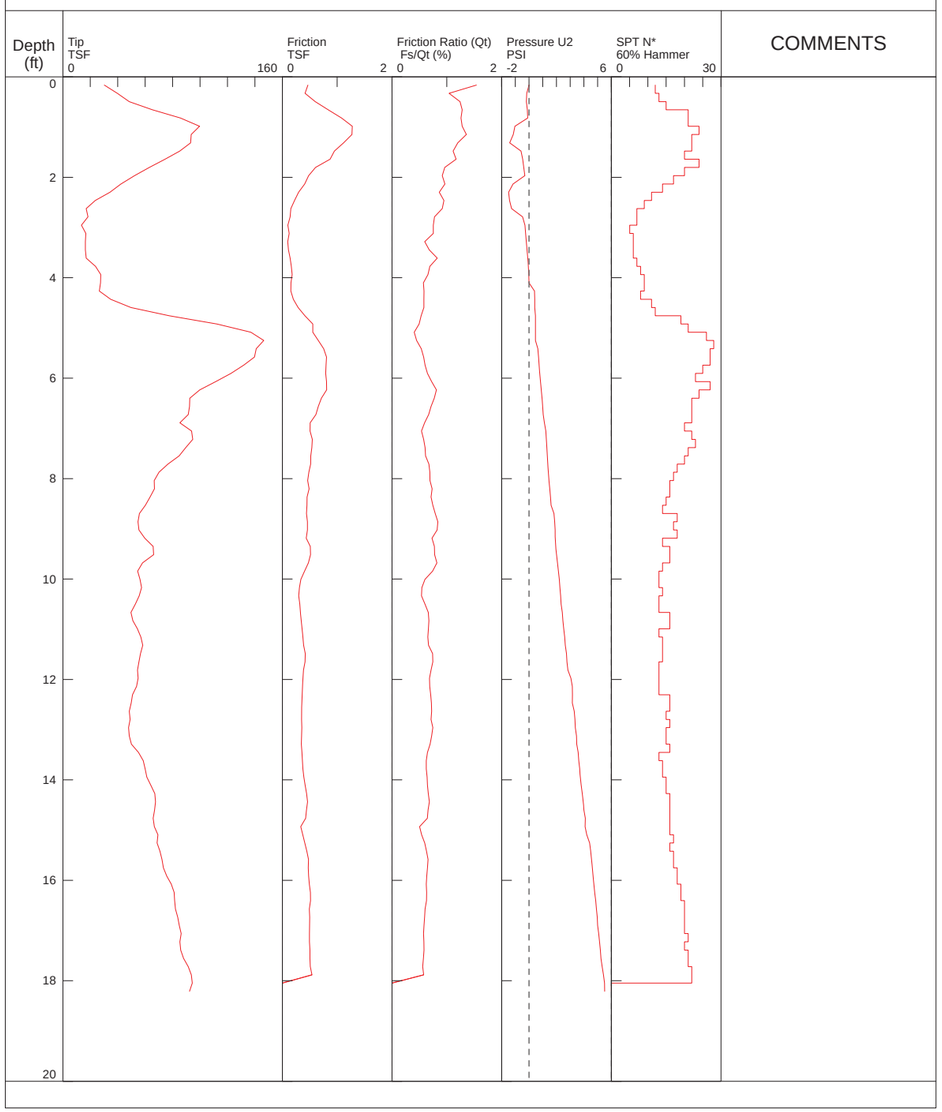
LOCATION: Wilmington N.C.
JOB NUMBER: U4751
TEST DATE: 1/21/2015 10:33:34 AM

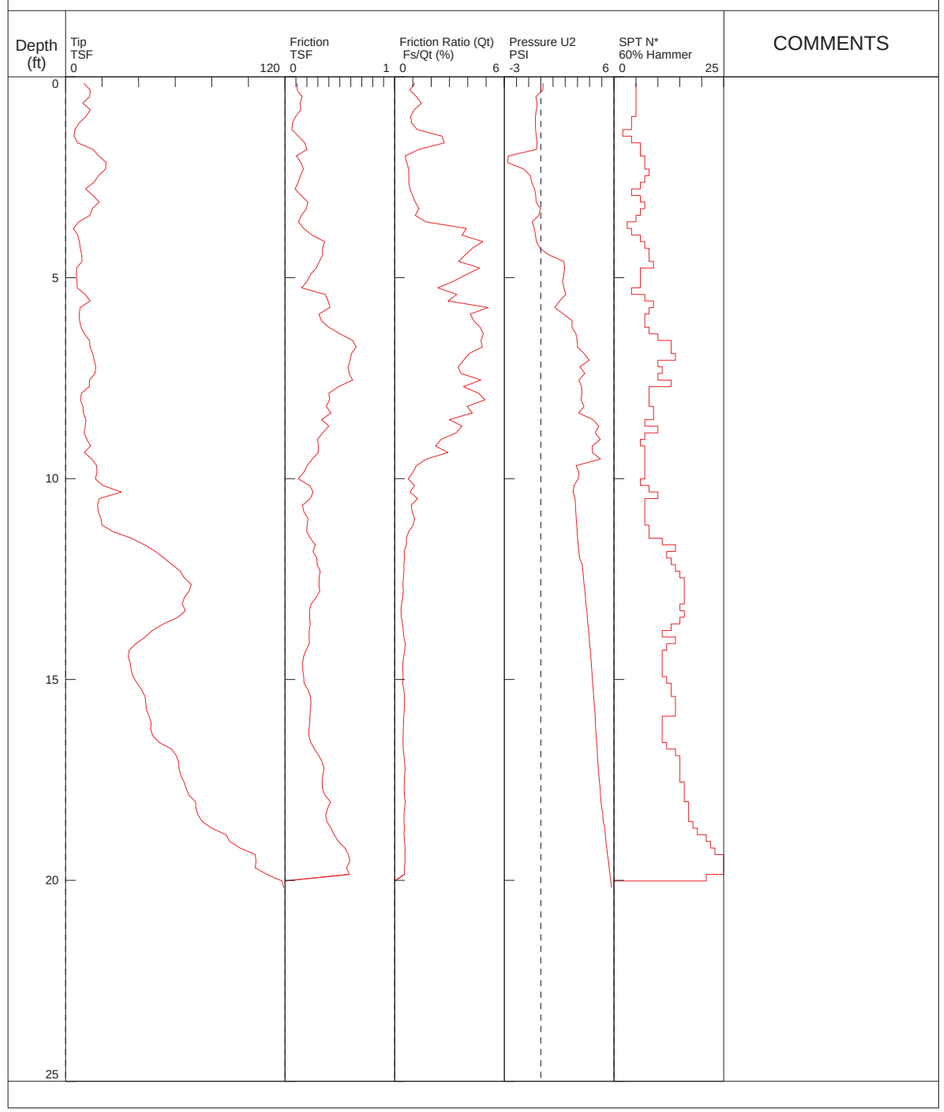
NW10-9



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

NW10-11



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

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 CUT-OFF ROAD) TO US 17 IN WILMINGTON

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

CONTENTS

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

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

DATE MAY 2015

NORTH CAROLINA PROFESSIONAL SEAL 028422 ENGINEER DONALD W. BROWN JR.

DocuSigned by:
Donald W. Brown Jr. 6/9/2015
056948D03967464
SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
U-4751	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		—	NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS					
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR		UNSUITABLE

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] DIEDRICH D-25
- [X] HOG, IOT CPT

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

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

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM#17 RR SPIKE IN 18-INCH PINEAT -BL- STA. 169+35, 120 FT RT.

ELEVATION: 45.01 FEET

NOTES:

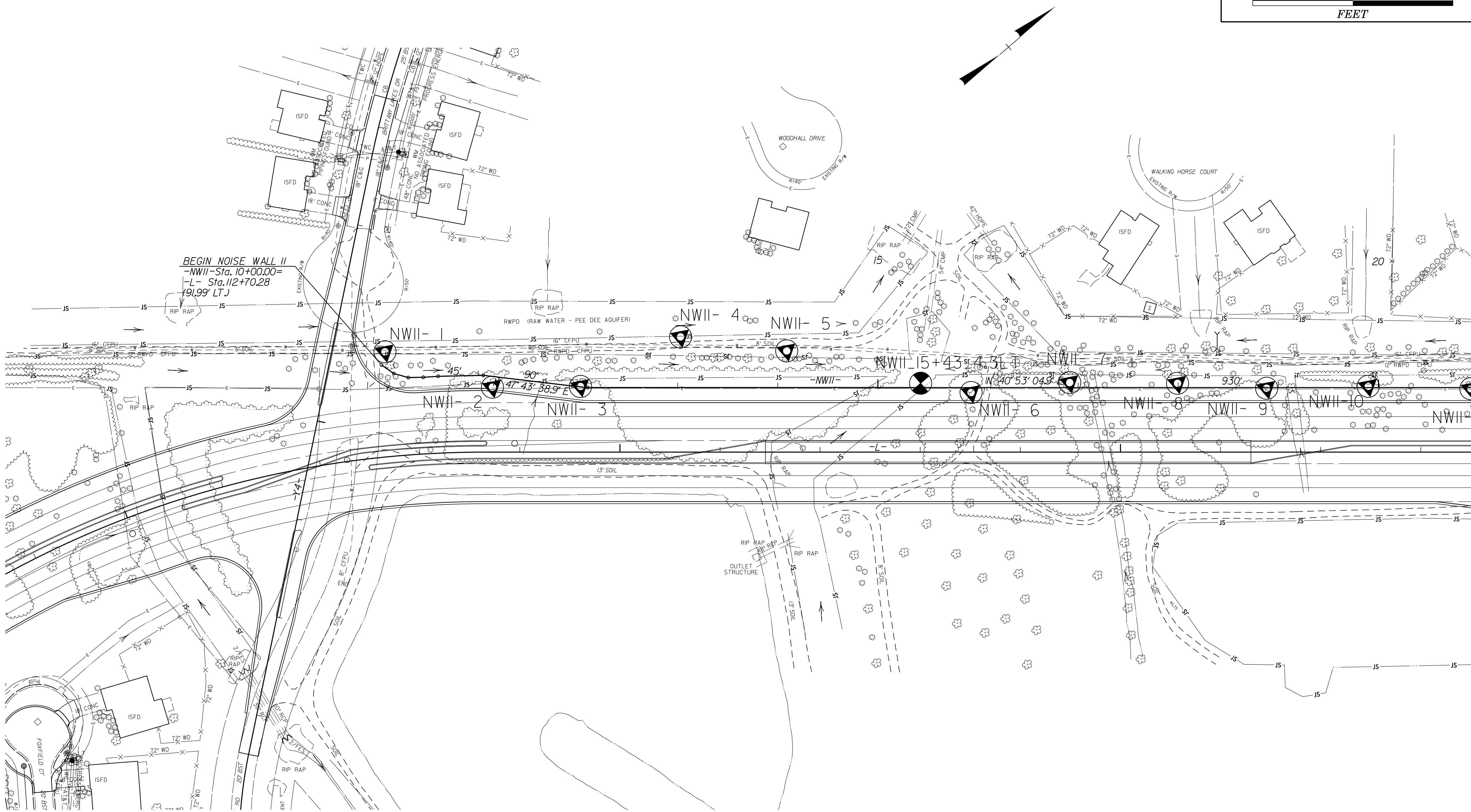
BORING NW11_15+43+4.3LT WAS RECEIVED FROM A PREVIOUS INVESTIGATION PERFORMED BY THE NCDOT GEU IN JUNE 2014.

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-4751	3

SITE PLAN

0 100 200
FEET



PROJECT REFERENCE NO.	SHEET NO.
U-4751	4

SITE PLAN

0 100 200

FEET

END NOISE WALL N
-NWII-STA: 25+10.00
-Y5- Sta 14+09.30

RAVENS GLASS COURT

BON HUNTER DR 24' BST

CHARRED PINE DRIVE
50' PUBLIC R/W

NEEDLEFISH CT 18' BST

NCDOT GPS MON. U4751-8

NWII-12 NWII-13 NWII-14 NWII-15

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PROJECT REFERENCE NO.	SHEET NO.
U-4751	5

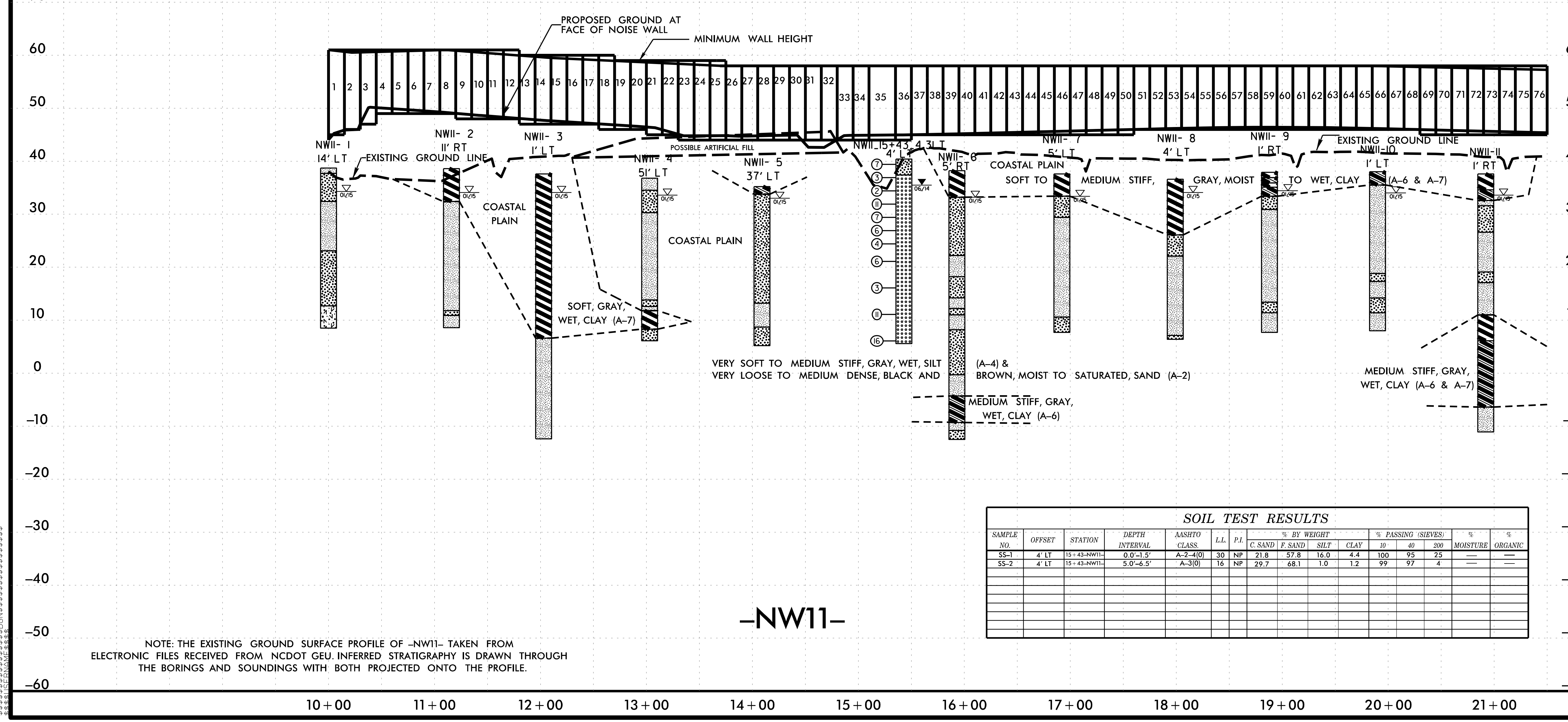
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PROFILE ALONG –NW11–



NOTE: THE EXISTING GROUND SURFACE PROFILE OF –NW11– TAKEN FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND SOUNDINGS WITH BOTH PROJECTED ONTO THE PROFILE.

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS–1	4' LT	15+43–NW11–	0.0'–1.5'	A–2–4(0)	30	NP	21.8	57.8	16.0	4.4	100	95	25	—	—
SS–2	4' LT	15+43–NW11–	5.0'–6.5'	A–3(0)	16	NP	29.7	68.1	1.0	1.2	99	97	4	—	—

–NW11–

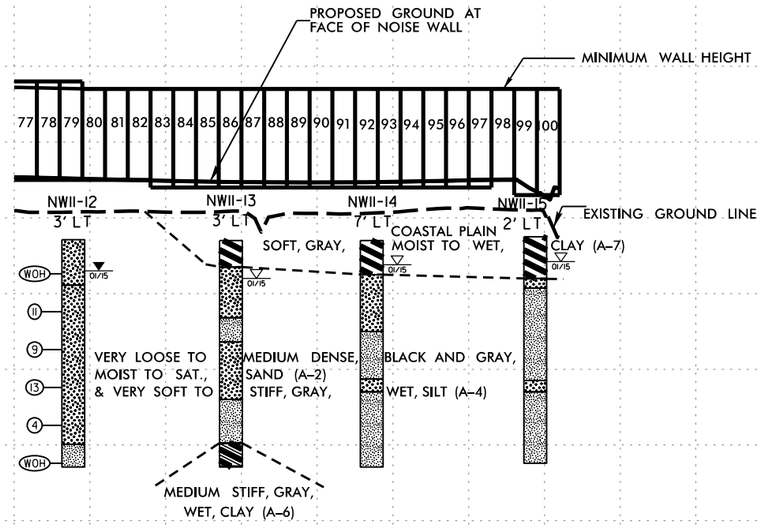
5/14/99

PROJECT REFERENCE NO.	SHEET NO.
U-4751	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PROFILE ALONG –NW11–



NOTE: THE EXISTING GROUND SURFACE PROFILE OF –NW11– TAKEN FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU. INFERREDSTRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND SOUNDINGS WITH BOTH PROJECTED ONTO THE PROFILE.

–NW11–

130 120 110 100 90 80 70 60 50 40 30 20 10 0 –10 –20 –30 –40 –50 –60

22+00 23+00 24+00 25+00

$$$$SYSTIME$$$$
$$$$USERNAME$$$$
$$$$FILENAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U–4751	7

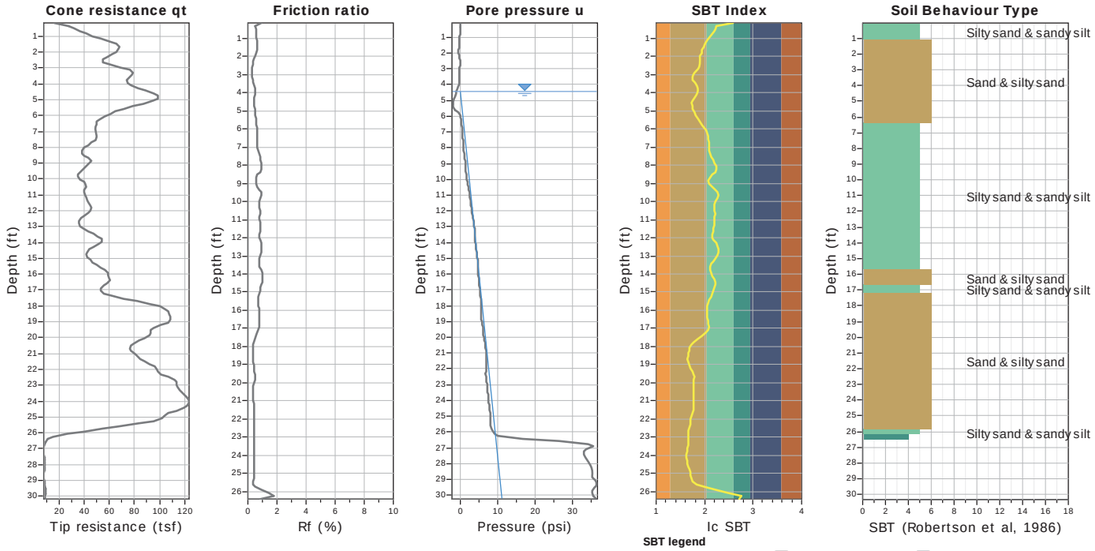
APPENDIX A
CPT LOGS

DB MAY 2015
INITIALS DATE

STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

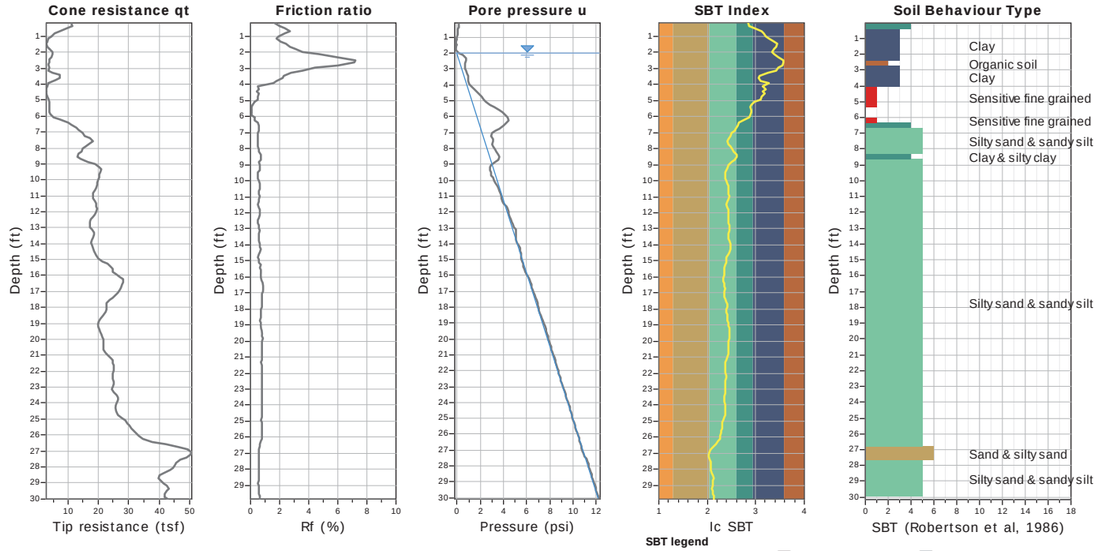
CPT: NW11- 1
Total depth: 30.18 ft, Date: 1/7/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

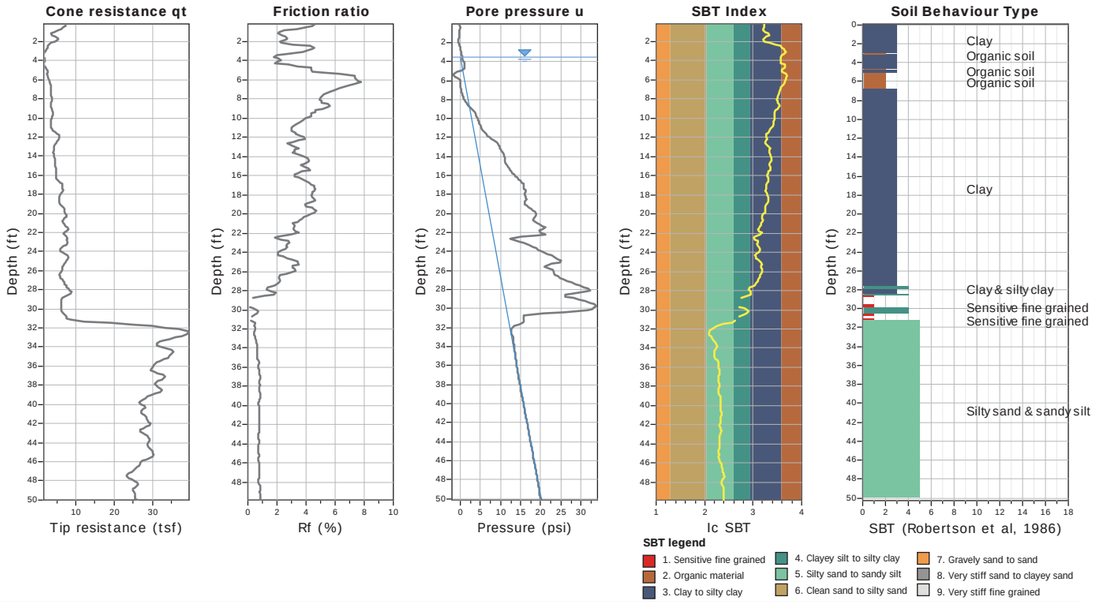
CPT: NW11- 2
Total depth: 30.02 ft, Date: 1/7/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

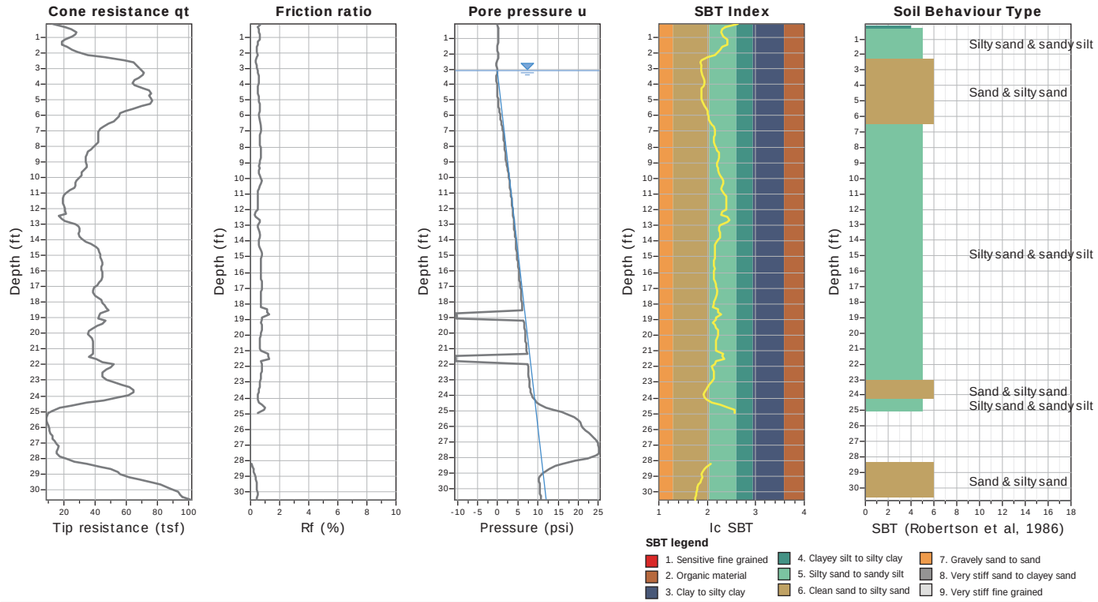
CPT: NW11- 3
Total depth: 50.03 ft, Date: 1/7/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

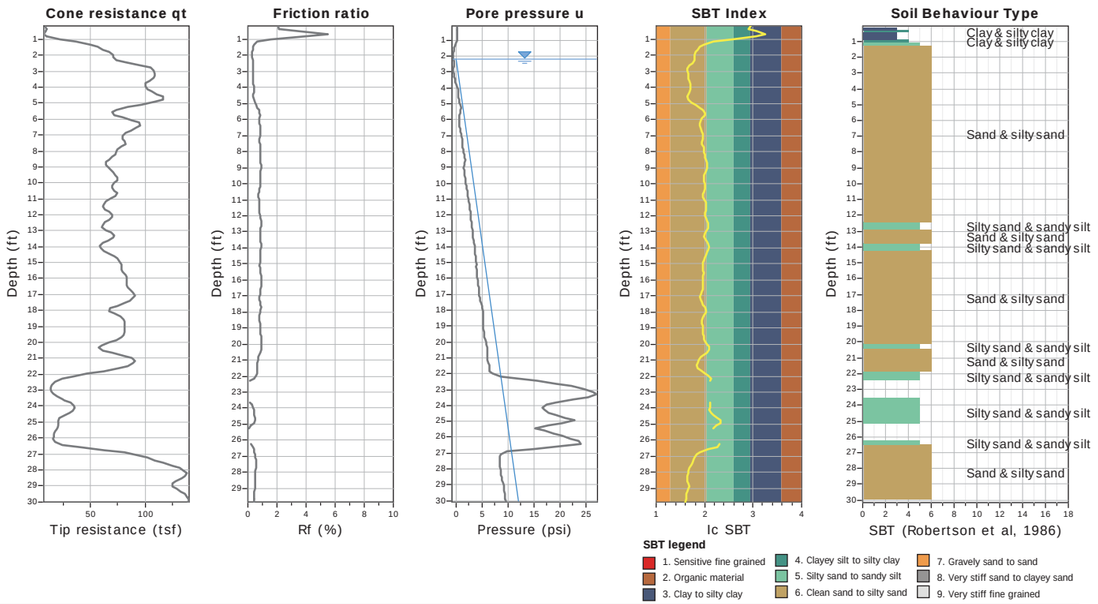
CPT: NW11- 4
Total depth: 30.68 ft, Date: 1/7/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

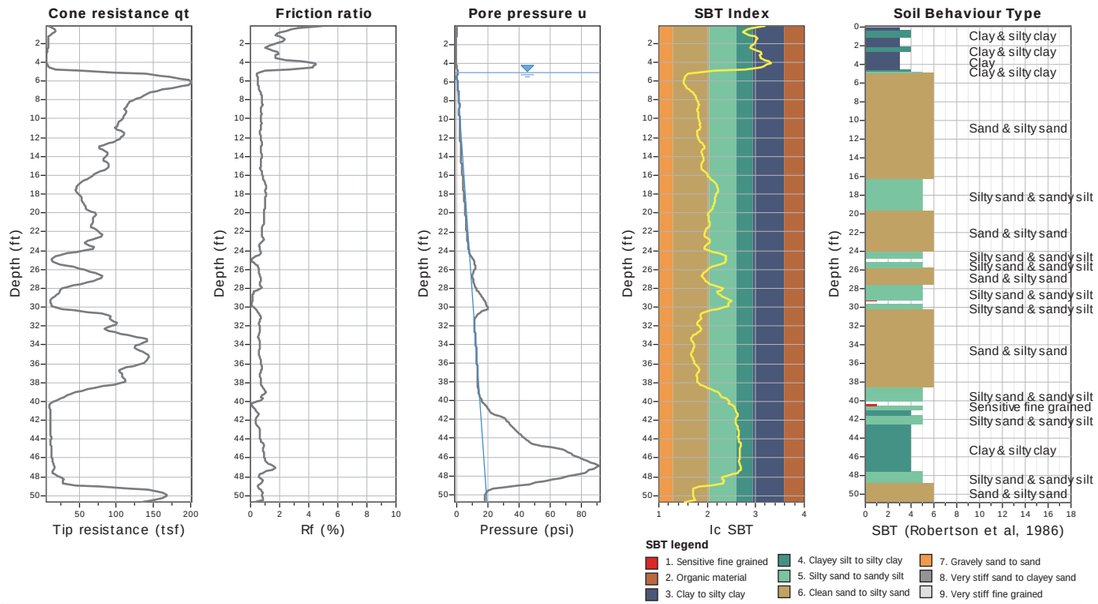
CPT: NW11- 5
Total depth: 30.02 ft, Date: 1/7/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

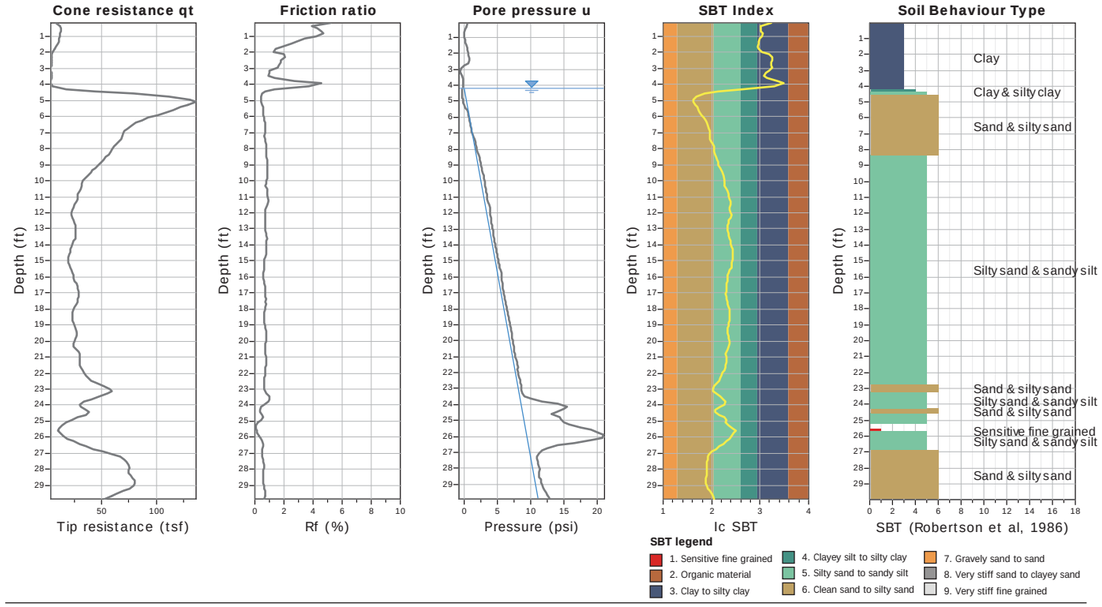
CPT: NW11- 6
Total depth: 50.69 ft, Date: 1/6/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

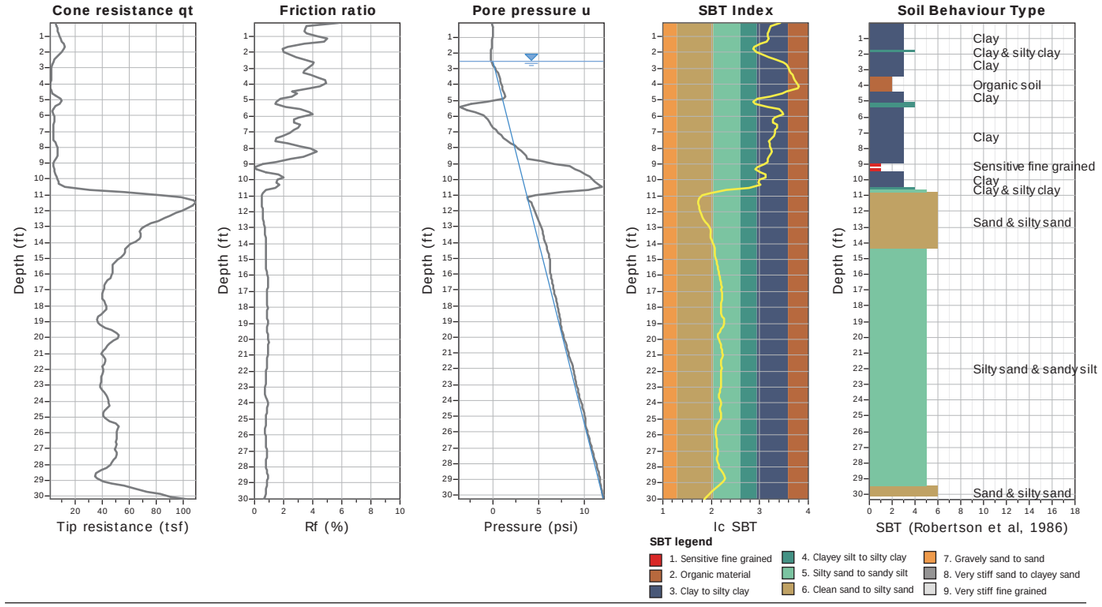
CPT: NW11- 7
Total depth: 29.86 ft, Date: 1/6/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

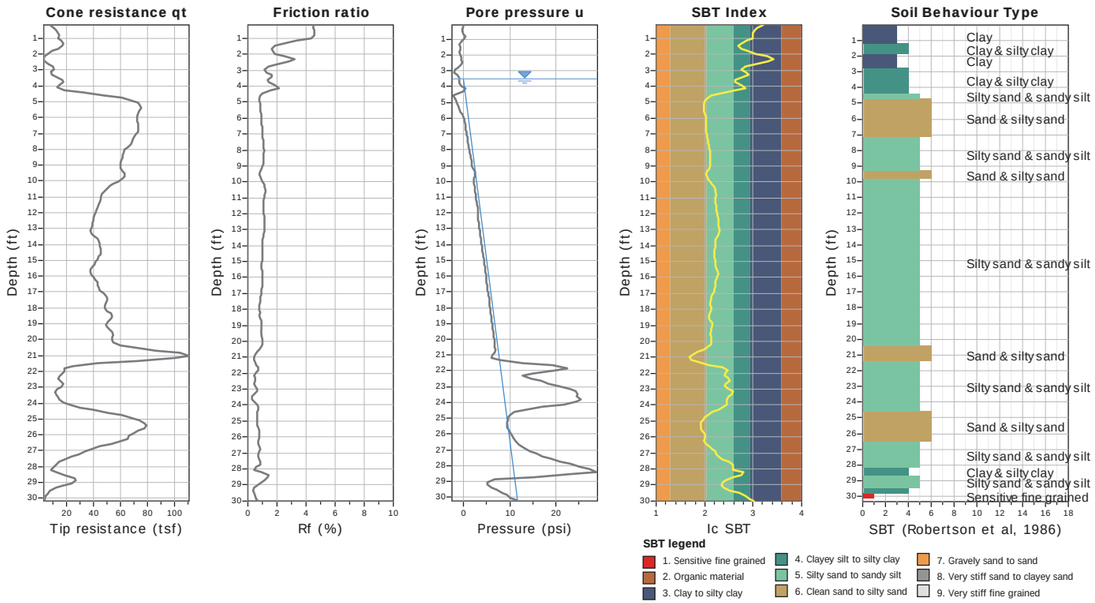
CPT: NW11- 8
Total depth: 30.18 ft, Date: 1/6/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

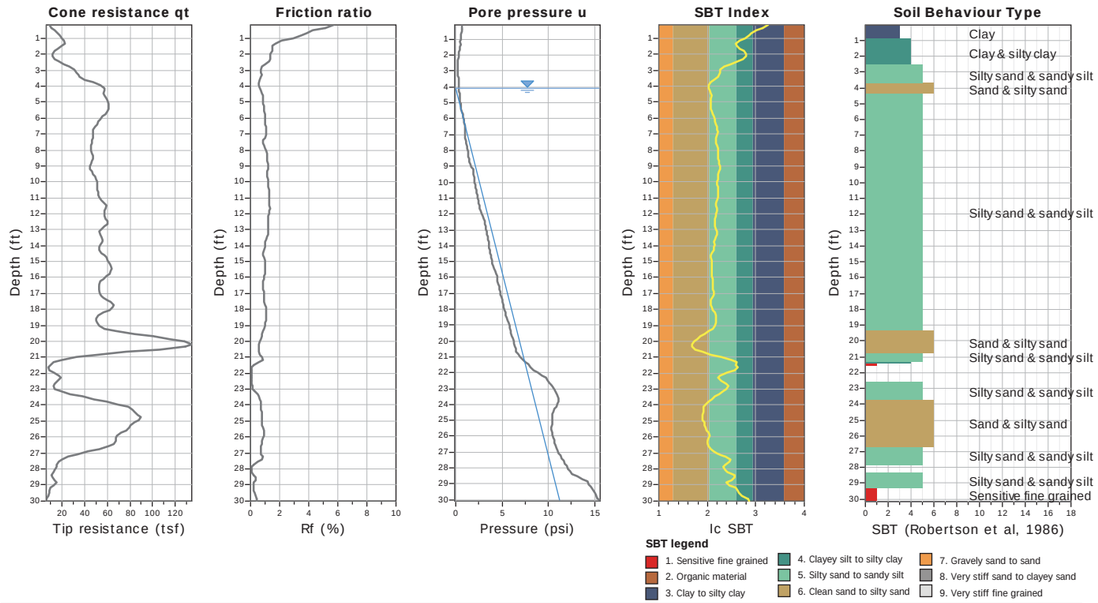
CPT: NW11- 9
Total depth: 30.18 ft, Date: 1/6/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

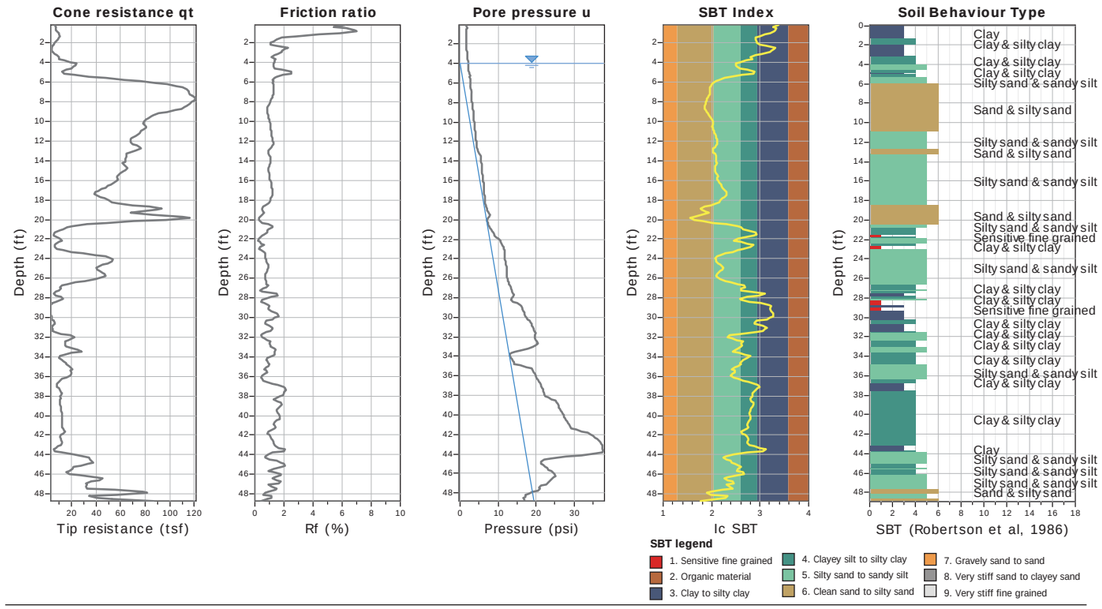
CPT: NW11-10
Total depth: 30.02 ft, Date: 1/6/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

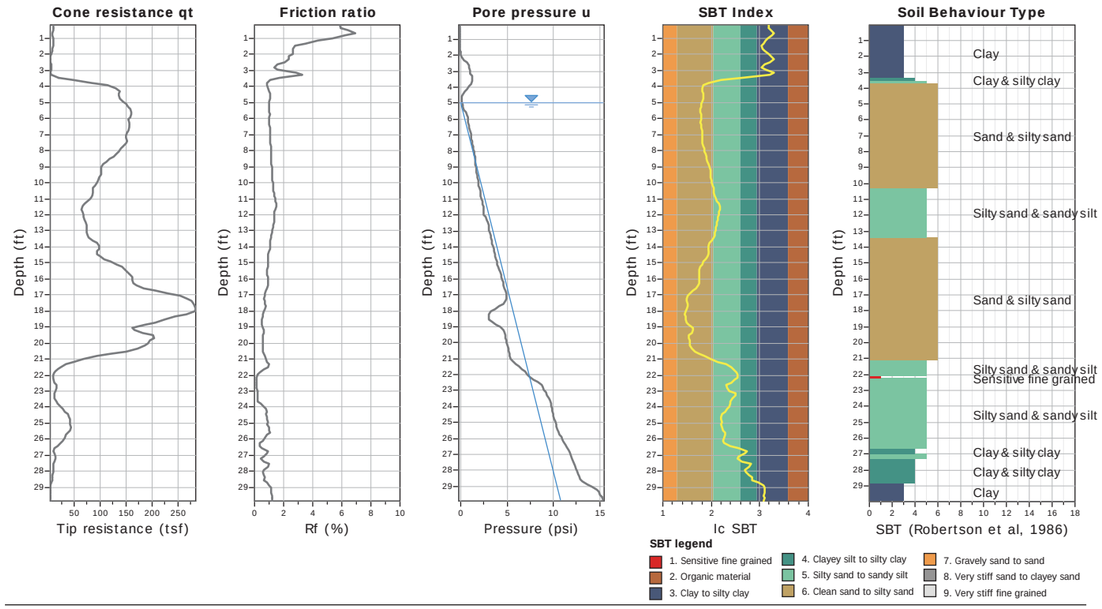
CPT: NW11-11
Total depth: 48.72 ft, Date: 1/6/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

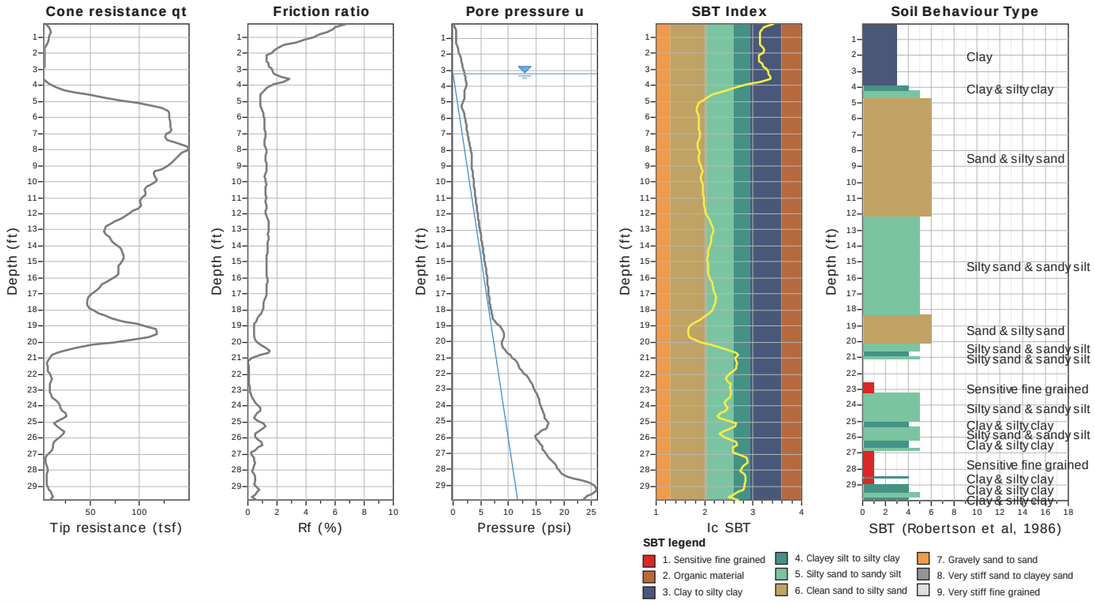
CPT: NW11-13
Total depth: 29.86 ft, Date: 1/6/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

CPT: NW11-14
Total depth: 29.86 ft, Date: 1/6/2015
Cone Type: Hogentogler 10 Ton
Cone Operator: Mid-Atlantic Drilling



STEWART

Project: U-4751 SOUND WALL 11
Location: NEW HANOVER CO.

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