

REFERENCE: R-3830

PROJECT: 38887

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

**STRUCTURE
SUBSURFACE INVESTIGATION**

COUNTY LEE
PROJECT DESCRIPTION NC 42 FROM US 421 TO SR 1579
(MAIN STREET) IN SANFORD AND ALONG SR 1579
FROM NC 42 TO SR 1538 (E. HARRINGTON AVE.) IN
BROADWAY
SITE DESCRIPTION RETAINING WALL 3 ON -L- FROM
102 + 14.88 TO 105 + 03.34, LEFT

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN & PROFILE
4-6	BORE LOGS
7	SOIL TEST RESULTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-3830	1	7

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

F&R PERSONNEL

S. WOODS

S. DAVIS

J. DAVIS

INVESTIGATED BY F&R, Inc.

DRAWN BY T.T. WALKER

CHECKED BY P. ALTON

SUBMITTED BY P. ALTON

DATE JANUARY 2018

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DocuSigned by:
Patrick Alton 1/30/2018
A270EF78A636447 DATE

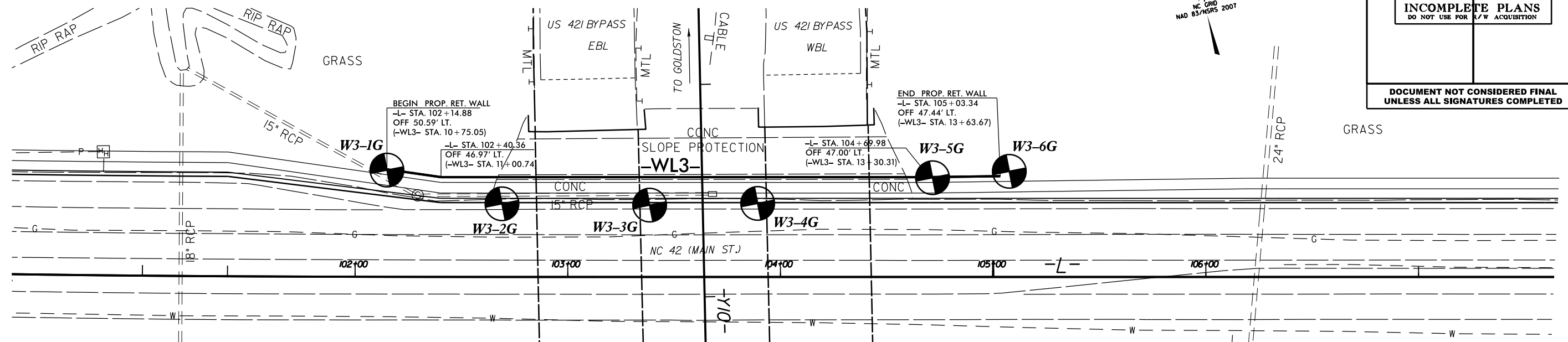
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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

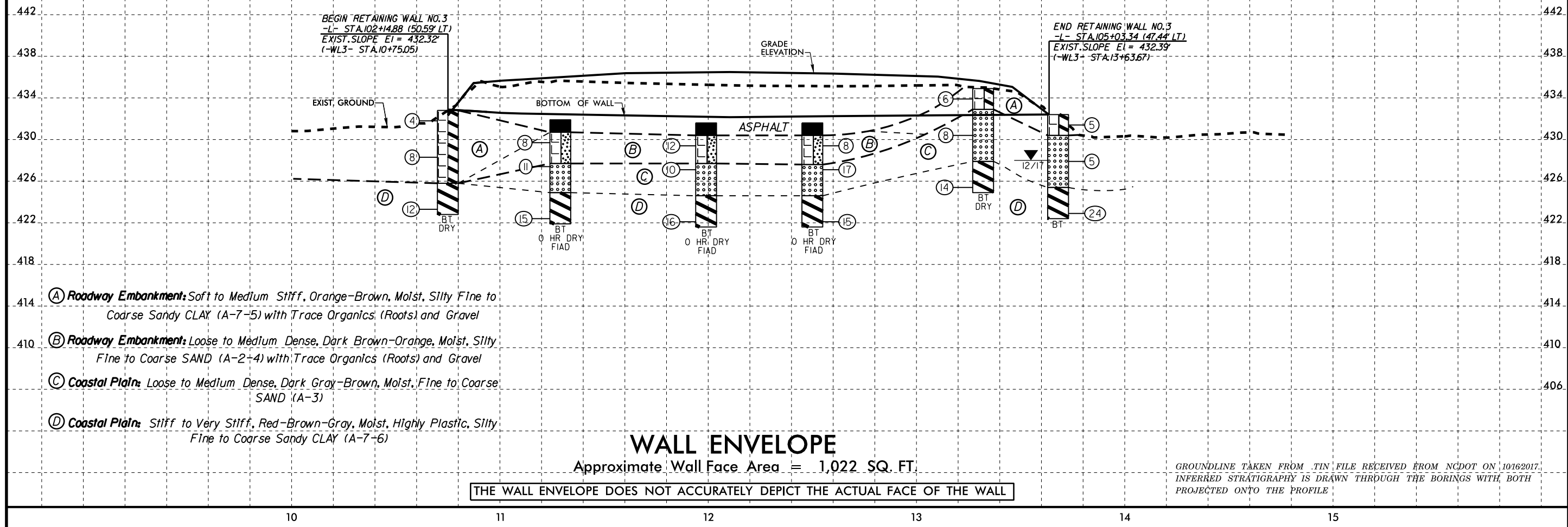
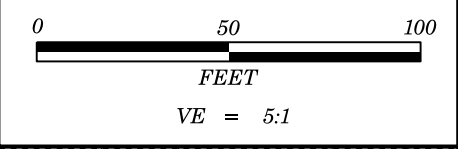
SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																													
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT 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										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.										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 60 BLOWS 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 (INCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD 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.										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 INTRODUCED 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 IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 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.																													
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERING																																							
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										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.										MINERALOGICAL COMPOSITION										PERCENTAGE OF MATERIAL										GROUND WATER									
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										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										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP																													
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS										ROCK HARDNESS																																							
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION 25/825 DIP & DIP DIRECTION OF ROCK STRUCTURES SOIL SYMBOL SPT DPT DMT TEST BORING SLOPE INDICATOR INSTALLATION ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CORE PENETROMETER TEST INFERRED SOIL BOUNDARY CORE BORING SOUNDING ROD INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE ALLUVIAL SOIL BOUNDARY PIEZOMETER INSTALLATION SPT N-VALUE										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 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.																																							
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ABBREVIATIONS																																							
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053										UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK										AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL. - CLAY MOD. - MODERATELY % - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC % - DRY UNIT WEIGHT CSE. - COARSE ORG. - ORGANIC SAMPLE ABBREVIATIONS DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SS - BULK DPT - DYNAMIC PENETRATION TEST SAP. - SAPROLITIC SD. - SAND, SANDY S - SPLIT SPOON e - VOID RATIO SD. - SAND, SANDY ST - SHELBY TUBE F - FINE SL. - SILT, SILTY RS - ROCK FOSS. - FOSSILIFEROUS TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAC. - FRACTURED, FRACTURES w - MOISTURE CONTENT CBR - CALIFORNIA BEARING RATIO FRAGS. - FRAGMENTS V - VERY HL. - HIGHLY																																							
SOIL MOISTURE - CORRELATION OF TERMS										SOIL MOISTURE - CORRELATION OF TERMS										FRACURE SPACING										BEDDING																													
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT										TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET																																							
PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT										INDURATION																																							
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH										DRILL UNITS: CME-45C CME-55 CME-550 VANE SHEAR TEST PORTABLE HOIST ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG.-CARBIDE INSERTS CASING w/ ADVANCER TRICONE *STEEL TEETH TRICONE *TUNG.-CARB. CORE BIT HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B H N HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST										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.																																							
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.																																																											
																														BENCH MARK: N/A ELEVATION: N/A FEET NOTES: FIAD= FILLED IMMEDIATELY AFTER DRILLING BORING ELEVATIONS OBTAINED FROM .TIN FILE RECEIVED FROM NCDOT ON 10/16/2017 DATE: 8-15-14																													

RETAINING WALL NO. 3 (PRELIMINARY DESIGN)

PROJECT REFERENCE NO. R-3830	SHEET NO. 3
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



W3-1G 10+75 ℄	W3-2G 11+29 13' RT	W3-3G 11+99 13' RT	W3-4G 12+50 12' RT	W3-5G 13+32 ℄	W3-6G 13+68 2' LT
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- (A) **Roadway Embankment:** Soft to Medium Stiff, Orange-Brown, Moist, Silty Fine to Coarse SANDY CLAY (A-7-5) with Trace Organics (Roots) and Gravel
- (B) **Roadway Embankment:** Loose to Medium Dense, Dark Brown-Orange, Moist, Silty Fine to Coarse SAND (A-2-4) with Trace Organics (Roots) and Gravel
- (C) **Coastal Plain:** Loose to Medium Dense, Dark Gray-Brown, Moist, Fine to Coarse SAND (A-3)
- (D) **Coastal Plain:** Stiff to Very Stiff, Red-Brown-Gray, Moist, Highly Plastic, Silty Fine to Coarse SANDY CLAY (A-7-6)

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38887.1.1		TIP R-3830		COUNTY LEE		GEOLOGIST S. Woods									
SITE DESCRIPTION Retaining Wall 3 on -L- from 102+14.88 to 105+03.34, Left							GROUND WTR (ft)								
BORING NO. W3-1G		STATION 10+75		OFFSET CL		ALIGNMENT -WL3-									
COLLAR ELEV. 432.8 ft		TOTAL DEPTH 10.0 ft		NORTHING 622,642		EASTING 1,964,616									
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 88% 02/11/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER S. Davis		START DATE 12/05/17		COMP. DATE 12/05/17		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
435															
	432.8	0.0	2	2	2								M	GROUND SURFACE	0.0
430	429.3	3.5	3	4	4								M	ROADWAY EMBANKMENT Orange-brown, silty fine to coarse sandy CLAY (A-7-5), with trace organics (roots) & gravel from 0-1.5'	
425	424.3	8.5	3	4	8								M	COASTAL PLAIN Red-brown-gray, silty fine to coarse sandy CLAY (A-7-6)	10.0
Boring Terminated at Elevation 422.8 ft in CLAY (COASTAL PLAIN)															

WBS 38887.1.1		TIP R-3830		COUNTY LEE		GEOLOGIST S. Woods									
SITE DESCRIPTION Retaining Wall 3 on -L- from 102+14.88 to 105+03.34, Left							GROUND WTR (ft)								
BORING NO. W3-2G		STATION 11+29		OFFSET 13 ft RT		ALIGNMENT -WL3-									
COLLAR ELEV. 431.9 ft		TOTAL DEPTH 10.0 ft		NORTHING 622,616		EASTING 1,964,666									
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 88% 02/11/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER S. Davis		START DATE 12/05/17		COMP. DATE 12/05/17		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
435															
	431.9	0.0											M	GROUND SURFACE	0.0
430	430.7	1.2	5	4	4								M	ROADWAY EMBANKMENT ASPHALT	1.2
	428.4	3.5	3	5	6								M	ROADWAY EMBANKMENT Dark brown-orange, silty fine to coarse SAND (A-2-4), with trace organics (roots) & gravel	4.2
425	424.9	7.0											M	COASTAL PLAIN Dark gray-brown, fine to coarse SAND (A-3)	7.0
	423.4	8.5	3	7	8								M	COASTAL PLAIN Red-brown-gray, silty fine to coarse sandy CLAY (A-7-6)	10.0
Boring Terminated at Elevation 421.9 ft in CLAY (COASTAL PLAIN)															
NOTES: 1) Boring Filled Immediately After Drilling (FIAD) due to location on shoulder of highway															

NCDOT BORE DOUBLE R3830_GEO_BH_WALLS.GPJ NC_DOT.GDT 1/1/18

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38887.1.1		TIP R-3830		COUNTY LEE		GEOLOGIST S. Woods										
SITE DESCRIPTION Retaining Wall 3 on -L- from 102+14.88 to 105+03.34, Left							GROUND WTR (ft)									
BORING NO. W3-3G		STATION 11+99		OFFSET 13 ft RT		ALIGNMENT -WL3-										
COLLAR ELEV. 431.6 ft		TOTAL DEPTH 10.0 ft		NORTHING 622,602		EASTING 1,964,734										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 88% 02/11/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER S. Davis		START DATE 12/05/17		COMP. DATE 12/05/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
435																
430	430.4	1.2	5	6	6									431.6	0.0	GROUND SURFACE
														430.4	1.2	ASPHALT
	428.1	3.5	3	5	5									427.7	3.9	ROADWAY EMBANKMENT Dark brown-orange, silty fine to coarse SAND (A-2-4), with trace organics (roots) & gravel
425														424.6	7.0	COASTAL PLAIN Dark gray, fine to coarse SAND (A-3)
	423.1	8.5	3	6	10									421.6	10.0	Red-brown-gray, silty fine to coarse sandy CLAY (A-7-6)
																Boring Terminated at Elevation 421.6 ft in CLAY (COASTAL PLAIN)
NOTES: 1) Boring Filled Immediately After Drilling (FIAD) due to location on shoulder of highway																

WBS 38887.1.1		TIP R-3830		COUNTY LEE		GEOLOGIST S. Woods										
SITE DESCRIPTION Retaining Wall 3 on -L- from 102+14.88 to 105+03.34, Left							GROUND WTR (ft)									
BORING NO. W3-4G		STATION 12+50		OFFSET 12 ft RT		ALIGNMENT -WL3-										
COLLAR ELEV. 431.6 ft		TOTAL DEPTH 10.0 ft		NORTHING 622,593		EASTING 1,964,784										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 88% 02/11/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER S. Davis		START DATE 12/05/17		COMP. DATE 12/05/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
435																
430	430.4	1.2	4	3	5									431.6	0.0	GROUND SURFACE
														430.4	1.2	ASPHALT
	428.1	3.5	7	9	8									427.6	4.0	ROADWAY EMBANKMENT Dark brown-orange, silty fine to coarse SAND (A-2-4), with trace organics (roots) & gravel
425														424.6	7.0	COASTAL PLAIN Gray-brown, fine to coarse SAND (A-3)
	423.1	8.5	4	5	10									421.6	10.0	Red-brown-gray, silty fine to coarse sandy CLAY (A-7-6)
																Boring Terminated at Elevation 421.6 ft in CLAY (COASTAL PLAIN)
NOTES: 1) Boring Filled Immediately After Drilling (FIAD) due to location on shoulder of highway																

NCDOT BORE DOUBLE R3830_GEO_BH_WALLS.GPJ NC_DOT.GDT 1/1/18

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 38887.1.1		TIP R-3830		COUNTY LEE		GEOLOGIST S. Woods										
SITE DESCRIPTION Retaining Wall 3 on -L- from 102+14.88 to 105+03.34, Left							GROUND WTR (ft)									
BORING NO. W3-5G		STATION 13+32		OFFSET CL		ALIGNMENT -WL3-										
COLLAR ELEV. 435.1 ft		TOTAL DEPTH 10.0 ft		NORTHING 622,589		EASTING 1,964,867										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 88% 02/11/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER S. Davis		START DATE 12/05/17		COMP. DATE 12/05/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
440																
435	435.1	0.0	3	3	3										435.1	GROUND SURFACE
430	431.6	3.5	3	4	4									M	433.1	ROADWAY EMBANKMENT Orange-brown, silty fine to coarse sandy CLAY (A-7-5), with trace organics (roots) & gravel
														M	428.1	COASTAL PLAIN Gray-brown, fine to coarse SAND (A-3)
	426.6	8.5	3	5	9									M	425.1	Red-brown-gray, silty fine to coarse sandy CLAY (A-7-6)
																Boring Terminated at Elevation 425.1 ft in CLAY (COASTAL PLAIN)

WBS 38887.1.1		TIP R-3830		COUNTY LEE		GEOLOGIST S. Woods											
SITE DESCRIPTION Retaining Wall 3 on -L- from 102+14.88 to 105+03.34, Left							GROUND WTR (ft)										
BORING NO. W3-6G		STATION 13+68		OFFSET 2 ft LT		ALIGNMENT -WL3-											
COLLAR ELEV. 432.6 ft		TOTAL DEPTH 10.0 ft		NORTHING 622,585		EASTING 1,964,903											
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 88% 02/11/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
DRILLER S. Davis		START DATE 12/05/17		COMP. DATE 12/05/17		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
435																	
	432.6	0.0													432.6	GROUND SURFACE	
430	429.1	3.5	3	2	3									SS-12	21%	430.6	ROADWAY EMBANKMENT Orange, silty fine to coarse sandy CLAY (A-7-5), with trace organics (roots) & gravel
														M		425.6	COASTAL PLAIN Gray-brown, fine to coarse SAND (A-3)
425	424.1	8.5	6	9	15									SS-14	21%	422.6	Red-brown-gray, silty fine to coarse sandy CLAY (A-7-6)
																	Boring Terminated at Elevation 422.6 ft in CLAY (COASTAL PLAIN)

NCDOT BORE DOUBLE R3830_GEO_BH_WALLS.GPJ NC_DOT.GDT 1/1/18

**North Carolina Department of Transportation
Division of Highways
Materials and Test Unit
Soils Laboratory**

T.I.P. ID NO.: R-3830
DESCRIPTION: Retaining Wall 3 on -L- from 102+14.88 to 105+03.34, Left

REPORT ON SAMPLES OF: SOIL FOR QUALITY

WBS No.: 38887.1.1
DATE SAMPLED: 12/17
SAMPLED FROM: -WL3-
SUBMITTED BY: D. Racey

COUNTY: Lee
RECEIVED: 12/17
REPORTED: 12/17
BY: S. Alkhafaji
Certification No. 101-01-0603

PROJ. SAMPLE NO.	SS-12	SS-14												
BORING NO.	W3-6G	W3-6G												
Retained #4 Sieve %	17.1	0.0												
Passing #10 Sieve %	81.1	99.9												
Passing #40 Sieve %	69.6	86.3												
Passing #200 Sieve %	55.7	70.1												

SOIL MORTAR - 100%														
Coarse Sand Ret - #60 %	20.0	16.1												
Fine Sand Ret - #270 %	15.1	19.6												
Silt 0.053 - 0.010 mm %	22.4	15.7												
Clay < 0.010 mm %	42.5	48.6												
L.L.	57	52												
P.L.	35	24												
P.I.	22	28												
AASHTO Classification	A-7-5(11)	A-7-6(19)												
Station	13+68	13+68												
Offset	2' LT.	2' LT.												
Depth (ft)	0.0	8.5												
to	1.5	10.0												
Alignment	-WL3-	-WL3-												
Moisture Content (%)	21.0	21.4												
Organic Content (%)	NT	NT												

NP = Not plastic
NT = Not tested
ND = Not Determined
CL = Centerline

W.P. Alton, P.E.
Soils Engineer