

REFERENCE: I-5987A

PROJECT: 47533

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY ROBESON
PROJECT DESCRIPTION I-95 IMPROVEMENTS FROM SOUTH OF US 301 (EXIT 22) TO NORTH OF SR 1758 (McDUFFIE CROSSING ROAD)
SITE DESCRIPTION SITE 3 - BRIDGE ON SR 1758 (McDUFFIE CROSSING ROAD) OVER I-95 BETWEEN SR 1763 AND US 301

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-9	BORE LOGS
10	SOIL TEST RESULTS
11	SITE PHOTOGRAPHS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5987A	1	11

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

PERSONNEL

<u>PAINTER, B. (F&R Inc.)</u>	<u>DEGON, A. N.</u>
<u>PESL, W. (F&R Inc.)</u>	<u>TURNAGE, J. R.</u>
<u>TIGNOR, D. (F&R Inc.)</u>	<u>KELLY, N. S.</u>
<u>CLARKE, R. (F&R Inc.)</u>	<u>SMITH, R. (NCDOT)</u>

INVESTIGATED BY TERRACON CONSULTANTS
F&R Inc.

DRAWN BY FIELDS, W. D.

CHECKED BY RIGGS, Jr., A. F.

SUBMITTED BY ALEXANDER, M. J.

DATE SEPTEMBER 2021

Prepared in the Office of:



DocuSigned by:
Matthew Alexander 10/29/2021

0FB0038EEA06152 SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

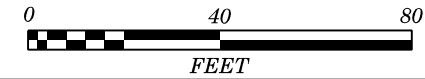
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

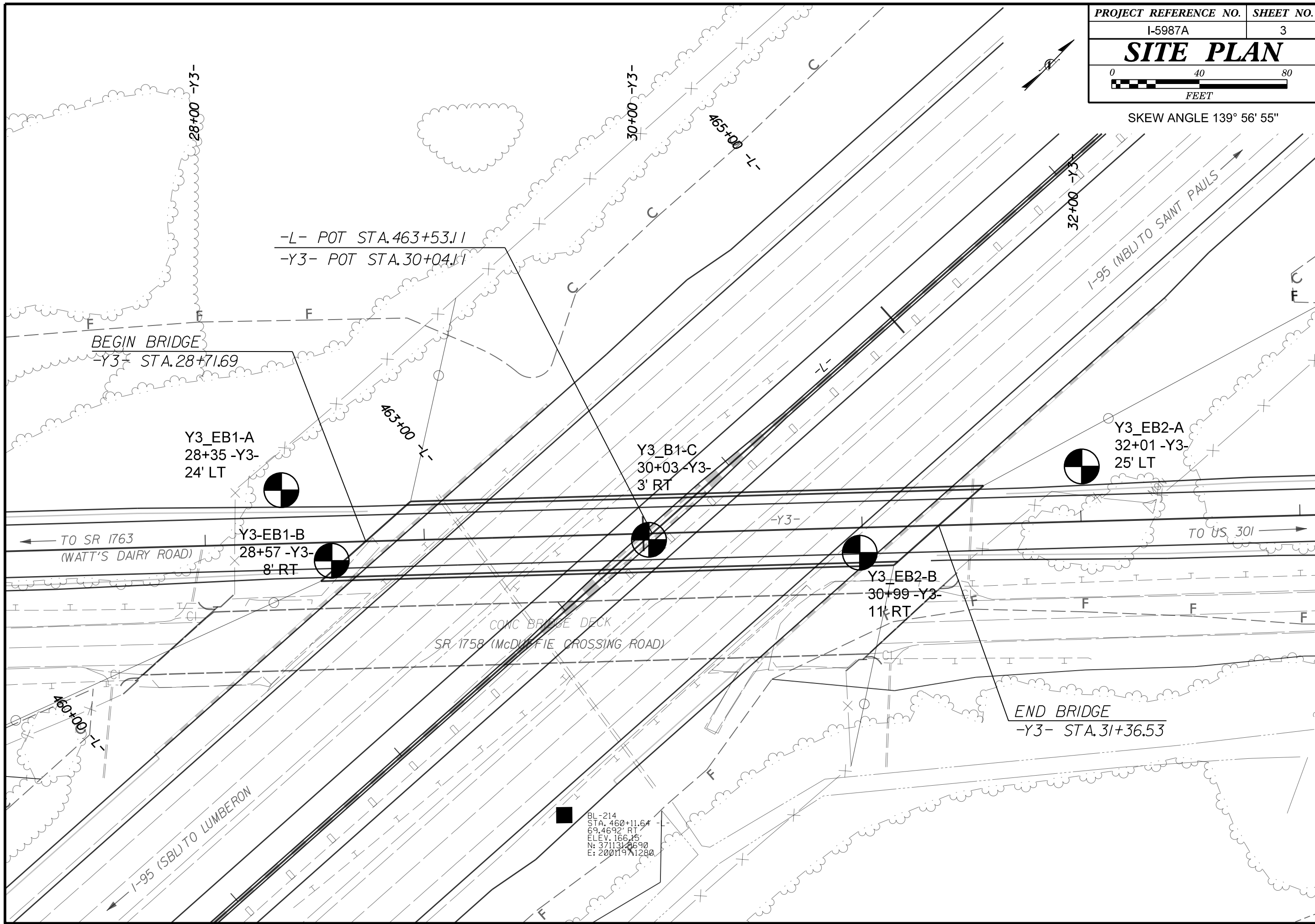
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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 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 YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CPS) 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 DISLOGGED 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 (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. 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 (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																																																																																																																																			
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION										WEATHERING																																																																																																																																																																													
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th><th>A-1-b</th><th>A-3</th><th>A-2-4</th><th>A-2-5</th><th>A-2-6</th><th>A-2-7</th><th>A-4</th><th>A-5</th><th>A-6</th><th>A-7</th><th>A-1, A-2</th><th>A-3</th><th>A-4, A-5</th><th>A-6, A-7</th><th></th> </tr> </thead> <tbody> <tr> <td>SYMBOL</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>% PASSING #10 #40 #200</td> <td>50 MX 30 MX 15 MX</td><td>50 MX 25 MX</td><td>51 MN 10 MX</td><td>35 MX 10 MX</td><td>35 MX 10 MX</td><td>35 MX 10 MX</td><td>35 MX 10 MX</td><td>36 MN 10 MX</td><td>36 MN 10 MX</td><td>36 MN 10 MX</td><td>36 MN 10 MX</td><td>GRANULAR SOILS</td><td>SILT-CLAY SOILS</td><td>MUCK, PEAT</td><td></td><td></td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td colspan="11"></td> <td>SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td>HIGHLY ORGANIC SOILS</td> <td></td><td></td> </tr> <tr> <td>GROUP INDEX</td> <td colspan="11"></td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="2">STONE FRAGS. GRAVEL, AND SAND</td> <td colspan="2">FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="2">CLAYEY SOILS</td> <td colspan="5"></td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> <td colspan="5"></td> </tr> <tr> <td colspan="17" style="text-align: center;">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</td> </tr> </tbody> </table>										GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					GROUP CLASS.	A-1	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7		SYMBOL																	% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX 10 MX	35 MX 10 MX	35 MX 10 MX	35 MX 10 MX	36 MN 10 MX	36 MN 10 MX	36 MN 10 MX	36 MN 10 MX	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT			MATERIAL PASSING #40 LL PI												SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	HIGHLY ORGANIC SOILS			GROUP INDEX																			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	UNSATURABLE						PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30																	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i> 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.																			
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS																																																																																																																																																																																						
GROUP CLASS.	A-1	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7																																																																																																																																																																																		
SYMBOL																																																																																																																																																																																																	
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX 10 MX	35 MX 10 MX	35 MX 10 MX	35 MX 10 MX	36 MN 10 MX	36 MN 10 MX	36 MN 10 MX	36 MN 10 MX	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT																																																																																																																																																																																			
MATERIAL PASSING #40 LL PI												SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	HIGHLY ORGANIC SOILS																																																																																																																																																																																				
GROUP INDEX																																																																																																																																																																																																	
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	UNSATURABLE																																																																																																																																																																																				
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30																																																																																																																																																																																																	
CONSISTENCY OR DENSENESS										GROUND WATER										MISCELLANEOUS SYMBOLS																																																																																																																																																																													
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </tbody> </table>										PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (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	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										<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td> ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td> DIP & DIP DIRECTION OF ROCK STRUCTURES</td> <td> SLOPE INDICATOR INSTALLATION</td> </tr> <tr> <td> SOIL SYMBOL</td> <td> TEST BORING</td> <td> CONE PENETROMETER TEST</td> </tr> <tr> <td> ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td> AUGER BORING</td> <td> SOUNDING ROD</td> </tr> <tr> <td> INFERRED SOIL BOUNDARY</td> <td> CORE BORING</td> <td> TEST BORING WITH CORE</td> </tr> <tr> <td> INFERRED ROCK LINE</td> <td> MONITORING WELL</td> <td> SPT N-VALUE</td> </tr> <tr> <td> ALLUVIAL SOIL BOUNDARY</td> <td> PIEZOMETER INSTALLATION</td> <td></td> </tr> </tbody> </table>										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION	DIP & DIP DIRECTION OF ROCK STRUCTURES	SLOPE INDICATOR INSTALLATION	SOIL SYMBOL	TEST BORING	CONE PENETROMETER TEST	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT	AUGER BORING	SOUNDING ROD	INFERRED SOIL BOUNDARY	CORE BORING	TEST BORING WITH CORE	INFERRED ROCK LINE	MONITORING WELL	SPT N-VALUE	ALLUVIAL SOIL BOUNDARY	PIEZOMETER INSTALLATION																																																																																																																																							
PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (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																																																																																																																																																																																														
ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION	DIP & DIP DIRECTION OF ROCK STRUCTURES	SLOPE INDICATOR INSTALLATION																																																																																																																																																																																															
SOIL SYMBOL	TEST BORING	CONE PENETROMETER TEST																																																																																																																																																																																															
ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT	AUGER BORING	SOUNDING ROD																																																																																																																																																																																															
INFERRED SOIL BOUNDARY	CORE BORING	TEST BORING WITH CORE																																																																																																																																																																																															
INFERRED ROCK LINE	MONITORING WELL	SPT N-VALUE																																																																																																																																																																																															
ALLUVIAL SOIL BOUNDARY	PIEZOMETER INSTALLATION																																																																																																																																																																																																
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ABBREVIATIONS																																																																																																																																																																													
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th><th>10</th><th>40</th><th>60</th><th>200</th><th>270</th> </tr> </thead> <tbody> <tr> <td></td> <td>4.76</td><td>2.00</td><td>0.42</td><td>0.25</td><td>0.075</td><td>0.053</td> </tr> </tbody> </table>										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	<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td> UNDERCUT</td> <td> UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td> UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</td> </tr> <tr> <td> SHALLOW UNDERCUT</td> <td> UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> <td></td> </tr> </tbody> </table>										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		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>GRAIN SIZE</th> <th>MM</th> <th>305</th><th>75</th><th>2.0</th><th>0.25</th><th>0.05</th><th>0.005</th> </tr> </thead> <tbody> <tr> <td></td> <td>IN.</td> <td>12</td><td>3</td><td></td><td></td><td></td><td></td> </tr> </tbody> </table>										GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005		IN.	12	3																																																																																																																																				
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																																																																																																																																																																																																
GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005																																																																																																																																																																																										
	IN.	12	3																																																																																																																																																																																														
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING																																																																																																																																																																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PLASTIC RANGE (PI)</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table>										SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>DRILL UNITS:</th> <th>ADVANCING TOOLS:</th> <th>HAMMER TYPE:</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input checked="" type="checkbox"/> CME-55 (RF08074)</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input type="checkbox"/> -B <input type="checkbox"/> -H</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input type="checkbox"/> -N</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td>HAND TOOLS:</td> </tr> <tr> <td><input checked="" type="checkbox"/> CME-55 (F&R3495)</td> <td><input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td><input checked="" type="checkbox"/> DIERICH D-50 (TE245)</td> <td><input checked="" type="checkbox"/> TRICONE 2% *STEEL TEETH</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td></td> <td><input type="checkbox"/> TRICONE * TUNG-CARB.</td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td></td> <td><input checked="" type="checkbox"/> 2 1/4" HOLLOW STEM AUGERS</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> <tr> <td></td> <td><input checked="" type="checkbox"/> 3/4" HOLLOW STEM AUGERS</td> <td></td> </tr> </tbody> </table>										DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	<input type="checkbox"/> CME-45C	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL	<input checked="" type="checkbox"/> CME-55 (RF08074)	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:	<input type="checkbox"/> CME-550	<input type="checkbox"/> 8" HOLLOW AUGERS	<input type="checkbox"/> -B <input type="checkbox"/> -H	<input type="checkbox"/> VANE SHEAR TEST	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> -N	<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG-CARBIDE INSERTS	HAND TOOLS:	<input checked="" type="checkbox"/> CME-55 (F&R3495)	<input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER	<input type="checkbox"/> POST HOLE DIGGER	<input checked="" type="checkbox"/> DIERICH D-50 (TE245)	<input checked="" type="checkbox"/> TRICONE 2% *STEEL TEETH	<input type="checkbox"/> HAND AUGER		<input type="checkbox"/> TRICONE * TUNG-CARB.	<input type="checkbox"/> SOUNDING ROD		<input checked="" type="checkbox"/> 2 1/4" HOLLOW STEM AUGERS	<input type="checkbox"/> VANE SHEAR TEST		<input checked="" type="checkbox"/> 3/4" HOLLOW STEM AUGERS		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>TERM</th> <th>SPACING</th> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td></td> <td></td> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table>										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	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>INDURATION</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </tbody> </table>										INDURATION	DESCRIPTION	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.																																																																				
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION																																																																																																																																																																																															
LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																																																																																																																																																															
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																															
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE																																																																																																																																																																																															
SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																															
DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:																																																																																																																																																																																															
<input type="checkbox"/> CME-45C	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL																																																																																																																																																																																															
<input checked="" type="checkbox"/> CME-55 (RF08074)	<input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:																																																																																																																																																																																															
<input type="checkbox"/> CME-550	<input type="checkbox"/> 8" HOLLOW AUGERS	<input type="checkbox"/> -B <input type="checkbox"/> -H																																																																																																																																																																																															
<input type="checkbox"/> VANE SHEAR TEST	<input type="checkbox"/> HARD FACED FINGER BITS	<input type="checkbox"/> -N																																																																																																																																																																																															
<input type="checkbox"/> PORTABLE HOIST	<input type="checkbox"/> TUNG-CARBIDE INSERTS	HAND TOOLS:																																																																																																																																																																																															
<input checked="" type="checkbox"/> CME-55 (F&R3495)	<input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER	<input type="checkbox"/> POST HOLE DIGGER																																																																																																																																																																																															
<input checked="" type="checkbox"/> DIERICH D-50 (TE245)	<input checked="" type="checkbox"/> TRICONE 2% *STEEL TEETH	<input type="checkbox"/> HAND AUGER																																																																																																																																																																																															
	<input type="checkbox"/> TRICONE * TUNG-CARB.	<input type="checkbox"/> SOUNDING ROD																																																																																																																																																																																															
	<input checked="" type="checkbox"/> 2 1/4" HOLLOW STEM AUGERS	<input type="checkbox"/> VANE SHEAR TEST																																																																																																																																																																																															
	<input checked="" type="checkbox"/> 3/4" HOLLOW STEM AUGERS																																																																																																																																																																																																
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																																																																																																																																																																																														
INDURATION	DESCRIPTION																																																																																																																																																																																																
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.																																																																																																																																																																																																
PLASTICITY										BENCH MARK: BL-214										NOTES:																																																																																																																																																																													
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td></td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>SLIGHTLY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table>										NON PLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH		0-5	VERY LOW	SLIGHTLY PLASTIC	6-15	SLIGHT	MODERATELY PLASTIC	16-25	MEDIUM	HIGHLY PLASTIC	26 OR MORE	HIGH	69.47' RIGHT OF STA. 460+11.64 -L- N: 371,31,969; E: 2,001,97,128 ELEVATION: 166.15 FEET										FIAD - FILLED IMMEDIATELY AFTER DRILLING																																																																																																																																																														
NON PLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH																																																																																																																																																																																															
	0-5	VERY LOW																																																																																																																																																																																															
SLIGHTLY PLASTIC	6-15	SLIGHT																																																																																																																																																																																															
MODERATELY PLASTIC	16-25	MEDIUM																																																																																																																																																																																															
HIGHLY PLASTIC	26 OR MORE	HIGH																																																																																																																																																																																															
COLOR										INDURATION										INDURATION																																																																																																																																																																													
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.										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										NOTE: ELEVATIONS OF BORINGS Y3_EBI-A, Y3_BI-C AND Y3_EB2-A PERFORMED BY F&R INC. OBTAINED FROM PROVIDED TIN FILE: I5987_Is.tbl.tin DATED: 11-14-2019																																																																																																																																																																													

SITE PLAN



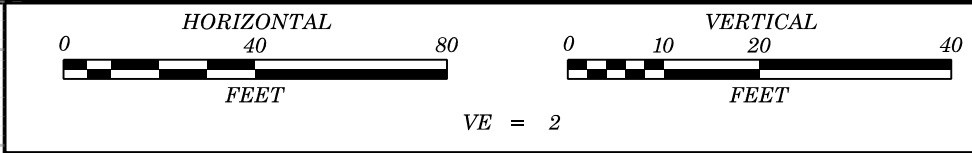
SKEW ANGLE 139° 56' 55"



BL-214
 STA. 460+11.64
 69.4692' RT
 ELEV. 166.15'
 N: 371131.2690
 E: 200119.1280

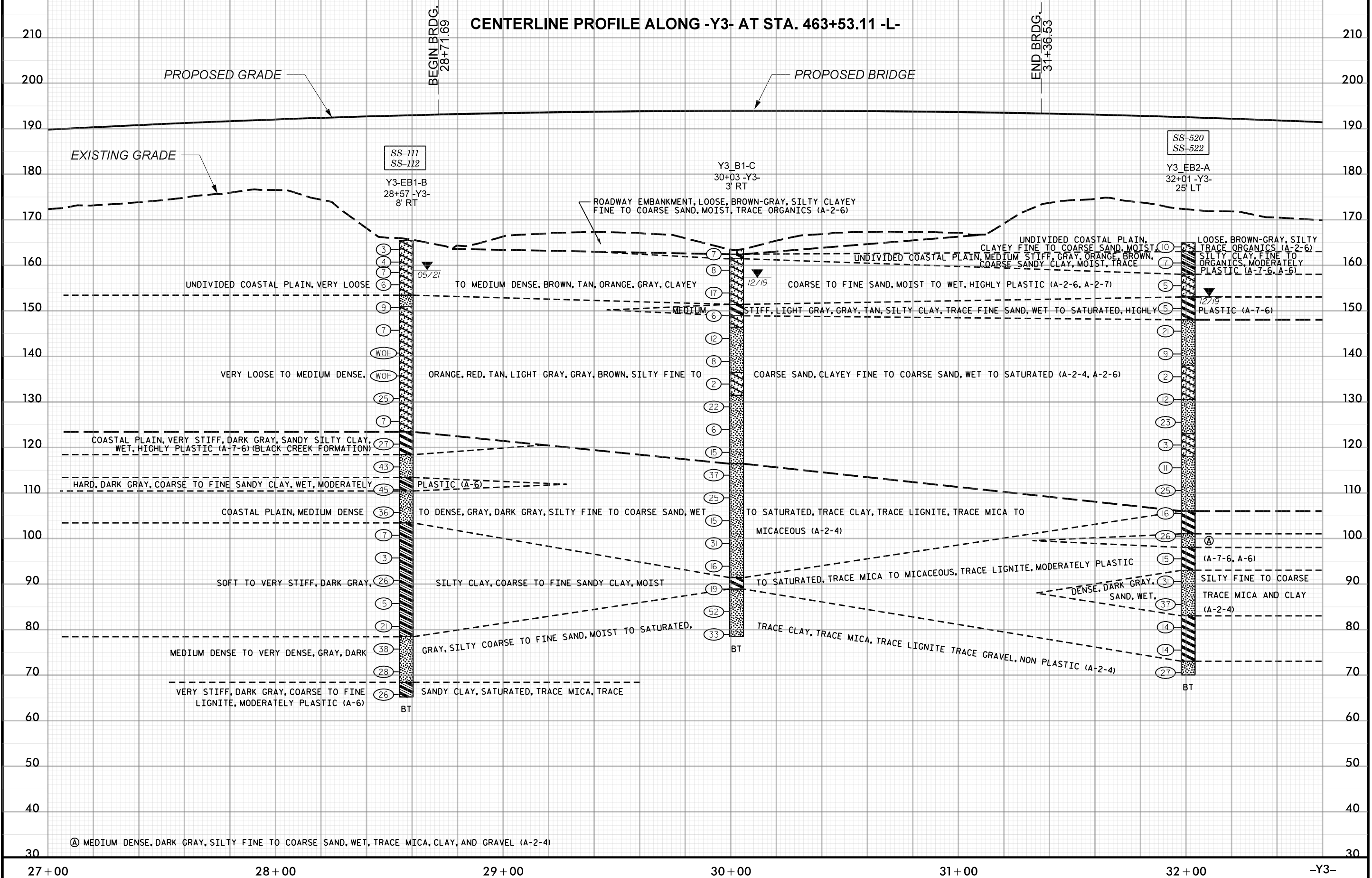
NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE EXISTING GROUND PROFILE ALONG THE CENTERLINE OF -Y3- TAKEN FROM THE PROVIDED PROJECT TIN FILE (I5987_ls_tin1.tin).

SKREW ANGLE 139° 56' 55"



PROJECT REFERENCE NO.	SHEET NO.
I-5987A	4

CENTERLINE PROFILE ALONG -Y3-



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 47533.1.1		TIP I-5987		COUNTY ROBESON		GEOLOGIST M. Arnold										
SITE DESCRIPTION BRIDGE ON SR 1758 (McDUFFIE CROSSING RD.) OVER I-95							GROUND WTR (ft)									
BORING NO. Y3_EB1-A		STATION 28+35		OFFSET 24 ft LT		ALIGNMENT -Y3-										
COLLAR ELEV. 166.4 ft		TOTAL DEPTH 100.0 ft		NORTHING 371,148		EASTING 2,001,001										
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 03/01/2019			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER D. Tignor		START DATE 12/02/19		COMP. DATE 12/03/19		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						
175																
170																
166.4	166.4	0.0	2	6	7										166.4	GROUND SURFACE
165	162.9	3.5	3	1	2										164.4	UNDIVIDED COASTAL PLAIN MEDIUM DENSE, BROWN, CLAYEY SILTY FINE TO COARSE SAND, MOIST, TRACE ORGANICS (A-2-4)
160	157.9	8.5	3	4	4										159.4	SOFT, GRAY-BROWN, SILTY FINE TO COARSE SANDY CLAY, MOIST, MODERATELY PLASTIC (A-6)
155	152.9	13.5	2	2	1										154.4	LOOSE, ORANGE-GRAY, CLAYEY FINE TO COARSE SAND, WET (A-2-6)
150	147.9	18.5	4	6	5										149.4	SOFT, GRAY-ORANGE, SILTY FINE TO COARSE SANDY CLAY, WET, MODERATELY PLASTIC (A-7-6)
145	142.9	23.5	WOH	WOH	1										147.4	STIFF, ORANGE-GRAY, SILTY FINE TO COARSE SANDY CLAY, WET (A-6)
140	137.9	28.5	3	2	2										144.4	MEDIUM DENSE, ORANGE-GRAY, SILTY FINE TO COARSE SAND, WET (A-2-4)
135	132.9	33.5	WOH	1	9										144.4	VERY LOOSE, RED-BROWN-GRAY, CLAYEY FINE TO COARSE SAND, SATURATED (A-2-6)
130	127.9	38.5	9	11	5										139.4	LOOSE, ORANGE-GRAY, SILTY FINE TO COARSE SAND, TRACE MICA (A-2-4)
125	122.9	43.5	2	4	7										137.0	LOOSE, RED-GRAY-BROWN, CLAYEY FINE TO COARSE SAND, SATURATED (A-2-6)
120	117.9	48.5	4	4	5										131.8	LOOSE TO MEDIUM DENSE, GRAY-RED-ORANGE, SILTY FINE SAND, SATURATED, TRACE MICA (A-2-4)
115	112.9	53.5	19	16	12										124.4	COASTAL PLAIN MEDIUM DENSE, GRAY, CLAYEY FINE TO COARSE SAND, SATURATED, TRACE LIGNITE (A-2-4) (BLACK CREEK FORMATION)
110	107.9	58.5	8	12	15										121.9	STIFF, DARK GRAY, FINE SANDY SILTY CLAY, MOIST (A-7-6)
105	102.9	63.5	13	11	16										114.4	MEDIUM DENSE, DARK GRAY, SILTY FINE TO COARSE SAND, SATURATED, TRACE CLAY AND MICA (A-2-4)
100	97.9	68.5	4	5	11										102.0	VERY STIFF, DARK GRAY, FINE SANDY SILTY CLAY, WET, TRACE MICA (A-7-6)
95																

WBS 47533.1.1		TIP I-5987		COUNTY ROBESON		GEOLOGIST M. Arnold										
SITE DESCRIPTION BRIDGE ON SR 1758 (McDUFFIE CROSSING RD.) OVER I-95							GROUND WTR (ft)									
BORING NO. Y3_EB1-A		STATION 28+35		OFFSET 24 ft LT		ALIGNMENT -Y3-										
COLLAR ELEV. 166.4 ft		TOTAL DEPTH 100.0 ft		NORTHING 371,148		EASTING 2,001,001										
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 03/01/2019			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER D. Tignor		START DATE 12/02/19		COMP. DATE 12/03/19		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						
95																
90																
85	87.9	78.5	11	12	20										89.4	VERY STIFF, DARK GRAY, FINE SANDY SILTY CLAY, WET, TRACE MICA (A-7-6) (continued)
80	82.9	83.5	5	8	19										84.4	DENSE, GRAY, SILTY FINE TO COARSE SAND, SATURATED, TRACE MICA (A-2-4)
75	77.9	88.5	5	6	8										82.2	VERY STIFF, DARK GRAY, FINE SANDY SILTY CLAY, WET, TRACE MICA (A-7-6)
70	72.9	93.5	17	17	16										79.4	MEDIUM DENSE, GRAY, SILTY FINE TO COARSE SAND, WET, TRACE MICA (A-2-4)
	67.9	98.5	10	17	12										74.4	STIFF, DARK GRAY, SILTY CLAY, WET (A-7-6)
															74.4	DENSE, GRAY, SILTY FINE TO COARSE SAND, SATURATED, TRACE MICA (A-2-4)
															67.3	LIGNITE
															66.9	VERY STIFF, DARK GRAY, SILTY CLAY, MOIST (A-7-6)
															66.4	Boring Terminated at Elevation 66.4 ft in CLAY (COASTAL PLAIN) (BLACK CREEK FORMATION)

NCDOT BORE DOUBLE I5987 GEO BORELOGS BRDG Y3.GPJ NC_DOT.GDT 8/16/21

Notes:
 1. Surficial Organic Soil: 0.0-0.1'
 2. NM=Not Measured due to mud rotary techniques

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 47533.1.1		TIP I-5987		COUNTY ROBESON		GEOLOGIST W. Pesl										
SITE DESCRIPTION BRIDGE ON SR 1758 (McDUFFIE CROSSING RD.) OVER I-95							GROUND WTR (ft)									
BORING NO. Y3_EB2-A		STATION 32+01		OFFSET 25 ft LT		ALIGNMENT -Y3-										
COLLAR ELEV. 165.5 ft		TOTAL DEPTH 95.0 ft		NORTHING 371,411		EASTING 2,001,255										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 84% 03/01/2019			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER S. Davis		START DATE 12/05/19		COMP. DATE 12/05/19		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						
170																
165	165.5	0.0	2	3	7											165.5 GROUND SURFACE 0.0
160	162.0	3.5	2	3	4											163.5 UNDIVIDED COASTAL PLAIN 2.9
155	157.0	8.5	2	2	3											158.5 LOOSE, BROWN-GRAY, SILTY CLAYEY FINE TO COARSE SAND, MOIST, TRACE ORGANICS (A-2-6) 7.0
150	152.0	13.5	2	2	3											153.5 MEDIUM STIFF, GRAY-BROWN-ORANGE, SILTY FINE TO COARSE SANDY CLAY, MOIST, TRACE ORGANICS, MODERATELY PLASTIC (A-6) 12.0
145	147.0	18.5	9	8	13											148.5 LOOSE, GRAY-TAN, SILTY CLAYEY FINE TO COARSE SAND, WET (A-2-6) 17.0
140	142.0	23.5	5	4	5											148.5 LOOSE TO MEDIUM DENSE, RED-BROWN-GRAY, SILTY FINE SAND, WET TO SATURATED (A-2-4) 17.0
135	137.0	28.5	2	1	1											138.5 VERY LOOSE TO MEDIUM DENSE, ORANGE-TAN-GRAY, SILTY CLAYEY FINE SAND, SATURATED (A-2-6) 27.0
130	132.0	33.5	2	3	9											131.0 MEDIUM DENSE, BROWN-GRAY, SILTY FINE TO COARSE SAND, WET (A-2-4) 34.5
125	127.0	38.5	5	10	13											123.5 VERY LOOSE TO MEDIUM DENSE, ORANGE-TAN-GRAY, SILTY CLAYEY FINE TO COARSE SAND, SATURATED (A-2-6) 42.0
120	122.0	43.5	2	2	1											118.5 MEDIUM DENSE, ORANGE-BROWN-GRAY, SILTY FINE TO COARSE SAND, WET, TRACE CLAY (A-2-4) 47.0
115	117.0	48.5	3	5	6											106.5 COASTAL PLAIN 59.0
110	112.0	53.5	5	9	16											101.5 VERY STIFF, DARK GRAY, SILTY CLAY, WET, TRACE MICA AND LIGNITE (A-7-6) (BLACK CREEK FORMATION) 64.0
105	107.0	58.5	12	7	9											98.5 MEDIUM DENSE, DARK GRAY, SILTY FINE TO COARSE SAND, WET, TRACE MICA, CLAY, AND GRAVEL (A-2-4) 67.0
100	102.0	63.5	8	13	13											93.5 STIFF TO VERY STIFF, DARK GRAY, FINE SANDY SILTY CLAY, WET, MICACEOUS (A-7-6) 72.0
95	97.0	68.5	5	6	9											93.5 DENSE, DARK GRAY, SILTY FINE TO COARSE SAND, WET, TRACE MICA AND CLAY (A-2-4) 95.0
90	92.0	73.5	9	13	18											

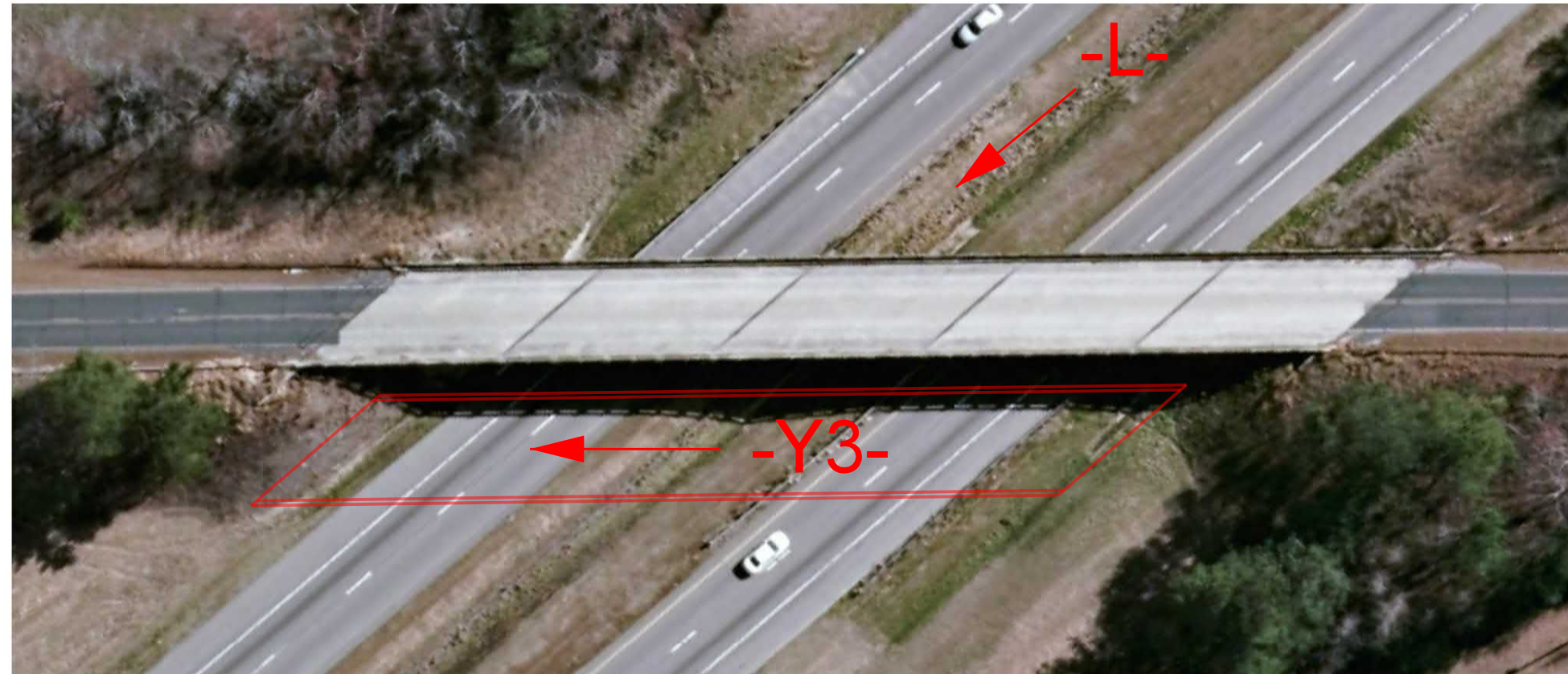
WBS 47533.1.1		TIP I-5987		COUNTY ROBESON		GEOLOGIST W. Pesl										
SITE DESCRIPTION BRIDGE ON SR 1758 (McDUFFIE CROSSING RD.) OVER I-95							GROUND WTR (ft)									
BORING NO. Y3_EB2-A		STATION 32+01		OFFSET 25 ft LT		ALIGNMENT -Y3-										
COLLAR ELEV. 165.5 ft		TOTAL DEPTH 95.0 ft		NORTHING 371,411		EASTING 2,001,255										
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 84% 03/01/2019			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER S. Davis		START DATE 12/05/19		COMP. DATE 12/05/19		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						
90																
85	87.0	78.5	11	21	16											83.5 DENSE, DARK GRAY, SILTY FINE TO COARSE SAND, WET, TRACE MICA AND CLAY (A-2-4) (continued) 82.0
80	82.0	83.5	5	6	8											83.5 STIFF, DARK GRAY-GRAY, SILTY CLAY, MOIST, TRACE MICA (A-7-6) 82.0
75	77.0	88.5	4	6	8											73.5 MEDIUM DENSE, DARK GRAY-GRAY, SILTY FINE TO COARSE SAND, WET, TRACE CLAY (A-2-4) 92.0
	72.0	93.5	12	11	16											70.5 Boring Terminated at Elevation 70.5 ft in SAND (COASTAL PLAIN) (BLACK CREEK FORMATION) 95.0

NCDOT BORE DOUBLE I5987 GEO BORELOGS BRDG Y3.GPJ NC_DOT.GDT 8/16/21

Notes:
 1. Surficial Organic Soil: 0.0-0.2'
 2. NM=Not Measured due to mud rotary techniques

SITE PHOTOGRAPHS

BRIDGE ON SR 1758 (McDUFFIE CROSSING ROAD)
OVER I-95 BETWEEN SR 1763 AND US 301



LOOKING SOUTH ALONG I-95
PROPOSED BRIDGE NORTH OF EXISTING BRIDGE, EB2 (LEFT) EB1 (RIGHT)



LOOKING SOUTH ON I-95 TOWARD
PROPOSED BRIDGE NORTH OF EXISTING BRIDGE, EB2 (LEFT) EB1 (RIGHT)