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REFERENCE: U-2519BA

PROJECT: 34817

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<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
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5-7	CROSS SECTIONS
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STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 GEOTECHNICAL ENGINEERING UNIT

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND
 PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP
FROM SOUTH OF SR 1003 (CAMDEN RD.) TO
SOUTH OF SR 1104 (STRICKLAND BRIDGE RD.)
 SITE DESCRIPTION BRIDGE #447 ON CAMDEN RD.
(-Y13-) OVER FAYETTEVILLE OUTER LOOP
BETWEEN SR 3438 AND SR 4176

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	10

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.

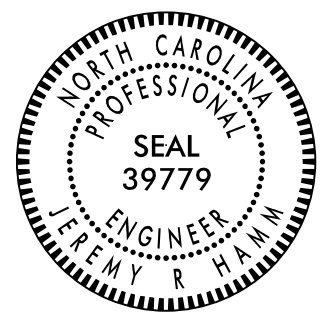
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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

MID-ATLANTIC
HAMM, J.R.
GOODNIGHT, D.J.

INVESTIGATED BY GOODNIGHT, D.J.
 DRAWN BY HILL, M.J.
 CHECKED BY HAMM, J.R.
 SUBMITTED BY FALCON ENG.
 DATE MAY 2017

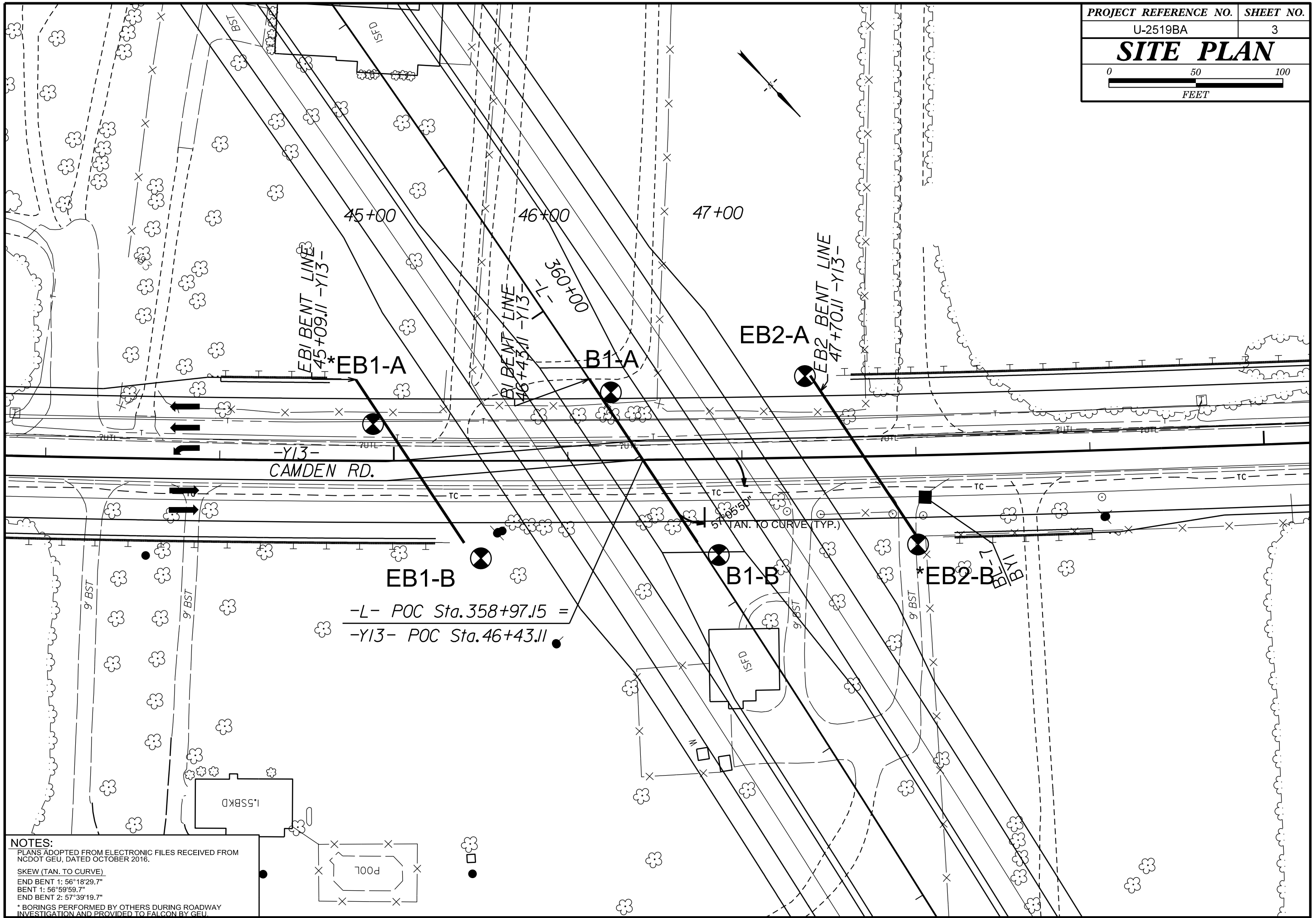


DocuSigned by:
Jeremy R Hamm 6/8/2017
 ED7938089E22487...
 SIGNATURE DATE

**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																																																																																																																																																																						
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (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></p>										<p>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.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>										<p>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 (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 (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. 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.</p>																																																																																																																																																																						
<p style="text-align: center;">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="2">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>A-1</th> <th>A-3</th> <th>A-2</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> <th></th> <th></th> <th></th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-4</td> <td>A-5</td> <td>A-6</td> <td>A-7</td> <td>A-1, A-2</td> <td>A-3</td> <td>A-4, A-5</td> <td>A-6, A-7</td> <td></td> </tr> <tr> <td>SYMBOL</td> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</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 35 MX 35 MX</td> <td>40 MX 41 MN 10 MX 11 MN</td> <td>40 MX 41 MN 11 MN 11 MN</td> <td>40 MX 41 MN 11 MN 11 MN</td> <td>36 MN 36 MN 36 MN</td> <td>40 MX 41 MN 40 MX 41 MN</td> <td>40 MX 41 MN 40 MX 41 MN</td> <td>40 MX 41 MN 40 MX 41 MN</td> <td>40 MX 41 MN 40 MX 41 MN</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td>MUCK, PEAT</td> <td></td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td colspan="5"></td> <td colspan="5"></td> <td colspan="5"></td> </tr> <tr> <td>GROUP INDEX</td> <td colspan="5">0</td> <td colspan="5">4 MX</td> <td colspan="5">8 MX 12 MX 16 MX NO MX</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="2">STONE FRAGS. 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CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>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.</p> <p>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></p> <p>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></p> <p>VERY SEVERE (IV 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></p> <p>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.</p>										<p style="text-align: center;">GROUND WATER</p> <p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>▽ PW STATIC WATER LEVEL AFTER 24 HOURS</p> <p>▽ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>○ SPRING OR SEEP</p>									
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<p style="text-align: center;">TEXTURE OR GRAIN SIZE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <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> <tr> <td></td> <td>4.75</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> <tr> <td>BOULDER (BLDR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COBBLE (COB.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GRAVEL (GR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COARSE SAND (CS. SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>FINE SAND (F SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SILT (SL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLAY (CL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GRAIN SIZE</td> <td>305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> </tr> <tr> <td>MM</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>IN.</td> <td>12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>										U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270		4.75	2.00	0.42	0.25	0.075	0.053	BOULDER (BLDR.)							COBBLE (COB.)							GRAVEL (GR.)							COARSE SAND (CS. SD.)							FINE SAND (F SD.)							SILT (SL.)							CLAY (CL.)							GRAIN SIZE	305	75	2.0	0.25	0.05	0.005	MM							IN.	12	3					<p style="text-align: center;">RECOMMENDATION SYMBOLS</p> <p>UNDERCUT</p> <p>SHALLOW UNDERCUT</p> <p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p> <p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p> <p>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>																																																																																																						
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<p style="text-align: center;">COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>										<p style="text-align: center;">ROCK HARDNESS</p> <p>VERY HARD: CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD: CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>MODERATELY HARD: CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.</p> <p>MEDIUM HARD: CAN BE 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.</p> <p>SOFT: CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.</p> <p>VERY SOFT: CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>										<p style="text-align: center;">FRACTURE SPACING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table> <p style="text-align: center;">BEDDING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table>										TERM	SPACING	VERY WIDE	MORE THAN 10 FEET	WIDE	3 TO 10 FEET	MODERATELY CLOSE	1 TO 3 FEET	CLOSE	0.16 TO 1 FOOT	VERY CLOSE	LESS THAN 0.16 FEET	TERM	THICKNESS	VERY THICKLY BEDDED	4 FEET	THICKLY BEDDED	1.5 - 4 FEET	THINLY BEDDED	0.16 - 1.5 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	THINLY LAMINATED	< 0.008 FEET																																																																																																																																													
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<p style="text-align: center;">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE: RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED: GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED: GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED: SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p style="text-align: center;">FRAC. MARK: BL - 7; 36" REBAR WITH ALUMINUM TRAVERSE CAP</p> <p>N: 442842, 4630 E: 1992799, 3360</p> <p>-Y13- 48+05, 24 ft RT ELEVATION: 178.99 FEET</p>																																																																																																																																																																																										
<p style="text-align: center;">NOTES:</p> <p>FIAD - FILLED IMMEDIATELY AFTER DRILLING</p> <p>UCP - UNDIVIDED COASTAL PLAIN</p>																																																																																																																																																																																																				

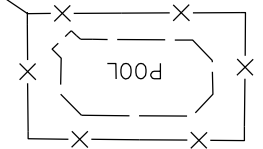


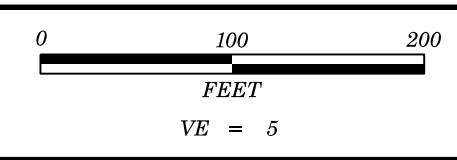
$$\begin{array}{l}
 -L- \text{ POC Sta. } 358+97.15 = \\
 -Y13- \text{ POC Sta. } 46+43.11
 \end{array}$$

NOTES:
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU, DATED OCTOBER 2016.

SKEW (TAN. TO CURVE)
 END BENT 1: 56°18'29.7"
 BENT 1: 56°59'59.7"
 END BENT 2: 57°39'19.7"

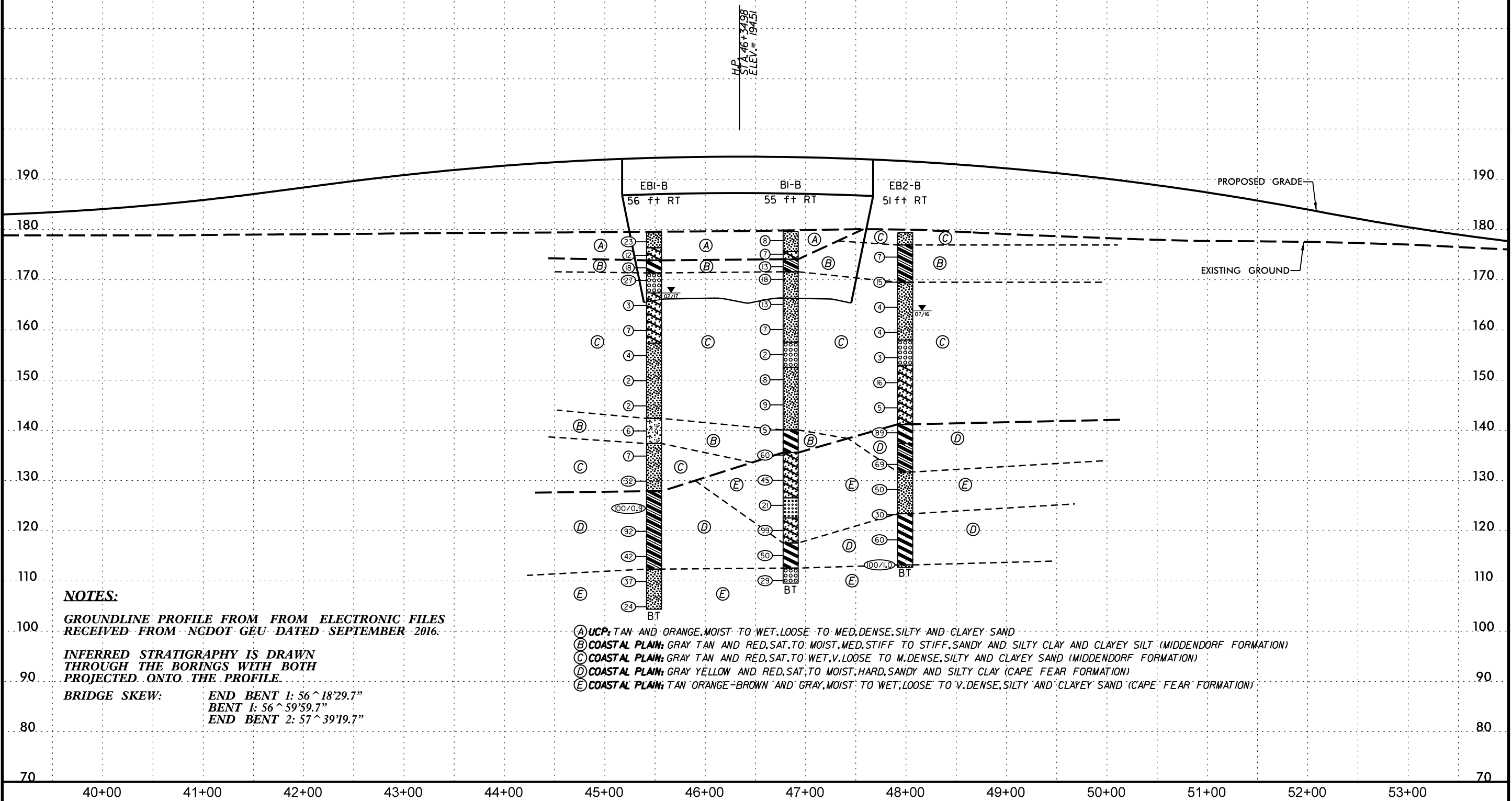
* BORINGS PERFORMED BY OTHERS DURING ROADWAY INVESTIGATION AND PROVIDED TO FALCON BY GEU.





PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	4
BRIDGE NO. 447 ON CAMDEN RD. (-Y13-) OVER FAYETTEVILLE OUTER LOOP (-L-)	

-Y13-



NOTES:

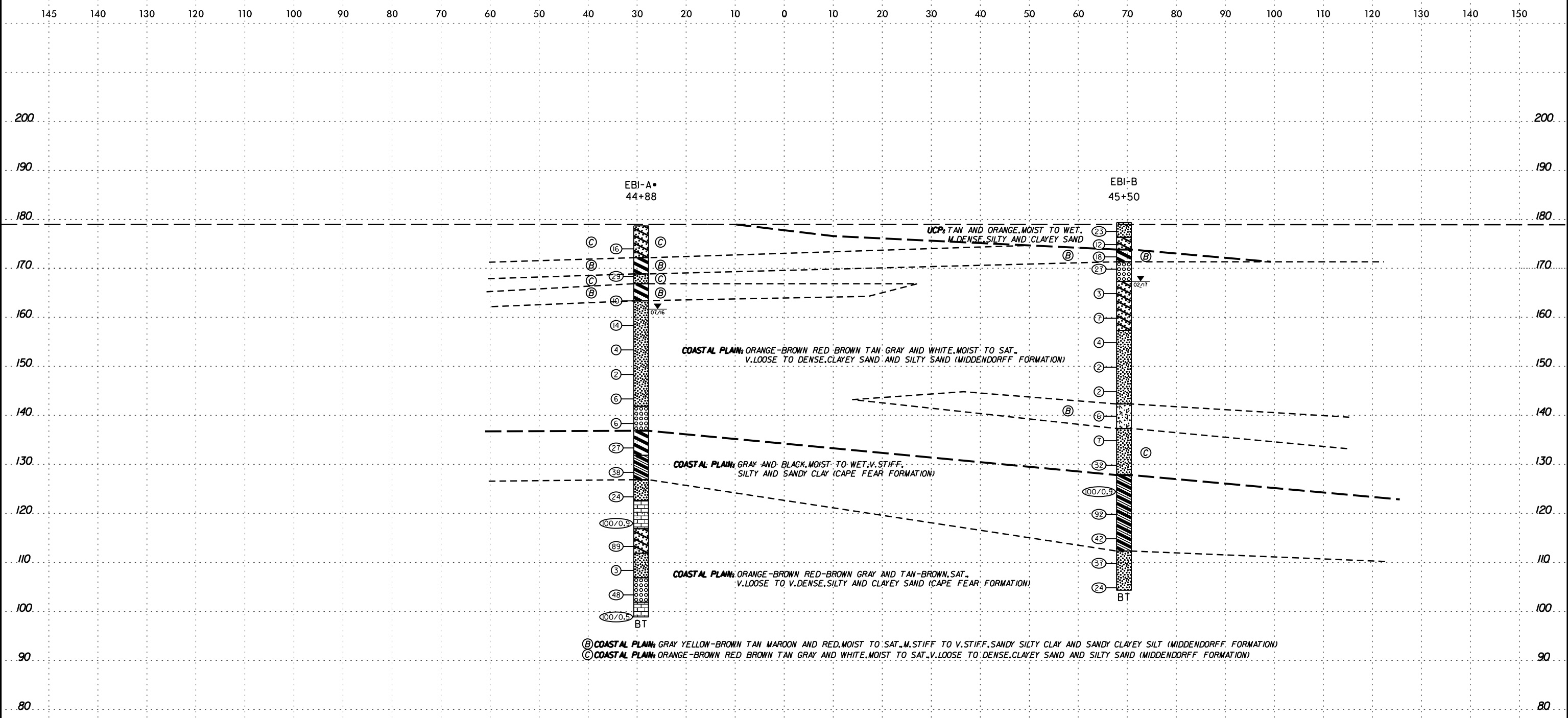
GROUNDLINE PROFILE FROM FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU DATED SEPTEMBER 2016.

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

BRIDGE SKEW: END BENT 1: 56°18'29.7"
 BENT 1: 56°59'59.7"
 END BENT 2: 57°39'19.7"

- (A) UCP: TAN AND ORANGE, MOIST TO WET, LOOSE TO MED. DENSE, SILTY AND CLAYEY SAND
- (B) COASTAL PLAIN: GRAY TAN AND RED, SAT. TO MOIST, MED. STIFF TO STIFF, SANDY AND SILTY CLAY AND CLAYEY SILT (MIDDENDORF FORMATION)
- (C) COASTAL PLAIN: GRAY TAN AND RED, SAT. TO WET, V. LOOSE TO M. DENSE, SILTY AND CLAYEY SAND (MIDDENDORF FORMATION)
- (D) COASTAL PLAIN: GRAY YELLOW AND RED, SAT. TO MOIST, HARD, SANDY AND SILTY CLAY (CAPE FEAR FORMATION)
- (E) COASTAL PLAIN: TAN ORANGE-BROWN AND GRAY, MOIST TO WET, LOOSE TO V. DENSE, SILTY AND CLAYEY SAND (CAPE FEAR FORMATION)

8/23/99



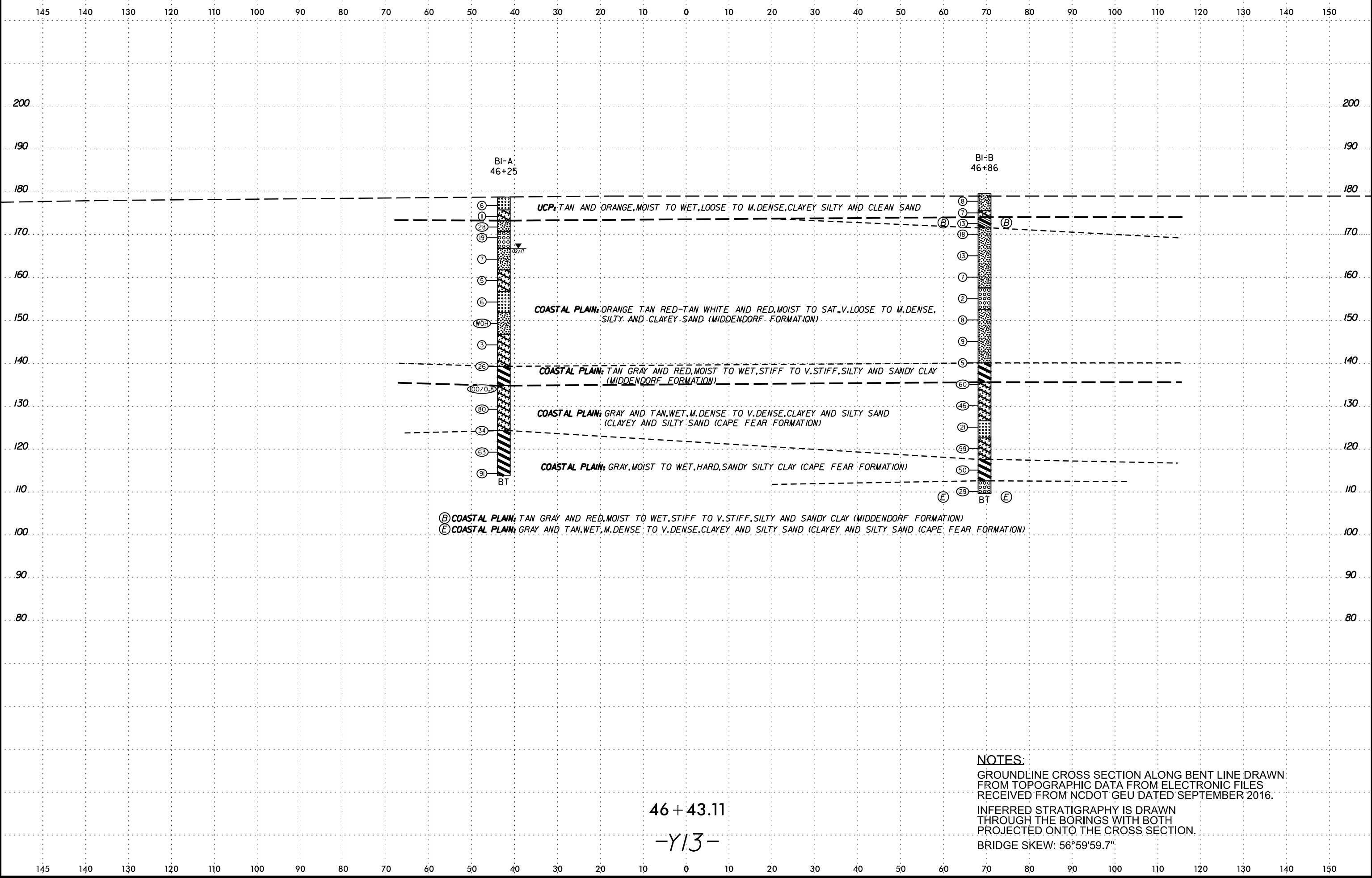
(B) COASTAL PLAIN: GRAY YELLOW-BROWN TAN MAROON AND RED, MOIST TO SAT., M. STIFF TO V. STIFF, SANDY SILTY CLAY AND SANDY CLAYEY SILT (MIDDENDORFF FORMATION)
 (C) COASTAL PLAIN: ORANGE-BROWN RED BROWN TAN GRAY AND WHITE, MOIST TO SAT., V. LOOSE TO DENSE, CLAYEY SAND AND SILTY SAND (MIDDENDORFF FORMATION)

NOTES:
 GROUNDLINE CROSS SECTION ALONG BENT LINE DRAWN FROM TOPOGRAPHIC DATA FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU DATED SEPTEMBER 2016.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.
 BRIDGE SKEW: 56° 18' 29.7"
 *BORING EB1-A PERFORMED BY OTHERS DURING ROADWAY INVESTIGATION AND PROVIDED TO FALCON BY NCDOT GEU

45 + 09.11
 -Y13-

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8/23/99



(B) COASTAL PLAIN: TAN GRAY AND RED, MOIST TO WET, STIFF TO V. STIFF, SILTY AND SANDY CLAY (MIDDENDORF FORMATION)
 (E) COASTAL PLAIN: GRAY AND TAN, WET, M. DENSE TO V. DENSE, CLAYEY AND SILTY SAND (CLAYEY AND SILTY SAND (CAPE FEAR FORMATION))

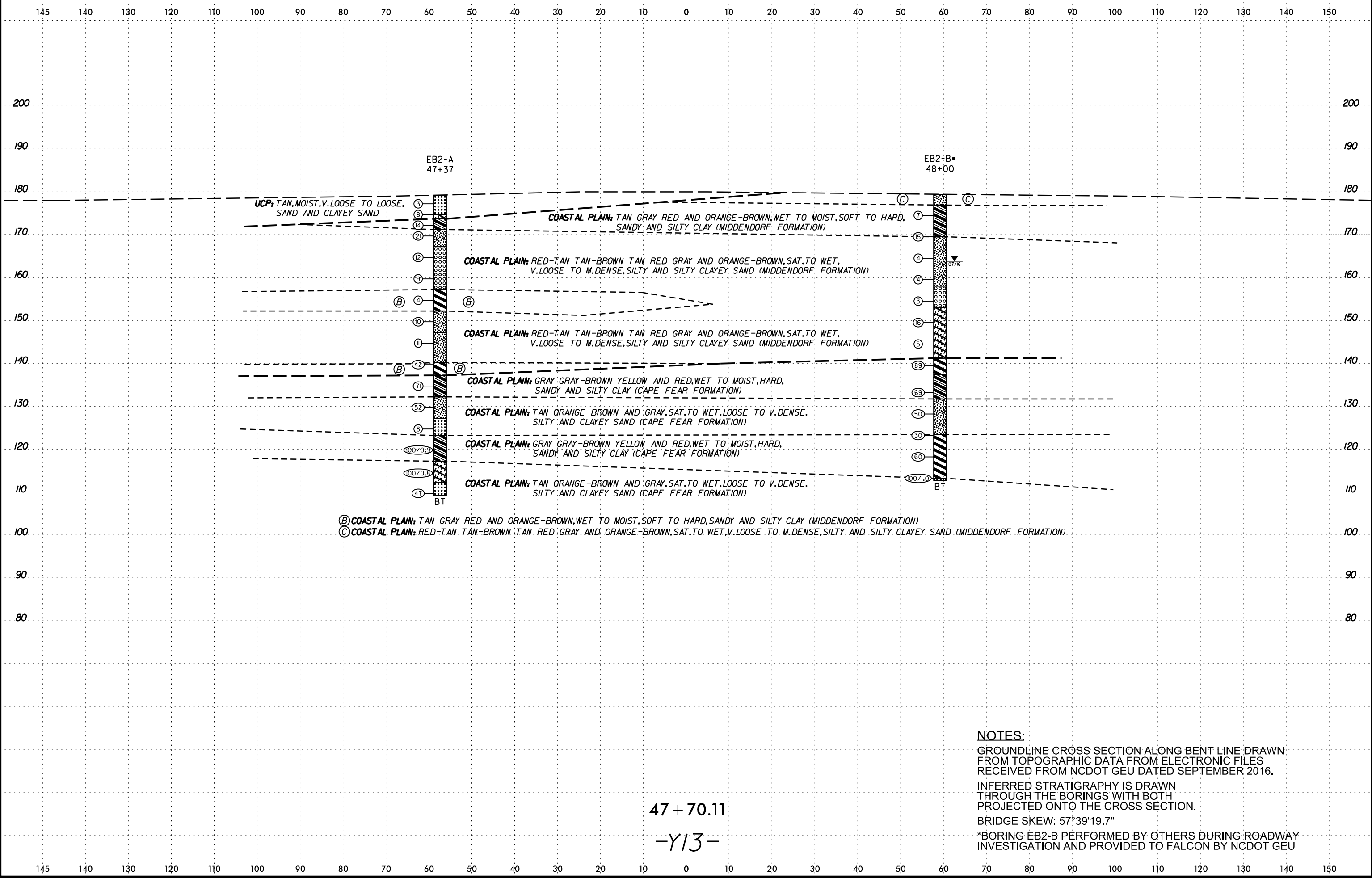
46 + 43.11

-Y13-

NOTES:
 GROUNDLINE CROSS SECTION ALONG BENT LINE DRAWN FROM TOPOGRAPHIC DATA FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU DATED SEPTEMBER 2016.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.
 BRIDGE SKEW: 56°59'59.7"

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8/23/99



(B) COASTAL PLAIN: TAN GRAY RED AND ORANGE-BROWN, WET TO MOIST, SOFT TO HARD, SANDY AND SILTY CLAY (MIDDENDORF FORMATION)
 (C) COASTAL PLAIN: RED-TAN TAN-BROWN TAN RED GRAY AND ORANGE-BROWN, SAT. TO WET, V. LOOSE TO M. DENSE, SILTY AND SILTY CLAYEY SAND (MIDDENDORF FORMATION)

47 + 70.11

-Y13-

NOTES:
 GROUNDLINE CROSS SECTION ALONG BENT LINE DRAWN FROM TOPOGRAPHIC DATA FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU DATED SEPTEMBER 2016.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.
 BRIDGE SKEW: 57°39'19.7"
 *BORING EB2-B PERFORMED BY OTHERS DURING ROADWAY INVESTIGATION AND PROVIDED TO FALCON BY NCDOT GEU

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Smith, B.										
SITE DESCRIPTION BRIDGE NO. 447 ON CAMDEN RD. (-Y13-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 44+88		OFFSET 21 ft LT		ALIGNMENT -Y13-										
COLLAR ELEV. 178.7 ft		TOTAL DEPTH 79.8 ft		NORTHING 442,641		EASTING 1,992,551										
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 81% 11/09/2016				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Moseley, M.		START DATE 07/07/16		COMP. DATE 07/07/16		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						
180														178.7	0.0	COASTAL PLAIN ORANGE-BROWN, CLAYEY SAND (MIDDENDORF FORMATION)
175	175.0	3.7	4	8	8								M	172.2	6.5	GRAY, YELLOW-BROWN AND RED, SILTY CLAY
170	169.4	9.3	8	14	15								M	168.9	9.8	ORANGE-BROWN AND RED, SILTY SAND
165	164.4	14.3	1	5	5								M	166.9	11.8	YELLOW-BROWN AND RED, SILTY CLAY
160	159.4	19.3	4	10	4								Sat.	163.4	15.3	ORANGE-BROWN, BROWN, WHITE AND RED, SILTY SAND WITH TRACE TO LITTLE CLAY AND FINE TO COARSE SAND
155	154.4	24.3	1	1	3								Sat.			
150	149.4	29.3	1	1	1								Sat.			
145	144.4	34.3	3	3	3								Sat.			
140	139.4	39.3	2	3	3								Sat.	141.9	36.8	
135	134.4	44.3	3	10	17								Sat.	136.9	41.8	COASTAL PLAIN GRAY AND BLACK SILTY CLAY AND SANDY CLAY WITH LITTLE WOOD FRAGMENTS (CAPE FEAR FORMATION)
130	129.4	49.3	8	14	24								W	131.9	46.8	
125	124.4	54.3	13	14	10								Sat.	126.9	51.8	ORANGE-BROWN AND RED-BROWN, SILTY SAND WITH LITTLE CLAY
120	119.4	59.3	32	50	50/0.4								Sat.	122.7	56.0	COASTAL PLAIN SEDIMENTARY ROCK (SANDY MUDSTONE)
115	114.3	64.4	18	33	56								Sat.	116.9	61.8	COASTAL PLAIN GRAY, TAN-BROWN, ORANGE-BROWN, RED-BROWN AND GRAY, CLAYEY SAND, SILTY SAND WITH LITTLE CLAY, AND FINE TO COARSE SAND WITH TRACE GRAVEL
110	109.4	69.3	3	1	2								Sat.	111.9	66.8	
105	104.4	74.3	8	25	23								Sat.	106.9	71.8	
100	99.4	79.3	100/0.5										Sat.	101.9	76.8	COASTAL PLAIN SEDIMENTARY ROCK (SANDY MUDSTONE)
														98.9	79.8	Boring Terminated at Elevation 98.9 ft IN COASTAL PLAIN SEDIMENTARY ROCK (SANDY MUDSTONE)
*NOTE: BORING PERFORMED BY OTHERS DURING ROADWAY INVESTIGATION AND PROVIDED TO FALCON BY NCDOT GEU.																

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Hamm, J.										
SITE DESCRIPTION BRIDGE NO. 447 ON CAMDEN RD. (-Y13-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 45+50		OFFSET 56 ft RT		ALIGNMENT -Y13-										
COLLAR ELEV. 178.8 ft		TOTAL DEPTH 75.0 ft		NORTHING 442,633		EASTING 1,992,650										
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/09/2016				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Wiggins, M.		START DATE 02/13/17		COMP. DATE 02/13/17		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						
180														178.8	0.0	UNDIVIDED COASTAL PLAIN TAN, SILTY F. SAND (A-2-4)
175	175.3	3.5	6	11	12								M	175.8	3.0	TAN AND ORANGE, CLAYEY SAND (A-2-6)
170	172.8	6.0	4	7	11								W	173.3	5.5	
165	170.3	8.5	19	15	12								W	170.8	8.0	COASTAL PLAIN GRAY TAN AND MAROON, F. SANDY SILTY CLAY (A-7)
160	166.8	12.0											W	166.8	12.0	(MIDDENDORF FORMATION)
155	165.3	13.5	1	2	1								Sat.			TAN AND RED, SLI. SILTY SAND (A-1a) WITH IRON CEMENTED CONCRETIONS, TAN RED AND GRAY, CLAYEY SAND (A-2-7) WITH FAT CLAY LAYERS
150	163.4	15.4											Sat.			
145	160.3	18.5	1	3	4								Sat.	156.8	22.0	TAN RED AND GRAY, SILTY SAND (A-2-4)
140	155.3	23.5	2	1	3								Sat.			
135	153.3	25.5	1	1	1								Sat.			
130	150.3	28.5	1	1	1								Sat.			
125	145.3	33.5	1	1	1								Sat.			
120	143.3	35.5	2	2	4								Sat.	141.8	37.0	GRAY AND TAN, SANDY CLAYEY SILT (A-5) WITH FAT CLAY LAYERS
115	140.3	38.5	2	2	5								Sat.	136.8	42.0	TAN AND RED, SILTY SAND (A-2-4) WITH IRON CONCRETIONS AND FAT CLAY LAYERS
110	135.3	43.5	2	2	5								Sat.			
105	130.3	48.5	4	10	22								Sat.	127.3	51.5	COASTAL PLAIN DARK GRAY, SANDY CLAY (A-6) (CAPE FEAR FORMATION)
100	125.3	53.5	25	51	49/0.4								W			
95	120.3	58.5	19	37	55								W			
90	115.3	63.5	18	22	20								W			
85	110.3	68.5	8	16	21								W	111.8	67.0	GRAY, SILTY CSE. SAND (A-2-4)
80	105.3	73.5	12	15	9								W	103.8	75.0	Boring Terminated at Elevation 103.8 ft IN COASTAL PLAIN (CAPE FEAR FORMATION)

NCDOT BORE DOUBLE U2519BA_GEO_BRDG0447_SPT_BORINGS.GPJ_NC_DOT.GDT 3/30/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Goodnight, D.										
SITE DESCRIPTION BRIDGE NO. 447 ON CAMDEN RD. (-Y13-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)									
BORING NO. B1-A		STATION 46+25		OFFSET 39 ft LT		ALIGNMENT -Y13-										
COLLAR ELEV. 178.7 ft		TOTAL DEPTH 65.0 ft		NORTHING 442,752		EASTING 1,992,632										
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/09/2016				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Wiggins, M.		START DATE 02/14/17		COMP. DATE 02/14/17		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						
180															178.7	0.0
175	177.7	1.0	3	4	2								M	UNDIVIDED COASTAL PLAIN TAN, F. SAND (A-3)	3.0	
	175.2	3.5	3	4	7								M	TAN, CLAYEY SAND (A-2-6)	5.5	
	172.7	6.0	7	13	15								M	COASTAL PLAIN ORANGE AND TAN, SILTY F. SAND (A-2-4)	8.0	
170	170.2	8.5	8	10	9								M	(MIDDENDORF FORMATION)	12.0	
165	165.2	13.5	3	4	3								W	RED-TAN, SLI. SILTY F. TO CSE. SAND (A-1-B)	17.0	
160	160.2	18.5	3	3	2								W	RED-TAN, SILTY CLAYEY SAND (A-2-5) RED-TAN, CLAYEY SAND (A-2-6)	17.0	
155	155.2	23.5	3	3	3								Sat.	WHITE AND TAN, SLIGHTLY SILTY SAND (A-3)	22.0	
150	150.2	28.5	WOH	1	WOH								Sat.	LIGHT TAN, SILTY SAND (A-2-4)	27.0	
145	145.2	33.5	1	2	1								Sat.	RED-TAN, CLAYEY SAND (A-2-6)	32.0	
140	140.2	38.5	4	9	17								M	TAN AND GRAY, SILTY CLAY (A-7)	39.5	
135	135.2	43.5	28	52	48/0.3								W	COASTAL PLAIN GRAY AND TAN, CLAYEY F. SAND (A-2-6) WITH LENSES OF CLEAN SAND (CAPE FEAR FORMATION)	44.0	
130	130.2	48.5	20	32	48								W	GRAY, F. SANDY SILTY CLAY (A-7)	54.5	
125	125.2	53.5	13	12	22								M	GRAY, F. SANDY SILTY CLAY (A-7)	54.5	
120	120.2	58.5	14	26	37								M			
115	115.2	63.5	17	36	55								M			
															113.7	65.0
Boring Terminated at Elevation 113.7 ft IN COASTAL PLAIN (CAPE FEAR FORMATION)																

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Hamm, J. / Goodnight, D.										
SITE DESCRIPTION BRIDGE NO. 447 ON CAMDEN RD. (-Y13-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)									
BORING NO. B1-B		STATION 46+86		OFFSET 55 ft RT		ALIGNMENT -Y13-										
COLLAR ELEV. 179.1 ft		TOTAL DEPTH 70.0 ft		NORTHING 442,734		EASTING 1,992,742										
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/09/2016				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Wiggins, M.		START DATE 02/13/17		COMP. DATE 02/14/17		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						
180															179.1	0.0
175	178.3	0.8	3	4	4								M	UNDIVIDED COASTAL PLAIN TAN, SILTY SAND (A-2-4) WITH TRACE ROOTS	4.0	
	175.6	3.5	3	3	4								W	TAN AND ORANGE, CSE. SAND (A-2-6)	5.5	
	173.1	6.0	7	6	7								W	COASTAL PLAIN TAN AND RED, SANDY CLAY (A-6) (MIDDENDORF FORMATION)	8.0	
170	170.6	8.5	6	9	9								W	TAN, SILTY SAND (A-2-4) WITH CLAY AND CSE. SAND	8.0	
165	165.6	13.5	5	6	7								Sat.			
160	160.6	18.5	3	4	3								Sat.			
155	155.6	23.5	1	1	1								Sat.	WHITE, CSE. SAND (A-1-a)	22.0	
150	150.6	28.5	2	3	5								Sat.	TAN AND RED, SILTY F. SAND (A-2-4)	27.0	
145	145.6	33.5	3	4	5								Sat.			
140	140.6	38.5	1	1	4								Sat.	GRAY AND RED, SILTY CLAY (A-7)	39.5	
135	135.6	43.5	18	27	33								W	COASTAL PLAIN GRAY, CLAYEY SAND (A-2-6) (CAPE FEAR FORMATION)	44.0	
130	130.6	48.5	16	19	26								W			
125	125.6	53.5	6	9	12								W	TAN, SLI. SILTY SAND (A-3)	53.0	
120	120.6	58.5	22	48	51								W	GRAY, CLAYEY SAND (A-2-6)	57.0	
115	115.6	63.5	12	21	29								W	GRAY, F. SANDY SILTY CLAY (A-7)	62.0	
110	110.6	68.5	9	13	16								W	GRAY, SLI. CLAYEY F. TO CSE. SAND (A-1-b)	67.0	
													W	Boring Terminated at Elevation 109.1 ft IN COASTAL PLAIN (CAPE FEAR FORMATION)	70.0	

NCDOT BORE DOUBLE U2519BA_GEO_BRDG0447_SPT_BORINGS.GPJ NC_DOT.GDT 3/30/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Goodnight, D.										
SITE DESCRIPTION BRIDGE NO. 447 ON CAMDEN RD. (-Y13-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 47+37		OFFSET 47 ft LT		ALIGNMENT -Y13-										
COLLAR ELEV. 178.5 ft		TOTAL DEPTH 70.0 ft		NORTHING 442,841		EASTING 1,992,702										
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/09/2016				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Wiggins, M.		START DATE 02/15/17		COMP. DATE 02/15/17		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						
180														178.5	0.0	UNDIVIDED COASTAL PLAIN TAN, F. SAND (A-3)
175	177.5	1.0	2	1	2									174.0	4.5	TAN, CLAYEY SAND (A-2-6)
	175.0	3.5	3	3	5									173.0	5.5	COASTAL PLAIN TAN, SANDY CLAY (A-6) (MIDDENDORF FORMATION)
	172.5	6.0	4	5	9									170.5	8.0	RED-TAN, CLAYEY SILTY SAND (A-2-5)
170	170.0	8.5	9	11	10									166.5	12.0	TAN, SLT. SILTY F. TO CSE. SAND (A-1-b) WITH INTERMITTENT LENSES OF SANDY CLAY
165	165.0	13.5	4	6	6									156.5	22.0	TAN AND GRAY, SILTY CLAY (A-7)
160	160.0	18.5	2	4	5									151.5	27.0	GRAY AND TAN, SILTY CLAYEY SAND (A-2-5)
155	155.0	23.5	2	2	2									146.5	32.0	TAN, SILTY SAND (A-2-4)
150	150.0	28.5	2	4	6									139.5	39.0	GRAY AND RED, SILTY CLAY (A-7)
145	145.0	33.5	3	5	6									136.5	42.0	COASTAL PLAIN GRAY, SANDY CLAY (A-6) (CAPE FEAR FORMATION)
140	140.0	38.5	5	16	26									131.5	47.0	TAN, SILTY SAND (A-2-4)
135	135.0	43.5	19	33	38									126.5	52.0	TAN, SLT. SILTY SAND (A-3)
130	130.0	48.5	15	21	31									122.5	56.0	GRAY, SANDY CLAY (A-6)
125	125.0	53.5	8	3	5									116.5	62.0	GRAY, CLAYEY SAND (A-2-6)
120	120.0	58.5	32	68/0.4										111.5	67.0	GRAY, SLT. SILTY F. TO CSE. SAND (A-3)
115	115.0	63.5	11	65	35/0.3									108.5	70.0	Boring Terminated at Elevation 108.5 ft IN COASTAL PLAIN (CAPE FEAR FORMATION)
110	110.0	68.5	22	24	23											

NCDOT BORE DOUBLE U2519BA_GEO_BRDG0447_SPT_BORINGS.GPJ NC_DOT_GDT 3/30/17

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Smith, B.										
SITE DESCRIPTION BRIDGE NO. 447 ON CAMDEN RD. (-Y13-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 48+00		OFFSET 51 ft RT		ALIGNMENT -Y13-										
COLLAR ELEV. 179.4 ft		TOTAL DEPTH 66.7 ft		NORTHING 442,821		EASTING 1,992,816										
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 81% 11/09/2016				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Moseley, M.		START DATE 06/30/16		COMP. DATE 06/30/16		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						
180														179.4	0.0	COASTAL PLAIN TAN-BROWN, SILTY SAND (MIDDENDORF FORMATION)
175	175.5	3.9	2	2	5									176.9	2.5	GRAY, ORANGE-BROWN AND RED, SANDY CLAY
170	170.5	8.9	4	6	9									169.5	9.9	ORANGE-BROWN, TAN-BROWN, GRAY AND RED, SILTY SAND WITH TRACE TO LITTLE CLAY, FINE TO COARSE SAND WITH TRACE GRAVEL AND CLAYEY SAND
165	165.5	13.9	3	2	2									158.0	21.4	
160	160.5	18.9	1	2	2									153.0	26.4	
155	155.5	23.9	2	1	2									141.2	38.2	COASTAL PLAIN GRAY-BROWN, SILTY CLAY WITH LITTLE SAND AND SANDY CLAY (CAPE FEAR FORMATION)
150	150.5	28.9	3	7	9									137.4	42.0	GRAY AND ORANGE-BROWN, SILTY SAND WITH LITTLE CLAY
145	145.5	33.9	1	2	3									131.7	47.7	
140	140.5	38.9	6	29	60									123.4	56.0	GRAY, YELLOW AND RED, SILTY CLAY
135	134.2	45.2	14	25	44									113.2	66.2	GRAY, SILTY SAND
130	129.2	50.2	25	22	28									112.7	66.7	Boring Terminated at Elevation 112.7 ft IN COASTAL PLAIN (SILTY SAND)
125	124.2	55.2	4	5	25											
120	119.2	60.2	13	23	37											
115	114.2	65.2	15	23	77											

*NOTE: BORING PERFORMED BY
OTHERS DURING ROADWAY
INVESTIGATION AND PROVIDED TO
FALCON BY NCDOT GEU.

REFERENCE: U-2519BA

PROJECT: 34817

CONTENTS

SHEET NO.	DESCRIPTION
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2	LEGEND (SOIL & ROCK)
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5	NBL PROFILE
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10	SITE PHOTOGRAPHS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND

PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP
FROM SOUTH OF SR 1003 (CAMDEN RD) TO
SOUTH OF SR 1104 (STRICKLAND BRIDGE RD)

SITE DESCRIPTION DUAL STRUCTURE BRIDGE ON -L-
(STA. 398 + 06.2 NBL) & (STA. 397 + 69.8 SBL) OVER
UNNAMED TRIBUTARY TO STEWARTS CREEK

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	10

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

B. SMITH, PG

MIKE MOSELEY

MICHAEL MOSELEY

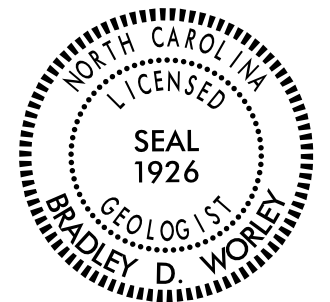
INVESTIGATED BY B. WORLEY, PG

DRAWN BY B. WORLEY, PG

CHECKED BY D. DEWEY, PE

SUBMITTED BY Summit Design and Engineering Services, PLLC

DATE NOVEMBER, 2016



DocuSigned by:

Brad Worley

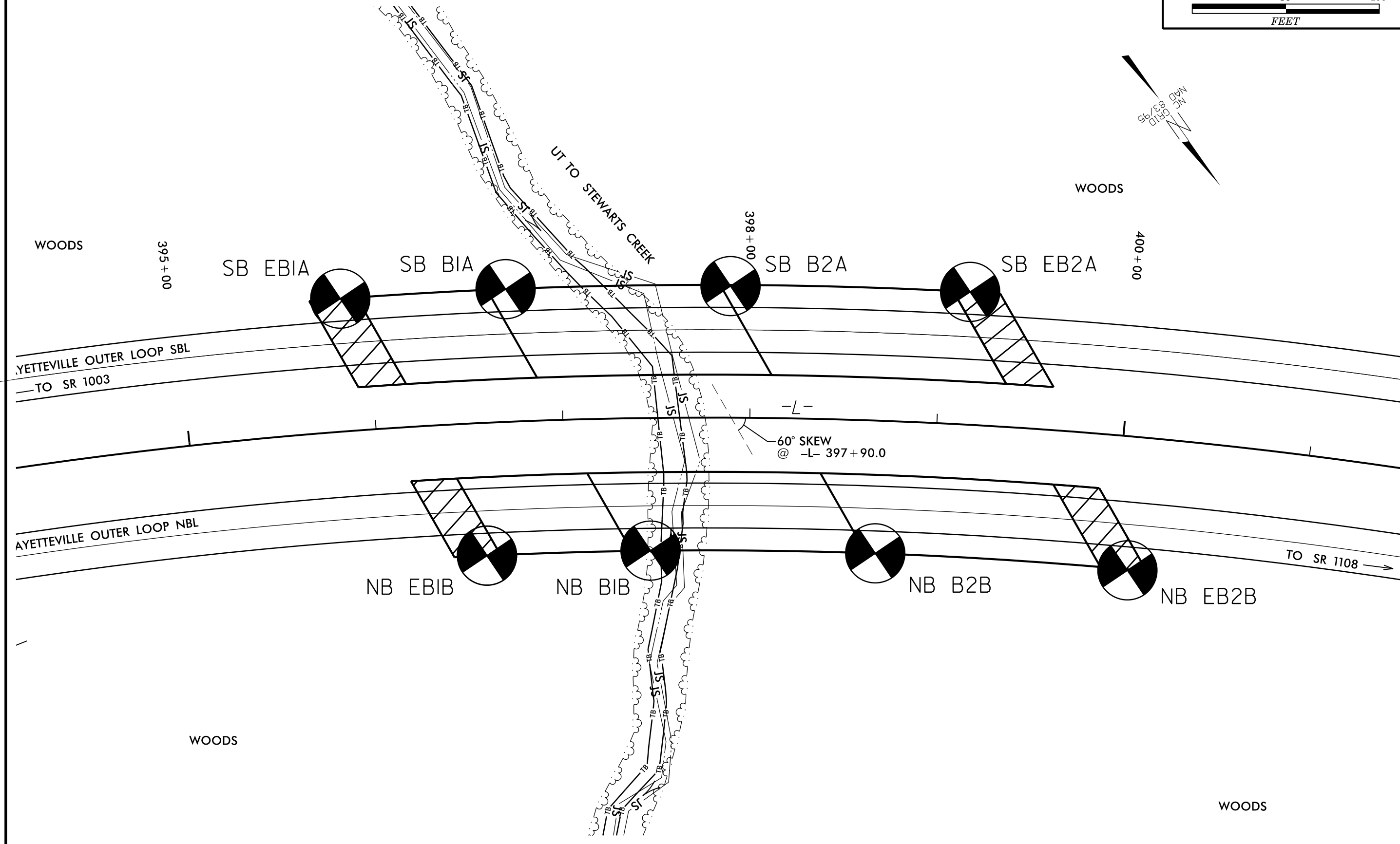
3/1/2017

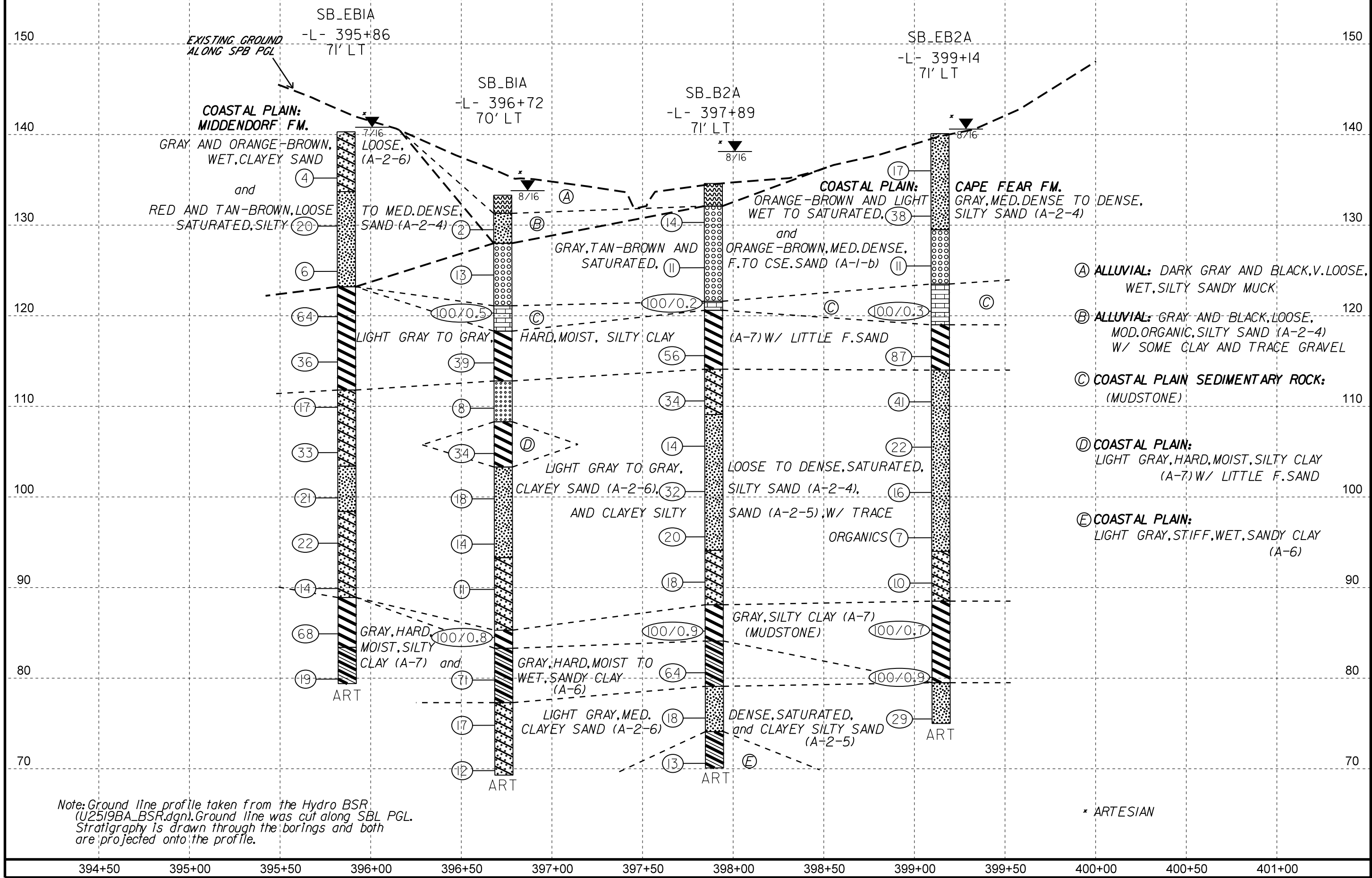
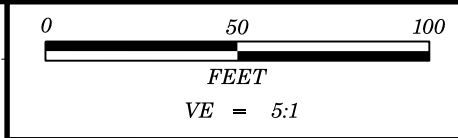
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DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	3
SITE PLAN	
 0 50 100 FEET	





Note: Ground line profile taken from the Hydro BSR (U2519BA_BSR.dgn). Ground line was cut along SBL PGL. Stratigraphy is drawn through the borings and both are projected onto the profile.

* ARTESIAN

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST B. Smith, PG										
SITE DESCRIPTION Dual Structure Bridge on -L- Over Unamed Tributary to Stewarts Creek							GROUND WTR (ft)									
BORING NO. SB_EB1A		STATION 395+86		OFFSET 71 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 140.3 ft		TOTAL DEPTH 60.9 ft		NORTHING 443,246		EASTING 1,989,023										
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 92% 11/05/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Mike Moseley		START DATE 07/12/16		COMP. DATE 07/12/16		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						
145																
140																
135	136.2	4.1	2	2	2								W	GROUND SURFACE	0.0	
130	130.9	9.4	7	12	8								Sat.	COASTAL PLAIN MIDDENDORF FORMATION Gray and orange-brown, Clayey SAND (A-2-6)		
125	125.9	14.4	1	1	5								Sat.	Red and tan-brown, Silty SAND (A-2-4) (Harder drilling at 17.1')		
120	120.9	19.4	15	28	36								Sat.	CAPE FEAR FORMATION	17.1	
115	115.9	24.4	10	15	21								M	Gray to dark gray, Silty CLAY (A-7) w/ little f. sand (Softer drilling at 28.5')		
110	110.9	29.4	4	6	11								M	Gray, Clayey SAND (A-2-6)	28.5	
105	105.9	34.4	10	12	21								Sat.	Gray, Clayey SAND (A-2-6)		
100	100.9	39.4	5	6	15								Sat.	Gray, Clayey Silty SAND (A-2-5)	36.9	
95	95.9	44.4	8	11	11								Sat.	Gray, Clayey SAND (A-2-6) (Harder drilling at 51.4')	41.9	
90	90.9	49.4	5	7	7								Sat.	Gray, Silty CLAY (A-7)	51.4	
85	85.9	54.4	18	30	38								W	Gray, Silty CLAY (A-7)	58.9	
80	80.9	59.4	7	8	11								M	Gray, Sandy CLAY (A-6)	60.9	
													W	Boring Terminated at Elevation 79.4 ft In Coastal Plain Sandy CLAY (A-6) Note: ARTESIAN Head Elevation = 140.8'		

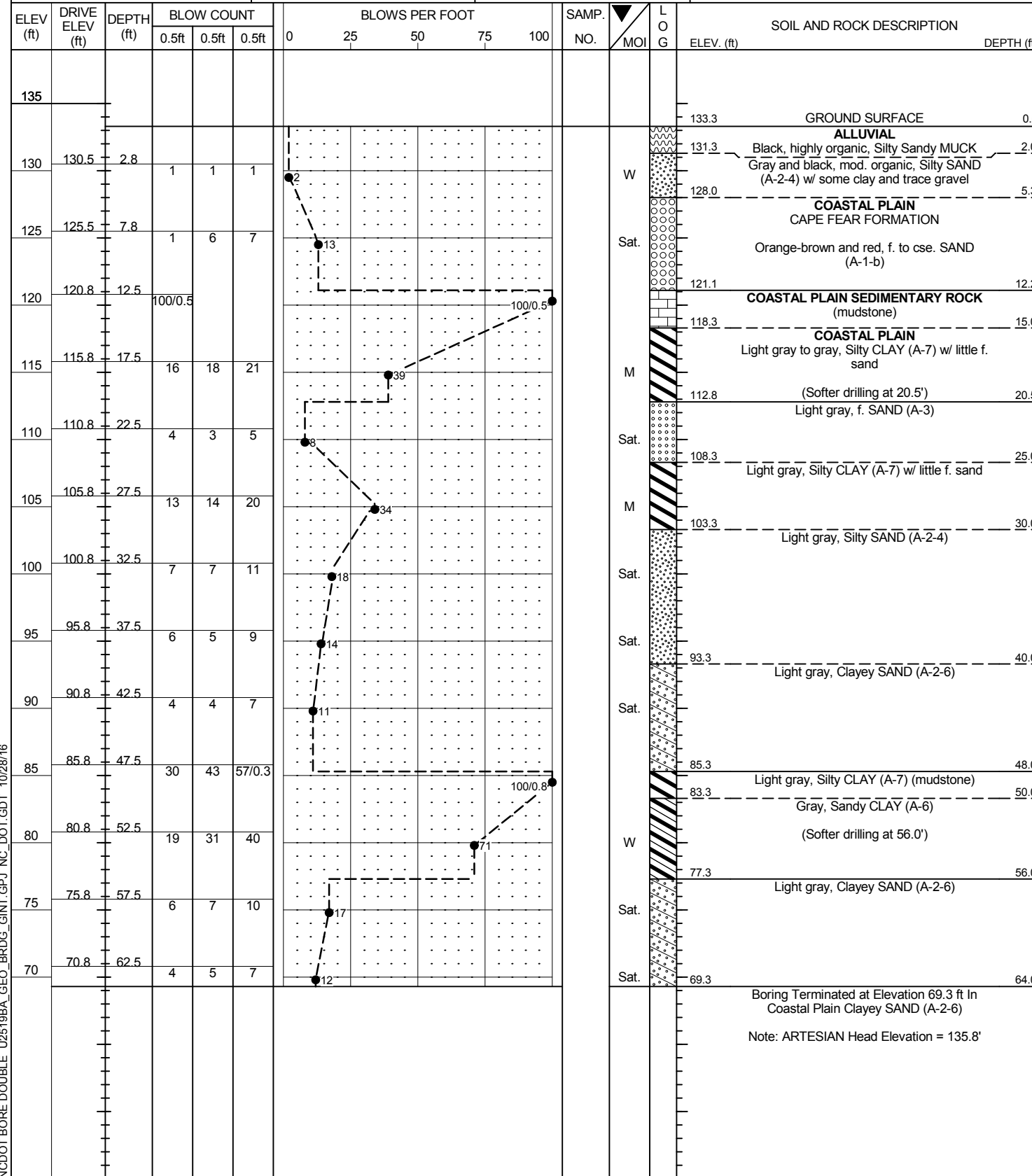
WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST B. Smith, PG										
SITE DESCRIPTION Dual Structure Bridge on -L- Over Unamed Tributary to Stewarts Creek							GROUND WTR (ft)									
BORING NO. NB_EB1B		STATION 396+56		OFFSET 71 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 141.4 ft		TOTAL DEPTH 60.4 ft		NORTHING 443,404		EASTING 1,989,038										
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 92% 11/05/2015				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic										
DRILLER Mike Moseley		START DATE 07/11/16		COMP. DATE 07/12/16		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						
145																
140																
135	137.9	3.5	3	4	7								M	GROUND SURFACE	0.0	
130	132.5	8.9	7	7	13								Sat.	COASTAL PLAIN MIDDENDORF FORMATION Light tan-brown to orange-brown and red, Silty SAND (A-2-4) and Clayey Silty SAND (A-2-5) (Harder drilling at 18.4')		
125	127.5	13.9	5	8	8								Sat.			
120	122.5	18.9	50	50/01									Sat.	CAPE FEAR FORMATION	18.4	
115	117.5	23.9	12	18	28								M	COASTAL PLAIN SEDIMENTARY ROCK CAPE FEAR FORMATION (mudstone)	21.4	
110	112.5	28.9	7	11	19								M	COASTAL PLAIN Gray, Silty CLAY (A-7) w/ little f. sand	26.4	
105	107.5	33.9	25	28	37								Sat.	Light gray, Clayey SAND (A-2-6)	31.4	
100	102.5	38.9	6	8	12								W	Gray, hard, Sandy CLAY (A-6)	36.4	
95	97.5	43.9	5	7	11								Sat.	Gray, Clayey Silty SAND (A-2-5)	41.4	
90	92.5	48.9	4	5	6								Sat.	Gray, f. to cse. SAND (A-1-b)	46.4	
85	87.5	53.9	23	57	43/0.2								Sat.	Light gray, Clayey SAND (A-2-6) (Harder Drilling at 52.9')	52.9	
80	82.5	58.9	12	19	23								W	Gray, Silty CLAY (A-7) w. little sand (sandy mudstone)	56.4	
													W	Gray, Sandy CLAY (A-6)	60.4	
														Boring Terminated at Elevation 81.0 ft In Coastal Plain Sandy CLAY (A-6) Note: ARTESIAN Head Elevation = 141.9'		

NCDOT BORE DOUBLE U2519BA_GEO_BRDG_GINT.GPJ_NC_DOT.GDT 10/28/16

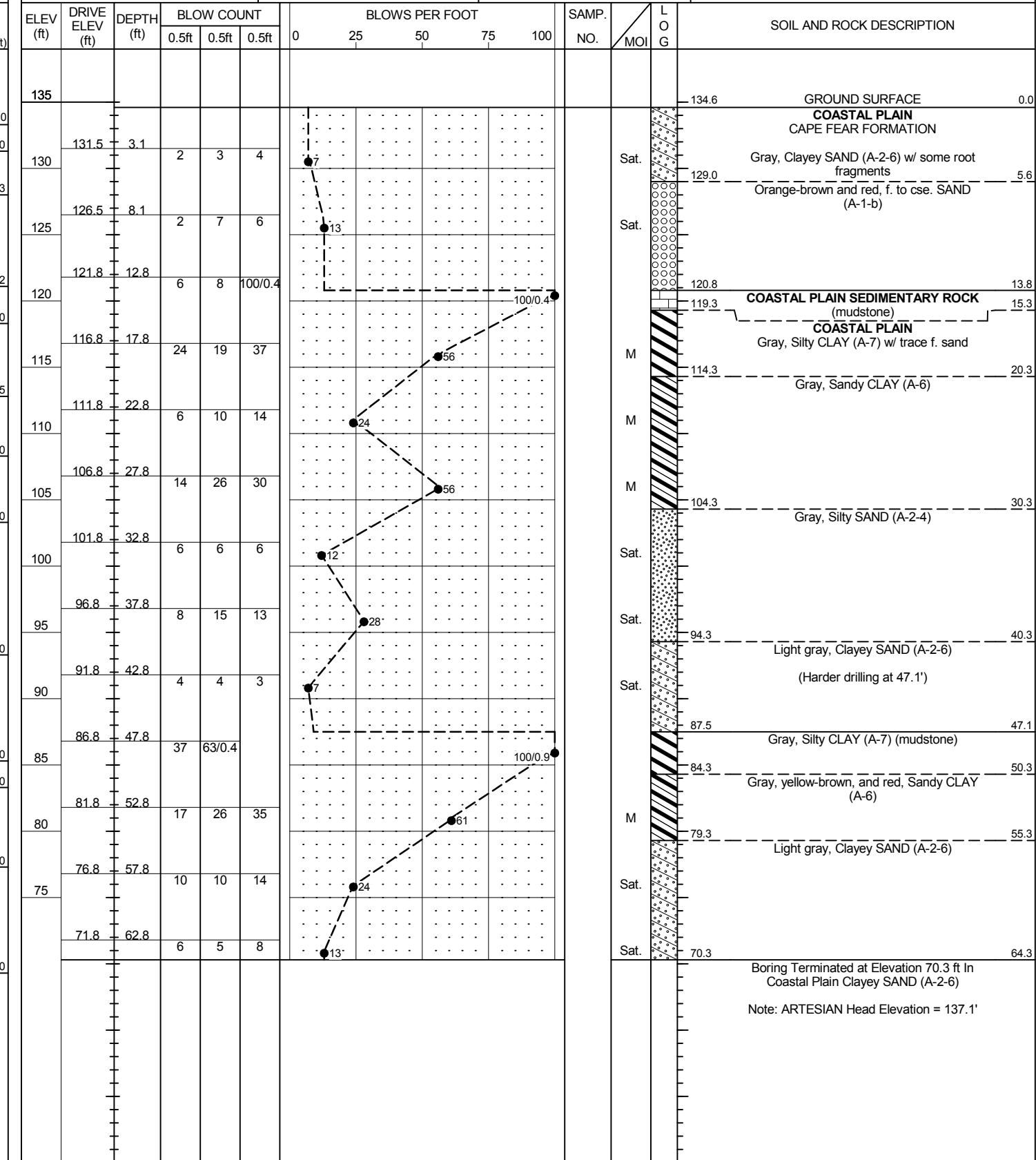
GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34817.1.FR7	TIP U-2519BA	COUNTY CUMBERLAND	GEOLOGIST B. Smith, PG
SITE DESCRIPTION Dual Structure Bridge on -L- Over Unamed Tributary to Stewarts Creek			GROUND WTR (ft)
BORING NO. SB_B1A	STATION 396+72	OFFSET 70 ft LT	ALIGNMENT -L-
COLLAR ELEV. 133.3 ft	TOTAL DEPTH 64.0 ft	NORTHING 443,293	EASTING 1,988,948
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Mike Moseley	START DATE 08/23/16	COMP. DATE 08/24/16	SURFACE WATER DEPTH N/A



WBS 34817.1.FR7	TIP U-2519BA	COUNTY CUMBERLAND	GEOLOGIST B. Smith, PG
SITE DESCRIPTION Dual Structure Bridge on -L- Over Unamed Tributary to Stewarts Creek			GROUND WTR (ft)
BORING NO. NB_B1B	STATION 397+45	OFFSET 71 ft RT	ALIGNMENT -L-
COLLAR ELEV. 134.6 ft	TOTAL DEPTH 64.3 ft	NORTHING 443,452	EASTING 1,988,965
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Mike Moseley	START DATE 08/23/16	COMP. DATE 08/23/16	SURFACE WATER DEPTH N/A

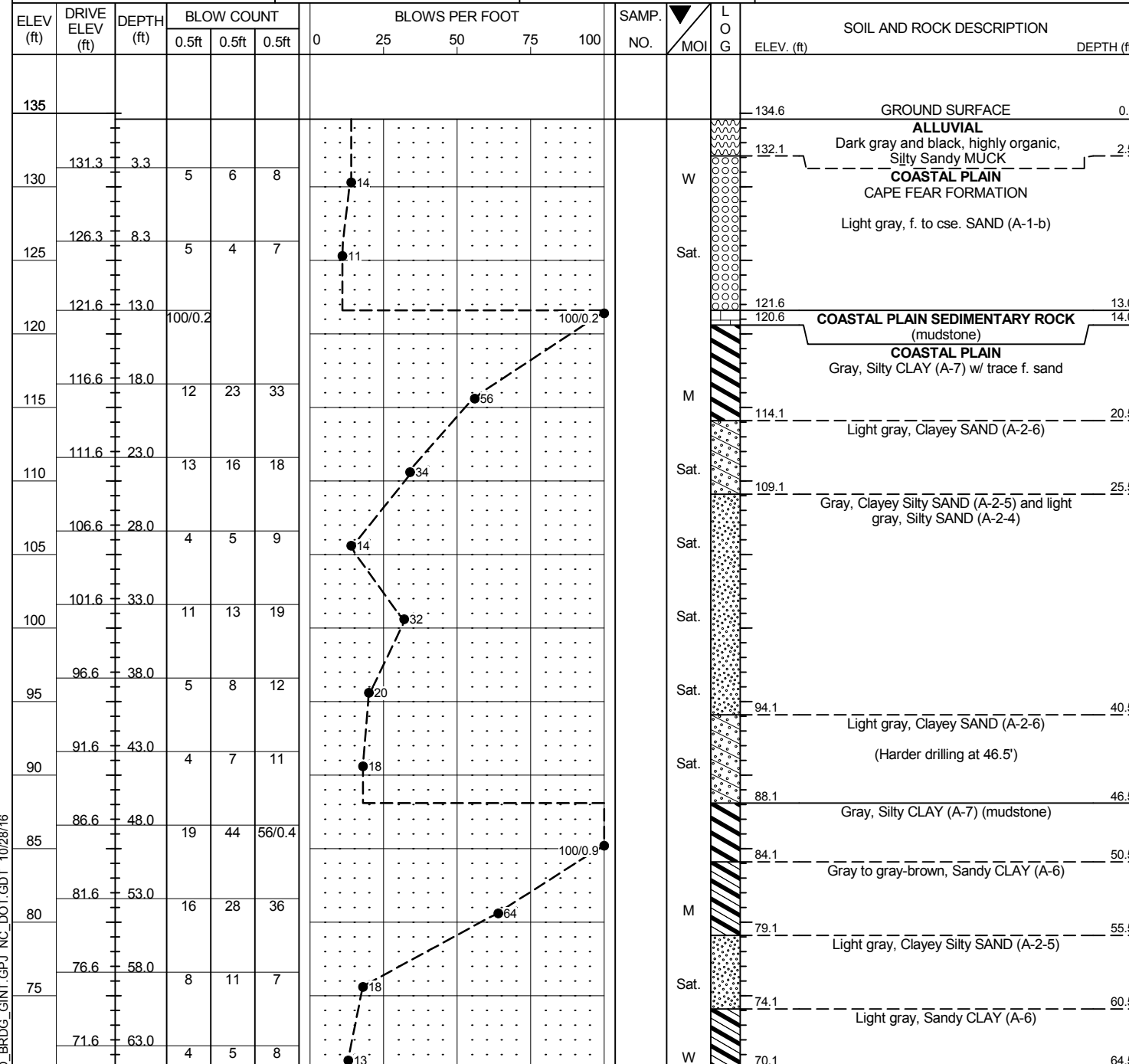


NCDOT BORE DOUBLE U2519BA_GEO_BRDG_GINT.GPJ NC_DOT.GDT 10/28/16

GEOTECHNICAL BORING REPORT

BORE LOG

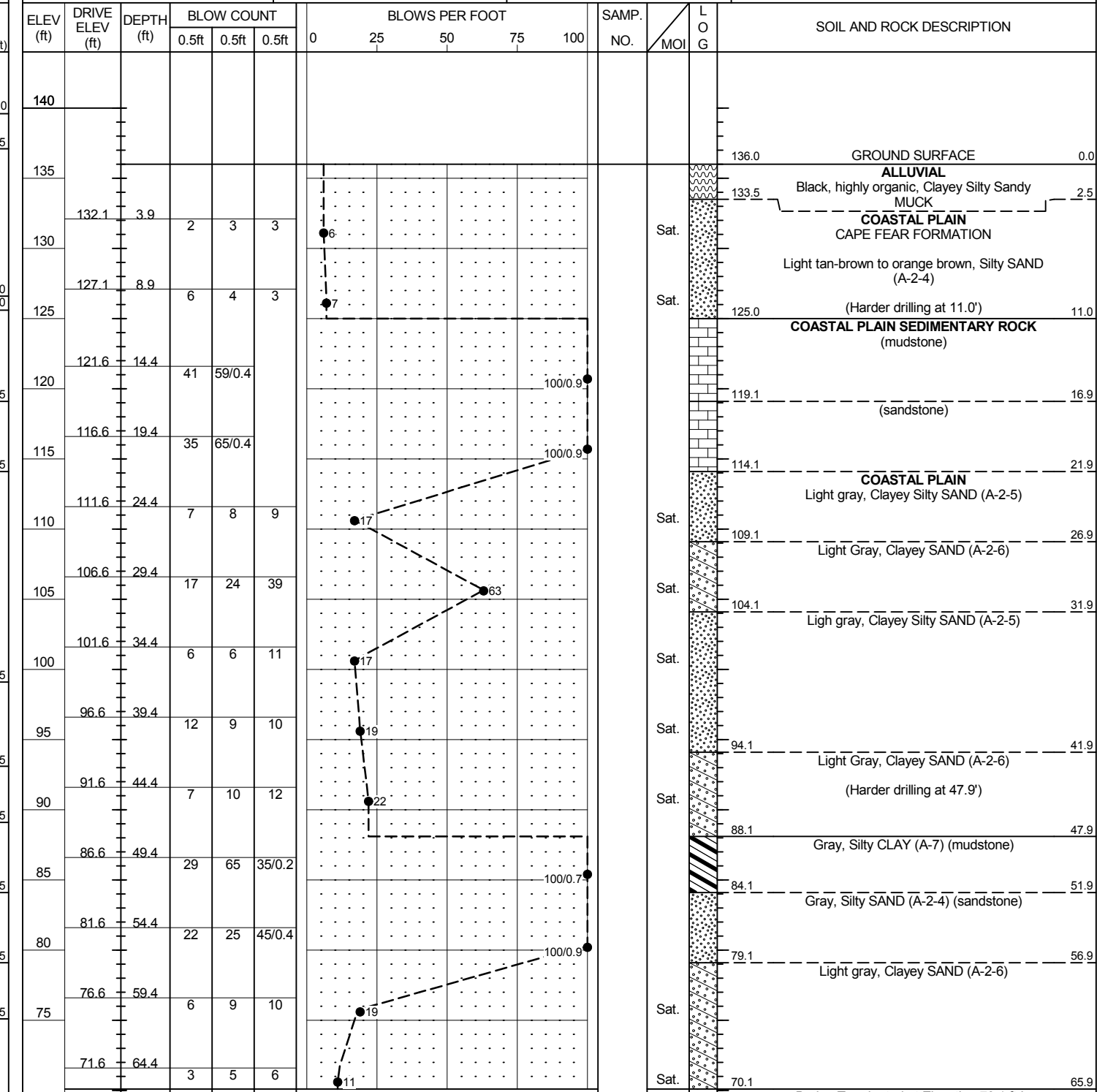
WBS 34817.1.FR7	TIP U-2519BA	COUNTY CUMBERLAND	GEOLOGIST B. Smith, PG
SITE DESCRIPTION Dual Structure Bridge on -L- Over Unamed Tributary to Stewarts Creek			GROUND WTR (ft)
BORING NO. SB_B2A	STATION 397+89	OFFSET 71 ft LT	ALIGNMENT -L-
COLLAR ELEV. 134.6 ft	TOTAL DEPTH 64.5 ft	NORTHING 443,361	EASTING 1,988,849
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Mike Moseley	START DATE 08/18/16	COMP. DATE 08/18/16	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE U2519BA_GEO_BRDG_GINT.GPJ NC_DOT_GDT 10/28/16

Boring Terminated at Elevation 70.1 ft In Coastal Plain Sandy CLAY (A-6)
Note: ARTESIAN Head Elevation = 138.1'

WBS 34817.1.FR7	TIP U-2519BA	COUNTY CUMBERLAND	GEOLOGIST B. Smith, PG
SITE DESCRIPTION Dual Structure Bridge on -L- Over Unamed Tributary to Stewarts Creek			GROUND WTR (ft)
BORING NO. NB_B2B	STATION 398+69	OFFSET 70 ft RT	ALIGNMENT -L-
COLLAR ELEV. 136.0 ft	TOTAL DEPTH 65.9 ft	NORTHING 443,522	EASTING 1,988,867
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Mike Moseley	START DATE 08/17/16	COMP. DATE 08/17/16	SURFACE WATER DEPTH N/A



Boring Terminated at Elevation 70.1 ft In Coastal Plain Clayey SAND (A-2-6)
Note: 0-HR: ARTESIAN Head Elevation = 138.0'
24-HR: ARTESIAN Head Elevation = 143.0'

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST B. Smith, PG										
SITE DESCRIPTION Dual Structure Bridge on -L- Over Unamed Tributary to Stewarts Creek							GROUND WTR (ft)									
BORING NO. SB_EB2A		STATION 399+14		OFFSET 71 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 140.1 ft		TOTAL DEPTH 65.1 ft		NORTHING 443,437		EASTING 1,988,745										
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Mike Moseley		START DATE 08/16/16		COMP. DATE 08/17/16		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						
145																
140																
137.0	137.0	3.1	2	7	10											
135																
132.0	132.0	8.1	10	22	16											
130																
126.5	126.5	13.6	WOH	5	6											
125																
121.5	121.5	18.6	100/0.3													
120																
116.5	116.5	23.6	16	31	56											
115																
111.5	111.5	28.6	12	19	22											
110																
106.5	106.5	33.6	7	10	12											
105																
101.5	101.5	38.6	6	7	9											
100																
96.5	96.5	43.6	6	3	4											
95																
91.5	91.5	48.6	4	5	5											
90																
86.5	86.5	53.6	26	62	38/0.2											
85																
81.5	81.5	58.6	27	48	52/0.4											
80																
76.5	76.5	63.6	12	14	15											
75																

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST B. Smith, PG										
SITE DESCRIPTION Dual Structure Bridge on -L- Over Unamed Tributary to Stewarts Creek							GROUND WTR (ft)									
BORING NO. NB_EB2B		STATION 400+09		OFFSET 71 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 147.0 ft		TOTAL DEPTH 60.4 ft		NORTHING 443,607		EASTING 1,988,762										
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015			DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Mike Moseley		START DATE 08/12/16		COMP. DATE 08/16/16		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						
150																
145																
143.4	143.4	3.6	5	7	16											
140																
138.4	138.4	8.6	11	18	30											
135																
132.9	132.9	14.1	7	12	12											
130																
127.9	127.9	19.1	8	4	4											
125																
122.9	122.9	24.1	100/0.2													
120																
117.9	117.9	29.1	100/0.2													
115																
112.9	112.9	34.1	13	17	19											
110																
107.9	107.9	39.1	17	32	37											
105																
102.9	102.9	44.1	7	6	9											
100																
97.9	97.9	49.1	9	15	12											
95																
92.9	92.9	54.1	5	7	10											
90																
87.9	87.9	59.1	29	52	48/0.3											

NCDOT BORE DOUBLE U2519BA_GEO_BRDG_GINT.GPJ_NC_DOT.GDT 10/28/16

SITE PHOTOGRAPH

Proposed Dual Structure Bridge on -L- Over Unnamed Tributary to Stewarts Creek



View Facing South from EB1-B toward EB1-B



View Facing South from B1-B toward B1-A



View Facing North from B2-A toward B2-B



View Facing South from EB2-B toward EB1-A

REFERENCE: U-2519BA

PROJECT: 34817

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5	CROSS SECTION
6-7	BORE LOG

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND
 PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP
FROM SOUTH OF SR 1003 (CAMDEN RD.) TO
SOUTH OF SR1104 (STRICKLAND BRIDGE RD.)
 SITE DESCRIPTION BRIDGE #450 ON KING RD.
(-Y14-) OVER FAYETTEVILLE OUTER LOOP
BETWEEN SR 1406 AND SR 1112

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	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 (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.

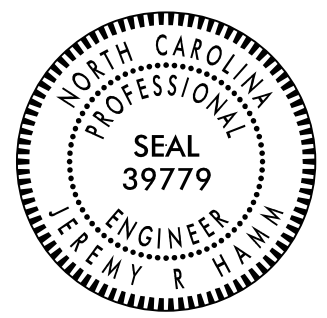
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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

MID ATLANTIC
GOODNIGHT, D.J.

INVESTIGATED BY GOODNIGHT, D.J.
 DRAWN BY HILL, M.J.
 CHECKED BY HAMM, J.R.
 SUBMITTED BY FALCON ENG.
 DATE MAY 2017



6/8/2017

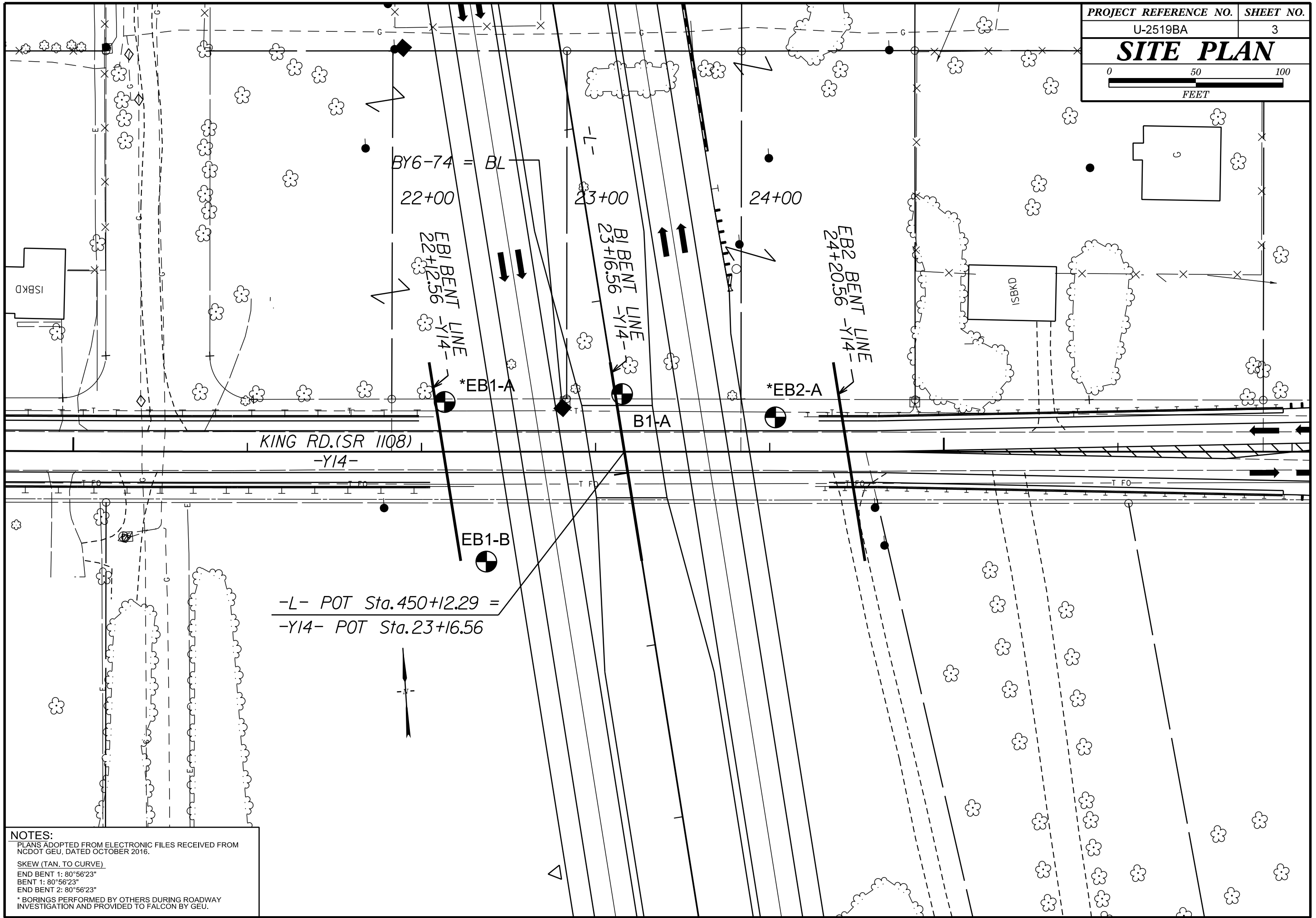
DocuSigned by:
Jeremy R Hamm 6/8/2017

ED7936089E22487 SIGNATURE DATE

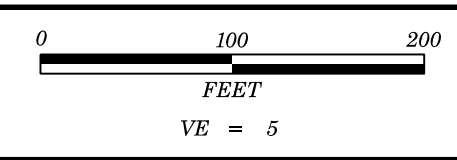
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																									
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (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></p>										<p>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.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>										<p>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 (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. 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.</p>																																																																									
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>NON PLASTIC</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> </table>										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	<p>DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST</p>										<p>FRAC. MARK: BM (BY6-74); 36" REBAR WITH ALUMINUM TRAVERSE CAP N: 448304.2038 E: 1987508.3025 -Y14- 22+80, 25 ft LT ELEVATION: 197.18 FEET</p>										<p>FIAD - FILLED IMMEDIATELY AFTER DRILLING UCP - UNDIVIDED COASTAL PLAIN</p>																																																										
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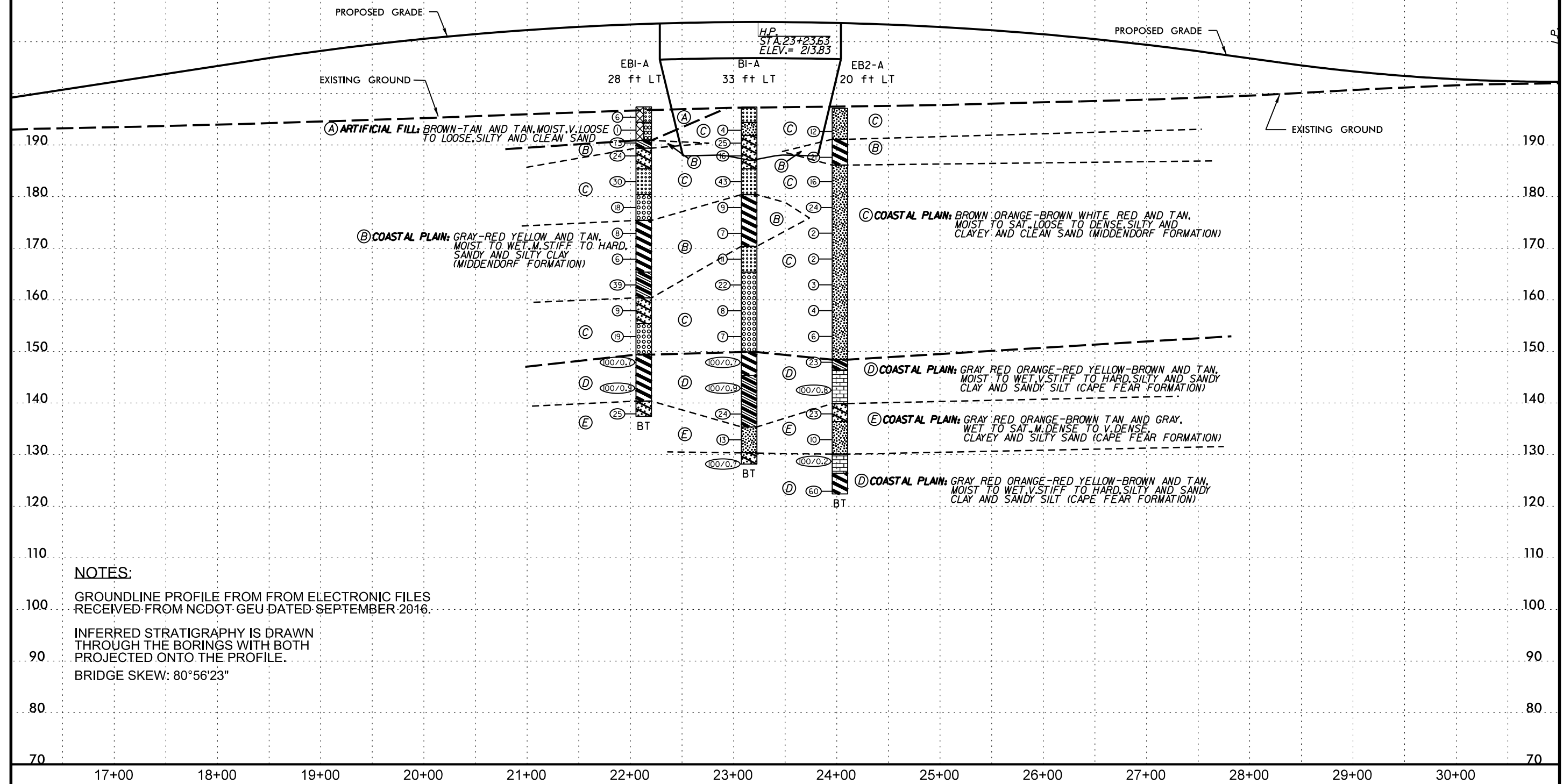


NOTES:
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU, DATED OCTOBER 2016.
 SKEW (TAN. TO CURVE)
 END BENT 1: 80°56'23"
 BENT 1: 80°56'23"
 END BENT 2: 80°56'23"
 *BORINGS PERFORMED BY OTHERS DURING ROADWAY INVESTIGATION AND PROVIDED TO FALCON BY GEU.

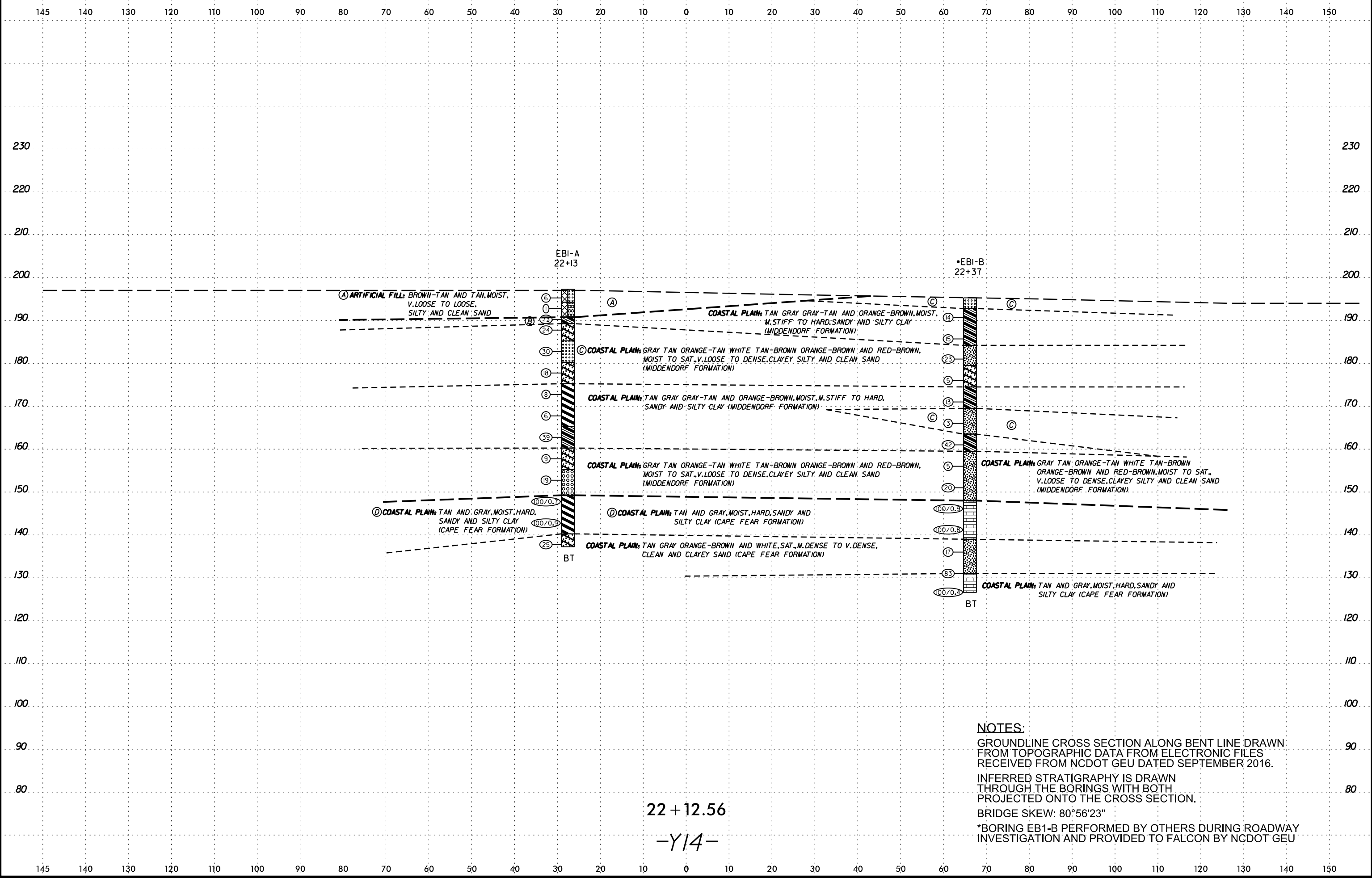


PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	4
BRIDGE NO. 450 ON KING RD. (-Y14-) OVER FAYETTEVILLE OUTER LOOP (-L-)	

-Y14-



8/23/99



22 + 12.56

-Y14-

NOTES:
GROUNDLINE CROSS SECTION ALONG BENT LINE DRAWN FROM TOPOGRAPHIC DATA FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU DATED SEPTEMBER 2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.
BRIDGE SKEW: 80°56'23"
*BORING EB1-B PERFORMED BY OTHERS DURING ROADWAY INVESTIGATION AND PROVIDED TO FALCON BY NCDOT GEU

26-APR-2017 15:03
I:\Projects\2017\017005.00 NCDOT GEU U-2519BA Sites 1,3&4\U2519BA.GEO.BRDC.SITE_3\CADD.GEOTECH\XSEC\U2519BA.GEO.XS1.dgn
gedm@ncs.com

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Goodnight, D.	
SITE DESCRIPTION BRIDGE NO. 450 ON KING RD. (-Y14-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)
BORING NO. EB1-A		STATION 22+13		OFFSET 28 ft LT		ALIGNMENT -Y14-	
COLLAR ELEV. 197.3 ft		TOTAL DEPTH 60.0 ft		NORTHING 448,312		EASTING 1,987,441	
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/09/2016				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER Wiggins, M.		START DATE 02/16/17		COMP. DATE 02/16/17		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					
200															
195	196.3	1.0													197.3
	193.8	3.5	3	4	2										194.3
	191.3	6.0	WOH	WOH	1										190.8
190	188.8	8.5	6	29	44										189.3
	188.8	8.5	12	11	13										185.3
185	183.8	13.5													180.3
	178.8	18.5	10	14	16										175.3
180	173.8	23.5	8	10	8										165.3
	168.8	28.5	2	2	4										160.3
175	163.8	33.5	6	15	24										155.3
	158.8	38.5	4	5	4										149.3
170	153.8	43.5	6	9	10										140.3
	148.8	48.5	26	64	36/0.2										137.3
165	143.8	53.5	29	50	50/0.4										
160	138.8	58.5	7	10	15										

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Smith, B.	
SITE DESCRIPTION BRIDGE NO. 450 ON KING RD. (-Y14-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)
BORING NO. EB1-B		STATION 22+37		OFFSET 63 ft RT		ALIGNMENT -Y14-	
COLLAR ELEV. 195.3 ft		TOTAL DEPTH 68.7 ft		NORTHING 448,219		EASTING 1,987,459	
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 76% 11/09/2016				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER Moseley, M.		START DATE 09/15/16		COMP. DATE 09/15/16		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					
200															
195	195.3	0.0													195.3
	192.8	2.5													190.8
190	191.7	3.6	2	4	10										185.3
	186.7	8.6	8	8	7										180.3
185	182.0	13.3	4	11	12										175.3
	177.0	18.3	4	3	2										165.3
180	172.0	23.3	3	4	9										160.3
	167.0	28.3	1	2	1										155.3
175	162.0	33.3	8	17	25										149.3
	157.0	38.3	2	2	3										140.3
170	152.0	43.3	6	8	12										137.3
	147.0	48.3	27	73/0.4											
165	142.0	53.3	45	55/0.3											
160	137.0	58.3	5	8	9										
	132.0	63.3	4	13	70										
155	127.0	68.3	100/0.4												

NCDOT BORE DOUBLE U2519BA_GEO_BRDG0450_SPT_BORINGS.GPJ NC_DOT.GDT 4/19/17

*NOTE: BORING PERFORMED BY OTHERS DURING ROADWAY INVESTIGATION AND PROVIDED TO FALCON BY NCDOT GEU.

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Goodnight, D.									
SITE DESCRIPTION BRIDGE NO. 450 ON KING RD. (-Y14-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)								
BORING NO. B1-A		STATION 23+15		OFFSET 33 ft LT		ALIGNMENT -Y14-									
COLLAR ELEV. 197.1 ft		TOTAL DEPTH 69.2 ft		NORTHING 448,310		EASTING 1,987,543									
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/09/2016			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic									
DRILLER Wiggins, M.		START DATE 02/16/17		COMP. DATE 02/16/17		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					
200														197.1	0.0
195	193.6	3.5												194.1	3.0
190	191.1	6.0	2	2	2								191.6	5.9	
185	188.6	8.5	8	14	11								185.1	12.9	
180	183.6	13.5	4	7	9								180.1	17.0	
175	178.6	18.5	9	18	25								170.1	27.0	
170	173.6	23.5	3	4	5								165.1	32.0	
165	168.6	28.5	2	2	5								149.6	47.5	
160	163.6	33.5	4	5	6								145.1	52.0	
155	158.6	38.5	6	10	12								135.1	62.0	
150	153.6	43.5	3	4	4								130.1	67.0	
145	148.6	48.5	3	2	5								127.9	69.2	
140	143.6	53.5	20	60	40/0.2										
135	138.6	58.5	23	47	53/0.4										
130	133.6	63.5	8	10	14										
	128.6	68.5	5	5	8										
			35	65/0.2											

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Smith, B.									
SITE DESCRIPTION BRIDGE NO. 450 ON KING RD. (-Y14-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 24+03		OFFSET 20 ft LT		ALIGNMENT -Y14-									
COLLAR ELEV. 197.1 ft		TOTAL DEPTH 74.7 ft		NORTHING 448,291		EASTING 1,987,630									
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 76% 11/09/2016			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic									
DRILLER Moseley, M.		START DATE 09/14/16		COMP. DATE 09/14/16		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					
200														197.1	0.0
195	193.6	3.5												191.1	6.0
190	188.6	8.5	4	5	7								186.1	11.0	
185	183.9	13.2	5	9	12										
180	178.9	18.2	2	4	12										
175	173.9	23.2	8	13	11										
170	168.9	28.2	2	1	1										
165	163.9	33.2	1	1	1										
160	158.9	38.2	1	2	2										
155	153.9	43.2	1	3	3										
150	148.9	48.2	2	5	18										
145	143.9	53.2	22	50	50/0.4										
140	138.9	58.2	7	10	13										
135	133.9	63.2	5	6	4										
130	128.9	68.2	100/0.2												
125	123.9	73.2	15	25	35										

NCDOT BORE DOUBLE U2519BA_GEO_BRDG0450_SPT_BORINGS.GPJ NC_DOT_GDT 4/19/17

*NOTE: BORING PERFORMED BY OTHERS DURING ROADWAY INVESTIGATION AND PROVIDED TO FALCON BY NCDOT GEU.

REFERENCE: U-2519BA

PROJECT: 34817

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	9

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
7-9	BORE LOGS

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND
PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP
FROM SOUTH OF SR 1003 (CAMDEN RD.) TO
SOUTH OF SR1104 (STRICKLAND BRIDGE RD.)
SITE DESCRIPTION BRIDGE #451 ON STONEY POINT RD.
(-Y16-) OVER FAYETTEVILLE OUTER LOOP
BETWEEN SR 1109 AND SR 1104

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

MID ATLANTIC

GOODNIGHT, D.J.

INVESTIGATED BY GOODNIGHT, D.J.

DRAWN BY HILL, M.J.

CHECKED BY HAMM, J.R.

SUBMITTED BY FALCON ENG.

DATE MAY 2017



DocuSigned by:
Jeremy R Hamm 6/8/2017
ED7938089E22487...
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

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		
	A-1	A-3	A-2	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-4, A-5
GROUP CLASS.	A-1-a	A-1-b	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-4, A-5	A-6, A-7
SYMBOL													
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 35 MX	40 MX 35 MX	41 MN 35 MX	41 MN 35 MX	40 MX 36 MN	41 MN 36 MN	40 MX 36 MN	41 MN 36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	-	-	40 MX 10 MN	41 MN 10 MN	41 MN 11 MN	40 MX 11 MN	40 MX 11 MN	40 MX 11 MN	40 MX 11 MN	40 MX 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	UNSATURABLE				
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 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

TEXTURE OR GRAIN SIZE

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
BOULDER (BLDR.)						
COBBLE (COB.)						
GRAVEL (GR.)						
COARSE SAND (CSE. SD.)						
FINE SAND (F SD.)						
SILT (SL.)						
CLAY (CL.)						
GRAIN SIZE	305	75	2.0	0.25	0.05	0.005
MM						
IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

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
PL - PLASTIC LIMIT	- 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

PLASTICITY

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

	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
- 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
- DIP & DIP DIRECTION OF ROCK STRUCTURES
- TEST BORING
- AUGER BORING
- CORE BORING
- MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- 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
- W - UNIT WEIGHT
- W_d - DRY UNIT WEIGHT
- 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
- 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

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 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 (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 (IV 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 (IV 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 GROUDED 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 GROUDED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
- VERY SOFT** CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.

FRACTURE SPACING

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

- 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.

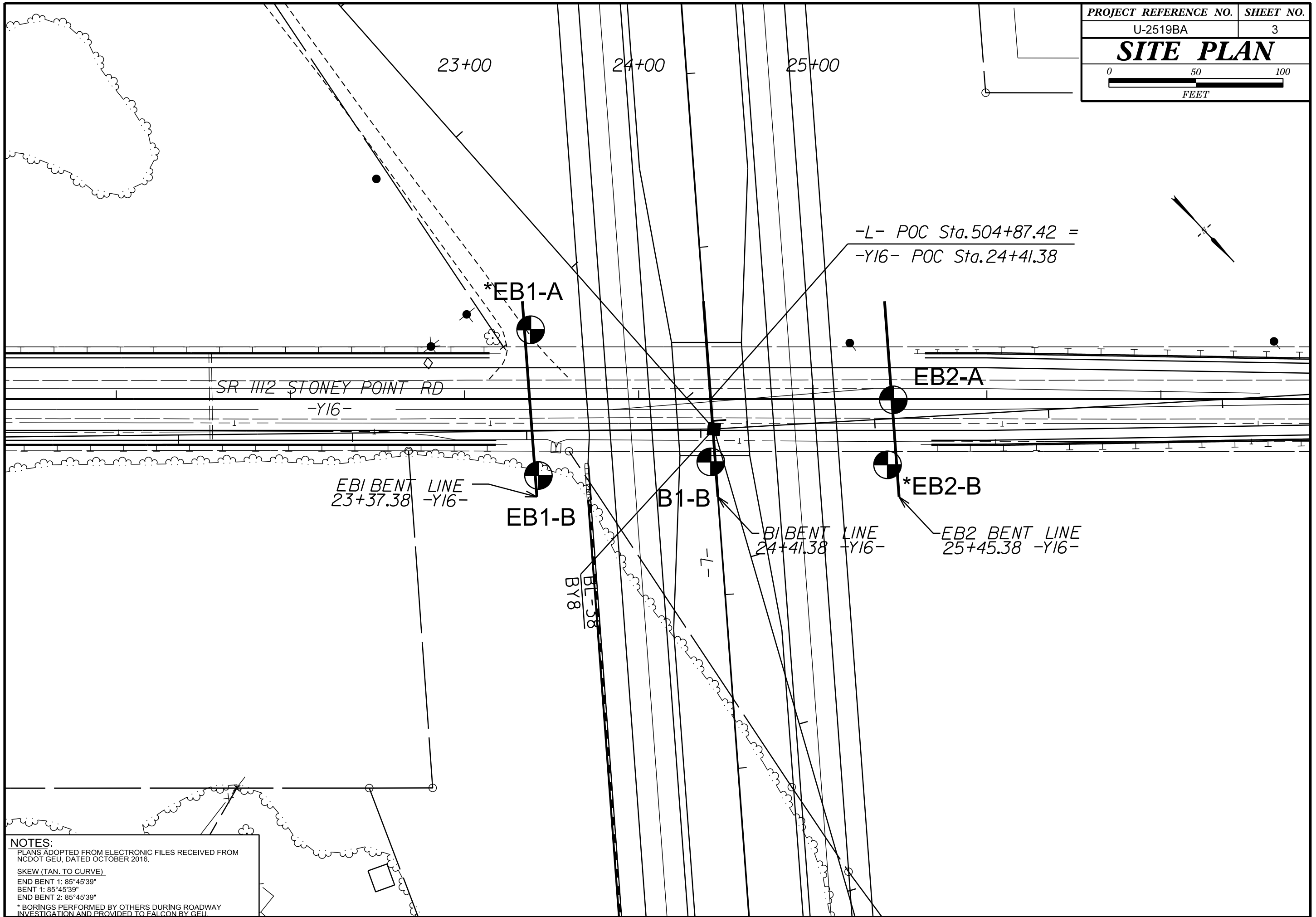
TERMS AND DEFINITIONS

- 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 DISLOADED 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.

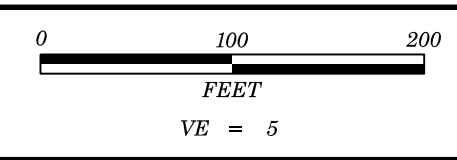
BENCH MARK: BM (BL-38); 36" REBAR WITH ALUMINUM TRAVERSE CAP
 N: 4534.4280 E: 1988530.7290
 -Y16- 24+43, 17 ft RT ELEVATION: 217.96 FEET

NOTES:

- FIAD - FILLED IMMEDIATELY AFTER DRILLING
- UCP - UNDIVIDED COASTAL PLAIN

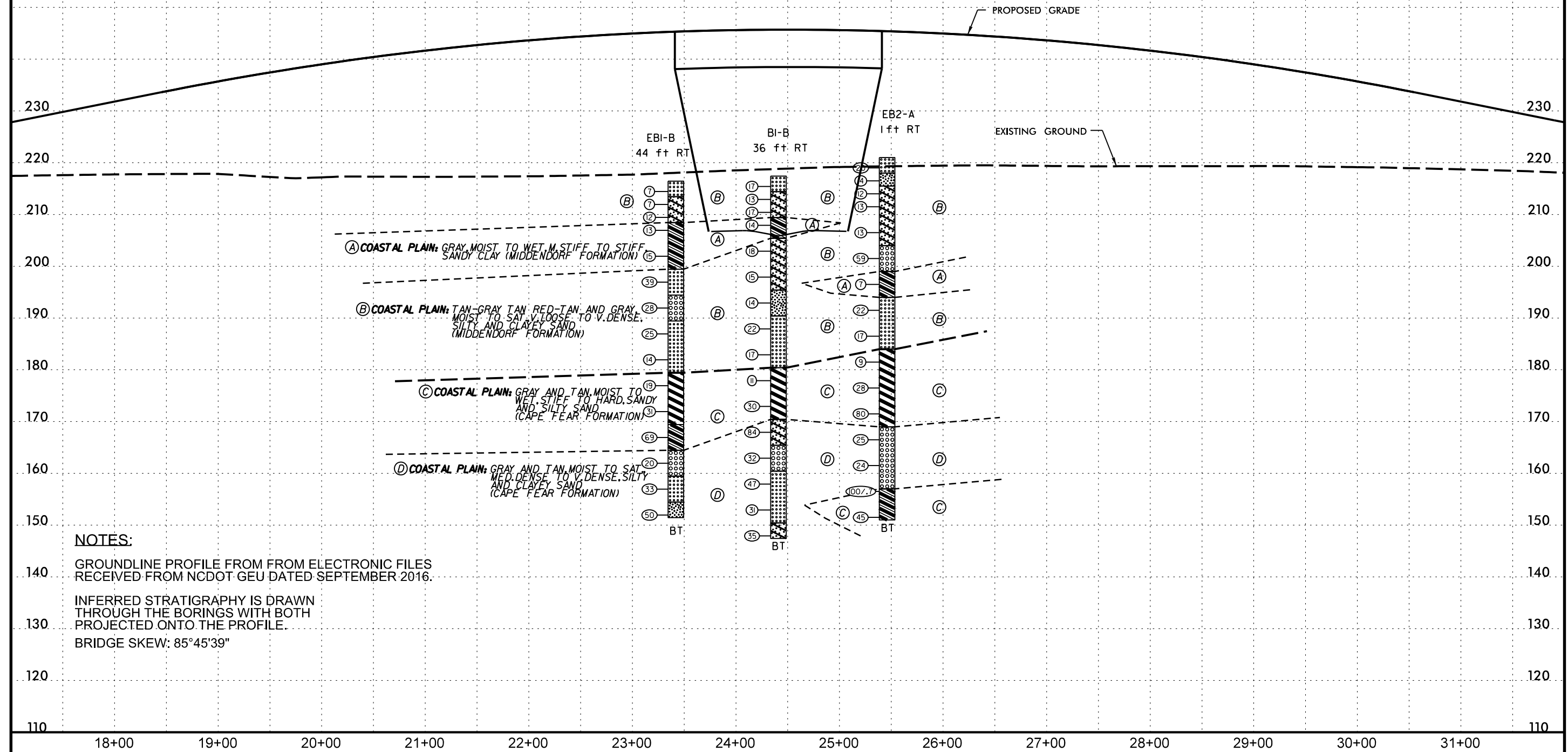


NOTES:
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM
 NCDOT GEU, DATED OCTOBER 2016.
 SKEW (TAN. TO CURVE)
 END BENT 1: 85°45'39"
 BENT 1: 85°45'39"
 END BENT 2: 85°45'39"
 * BORINGS PERFORMED BY OTHERS DURING ROADWAY
 INVESTIGATION AND PROVIDED TO FALCON BY GEU.



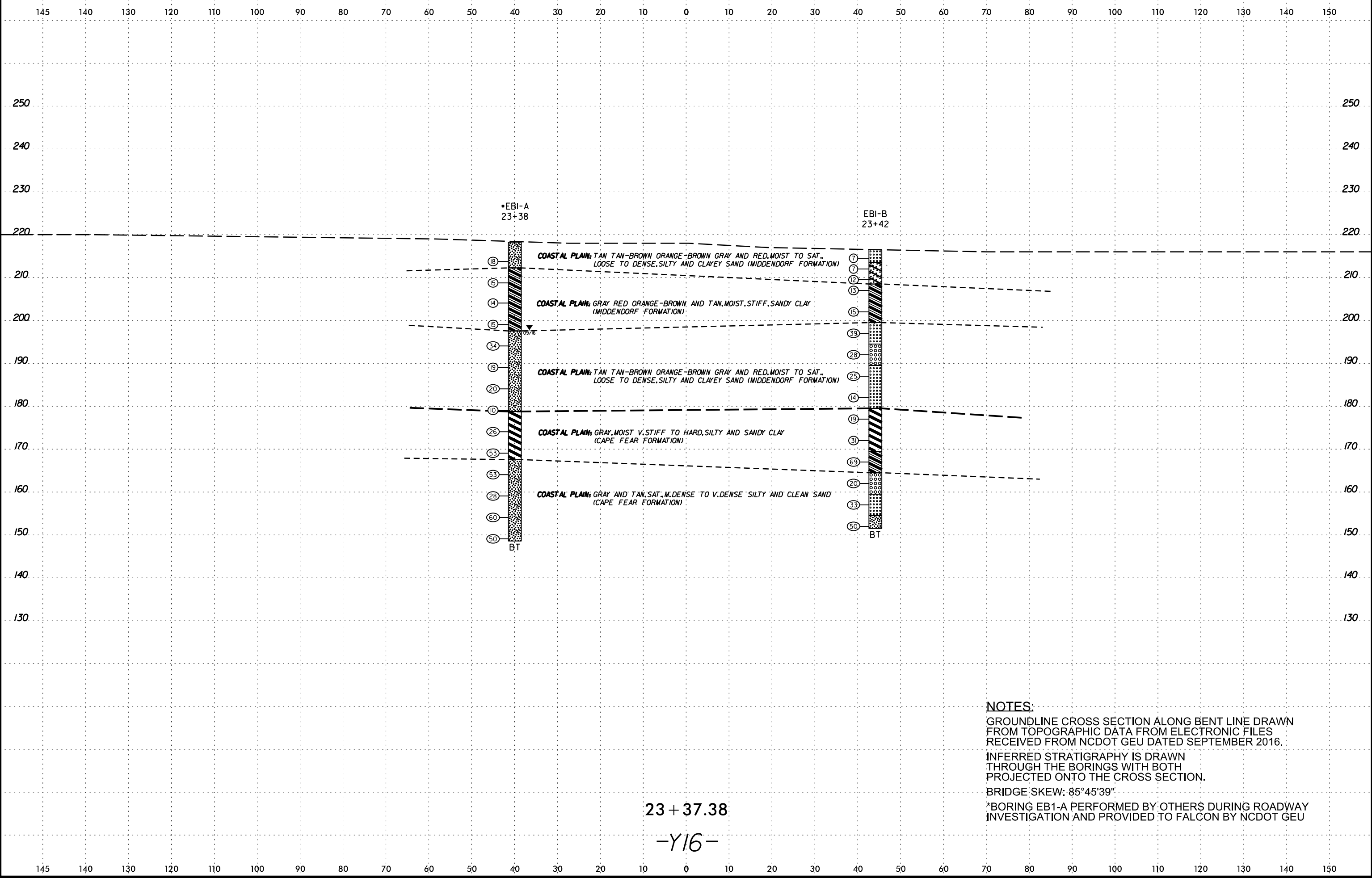
PROJECT REFERENCE NO.	SHEET NO.
U-2519BA	4
BRIDGE NO. 451 ON STONEY POINT RD. (-Y16) OVER FAYETTEVILLE OUTER LOOP	

-Y16-



NOTES:
 GROUNDLINE PROFILE FROM FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU DATED SEPTEMBER 2016.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
 BRIDGE SKEW: 85°45'39"

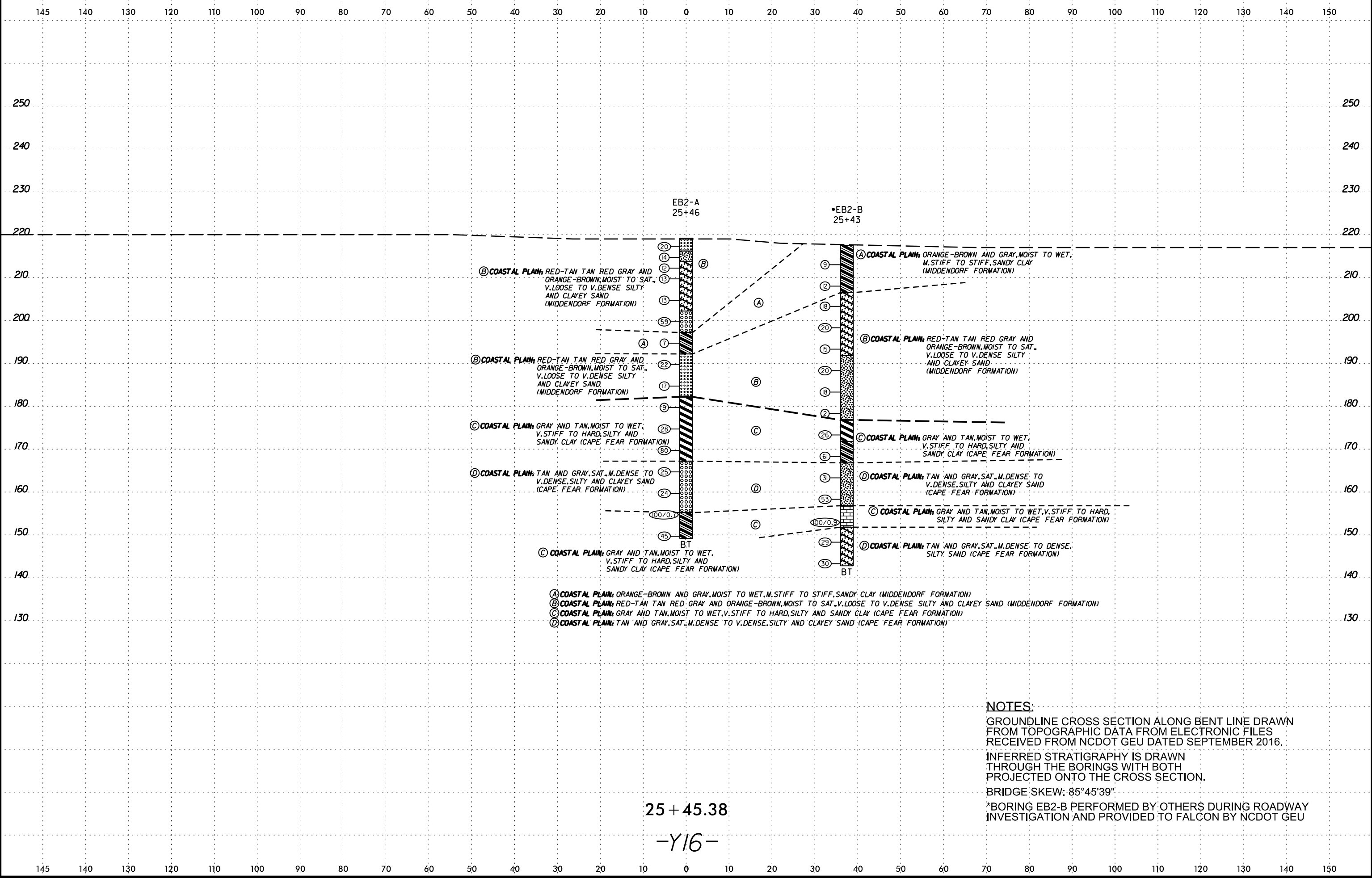
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NOTES:
GROUNDLINE CROSS SECTION ALONG BENT LINE DRAWN FROM TOPOGRAPHIC DATA FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU DATED SEPTEMBER 2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.
BRIDGE SKEW: 85°45'39"
*BORING EB1-A PERFORMED BY OTHERS DURING ROADWAY INVESTIGATION AND PROVIDED TO FALCON BY NCDOT GEU

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cadmschne AT GEU1-4

8/23/99



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gedmch@ncs.com

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Goodnight, D.	
SITE DESCRIPTION BRIDGE NO. 451 ON STONEY POINT RD. (-Y16-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)
BORING NO. B1-B		STATION 24+41		OFFSET 36 ft RT		ALIGNMENT -Y16-	
COLLAR ELEV. 217.4 ft		TOTAL DEPTH 70.0 ft		NORTHING 453,478		EASTING 1,988,544	
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/09/2016				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER Wiggins, M.		START DATE 02/16/17		COMP. DATE 02/16/17		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						
220														217.4	GROUND SURFACE	0.0
215	216.4	1.0	5	9	8								M	214.4	COASTAL PLAIN TAN, F. SAND (A-3) (MIDDENDORF FORMATION)	3.0
	213.9	3.5	6	5	8								M	209.4	TAN, SILTY CLAYEY SAND (A-2-6)	8.0
	211.4	6.0	4	6	8								M	205.4	GRAY, SANDY CLAY (A-6)	12.0
	208.9	8.5	5	8	10								M	205.4	TAN-GRAY, CLAYEY SILTY SAND (A-2-6)	12.0
	203.9	13.5	3	6	9								M	195.4	TAN-GRAY, CLAYEY SILTY SAND (A-2-5)	22.0
	198.9	18.5	3	6	8								W	190.4	TAN, F. SAND (A-3)	27.0
	193.9	23.5	10	12	10								Sat.	180.4	COASTAL PLAIN GRAY, SILTY CLAY (A-7) (CAPE FEAR FORMATION)	37.0
	188.9	28.5	6	8	9								Sat.	170.4	GRAY, CLAYEY SAND (A-2-6)	47.0
	183.9	33.5	2	4	7								M	165.4	GRAY, SLIGHTLY SILTY F. TO CSE. SAND (A-1-b)	52.0
	178.9	38.5	7	12	18								M	160.4	GRAY, SLIGHTLY SILTY SAND (A-3)	57.0
	173.9	43.5	26	37	47								Sat.	150.4	LIGHT GRAY, CLAYEY SAND (A-2-6)	67.0
	168.9	48.5	11	16	16								Sat.	147.4	Boring Terminated at Elevation 147.4 ft IN COASTAL PLAIN (CAPE FEAR FORMATION)	70.0
	163.9	53.5	15	21	26								Sat.			
	158.9	58.5	19	17	14								Sat.			
	153.9	63.5	12	15	20								Sat.			
	148.9	68.5											Sat.			

WBS 34817.1.FR7		TIP U-2519BA		COUNTY CUMBERLAND		GEOLOGIST Goodnight, D.	
SITE DESCRIPTION BRIDGE NO. 451 ON STONEY POINT RD. (-Y16-) OVER FAYETTEVILLE OUTER LOOP (-L-)							GROUND WTR (ft)
BORING NO. EB2-A		STATION 25+46		OFFSET 1 ft RT		ALIGNMENT -Y16-	
COLLAR ELEV. 219.2 ft		TOTAL DEPTH 70.0 ft		NORTHING 453,516		EASTING 1,988,440	
DRILL RIG/HAMMER EFF./DATE MID3964 CME-45C 83% 08/09/2016				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
DRILLER Wiggins, M.		START DATE 02/17/17		COMP. DATE 02/17/17		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						
220														219.2	GROUND SURFACE	0.0
215	218.2	1.0	9	10	10								M	216.2	COASTAL PLAIN TAN, F. SAND (A-3) (MIDDENDORF FORMATION)	3.0
	215.7	3.5	4	6	8								M	213.7	RED-TAN, SLIGHTLY SILTY F. SAND (A-2-4)	5.5
	213.2	6.0	3	5	8								M	209.4	RED-TAN, SILTY CLAYEY F. SAND (A-2-6)	8.0
	210.7	8.5	5	6	7								M	202.2	TAN, SLIGHTLY SILTY F. TO CSE. SAND (A-1-b)	17.0
	205.7	13.5	13	26	33								W	197.2	GRAY, SANDY CLAY (A-6)	22.0
	200.7	18.5	3	3	4								W	192.2	RED-GRAY, SLIGHTLY SILTY SAND (A-3)	27.0
	195.7	23.5	17	14	8								Sat.	182.2	COASTAL PLAIN GRAY AND TAN, SANDY SILTY CLAY (A-7) WITH LITTLE ORGANICS (CAPE FEAR FORMATION)	37.0
	185.7	33.5	6	7	10								Sat.	167.2	TAN AND GRAY, SLIGHTLY SILTY F. TO CSE. SAND (A-1-b)	52.0
	180.7	38.5	4	2	7								W	155.2	GRAY, SANDY CLAY (A-6)	64.0
	175.7	43.5	7	11	17								M	149.2	Boring Terminated at Elevation 149.2 ft IN COASTAL PLAIN (CAPE FEAR FORMATION)	70.0
	170.7	48.5	13	30	50								M			
	165.7	53.5	8	12	13								Sat.			
	160.7	58.5	10	10	14								Sat.			
	155.7	63.5	19	60	40/0.2								M			
	150.7	68.5	12	21	24								M			

NCDOT BORE DOUBLE U2519BA_GEO_BRDG0451_SPT_BORINGS.GPJ NC_DOT_GDT 4/19/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34817.1.FR7	TIP U-2519BA	COUNTY CUMBERLAND	GEOLOGIST Smith, B.
SITE DESCRIPTION Bridge No. 451 on Stoney Point Rd. (-Y16-) over Fayetteville Outer Loop (-L-)			GROUND WTR (ft)
BORING NO. EB2-B	STATION 25+43	OFFSET 38 ft RT	ALIGNMENT -Y16-
COLLAR ELEV. 217.5 ft	TOTAL DEPTH 74.7 ft	NORTHING 453,543	EASTING 1,988,466
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 76% 11/09/2016		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Moseley, M.	START DATE 10/03/16	COMP. DATE 10/03/16	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
220														217.5	0.0	GROUND SURFACE
215	214.0	3.5	3	4	5							M				COASTAL PLAIN GRAY AND ORANGE-BROWN, SANDY CLAY (MIDDENDORF FORMATION)
210	209.0	8.5	3	5	7											
205	204.3	13.2	5	7	11							Sat.		206.5	11.0	GRAY, RED, AND ORANGE-BROWN, CLAYEY SAND AND SILTY SAND WITH TRACE TO LITTLE CLAY
200	199.3	18.2	3	8	12							Sat.				
195	194.3	23.2	3	7	8							Sat.				
190	189.3	28.2	7	8	12							Sat.				
185	184.3	33.2	6	8	10							Sat.				
180	179.3	38.2	3	0	2							Sat.				
175	174.3	43.2	6	10	16							Sat.		176.8	40.7	COASTAL PLAIN GRAY, SILTY CLAY AND SANDY CLAY (CAPE FEAR FORMATION)
170	169.3	48.2	12	20	41							W		171.8	45.7	
165	164.3	53.2	6	14	17							Sat.		166.8	50.7	GRAY, SILTY SAND
160	159.3	58.2	22	23	30							Sat.				
155	154.3	63.2	20	41	59/0.4							Sat.		156.8	60.7	COASTAL PLAIN SEDIMENTARY ROCK (MUDSTONE)
150	149.3	68.2	11	12	17							Sat.		151.8	65.7	COASTAL PLAIN GRAY, CLAYEY SAND
145	144.3	73.2	9	13	17							Sat.		142.8	74.7	Boring Terminated at Elevation 142.8 ft IN COASTAL PLAIN (CLAYEY SAND)

NCDOT BORE DOUBLE U2519BA_GEO_BRDG0451_SPT_BORINGS.GPJ_NC_DOT_GDT 4/19/17

*NOTE: BORING PERFORMED BY OTHERS DURING ROADWAY INVESTIGATION AND PROVIDED TO FALCON BY NCDOT GEU.

REFERENCE: U-2519BA

PROJECT: 34817

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE WITH SOIL TEST RESULTS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND
 PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP
FROM SOUTH OF SR 1033 (CAMDEN RD) TO
SOUTH OF SR 1104 (STRICKLAND BRIDGE RD)
 SITE DESCRIPTION NOISE WALL NWIA RIGHT OF
-Y13- 16+81 TO 22+21

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	4

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 T07-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

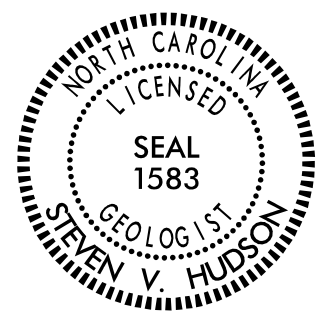
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND 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
CHRIS ALEXANDER
MIKE D. MASON
T. SPENCER

INVESTIGATED BY STEVEN HUDSON
 DRAWN BY STEVEN HUDSON
 CHECKED BY J. LEE STONE, LG
 SUBMITTED BY STEVEN HUDSON, LG
 DATE FEBRUARY 2018



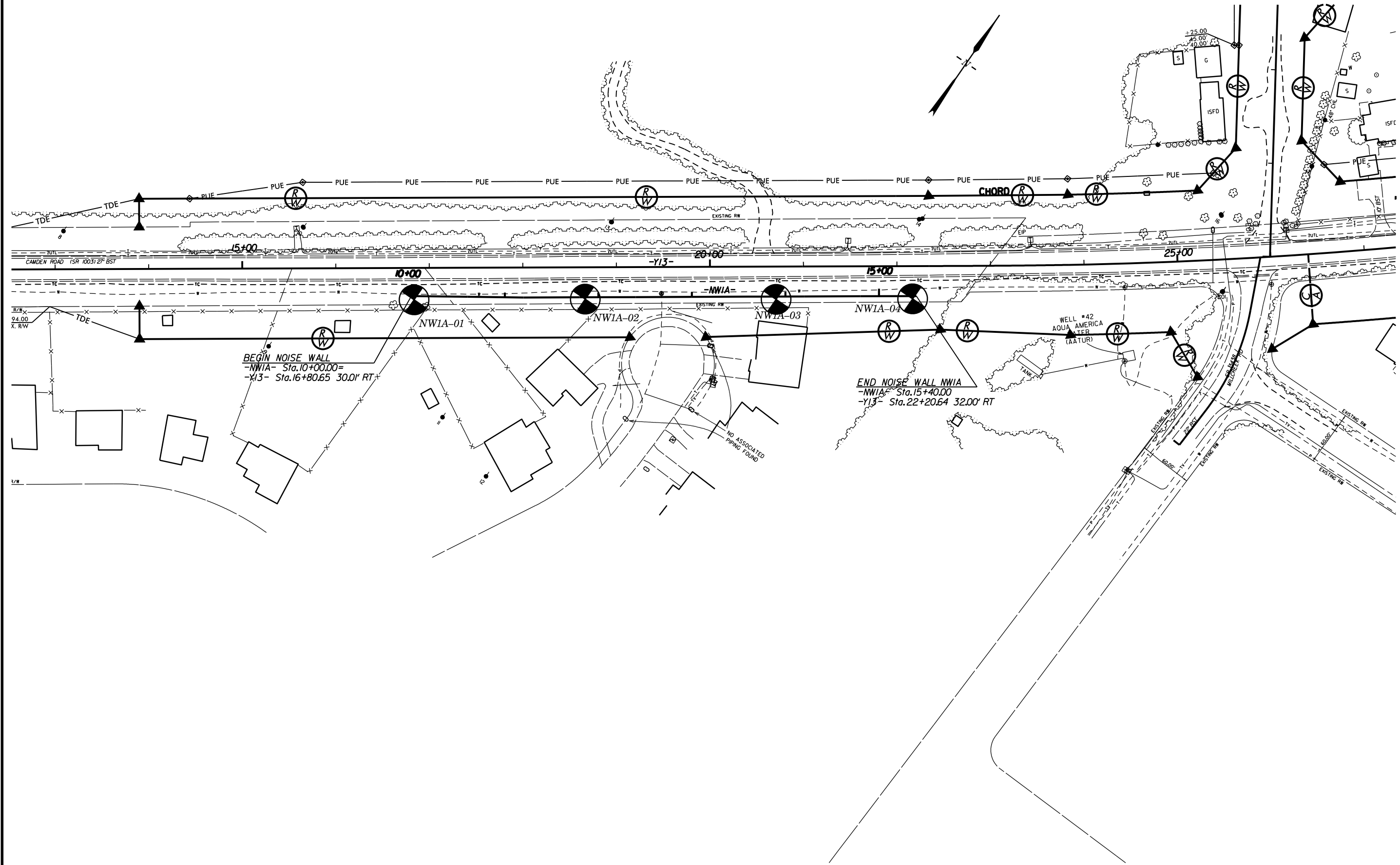
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 SIGNATURE DATE 3/9/2018

**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																																																																																																																																																																		
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, 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></p>										<p>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.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>										<p>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 (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.</p>																																																																																																																																																																		
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <th rowspan="2">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>A-1</th> <th>A-3</th> <th>A-2</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> <th></th> <th></th> <th></th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SYMBOL</td> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</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 35 MX 35 MX</td> <td>40 MX 35 MX</td> <td>41 MN 35 MX</td> <td>41 MN 35 MX</td> <td>40 MX 36 MN</td> <td>41 MN 36 MN</td> <td>40 MX 36 MN</td> <td>41 MN 36 MN</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td colspan="5"></td> <td colspan="5"></td> <td colspan="5">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> </tr> <tr> <td>GROUP INDEX</td> <td colspan="5">0</td> <td colspan="5">4 MX</td> <td colspan="5">8 MX 12 MX 16 MX NO MX</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">HIGHLY ORGANIC SOILS</td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td colspan="5">FAIR TO POOR POOR UNSUITABLE</td> </tr> </table> <p>PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p>										GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					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					GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7										SYMBOL	[Pattern]					[Pattern]					[Pattern]					% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 35 MX 35 MX	40 MX 35 MX	41 MN 35 MX	41 MN 35 MX	40 MX 36 MN	41 MN 36 MN	40 MX 36 MN	41 MN 36 MN						MATERIAL PASSING #40 LL PI											SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER					GROUP INDEX	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		HIGHLY ORGANIC SOILS					GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD					FAIR TO POOR					FAIR TO POOR POOR UNSUITABLE					<p>ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>										<p>WEATHERED ROCK (WR)</p> <p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p>										<p>CRYSTALLINE ROCK (CR)</p> <p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>										<p>NON-CRYSTALLINE ROCK (NCR)</p> <p>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.</p>									
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<p>MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>COMPRESSION</p> <p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p>										<p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p> <p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>																																																																																																																																																																												
<p>PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <th></th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>											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	<p>GROUND WATER</p> <p>▽ 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</p>										<p>WEATHERING</p> <p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (IV 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 (IV 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.</p>																																																																																																																																																								
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<p>COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>										<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. 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.</p>										<p>BENCH MARK: LOCATIONS AND ELEVATIONS OBTAINED WITH REAL TIME KINEMATICS (RTK) SURVEY GRADE POSITIONING SYSTEM (GPS)</p> <p style="text-align: right;">ELEVATION: FEET</p> <p>NOTES: U.C.P. = UNDIVIDED COASTAL PLAIN</p>																																																																																																																																																																												



REFERENCE: U-2519BA

PROJECT: 34817

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	4

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE WITH SOIL TEST RESULTS

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND
 PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP
FROM SOUTH OF SR 1033 (CAMDEN RD) TO
SOUTH OF SR 1104 (STRICKLAND BRIDGE RD)
 SITE DESCRIPTION NOISE WALL NWIB RIGHT OF
-Y13- 30+59 TO 36+22

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 T07-6850. 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
CHRIS ALEXANDER
MIKE D. MASON
T. SPENCER

INVESTIGATED BY STEVEN HUDSON
 DRAWN BY STEVEN HUDSON
 CHECKED BY J. LEE STONE, LG
 SUBMITTED BY STEVEN HUDSON, LG
 DATE FEBRUARY 2018



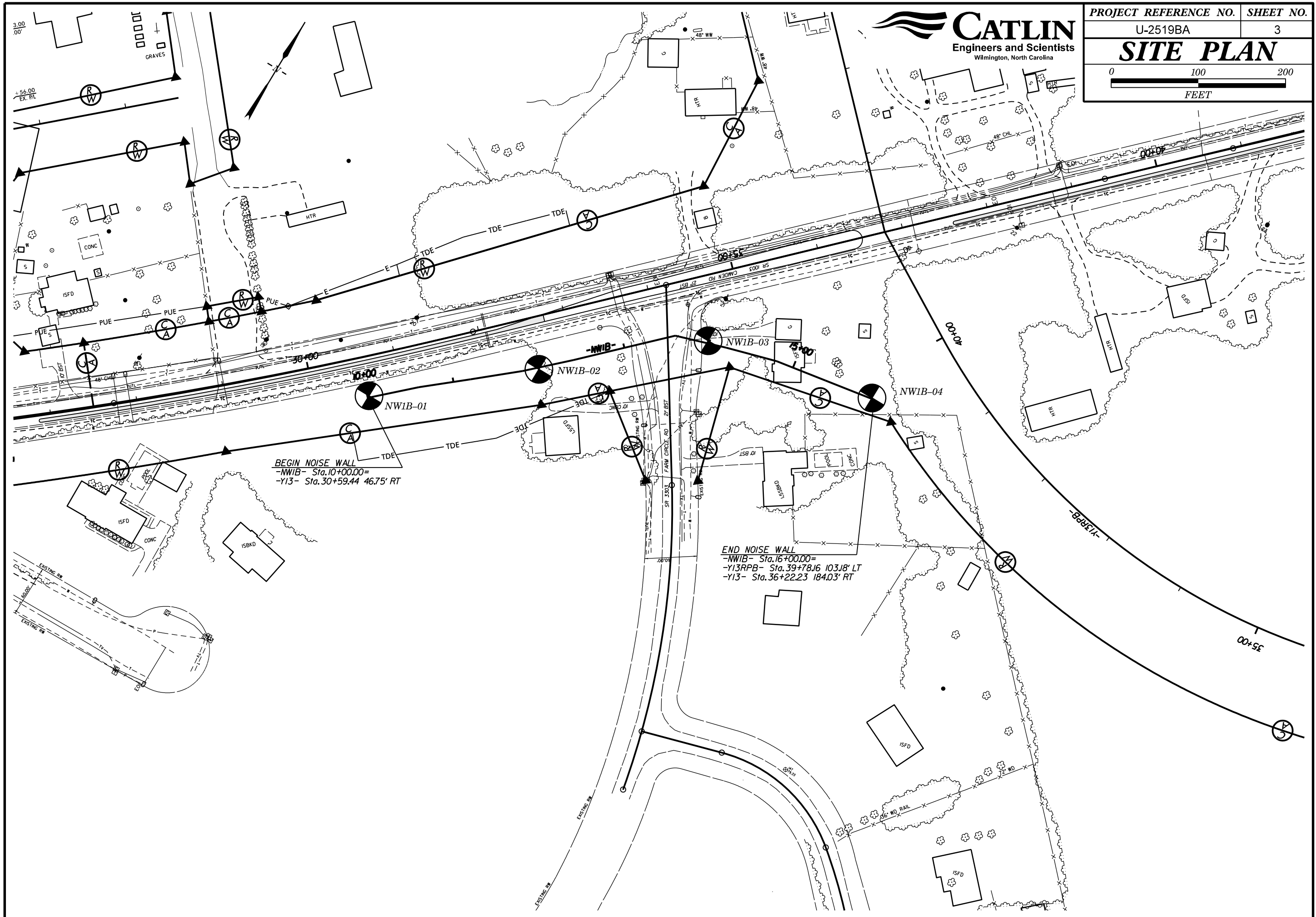
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 SIGNATURE DATE

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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, 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></p>										<p>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.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>										<p>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 DISLOADED 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 (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. 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.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
<p style="text-align: center;">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <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-3</th> <th>A-2</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 colspan="5"></th> </tr> <tr> <th>SYMBOL</th> <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></td> <td></td> <td></td> <td></td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX 10 MX</td> <td>51 MN 35 MX 35 MX 35 MX</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> <td>36 MN 36 MN 36 MN</td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td colspan="2">-</td> <td>40 MX 10 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> </tr> <tr> <th>GROUP INDEX</th> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>NO MX</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="2">STONE FRAGS. GRAVEL, AND SAND</td> <td>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">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td colspan="5">HIGHLY ORGANIC SOILS</td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td colspan="4">UNSATURABLE</td> </tr> <tr> <td colspan="10">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</td> <td colspan="10"></td> <td colspan="10"></td> </tr> <tr> <td colspan="10"> <p style="text-align: center;">CONSISTENCY OR DENSENESS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <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> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)</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> </table> </td> <td colspan="10"> <p style="text-align: center;">MISCELLANEOUS SYMBOLS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td></td> <td>DIP & DIP DIRECTION OF ROCK STRUCTURES</td> <td></td> <td>SOIL SYMBOL</td> <td></td> <td>TEST BORING</td> <td></td> <td>SLOPE INDICATOR INSTALLATION</td> </tr> <tr> <td></td> <td>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td></td> <td>AUGER BORING</td> <td></td> <td>CONE PENETROMETER TEST</td> <td></td> <td>CORE BORING</td> <td></td> <td>SOUNDING ROD</td> </tr> <tr> <td></td> <td>INFERRED SOIL BOUNDARY</td> <td></td> <td>MONITORING WELL</td> <td></td> <td>TEST BORING WITH CORE</td> <td></td> <td>PIEZOMETER INSTALLATION</td> <td></td> <td>SPT N-VALUE</td> </tr> <tr> <td></td> <td>INFERRED ROCK LINE</td> <td></td> <td>ALLUVIAL SOIL BOUNDARY</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> </td> <td colspan="10"> <p style="text-align: center;">RECOMMENDATION SYMBOLS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td>UNDERCUT</td> <td></td> <td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td></td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</td> </tr> <tr> <td></td> <td>SHALLOW UNDERCUT</td> <td></td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> <td></td> <td></td> </tr> </table> </td> <td colspan="10"> <p style="text-align: center;">ABBREVIATIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>AR - AUGER REFUSAL</td> <td>CL. - CLAY</td> <td>CPT - CLAY PENETRATION TEST</td> <td>CSE. - COARSE</td> <td>DMT - DILATOMETER TEST</td> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>e - VOID RATIO</td> <td>F - FINE</td> <td>FOSS. - FOSSILIFEROUS</td> <td>FRAC. - FRACTURED, FRACTURES</td> <td>FRAGS. - FRAGMENTS</td> <td>HI. - HIGHLY</td> <td>MED. - MEDIUM</td> <td>MICA. - MICACEOUS</td> <td>MOD. - MODERATELY</td> <td>NP - NON PLASTIC</td> <td>ORG. - ORGANIC</td> <td>PMT - PRESSUREMETER TEST</td> <td>SAP. - SAPROLITIC</td> <td>SD. - SAND, SANDY</td> <td>SL. - SILT, SILTY</td> <td>SLI. - SLIGHTLY</td> <td>TCR - TRICONE REFUSAL</td> <td>w - MOISTURE CONTENT</td> <td>V - VERY</td> <td>VST - VANE SHEAR TEST</td> <td>WEA. - WEATHERED</td> <td>UNIT WEIGHT</td> <td>DRY UNIT WEIGHT</td> </tr> <tr> <td>BT - BORING TERMINATED</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> <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> </table> </td> <td colspan="10"> <p style="text-align: center;">TEXTURE OR GRAIN SIZE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <td>4</td> <td>10</td> <td>40</td> <td>60</td> <td>200</td> <td>270</td> </tr> <tr> <td></td> <td>4.75</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE. SD.)</th> <th>FINE SAND (F SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>GRAIN SIZE</th> <td>MM 305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> </tr> <tr> <td></td> <td>IN. 12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> </td> </tr> <tr> <td colspan="10"> <p style="text-align: center;">SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table> </td> <td colspan="10"> <p style="text-align: center;">EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> ADVANCING TOOLS:</td> <td><input checked="" type="checkbox"/> AUTOMATIC</td> <td><input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> CME-55</td> <td><input type="checkbox"/> CLAY BITS</td> <td colspan="2">CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-550</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td><input type="checkbox"/> -B</td> <td><input type="checkbox"/> -H</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input type="checkbox"/> -N</td> <td></td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td colspan="2">HAND TOOLS:</td> </tr> <tr> <td></td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> <td></td> </tr> <tr> <td></td> <td><input checked="" type="checkbox"/> CASING</td> <td><input type="checkbox"/> HAND AUGER</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> W/ ADVANCER</td> <td><input type="checkbox"/> SOUNDING ROD</td> <td></td> </tr> <tr> <td></td> <td><input checked="" type="checkbox"/> TRICONE 2 1/8" STEEL TEETH</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> TRICONE TUNG-CARB.</td> <td></td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> CORE BIT</td> <td></td> <td></td> </tr> </table> </td> <td colspan="10"> <p style="text-align: center;">PLASTICITY</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NON PLASTIC</th> <th colspan="2">PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td></td> <td>0-5</td> <td></td> <td>VERY LOW</td> </tr> <tr> <td>SLIGHTLY PLASTIC</td> <td>6-15</td> <td></td> <td>SLIGHT</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>16-25</td> <td></td> <td>MEDIUM</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>26 OR MORE</td> <td></td> <td>HIGH</td> </tr> </table> </td> <td colspan="10"> <p style="text-align: center;">FRACATURE SPACING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table> </td> <td colspan="10"> <p style="text-align: center;">BEDDING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table> </td> </tr> <tr> <td colspan="10"> <p style="text-align: center;">COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p> </td> <td colspan="10"> <p style="text-align: center;">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <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> </table> </td> <td colspan="10"> <p style="text-align: center;">FRACATURE SPACING</p> <p>TERM: ELEVATION: FEET</p> </td> <td colspan="10"> <p style="text-align: center;">NOTES:</p> <p>U.C.P. = UNDIVIDED COASTAL PLAIN</p> </td> </tr> </table>										GENERAL CLASS.	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GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER					HIGHLY ORGANIC SOILS					GEN. 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<p style="text-align: center;">COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>										<p style="text-align: center;">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <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> </table>										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.	<p style="text-align: center;">FRACATURE SPACING</p> <p>TERM: ELEVATION: FEET</p>										<p style="text-align: center;">NOTES:</p> <p>U.C.P. = UNDIVIDED COASTAL PLAIN</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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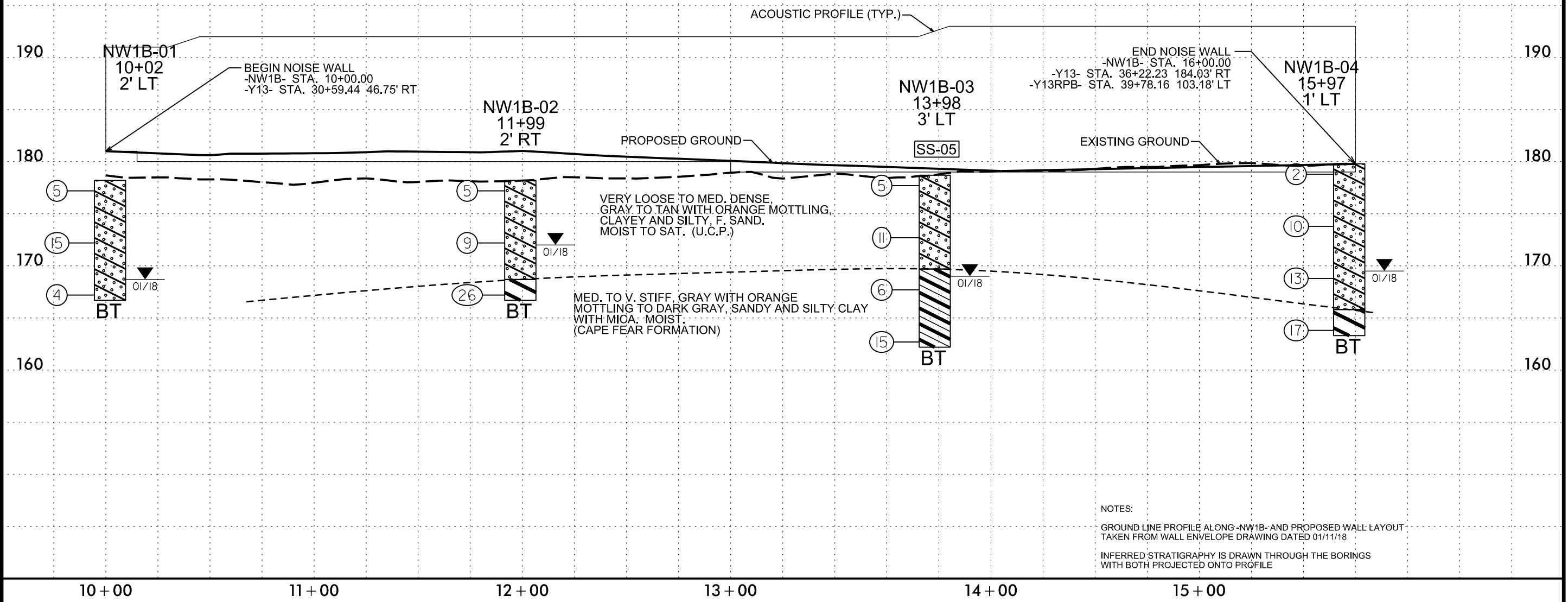
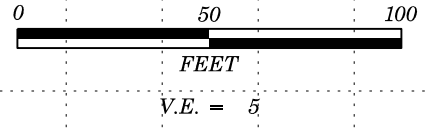
5/14/99

NW1B



PROJECT REFERENCE NO. U-2519BA	SHEET NO. 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

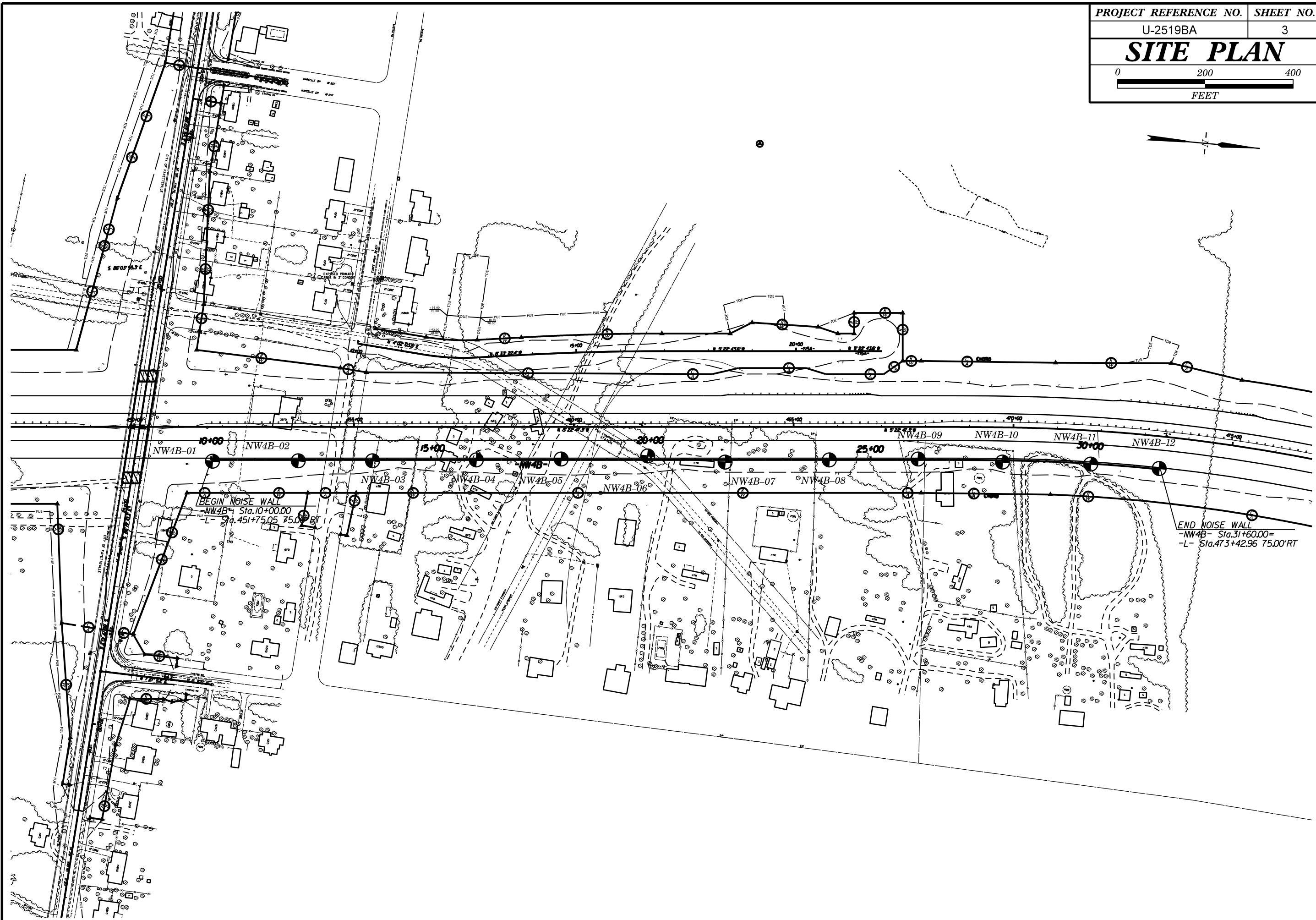
SAMPLE NUMBER	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P. I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-05	3 ft LT	13+98	5.0'-6.5'	A-2-7(3)	54	27	50.0	16.1	6.5	27.4	92.5	64	35	18	-



21-FEB-2018 08:53 S:\pml\g\PROJECT\2018\218005 NCDOT_U2519BA_FAYETTEVILLE-NOISE-WALLS_U2519BA_GEO_SWAL_CADD_GEO TECH\Plan\pof_U2519BA_Geo_pf1_NW1B.dgn

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

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, 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></p>										<p>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.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>										<p>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 (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. 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.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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SD.)</th> <th>FINE SAND (F SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> <tr> <td>GRAIN SIZE</td> <td>MM 305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> </tr> <tr> <td></td> <td>IN. 12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> </td> <td colspan="10"> <p>RECOMMENDATION SYMBOLS</p> <table border="1" style="width: 100%;"> <tr> <td>[Symbol]</td><td>UNDERCUT</td> <td>[Symbol]</td><td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td>[Symbol]</td><td>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</td> </tr> <tr> <td>[Symbol]</td><td>SHALLOW UNDERCUT</td> <td>[Symbol]</td><td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> <td></td><td></td> </tr> </table> </td> <td colspan="10"> <p>ABBREVIATIONS</p> <table border="1" style="width: 100%;"> <tr> <td>AR - AUGER REFUSAL</td> <td>CL - CLAY</td> <td>CPT - CLAY PENETRATION TEST</td> <td>CSE - COARSE</td> <td>DMT - DILATOMETER TEST</td> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>e - VOID RATIO</td> <td>F - FINE</td> <td>FOSS. - FOSSILIFEROUS</td> <td>FRAC. - FRACTURED, FRACTURES</td> <td>FRAGS. - FRAGMENTS</td> <td>HI. - HIGHLY</td> <td>MED. - MEDIUM</td> <td>MICA. - MICACEOUS</td> <td>MOD. - MODERATELY</td> <td>NP - NON PLASTIC</td> <td>ORG. - ORGANIC</td> <td>PMT - PRESSUREMETER TEST</td> <td>SAP. - SAPROLITIC</td> <td>SD. - SAND, SANDY</td> <td>SL. - SILT, SILTY</td> <td>SLI. - SLIGHTLY</td> <td>TCR - TRICONE REFUSAL</td> <td>w - MOISTURE CONTENT</td> <td>V - VERY</td> <td>VST - VANE SHEAR TEST</td> <td>WEA. - WEATHERED</td> <td>UNIT WEIGHT</td> <td>DRY UNIT WEIGHT</td> </tr> <tr> <td colspan="15"></td> <td colspan="10"> <p>SAMPLE ABBREVIATIONS</p> <p>S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p> </td> </tr> </table> </td> <td colspan="10"> <p>SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1" style="width: 100%;"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table> </td> <td colspan="10"> <p>EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1" style="width: 100%;"> <tr> <th>DRILL UNITS:</th> <th>ADVANCING TOOLS:</th> <th>HAMMER TYPE:</th> </tr> <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 type="checkbox"/> CME-55</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td></td> </tr> <tr> <td><input checked="" type="checkbox"/> CME-550</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td></td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td></td> </tr> <tr> <td></td> <td><input checked="" type="checkbox"/> TRICONE <input type="checkbox"/> 2 1/8" STEEL TEETH</td> <td></td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TRICONE <input type="checkbox"/> TUNG-CARB.</td> <td></td> </tr> <tr> <td></td> <td><input type="checkbox"/> CORE BIT</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table> </td> <td colspan="10"> <p>FRACATURE SPACING</p> <table border="1" style="width: 100%;"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table> </td> <td colspan="10"> <p>BEDDING</p> <table border="1" style="width: 100%;"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table> </td> <td colspan="10"> <p>INDURATION</p> <table border="1" style="width: 100%;"> <tr> <th>FRIBLE</th> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; 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SOFT	CAN BE GROOVED 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 FINGER NAIL.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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[Symbol]	SHALLOW UNDERCUT	[Symbol]	UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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<p>PLASTICITY</p> <table border="1" style="width: 100%;"> <tr> <th>NON PLASTIC</th> <th>SLIGHTLY PLASTIC</th> <th>MODERATELY PLASTIC</th> <th>HIGHLY PLASTIC</th> </tr> <tr> <td>PLASTICITY INDEX (PI)</td> <td>0-5</td> <td>6-15</td> <td>16-25</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>VERY LOW</td> <td>SLIGHT</td> </tr> <tr> <td></td> <td></td> <td>MEDIUM</td> <td>HIGH</td> </tr> </table>										NON PLASTIC	SLIGHTLY PLASTIC	MODERATELY PLASTIC	HIGHLY PLASTIC	PLASTICITY INDEX (PI)	0-5	6-15	16-25		26 OR MORE					VERY LOW	SLIGHT			MEDIUM	HIGH	<p>COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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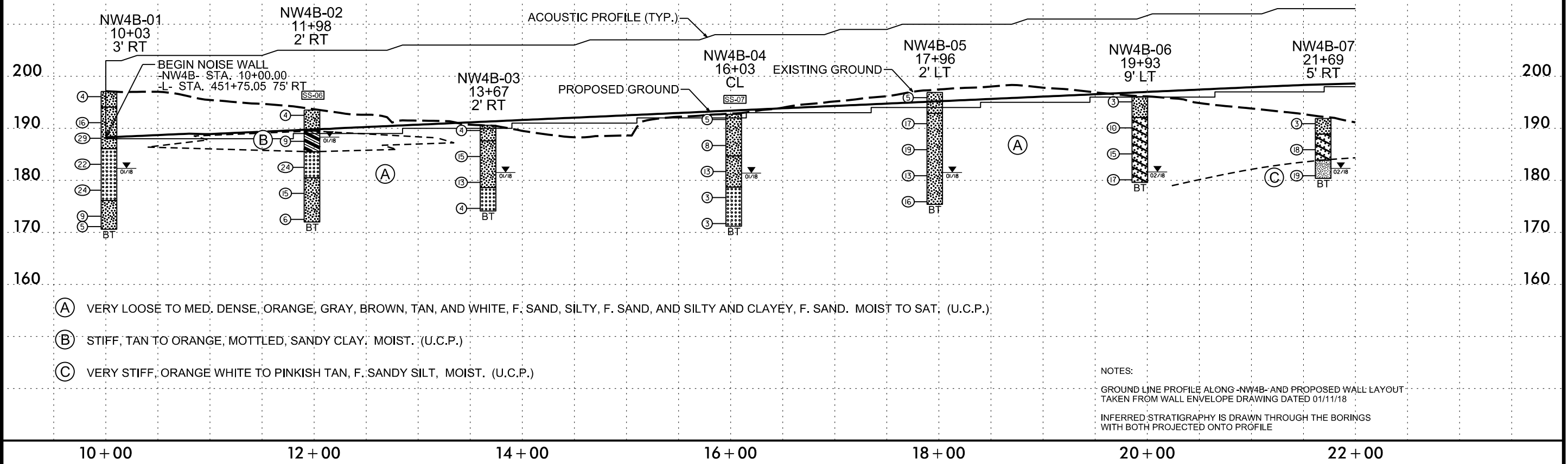
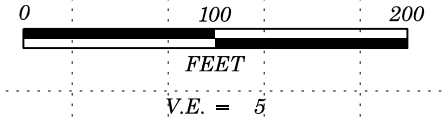
5/14/99

NW4B



PROJECT REFERENCE NO. U-2519BA	SHEET NO. 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

SAMPLE NUMBER	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-06	2 ft RT	11+98	5.0 - 6.5	A-6(3)	31	15	9.3	55.9	9.7	25.1	100	95	44	-	-
SS-07	CL	16+03	15.0 - 16.5	A-3(0)	19	NP	45.5	46.5	2.4	5.6	79.8	63	9	-	-



21-FEB-2018 08:54 S:\pml\g\PROJECT\2018\218005 NCDOT_U2519BA_A_FAYETTEVILLE-NOISE-WALLS_U2519BA_GEO_SWAL_CADD_GEO TECH\Plan\Prof\U2519BA_Geo_pf1_NW4B_01.dgn

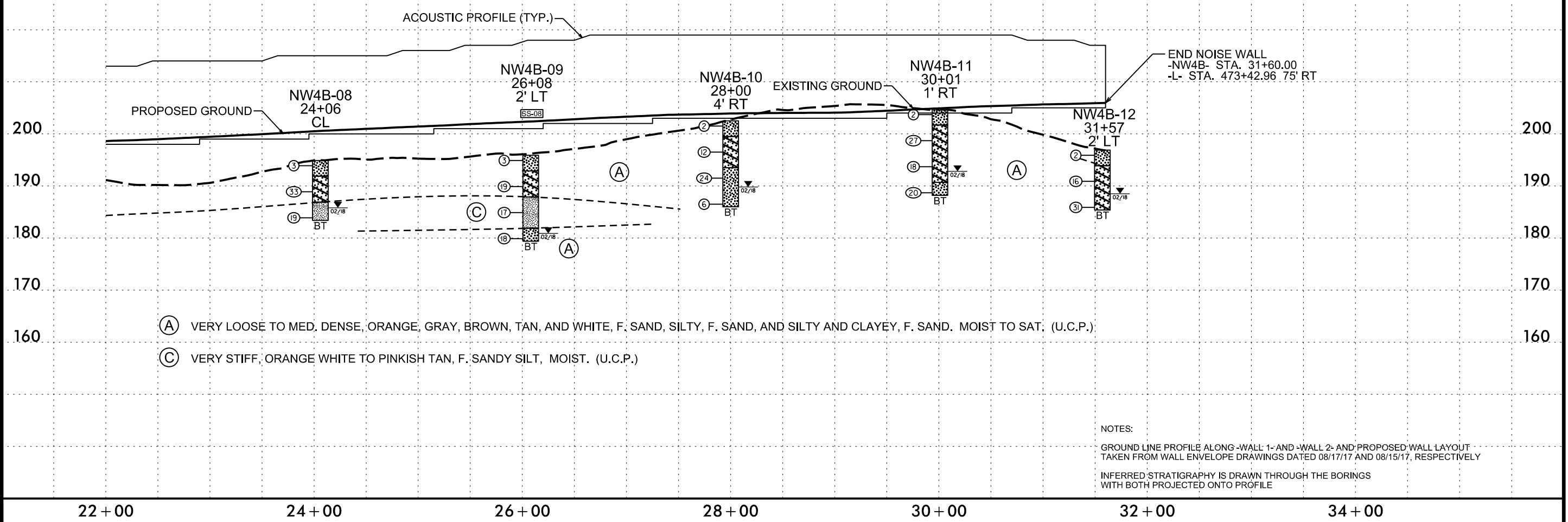
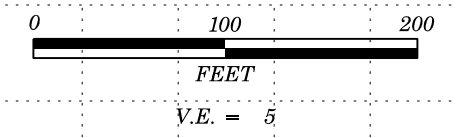
5/14/99

NW4B



PROJECT REFERENCE NO. <i>U-2519BA</i>	SHEET NO. 5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

SAMPLE NUMBER	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-08	2 ft LT	26+08	10.0 - 11.5	A-4(0)	16	NP	10.8	56.4	14.9	17.9	99.6	94	43	-	-



21-FEB-2018 08:54 S:\p\mk\g\PROJECT\2018\218005 NCDOT_U2519BA_FAYETTEVILLE-NOISE-WALLS_U2519BA_GEO_SWAL\CADD_GEO\TECH\Plan\Prof_U2519BA_Geo_pf1_NW4B.dgn

REFERENCE: U-2519BA

PROJECT: 34817

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE WITH SOIL TEST RESULTS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CUMBERLAND
 PROJECT DESCRIPTION FAYETTEVILLE OUTER LOOP
FROM SOUTH OF SR 1033 (CAMDEN RD) TO
SOUTH OF SR 1104 (STRICKLAND BRIDGE RD)
 SITE DESCRIPTION NOISE WALL NW5 RIGHT OF
-L- 505 + 40 TO 516 + 66

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2519BA	1	4

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 T07-6850. 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

CHRIS ALEXANDER

MIKE D. MASON

T. SPENCER

INVESTIGATED BY STEVEN HUDSON

DRAWN BY STEVEN HUDSON

CHECKED BY J. LEE STONE, LG

SUBMITTED BY STEVEN HUDSON, LG

DATE FEBRUARY 2018



DocuSigned by:

Steve V Hudson 3/9/2018

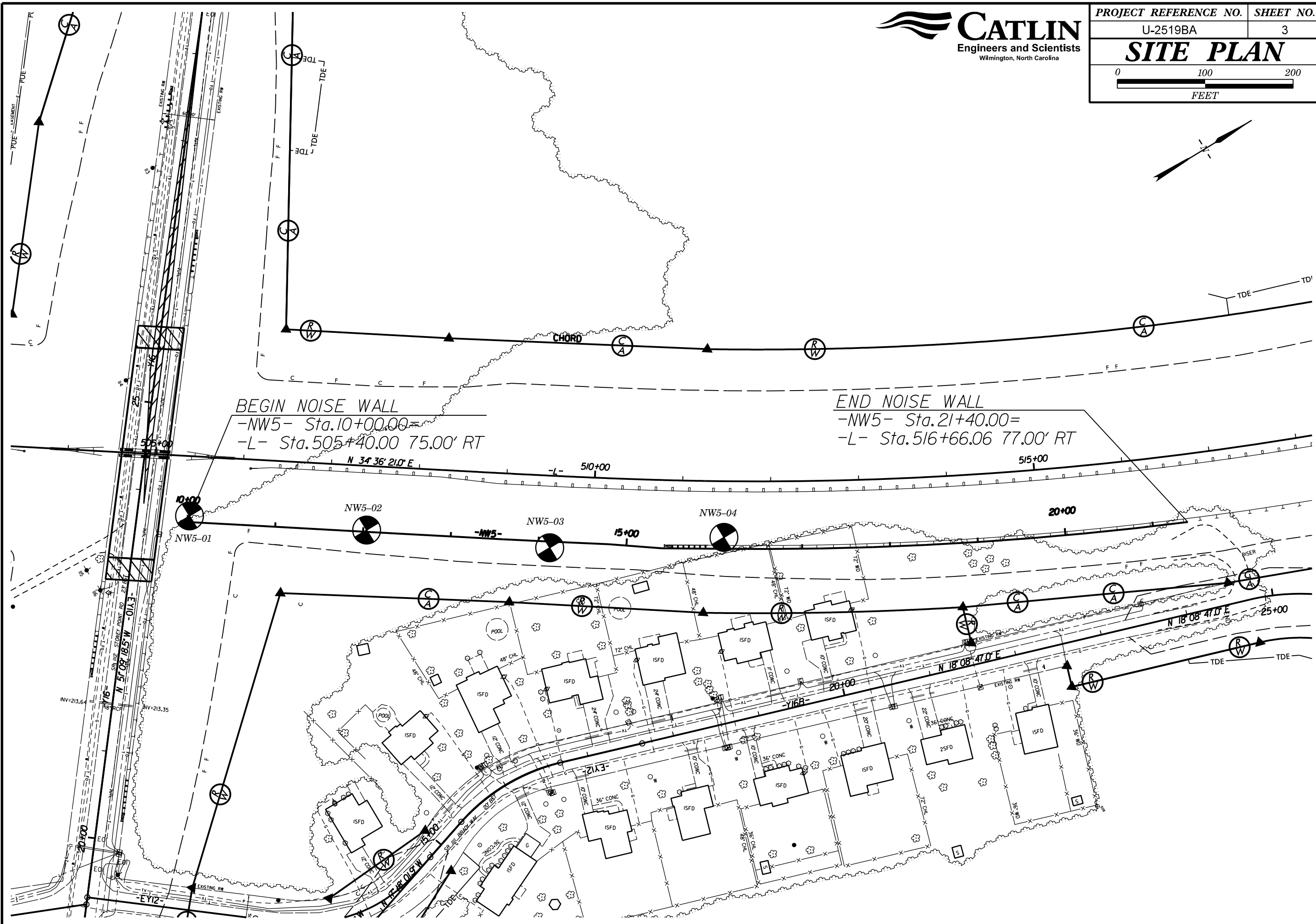
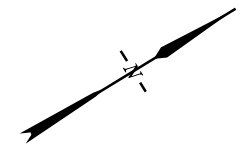
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**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

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																																																																																																																																																																												
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, 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></p>										<p>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.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>										<p>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.</p>																																																																																																																																																																												
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ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p style="text-align: center;">WEATHERING</p> <p>FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (IV 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.</p> <p>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.</p> <p>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.</p> <p>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></p> <p>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></p> <p>VERY SEVERE (IV 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></p> <p>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.</p>										<p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>										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
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<p style="text-align: center;">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE: RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED: GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED: GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED: SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p style="text-align: center;">NOTES:</p> <p>U.C.P. = UNDIVIDED COASTAL PLAIN</p>																																																																																																																																																																																																



BEGIN NOISE WALL
 -NW5- Sta. 10+00.00
 -L- Sta. 505+40.00 75.00' RT

END NOISE WALL
 -NW5- Sta. 21+40.00=
 -L- Sta. 516+66.06 77.00' RT

N 34° 36' 21.0" E -L- 510+00

515+00

NW5-01

NW5-02

NW5-03

NW5-04

20+00

N 18° 08' 47.0" E

N 18° 08' 47.0" E

INV=213.6

INV=213.35

EY12

EY12

Y16B

Y16B

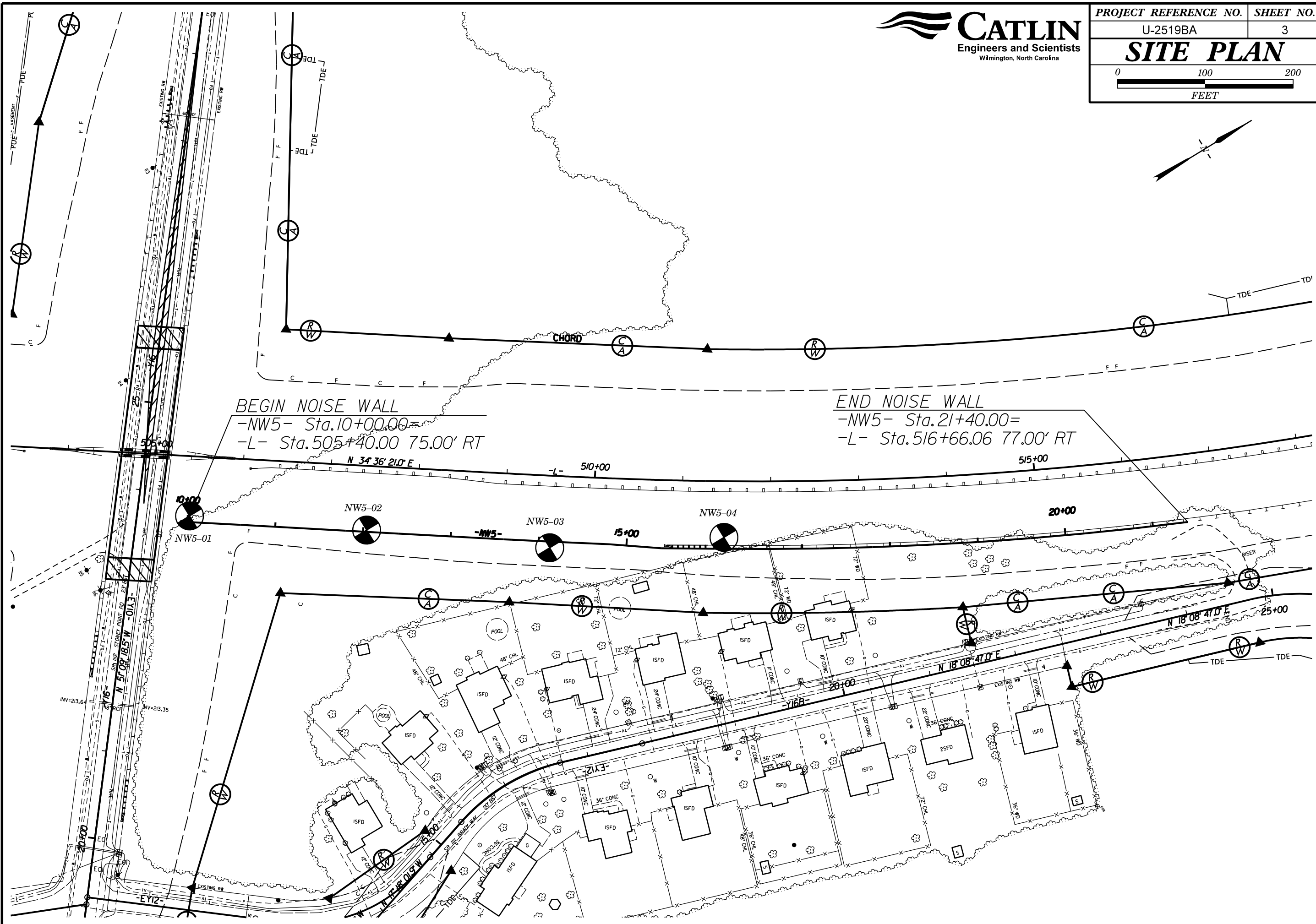
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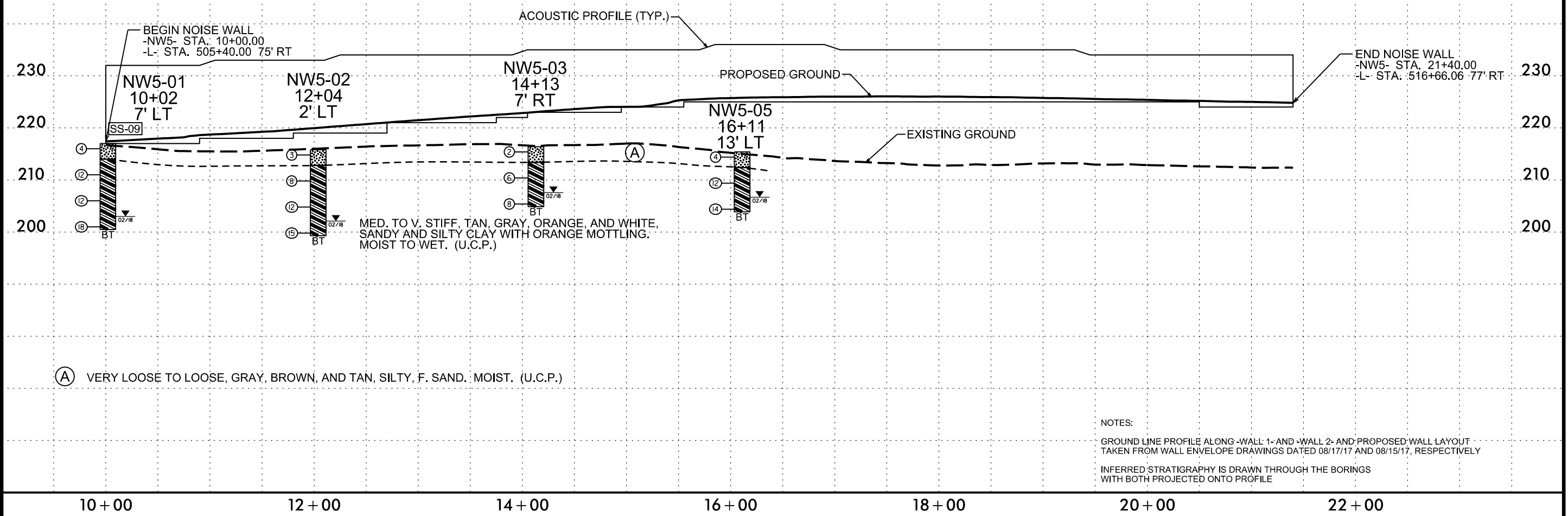
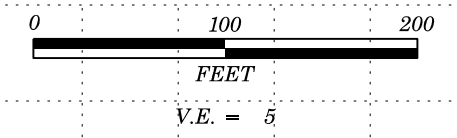
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NW5



PROJECT REFERENCE NO. U-2519BA	SHEET NO. 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

SAMPLE NUMBER	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-09	7 ft LT	10+02	10.0 - 11.5	A-6(5)	40	19	37.7	17.4	9.8	35.1	99.8	75	47	-	-



21-FEB-2018 08:58 S:\pml\g\PROJECT\2018\218005 NDDOT_U2519BA_FAYETTEVILLE-NOISE-WALLS\U2519BA_GEO_SWAL\CADD_GEO TECH\Plan\Prof\U2519BA_Geo_pf1_NW5.dgn