

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

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STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33767.1.1 (B-4555) F.A. PROJ. BRNHS-70(72)

COUNTY JOHNSTON

PROJECT DESCRIPTION _____

BRIDGE NO. 97 OVER NORFOLK SOUTHERN

RAILROAD ON US 70

SITE DESCRIPTION _____

BRIDGE INVESTIGATION AND INVENTORY REPORT

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) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THIS 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.

PERSONNEL

J. HAMM

T. EVANS

P. ZHANG

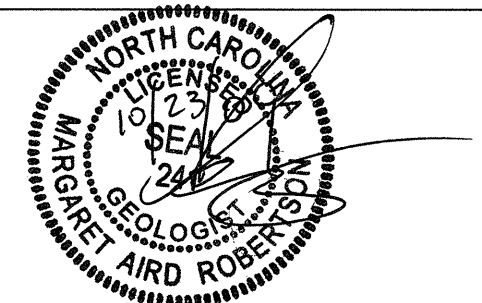
INVESTIGATED BY J. HAMM

CHECKED BY M. ROBERTSON

SUBMITTED BY FALCON

DATE 10/23/09

For Letting



PROJECT: 33767.1.1
ID: B-4555

DRAWN BY: J. HAMM

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

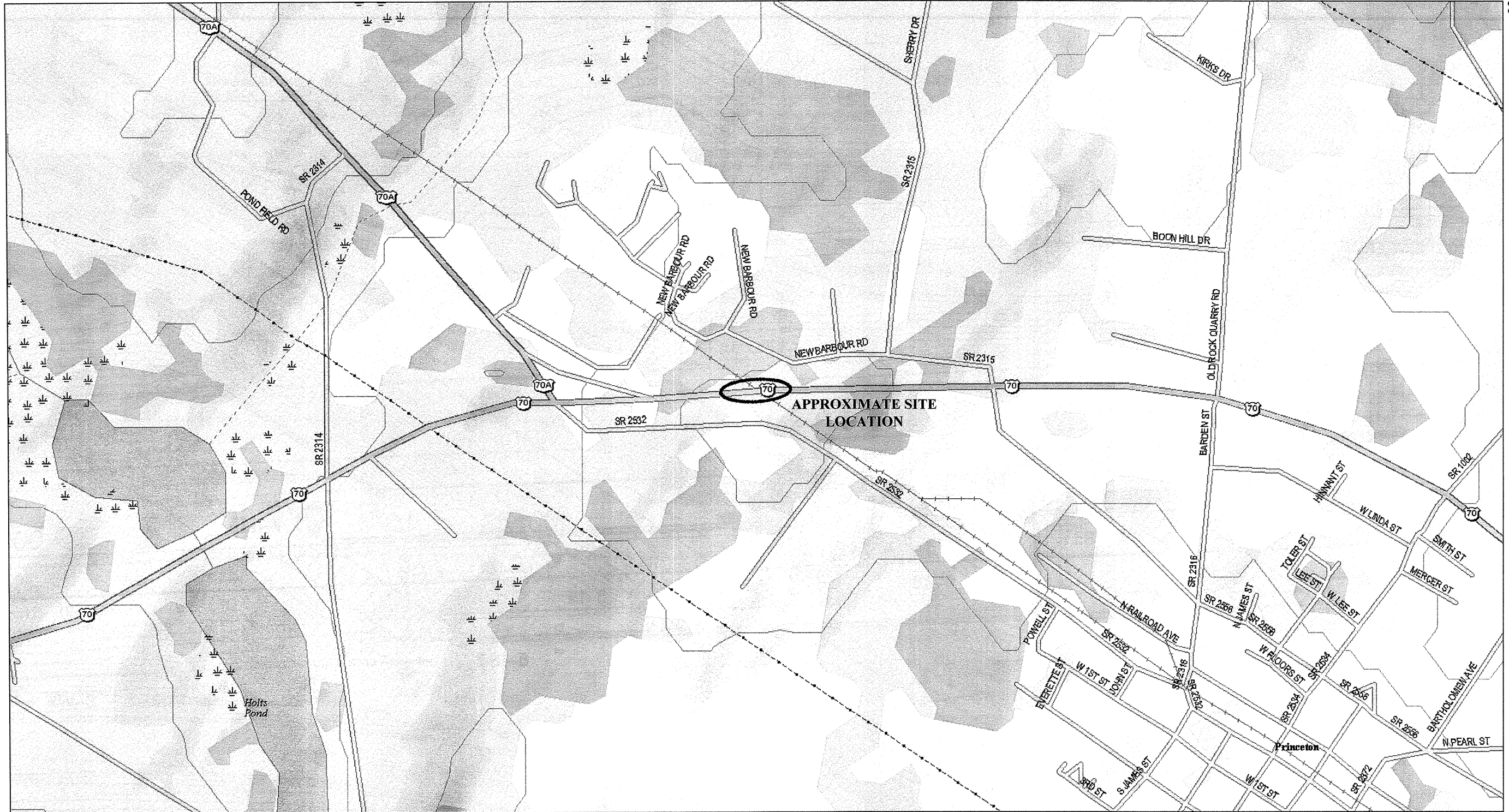
NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION

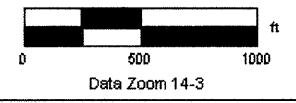
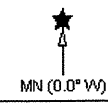
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| PROJECT REFERENCE NO. 33767.1.1(B-4555) | SHEET NO. 2 |
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SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

| SOIL DESCRIPTION | | GRADATION | | ROCK DESCRIPTION | | TERMS AND DEFINITIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|--|---|--|--|--|---|----------------|---|--|---|---|---|------------|--|---|---|---------|--|---------------|----------------|-------|-------|----------------------|---|--|-----|-----|-----|-----|-------|-------|----------|--|-----|----------|----------|--|--|--|--|--|--|--|--|--|
| <p>SOIL IS CONSIDERED TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p style="text-align: center;"><i>VERY STIFF, GRN. SILTY CLM. MOST 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. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p> | | <p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, 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, 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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SOIL LEGEND AND AASHTO CLASSIFICATION | | MINERALOGICAL COMPOSITION | | WEATHERING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">GENERAL CLASS.</th> <th colspan="2">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="2">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="2">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>SYMBOL</th> <th>A-1</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> </tr> <tr> <td>A-1-a</td> <td></td> <td>A-1-b</td> <td>A-2-1</td> <td>A-2-2</td> <td>A-2-3</td> <td>A-2-4</td> <td>A-2-5</td> </tr> <tr> <td>A-3</td> <td></td> <td>A-4</td> <td>A-5</td> <td>A-6</td> <td>A-7</td> <td>A-7-a</td> <td>A-7-b</td> </tr> <tr> <td>A-1, A-2</td> <td></td> <td>A-3</td> <td>A-4, A-5</td> <td>A-6, A-7</td> <td></td> <td></td> <td></td> </tr> </table> | | GENERAL CLASS. | | GRANULAR MATERIALS (≤ 35% PASSING #200) | | SILT-CLAY MATERIALS (> 35% PASSING #200) | | ORGANIC MATERIALS | | GROUP CLASS. | SYMBOL | A-1 | A-2 | A-4 | A-5 | A-6 | A-7 | A-1-a | | A-1-b | A-2-1 | A-2-2 | A-2-3 | A-2-4 | A-2-5 | A-3 | | A-4 | A-5 | A-6 | A-7 | A-7-a | A-7-b | A-1, A-2 | | A-3 | A-4, A-5 | A-6, A-7 | | | | <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;">COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p> | | <p>WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CPS) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p> | | | |
| GENERAL CLASS. | | GRANULAR MATERIALS (≤ 35% PASSING #200) | | SILT-CLAY MATERIALS (> 35% PASSING #200) | | ORGANIC MATERIALS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GROUP CLASS. | SYMBOL | A-1 | A-2 | A-4 | A-5 | A-6 | A-7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A-1-a | | A-1-b | A-2-1 | A-2-2 | A-2-3 | A-2-4 | A-2-5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A-3 | | A-4 | A-5 | A-6 | A-7 | A-7-a | A-7-b | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A-1, A-2 | | A-3 | A-4, A-5 | A-6, A-7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">PERCENTAGE OF MATERIAL</th> <th colspan="2">GROUND WATER</th> </tr> <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> | | PERCENTAGE OF MATERIAL | | GROUND WATER | | 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 | <p>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</p> | | | | | | | | | | | | | | | | | | | | | |
| PERCENTAGE OF MATERIAL | | GROUND WATER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CONSISTENCY OR DENSENESS | | MISCELLANEOUS SYMBOLS | | ROCK HARDNESS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <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-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td><4 4 TO 10 10 TO 30 30 TO 50 >50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td><2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30</td> <td><0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4</td> </tr> </table> | | PRIMARY SOIL TYPE | COMPACTNESS OR CONSISTENCY | RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) | RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | GENERALLY GRANULAR MATERIAL (NON-COHESIVE) | VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE | <4 4 TO 10 10 TO 30 30 TO 50 >50 | N/A | GENERALLY SILT-CLAY MATERIAL (COHESIVE) | VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD | <2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30 | <0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4 | <p>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 SOUNDING ROD</p> <p>SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL</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. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TEXTURE OR GRAIN SIZE | | ABBREVIATIONS | | FRACTURE SPACING | | BEDDING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <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> </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 | <p>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</p> <p>HL - 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</p> <p>w - MOISTURE CONTENT v - VERY VST - VANE SHEAR TEST WEA. - WEATHERED γ_u - UNIT WEIGHT γ_d - DRY UNIT WEIGHT</p> | | <p>VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET</p> | | <p>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</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SOIL MOISTURE - CORRELATION OF TERMS | | EQUIPMENT USED ON SUBJECT PROJECT | | INDURATION | | NOTES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <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 PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT</td> <td>- SATURATED - (SAT.) - WET - (W) - MOIST - (M) - DRY - (D)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE SOLID; AT OR NEAR OPTIMUM MOISTURE REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table> | | SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT | - SATURATED - (SAT.) - WET - (W) - MOIST - (M) - DRY - (D) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE SOLID; AT OR NEAR OPTIMUM MOISTURE REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | <p>DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> CME-45</p> <p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING w/ ADVANCER <input checked="" type="checkbox"/> TRICONE 3" STEEL TEETH <input type="checkbox"/> TRICONE " TUNG-CARB. <input type="checkbox"/> CORE BIT <input checked="" type="checkbox"/> 4" DRAG BIT</p> <p>HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -N <input type="checkbox"/> -H</p> <p>HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</p> | | <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE 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: BM 3 -BL- STA. 14+73.85, 457.51' LT ELEVATION: 975.62 FT. NOTES: FIAD - BORING FILLED IN AFTER DRILLING 15° DOMINANT FOLIATION OF ROCK OUTCROP (STRIKE AND DIP)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT | - SATURATED - (SAT.) - WET - (W) - MOIST - (M) - DRY - (D) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE SOLID; AT OR NEAR OPTIMUM MOISTURE REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PLASTICITY | | COLOR | | FRAC. SPACING | | INDURATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NONPLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>LOW PLASTICITY</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MED. PLASTICITY</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGH PLASTICITY</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </table> | | NONPLASTIC | PLASTICITY INDEX (PI) | DRY STRENGTH | LOW PLASTICITY | 0-5 | VERY LOW | MED. PLASTICITY | 6-15 | SLIGHT | HIGH PLASTICITY | 16-25 | MEDIUM | | 26 OR MORE | HIGH | <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> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NONPLASTIC | PLASTICITY INDEX (PI) | DRY STRENGTH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LOW PLASTICITY | 0-5 | VERY LOW | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MED. PLASTICITY | 6-15 | SLIGHT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HIGH PLASTICITY | 16-25 | MEDIUM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 26 OR MORE | HIGH | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



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 www.delorme.com

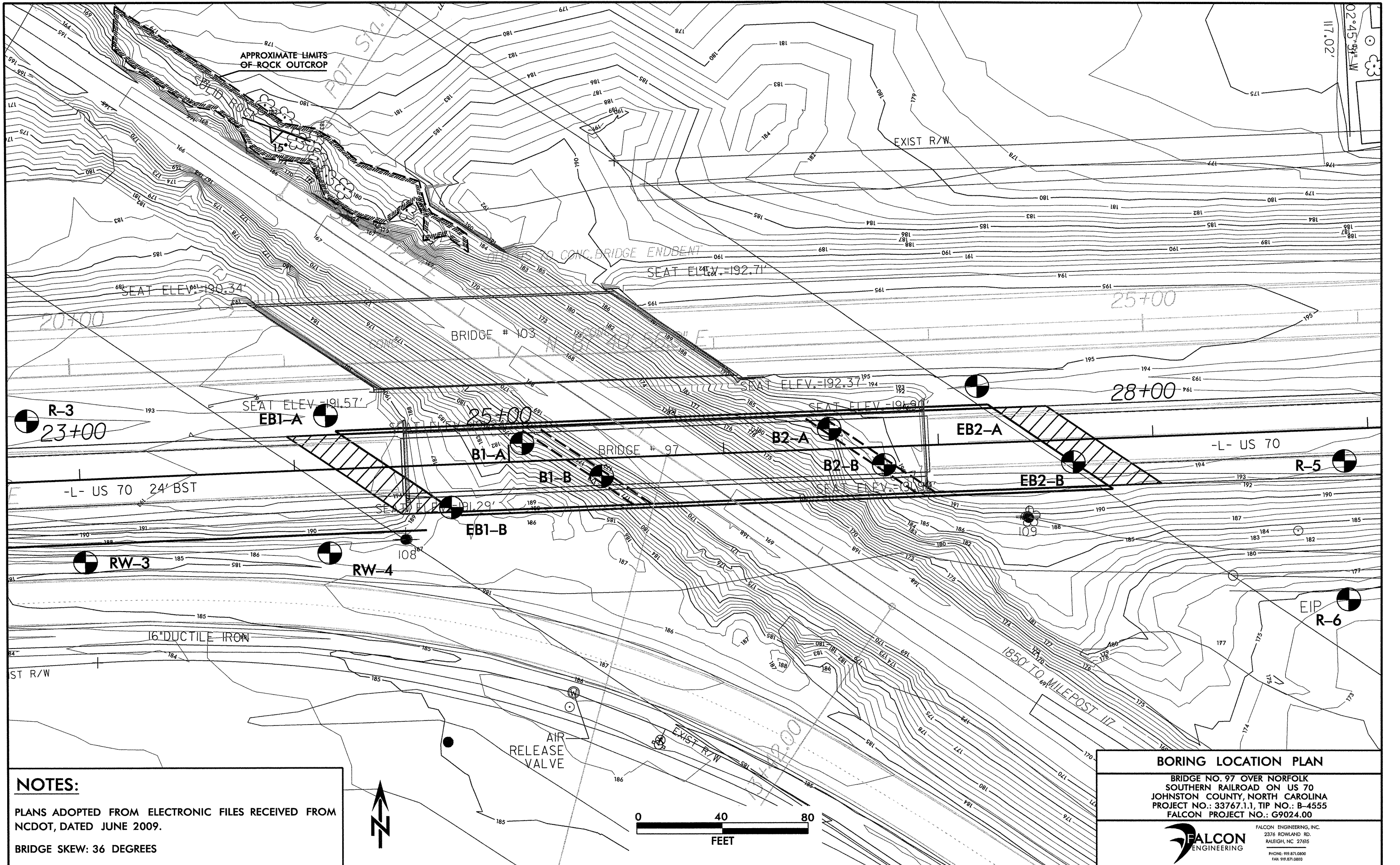


SITE VICINITY MAP

**BRIDGE NO. 97 OVER NORFOLK
 SOUTHERN RAILROAD ON US 70
 JOHNSTON COUNTY, NORTH CAROLINA
 TIP NO: B-4555, STATE PROJECT NO: 33767.1.1**



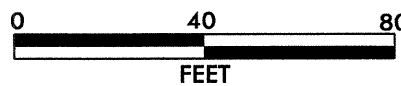
FALCON ENGINEERING, INC.
 2736 ROWLAND RD.
 RALEIGH, NC 27615
 PHONE (919) 871-0800
 FAX (919) 871-0803



NOTES:

PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED JUNE 2009.

BRIDGE SKEW: 36 DEGREES

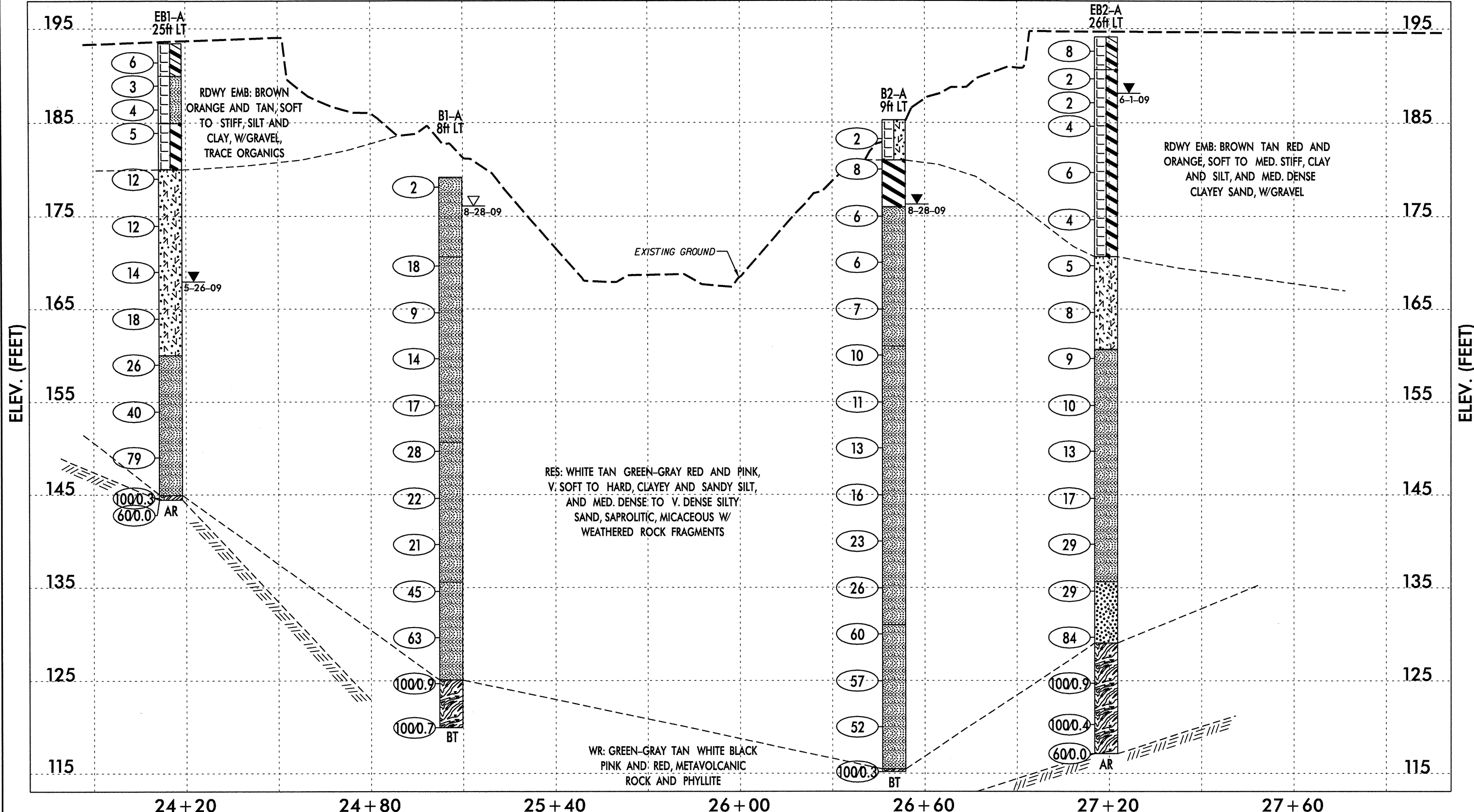


BORING LOCATION PLAN

BRIDGE NO. 97 OVER NORFOLK
 SOUTHERN RAILROAD ON US 70
 JOHNSTON COUNTY, NORTH CAROLINA
 PROJECT NO.: 33767.1.1, TIP NO.: B-4555
 FALCON PROJECT NO.: G9024.00

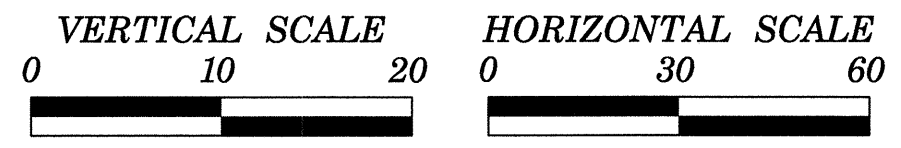


FALCON ENGINEERING, INC.
 2376 ROWLAND RD.
 RALEIGH, NC 27615
 PHONE: 919.871.0800
 FAX: 919.871.0809



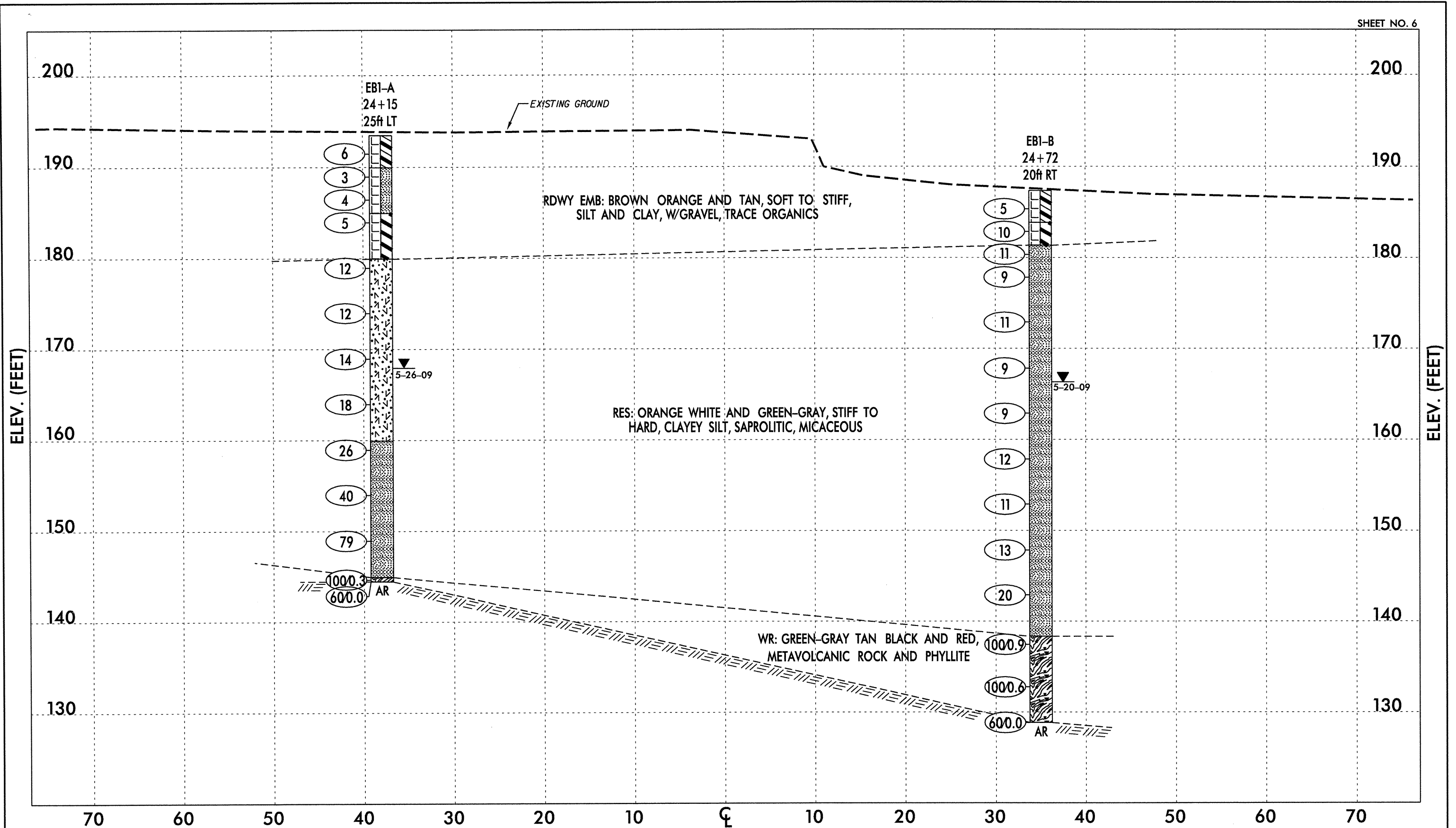
NOTES:

- GROUNDLINE PROFILE AT CL OF -L- TAKEN FROM ROADWAY DESIGN PLANS AS OF 6/23/09
- INFERRED LITHOLOGIC BOUNDARIES ARE DRAWN THROUGH BORINGS AND PROJECTED ONTO THE PROFILE

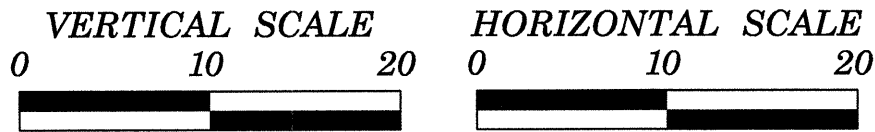


SUBSURFACE PROFILE ALONG CL OF -L-
 BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
 JOHNSTON COUNTY, NORTH CAROLINA
 PROJECT NO.: 33767.1.1, TIP NO.: B-4555
 FALCON PROJECT NO.: G9024.00

FALCON ENGINEERING, INC.
 1728 BOWLING BLVD.
 RALEIGH, NC 27605
 PHONE: 919.489.8800
 FAX: 919.489.8801



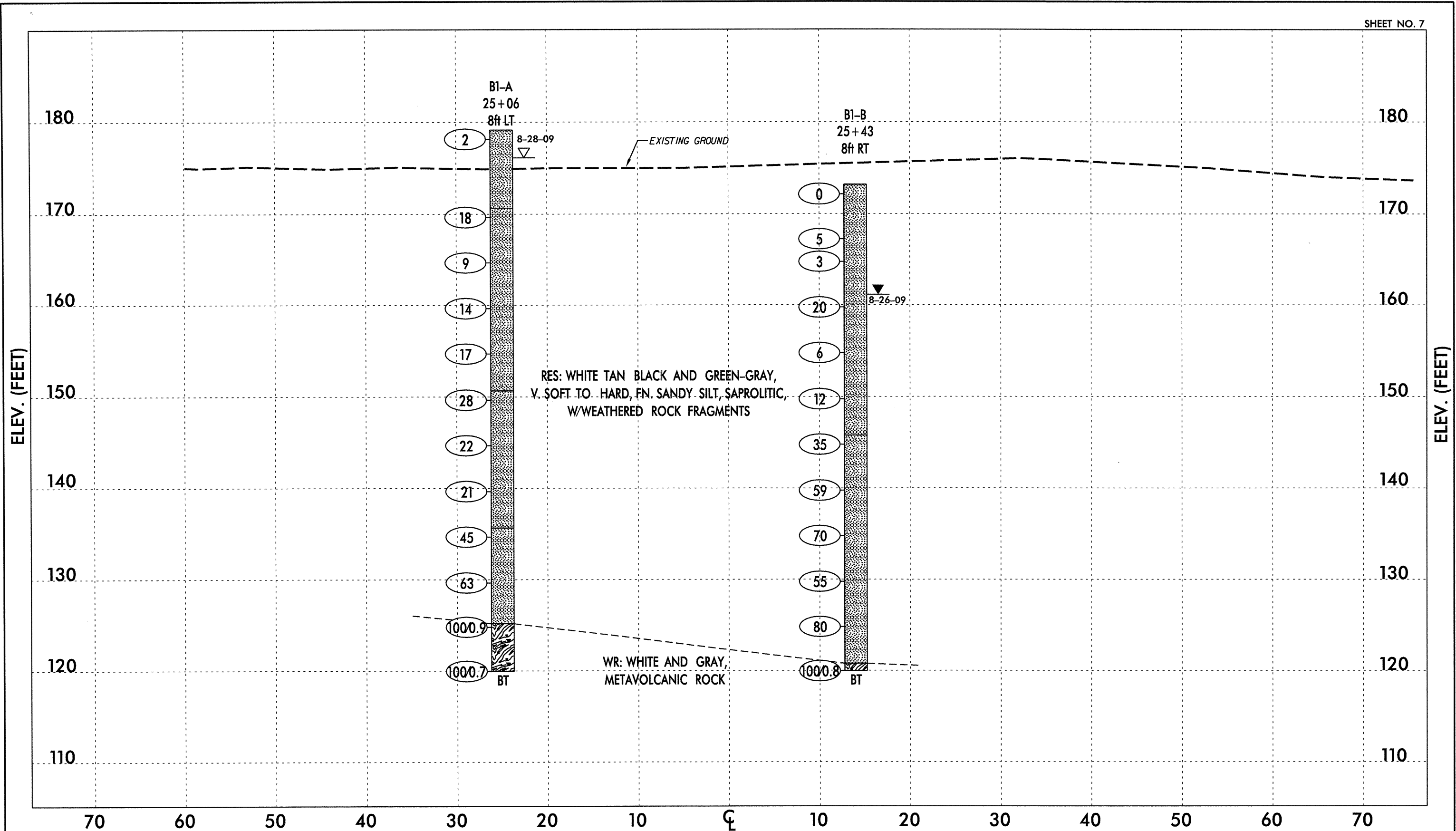
- NOTES:**
- GROUNDLINE ALONG BENT LINE TAKEN FROM ROADWAY DESIGN PLANS AS OF 6/23/09
 - INFERRED STRATIGRAPHY IS DRAWN AT THE BENT CL WITH THE BORINGS PROJECTED ONTO THE BENT LINE.
 - BRIDGE SKEW: 36 DEGREES



CROSS SECTION END BENT 1

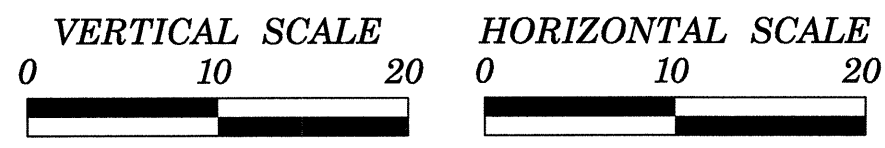
BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO.: 33767.1.1, TIP NO.: B-4555
FALCON PROJECT NO.: G9024.00

FALCON ENGINEERING
FALCON ENGINEERING, INC.
3724 SCHWAB DR.
RANDOLPH, NC 27858
PHONE: 919.486.8800
WWW.FALCON-ENG.COM



NOTES:

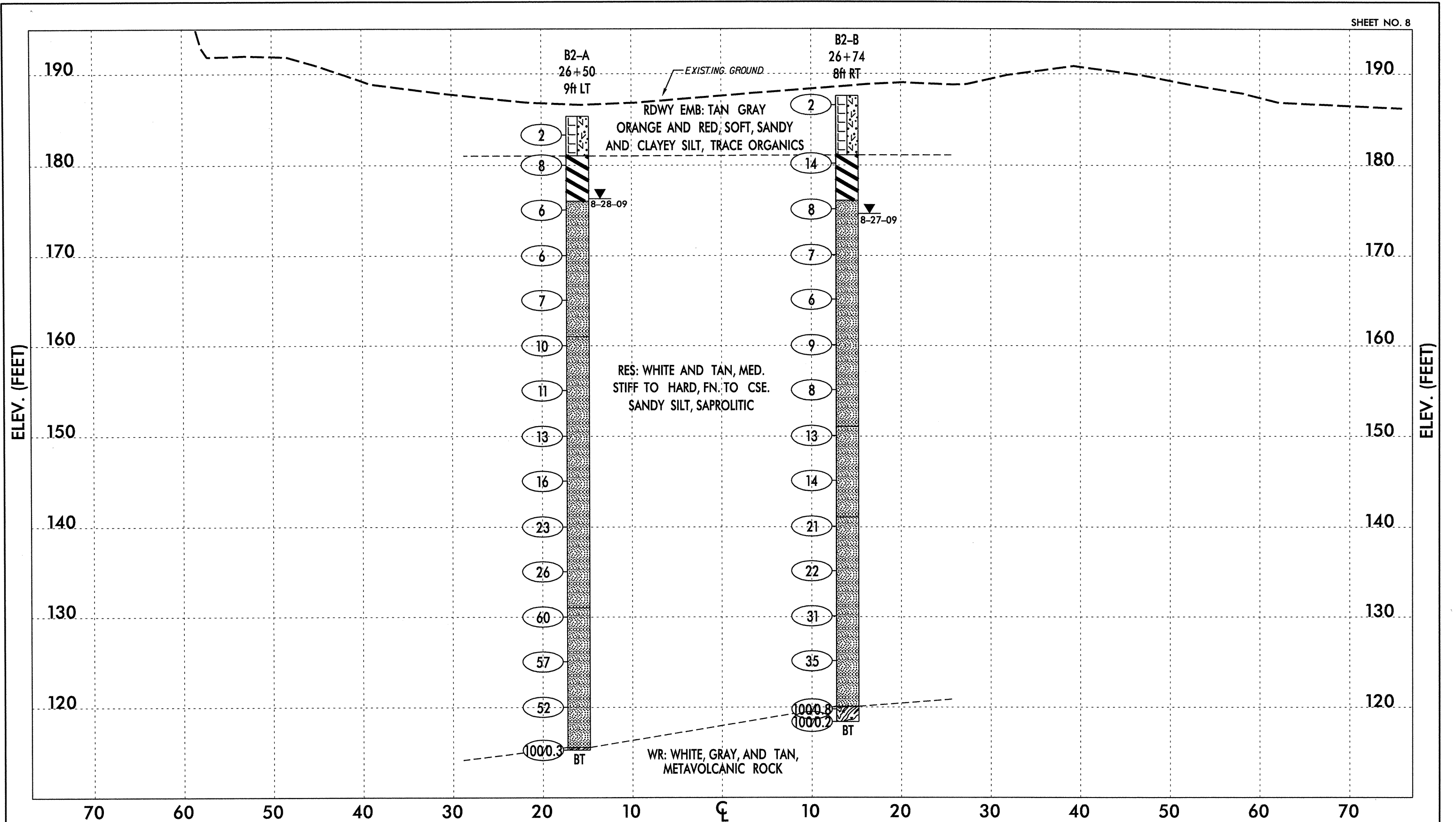
- GROUNDLINE ALONG BENT LINE TAKEN FROM ROADWAY DESIGN PLANS AS OF 6/23/09
- INFERRED STRATIGRAPHY IS DRAWN AT THE BENT CL WITH THE BORINGS PROJECTED ONTO THE BENT LINE.
- BRIDGE SKEW: 36 DEGREES



CROSS SECTION BENT 1

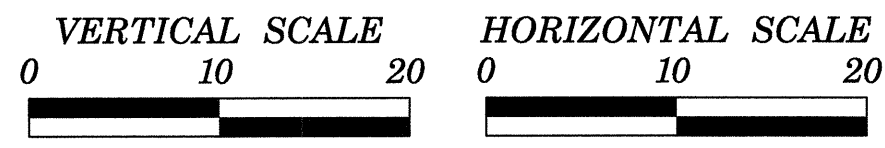
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JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO.: 33747.1.1, TIP NO.: B-4555
FALCON PROJECT NO.: G9024.00

FALCON ENGINEERING, INC.
STATE LICENSE NO. 1000000000
NORTH CAROLINA LICENSE NO. 1000000000



NOTES:

- GROUNDLINE ALONG BENT LINE TAKEN FROM ROADWAY DESIGN PLANS AS OF 6/23/09
- INFERRED STRATIGRAPHY IS DRAWN AT THE BENT CL WITH THE BORINGS PROJECTED ONTO THE BENT LINE.
- BRIDGE SKEW: 36 DEGREES

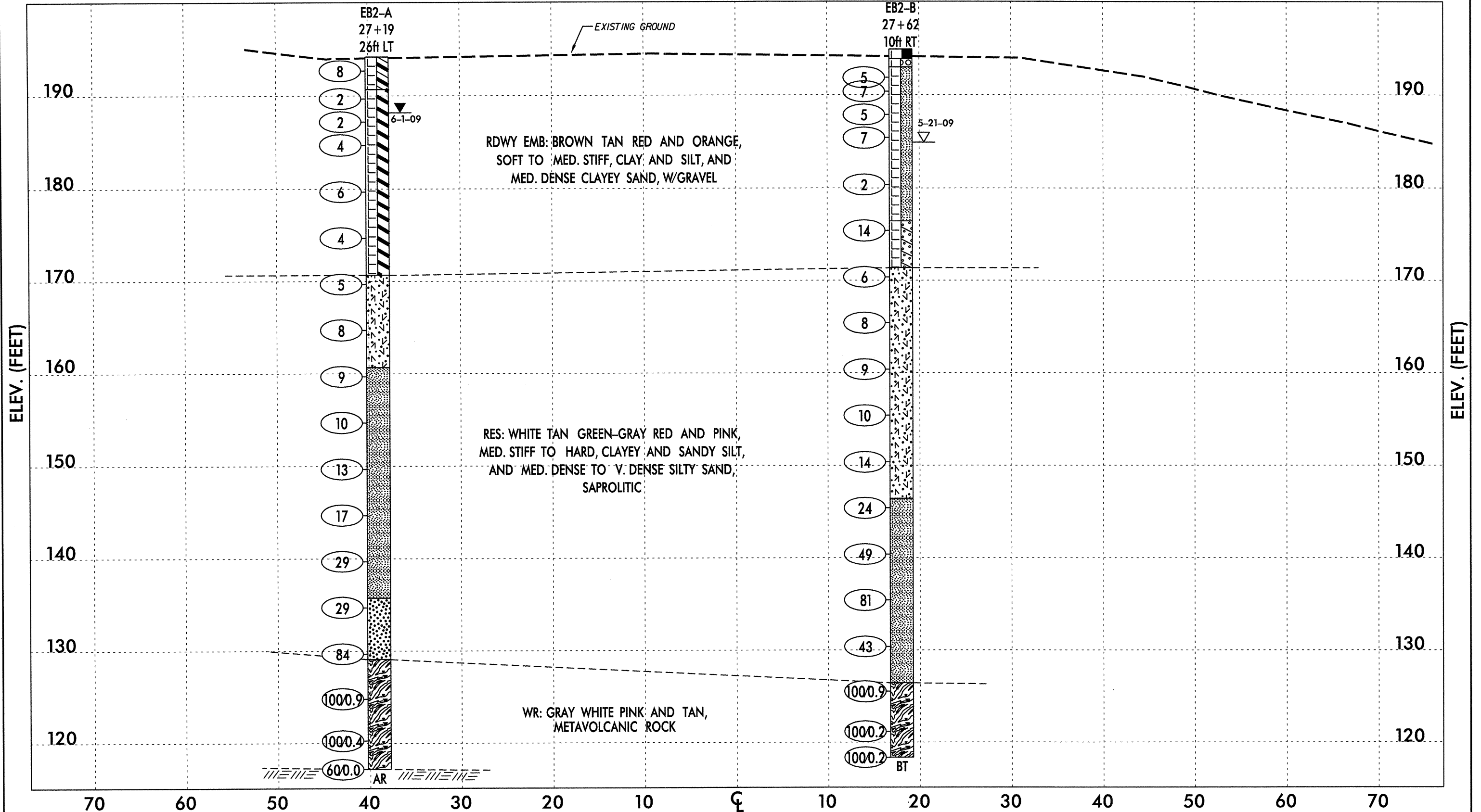


CROSS SECTION BENT 2

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO.: 33767.1.1, TIP NO.: B-4555
FALCON PROJECT NO.: G9024.00

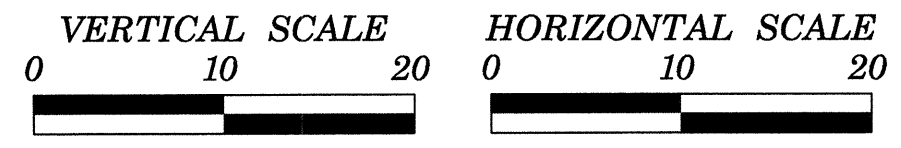
FALCON ENGINEERING

FALCON ENGINEERING, INC.
3704 SCHWAB RD.
RALEIGH, NC 27609
PHONE: 919.876.0000
WWW.FALCON-ENG.COM



NOTES:

- GROUNDLINE ALONG BENT LINE TAKEN FROM ROADWAY DESIGN PLANS AS OF 6/23/09
- INFERRED STRATIGRAPHY IS DRAWN AT THE BENT CL WITH THE BORINGS PROJECTED ONTO THE BENT LINE.
- BRIDGE SKEW: 36 DEGREES



CROSS SECTION END BENT 2

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
PROJECT NO.: 33767.1.1, TIP NO.: B-4555
FALCON PROJECT NO.: G9024.00

FALCON ENGINEERING
3336 RICHMOND RD.
RANDOLPH, NC 27155
PHONE: (704) 771-1111
FAX: (704) 771-1112

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

| | | | |
|--|-------------------------|-------------------------|-----------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. EB1-A | STATION 24+15 | OFFSET 25ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 193.5 ft | TOTAL DEPTH 49.0 ft | NORTHING 628,311 | EASTING 2,245,895 |
| DRILL MACHINE CME-45 | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic | |
| START DATE 05/22/09 | COMP. DATE 05/22/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK 49.0 ft |

| 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 | | | | |
| 195 | | | | | | | | | | | | | GROUND SURFACE | 0.0 |
| 192.5 | 190 | 1.0 | | | | | | | | | | | ROADWAY EMBANKMENT | |
| 190 | 190.0 | 3.5 | 2 | 3 | 3 | | | | | | | | BROWN, MED. STIFF, SANDY CLAY (A-6) | 3.5 |
| 187.5 | 185 | 6.0 | 1 | 1 | 2 | | | | | | | | TRACE ORGANICS | |
| 185 | 185.0 | 8.5 | 1 | 2 | 2 | | | | | | | | ORANGE AND TAN, SOFT, CLAYEY FN. SANDY SILT (A-4) | 8.5 |
| 180 | 180.0 | 13.5 | 2 | 3 | 2 | | | | | | | | ORANGE, MED. STIFF, SILTY CLAY (A-7-5) | 13.5 |
| 175 | 175.0 | 18.5 | 3 | 4 | 8 | | | | | | | | RESIDUAL | |
| 170 | 170.0 | 23.5 | 4 | 5 | 7 | | | | | | | | ORANGE, WHITE, AND GREEN-GRAY, STIFF TO V. STIFF, CLAYEY SILT (A-5) | |
| 165 | 165.0 | 28.5 | 5 | 5 | 9 | | | | | | | | SAPROLITIC, MICACEOUS | |
| 160 | 160.0 | 33.5 | 3 | 7 | 11 | | | | | | | | | |
| 155 | 155.0 | 38.5 | 8 | 9 | 17 | | | | | | | | GREEN-GRAY, V. STIFF TO HARD, FN. SANDY SILT (A-4) SAPROLITIC, MICACEOUS | 33.5 |
| 150 | 150.0 | 43.5 | 9 | 16 | 24 | | | | | | | | | |
| 145 | 145.0 | 48.5 | 11 | 25 | 54 | | | | | | | | | |
| 144.5 | 144.5 | 49.0 | 100/0.3 | 60/0.0 | | | | | | | | | WEATHERED ROCK | 48.5 |
| 140 | | | | | | | | | | | | | GREEN-GRAY, PHYLLITE | 49.0 |
| 135 | | | | | | | | | | | | | Boring Terminated WITH TRICONE REFUSAL at Elevation 144.5 ft ON NCR: PHYLLITE | |

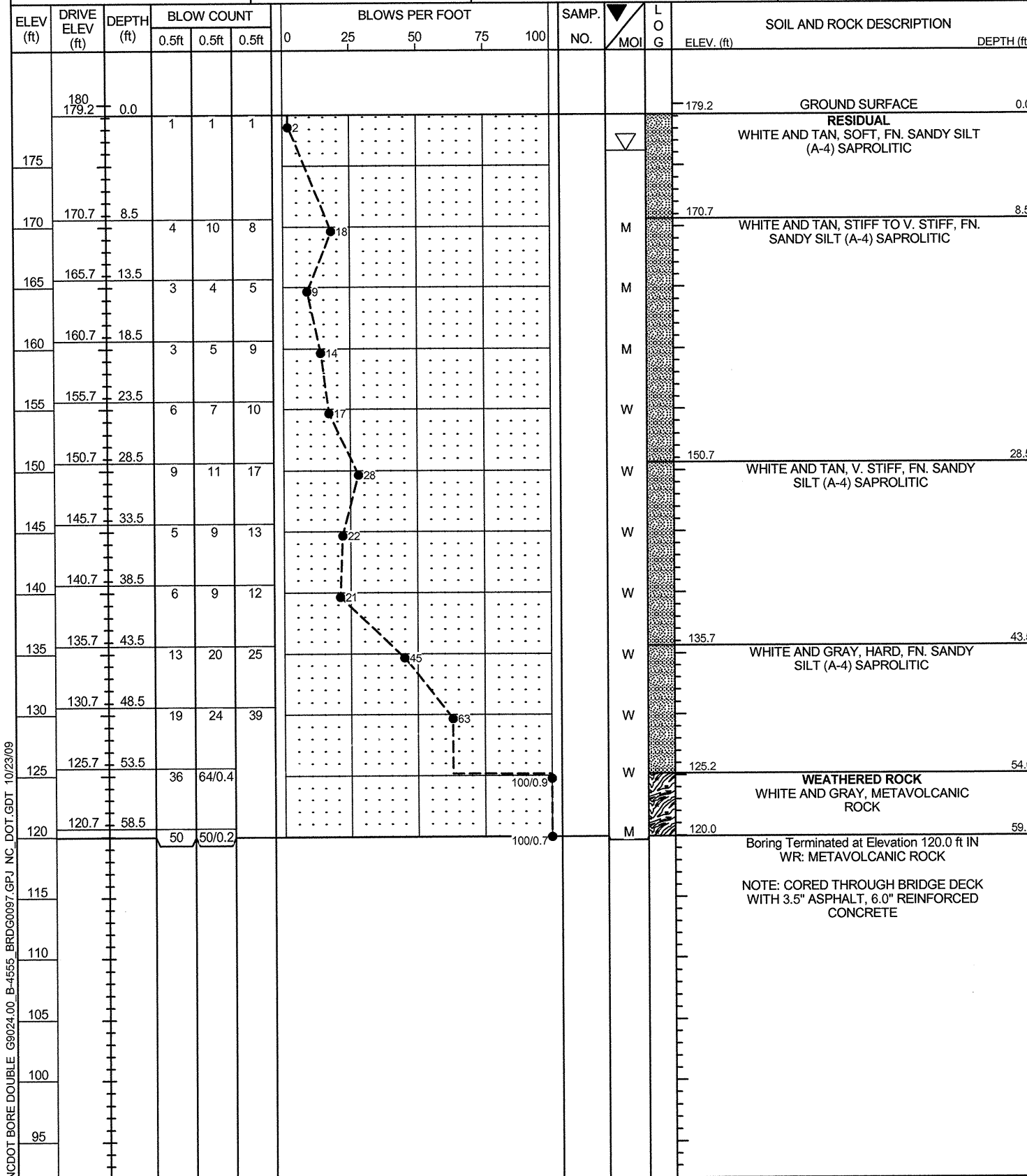
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|--|-------------------------|-------------------------|-----------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. EB1-B | STATION 24+72 | OFFSET 20ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 187.4 ft | TOTAL DEPTH 58.5 ft | NORTHING 628,268 | EASTING 2,245,954 |
| DRILL MACHINE CME-45 | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic | |
| START DATE 05/20/09 | COMP. DATE 05/20/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK 58.5 ft |

| 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 | | | | |
| 190 | | | | | | | | | | | | | GROUND SURFACE | 0.0 |
| 186.4 | 185 | 1.0 | | | | | | | | | | | ROADWAY EMBANKMENT | |
| 183.9 | 185 | 3.5 | 1 | 2 | 3 | | | | | | | | BROWN AND TAN, MED. STIFF, SANDY CLAY (A-6) W/ GRAVEL, TRACE ORGANICS | 3.5 |
| 181.4 | 180 | 6.0 | 2 | 4 | 6 | | | | | | | | ORANGE, STIFF, CLAYEY SILT (A-7-5) | 6.0 |
| 178.9 | 180 | 8.5 | 3 | 5 | 6 | | | | | | | | TRACE ORGANICS | |
| 175 | 175.0 | 13.5 | 4 | 4 | 5 | | | | | | | | RESIDUAL | |
| 170 | 170.0 | 18.5 | 4 | 5 | 6 | | | | | | | | ORANGE, WHITE, AND GRAY, STIFF TO V. STIFF, CLAYEY SILT (A-4) SAPROLITIC | |
| 165 | 165.0 | 23.5 | 3 | 4 | 5 | | | | | | | | | |
| 160 | 160.0 | 28.5 | 3 | 3 | 6 | | | | | | | | | |
| 155 | 155.0 | 33.5 | 3 | 5 | 7 | | | | | | | | | |
| 150 | 150.0 | 38.5 | 3 | 5 | 6 | | | | | | | | | |
| 145 | 145.0 | 43.5 | 3 | 5 | 8 | | | | | | | | | |
| 140 | 140.0 | 48.5 | 6 | 8 | 12 | | | | | | | | | |
| 138.9 | 138.9 | 49.0 | 18 | 45 | 55/0.4 | | | | | | | | WEATHERED ROCK | 49.0 |
| 135 | 135.0 | 53.5 | 12 | 45 | 55/0.1 | | | | | | | | GREEN-GRAY, TAN, BLACK, AND RED, METAVOLCANIC ROCK | |
| 130 | 130.0 | 58.5 | 60/0.0 | | | | | | | | | | Boring Terminated WITH TRICONE REFUSAL at Elevation 128.9 ft ON CR: METAVOLCANIC ROCK | 58.5 |

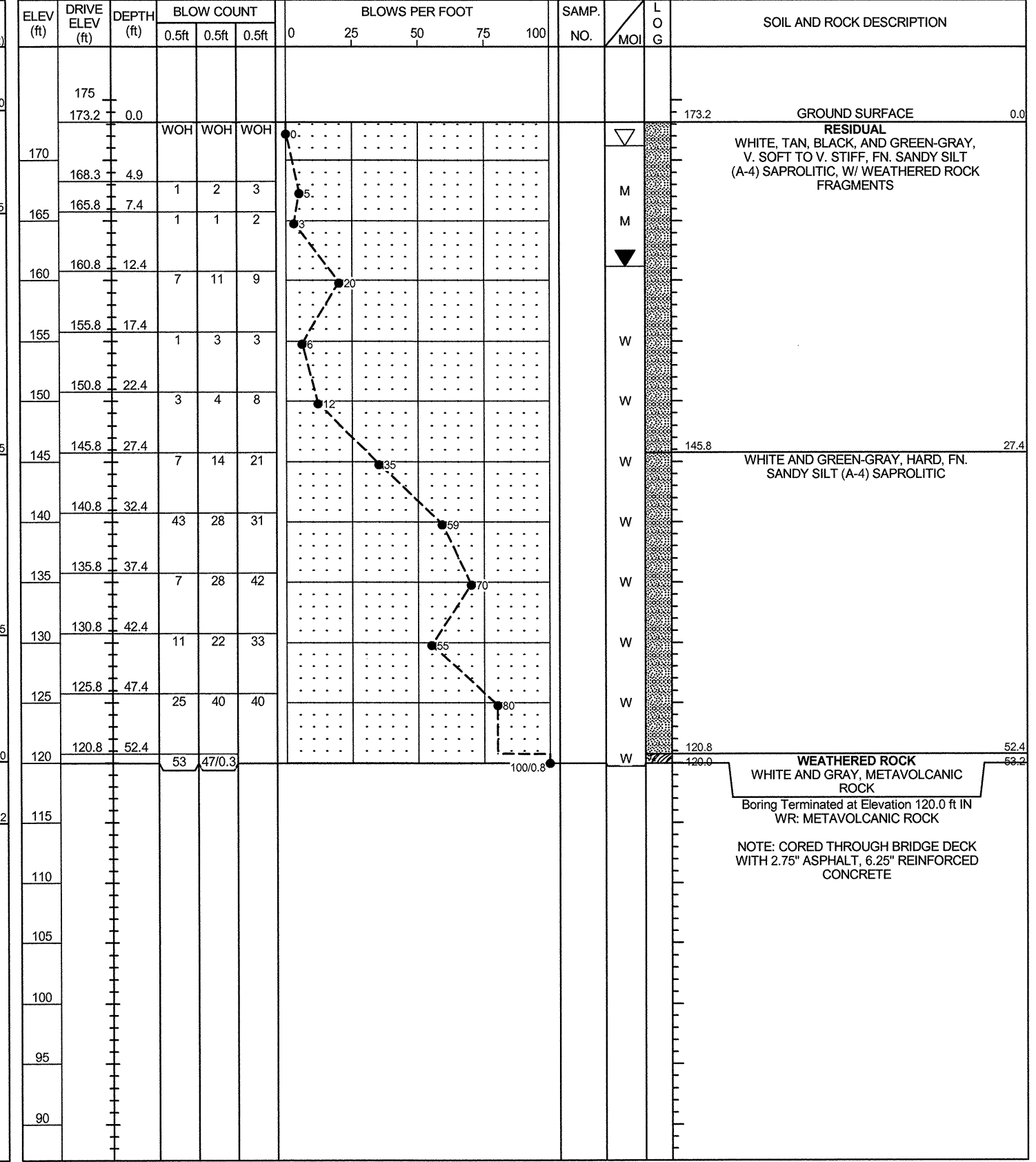
NCDOT BORE DOUBLE G9024.00 B-4555 BRDG0097.GPJ NC_DOT_GDT 10/23/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

| | | | |
|--|-------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. B1-A | STATION 25+06 | OFFSET 8ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 179.2 ft | TOTAL DEPTH 59.2 ft | NORTHING 628,298 | EASTING 2,245,986 |
| DRILL MACHINE CME-45 | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic | |
| START DATE 08/28/09 | COMP. DATE 08/28/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |



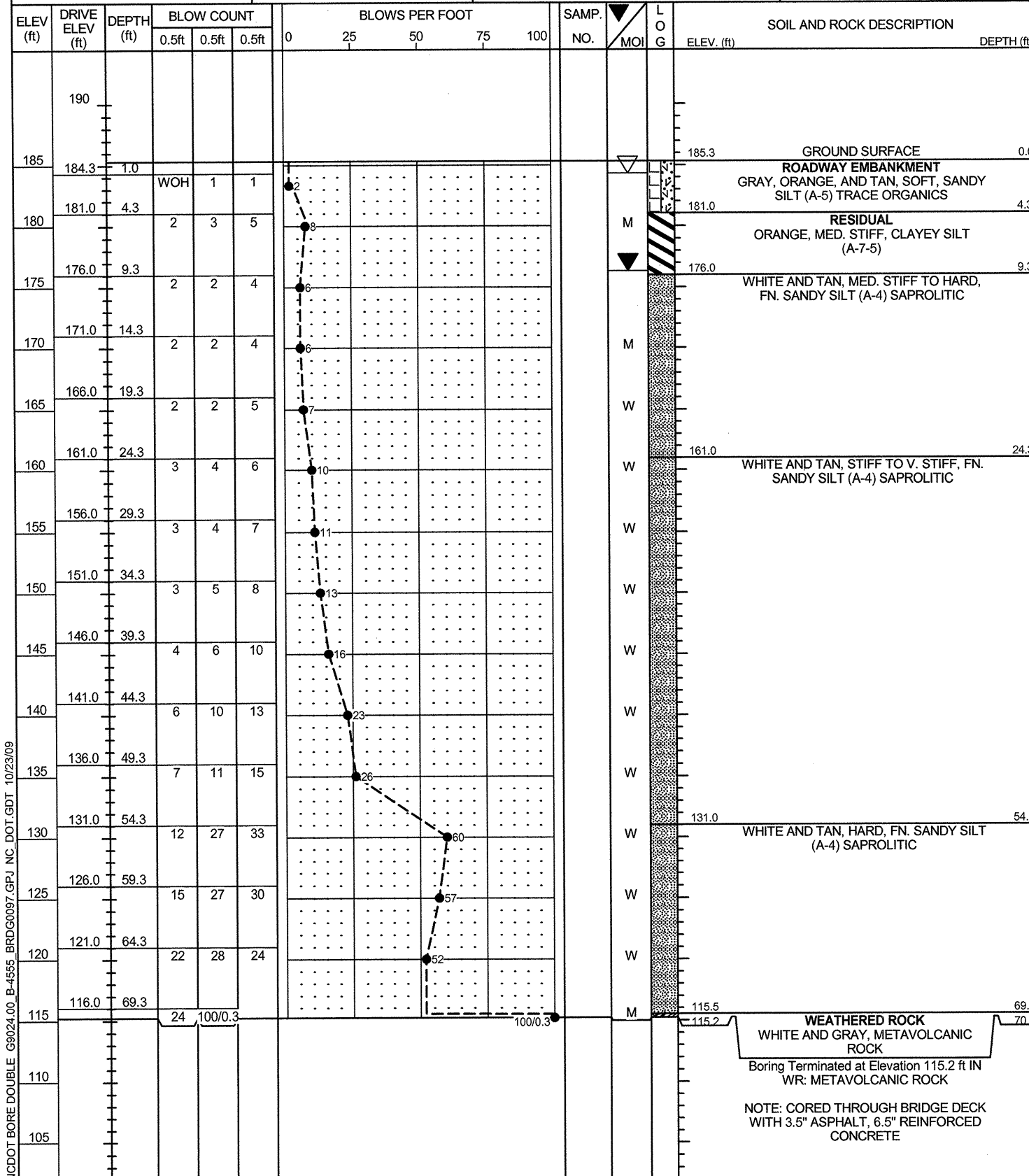
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|--|-------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. B1-B | STATION 25+43 | OFFSET 8ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 173.2 ft | TOTAL DEPTH 53.2 ft | NORTHING 628,283 | EASTING 2,246,023 |
| DRILL MACHINE CME-45 | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic | |
| START DATE 08/25/09 | COMP. DATE 08/25/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |



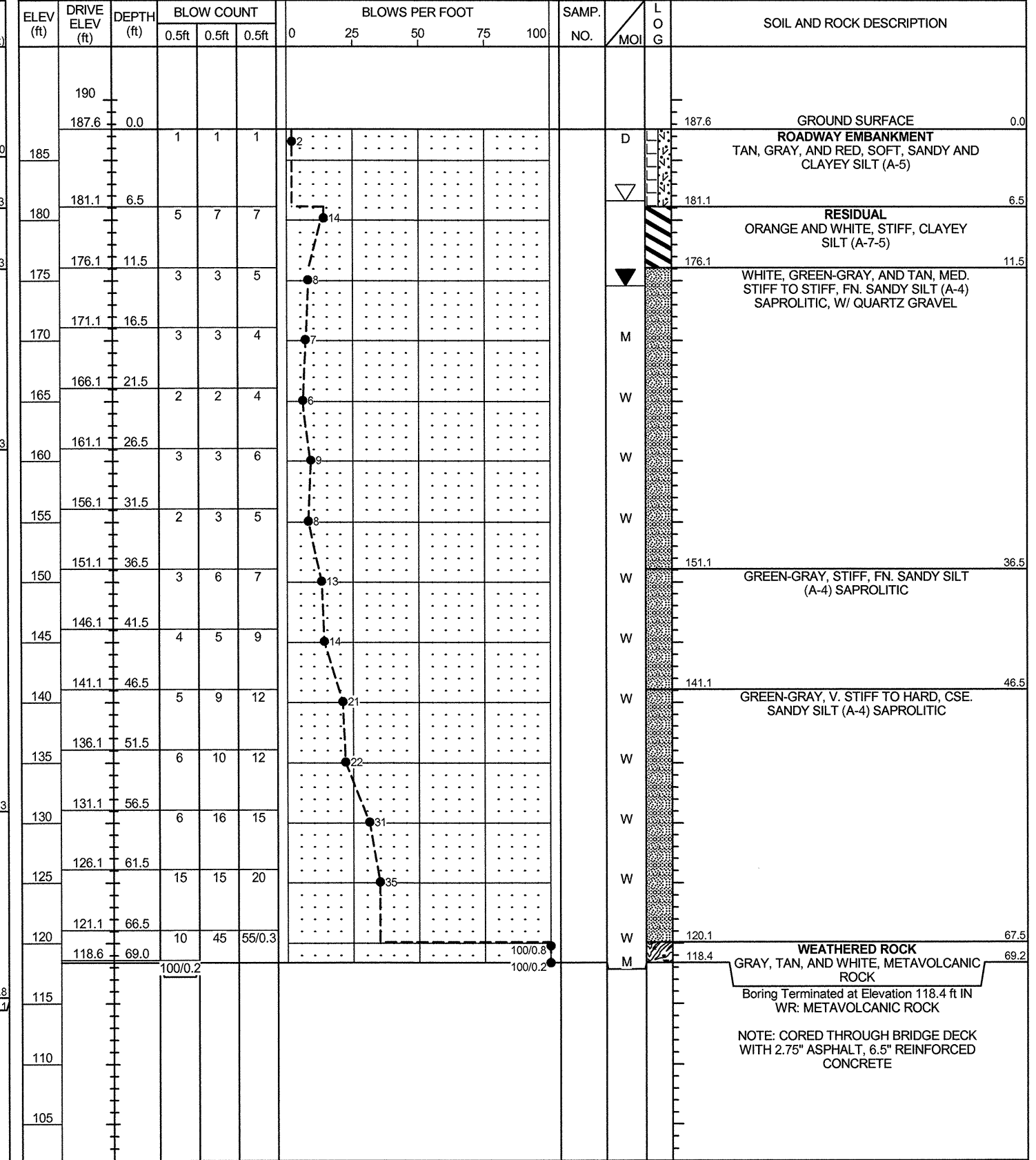
NCDOT BORE DOUBLE G9024.00_B-4555_BRDG0097.GPJ NC DOT.GDT 10/23/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

| | | | | | | | |
|--|---------------------|-------------------------|-------------------|-----------------------|--|-------------------|-----------------|
| PROJECT NO. 33767.1.1 | | ID. B-4555 | | COUNTY JOHNSTON | | GEOLOGIST J. HAMM | |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | | | | | GROUND WTR (ft) |
| BORING NO. B2-A | STATION 26+50 | OFFSET 9ft LT | ALIGNMENT -L- | 0 HR. 1.0 | | | |
| COLLAR ELEV. 185.3 ft | TOTAL DEPTH 70.1 ft | NORTHING 628,305 | EASTING 2,246,129 | 24 HR. 9.0 | | | |
| DRILL MACHINE CME-45 | | DRILL METHOD Mud Rotary | | HAMMER TYPE Automatic | | | |
| START DATE 08/27/09 | COMP. DATE 08/27/09 | SURFACE WATER DEPTH N/A | | DEPTH TO ROCK N/A | | | |



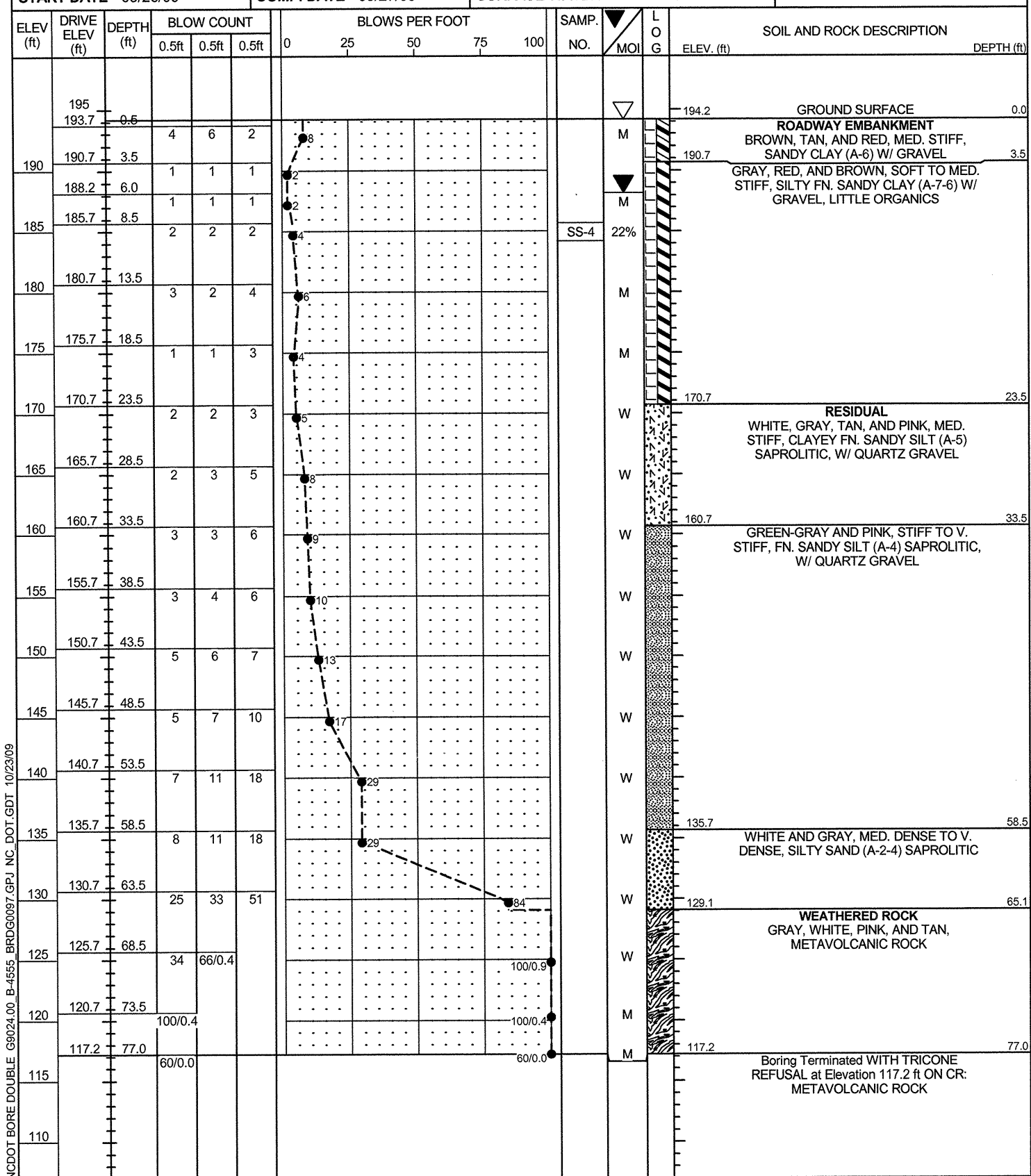
| | | | | | | | |
|--|---------------------|-------------------------|-------------------|-----------------------|--|-------------------|-----------------|
| PROJECT NO. 33767.1.1 | | ID. B-4555 | | COUNTY JOHNSTON | | GEOLOGIST J. HAMM | |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | | | | | GROUND WTR (ft) |
| BORING NO. B2-B | STATION 26+74 | OFFSET 8ft RT | ALIGNMENT -L- | 0 HR. 6.0 | | | |
| COLLAR ELEV. 187.6 ft | TOTAL DEPTH 69.2 ft | NORTHING 628,288 | EASTING 2,246,155 | 24 HR. 13.0 | | | |
| DRILL MACHINE CME-45 | | DRILL METHOD Mud Rotary | | HAMMER TYPE Automatic | | | |
| START DATE 08/26/09 | COMP. DATE 08/26/09 | SURFACE WATER DEPTH N/A | | DEPTH TO ROCK N/A | | | |



NCDOT BORE DOUBLE G9024.00_B-4555_BRDG0097.GPJ NC DOT.GDT 10/23/09

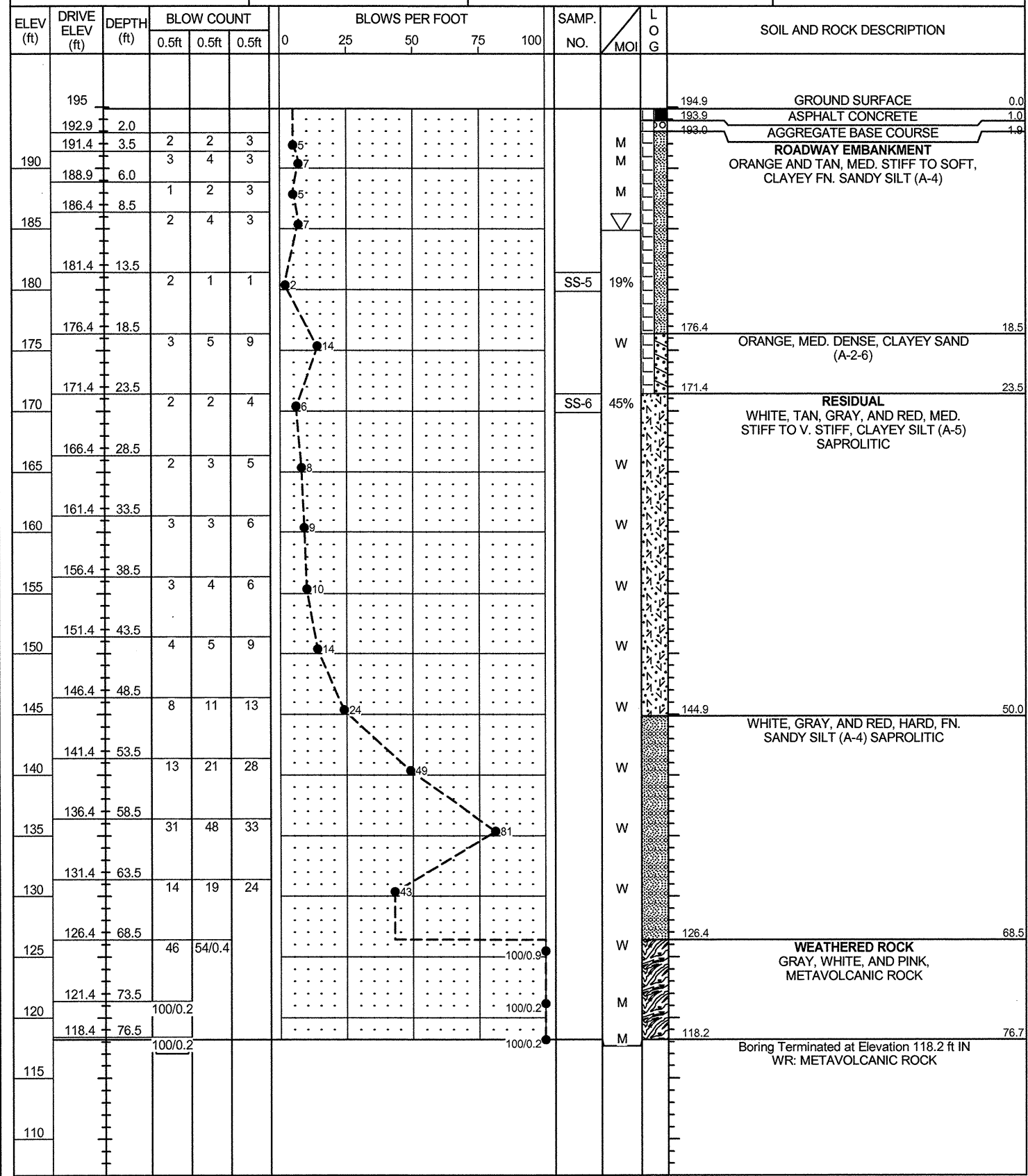


| | | | |
|--|-------------------------|-------------------------|-----------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. EB2-A | STATION 27+19 | OFFSET 26ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 194.2 ft | TOTAL DEPTH 77.0 ft | NORTHING 628,324 | EASTING 2,246,198 |
| DRILL MACHINE CME-45 | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic | |
| START DATE 05/26/09 | COMP. DATE 05/27/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK 77.0 ft |



NCDOT BORE DOUBLE G9024.00, B-4555, BRDG0097.GPJ, NC_DOT_GDT_10/23/09

| | | | |
|--|-------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. EB2-B | STATION 27+62 | OFFSET 10ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 194.9 ft | TOTAL DEPTH 76.7 ft | NORTHING 628,289 | EASTING 2,246,243 |
| DRILL MACHINE CME-45 | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic | |
| START DATE 05/21/09 | COMP. DATE 05/21/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |



The following Borings were performed at the site for associated projects and were originally included under separate reports titled "Roadway Subsurface Investigation" submitted 7-23-09 and "Structure Subsurface Investigation" (Retaining Wall) submitted 6-30-09.



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

| | | | | |
|--|--------------------------|-------------------------|-----------------------|-----------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM | |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | | GROUND WTR (ft) |
| BORING NO. R-3 | STATION 22+76 | OFFSET 28ft LT | ALIGNMENT -L- | 0 HR. Dry |
| COLLAR ELEV. 191.5 ft | TOTAL DEPTH 10.0 ft | NORTHING 628,309 | EASTING 2,245,756 | 24 HR. Dry |
| DRILL MACHINE CME-45B | DRILL METHOD H.S. Augers | | HAMMER TYPE Automatic | |
| START DATE 05/26/09 | COMP. DATE 05/26/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|------|---|------------|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 195 | | | | | | | | | | | | | | | | |
| 190 | 190.5 | 1.0 | 3 | 2 | 3 | | | | | | | | M | ROADWAY EMBANKMENT TAN AND BROWN, MED. STIFF, SANDY CLAY (A-6) W/ TRACE ORGANICS | 0.0 | |
| | 188.0 | 3.5 | 2 | 2 | 2 | | | | | | | | M | ROADWAY EMBANKMENT TAN AND BROWN, MED. STIFF, CLAYEY SANDY SILT (A-4) | 3.5 | |
| 185 | 185.5 | 6.0 | 1 | 2 | 1 | | | | | | | | SS-8 | ROADWAY EMBANKMENT LT BROWN, MED. STIFF, SANDY CLAY (A-6) W/ GRAVEL | 7.5 | |
| | 183.0 | 8.5 | 2 | 3 | 5 | | | | | | | | M | Boring Terminated at Elevation 181.5 ft IN RES: SANDY CLAY | 10.0 | |
| 180 | | | | | | | | | | | | | | | | |
| 175 | | | | | | | | | | | | | | | | |
| 170 | | | | | | | | | | | | | | | | |
| 165 | | | | | | | | | | | | | | | | |
| 160 | | | | | | | | | | | | | | | | |
| 155 | | | | | | | | | | | | | | | | |
| 150 | | | | | | | | | | | | | | | | |
| 145 | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE G8024.00_B-4555_BRDG0097.GPJ NC DOT.GDT 10/23/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

| | | | |
|--|--------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. R-5 | STATION 28+89 | OFFSET 15ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 193.9 ft | TOTAL DEPTH 15.0 ft | NORTHING 628,290 | EASTING 2,246,369 |
| DRILL MACHINE CME-45B | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic | |
| START DATE 05/21/09 | COMP. DATE 05/21/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|-----|---------------------------|------------|------|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 195 | | | | | | | | | | | | | | | 193.9 | 0.0 |
| | | 1.0 | | | | | | | | | | | | | | |
| | | 3.5 | 2 | 3 | 4 | | | | | | | | | | | |
| 190 | | 3.5 | 2 | 3 | 2 | | | | | | | | | | 190.4 | 3.5 |
| | | 6.0 | 2 | 2 | 2 | | | | | | | | | | | |
| | | 8.5 | 2 | 2 | 2 | | | | | | | | | | | |
| 185 | | 8.5 | 2 | 2 | 2 | | | | | | | | | | 185.4 | 8.5 |
| | | 13.5 | 2 | 2 | 2 | | | | | | | | | | | |
| 180 | | 13.5 | 2 | 2 | 2 | | | | | | | | | | 180.4 | 13.5 |
| | | | | | | | | | | | | | | | 178.9 | 15.0 |
| 175 | | | | | | | | | | | | | | | | |
| 170 | | | | | | | | | | | | | | | | |
| 165 | | | | | | | | | | | | | | | | |
| 160 | | | | | | | | | | | | | | | | |
| 155 | | | | | | | | | | | | | | | | |
| 150 | | | | | | | | | | | | | | | | |
| 145 | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | |

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|--|--------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. R-6 | STATION 28+88 | OFFSET 79ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 173.7 ft | TOTAL DEPTH 25.0 ft | NORTHING 628,226 | EASTING 2,246,371 |
| DRILL MACHINE CME-45B | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic | |
| START DATE 05/19/09 | COMP. DATE 05/19/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|-----|---------------------------|------------|-----|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 175 | | | | | | | | | | | | | | | 173.7 | 0.0 |
| | | 1.0 | | | | | | | | | | | | | | |
| | | 3.5 | 2 | 2 | 2 | | | | | | | | | | | |
| 170 | | 3.5 | 5 | 3 | 3 | | | | | | | | | | 170.2 | 3.5 |
| | | 6.0 | 11 | 9 | 6 | | | | | | | | | | | |
| | | 8.5 | 1 | 2 | 6 | | | | | | | | | | | |
| 165 | | 8.5 | 1 | 2 | 6 | | | | | | | | | | 165.2 | 8.5 |
| | | 13.5 | 2 | 2 | 3 | | | | | | | | | | | |
| 160 | | 13.5 | 2 | 2 | 3 | | | | | | | | | | | |
| | | 18.5 | 1 | 2 | 1 | | | | | | | | | | | |
| 155 | | 18.5 | 1 | 2 | 1 | | | | | | | | | | | |
| | | 23.5 | 17 | 15 | 19 | | | | | | | | | | | |
| 150 | | 23.5 | 17 | 15 | 19 | | | | | | | | | | | |
| 145 | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | | | | | |
| 100 | | | | | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE G9024.00 B-4555_BRDG097.GPJ NC DOT.GDT 10/23/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

| | | | |
|--|--------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. RW-3 | STATION 23+01 | OFFSET 39ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 184.1 ft | TOTAL DEPTH 25.0 ft | NORTHING 628,243 | EASTING 2,245,783 |
| DRILL MACHINE CME-45B | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic | |
| START DATE 05/20/09 | COMP. DATE 05/20/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|--------|----------------|----|----|----|-----|-----------|-----|-----|---------------------------|--|------|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 185 | | | | | | | | | | | | | | 184.1 | GROUND SURFACE | 0.0 |
| 183.1 | 183.1 | 1.0 | | | | | | | | | | | | 180.1 | RESIDUAL BROWN, TAN, AND ORANGE, MED. STIFF, CLAYEY SILT (A-5) W/ ROOTS, SAPROLITIC, MICACEOUS | 4.0 |
| 180 | 180.6 | 3.5 | 2 | 2 | 3 | | | | | | | | | 178.1 | WEATHERED ROCK GREEN-GRAY, WHITE, AND TAN, PHYLLITE | 6.0 |
| | 178.1 | 6.0 | 17 | 50 | 50/0.4 | | | | | | | | | 176.6 | RESIDUAL GREEN-GRAY AND WHITE, V. DENSE, SANDY SILT (A-4) W/ ROCK FRAGS, SAPROLITIC, MICACEOUS | 7.5 |
| 175 | 175.6 | 8.5 | 8 | 40 | 43 | | | | | | | | | 170.6 | RESIDUAL WHITE AND TAN, STIFF, CLAYEY SILT (A-5) MICACEOUS | 13.5 |
| | 170.6 | 13.5 | 3 | 4 | 5 | | | | | | | | | 170.6 | RESIDUAL WHITE AND TAN, STIFF TO V. STIFF, CLAYEY FN SANDY SILT (A-4) MICACEOUS | 13.5 |
| 170 | 170.6 | 13.5 | 2 | 3 | 6 | | | | | | | | | 159.1 | Boring Terminated at Elevation 159.1 ft IN RES: CLAYEY FN SANDY SILT | 25.0 |
| 165 | 165.6 | 18.5 | 4 | 7 | 5 | | | | | | | | | | | |
| 160 | 160.6 | 23.5 | 9 | 12 | 15 | | | | | | | | | | | |
| 155 | | | | | | | | | | | | | | | | |
| 150 | | | | | | | | | | | | | | | | |
| 145 | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | | | | | |

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|--|--------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. RW-4 | STATION 24+15 | OFFSET 39ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 186.4 ft | TOTAL DEPTH 25.0 ft | NORTHING 628,247 | EASTING 2,245,897 |
| DRILL MACHINE CME-45B | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic | |
| START DATE 05/20/09 | COMP. DATE 05/20/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|-----|---------------------------|---|-----|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 190 | | | | | | | | | | | | | | 186.4 | GROUND SURFACE | 0.0 |
| 185 | 185.4 | 1.0 | | | | | | | | | | | | 183.4 | ROADWAY EMBANKMENT TAN AND BROWN, SOFT, CLAYEY FN SANDY SILT (A-4) | 3.0 |
| | 182.9 | 3.5 | 2 | 1 | 1 | | | | | | | | | 179.9 | ROADWAY EMBANKMENT ORANGE, SOFT, SILTY CLAY (A-7-5) W/ TRACE ORGANICS | 6.5 |
| 180 | 180.4 | 6.0 | 1 | 1 | 2 | | | | | | | | | 177.9 | RESIDUAL ORANGE AND WHITE, STIFF, FN. SANDY SILT (A-4) | 8.5 |
| | 177.9 | 8.5 | 2 | 4 | 5 | | | | | | | | | | | |
| 175 | 172.9 | 13.5 | 3 | 4 | 5 | | | | | | | | | | | |
| | 172.9 | 13.5 | 2 | 3 | 5 | | | | | | | | | | | |
| 170 | 167.9 | 18.5 | 3 | 4 | 5 | | | | | | | | | | | |
| 165 | 162.9 | 23.5 | 4 | 5 | 6 | | | | | | | | | | | |
| 160 | | | | | | | | | | | | | | | | |
| 155 | | | | | | | | | | | | | | | | |
| 150 | | | | | | | | | | | | | | | | |
| 145 | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE G9024.00 B-4555 BRDG0097.GPJ NC DOT.GDT 10/23/09

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70

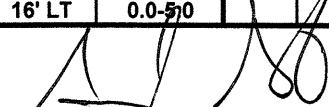
NCDOT Project No: 33767.1.1 - T.I.P. No: B-4555

JOHNSTON COUNTY, NC

FALCON ENGINEERING, INC. PROJECT NO: G9024.00

| BORING # | | | SAMPLE # | | | TOTAL SAMPLE | | | MINUS 2.00 mm FRACTION | | | | Atterberg Limit Test Results | | | MC |
|--|---------------|--------------|-----------------|-----|------|------------------|-----------|------|------------------------|----|----|----|------------------------------|----|----|------|
| AASHTO Classification | | | PERCENT PASSING | | | PERCENT RETAINED | | | | | | | | | | |
| STATION # | OFFSET (FEET) | DEPTH (FEET) | #10 | #40 | #200 | Coarse Sand | Fine Sand | SILT | CLAY | LL | PL | PI | % | | | |
| EB1-A | | | SS-1 | | | 100 | 95 | 73 | 8 | 37 | 37 | 18 | 35 | NP | NP | 36.0 |
| A-4 | | | | | | | | | | | | | | | | |
| 24+15 | 25' LT | 3.5-5.0 | | | | | | | | | | | | | | |
| EB1-A | | | SS-2 | | | 100 | 99 | 96 | 1 | 6 | 24 | 69 | 71 | 34 | 37 | 36.6 |
| A-7-5 | | | | | | | | | | | | | | | | |
| 24+15 | 25' LT | 8.5-10.0 | | | | | | | | | | | | | | |
| EB1-B | | | SS-3 | | | 100 | 99 | 95 | 1 | 10 | 32 | 57 | 60 | 22 | 38 | 32.3 |
| A-7-5 | | | | | | | | | | | | | | | | |
| 24+72 | 20' RT | 3.5-5.0 | | | | | | | | | | | | | | |
| EB2-A | | | SS-4 | | | 100 | 97 | 72 | 9 | 28 | 23 | 40 | 41 | 22 | 19 | 22.3 |
| A-7-6 | | | | | | | | | | | | | | | | |
| 27+19 | 26' LT | 8.5-10.0 | | | | | | | | | | | | | | |
| EB2-B | | | SS-5 | | | 100 | 94 | 62 | 16 | 35 | 35 | 14 | 15 | NP | NP | 19.1 |
| A-4 | | | | | | | | | | | | | | | | |
| 27+62 | 10' RT | 13.5-15.0 | | | | | | | | | | | | | | |
| EB2-B | | | SS-6 | | | 100 | 98 | 94 | 2 | 9 | 69 | 20 | 46 | NP | NP | 45.4 |
| A-5 | | | | | | | | | | | | | | | | |
| 27+62 | 10' RT | 23.5-25 | | | | | | | | | | | | | | |
| The following borings were performed at the site for associated projects and were originally included under separate reports titled "Roadway Subsurface Investigation" submitted 7-23-09 and "Structure Subsurface Investigation" (Retaining Wall) submitted 6-30-09. Sample numbers are shown as they appeared in "Roadway Subsurface Investigation". | | | | | | | | | | | | | | | | |
| R-3 | | | SS-8 | | | 100 | 93 | 69 | 13 | 29 | 30 | 28 | 23 | 17 | 6 | 22.6 |
| A-4 | | | | | | | | | | | | | | | | |
| 22+76 | 28' LT | 6.0-7.5 | | | | | | | | | | | | | | |
| R-6 | | | SS-9 | | | 100 | 98 | 86 | 3 | 26 | 31 | 40 | 32 | NP | NP | 39.0 |
| A-4 | | | | | | | | | | | | | | | | |
| 28+88 | 79' LT | 8.5-10.0 | | | | | | | | | | | | | | |
| R-6 | | | SS-10 | | | 100 | 95 | 77 | 8 | 31 | 49 | 12 | 35 | NP | NP | 47.9 |
| A-4 | | | | | | | | | | | | | | | | |
| 28+88 | 79' LT | 18.5-20.0 | | | | | | | | | | | | | | |
| RW-3 | | | SS-13 | | | 100 | 99 | 94 | 2 | 19 | 66 | 13 | 38 | NP | NP | 25.8 |
| A-4 | | | | | | | | | | | | | | | | |
| 23+01 | 39' RT | 13.5-15.0 | | | | | | | | | | | | | | |
| RW-4 | | | SS-14 | | | 100 | 94 | 71 | 13 | 26 | 38 | 23 | 18 | 16 | 32 | 17.3 |
| A-4 | | | | | | | | | | | | | | | | |
| 24+15 | 39' RT | 1.0-2.5 | | | | | | | | | | | | | | |
| R-2, R-3 | | | BS-1 | | | 100 | 90 | 63 | 19 | 24 | 20 | 37 | 35 | 18 | 17 | 22.6 |
| A-6 | | | | | | | | | | | | | | | | |
| - | - | 0.0-5.0 | | | | | | | | | | | | | | |
| R-4 | | | BS-2 | | | 100 | 95 | 75 | 10 | 23 | 28 | 39 | 39 | 23 | 16 | 21.6 |
| A-6 | | | | | | | | | | | | | | | | |
| 30+12 | 16' LT | 0.0-5.0 | | | | | | | | | | | | | | |

SIGNATURE



NCDOT NO. 105-03-0803

Notes: LL = Liquid limit
 PL = Plastic limit
 PI = Plasticity index = LL - PL



LOOKING EAST (UPSTATION) TOWARD EXISTING BRIDGE ALONG WEST APPROACH FROM APPROXIMATE STATION 19+00.



LOOKING EAST (UPSTATION) FROM RIGHT OF -L- ALONG EXISTING BRIDGE .

SITE PHOTOGRAPHS

**BRIDGE NO. 97 OVER NORFOLK
SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
TIP NO: B-4555, STATE PROJECT NO: 33767.1.1**



FALCON ENGINEERING, INC.
2736 ROWLAND RD.
RALEIGH, NC 27615
PHONE (919) 871-0800
FAX (919) 871-0803



RIGHT OF -L-, LOOKING NORTHWEST ALONG NORFOLK SOUTHERN RAILROAD FROM BETWEEN INTERIOR BENTS 1 AND 2.

LOOKING NORTHWEST (LEFT OF -L-) AT NORFOLK SOUTHERN RAILROAD AND ROCK OUTCROPPING FROM WESTBOUND BRIDGE, BETWEEN INTERIOR BENTS 1 AND 2.

SITE PHOTOGRAPHS

**BRIDGE NO. 97 OVER NORFOLK
SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
TIP NO: B-4555, STATE PROJECT NO: 33767.1.1**



FALCON ENGINEERING, INC.
2736 ROWLAND RD.
RALEIGH, NC 27615
PHONE (919) 871-0800
FAX (919) 871-0803



LOOKING WEST (DOWNSTATION) TOWARD EXTISING BRIDGE ALONG EAST APPROACH FROM APPROXIMATE STATION 31+00.



LOOKING EAST (UPSTATION) FROM WEST END OF BRIDGE, APPROXIMATE STATION 29+00.

SITE PHOTOGRAPHS

**BRIDGE NO. 97 OVER NORFOLK
SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
TIP NO: B-4555, STATE PROJECT NO: 33767.1.1**



FALCON ENGINEERING, INC.
2736 ROWLAND RD.
RALEIGH, NC 27615
PHONE (919) 871-0800
FAX (919) 871-0803

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C. | 33767.1.1 (B-4555) | 1 | 16 |

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33767.1.1 (B-4555) F.A. PROJ. BRNHS-70(72)

COUNTY JOHNSTON

PROJECT DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RR ON US 70

SITE DESCRIPTION RETAINING WALL -WL- FROM -L- STA. 19+75 TO 24+94

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| <u>SHEET</u> | <u>DESCRIPTION</u> |
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| 2 | LEGEND |
| 3 | SITE VICINITY MAP |
| 4 | BORING LOCATION PLAN |
| 5 | SUBSURFACE PROFILE ALONG -WL- |
| 6 | CROSS SECTION STA. 20+00 -L- |
| 7 | CROSS SECTION STA. 21+00 -L- |
| 8 | CROSS SECTION STA. 22+00 -L- |
| 9 | CROSS SECTION STA. 23+00 -L- |
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CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THIS 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.

PERSONNEL

J. HAMM

G. LANG

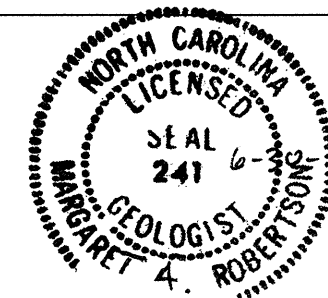
M. ROBERTSON

INVESTIGATED BY J. HAMM

CHECKED BY G. LANG/M. ROBERTSON

SUBMITTED BY FALCON

DATE 6-30-09



PROJECT: 33767.1.1 ID: B-4555

DRAWN BY: J. HAMM

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

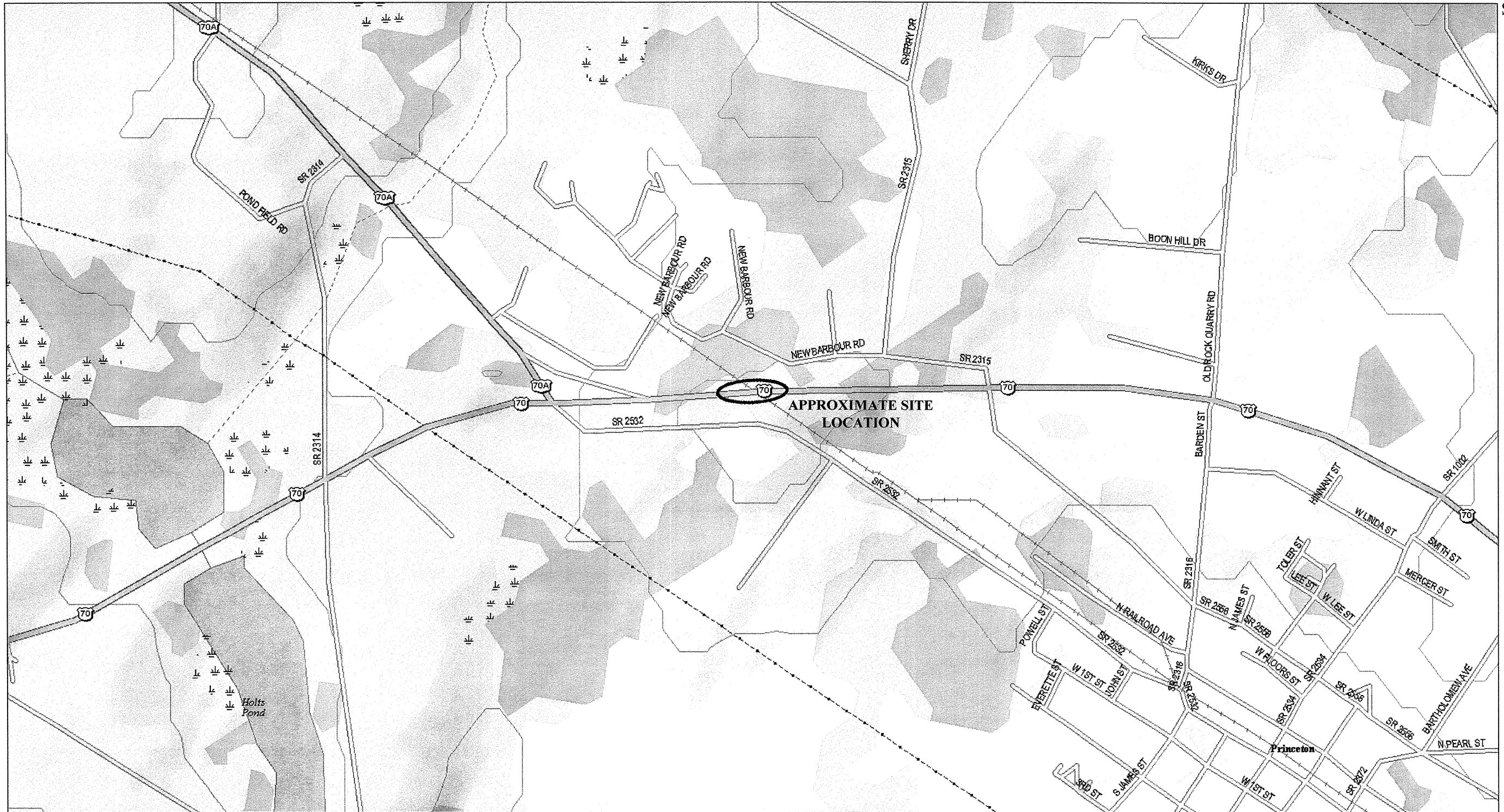
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

| | |
|--|----------------|
| PROJECT REFERENCE NO. 33767.I.I(B-4555) | SHEET NO. 2 |
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SUBSURFACE INVESTIGATION

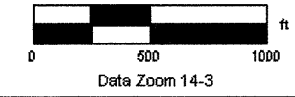
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

| SOIL DESCRIPTION | | | | | | | | | | GRADATION | | | | | | | | | | ROCK DESCRIPTION | | | | | | | | | | TERMS AND DEFINITIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|
| SOIL IS CONSIDERED TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i> | | | | | | | | | | WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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. | | | | | | | | | | HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CPS) | | | | | | | | | | 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, 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. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS 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. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SOIL LEGEND AND AASHTO CLASSIFICATION | | | | | | | | | | MINERALOGICAL COMPOSITION | | | | | | | | | | WEATHERING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS | | | | | | | | | | MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. | | | | | | | | | | FRESH VERY SLIGHT (V SL.) SLIGHT MODERATE (MOD.) MODERATELY SEVERE (MOD. SEV.) SEVERE (SEV.) VERY SEVERE (V SEV.) COMPLETE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GROUP CLASS. A-1, A-2, A-3, A-4, A-5, A-6, A-7 | | | | | | | | | | COMPRESSIBILITY | | | | | | | | | | ROCK FRESH, CRYSTALLINE BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. 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. 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. 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. 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, YIELDS SPT N VALUES > 100 BPF. ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF. 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. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SYMBOL | | | | | | | | | | SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE | | | | | | | | | | LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PERCENTAGE OF MATERIAL | | | | | | | | | | ORGANIC MATERIAL TRACE OF ORGANIC MATTER LITTLE ORGANIC MATTER MODERATELY ORGANIC HIGHLY ORGANIC | | | | | | | | | | GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE LITTLE SOME HIGHLY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CONSISTENCY OR DENSENESS | | | | | | | | | | MISCELLANEOUS SYMBOLS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | | | | | | | | | | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD | | | | | | | | | | SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL | | | | | | | | | | SAMPLE DESIGNATIONS S - BULK SAMPLE SS - SPLIT SPOON SAMPLE ST - SHELBY TUBE SAMPLE RS - ROCK SAMPLE RT - RECOMPACTED TRIAXIAL SAMPLE CBR - CALIFORNIA BEARING RATIO SAMPLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TEXTURE OR GRAIN SIZE | | | | | | | | | | ABBREVIATIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| U.S. STD. SIEVE SIZE OPENING (MM) | | | | | | | | | | 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 | | | | | | | | | | HL - 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 ? - UNIT WEIGHT % - DRY UNIT WEIGHT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BOULDER (BLOR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.) | | | | | | | | | | EQUIPMENT USED ON SUBJECT PROJECT | | | | | | | | | | FRACTURE SPACING | | | | | | | | | | BEDDING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | | | | | | | DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST CME-45B | | | | | | | | | | ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE 3" STEEL TEETH TRICONE TUNG-CARB. CORE BIT | | | | | | | | | | HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST | | | | | | | | | | TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET 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 | | | | | | | | | |
| SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | | | | | | | | | | | | | | | | | INDURATION | | | | | | | | | | BENCH MARK: BM#3; -BYI- STA. 6+35.36, 8.85' LT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PLASTICITY | | | | | | | | | | | | | | | | | | | | FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. | | | | | | | | | | ELEVATION: 165.4 FT. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PLASTICITY INDEX (PI) DRY STRENGTH | | | | | | | | | | | | | | | | | | | | FRIABLE MODERATELY INDURATED INDURATED EXTREMELY INDURATED | | | | | | | | | | NOTES: FIAD - BORING FILLED IN AFTER DRILLING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



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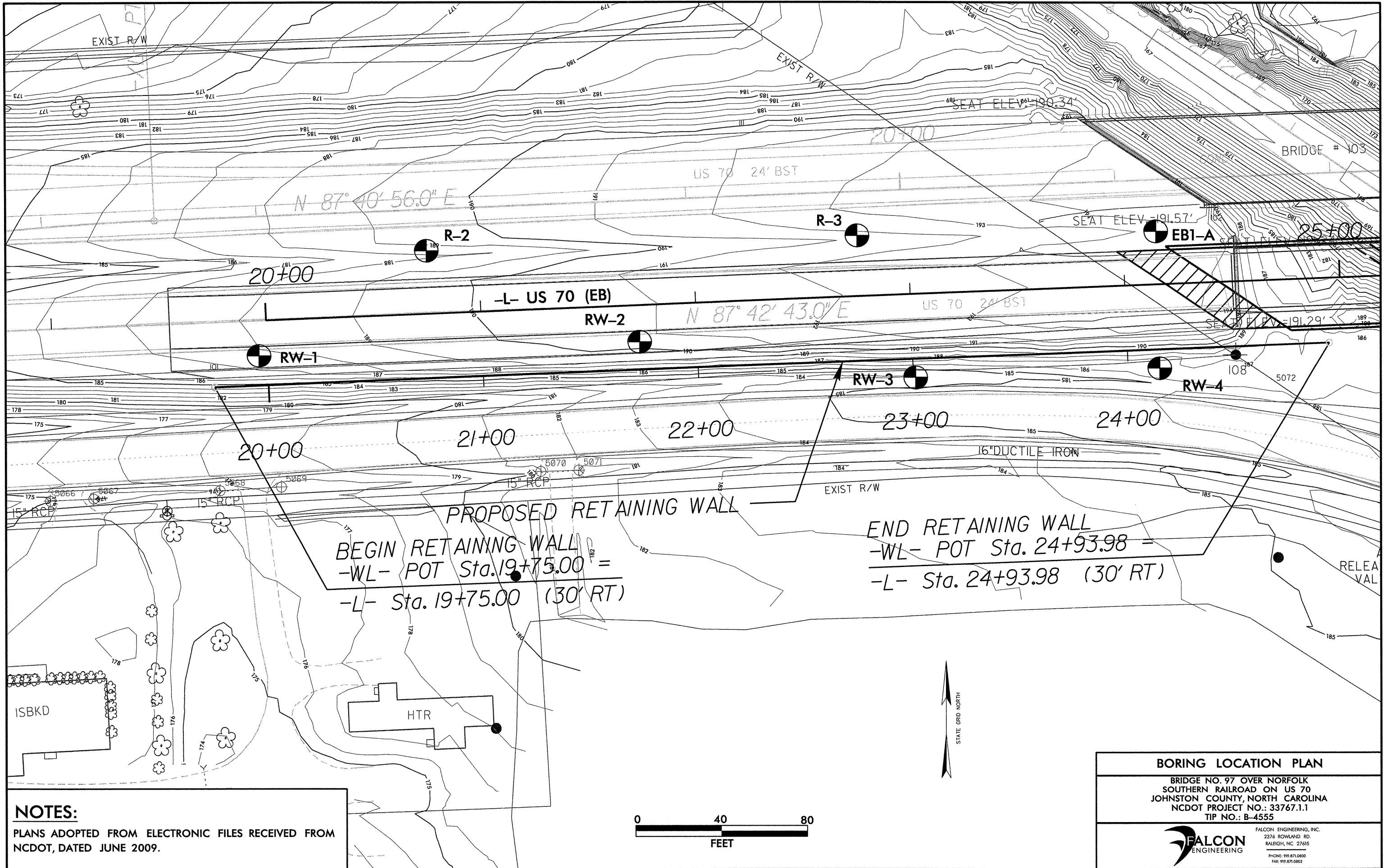


SITE VICINITY MAP

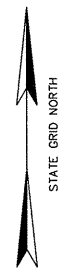
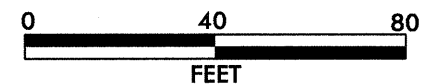
**BRIDGE NO. 97 OVER NORFOLK
SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
TIP NO: B-4555, STATE PROJECT NO: 33767.1.1**




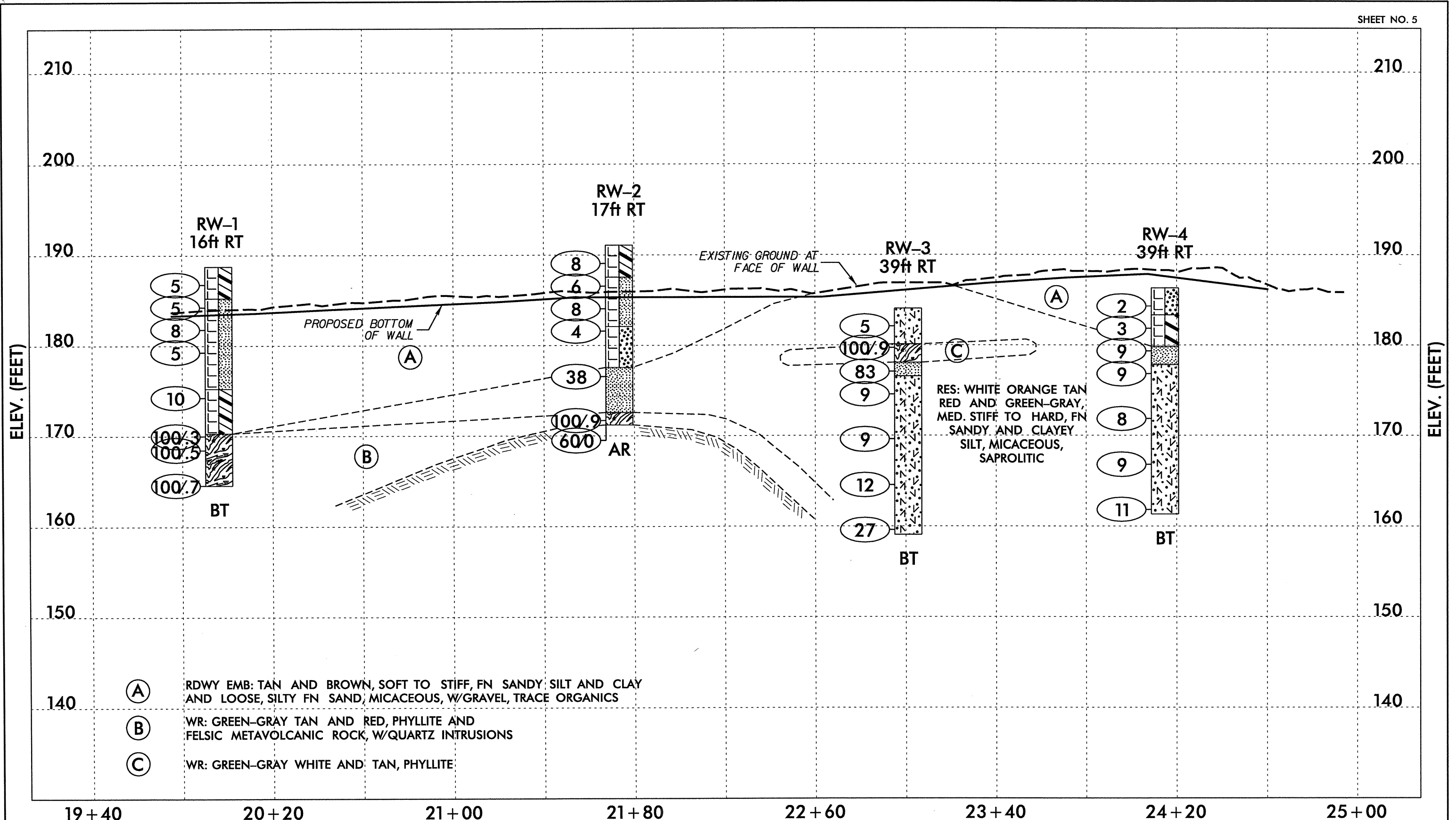
FALCON ENGINEERING, INC.
2736 ROWLAND RD.
RALEIGH, NC 27615
PHONE (919) 871-0800
FAX (919) 871-0803



NOTES:
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM
 NCDOT, DATED JUNE 2009.



| | |
|--|---|
| BORING LOCATION PLAN | |
| BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 JOHNSTON COUNTY, NORTH CAROLINA NCDOT PROJECT NO.: 33767.1.1 TIP NO.: B-4555 | |
|  | FALCON ENGINEERING, INC. 2376 ROWLAND RD. RALEIGH, NC 27615 PHONE: 919.871.0800 FAX: 919.871.0803 |

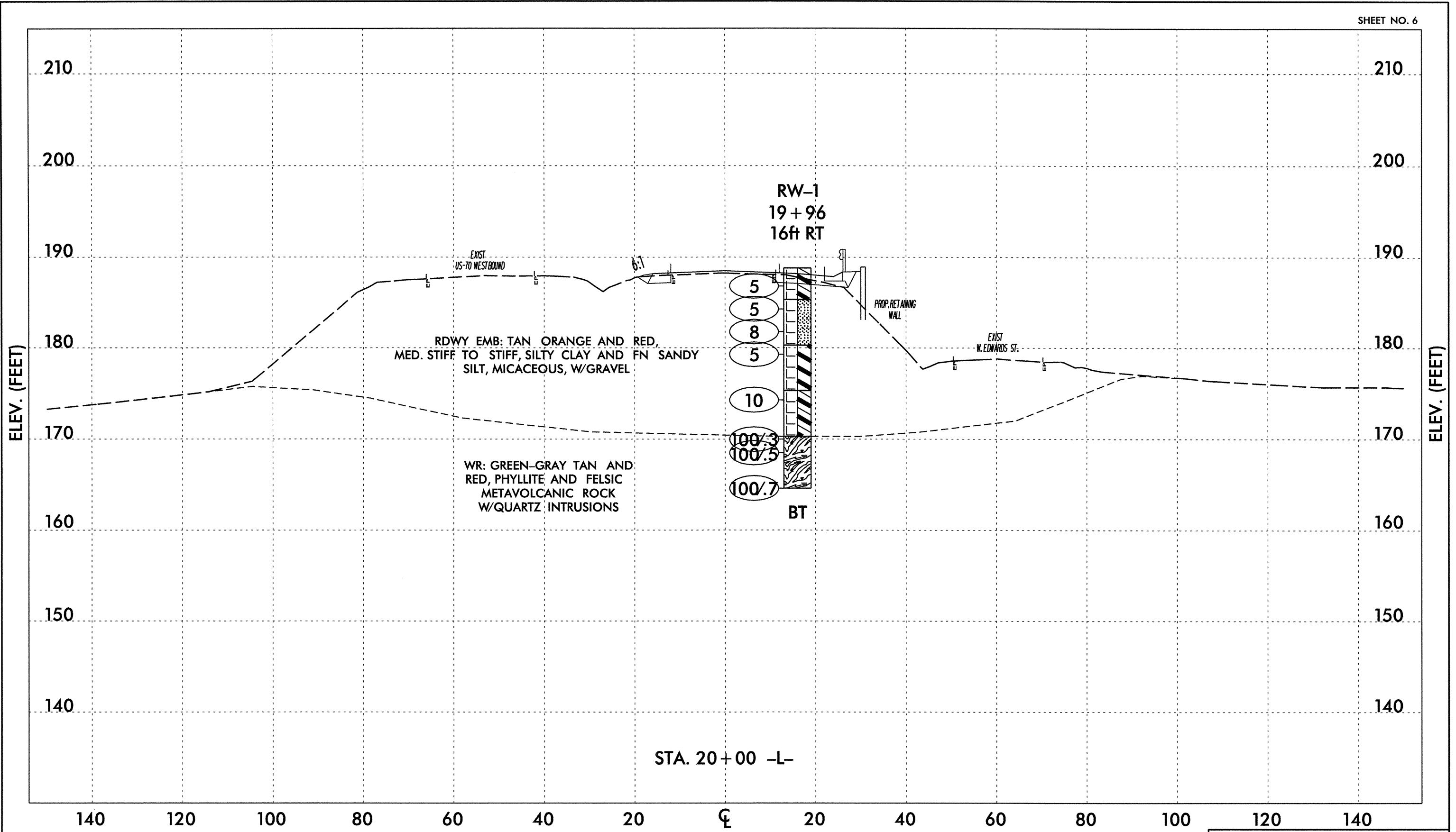


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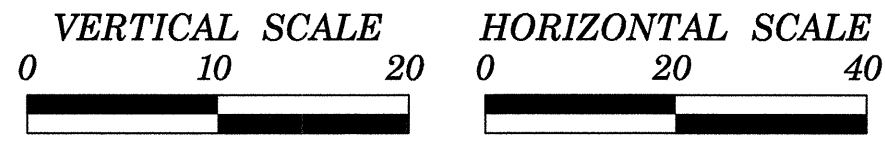
- PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED JUNE, 2009
- INFERRED LITHOLOGIC BOUNDARIES ARE DRAWN THROUGH BORINGS AND PROJECTED ONTO AND ACROSS THE PROFILE.

SUBSURFACE PROFILE ALONG -WL-
 BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
 JOHNSTON COUNTY, NORTH CAROLINA
 PROJECT NO: 33767.1.1
 TIP NO: B-4555
 SHEET 1 OF 1

FALCON ENGINEERING
 2726 HOWARD RD.
 RAYLE, NC 27580
 PHONE: 919.487.1111
 FAX: 919.487.1112

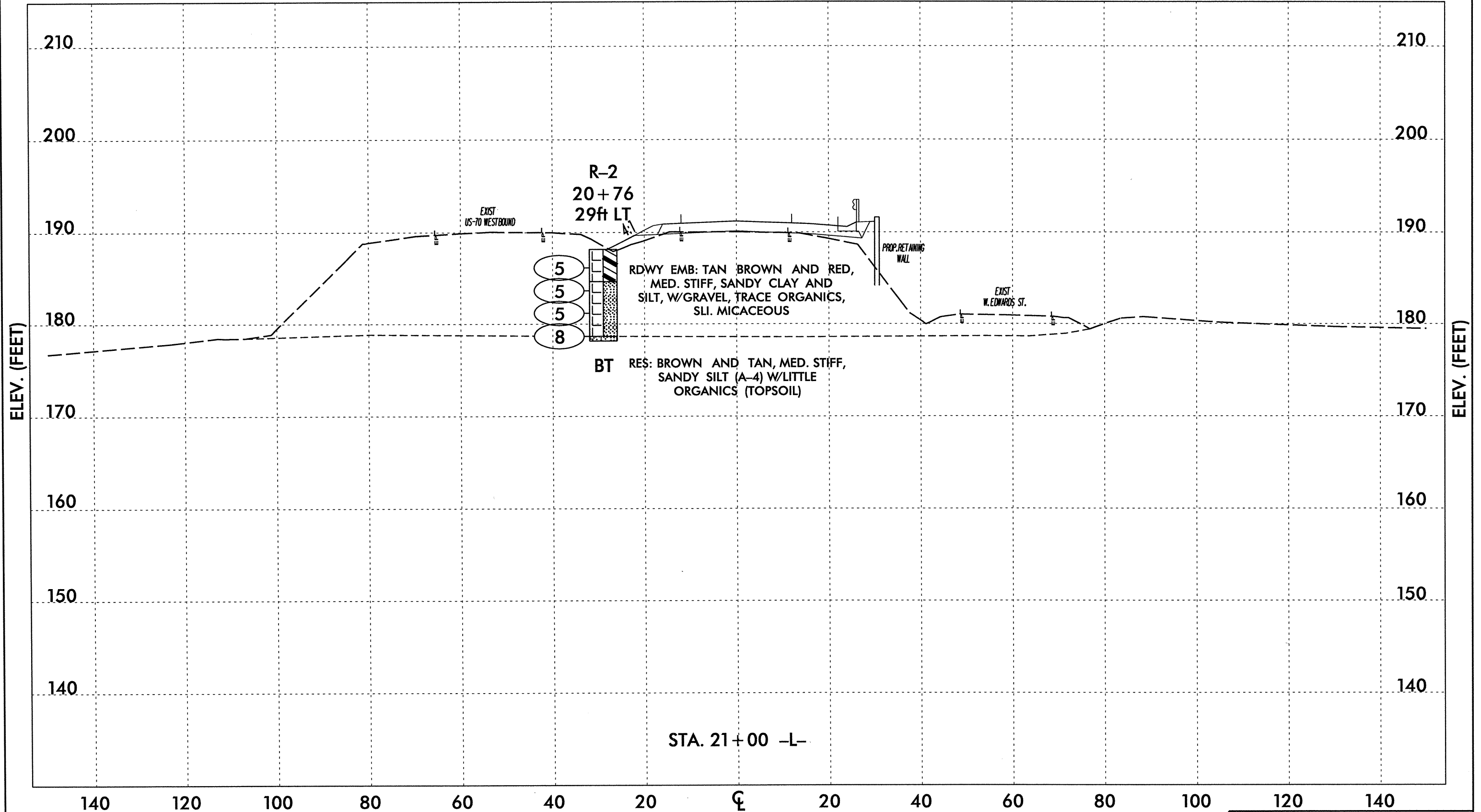


NOTES:
 • PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED JUNE, 2009



SUBSURFACE CROSS SECTION STA. 20+00 -L-
 BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
 JOHNSTON COUNTY, NORTH CAROLINA
 PROJECT NO: 33767.1.1
 TIP NO: B-4555
 SHEET 1 OF 5

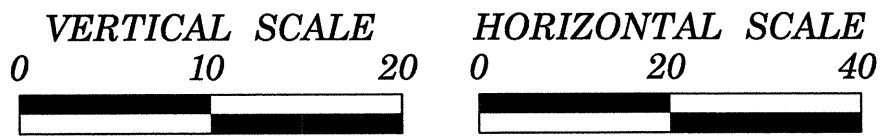
FALCON ENGINEERING, INC.
 2724 EDWARDS ST.
 RALEIGH, NC 27603
 PHONE: 919.876.0000
 FAX: 919.876.0001



ELEV. (FEET)

ELEV. (FEET)

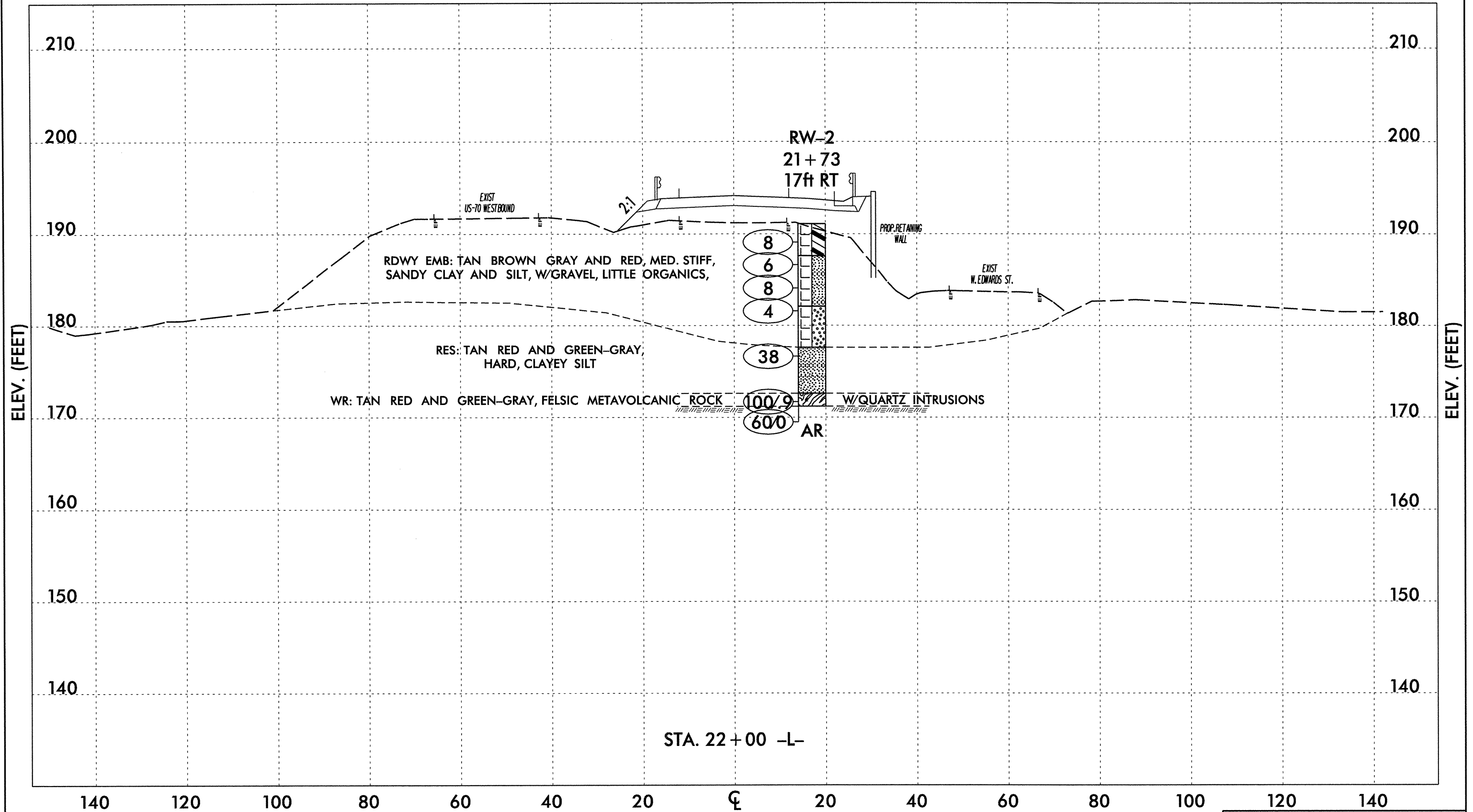
STA. 21+00 -L-



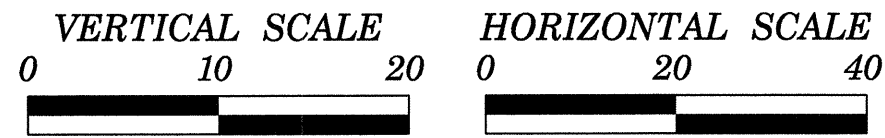
NOTES:
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SUBSURFACE CROSS SECTION STA. 21+00 -L-
 BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
 JOHNSTON COUNTY, NORTH CAROLINA
 PROJECT NO: 33767.1.1
 TIP NO: B-4555
 SHEET 2 OF 5

FALCON ENGINEERING, INC.
 3734 HOWARD RD.
 RALEIGH, NC 27605
 PHONE: 919.876.8888
 FAX: 919.876.8889

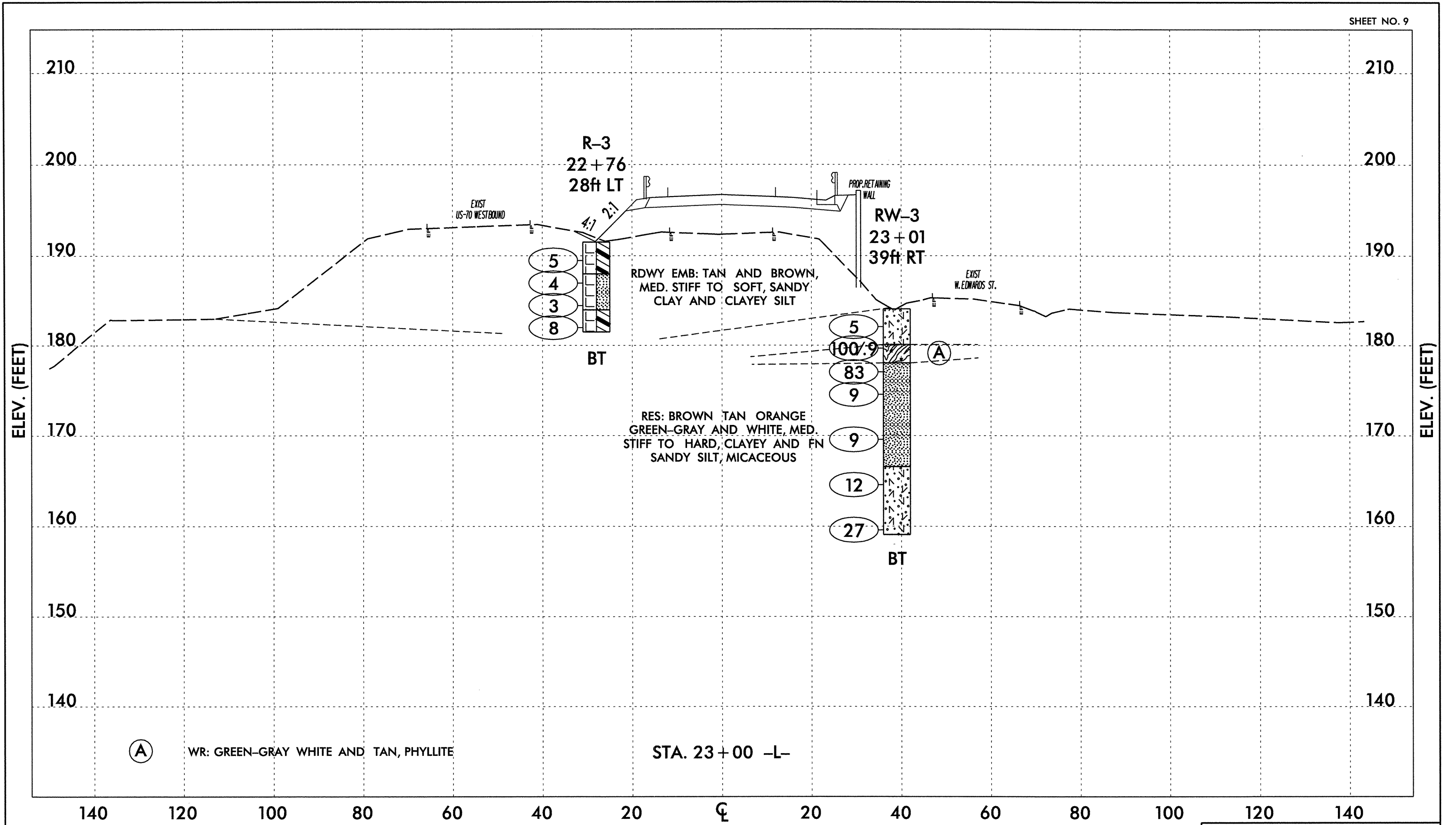


NOTES:
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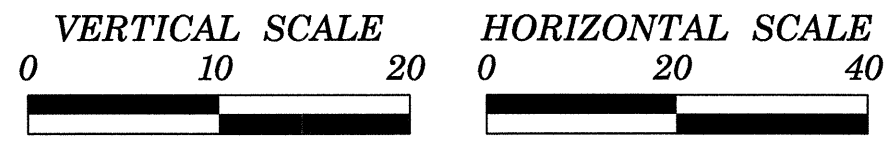


SUBSURFACE CROSS SECTION STA. 22+00 -L-
 BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
 JOHNSTON COUNTY, NORTH CAROLINA
 PROJECT NO: 33767.1.1
 TIP NO: B-4555
 SHEET 3 OF 5

FALCON ENGINEERING, INC.
 2776 RICHMOND RD.
 RALEIGH, NC 27612
 PHONE: 919.882.8800
 FAX: 919.882.8801

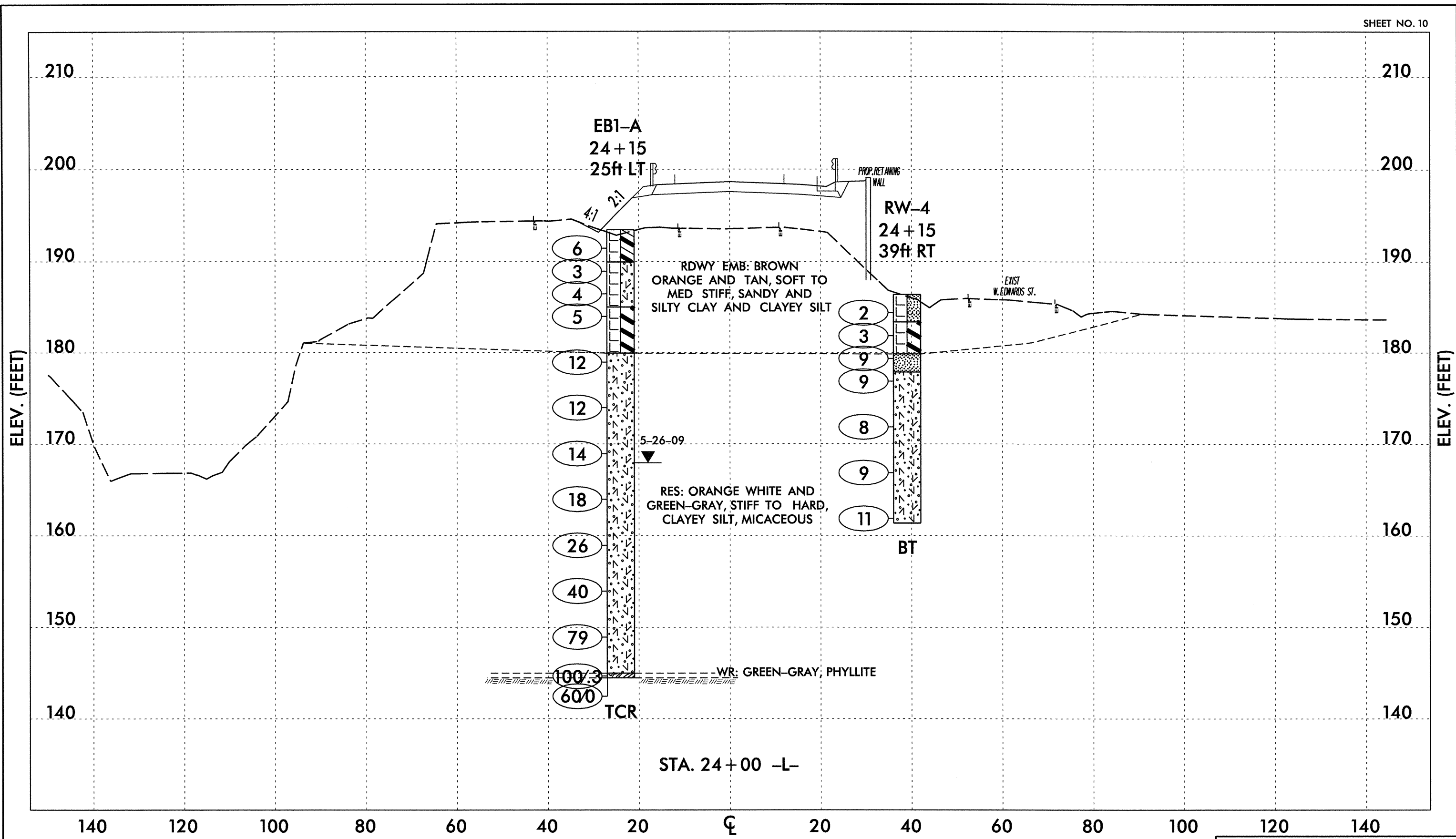


NOTES:
 • PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED JUNE, 2009

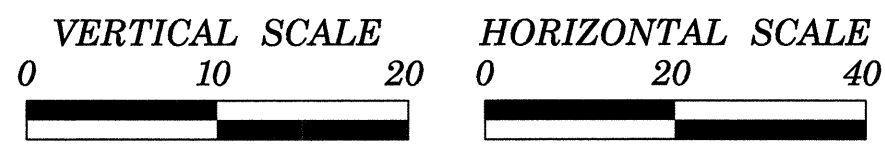


SUBSURFACE CROSS SECTION STA. 23+00 -L-
 BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
 JOHNSTON COUNTY, NORTH CAROLINA
 PROJECT NO: 33767.1.1
 TIP NO: B-4555
 SHEET 4 OF 5

FALCON ENGINEERING, INC.
 2726 SCHUBERT RD.
 RALEIGH, NC 27615
 PHONE: 919.882.8888
 FAX: 919.882.8889



NOTES:
 • PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM NCDOT, DATED JUNE, 2009



SUBSURFACE CROSS SECTION STA. 24+00 -L-
 BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70
 JOHNSTON COUNTY, NORTH CAROLINA
 PROJECT NO: 33767.1.1
 TIP NO: B-4555
 SHEET 5 OF 5

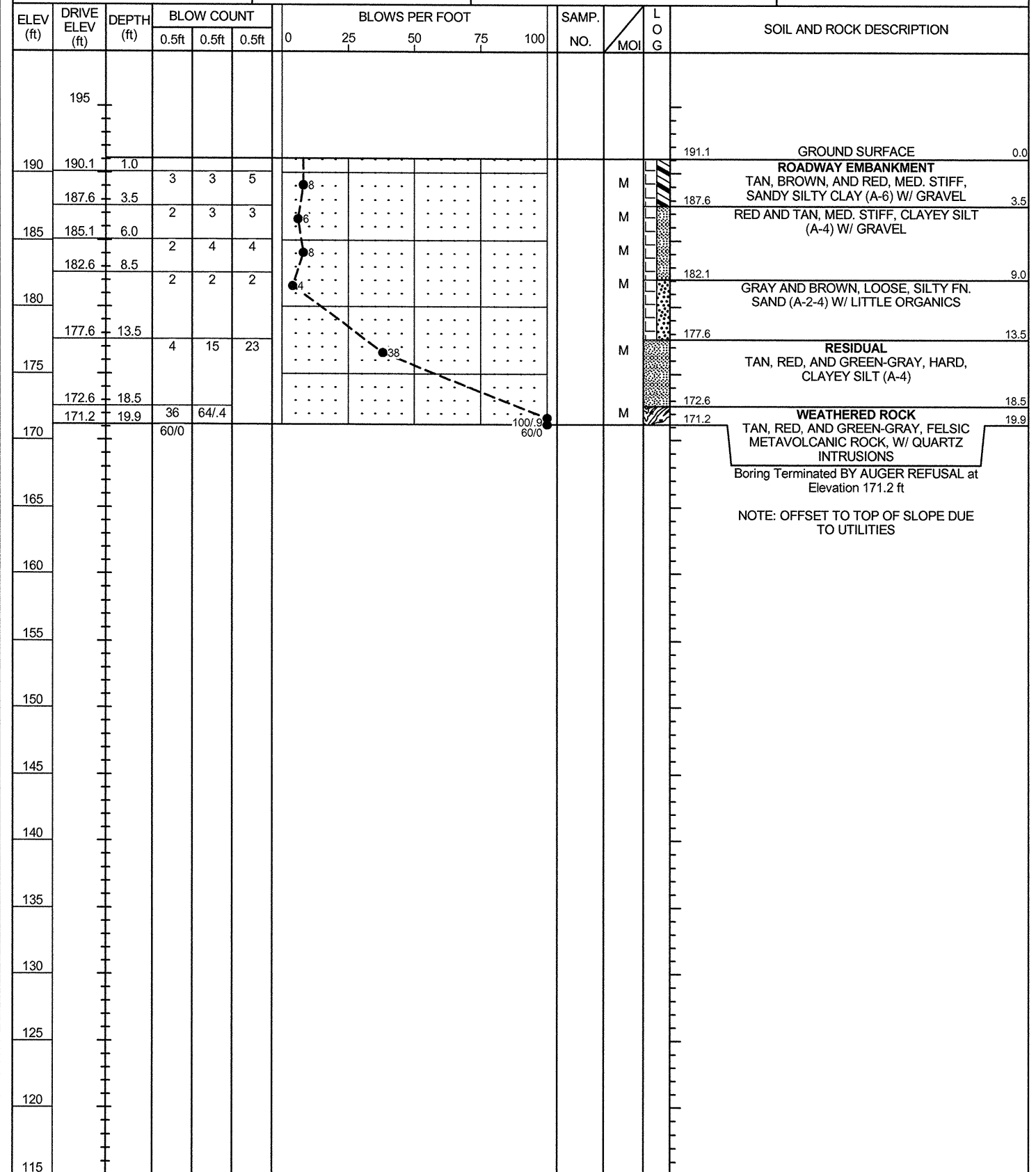
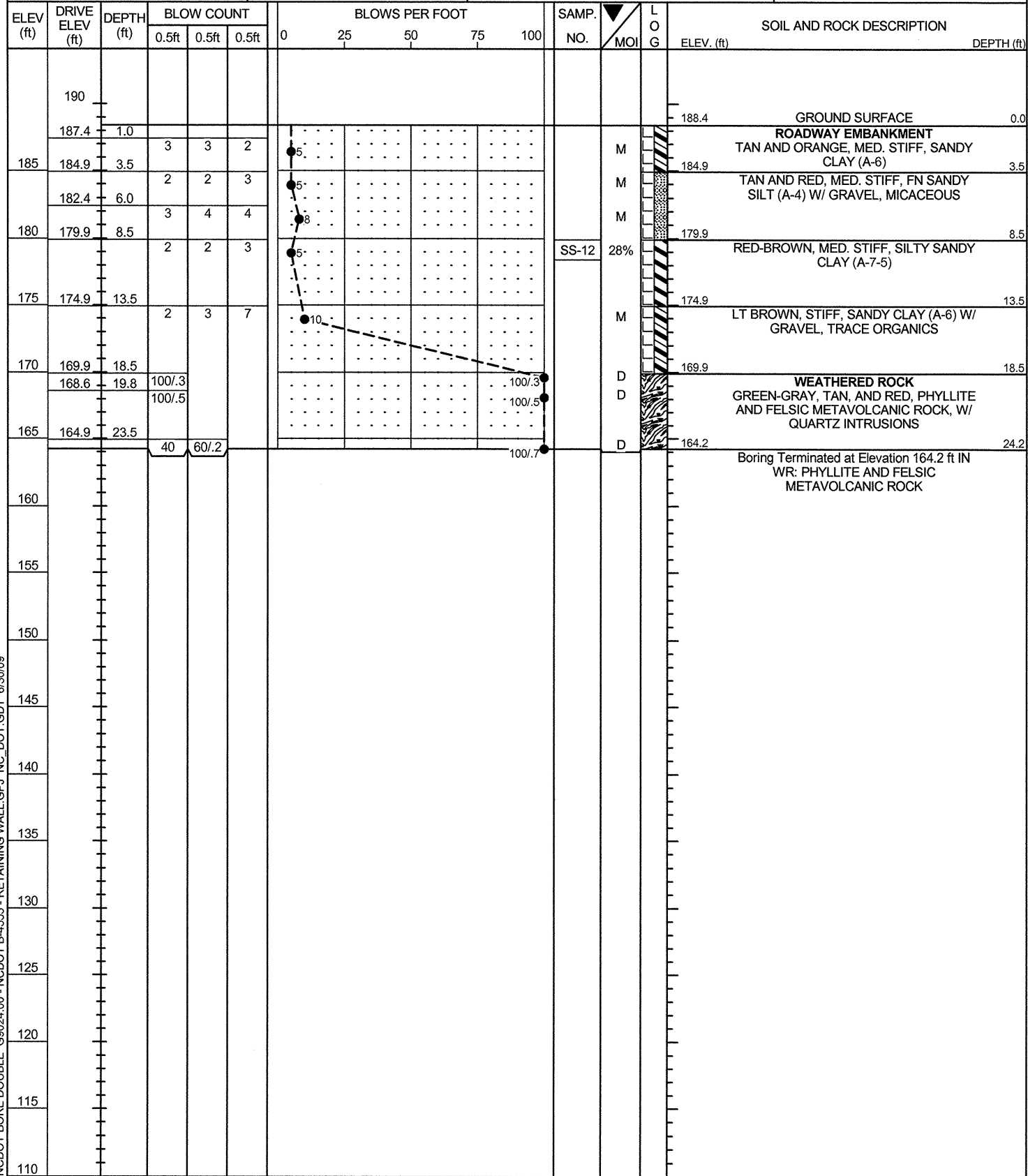


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

| | | | |
|--|--------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. RW-1 | STATION 19+96 | OFFSET 16ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 188.4 ft | TOTAL DEPTH 24.2 ft | NORTHING 628,253 | EASTING 2,245,478 |
| DRILL MACHINE CME-45B | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic | |
| START DATE 05/26/09 | COMP. DATE 05/26/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |

| | | | |
|--|--------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. RW-2 | STATION 21+73 | OFFSET 17ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 191.1 ft | TOTAL DEPTH 19.9 ft | NORTHING 628,259 | EASTING 2,245,655 |
| DRILL MACHINE CME-45B | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic | |
| START DATE 05/26/09 | COMP. DATE 05/26/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |



NCDOT BORE DOUBLE G9024.00 - NCDOT B-4555 - RETAINING WALL.GPJ NC.DOT.GDT 6/30/09



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

| | | | |
|--|--------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. RW-3 | STATION 23+01 | OFFSET 39ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 184.1 ft | TOTAL DEPTH 25.0 ft | NORTHING 628,243 | EASTING 2,245,783 |
| DRILL MACHINE CME-45B | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic | |
| START DATE 05/20/09 | COMP. DATE 05/20/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |

| | | | |
|--|--------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. RW-4 | STATION 24+15 | OFFSET 39ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 186.4 ft | TOTAL DEPTH 25.0 ft | NORTHING 628,247 | EASTING 2,245,897 |
| DRILL MACHINE CME-45B | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic | |
| START DATE 05/20/09 | COMP. DATE 05/20/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|-----|---------------------------|--|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 185 | | | | | | | | | | | | | | 184.1 GROUND SURFACE 0.0 | | |
| 183.1 | 183.1 | 1.0 | | 2 | 2 | 3 | | | | | | | | | RESIDUAL BROWN, TAN, AND ORANGE, MED. STIFF, CLAYEY SILT (A-5) W/ ROOTS, SAPROLITIC, MICACEOUS 4.0 | |
| 180 | 180.6 | 3.5 | | 17 | 50 | 50/4 | | | | | | | | | WEATHERED ROCK GREEN-GRAY, WHITE, AND TAN, PHYLLITE 6.0 | |
| | 178.1 | 6.0 | | 8 | 40 | 43 | | | | | | | | | RESIDUAL GREEN-GRAY AND WHITE, V. DENSE, SANDY SILT (A-4) W/ ROCK FRAGS, SAPROLITIC, MICACEOUS 7.5 | |
| 175 | 175.6 | 8.5 | | 3 | 4 | 5 | | | | | | | | | WHITE AND TAN, STIFF, CLAYEY SILT (A-5) MICACEOUS 13.5 | |
| | 170.6 | 13.5 | | 2 | 3 | 6 | | | | | | | | | WHITE AND TAN, STIFF TO V. STIFF, CLAYEY FN SANDY SILT (A-4) MICACEOUS 159.1 | |
| 165 | 165.6 | 18.5 | | 4 | 7 | 5 | | | | | | | | | Boring Terminated at Elevation 159.1 ft IN RES: CLAYEY FN SANDY SILT | |
| 160 | 160.6 | 23.5 | | 9 | 12 | 15 | | | | | | | | | NOTE: OFFSET TO BOTTOM OF SLOPE TO ACCOUNT FOR RW-2 OFFSET | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | MOI | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|-----|---------------------------|--|--|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 190 | | | | | | | | | | | | | | 186.4 GROUND SURFACE 0.0 | | |
| 185 | 185.4 | 1.0 | | 2 | 1 | 1 | | | | | | | | | ROADWAY EMBANKMENT TAN AND BROWN, SOFT, CLAYEY FN SANDY SILT (A-4) 3.0 | |
| | 182.9 | 3.5 | | 1 | 1 | 2 | | | | | | | | | ORANGE, SOFT, SILTY CLAY (A-7-5) W/ TRACE ORGANICS 6.5 | |
| 180 | 180.4 | 6.0 | | 2 | 4 | 5 | | | | | | | | | RESIDUAL ORANGE AND WHITE, STIFF, FN. SANDY SILT (A-4) 8.5 | |
| | 177.9 | 8.5 | | 3 | 4 | 5 | | | | | | | | | WHITE AND ORANGE, STIFF, CLAYEY SILT (A-5) MICACEOUS | |
| 175 | | | | 2 | 3 | 5 | | | | | | | | | | |
| | 172.9 | 13.5 | | 3 | 4 | 5 | | | | | | | | | | |
| 170 | | | | 4 | 5 | 6 | | | | | | | | | | |
| | 167.9 | 18.5 | | 4 | 5 | 6 | | | | | | | | | | |
| 165 | | | | | | | | | | | | | | | | |
| | 162.9 | 23.5 | | | | | | | | | | | | | | |
| 160 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 155 | | | | | | | | | | | | | | | | |
| 150 | | | | | | | | | | | | | | | | |
| 145 | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE G9024.00 - NCDOT B-4555 - RETAINING WALL.GPJ NC_DOT_GDT 6/30/09



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

| | | | |
|--|--------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. R-2 | STATION 20+76 | OFFSET 29ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 188.2 ft | TOTAL DEPTH 10.0 ft | NORTHING 628,302 | EASTING 2,245,555 |
| DRILL MACHINE CME-45B | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic | |
| START DATE 05/26/09 | COMP. DATE 05/26/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |

| | | | |
|--|--------------------------|-------------------------|-------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. R-3 | STATION 22+76 | OFFSET 28ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 191.5 ft | TOTAL DEPTH 10.0 ft | NORTHING 628,309 | EASTING 2,245,756 |
| DRILL MACHINE CME-45B | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic | |
| START DATE 05/26/09 | COMP. DATE 05/26/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG MOI | LOG G | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|---------|-------|---------------------------|------------|---|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 190 | | | | | | | | | | | | | | | | |
| 187.2 | 188.2 | 1.0 | | | | | | | | | | | | | 188.2 | GROUND SURFACE |
| 185 | 184.7 | 3.5 | 2 | 2 | 3 | | | | | | | | | M | 184.7 | ROADWAY EMBANKMENT TAN AND BROWN, MED. STIFF, SANDY CLAY (A-6) W/ GRAVEL, TRACE ORGANICS, SLI. MICACEOUS |
| | 182.2 | 6.0 | 2 | 2 | 3 | | | | | | | | | M | | TAN AND RED, MED. STIFF, SANDY SILT (A-4) W/ GRAVEL, TRACE ORGANICS |
| 180 | 179.7 | 8.5 | 2 | 2 | 3 | | | | | | | | | M | | |
| | | | 2 | 4 | 4 | | | | | | | | | M | 178.7 | RESIDUAL BROWN AND TAN, MED. STIFF, SANDY SILT (A-4) W/ LITTLE ORGANICS (TOPSOIL) |
| 175 | | | | | | | | | | | | | | | 178.2 | Boring Terminated at Elevation 178.2 ft RES: SANDY SILT |
| 170 | | | | | | | | | | | | | | | | |
| 165 | | | | | | | | | | | | | | | | |
| 160 | | | | | | | | | | | | | | | | |
| 155 | | | | | | | | | | | | | | | | |
| 150 | | | | | | | | | | | | | | | | |
| 145 | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | | | | |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG MOI | LOG G | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|---------|-------|---------------------------|------------|---|---|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | | |
| 195 | | | | | | | | | | | | | | | | | |
| 190 | 191.5 | 1.0 | | | | | | | | | | | | | 191.5 | GROUND SURFACE | |
| | 190.5 | 3.5 | 3 | 2 | 3 | | | | | | | | | M | 188.0 | ROADWAY EMBANKMENT TAN AND BROWN, MED. STIFF, SANDY CLAY (A-6) W/ TRACE ORGANICS | |
| | 188.0 | 6.0 | 2 | 2 | 2 | | | | | | | | | M | | TAN AND BROWN, MED. STIFF, CLAYEY SANDY SILT (A-4) | |
| 185 | 185.5 | 8.5 | 1 | 2 | 1 | | | | | | | | | SS-8 | 23% | 184.0 | LT BROWN, MED. STIFF, SANDY CLAY (A-6) W/ GRAVEL |
| | 183.0 | | 2 | 3 | 5 | | | | | | | | | M | | 181.5 | Boring Terminated at Elevation 181.5 ft IN RES: SANDY CLAY |
| 180 | | | | | | | | | | | | | | | | | |
| 175 | | | | | | | | | | | | | | | | | |
| 170 | | | | | | | | | | | | | | | | | |
| 165 | | | | | | | | | | | | | | | | | |
| 160 | | | | | | | | | | | | | | | | | |
| 155 | | | | | | | | | | | | | | | | | |
| 150 | | | | | | | | | | | | | | | | | |
| 145 | | | | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE G9024.00 - NCDOT B-4555 - RETAINING WALL.GPJ NC_DOT.GDT 7/7/09



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

| | | | |
|--|-------------------------|-------------------------|-----------------------|
| PROJECT NO. 33767.1.1 | ID. B-4555 | COUNTY JOHNSTON | GEOLOGIST J. HAMM |
| SITE DESCRIPTION BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70 | | | GROUND WTR (ft) |
| BORING NO. EB1-A | STATION 24+15 | OFFSET 25ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 193.5 ft | TOTAL DEPTH 49.0 ft | NORTHING 628,311 | EASTING 2,245,895 |
| DRILL MACHINE CME-45B | DRILL METHOD Mud Rotary | HAMMER TYPE Automatic | |
| START DATE 05/22/09 | COMP. DATE 05/22/09 | SURFACE WATER DEPTH N/A | DEPTH TO ROCK 49.0 ft |

| 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 | | | | | | | |
| 195 | | | | | | | | | | | | | | | | | |
| 192.5 | 193.5 | 1.0 | | | | | | | | | | | | | 193.5 | GROUND SURFACE | |
| 190 | 190.0 | 3.5 | 2 | 3 | 3 | 6 | | | | | | | M | | 190.0 | ROADWAY EMBANKMENT BROWN, MED. STIFF, SANDY CLAY (A-6) TRACE ORGANICS | |
| 187.5 | 187.5 | 6.0 | 1 | 1 | 2 | 3 | | | | | | | SS-1 | 36% | | 185.0 | ORANGE AND TAN, SOFT, FN SANDY CLAYEY SILT (A-4) |
| 185 | 185.0 | 8.5 | 1 | 2 | 2 | 4 | | | | | | | M | | | 185.0 | ORANGE, MED. STIFF, SILTY CLAY (A-7-5) |
| 180 | 180.0 | 13.5 | 2 | 3 | 2 | 5 | | | | | | | SS-2 | 37% | | 180.0 | RESIDUAL ORANGE, WHITE, AND GREEN-GRAY, STIFF TO HARD, CLAYEY SILT (A-5) MICACEOUS |
| 175 | 175.0 | 18.5 | 3 | 4 | 8 | 12 | | | | | | | M | | | 175.0 | |
| 170 | 170.0 | 23.5 | 4 | 5 | 7 | 12 | | | | | | | W | | | 170.0 | |
| 165 | 165.0 | 28.5 | 5 | 5 | 9 | 14 | | | | | | | W | | | 165.0 | |
| 160 | 160.0 | 33.5 | 3 | 7 | 11 | 18 | | | | | | | W | | | 160.0 | |
| 155 | 155.0 | 38.5 | 8 | 9 | 17 | 26 | | | | | | | W | | | 155.0 | |
| 150 | 150.0 | 43.5 | 9 | 16 | 24 | 40 | | | | | | | W | | | 150.0 | |
| 145 | 145.0 | 48.5 | 11 | 25 | 54 | 79 | | | | | | | W | | | 145.0 | |
| 144.5 | 144.5 | 49.0 | 100/3 | | | 100/3 | | | | | | | W | | | 144.5 | WEATHERED ROCK GREEN-GRAY, PHYLLITE Boring Terminated BY TRICONE REFUSAL at Elevation 144.5 ft |
| 140 | | | 60/0 | | | 60/0 | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | | | | |
| 125 | | | | | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE G6024.00 - NCDOT B-4555 - RETAINING WALL GP1 - NC_DOT.GDT 6/30/09

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

BRIDGE NO. 97 OVER NORFOLK SOUTHERN RAILROAD ON US 70

NCDOT Project No: 33767.1.1 - T.I.P. No: B-4555

JOHNSTON COUNTY, NC

FALCON ENGINEERING, INC. PROJECT NO: G9024.00

| BORING # | | | SAMPLE # | | | TOTAL SAMPLE | | | MINUS 2.00 mm FRACTION | | | | Atterberg Limit Test Results | | | MC |
|-----------------------|---------------|--------------|-----------------|-----|------|------------------|-----------|------|------------------------|----|----|----|------------------------------|----|----|------|
| AASHTO Classification | | | PERCENT PASSING | | | PERCENT RETAINED | | | | | | | | | | |
| STATION # | OFFSET (FEET) | DEPTH (FEET) | #10 | #40 | #200 | Coarse Sand | Fine Sand | SILT | CLAY | LL | PL | PI | % | | | |
| EB1-A | | | SS-1 | | | 100 | 95 | 73 | 8 | 37 | 37 | 18 | 35 | NP | NP | 36.0 |
| A-4 | | | | | | | | | | | | | | | | |
| 24+15 | 25' LT | 3.5-5.0 | | | | | | | | | | | | | | |
| EB1-A | | | SS-2 | | | 100 | 99 | 96 | 1 | 6 | 24 | 69 | 71 | 34 | 37 | 36.6 |
| A-7-5 | | | | | | | | | | | | | | | | |
| 24+15 | 25' LT | 8.5-10.0 | | | | | | | | | | | | | | |
| R-3 | | | SS-8 | | | 100 | 93 | 69 | 13 | 29 | 30 | 28 | 23 | 17 | 6 | 22.6 |
| A-4 | | | | | | | | | | | | | | | | |
| 22+76 | 28' LT | 6.0-7.5 | | | | | | | | | | | | | | |
| RW-1 | | | SS-12 | | | 100 | 94 | 70 | 14 | 23 | 15 | 48 | 56 | 38 | 18 | 27.6 |
| A-7-5 | | | | | | | | | | | | | | | | |
| 19+96 | 16' RT | 8.5-10.0 | | | | | | | | | | | | | | |
| RW-3 | | | SS-13 | | | 100 | 99 | 94 | 2 | 19 | 66 | 13 | 38 | NP | NP | 25.8 |
| A-4 | | | | | | | | | | | | | | | | |
| 23+01 | 39' RT | 13.5-15.0 | | | | | | | | | | | | | | |
| RW-4 | | | SS-14 | | | 100 | 94 | 71 | 13 | 26 | 38 | 23 | 18 | 16 | 2 | 17.3 |
| A-4 | | | | | | | | | | | | | | | | |
| 24+15 | 39' RT | 1.0-2.5 | | | | | | | | | | | | | | |
| R-2, R-3 | | | SS-1 | | | 100 | 90 | 63 | 19 | 24 | 20 | 37 | 35 | 18 | 17 | 22.6 |
| A-6 | | | | | | | | | | | | | | | | |
| - | - | 0-5.0 | | | | | | | | | | | | | | |

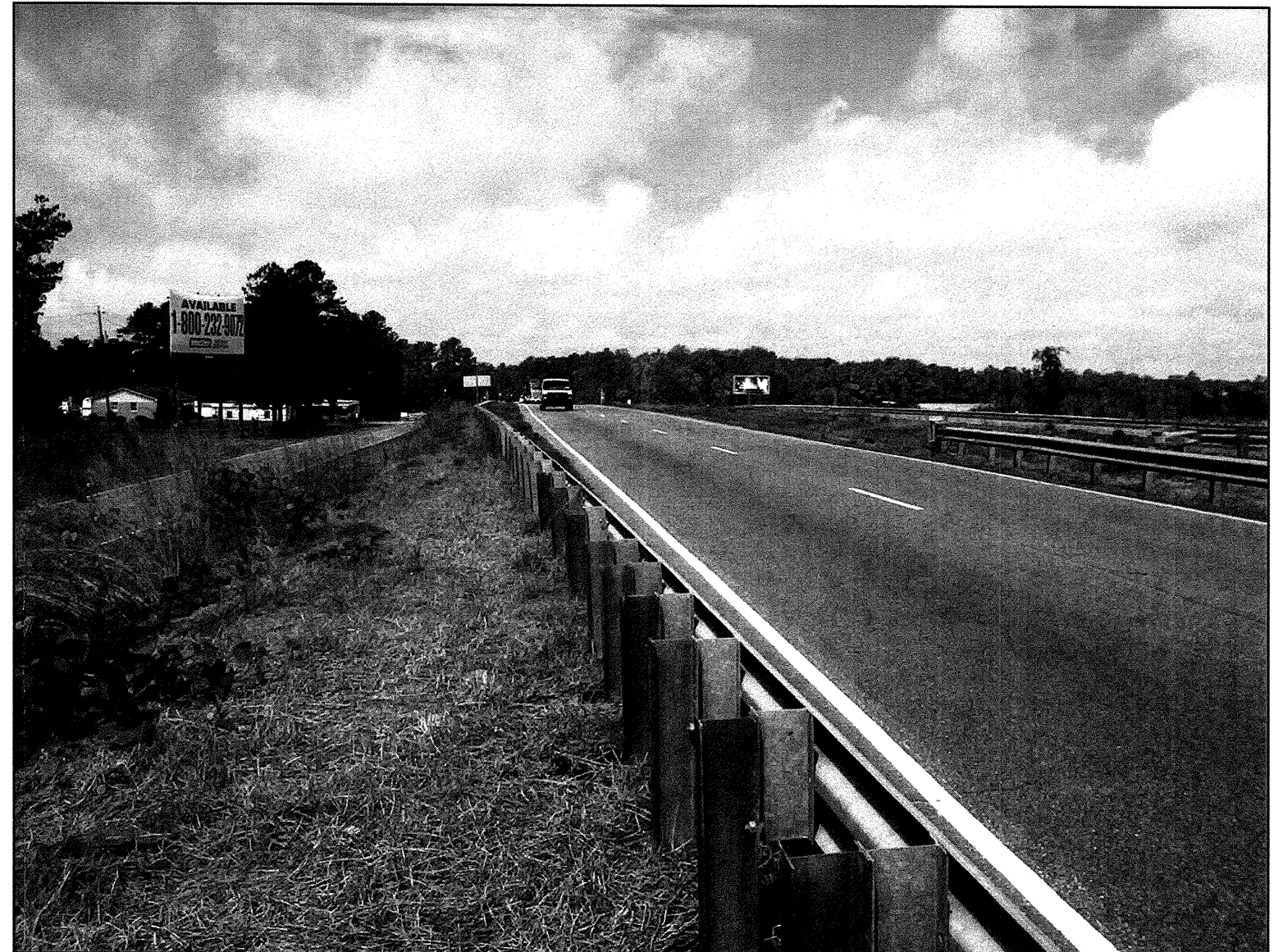
SIGNATURE *[Signature]*

NCDOT NO. 105-03-0803

Notes: LL = Liquid limit
 PL = Plastic limit
 PI = Plasticity index = LL - PL



LOOKING EAST (UPSTATION) ALONG -WL- FROM BEGINNING OF WALL,
APPROXIMATE STATION 19+75



LOOKING WEST (DOWNSTATION) ALONG -WL- FROM END OF WALL,
APPROXIMATE STATION 25+00

SITE PHOTOGRAPHS

**BRIDGE NO. 97 OVER NORFOLK
SOUTHERN RAILROAD ON US 70
JOHNSTON COUNTY, NORTH CAROLINA
TIP NO: B-4555, STATE PROJECT NO: 33767.1.1**



FALCON ENGINEERING, INC.
2736 ROWLAND RD.
RALEIGH, NC 27615
PHONE (919) 871-0800
FAX (919) 871-0803