

NOTE: SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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

| STATE           | STATE PROJECT REFERENCE NO. | SHEET NO.   | TOTAL SHEETS |
|-----------------|-----------------------------|-------------|--------------|
| N.C.            | 38524.1.1 (B-4752)          | 1           | 12           |
| STATE PROJ. NO. | F.A. PROJ. NO.              | DESCRIPTION |              |
|                 |                             | P.E.        |              |
|                 |                             | RW & UTIL.  |              |
|                 |                             |             |              |
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|      | SAMPLE RESULTS       | II   |         |        |

ROADWAY  
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 38524.1.1 (B-4752) F.A. PROJ. BRSTP-2014(3)  
COUNTY GASTON  
PROJECT DESCRIPTION BRIDGE #6 ON SR 2014 (LAKEWOOD RD.)  
OVER SOUTH FORK OF THE CATAWBA RIVER

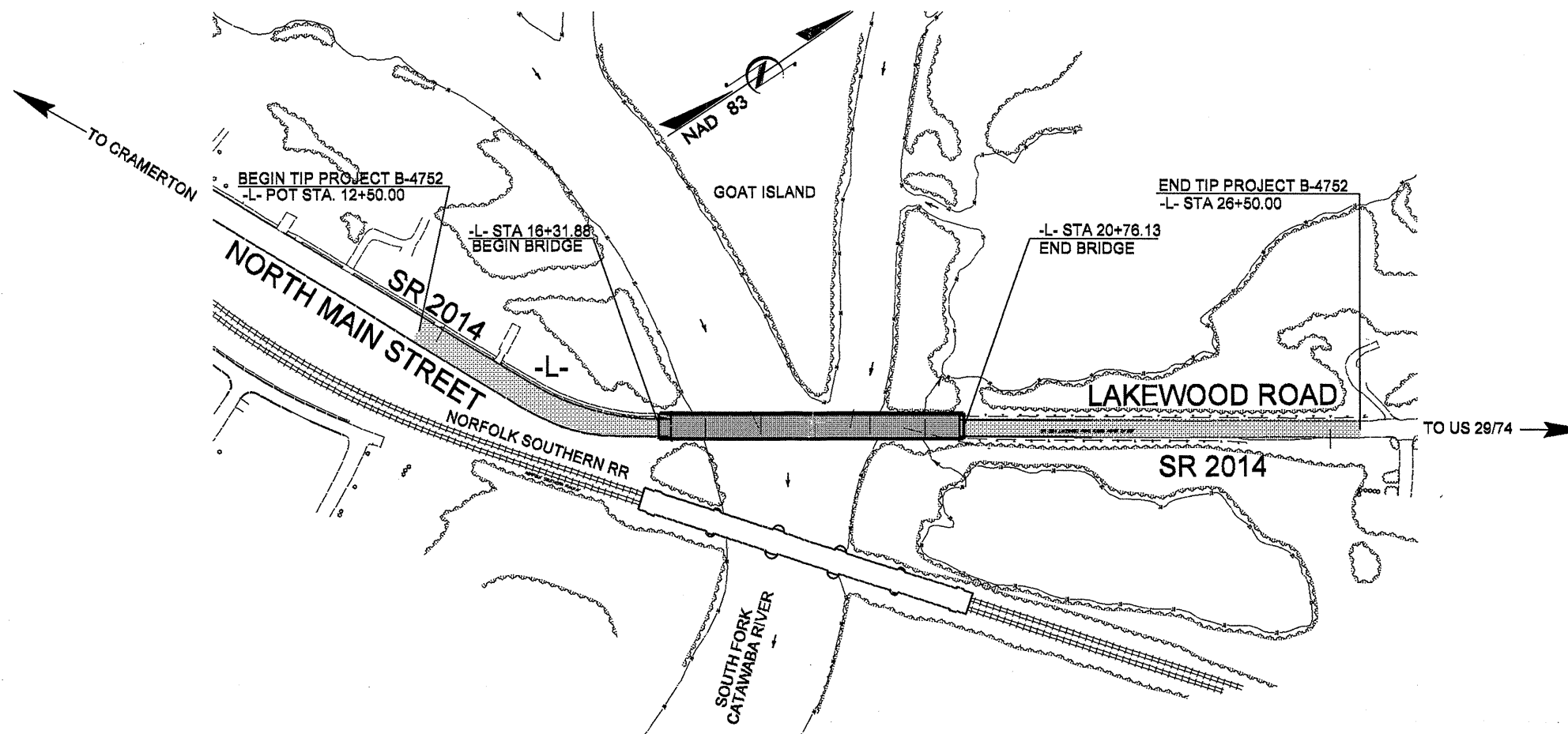
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THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR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

INVENTORY



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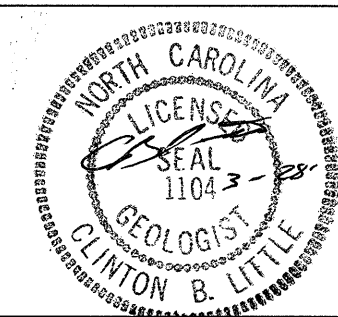
DATE FEBRUARY, 2011

ID: B-4752  
CONTRACT: C203014

DRAWN BY: J. E. ROLFSMEYER/J.P. ROGERS

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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. 38524.11(B-4752) SHEET NO. 2

**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 (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:<br><i>VERY STIFF, GRAY-SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH 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.<br><b>ANGULARITY OF GRAINS</b><br>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <u>ANGULAR</u> , <u>SUBANGULAR</u> , <u>SUBROUNDED</u> , OR <u>ROUNDED</u> .   |  |  |  | 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:<br> NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.<br> FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.<br> 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.<br> COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC. |  |  |  | ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.<br>AQUIFER - A WATER BEARING FORMATION OR STRATA.<br>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.<br>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.<br>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.<br>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.<br>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.<br>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.<br>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.<br>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.<br>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.<br>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.<br>FISSELE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.<br>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL.<br>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.<br>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.<br>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.<br>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.<br>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.<br>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.<br>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.<br>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.<br>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.<br>SAPROLITE (SAP) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.<br>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.<br>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.<br>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.<br>STRATA CORE RECOVERY (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.<br>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.<br>TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. |  |  |  |
| <b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>   |  |  |  | <b>MINERALOGICAL COMPOSITION</b>   |  |  |  | <b>WEATHERING</b>   |  |  |  |  |  |  |  |
| 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 ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.   |  |  |  |  |  |  |  |
| GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-3, A-4, A-5, A-6, A-7  |  |  |  | SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50   |  |  |  | VERY SLIGHT (V SL.) 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.   |  |  |  |  |  |  |  |
| SYMBOL   |  |  |  | COMPRESSION  |  |  |  | SLIGHT (SL.) 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.  |  |  |  |  |  |  |  |
| % PASSING  |  |  |  | PERCENTAGE OF MATERIAL   |  |  |  | MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.  |  |  |  |  |  |  |  |
| LIQUID LIMIT PLASTIC INDEX   |  |  |  | GROUND WATER   |  |  |  | SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL.   |  |  |  |  |  |  |  |
| GROUP INDEX  |  |  |  | MISCELLANEOUS SYMBOLS  |  |  |  | VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT N VALUES > 100 BPF.  |  |  |  |  |  |  |  |
| USUAL TYPES OF MAJOR MATERIALS   |  |  |  | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION  |  |  |  | COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.   |  |  |  |  |  |  |  |
| GER. RATING AS A SUBGRADE  |  |  |  | TEST BORING  |  |  |  | ROCK HARDNESS   |  |  |  |  |  |  |  |
| EXCELLENT TO GOOD FAIR TO POOR FAIR TO POOR POOR UNSUITABLE  |  |  |  | SOIL SYMBOL  |  |  |  | VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.   |  |  |  |  |  |  |  |
| PI OF A-7-5 SUBGROUP IS <= LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30   |  |  |  | ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT   |  |  |  | HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.  |  |  |  |  |  |  |  |
| CONSISTENCY OR DENSENESS   |  |  |  | INFERRED SOIL BOUNDARY   |  |  |  | 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.   |  |  |  |  |  |  |  |
| PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )   |  |  |  | INFERRED ROCK LINE   |  |  |  | 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.  |  |  |  |  |  |  |  |
| VERY LOOSE 4 TO 10 MEDIUM DENSE 10 TO 30 DENSE 30 TO 50 VERY DENSE >50   |  |  |  | ALLUVIAL SOIL BOUNDARY   |  |  |  | SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  |  |  |  |  |  |  |  |
| VERY SOFT 2 TO 4 SOFT 4 TO 6 MEDIUM STIFF 8 TO 15 STIFF 15 TO 30 HARD >30  |  |  |  | DIP & DIP DIRECTION OF ROCK STRUCTURES   |  |  |  | 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.  |  |  |  |  |  |  |  |
| TEXTURE OR GRAIN SIZE  |  |  |  | ABBREVIATIONS  |  |  |  | FRACTURE SPACING  |  |  |  | BEDDING  |  |  |  |
| 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   |  |  |  | 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 # - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WA. - WEATHERED UNIT WEIGHT WU - DRY UNIT WEIGHT |  |  |  | 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  |  |  |  |
| GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3  |  |  |  | SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO   |  |  |  | INDURATION  |  |  |  |  |  |  |  |
| SOIL MOISTURE - CORRELATION OF TERMS   |  |  |  | EQUIPMENT USED ON SUBJECT PROJECT  |  |  |  | FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.   |  |  |  |  |  |  |  |
| 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  |  |  |  | FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.  |  |  |  |  |  |  |  |
| LL LIQUID LIMIT SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE   |  |  |  | ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE *STEEL TEETH TRICONE 2 15/16 TUNG-CARB. CORE BIT   |  |  |  | MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.  |  |  |  |  |  |  |  |
| PL PLASTIC LIMIT WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE   |  |  |  | HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H   |  |  |  | INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.  |  |  |  |  |  |  |  |
| OM OPTIMUM MOISTURE MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE   |  |  |  | HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST SAMPLER PROBE   |  |  |  | EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.   |  |  |  |  |  |  |  |
| SL SHRINKAGE LIMIT DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE  |  |  |  | PLASTICITY   |  |  |  |   |  |  |  |  |  |  |  |
| NONPLASTIC 0-5 VERY LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH  |  |  |  | COLOR  |  |  |  |   |  |  |  |  |  |  |  |
| DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |

NOTES:  
\*In file also used for sampler probe boring elevations: b4752.is.tin.tin w/ date 11/5/2009.

# Earthwork Balance Sheet

Volumes in Cubic Yards

PROJECT: B-4752

COUNTY: Gaston

DATE: 5/21/2012

COMPILED BY: SEC

SHEET \_\_\_ OF \_\_\_ SHEETS

| STATION                                   | STATION                  | EXCAVATION     |      |          |                  |                   | EMBANKMENT |      |       |              | BORROW | WASTE |          |         |       |
|---|--------------------------|----------------|------|----------|------------------|-------------------|------------|------|-------|--------------|--------|-------|----------|---------|-------|
|   |                          | TOTAL UNCLASS. | ROCK | UNDERCUT | UNSUIT. UNCLASS. | SUITABLE UNCLASS. | TOTAL      | ROCK | EARTH | EMBANK. +15% |        | ROCK  | SUITABLE | UNSUIT. | TOTAL |
| 13+00                                     | 16+31.88<br>BEGIN BRIDGE | 357            |      |          |                  | 357               | 27         |      | 27    | 31           |        |       | 326      |         | 326   |
|   | <b>SUBTOTAL</b>          | 357            |      |          |                  | 357               | 27         |      | 27    | 31           |        |       | 326      |         | 326   |
|   |                          |                |      |          |                  |                   |            |      |       |              |        |       |          |         |       |
| 20+76.13<br>END BRIDGE                    | 26+00                    | 391            |      |          |                  | 391               | 5,182      |      | 5,182 | 5,959        | 5,568  |       |          |         |       |
|   | <b>SUBTOTAL</b>          | 391            |      |          |                  | 391               | 5,182      |      | 5,182 | 5,959        | 5,568  |       |          |         |       |
|   |                          |                |      |          |                  |                   |            |      |       |              |        |       |          |         |       |
|   | <b>SUBTOTAL</b>          |                |      |          |                  |                   |            |      |       |              |        |       |          |         |       |
|   |                          |                |      |          |                  |                   |            |      |       |              |        |       |          |         |       |
|   | <b>SUBTOTAL</b>          |                |      |          |                  |                   |            |      |       |              |        |       |          |         |       |
|   |                          |                |      |          |                  |                   |            |      |       |              |        |       |          |         |       |
|   | <b>SUBTOTAL</b>          |                |      |          |                  |                   |            |      |       |              |        |       |          |         |       |
|   |                          |                |      |          |                  |                   |            |      |       |              |        |       |          |         |       |
|   | <b>TOTAL</b>             | 748            |      |          |                  | 748               | 5,209      |      | 5,209 | 5,990        | 5,568  |       | 326      |         | 326   |
| MATERIAL FOR SHOULDER CONSTRUCTION        |                          |                |      |          |                  |                   | 10         |      | 10    | 12           | 12     |       |          |         |       |
| LOSS DUE TO CLEARING & GRUBBING           |                          | -100           |      |          |                  | -100              |            |      |       |              | 100    |       |          |         |       |
| <b>PROJECT TOTAL</b>                      |                          | 648            |      |          |                  | 648               | 5,219      |      | 5,219 | 6,002        | 5,680  |       | 326      |         | 326   |
| EST. 5% TO REPLACE TOP SOIL ON BORROW PIT |                          |                |      |          |                  |                   |            |      |       |              | 284    |       |          |         |       |
| <b>GRAND TOTAL</b>                        |                          | 648            |      |          |                  | 648               | 5,219      |      | 5,219 | 6,002        | 5,964  |       | 326      |         | 326   |
| <b>SAY</b>                                |                          | 660            |      |          |                  |                   |            |      |       |              | 6,100  |       |          |         |       |
| EST. DDE                                  |                          | 5              | CY   |          |                  |                   |            |      |       |              |        |       |          |         |       |
| EST. SHALLOW UNDERCUT                     |                          | 500            | CY   |          |                  |                   |            |      |       |              |        |       |          |         |       |
| CLASS IV SUBGRADE STABILIZATION           |                          | 1,000          | TON  |          |                  |                   |            |      |       |              |        |       |          |         |       |

PER GEOTECH RECOMMENDATION, ESTIMATED 750 CUBIC YARDS OF UNDERCUT TO BE USED IN THE DISCRETION OF THE RESIDENT ENGINEER.

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PURDUE  
GOVERNOR

Eugene A. Conti, Jr.  
SECRETARY

February 28, 2011

STATE PROJECT: 38524.1.1 (B-4752)  
FEDERAL PROJECT: BRSTP-2014(3)  
COUNTY: Gaston  
DESCRIPTION: Bridge No. 06 on SR 2014 (Lakewood Rd.) over S. Fork Catawba River  
SUBJECT: Geotechnical Report – Inventory

**PROJECT DESCRIPTION**

This project is located in southeastern Gaston County near the City of Cramerton. The confluence of the South Fork Catawba River and its North Channel is within the project corridor. This report addresses the widening of the existing -L- line (SR 2014, Lakewood Road) and includes both the approaches at Bridge No. 06. No provisions have been made for an on-site detour. The following alignment was investigated:

-L- Station 12+50.00 to 26+00.00 (0.26 miles)

The initial field investigation was conducted in September 2010. This investigation consisted of three preliminary bridge borings at existing Bridge No. 06. All three borings were conducted with a CME-550X drill machine with an automatic hammer. Standard Penetration Tests were conducted at each boring location utilizing 'N' casing with advancers. A Roadway investigation consisting of hand probes and visual reconnaissance was conducted in January and February 2010. 15 soil samples were submitted to the Materials and Tests Unit for laboratory analysis.

**AREAS OF SPECIAL GEOTECHNICAL INTEREST**

**Roadway Embankment Soils:** Roadway embankment soils were encountered in the preliminary bridge borings performed at each end of existing bridge No. 06. These soils are up to 32' thick and consist of soft to medium stiff sandy clay (A-7-5, A-6) and very loose to loose clayey sand (A-2-6). Please refer to the attached inventory plan sheets for a horizontal and vertical depiction of the extent of these soils.

**Alluvial Soils:** Much of the project corridor has a significant alluvial deposit. It is associated with the South Fork Catawba River which serves as the primary drainage outlet for this project.

Station 15+60 to 24+75 -L-: Alluvial soils in this segment are up to 27.0' deep and consist primarily of sandy/silty clay (A-7, A-6), sandy silt (A-4), and silty/clayey sand (A-2-4). Layers of organic material were encountered in the clay soils at Station 20+07 -L-. Maximum proposed roadway fill heights through this area are approximately eight feet. Groundwater, where measured, was near elevation 566'.

Lakewood Road (-L-) has a pond on each side of the road between Stations 20+00 -L- and 25+00 -L-. The proposed widening will encroach onto both ponds at some point in this interval. The maximum fill heights previously stated for the project occur in this segment on the left side of line -L-.

**SOIL PROPERTIES**

*Residual Soils*

All residual soils on the project are derived from the metamorphosed quartz diorite (PzZq) rocks encountered within the project corridor. Crystalline and severely weathered crystalline rock was encountered between elevations 510' and 552' in the preliminary bridge borings. The dominant residual soil types encountered are silty sand (A-2-4, A-1-b) and sandy silt (A-4).

Respectfully submitted,

John P. Rogers  
Project Geological Engineer

**MAILING ADDRESS:**  
NC DEPARTMENT OF TRANSPORTATION  
GEOTECHNICAL ENGINEERING UNIT  
1589 MAIL SERVICE CENTER  
RALEIGH NC 27699-1589

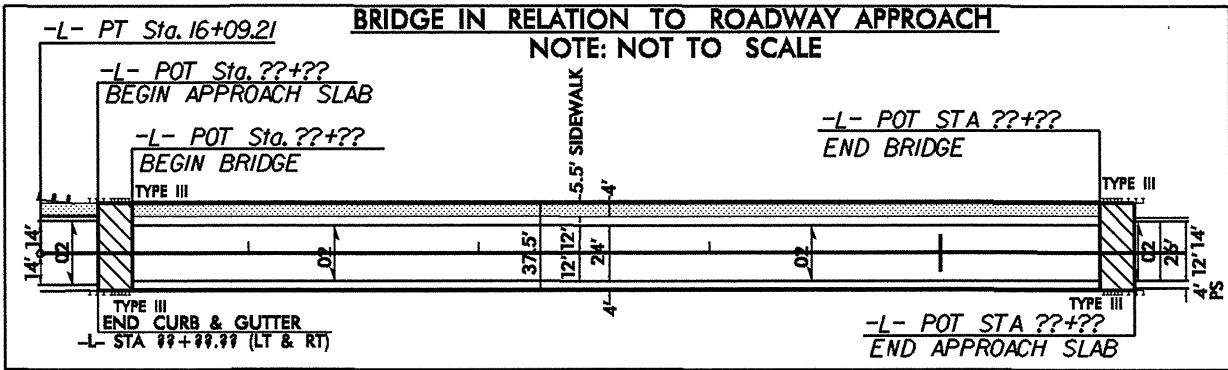
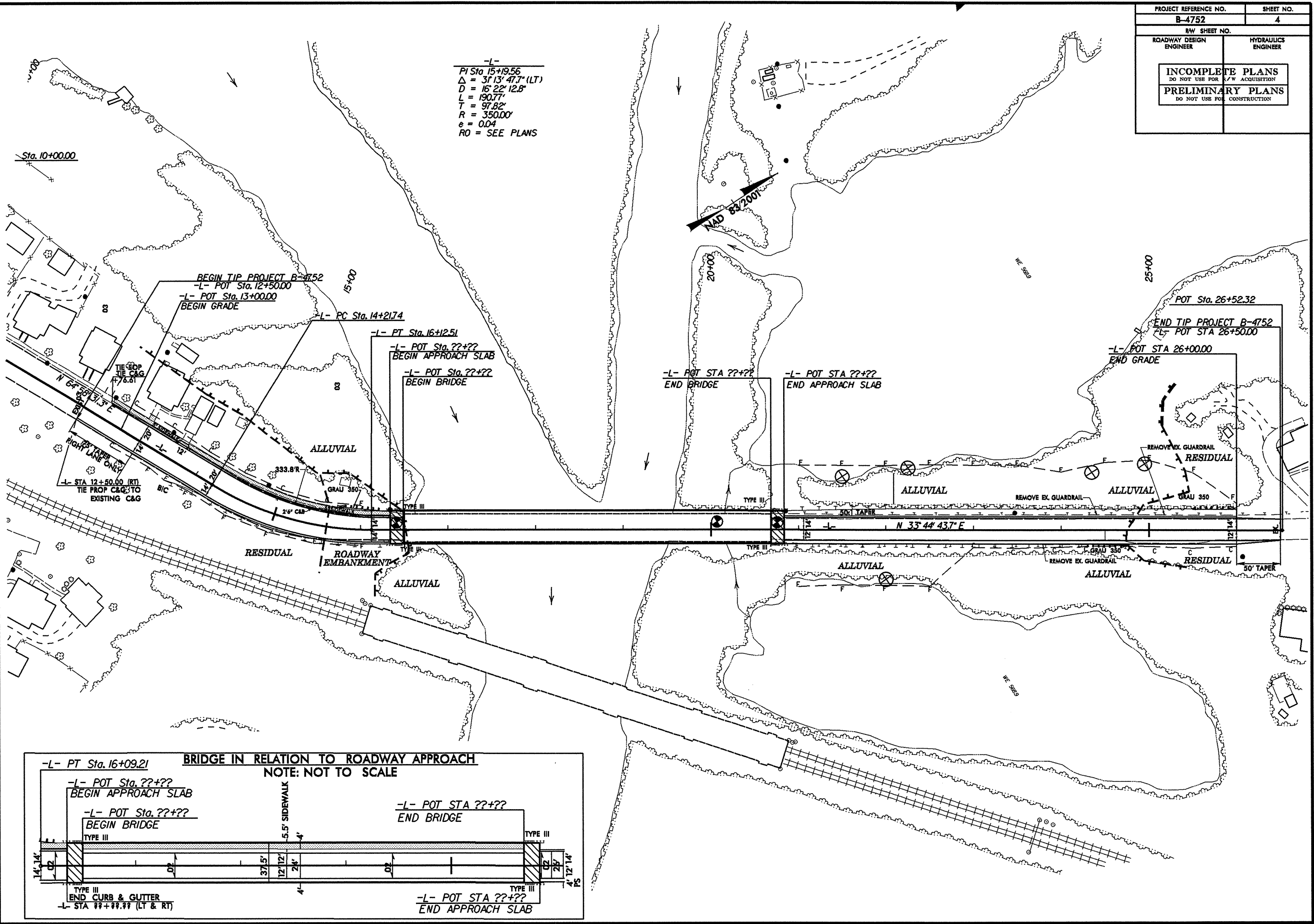
TELEPHONE: 919-250-4088  
FAX: 919-250-4237  
WEBSITE: [WWW.DOH.DOT.STATE.NC.US](http://WWW.DOH.DOT.STATE.NC.US)

**LOCATION:**  
CENTURY CENTER COMPLEX  
ENTRANCE B-2  
1020 BIRCH RIDGE DRIVE  
RALEIGH NC

8.17.99

|  |                       |
|--|-----------------------|
| PROJECT REFERENCE NO.<br><b>B-4752</b>   | SHEET NO.<br><b>4</b> |
| RW SHEET NO.   |                       |
| ROADWAY DESIGN ENGINEER  | HYDRAULICS ENGINEER   |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR R/W ACQUISITION<br><b>PRELIMINARY PLANS</b><br>DO NOT USE FOR CONSTRUCTION |                       |

-L-  
 PI Sta 15+19.56  
 $\Delta = 31^{\circ} 13' 47.7" (LT)$   
 $D = 16^{\circ} 22' 12.8"$   
 $L = 190.77'$   
 $T = 97.82'$   
 $R = 350.00'$   
 $e = 0.04$   
 RO = SEE PLANS



23-FEB-2011 14:27:52, GEO. RDWAY\_CASTON\CADD\_GEO\TECH\Plan\Prof\revised\b4752.gao\_psh\_4.dgn

# -L- SR 2014

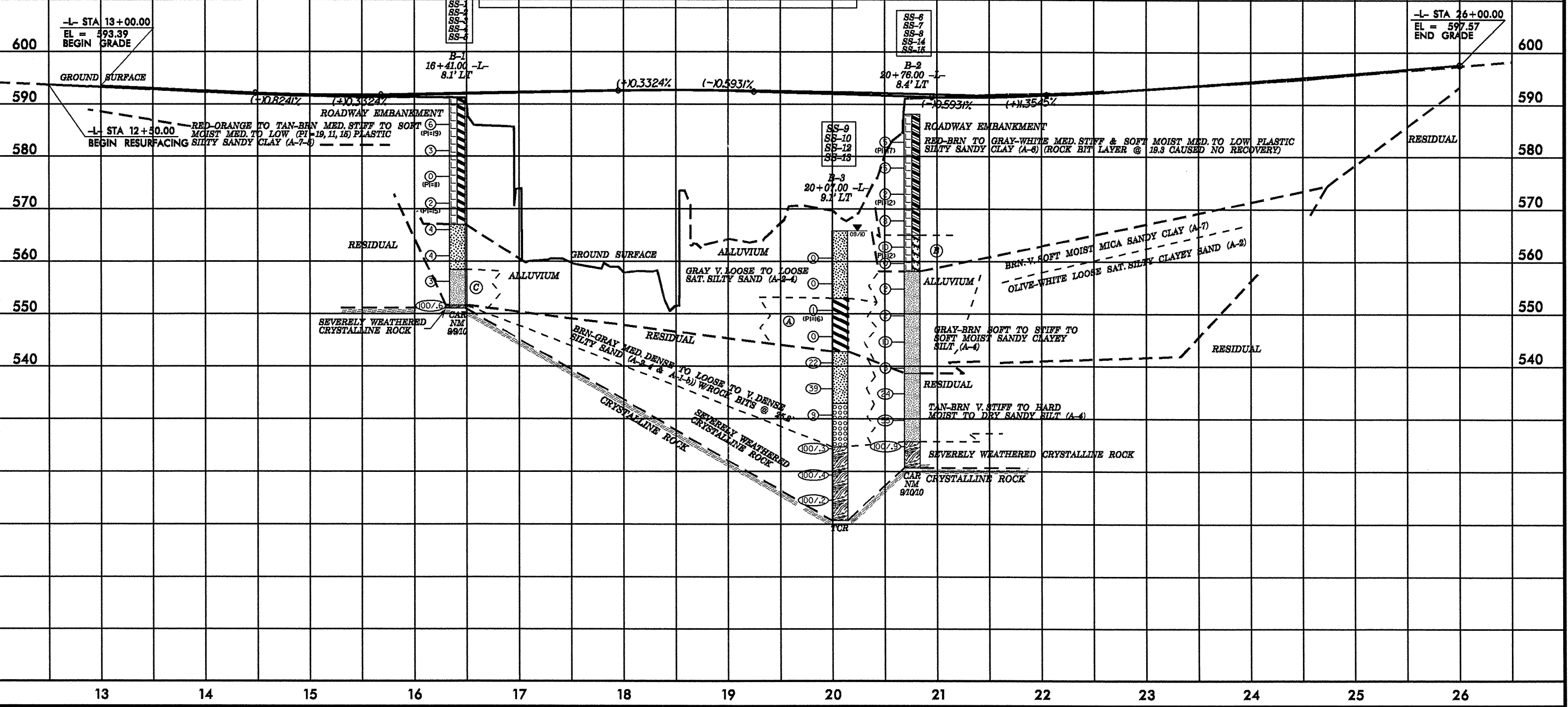
NOTES:  
 INFERRED STRATIGRAPHY IS DRAWN THRU THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE  
 GROUNDLINE PROFILE AT CL OF -L- TAKEN FROM ROADWAY DESIGN PLANS AS OF 9/13/2010

**BORING DESCRIPTIONS**

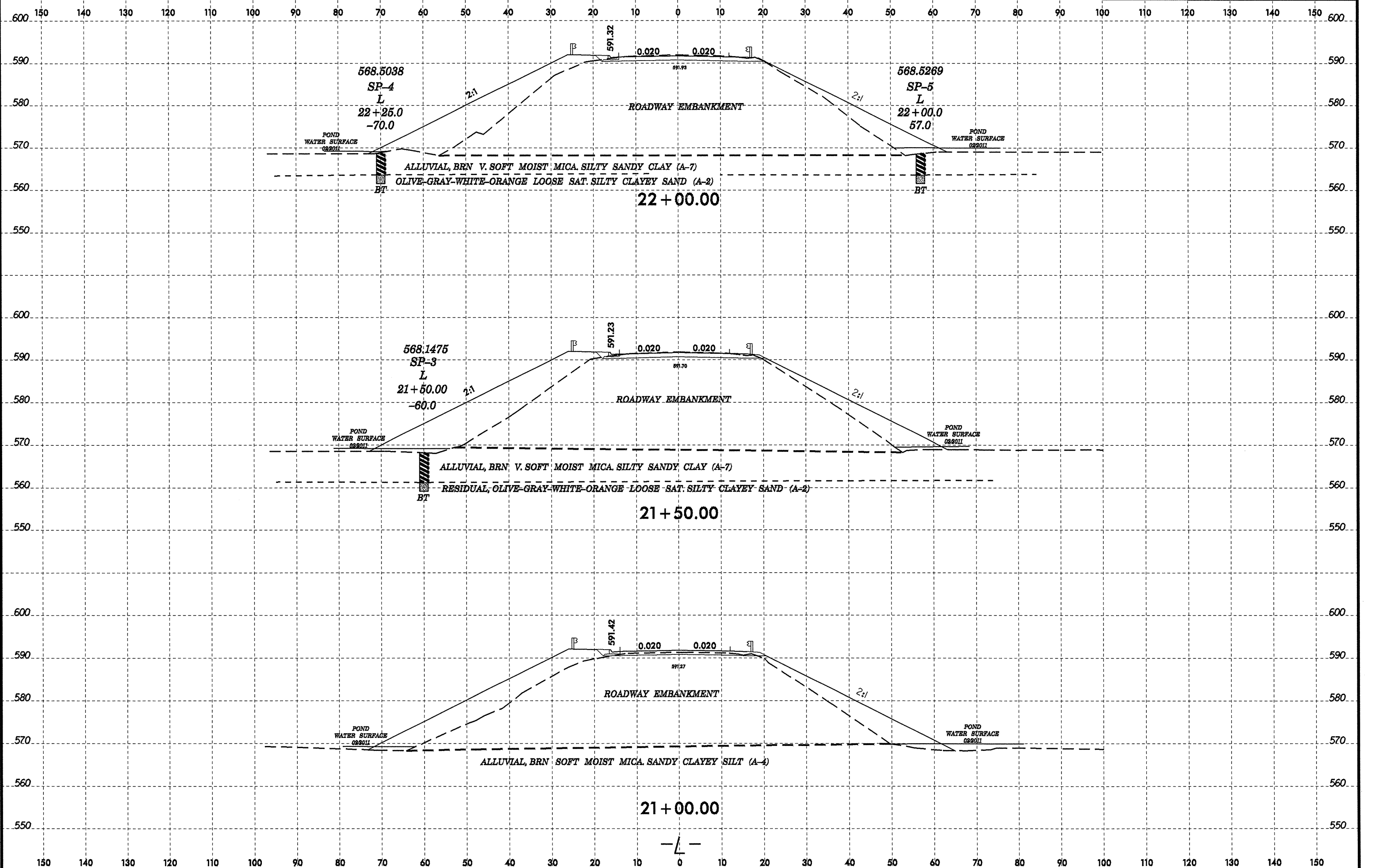
(A) GRAY V. SOFT MOIST TO WET MED. PLASTIC SILTY CLAY (A-7-5) W/ LAYERS OF ORGANIC MATERIAL

(B) GRAY LOOSE TO V. LOOSE LOW PLASTIC SILTY CLAYEY SAND (A-2-6) W/ ROCK IN FILL @ 2' (CASING ADV. BROKE OFF IN ROCK FILL @ 29.3'; SO, REDRILLED ADJ. BORING 2.3' FROM ORIG.)

(C) BRN SOFT TO V. STIFF MOIST CLAYEY SANDY SILT (A-4)

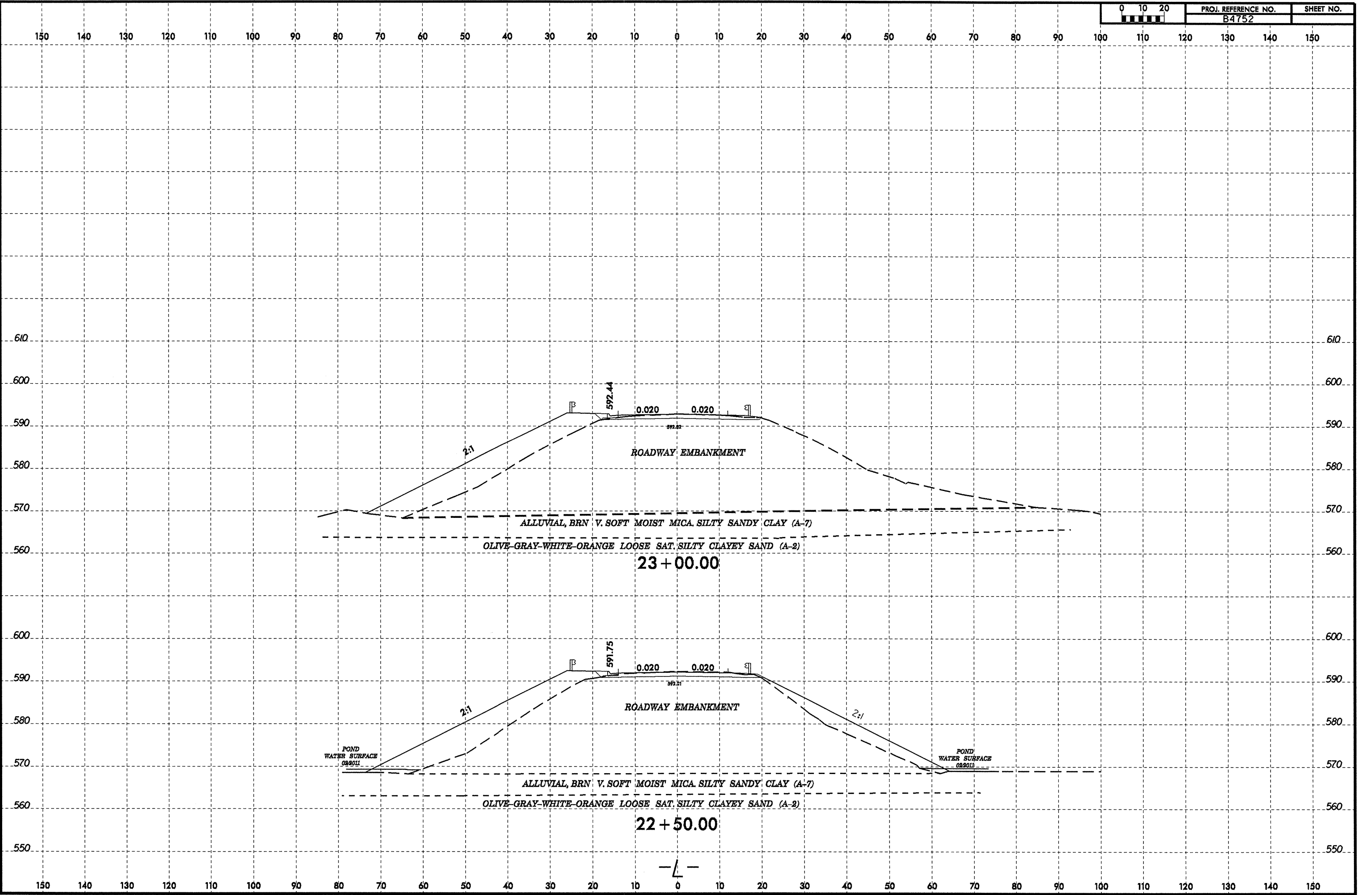


8/23/99



22-FEB-2011 14:43  
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 John O'Connell

8/23/99  
21-FEB-2011 15:50  
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John Rogers AT GEH248330





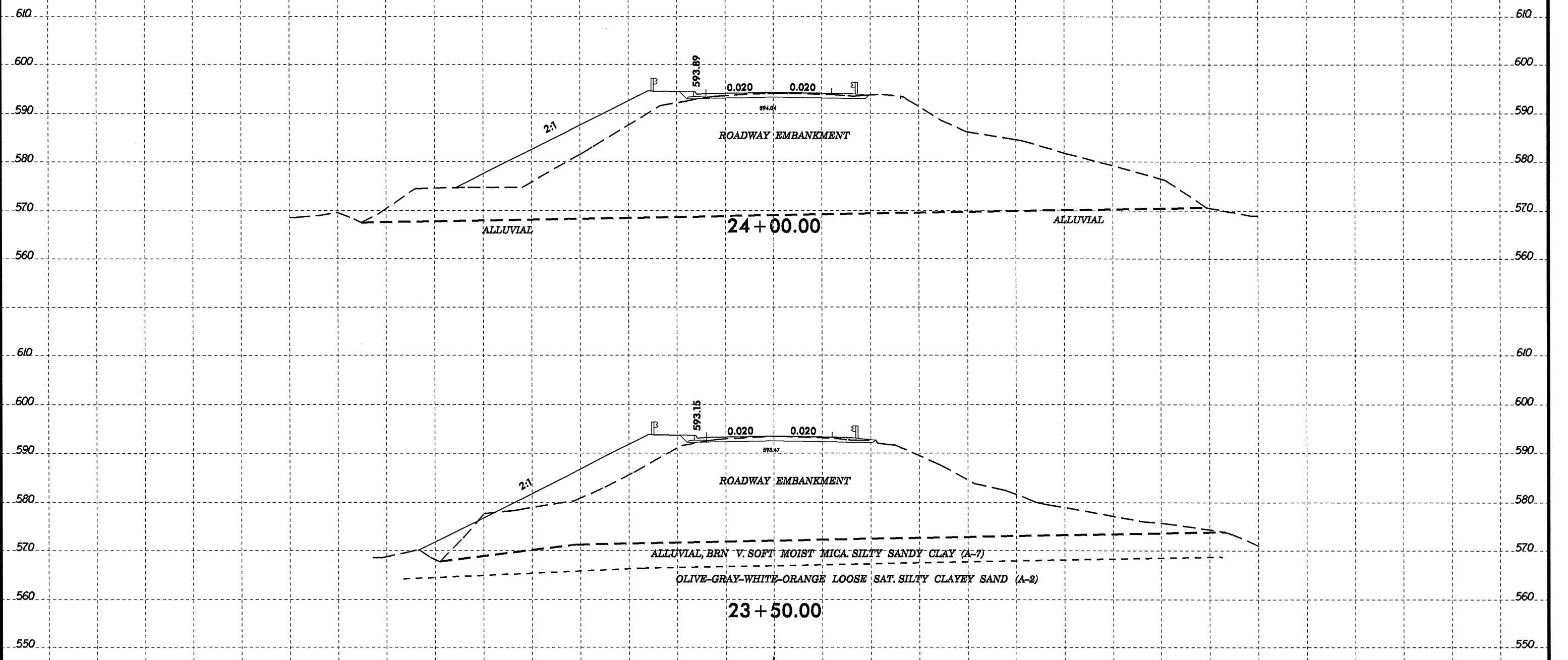
8/23/99



PROJ. REFERENCE NO.  
B4752

SHEET NO.

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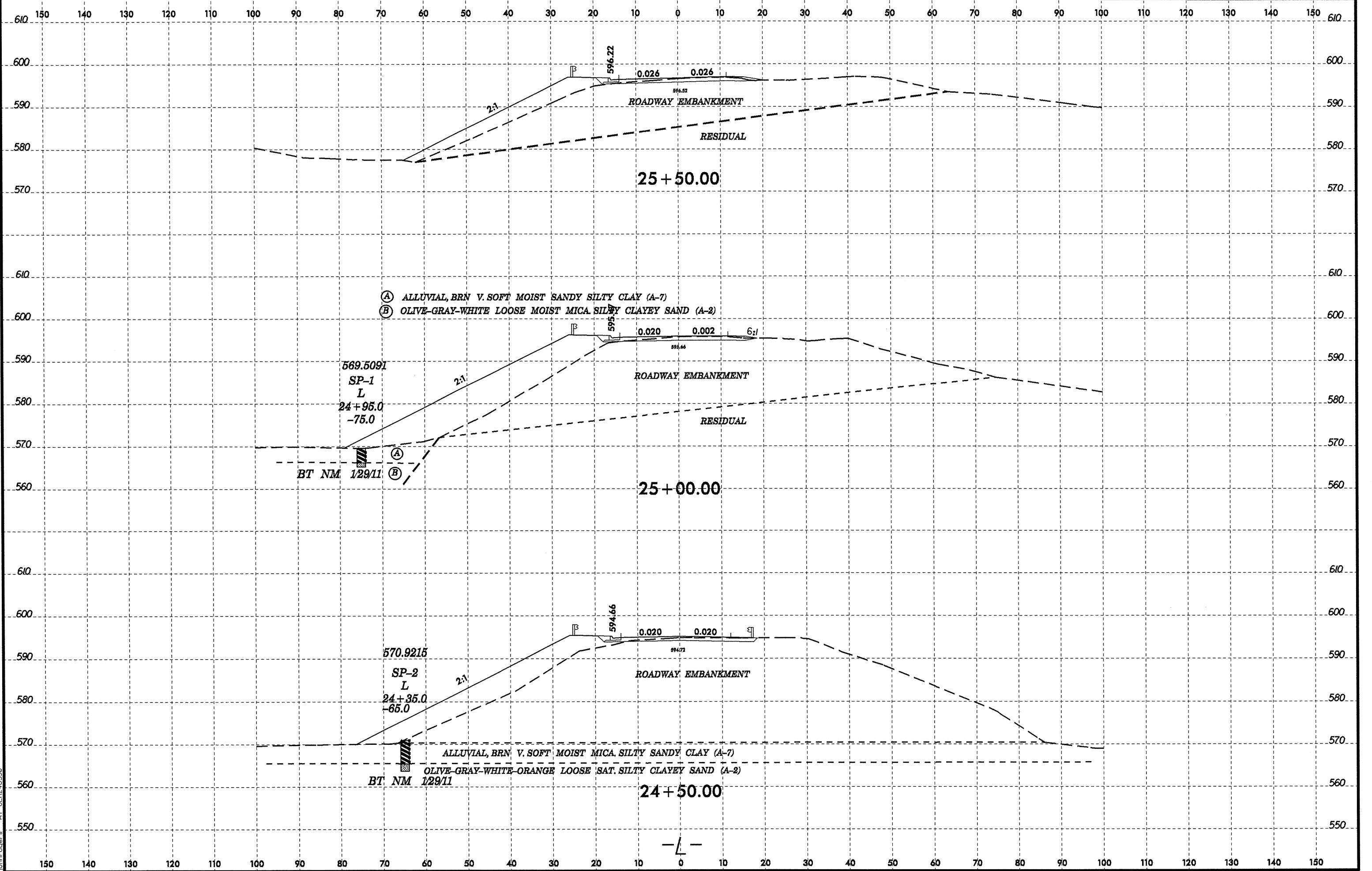


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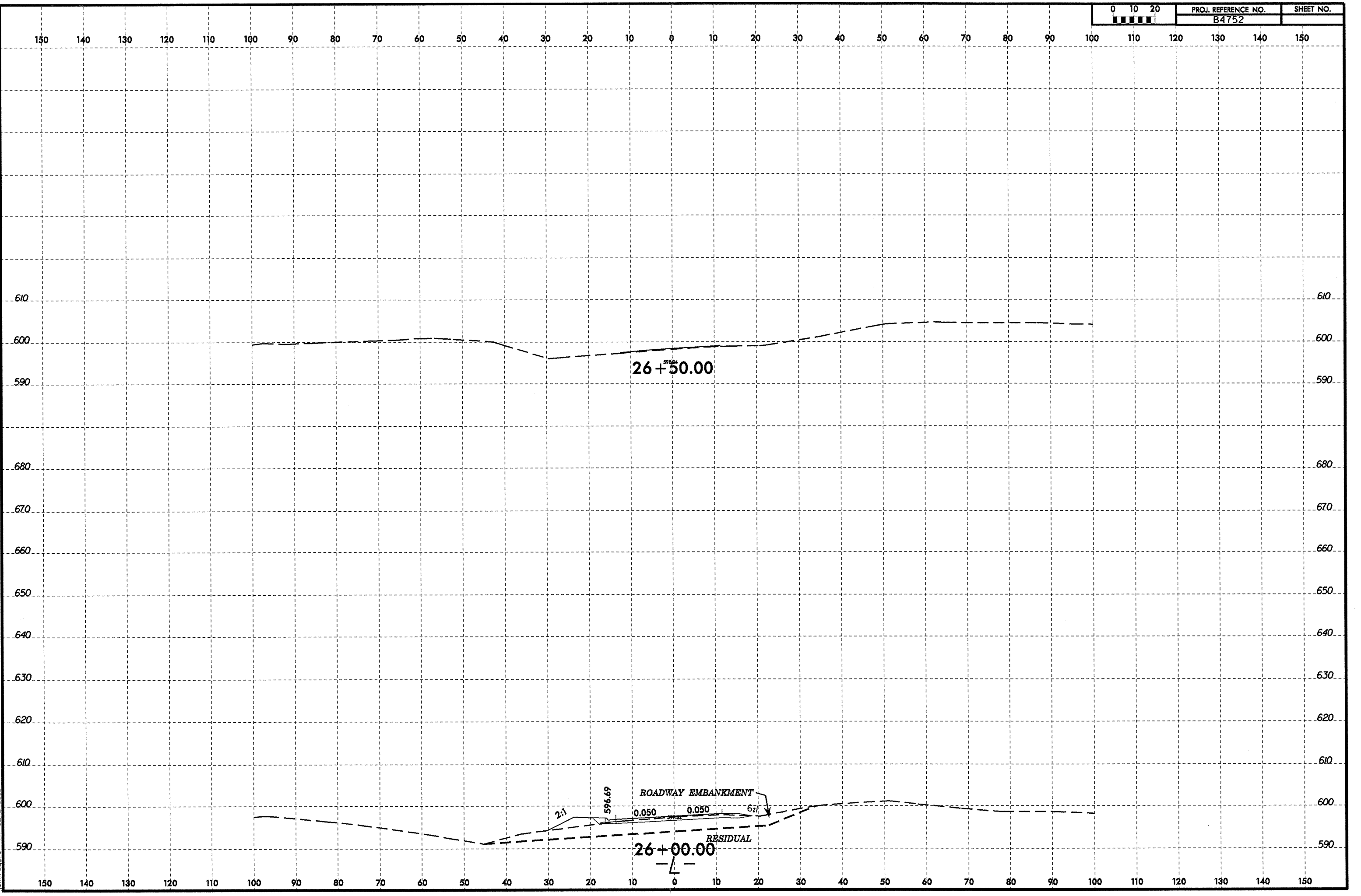
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John Rogers AT 08/23/99

8/23/99  
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John Colera



TEST RESULTS

PROJECT: 38524.1.1 (B-4752)

COUNTY: GASTON

SITE DESCRIPTION: BRIDGE #6 ON SR 2014 OVER SOUTH FORK OF CATAWBA RIVER

SHEET  
11

SOIL SAMPLE RESULTS

| SAMPLE NO. | OFFSET | STATION   | DEPTH<br>INTERVAL | AASHTO<br>CLASS | N  | L.L. | P.I. | % BY WEIGHT |         |      |      | % PASSING SIEVES |    |     | %<br>MOISTURE | %<br>ORGANIC | UNIT<br>WT. (d) | VOID<br>RATIO |
|------------|--------|-----------|-------------------|-----------------|----|------|------|-------------|---------|------|------|------------------|----|-----|---------------|--------------|-----------------|---------------|
|            |        |           |                   |                 |    |      |      | C. SAND     | F. SAND | SILT | CLAY | 10               | 40 | 200 |               |              |                 |               |
| <b>B-1</b> |        |           |                   |                 |    |      |      |             |         |      |      |                  |    |     |               |              |                 |               |
| SS-1       | 8' LT  | 16+41 -L- | 4.8-5.8           | A-7-5(14)       | 6  | 53   | 19   | 16.9        | 18.9    | 22   | 42.2 | 100              | 89 | 70  |               |              |                 |               |
| SS-2       | 8' LT  | 16+41 -L- | 14.8-15.8         | A-7-5(6)        | 0  | 45   | 11   | 21.5        | 24.3    | 30.1 | 24.1 | 100              | 87 | 61  |               |              |                 |               |
| SS-3       | 8' LT  | 16+41 -L- | 19.8-20.8         | A-7-5(7)        | 2  | 48   | 15   | 26.5        | 19.9    | 25.4 | 28.1 | 98               | 80 | 57  |               |              |                 |               |
| SS-4       | 8' LT  | 16+41 -L- | 24.8-25.8         | A-2-4(0)        | 4  | 21   | NP   | 23.7        | 61.7    | 12.6 | 2    | 100              | 95 | 20  |               |              |                 |               |
| SS-5       | 8' LT  | 16+41 -L- | 34.8-35.8         | A-4(0)          | 3  | 22   | 2    | 11.1        | 58.9    | 18   | 12.1 | 100              | 98 | 38  |               |              |                 |               |
| <b>B-2</b> |        |           |                   |                 |    |      |      |             |         |      |      |                  |    |     |               |              |                 |               |
| SS-6       | 8' LT  | 20+76 -L- | 4.8-5.8           | A-6(2)          | 5  | 35   | 17   | 42.8        | 17.9    | 11.2 | 28.1 | 94               | 66 | 39  |               |              |                 |               |
| SS-7       | 8' LT  | 20+76 -L- | 14.8-15.8         | A-6(3)          | 2  | 39   | 12   | 37.4        | 17.5    | 25.0 | 20.1 | 97               | 70 | 47  |               |              |                 |               |
| SS-8       | 8' LT  | 20+76 -L- | 24.8-25.8         | A-2-6(0)        | 10 | 36   | 12   | 50.5        | 15.9    | 13.6 | 20.1 | 80               | 50 | 29  |               |              |                 |               |
| SS-14      | 8' LT  | 20+76 -L- | 32.9-33.9         | A-4(8)          | 2  | 36   | 9    | 6.4         | 18.3    | 39.1 | 36.2 | 100              | 96 | 84  |               |              |                 |               |
| SS-15      | 8' LT  | 20+76 -L- | 52.9-53.9         | A-4(2)          | 24 | 37   | 3    | 12.1        | 37.8    | 42.1 | 8    | 100              | 95 | 61  |               |              |                 |               |
| <b>B-3</b> |        |           |                   |                 |    |      |      |             |         |      |      |                  |    |     |               |              |                 |               |
| SS-9       | 9' LT  | 20+07 -L- | 4.7-5.7           | A-2-4(0)        | 0  | 23   | NP   | 40.6        | 38.8    | 12.6 | 8    | 97               | 71 | 23  |               |              |                 |               |
| SS-10      | 9' LT  | 20+07 -L- | 14.7-15.7         | A-7-5(19)       | 1  | 47   | 16   | 1           | 6.3     | 44.4 | 48.4 | 100              | 99 | 96  |               |              |                 |               |
| SS-12      | 9' LT  | 20+07 -L- | 29.7-30.7         | A-2-4(0)        | 39 | 27   | 4    | 41.4        | 23.5    | 27   | 8    | 81               | 54 | 34  |               |              |                 |               |
| SS-13      | 9' LT  | 20+07 -L- | 34.7-35.7         | A-1-b)(0)       | 9  | 28   | NP   | 55.9        | 28.5    | 13.6 | 2    | 87               | 50 | 19  |               |              |                 |               |

ROCK SAMPLE RESULTS

| SAMPLE NO. | OFFSET | STATION | DEPTH<br>INTERVAL | RQD | UNIT WT | Q(MPa)<br>(ksf) | E(MPa)<br>(MPsi) |
|------------|--------|---------|-------------------|-----|---------|-----------------|------------------|
|------------|--------|---------|-------------------|-----|---------|-----------------|------------------|