

**PROJECT: 33687.1.1**      **ID: B-4409**

# STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STATE	PROJECT REFERENCE NO.	SHEET	TOTAL SHEETS
N.C.	B-4409	1	27
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33687.1.1	BRZ-1627(3)	P.E. CONST.	

For Letting

## STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33687.1.1 I.D. NO. B-4409

F.A. PROJECT BRZ-1627(3)

COUNTY ANSON

PROJECT DESCRIPTION REPLACE BRIDGE NO. 308  
OVER WINSTON-SALEM SOUTHBOUND RR ON SR 1627

SITE DESCRIPTION \_\_\_\_\_

### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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.

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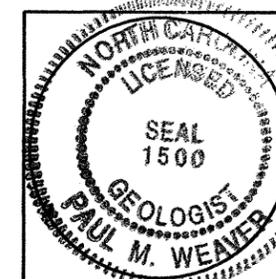
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INVESTIGATED BY G. LICAYAN / T. WELLS      PERSONNEL D. KITCHEN  
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NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.



7/12/07

*Paul M. Weaver*  
SIGNATURE

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

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4409	33687.1.1	2	27

**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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND 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, 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. <b>ANGULARITY OF GRAINS</b> THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN IMPLIED 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: <b>WEATHERED ROCK (WR)</b>  NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT. <b>CRYSTALLINE ROCK (CR)</b>  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. <b>NON-CRYSTALLINE ROCK (NCR)</b>  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. <b>COASTAL PLAIN SEDIMENTARY ROCK (CPS)</b>  COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.		<b>ALLUVIUM (ALLUV.)</b> - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE STRATA RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (F.P.)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM.)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (R.Q.D.)</b> - 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. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRODUCED ROCKS. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS IN OR B.P.F. 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 LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.)</b> - 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. <b>TOPSOIL (T.S.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.					
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>		<b>MINERALOGICAL COMPOSITION</b>		<b>WEATHERING</b>		<b>ROCK HARDNESS</b>					
GENERAL CLASS. GRANULAR MATERIALS (1-5% PASSING #200) SILT-CLAY MATERIALS (1-5% PASSING #200) ORGANIC MATERIALS		MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.		<b>FRESH</b> - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. <b>VERY SLIGHT (V, SL.)</b> - ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK TYPE INCLUDES HAMMER BLOWS IF OF A CRYSTALLINE NATURE. <b>SLIGHT (SL.)</b> - 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. <b>MODERATE (MOD.)</b> - 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. <b>MODERATELY SEVERE (MOD. SEV.)</b> - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED WOULD YIELD SPT REFUSAL</i> <b>SEVERE (SEV.)</b> - ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED YIELDS SPT N VALUES &gt; 100 B.P.F.</i> <b>VERY SEVERE (V, SEV.)</b> - 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. <i>IF TESTED YIELDS SPT N VALUES &lt; 100 B.P.F.</i> <b>COMPLETE</b> - 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.		<b>COMPRESSION</b> SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE <b>PERCENTAGE OF MATERIAL</b> 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		<b>GROUND WATER</b>  WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.  STATIC WATER LEVEL AFTER 24 HOURS.  PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA  SPRING OR SEEPAGE		<b>MISCELLANEOUS SYMBOLS</b>  ROADWAY EMBANKMENT WITH SOIL DESCRIPTION  SOIL SYMBOL  ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS  INFERRED SOIL BOUNDARIES  INFERRED ROCK LINE  ALLUVIAL SOIL BOUNDARY  DIP/DIP DIRECTION OF ROCK STRUCTURES  SOUNDING ROD  TEST BORING  AUGER BORING  CORE BORING  MONITORING WELL  PIEZOMETER INSTALLATION  SLOPE INDICATOR INSTALLATION  SPT N-VALUE  SPT REFUSAL <b>ABBREVIATIONS</b> AR - AUGER REFUSAL BT - BORING TERMINATED CL - CAVE IN CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE C.T. - CORING TERMINATED DHT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST F - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC - FRACTURED FRAGS. - FRAGMENTS MED. - MEDIUM N/A - NOT APPLICABLE NM - NOT MEASURED SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL U - UNIT WEIGHT U <sub>d</sub> - DRY UNIT WEIGHT W - MOISTURE CONTENT V. - VERY VST - VANE SHEAR TEST	
<b>CONSISTENCY OR DENSENESS</b>		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )		SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE		VERY HARD HARD MODERATELY HARD MEDIUM HARD SOFT VERY SOFT		VERY HARD HARD MODERATELY HARD MEDIUM HARD SOFT VERY SOFT					
<b>TEXTURE OR GRAIN SIZE</b>		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.0 0.42 0.25 0.075 0.053		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
<b>PLASTICITY</b>		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
<b>COLOR</b>		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
<b>EQUIPMENT USED ON SUBJECT PROJECT</b>		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
DRILL UNITS: MOBILE B-57, BK-51, CME-45, CME-55, PORTABLE MOIST, OTHER CME 850, OTHER ACKER MARK II		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
<b>FRACTURE SPACING</b>		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
TERM SPACING: VERY WIDE MORE THAN 18 FEET, WIDE 3 TO 18 FEET, MODERATELY CLOSE 1 TO 3 FEET, CLOSE 0.16 TO 1 FEET, VERY CLOSE LESS THAN 0.16 FEET		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
<b>BEDDING</b>		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
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		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
<b>INDURATION</b>		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
<b>NOTES:</b>		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					
BENCH MARK: NCDOT BM "2"-BL - STA. 21+98.52' RT, RR SPIKE IN 20" OAK/ RIVER BIRCH ELEVATION: 271.77'		<b>COMPRESSION</b>		<b>ROCK HARDNESS</b>		<b>ROCK HARDNESS</b>					



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Appendices

Appendix A (Issued Under Separate Cover)

- 1. Laboratory Results of Rock Tests

Appendix B (Issued Under Separate Cover)

- 1. FHWA Geotechnical Report Review Checklist
- 2. Boring Quantity Summation Sheet
- 3. Field Boring and Coring Logs
- 4. Survey Notes
- 5. Property Owner Contact Report Sheet

**SUBMITTED TO:** North Carolina Department of Transportation  
1589 Mail Service Center  
Raleigh, North Carolina 27699-1589

**ATTENTION:** Mr. Njoroge W. Wainaina, P.E.  
State Geotechnical Engineer

**SUBMITTED BY:** Trigon Engineering Consultants, Inc.  
Post Office Box 18846  
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Trigon Project No. 071-07-019

**DATE:** June 14, 2007

**STATE PROJECT:** 33687.1.1

**TIP :** B-4409

**FEDERAL PROJECT:** BRZ-1627(3)

**COUNTY:** Anson

**DESCRIPTION:** Replace Bridge No. 308 Over Winston-Salem Southbound RR on SR 1627

**SUBJECT:** Geotechnical Report of Structure Subsurface Investigation



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At the time of this investigation, a three-span bridge (existing Bridge No. 308) was present at the site of the proposed bridge. The existing bridge consists of a concrete deck on concrete girders with concrete abutments at the end bents. The existing bridge is approximately 113 feet in length and approximately 26 feet in width.

## 2.0 PROJECT DESCRIPTION

Proposed for construction is a new, three-span structure to replace the existing Bridge No. 308 on SR 1627 over the Winston-Salem Southbound Railroad. The proposed bridge will be a replacement-in-place of the existing bridge. Information for the proposed bridge structure was obtained from the Preliminary General Drawings provided to Trigon by the NCDOT. The proposed bridge will be 163 feet in length and approximately 31 feet in width (out to out) with a skew angle of 119°1'20" at each bent.

The proposed grade along the centerline of the proposed bridge will remain essentially unchanged at End Bent-1 and End Bent-2, while the proposed grade will be approximately 4 feet lower than the existing grade in the vicinity of Bent-1 and approximately 15 feet lower than the existing grade in the vicinity of Bent-2. The proposed excavation in the vicinity of Bent-1 is to accommodate a steeper abutment slope at End Bent-1 than currently exists, while the proposed excavation at Bent-2 is to accommodate a second track for the railroad in the future. The Preliminary General Drawings call for locating the proposed End Bent-2 approximately 38 feet upstation of the existing End Bent-2. As part of this relocation, excavation of the existing End Bent-2 abutment and abutment slope, including the portion of the abutment slope where the proposed Bent-2 is to be located, will be required. Excavation of the existing End Bent-2 abutment will extend vertically a maximum of approximately 15 feet.

The Preliminary General Drawings are in English units with feet as the primary unit of length.

## 3.0 SCOPE OF INVESTIGATION

### 3.1 FIELD TESTING

The as-drilled boring locations were established by Trigon personnel using the existing bridge and landmarks shown on the Preliminary General Drawings as points of reference. Elevations at the as-drilled boring locations, along the existing ground surface at the bent locations, and along the structure profile were

**STATE PROJECT:** 33687.1.1  
**TIP :** B-4409  
**FEDERAL PROJECT:** BRZ-1627(3)  
**COUNTY:** Anson  
**DESCRIPTION:** Bridge No. 308 Over Winston-Salem Southbound RR on SR 1627  
**SUBJECT:** Geotechnical Report of Structure Subsurface Investigation

Trigon Engineering Consultants, Inc. has completed the authorized geotechnical investigation for the above referenced project in Anson County, North Carolina. The purpose of this exploration was to investigate the subsurface conditions at the proposed bridge bent locations and to provide general construction considerations based on the subsurface conditions.

## 1.0 SITE DESCRIPTION

The project site is located in the northernmost portion of Anson County north of the town of Cedar Hill, North Carolina at the approximate location shown on the Site Vicinity Map (Drawing No. 1) attached behind this report. The site and project description of the proposed project is "Replace Bridge No. 308 Over Winston-Salem Southbound RR on SR 1627". Topographically, the site slopes steeply down toward the railroad from each end of the existing bridge. The ground surface in the vicinity of the proposed End Bents slopes gently towards the north and south. The topography of the general site vicinity consists of gently rolling hills.

surveyed by personnel from Trigon using Bench Mark No. 2 which was established by an NCDOT survey crew.

Trigon's subsurface investigation for the proposed bridge was conducted between April 30 and May 30, 2007. This exploration consisted of eight soil test borings with two borings at each proposed bent location. As-drilled soil test boring locations are shown on the Boring Identification Diagram (Drawing No. 2) following this report, and boring logs are included following this report.

The borings for Bent-1 were drilled through the deck of the existing bridge necessitating offsetting the borings in towards the -L- centerline from the proposed locations. The borings for Bent-2 were drilled within the roadway at the end of the existing bridge, and these borings were also offset in toward the -L- centerline from the proposed locations. The borings for End Bent-2 were drilled approximately 8 feet downstation of the proposed locations because the proposed bridge layout was changed by the NCDOT Design Group after the End Bent-2 borings had already been completed

All of the borings for this project were drilled using a truck-mounted Acker AD-II drilling machine equipped with a 140-pound manual hammer. The end bent borings were advanced utilizing 0.5-foot (O.D.) continuous-flight hollow-stem auger techniques. The interior bent borings were advanced utilizing 0.33-foot tricone/wash-drilling techniques.

Standard Penetration Tests were performed in the soil and weathered rock materials in the soil test borings in general accordance with NCDOT guidelines. In conjunction with this testing, split-barrel soil and weathered rock samples were recovered for visual classification and potential laboratory testing.

Rock coring was performed at the interior bent borings in order to evaluate the nature of the weathered rock/crystalline rock. The cored weathered rock/crystalline rock was returned to our laboratory for further classification and possible testing. The rock coring utilized an NQ size hollow double-tube core barrel. Pond water alone was used as the drilling fluid during the rock coring.

### 3.2 LABORATORY TESTING

Laboratory soil testing was performed on twelve representative split-barrel samples to aid in the assessment of AASHTO soil classification and to provide data for evaluation of engineering properties. The laboratory testing on the samples consisted of Natural Moisture Content, Atterberg Limits, and grain size analysis with

hydrometer. In addition, two Unconfined Compressive Strength (Qu only) tests were performed on selected samples of the recovered rock core. Laboratory tests were performed in general accordance with AASHTO and NCDOT specifications. The results of the soil and rock laboratory tests are included on Sheet 25 located behind this report. Laboratory results of the rock testing are also included under separate cover in Appendix A.

### 3.3 SITE GEOLOGY

The site of the proposed project is located in the Carolina Slate Belt of the Piedmont Physiographic province. Carolina Slate Belt rocks are comprised of metamorphosed sedimentary and volcanic rocks intruded by a variety of plutons (Butler et al., 1991).

According to the 1985 Geologic Map of North Carolina, the site is located in an area generally consisting of Metamudstone and Meta-Argillite. The crystalline rock encountered in our test borings generally consisted of moderately severely to slightly weathered, medium hard to moderately hard Metamudstone. The quality of the rock encountered ranged from very poor to poor. The overlying residual soils at the site are the product of the physical and chemical weathering of the underlying crystalline rock.

### 3.4 FOUNDATION MATERIALS

The generalized subsurface conditions indicated by the borings are described below. For soil descriptions and general stratification at a particular boring location, the respective Boring Log should be reviewed. For rock descriptions and stratification at a particular boring location, the respective Coring Log should be reviewed. The Boring Identification Diagram, Boring Logs, Coring Logs, and Core Photographs are located behind this report. Representative subsurface cross-sections at each bent location and a subsurface profile along the right side of the proposed structure are also included behind this report. The subsurface properties for the project site are described below.

Foundation materials encountered included roadway embankment fill, residual soils, weathered rock, and crystalline rock.

Roadway embankment fill was encountered beginning at the existing ground surface at the End Bent-1, Bent-2, and End Bent-2 borings. The roadway embankment fill extends to a depth of ±17 feet (Elevation

±258 feet) at the End Bent-1 borings; to a depth of ±17 feet (Elevation ±259 feet) at the Bent-2 borings, and to depths ranging from ±13 feet to ±14 feet (Elevations ±262 feet to ±261 feet) at the End Bent-2 borings. The roadway embankment fill encountered generally consists of soft to stiff, fine to coarse sandy, silty clay (A-7-5 and A-7-6), and fine to coarse sandy, clayey silt (A-4). Standard Penetration Resistance values within the fill material ranged from 3 to 13 blows per foot (bpf).

A 0.9-foot to 2.2-foot thick zone of concrete was encountered at the Bent-2 borings underlying the roadway embankment fill and overlying the residual soil. This zone is present between depths of 17.5 feet and 18.4 feet (Elevations 258.5 feet and 257.6 feet) at Boring B2-A, and between depths of 16.5 feet and 18.7 feet (Elevations 259.5 feet and 257.3 feet) at Boring B2-B. This concrete is most likely either the remnant of a structure previously present at the location of the existing bridge, the result of spillage during placement of concrete for the existing bridge, or is part of the foundation system for the existing structure.

Residual soil was encountered beginning at the existing ground surface at the Bent-1 borings, and underlying the roadway embankment fill at the remaining borings. The residual soil extends to depths ranging from ±29 feet to ±26 feet (Elevations ±246 feet to ±249 feet) at the End Bent-1 borings, to a depth of ±7 feet (Elevation ±249 feet) at the Bent-1 borings, to depths ranging from ±25 feet to ±27 feet (Elevations ±251 feet to ±249 feet) at the Bent-2 borings, and to depths ranging from ±24 feet to ±26 feet (Elevations ±251 feet to ±249 feet) at the End Bent-2 borings. The residuum generally consists of soft to hard, fine to coarse sandy, clayey silt (A-4 and A-5). Standard Penetration Resistance values within the residual soil ranged from 3 to 88 bpf.

Weathered rock was encountered underlying the residual soil at all of the borings drilled for this project. The weathered rock generally consists of Metamudstone. The weathered rock was encountered between the following depths and elevations: 29.0 feet to 43.6 feet (Elevations 246.1 feet to 231.5 feet) at Boring EB1-A, 26.0 feet to 37.6 feet (Elevations 248.8 feet to 237.2 feet) at Boring EB1-B, 7.5 feet to 12.4 feet (Elevations 249.0 feet to 244.1 feet) at Boring B1-A, 7.5 feet to 16.5 feet (Elevations 249.1 feet to 240.1 feet) at Boring B1-B, 25.0 feet to 36.4 feet (Elevations 251.0 feet to 239.6 feet) at Boring B2-A, 27.0 feet to 35.7 feet (Elevations 249.0 feet to 240.3 feet) at Boring B2-B, 24.0 feet to the boring termination depth of 39.2 feet (Elevations 251.2 feet to 236.0 feet) at Boring EB2-A, and 26.0 feet to 43.6 feet (Elevations 249.1 feet to 231.5 feet) at Boring EB2-B. Weathered rock was also encountered as a zone within the crystalline rock at the Bent-2 borings.

Crystalline rock was encountered underlying the weathered rock at the End Bent-1, Bent-1, and Bent-2 borings, and at Boring EB2-B. Crystalline rock was not encountered within the depths explored at Boring EB2-A. The crystalline rock generally consists of Metamudstone. The top of the crystalline rock was encountered at the following depths and elevations: ±44 feet to ±38 feet (Elevations ±231 feet to ±237 feet) at the End Bent-1 borings, ±12 feet to ±16 feet (Elevations ±244 feet to ±240 feet) at the Bent-1 borings, ±36 feet (Elevation ±240 feet) at the Bent-2 borings, and at a depth of ±44 feet (Elevation ±231 feet) at Boring EB2-B. As noted previously, a zone of weathered rock was encountered within the crystalline rock at the Bent-2 borings. This weathered rock zone is present between depths of 47.3 feet and 49.7 feet (Elevations 228.7 feet and 226.3 feet) at Boring B2-A, and between depths of 48.6 feet and 50.4 feet (Elevations 227.4 feet and 225.6 feet) at Boring B2-B.

Between approximately 25 feet and 35 feet of weathered rock/crystalline rock was cored at the interior bent borings to evaluate the nature of the refusal materials. In general, the cored weathered rock is severely weathered, very soft to medium hard, Metamudstone with very close to close fracture spacing. The strata recovery (REC) values within the weathered rock ranged from 11 to 96 percent. In general, the cored crystalline rock is moderately severely to slightly weathered, medium hard to moderately hard Metamudstone with very close to close fracture spacing. Strata (REC) values within the crystalline rock ranged from 76 to 100 percent and strata Rock Quality Designation (RQD) values ranged from 0 to 45 percent indicating a very poor to poor quality rock.

### 3.5 GROUNDWATER

Groundwater was encountered at all of the borings drilled for this project. The groundwater elevations generally ranged from ±243 feet to ±250 feet. The groundwater elevation at Boring B2-A was ±263 feet which, given its significantly higher elevation than in the other seven borings, indicates a perched water table.

### 4.0 CONSTRUCTION CONSIDERATIONS

Concrete is present at the roadway embankment fill/residual soil interface at the Bent-2 borings. Whether this concrete is part of foundation of the existing bridge, the result of spillage during the placement of concrete for the existing bridge, or is the remnant of a previous structure at the site could not be determined within the scope of this investigation.

**5.0 CLOSURE**

The geotechnical investigation, analysis, and general construction considerations included in this report are based on the Preliminary General Drawing and the data obtained from our field and laboratory-testing program. If the proposed location and geometry, or finished grades are changed or are different from those outlined above, or if subsurface conditions are encountered during construction which differ from those indicated by our borings, we will require the opportunity to review these changed conditions and make any necessary modifications to the general conditions presented in this report.

Cross-sections and profiles are a generalized interpretation of soil conditions between borings and should not be considered accurate other than at the boring locations. Subsurface conditions between boring locations or elsewhere on the site may vary, and subsurface anomalies may exist which were not detected.

Trigon Engineering Consultants, Inc. appreciates the opportunity to be of service to the NCDOT on this project. Should you have any questions concerning this report, please feel free to contact the undersigned.

Respectfully submitted,

**TRIGON ENGINEERING CONSULTANTS, INC.**



Paul M. Weaver, P.G.  
Registered North Carolina No. 1500

PMW/JRV:pmw

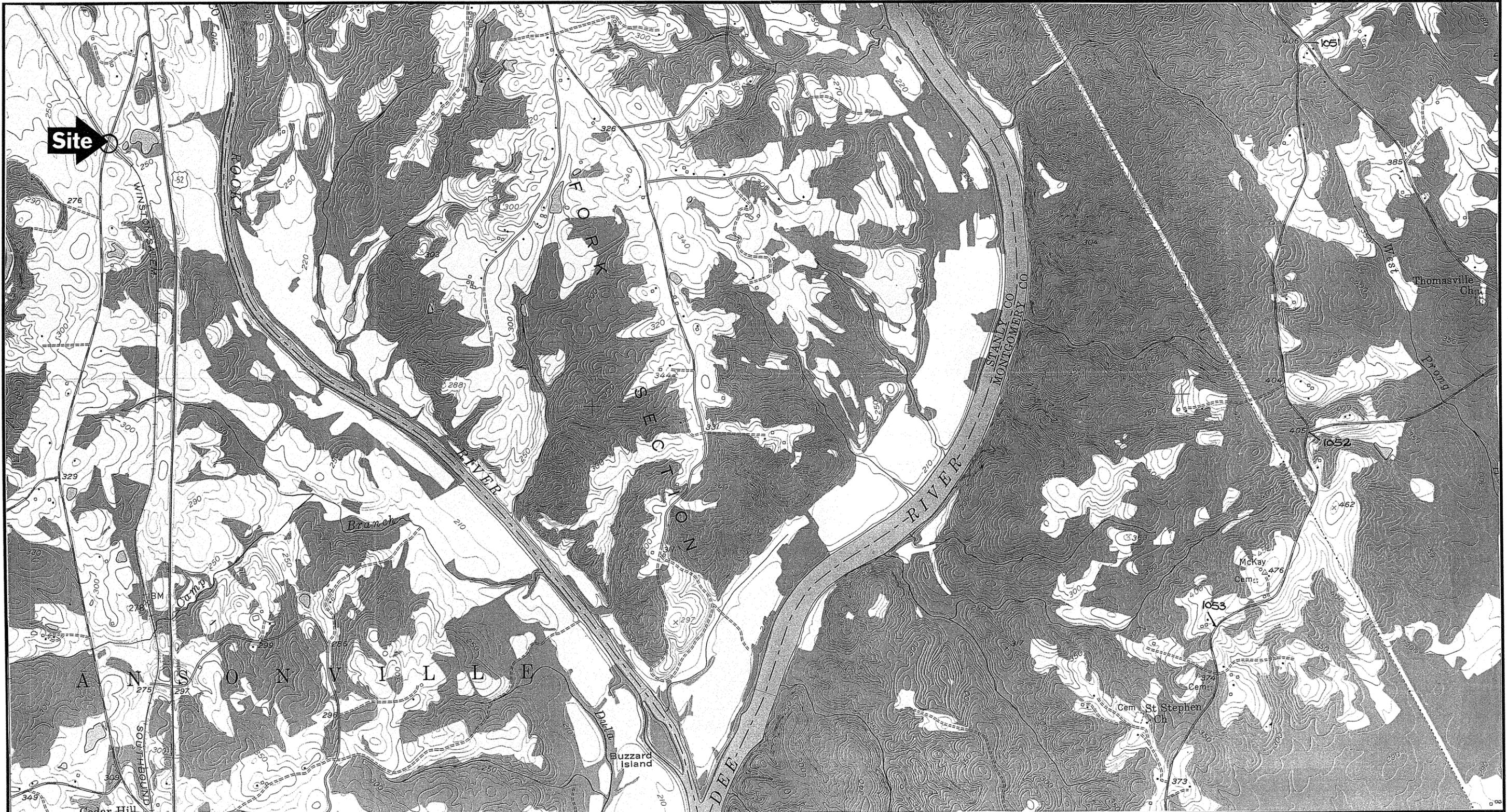
Attachments

s:\0710\projectss\2007\Bridge 308 (B-4409)\Bridge 308 report.doc



Jeffrey R. Vinson, P.G.  
Senior Project Manager

7/12/07



Trigon Engineering Consultants, Inc.  
Greensboro North Carolina

SCALE:  
1" = 24,000'

DATE:  
5/22/07

STATE PROJECT NO.  
33687.1.1

TIP NO.:  
B-4409

**SITE VICINITY MAP**

Replace Bridge No. 308 Over Winston-Salem Southbound RR on SR 1627, Anson County, North Carolina

USGS Mount Gilead West Quadrangle

DRAWING NUMBER:  
1

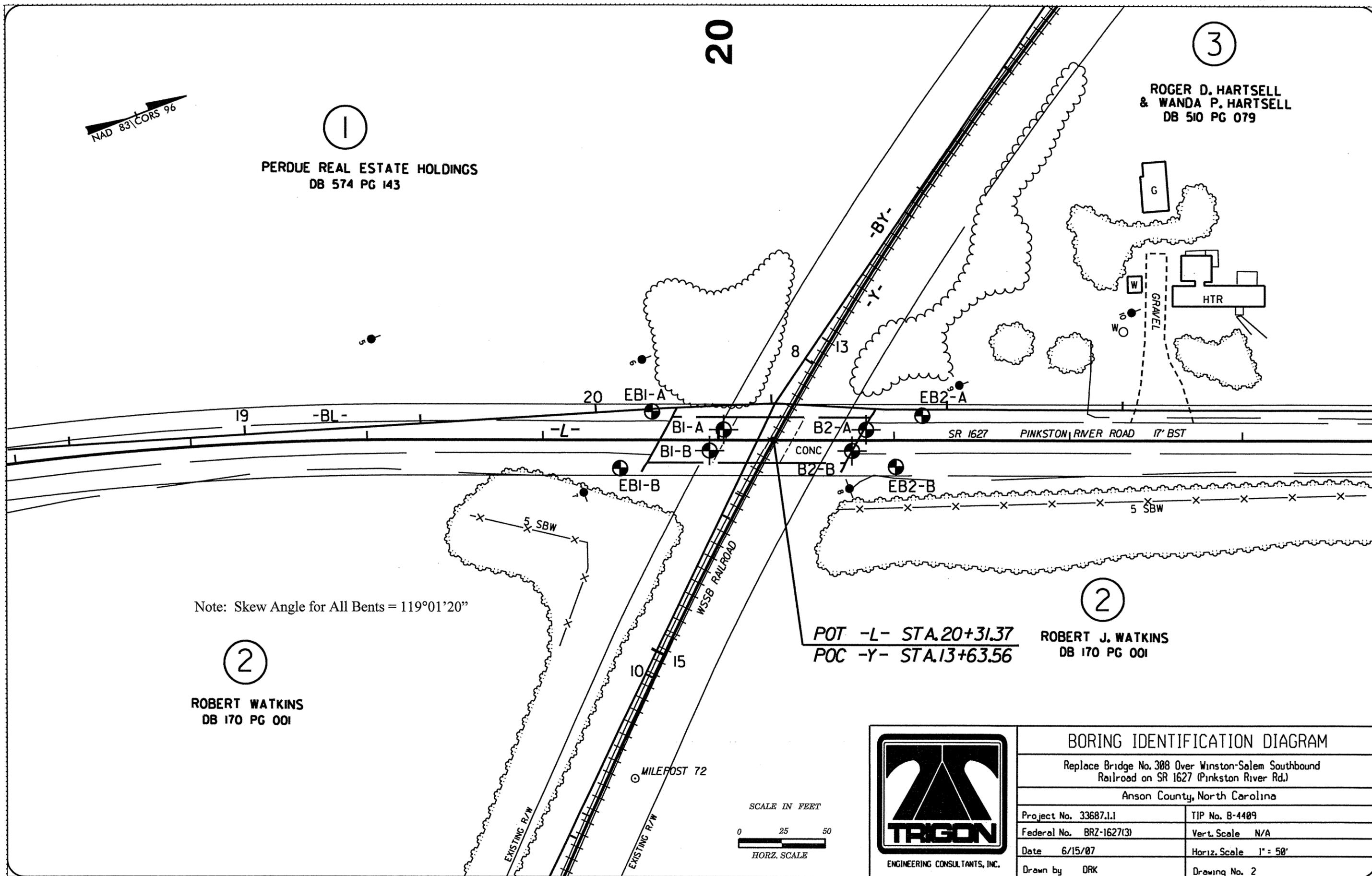


①

PERDUE REAL ESTATE HOLDINGS  
DB 574 PG 143

③

ROGER D. HARTSELL  
& WANDA P. HARTSELL  
DB 510 PG 079



Note: Skew Angle for All Bents = 119°01'20"

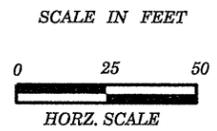
②

ROBERT WATKINS  
DB 170 PG 001

②

POT -L- STA. 20+31.37  
POC -Y- STA. 13+63.56

ROBERT J. WATKINS  
DB 170 PG 001

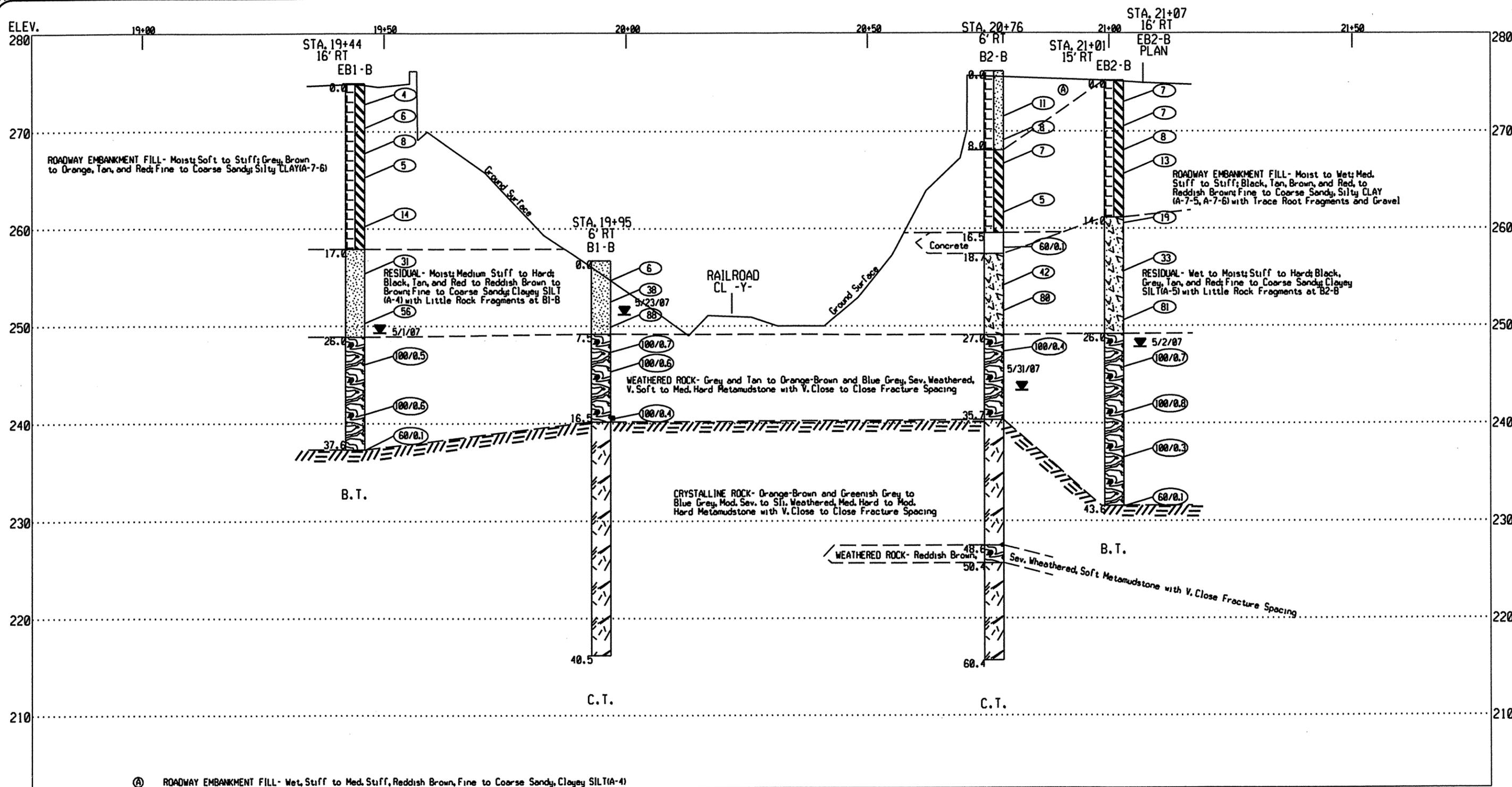


**BORING IDENTIFICATION DIAGRAM**

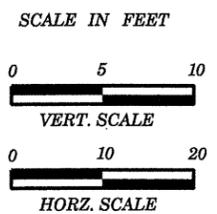
Replace Bridge No. 308 Over Winston-Salem Southbound Railroad on SR 1627 (Pinkston River Rd.)

Anson County, North Carolina

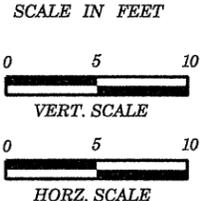
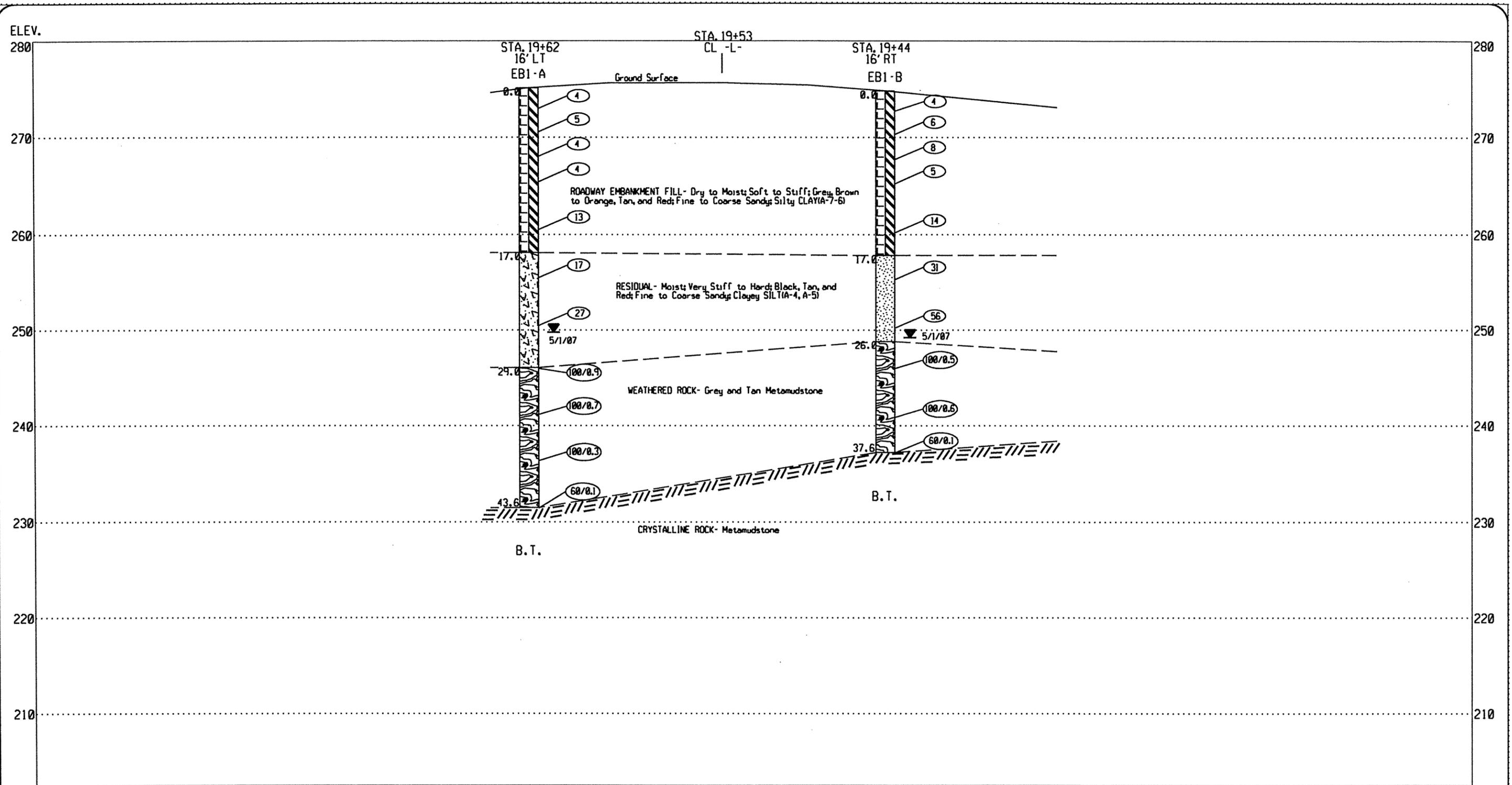
Project No. 33687.1.1	TIP No. B-4409
Federal No. BRZ-1627(3)	Vert. Scale N/A
Date 6/15/07	Horiz. Scale 1" = 50'
Drawn by DRK	Drawing No. 2



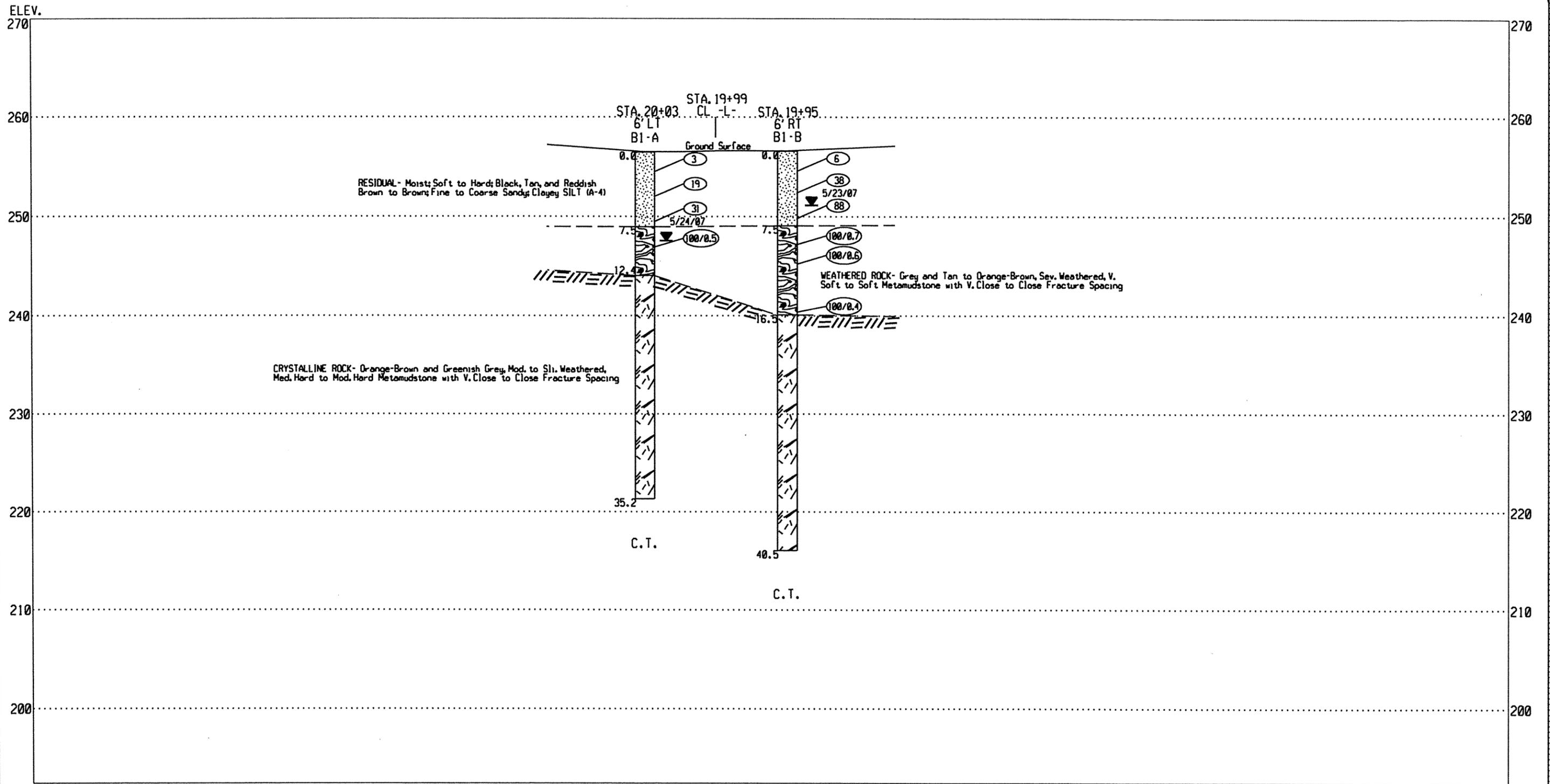
Ⓐ ROADWAY EMBANKMENT FILL- Wet, Stiff to Med. Stiff, Reddish Brown, Fine to Coarse Sandy, Clayey SILT(A-4)



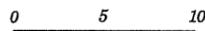
<b>PROFILE 16' RIGHT OF -L-</b>	
Replace Bridge No. 308 Over Winston-Salem Southbound Railroad on SR 1627 (Pinkston River Rd.)	
Anson County, North Carolina	
Project No. 33687.1.1	TIP No. B-4409
Federal No. BRZ-1627(3)	Vert. Scale 1" = 10'
Date 6/15/07	Horiz. Scale 1" = 20'
Drawn by DRK	Drawing No. 3



CROSS-SECTION ALONG END BENT-1	
Replace Bridge No. 308 Over Winston-Salem Southbound Railroad on SR 1627 (Pinkston River Rd.)	
Anson County, North Carolina	
Project No. 33687.1.1	TIP No. B-4409
Federal No. BRZ-1627(3)	Vert. Scale 1" = 10'
Date 6/15/07	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 4



SCALE IN FEET



VERT. SCALE



HORZ. SCALE



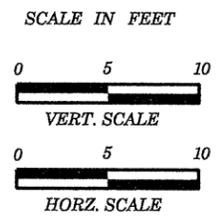
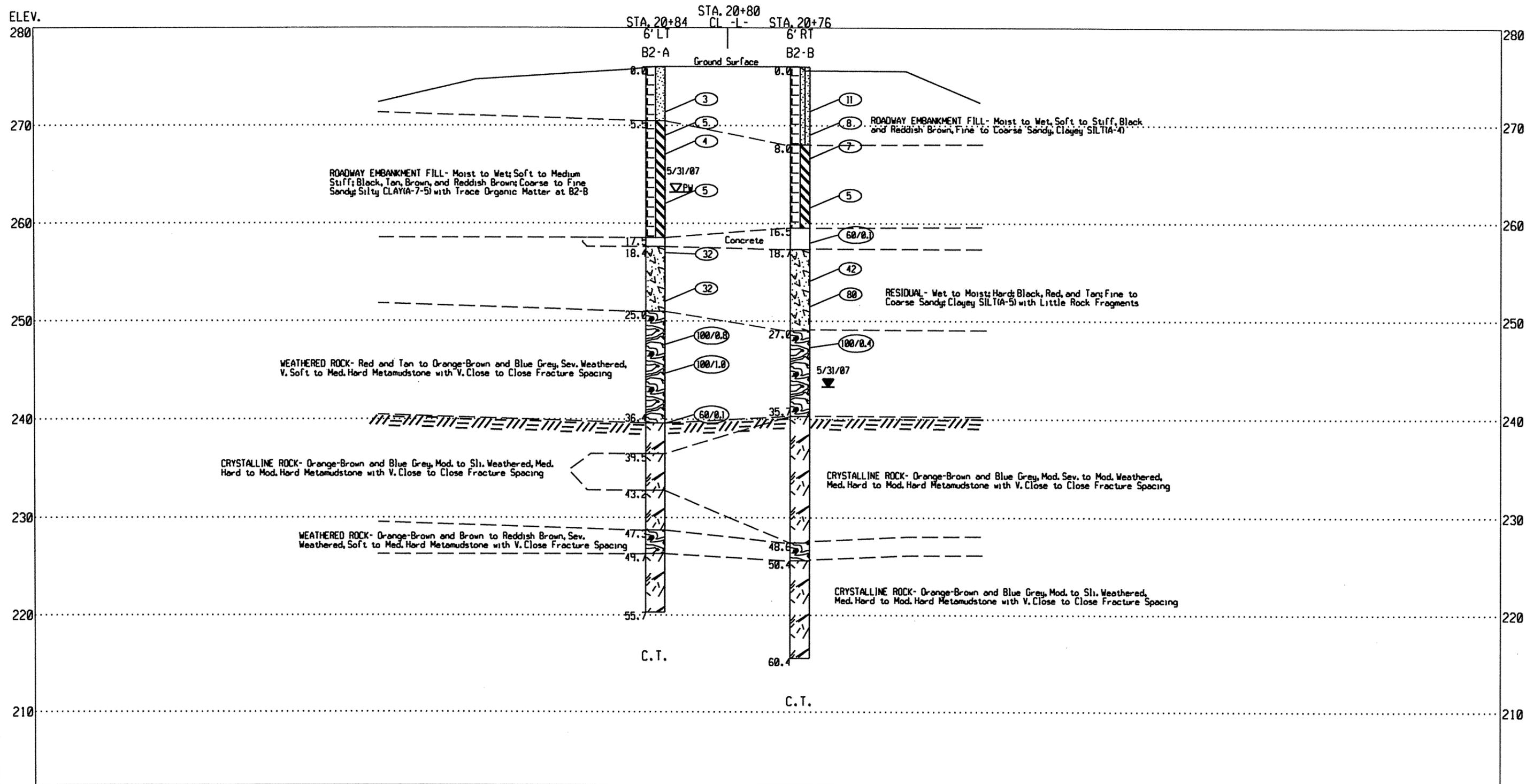
ENGINEERING CONSULTANTS, INC.

CROSS-SECTION ALONG BENT-1

Replace Bridge No. 308 Over Winston-Salem Southbound Railroad on SR 1627 (Pinkston River Rd.)

Anson County, North Carolina

Project No. 33687.1.1	TIP No. B-4409
Federal No. BRZ-1627(3)	Vert. Scale 1" = 10'
Date 6/15/07	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 5

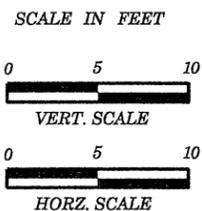
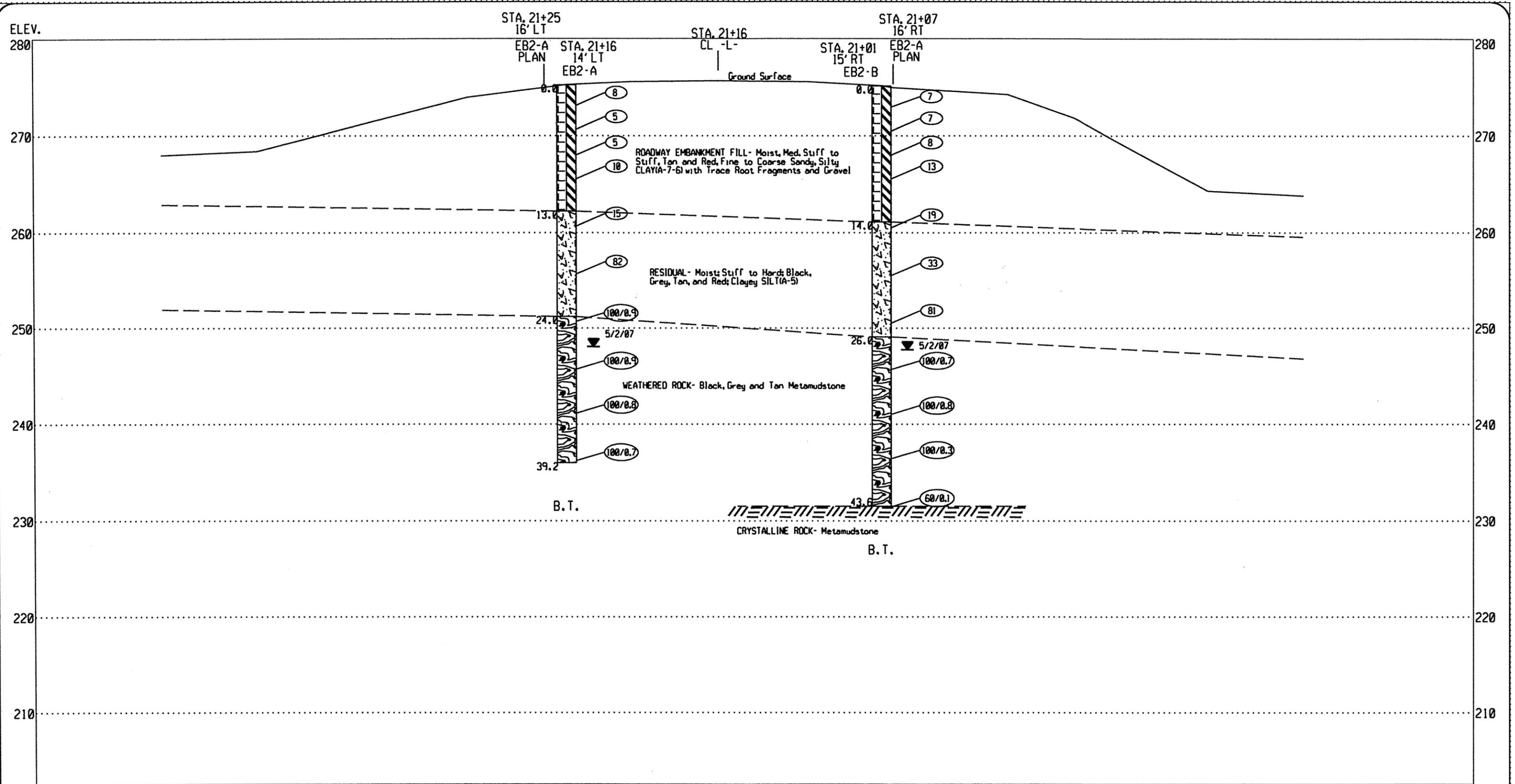


CROSS-SECTION ALONG BENT-2

Replace Bridge No. 308 Over Winston-Salem Southbound Railroad on SR 1627 (Pinkston River Rd.)

Anson County, North Carolina

Project No. 33687.1.1	TIP No. B-4409
Federal No. BRZ-1627(3)	Vert. Scale 1" = 10'
Date 6/15/07	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 6



CROSS-SECTION ALONG END BENT-2	
Replace Bridge No. 308 Over Winston-Salem Southbound Railroad on SR 1627 (Pinkston River Rd.)	
Anson County, North Carolina	
Project No. 33687.1.1	TIP No. B-4409
Federal No. BRZ-1627(3)	Vert. Scale 1" = 10'
Date 6/15/07	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 7

PROJECT NO. 33687.1.1		ID. B-4409		COUNTY Anson		GEOLOGIST G. Licayan											
SITE DESCRIPTION Replace Bridge No. 308 over Winston-Salem Southbound RR on SR 1627							GROUND WTR (ft)										
BORING NO. EB1-A		STATION 19+62		OFFSET 16ft LT		ALIGNMENT -L-											
COLLAR ELEV. 275.1 ft		TOTAL DEPTH 43.6 ft		NORTHING 1,666,210		EASTING 523,144											
DRILL MACHINE Acker AD-II		DRILL METHOD HSA		HAMMER TYPE 140lb Manual													
START DATE 04/30/07		COMP. DATE 04/30/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 43.6 ft											
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)		
		0.5ft	0.5ft	0.5ft	0	25	50	75	100								
280																	
274.1	1.0	3	2	2										275.1	0.0	ROADWAY EMBANKMENT FILL: Soft to Stiff; Grey, Tan and Red; Fine to Coarse Sandy; Silty CLAY	
271.6	3.5	2	2	3										27.6%			
269.1	6.0	2	2	2													
266.6	8.5	2	2	2													
261.6	13.5	5	6	7													
256.6	18.5	5	7	10										258.1	17.0	RESIDUAL: Very Stiff; Black, Tan and Red; Fine to Coarse Sandy; Clayey SILT	
251.6	23.5	6	11	16										35.5%			
246.6	28.5	24	76/0.4											246.1	29.0	WEATHERED ROCK: Grey and Tan Metamudstone	
241.6	33.5	54	46/0.2											100/0.9			
236.6	38.5	100/0.3												100/0.7			
231.6	43.5	60/0.1												100/0.3			
		60/0.1												60/0.1		231.5	Boring Terminated with SPT Refusal at Elevation 231.5 ft. on Crystalline Rock: Metamudstone

NCDOT BORE SINGLE 07107019NEW.GPJ NC\_DOT.GDT 7/18/07

PROJECT NO. 33687.1.1		ID. B-4409		COUNTY Anson		GEOLOGIST G. Licayan										
SITE DESCRIPTION Replace Bridge No. 308 over Winston-Salem Southbound RR on SR 1627							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 19+44		OFFSET 16ft RT		ALIGNMENT -L-										
COLLAR ELEV. 274.8 ft		TOTAL DEPTH 37.6 ft		NORTHING 1,666,234		EASTING 523,115										
DRILL MACHINE Acker AD-II		DRILL METHOD HSA		HAMMER TYPE 140lb Manual												
START DATE 04/30/07		COMP. DATE 04/30/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 37.6 ft										
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100							
275																
273.8	1.0	2	2	2										274.8	0.0	ROADWAY EMBANKMENT FILL: Soft to Stiff; Grey, Brown to Orange, Tan and Red; Fine to Coarse Sandy; Silty CLAY
271.3	3.5	3	2	4												
268.8	6.0	3	4	4												
266.3	8.5	3	2	3												
261.3	13.5	4	6	8												
256.3	18.5	7	13	18												
251.3	23.5	15	23	33												
246.3	28.5	100/0.5												257.8	17.0	RESIDUAL: Hard; Black, Tan and Red; Fine to Coarse Sandy; Clayey SILT
241.3	33.5	90	10/0.1											22.8%		
237.3	37.5	60/0.1												248.8	26.0	WEATHERED ROCK: Grey and Tan Metamudstone
		60/0.1												237.2	37.6	Boring Terminated with SPT Refusal at Elevation 237.2 ft. on Crystalline Rock: Metamudstone

NCDOT BORE SINGLE 07107019NEW.GPJ NC\_DOT.GDT 7/18/07



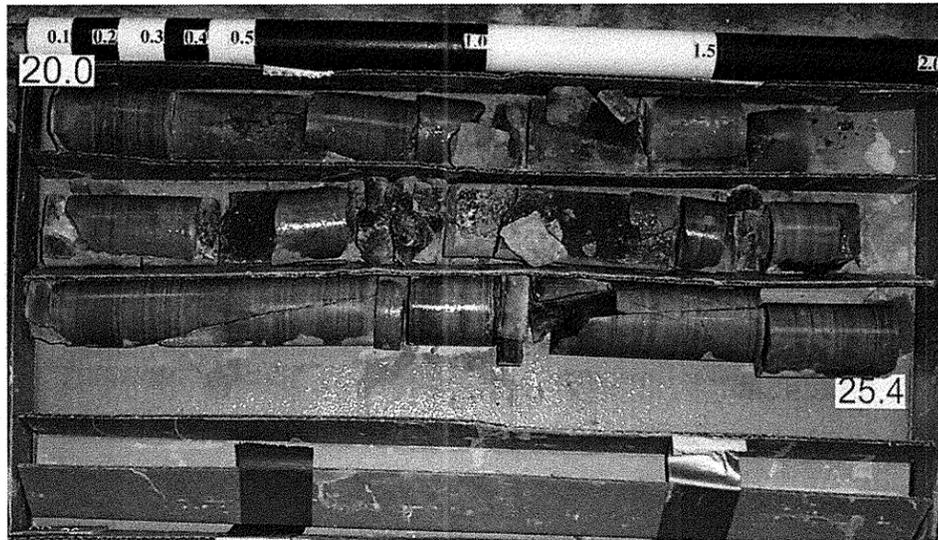
# CORE PHOTOGRAPHS

NCDOT Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 over Winston-Salem Southbound Railroad on SR 1627

B1-A



Box 1 of 3



Box 2 of 3  
(SCALE = 1:4)

# CORE PHOTOGRAPHS

NCDOT Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 over Winston-Salem Southbound Railroad on SR 1627

B1-A



Box 3 of 3  
(SCALE = 1:4)

PROJECT NO. 33687.1.1	ID. B-4409	COUNTY Anson	GEOLOGIST T.Wells/Paul Weaver
SITE DESCRIPTION Replace Bridge No. 308 over Winston-Salem Southbound RR on SR 1627			GROUND WTR (ft)
BORING NO. B1-B	STATION 19+95	OFFSET 6ft RT	ALIGNMENT -L-
COLLAR ELEV. 256.6 ft	TOTAL DEPTH 40.5 ft	NORTHING 1,666,243	EASTING 523,167
DRILL MACHINE Acker AD-II	DRILL METHOD Wash Rotary/NQ Core	HAMMER TYPE 140lb Manual	
START DATE 05/21/07	COMP. DATE 05/22/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 16.5 ft

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				
260													0.0
255.6	1.0												256.6
253.4	3.2	8	3	3									249.1
250.9	5.7	11	17	21									240.1
247.7	8.9	12	28	60									240.1
245.7	10.9	40	60/0.2										240.1
240.7	15.9	90	10/0.1										240.1
		100/0.4											240.1

216.1  
Coring Terminated at Elevation 216.1 ft. in Crystalline Rock: Metamudstone  
Note: Pond Water Used as Drilling Fluid

PROJECT NO. 33687.1.1	ID. B-4409	COUNTY Anson	GEOLOGIST T.Wells/Paul Weaver
SITE DESCRIPTION Replace Bridge No. 308 over Winston-Salem Southbound RR on SR 1627			GROUND WTR (ft)
BORING NO. B1-B	STATION 19+95	OFFSET 6ft RT	ALIGNMENT -L-
COLLAR ELEV. 256.6 ft	TOTAL DEPTH 40.5 ft	NORTHING 1,666,243	EASTING 523,167
DRILL MACHINE Acker AD-II	DRILL METHOD Wash Rotary/NQ Core	HAMMER TYPE 140lb Manual	
START DATE 05/21/07	COMP. DATE 05/22/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 16.5 ft

ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
				REC. (%)	ROD (%)		REC. (%)	ROD (%)			
247.7											8.9
247.7	8.9	2.0	5:30	(1.8)	(0.0)		(6.1)				8.9
245.7	10.9			90%	0%		92%				11.5
245.1	11.5										11.5
		4.4	5:50	(4.1)							15.9
			5:20/0.4	93%							15.9
			5:43								15.9
			7:31								15.9
			6:17								15.9
240.7	15.9	4.6	10:27	(4.6)	(1.7)		(23.7)	(10.9)			16.5
240.3	16.3			100%	37%		99%	45%			16.5
			3:50/0.6								16.5
			8:15								16.5
			8:12								16.5
235.7	20.9	5.0	8:23	(4.9)	(2.3)						20.9
			8:12	98%	46%						20.9
			8:28								20.9
			8:48								20.9
			10:35								20.9
230.7	25.9	4.8	8:40	(4.8)	(1.5)						25.9
			9:24	100%	31%						25.9
			8:20								25.9
			8:45								25.9
			8:29								25.9
			10:15								25.9
225.9	30.7	4.8	13:50/0.8	(4.6)	(3.1)						30.7
			10:44	96%	65%						30.7
			8:32								30.7
			9:05								30.7
			9:35								30.7
221.1	35.5	5.0	14:27/0.8	(5.0)	(2.3)						35.5
			10:42	100%	46%						35.5
			11:15								35.5
			10:35								35.5
			11:20								35.5
216.1	40.5		19:00								40.5

216.1  
Coring Terminated at Elevation 216.1 ft. in Crystalline Rock: Metamudstone  
Note: Pond Water Used as Drilling Fluid

NCDOT BORE SINGLE 07107019NEW.GPJ NC\_DOT\_GDT 7/18/07

NCDOT CORE SINGLE COPY OF 07107019NEW.GPJ NC\_DOT\_GDT 7/12/07

# CORE PHOTOGRAPHS

NCDOT Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 over Winston-Salem Southbound Railroad on SR 1627



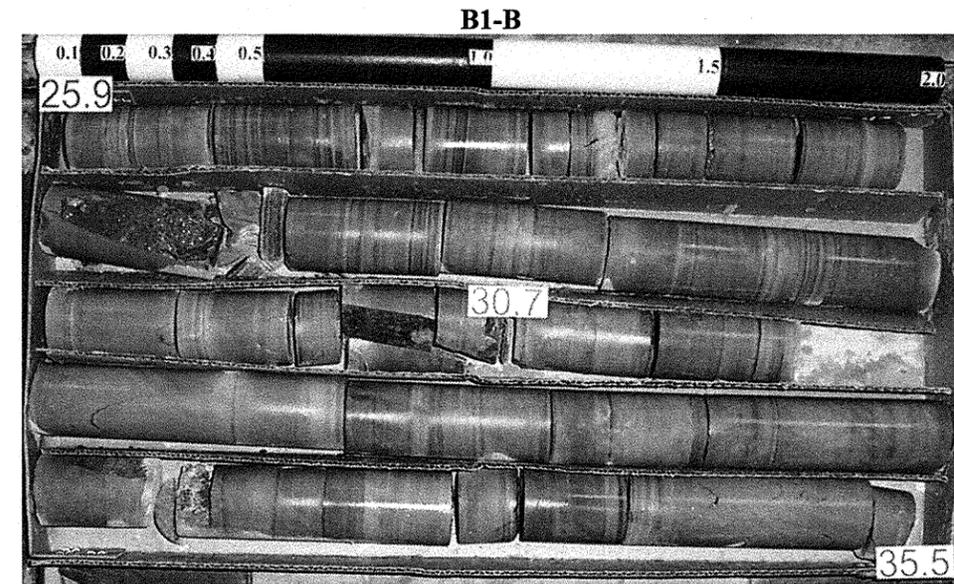
Box 1 of 4



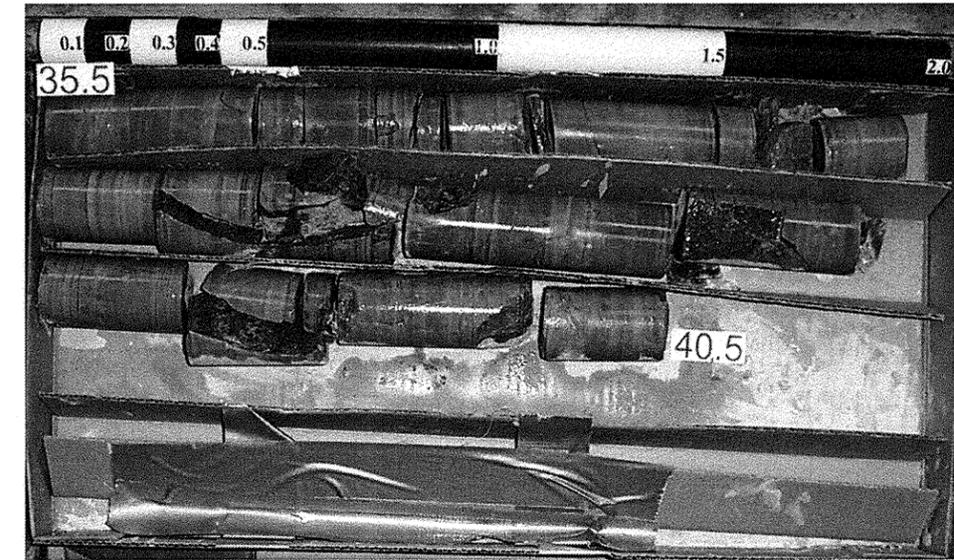
Box 2 of 4  
(SCALE = 1:4)

# CORE PHOTOGRAPHS

NCDOT Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 over Winston-Salem Southbound Railroad on SR 1627

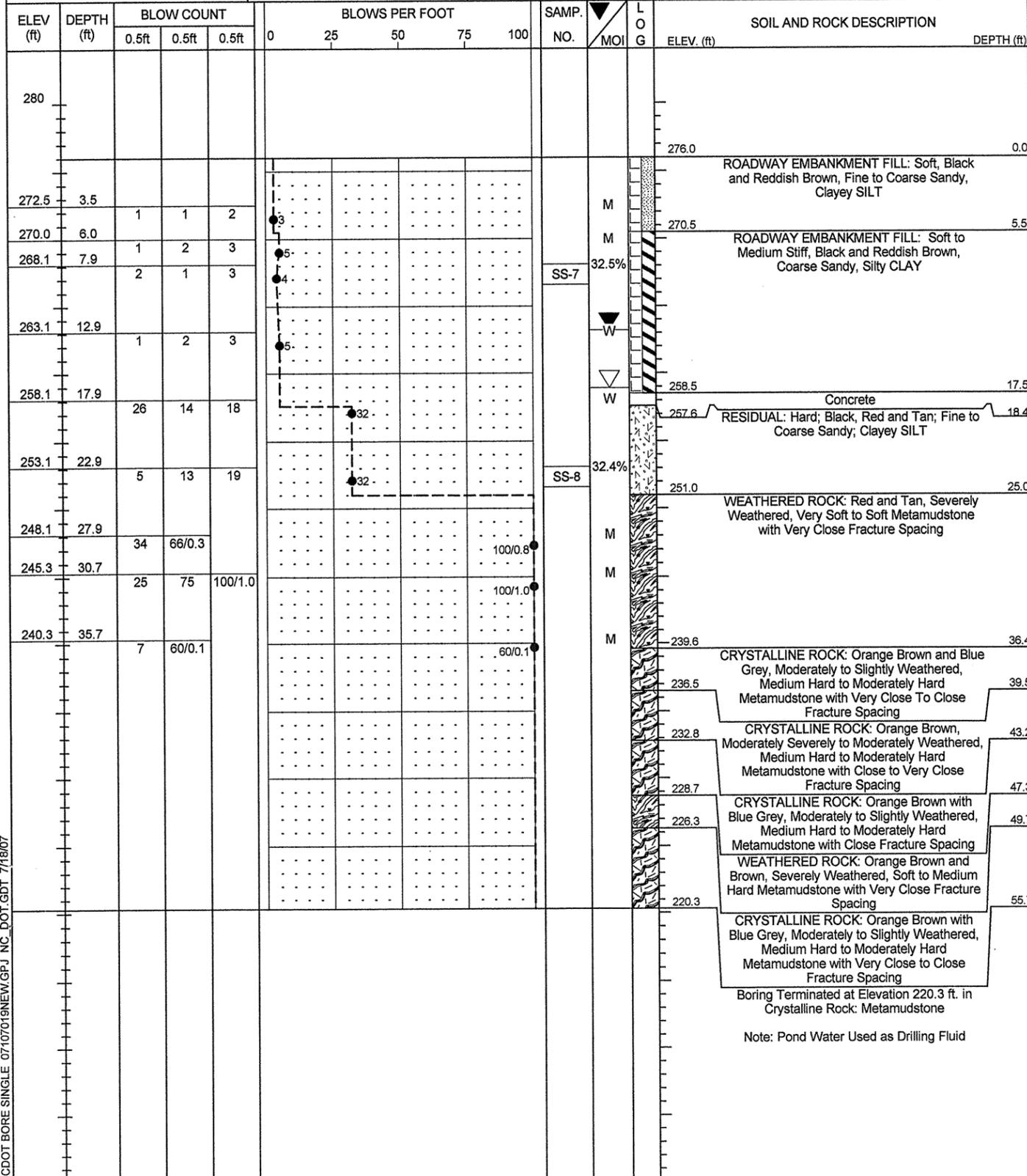


Box 3 of 4

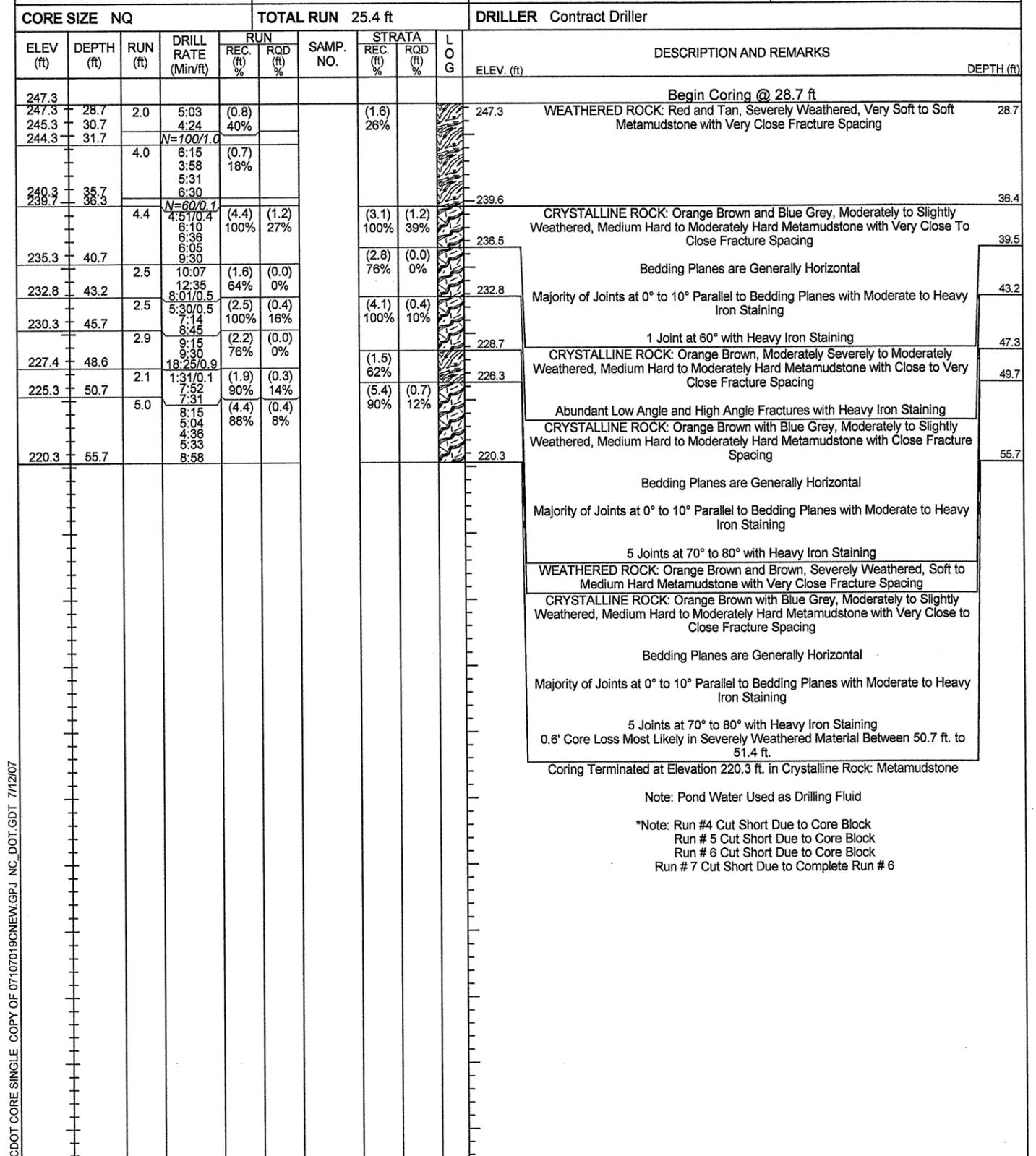


Box 4 of 4  
(SCALE = 1:4)

PROJECT NO. 33687.1.1	ID. B-4409	COUNTY Anson	GEOLOGIST T.Wells/Paul Weaver
SITE DESCRIPTION Replace Bridge No. 308 over Winston-Salem Southbound RR on SR 1627			GROUND WTR (ft)
BORING NO. B2-A	STATION 20+84	OFFSET 6ft LT	ALIGNMENT -L-
COLLAR ELEV. 276.0 ft	TOTAL DEPTH 55.7 ft	NORTHING 1,666,264	EASTING 523,254
DRILL MACHINE Acker AD-II	DRILL METHOD Mud Rotary/NQ Core	HAMMER TYPE 140lb Manual	
START DATE 05/23/07	COMP. DATE 05/30/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 36.4 ft



PROJECT NO. 33687.1.1	ID. B-4409	COUNTY Anson	GEOLOGIST T.Wells/Paul Weaver
SITE DESCRIPTION Replace Bridge No. 308 over Winston-Salem Southbound RR on SR 1627			GROUND WTR (ft)
BORING NO. B2-A	STATION 20+84	OFFSET 6ft LT	ALIGNMENT -L-
COLLAR ELEV. 276.0 ft	TOTAL DEPTH 55.7 ft	NORTHING 1,666,264	EASTING 523,254
DRILL MACHINE Acker AD-II	DRILL METHOD Mud Rotary/NQ Core	HAMMER TYPE 140lb Manual	
START DATE 05/23/07	COMP. DATE 05/30/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 36.4 ft



Note: Pond Water Used as Drilling Fluid  
 \*Note: Run #4 Cut Short Due to Core Block  
 Run # 5 Cut Short Due to Core Block  
 Run # 6 Cut Short Due to Core Block  
 Run # 7 Cut Short Due to Complete Run # 6

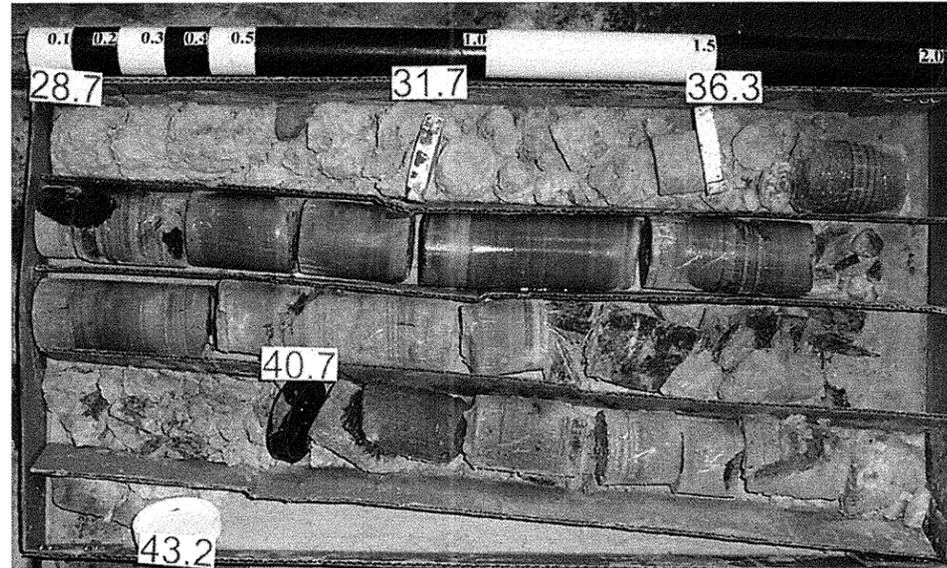
NCDOT BORE SINGLE 07107019NEW.GPJ NC\_DOT\_GDT\_7/18/07

NCDOT CORE SINGLE COPY OF 07107019NEW.GPJ NC\_DOT\_GDT\_7/12/07

# CORE PHOTOGRAPHS

NCDOT Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 over Winston-Salem Southbound Railroad on SR 1627

B2-A



Box 1 of 3

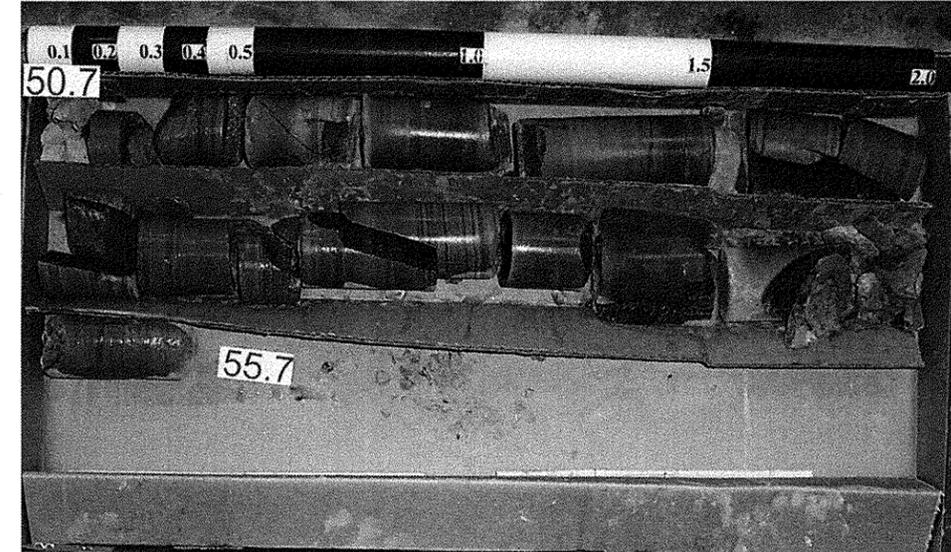


Box 2 of 3  
(SCALE = 1:4)

# CORE PHOTOGRAPHS

NCDOT Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 over Winston-Salem Southbound Railroad on SR 1627

B2-A



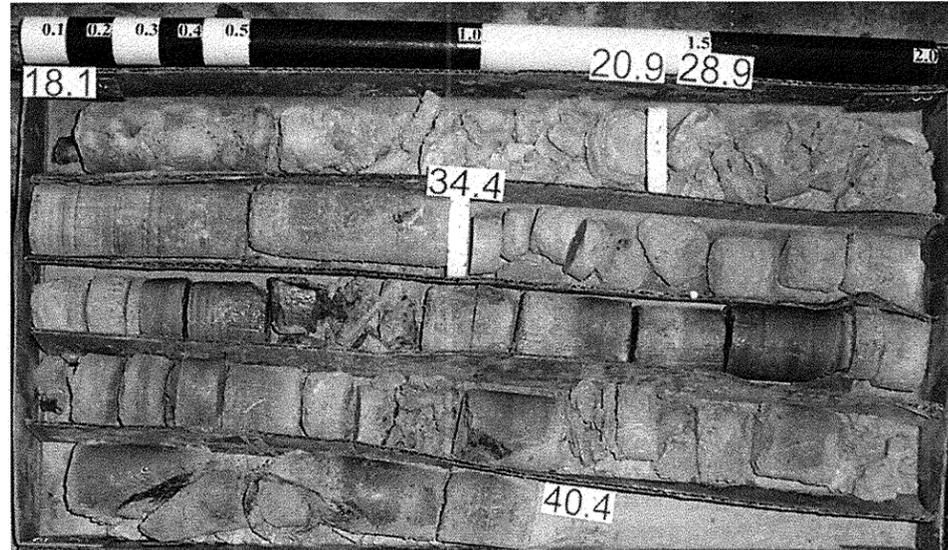
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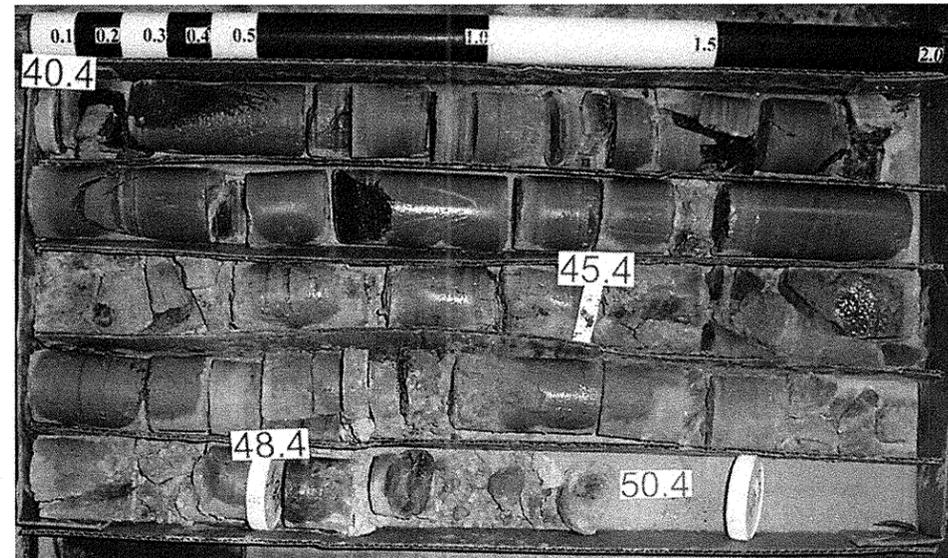
# CORE PHOTOGRAPHS

NCDOT Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 over Winston-Salem Southbound Railroad on SR 1627

B2-B



Box 1 of 4



Box 2 of 4  
(SCALE = 1:4)

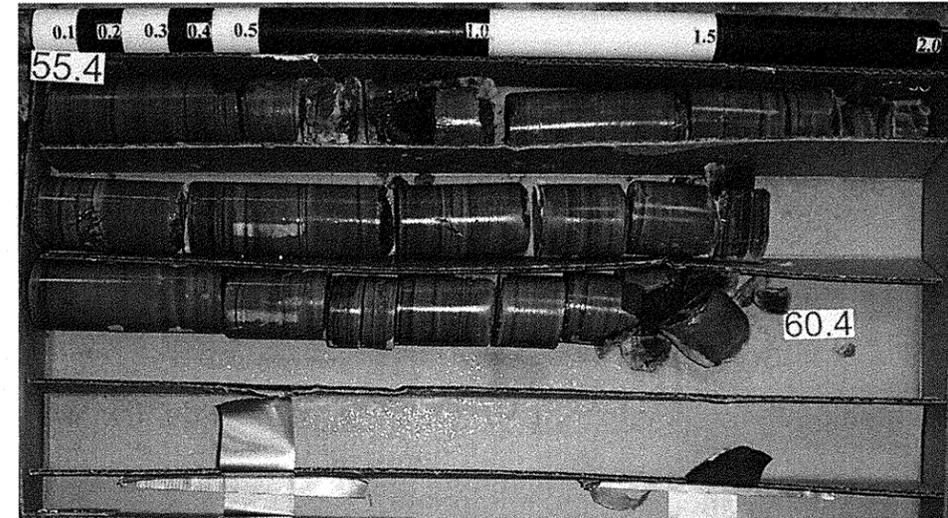
# CORE PHOTOGRAPHS

NCDOT Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 over Winston-Salem Southbound Railroad on SR 1627

B2-B



Box 3 of 4



Box 4 of 4

(SCALE = 1:4)

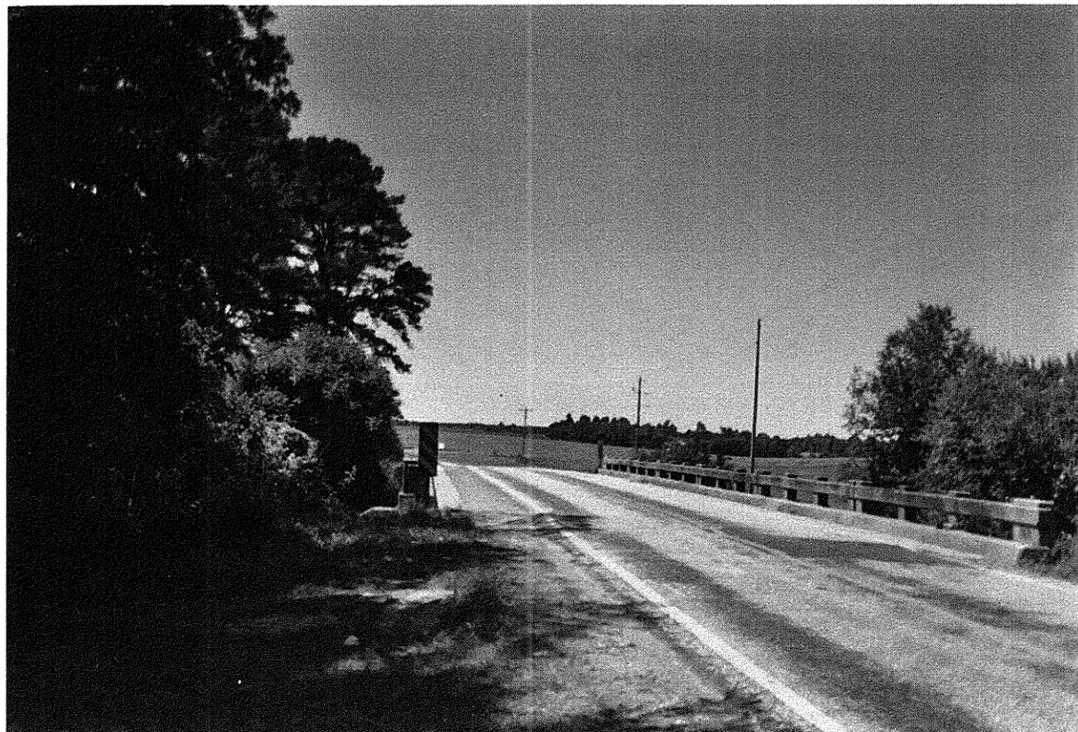




**SITE PHOTOGRAPHS**  
State Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 Over Winston-Salem Southbound Railroad on SR 1627  
Anson County, North Carolina  
Page 1 of 4

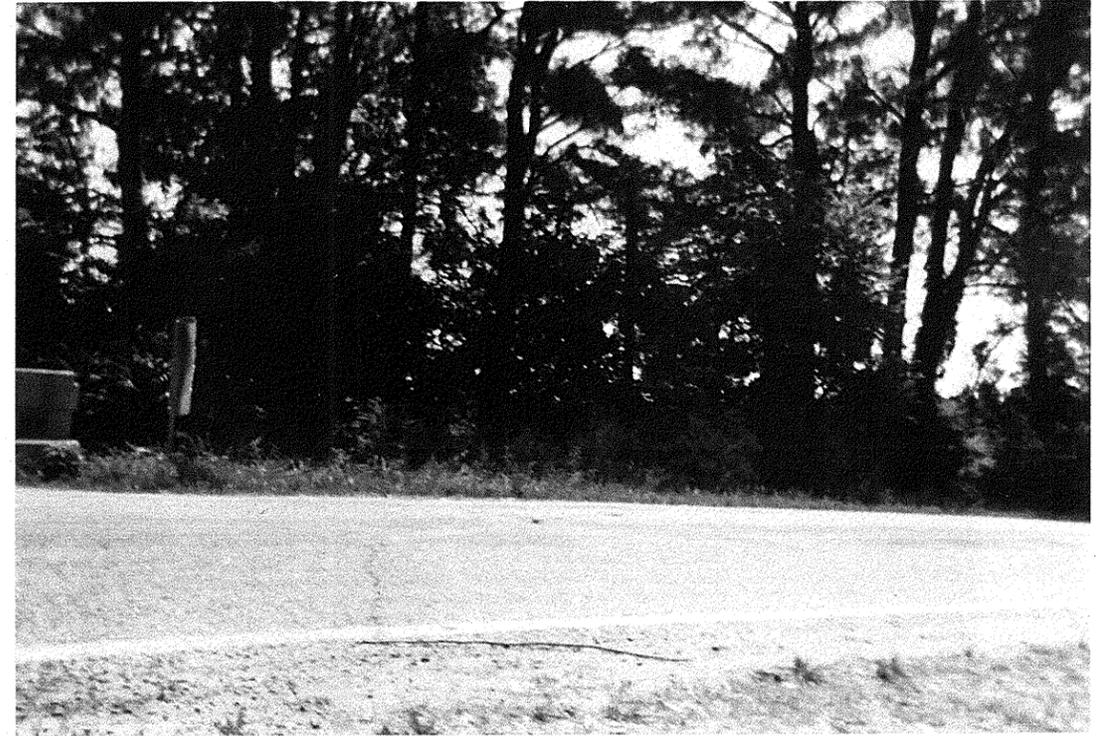


Photograph 1 – View Approximately 16' Rt. of -L-  
Looking Upstation from EB1-B



Photograph 2 – View Approximately 16' Right of -L-  
Looking Downstation from EB2-B

**SITE PHOTOGRAPHS**  
State Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 Over Winston-Salem Southbound Railroad on SR 1627  
Anson County, North Carolina  
Page 2 of 4



Photograph 3 – View Left to Right Across End Bent-1



Photograph 4 – View Right to Left Across End Bent-1

**SITE PHOTOGRAPHS**  
State Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 Over Winston-Salem Southbound Railroad on SR 1627  
Anson County, North Carolina  
Page 3 of 4



Photograph 5 – View Right to Left Across Bent-1



Photograph 6 – View Left to Right Across Bent-2

**SITE PHOTOGRAPHS**  
State Project No. 33687.1.1 TIP No. B-4409  
Bridge No. 308 Over Winston-Salem Southbound Railroad on SR 1627  
Anson County, North Carolina  
Page 4 of 4



Photograph 7 – View Left to Right Across End Bent-2



Photograph 8 – View Right to Left Across End Bent-2

PROJECT: 33688.1.1 ID: B-4410

# STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4410	1	29
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33688.1.1	BRZ-1627(4)	P.E.	
		CONST.	

For Letting

## STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33688.1.1 I.D. NO. B-4410

F.A. PROJECT BRZ-1627(4)

COUNTY ANSON

PROJECT DESCRIPTION REPLACE BRIDGE NO. 307  
OVER WINSTON-SALEM SOUTHBOUND RR ON SR 1627

SITE DESCRIPTION \_\_\_\_\_

### CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS 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 UNIT @ (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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.

### CONTENTS:

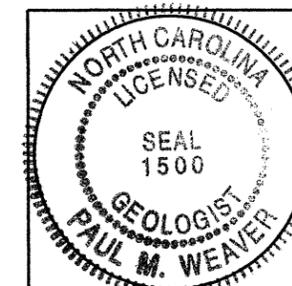
- 1) NCDOT LEGEND SHEET(SHEET 2)
- 2) GEOTECHNICAL REPORT OF SUBSURFACE EXPLORATION (SHEETS 3-7)
- 3) SITE VICINITY MAP (DRAWING No. 1, SHEET 8)
- 4) BORING IDENTIFICATION DIAGRAM (DRAWING No. 2, SHEET 9)
- 5) SUBSURFACE PROFILE AND CROSS-SECTIONS (DRAWING Nos. 3-7, SHEETS 10-14)
- 6) FINAL BORING LOGS, CORING LOGS, AND CORE PHOTOGRAPHS (SHEETS 15-26)
- 7) SUMMARY OF SOIL LABORATORY TEST DATA (SHEET 27)
- 8) SUMMARY OF ROCK LABORATORY TEST DATA (SHEET 27)
- 9) SITE PHOTOGRAPHS (SHEET 28-29)

INVESTIGATED BY G. LICAYAN/ T. WELLS PERSONNEL D. KITCHEN  
 CHECKED BY J. VINSON A. HAYES  
 SUBMITTED BY P. WEAVER C. HELIN  
 DATE 6/27/07 K. LEE

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.

DRAWN BY: DRK



7/24/07  
 SEAL  
 SIGNATURE Paul M. Weaver

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

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4410	33688.1.1	2	29

**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 WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND 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, HARD 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.				HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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:				ALLUVIUM (ALLUV.) - SOILS WHICH 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 WHICH 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 - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - 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 SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - 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 WHICH 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, WHICH 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 B.P.F. 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 LESS THAN 0.1 FOOT PENETRATION WITH 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 (S.R.Q.D.) - 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 (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.			
THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.				MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.				WEATHERED ROCK (WR)  CRYSTALLINE ROCK (CR)  NON-CRYSTALLINE ROCK (NCR)  COASTAL PLAIN SEDIMENTARY ROCK (CP) 				FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. 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 SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.			
<b>SOIL LEGEND AND AASHTO CLASSIFICATION</b>				<b>MINERALOGICAL COMPOSITION</b>				<b>WEATHERING</b>				<b>WEATHERING</b>			
GENERAL CLASS. GRANULAR MATERIALS (75% PASSING #200) SILT-CLAY MATERIALS (75% PASSING #200) ORGANIC MATERIALS				ORGANIC MATERIAL				FRESH				ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.			
GROUP CLASS. A-1, A-2, A-3, A-4, A-5, A-6, A-7, A-1, A-2, A-3, A-4, A-5, A-6, A-7				TRACE OF ORGANIC MATTER				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				LITTLE ORGANIC MATTER				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				MODERATELY ORGANIC				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				HIGHLY ORGANIC				MODERATELY SEVERE (MOD. SEV.)				ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL.</i>			
GROUP INDEX				SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER				SEVERE (SEV.)				ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL, IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 B.P.F.</i>			
USUAL TYPES OF MAJOR MATERIALS				HIGHLY ORGANIC SOILS				VERY SEVERE (V. SEV.)				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. <i>IF TESTED, YIELDS SPT N VALUES &lt; 100 B.P.F.</i>			
GENERATING AS A SUBGRADE				FAIR TO POOR				COMPLETE				ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS ALSO AN EXAMPLE.			
P.I. OF A-7-5 ≤ L.L. - 30 + P.I. OF A-7-6 > L.L. - 30				POOR				<b>GROUND WATER</b>				<b>ROCK HARDNESS</b>			
EXCELLENT TO GOOD				UNSATURATED				WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.				VERY HARD			
FAIR TO POOR				PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA				STATIC WATER LEVEL AFTER 24 HOURS.				HARD			
POOR				SPRING OR SEEPAGE				PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA				MODERATELY HARD			
UNSATURATED				UNSATURATED				SPRING OR SEEPAGE				MEDIUM HARD			
<b>CONSISTENCY OR DENSENESS</b>				<b>MISCELLANEOUS SYMBOLS</b>				<b>ROCK HARDNESS</b>				<b>ROCK HARDNESS</b>			
PRIMARY SOIL TYPE				ROADWAY EMBANKMENT WITH SOIL DESCRIPTION				VERY HARD				CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.			
COMPACTNESS OR CONSISTENCY				SOIL SYMBOL				HARD				CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.			
RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)				ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS				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.			
RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )				INFERRED SOIL BOUNDARIES				MEDIUM HARD				CAN BE GROOVED OR GOUGED 0.85 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT, CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.			
GENERALY GRANULAR MATERIAL (NON-COHESIVE)				INFERRED ROCK LINE				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 LOOSE				ALLUVIAL SOIL BOUNDARY				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.			
LOOSE				DIP/DIP DIRECTION OF ROCK STRUCTURES				TEXTURE OR GRAIN SIZE				U.S. STD. SIEVE SIZE OPENING (MM)			
MEDIUM DENSE				SOUNDING ROD				SOFT				4			
DENSE				SOUNDING ROD				MODERATELY SOFT				10			
VERY DENSE				SOUNDING ROD				SOFT				40			
GENERALY SILT-CLAY MATERIAL (COHESIVE)				SOUNDING ROD				MODERATELY SOFT				100			
VERY SOFT				SOUNDING ROD				SOFT				200			
SOFT				SOUNDING ROD				MODERATELY SOFT				400			
MEDIUM STIFF				SOUNDING ROD				SOFT				800			
STIFF				SOUNDING ROD				MODERATELY SOFT				1600			
VERY STIFF				SOUNDING ROD				SOFT				3200			
HARD				SOUNDING ROD				MODERATELY SOFT				6400			
GENERALY GRANULAR MATERIAL (NON-COHESIVE)				SOUNDING ROD				SOFT				12800			
VERY LOOSE				SOUNDING ROD				MODERATELY SOFT				25600			
LOOSE				SOUNDING ROD				SOFT				51200			
MEDIUM DENSE				SOUNDING ROD				MODERATELY SOFT				102400			
DENSE				SOUNDING ROD				SOFT				204800			
VERY DENSE				SOUNDING ROD				MODERATELY SOFT				409600			
GENERALY SILT-CLAY MATERIAL (COHESIVE)				SOUNDING ROD				SOFT				819200			
VERY SOFT				SOUNDING ROD				MODERATELY SOFT				1638400			
SOFT				SOUNDING ROD				SOFT				3276800			
MEDIUM STIFF				SOUNDING ROD				MODERATELY SOFT				6553600			
STIFF				SOUNDING ROD				SOFT				13107200			
VERY STIFF				SOUNDING ROD				MODERATELY SOFT				26214400			
HARD				SOUNDING ROD				SOFT				52428800			
GENERALY GRANULAR MATERIAL (NON-COHESIVE)				SOUNDING ROD				MODERATELY SOFT				104857600			
VERY LOOSE				SOUNDING ROD				SOFT				209715200			
LOOSE				SOUNDING ROD				MODERATELY SOFT				419430400			
MEDIUM DENSE				SOUNDING ROD				SOFT				838860800			
DENSE				SOUNDING ROD				MODERATELY SOFT				1677721600			
VERY DENSE				SOUNDING ROD				SOFT				3355443200			
GENERALY SILT-CLAY MATERIAL (COHESIVE)				SOUNDING ROD				MODERATELY SOFT				6710886400			
VERY SOFT				SOUNDING ROD				SOFT				13421772800			
SOFT				SOUNDING ROD				MODERATELY SOFT				26843545600			
MEDIUM STIFF				SOUNDING ROD				SOFT				53687091200			
STIFF				SOUNDING ROD				MODERATELY SOFT				107374182400			
VERY STIFF				SOUNDING ROD				SOFT				214748364800			
HARD				SOUNDING ROD				MODERATELY SOFT				429496729600			
GENERALY GRANULAR MATERIAL (NON-COHESIVE)				SOUNDING ROD				SOFT				858993459200			
VERY LOOSE				SOUNDING ROD				MODERATELY SOFT				1717986918400			
LOOSE				SOUNDING ROD				SOFT				3435973836800			
MEDIUM DENSE				SOUNDING ROD				MODERATELY SOFT				6871947673600			
DENSE				SOUNDING ROD				SOFT				13743895347200			
VERY DENSE				SOUNDING ROD				MODERATELY SOFT				27487790694400			
GENERALY SILT-CLAY MATERIAL (COHESIVE)				SOUNDING ROD				SOFT				54975581388800			
VERY SOFT				SOUNDING ROD				MODERATELY SOFT				109951162777600			
SOFT				SOUNDING ROD				SOFT				219902325555200			
MEDIUM STIFF				SOUNDING ROD				MODERATELY SOFT				439804651110400			
STIFF				SOUNDING ROD				SOFT				879609302220800			
VERY STIFF				SOUNDING ROD				MODERATELY SOFT				1759218604441600			
HARD				SOUNDING ROD				SOFT				3518437208883200			
GENERALY GRANULAR MATERIAL (NON-COHESIVE)				SOUNDING ROD				MODERATELY SOFT				7036874417766400			
VERY LOOSE				SOUNDING ROD				SOFT				14073748835532800			
LOOSE				SOUNDING ROD				MODERATELY SOFT				28147497671065600			
MEDIUM DENSE				SOUNDING ROD				SOFT				56294995342131200			
DENSE				SOUNDING ROD				MODERATELY SOFT				112589990684262400			
VERY DENSE				SOUNDING ROD				SOFT				225179981368524800			
GENERALY SILT-CLAY MATERIAL (COHESIVE)				SOUNDING ROD				MODERATELY SOFT				450359962737049600			
VERY SOFT				SOUNDING ROD				SOFT				900719925474099200			
SOFT				SOUNDING ROD				MODERATELY SOFT				1801439850948198400			
MEDIUM STIFF				SOUNDING ROD				SOFT				3602879701896396800			
STIFF				SOUNDING ROD				MODERATELY SOFT				7205759403792793600			
VERY STIFF				SOUNDING ROD				SOFT				14411518807585587200			
HARD				SOUNDING ROD				MODERATELY SOFT				28823037615171174400			
GENERALY GRANULAR MATERIAL (NON-COHESIVE)				SOUNDING ROD				SOFT				57646075230342348800			
VERY LOOSE				SOUNDING ROD				MODERATELY SOFT				115292150460684697600			
LOOSE				SOUNDING ROD				SOFT				230584300921369395200			
MEDIUM DENSE				SOUNDING ROD				MODERATELY SOFT				461168601842738790400			
DENSE				SOUNDING ROD				SOFT				922337203685477580800			
VERY DENSE				SOUNDING ROD				MODERATELY SOFT				1844674407370955161600			
GENERALY SILT-CLAY MATERIAL (COHESIVE)				SOUNDING ROD				SOFT				3689348814741910323200			



**ENGINEERING CONSULTANTS, INC.**



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**SUBMITTED TO:** North Carolina Department of Transportation  
1589 Mail Service Center  
Raleigh, North Carolina 27699-1589

**ATTENTION:** Mr. Njoroge W. Wainaina, P.E.  
State Geotechnical Engineer

**SUBMITTED BY:** Trigon Engineering Consultants, Inc.  
Post Office Box 18846  
Greensboro, North Carolina 27419-8846  
Trigon Project No. 071-07-020

**DATE:** June 27, 2007

**STATE PROJECT:** 33688.1.1

**TIP :** B-4410

**FEDERAL PROJECT:** BRZ-1627(4)

**COUNTY:** Anson

**DESCRIPTION:** Replace Bridge No. 307 Over Winston-Salem Southbound RR on SR 1627

**SUBJECT:** Geotechnical Report of Structure Subsurface Investigation

Mr. Njoroge W. Wainaina, P.E., NCDOT  
Replace Bridge No.307 over Winston-Salem Southbound RR on SR 1627, Anson County, North Carolina

June 28, 2007  
Trigon Project No. 071-07-020

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**Appendices**

**Appendix A (Issued Under Separate Cover)**

1. Laboratory Results of Rock Tests

**Appendix B (Issued Under Separate Cover)**

1. FHWA Geotechnical Report Review Checklist
2. Boring Quantity Summation Sheet
3. Field Boring and Coring Logs
4. Survey Notes
5. Property Owner Contact Report Sheet



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Mr. Njoroge W. Wainaina, P.E., NCDOT

Replace Bridge No.307 over Winston-Salem Southbound RR on SR 1627, Anson County, North Carolina

June 28, 2007

Trigon Project No. 071-07-020

At the time of this investigation, a three-span bridge (existing Bridge No. 307) was present at the site of the proposed bridge. The existing bridge consists of a concrete deck on concrete girders with concrete abutments at the end bents. The existing bridge is approximately 190 feet in length and approximately 26 feet in width.

## 2.0 PROJECT DESCRIPTION

Proposed for construction is a new, three-span structure to replace the existing Bridge No. 307 on SR 1627 over the Winston-Salem Southbound Railroad. The proposed bridge will be a replacement-in-place of the existing bridge. Information for the proposed bridge structure was obtained from the Preliminary General Drawing provided to Trigon by the NCDOT. The proposed bridge will be 250 feet in length and approximately 31 feet in width (out to out) with a skew angle of 35°00'09" at each bent.

The proposed grade along the centerline of the proposed bridge will remain essentially unchanged at End Bent-1 and End Bent-2, while the proposed grade will be approximately 5 feet lower than the existing grade in the vicinity of Bent-1 and approximately 9 feet lower than the existing grade in the vicinity of Bent-2. The proposed excavation in the vicinity of Bent-1 is to accommodate a steeper abutment slope at End Bent-1 than currently exists, while the proposed excavation at Bent-2 is to accommodate a second track for the railroad in the future. The Preliminary General Drawing calls for locating the proposed End Bent-2 approximately 47 feet upstation of the existing End Bent-2. As part of this relocation, the existing End Bent-2 abutment and abutment slope, including the portion of the existing abutment slope where the proposed Bent-2 is to be located, are to be removed. Excavation of the existing End Bent-2 abutment will extend vertically a maximum of approximately 25 feet.

The Preliminary General Drawing is in English units with feet as the primary unit of length.

## 3.0 SCOPE OF INVESTIGATION

### 3.1 FIELD TESTING

The as-drilled boring locations were established by Trigon personnel using the existing bridge and landmarks shown on the Preliminary General Drawing as points of reference. Elevations at the as-drilled boring locations, along the existing ground surface at the bent locations, and along the structure profile were surveyed by personnel from Trigon using Bench Mark No. 2 which was established by an NCDOT survey crew.

**STATE PROJECT:** 33688.1.1

**TIP :** B-4410

**FEDERAL PROJECT:** BRZ-1627(4)

**COUNTY:** Anson

**DESCRIPTION:** Bridge No. 307 Over Winston-Salem Southbound RR on SR 1627

**SUBJECT:** Geotechnical Report of Structure Subsurface Investigation

Trigon Engineering Consultants, Inc. has completed the authorized geotechnical investigation for the above referenced project in Anson County, North Carolina. The purpose of this exploration was to investigate the subsurface conditions at the proposed bridge bent locations and to provide general construction considerations based on the subsurface conditions.

## 1.0 SITE DESCRIPTION

The project site is located in the northernmost portion of Anson County north of the town of Cedar Hill, North Carolina at the approximate location shown on the Site Vicinity Map (Drawing No. 1) attached behind this report. The site and project description of the proposed project is "Replace Bridge No. 307 Over Winston-Salem Southbound RR on SR 1627". Topographically, the site slopes steeply down toward the railroad from each end of the existing bridge. The ground surface in the vicinity of the proposed End Bents slopes gently down towards the north and south. The topography of the general site vicinity consists of gently rolling hills.

*Thank you for our success.*

Trigon's subsurface investigation for the proposed bridge was conducted between May 2 and May 31, 2007. This exploration consisted of eight soil test borings with two borings at each proposed bent location. As-drilled soil test boring locations are shown on the Boring Identification Diagram (Drawing No. 2) following this report, and boring logs, coring logs, and core photographs are also included following this report.

All of the borings for this project were drilled using a truck-mounted Acker AD-II drilling machine equipped with a 140-pound manual hammer. Boring EB2-B and the first 55 feet of Boring EB1-A were advanced utilizing 0.5-foot (O.D.) continuous-flight hollow-stem auger techniques. The remaining borings and the portion of Boring EB1-A below 55 feet were advanced via wash-drilling techniques utilizing a 0.33-foot tricone drill bit. The interior bent borings were performed through holes cored through the concrete bridge deck with casing extended from the bridge deck down to the existing ground surface. Pond water alone was used as the drilling fluid with the exception of Boring EB1-B which used a bentonite mud slurry as the drilling fluid.

Standard Penetration Tests were performed in the soil and weathered rock materials in the soil test borings in general accordance with NCDOT guidelines. In conjunction with this testing, split-barrel soil and weathered rock samples were recovered for visual classification and potential laboratory testing.

Rock coring was performed at the interior bent borings in order to evaluate the nature of the weathered rock/crystalline rock. The cored weathered rock/crystalline rock was returned to our laboratory for further classification and possible testing. The rock coring utilized an NQ size hollow double-tube core barrel with pond water alone was used as the drilling fluid during the rock coring.

### 3.2 LABORATORY TESTING

Laboratory soil testing was performed on seventeen representative split-barrel samples to aid in the assessment of AASHTO soil classification and to provide data for evaluation of engineering properties. The laboratory testing on the samples consisted of Natural Moisture Content, Atterberg Limits, and grain size analysis with hydrometer. In addition, two Unconfined Compressive Strength (Qu only) tests were performed on selected samples of the recovered rock core. Laboratory tests were performed in general accordance with AASHTO and NCDOT specifications. The results of the soil and rock laboratory tests are included on Sheet 27 located behind this report. Laboratory results of the rock testing are also included under separate cover in Appendix A.

### 3.3 SITE GEOLOGY

The site of the proposed project is located in the Carolina Slate Belt of the Piedmont Physiographic province. Carolina Slate Belt rocks are comprised of metamorphosed sedimentary and volcanic rocks intruded by a variety of plutons (Butler et al., 1991).

According to the 1985 Geologic Map of North Carolina, the site is located in an area generally consisting of Metamudstone and Meta-Argillite interbedded with Metasandstone, Metaconglomerate, and Metavolcanic rock. The crystalline rock encountered in our test borings on the west (downstation) side of the railroad tracks generally consisted of moderately severely to very slightly weathered, medium hard to hard Metavolcanic rock, while the crystalline rock encountered on the east (upstation) side of the railroad tracks generally consisted of moderately to slightly weathered, moderately hard to hard Meta-Argillite and Metamudstone. The quality of the Metavolcanic rock encountered ranged from very poor to very good with the majority being poor to fair, while the quality of the Meta-Argillite encountered ranged from very poor to poor. Metamudstone crystalline rock was not cored. The overlying residual soils at the site are the product of the physical and chemical weathering of the underlying crystalline rock.

### 3.4 FOUNDATION MATERIALS

The generalized subsurface conditions indicated by the borings are described below. For soil descriptions and general stratification at a particular boring location, the respective Boring Log should be reviewed. For rock descriptions and stratification at a particular boring location, the respective Coring Log should be reviewed. The Boring Identification Diagram, Boring Logs, Coring Logs, and Core Photographs are located behind this report. Representative subsurface cross-sections at each bent location and a subsurface profile along the right side of the proposed structure are also included behind this report. The subsurface properties for the project site are described below.

Foundation materials encountered included roadway embankment fill, residual soils, weathered rock, and crystalline rock.

Roadway embankment fill was encountered beginning at the existing ground surface at the End Bent-1 borings, at Boring B2-B, and at Boring EB2-A. The roadway embankment fill extends to a depth of  $\pm 4$  feet (Elevation  $\pm 324$  feet) at Boring EB1-A, to a depth of  $\pm 16$  feet (Elevation  $\pm 313$  feet) at the Boring EB1-B, to a depth of  $\pm 14$  feet (Elevation  $\pm 306$  feet) at Boring B2-B, and to a depth of  $\pm 16$  feet (Elevation

±312 feet) at Boring EB2-A. The roadway embankment fill encountered generally consists of soft to stiff, coarse to fine variably sandy, silty clay (A-6). Standard Penetration Resistance values within the fill material ranged from 3 to 14 blows per foot (bpf).

Residual soil was encountered underlying the roadway embankment fill at the End Bent-1 borings, at Boring B2-B, and at Boring EB2-A, and beginning at the existing ground surface at the remaining borings. The residual soil extends to depths ranging from ±63 feet to ±61 feet (Elevations ±265 feet to ±267 feet) at the End Bent-1 borings, to depths ranging from ±31 feet to ±37 feet (Elevations ±277 feet to ±271 feet) at the Bent-1 borings, to depths ranging from ±39 feet to ±33 feet (Elevations ±281 feet to ±287 feet) at the Bent-2 borings, and to depths ranging from ±21 feet to ±13 feet (Elevations ±307 feet to ±315 feet) at the End Bent-2 borings. The residuum generally consists of soft to hard, clayey, fine to coarse sandy silt (A-4 and A-5) and fine to coarse variably sandy, silty clay (A-6, A-7-5, and A-7-6). Standard Penetration Resistance values within the residual soil ranged from 3 to 86 bpf. Zones of residual soils sampling as coarse to fine sand (A-2-4) were encountered within the weathered rock and crystalline rock at Boring B2-A.

Weathered rock was encountered underlying the residual soil at all of the borings drilled for this project. The weathered rock at the End Bent-1 and Bent-1 borings generally consists of Metavolcanic rock, while the weathered rock at the Bent-2 and End Bent-2 borings generally consists of Metamudstone with Metasandstone encountered below the Metamudstone weathered rock at Boring B2-A. The top of the weathered rock was encountered at the following depths and elevations: ±63 feet to ±61 feet (Elevations ±265 feet to ±267) at the End Bent-1 borings, ±31 feet to ±37 feet (Elevations ±277 feet to ±271 feet) at the Bent-1 borings, ±39 feet to ±33 (Elevations ±281 feet to ±287 feet) at the Bent-2 borings, and ±21 feet to ±13 feet (Elevations ±307 feet to ±315 feet) at the End Bent-2 borings. Weathered rock was also encountered as a zone within the crystalline rock at Boring B1-B between depths of 52.7 feet and 53.9 feet (Elevations 255.3 feet and 254.1 feet), and at Boring B2-A between depths of 73.0 feet and 74.0 feet (Elevations 246.9 feet and 245.9 feet). Borings EB1-A, B2-B, and EB2-A were terminated within weathered rock.

Crystalline rock was encountered underlying the weathered rock at Boring EB1-B, at the Bent-1 borings, at Boring B2-A, and at Boring EB2-B. Crystalline rock was not encountered within the depths explored at Borings EB1-A, B2-B, and EB2-A. The crystalline rock encountered at Boring EB1-B and at Bent-1 generally consists of Metavolcanic rock, while the crystalline rock encountered at Boring B2-A generally

consists of Meta-Argillite and the crystalline rock encountered at Boring EB2-B generally consists of Metamudstone. The top of the crystalline rock was encountered at the following depths and elevations: ±69 feet (Elevation ±260 feet) at Boring EB1-B, ±52 feet to ±47 feet (Elevations ±256 feet to ±261 feet) at the Bent-1 borings, ±69 feet (Elevation ±251 feet) at the Boring B2-A, and at a depth of ±21 feet (Elevation ±307 feet) at Boring EB2-B. As noted previously, a zones of weathered rock were encountered within the crystalline rock at Borings B1-B and B2-A. In addition, a zone of crystalline rock was encountered within the weathered rock at Boring B2-A between depths of 61.3 feet and 62.3 feet (Elevations 258.6 feet and 257.6 feet).

Between approximately 30 feet and 35 feet of weathered rock/crystalline rock was cored at the interior bent borings to evaluate the nature of the refusal materials. In general, the cored weathered rock is severely weathered, soft Metavolcanic rock with very close fracture spacing at Bent-1, and severely weathered, soft to moderately hard Meta-Argillite and Metamudstone interlayered with Metasandstone with very close to close fracture spacing at Bent-2. The strata recovery (REC) values within the weathered rock ranged from 1 to 80 percent. It should be noted that all of the material cored at Boring B2-B was weathered rock with no crystalline rock encountered within the depths cored. In general, the cored crystalline rock is moderately severely to very slightly weathered, medium hard to hard Metavolcanic rock with very close to moderately close fracture spacing at Bent-1, and moderately to slightly weathered, moderately hard to hard Meta-Argillite with very close to close fracture spacing at Boring B2-A. Strata recovery (REC) values within the Metavolcanic crystalline rock ranged from 88 to 100 percent and strata Rock Quality Designation (RQD) values within the Metavolcanic crystalline rock ranged from 0 to 100 percent indicating a very poor to very good quality rock. Strata recovery (REC) values within the Meta-Argillite crystalline rock ranged from 90 to 100 percent and strata Rock Quality Designation (RQD) values within the Meta-Argillite crystalline rock ranged from 0 to 44 percent indicating a very poor to poor quality rock.

### 3.5 GROUNDWATER

Groundwater was encountered at all of the borings drilled for this project, with the exception of Boring EB2-B. Groundwater was not encountered within the depths explored at Boring EB2-B. The groundwater elevations generally ranged from ±298 feet to ±303 feet. Fluctuation of groundwater surface levels can occur with seasonal and climatic variations.

#### 4.0 CONSTRUCTION CONSIDERATIONS

Gravel and rock fragments are common within the roadway embankment fill and upper portions of residuum at the site.

#### 5.0 CLOSURE

The geotechnical investigation, analysis, and general construction considerations included in this report are based on the Preliminary General Drawing and the data obtained from our field and laboratory-testing program. If the proposed location and geometry, or finished grades are changed or are different from those outlined above, or if subsurface conditions are encountered during construction which differ from those indicated by our borings, we will require the opportunity to review these changed conditions and make any necessary modifications to the general conditions presented in this report.

Cross-sections and profiles are a generalized interpretation of soil conditions between borings and should not be considered accurate other than at the boring locations. Subsurface conditions between boring locations or elsewhere on the site may vary, and subsurface anomalies may exist which were not detected.

Trigon Engineering Consultants, Inc. appreciates the opportunity to be of service to the NCDOT on this project. Should you have any questions concerning this report, please feel free to contact the undersigned.

Respectfully submitted,

**TRIGON ENGINEERING CONSULTANTS, INC.**



Paul M. Weaver, P.G.  
 Registered North Carolina No. 1500

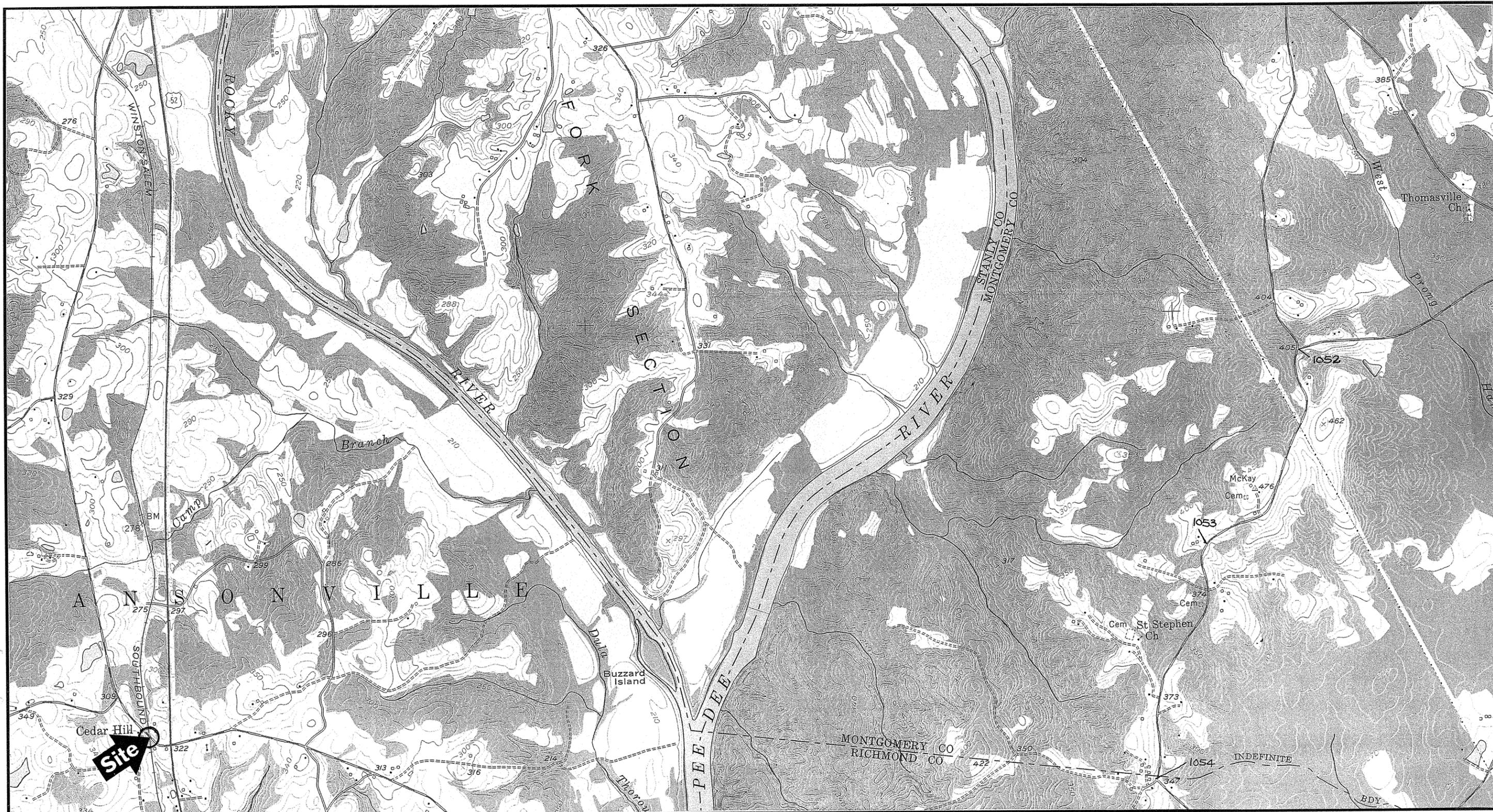
PMW/JRV:pmw

Attachments

s:\0710\projectss\2007\Bridge 307 (B-4410)\Bridge 307 Report.doc




Jeffrey R. Vinson, P.G.  
 Senior Project Manager



Trigon Engineering Consultants, Inc.  
Greensboro North Carolina

SCALE:  
1' = 24,000'

DATE:  
5/22/07

STATE PROJECT NO.  
33688.1.1

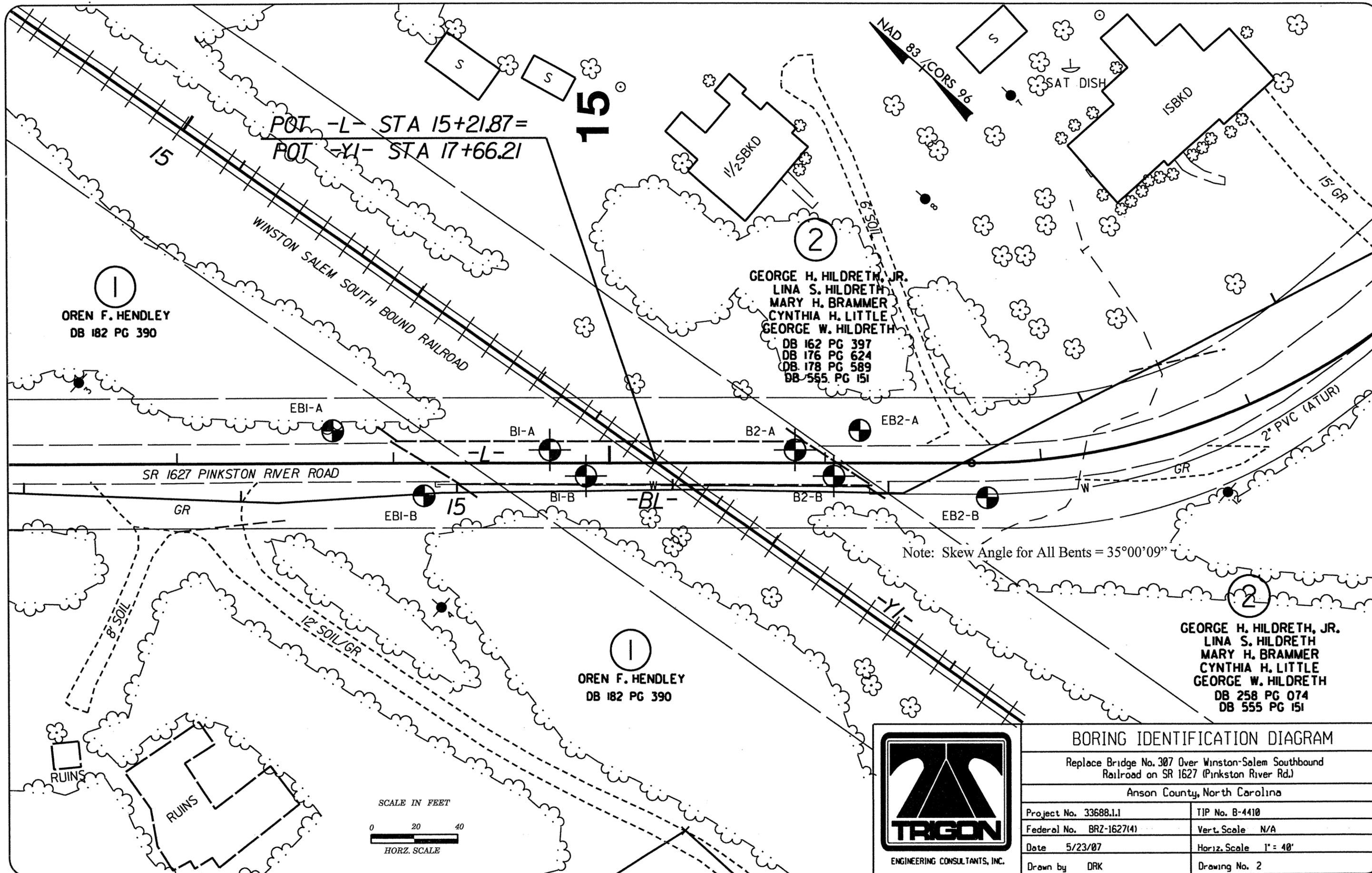
TIP NO.:  
B-4410

SITE VICINITY MAP

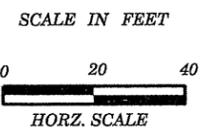
Replace Bridge No. 307 Over Winston-Salem Southbound RR on SR 1627, Anson County, North Carolina

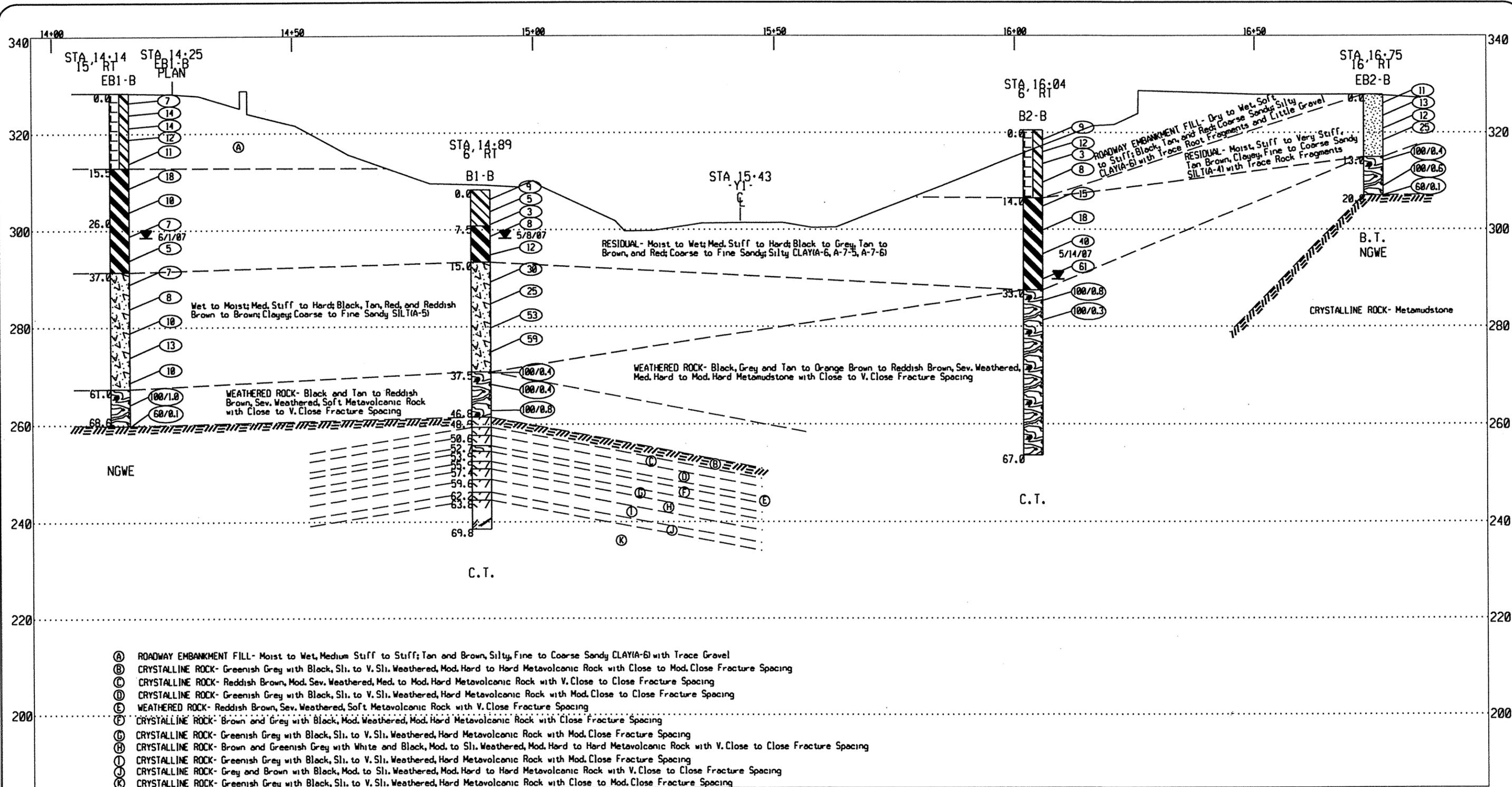
USGS Mount Gilead West Quadrangle

DRAWING NUMBER:  
1



BORING IDENTIFICATION DIAGRAM	
Replace Bridge No. 307 Over Winston-Salem Southbound Railroad on SR 1627 (Pinkston River Rd.)	
Anson County, North Carolina	
Project No. 33688.1.1	TIP No. B-4410
Federal No. BRZ-1627(4)	Vert. Scale N/A
Date 5/23/07	Horiz. Scale 1" = 40'
Drawn by DRK	Drawing No. 2





SCALE IN FEET

0 10 20

VERT. SCALE

0 10 20

HORZ. SCALE



ENGINEERING CONSULTANTS, INC.

PROFILE 15' RIGHT OF -L-

Replace Bridge No. 307 Over Winston-Salem Southbound Railroad on SR 1627 (Pinkston River Rd.)

Anson County, North Carolina

Project No. 33688.1.1

TIP No. B-4410

Federal No. BRZ-1627(4)

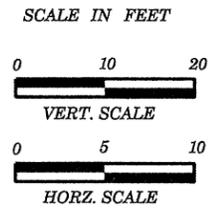
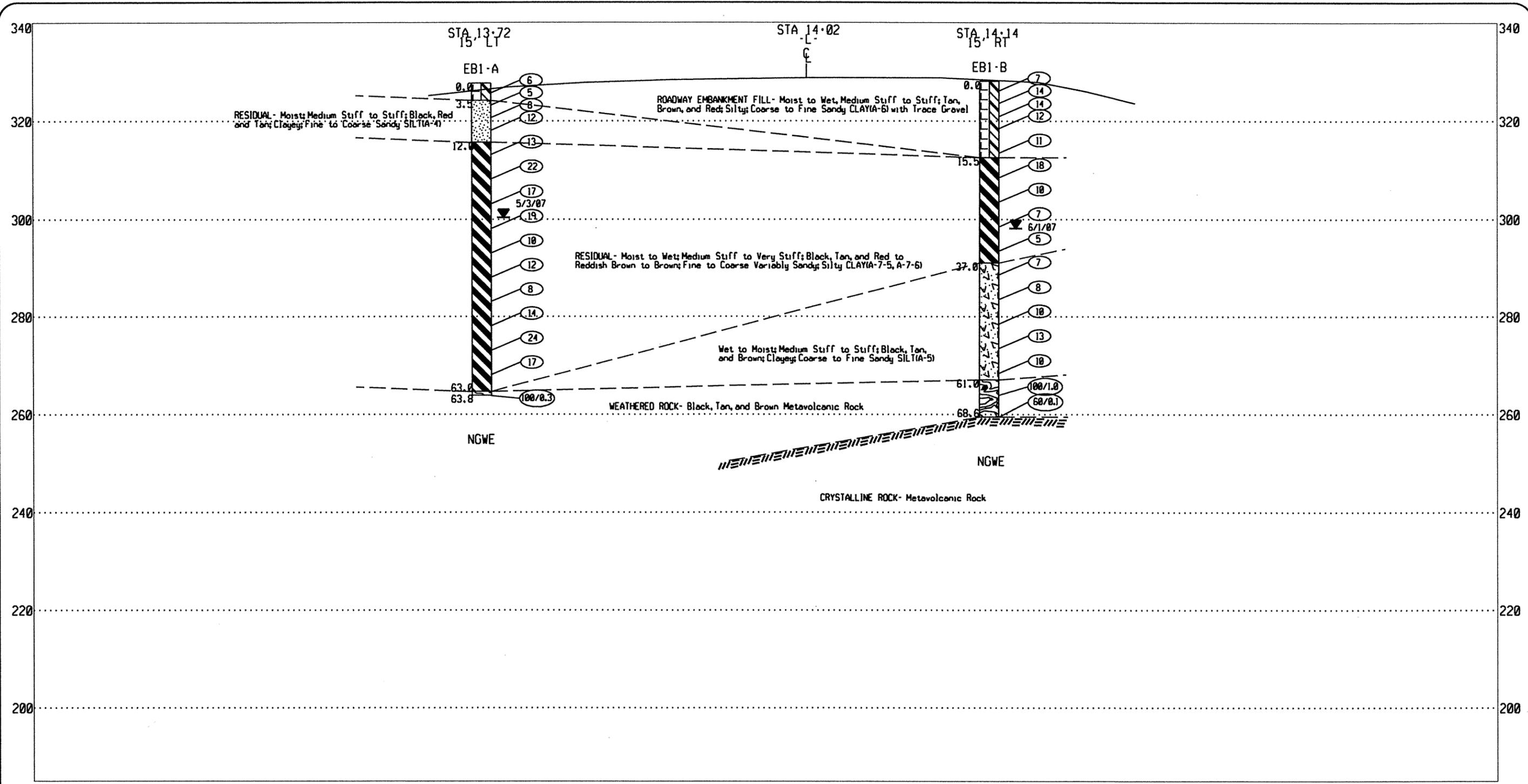
Vert. Scale 1" = 20'

Date 5/23/07

Horiz. Scale 1" = 20'

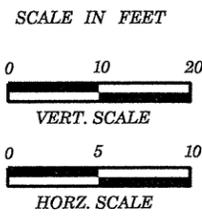
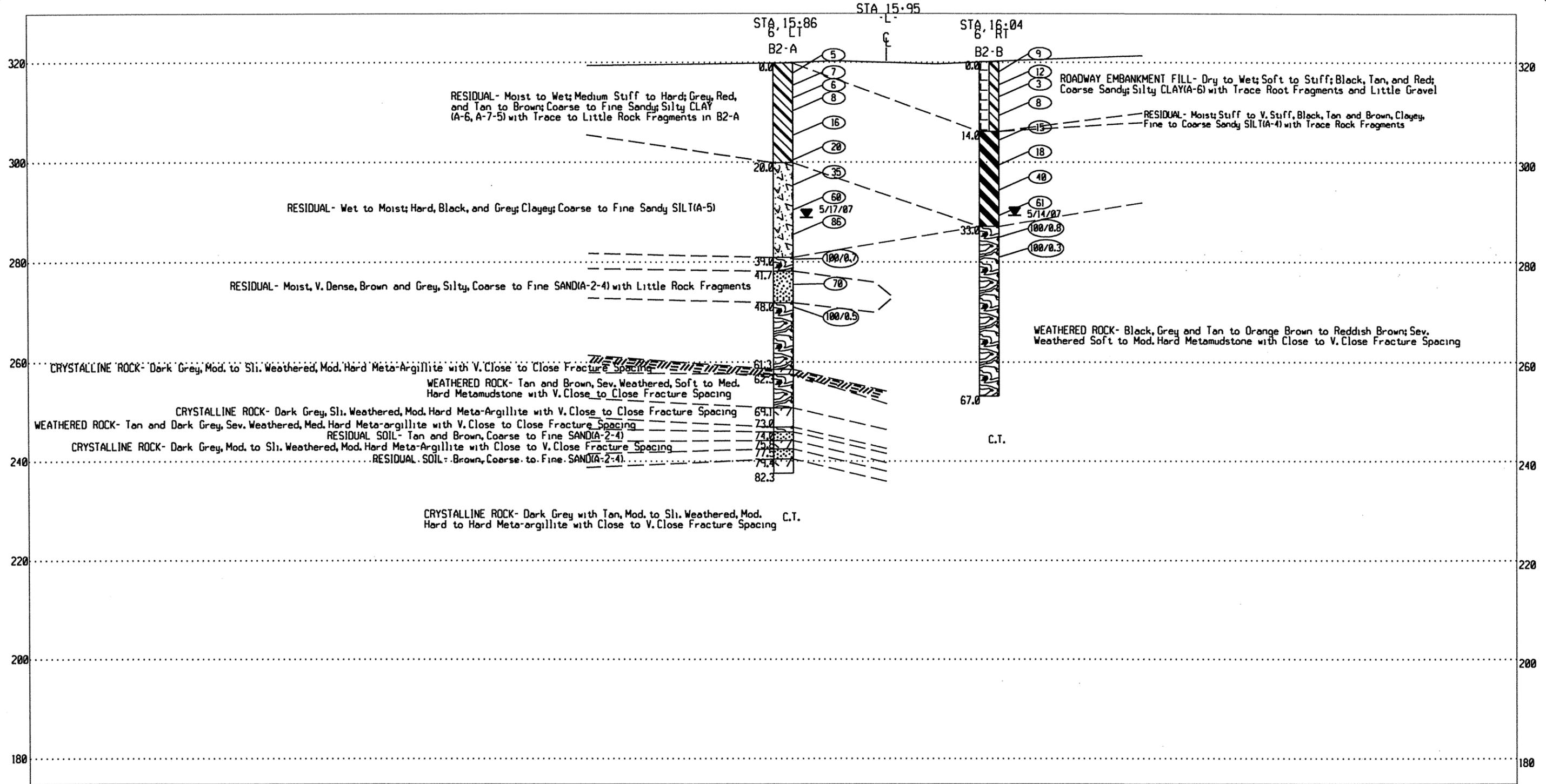
Drawn by DRK

Drawing No. 3

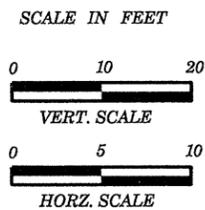
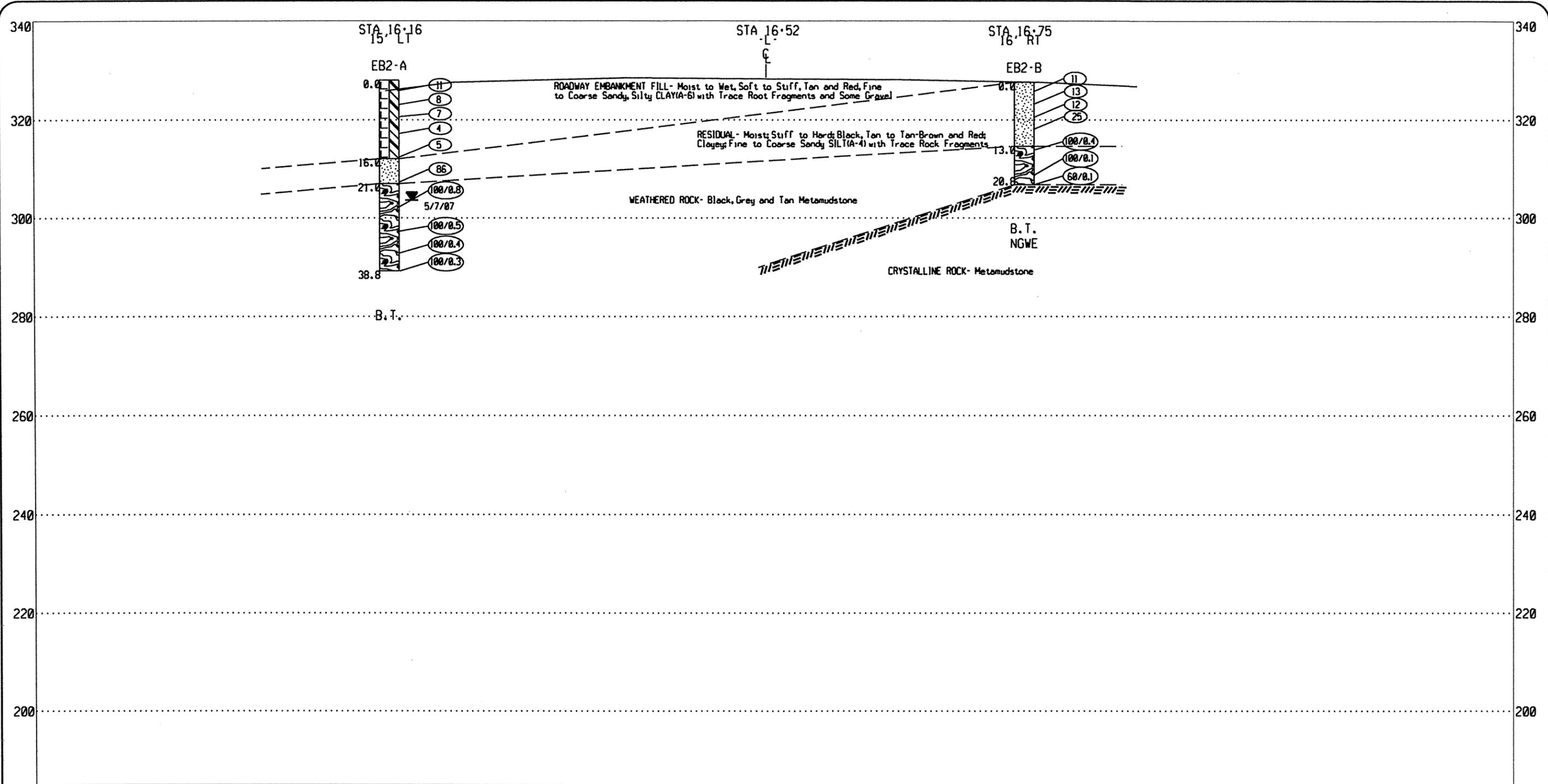


CROSS SECTION ALONG END BENT 1	
Replace Bridge No. 307 Over Winston-Salem Southbound Railroad on SR 1627 (Pinkston River Rd.)	
Anson County, North Carolina	
Project No. 33688.1.1	TIP No. B-4410
Federal No. BRZ-1627(4)	Vert. Scale 1" = 20'
Date 5/23/07	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 4





CROSS SECTION ALONG BENT 2	
Replace Bridge No. 307 Over Winston-Salem Southbound Railroad on SR 1627 (Pinkston River Rd.)	
Anson County, North Carolina	
Project No. 33688.1.1	TIP No. B-4410
Federal No. BRZ-1627(4)	Vert. Scale 1" = 20'
Date 5/23/07	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 6



CROSS SECTION ALONG END BENT 2	
Replace Bridge No. 307 Over Winston-Salem Southbound Railroad on SR 1627 (Pinkston River Rd.)	
Anson County, North Carolina	
Project No. 33688.1.1	TIP No. B-4410
Federal No. BRZ-1627(4)	Vert. Scale 1" = 20'
Date 5/23/07	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 7

PROJECT NO. 33688.1.1	ID. B-4410	COUNTY Anson	GEOLOGIST G.Licayan
SITE DESCRIPTION Replace Bridge No. 307 Over Winston-Salem Southbound RR on SR 1627			GROUND WTR (ft)
BORING NO. EB1-A	STATION 13+72	OFFSET 15ft LT	ALIGNMENT -L-
COLLAR ELEV. 327.7 ft	TOTAL DEPTH 63.8 ft	NORTHING 1,666,723	EASTING 509,146
DRILL MACHINE Acker AD-II	DRILL METHOD HSA/Wash Rotary	HAMMER TYPE 140lb Manual	
START DATE 05/02/07	COMP. DATE 05/02/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

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				
330													0.0
326.7	1.0	4	3	3							M	ROADWAY EMBANKMENT FILL: Medium Stiff, Tan and Red, Silty, Coarse to Fine Sandy CLAY with Trace Root Fragments and Gravel	3.5
324.2	3.5	5	2	3							M	RESIDUAL: Medium Stiff to Stiff, Black, Red and Tan; Clayey; Fine to Coarse Sandy SILT	
321.7	6.0	4	4	4							SS-1	17.5%	
319.2	8.5	3	7	5							M		
314.2	13.5	8	6	7							M	RESIDUAL: Medium Stiff to Very Stiff, Black, Tan and Red; Variably Fine to Coarse Sandy; Silty CLAY	12.0
309.2	18.5	6	10	12							M		
304.2	23.5	5	8	9							SS-2	41.8%	
299.2	28.5	8	10	9							W		
294.2	33.5	5	5	5							W		
289.2	38.5	5	6	6							W		
284.2	43.5	3	3	5							SS-3	68.4%	
279.2	48.5	5	8	6							W		
274.2	53.5	8	12	12							W		
269.2	58.5	4	7	10							W		
264.2	63.5	100/0.3										WEATHERED ROCK: Black and Tan Metavolcanic Rock	63.0
												WEATHERED ROCK: Black and Tan Metavolcanic Rock	63.8

Boring Terminated at Elevation 263.9 ft. in Weathered Rock: Metavolcanic Rock

Note: Pond Water Alone Used as Drilling Fluid Below 55.0 ft. (Where Wash Rotary Started)

PROJECT NO. 33688.1.1	ID. B-4410	COUNTY Anson	GEOLOGIST T.Wells
SITE DESCRIPTION Replace Bridge No. 307 Over Winston-Salem Southbound RR on SR 1627			GROUND WTR (ft)
BORING NO. EB1-B	STATION 14+14	OFFSET 15ft RT	ALIGNMENT -L-
COLLAR ELEV. 328.1 ft	TOTAL DEPTH 68.6 ft	NORTHING 1,666,728	EASTING 509,094
DRILL MACHINE Acker AD-II	DRILL METHOD Wash Rotary	HAMMER TYPE 140lb Manual	
START DATE 05/31/07	COMP. DATE 05/31/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 68.6 ft

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				
330													0.0
327.1	1.0	5	4	3							M	ROADWAY EMBANKMENT FILL: Medium Stiff to Stiff, Tan and Brown, Silty, Fine to Coarse Sandy CLAY with Trace Gravel	3.5
324.6	3.5	9	8	6							W		
322.1	6.0	5	7	7							M		
319.6	8.5	5	6	6							M		
314.6	13.5	3	4	7							SS-4	33.1%	
309.6	18.5	7	7	11							W	RESIDUAL: Very Stiff to Medium Stiff; Black, Tan and Reddish Brown to Brown; Fine to Coarse Sandy; Silty CLAY	15.5
304.6	23.5	5	4	6							W	Note: Moisture Content for SS-5 = 66.1%	
299.6	28.5	3	3	4							SS-5		
294.6	33.5	2	2	3							W		
289.6	38.5	2	3	4							SS-6	79.1%	
284.6	43.5	3	4	4							W	Medium Stiff to Stiff, Black, Tan and Brown; Clayey; Coarse to Fine Sandy SILT	37.0
279.6	48.5	4	4	6							W		
274.6	53.5	4	5	8							M		
269.6	58.5	3	4	6							M		
264.6	63.5	25	75	100/1.0								WEATHERED ROCK: Tan and Brown Metavolcanic Rock	61.0
259.6	68.5	60/0.1										WEATHERED ROCK: Tan and Brown Metavolcanic Rock	61.0
												Boring Terminated with Standard Penetration Test Refusal at Elevation 259.5 ft. in Crystalline Rock: Metavolcanic Rock	68.6

Note: Pond Water and Bentonite Used as Drilling Fluid



# CORE PHOTOGRAPHS

NCDOT Project No. 33688.1.1 TIP No. B-4410

Bridge No. 307 over Winston-Salem Southbound Railroad on SR 1627

B1-A



Box 1 of 2  
(SCALE = 1:4)



Box 2 of 2  
(SCALE = 1:4)





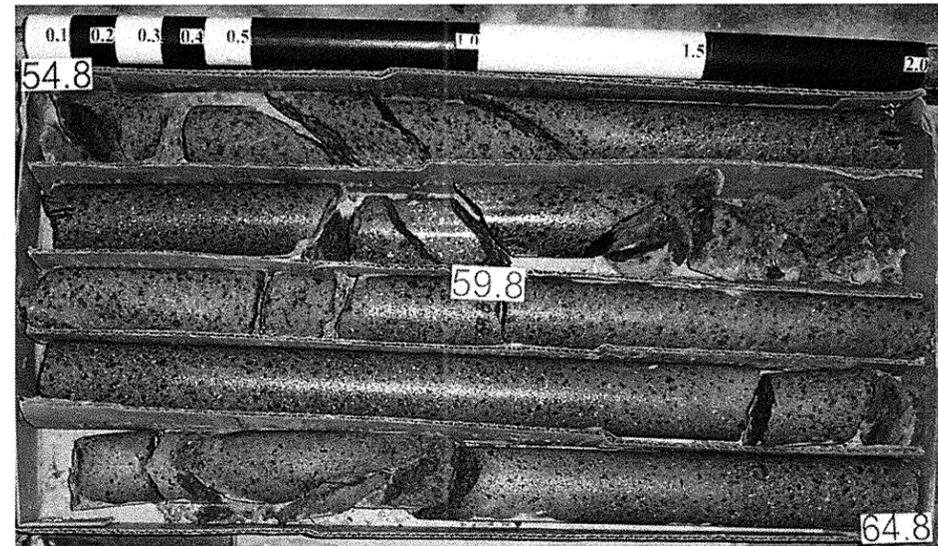
# CORE PHOTOGRAPHS

NCDOT Project No. 33688.1.1 TIP No. B-4410  
Bridge No. 307 over Winston-Salem Southbound Railroad on SR 1627

B1-B



Box 1 of 3



Box 2 of 3  
(SCALE = 1:4)

# CORE PHOTOGRAPHS

NCDOT Project No. 33688.1.1 TIP No. B-4410  
Bridge No. 307 over Winston-Salem Southbound Railroad on SR 1627

B1-B



Box 3 of 3  
(SCALE = 1:4)





# NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

PROJECT NO. 33688.1.1		ID. B-4410		COUNTY Anson		GEOLOGIST G.Licayan/P.Weaver	
SITE DESCRIPTION Replace Bridge No. 307 Over Winston-Salem Southbound RR on SR 1627							GROUND WTR (ft)
BORING NO. B2-A		STATION 15+86		OFFSET 6ft LT		ALIGNMENT -L-	
COLLAR ELEV. 319.9 ft		TOTAL DEPTH 82.3 ft		NORTHING 1,666,858		EASTING 508,979	
DRILL MACHINE Acker AD-II		DRILL METHOD Wash Rotary/NQ Core				HAMMER TYPE 140lb Manual	
START DATE 05/14/07		COMP. DATE 05/16/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 61.3 ft	
CORE SIZE NQ		TOTAL RUN 36.6 ft		DRILLER C. Heun			

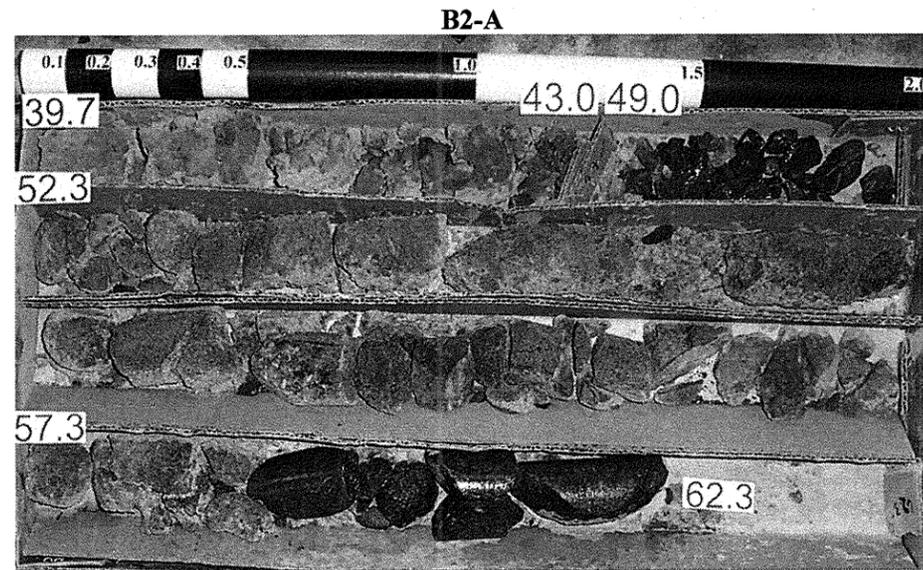
ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
				REC. (%)	RQD (%)		REC. (%)	RQD (%)			
280.2										Begin Coring @ 39.7 ft	
280.2	39.7	3.3	3:15	(1.2)			(1.2)			WEATHERED ROCK: Brown and Grey, Severely Weathered, Soft to Medium Hard Metamudstone with Very Close Fracture Spacing	39.7
276.9	43.0		12:54	36%			60%			RESIDUAL: Very Dense, Brown and Grey, Silty, Coarse to Fine SAND with Little Rock Fragments	41.7
			9:36/0.3				(0.0)			Note: Loss of Water at 42.2 ft.	
			N=70								
270.9	49.0						(5.1)			WEATHERED ROCK: Tan and Brown, Severely Weathered, Soft to Medium Hard Metasandstone with Very Close Fracture Spacing	48.0
		3.3	1:00/0.3	(0.7)			40%			Abundant Low to High Angle Fractures with Iron Staining	
267.6	52.3		7:10	21%							
		5.0	26:50								
			9:08	(3.9)							
			9:57	78%							
			9:10								
262.6	57.3		9:25								
		5.0	7:15								
			9:11								
			5:28	(1.4)	(0.0)						
			4:45	28%	0%						
			4:48								
257.6	62.3		5:24				(0.9)	(0.0)		CRYSTALLINE ROCK: Dark Grey, Moderately to Slightly Weathered, Moderately Hard Meta-Argillite with Very Close to Close Fracture Spacing	61.3
		5.0	7:21	(3.7)			90%	0%		Abundant High Angle Fractures with Iron Staining	62.3
			4:38	74%			(4.7)				
			6:00								
252.6	67.3		4:55							WEATHERED ROCK: Tan and Brown, Severely Weathered, Soft to Medium Hard Metasandstone with Very Close to Close Fracture Spacing	
		4.1	6:15								
			10:25	(3.3)	(1.7)						
			7:50	80%	41%						
248.5	71.4		8:45				(3.8)	(1.7)		CRYSTALLINE ROCK: Dark Grey, Slightly Weathered, Moderately Hard Meta-Argillite with Very Close to Close Fracture Spacing	69.1
247.6	72.3	0.9	10:45	(0.8)	(0.0)	RS-2	97%	44%			
		3.0	6:08/0.1	89%	0%					8 Joints at 20° to 30° 2 Joints at 45°	73.0
			5:15/0.9				(0.8)				
			8:20	(2.7)	(0.0)		80%				
244.6	75.3		11:39	90%	0%					WEATHERED ROCK: Tan and Dark Grey, Severely Weathered, Medium Hard Meta-Argillite with Very Close to Close Fracture Spacing	74.0
		2.0	23:02				(1.2)				
			7:50	(1.4)	(0.0)		67%	0%		RESIDUAL SOIL: Tan and Brown, Coarse to Fine SAND	75.8
242.6	77.3		10:40	70%	0%						
		5.0	9:50				(1.6)			CRYSTALLINE ROCK: Dark Grey, Moderately to Slightly Weathered, Moderately Hard Meta-Argillite with Close to Very Close Fracture Spacing	77.5
			9:39	(3.5)	(0.5)		94%				
			7:18	70%	10%		(0.5)			RESIDUAL SOIL- Brown, Coarse to Fine SAND	79.5
			8:51								
237.6	82.3		10:35				(0.5)	18%		CRYSTALLINE ROCK: Dark Grey with Tan, Moderately to Slightly Weathered, Moderately Hard to Hard Meta-Argillite with Close to Very Close Fracture Spacing	82.3
							(2.8)			Majority is Very Broken	
							100%			Coring Terminated at Elevation 237.6 ft. in Crystalline Rock: Meta-Argillite	

Note: Pond Water Alone Used as Drilling Fluid  
 Note: Run #6 Cut Short Due to Core Block  
 Run #7 Completed Run #6  
 Run#8 Cut Short Due to Core Block  
 Run #9 Completed Run #8

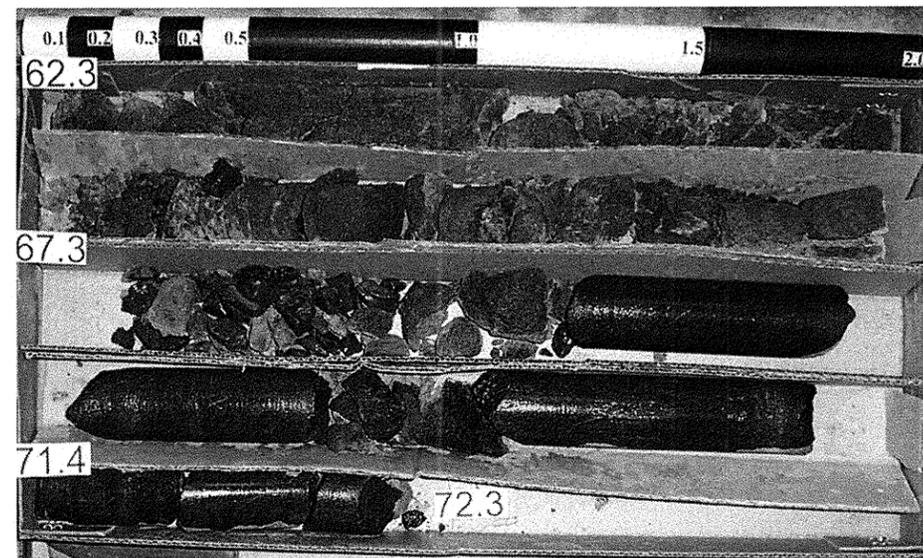
NCDOT CORE SINGLE COPY OF 071-07-020CNEW.GPJ NC\_DOT\_GDT 7/23/07

# CORE PHOTOGRAPHS

NCDOT Project No. 33688.1.1 TIP No. B-4410  
Bridge No. 307 over Winston-Salem Southbound Railroad on SR 1627



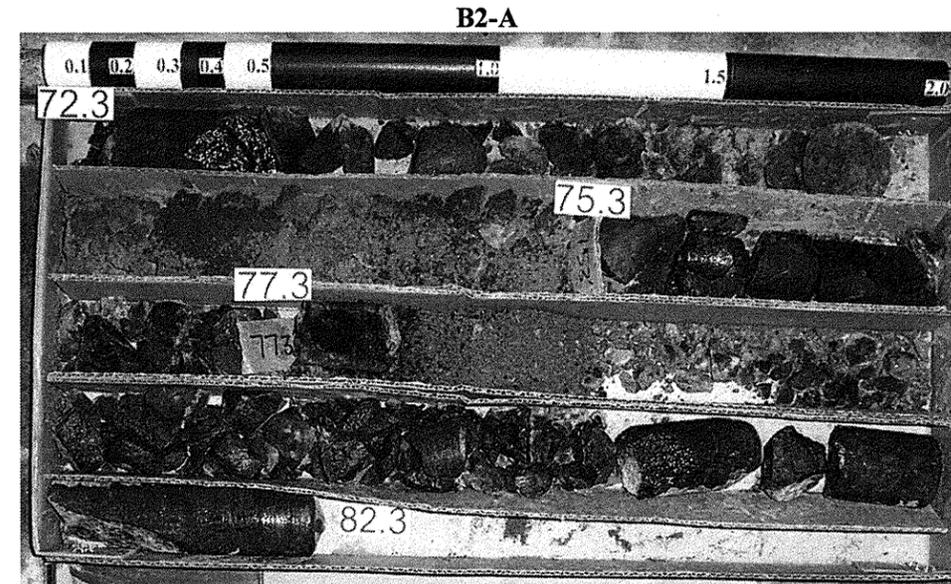
Box 1 of 3



Box 2 of 3  
(SCALE = 1:4)

# CORE PHOTOGRAPHS

NCDOT Project No. 33688.1.1 TIP No. B-4410  
Bridge No. 307 over Winston-Salem Southbound Railroad on SR 1627



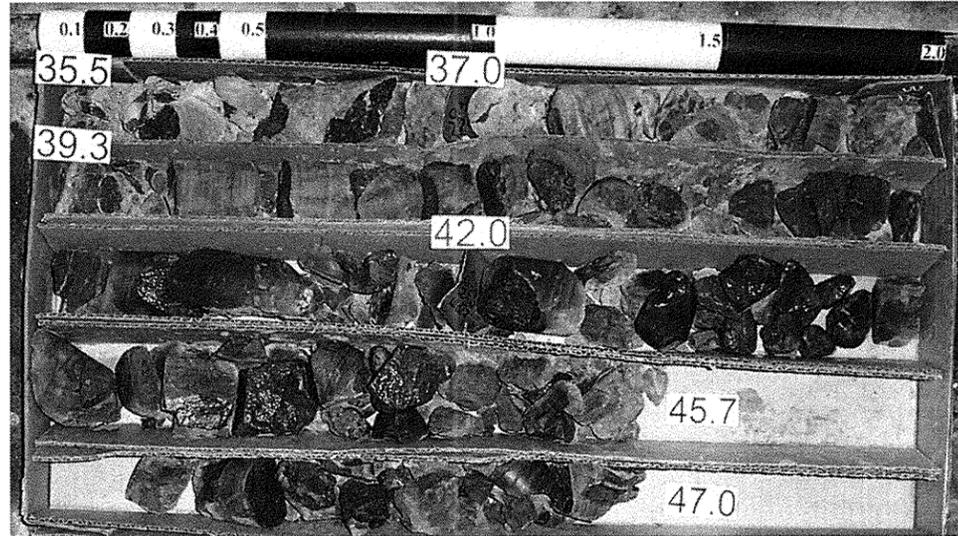
Box 3 of 3  
(SCALE = 1:4)



# CORE PHOTOGRAPHS

NCDOT Project No. 33688.1.1 TIP No. B-4410  
Bridge No. 307 over Winston-Salem Southbound Railroad on SR 1627

B2-B



Box 1 of 3

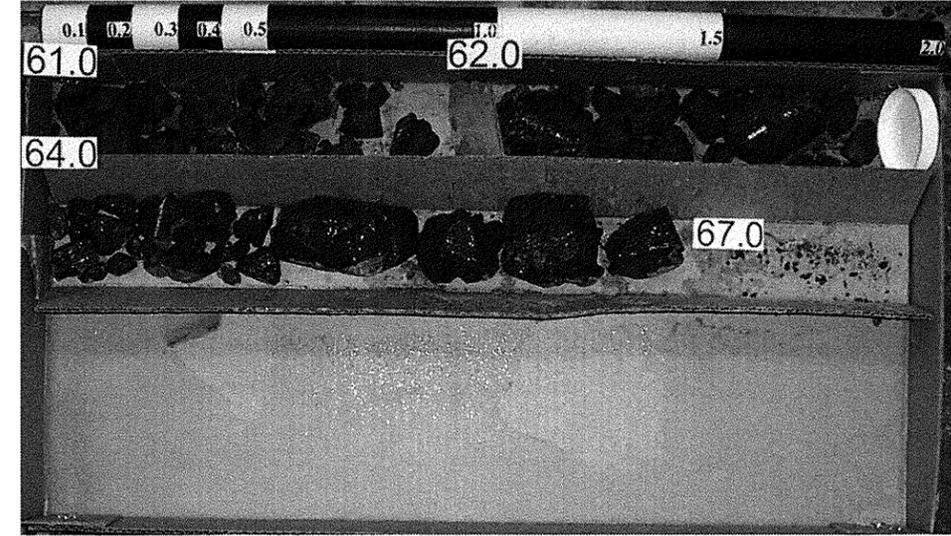


Box 2 of 3  
(SCALE = 1:4)

# CORE PHOTOGRAPHS

NCDOT Project No. 33688.1.1 TIP No. B-4410  
Bridge No. 307 over Winston-Salem Southbound Railroad on SR 1627

B2-B



Box 3 of 3  
(SCALE = 1:4)

PROJECT NO. 33688.1.1		ID. B-4410		COUNTY Anson		GEOLOGIST G.Licayan									
SITE DESCRIPTION Replace Bridge No. 307 Over Winston-Salem Southbound RR on SR 1627							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 16+16		OFFSET 15ft LT		ALIGNMENT -L-									
COLLAR ELEV. 328.0 ft		TOTAL DEPTH 38.8 ft		NORTHING 1,666,884		EASTING 508,963									
DRILL MACHINE Acker AD-II		DRILL METHOD Wash Rotary		HAMMER TYPE 140lb Manual											
START DATE 05/04/07		COMP. DATE 05/04/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
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						
330															328.0
327.0	1.0	5	5	6											0.0
324.5	3.5	5	4	4											
322.0	6.0	5	5	2											
319.5	8.5	3	2	2											
314.5	13.5	3	2	3											
309.5	18.5	29	44	42											
304.5	23.5	46	54/0.3												
299.5	28.5	100/0.5													
294.5	33.5	100/0.4													
289.5	38.5	100/0.3													
ROADWAY EMBANKMENT FILL: Soft to Stiff, Tan and Red, Fine to Coarse Sandy, Silty CLAY with Trace Root Fragments and Some Gravel															
RESIDUAL: Hard; Black, Tan and Red; Clayey; Coarse to Fine Sandy SILT with Rock Fragments at Bottom of Sampler															
WEATHERED ROCK: Black, Grey and Tan Metamudstone															
Boring Terminated at Elevation 289.2 ft. in Weathered Metamudstone															
Note: Pond Water Alone Used as Drilling Fluid															

NCDOT BORE SINGLE 071-07-020NEW.GPJ NC\_DOT.GDT 7/20/07

PROJECT NO. 33688.1.1		ID. B-4410		COUNTY Anson		GEOLOGIST T.Wells									
SITE DESCRIPTION Replace Bridge No. 307 Over Winston-Salem Southbound RR on SR 1627							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 16+75		OFFSET 16ft RT		ALIGNMENT -L-									
COLLAR ELEV. 327.6 ft		TOTAL DEPTH 20.8 ft		NORTHING 1,666,900		EASTING 508,898									
DRILL MACHINE Acker AD-II		DRILL METHOD HSA		HAMMER TYPE 140lb Manual											
START DATE 05/31/07		COMP. DATE 05/31/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
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						
330															327.6
326.6	1.0	5	6	5											0.0
324.1	3.5	5	5	8											
321.6	6.0	4	5	7											
319.1	8.5	5	15	10											
314.1	13.5	100/0.4													
309.1	18.5	65	35/0.1												
306.9	20.7	60/0.1													
RESIDUAL: Stiff to Very Stiff, Tan Brown, Clayey, Fine to Coarse Sandy SILT with Trace Rock Fragments															
WEATHERED ROCK: Black and Tan Metamudstone															
Boring Terminated with Standard Penetration Test Refusal at Elevation 306.8 ft. on Crystalline Rock: Metamudstone															

NCDOT BORE SINGLE 071-07-020NEW.GPJ NC\_DOT.GDT 7/20/07



**SITE PHOTOGRAPHS**  
State Project No. 33688.1.1 TIP No. B-4410  
Bridge No. 307 Over Winston-Salem Southbound Railroad on SR 1627  
Anson County, North Carolina  
Page 1 of 4



Photograph 1 – View Approximately 15' Rt. of -L-  
Looking Upstation from EB1-B

**SITE PHOTOGRAPHS**  
State Project No. 33688.1.1 TIP No. B-4410  
Bridge No. 307 Over Winston-Salem Southbound Railroad on SR 1627  
Anson County, North Carolina  
Page 2 of 4



Photograph 3 – View Approximately 15' Rt. of -L-  
Looking Upstation from Railroad



Photograph 2 – View Approximately 15' Right of -L-  
Looking Downstation from Railroad



Photograph 4 – View Approximately 15' Rt. of -L-  
Looking Downstation from EB2-B

**SITE PHOTOGRAPHS**  
State Project No. 33688.1.1 TIP No. B-4410  
Bridge No. 307 Over Winston-Salem Southbound Railroad on SR 1627  
Anson County, North Carolina  
Page 3 of 4



Photograph 5 – View Left to Right Across End Bent-1

**SITE PHOTOGRAPHS**  
State Project No. 33688.1.1 TIP No. B-4410  
Bridge No. 307 Over Winston-Salem Southbound Railroad on SR 1627  
Anson County, North Carolina  
Page 4 of 4



Photograph 7 – View Left to Right Across Bent-2



Photograph 6 – View Left to Right Across Bent-1



Photograph 8 – View Left to Right Across End Bent-2