STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3189	1	43
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
32920.1.1	BRZ-1643(1)	P.E.	
		CONST.	

PROJECT: 32920.1.1 ID: B-3189

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 32920.1.1 I.D. NO. B-3189

F.A. PROJECT BRZ-1643(1)

COUNTY HAYWOOD

PROJECT DESCRIPTION BRIDGE NO. 272 ON SR 1643(BRIDGE ST) OVER NORFOLK SOUTHERN RAILROAD IN CANTON

SITE DESCRIPTION

CONTENTS:

DRAWN BY: DRK

For Letting

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.

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.

INVESTIGATED BY D GOODNIGHT

CHECKED BY J VINSON

SUBMITTED BY P WEAVER

DATE 5/9/06

PERSONNEL D KITCHEN, S WILLARD, C HEUN, C PERT, T CHAPPELL, K LEE, R FAILMEZGER

NORTH CAROLINA LICENSED SEAL 1500 GEOLOGIST PAUL M. WEAVER

5/24/06

SEAL

Paul W

SIGNATURE

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3189	32920.1.1	2	43

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED 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 (AASHTO T206, 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:

VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤35% PASSING #200)							SILT-CLAY MATERIALS (>35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT	6 MX		N.P.	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

P.I. OF A-7-5 ≤ L.L. - 30 ; P.I. OF A-7-6 > L.L. - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.0	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F. SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12"	3"				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE
UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 30
MODERATELY COMPRESSIBLE	LIQUID LIMIT 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

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

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.
- STATIC WATER LEVEL AFTER 24 HOURS.
- PW — PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA
- SPRING OR SEEPAGE

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS
- INFERRED SOIL BOUNDARIES
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP/DIP DIRECTION OF ROCK STRUCTURES
- ● - SOUNDING ROD
- - BOULDER
- SPT CPT DPT DMT PMT VST — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

SAMPLE DESIGNATIONS
S- BULK SAMPLE
SS- SPLIT SPOON SAMPLE
ST- SHELBY TUBE SAMPLE
RS- ROCK SAMPLE
RT- RECOMPACTED TRIAXIAL SAMPLE
CBR - CBR SAMPLE

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
C.T. - CORING TERMINATED
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F. - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED
FRAGS. - FRAGMENTS
MED. - MEDIUM
NM - NOT MEASURED
PMT - PRESSUREMETER TEST
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT
W - MOISTURE CONTENT
V. - VERY
VST - VANE SHEAR TEST

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B- 57
- [ ] BK-51
- [x] CME-45
- [ ] CME-55
- [ ] PORTABLE HOIST
- [ ] OTHER CME 850
- [x] OTHER ACKER MARK II

ADVANCING TOOLS:
- [ ] CLAY BITS
- [x] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [x] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [x] TRICONE 3⅞" TUNG.-CARB.
- [x] CORE BIT
- [ ] OTHER _____

HAMMER TYPE:
- [ ] AUTOMATIC [x] MANUAL

CORE SIZE:
- [ ] -B-____
- [x] -N- 0
- [ ] -H- 0

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [x] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] OTHER _____

ROCK DESCRIPTION

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:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES > 100 BLOWS PER FOOT.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V. SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
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. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
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. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGISTS PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

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

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS 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 IS 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.

FLOAT - 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 (N 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.

BENCH MARK: BM #3 -L1- STA. 12+05.78, 15.1' LT

ELEVATION: 2629.90'

NOTES:

ENGINEERING CONSULTANTS, INC.

www.trigoneng.com

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SUBMITTED TO: North Carolina Department of Transportation
Geotechnical Engineering Unit
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. 071-05-016

DATE: May 23, 2006

STATE PROJECT: 32920.1.1

TIP : B-3189

FEDERAL PROJECT: BRZ-1643(1)

COUNTY: Haywood

DESCRIPTION: Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad in Canton

SUBJECT: Geotechnical Report of Structure Subsurface Investigation

Thank you for our success.

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Geotechnical Report

Appendices

ENGINEERING CONSULTANTS, INC.

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STATE PROJECT: 32920.1.1

TIP : B-3189

FEDERAL PROJECT: BRZ-1643(1)

COUNTY: Haywood

DESCRIPTION: Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad in Canton

SUBJECT: Geotechnical Report of Structure Subsurface Investigation

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

1.0 SITE DESCRIPTION

The project site is located in the east-central portion of Haywood County in the town of Canton at the approximate location shown on the Site Vicinity Map (Drawing No. 1) located behind this report. The site and project description of the proposed project is "Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad in Canton". Topographically, the site slopes steeply down towards the Norfolk Southern Railroad from each end of the existing bridge. The topography of the general site vicinity consists of steep hills and valleys.

At the time of this investigation, a three-span bridge (existing Bridge No. 272) was present at the site of the proposed bridge. The centerline of the existing bridge matches the centerline of the proposed bridge. The existing bridge consists of a timber deck with asphalt overlay bearing on combinations of steel and timber beams and steel, timber, and concrete piles. It appears that the bridge has been shored up several times using steel, concrete, and wood supports. The existing bridge is approximately 156 feet in length and approximately 25 feet in width. Timber and concrete abutment walls are present at the existing end bent abutments. Bridge rod soundings performed at the site as part of this investigation indicates that concrete footings for the existing Bent-2 extend out from the column faces for a distance of between 3 and 4 feet, and that concrete footings in front of the existing End Bent-2 abutment extend out from the abutment face for a distance of 1.4 feet.

2.0 PROJECT DESCRIPTION

Proposed for construction is a new, two-span structure to replace the existing Bridge No. 272 on SR 1643 (Bridge Street) over the Norfolk Southern Railroad. The new bridge will be a replacement-in-place of the existing bridge. Information for the proposed bridge structure was obtained from the Preliminary General Drawings dated April 2005. The Preliminary General Drawings were provided to Trigon by the NCDOT. The proposed bridge will be 130.0 feet in length and 41.3 feet in width (out to out). A skew angle of 90°00'00" is proposed for each bent. The proposed grades along the -L1- centerline between the abutments of the new bridge will remain essentially unchanged from the existing grade. Minor excavation of the existing abutment slope is proposed at End Bent-1 to in order to achieve a consistent 2(H):1(V) slope for the new bridge abutment slope. This excavation will involve both horizontal and vertical excavation, with a maximum vertical excavation of approximately 3 feet below the existing abutment slope surface. A vertical cast-in-place concrete abutment/crash wall is proposed for the new End Bent-2 abutment. This wall will be approximately 26 feet closer to the existing/proposed End Bent-1 than the existing End Bent-2. A maximum of approximately 22 feet of soil fill is proposed to be placed behind the End Bent-2 abutment/crash wall to bring the existing grade up to the proposed grade (approximately the existing roadway grade). Two retaining walls, each approximately 30 feet in length, are proposed to extend south (upstation) from the proposed End Bent-2 abutment wall. One wall will be approximately 23 feet left of the -L1- centerline while the other wall will be approximately 23 feet right of the -L1- centerline. Both walls will be parallel to the -L1- centerline for their entire length, and will serve the purpose of confining the proposed embankment fill behind the abutment/crash wall at the proposed End Bent-2.

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 locations for the soil test borings were located by personnel from Trigon using the existing bridge for reference. Elevations at the as-drilled boring locations, along the existing ground surface at the bent locations, and along the bridge and retaining walls structure profiles were surveyed by personnel from Trigon using the "BM-3" benchmark elevation (Elevation 2629.90 feet) established by an NCDOT survey crew as a reference point. The majority of the borings were offset to at least some extent from the ideal boring locations due to utilities, embankment slopes, or other obstructions. As-drilled boring locations are shown on the Boring Identification Diagram (Drawing No. 2).

The subsurface exploration for the proposed bridge and associated retaining walls was conducted in two phases. The first phase of the field work was performed between July 19 and August 8, 2005. This part of the exploration consisted of eight Standard Penetration Test (SPT) borings with two borings at each proposed bent location (EB1-A, EB1-B, EB2-A, and EB2-B) and two borings at each proposed retaining wall (RW-1 through RW-4). In addition, eleven bridge rod soundings were performed around the existing Bent-2 footings as part of the first phase of the investigation to evaluate the dimensions of the footings at that bent. A truck-mounted Acker AD-II drilling machine equipped with a 140-pound manual hammer was used to drill all eight borings for the first phase of this project. All eight borings were advanced through soil utilizing 0.33-foot tricone/wash-drilling techniques with tap water plus bentonite used as the drilling fluid. Initial mud densities ranged from 63.5 to 68.0 pounds per cubic foot.

The second phase of the subsurface exploration was conducted between April 17 and April 28, 2006. The purpose of this second phase of the investigation was to provide additional information requested by the designer to allow him to evaluate alternative end bent and retaining wall foundation configurations from those originally proposed at the time of the first phase of the investigation. This part of the exploration consisted of two SPT borings (SPT-1 and SPT-2), three dilatometer (DMT) test borings (D-1 through D-3), three Seismic Cone Penetrometer Test (SCPT) borings (SCPT-1 through SCPT-3), and one Cone Penetrometer Test (CPT) boring (CPT-1). In addition, three bridge rod soundings were performed around the existing End Bent-2 footing as part of the second phase of the investigation to evaluate the protrusion of the footings out from the abutment wall. An ATV-mounted CME-45 drilling machine was used to perform the dilatometer test borings, the cone penetrometer test boring, the SPT test borings, and the seismic cone test boring SCPT-3. The SCPT-1 and SCPT-2 seismic cone test borings were extended utilizing a truck-mounted Acker AD-II drilling rig. The

SPT test borings were advanced through soil utilizing 0.33-foot tricone/wash-drilling techniques with tap water plus bentonite used as the drilling fluid. Initial mud density in both borings was 64 pounds per cubic foot.

Standard Penetration Tests were performed in the soil and weathered rock materials in the SPT 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.

The bridge-rod soundings were performed utilizing ½-inch steel rods and an approximately 16-pound hammer with a 24-inch drop. A diagram indicating the locations of the bridge-rod soundings (Drawing No. 3), and Bridge Rod Sounding Logs used to record the bridge-rod sounding results, are included following this report.

Rock coring was performed at the end bent borings and at the RW-4 retaining wall boring 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 was performed with an NQ size hollow double-tube core barrel. Polymer plus tap water was used as the drilling fluid during rock coring at End Bent-1 and Boring RW-4, while bentonite plus tap water was used as the drilling fluid during rock coring at End Bent-2.

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 Limit, 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 laboratory tests are included on Sheet 43. A Summary of Rock Test Data table is also included on Sheet 43. 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 within the Blue Ridge Belt of the Blue Ridge physiographic province. Blue Ridge Belt rocks are comprised of metamorphosed sedimentary and volcanic rocks intruded by a variety of plutons, and contain "well-exposed Middle Proterozoic basement gneisses, Later Proterozoic plutons, Later Proterozoic metavolcanic and metasedimentary rift sequences, and thick early Paleozoic rifted

continental margin and platform deposits. These rocks were involved in foreland thrusting along the western flank of the Appalachian orogen and are a record of multiple periods of Paleozoic deformation associated with development of the southern Appalachian orogen" (*Geology of the Carolinas*, Horton, Zullo, 1991).

According to the 1985 Geologic Map of North Carolina, the site is located in an area generally consisting of biotite gneiss interlayered and gradational with biotite-garnet gneiss and amphibolite. The crystalline rock encountered in our test borings generally consisted of moderately severely to slightly weathered gneiss, with the majority of the recovered crystalline rock being moderately severely weathered. The crystalline rock cored ranged in quality from very poor to poor, with the majority of the crystalline rock recovered being very poor in quality. The overlying residual soils at the site are the product from the physical and chemical weathering of the underlying crystalline rock.

3.4 EXISTING FOOTINGS

The bridge rod soundings performed in the vicinity of the existing Bent-2 indicate that the edge of the footings extend between 3 feet and 4 feet out from the column face to the north, and between 1 foot to 2 feet out from the column face to the west. The bridge rod sounding performed in the vicinity of the existing End Bent-2 indicate that the footing extends out 1.4 feet from the abutment face to the north.

3.5 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 structure are also included behind this report. The subsurface properties for the project site are described below.

3.5.1 BRIDGE STRUCTURE

Foundation materials encountered at the bridge structure location included roadway embankment fill, artificial fill, residual soils, weathered rock, and crystalline rock.

Roadway embankment fill was encountered beginning at the existing ground surface at Boring EB1-B. The fill extends to a depth of 3.0 feet (Elevation 2624.2 feet). The roadway embankment fill encountered generally consists of loose, silty, course to fine sand (A-2-4) with traces of gravel and concrete debris. A Standard Penetration Resistance value of 100+ blows per foot (bpf) was encountered within the roadway embankment fill, but this high value was due to the gravel and concrete debris present within the fill material.

Artificial fill was encountered beginning at the existing ground surface at Boring EB2-A. The fill extends to a depth of 8.0 feet (Elevation 2598.9 feet). The artificial fill encountered generally consists of very loose, silty, course to fine sand (A-2-4) with gravel and asphalt, wood, and rubber debris. Standard Penetration Resistance values of 2 to 4 bpf were encountered within the artificial fill material.

Residual soils were encountered underlying the roadway embankment fill at Boring EB1-B, underlying the artificial fill at Boring EB2-A, and beginning at the existing ground surface at the remaining bridge structure borings. The residual soils extend to depths of ±52 feet to ±53 feet (Elevation ±2575 feet) at End Bent-1, and to a depth of ± 27 feet to ± 34 feet (Elevations ± 2580 feet to ± 2564 feet) at End Bent-2. The residual soils at the borings drilled for the bridge structure generally consist of medium stiff to hard, clayey, fine to coarse sandy silt (A-4), and loose to very dense, silty, coarse to fine sand (A-2-4) with traces to a little mica. Standard Penetration Resistance values within the residuum ranged from 5 and 91 bpf.

Weathered rock was encountered underlying the residual soils at all four of the bridge borings drilled for this project. The weathered rock generally consists of gneiss. The weathered rock was encountered between the following depths and elevations: 53.0 feet to 82.6 feet (Elevations 2575.1 feet to 2545.5 feet) at Boring EB1-A; 52.0 feet to 80.5 feet (Elevations 2575.2 feet to 2546.7 feet) at Boring EB1-B; 27.0 feet to 42.3 feet (Elevations 2579.9 feet to 2564.6 feet), and as a zone within the crystalline rock between 56.6 feet to 58.6 feet (Elevations 2550.3 feet to 2548.3 feet), at Boring EB2-A; and 34.0 feet to 35.7 feet (Elevations 2563.6 feet to 2561.9 feet) , and as zones within the crystalline rock between 43.6 feet to 51.6 feet (Elevations 2554.0 feet to 2546.0 feet) and 52.6 feet to 55.6 feet (Elevations 2545.0 feet to 2542.0 feet), at Boring EB2-B.

Crystalline rock was encountered at all four of the bridge structure borings dilled for this project. The crystalline rock generally consists of gneiss. The top of the crystalline rock was encountered at the following depths and elevations: 82.6 feet (Elevation 2545.5 feet) at EB1-A, 80.5 feet (Elevation 2546.7 feet) at EB1-B, 42.3 feet (Elevation 2564.6 feet) at EB2-A, and 35.7 feet (Elevation 2561.9 feet) at EB2-B. As noted in the

previous paragraph, weathered rock was encountered as zones within the crystalline rock at the End Bent-2 borings.

Between ±27 and ±35 feet of weathered rock/crystalline rock was cored at the bridge borings. In general, the cored weathered rock is severely weathered, very soft to soft, gneiss with very close to close fracture spacing. Strata recovery (REC) values within the weathered rock ranged from 0 to 39 percent. In general, the cored crystalline rock is moderately severely to slightly weathered, medium hard to hard, gneiss with very close to close fracture spacing. The majority of the crystalline rock recovered was moderately severely weathered and medium hard to moderately hard. The REC values within the crystalline rock ranged from 53 to 100 percent, and strata Rock Quality Designation (RQD) values ranged from 0 to 50 percent. All four bridge structure borings were terminated within crystalline rock.

3.5.2 RETAINING WALL STRUCTURES

Foundation materials encountered at the retaining wall structures locations included roadway embankment fill, residual soils, weathered rock, and crystalline rock. The borings drilled for the retaining walls were RW-1 through RW-4, SPT-1, and SPT-2.

Roadway embankment fill was encountered beginning at the existing ground surface at all six retaining wall structure borings. The fill extends to a depths ranging from ±4 feet to ±14 feet (Elevations ±2615 to ±2602 feet). The roadway embankment fill encountered, based on visual and laboratory classification, generally consists of very loose to medium dense, silty, course to fine sand (A-1-b and A-2-4); and soft to very stiff, silty, coarse to fine sandy clay (A-6) and variably clayey, coarse to fine sandy silt (A-4). Gravel and concrete debris was present within the fill at RW-1, with primarily concrete present between depths of 3.5 feet and 4.5 feet. Gravel, brick, and asphalt debris was present within the fill at RW-2. A little to some gravel and a little to a trace of mica were present within the fill at SPT-1 and SPT-2, and a trace of decayed plant material was present within the fill at SPT-2. It should be noted that the DMT and SCPT/CPT tests performed within the embankment fill material indicate a soil behavior in the material classified as coarse-grained that is more consistent with a fine-grained (clay and silt) soil. Standard Penetration Resistance (SPT) values of 1 to 100+ blows per foot (bpf) were encountered within the roadway embankment fill, but the high blow count values at Boring RW-1 were due to the gravel and concrete debris present within the fill material.

Residual soils were encountered underlying the roadway embankment fill at the retaining wall borings. The residual soils extend to depths of ±31 feet to ±74 feet (Elevations ±2579 feet to ±2553 feet). The residual soils at the retaining wall structures, based on visual and laboratory classification, generally consist of medium stiff to hard, variably clayey, coarse to fine sandy silt (A-4), and medium dense to very dense, silty, coarse to fine sand (A-1-b and A-2-4) with traces of mica. It should be noted that the DMT and SCPT/CPT tests performed within the residual soils indicate a soil behavior in the material classified as coarse-grained that is more consistent with a fine-grained (clay and silt) soil. Standard Penetration Resistance values within the residuum ranged from 12 to 73 bpf with SPT values generally increasing with increasing depth. The DMT tests performed in the vicinity of the proposed retaining walls also indicate generally increasing soil strength with increasing depth. Boring SPT-1 was terminated within residual soil.

Weathered rock was encountered underlying the residual soils at all of the retaining wall structure borings drilled for this project. The weathered rock generally consists of gneiss. The weathered rock was encountered between the following depths and elevations: 31.0 feet to at least the boring termination depth of 34.7 feet (Elevations 2575.2 feet to 2571.5 feet) at Boring RW-1; 74.0 feet to at least the boring termination depth of 74.8 feet (Elevations 2552.9 feet to 2552.1 feet) at Boring RW-2; 44.0 feet to at least the boring termination depth of 44.6 feet (Elevations 2574.5 feet to 2573.9 feet) at Boring RW-3; 63.0 feet to 74.6 feet (Elevations 2563.8 feet to 2552.2 feet) at Boring RW-4; and 39.5 feet to 55.0 feet (Elevations 2587.0 feet to 2571.5 feet) at Boring SPT-1 . Weathered rock was encountered directly underlying the roadway embankment fill, as a zone within the residual soil, and underlying the residual soil at Boring SPT-2. The zone of weathered rock between the fill and residual soil extends from 12.0 feet to 17.0 feet (Elevations 2614.5 feet to 2609.5 feet), while the zone of weathered rock within the residual soil extends from 22.0 feet to 26.5 feet (Elevations 2604.5 feet to 2600.0 feet). Weathered rock also underlies the residual soil at Boring SPT-2 beginning at a depth of 47.0 feet (Elevation 2579.5 feet) and continuing to at least the boring termination depth of 68.8 feet (Elevation 2557.6 feet). Borings RW-1, RW-2, RW-3, and SPT-2 were terminated within weathered rock.

Crystalline rock was encountered at Boring RW-4. The crystalline rock generally consists of gneiss. The top of the crystalline rock was encountered at a depth of 74.6 feet (Elevation 2552.2 feet). A total of 30.8 feet of weathered rock/crystalline rock was cored at Boring RW-4. The cored weathered rock at this boring location is severely weathered, soft to medium hard, gneiss with very close fracture spacing. The strata recovery (REC) value within the weathered rock was 32 percent. The cored crystalline rock at RW-4 is moderately to slightly weathered, hard, gneiss with very close to close fracture spacing. The REC value within the crystalline rock was 66 percent, and the strata Rock Quality Designation (RQD) value was 18 percent. Boring RW-4 was terminated within crystalline rock.

3.6 GROUNDWATER

Groundwater was encountered at all of the borings drilled for this project. The groundwater elevation at the End Bent-1 borings was ±2589 feet, while the groundwater elevation at Borings EB2-A and EB2-B was ± 2594 feet and ±2592 feet, respectively. The groundwater elevations at the borings drilled for the right side retaining wall (RW-1 and RW-2) were ±2605 feet and ±2604 feet, while the groundwater elevation at the borings drilled for the left side retaining wall (RW-3 and RW-4) were ±2595 feet and ±2593 feet. The groundwater elevation at Boring SPT-2 was ±2611 feet. A time-of-boring groundwater elevation of ±2616 feet was measured at Boring SPT-1, but a 24 hour groundwater reading could not be obtained due to cave-in within the bore hole. Fluctuation of groundwater surface levels can occur with seasonal and climatic variations.

4.0 NOTES TO THE DESIGNER

Various debris was present within the fill material encountered at Borings EB1-B, EB2-A, RW-1, and RW-2. The concrete debris encountered within the fill at Borings EB1-B and RW-1 was abundant enough to create difficulties in penetrating the material with standard drilling equipment, and yielded standard penetration values exceeding 100 blows per foot. The debris encountered within the fill at Boring EB2-A appears to be the result of a possible dump area (asphalt, wood, and rubber debris). It appears likely that debris of various types and in varying concentrations is present throughout the fill material on the south end of the existing bridge.

The DMT and SCPT/CPT tests performed in the vicinity of the proposed retaining walls and the proposed End Bent-2 indicate that the soil material that classifies as A-1-b and A-2-4 according to the AASHTO Soil Classification System may exhibit a soil behavior more consistent with fine-grained soils (i.e.: A-4 through A-7). Therefore, this material may have more cohesion and less friction than one would normally associate with coarse grained soils. The designer should consider the soil behavior type indicated by the DMT and SCPT/CPT testing when evaluating soil properties for foundation designs.

5.0 CLOSURE

The geotechnical investigation and general construction considerations included in this report are based on the Preliminary General Drawing and on 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

NORTH CAROLINA LICENSED SEAL 1500 GEOLOGIST PAUL M. WEAVER

5/24/06

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

PMW/JRV:pmw

Attachments

s\0710/projects/2005/Bridge 272 in Canton (071-05-016)/Bridge No. 272 over NSRR Report Rev. 2006.doc

TRIGON Trigon Engineering Consultants, Inc. Greensboro North Carolina	SCALE: NTS	DATE: 08/04/05	STATE PROJECT NO. 32920.1.1	TIP NO.: B-3189
	SITE VICINITY MAP Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad in Canton, Haywood County, North Carolina			
		DRAWING NUMBER: 1		

NAD 83

EXISTING R/W

-LI-

10+00

11+00

12+00

13+00

RR SWITCH

NORFOLK SOUTHERN RAILROAD R/W

-EY3-

KENNETH M. GANN
D.B.365 PG.634

COAST LAMP MFG. INC.
D.B.322 PG.630

2 S BK & BLK BUS

-LI- POT STA. 11+83.94
-EY3- POC STA. 20+03.28

EB1-A

EB1-B

EB2-A

EB2-B

D-1/SCPT-1

D-2/SCPT-2

D-3/SCPT-3

RW-1

RW-2

RW-3

RW-4

CPT-1

SPT-1

SPT-2

SR 1643 BRIDGE STREET

BLUE RIDGE PAPER PRODUCTS INC.

GRASS

BLK

CONC

CONC STEPS

RR SWITCH

RR SWITCH

-EY3-

CLAIRE SEAMAN ROGERS
D.B.84 PG.191
"TRACT NO.1"

2 S BK BUS

RL

BST PARKING

EXISTING R/W

EXISTING R/W

EXISTING R/W

-EY2-

+ 350' TO DEPOT ST

SCALE IN FEET

0 15 30

HORZ. SCALE

Note: Skew Angle for All Bents = 90°00'00"

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BORING IDENTIFICATION DIAGRAM

Bridge No. 272 on SR 1643(Bridge Street) Over NSRR in Canton

Haywood County, North Carolina

Project No. 32920.1.1	TIP No. B-3189
Federal No. BRZ-1643(1)	Vert. Scale N/A
Date 5/5/06	Horiz. Scale 1" = 30'
Drawn by DRK	Drawing No. 2

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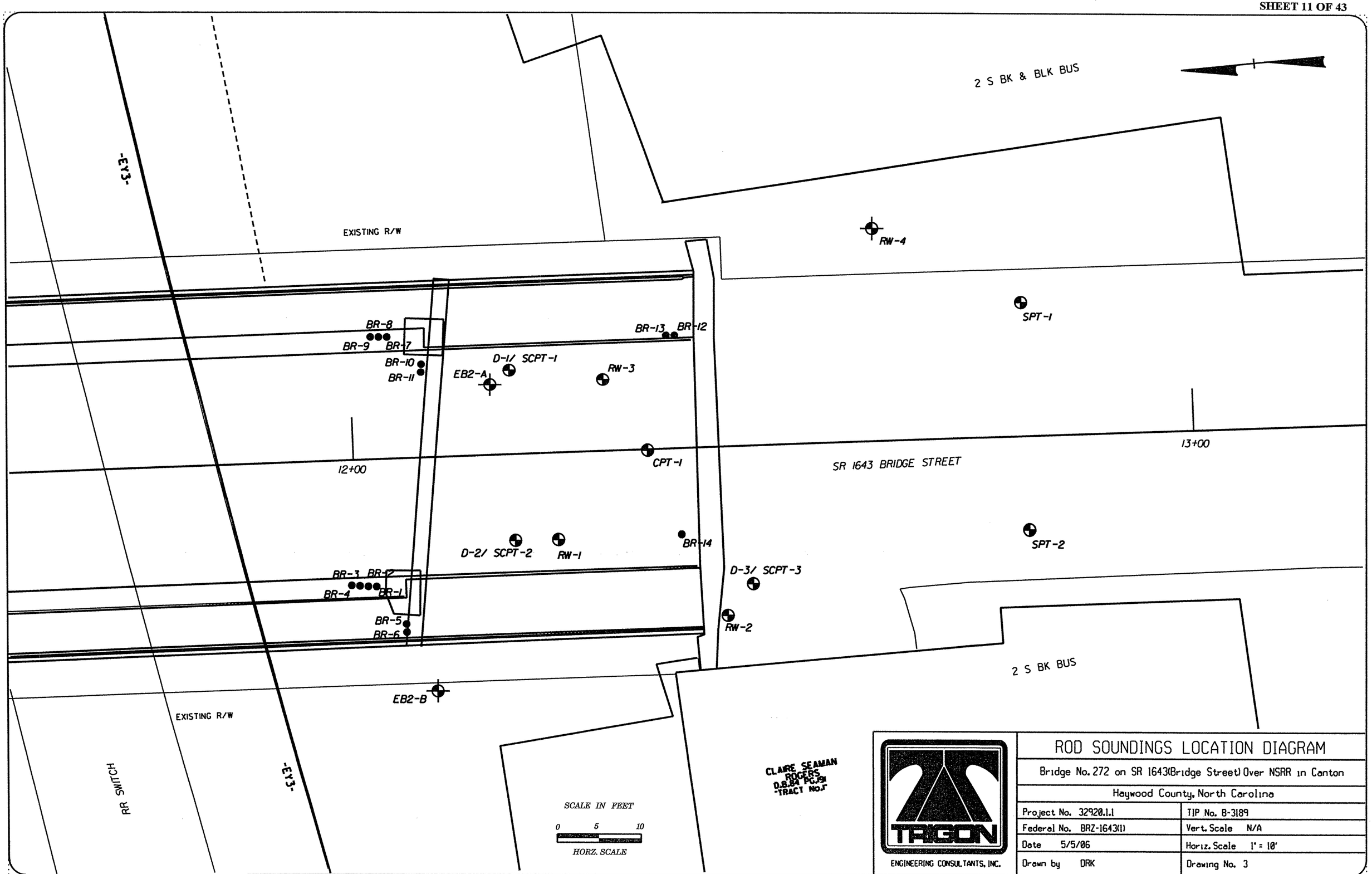

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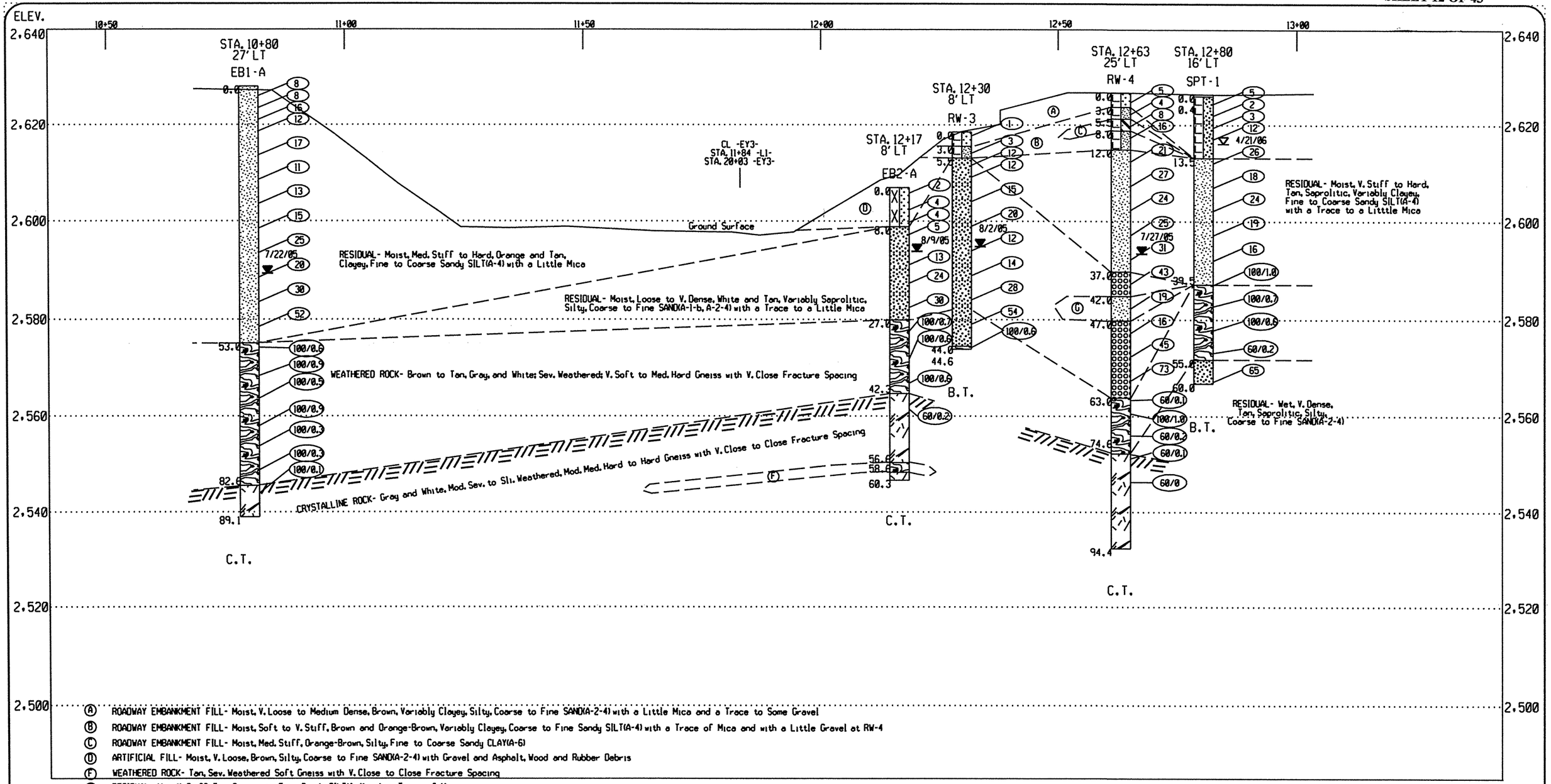
ROD SOUNDINGS LOCATION DIAGRAM

Bridge No. 272 on SR 1643(Bridge Street) Over NSRR in Canton

Haywood County, North Carolina

Project No. 32920.1.1	TIP No. B-3189
Federal No. BRZ-1643(1)	Vert. Scale N/A
Date 5/5/06	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 3



Ⓐ ROADWAY EMBANKMENT FILL- Moist, V. Loose to Medium Dense, Brown, Variably Clayey, Silty, Coarse to Fine SAND(A-2-4) with a Little Mica and a Trace to Some Gravel

Ⓑ ROADWAY EMBANKMENT FILL- Moist, Soft to V. Stiff, Brown and Orange-Brown, Variably Clayey, Coarse to Fine Sandy SILT(A-4) with a Trace of Mica and with a Little Gravel at RW-4

Ⓒ ROADWAY EMBANKMENT FILL- Moist, Med. Stiff, Orange-Brown, Silty, Fine to Coarse Sandy CLAY(A-6)

Ⓓ ARTIFICIAL FILL- Moist, V. Loose, Brown, Silty, Coarse to Fine SAND(A-2-4) with Gravel and Asphalt, Wood and Rubber Debris

Ⓕ WEATHERED ROCK- Tan, Sev. Weathered Soft Gneiss with V. Close to Close Fracture Spacing

Ⓖ RESIDUAL- Wet, V. Stiff, Tan, Coarse to Fine Sandy SILT(A-4) with a Trace of Mica

SCALE IN FEET

0 10 20

VERT. SCALE

0 10 20

HORZ. SCALE

TRIGON
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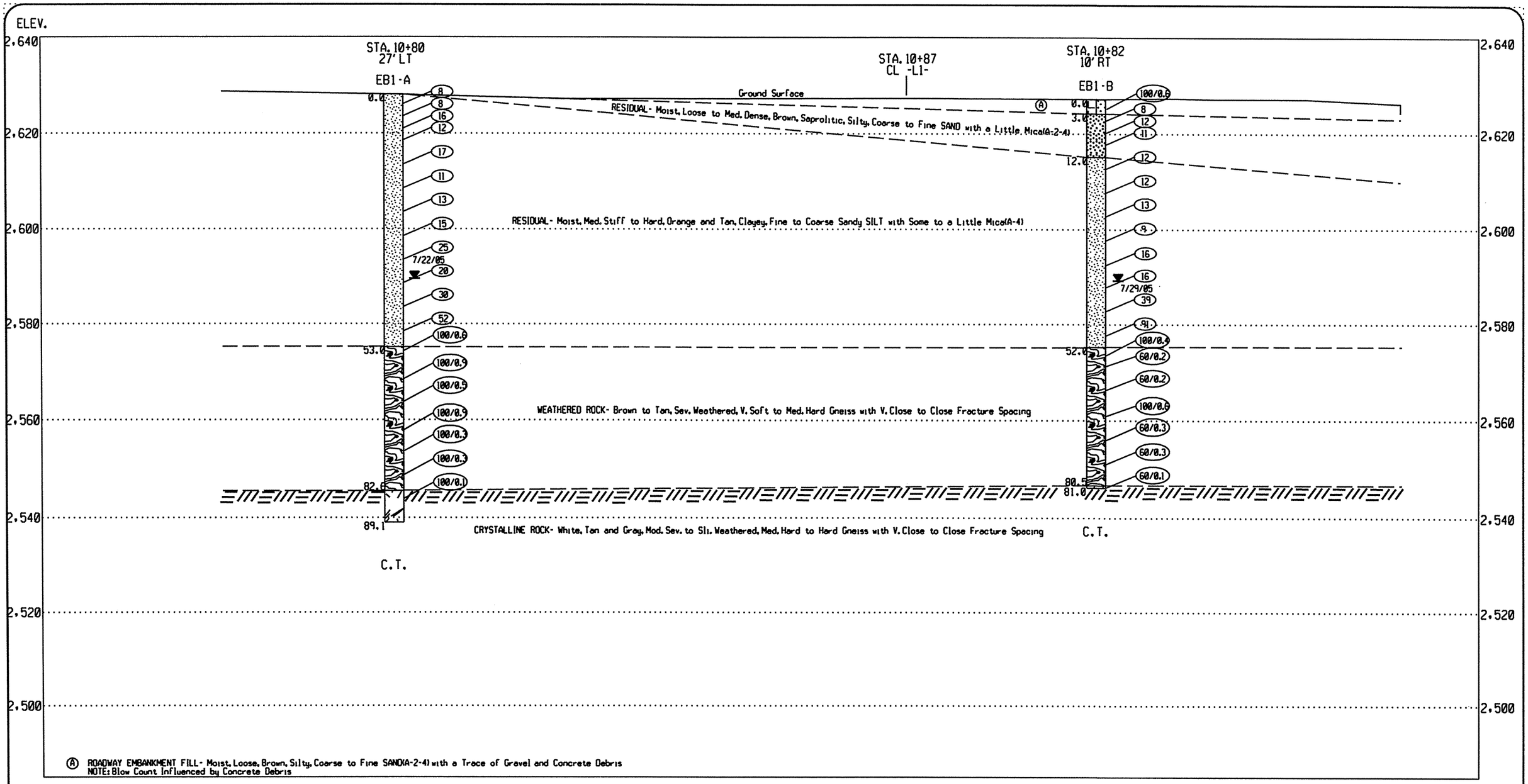
PROFILE 20' LEFT OF -L-

Bridge No. 272 on SR 1643(Bridge Street) Over NSRR in Canton

Haywood County, North Carolina

Project No. 32920.1.1	TIP No. B-3189
Federal No. BRZ-1643(1)	Vert. Scale 1" = 20'
Date 5/5/06	Horiz. Scale 1" = 20'
Drawn by DRK	Drawing No. 4



SCALE IN FEET

0 10 20

VERT. SCALE

0 2.5 5

HORZ. SCALE

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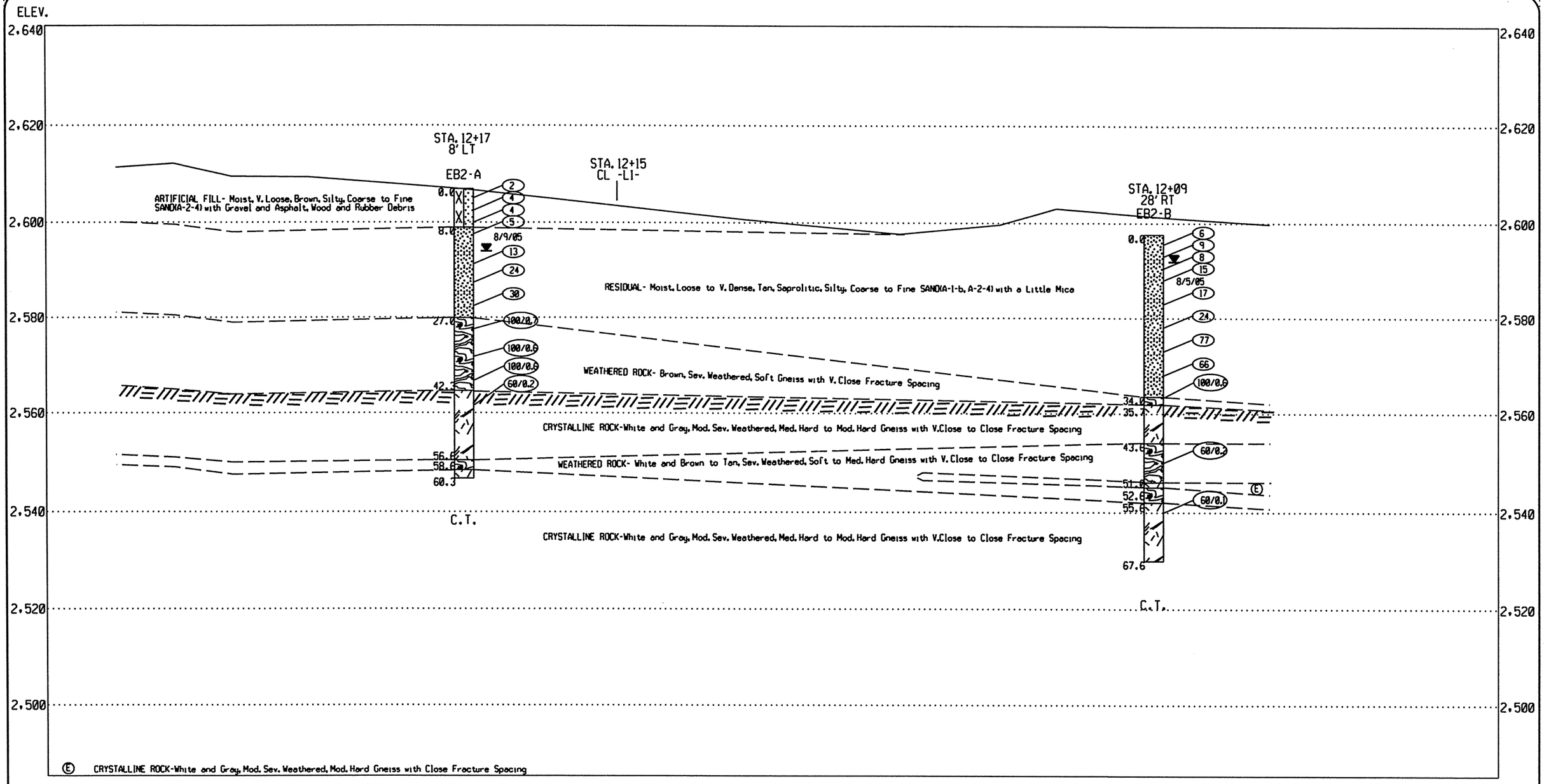
CROSS-SECTION ALONG END BENT-1

Bridge No. 272 on SR 1643(Bridge Street) Over NSRR in Canton

Haywood County, North Carolina

Project No. 32920.1.1	TIP No. B-3189
Federal No. BRZ-1643(1)	Vert. Scale 1" = 20'
Date 8/11/05	Horiz. Scale 1" = 5'
Drawn by DRK	Drawing No. 5



SCALE IN FEET

0 10 20

VERT. SCALE

0 2.5 5

HORZ. SCALE

TRIGON

ENGINEERING CONSULTANTS, INC.

CROSS-SECTION ALONG END BENT-2

Bridge No. 272 on SR 1643(Bridge Street) Over NSRR in Canton

Haywood County, North Carolina

Project No. 32920.1.1	TIP No. B-3189
Federal No. BRZ-1643(1)	Vert. Scale 1" = 20'
Date 8/11/05	Horiz. Scale 1" = 5'
Drawn by DRK	Drawing No. 6

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PAGE 1 OF 2

PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. EB1-A	**BORING LOCATION** 10+80	**OFFSET** 27ft LT	**ALIGNMENT** -LI-
COLLAR ELEV. 2628.1 ft	**NORTHING** 671519	**EASTING** 858784	**24 HR.** 38.8
TOTAL DEPTH 89.1 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual
DATE STARTED 7/19/05	**COMPLETED** 7/21/05	**SURFACE WATER DEPTH** NA	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,628.1									2,628.1 0.00
2,627.1	1.0								RESIDUAL: Medium Stiff to Hard, Orange and Tan, Clayey, Fine to Coarse Sandy SILT with a Little Mica
2,624.6	3.5	4	4	4	8		M		
2,622.1	6.0	3	4	4	8		M		
2,619.6	8.5	6	7	9	16		M		
2,614.6	13.5	5	5	7	12		M		
2,609.6	18.5	4	7	10	17	SS-1	32.1%		
2,604.6	23.5	3	4	7	11		M		
2,599.6	28.5	5	6	7	13		M		
2,594.6	33.5	4	6	9	15		M		
2,589.6	38.5	7	10	15	25		M		
2,584.6	43.5	6	8	12	20				
2,579.6	48.5	7	10	20	30		M		
2,574.6	53.5	15	22	30	52		M		
2,569.0	59.1	56	44/.1		100/.6				
2,564.0	64.1	20	80/.4		100/.9				
2,559.0	69.1	100/.5			100/.5				
2,554.0	74.1	20	44	56/.4	100/.9				
					100/.3				2,575.1 53.0
									WEATHERED ROCK: Brown to Tan, Severely Weathered, Very Soft to Soft, GNEISS with Very Close Fracture Spacing

NCDOT BORE SINGLE 07105016.GPJ NC_DOT.GDT 8/10/05

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BORING LOG **SHEET 15 OF 43**

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PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. EB1-A	**BORING LOCATION** 10+80	**OFFSET** 27ft LT	**ALIGNMENT** -LI-
COLLAR ELEV. 2628.1 ft	**NORTHING** 671519	**EASTING** 858784	**24 HR.** 38.8
TOTAL DEPTH 89.1 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual
DATE STARTED 7/19/05	**COMPLETED** 7/21/05	**SURFACE WATER DEPTH** NA	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,553.3					Continued from previous page				
2,549.0	79.1	100/.3			100/.3				WEATHERED ROCK: Brown to Tan, Severely Weathered, Very Soft to Soft, GNEISS with Very Close Fracture Spacing *(continued)*
2,544.0	84.1	100/.3			100/.1				2,545.5 82.6
		100/.1							CRYSTALLINE ROCK: White and Grey, Moderately to Slightly Weathered, Moderately Hard to Hard, GNEISS, with Very Close to Close Fracture Spacing
									2,539.0 89.1
									Coring Terminated at Elevation 2539.0ft in CRYSTALLINE ROCK: GNEISS
									Drilling Fluid = Bentonite and Polymer Plus Water
									Mud Density = 68lbs/cu.ft. at 45.0ft

NCDOT BORE SINGLE 07105016.GPJ NC_DOT.GDT 8/10/05

CORE BORING REPORT

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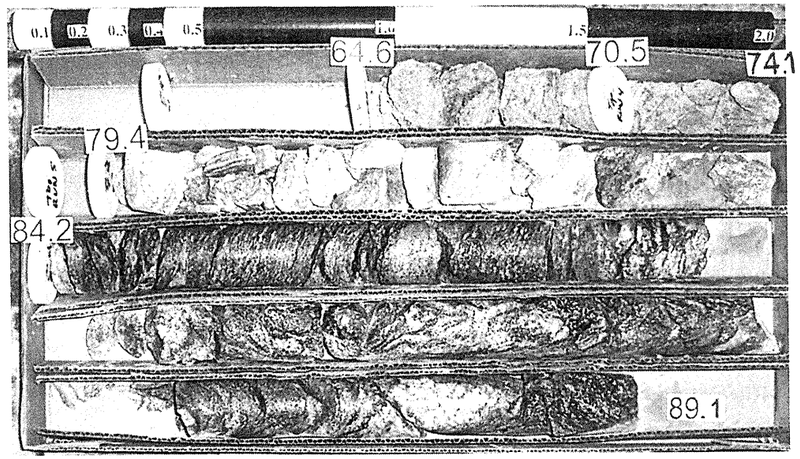
PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver	
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton				**GROUND WATER (ft)**
BORING NO. EB1-A	**BORING LOCATION** 10+80	**OFFSET** 27ft LT	**ALIGNMENT** -Ll-	**0 HR.** 36.0
COLLAR ELEV. 2628.1 ft	**NORTHING** 671519	**EASTING** 858784		**24 HR.** 38.8
TOTAL DEPTH 89.1 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual	
DATE STARTED 7/19/05	**COMPLETED** 7/21/05	**SURFACE WATER DEPTH** NA		
CORE SIZE NQ	**TOTAL RUN** 31.5 ft	**DRILLER** C.Heun		

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 54.1 ft
2,574.0	54.1	5.0	2:00 2:57 2:36 3:29 4:03	(0.0) 0%	(NA)		(0.7) 3%	(NA)		2,574.0 WEATHERED ROCK: Tan, Severely Weathered, Very Soft to Soft GNEISS with Very Close Fracture Spacing 54.1 Very Broken Throughout Core Loss 54.1ft-59.1ft; 60.0ft-64.1ft; 65.1ft-69.1ft; 70.7ft-74.1ft; 74.4ft-79.1ft; 79.4ft-82.6ft SPT Loss at 59.1ft-60.0ft; 64.1ft-64.6ft; 69.1ft-70.5ft; 74.1ft-74.4ft; 79.1ft-79.4ft
2,569.0	59.1		*N=100/.9*							
2,568.1	60.0	4.1	6:00 4:22 3:05 3:09	(0.0) 0%	(NA)					
2,564.0	64.1		:30/0.1 *N=100*							
2,563.5	64.6	4.5	3:38/0.5 6:04 5:10 4:00	(0.5) 11%	(NA)					
2,559.0	69.1		5:14 *N=100/.9*							
2,557.6	70.5	3.6	2:02/0.6 4:54 6:01 5:02	(0.2) 6%	(NA)					
2,554.0	74.1		*N=100/.3*							
2,553.7	74.4	4.7	1:22/0.7 2:41 3:55 4:04	(0.0) 0%	(NA)					
2,549.0	79.1		5:40 *N=100/.3*							
2,548.7	79.4	4.7	4:35/0.7 8:41 10:45 18:10	(1.5) 32%	(0.0) 0%					
2,544.0	84.1		20:11 *N=100/.1*							
2,543.9	84.2	4.9	9:03/0.9 10:04 6:30 20:27	(4.6) 94%	(0.3) 6%		(6.1) 95%	(0.3) 5%		2,545.5 82.6 CRYSTALLINE ROCK: White and Grey, Moderately to Slightly Weathered, Moderately Hard to Hard, GNEISS, with Very Close to Close Fracture Spacing Core Loss at 86.8ft-87.1ft SPT Loss at 84.1ft-84.2ft
2,539.0	89.1		28:22							2,539.0 89.1 16 Joints at 5°-10° 3 Joints at 70°-80° Very Broken 82.6ft-84.1ft Coring Terminated at Elevation 2539.0ft in CRYSTALLINE ROCK: GNEISS

NCDOT CORE SINGLE 07105016C.GPJ NC_DOT.GDT 8/10/05

State Project No. 32920.1.1 TIP No. B-3189
Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad
CORE PHOTOGRAPHS- BORING EB1-A



Box 1 of 1

Scale = 1:4

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. EB1-B	**BORING LOCATION** 10+82	**OFFSET** 10ft RT	**ALIGNMENT** -LI-	**0 HR.** 28.0
COLLAR ELEV. 2627.2 ft	**NORTHING** 671519	**EASTING** 858747		**24 HR.** 38.2
TOTAL DEPTH 81.0 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual
DATE STARTED 7/26/05	**COMPLETED** 7/28/05	**SURFACE WATER DEPTH** NA	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,627.2									2,627.2 0.00
2,625.9	1.3						M		ROADWAY EMBANKMENT FILL: Loose, Brown, Silty, Coarse to Fine SAND with a Trace of Gravel and Concrete Debris
2,624.2	3.0								Note: Blow Count Influenced by Concrete Debris
2,623.7	3.5	2	15	85/.1	100/.6		M		RESIDUAL: Loose to Medium Dense, Brown, Saprolitic, Silty, Coarse to Fine SAND with a Little Mica
2,621.2	6.0	3	3	5	8		M		
2,618.7	8.5	3	4	8	12		M		
2,615.2	12.0	4	5	6	11		M		Stiff to Hard, Tan, Clayey, Fine to Coarse Sandy SILT with Some to a Little Mica
2,613.7	13.5	5	5	7	12		M		
2,608.7	18.5	5	6	6	12		M		
2,603.7	23.5	4	5	8	13		M		
2,598.7	28.5	3	3	6	9		M		
2,593.7	33.5	4	7	9	16	SS-2	34.4%		
2,588.7	38.5	4	7	9	16		M		
2,583.7	43.5	10	19	20	39		M		
2,578.7	48.5	16	34	57	91		M		
2,575.2	52.0								WEATHERED ROCK: Brown, Severely Weathered, Soft to Medium Hard, GNEISS with Very Close to Close Fracture Spacing
2,573.7	53.5	100/.4			100/.4				
2,571.3	55.9	60/.2			60/.2				
2,566.3	60.9	60/.2			60/.2				
2,561.3	65.9	60	40/.1		100/.6				
2,556.3	70.9	60/.3			60/.3				

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N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG **SHEET 17 OF 43**

PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. EB1-B	**BORING LOCATION** 10+82	**OFFSET** 10ft RT	**ALIGNMENT** -LI-	**0 HR.** 28.0
COLLAR ELEV. 2627.2 ft	**NORTHING** 671519	**EASTING** 858747		**24 HR.** 38.2
TOTAL DEPTH 81.0 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual
DATE STARTED 7/26/05	**COMPLETED** 7/28/05	**SURFACE WATER DEPTH** NA	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,552.4					Continued from previous page				
2,551.3	75.9	60/.3			60/.3				WEATHERED ROCK: Brown, Severely Weathered, Soft to Medium Hard, GNEISS with Very Close to Close Fracture Spacing *(continued)*
2,546.7	80.5								2,546.7 80.5
2,546.3	80.9	60/.1			60/.1				2,546.2 81.0 CRYSTALLINE ROCK: White and Tan, Moderately Severely Weathered, Medium Hard to Moderately Hard GNEISS with Very Close Fracture Spacing
									Coring Terminated at Elevation 2546.3ft in CRYSTALLINE ROCK: GNEISS
									Boring Terminated with SPT Refusal at Elevation 2546.2ft in CRYSTALLINE ROCK: GNEISS
									Drilling Fluid = Bentonite Plus Water for Soil Drilling and Polymer Plus Water for Coring
									Mud Density = 64.0lbs/cu.ft. at 15.0ft

NCDOT BORE SINGLE 07105016.GPJ NC_DOT.GDT 8/11/05

CORE BORING REPORT

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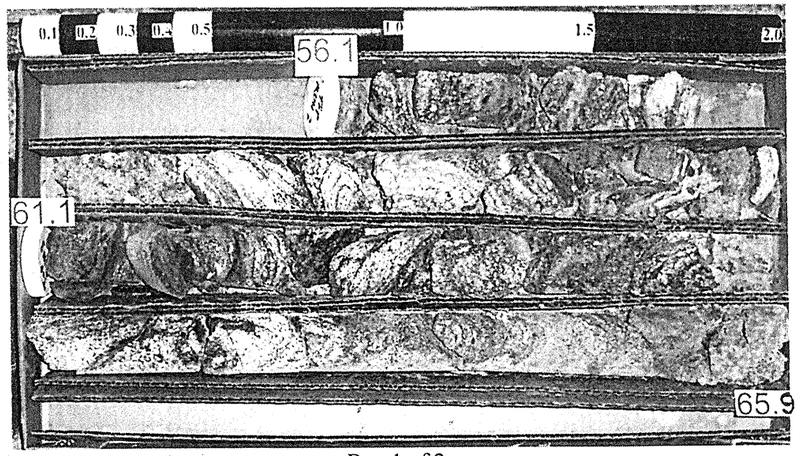
PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. EB1-B	**BORING LOCATION** 10+82	**OFFSET** 10ft RT	**ALIGNMENT** -Ll-	**0 HR.** 28.0
COLLAR ELEV. 2627.2 ft	**NORTHING** 671519	**EASTING** 858747		**24 HR.** 38.2
TOTAL DEPTH 81.0 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual
DATE STARTED 7/26/05	**COMPLETED** 7/28/05	**SURFACE WATER DEPTH** NA	
CORE SIZE NQ	**TOTAL RUN** 25.4 ft	**DRILLER** C.Heun	

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 53.9 ft
2,573.3	53.9	2.0	11:50	(0.0)	(NA)		(9.8)	(NA)		2,573.3 WEATHERED ROCK: Severely Weathered, Soft to Medium Hard, Brown GNEISS with Very Close to Close Fracture Spacing 53.9
2,571.3	55.9		11:45	0%			39%			
2,571.1	56.1	4.8	N=60/.2	(2.8)	(NA)					Very Broken Throughout
			9:27/0.8	58%						
			13:42							Core Loss 53.9ft-55.9ft; 56.1ft-57.0ft; 59.8ft-60.9ft; 64.9ft-65.9ft; 66.5ft-68.9ft; 69.5ft-70.9ft; 71.2ft-73.0ft; 74.6ft-75.9ft; 76.2ft-78.5ft; 80.0ft-80.9ft
			14:21							
2,566.3	60.9		14:04							Near Vertical Joint at 62.0-62.9ft
2,566.1	61.1	4.8	7:38	(3.8)	(NA)					
			N=60/.2	79%						18 Joints at 50°-60°
			9:56/0.8							9 Joints at 0°-5°
			9:25							
2,561.3	65.9		8:55							0.17ft Piece of Crystalline Rock 68.9ft-69.1ft
2,560.7	66.5	4.4	8:09	(0.6)	(NA)					
			9:48	14%						
			N=100/.6							
2,556.3	70.9		3:01/0.4							
2,556.0	71.2	4.7	5:53	(1.6)	(NA)					
			8:48	34%						
			6:17							
			7:04							
2,551.3	75.9		N=60/.3							
2,551.0	76.2	4.7	1:30/0.7	(1.5)	(0.0)					
			5:17	32%	0%					
			10:16							
			7:56							
2,546.3	80.9		7:33							
			N=60/.3							
			4:46/0.7							
			9:36							
			10:45							
			11:30							
			6:30							
			N=60/.1							
							(0.4)	(0.0)		2,546.7 80.5
							100%	0%		2,546.3 CRYSTALLINE ROCK: White and Tan Moderately Severely Weathered, Medium Hard to Moderately Hard GNEISS with Very Close Fracture Spacing 80.9
										Very Broken - Breaks Are Primarily Mechanical from Removing Rock from the Shoe
										Coring Terminated with SPT Refusal at Elevation 2546.3ft in CRYSTALLINE ROCK: GNEISS

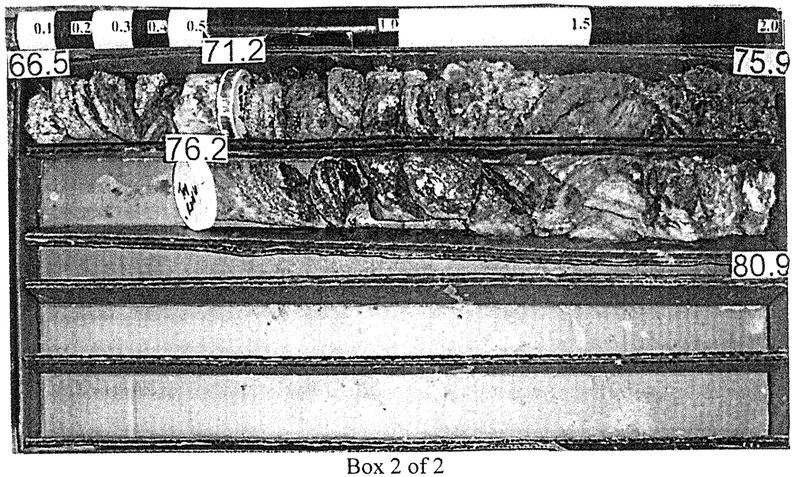
NCDOT CORE SINGLE 07105016C.GPJ NC_DOT.GDT 8/10/05

State Project No. 32920.1.1 TIP No. B-3189
Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad
CORE PHOTOGRAPHS- BORING EB1-B



Box 1 of 2

Scale = 1:4



Box 2 of 2

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

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PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. EB2-A	**BORING LOCATION** 12+17	**OFFSET** 8ft LT	**ALIGNMENT** -Ll-	**0 HR.** 13.0
COLLAR ELEV. 2606.9 ft	**NORTHING** 671384	**EASTING** 858757		**24 HR.** 13.1
TOTAL DEPTH 60.3 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual	
DATE STARTED 8/5/05	**COMPLETED** 8/5/05	**SURFACE WATER DEPTH** NA		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,606.9									2,606.9 0.00
2,606.9	0.0	2	1	1	2		M		ARTIFICIAL FILL: Very Loose, Brown, Silty, Coarse to Fine SAND with Gravel and Asphalt, Wood and Rubber Debris
2,603.4	3.5								
2,600.9	6.0	3	2	2	4		M		
2,598.4	8.5	2	2	2	4		M		
		2	2	3	5		M		2,598.9 8.0
2,592.1	14.8								RESIDUAL: Loose to Medium Dense, Tan, Saprolitic, Silty, Coarse to Fine SAND with a Little Mica
		4	6	7	13		M		
2,588.4	18.5								
		8	10	14	24		M		
2,583.4	23.5								
		9	14	16	30		M		
2,578.4	28.5								
		35	64	36/.2	100/.7				
2,572.2	34.7								
		80	20/.1		100/.6				
2,567.2	39.7								
		35	65/.1		100/.6				
2,561.6	45.3								
		60/.2			60/.2	RS-1	M		2,579.9 27.0
									WEATHERED ROCK: Brown, Severely Weathered, Soft GNEISS with Very Close Fracture Spacing
									2,564.6 42.3
									CRYSTALLINE ROCK: White and Grey, Moderately Severely Weathered, Medium Hard to Moderately Hard GNEISS with Close to Very Close Fracture Spacing
									Note: Weathered Zone from 44.8ft-45.5ft
									2,550.3 56.6
									WEATHERED ROCK: Tan, Severely Weathered, Soft GNEISS with Very Close Fracture Spacing 2,548.3 58.6
									2,546.6 60.3
									CRYSTALLINE ROCK: White and Grey, Moderately Severely Weathered, Medium Hard to Moderately Hard GNEISS with Very Close to Close Fracture Spacing
									Coring Terminated at Elevation 2546.6ft in CRYSTALLINE ROCK: GNEISS
									Drilling Fluid = Bentonite Plus Water
									Mud Density = 63.5lbs/cu.ft at 7.5ft

NCDOT BORE SINGLE 07105016.GPJ NC_DOT.GDT 8/10/05

CORE BORING REPORT
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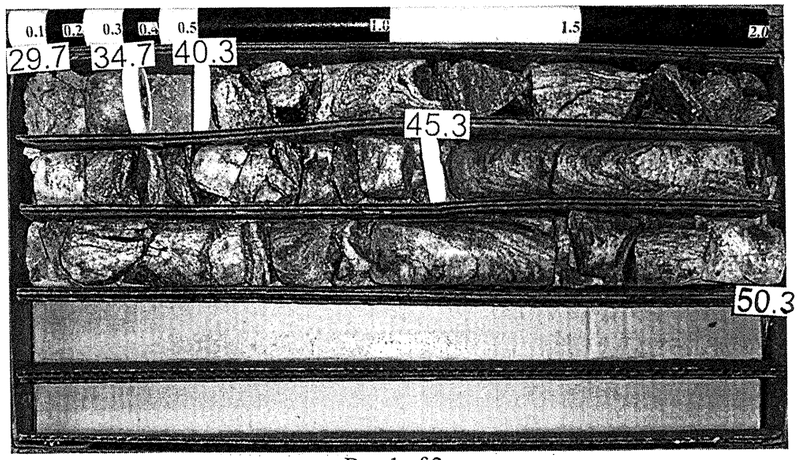
PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. EB2-A	**BORING LOCATION** 12+17	**OFFSET** 8ft LT	**ALIGNMENT** -Ll-	**0 HR.** 13.0
COLLAR ELEV. 2606.9 ft	**NORTHING** 671384	**EASTING** 858757		**24 HR.** 13.1
TOTAL DEPTH 60.3 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual	
DATE STARTED 8/5/05	**COMPLETED** 8/5/05	**SURFACE WATER DEPTH** NA		
CORE SIZE NQ	**TOTAL RUN** 29.2 ft	**DRILLER** C.Heun		

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 29.7 ft
2,577.2	29.7	5.0	2:19	(0.3)	(NA)		(0.3)	(NA)		2,577.2 WEATHERED ROCK: Brown, Severely Weathered, Soft GNEISS with Very Close Fracture Spacing 29.7
			4:45	6%			3%			
2,572.2	34.7		4:21							Very Broken Throughout
			2:41							
2,571.6	35.3	4.4	4:19							Very Little Recovery
			N=100/.6	(0.0)	(NA)					
2,567.2	39.7		3:26/0.4	0%						Core Loss at 29.7ft-34.4ft; 35.3ft-39.7ft; 40.3ft-42.3ft
			8:19							SPT Loss at 34.7ft-35.3ft; 39.7ft-40.3ft
2,566.6	40.3	5.0	5:33							
			3:53							
2,561.6	45.3		8:08	(2.5)	(0.0)					2,564.6 42.3
			N=100/.6	50%	0%					
2,561.4	45.5	4.8	4:10				(10.7)	(3.4)		CRYSTALLINE ROCK: White and Grey, Moderately Severely Weathered, Medium Hard to Moderately Hard GNEISS with Close to Very Close Fracture Spacing
			7:01				76%	24%		
2,556.6	50.3		18:42	(2.8)	(1.1)					Very Broken at 51.3ft-51.6ft; 52.6ft-53.0ft
			5:43	58%	23%					
		5.0	10:31							Note: Weathered Zone from 44.8ft-45.5ft
			N=60/.2							
			8:40/0.8	(4.1)	(2.0)					Core Loss at 44.8ft-45.5ft; 47.3ft-49.3ft; 51.4ft-52.3ft
			10:53	82%	40%	RS-1				SPT Loss at 45.3ft-45.5ft
			14:26							
			16:38							5 Joints at 60°-70°
			16:33							3 Joints at 80°-90°
2,551.6	55.3		7:22							2,550.3 Approximately 5-6 Joints at 30°-40° 56.6
		5.0	3:58	(2.2)	(0.3)		(0.0)	(NA)		2,548.3 WEATHERED ROCK: Tan, Severely Weathered, Soft GNEISS with Very Close Fracture Spacing 58.6
			7:20	44%	6%		0%			
			10:27				(0.9)	(0.0)		2,546.6 60.3
2,546.6	60.3		5:05				53%	0%		Very Broken Throughout
			6:10							No Recovery
			5:46							
			3:13							Core Loss at 56.6ft-58.6ft
			5:45							CRYSTALLINE ROCK: White and Grey, Moderately Severely Weathered, Medium Hard to Moderately Hard GNEISS with Very Close to Close Fracture Spacing
			14:53							
										Very Broken Throughout
										Core Loss at 58.6ft-59.4ft
										7-8 Joints at 20°-30°
										2 Joints at 0°-5°
										Coring Terminated at Elevation 2546.6ft in CRYSTALLINE ROCK: GENISS
										Drilling Fluid = Bentonite Plus Water
										Mud Density = 63.5lbs/cu.ft. at 7.5ft

NCDOT CORE SINGLE 07105016C.GPJ NC_DOT.GDT 8/10/05

State Project No. 32920.1.1 TIP No. B-3189
Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad
CORE PHOTOGRAPHS- BORING EB2-A



Box 1 of 2

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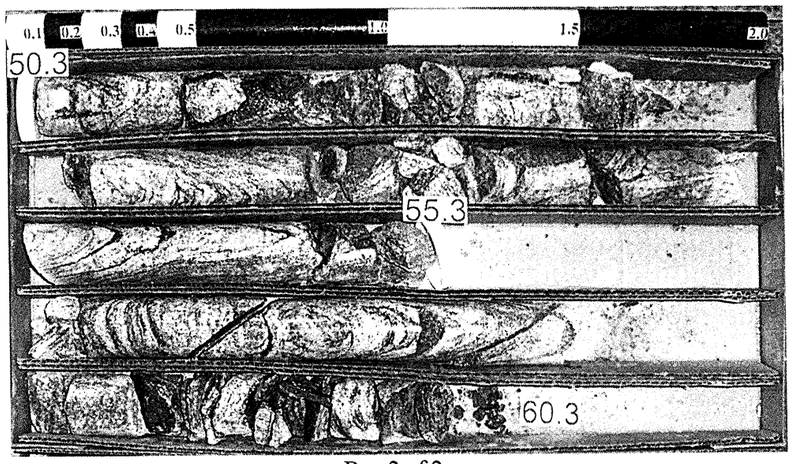


Box 2 of 2

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PAGE 1 OF 1

PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. EB2-B	**BORING LOCATION** 12+09	**OFFSET** 28ft RT	**ALIGNMENT** -Ll-	**0 HR.** 6.2
COLLAR ELEV. 2597.6 ft	**NORTHING** 671394	**EASTING** 858722		**24 HR.** 6.0
TOTAL DEPTH 67.6 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual	
DATE STARTED 8/3/05	**COMPLETED** 8/4/05	**SURFACE WATER DEPTH** NA		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,597.6									2,597.6 0.00
2,596.6	1.0								RESIDUAL: Loose to Very Dense, Tan, Saprolitic, Silty, Coarse to Fine SAND with a Little Mica
2,594.1	3.5	1	3	3	6		M		
2,591.6	6.0	3	3	6	9		M		
2,589.1	8.5	4	3	5	8		M		
2,584.1	13.5	5	6	9	15		M		
2,579.1	18.5	5	7	10	17		M		
2,574.1	23.5	8	11	13	24		M		
2,569.1	28.5	20	22	55	77		M		
2,564.1	33.5	9	24	42	66		M		
2,563.6	34.0								
2,561.9	35.7	16	83	17/.1	100/.6	RS-2			WEATHERED ROCK: Brown, Severely Weathered, Soft GNEISS with Very Close Fracture Spacing
2,554.0	43.6								CRYSTALLINE ROCK: White and Grey, Moderately Severely Weathered, Medium to Moderately Hard GNEISS with Very Close to Close Fracture Spacing
2,550.0	47.6	60/.2			60/.2				WEATHERED ROCK: White and Brown, Severely Weathered, Soft to Medium Hard GNEISS with Very Close to Close Fracture Spacing
2,546.0	51.6								
2,545.0	52.6								CRYSTALLINE ROCK: White and Grey, Moderately Severely Weathered, Moderately Hard, GNEISS with Close Fracture Spacing
2,542.0	55.6								WEATHERED ROCK: Brown, Severely Weathered, Soft GNEISS with Very Close Fracture Spacing
2,540.0	57.6	60/.1			60/.1				CRYSTALLINE ROCK: White and Grey, Moderately Severely Weathered, Medium to Moderately Hard GNEISS with Very Close to Close Fracture Spacing
2,530.0	67.6								Coring Terminated at Elevation 2530.0ft in CRYSTALLINE ROCK: GNEISS

Drilling Fluid = Bentonite Plus Water

Mud Density at Start = 63.5lbs/cu.ft. at 2.5ft

NCDOT BORE SINGLE 07105016.GPJ NC_DOT.GDT 8/10/05

CORE BORING REPORT
SHEET 21 OF 43

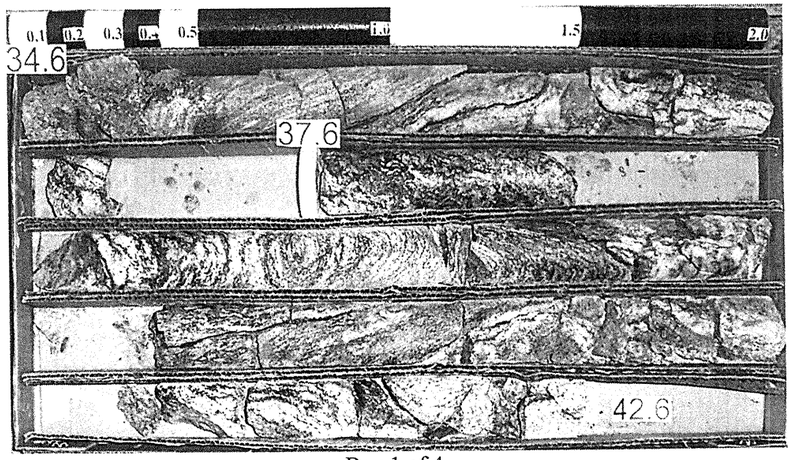
PAGE 1 OF 1

PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. EB2-B	**BORING LOCATION** 12+09	**OFFSET** 28ft RT	**ALIGNMENT** -Ll-	**0 HR.** 6.2
COLLAR ELEV. 2597.6 ft	**NORTHING** 671394	**EASTING** 858722		**24 HR.** 6.0
TOTAL DEPTH 67.6 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual	
DATE STARTED 8/3/05	**COMPLETED** 8/4/05	**SURFACE WATER DEPTH** NA		
CORE SIZE NQ	**TOTAL RUN** 32.7 ft	**DRILLER** C.Heun		

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 34.6 ft
2,563.0	34.6	3.0	6:37 11:30 22:30	(2.2) 73%	(0.0) 0%		(0.3) 27%	(NA) (2.6)	2,563.0 2,561.9	WEATHERED ROCK: Brown, Severely Weathered, Soft GNEISS with Very Close Fracture Spacing 34.6 35.7
2,560.0	37.6						(7.8) 99%	33%		Broken Throughout
2,555.0	42.6	5.0	10:12 8:24 10:24 14:13 22:49	(4.9) 98%	(1.8) 36%	RS-2				Core Loss at 34.6ft-35.4ft CRYSTALLINE ROCK: White and Grey, Moderately Severely Weathered, Medium to Moderately Hard GNEISS with Very Close to Close Fracture Spacing 43.6
2,550.0	47.6	5.0	8:18 13:40 9:17 9:00 12:12	(2.9) 58%	(0.8) 16%		(5.4) 69%	(NA)	2,554.0	Weathered Zone at 40.9ft-41.3ft 4 Joints at 70°-80° 5 Joints at 30°-40° 9 Joints at 5°-10°
2,549.8	47.8	4.8	N=60/.2	(4.5) 94%	(0.5) 10%					
2,545.0	52.6		5:08/0.8 13:22 11:23						2,546.0	Core Loss at 41.2ft-41.3ft 51.6
2,540.0	57.6	5.0	16:26 10:12 8:49 12:27 12:58	(1.5) 30%	(0.0) 0%		(1.0) 100% (0.0) 0%	(0.5) 50% (NA)	2,545.0 2,542.0	52.6 WEATHERED ROCK: White and Brown, Sevrely Weathered, Soft to Medium Hard GNEISS with Very Close to Close Fracture Spacing Very Broken Throughout
2,539.9	57.7	4.9	7:15 10:56	(4.8) 98%	(1.5) 31%		(9.3) 78%	(1.5) 13%		Core Loss at 43.6ft-44.7ft; 46.6ft-47.6ft; 47.8ft-48.1ft CRYSTALLINE ROCK: White and Grey, Moderately Severely Weathered, Moderately Hard GNEISS with Close Fracture Spacing 55.6
2,535.0	62.6	5.0	N=60/.1 10:05/0.9 8:04 10:51 9:57 8:50	(3.0) 60%	(0.0) 0%					2 Joints at 60°-70° Mechanically Broken at 52.4ft-52.6ft Due to Removal from Shoe
2,530.0	67.6		7:28 6:45 7:28 7:21 6:18						2,530.0	WEATHERED ROCK: Brown, Severely Weathered, Soft GNEISS with Very Close Fracture Spacing 67.6 Very Broken Throughout Core Loss at 52.6ft-55.6ft Small Fragments of Weathered Rock and Sand felt in the Polymer/Water Mixture Being Re-circulated CRYSTALLINE ROCK: White and Grey, Moderately Severely Weathered, Medium to Moderately Hard GNEISS with Very Close to Close Fracture Spacing Approximately 35 Joints at 5°-10° 11 Joints at 30°-40° Core Loss at 56.9ft-57.4ft; 62.6ft-63.1ft; 63.6ft-64.1ft; 64.8-65.3ft; 66.7-67.3ft SPT Loss at 57.6ft-57.7ft Weathered Zone at 66.7ft-67.4ft Coring Terminated at Elevation 2530.0ft in CRYSTALLINE ROCK: GNEISS

NCDOT CORE SINGLE 07105016C.GPJ NC_DOT.GDT 8/10/05

State Project No. 32920.1.1 TIP No. B-3189
Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad
CORE PHOTOGRAPHS- BORING EB2-B



Box 1 of 4

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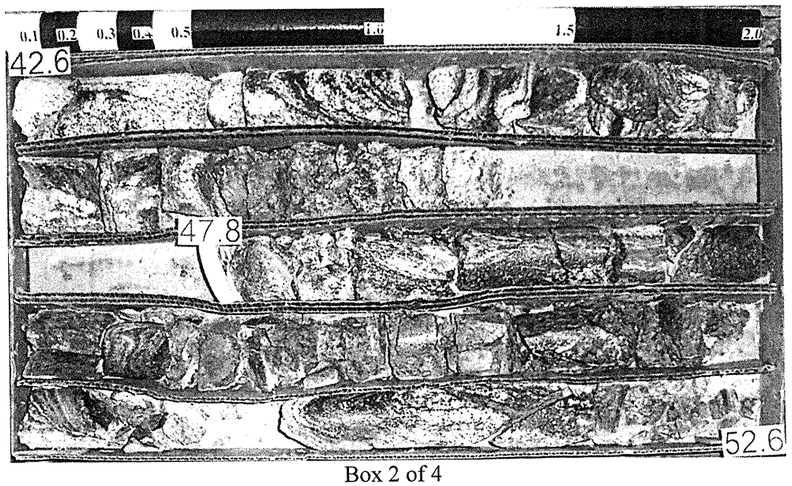
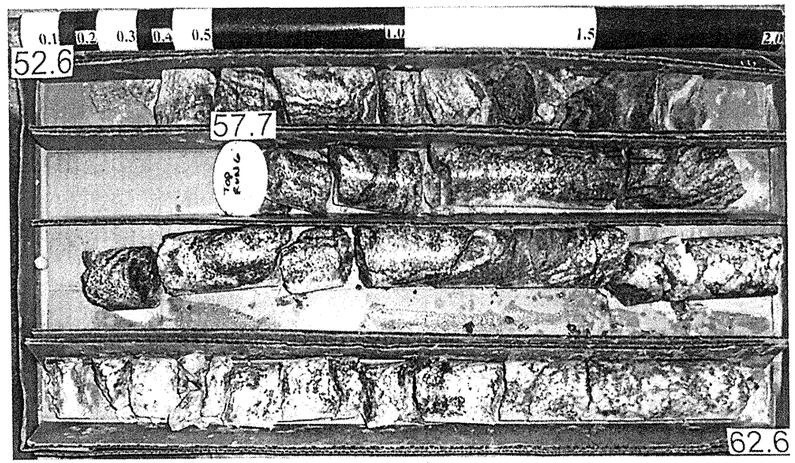


Box 2 of 4

State Project No. 32920.1.1 TIP No. B-3189
Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad
CORE PHOTOGRAPHS- BORING EB2-B



Box 3 of 4

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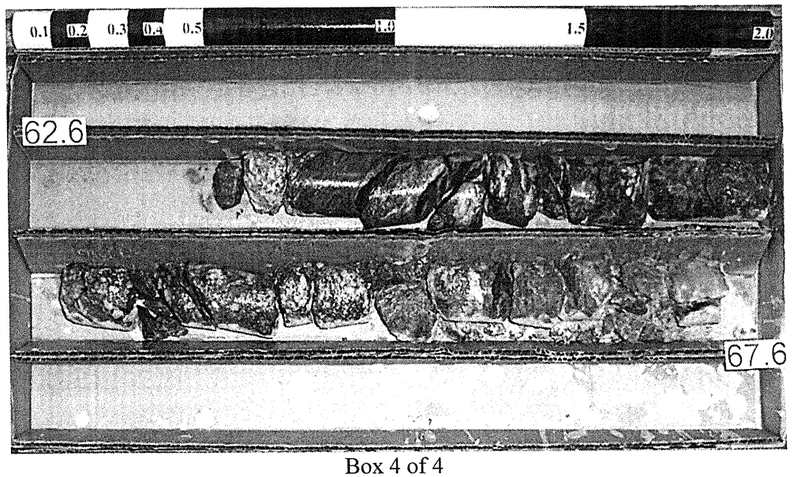


Box 4 of 4

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT - BRIDGE ROD SOUNDING LOGS

SHEET 1 OF 3

PROJECT NO. 32920.1.1 ID. B-3189 COUNTY Haywood GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 272 on SR 1643 over NSRR in Canton
BORING NO. STATION 12+05 OFFSET 15' RT ALIGNMENT -L-
NORTHING (see below) EASTING (see below)
COLLAR ELEV. N/A START DATE August 3, 2005 DRILL METHOD Bridge Rods
TOTAL DEPTH 4.0' & 4.5' COMPETION DATE August 3, 2005 NOTE

ELEV.	Location:	DEPTH (feet)	BLOW COUNT 6 in.	6 in.	Ttl.	BLOWS PER FOOT 10 20 30 40 **50** 60 70 80 90
	BR-1: North Face of Existing Bent-2, Right Column	0-1	1	4	5	
	1' from Column Face	1-2	4	3	7	
	NORTHING 671400	2-3	3	2	5	
	EASTING 858735	3-3.4	50/.4		100+	Refusal at 3.4'
	BR-2: North Face of Existing Bent-2, Right Column	0-1	1	3	4	
	2' from Column Face	1-2	5	4	9	
	NORTHING 671401	2-3	2	2	4	
	EASTING 858735	3-3.4	50/.4		100+	Refusal at 3.4'
	BR-3: North Face of Existing Bent-2, Right Column	0-1	1	3	4	
	3' from Column Face	1-2	7	5	12	
	NORTHING 671402	2-3	4	3	7	
	EASTING 858735	3-3.8	5	50/.3	100+	Refusal at 3.8'
	BR-4: North Face of Existing Bent-2, Right Column	0-1	1	4	4	
	4' from Column Face	1-2	2	4	6	
	NORTHING 671403	2-3	3	4	7	
	EASTING 858735	3-4	3	5	8	Bridge Rods Terminated at 4.0'
	BR-5: West Face of Existing Bent-2, Right Column	0-1	3	5	8	
	1' from Column Face	1-2	1	2	3	
	NORTHING 671397	2-3	3	2	5	
	EASTING 858730	3-3.4	50/.4		100+	Refusal at 3.4'
	BR-6: West Face of Existing Bent-2, Right Column	0-1	2	4	6	
	2' from Column Face	1-2	3	1	4	
	NORTHING 671397	2-3	2	2	4	
	EASTING 858729	3-4	3	3	6	
		4-4.5	3			Bridge Rods Terminated at 4.5'

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT - BRIDGE ROD SOUNDING LOGS

SHEET 2 OF 3

PROJECT NO. 32920.1.1 ID. B-3189 COUNTY Haywood GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 272 on SR 1643 over NSRR in Canton
BORING NO. STATION 12+07 OFFSET 13' LT ALIGNMENT -L-
NORTHING (see below) EASTING (see below)
COLLAR ELEV. N/A START DATE August 4, 2005 DRILL METHOD Bridge Rods
TOTAL DEPTH 6.5' & 7.0' COMPETION DATE August 4, 2005 NOTE

ELEV.	Location:	DEPTH (feet)	BLOW COUNT 6 in.	6 in.	Ttl.	BLOWS PER FOOT 10 20 30 40 **50** 60 70 80 90
	B-7: North Face of Existing Bent-2, Left Column	0-1	2	3	5	
	2' from Column Face	1-2	1	1	2	
	NORTHING 671396	2-3	3	2	5	
	EASTING 858764	3-4	1	2	3	
		4-5	1	2	3	
		5-5.9	6	5	11	Refusal at 5.9'
	BR-8: North Face of Existing Bent-2, Left Column	0-1	3	1	4	
	3' from Column Face	1-2	1	2	3	
	NORTHING 671397	2-3	3	2	5	
	EASTING 858764	3-4	2	2	4	
		4-5	3	3	6	
		5-5.9	5	10	15	Refusal at 5.9'
	BR-9: North Face of Existing Bent-2, Left Column	0-1	1	1	2	
	4' from Column Face	1-2	1	1	2	
	NORTHING 671398	2-3	2	2	4	
	EASTING 858764	3-4	1	3	4	
		4-5	6	7	13	
		5-6	14	17	31	
		6-6.5	18			Bridge Rods Terminated at 6.5'
	BR-10: West Face of Existing Bent-2, Left Column	0-1	1	5	6	
	1' from Column Face	1-2	1	1	2	
	NORTHING 671392	2-3	1	2	3	
	EASTING 858760	3-4	2	1	3	
		4-5	2	3	5	
		5-6	4	4	8	
		6-6.4	4	100+		Bridge Rods Terminated at 6.4'
	BR-11: West Face of Existing Bent-2, Left Column	0-1	1	6	7	
	2' from Column Face	1-2	5	2	7	
	NORTHING 671392	2-3	1	1	2	
	EASTING 858759	3-4	1	2	3	
		4-5	1	2	3	
		5-6	3	4	7	
		6-7	3	7	10	Bridge Rods Terminated at 7.0'

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT - BRIDGE ROD SOUNDING LOGS

SHEET 3 OF 3

PROJECT NO. 32920.1.1	ID. B-3189	COUNTY Haywood	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 272 on SR 1643 over NSRR in Canton			
BORING NO.	STATION (see below)	OFFSET (see below)	ALIGNMENT -L-
NORTHING (see below)	EASTING (see below)		
COLLAR ELEV. (see below)	START DATE April 20, 2006		DRILL METHOD Bridge Rods
TOTAL DEPTH (see below)	COMPETION DATE April 20, 2006		NOTE

ELEV.	Location:	DEPTH (feet)	BLOW COUNT 6 in.	6 in.	Ttl.	BLOWS PER FOOT 10 20 30 40 **50** 60 70 80 90
	B-12: Sta. 12+38.7, 13.5' Lt.	0-1	1	0	1	
	NORTHING 671362	1-2	1	1	2	
	EASTING 858761	2-3	1	4	5	
	Ground Surface Elev. = 2621.5'	3-3.7	6	50/.2		Refusal at 3.7' (Elev. 2617.8')
	BR-13: Sta. 12+37.7, 13.5' LT	0-1	1	2	3	
	NORTHING 671363	1-2	4	1	5	
	EASTING 858761	2-3	2	2	4	
	Ground Surface Elev. = 2621.5'	3-4	3	9	12	
		4-5	6	6	12	
		5-6	11	12	23	
		6-7	25	25	50	Bridge Rods Terminated at 7.0' (Elev. 2614.5')
	BR-14: Sta. 12+38.7, 10' RT.	0-1	1	2	3	
	NORTHING 671363	1-2	2	4	6	
	EASTING 858737	2-3	6	6	12	
	Ground Surface Elev.=2620.8')	3-4	9	9	18	
		4-5	9	13	22	
		5-6	20	15	35	Bridge Rods Terminated at 6.0' (Elev. 2614.8')

NAD 83

EXISTING R/W

EBI-A

RR SWITCH

NORFOLK SOUTHERN RAILROAD R/W

-EY3-

KENNETH M. GANN
D.B.365 PG.634

COAST LAMP MFG. INC.
D.B.322 PG.630

2 S BK & BLK BUS

-LI- POT STA. 11+83.94
-EY3- POC STA. 20+03.28

RW-4

SPT-1

D-1/SCPT-1

EB2-A

RW-3

CPT-1

SR 1643 BRIDGE STREET

13+00

12+00

RW-1

D-2/SCPT-2

D-3/SCPT-3

SPT-2

RW-2

EB2-B

-LI-

10+00

11+00

EBI-B

EXISTING R/W

BLUE RIDGE PAPER PRODUCTS INC.

GRASS

BLK

CONC

CONC STEPS

RR SWITCH

RR SWITCH

-EY3-

CLAIRE SEAMAN ROGERS
D.B.84 PG.191
"TRACT No.1"

2 S BK BUS

RL

BST PARKING

Note: Skew Angle for All Bents = 90°00'00"

EXISTING R/W

-EY2-

+ 350' TO DEPOT ST

EXISTING R/W

SCALE IN FEET

0 15 30

HORZ. SCALE

TRIGON

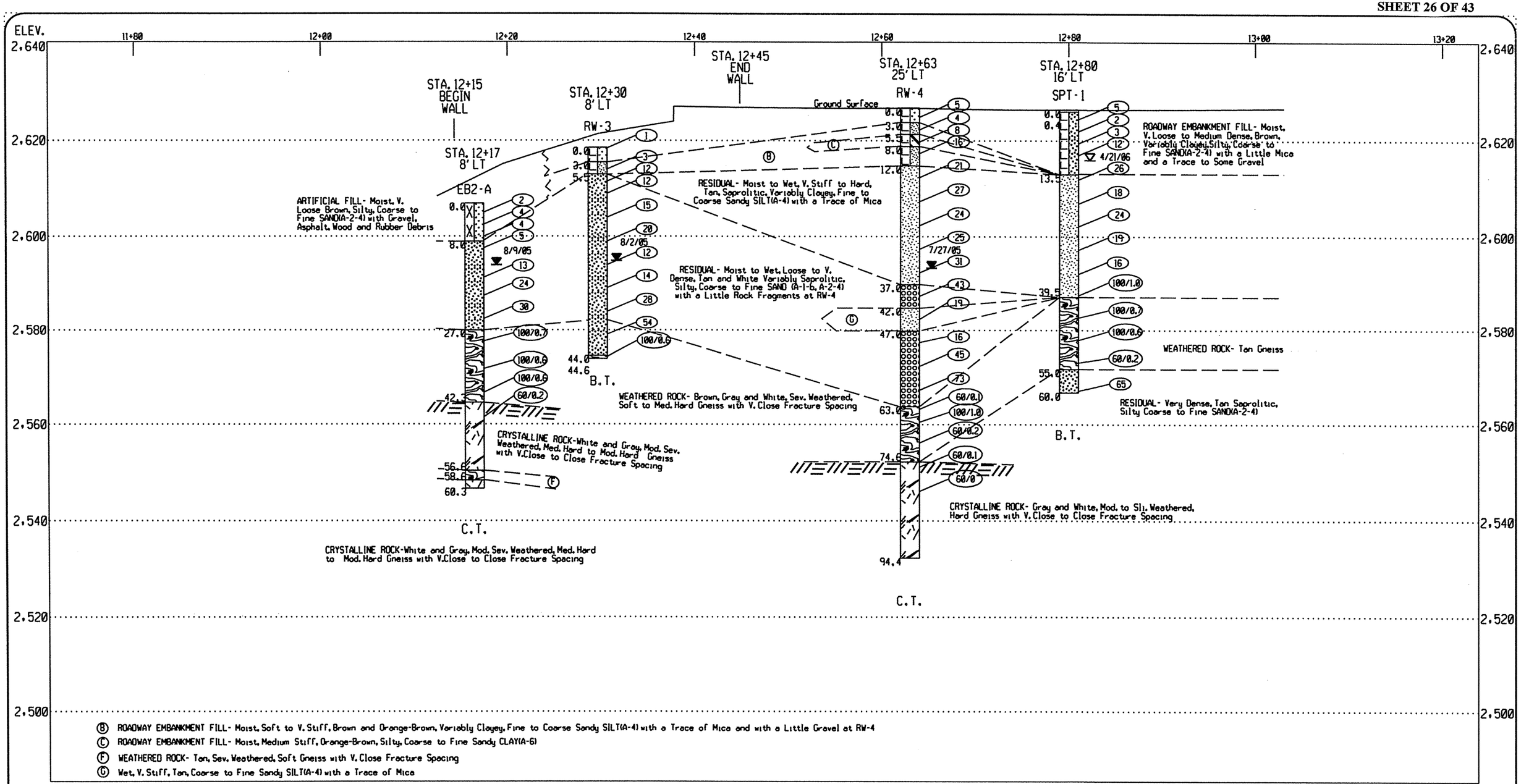
ENGINEERING CONSULTANTS, INC.

BORING IDENTIFICATION DIAGRAM

Bridge No. 272 on SR 1643(Bridge Street) Over NSRR in Canton

Haywood County, North Carolina

Project No. 32920.1.1	TIP No. B-3189
Federal No. BRZ-1643(1)	Vert. Scale N/A
Date 5/5/06	Horiz. Scale 1" = 30'
Drawn by DRK	Drawing No. 2



SCALE IN FEET

0 10 20

VERT. SCALE

0 5 10

HORZ. SCALE

TRIGON
ENGINEERING CONSULTANTS, INC.

PROFILE ALONG LEFT SIDE RETAINING WALL

Bridge No. 272 on SR 1643(Bridge Street) Over NSRR in Canton

Haywood County, North Carolina

Project No. 32920.1.1	TIP No. B-3189
Federal No. BRZ-1643(1)	Vert. Scale 1" = 20'
Date 5/5/06	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 7

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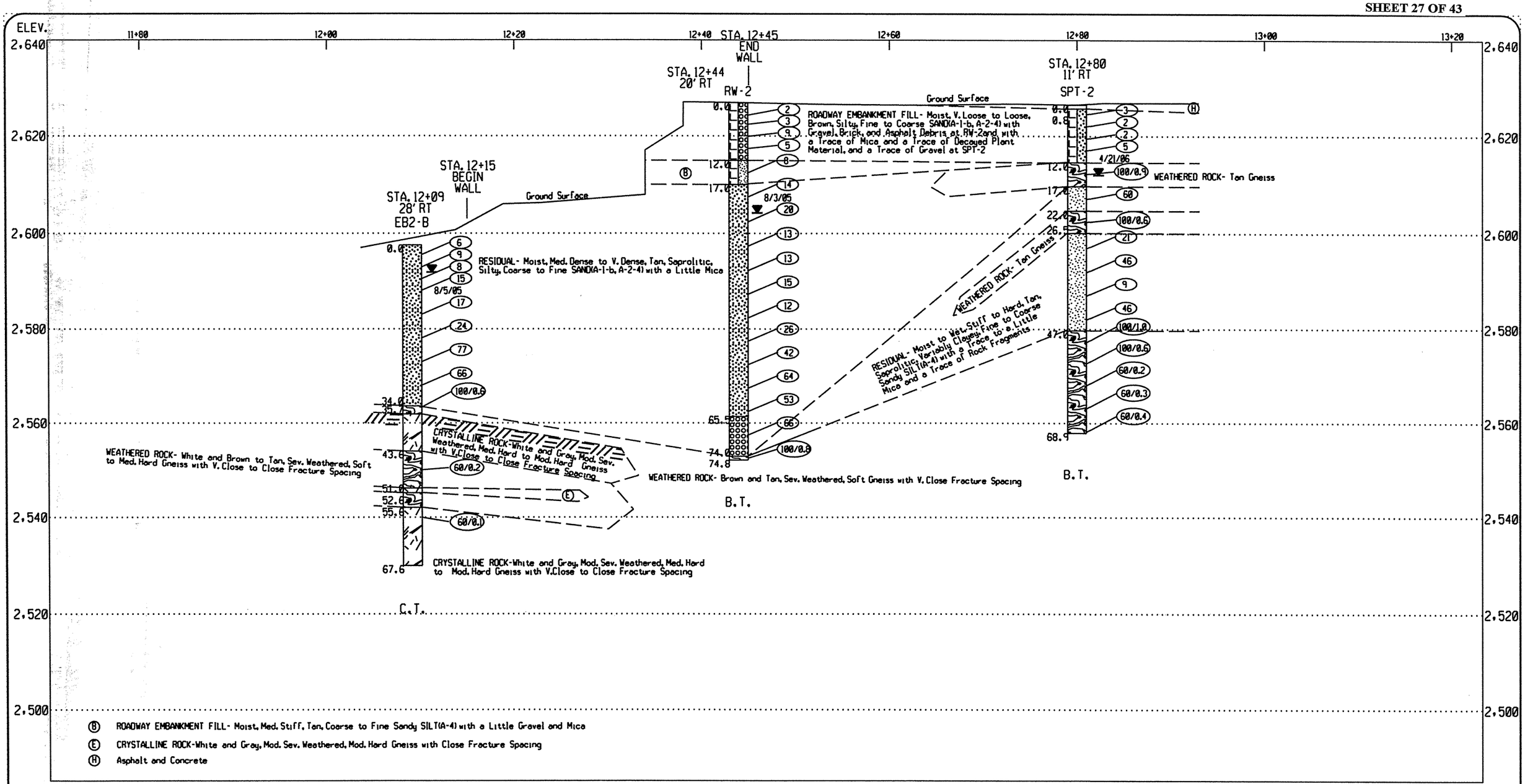

SCALE IN FEET

0 10 20
VERT. SCALE

0 5 10
HORZ. SCALE

TRIGON
ENGINEERING CONSULTANTS, INC.

PROFILE ALONG RIGHT SIDE RETAINING WALL

Bridge No. 272 on SR 1643(Bridge Street) Over NSRR in Canton

Haywood County, North Carolina

Project No. 32920.1.1	TIP No. B-3189
Federal No. BRZ-1643(1)	Vert. Scale 1" = 20'
Date 5/5/06	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 8

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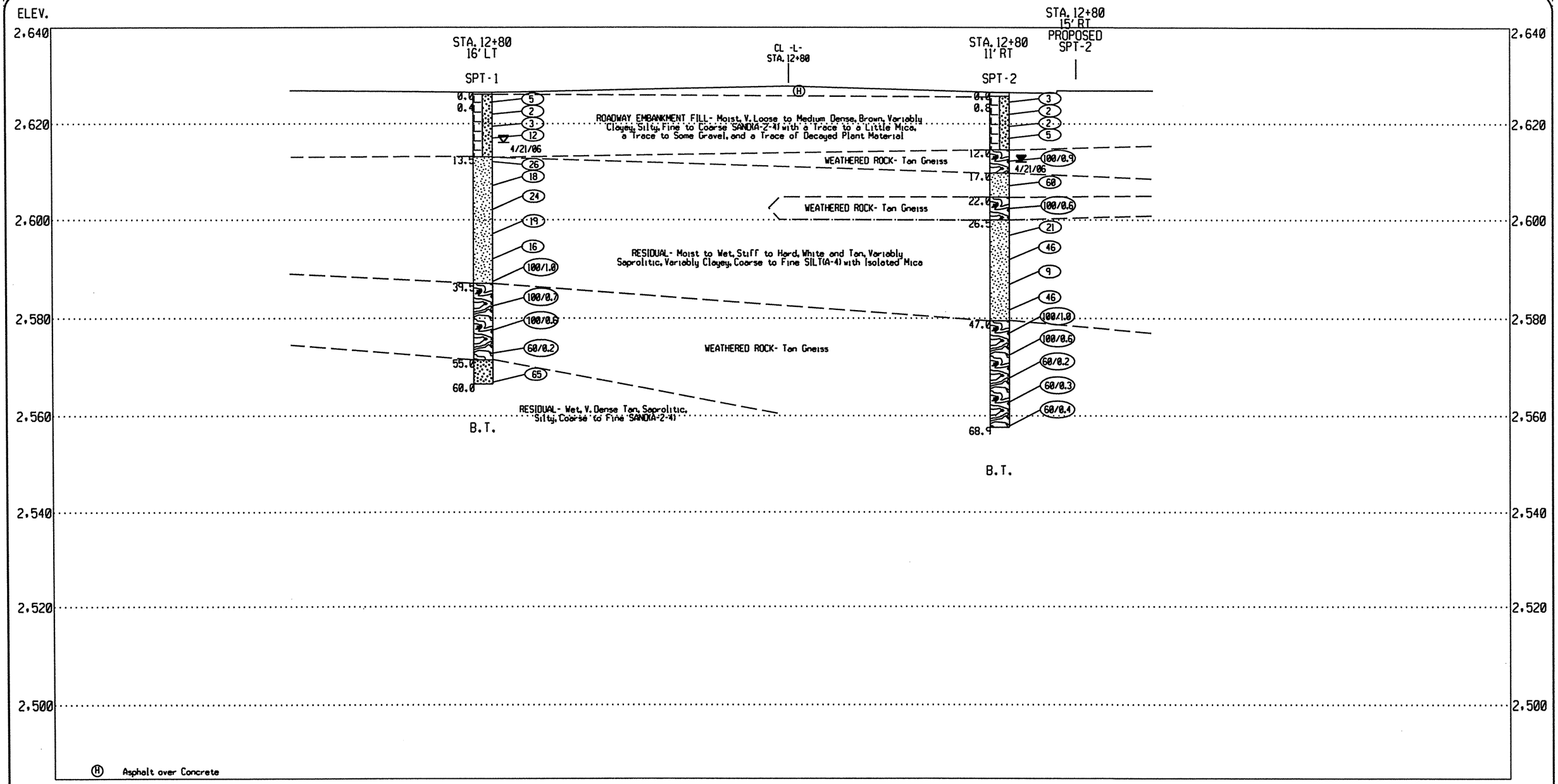

SCALE IN FEET

0 10 20

VERT. SCALE

0 2.5 5

HORZ. SCALE

TRIGON
ENGINEERING CONSULTANTS, INC.

CROSS-SECTION AT STA. 12+80

Bridge No. 272 on SR 1643(Bridge Street) Over NSRR in Canton

Haywood County, North Carolina

Project No. 32920.1.1	TIP No. B-3189
Federal No. BRZ-1643(1)	Vert. Scale 1" = 20'
Date 5/5/06	Horiz. Scale 1" = 5'
Drawn by DRK	Drawing No. 9

...\05016-2-v8-e.dgn 5/24/2006 7:41:31 AM

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG **SHEET 29 OF 43**

PAGE 1 OF 1

PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. RW-1	**BORING LOCATION** 12+24	**OFFSET** 10ft RT	**ALIGNMENT** -LI- **0 HR.** 0.0
COLLAR ELEV. 2606.2 ft	**NORTHING** 671378	**EASTING** 858738	**24 HR.** 1.0
TOTAL DEPTH 34.7 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary	**HAMMER TYPE** 140lb Manual
DATE STARTED 7/28/05	**COMPLETED** 7/29/05	**SURFACE WATER DEPTH** NA	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,606.2									2,606.2 0.00
2,604.6	1.6								ROADWAY EMBANKMENT FILL: Brown, Silty, Fine to Coarse SAND with Gravel and Concrete Debris
2,602.7	3.5	24	12	88/.1	100/.6	SS-3	M		2,601.7 4.5
2,600.2	6.0	60/0.0			60/0.0		M		Note: Blow Counts Influenced by Concrete Debris
2,597.7	8.5	8	11	16	27		M		Concrete from 3.5ft to 4.5ft
2,592.7	13.5	10	12	15	27		M		RESIDUAL: Medium Dense, Tan, Saprolitic, Silty, Coarse to Fine SAND
2,587.7	18.5	9	13	13	26	SS-4	M		2,594.2 12.0
2,582.7	23.5	14	22	22	44		M		Medium Dense to Dense, Tan, Saprolitic, Silty, Fine to Coarse SAND
2,577.7	28.5	10	14	23	37		M		2,584.2 22.0
2,572.7	33.5	20	28	39	67		M		Hard, Tan, Coarse to Fine Sandy SILT
		25	60	40/.2	100/.7				2,575.2 31.0
									WEATHERED ROCK: Tan GNEISS
									2,571.5 34.7
									Boring Terminated at Elevation 2571.5ft in WEATHERED ROCK: GNEISS
									Drilling Fluid = Bentonite Plus Water
									Mud Density = 64.0lbs/cu.ft. at 5.0ft

NCDOT BORE SINGLE 07105016.GPJ NC_DOT.GDT 8/10/05

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood		**GEOLOGIST** D.Goodnight/P.Weaver	
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton				**GROUND WATER (ft)**	
BORING NO. RW-2	**BORING LOCATION** 12+44	**OFFSET** 20ft RT	**ALIGNMENT** -Ll-	**0 HR.**	23.0
COLLAR ELEV. 2626.9 ft	**NORTHING** 671358	**EASTING** 858727		**24 HR.**	23.0
TOTAL DEPTH 74.8 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary		**HAMMER TYPE** 140lb Manual	
DATE STARTED 8/2/05	**COMPLETED** 8/2/05	**SURFACE WATER DEPTH** NA			

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,626.9									2,626.9 0.00
2,625.3	1.6						M		ROADWAY EMBANKMENT FILL: Very Loose to Loose, Brown, Silty, Fine to Coarse SAND with Some Gravel, Brick and Asphalt Debris
2,623.4	3.5	3	1	1	2		M		
2,620.9	6.0	1	2	1	3		M		
2,618.4	8.5	5	6	3	9		M		
2,613.4	13.5	8	3	2	5		M		2,614.9 12.0
2,608.4	18.5	4	4	4	8		M		ROADWAY EMBANKMENT FILL: Medium Stiff, Tan, Coarse to Fine Sandy SILT with a Little Mica and Gravel
2,603.4	23.5	5	6	8	14		M		2,609.9 17.0
2,598.4	28.5	8	8	12	20		M		RESIDUAL: Medium Dense to Very Dense, Tan, Saprolitic, Silty, Coarse to Fine SAND with a Little Mica
2,593.4	33.5	4	5	8	13		M		
2,588.4	38.5	7	5	8	13		M		
2,583.4	43.5	6	6	9	15		M		
2,578.4	48.5	5	5	7	12		M		
2,573.4	53.5	7	9	17	26		M		
2,568.4	58.5	8	19	23	42		M		
2,563.4	63.5	12	24	40	64		M		
2,558.4	68.5	16	23	30	53		M		2,561.4 65.5
2,553.4	73.5	35	29	37	66		M		Very Dense, Tan, Saprolitic, Silty, Fine to Coarse SAND with a Trace of Mica
		17	50	50/.3	100/.3				2,552.9 74.0 2,552.1 74.8

NCDOT BORE SINGLE 07105016.GPJ NC_DOT.GDT 8/10/05

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG **SHEET 30 OF 43**

PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood		**GEOLOGIST** D.Goodnight/P.Weaver	
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton				**GROUND WATER (ft)**	
BORING NO. RW-2	**BORING LOCATION** 12+44	**OFFSET** 20ft RT	**ALIGNMENT** -Ll-	**0 HR.**	23.0
COLLAR ELEV. 2626.9 ft	**NORTHING** 671358	**EASTING** 858727		**24 HR.**	23.0
TOTAL DEPTH 74.8 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary		**HAMMER TYPE** 140lb Manual	
DATE STARTED 8/2/05	**COMPLETED** 8/2/05	**SURFACE WATER DEPTH** NA			

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,552.1					Continued from previous page				WEATHERED ROCK: Tan GNEISS
									Boring Terminated at Elevation 2552.1ft in WEATHERED ROCK: GNEISS
									Drilling Fluid = Bentonite Plus Water
									Mud Density = 63.0lbs/cu.ft. at 3.1ft

NCDOT BORE SINGLE 07105016.GPJ NC_DOT.GDT 8/10/05

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG **SHEET 31 OF 43**

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PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. RW-3	**BORING LOCATION** 12+30	**OFFSET** 8ft LT	**ALIGNMENT** -LI- — **0 HR.** 8.3
COLLAR ELEV. 2618.5 ft	**NORTHING** 671371	**EASTING** 858756	**24 HR.** 23.7
TOTAL DEPTH 44.6 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary	**HAMMER TYPE** 140lb Manual
DATE STARTED 8/1/05	**COMPLETED** 8/1/05	**SURFACE WATER DEPTH** NA	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,618.5									2,618.5 — 0.00
2,618.5	0.0	2	WOH	1	1		M		ROADWAY EMBANKMENT FILL: Very Loose, Brown, Silty, Coarse to Fine SAND with a Little Mica and Gravel
2,615.0	3.5								2,615.5 — 3.0
2,612.5	6.0	3	2	1	3		W		ROADWAY EMBANKMENT FILL: Soft, Brown, Clayey, Coarse to Fine Sandy SILT with a Trace of Mica
2,610.0	8.5	4	5	7	12				2,613.0 — 5.5
2,605.0	13.5	4	5	7	12		M		RESIDUAL: Medium Dense to Very Dense, Tan, Saprolitic, Silty, Coarse to Fine SAND with a Little Mica
2,600.0	18.5	6	7	8	15		M		
2,595.0	23.5	7	7	13	20		M		
2,590.0	28.5	4	6	6	12		M		
2,585.0	33.5	4	5	9	14		M		
2,580.0	38.5	8	9	19	28		M		
2,575.0	43.5	14	20	34	54		M		
		21	68	32/.1	100/.6				2,574.5 — 44.0
									2,573.9 — 44.6 WEATHERED ROCK: GNEISS
									Boring Terminated at Elevation 2573.9ft in WEATHERED ROCK: GNEISS
									Drilling Fluid = Bentonite Plus Water
									Mud Density = 64.0lbs/cu.ft. at 7.5ft

NCDOT BORE SINGLE 07105016.GPJ NC_DOT.GDT 8/10/05

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver	
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton				**GROUND WATER (ft)**
BORING NO. RW-4	**BORING LOCATION** 12+63	**OFFSET** 25ft LT	**ALIGNMENT** -LI-	**0 HR.** 33.6
COLLAR ELEV. 2626.8 ft	**NORTHING** 671337	**EASTING** 858771		**24 HR.** 33.5
TOTAL DEPTH 94.4 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual	
DATE STARTED 7/21/05	**COMPLETED** 7/26/05	**SURFACE WATER DEPTH** NA		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,626.8									2,626.8 0.00
2,625.8	1.0						M		ROADWAY EMBANKMENT FILL: Loose, Brown, Silty, Coarse to Fine SAND with a Little Mica
2,623.3	3.5	2	3	2	5				2,623.8 3.0
2,620.8	6.0	2	2	2	4	SS-5	25.7%		ROADWAY EMBANKMENT FILL: Soft, Brown, Clayey, Fine to Coarse Sandy SILT with a Little Gravel
2,618.3	8.5	3	4	4	8	SS-6	32.5%		2,621.3 5.5
2,613.3	13.5	7	7	9	16		M		ROADWAY EMBANKMENT FILL: Medium Stiff, Orange-Brown, Silty, Fine to Coarse Sandy CLAY
2,608.3	18.5	7	10	11	21		M		2,618.8 8.0
2,603.3	23.5	7	11	16	27		M		ROADWAY EMBANKMENT FILL: Very Stiff, Orange-Brown, Coarse to Fine Sandy SILT with a Trace of Mica
2,598.3	28.5	7	10	14	24		M		2,614.8 12.0
2,593.3	33.5	11	11	14	25	SS-7	18.9%		RESIDUAL: Very Stiff to Hard, Tan, Saprolitic, Variably Clayey, Fine to Coarse Sandy SILT with a Trace of Mica
2,588.3	38.5	7	13	18	31		W		
2,583.3	43.5	9	19	24	43		W		
2,578.3	48.5	6	9	10	19		W		
2,573.3	53.5	7	7	9	16	SS-8	W		
2,568.3	58.5	15	20	25	45		W		
2,563.3	63.5	16	34	39	73		W		
2,561.2	65.6	60/.1			60/.1				
2,556.2	70.6	28	72/.5		100/1.0				
		60/.2			60/.2				

2,589.8 37.0
Dense, Tan and White, Silty, Fine to Coarse SAND

2,584.8 42.0
Very Stiff, Tan, Coarse to Fine Sandy SILT with a Trace of Mica

2,579.8 47.0
Medium Dense to Very Dense, Tan, Silty, Fine to Coarse SAND with a Little Rock Fragments

2,563.8 63.0
WEATHERED ROCK: Grey and White, Severely Weathered, Soft to Medium Hard, GNEISS with Very Close Fracture Spacing

2,552.2 74.6

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG **SHEET 32 OF 43**

PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver	
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton				**GROUND WATER (ft)**
BORING NO. RW-4	**BORING LOCATION** 12+63	**OFFSET** 25ft LT	**ALIGNMENT** -LI-	**0 HR.** 33.6
COLLAR ELEV. 2626.8 ft	**NORTHING** 671337	**EASTING** 858771		**24 HR.** 33.5
TOTAL DEPTH 94.4 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual	
DATE STARTED 7/21/05	**COMPLETED** 7/26/05	**SURFACE WATER DEPTH** NA		

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,552.0					Continued from previous page				
2,551.2	75.6	60/.1			60/.1				CRYSTALLINE ROCK: Grey and White, Moderately to Slightly Weathered, Hard, GNEISS with Very Close to Close Fracture Spacing *(continued)*
2,546.2	80.6	60/0			60/0				
									2,532.4 94.4
									Coring Terminated at Elevation 2532.4ft in CRYSTALLINE ROCK (Grey GNEISS)
									Drilling Fluid = Bentonite Plus Water
									Mud Density = 63.5lbs/cu.ft. at 2.5ft

CORE BORING REPORT

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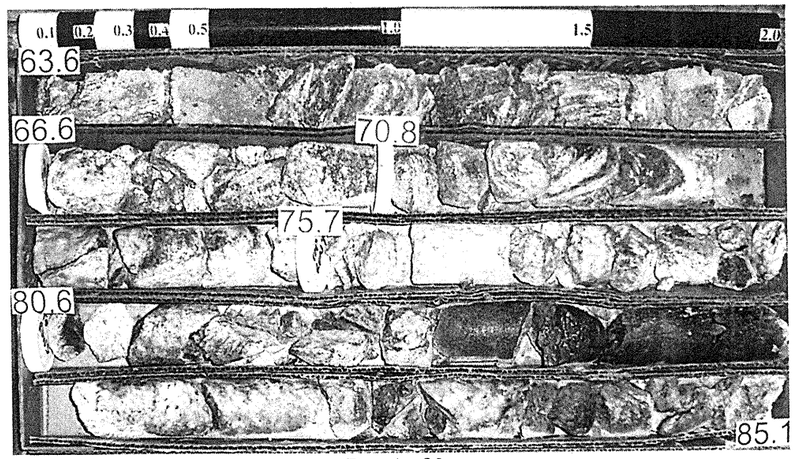
PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood	**GEOLOGIST** D.Goodnight/P.Weaver
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton			**GROUND WATER (ft)**
BORING NO. RW-4	**BORING LOCATION** 12+63	**OFFSET** 25ft LT **ALIGNMENT** -Ll-	**0 HR.** 33.6
COLLAR ELEV. 2626.8 ft	**NORTHING** 671337	**EASTING** 858771	**24 HR.** 33.5
TOTAL DEPTH 94.4 ft	**DRILL MACHINE** Acker AD-II	**DRILL METHOD** Wash Rotary/NQ Core	**HAMMER TYPE** 140lb Manual
DATE STARTED 7/21/05	**COMPLETED** 7/26/05	**SURFACE WATER DEPTH** NA	
CORE SIZE NQ	**TOTAL RUN** 29.5 ft	**DRILLER** C.Heun	

ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 63.6 ft
2,563.2	63.6	2.0	9:45	(1.7)	(NA)		(3.1)	(NA)		2,563.2 WEATHERED ROCK: Grey and White, Severely Weathered, Soft to Medium Hard, GNEISS with Very Close Fracture Spacing 63.6
2,561.2	65.6		11:51	85%			32%			
			N=100/.5							Very Broken Throughout
2,560.2	66.6	4.0	3:57	(0.8)	(NA)					
			5:24	20%						2 Joints at 70°-80°
2,556.2	70.6		6:49							
			8:58							Core Loss at 63.6ft-63.9ft; 66.6ft-69.8ft; 70.8ft-74.0ft
2,556.0	70.8	4.8	*N=60/.2*	(1.6)	(0.0)					SPT Loss at 65.6ft-66.6ft; 70.5ft-70.8ft
			4:50/0.8	33%	0%					
			5:18							
2,551.2	75.6		4:39				(13.1)	(3.5)		2,552.2 74.6
2,551.1	75.7	4.9	6:50	(1.2)	(0.0)		66%	18%		CRYSTALLINE ROCK: Grey and White, Moderately to Slightly Weathered, Hard, GNEISS with Very Close to Close Fracture Spacing
			18:24	24%	0%					
			N=60/.1							Very Broken at 75.7ft-86.3ft and at 93.6ft-94.0ft
2,546.2	80.6		8:04/0.9							
			5:41							Vertical Joint 85.1ft-86.3ft; 81.6ft-82.1ft
		4.5	21:00	(3.8)	(0.7)					
			8:03	84%	16%					4 Joints at 70°-80°
			10:22							Approximately 20 joints at 0°-5°
2,541.7	85.1		7:07							Approximately 5 Joints at 30°-40°
		5.0	12:02	(4.6)	(1.6)					
			13:23	92%	32%					Core Loss at 75.7ft-79.4ft; 80.6ft-81.3ft; 89.7ft-90.1ft; 90.1ft-91.9ft
			10:27							
			31:26/0.5							Runs 5, 6, and 7 Cut Short Due to Core Blocks
2,536.7	90.1		18:07							
		4.3	10:41	(2.5)	(1.2)					
			39:23	58%	28%					
			16:17							
2,532.4	94.4		9:15							2,532.4 94.4
			9:11							Coring Terminated at Elevation 2532.4ft in CRYSTALLINE ROCK (Grey GNEISS)
			9:59							
			5:36							
			27:13							
			16:10/0.3							

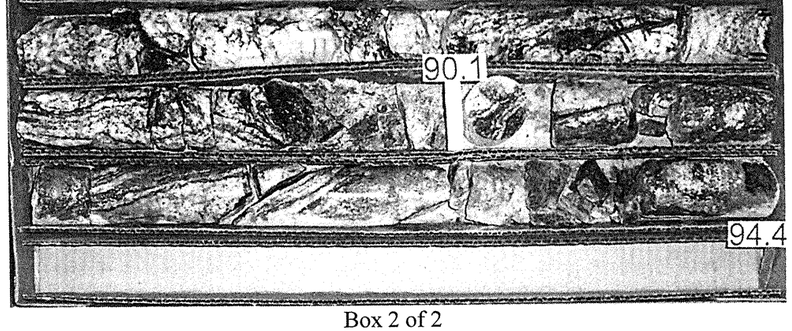
NCDOT CORE SINGLE 07105016C.GPJ NC_DOT.GDT 8/10/05

State Project No. 32920.1.1 TIP No. B-3189
Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad
CORE PHOTOGRAPHS- BORING RW-4



Box 1 of 2

Scale = 1:4



Box 2 of 2

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

PAGE 1 OF 1

PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood		**GEOLOGIST** D.Goodnight/P.Weaver	
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton				**GROUND WATER (ft)**	
BORING NO. SPT-1	**BORING LOCATION** 12+80	**OFFSET** 16ft LT	**ALIGNMENT** -L-	**0 HR.** 10.8	
COLLAR ELEV. 2626.5 ft	**NORTHING** 671321	**EASTING** 858761		**24 HR.** C.I. @ 2.0	
TOTAL DEPTH 60.0 ft	**DRILL MACHINE** CME 45 Mudbug	**DRILL METHOD** Wash/Mud Rotary		**HAMMER TYPE** 140lb Manual	
DATE STARTED 4/20/06	**COMPLETED** 4/21/06	**SURFACE WATER DEPTH** NA			

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,626.5									2,626.5 0.00
2,625.5	1.0								2,626.1 ASPHALT (2 Inches); CONCRETE (3 Inches) 0.4
2,623.0	3.5	3	2	3	5		M		ROADWAY EMBANKMENT FILL: Very Loose To Medium Dense, Brown, Clayey, Silty, Fine To Coarse SAND With A Little Mica And A Trace To Some Gravel
2,620.5	6.0	2	1	1	2		M		
2,618.0	8.5	2	2	1	3		M		
2,613.0	13.5	3	5	7	12	SS-9	M		2,613.0 13.5
2,608.0	18.5	9	13	13	26		W		RESIDUAL: Very Stiff, White And Tan, Saprolitic, Clayey, Fine To Coarse Sandy SILT With A Little Mica
2,603.0	23.5	9	8	10	18		W		
2,598.0	28.5	5	10	14	24		W		
2,593.0	33.5	7	9	10	19	SS-10	24.0%		
2,588.0	38.5	6	7	9	16		W		
2,583.0	43.5	3	20	80/.5	100/1.0				2,587.0 39.5
2,578.0	48.5	37	63/.2		100/.7				WEATHERED ROCK: Tan GNEISS
2,573.0	53.5	75	25/.1		100/.6				
2,568.0	58.5	60/.2			60/.2				2,571.5 55.0
		45	33	32	65		W		RESIDUAL: Very Dense, Tan Saprolitic, Silty Coarse To Fine SAND
									2,566.5 60.0
									Boring Terminated At Elevation 2566.5ft In RESIDUAL: Silty, Coarse To Fine SAND

Note: Drilling Fluid = Bentonite Mud Slurry
Initial Mud Density = 84lbs/cu.ft.

NCDOT BORE SINGLE 07105016.GPJ NC_DOT.GDT 5/8/06

N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

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PROJECT NO. 32920.1.1	**ID No.** B-3189	**COUNTY** Haywood		**GEOLOGIST** D.Goodnight/P.Weaver	
SITE DESCRIPTION Bridge No. 272 on SR 1643 (Bridge St.) over NSRR in Canton				**GROUND WATER (ft)**	
BORING NO. SPT-2	**BORING LOCATION** 12+80	**OFFSET** 11ft RT	**ALIGNMENT** -L-	**0 HR.** 14.3	
COLLAR ELEV. 2626.5 ft	**NORTHING** 671321	**EASTING** 858734		**24 HR.** 15.0	
TOTAL DEPTH 68.9 ft	**DRILL MACHINE** CME 45 Mudbug	**DRILL METHOD** Wash/Mud Rotary		**HAMMER TYPE** 140lb Manual	
DATE STARTED 4/20/06	**COMPLETED** 4/20/06	**SURFACE WATER DEPTH** NA			

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
2,626.5									2,626.5 0.00
2,625.5	1.0								2,625.7 ASPHALT (3.5 Inches); CONCRETE (6 Inches) 0.8
2,623.0	3.5	2	1	2	3		M		ROADWAY EMBANKMENT FILL: Very Loose To Loose, Brown, Silty, Fine To Coarse SAND With A Little To A Trace Of Mica, A Trace Of Decayed Plant Material, And A Trace Of Gravel
2,620.5	6.0	2	1	1	2	SS-11	M		
2,618.0	8.5	2	1	1	2		M		
2,613.0	13.5	2	2	3	5		M		2,614.5 12.0
2,608.0	18.5	27	45	55/.4	100/.9				WEATHERED ROCK: Tan GNEISS
2,603.0	23.5	25	33	27	60		M		2,609.5 17.0
2,598.0	28.5	25	71	29/.1	100/.6				RESIDUAL: Hard, Tan, Saprolitic, Coarse To Fine Sandy SILT
2,593.0	33.5	16	11	10	21		W		2,604.5 22.0
2,588.0	38.5	18	21	25	46		W		WEATHERED ROCK: Tan GNEISS
2,583.0	43.5	5	3	6	9		W		2,600.0 26.5
2,578.0	48.5	15	22	24	46	SS-12	23.4%		RESIDUAL: Stiff To Hard, Tan, Saprolitic, Clayey, Fine To Coarse Sandy SILT With A Trace Of Mica And Rock Fragments
2,573.0	53.5	45	35	65/.5	100/1.0				2,579.5 47.0
2,568.0	58.5	45	55/.1		100/.6				WEATHERED ROCK: Tan GNEISS
2,563.0	63.5	60/.2			60/.2				
2,558.0	68.5	60/.3			60/.3				
		60/.4			60/.4				2,557.6 68.9
									Boring Terminated At Elevation = 2557.6 ft. In WEATHERED ROCK: GNEISS

Note: Drilling Fluid = Bentonite Mud Slurry
Initial Mud Density = 64lbs/cu.ft.

NCDOT BORE SINGLE 07105016.GPJ NC_DOT.GDT 5/8/06

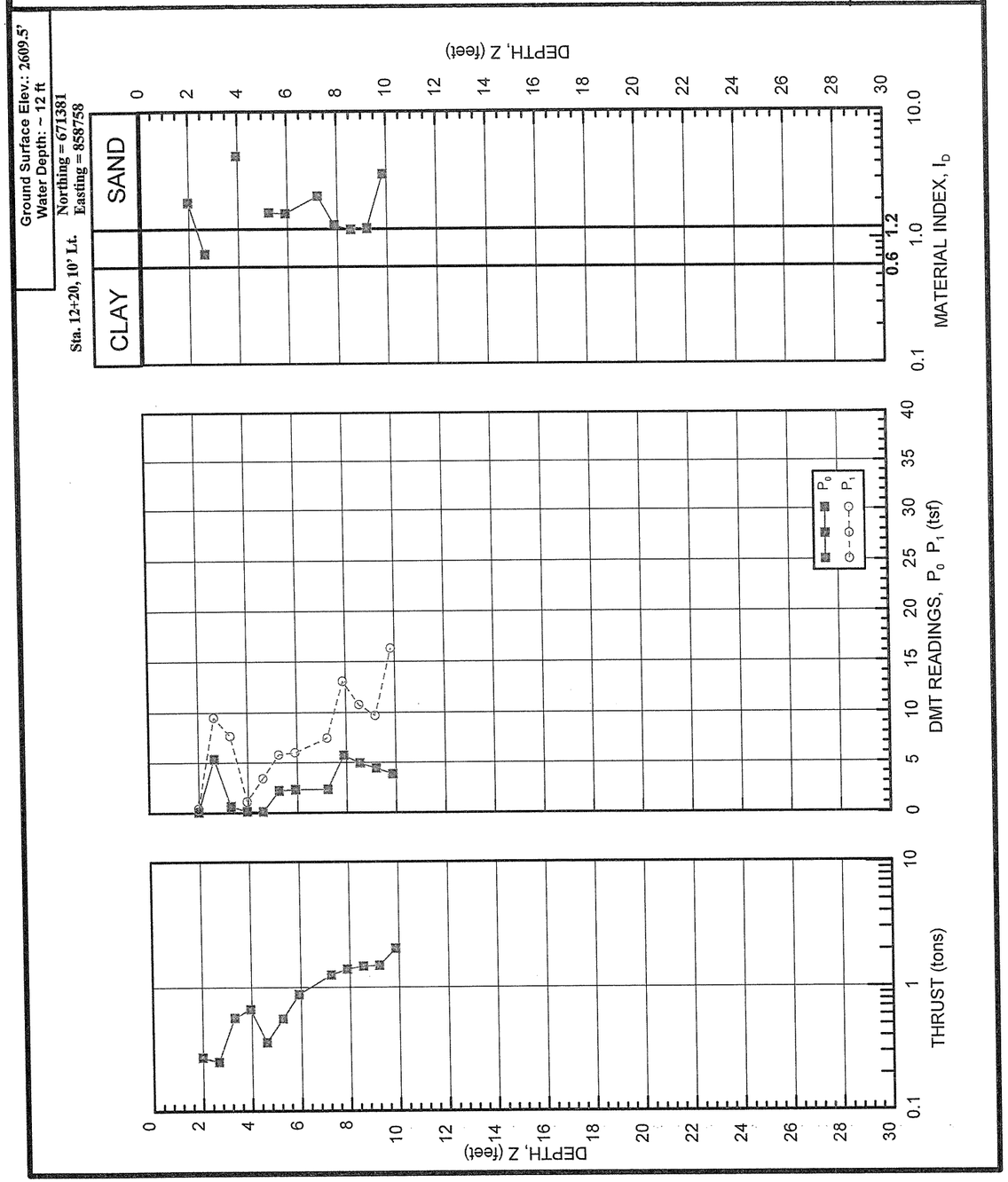
PROJECT: Bridge Street over Norfolk Southern Railroad
LOCATION: Canton, NC

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 4/17/06

SOUNDING D-1

DILATOMETER RESULTS

Ground Surface Elev.: 2609.5'
Water Depth: ~ 12 ft
Sta. 12+20, 10' Lt. Northing = 671381 Easting = 858758



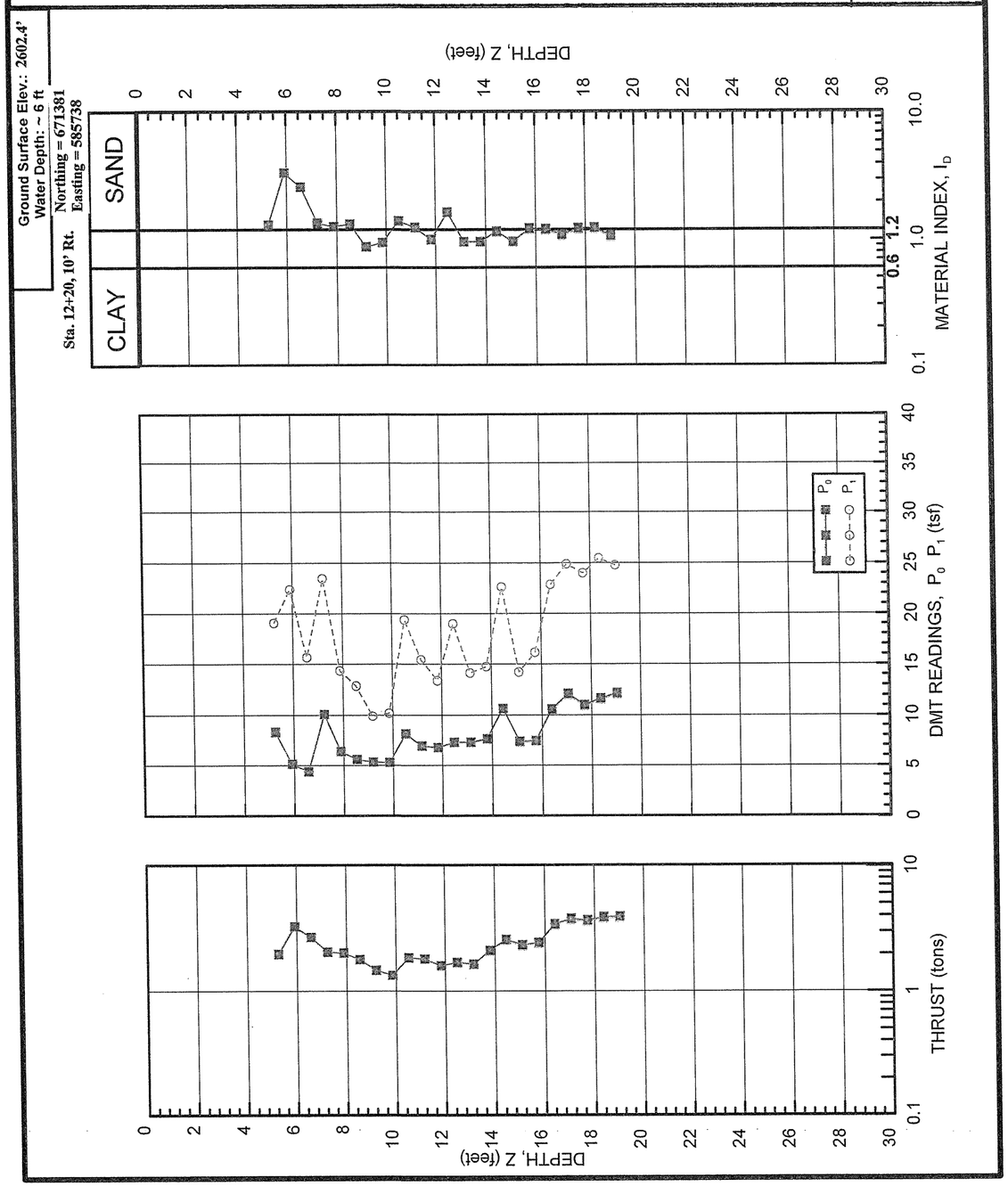
PROJECT: Bridge Street over Norfolk Southern Railroad
LOCATION: Canton, NC

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 4/18/06

SOUNDING D-2

DILATOMETER RESULTS

Ground Surface Elev.: 2602.4'
Water Depth: ~ 6 ft
Sta. 12+20, 10' Rt. Northing = 671381 Easting = 585738



PROJECT: Bridge Street over Norfolk Southern Railroad
LOCATION: Canton, NC

IN-SITU SOIL TESTING, L.C.
ENGINEER: R. Failmezger
SOUNDING DATE: 4/19/06

SOUNDING D-3

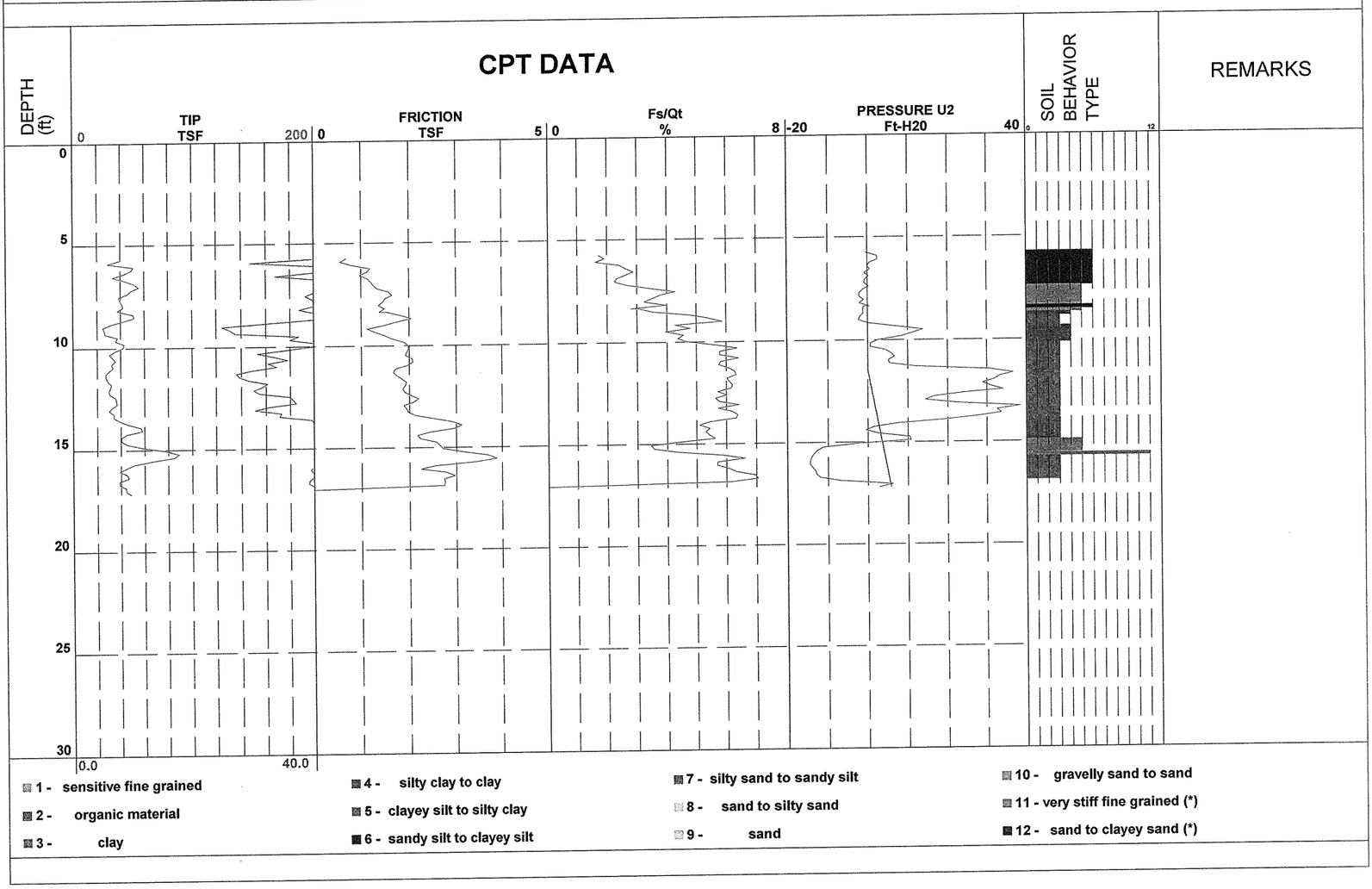
DILATOMETER RESULTS

Ground Surface Elev.: 2626.7'
Water Depth: ~ 20 ft

Sta. 12+45, 16' Rt.
Northing = 671356
Easting = 858763

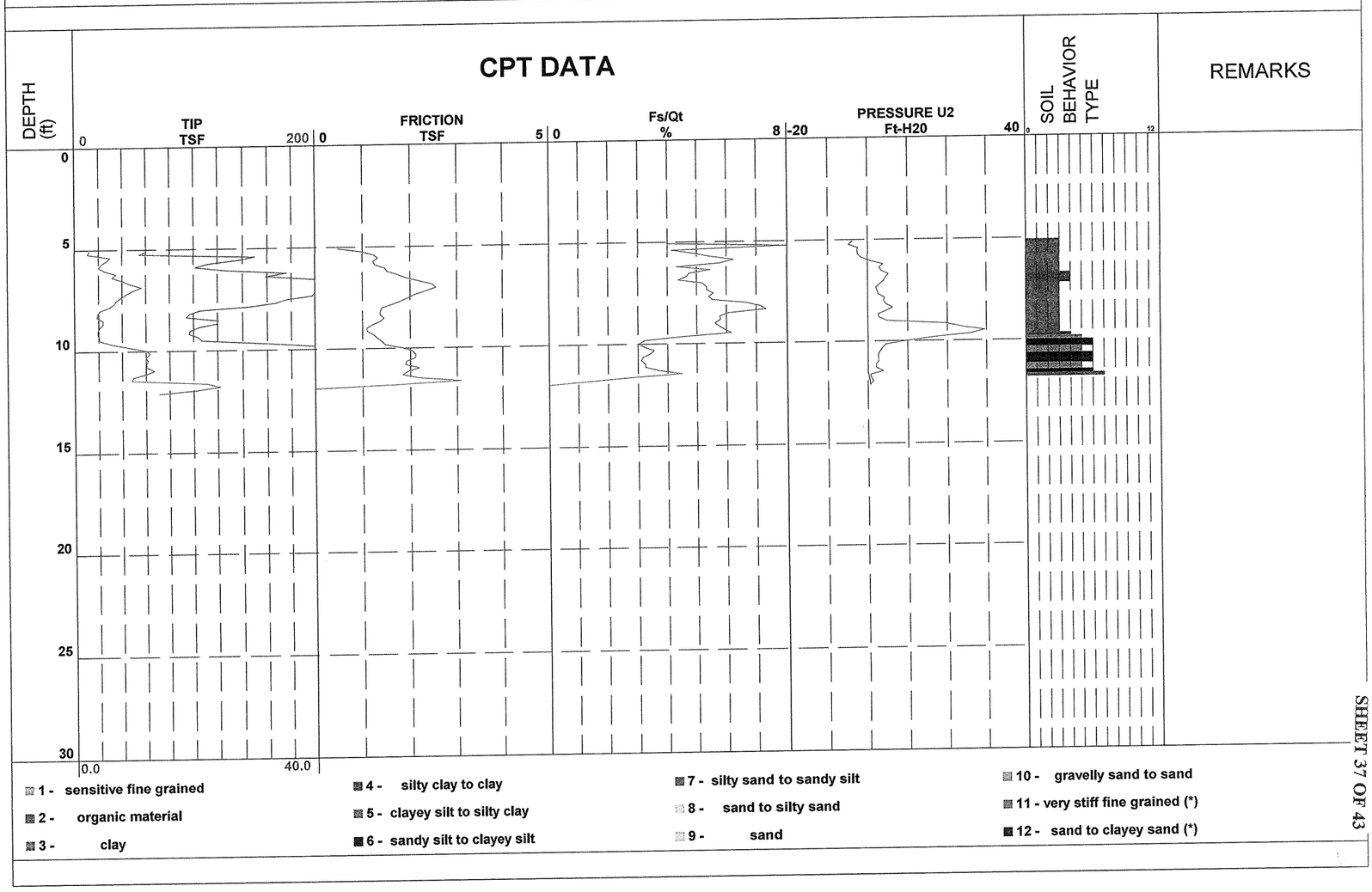
In-Situ Soil Testing, L.C. CPTU Sounding Data

Project	Bridge Street over Norfolk Southern Railroad			Sounding	SCPT-1
Location	Canton, North Carolina	Cone Number	DSG0416	Date/Time	4/28/2006 10:26:54 AM
Operator	R. Failmezger	Ground Elev.	2609.3'	Water Depth	~12 ft
Engineer	R. Failmezger, P.E.	File Name	2006-22SCPT-1a.cpt	Total Depth	17.22 ft
			Sta. 12+18, 10' Lt.	Northing = 671383	
				Easting = 858758	



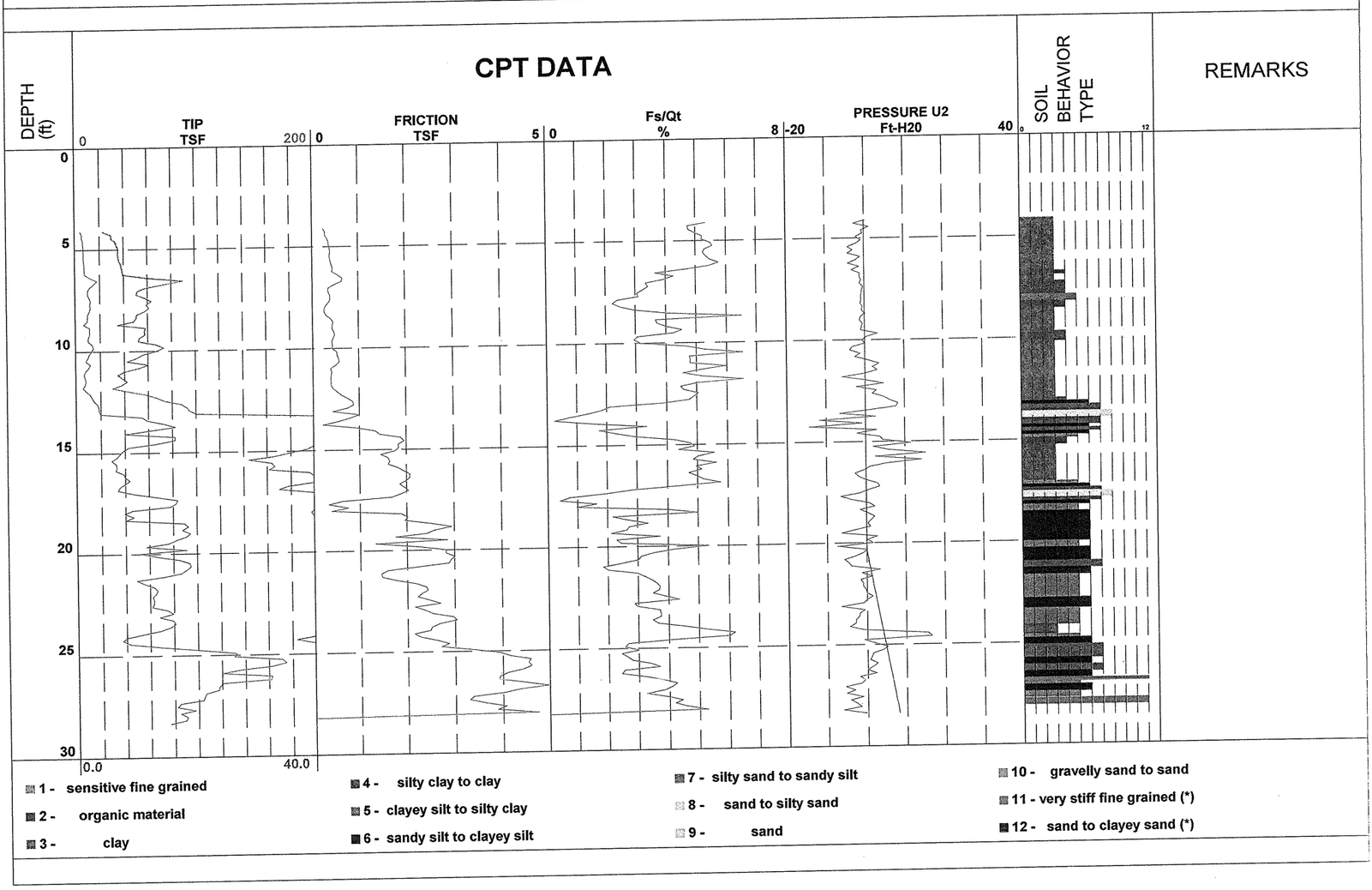
In-Situ Soil Testing, L.C. CPTU Sounding Data

Project	Bridge Street over Norfolk Southern Railroad			Sounding	SCPT-2
Location	Canton, North Carolina	Cone Number	DSG0416	Date/Time	4/28/2006 2:34:51 PM
Operator	R. Failmezger	Ground Elev.	2600.0'	Water Depth	
Engineer	R. Failmezger, P.E.	File Name	2006-22SCPT-2.cpt	Total Depth	12.14 ft
			Sta. 12+17, 10' Rt.	Northing = 671384	
				Easting = 858739	



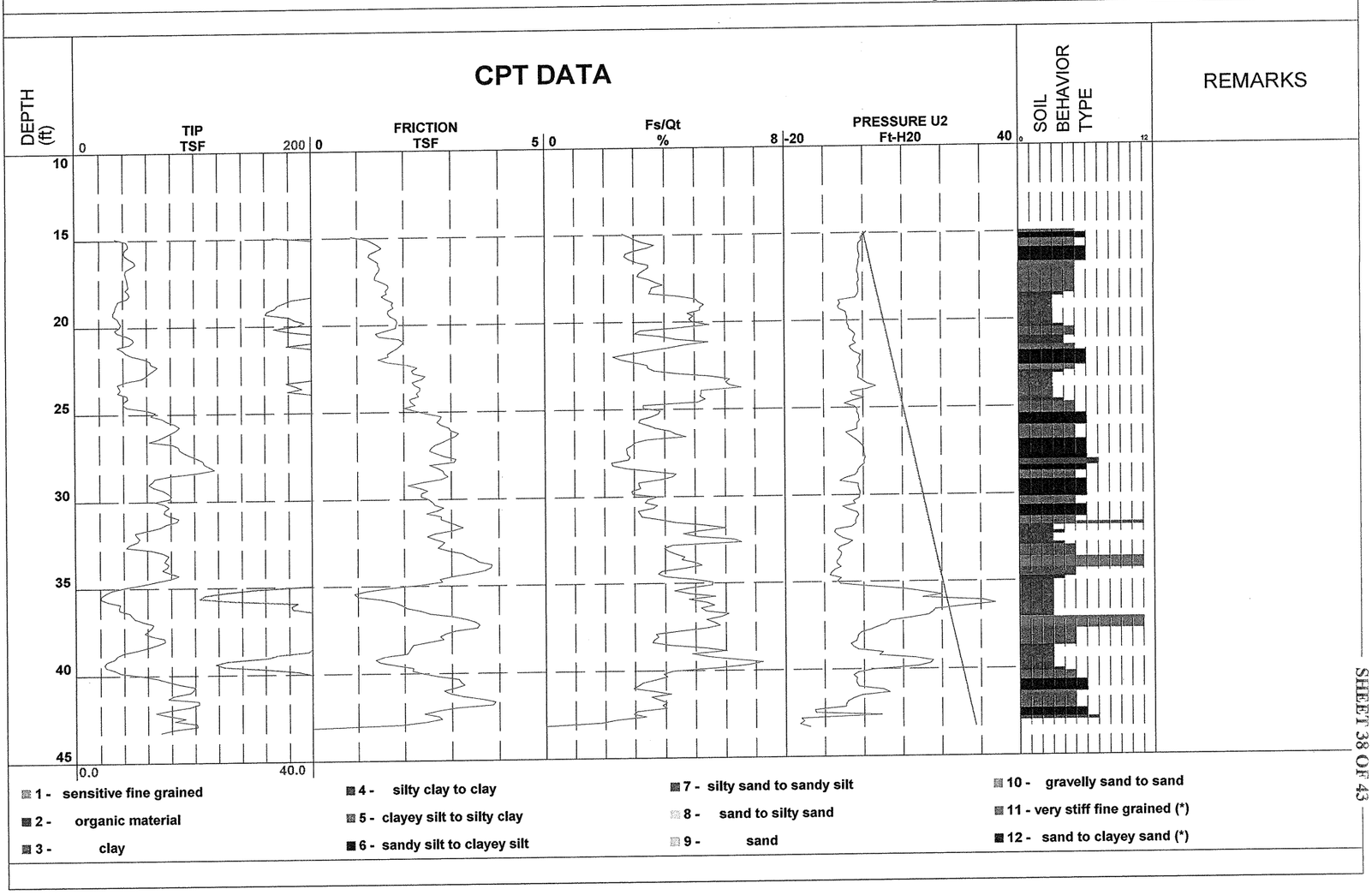
In-Situ Soil Testing, L.C. CPTU Sounding Data

Project	Bridge Street over Norfolk Southern Railroad			Sounding	SCPT-3
Location	Canton, North Carolina	Cone Number	DSG0416	Date/Time	4/21/2006 12:14:04 PM
Operator	R. Failmezger	Ground Elev.	2626.7'	Water Depth	~21 ft
Engineer	R. Failmezger, P.E.	File Name	2006-22SCPT-3.cpt	Total Depth	28.38 ft
		Sta. 12+48, 16' Rt	Northing = 671353 Easting = 858763		



In-Situ Soil Testing, L.C. CPTU Sounding Data

Project	Bridge Street over Norfolk Southern Railroad			Sounding	CPT-1
Location	Canton, North Carolina	Cone Number	DSG0416	Date/Time	4/21/2006 3:29:03 PM
Operator	R. Failmezger	Ground Elev.	2619.6'	Water Depth	14.76 ft
Engineer	R. Failmezger, P.E.	File Name	2006-22CPT-1a.cpt	Total Depth	43.31 ft
		Sta. 12+35, CL	Northing = 671366 Easting = 858747		



State Project No. 32920.1.1
TIP No. B-3189 F.A. No. BRZ-1643(1)
Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad in Canton
Haywood County, North Carolina
SUMMARY OF LABORATORY TEST DATA

						Atterberg Limits			Gradation Results							
Boring Number	Sample Depth (ft.)	Sample No.*	Natural Moisture Content (%)	AASHTO Class (Group Index)	N-Value (blows/ ft.)	L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Retained #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
EB1-A	13.5-15.0	SS-1	32.1	A-4 (0)	17	35	34	1	98	73	39	64	37	26	21	16
EB1-B	33.5-35.0	SS-2	34.4	A-4 (0)	16	32	31	1	98	79	44	60	31	28	25	16
RW-1	1.6-3.1	SS-3	-	A-1-b (0)	100+	31	NP	NP	61	39	21	81	45	24	24	7
RW-1	13.5-15.0	SS-4	-	A-1-b (0)	26	26	NP	NP	92	44	23	79	60	18	15	7
RW-4	3.5-5.0	SS-5	25.7	A-4 (20)	4	36	27	9	88	67	45	58	33	19	34	14
RW-4	6.0-7.5	SS-6	32.5	A-6 (7)	8	40	28	12	99	84	64	38	22	16	23	39
RW-4	28.5-30.0	SS-7	18.9	A-4 (0)	25	27	NP	NP	97	68	45	59	37	20	33	10
RW-4	48.5-50.0	SS-8	-	A-1-b (0)	16	30	NP	NP	88	42	22	80	60	18	17	5
SPT-1	8.5-10.0	SS-9	-	A-2-4 (0)	12	31	29	2	78	46	26	76	50	19	18	13
SPT-1	28.5-30.0	SS-10	24.0	A-4 (0)	19	26	NP	NP	99	75	47	58	34	24	28	14
SPT-2	3.5-5.0	SS-11	-	A-2-4 (0)	2	24	NP	NP	90	51	24	79	53	24	16	7
SPT-2	43.5-45.0	SS-12	23.4	A-4 (0)	46	34	31	3	92	65	41	63	38	22	24	16

* SS = Split-Spoon Sample (ASTM-D-1586)
** G = Grab Sample
***ST=Shelby Tube (Undisturbed) Sample
NP -- Non Plastic NA-- Non Applicable

TRIGON ENGINEERING CONSULTANTS, INC.
GREENSBORO, NORTH CAROLINA
Trigon Job Number: 071-05-016
Page: 1 of 1

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 32920.1.1
TIP NO.: B-3189
F.A. NO.: BRZ-1643(1)
COUNTY: Haywood
DESCRIPTION: Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad

Sample #	Boring #	Depth (ft.)	Rock Type	Geologic Map Unit	Run RQD	Length (ft.)	Diameter (ft.)	Dry Density (lbs/cu. ft.)	Unconfined Compressive Strength (psi)	Maximum Load (lbs.)	Loading Rate (in./min.)
RS-1	EB2-A	52.3-52.6	Gneiss	Zybn	40%	0.3412	0.1666	157.0	1,608	5,050	0.009
RS-2	EB2-B	37.6-37.9	Gneiss	Zybn	36%	0.3291	0.1666	164.2	1,143	3,590	0.009

SITE PHOTOGRAPHS
State Project No. 32920.1.1 TIP No. B-3189
Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad
Haywood County, North Carolina
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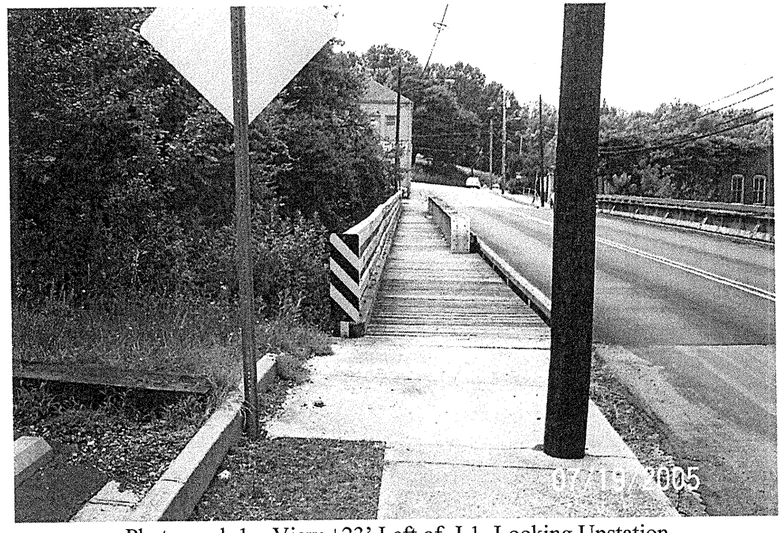
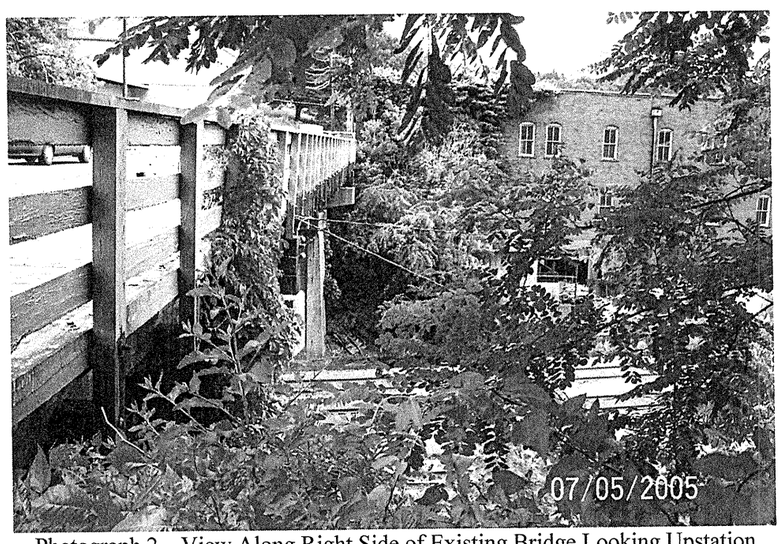


Photograph 1 – View ±23' Left of -L1- Looking Upstation



Photograph 2 – View Along Right Side of Existing Bridge Looking Upstation

SITE PHOTOGRAPHS
State Project No. 32920.1.1 TIP No. B-3189
Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad
Haywood County, North Carolina
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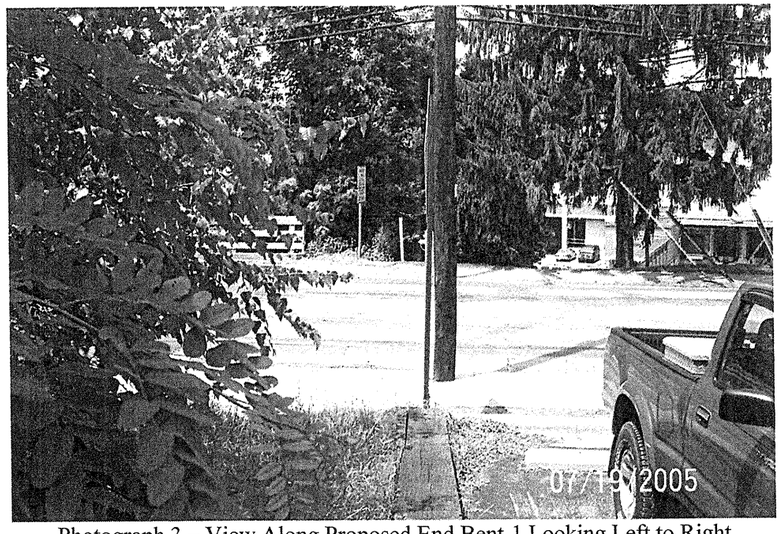
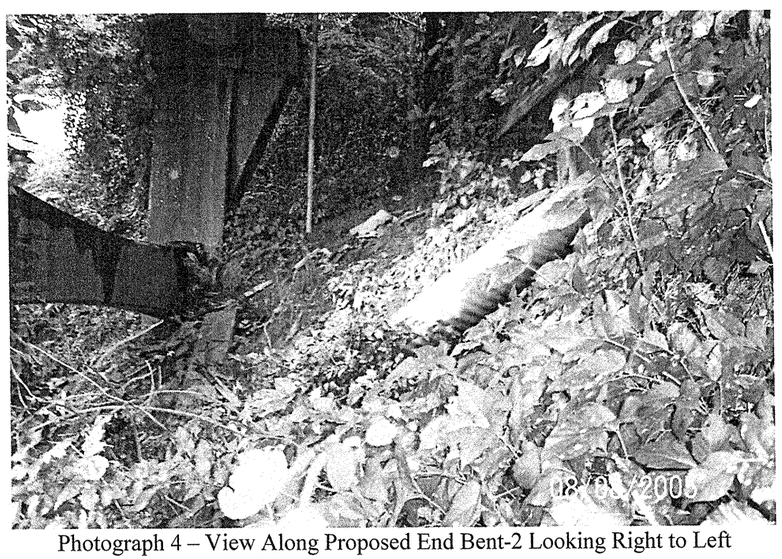
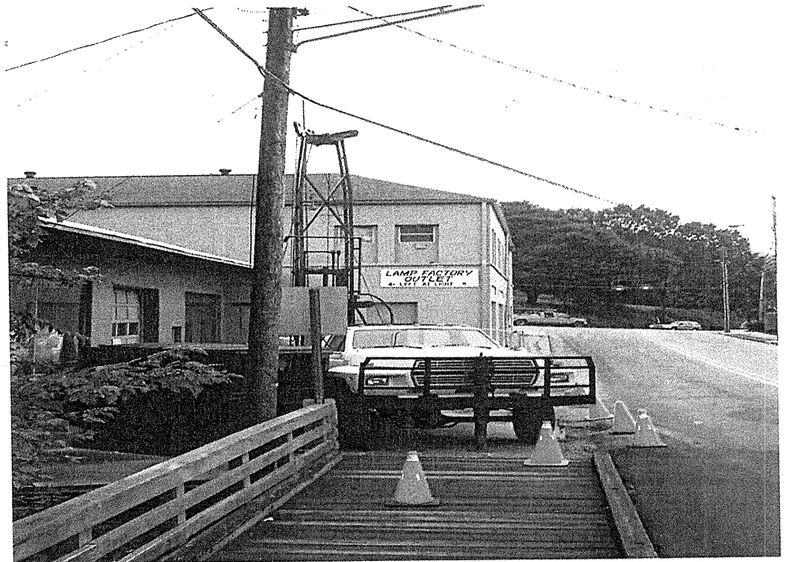


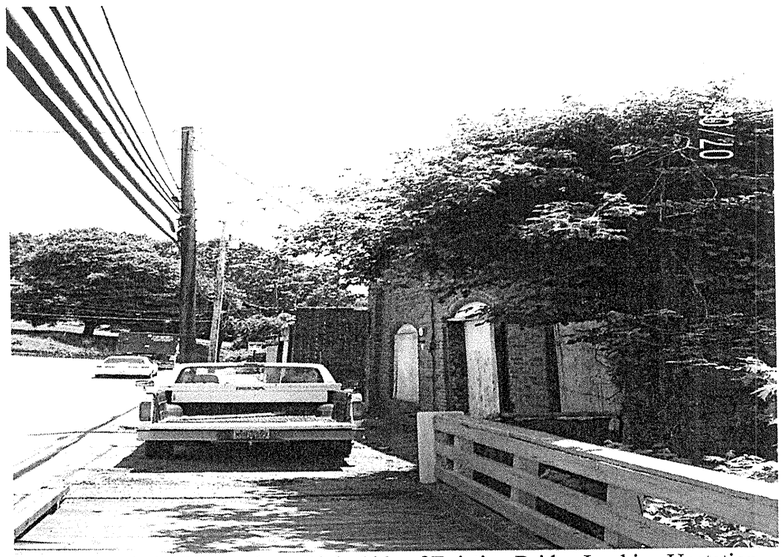
Photograph 3 – View Along Proposed End Bent-1 Looking Left to Right



Photograph 4 – View Along Proposed End Bent-2 Looking Right to Left

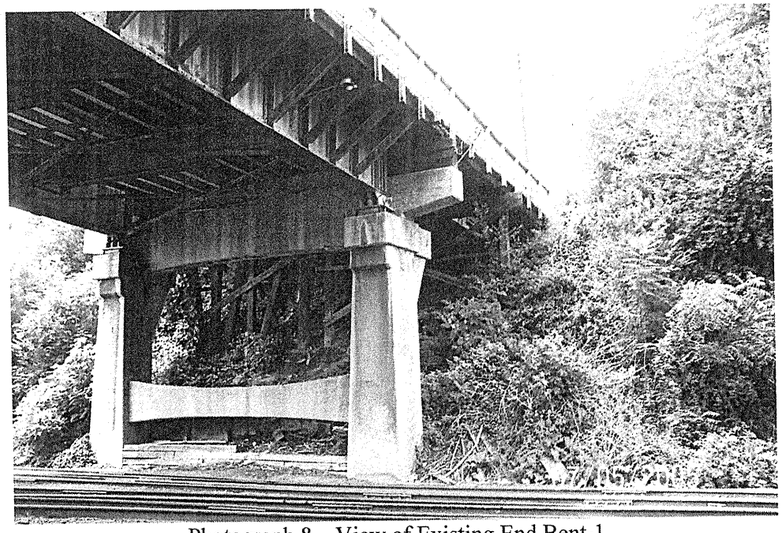


Photograph 5 – View Along Proposed Left Side Retaining Wall Looking Upstation



Photograph 6 – View Along Right Side of Existing Bridge Looking Upstation

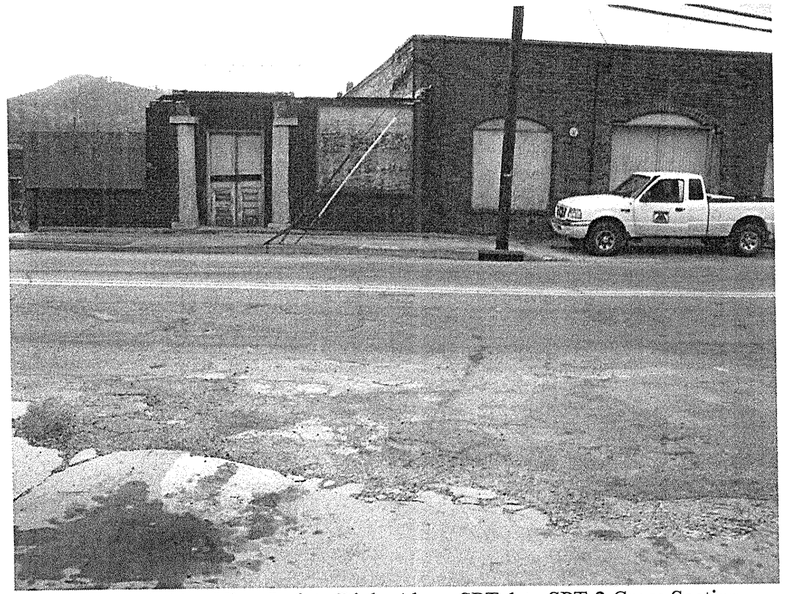
Photograph 7 – View of Existing End Bent-2 Abutment



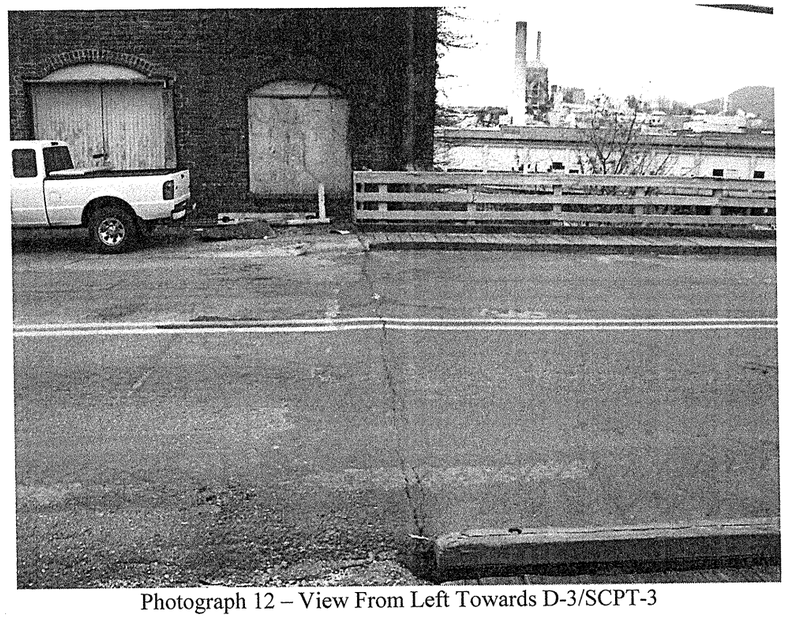
Photograph 8 – View of Existing End Bent-1

Photograph 9 – View of Existing Bridge Looking West

Photograph 10 – View of Existing Bridge Looking East



Photograph 11 – View Left to Right Along SPT-1 to SPT-2 Cross Section



Photograph 12 – View From Left Towards D-3/SCPT-3

SITE PHOTOGRAPHS
State Project No. 32920.1.1 TIP No. B-3189
Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad
Haywood County, North Carolina
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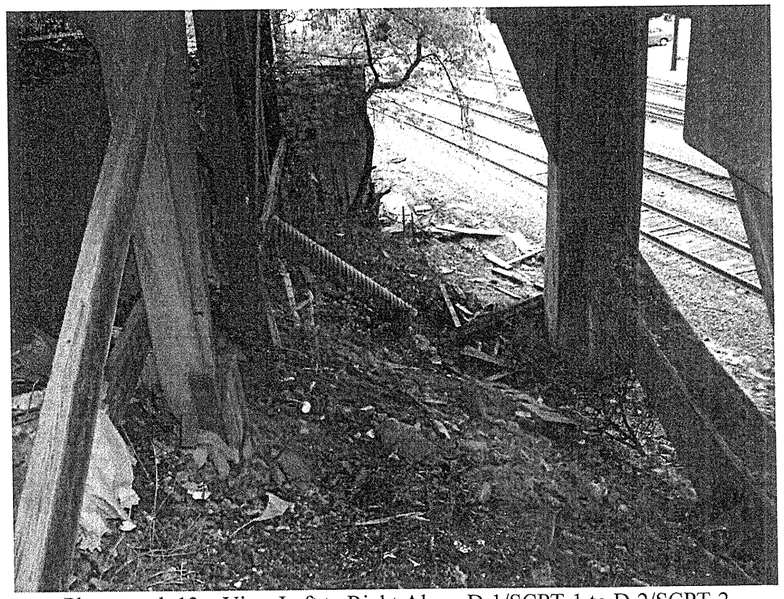
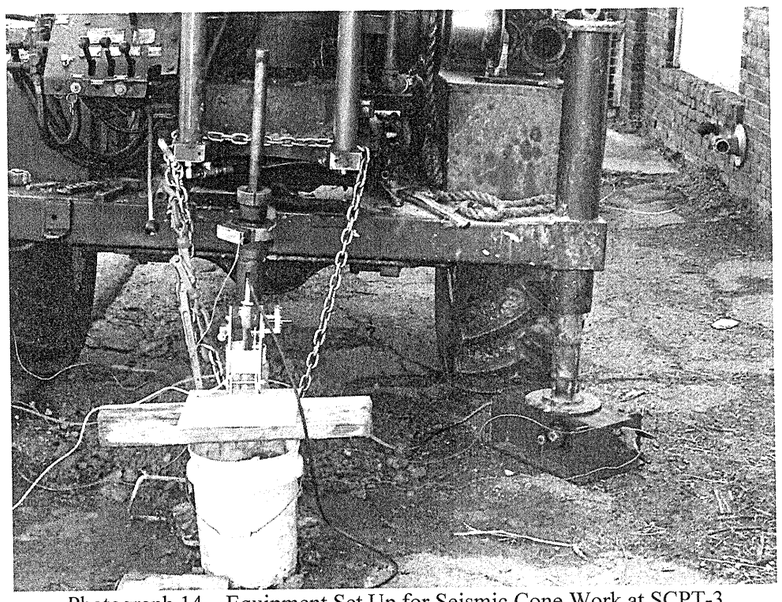


Photograph 13 – View Left to Right Along D-1/SCPT-1 to D-2/SCPT-2



Photograph 14 – Equipment Set Up for Seismic Cone Work at SCPT-3

SITE PHOTOGRAPHS
State Project No. 32920.1.1 TIP No. B-3189
Bridge No. 272 on SR 1643 (Bridge Street) over Norfolk Southern Railroad
Haywood County, North Carolina
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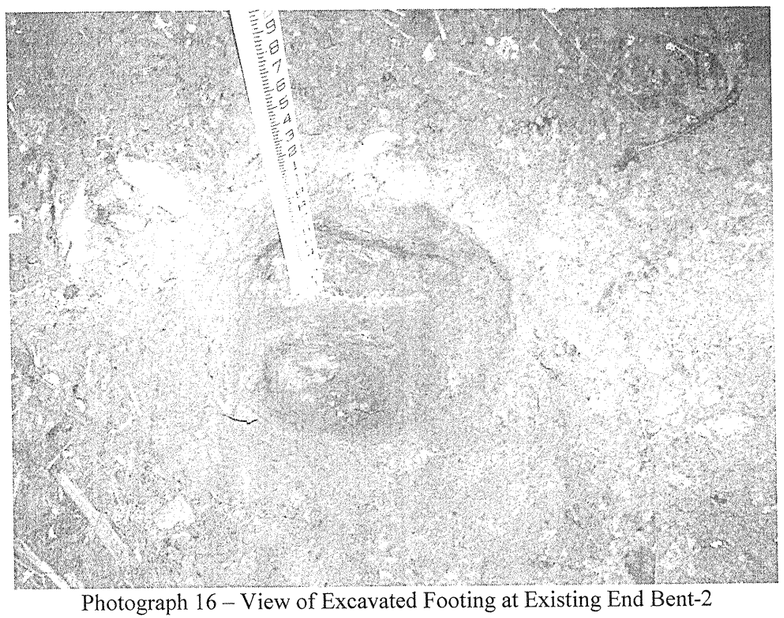
Photograph 15 – View of Excavated Footing At Existing End Bent-2



Photograph 16 – View of Excavated Footing at Existing End Bent-2