STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	35012.1.1 (U-4012)	1	22

STATE PROJ.NO.	F.A.PROJ.NO.	DESCRIPTION
35012.1.1	NHF-15(8)	P.E.
		CONST.

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 35012.1.1 I.D. NO. U-4012

F.A. PROJECT NHF-15(8)

COUNTY DURHAM

PROJECT DESCRIPTION DURHAM - US 15-501 FROM NORTH OF MT MORIAH RD. TO SOUTH OF GARRETT RD.

SITE DESCRIPTION BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK AT -L- STATION 70+22

CONTRACT: ID: U-4012

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1	TITLE SHEET
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11-17	BORE LOG & CORE REPORTS
18	SOIL TEST RESULTS
19	SCOUR REPORT
20-21	CORE PHOTOGRAPHS
22	SITE PHOTOGRAPH

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 N.T. ROBERSON PERSONNEL L.T. DEL GRECO

CHECKED BY D.N. ARGENBRIGHT C.D. CZAJKA

SUBMITTED BY D.N. ARGENBRIGHT

DATE JUNE 2004

NORTH CAROLINA LICENSED GEOLOGIST SEAL 1913 NEILL T. ROBERSON 6-28-04

DRAWN BY: CDC

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.

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.

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
U-4012	35012.1.1	2	22

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL 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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT / PLASTIC INDEX	6 MX		N.P.	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS 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/FT^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 >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
GRAIN SIZE 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) PL — PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- 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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- SPT CPT DPT DMT VST PMT 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
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F. - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED
FRAGS. - FRAGMENTS
MED. - MEDIUM
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-___
- [ ] BK-51
- [X] CME-45C
- [ ] CME-550
- [ ] PORTABLE HOIST
- [ ] OTHER _____
- [ ] OTHER _____

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

HAMMER TYPE:
- [ ] AUTOMATIC [X] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -NQD4
- [ ] -H_____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] 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 FOLOWS:

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 (CAL.C.) - 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 10 CENTIMETERS DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM NO. 4 - R/R SPIKE IN BASE OF 18" RED OAK 114' RT OF -L- STA 70+50
ELEVATION: 249.28'

NOTES:

REVISED 09/15/00

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

Michael F. Easley
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

Lyndo Tippett
SECRETARY

June 21, 2004

STATE PROJECT: 35012.1.1 (U-4012)
F.A. PROJECT: NHF-15(8)
COUNTY: Durham

DESCRIPTION: Durham – US 15-501 from north of Mt. Moriah Rd. to south of Garrett Rd.

SUBJECT: Bridge No. 17 and No. 21 on US15-501 over New Hope Creek at -L- Station 70+22

Project Description

Two four-span bridges, 300-feet in length with a 90° skew, are proposed on -L- (US 15-501) over New Hope Creek to replace the existing structures due to the widening of US 15-501. The new bridges will be 165 feet longer than the existing bridges. The project is located in Durham County about five miles southwest of Durham.

The subsurface investigation was conducted during March and April of 2003 using a track-mounted CME 45C drill machine. One Standard Penetration Test boring was performed at each of the ten proposed bent locations. All borings were advanced until non-crystalline rock was encountered. Representative soil samples were obtained for visual classification in the field and selected samples were submitted to the Materials and Test Unit for laboratory analysis.

Physiography and Geology

The project is located in gently rolling terrain of the Piedmont Physiographic Province. Geologically, the site is located within the Triassic Basin and is underlain by non-crystalline sedimentary sandstone and mudstone. The area consists of a mixture of wooded land and sparse homes and businesses. New Hope Creek is a tributary of Jordan Lake and the Haw River.

Soil Properties

Soils encountered at the project site include roadway embankment, alluvial and Triassic residual soils.

Roadway embankment soils are present at end bent 1, bent 1 and end bent 2. These soils consist primarily of orange and gray, moist, stiff, sandy clays (A-6). These soils are 1.0 to 14.9 feet thick and are underlain by alluvial soils.

Alluvial soils were encountered in each boring and range in thickness from 9.5 to 21.5 feet. Alluvial soils consist predominantly of loose to medium dense, silty sand (A-2-4) and orange to brown, moist to wet, soft to very stiff, sandy silt and sandy clay (A-4, A-6). Lesser amounts of gray, wet, loose, sand (A-1-b) are also present. The alluvial soils were deposited on residual soil and weathered rock.

Triassic residual soils were encountered in most borings and range in thickness from 1.0 to 7.0 feet. These soils consist primarily of brown and gray, moist to wet, medium stiff to hard, sandy silt and sandy clay (A-4, A-6). Triassic residual soils are derived from the underlying weathered rock.

Rock Properties

Weathered rock was derived from the underlying non-crystalline sedimentary sandstone and mudstone and ranges in thickness from 2.1 to 10.7 feet. The top of weathered rock was encountered at elevations ranging from 233.4 to 223.0 feet.

Non-crystalline rock was encountered at each boring location. The top of non-crystalline rock ranges in elevation from 228.7 to 219.7 feet. Rock core was obtained from three of the interior bent borings. Non-crystalline rock was penetrated with N casing and NQD4 core barrel in borings B1-A, B2-B, and B3-A. Non-crystalline rock consists of gray and brown, moderately severely weathered to slightly weathered, soft to hard, extremely fractured to sound Triassic sandstone and mudstone. Core recovery (REC) ranged from 53% in boring B2-B to 100% in boring B1-A. Rock Quality Designation (RQD) ranges from 40% in B3-A to 67% in B2-B. More detailed rock descriptions can be found in the Core Boring Reports.

Temporary Detour Structure

A temporary detour structure will be constructed approximately 33 feet northwest of the existing bridges along -DET1- at Sta. 23+25. The structure has a total length of 166 feet. Borings B2-A and B3-A (see sheets No. 13 and 15 for boring logs) were drilled near the proposed end bents and provide data for the detour structure. Geologic conditions along the -DET1- alignment should correlate directly to those encountered along the main structure.

Groundwater

Groundwater was encountered at each bent location. Groundwater elevations ranged from 249.1 to 245.3 feet. Surface water in the New Hope Creek was at elevation 243.7 feet as noted in the bridge survey and hydraulic design report dated November 17, 2003.

Notice

This Geotechnical foundation report is based on the bridge survey report for New Hope Creek dated November 17, 2003. If significant changes are made in the design or location of the proposed structure, the subsurface information should be reviewed and modified as necessary.

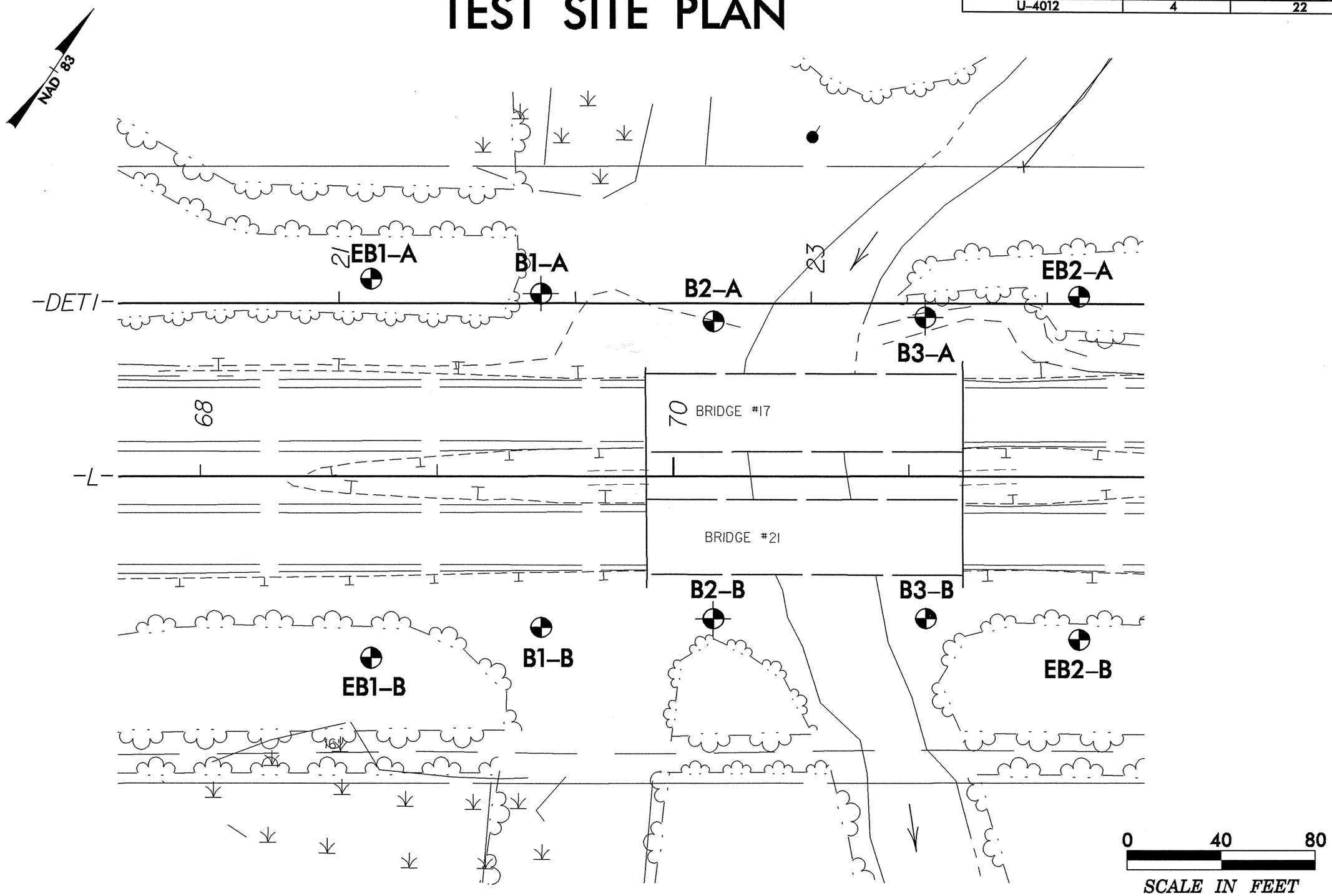
Respectfully submitted,

Neil T. Roberson

Neil T. Roberson
Project Geologist

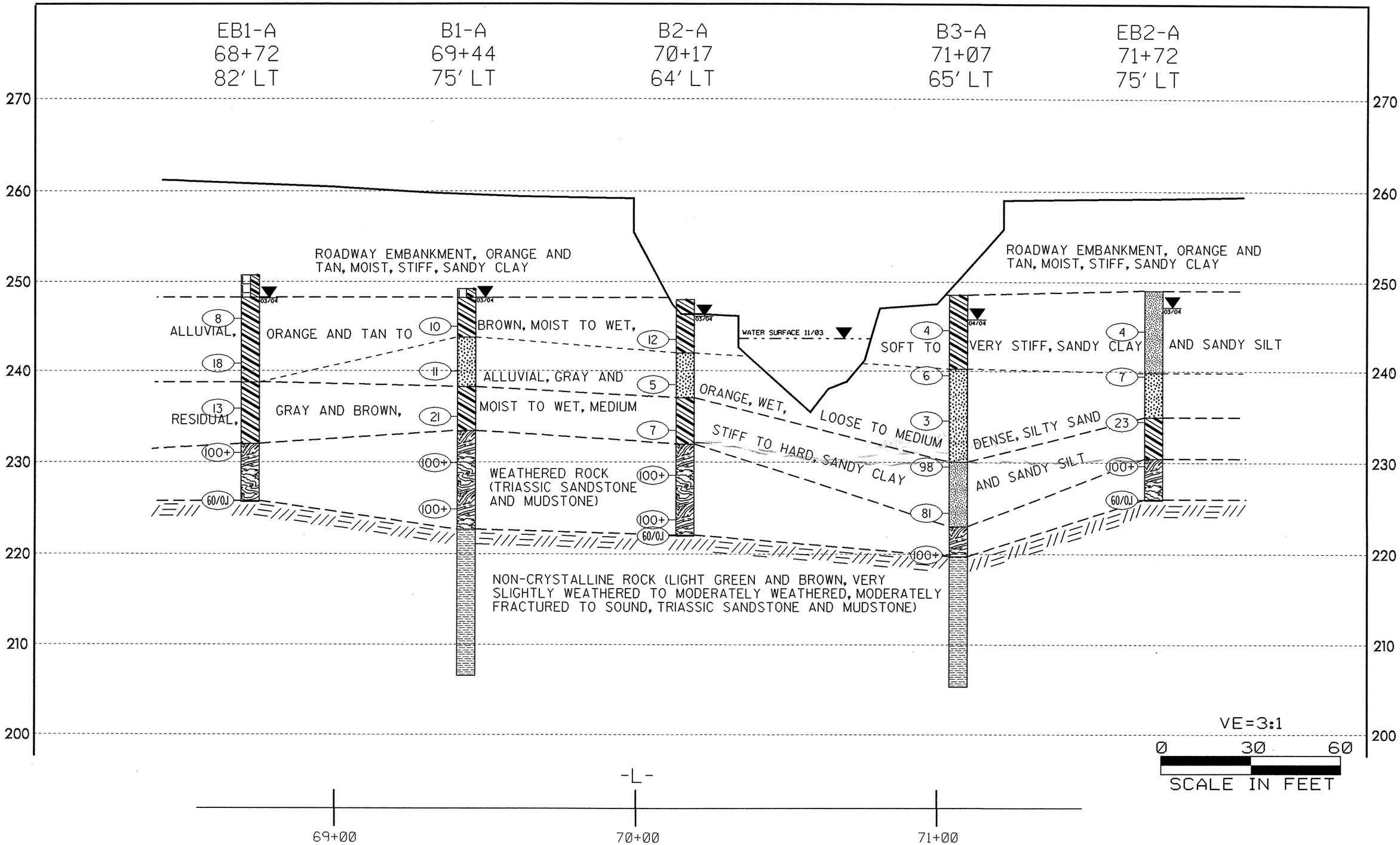
TEST SITE PLAN

PROJECT REF. NO.	SHEET NO.	TOTAL SHEETS
U-4012	4	22



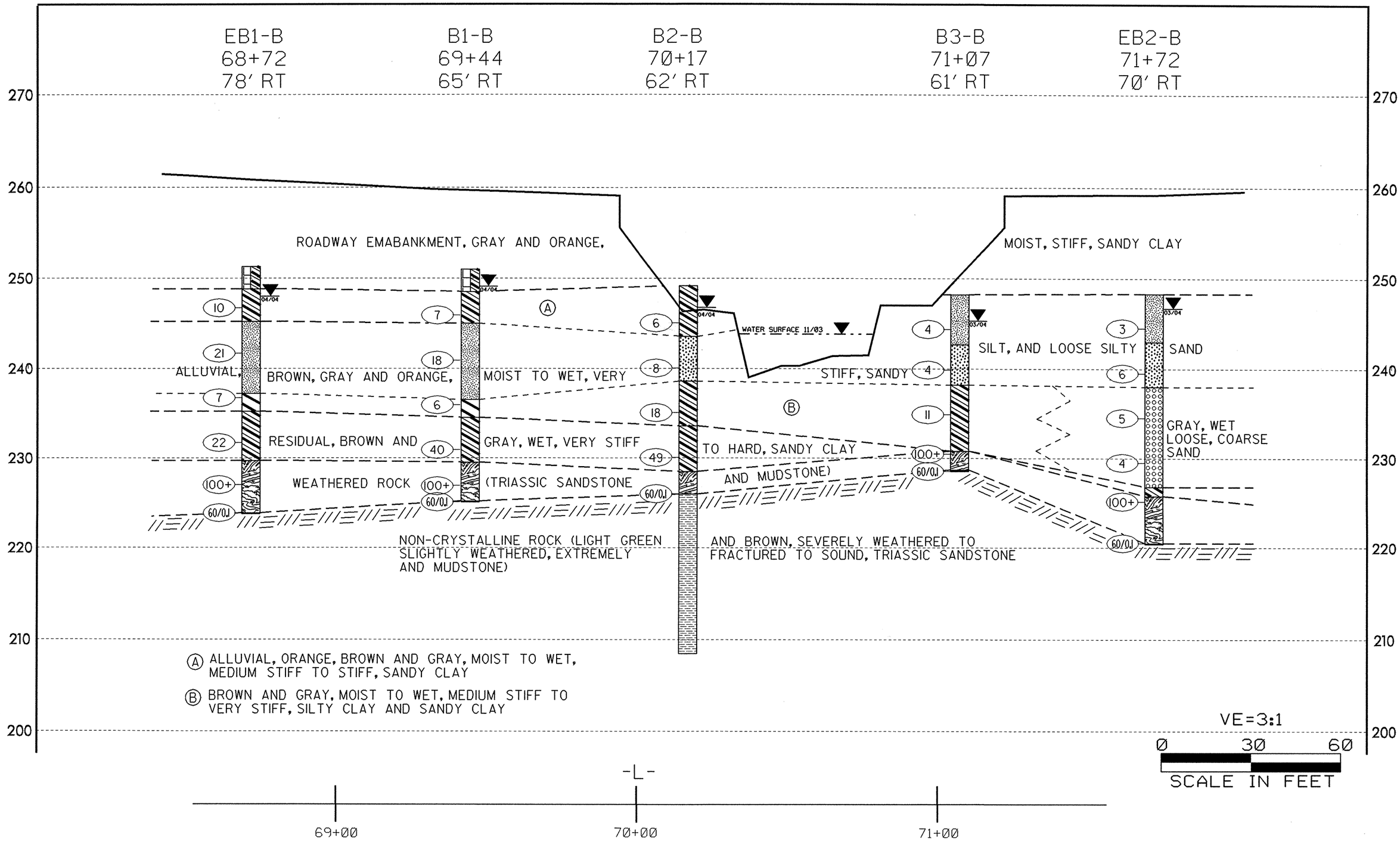
PROFILE THROUGH BORINGS PROJECTED LEFT OF -L-

BRIDGE NO. 17 AND 21, 35012.1.1 (U-4012)



PROFILE THROUGH BORINGS PROJECTED RIGHT OF -L-

BRIDGE NO. 17 AND 21, 35012.1.1 (U-4012)



PROFILE THROUGH BORINGS PROJECTED ALONG -DETI-

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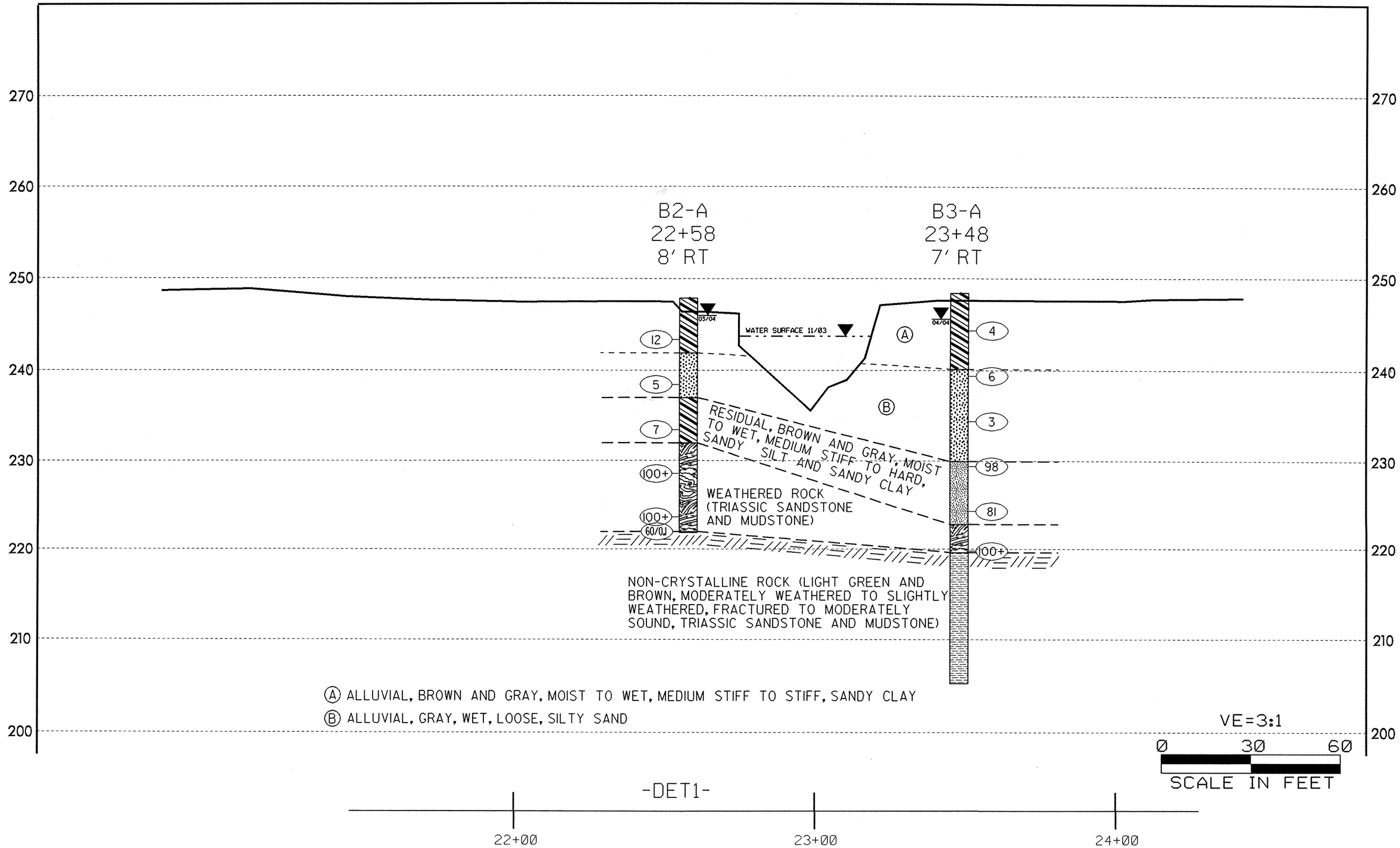
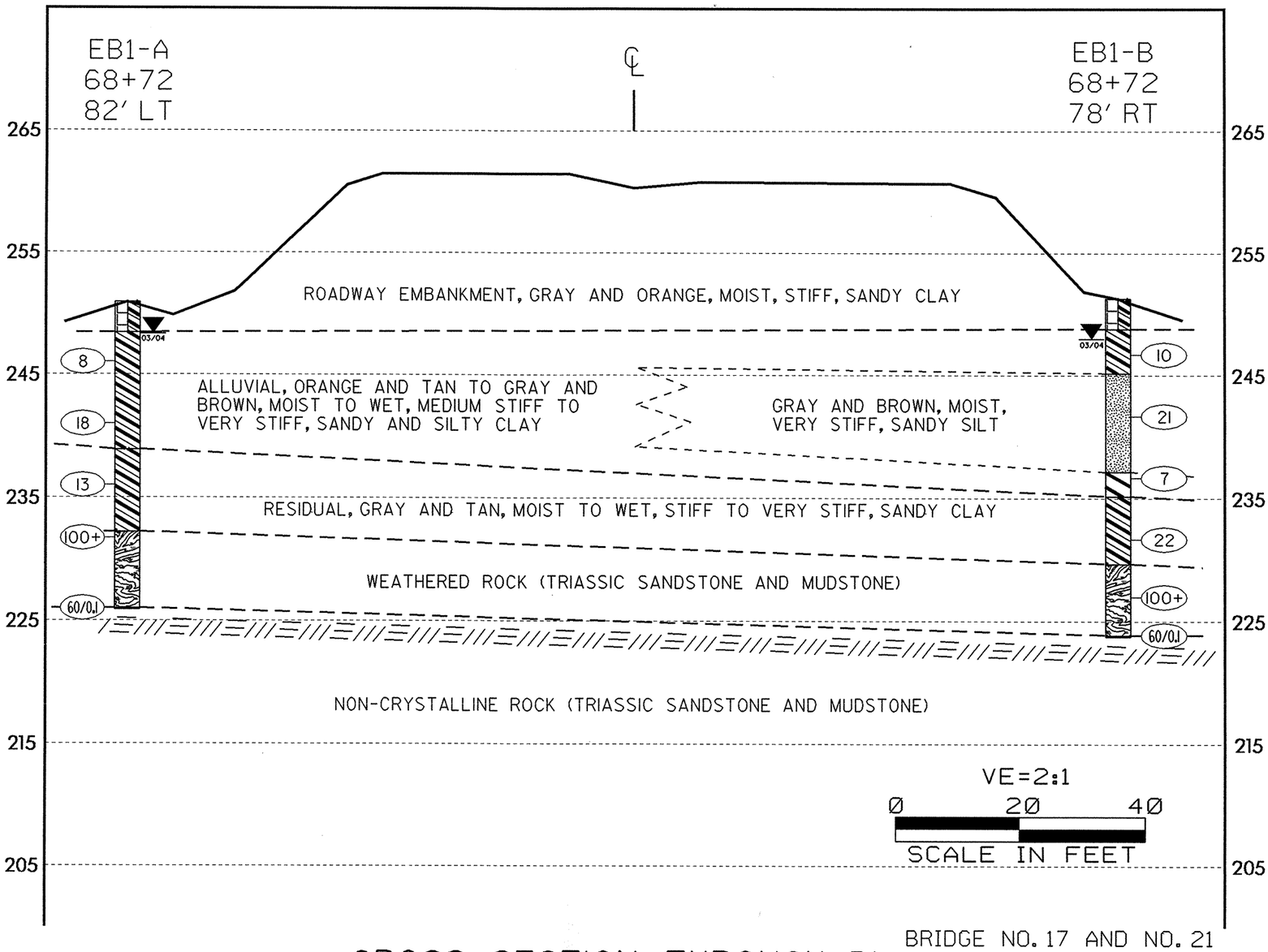


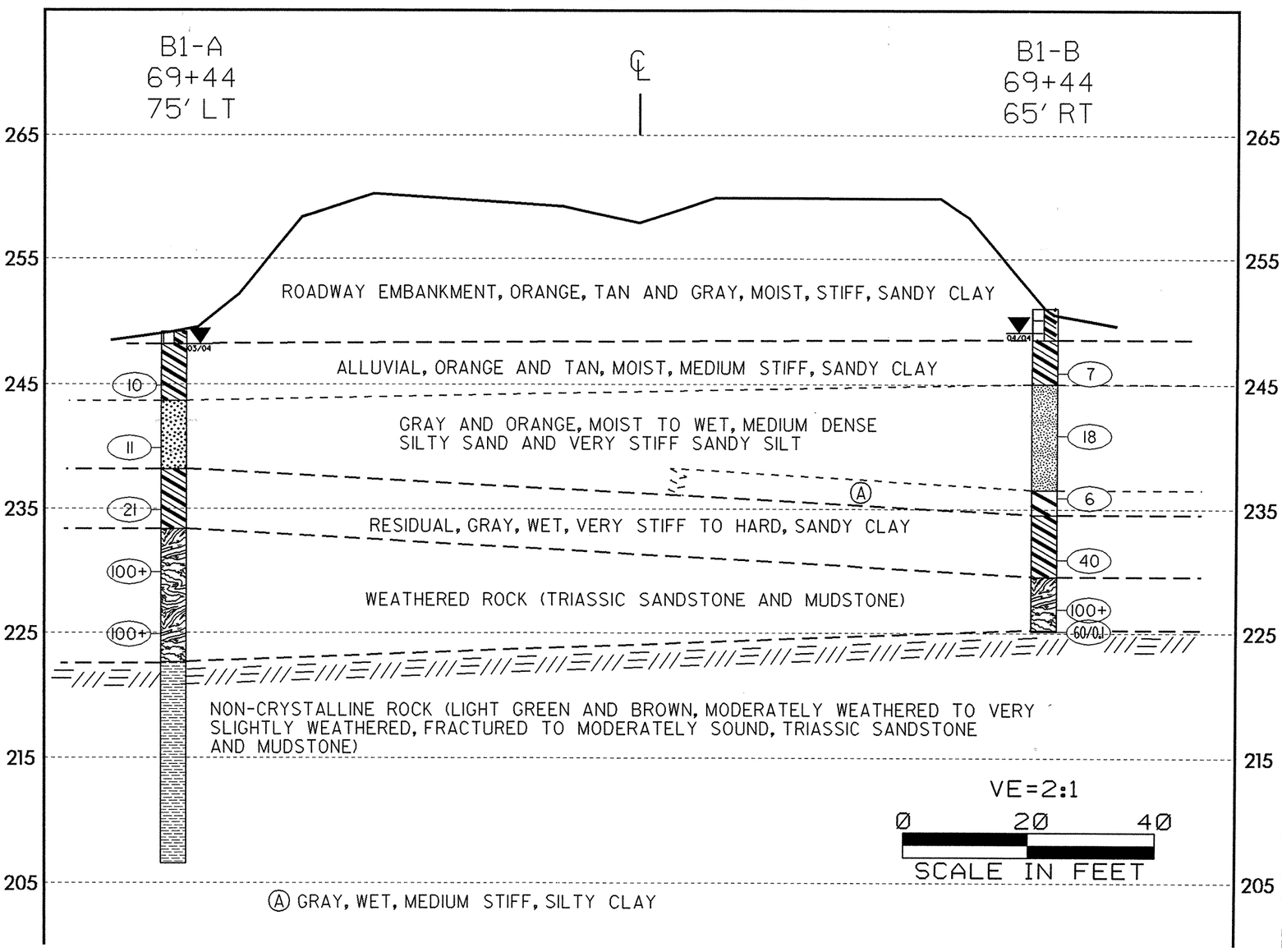
BRIDGE NO. 17 AND NO. 21
35012.1.1 (U-4012)

CROSS SECTION THROUGH EB1



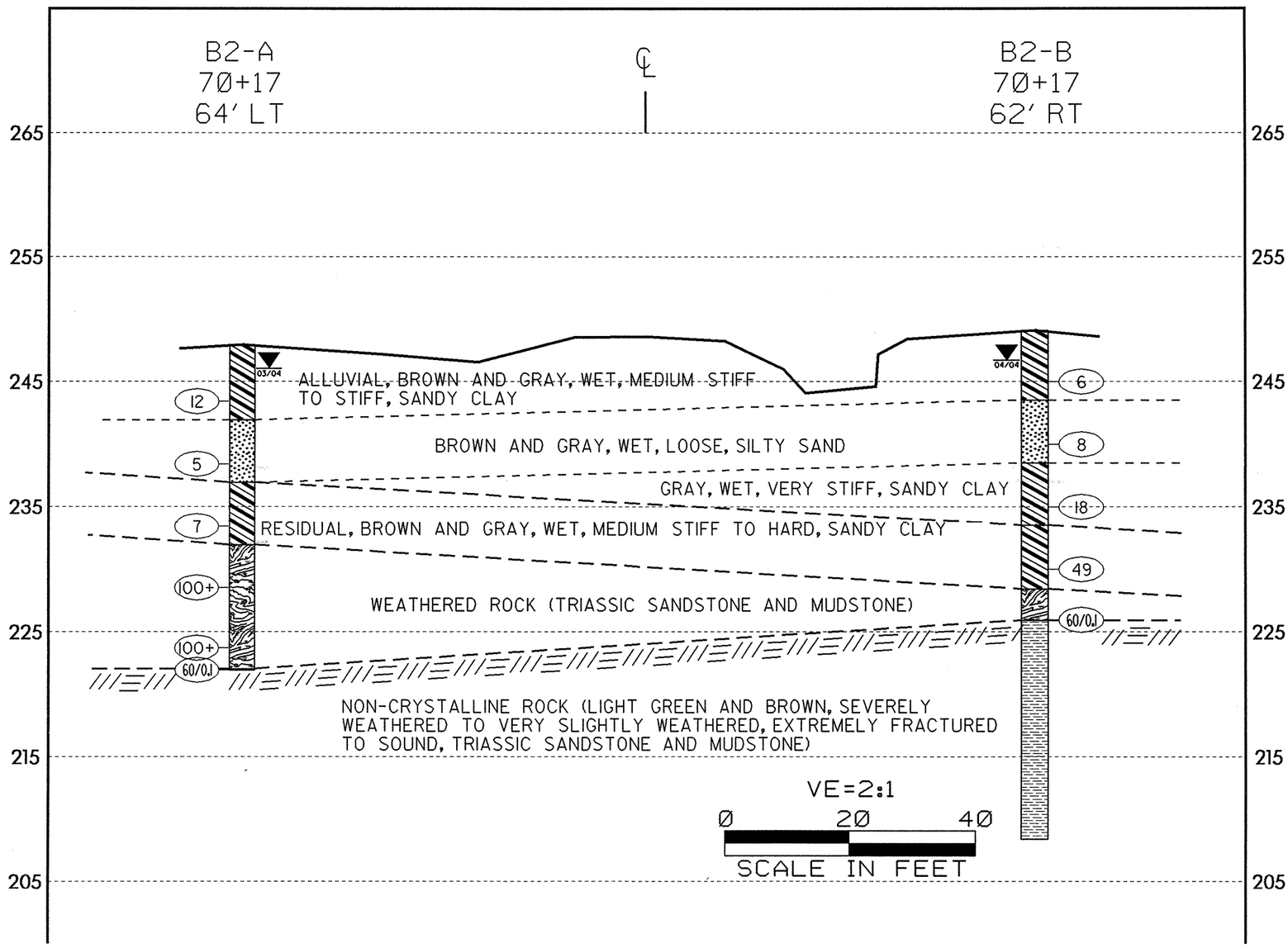
BRIDGE NO. 17 AND NO. 21
35012.1.1 (U-4012)

CROSS SECTION THROUGH B1



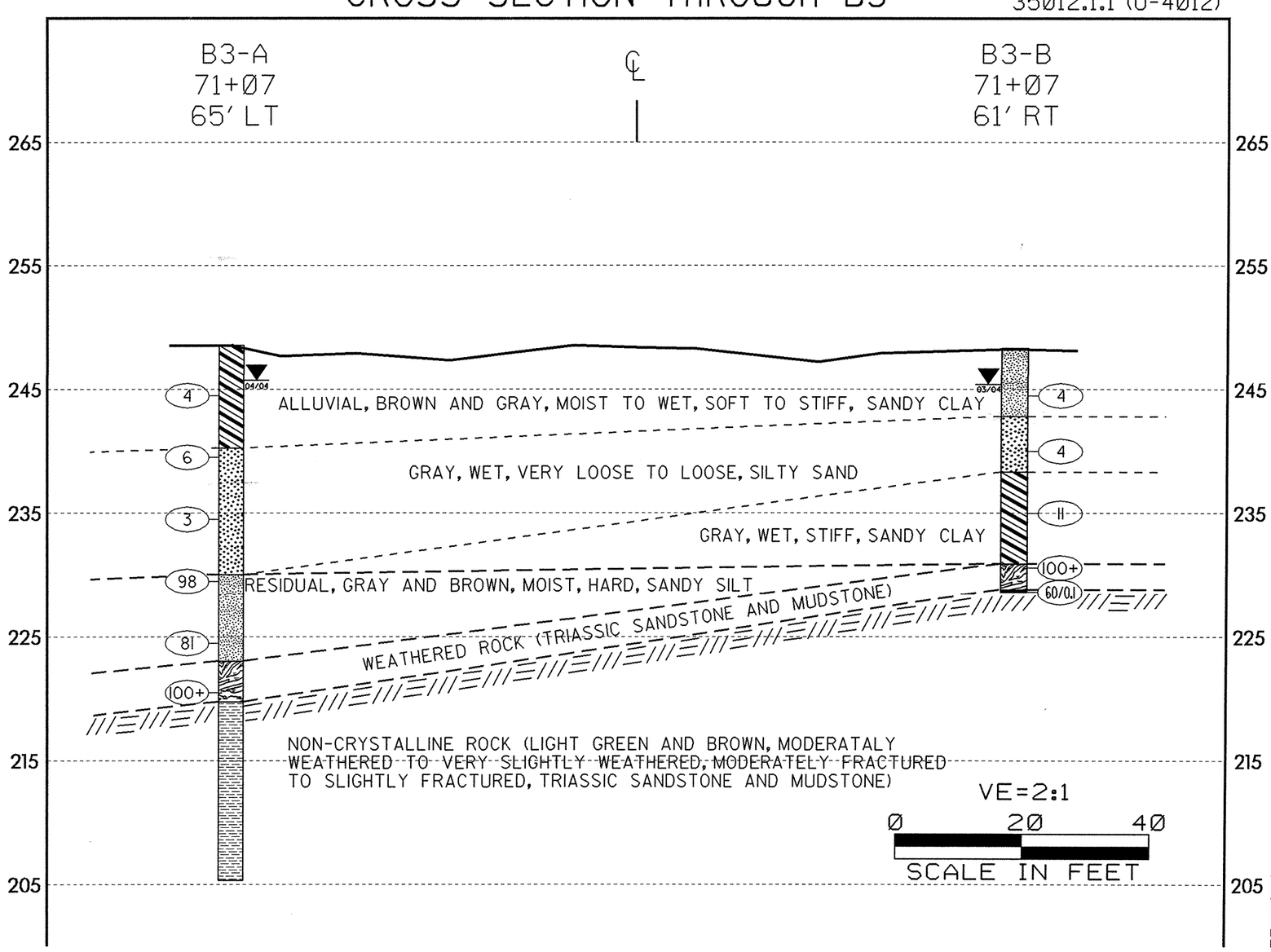
CROSS SECTION THROUGH B2

BRIDGE NO. 17 AND NO. 21
35012.1.1 (U-4012)



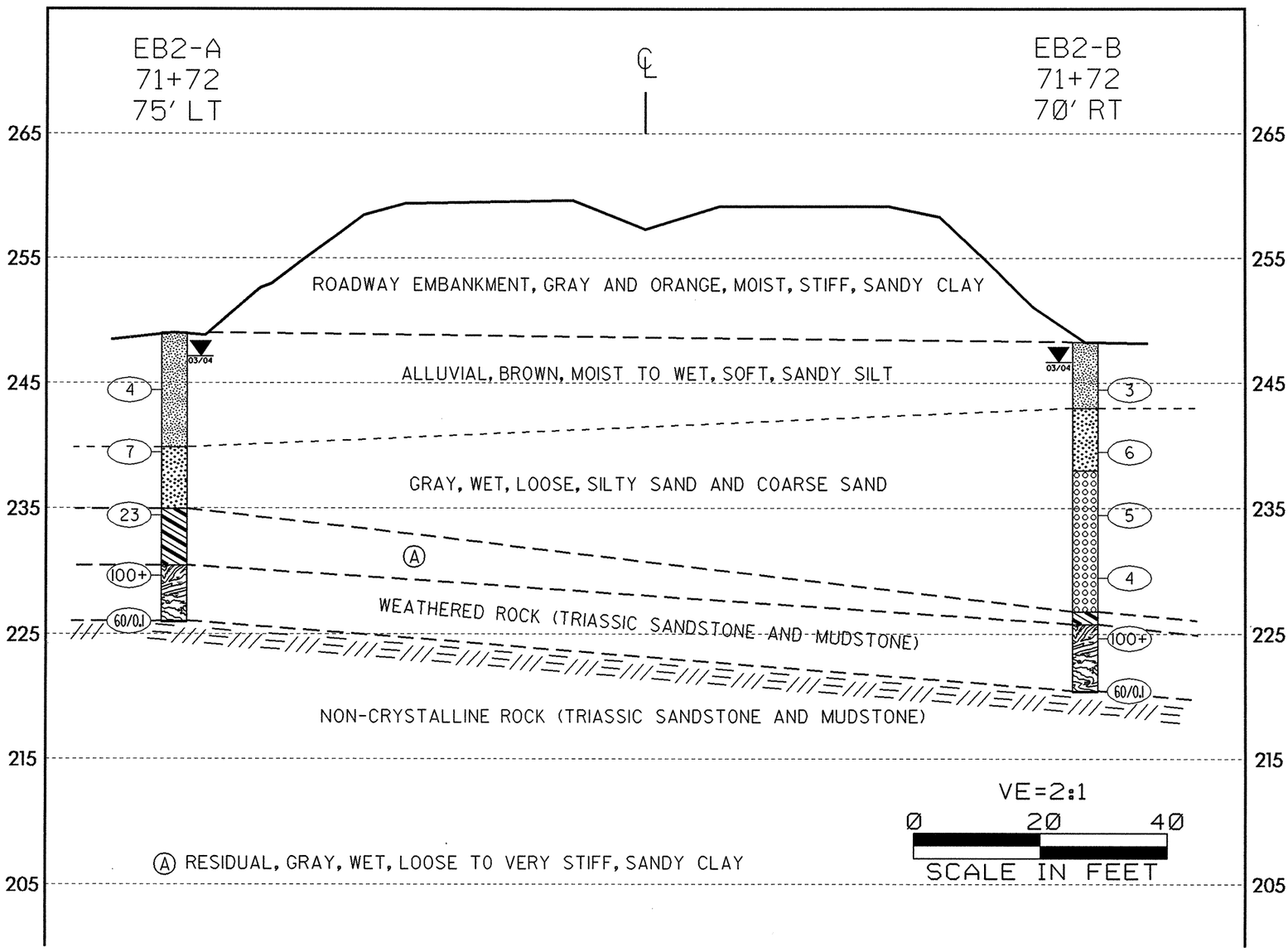
CROSS SECTION THROUGH B3

BRIDGE NO. 17 AND NO. 21
35012.1.1 (U-4012)



BRIDGE NO. 17 AND NO. 21
35012.1.1 (U-4012)

CROSS SECTION THROUGH EB2



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 35012.1.1	**ID.** U-4012	**COUNTY** DURHAM	**GEOLOGIST** L. T. DEL GRECO
SITE DESCRIPTION BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK			**GROUND WATER**
BORING NO. EBI-A	**BORING LOCATION** 68+72	**OFFSET** 82' LT	**ALIGNMENT** -L-
COLLAR ELEVATION 250.9'	**NORTHING** 803983	**EASTING** 2005252	**0 HR.** 8.2' / **24 HR.** 2.6'
TOTAL DEPTH 25.0'	**DRILL MACHINE** CME-45C	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** MANUAL
START DATE 3/31/04	**COMPLETION DATE** 3/31/04	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 24.9'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	▽/MOI.	LOG	SOIL AND ROCK DESCRIPTION
250.9										
250.0										ROADWAY EMBANKMENT, ORANGE AND TAN, SANDY CLAY
	3.9	2	3	5	1.0	X 8	SS-10	W		ALLUVIAL, ORANGE AND TAN, SANDY CLAY
245.0	8.9	6	8	10	1.0	X 18		M		
240.0	13.9	6	6	7	1.0	X 13	SS-11	M		RESIDUAL, GRAY AND TAN, SANDY CLAY
235.0	18.9	25	75		0.8	100+ X				WEATHERED ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
230.0	24.9	60			0.1	60/0.1 X				
225.0						SPT REFUSAL AT ELEVATION 225.9 FEET IN NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)				NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
220.0										
215.0										
210.0										
205.0										
200.0										
195.0										
190.0										
185.0										
180.0										
175.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 35012.1.1	**ID.** U-4012	**COUNTY** DURHAM	**GEOLOGIST** L.T. DEL GRECO
SITE DESCRIPTION BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK			**GROUND WATER**
BORING NO. EBI-B	**BORING LOCATION** 68+72	**OFFSET** 78' RT	**ALIGNMENT** -L-
COLLAR ELEVATION 251.3'	**NORTHING** 803849	**EASTING** 2005340	**0 HR.** 2.3' / **24 HR.** 3.3'
TOTAL DEPTH 27.5'	**DRILL MACHINE** CME-45C	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** MANUAL
START DATE 4/1/04	**COMPLETION DATE** 4/1/04	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 27.4'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	▽/MOI.	LOG	SOIL AND ROCK DESCRIPTION
251.3										
250.0								M		ROADWAY EMBANKMENT, GRAY AND ORANGE, SANDY CLAY
	3.6	3	4	6	1.0	X 10		M		ALLUVIAL, GRAY AND ORANGE, SANDY CLAY
245.0	8.6	7	8	13	1.0	X 21	SS-13	M		BROWN AND GRAY, SANDY SILT
240.0	13.6	3	2	5	1.0	X 7		W		
235.0							SS-14			BROWN AND GRAY, SILTY CLAY
	18.6	4	9	13	1.0	X 22	SS-15	W		RESIDUAL, GRAY, SANDY CLAY
230.0	23.6	64	36		0.7	100+ X				WEATHERED ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
225.0	27.4	60			0.1	60/0.1 X				NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
						SPT REFUSAL AT ELEVATION 223.8 FEET IN NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)				
220.0										
215.0										
210.0										
205.0										
200.0										
195.0										
190.0										
185.0										
180.0										
175.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 35012.1.1	ID. U-4012	COUNTY DURHAM	GEOLOGIST L.T. DEL GRECO
SITE DESCRIPTION BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK			GROUND WATER
BORING NO. B1-A	BORING LOCATION 69+44	OFFSET 75' LT	ALIGNMENT -L-
COLLAR ELEVATION 249.2'	NORTHING 804016	EASTING 2005316	0 HR. N/A
			24 HR. 1.0'
TOTAL DEPTH 42.6'	DRILL MACHINE CME-45C	DRILL METHOD N-CASING/CORE	HAMMER TYPE MANUAL
START DATE 3/31/04	COMPLETION DATE 4/1/04	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 26.5'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
249.2										ROADWAY EMBANKMENT, ORANGE AND TAN, SILTY SAND
245.0	3.3	3	4	6	1.0	10		M		ALLUVIAL, ORANGE AND TAN, SANDY CLAY
240.0	8.3	4	5	6	1.0	11	SS-12	W		GRAY AND ORANGE, SILTY SAND
235.0	13.3	6	8	13	1.0	21		W		RESIDUAL, GRAY, SANDY CLAY
230.0	18.3	37	57	43	0.9	100+				WEATHERED ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
225.0	23.3	67	33		0.9	100+				
220.0										NON-CRYSTALLINE ROCK (LIGHT GREEN AND BROWN, VERY SLIGHTLY WEATHERED TO MODERATELY WEATHERD, MODERATELY FRACTURED TO SOUND, TRIASSIC SANDSTONE AND MUDSTONE)
215.0							RS-1			
210.0										REC = 93% ROD = 55%
205.0						BORING TERMINATED AT ELEVATION 206.6 FEET IN NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)				
200.0										
195.0										
190.0										
185.0										
180.0										
175.0										
170.0										

CORE BORING REPORT

PROJECT: 35012.1.1 ID: U-4012 COUNTY: DURHAM BORING NO: B1-A

DESCRIPTION: BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK

LOCATION OF BORING: -L-, 69+44, 75' LT COMPLETION DATE: 4/1/04

COLLAR or GROUND ELEVATION: 249.2 ft CORE SIZE: NQD4 GEOLOGIST: C. DOUG CZAJKA

CORE EQUIPMENT: CME-45C, N-CASING, NQD4 DRILLER: GARY PAYNTER

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (ft) (%)	RQD (ft) (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
221.6	27.6	5:07					LIGHT GREEN AND BROWN, MODERATELY WEATHERED, SLIGHTLY FRACTURED, TRIASSIC
		3:36		5.0	2.3		SANDSTONE AND MUDSTONE
		5:01	5.0				THREE 60 DEGREE FRACTURES AT 28.5', 31.2', AND 32.1'
		3:28		(100%)	(46%)		SEVERELY WEATHERED FROM 29.4' TO 29.7'
216.6	32.6	3:23					
216.6	32.6	4:23					LIGHT GREEN AND BROWN, VERY SLIGHTLY WEATHERED, SOUND, INTERBEDDED TRIASSIC
		3:15		4.7	3.8	RS-1	SANDSTONE AND MUDSTONE
		3:17	5.0			33.3-34.0	
		4:17		(94%)	(76%)		
211.6	37.6	3:53					
211.6	37.6	5:10					LIGHT GREEN AND BROWN, SLIGHTLY WEATHERED, MODERATELY FRACTURED, INTERBEDDED
		4:54		4.2	2.2		TRIASSIC SANDSTONE AND MUDSTONE
		3:40	5.0				
		5:24		(84%)	(44%)		
206.6	42.6	5:41					
							BOREHOLE TERMINATED AT ELEVATION OF 206.6 FEET, IN SANDSTONE & MUDSTONE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 35012.1.1	**ID.** U-4012	**COUNTY** DURHAM	**GEOLOGIST** L.T. DEL GRECO
SITE DESCRIPTION BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK			**GROUND WATER**
BORING NO. B1-B	**BORING LOCATION** 69+44	**OFFSET** 65' RT	**ALIGNMENT** -L-
COLLAR ELEVATION 251.0'	**NORTHING** 803899	**EASTING** 2005393	**0 HR.** 7.9' / **24 HR.** 1.9'
TOTAL DEPTH 25.9'	**DRILL MACHINE** CME-45C	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** MANUAL
START DATE 4/2/04	**COMPLETION DATE** 4/2/04	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 25.8'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
251.0										
250.0										ROADWAY EMBANKMENT GRAY AND ORANGE, SANDY CLAY
	4	3	3	4	1.0	X 7		M		ALLUVIAL, GRAY AND ORANGE, SANDY CLAY
245.0										
	9	5	9	9	1.0	X 18		M		GRAY AND ORANGE, SANDY SILT
240.0										
	14	3	2	4	1.0	X 6		W		
235.0								W		GRAY, SILTY CLAY
	19	4	8	32	1.0	X 40		W		RESIDUAL, GRAY, SANDY CLAY
230.0										
	24	43	57		0.9	100+ X				WEATHERED ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
	25.8	60			0.1	60/0.1 X				
225.0						SPT REFUSAL AT ELEVATION 225.2 FEET IN NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)				NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
220.0										
215.0										
210.0										
205.0										
200.0										
195.0										
190.0										
185.0										
180.0										
175.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 35012.1.1	**ID.** U-4012	**COUNTY** DURHAM	**GEOLOGIST** L.T. DEL GRECO
SITE DESCRIPTION BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK			**GROUND WATER**
BORING NO. B2-A	**BORING LOCATION** 70+17	**OFFSET** 64' LT	**ALIGNMENT** -L-
COLLAR ELEVATION 247.9'	**NORTHING** 804047	**EASTING** 2005383	**0 HR.** 4.9' / **24 HR.** 1.9'
TOTAL DEPTH 26.0'	**DRILL MACHINE** CME-45C	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** MANUAL
START DATE 3/30/04	**COMPLETION DATE** 3/30/04	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 25.9'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
247.9										
245.0	3.5	3	5	7	1.0	X 12	SS-7	W		ALLUVIAL, BROWN AND GRAY, SANDY CLAY
240.0	8.5	WOH	3	2	1.0	X 5	SS-8	W		GRAY, SILTY SAND
235.0	13.5	WOH	3	4	1.0	X 7	SS-9	W		RESIDUAL, GRAY, SANDY CLAY
230.0	18.5	11	89		0.9	100+ X				WEATHERED ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
225.0	23.5	68	32		0.7	100+ X				
	25.9	60			0.1	60/0.1 X				
220.0						SPT REFUSAL AT ELEVATION 221.9 FEET IN NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)				NON-CYRSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
215.0										
210.0										
205.0										
200.0										
195.0										
190.0										
185.0										
180.0										
175.0										
170.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 35012.1.1	ID. U-4012	COUNTY DURHAM	GEOLOGIST L.T. DEL GRECO
SITE DESCRIPTION BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK			GROUND WATER
BORING NO. B2-B	BORING LOCATION 70+17	OFFSET 62' RT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEVATION 249.1'	NORTHING 803942	EASTING 2005452	24 HR. 2.4'
TOTAL DEPTH 40.7'	DRILL MACHINE CME-45C	DRILL METHOD H.S. AUGERS/CORE	HAMMER TYPE MANUAL
START DATE 4/2/04	COMPLETION DATE 4/5/04	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 23.2'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
249.1										
245.0	3.1	2	3	3	1.0	6	SS-16	W		ALLUVIAL, BROWN AND GRAY, SANDY CLAY
240.0	8.1	1	4	4	1.0	8	SS-17	W		BROWN, SILTY SAND
235.0	13.1	4	7	11	1.0	18	SS-18	W		GRAY, SANDY CLAY
230.0	18.1	19	22	27	1.0	49	SS-19	W		RESIDUAL, BROWN AND GRAY, SANDY CLAY
225.0	23.1	60			0.1	60/0.1	RS-2			WEATHERED ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
220.0										NON CRYSTALLINE ROCK (LIGHT GREEN AND BROWN, VERY SLIGHTLY WEATHERED TO SEVERELY WEATHERED, SOUND TO EXTREMELY FRACTURED, TRIASSIC SANDSTONE AND MUDSTONE)
215.0										
210.0										REC = 83% ROD = 67%
205.0						BORING TERMINATED AT ELEVATION 208.4 FEET IN NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)				
200.0										
195.0										
190.0										
185.0										
180.0										
175.0										
170.0										

CORE BORING REPORT

PROJECT: 35012.1.1 ID: U-4012 COUNTY: DURHAM BORING NO: B2-B

DESCRIPTION: BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK

LOCATION OF BORING: -L-, 70+17, 62' RT COMPLETION DATE: 4/5/04

COLLAR or GROUND ELEVATION: 249.1 ft CORE SIZE: NQD4 GEOLOGIST: LUKE DEL GRECO

CORE EQUIPMENT: CME-45C, HSA, NQD4 DRILLER: GARY PAYNTER

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (ft) (%)	RQD (ft) (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
225.6	23.5	0:48					LIGHT GREEN AND BROWN, VERY SLIGHTLY WEATHERED, SOUND, INTERBEDDED TRIASSIC
		2:03		2.4	1.8	RS-2	SANDSTONE AND MUDSTONE
		1:31	4.5			24.4-25.1	MODERATELY SEVERELY WEATHERED FROM 23.5' TO 23.8'
		1:35		(53%)	(40%)		
221.1	28.0	3:12					
221.1	28.0	4:09					LIGHT GREEN AND BROWN, VERY SLIGHTLY WEATHERED, SOUND, INTERBEDDED TRIASSIC
		3:34		3.3	3.3		SANDSTONE AND MUDSTONE
		6:41	3.7				
		10:03		(89%)	(89%)		
217.4	31.7	-					
217.4	31.7	17:19					LIGHT GREEN AND BROWN, VERY SLIGHTLY WEATHERED, SOUND, INTERBEDDED TRIASSIC
		6:01		4.0	4.0		SANDSTONE AND MUDSTONE
		6:20	4.0				
		6:19		(100%)	(100%)		
213.4	35.7	-					
213.4	35.7	16:04					LIGHT GREEN AND BROWN, SLIGHTLY WEATHERED, SOUND , INTERBEDDED TRIASSIC
		9:15		4.5	2.4		SANDSTONE AND MUDSTONE
		8:42	5.0				
		8:12		(90%)	(48%)		
208.4	40.7	7:36					
							BOREHOLE TERMINATED AT ELEVATION OF 208.4 FEET, IN SANDSTONE & MUDSTONE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 35012.1.1	ID. U-4012	COUNTY DURHAM	GEOLOGIST L.T. DEL GRECO
SITE DESCRIPTION BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK			GROUND WATER
BORING NO. B3-A	BORING LOCATION 71+07	OFFSET 65' LT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEVATION 248.5'	NORTHING 804097	EASTING 2005458	24 HR. 2.8'
TOTAL DEPTH 43.4'	DRILL MACHINE CME-45C	DRILL METHOD H.S. AUGERS/CORE	HAMMER TYPE MANUAL
START DATE 4/6/04	COMPLETION DATE 4/6/04	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 28.8'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	▽/MOI.	LOG	SOIL AND ROCK DESCRIPTION
248.5										
245.0	3.0	1	2	2	1.0	X4	SS-20	▼ M		ALLUVIAL, BROWN, SANDY CLAY
240.0	8.0	2	4	2	1.0	X6	SS-21	M W		GRAY, SILTY SAND
235.0	13.0	2	1	2	1.0	X3		W		
230.0	18.0	5	20	78	1.0	98 X	SS-22	W M		RESIDUAL, BROWN AND GRAY, SANDY SILT
225.0	23.0	20	44	37	1.0	X81		M		
220.0	28.0	73	27		0.6	100+ X				WEATHERED ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
215.0										NON-CRYSTALLINE ROCK (LIGHT GREEN AND BROWN, SLIGHTLY WEATHERED TO VERY SLIGHTLY WEATHERED, MODERATELY FRACTURED TO SLIGHTY FRACTURED TRIASSIC SANDSTONE AND MUDSTONE)
210.0							RS-3			REC = 88% RQD = 40%
205.0						BORING TERMINATED AT ELEVATION 205.1 FEET IN NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)				
200.0										
195.0										
190.0										
185.0										
180.0										
175.0										
170.0										

CORE BORING REPORT

PROJECT: 35012.1.1 ID: U-4012 COUNTY: DURHAM BORING NO: B3-A

DESCRIPTION: BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK

LOCATION OF BORING: -L-, 71+07, 65' LT COMPLETION DATE: 4/6/04

COLLAR or GROUND ELEVATION: 248.5 ft CORE SIZE: NQD4 GEOLOGIST: LUKE DEL GRECO

CORE EQUIPMENT: CME-45C, HSA, NQD4 DRILLER: GARY PAYNTER

ELEV (ft)	DEPTH (ft)	DRILL RATE (min/ft)	RUN (ft)	REC (ft) (%)	RQD (ft) (%)	SAMPLE NUMBER	FIELD CLASSIFICATION and REMARKS
219.7	28.8	22:30					LIGHT GREEN AND BROWN, VERY SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, INTERBEDDED SANDSTONE AND MUDSTONE
		12:02		3.9	3.0		
		4:11	5.0				
		2:36		(78%)	(60%)		
214.7	33.8	5:01					
214.7	33.8	3:08					LIGHT GREEN AND BROWN, SLIGHTLY WEATHERED, MODERATELY FRACTURED, INTERBEDDED TRIASSIC MUDSTONE AND SANDSTONE
		3:30		4.6	1.6		
		1:33	5.0				
		2:52		(92%)	(32%)		
209.7	38.8	3:24					
209.7	38.8	5:26					BROWN, MODERATELY WEATHERED, MODERATELY FRACTURED, TRIASSIC MUDSTONE
		3:20		4.3	1.2	RS-3	
		3:40	4.6			39.5-40.1	
		4:34		(93%)	(26%)		
205.1	43.4	7:37					
							BOREHOLE TERMINATED AT ELEVATION OF 205.3 FEET, IN MUDSTONE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 35012.1.1	**ID.** U-4012	**COUNTY** DURHAM	**GEOLOGIST** L.T. DEL GRECO
SITE DESCRIPTION BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK			**GROUND WATER**
BORING NO. B3-B	**BORING LOCATION** 71+07	**OFFSET** 61' RT	**ALIGNMENT** -L-	**0 HR.** 7.2'
COLLAR ELEVATION 248.2'	**NORTHING** 803992	**EASTING** 2005527	**24 HR.** 2.9'
TOTAL DEPTH 19.6'	**DRILL MACHINE** CME-45C	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** MANUAL
START DATE 3/30/04	**COMPLETION DATE** 3/30/04	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 19.5'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
248.2										
245.0	2.8	2	3	1	1.0	X 4	SS-5	W		ALLUVIAL, BROWN AND GRAY, SANDY SILT
240.0	7.3	2	1	3	1.0	X 4		W		GRAY, SILTY SAND
235.0	12.3	2	3	8	1.0	X 11	SS-6	W		GRAY, SANDY CLAY
230.0	17.3 19.5	100 60			0.4 0.1	100+ X 60/0.1 X		W		WEATHERED ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
225.0						SPT REFUSAL AT ELEVATION 228.6 FEET IN NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)				NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
220.0										
215.0										
210.0										
205.0										
200.0										
195.0										
190.0										
185.0										
180.0										
175.0										
170.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 35012.1.1	**ID.** U-4012	**COUNTY** DURHAM	**GEOLOGIST** L.T. DEL GRECO
SITE DESCRIPTION BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK			**GROUND WATER**
BORING NO. EB2-A	**BORING LOCATION** 71+72	**OFFSET** 75' LT	**ALIGNMENT** -L-
COLLAR ELEVATION 249.0'	**NORTHING** 804142	**EASTING** 2005506	**0 HR.** 11.5' / **24 HR.** 1.9'
TOTAL DEPTH 23.1'	**DRILL MACHINE** CME-45C	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** MANUAL
START DATE 3/29/04	**COMPLETION DATE** 3/29/04	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 23.0'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
249.0										
245.0	3.6	1	2	2	1.0	X4	SS-1	W		ALLUVIAL, BROWN, SANDY SILT
240.0	8.6	3	3	4	1.0	X7	SS-2	W W		GRAY, SILTY SAND
235.0	13.6	5	7	16	1.0	X23	SS-3	W W		RESIDUAL, GRAY, SANDY CLAY
230.0	18.6	12	88		0.8	100+X				WEATHERED ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
	23.0	60			0.1	60/0.1X				NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
225.0						SPT REFUSAL AT ELEVATION 225.9 FEET IN NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)				
220.0										
215.0										
210.0										
205.0										
200.0										
195.0										
190.0										
185.0										
180.0										
175.0										
170.0										

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO. 35012.1.1	**ID.** U-4012	**COUNTY** DURHAM	**GEOLOGIST** L.T. DEL GRECO
SITE DESCRIPTION BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK			**GROUND WATER**
BORING NO. EB2-B	**BORING LOCATION** 71+72	**OFFSET** 70' RT	**ALIGNMENT** -L-
COLLAR ELEVATION 248.3'	**NORTHING** 804020	**EASTING** 2005586	**0 HR.** 5.9' / **24 HR.** 1.6'
TOTAL DEPTH 27.9'	**DRILL MACHINE** CME-45C	**DRILL METHOD** H.S. AUGERS	**HAMMER TYPE** MANUAL
START DATE 3/30/04	**COMPLETION DATE** 3/30/04	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 27.8'

ELEV.	DEPTH (FT.)	BLOW COUNT 0.5'	0.5'	0.5'	PEN. (FT.)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NUMBER	MOI.	LOG	SOIL AND ROCK DESCRIPTION
248.3										
245.0	2.8	2	1	2	1.0	X3		M		ALLUVIAL, BROWN, SANDY SILT
240.0	7.8	1	2	4	1.0	X6		W		GRAY, SILTY SAND
235.0	12.8	2	4	1	1.0	X5	SS-4	W		GRAY, SAND
230.0	17.8	2	2	2	1.0	X4		W		
225.0	22.8	100			0.3	100+X				RESIDUAL, GRAY, SANDY CLAY
	27.8	60			0.1	60/0.1X				WEATHERED ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
220.0						SPT REFUSAL AT ELEVATION 220.4 FEET IN NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)				NON-CRYSTALLINE ROCK (TRIASSIC SANDSTONE AND MUDSTONE)
215.0										
210.0										
205.0										
200.0										
195.0										
190.0										
185.0										
180.0										
175.0										
170.0										

EB1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-10	82 LT	68+72	3.9-5.4	A-6(12)	37	17	6.1	24.6	37.0	32.3	100	98	75	-	-
SS-11	82 LT	68+72	13.9-15.4	A-6(4)	28	11	10.5	37.8	27.5	24.2	100	98	58	-	-

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-13	78 RT	68+72	8.6-10.1	A-4(4)	26	10	4.4	38.8	34.5	22.2	100	98	66	-	-
SS-14	78 RT	68+72	14.1-15.1	A-7-6(27)	48	25	1.0	4.8	39.6	54.5	100	100	96	-	-
SS-15	78 RT	68+72	18.6-20.1	A-6(3)	26	11	13.3	36.8	29.7	20.2	100	95	56	-	-

B1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-12	75 LT	69+44	8.3-9.8	A-2-4(0)	20	NP	36.4	34.3	17.2	12.1	100	84	34	-	-

B2-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-7	64 LT	70+17	3.5-5.0	A-6(9)	32	13	6.5	18.6	42.6	32.3	100	96	80	-	-
SS-8	64 LT	70+17	8.5-10.0	A-2-4(0)	20	NP	26.3	44.0	15.6	14.1	100	89	34	-	-
SS-9	64 LT	70+17	13.5-15.0	A-6(10)	34	15	2.4	29.1	36.2	32.3	100	99	76	-	-

B2-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-16	62 RT	70+17	3.1-4.6	A-6(11)	35	15	5.9	23.6	38.2	32.3	100	97	78	-	-
SS-17	62 RT	70+17	8.1-9.6	A-2-4(0)	22	NP	50.1	23.4	16.4	10.1	88	59	26	-	-
SS-18	62 RT	70+17	13.1-14.6	A-6(15)	38	18	5.7	9.5	40.4	44.4	95	91	84	-	-
SS-19	62 RT	70+17	18.1-19.6	A-6(2)	33	14	19.4	14.3	33.9	32.3	60	52	42	-	-

B3-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-20	65 LT	71+07	3.0-4.5	A-6(8)	32	13	5.3	26.7	33.7	34.3	100	98	75	-	-
SS-21	65 LT	71+07	8.3-9.5	A-2-4(0)	25	5	51.9	23.2	14.7	10.1	99	64	28	-	-
SS-22	65 LT	71+07	18.5-19.5	A-4(2)	29	9	21.6	30.3	33.9	14.1	98	88	53	-	-

B3-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-5	61 RT	71+07	2.8-4.3	A-4(0)	23	4	11.9	41.8	30.1	16.2	100	95	54	-	-
SS-6	61 RT	71+07	12.3-13.8	A-6(7)	34	17	8.7	40.0	27.1	24.2	100	99	58	-	-

EB2-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	75 LT	71+72	3.6-5.1	A-4(1)	24	6	4.8	48.5	26.5	20.2	100	100	55	-	-
SS-2	75 LT	71+72	9.2-10.1	A-2-4(0)	19	NP	23.0	51.3	17.6	8.1	100	92	31	-	-
SS-3	75 LT	71+72	14.1-15.1	A-6(9)	36	19	25.9	17.0	28.9	28.3	99	82	60	-	-

EB2-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-4	70 RT	71+72	12.8-14.3	A-1-b(0)	23	NP	77.0	18.0	3.0	2.0	97	48	7	-	-

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 35012.1.1 ID: U-4012 COUNTY: Durham

DESCRIPTION(1): BRIDGE NO. 17 AND NO. 21 ON US 15-501 OVER NEW HOPE CREEK AT -L- ST ATION 70+22

INFORMATION ON EXISTING BRIDGE

Information obtained from: ☑ field inspection ☐ microfilm (Reel: ____ Pos: ____) ☑ other: HYDRAULIC REPORT

BR. NO.: 17&21 BR. LENGTH: 136' NO. BENTS: 4 NO. BENTS IN: CHANNEL: 2 FLOODPLAIN: 2

FOUNDATION TYPE: THE FOUNDATION CONSISTS OF CONCRETE PILES

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: SCOUR HOLES AT EB1 OF NO. 17 AND EB2 OF NO. 21

INTERIOR BENTS: CHANNEL SCOUR AT ALL INTERIOR BENTS, SLIGHT LOCALIZED SCOUR AT PILES

CHANNEL BED: MINOR SCOUR

CHANNEL BANKS: SOME EVIDENCE OF MINOR SCOUR

EXISTING SCOUR PROTECTION:

TYPE(3): CONCRETE END SLOPE PROTECTION

EXTENT(4): EXTENDS TO 10 FEET BEYOND EDGE OF BRIDGE AT ALL END BENTS

EFFECTIVENESS(5): EFFECTIVE

OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.): NONE

DESIGN INFORMATION

CHANNEL BED MATERIAL(7): CHANNEL BED MATERIAL CONSISTS OF SILTY SAND(SS-8)

CHANNEL BANK MATERIAL(8): CHANNEL BANK MATERIAL CONSISTS OF SANDY CLAY AND SANDY SILT (SS-5, SS-16)

CHANNEL BANK COVER(9): TREES, SHRUBS AND GRASS

FLOOD PLAIN WIDTH(10): APPROXIMATELY 1200 FEET

FLOOD PLAIN COVER(11): TREES, SHRUBS AND GRASS

DESIGN INFORMATION CONT.

STREAM IS: X DEGRADING ____ AGGRADING (12)

OTHER OBSERVATIONS AND COMMENTS:

CHANNEL MIGRATION TENDENCY (13): LOW MIGRATION TENDENCY TOWARDS THE WEST

GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS(14):

BRIDGE NO. 17	B1=243.0	B2=231.7	B3=237.4
BRIDGE NO. 21	B1=242.5	B2=237.0	B3=242.1

THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATIONS ARE UNCHANGED FROM THE HYDRAULIC UNIT ESTIMATES

REPORTED BY: C. Doug Gajka C.D. GZAJKA DATE: 03/29/2004

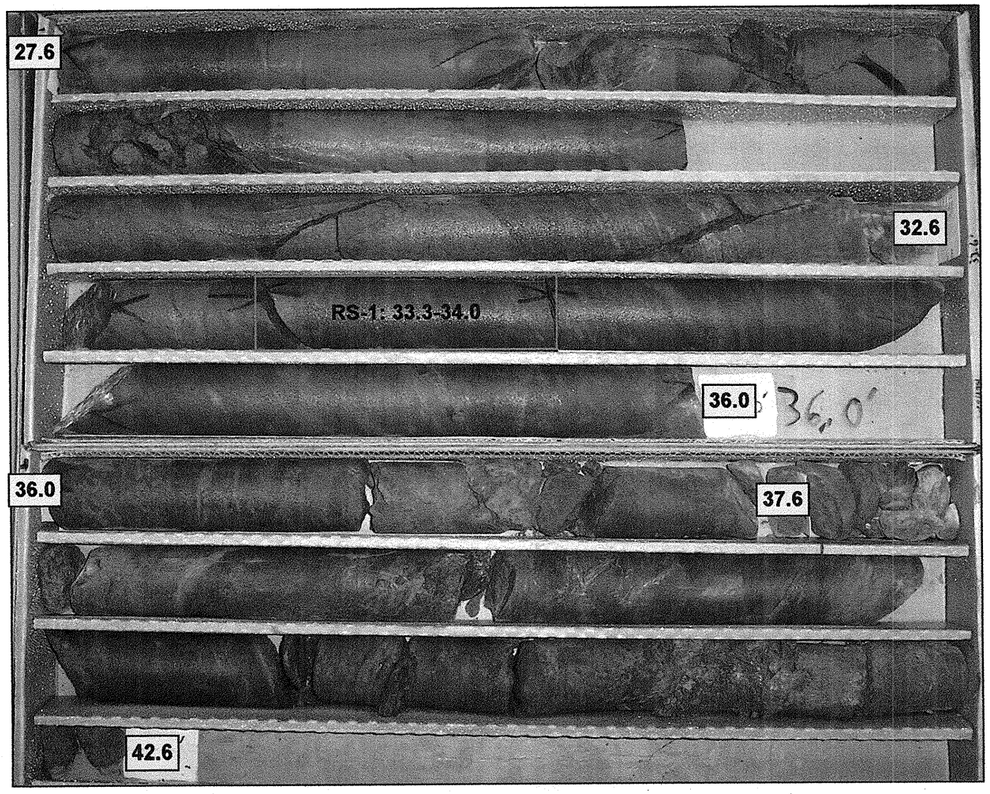
INSTRUCTIONS

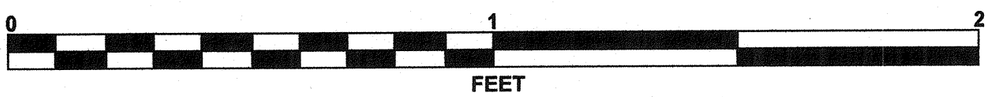
(1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE, INCLUDING ROUTE NUMBER AND BODY OF WATER CROSSED.
(2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
(3) NOTE ANY EXISTING SCOUR PROTECTION (RIR RAP, ETC.)
(4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
(5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
(6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
(7) DESCRIBE THE CHANNEL BED MATERIAL BASED ON OBSERVATION AND/OR SAMPLES.
(8) DESCRIBE THE CHANNEL BANK MATERIAL BASED ON OBSERVATION AND/OR SAMPLES.
(9) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.)
(10) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
(11) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
(12) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING.
(13) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE LATERALLY DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
(14) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS THE RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. IF THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS DEPENDENT ON SCOUR COUNTER MEASURES, EXPLAIN. (RIPRAP ARMORING ON SLOPES, ETC.) THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY, CORE RECOVERY PERCENTAGE, PERCENTAGE RQD, DIFFERENTIAL WEATHERING, SHEAR STRENGTH, OBSERVATIONS AT EXISTING STRUCTURES, OTHER TESTS DEEMED APPROPRIATE, AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

CORE PHOTOGRAPHS

B1-A

BOXES 1 & 2: 27.6 - 34.6 FEET



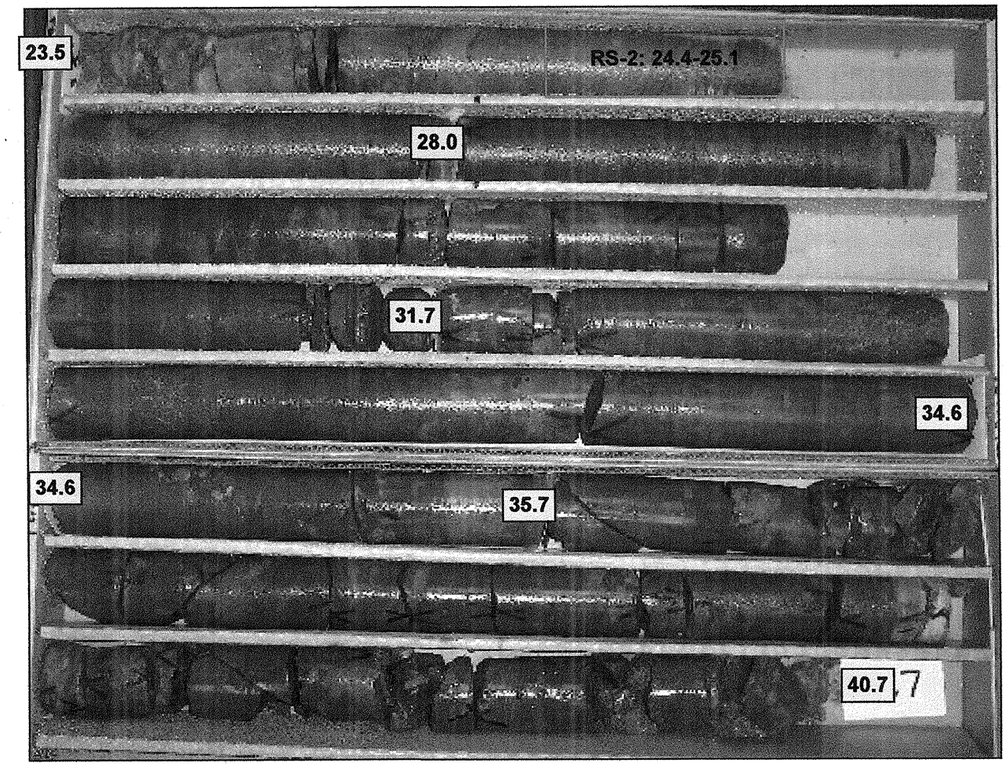


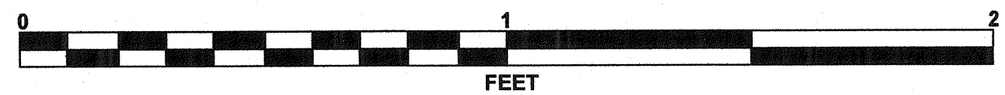
35012.1.1 (U-4012)/BRIDGE NO. 17 AND NO. 21

CORE PHOTOGRAPHS

B2-B

BOXES 1 & 2: 23.5. - 40.7 FEET



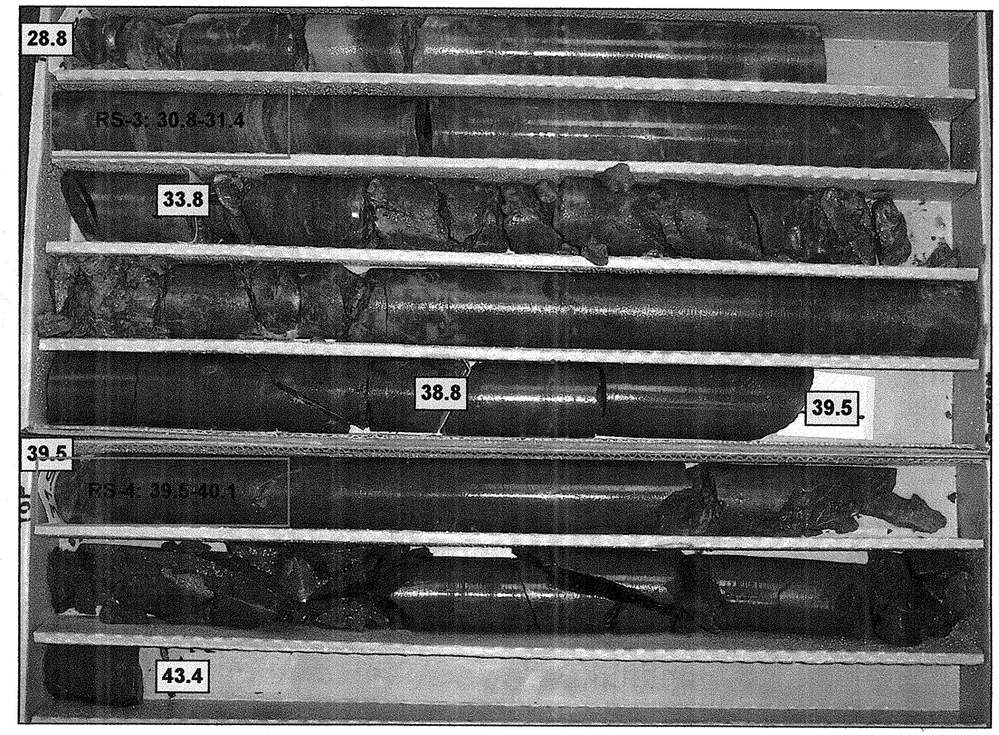


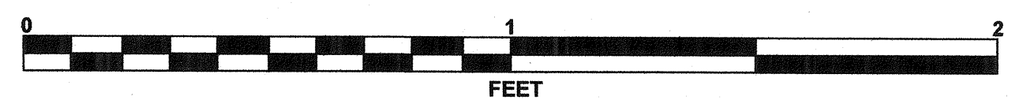
35012.1.1 (U-4012)/BRIDGE NO. 17 AND NO. 21

CORE PHOTOGRAPHS

B3-A

BOXES 1 & 2: 28.8 - 43.2 FEET





STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
35012.1.1	22	22

SITE PHOTOGRAPH

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3450	1	23
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
8.2353001	BRSTP-1116(4)	P.E.	
		CONST.	

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

RETURNED FROM LETTING

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 8.2353001 I.D. NO. B-3450
F.A. PROJECT BRSTP-1116(4)
COUNTY DURHAM
PROJECT DESCRIPTION BRIDGE NO. 122 OVER SANDY CREEK AND BRIDGE NO. 217 OVER TRIBUTARY TO SANDY CREEK ON SR 1116 (GARRETT RD)
SITE DESCRIPTION BRIDGE NO. 217 OVER TRIBUTARY TO SANDY CREEK ON SR 1116 (GARRETT RD)

CAUTION NOTICE

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

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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1) NCDOT GEOTECHNICAL UNIT SOIL AND ROCK CLASSIFICATION SHEET
2) SITE VICINITY MAP
3) BORING INDENTIFICATION DIAGRAM
4) BRIDGE 217 SUBSURFACE PROFILE AND CROSS-SECTIONS
5) BRIDGE 217 FINAL BORING LOGS, CORING LOGS, AND CORE PHOTOGRAPHS
6) CMP SUBSURFACE PROFILE AND CROSS SECTIONS
7) CMP FINAL BORING LOGS
8) SCOUR REPORT, CHANNEL BED AND BANK MATERIAL LABORATORY TEST DATA AND GRAIN SIZE DISTRIBUTION GRAPHS
9) SUMMARY OF LABORATORY TEST DATA

For Letting

INVESTIGATED BY D GOODNIGHT
CHECKED BY J VINSON
SUBMITTED BY P WEAVER
DATE 11/1/02

PERSONNEL D KITCHEN
P BOND
B SHULL
H HODGMAN
R TOOTHMAN
T WELL
G LICAYAN

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

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

NORTH CAROLINA LICENSED SEAL 1500 GEOLOGIST PAUL M. WEAVER

SEAL

SIGNATURE

DRAWN BY: DRK

PROJECT: 8.2353001 ID: B-3450

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3450	8.2353001	2	23

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL 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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
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/FT^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 >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

GRAIN SIZE 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) PL — PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- 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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- SPT CPT DPT DMT PMT VST TEST BORING
- AUGER BORING
- CORE BORING
- 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
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:
- [X] MOBILE B- 57
- [ ] BK-51
- [ ] CME-45
- [ ] CME-550
- [ ] PORTABLE HOIST
- [X] OTHER CME-550
- [X] OTHER CME-550X

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 3 7/8" " TUNG.-CARB.
- [X] CORE BIT
- [ ] OTHER _____

HAMMER TYPE:
- [X] AUTOMATIC
- [X] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [X] -H 0

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] 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 FOLOWS:

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 (CAL.) - 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.

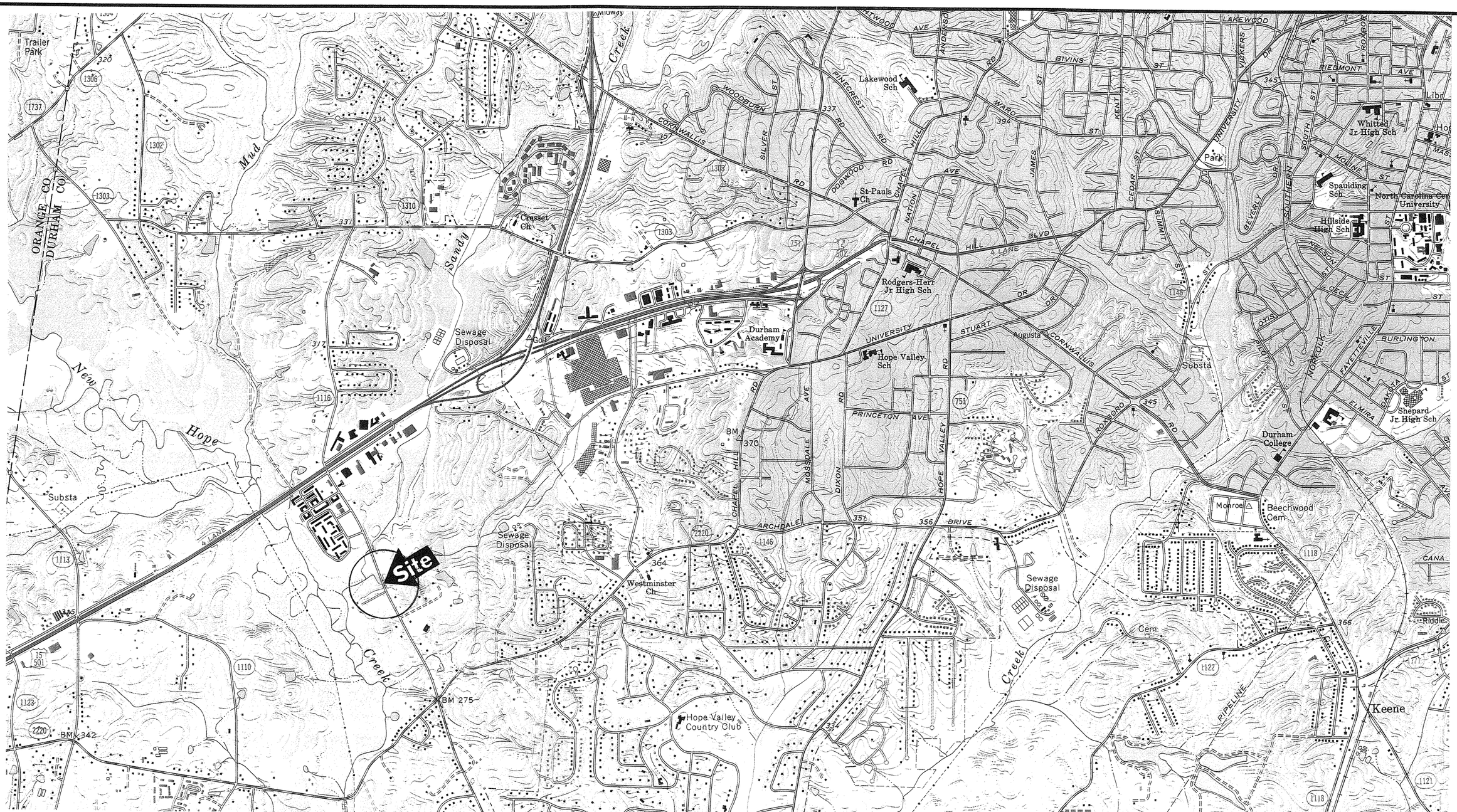
TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #3:-BL- STA. 15+67.9, 178.0' LT

ELEVATION: 250.58'

NOTES:

REVISED 09/15/00



SCALE: 1 = 24,000	**DATE:** 09/27/02	**STATE PROJECT NO.:** 8.2353001	**TIP NO.:** B-3450

Site Vicinity Map

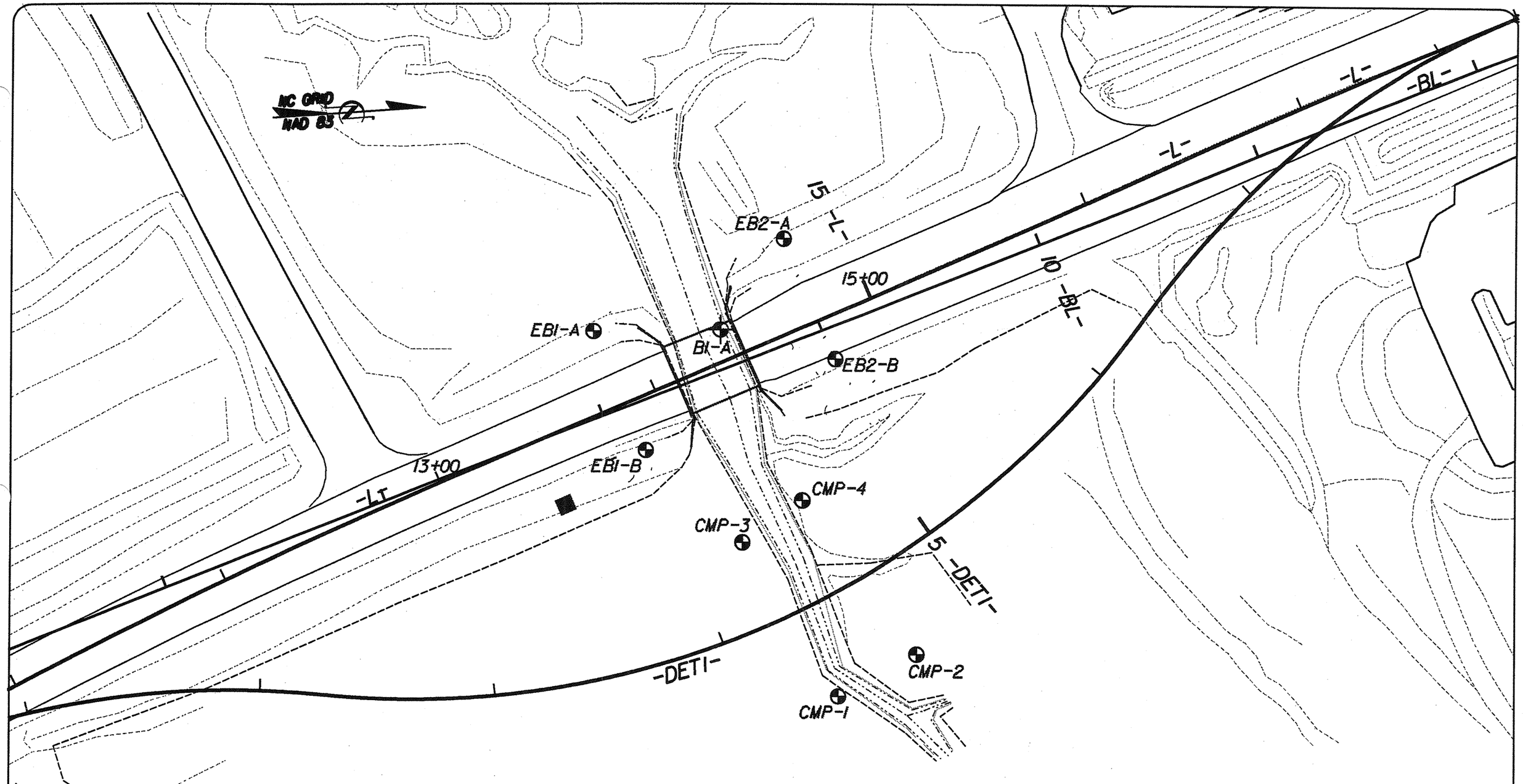
Bridge No. 217 Over Tributary to Sandy Creek on SR1116 (Garrett Road)

TRIGON

Trigon Engineering Consultants, Inc.
Greensboro North Carolina

Southwest Durham, North Carolina

DRAWING NUMBER: 1



SCALE IN FEET

0 20 40

HORZ. SCALE

TRIGON

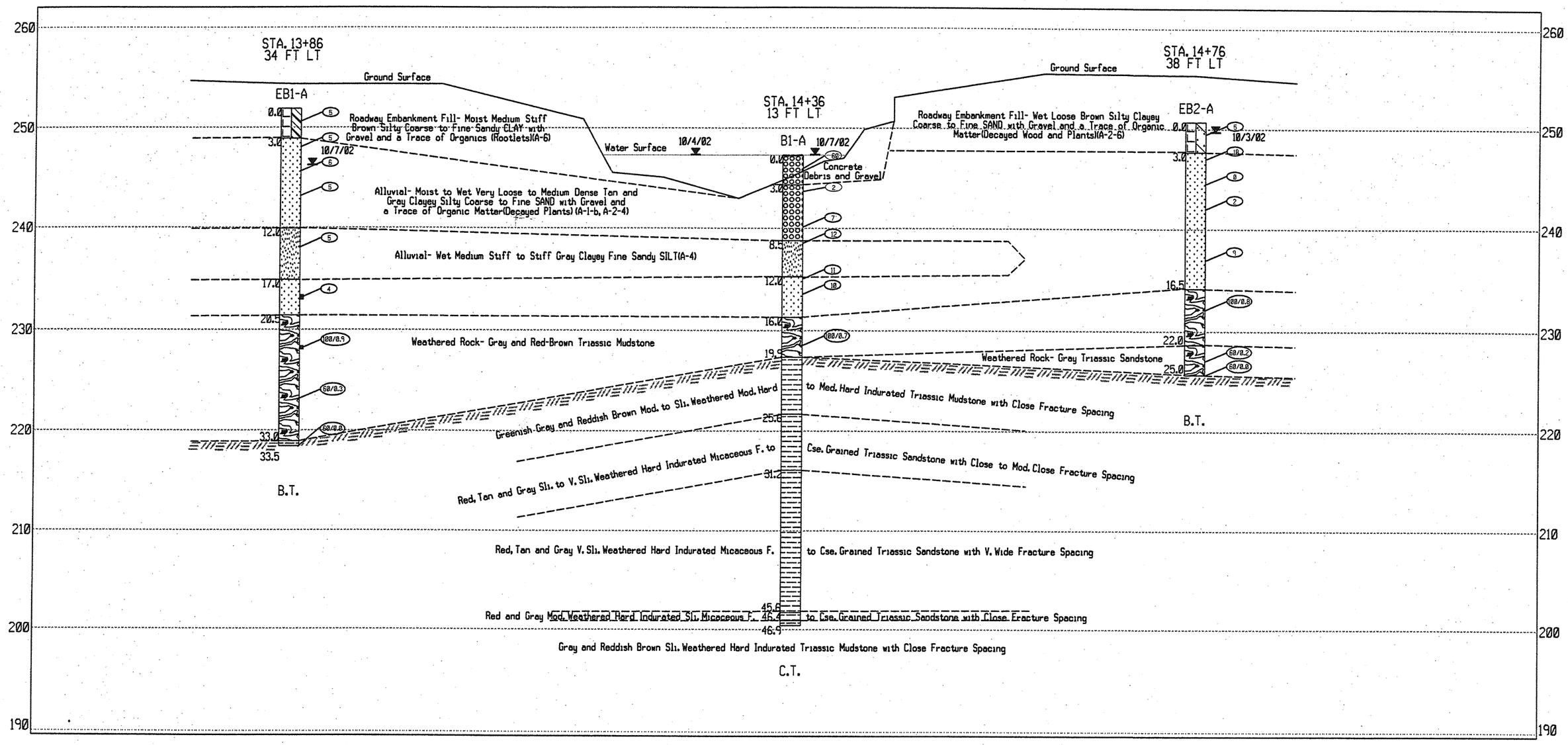
ENGINEERING CONSULTANTS, INC.

BORING IDENTIFICATION DIAGRAM

Bridge No. 217 Over Tributary of Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale N/A
Date 11/4/02	Horiz. Scale 1" = 40'
Drawn by DRK	Drawing No. 2



SCALE IN FEET

0 5 10

VERT. SCALE

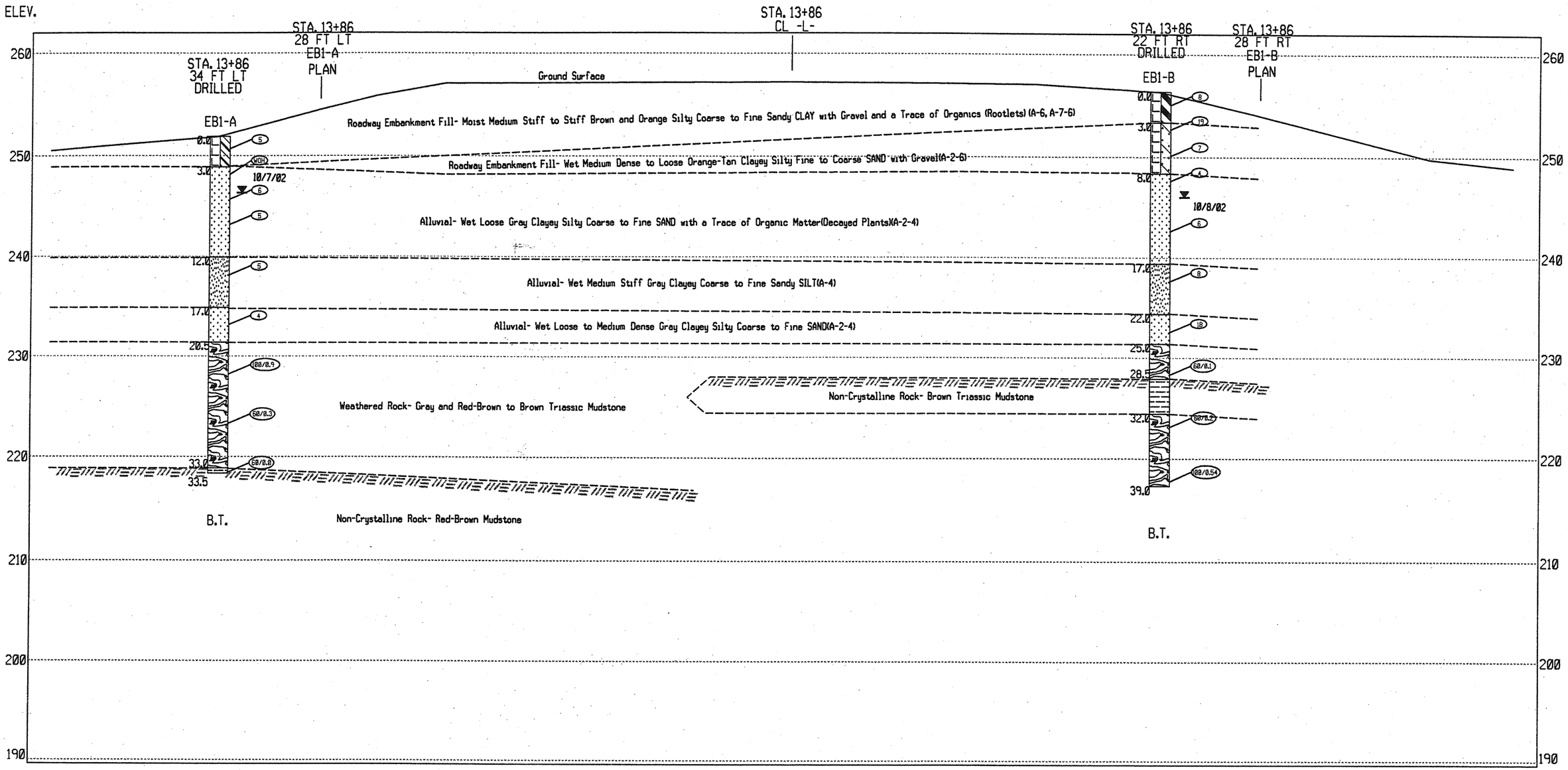
0 5 10

HORZ. SCALE

TRIGON

ENGINEERING CONSULTANTS, INC.

PROFILE 28' LEFT of -L-	
Bridge No. 217 Over Tributary to Sandy Creek on SR 1116 (Garrett Rd.)	
Durham County, North Carolina	
Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 3



SCALE IN FEET

0 5 10
VERT. SCALE

0 3 6
HORZ. SCALE

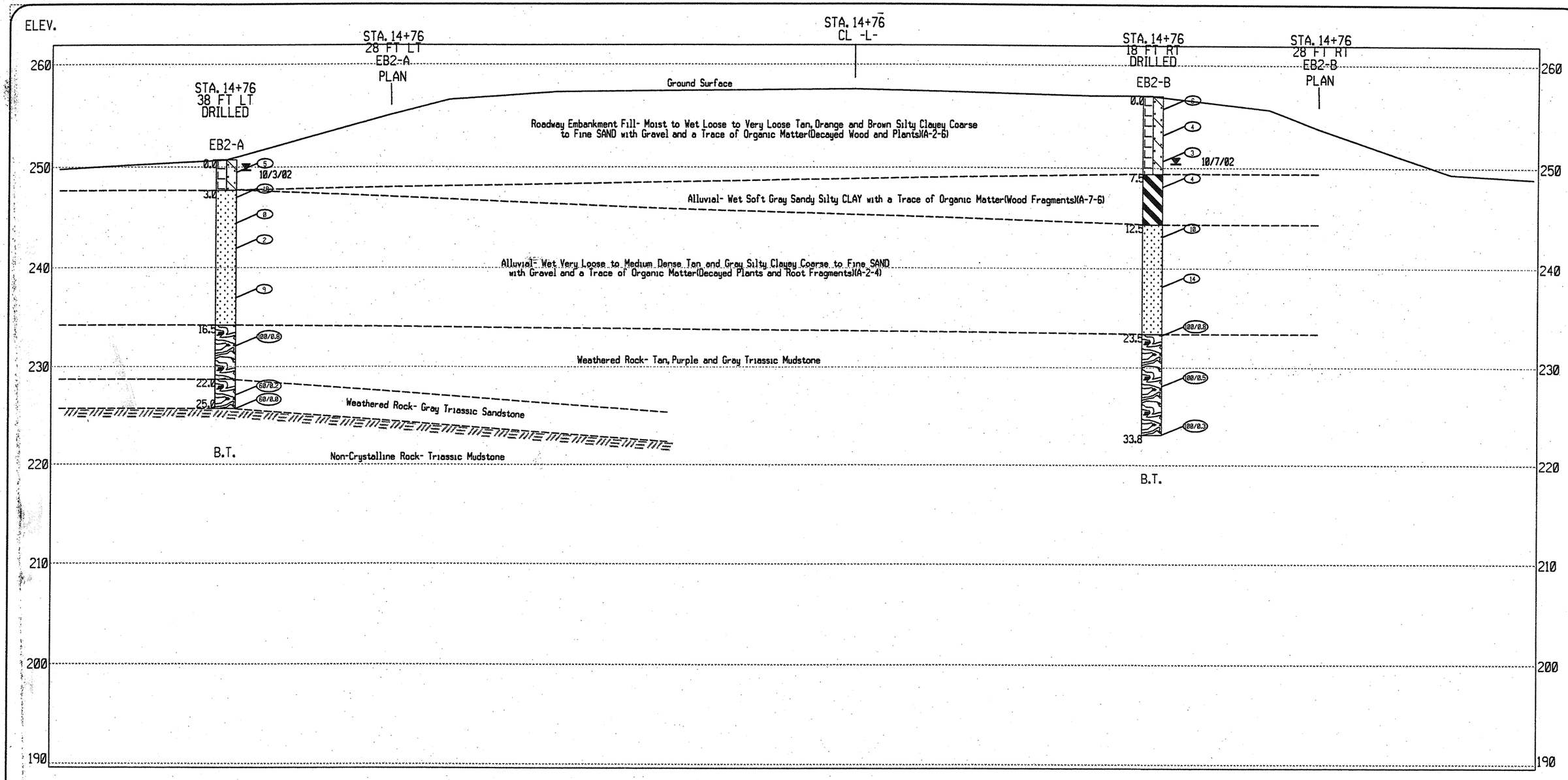
TRIGON
ENGINEERING CONSULTANTS, INC.

CROSS SECTION DIAGRAM AT END BENT-1

Bridge No. 217 Over Tributary to Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 6'
Drawn by DRK	Drawing No. 4



SCALE IN FEET

0 5 10

VERT. SCALE

0 3 6

HORZ. SCALE

TRIGON

ENGINEERING CONSULTANTS, INC.

CROSS SECTION DIAGRAM AT END BENT-2

Bridge No. 217 Over Tributary to Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 6'
Drawn by DRK	Drawing No. 5

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 217 Over Tributary of Sandy Creek on SR1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. EB1-A	BORING LOCATION 13+86	OFFSET 34 ft LT	ALIGNMENT -L-	0 HR. NM
COLLAR ELEV. 251.9 ft	NORTHING 802493.22	EASTING 2008008.92	24 HR. 5.7
TOTAL DEPTH 33.5 ft	DRILL MACHINE CME 850	DRILL METHOD 3-7/8" Tricone/Wash Rotary	HAMMER TYPE 140 lb. Automatic
DATE STARTED 10/3/02	COMPLETED 10/3/02	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	
251.9										
250.9	1.0								251.9	0.00
248.4	3.5	2	3	2	5	SS-1	17.5%		ROADWAY EMBANKMENT FILL: Medium Stiff Brown Silty Coarse to Fine Sandy CLAY with Gravel and a Trace of Organic Matter (Rootlets)	3.0
245.9	6.0	2	2	3	5	SS-2	W		ALLUVIAL: Loose Grey Clayey Silty Coarse to Fine SAND with a Trace of Organic Matter (26%) (Decayed Wood)	
243.4	8.5	2	2	4	6		W			
238.4	13.5	1	2	3	5		W			
233.4	18.5	2	2	3	5	SS-3	20.9%		ALLUVIAL: Medium Stiff Grey Clayey Fine Sandy SILT	12.0
228.4	23.5	2	2	2	4		W		ALLUVIAL: Loose Grey Silty Coarse to Fine SAND	17.0
223.4	28.5	14	21	69/0.4	100/0.9				WEATHERED ROCK: Grey and Red-Brown Triassic Mudstone	20.5
		60/0.3			60/0.3					
218.4	33.5	60/0.0			60/0.0				218.9 / 218.4 NON-CRYSTALLINE ROCK: Red-Brown Triassic Mudstone Boring Terminated by SPT Refusal at Elevation 218.4 feet in Non-Crystalline Rock (Triassic Mudstone)	33.0 / 33.5

NCDOT BORE SINGLE 07102017.GPJ NC_DOT.GDT 11/12/02

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 217 Over Tributary of Sandy Creek on SR1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. EB1-B	BORING LOCATION 13+86.0	OFFSET 22.0ft RT	ALIGNMENT -L-	0 HR. 3.00
COLLAR ELEV. 256.4 ft	NORTHING 802512.88	EASTING 2008061.38	24 HR. 10.40
TOTAL DEPTH 39.0 ft	DRILL MACHINE Mobile B-57	DRILL METHOD 3-7/8" Tricone/Wash Rotary	HAMMER TYPE 140 lb. Manual
DATE STARTED 10/7/02	COMPLETED 10/7/02	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	
256.4										
255.4	1.0								256.4	0.00
252.9	3.5	3	4	4	8	SS-4	20.1%		ROADWAY EMBANKMENT FILL: Medium Stiff to Stiff Orange Silty Fine to Coarse Sandy CLAY with Gravel	3.0
250.4	6.0	6	10	9	19	SS-5	W		ROADWAY EMBANKMENT FILL: Medium Dense to Loose Orange-Tan Clayey Silty Fine to Coarse SAND with Gravel	
247.9	8.5	4	4	3	7		W			
242.9	13.5	2	2	2	4				ALLUVIAL: Loose Grey Clayey Silty Coarse to Fine SAND	8.0
237.9	18.5	4	2	4	6		W			
232.9	23.5	4	4	4	8		W		ALLUVIAL: Medium Stiff Grey Clayey Coarse to Fine Sandy SILT	17.0
227.9	28.5	2	5	13	18		W		ALLUVIAL: Medium Dense Grey Clayey Silty Coarse to Fine SAND	22.0
		60/0.1			60/0.1				WEATHERED ROCK: Brown Triassic Mudstone	25.0
222.9	33.5	60/0.2			60/0.2				NON-CRYSTALLINE ROCK: Brown Triassic Mudstone	28.5
217.9	38.5	70	30/0.4		100/0.54				WEATHERED ROCK: Brown Triassic Mudstone Boring Terminated at Elevation 217.4 feet in Weathered Rock (Triassic Mudstone)	32.0 / 39.0

NCDOT BORE SINGLE 07102017.GPJ NC_DOT.GDT 11/14/02

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 217 Over Tributary of Sandy Creek on SR1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. B1-A	BORING LOCATION 14+36	OFFSET 13 ft LT	ALIGNMENT -L-	0 HR. 0.0
COLLAR ELEV. 247.3 ft	NORTHING 802547.29	EASTING 2008011.04	24 HR. 0.0
TOTAL DEPTH 46.9 ft	DRILL MACHINE Mobile B-57	DRILL METHOD 3-7/8" Tricone Wash/HQ Core	HAMMER TYPE 140 lb. Manual
DATE STARTED 10/2/02	COMPLETED 10/3/02	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	
247.3										
246.3	1.0								Concrete Debris and Gravel	0.00
243.8	3.5	21	40	20	60				ALLUVIAL: Very Loose to Very Loose Grey Fine to Coarse SAND with Traces of Clay and Silt	3.0
240.3	7.0	4	1	1	2	ST-1	W			
238.8	8.5	4	4	3	7	SS-6	W		ALLUVIAL: Stiff Grey Clayey Fine Sandy SILT	8.5
235.3	12.0	3	4	8	12	SS-7	26.0%			
233.8	13.5	2	3	8	11	ST-2	W		ALLUVIAL: Medium Dense Grey Clayey Silty Coarse to Fine SAND	12.0
228.8	18.5	6	5	5	10		W		WEATHERED ROCK: Grey Triassic Mudstone	16.0
		15	35	65/0.2	100/0.7				Greenish Grey and Reddish Brown; Moderately to Slightly Weathered; Moderately Hard to Medium Hard; Indurated Triassic Mudstone with Close Fracture Spacing	19.9
						RS-1			Red, Tan, and Grey; Slightly to Very Slightly Weathered; Hard; Indurated; Micaceous; Fine to Coarse Grained Triassic Sandstone with Close to Moderately Close Fracture Spacing	25.6
									Red, Tan, and Grey; Very Slightly Weathered; Hard; Indurated; Micaceous; Fine to Coarse Grained Triassic Sandstone with Very Wide Fracture Spacing	31.2
									Red and Grey; Moderately Weathered; Hard; Indurated; Slightly Micaceous; Fine to Coarse Grained Triassic Sandstone with Close Fracture Spacing	45.6
									Grey and Reddish Brown; Slightly Weathered; Hard; Indurated; Triassic Mudstone with Close Fracture Spacing	46.4 / 46.9
									Coring Terminated at Elevation 200.4 feet in Non-Crystalline Rock (Slightly Weathered Triassic Mudstone)	

NCDOT BORE SINGLE 07102017.GPJ NC_DOT.GDT 11/12/02

N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 217 Over Tributary of Sandy Creek on SR1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. B1-A	BORING LOCATION 14+36	OFFSET 13 ft LT	ALIGNMENT -L-	0 HR. 0.0
COLLAR ELEV. 247.3 ft	NORTHING 802547.29	EASTING 2008011.04	24 HR. 0.0
TOTAL DEPTH 46.9 ft	DRILL MACHINE Mobile B-57	DRILL METHOD 3-7/8" Tricone/Wash Rotary	HAMMER TYPE 140 lb. Manual
DATE STARTED 10/2/02	COMPLETED 10/3/02	SURFACE WATER DEPTH NA	
CORE SIZE HQ	TOTAL RUN 27.0 ft	DRILLER B. Shull	

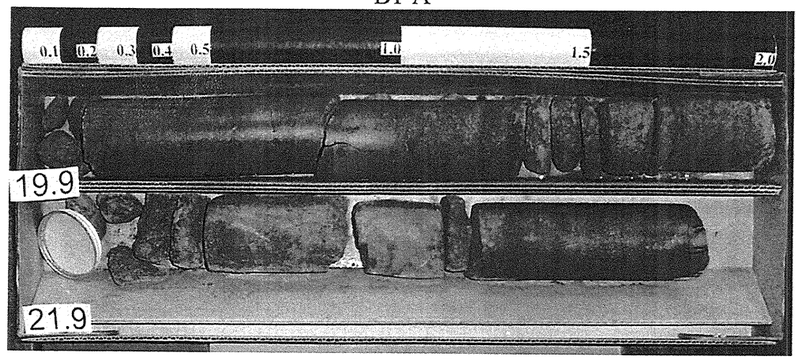
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS	
										Begin Coring @ 19.9 ft	
227.4	19.9	2.0	6:45	(95%	(55%		(79%	(49%		Greenish Grey and Reddish Brown; Moderately to Slightly Weathered; Moderately Hard to Medium Hard; Indurated Triassic Mudstone with Close Fracture Spacing	19.9
225.4	21.9		5:07	1.9)	1.1)		4.5)	2.8)			
		5.0	5:00	(78%	(60%					jts @ 0° to 10°	
			3:20	3.9)	3.0)					24.1 feet to 25.6 feet is intact	25.6
			4:46							Red, Tan, and Grey; Slightly to Very Slightly Weathered; Hard; Indurated; Micaceous; Fine to Coarse Grained Triassic Sandstone with Close to Moderately Close Fracture Spacing	
220.4	26.9		4:02				(93%	(93%			
		5.0	3:41	(92%	(92%		5.2)	5.2)		3 jts @ 0° to 10° along grain	31.2
			3:25	4.6)	4.6)	RS-1				Red, Tan, and Grey; Very Slightly Weathered; Hard; Indurated; Micaceous; Fine to Coarse Grained Triassic Sandstone with Very Wide Fracture Spacing	
			2:29								
			2:36							No natural fractures	
215.4	31.9		2:36								
		5.0	4:10	(100%	(100%		(100%	(100%			
			3:24	5.0)	5.0)		14.4)	14.4)			
			3:04								
			3:17								
210.4	36.9		3:32								
		5.0	3:21	(100%	(100%						
			3:55	5.0)	5.0)						
			3:42								
			3:42								
205.4	41.9		2:39								
		5.0	2:59	(100%	(98%						
			3:50	5.0)	4.9)						
			2:40								
			2:30								
200.4	46.9		2:40				(100%	(88%		Red and Grey; Moderately Weathered; Hard; Indurated; Slightly Micaceous; Fine to Coarse Grained Triassic Sandstone with Close Fracture Spacing	45.6
			2:47				0.8)	0.7)			
							(100%	(100%		3 jts @ 10°	46.4 / 46.9
							0.5)	0.5)		Grey and Reddish Brown; Slightly Weathered; Hard; Indurated; Triassic Mudstone with Close Fracture Spacing	
										No breaks	
										Coring Terminated at Elevation 200.4 feet in Non-Crystalline Rock (Slightly Weathered Triassic Mudstone)	

NCDOT CORE SINGLE 07102017.GPJ NC_DOT.GDT 11/12/02

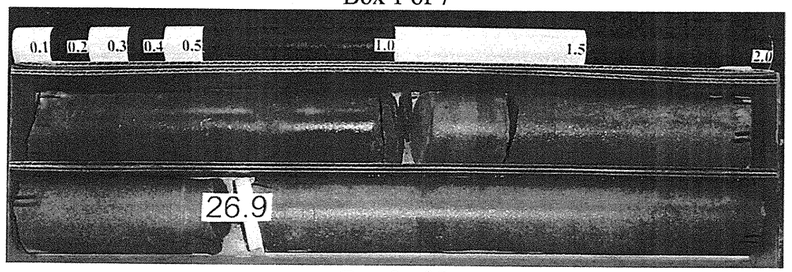
CORE PHOTOGRAPHS

Bridge No. 217 over Tributary to Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

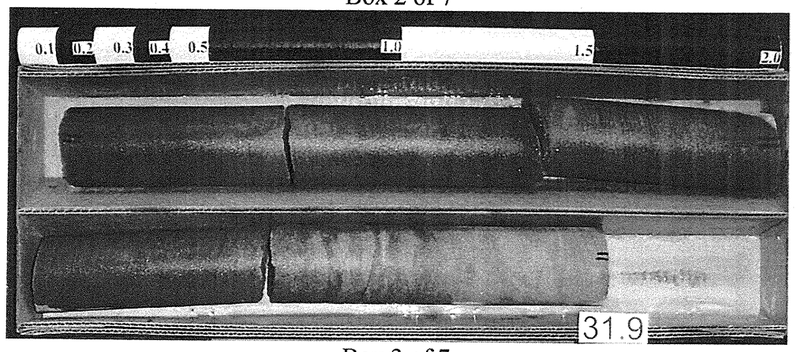
B1-A



Box 1 of 7



Box 2 of 7



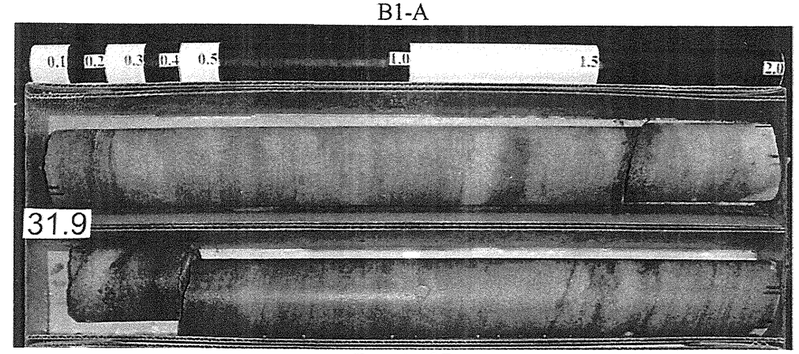
Box 3 of 7

(SCALE = 1:4)

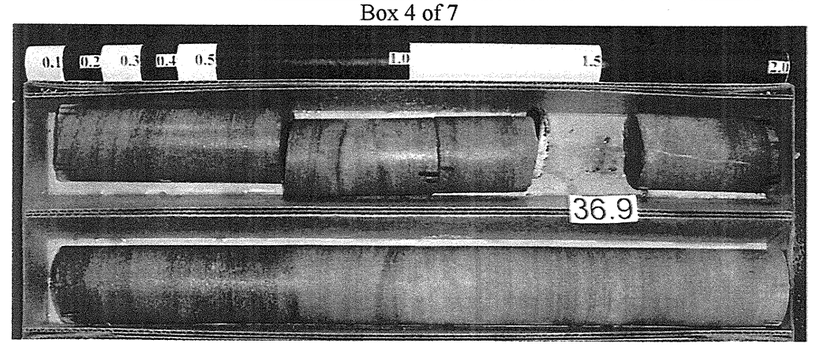
CORE PHOTOGRAPHS

Bridge No. 217 over Tributary to Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

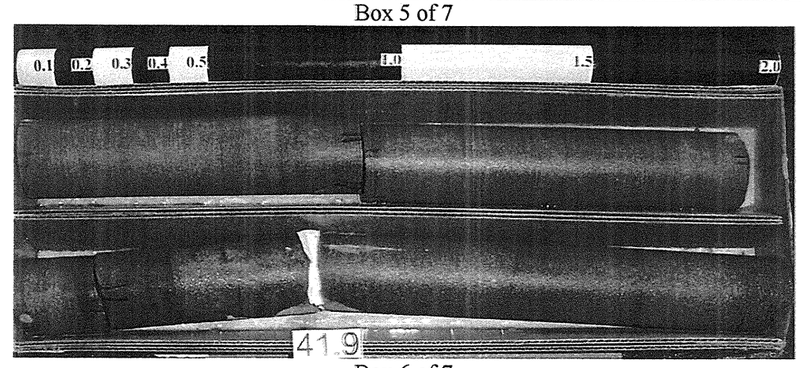
B1-A



Box 4 of 7



Box 5 of 7



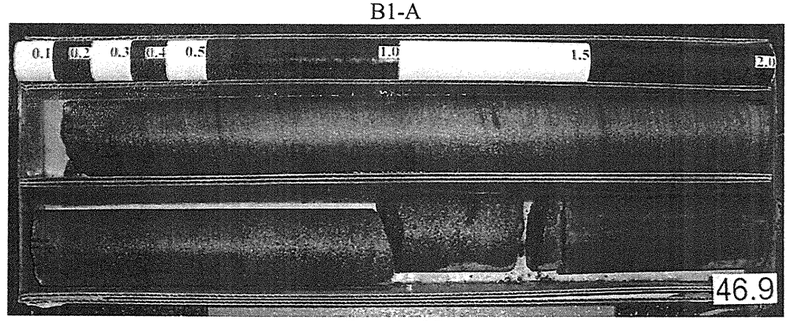
Box 6 of 7

(SCALE = 1:4)

CORE PHOTOGRAPHS

Bridge No. 217 over Tributary to Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

B1-A



Box 7 of 7

(SCALE = 1:4)

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 217 Over Tributary of Sandy Creek on SR1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. EB2-A	BORING LOCATION 14+76	OFFSET 38 ft LT	ALIGNMENT -L-	0 HR. 1.0
COLLAR ELEV. 250.7 ft	NORTHING 802576.02	EASTING 2007973.65	24 HR. 1.0
TOTAL DEPTH 25.0 ft	DRILL MACHINE CME 850	DRILL METHOD 3-7/8" Tricone/Wash Rotary	HAMMER TYPE 140 lb. Automatic
DATE STARTED 10/2/02	COMPLETED 10/2/02	SURFACE WATER DEPTH NA	

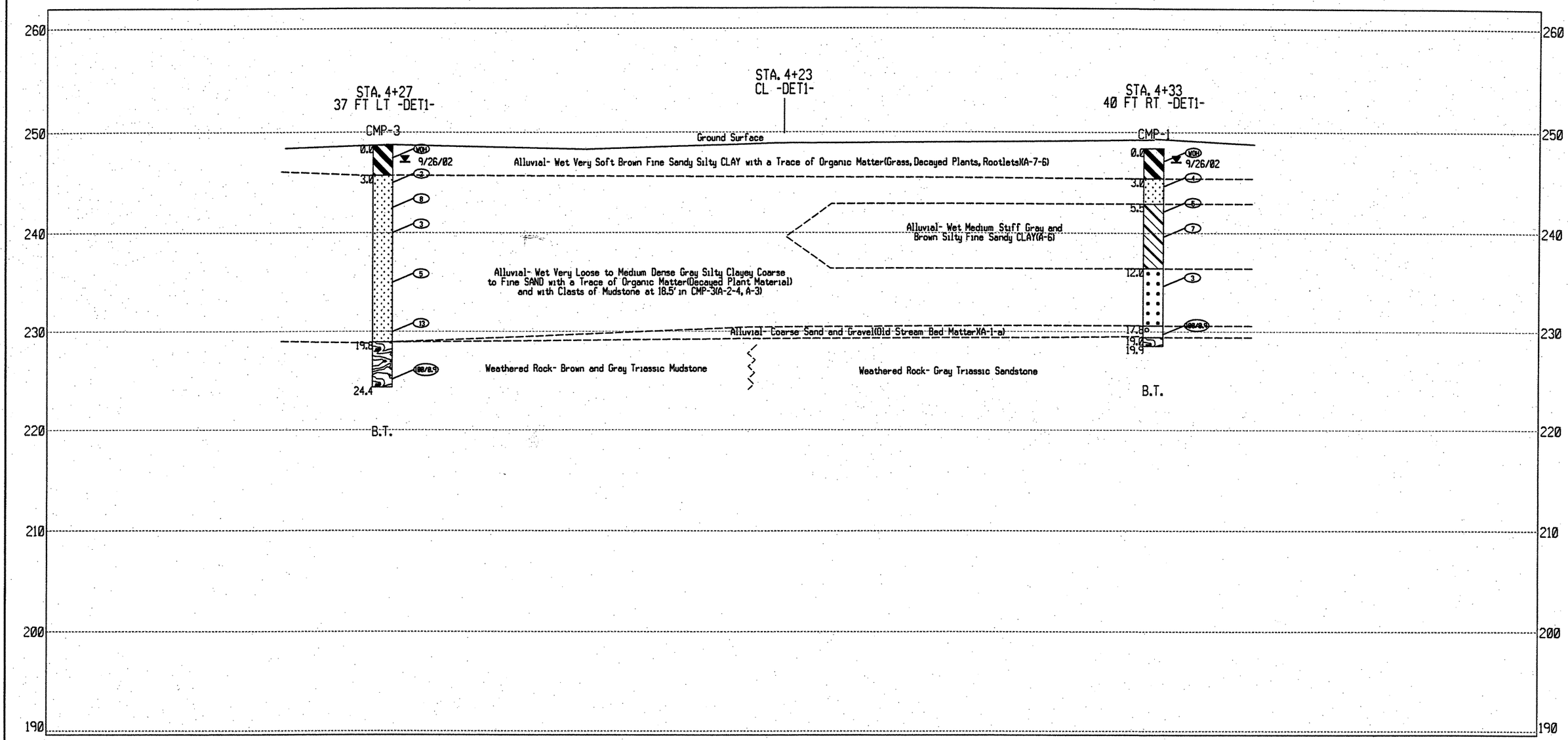
ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 20 40 60 80 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
250.7									250.7 — 0.00
249.7	1.0								ROADWAY EMBANKMENT FILL: Loose Brown Silty Clayey Coarse to Fine SAND with Gravel and a Trace of Organic Matter (Decayed Wood and Plants)
247.2	3.5	2	2	3	5 18	SS-8	W		247.7 — 3.0
244.7	6.0	11	12	6			W		ALLUVIAL: Very Loose to Medium Dense Tan and Grey Silty Clayey Coarse to Fine SAND with Gravel and with a Trace Organic Matter (Decayed Plants)
242.2	8.5	WOH	WOH	WOH	WOH	SS-9	W		
237.2	13.5	1	1	1	2		W		
232.2	18.5	2	4	5	9		M		234.2 — 16.5
227.2	23.5	11	89/0.3		100/0.8				WEATHERED ROCK: Grey and Red-Brown Triassic Mudstone
225.7	25.0	60/0.2			60/0.2				228.7 — 22.0
		60/0.0			60/0.0				WEATHERED ROCK: Grey Triassic Sandstone
									225.7 — 25.0
									Boring Terminated with SPT Refusal at Elevation 225.7 feet on Non-Crystalline Rock (Triassic Sandstone)

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST G. Licayan
SITE DESCRIPTION Bridge No. 217 Over Tributary of Sandy Creek on SR1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. EB2-B	BORING LOCATION 14+76	OFFSET 18 ft RT	ALIGNMENT -L-	0 HR. 2.0
COLLAR ELEV. 256.9 ft	NORTHING 802595.64	EASTING 2008026.14	24 HR. 6.6
TOTAL DEPTH 33.8 ft	DRILL MACHINE CME 55	DRILL METHOD 3-7/8" Tricone/Wash Rotary	HAMMER TYPE 140 lb. Manual
DATE STARTED 10/3/02	COMPLETED 10/3/02	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
256.9									256.9 — 0.00
255.9	1.0								ROADWAY EMBANKMENT FILL: Loose to Very Loose Tan, Orange, and Brown Silty Clayey Coarse to Fine SAND with Gravel
253.4	3.5	6	4	2	6				
250.9	6.0	4	3	1	4		W		
248.4	8.5	4	1	2	3				249.4 — 7.5
243.4	13.5	2	1	3	4		W		ALLUVIAL: Soft Grey Fine Sandy Silty CLAY with a Trace of Organic Matter (Wood Fragments)
238.4	18.5	3	3	7	10	SS-10	W		244.4 — 12.5
233.4	23.5	5	6	8	14		W		ALLUVIAL: Loose to Medium Dense Grey Clayey Silty Coarse to Fine SAND with Trace of Organic Matter (Root Fragments)
228.4	28.5	23	77/0.3		100/0.8		M		233.4 — 23.5
223.4	33.5	100/0.5			100/0.5		M		WEATHERED ROCK: Tan, Purple, and Grey Triassic Mudstone
		100/0.3			100/0.3		M		223.1 — 33.8
									Boring Terminated at Elevation 223.1 feet in Weathered Rock: (Triassic Mudstone)



SCALE IN FEET

0 5 10

VERT. SCALE

0 5 10

HORZ. SCALE

TRIGON

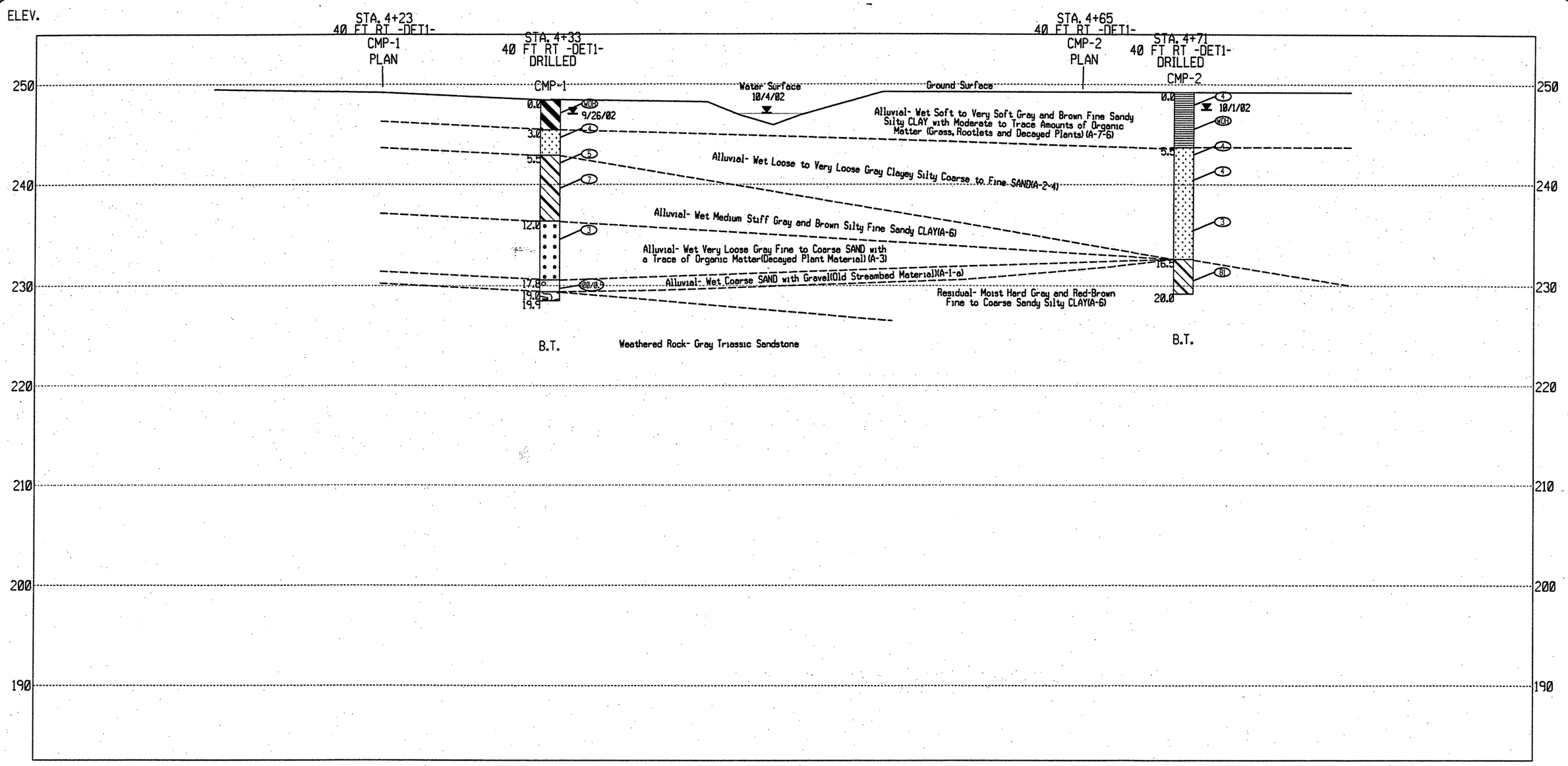
ENGINEERING CONSULTANTS, INC.

PROFILE DIAGRAM FROM CMP-3 to CMP-1

Bridge No. 217 Over Tributary to Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 6



SCALE IN FEET

0 5 10

VERT. SCALE

0 3 6

HORZ. SCALE

TRIGON

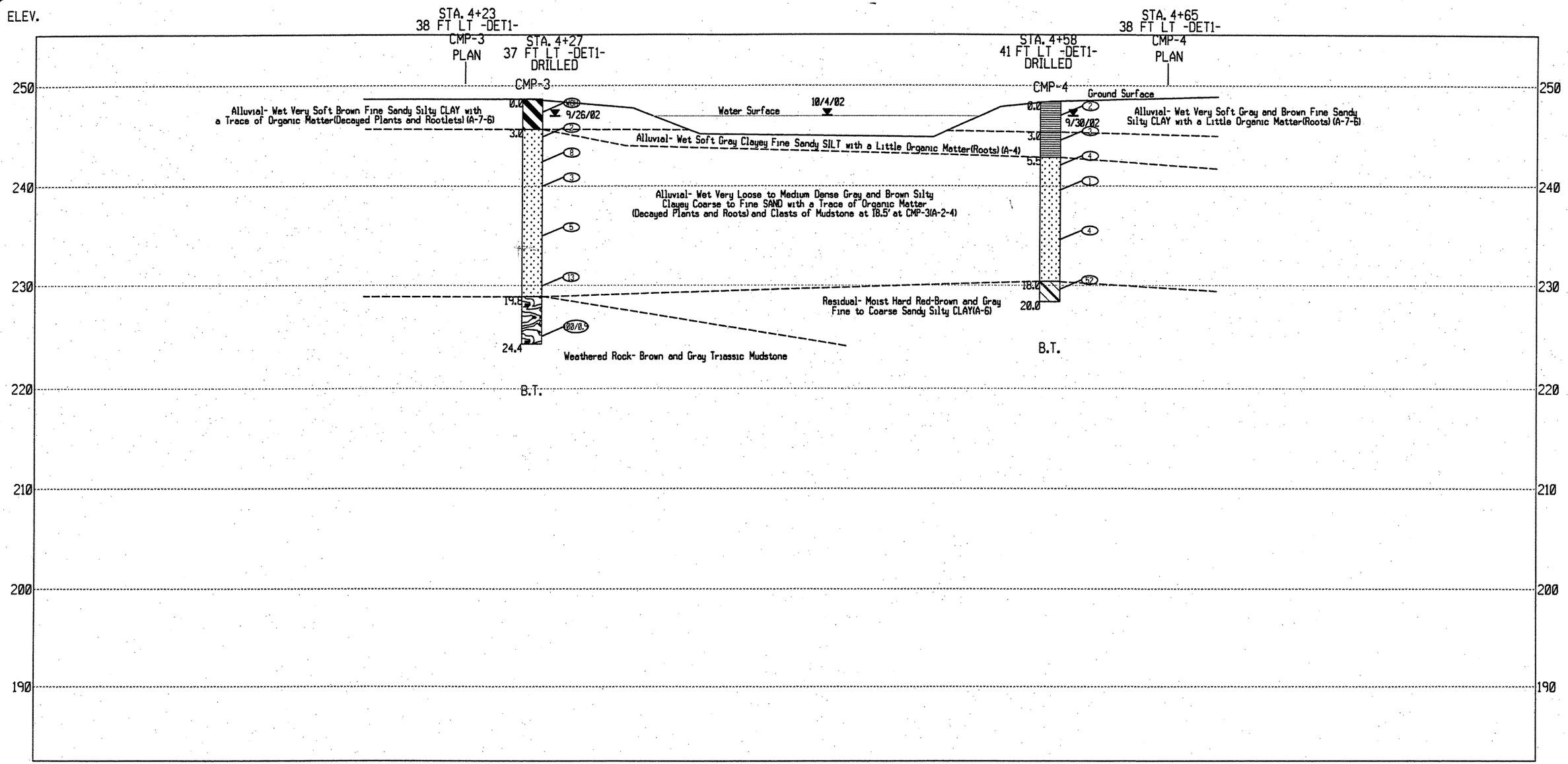
ENGINEERING CONSULTANTS, INC.

CROSS SECTION DIAGRAM FROM CMP-1 to CMP-2

Bridge No. 217 Over Tributary to Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 6'
Drawn by DRK	Drawing No. 7



SCALE IN FEET

0 5 10

VERT. SCALE

0 3 6

HORZ. SCALE

TRIGON

ENGINEERING CONSULTANTS, INC.

CROSS SECTION DIAGRAM FROM CMP-3 to CMP-4

Bridge No. 217 Over Tributary to Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 6'
Drawn by DRK	Drawing No. 8

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	**ID.** B-3450	**COUNTY** Durham	**GEOLOGIST** D. Goodnight
SITE DESCRIPTION Bridge No. 217 Over Tributary of Sandy Creek on SR1116 (Garrett Road)			**GROUND WATER (ft)**
BORING NO. CMP-1	**BORING LOCATION** 4+33	**OFFSET** 40 ft RT	**ALIGNMENT** -DET1-	**0 HR.** 1.0
COLLAR ELEV. 248.4 ft	**NORTHING** 802589.83	**EASTING** 2008169.99	**24 HR.** 1.4
TOTAL DEPTH 19.9 ft	**DRILL MACHINE** CME 850	**DRILL METHOD** 3-7/8" Tricone/Wash Rotary	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 9/25/02	**COMPLETED** 9/25/02	**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	
248.4										
247.4	1.0								ALLUVIAL: Very Soft Brown Fine Sandy Silty CLAY with a Trace of Organic Matter (Grass and Rootlets)	248.4 / 0.00
244.9	3.5	WOH	WOH	WOH	WOH					245.4 / 3.0
242.4	6.0	2	2	2	4	SS-11	W		ALLUVIAL: Very Loose Grey Silty Coarse to Fine SAND with Trace of Clay	242.9 / 5.5
239.9	8.5	2	2	3	5	SS-12	21.7%		ALLUVIAL: Medium Stiff Grey and Brown Silty Fine Sandy CLAY	
234.9	13.5	2	3	4	7		W			236.4 / 12.0
229.9	18.5	2	1	2	3	SS-13	W		ALLUVIAL: Very Loose Grey Fine to Coarse SAND with a Trace of Organic Matter (Decayed Plant Material)	230.6 / 17.8
		15	43	57/0.4	100/0.0				ALLUVIAL: Coarse Sand and Gravel (Old Streambed Material)	229.4 / 19.0
									WEATHERED ROCK: Grey Triassic Sandstone	228.5 / 19.9
									Boring Terminated at Elevation 228.5 feet in Weathered Rock (Triassic Sandstone)	

NCDOT BORE SINGLE 07102017.GPJ NC_DOT.GDT 11/12/02

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	**ID.** B-3450	**COUNTY** Durham	**GEOLOGIST** D. Goodnight
SITE DESCRIPTION Bridge No. 217 Over Tributary of Sandy Creek on SR1116 (Garrett Road)			**GROUND WATER (ft)**
BORING NO. CMP-2	**BORING LOCATION** 4+71	**OFFSET** 40 ft RT	**ALIGNMENT** -DET1-	**0 HR.** 1.5
COLLAR ELEV. 249.2 ft	**NORTHING** 802624.19	**EASTING** 2008153.96	**24 HR.** 1.8
TOTAL DEPTH 20.0 ft	**DRILL MACHINE** CME 850	**DRILL METHOD** 3-7/8" Tricone/Wash Rotary	**HAMMER TYPE** 140 lb. Automatic
DATE STARTED 9/30/02	**COMPLETED** 9/30/02	**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	
249.2										
248.2	1.0								ALLUVIAL: Soft to Very Soft Moderately Organic (Rootlets and Decayed Plants) Grey and Brown Fine Sandy Silty CLAY	249.2 / 0.00
245.7	3.5	2	2	2	4	SS-14				
243.2	6.0	WOH	WOH	WOH	WOH		W		Natural Moisture = 35.1%	243.7 / 5.5
240.7	8.5	1	2	2	4		W		ALLUVIAL: Loose to Very Loose Grey Clayey Silty Coarse to Fine SAND	
235.7	13.5	WOH	2	2	4		W			
230.7	18.5	1	1	2	3	SS-15	W			232.7 / 16.5
		8	33	48	81		M		RESIDUAL: Hard Grey and Red-Brown Fine to Coarse Sandy Silty CLAY	229.2 / 20.0
									Boring Terminated at Elevation 229.2 feet in Residual Soil	

NCDOT BORE SINGLE 07102017.GPJ NC_DOT.GDT 11/12/02

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 217 Over Tributary of Sandy Creek on SR1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. CMP-3	BORING LOCATION 4+27	OFFSET 37 ft LT	ALIGNMENT -DET1-
COLLAR ELEV. 248.7 ft	NORTHING 802552.05	EASTING 2008102.87	0 HR. 1.5 / 24 HR. 1.7
TOTAL DEPTH 24.4 ft	DRILL MACHINE CME 850	DRILL METHOD 3-7/8" Tricone/Wash Rotary	HAMMER TYPE 140 lb. Automatic
DATE STARTED 9/25/02	COMPLETED 9/25/02	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
248.7									
247.7	1.0								248.7 — 0.00
245.2	3.5	WOH	WOH	WOH	WOH				ALLUVIAL: Very Soft Brown Fine Sandy Silty CLAY with a Trace of Organic Matter (Decayed Plants and Rootlets) — 245.7 — 3.0
242.7	6.0	WOH	1	1	2		W		ALLUVIAL: Very Loose to Medium Dense Grey Silty Clayey Coarse to Fine SAND with a Trace of Organic Matter (Decayed Plants) and with Clasts of Mudstone at 18.5 feet
240.2	8.5	3	4	4	8		W		
235.2	13.5	2	2	1	3	SS-16	W		
230.2	18.5	3	2	3	5		W		
225.2	23.5	7	6	7	13		W		228.9 — 19.8
		32	68/0.4		100/0.9				WEATHERED ROCK: Brown and Grey Triassic Mudstone — 224.3 — 24.4
									Boring Terminated at Elevation 224.3 feet in Weathered Rock (Triassic Mudstone)

NCDOT BORE SINGLE 07102017.GPJ NC_DOT.GDT 11/12/02

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 217 Over Tributary of Sandy Creek on SR1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. CMP-4	BORING LOCATION 4+58	OFFSET 41 ft LT	ALIGNMENT -DET1-
COLLAR ELEV. 248.4 ft	NORTHING 802578.53	EASTING 2008086.41	0 HR. 1.5 / 24 HR. 1.4
TOTAL DEPTH 20.0 ft	DRILL MACHINE CME 850	DRILL METHOD 3-7/8" Tricone/Wash Rotary	HAMMER TYPE 140 lb. Automatic
DATE STARTED 9/26/02	COMPLETED 9/26/02	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
248.4									
247.4	1.0								248.4 — 0.00
244.9	3.5	2	1	1	2				ALLUVIAL: Very Soft Grey and Brown Fine Sandy Silty CLAY with a Little Organic Matter (Roots) — 245.4 — 3.0
242.4	6.0	2	1	2	3	SS-17	19.6%		ALLUVIAL: Soft Grey Clayey Fine Sandy SILT with a Little Organic Matter (Roots) — 242.9 — 5.5
239.9	8.5	3	2	2	4		W		ALLUVIAL: Loose to Very Loose Grey and Brown Silty Coarse to Fine SAND with a Trace Organic Matter (Roots)
234.9	13.5	2	1	WOH	1		W		
229.9	18.5	1	2	2	4		W		230.4 — 18.0
		5	12	40	52	SS-18	12.2%		RESIDUAL: Hard Red-Brown and Grey Fine to Coarse Sandy Silty CLAY — 228.4 — 20.0
									Boring Terminated at Elevation 228.4 feet in Residual Soil

NCDOT BORE SINGLE 07102017.GPJ NC_DOT.GDT 11/12/02

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 8.2353001 ID: B-3450 COUNTY: Durham

DESCRIPTION(1): Bridge No. 217 over Tributary to Sandy Creek on SR 1116 (Garrett Road)

INFORMATION ON EXISTING BRIDGES Information obtained from: X field inspection
___ microfilm(Reel: ___ Pos: ___)
X other Bridge Survey and Hydraulic Design Report dated 5/10/02

COUNTY BRIDGE NO. 217 BRIDGE LENGTH 31 NO. BENTS IN: CHANNEL 2 FLOOD PLAIN 0

FOUNDATION TYPE: Steel H-Piles and timber abutments

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: Slumping/sloughing downstream of End Bent-1, erosion around wingwalls, collapsing wingwall upstream side of End Bent-2.

INTERIOR BENTS: N/A

CHANNEL BED: Channel is deeper on upstream side of bridge than downstream side.

CHANNEL BANKS: Undermining of trees (trees fallen across creek)

EXISTING SCOUR PROTECTION:

TYPE(3): Wingwalls, rough concrete at base of wingwalls

EXTENT(4): At end bents of existing bridge

EFFECTIVENESS(5): moderately effective, some parts of wingwalls are damaged and rotted

OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.): Fallen trees are across channel upstream and downstream of existing bridge; 50' downstream of existing bridge are vegetated sand/silt bar islands in channel as well as exposed roots and tree debris.

DESIGN INFORMATION

CHANNEL BED MATERIAL(7) (SAMPLE RESULTS ATTACHED): Silty coarse to fine very sandy CLAY (A-6)

CHANNEL BANK MATERIAL(8) (SAMPLE RESULTS ATTACHED): Clayey silty fine to coarse SAND (A-2-4, A-2-6, and A-2-7) with gravel, and clayey coarse to fine very sandy SILT (A-4) with gravel

FOUNDATION BEARING MATERIAL(9): Weathered rock and non-crystalline rock (triassic mudstone and sandstone)

CHANNEL BANK COVER(10): Hardwood trees, grass, brush

FLOOD PLAIN WIDTH(11): Approximately 600 feet

FLOOD PLAIN COVER(12): Hardwood trees, grass, brush; much of ground surface is scoured clean of vegetation leaving floodplain silts exposed.

DESIGN INFORMATION CONT.

STREAM IS ___ DEGRADING X AGGRADING (13)

OTHER OBSERVATIONS AND COMMENTS: ___

CHANNEL MIGRATION TENDENCY (14): channel is meandering through soft alluvial materials; there is a high potential for stream migration over next 100 years

REPORTED BY: Paul Nolan DATE: 11/1/2002
Trigon Engineering Consultants, Inc.

GEOTECHNICALLY ADJUSTED SCOUR ELEVATION (15): ___

2 EFA tubes were submitted to the Materials and Test Lab and adjusted scour will be provided by the Hydraulics Unit based on EFA results

REPORTED BY: Cheryl A Lounsbury DATE: 11/18/2002
NCDOT GEOTECHNICAL UNIT

INSTRUCTIONS

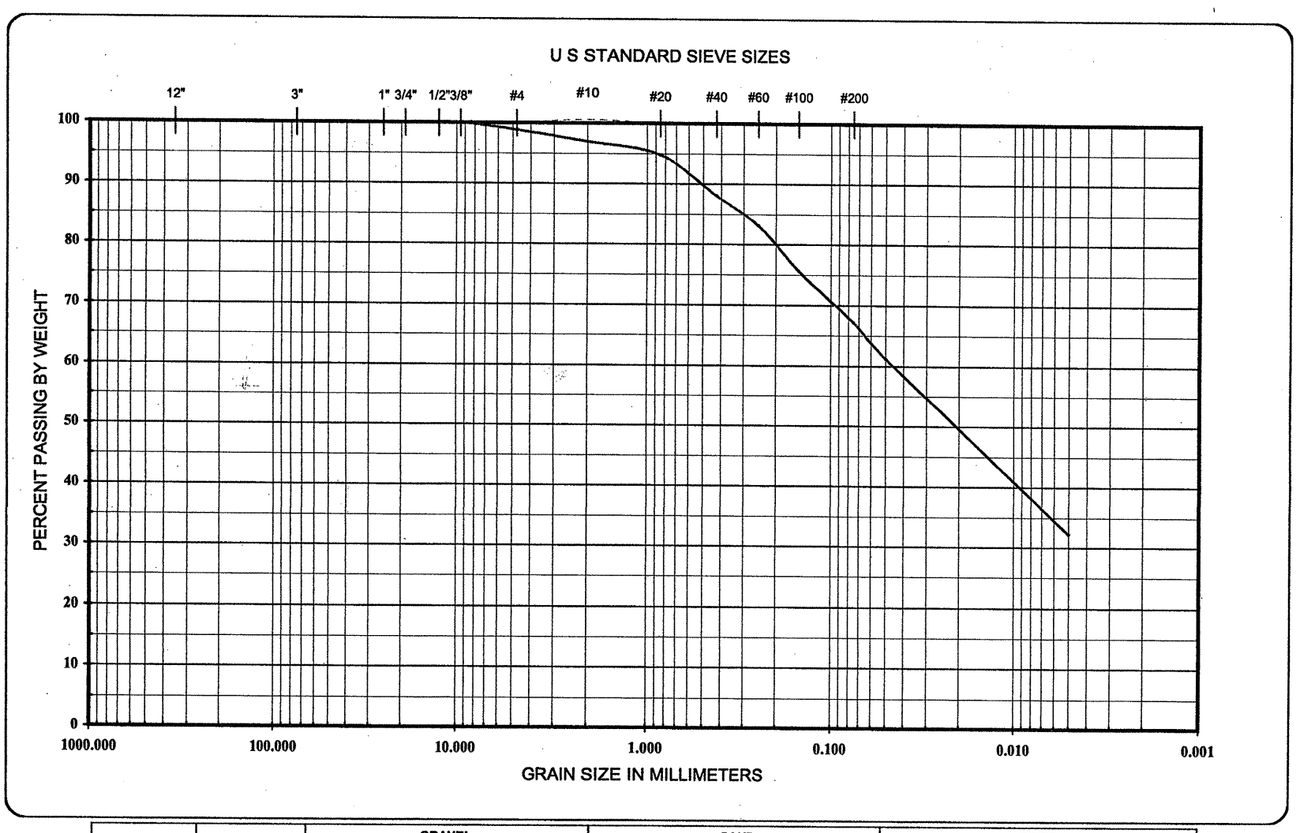
(1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
(2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
(3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.)
(4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
(5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
(6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
(7) DESCRIBE THE CHANNEL BED MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
(8) DESCRIBE THE CHANNEL BANK MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
(9) DESCRIBE THE FOUNDATION BEARING MATERIAL,
(10) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.
(11) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
(12) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
(13) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING
(14) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE LATERALLY DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
(15) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENTAGE RQD; DIFFERENTIAL WEATHERING, SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

PROJECT #: 8.2353001

COUNTY: Durham

DESCRIPTION: Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)

	CHANNEL BED MATERIAL		CHANNEL BANK MATERIAL			
SAMPLE #	G-1 (SBD-1)	G-2 (SBD-2)	G-3 (SBK-1)	G-4 (SBK-2)	SS-4	SS-8
RETAINED #4	1%	1%	7%	28%	11%	7%
PASSING #10	97%	95%	82%	37%	69%	79%
PASSING #40	88%	85%	74%	27%	43%	70%
PASSING #200	67%	57%	48%	19%	27%	32%
COARSE SAND	14%	17%	17%	35%	43%	22%
FINE SAND	23%	27%	27%	16%	20%	40%
SILT	31%	28%	33%	38%	21%	17%
CLAY	32%	28%	23%	11%	16%	21%
LL	30	29	30	43	32	20
PL	9	11	10	16	14	5
AASHTO CLASSIFICATION	A-6 (5)	A-6 (4)	A-4 (2)	A-2-7 (0)	A-2-6 (0)	A-2-4 (0)
STATION	14+20	14+34	14+05	14+42	13+86	14+76
OFFSET	25' LT	35' RT	25' LT	23' RT	22' RT	38' LT
DEPTH	0.0-0.5'	0.0-0.5'	0.0-0.5'	0.0-0.5'	3.5-5.0'	6.0-7.5'



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
SDB-1	G-1	0.0-0.5	34.4	30	21	9	Brown Silty Coarse to Fine Sandy CLAY (A-6)

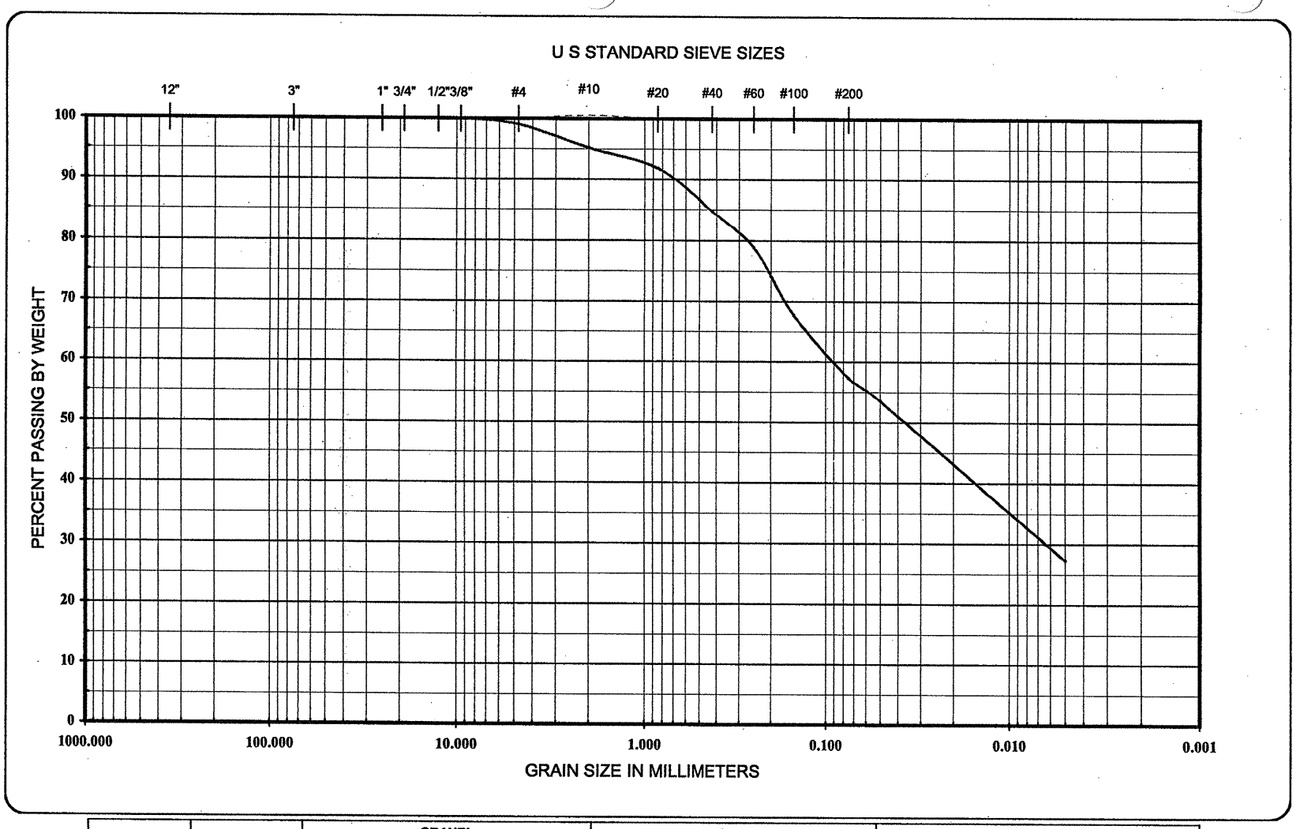
GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 217)

071-02-017

10/23/2002

TRIGON



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
SBD-2	G-2	0.0-0.5	36.9	29	18	11	Brown Silty Coarse to Fine Sandy CLAY (A-6)

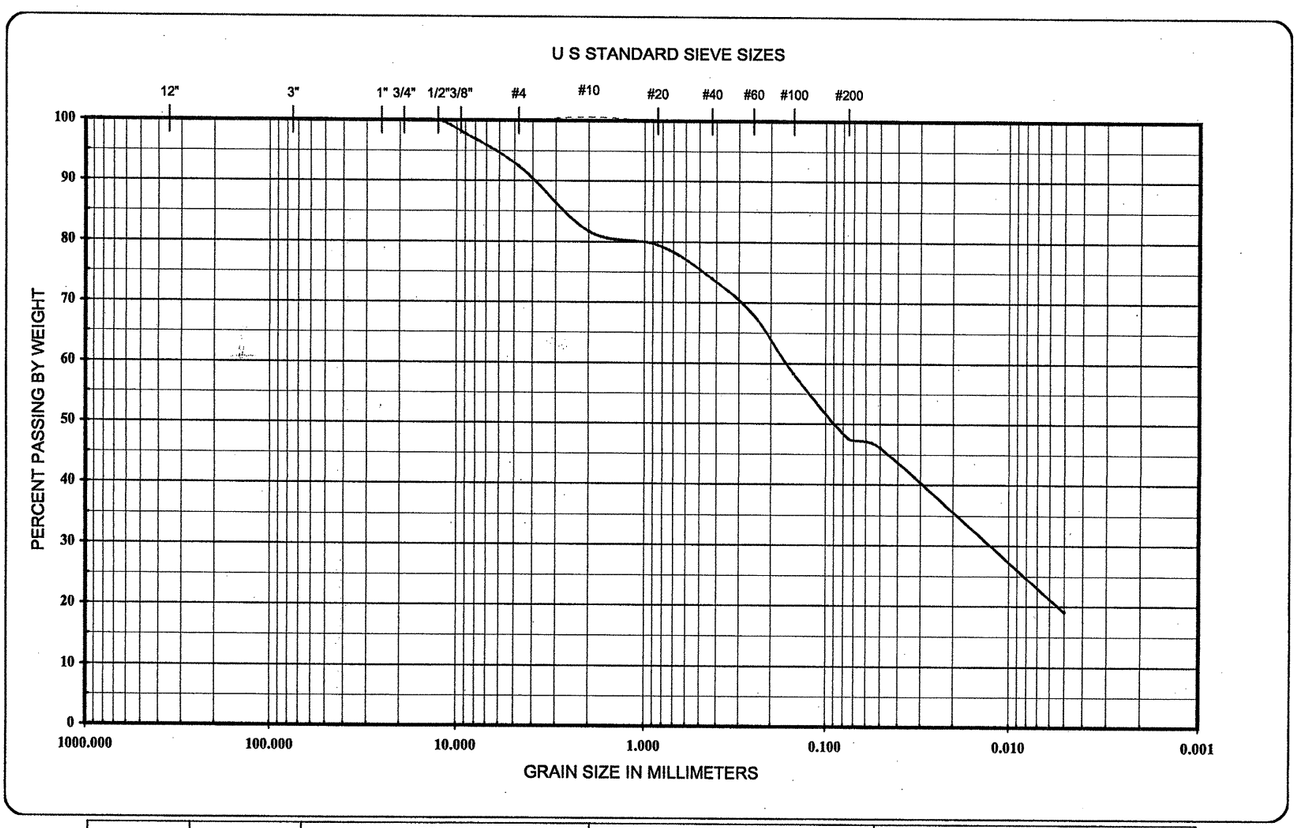
GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 217)

071-02-017

10/23/2002

TRIGON



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
SBK-1	G-3	0.0-0.5	14.4	30	20	10	Brown Clayey Coarse to Fine Sandy SILT (A-4)

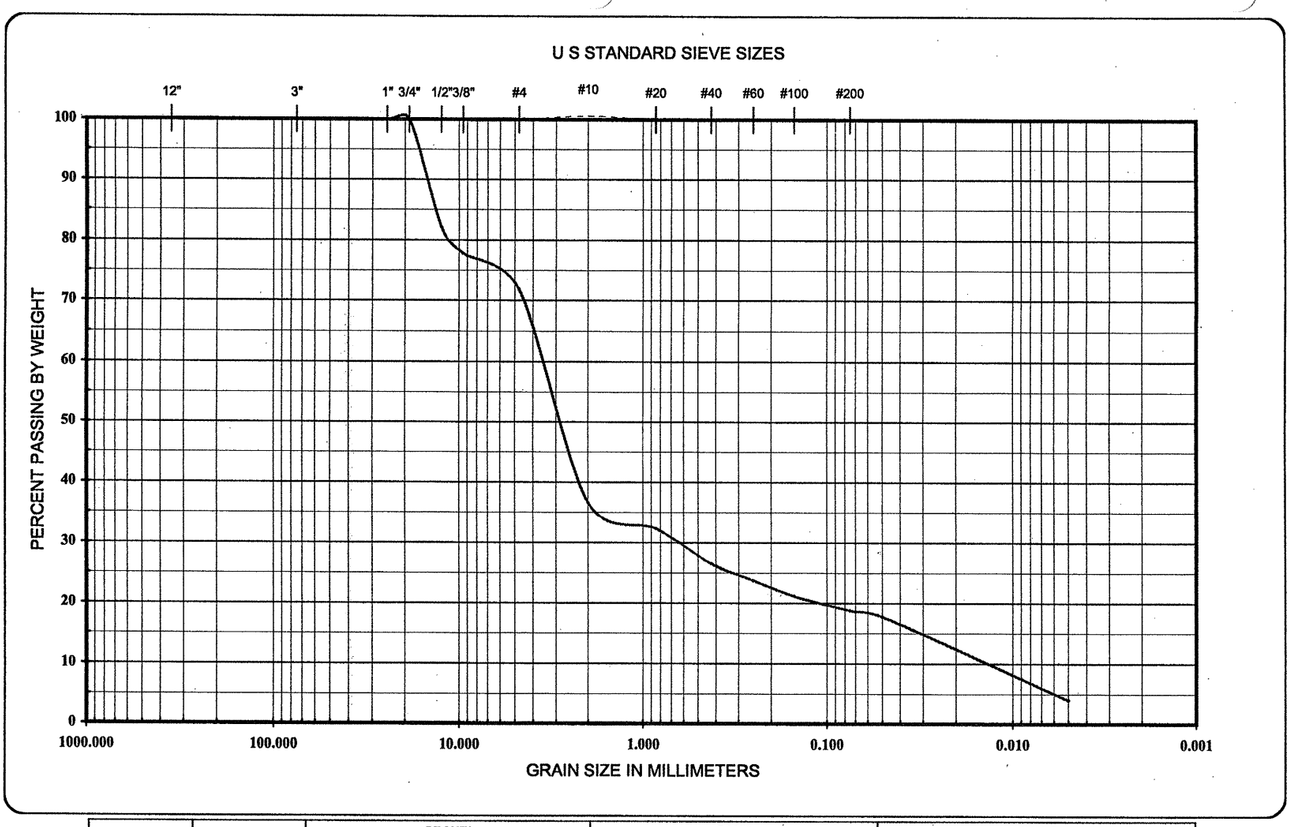
GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 217)

071-02-017

10/23/2002

TRIGON



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
SBK-2	G-4	0.0-0.5	NA	43	27	16	Brown Clayey Silty Fine to Coarse SAND and Gravel (A-2-7)

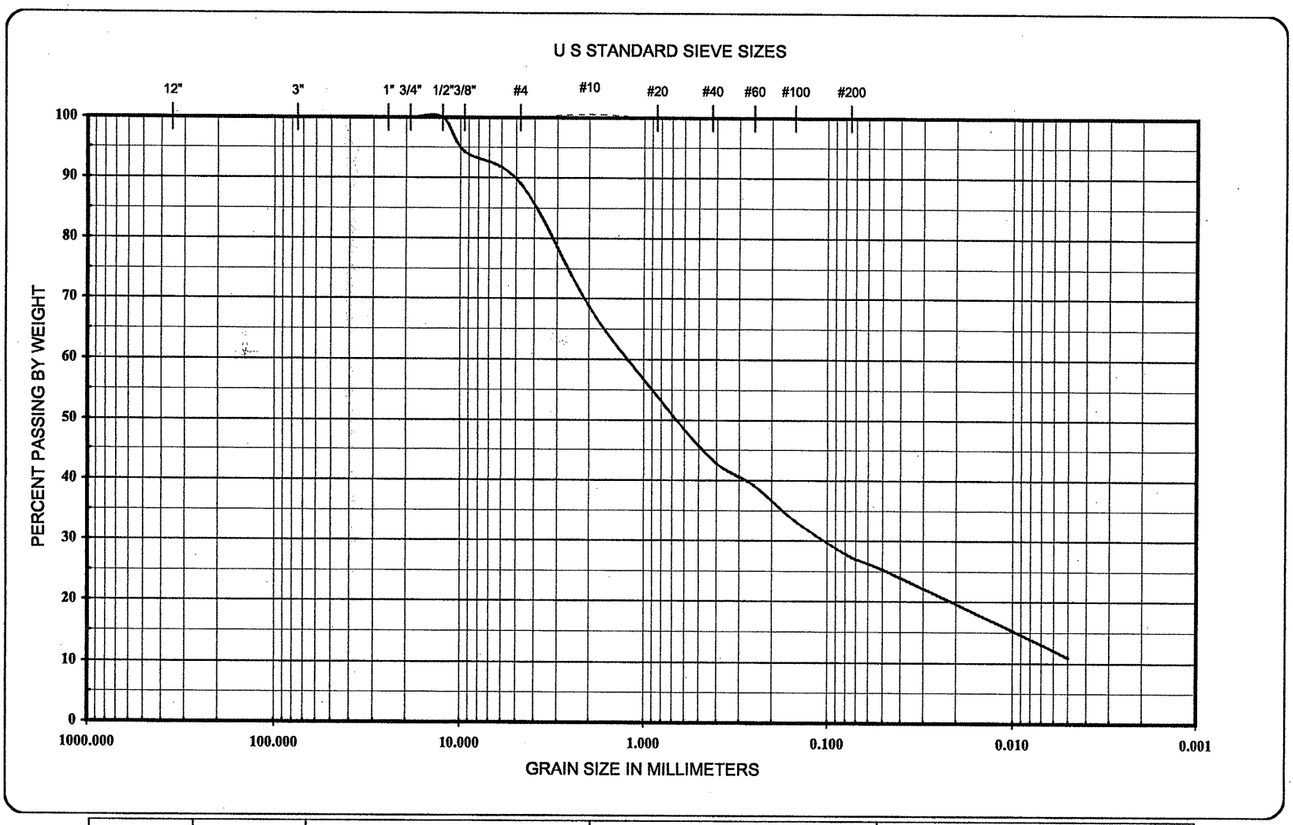
GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 217)

071-02-017

10/23/2002

TRIGON



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
EB1-B	SS-4	3.5-5.0	NA	32	18	14	Orange-Tan Clayey Silty Fine to Coarse SAND with Gravel (A-2-6)

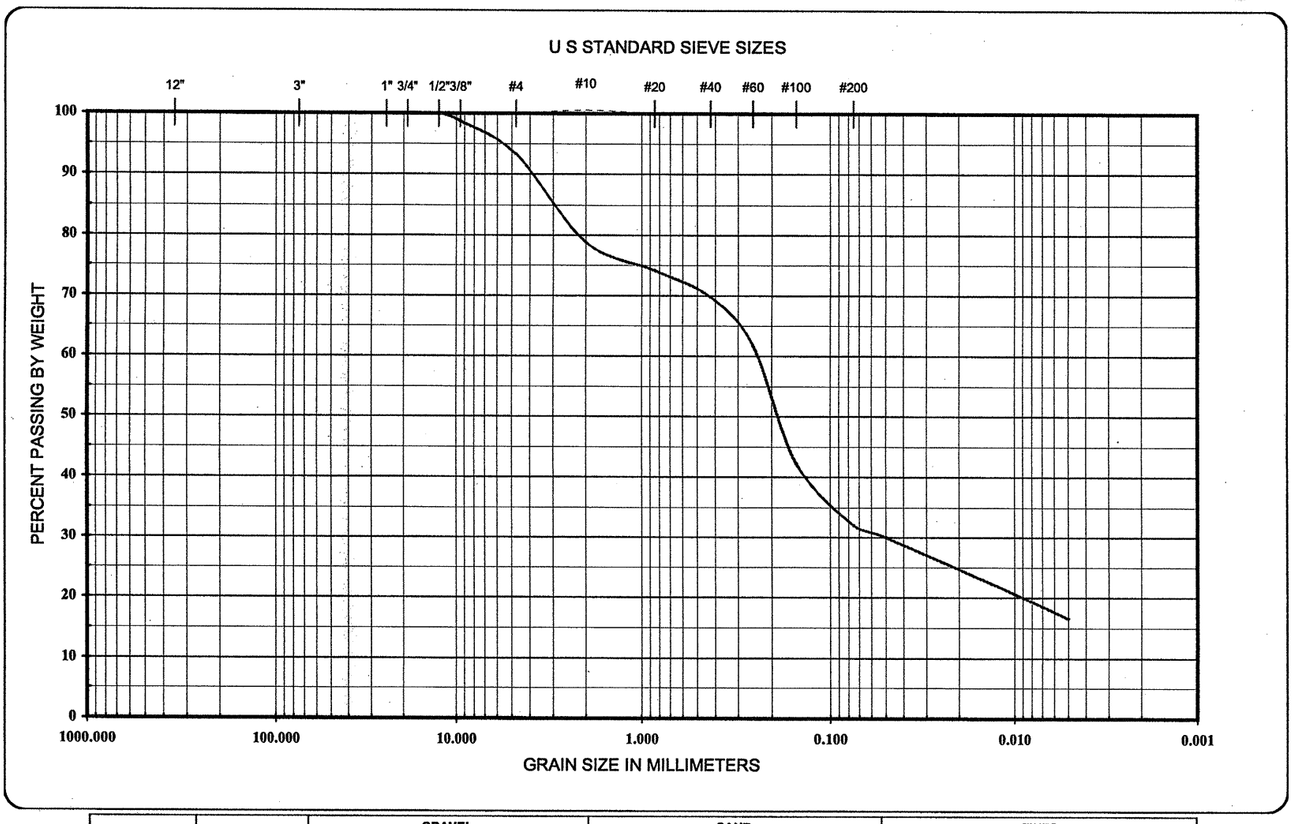
GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 217)

071-02-017

10/23/2002

TRIGON



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
EB2-A	SS-8	6.0-7.5	NA	20	15	5	Grey Silty Clayey Coarse to Fine SAND (A-2-4) with Gravel

GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 217)

071-02-017

10/23/2002

State Project No. 8.2353001
TIP No. B-3450
Bridge No. 217 over Tributary to Sandy Creek on SR 1116 (Garrett Road)
Durham 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	Pass #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
EB1-A	1.0-2.5	SS-1	17.5	A-6 (1)	5	32	20	12	74	66	39	35	20	33	29	18
EB1-A	13.5-15.0	SS-2	20.9	A-4 (0)	5	22	19	3	100	99	55	47	6	46	28	20
EB1-B	1.0-2.5	SS-3	20.1	A-7-6 (2)	8	41	25	16	75	56	37	35	32	21	24	23
EB1-B	3.5-5.0	SS-4	-	A-2-6 (0)	19	32	18	14	69	43	27	25	43	20	21	16
B1-A	7.0-8.5	SS-5	-	A-1-b (0)	7	13	NP	NP	94	41	6	6	80	14	2	4
B1-A	8.5-10.0	SS-6	26.0	A-4 (3)	12	26	18	8	100	99	66	58	2	39	34	25
EB2-A	1.0-2.5	SS-7	-	A-2-6 (1)	5	33	18	15	69	58	35	34	25	25	22	28
EB2-A	6.0-7.5	SS-8	-	A-2-4 (0)	WOH	20	15	5	79	70	32	30	22	40	17	21
EB2-B	13.5-15.0	SS-9	-	A-2-4 (0)	10	14	NP	NP	100	80	28	25	36	39	16	9
CMP-1	3.5-5.0	SS-10	-	A-2-4 (0)	4	14	NP	NP	100	91	22	18	26	57	11	6
CMP-1	6.0-7.5	SS-11	21.7	A-6 (4)	5	30	21	11	100	99	62	52	3	45	30	22
CMP-1	13.5-15.0	SS-12	-	A-3 (0)	3	11	NP	NP	100	71	6	6	66	29	3	2
CMP-2	1.0-2.5	SS-13	35.1	A-7-6 (29)	4	53	26	27	100	99	94	92	1	7	44	48
CMP-2	13.5-15.0	SS-14	-	A-2-4 (0)	3	18	NP	NP	99	89	34	29	27	45	15	13
CMP-3	8.5-10.0	SS-15	-	A-2-4 (0)	3	14	NP	NP	96	64	14	12	56	31	5	8
CMP-4	3.5-5.0	SS-16	19.6	A-4 (0)	3	24	21	3	100	97	48	37	7	56	19	18
CMP-4	18.5-20.0	SS-17	12.2	A-6 (8)	52	37	25	12	86	80	71	71	9	8	59	24
SBD-1	0.0-0.5	G-1	34.4	A-6 (5)	NA	30	21	9	97	88	67	61	14	23	31	32
SBD-2	0.0-0.5	G-2	36.9	A-6 (4)	NA	29	18	11	95	85	57	54	17	27	28	28
SBK-1	0.0-0.5	G-3	14.4	A-4 (2)	NA	30	20	10	82	74	48	46	17	27	33	23
SBK-2	0.0-0.5	G-4	-	A-2-7 (0)	NA	43	27	16	37	27	19	18	35	16	38	11

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

TRIGON ENGINEERING CONSULTANTS, INC.
GREENSBORO, NORTH CAROLINA
Trigon Job Number: 071-02-017
Page: 1 of 1

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 8.2353001 (B-3450))
F.A. NO.: BRSTP-1116(4)
COUNTY: Durham
DESCRIPTION: Bridge No. 217 over Tributary to Sandy Creek on SR 1116 (Garrett Road)

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	B1-A	27.0-27.4	Triassic Sandstone	TRC	92%	0.4224	0.2039	155.10	8,511	40,000	0.009

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3450	1	31

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
8.2353001	BRSTP-1116(4)	P.E.
		CONST.

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

RETURNED FROM LETTING

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 8.2353001 I.D. NO. B-3450

F.A. PROJECT BRSTP-1116(4)

COUNTY DURHAM

PROJECT DESCRIPTION BRIDGE NO. 122 OVER SANDY CREEK AND BRIDGE NO. 217 OVER TRIBUTARY TO SANDY CREEK ON SR 1116 (GARRETT RD)

SITE DESCRIPTION BRIDGE NO. 122 OVER SANDY CREEK ON SR 1116 (GARRETT RD)

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 ON-PLACE TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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1) NCDOT GEOTECHNICAL UNIT SOIL AND ROCK CLASSIFICATION SHEET
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5) BRIDGE 122 FINAL BORING LOGS, CORING LOGS, AND CORE PHOTOGRAPHS
6) DETOUR BRIDGE SUBSURFACE PROFILE
7) DETOUR BRIDGE FINAL BORING LOGS
8) SCOUR REPORT, CHANNEL BED AND BANK MATERIAL LABORATORY TEST DATA AND GRAIN SIZE DISTRIBUTION GRAPHS
9) SUMMARY OF LABORATORY TEST DATA

For Letting

INVESTIGATED BY D GOODNIGHT PERSONNEL D KITCHEN
CHECKED BY J VINSON P BOND
SUBMITTED BY P WEAVER B SHULL
DATE 11/1/02 H HODGMAN
R TOOTHMAN
T WELL

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

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

NORTH CAROLINA LICENSED SEAL 1500 GEOLOGIST PAUL M. WEAVER

SEAL

SIGNATURE

DRAWN BY: DRK

PROJECT: 8.2353001 ID: B-3450

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3450	8.2353001	2	31

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL 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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT / PLASTIC INDEX	6 MX		N.P.	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS 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/FT^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.5 0.5 TO 1 1 TO 2 2 TO 4 >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
GRAIN SIZE 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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- 25/626 DIP/DIP DIRECTION OF ROCK STRUCTURES
- ● - SOUNDING ROD
- SPT CPT DPT DMT VST PMT 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
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:
- [X] MOBILE B- 57
- [ ] BK-51
- [ ] CME-45
- [X] CME-550 X
- [ ] PORTABLE HOIST
- [X] OTHER CME-850
- [X] OTHER CME-550X

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 3 3/4" TUNG.-CARB.
- [X] CORE BIT
- [ ] OTHER _____

HAMMER TYPE:
- [X] AUTOMATIC
- [X] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [X] -H 0

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] WANE 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 FOLOWS:

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.

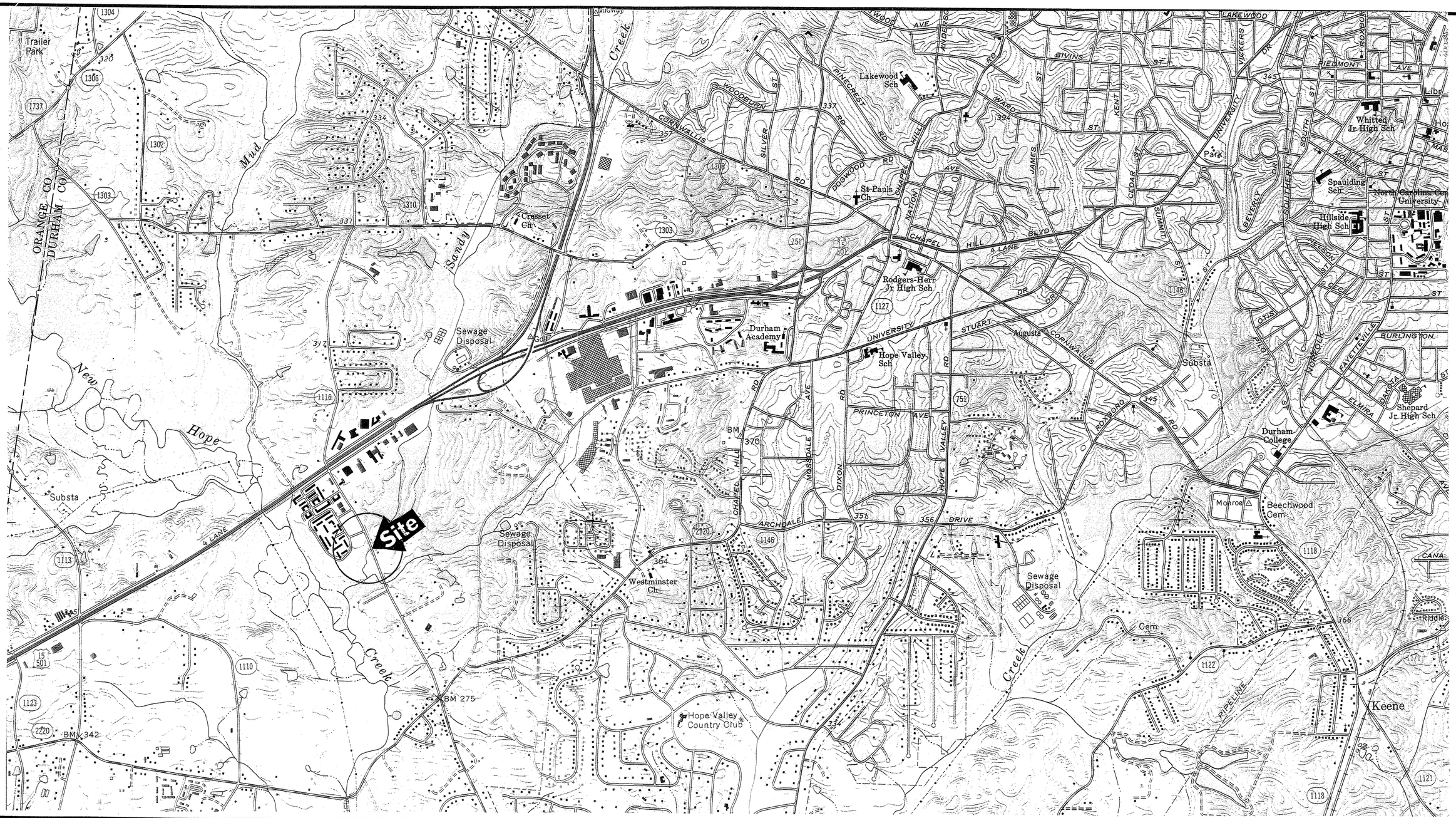
TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #3: -BL- STA. 15+67.9, 178.0' LT

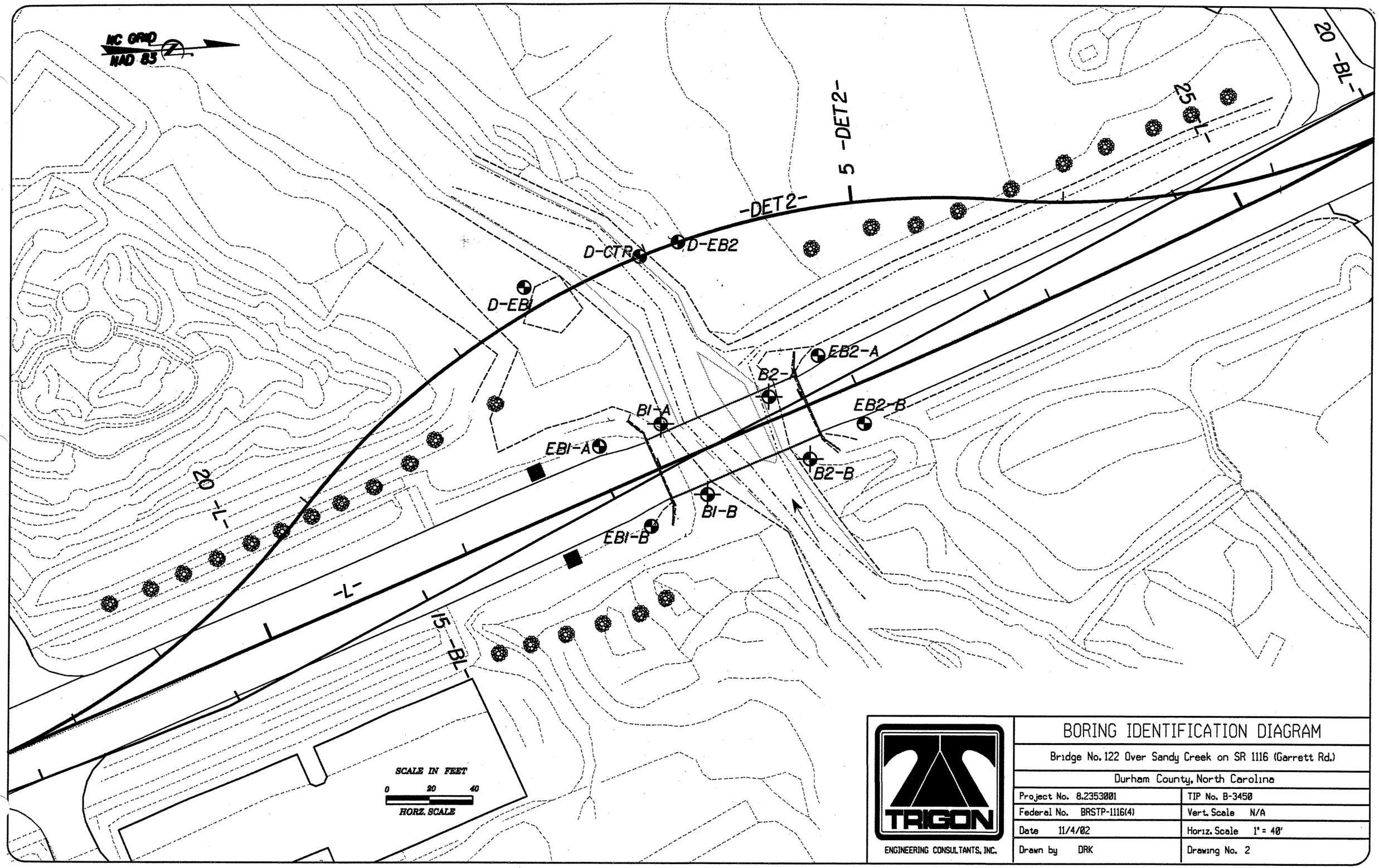
ELEVATION: 250.58'

NOTES:

REVISED 09/15/00



TRIGON Trigon Engineering Consultants, Inc. Greensboro North Carolina	SCALE: 1 = 24,000	DATE: 09/27/02	STATE PROJECT NO.: 8.2353001	TIP NO.: B-3450
	Site Vicinity Map Bridge No. 122 Over Sandy Creek on SR1116 (Garrett Road)			
	Southwest Durham, North Carolina		DRAWING NUMBER: 1	



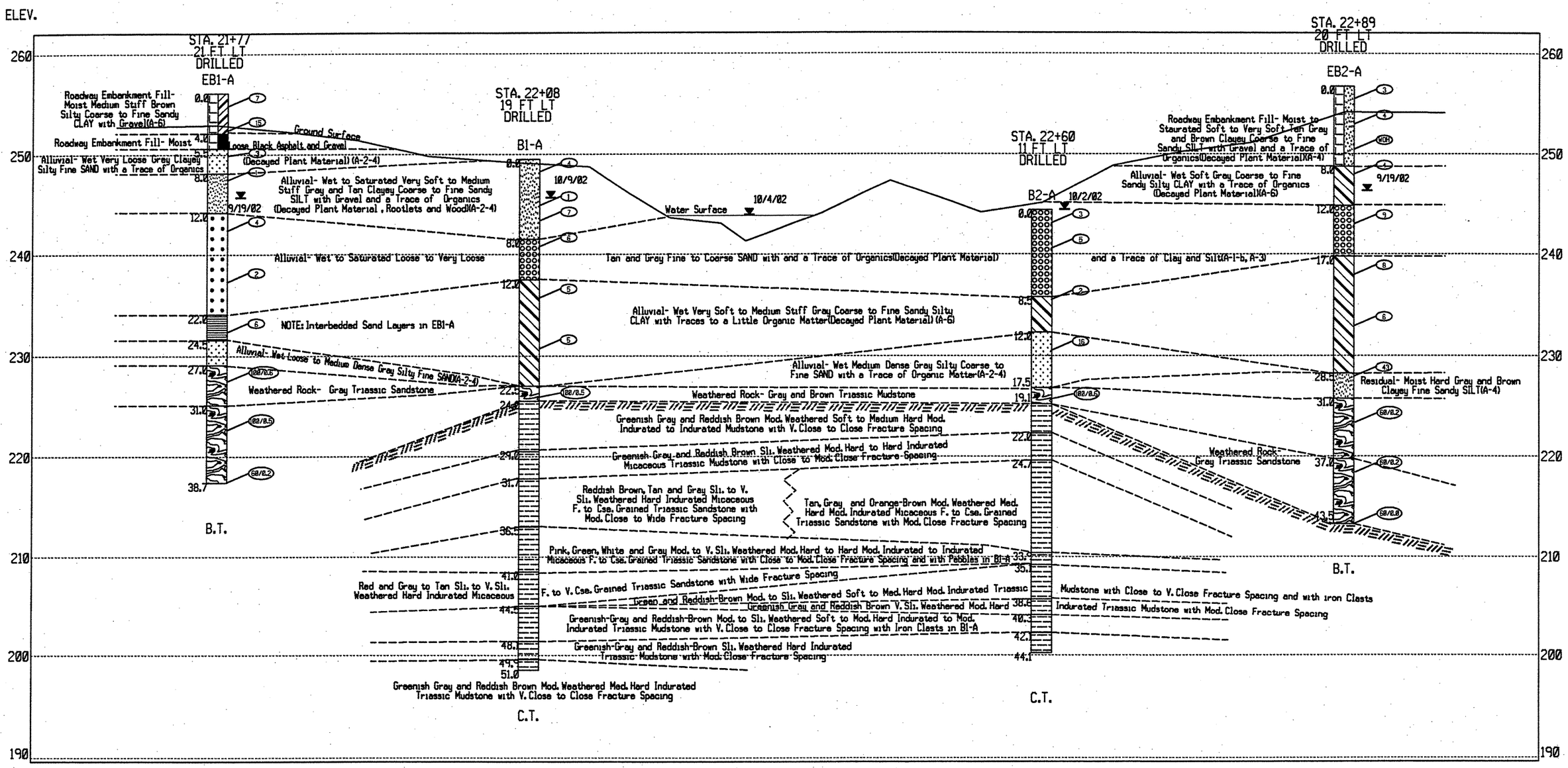
TRIGON
ENGINEERING CONSULTANTS, INC.

BORING IDENTIFICATION DIAGRAM

Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale N/A
Date 11/4/02	Horiz. Scale 1" = 40'
Drawn by DRK	Drawing No. 2



SCALE IN FEET

0 5 10

VERT. SCALE

0 2 4

HORZ. SCALE

TRIGON

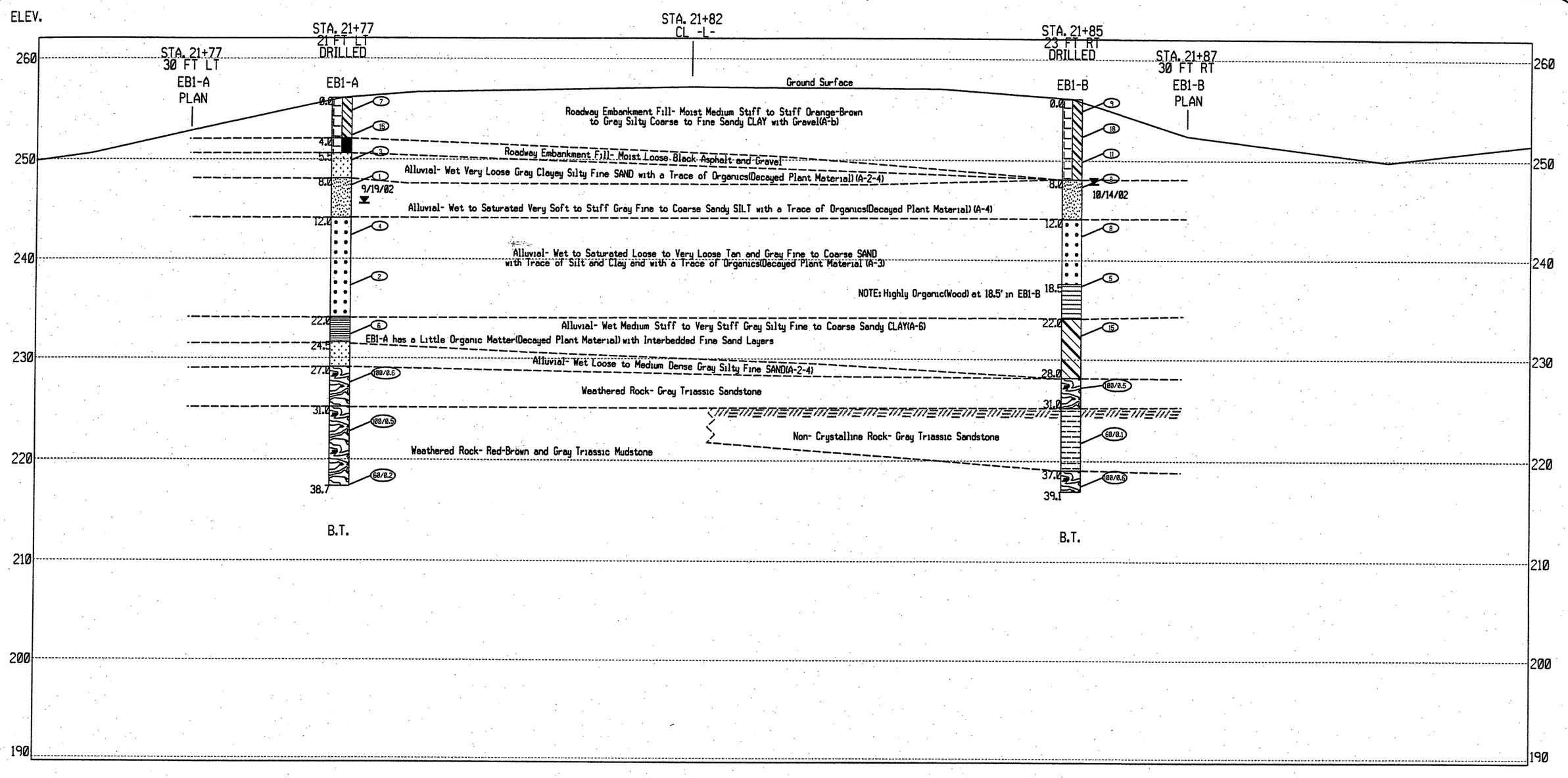
ENGINEERING CONSULTANTS, INC.

PROFILE 30' LEFT of -L-

Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 4'
Drawn by DRK	Drawing No. 3



SCALE IN FEET

0 5 10

VERT. SCALE

0 3 6

HORZ. SCALE

TRIGON

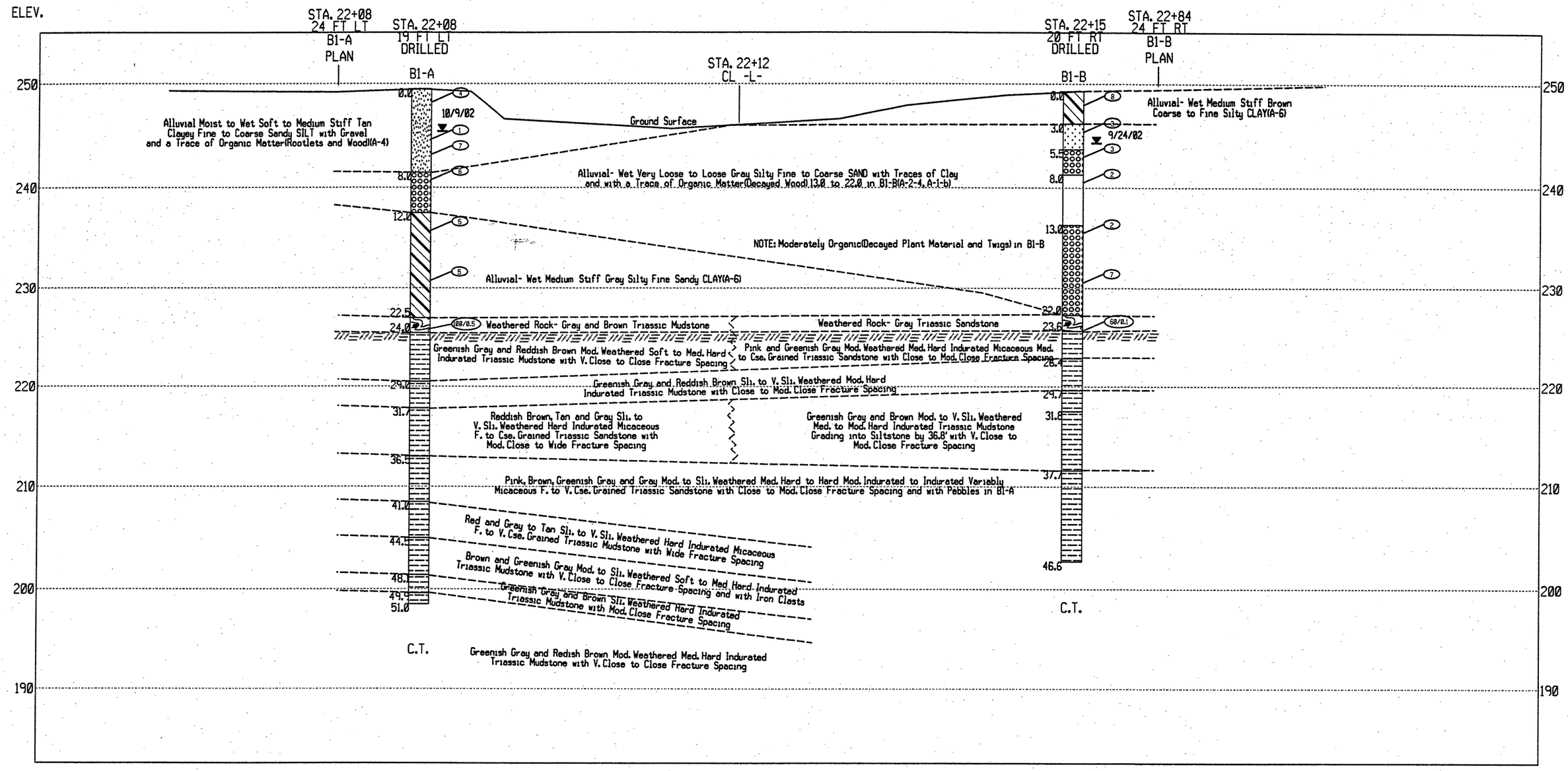
ENGINEERING CONSULTANTS, INC.

CROSS SECTION DIAGRAM AT END BENT-1

Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 6'
Drawn by DRK	Drawing No. 4



SCALE IN FEET

0 5 10

VERT. SCALE

0 3 6

HORZ. SCALE

TRIGON

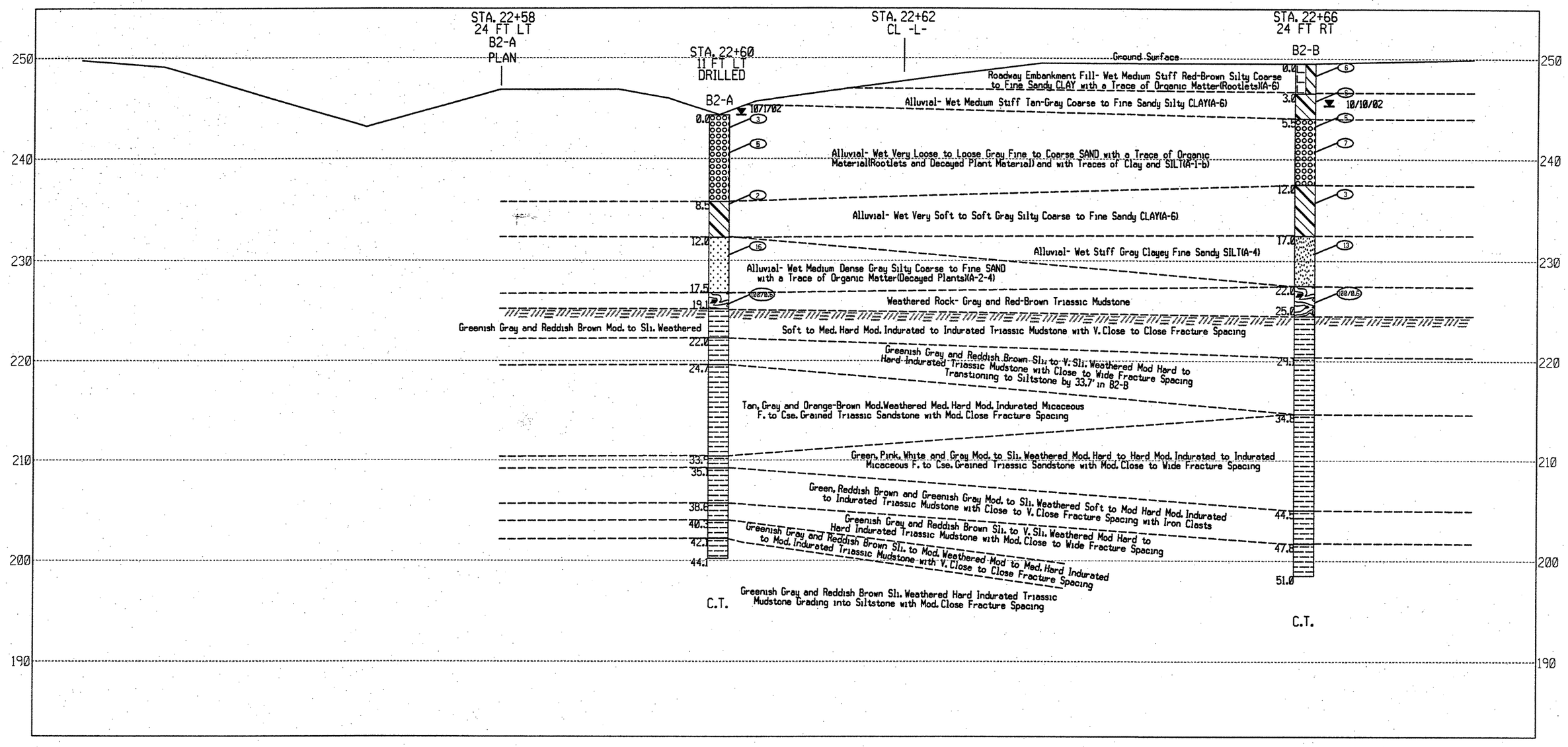
ENGINEERING CONSULTANTS, INC.

CROSS SECTION DIAGRAM AT BENT-1

Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 6'
Drawn by DRK	Drawing No. 5



SCALE IN FEET

0 5 10

VERT. SCALE

0 3 6

HORZ. SCALE

TRIGON

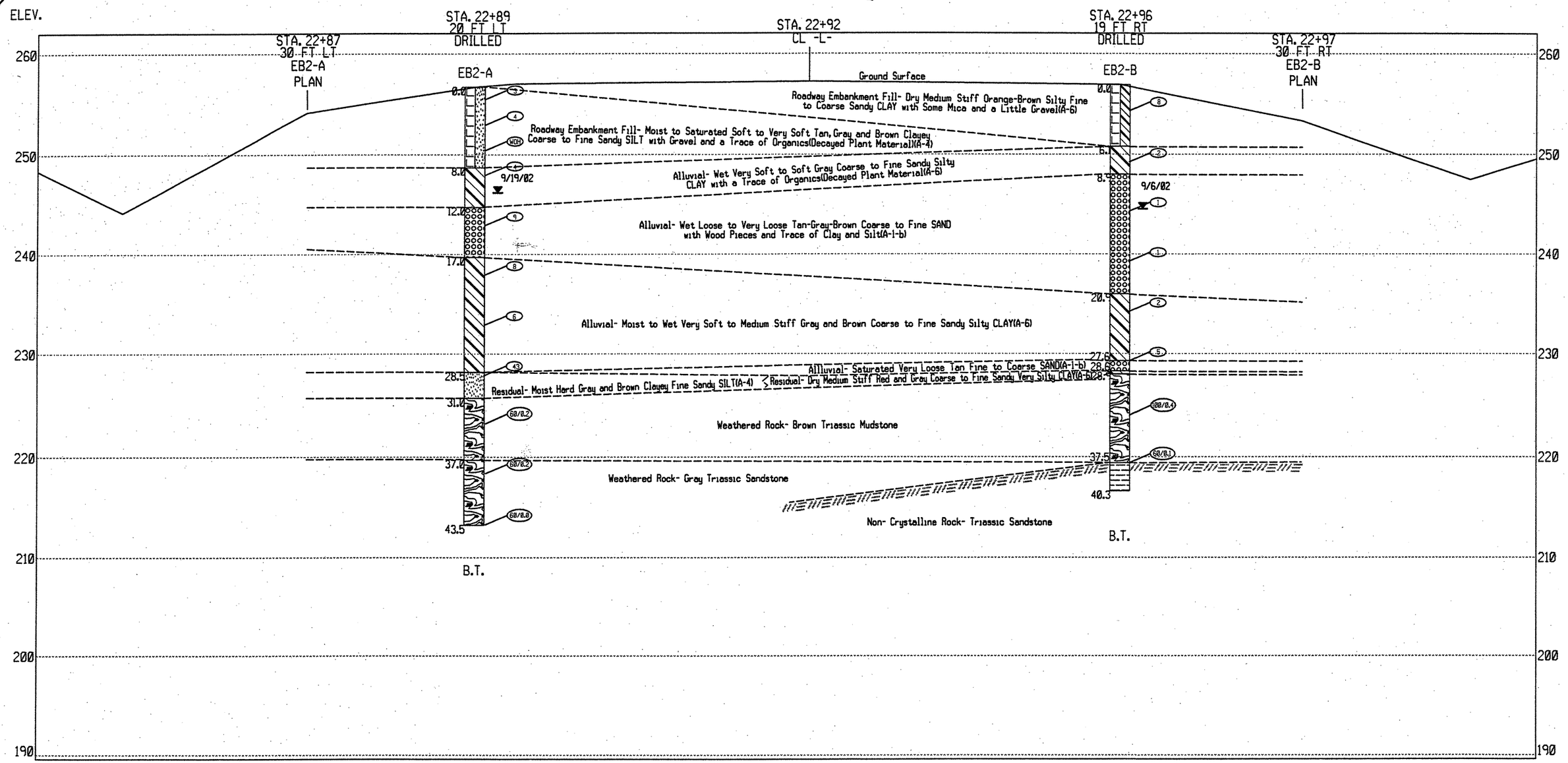
ENGINEERING CONSULTANTS, INC.

CROSS SECTION DIAGRAM AT BENT-2

Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 6'
Drawn by DRK	Drawing No. 6



SCALE IN FEET

0 5 10

VERT. SCALE

0 3 6

HORZ. SCALE

TRIGON

ENGINEERING CONSULTANTS, INC.

CROSS SECTION DIAGRAM AT END BENT-2

Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 6'
Drawn by DRK	Drawing No. 7

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. EB1-A	BORING LOCATION 21+77	OFFSET 21 ft LT	ALIGNMENT -L-	0 HR. 4.8
COLLAR ELEV. 256.1 ft	NORTHING 803238.48	EASTING 2007743.85	24 HR. 10.5
TOTAL DEPTH 38.7 ft	DRILL MACHINE CME 850	DRILL METHOD 3-7/8" Tricone Wash Rotary	HAMMER TYPE 140 lb. Automatic
DATE STARTED 9/18/02	COMPLETED 9/18/02	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	
256.1										256.1 / 0.00
255.1	1.0	2	3	4	7	SS-1	16.2%		ROADWAY EMBANKMENT FILL: Medium Stiff Brown Silty Coarse to Fine Sandy CLAY with Gravel	252.1 / 4.0
252.6	3.5	2	9	6	15				ROADWAY EMBANKMENT FILL: Loose Moist Black Asphalt and Gravel	250.6 / 5.5
250.1	6.0	2	1	2	3		W		ALLUVIAL: Very Loose Grey Clayey Silty Fine SAND with a Trace of Organics (Decayed Plant Material)	248.1 / 8.0
247.6	8.5	WOH	WOH	1	1	SS-2	20.1%		ALLUVIAL: Very Soft Grey Clayey Coarse to Fine Sandy SILT with a Trace of Organics (Decayed Plant Material)	244.1 / 12.0
242.6	13.5	2	2	2	4		S		ALLUVIAL: Loose to Very Loose Tan and Grey Fine to Coarse SAND with a Trace of Silt and Clay and with a Little Organics (Decayed Plant Material)	
237.6	18.5	1	1	1	2		S			234.1 / 22.0
232.6	23.5	WOH	WOH	6	6	SS-3	W		ALLUVIAL: Medium Stiff Grey Fine Sandy Silty CLAY with Interbedded Fine Sand Layers and with a Little Organic Matter (5.3% Decayed Plant Material)	231.6 / 24.5
									ALLUVIAL: Loose to Medium Dense Grey Silty Fine SAND	229.1 / 27.0
227.6	28.5	60	40/0.1		100/0.6		M/W		WEATHERED ROCK: Grey Triassic Sandstone	225.1 / 31.0
222.6	33.5	100/0.5			100/0.5				WEATHERED ROCK: Brown and Grey Triassic Mudstone	
217.6	38.5	60/0.2			60/0.2					217.4 / 38.7
									Boring Terminated at Elevation 217.4 feet in Weathered Rock (Brown Triassic Mudstone)	

NCDOT BORE SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. EB1-B	BORING LOCATION 21+85	OFFSET 23 ft RT	ALIGNMENT -L-	0 HR. 11.2
COLLAR ELEV. 256.1 ft	NORTHING 803261.49	EASTING 2007782.32	24 HR. 10.5
TOTAL DEPTH 39.1 ft	DRILL MACHINE Mobile B-57	DRILL METHOD 3-7/8" Tricone Wash Rotary	HAMMER TYPE 140 lb. Manual
DATE STARTED 10/10/02	COMPLETED 10/10/02	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	
256.1										256.1 / 0.00
255.1	1.0	5	4	5	9	SS-4	14.4%		ROADWAY EMBANKMENT FILL: Stiff to Very Stiff Orange-Brown to Grey Silty Fine to Coarse Sandy CLAY with Gravel	
252.6	3.5	12	9	9	18		M			
250.1	6.0	6	5	6	11		M			248.1 / 8.0
247.6	8.5	4	6	2	8		W		ALLUVIAL: Medium Stiff to Stiff Grey Clayey Coarse to Fine Sandy SILT	244.1 / 12.0
242.6	13.5	3	3	5	8	SS-5	W		ALLUVIAL: Loose Tan and Grey Fine to Coarse SAND with a Trace of Silt and Clay	237.6 / 18.5
237.6	18.5	1	2	3	5		W		Loose Highly Organic (Wood) Tan and Grey Fine to Coarse SAND with a Trace of Silt and Clay	234.1 / 22.0
232.6	23.5	1	4	11	15		W		ALLUVIAL: Stiff to Very Stiff Grey Silty Fine to Coarse Sandy CLAY	228.1 / 28.0
227.6	28.5	100			100/0.5				WEATHERED ROCK: Grey Triassic Sandstone	225.1 / 31.0
222.6	33.5	60/0.1			60/0.1				NON-CRYSTALLINE ROCK: Grey Triassic Sandstone	219.1 / 37.0
217.6	38.5	50	50/0.1		100/0.5				WEATHERED ROCK: Red-Brown and Grey Triassic Mudstone	217.0 / 39.1
									Boring Terminated at Elevation 217.0 feet in Weathered Rock (Triassic Mudstone)	

NCDOT BORE SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

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

BORING LOG

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. B1-A	BORING LOCATION 22+08	OFFSET 19 ft LT	ALIGNMENT -L-	0 HR. 2.5
COLLAR ELEV. 249.5 ft	NORTHING 803268.21	EASTING 2007734.78	24 HR. 4.0
TOTAL DEPTH 51.0 ft	DRILL MACHINE Mobile B-57	DRILL METHOD 3-7/8" Tricone Wash/HQ Core	HAMMER TYPE 140 lb. Manual
DATE STARTED 10/8/02	COMPLETED 10/8/02	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
249.5									
248.5	1.0								249.5 — 0.00 ALLUVIAL: Soft to Medium Stiff Tan Clayey Fine to Coarse Sandy SILT with Gravel and a Trace of Organic Matter (Rootlets and Wood)
		2	2	2	4	SS-6			
245.0	4.5					ST-1			Natural Moisture = 16.5%
243.5	6.0	WOH	WOH	1	1		W		
		8	4	3	7		W		241.5 — 8.0 ALLUVIAL: Loose Grey Fine to Coarse SAND
241.0	8.5								
		3	3	3	6		W		
236.0	13.5								237.5 — 12.0 ALLUVIAL: Medium Stiff Grey Silty Fine Sandy CLAY
		3	4	1	5	SS-7	27.8%		
						ST-2			
231.0	18.5								
		3	2	3	5		W		
226.0	23.5								227.0 — 22.5
		73	27/0.0		100/0.5				225.5 — 24.0 WEATHERED ROCK: Grey and Brown Triassic Mudstone
									Greenish Grey and Reddish Brown; Moderately Weathered; Soft to Medium Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing — 220.5 — 29.0
									Greenish Grey and Reddish Brown; Slightly Weathered; Moderately Hard; Indurated Triassic Mudstone with Moderately Close Fracture Spacing — 217.8 — 31.7
						RS-1			Reddish Brown, Tan and Grey; Slightly to Very Slightly Weathered; Hard, Indurated; Micaceous; Fine to Coarse Grained; Triassic Sandstone with Moderately Close to Wide Fracture Spacing — 213.0 — 36.5
									Pink, Green, and Grey; Moderately to Slightly Weathered; Moderately Hard to Hard; Moderately Indurated to Indurated; Micaceous; Fine to Very Coarse Grained Triassic Sandstone with Close to Moderately Close Fracture Spacing and with Pebbles — 208.5 — 41.0 — 205.0 — 44.5
									Red and Grey to Tan; Slightly to Very Slightly Weathered; Hard; Indurated Micaceous Fine to Very Coarse Grained Triassic Sandstone with Wide Fracture Spacing — 201.4 — 48.1
									Brown and Greenish Grey; Moderately to Slightly Weathered; Soft to Medium Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing and with Iron Clasts — 199.6 — 49.9 — 198.5 — 51.0
									Greenish Grey and Brown; Slightly Weathered; Hard; Indurated Triassic Mudstone with Moderately Close Fracture Spacing
									Greenish Grey and Reddish Brown; Moderately Weathered; Medium Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing
									Coring Terminated at Elevation 198.5 feet in Non-Crystalline Rock (Moderately Weathered Triassic Mudstone)

NCDOT BOREC SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

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

CORE BORING REPORT

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. B1-A	BORING LOCATION 22+08	OFFSET 19 ft LT	ALIGNMENT -L-	0 HR. 2.5
COLLAR ELEV. 249.5 ft	NORTHING 803268.21	EASTING 2007734.78	24 HR. 4.0
TOTAL DEPTH 51.0 ft	DRILL MACHINE Mobile B-57	DRILL METHOD 3-7/8" Tricone Wash/HQ Core	HAMMER TYPE 140 lb. Manual
DATE STARTED 10/8/02	COMPLETED 10/8/02	SURFACE WATER DEPTH NA	
CORE SIZE HQ	TOTAL RUN 27.0 ft	DRILLER B. Shull	

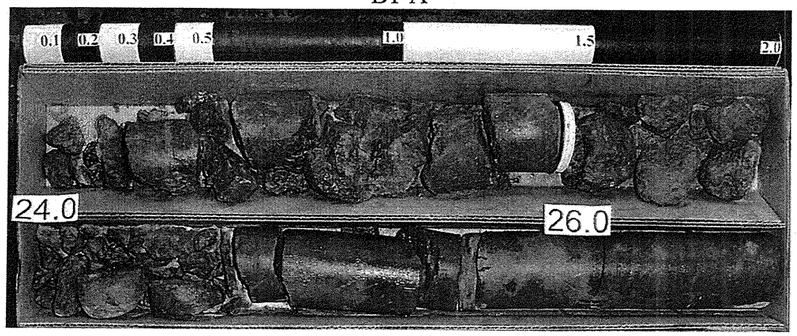
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 24.0 ft
225.5	24.0	2.0	4:06	(80%	(0%		(56%	(0%		225.5 — 24.0 Greenish Grey and Reddish Brown; Moderately Weathered; Soft to Medium Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing
223.5	26.0		7:21	1.6)	0.0)		2.8)	0.0)		
		5.0	4:40	(64%	(40%					
			5:11	3.2)	2.0)					jts @ 0° to 10° with minor clay infilling
			8:43							220.5 — Very broken 26.0 feet to 29.0 feet — 29.0
			7:45				(100%	(100%		Greenish Grey and Reddish Brown; Slightly Weathered; Moderately Hard; Indurated Triassic Mudstone with Moderately Close Fracture Spacing
218.5	31.0		6:42				2.7)	2.7)		217.8 — 31.7
		5.0	5:31	(100%	(100%					
			3:54	5.0)	5.0)	RS-1	(100%	(100%		No natural breaks
			4:30				4.8)	4.8)		Reddish Brown, Tan and Grey; Slightly to Very Slightly Weathered; Hard, Indurated; Micaceous; Fine to Coarse Grained; Triassic Sandstone with Moderately Close to Wide Fracture Spacing
213.5	36.0		2:47							213.0 — 36.5
		5.0	3:27	(100%	(74%					
			3:21	5.0)	3.7)		(100%	(71%		1 jt @ 0° with light iron staining
			1:35				4.5)	3.2)		Pink, Green, and Grey; Moderately to Slightly Weathered; Moderately Hard to Hard; Moderately Indurated to Indurated; Micaceous; Fine to Very Coarse Grained Triassic Sandstone with Close to Moderately Close Fracture Spacing and with Pebbles
			2:11							
208.5	41.0		3:00							208.5 — 41.0
		5.0	2:20	(88%	(68%		(100%	(97%		
			2:45	4.4)	3.4)		3.5)	3.4)		
			2:22							205.0 — 44.5
			3:30							1 jt @ 80° at 36.8 feet, jt thickness = <0.01 foot
			4:45				(75%	(36%		1 jt @ 10° at 37.0 feet with clay, jt thickness = 0.01 foot
203.5	46.0		12:19				2.7)	1.3)		1 jt @ 80° from 38.5 feet to 39.5 feet, jt thickness = <0.01 foot
		5.0	7:17	(94%	(68%					201.4 — 48.1 — 1 jt @ 70° from 39.8 feet to 40.1 feet with bisecting 0° jt
			4:50	4.7)	3.4)					
			4:53				(100%	(100%		3 jts @ 0° to 10° between 40.3 feet and 41.0 feet
			4:33				1.8)	1.8)		199.6 — 49.9
198.5	51.0		7:46				(100%	(27%		198.5 — 51.0 — Red and Grey to Tan; Slightly to Very Slightly Weathered; Hard; Indurated Micaceous Fine to Very Coarse Grained Triassic Sandstone with Wide Fracture Spacing
							1.1)	0.3)		
										Mudstone layer 43.4 feet to 43.7 feet
										1 jt @ 0° at 44.4 feet with light iron staining
										Brown and Greenish Grey; Moderately to Slightly Weathered; Soft to Medium Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing and with Iron Clasts
										Very broken 44.5 feet to 45.8 feet and 46.0 feet to 46.6 feet
										1 jt @ 30° at 45.8 feet
										1 jt @ 25° at 46.6 feet
										4 jts @ 0° to 10° from 46.8 feet to 48.1 feet
										Greenish Grey and Brown; Slightly Weathered; Hard; Indurated Triassic Mudstone with Moderately Close Fracture Spacing
										No natural breaks
										Greenish Grey and Reddish Brown; Moderately Weathered; Medium Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing
										Coring Terminated at Elevation 198.5 feet in Non-Crystalline Rock (Moderately Weathered Triassic Mudstone)

NCDOT CORE SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

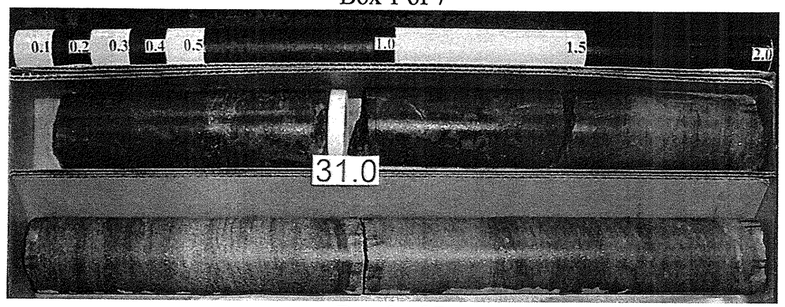
CORE PHOTOGRAPHS

Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

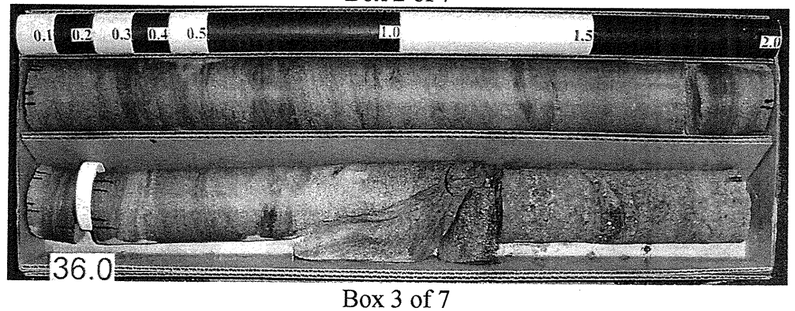
B1-A



Box 1 of 7



Box 2 of 7



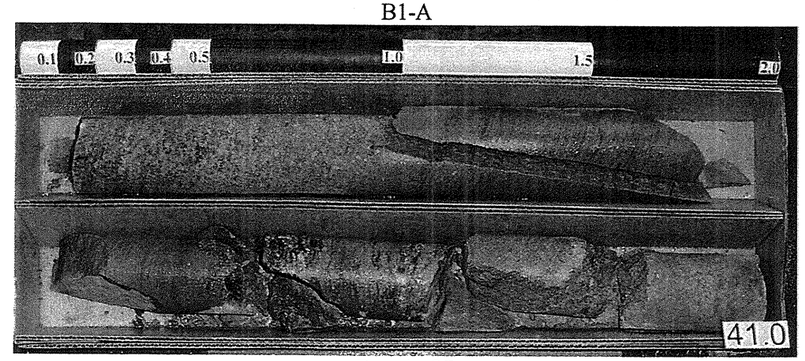
Box 3 of 7

(SCALE = 1:4)

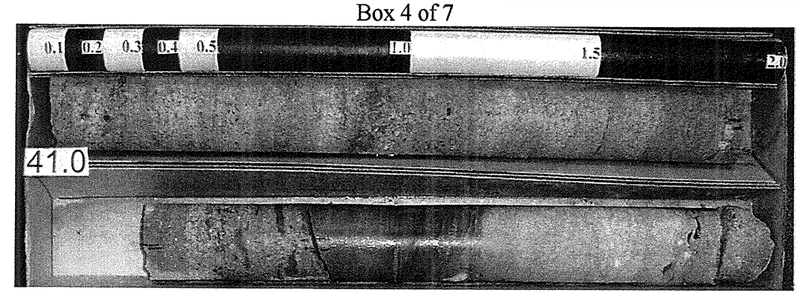
CORE PHOTOGRAPHS

Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

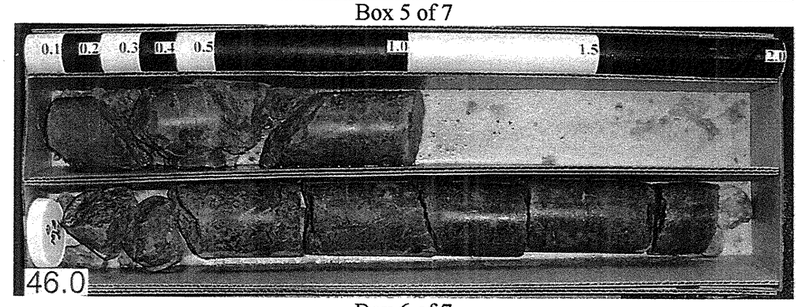
B1-A



Box 4 of 7



Box 5 of 7



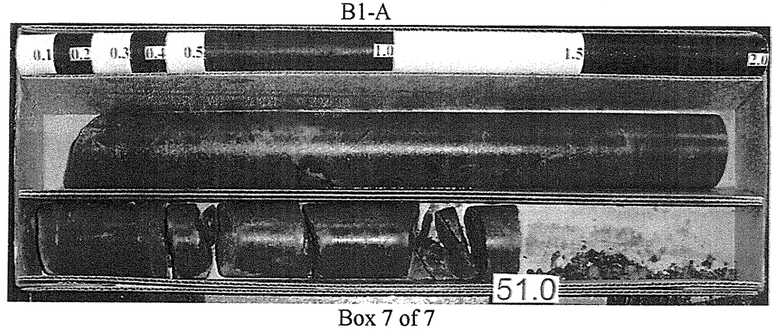
Box 6 of 7

(SCALE = 1:4)

CORE PHOTOGRAPHS

Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

B1-A



Box 7 of 7

(SCALE = 1:4)

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

BORING LOG

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. B1-B	BORING LOCATION 22+15	OFFSET 20 ft RT	ALIGNMENT -L-	0 HR. 5.0
COLLAR ELEV. 249.3 ft	NORTHING 803288.62	EASTING 2007768.86	24 HR. 4.9
TOTAL DEPTH 46.6 ft	DRILL MACHINE CME 850	DRILL METHOD 3-7/8" Tricone Wash/HQ Core	HAMMER TYPE 140 lb. Automatic
DATE STARTED 9/19/02	COMPLETED 9/23/02	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
249.3									249.3 0.00
248.3	1.0								ALLUVIAL: Medium Stiff Brown Coarse to Fine Sandy Silty CLAY
		2	3	5	8	SS-8	24.7%		
245.8	3.5								246.3 3.0 ALLUVIAL: Very Loose Tan Silty Fine SAND
		2	1	2	3				
243.3	6.0								243.8 5.5 ALLUVIAL: Very Loose Grey Fine to Coarse SAND with Traces of Clay and Silt
		2	2	1	3		W		
240.8	8.5								241.3 8.0 ALLUVIAL: Very Loose Grey Moderately Organic (Decayed Plant Material) Fine to Coarse SAND with a Trace of Clay and Silt
		WOH	1	1	2		W		
235.8	13.5								236.3 13.0 ALLUVIAL: Very Loose to Loose Grey Fine to Coarse SAND with Traces of Clay and Silt and Organic Matter (Decayed Wood)
		2	1	1	2		W		
230.8	18.5								227.3 22.0 WEATHERED ROCK: Grey Triassic Sandstone
		2	4	3	7				
225.8	23.5								225.7 23.6 Pink and Greenish Grey; Moderately Weathered; Medium Hard; Indurated; Micaceous Medium to Coarse Grained Triassic Sandstone with Close to Moderately Close Fracture Spacing
		60/0.1			60/0.1				
									222.9 26.4 Greenish Grey and Brown; Slightly to Very Slightly Weathered; Moderately Hard; Indurated Triassic Mudstone with Close to Moderately Close Fracture Spacing
									219.6 29.7 Greenish Grey and Brown; Moderately Weathered; Medium Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing
									217.5 31.8 Greenish Grey and Brown; Slightly to Very Slightly Weathered; Moderately Hard; Indurated Triassic Mudstone Grading into Siltstone by 36.8 feet with Close to Moderately Close Fracture Spacing
									211.6 37.7 Pink, Brown, Greenish Grey, and Grey; Moderately Weathered; Moderately Hard to Medium Hard; Indurated; Medium to Coarse Grained; Slightly Micaceous; Triassic Sandstone with Moderately Close to Close Fracture Spacing
									202.7 46.6 Coring Terminated at 202.7 feet in Non-Crystalline Rock (Moderately Weathered Triassic Sandstone)

NCDOT BOre SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

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

CORE BORING REPORT

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. B1-B	BORING LOCATION 22+15	OFFSET 20 ft RT	ALIGNMENT -L-	0 HR. 5.0
COLLAR ELEV. 249.3 ft	NORTHING 803288.62	EASTING 2007768.86	24 HR. 4.9
TOTAL DEPTH 46.6 ft	DRILL MACHINE CME 850	DRILL METHOD 3-7/8" Tricone Wash/HQ Core	HAMMER TYPE 140 lb. Automatic
DATE STARTED 9/19/02	COMPLETED 9/23/02	SURFACE WATER DEPTH NA	
CORE SIZE HQ	TOTAL RUN 23.0 ft	DRILLER R. Toothman	

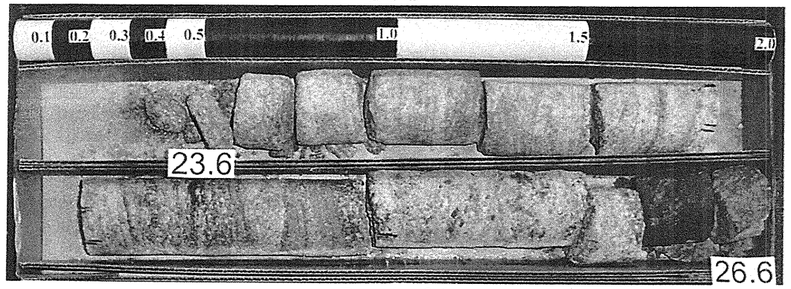
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 23.6 ft
225.7	23.6	3.0	2:08 2:01 13:34	(100% 3.0)	(57% 1.7)		(100% 2.8)	(61% 1.7)		225.7 23.6 Pink and Greenish Grey; Moderately Weathered; Medium Hard; Indurated; Micaceous Medium to Coarse Grained Triassic Sandstone with Close to Moderately Close Fracture Spacing
222.7	26.6	5.0	4:45 5:01 8:14 11:51 12:25	(88% 4.4)	(62% 3.1)		(88% 2.9)	(85% 2.8)		222.9 26.4 8 jts @ 0° to 10°
217.7	31.6	5.0	5:08 5:25 5:56 4:57	(96% 4.8)	(88% 4.4)		(81% 1.7)	(19% 0.4)		219.6 29.7 23.6 feet to 24.6 feet No fractures from 24.6 feet to 25.6 feet and 25.6 feet to 26.2 feet
212.7	36.6	5.0	4:00 3:00 2:54 7:30 1:43	(96% 4.8)	(94% 4.7)		(100% 5.9)	(92% 5.4)		217.5 31.8 Greenish Grey and Brown; Slightly to Very Slightly Weathered; Moderately Hard; Indurated Triassic Mudstone with Close to Moderately Close Fracture Spacing 26.4 feet to 27.0 feet is moderately weathered with very close to close fracture spacing; fractures @ 0° 27.0 feet to 29.7 feet - 3 jts @ 0° to 10°
207.7	41.6	5.0	2:22 1:33 2:23 1:35 3:20 6:22	(100% 5.0)	(80% 4.0)		(98% 8.7)	(85% 7.6)		211.6 37.7 Greenish Grey and Brown; Moderately Weathered; Medium Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing 12 jts @ 0° to 10° Numerous small unopened fractures
202.7	46.6									202.7 46.6 Greenish Grey and Brown; Slightly to Very Slightly Weathered; Moderately Hard; Indurated Triassic Mudstone Grading into Siltstone by 36.8 feet with Close to Moderately Close Fracture Spacing 2 jts @ 10° and 2 jts @ 30° with light clay Very broken 32.8 feet to 33.0 feet Pink, Brown, Greenish Grey, and Grey; Moderately Weathered; Moderately Hard to Medium Hard; Indurated; Medium to Coarse Grained; Slightly Micaceous; Triassic Sandstone with Moderately Close to Close Fracture Spacing 11 jts @ 0° to 10° 1 jt @ 50° at 44.2 feet Intact 44.2 feet to 46.6 feet except for mechanical fractures Coring Terminated at 202.7 feet in Non-Crystalline Rock (Moderately Weathered Triassic Sandstone)

NCDOT CORE SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

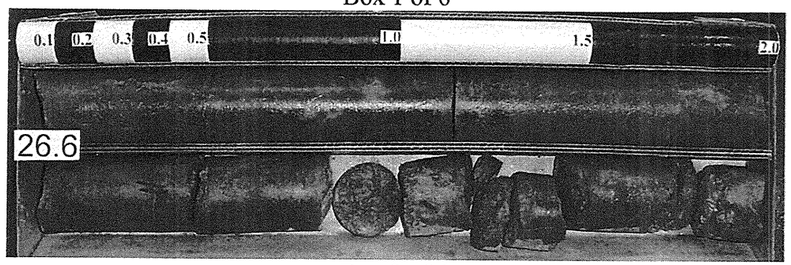
CORE PHOTOGRAPHS

Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

B1-B



Box 1 of 6



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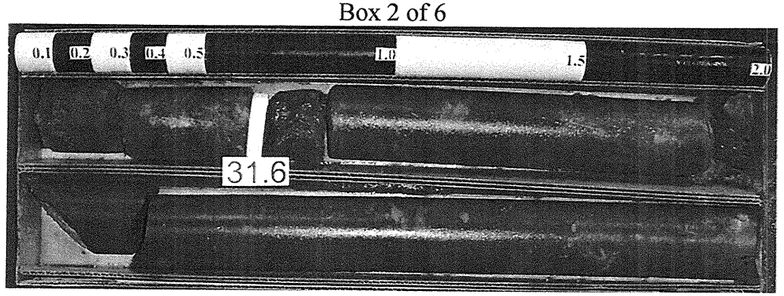


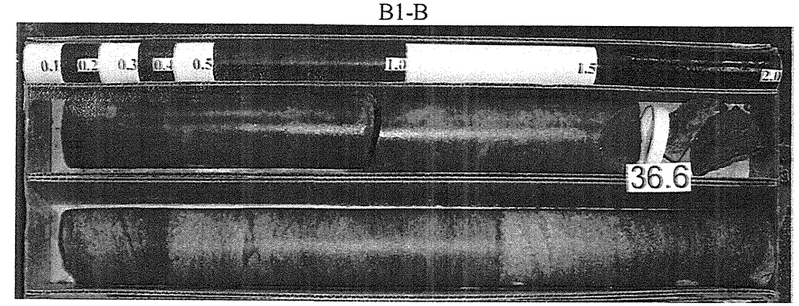
Box 3 of 6

(SCALE = 1:4)

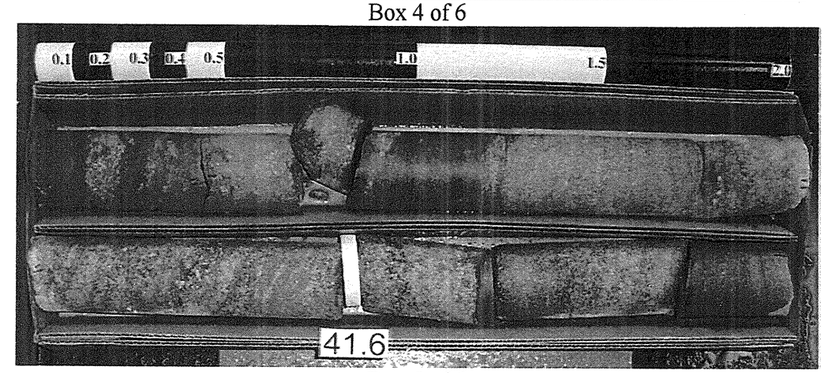
CORE PHOTOGRAPHS

Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

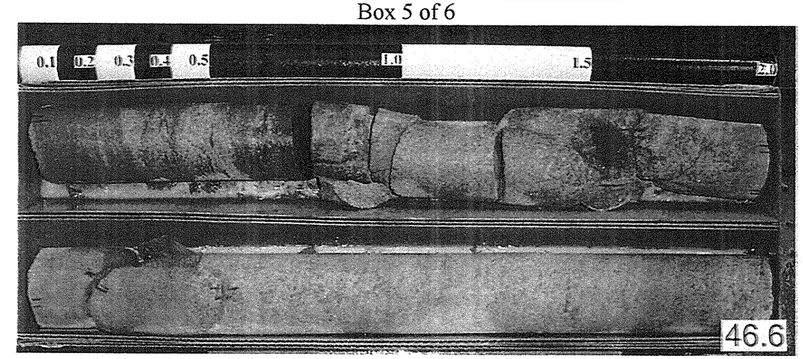
B1-B



Box 4 of 6



Box 5 of 6



Box 6 of 6

(SCALE = 1:4)

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

BORING LOG

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. B2-A	BORING LOCATION 22+60	OFFSET 11 ft LT	ALIGNMENT -L-	0 HR. 0.0
COLLAR ELEV. 244.3 ft	NORTHING 803319.74	EASTING 2007724.14	24 HR. 0.0
TOTAL DEPTH 44.1 ft	DRILL MACHINE Mobile B-57	DRILL METHOD 3-7/8" Tricone Wash/HQ Core	HAMMER TYPE 140 lb. Manual
DATE STARTED 9/30/02	COMPLETED 10/1/02	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	
244.3										
243.3	1.0								ALLUVIAL: Very Loose to Loose Grey Fine to Coarse SAND with a Trace of Organic Matter (Rootlets and Decaying Plants) and with Traces of Clay and Silt	244.3 / 0.00
240.8	3.5	3	2	1	8		W			
		3	2	3	5	SS-9	W			
235.8	8.5								ALLUVIAL: Very Soft Grey Coarse to Fine Sandy Silty CLAY	235.8 / 8.5
		3	1	1	2	SS-10	29.6%			
230.8	13.5								ALLUVIAL: Medium Dense Grey Silty Coarse to Fine SAND with a Trace of Organic Matter (Decayed Plants)	232.3 / 12.0
		5	6	10	16		W			
225.8	18.5								WEATHERED ROCK: Grey Triassic Mudstone	228.8 / 17.5
		64	36/0.1		100/0.6				Greenish Grey and Reddish Brown; Moderately Weathered; Soft to Medium Hard; Moderately Indurated Triassic Mudstone with Very Close to Close Fracture Spacing	225.2 / 19.1
									Greenish Grey and Reddish Brown; Slightly Weathered; Hard; Indurated Micaceous Triassic Mudstone with Close to Moderately Close Fracture Spacing	222.3 / 22.0
									Tan, Grey, and Orange-Brown; Moderately Weathered; Medium Hard; Moderately Indurated; Micaceous; Fine to Coarse Grained Triassic Sandstone with Moderately Close Fracture Spacing	219.6 / 24.7
									Green, White, and Grey; Slightly to Very Slightly Weathered; Hard; Indurated; Micaceous; Fine to Coarse Grained Triassic Sandstone with Moderately Close Fracture Spacing	210.4 / 33.9
									Green with Reddish Brown; Moderately to Slightly Weathered; Soft to Medium Hard; Moderately Indurated Triassic Mudstone with Close to Very Close Fracture Spacing and with Iron Clasts	209.2 / 35.1
									Greenish Grey and Reddish Brown; Very Slightly Weathered; Moderately Hard; Indurated Triassic Mudstone with Moderately Close Fracture Spacing	205.7 / 38.6
									Greenish Grey and Reddish Brown; Slightly to Moderately Weathered; Moderate to Medium Hard; Indurated to Moderately Indurated; Triassic Mudstone with Very Close to Close Fracture Spacing	204.0 / 40.3
									Greenish Grey and Reddish Brown; Slightly Weathered; Hard; Indurated Triassic Mudstone Grading into Siltstone with Moderately Close Fracture Spacing	202.2 / 42.1
									Coring Terminated at Elevation 200.2 feet in Non-Crystalline Rock (Slightly Weathered Triassic Siltstone)	200.2 / 44.1

NCDOT BORE SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

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

CORE BORING REPORT

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. B2-A	BORING LOCATION 22+60	OFFSET 11 ft LT	ALIGNMENT -L-	0 HR. 0.0
COLLAR ELEV. 244.3 ft	NORTHING 803319.74	EASTING 2007724.14	24 HR. 0.0
TOTAL DEPTH 44.1 ft	DRILL MACHINE Mobile B-57	DRILL METHOD 3-7/8" Tricone Wash/HQ Core	HAMMER TYPE 140 lb. Manual
DATE STARTED 9/30/02	COMPLETED 10/1/02	SURFACE WATER DEPTH NA	
CORE SIZE HQ	TOTAL RUN 25.0 ft	DRILLER B. Shull	

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 @ 19.1 ft	
225.2	19.1	5.0	5:30 6:00 6:11 10:35 6:00	(84% 4.2)	(58% 2.9)		(72% 2.1)	(28% 0.80)		Greenish Grey and Reddish Brown; Moderately Weathered; Soft to Medium Hard; Moderately Indurated Triassic Mudstone with Very Close to Close Fracture Spacing	225.2 / 19.1
220.2	24.1						(93% 2.5)	(89% 2.4)		Numerous horizontal and vertical fractures with clay infilling, fracture spacing and thickness not possible due to brokenness	222.3 / 22.0
		5.0	4:13 3:14 2:22 1:56 1:00	(96% 4.8)	(94% 4.7)		(100% 9.2)	(100% 9.2)		Greenish Grey and Reddish Brown; Slightly Weathered; Hard; Indurated Micaceous Triassic Mudstone with Close to Moderately Close Fracture Spacing	219.6 / 24.7
215.2	29.1									1 jt @ 30° 1 jt @ 0° 2 jts @ 0°	
		5.0	1:41 1:34 1:49 1:56 4:47	(98% 4.9)	(98% 4.9)					Tan, Grey, and Orange-Brown; Moderately Weathered; Medium Hard; Moderately Indurated; Micaceous; Fine to Coarse Grained Triassic Sandstone with Moderately Close Fracture Spacing	210.4 / 33.9
210.2	34.1									Iron staining of much of fabric 1 jt @ 0° with iron staining and clay	209.2 / 35.1
		5.0	2:25 13:37 11:03 9:01 7:37	(80% 4.0)	(52% 2.6)		(100% 1.2) (69% 2.4)	(100% 1.2) (40% 1.4)		Green, White, and Grey; Slightly to Very Slightly Weathered; Hard; Indurated; Micaceous; Fine to Coarse Grained Triassic Sandstone with Moderately Close Fracture Spacing	205.7 / 38.6
205.2	39.1									1 jt @ 10° Dark grey mudstone layer from 33.2 feet to 33.6 feet	204.0 / 40.3
		5.0	10:06 5:56 5:21 4:01 3:30	(100% 5.0)	(84% 4.2)		(100% 1.7) (100% 1.8)	(100% 1.7) (33% 0.6)		Green with Reddish Brown; Moderately to Slightly Weathered; Soft to Medium Hard; Moderately Indurated Triassic Mudstone with Close to Very Close Fracture Spacing and with Iron Clasts	202.2 / 42.1
200.2	44.1						(100% 2.0)	(100% 2.0)		Very broken 35.1 feet to 36.0 feet 6 jts @ 0° to 10° 3 jts @ 20° to 30°	200.2 / 44.1
										Greenish Grey and Reddish Brown; Very Slightly Weathered; Moderately Hard; Indurated Triassic Mudstone with Moderately Close Fracture Spacing No natural breaks	
										Greenish Grey and Reddish Brown; Slightly to Moderately Weathered; Moderate to Medium Hard; Indurated to Moderately Indurated; Triassic Mudstone with Very Close to Close Fracture Spacing 6 jts @ 0° to 10°	
										Greenish Grey and Reddish Brown; Slightly Weathered; Hard; Indurated Triassic Mudstone Grading into Siltstone with Moderately Close Fracture Spacing No breaks	
										Coring Terminated at Elevation 200.2 feet in Non-Crystalline Rock (Slightly Weathered Triassic Siltstone)	

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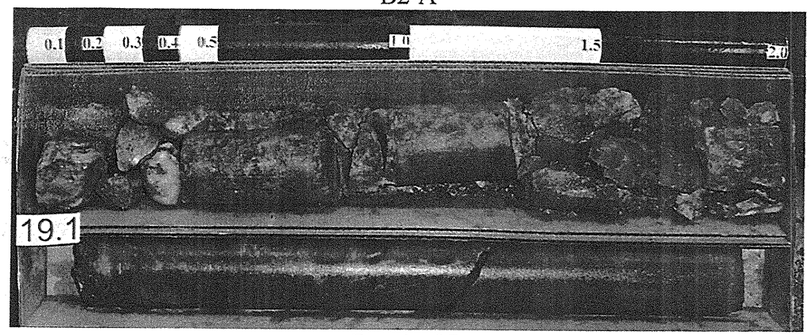
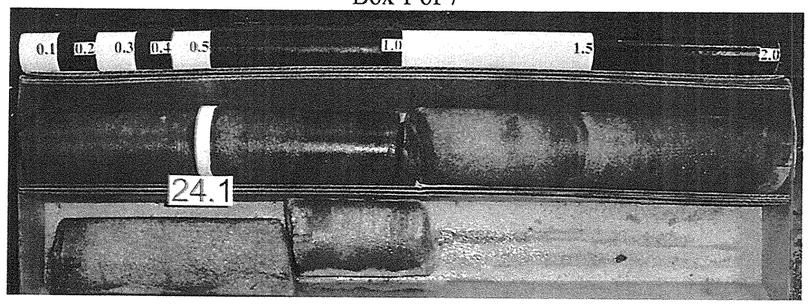
CORE PHOTOGRAPHS

Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

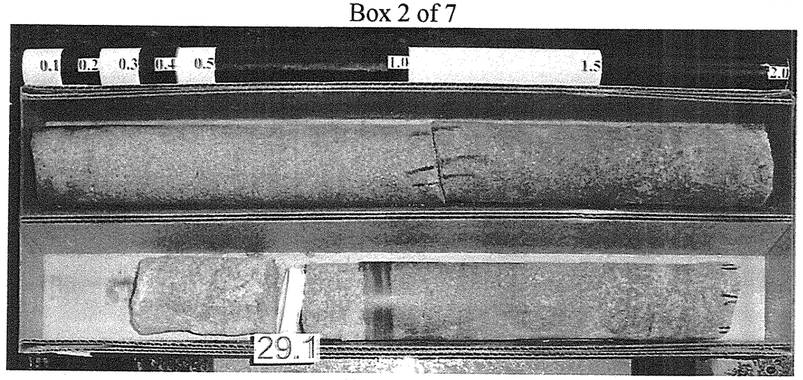
B2-A



Box 1 of 7



Box 2 of 7



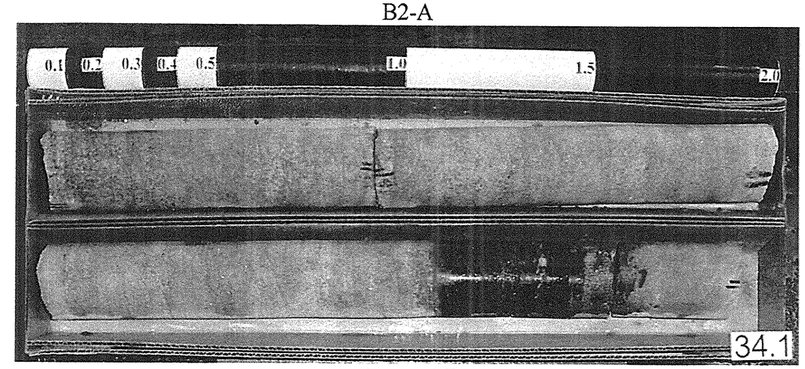
Box 3 of 7

(SCALE = 1:4)

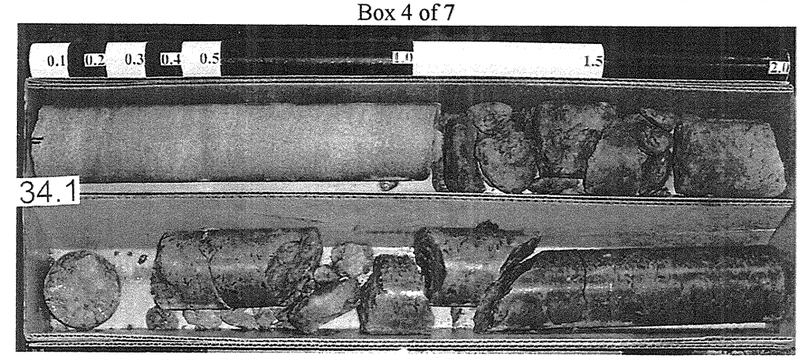
CORE PHOTOGRAPHS

Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

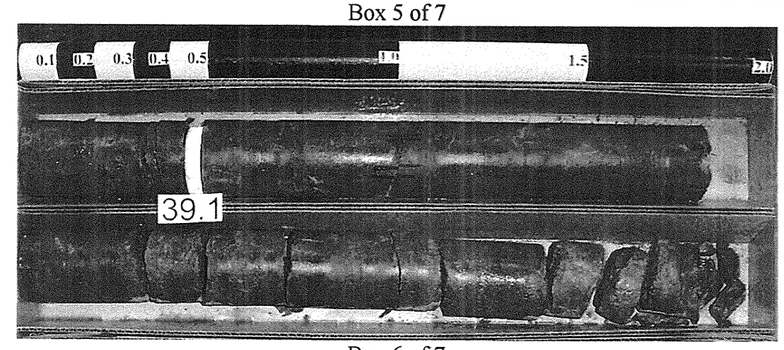
B2-A



Box 4 of 7



Box 5 of 7



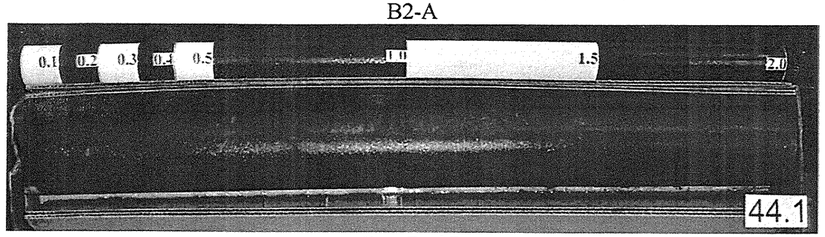
Box 6 of 7

(SCALE = 1:4)

CORE PHOTOGRAPHS

Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

B2-A



Box 7 of 7

(SCALE = 1:4)

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. B2-B	BORING LOCATION 22+66	OFFSET 24 ft RT	ALIGNMENT -L-	0 HR. 3.1
COLLAR ELEV. 249.5 ft	NORTHING 803337.68	EASTING 2007754.72	24 HR. 4.3
TOTAL DEPTH 51.0 ft	DRILL MACHINE Mobile B-57	DRILL METHOD 3-7/8" Tricone Wash/HQ Core	HAMMER TYPE 140 lb. Manual
DATE STARTED 10/9/02	COMPLETED 10/9/02	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	
249.5										
248.5	1.0								249.5 ROADWAY EMBANKMENT FILL: Medium Stiff Red-Brown Silty Coarse to Fine Sandy CLAY with a Trace of Organic Matter (Rootlets)	0.00
246.0	3.5	3	3	3	6	SS-11	22.6%		246.5 ALLUVIAL: Medium Stiff Tan-Grey Coarse to Fine Sandy Silty CLAY	3.0
243.5	6.0	8	3	3	6				244.0 ALLUVIAL: Loose Grey Fine to Coarse SAND with a Trace of Organic Matter (Decayed Plants) and with Traces of Clay and Silt	5.5
241.0	8.5	5	2	3	5		W			
236.0	13.5	11	4	3	7		W		237.5 ALLUVIAL: Soft Grey Silty Coarse to Fine Sandy CLAY	12.0
231.0	18.5	3	2	1	3		W		232.5 ALLUVIAL: Stiff Grey Clayey Fine Sandy SILT	17.0
226.0	23.5	5	7	6	13	SS-12	28.2%		227.5 WEATHERED ROCK: Grey and Red-Brown Triassic Mudstone	22.0
		75	25/0.1		100/0.6				224.5 Greenish Grey and Reddish Brown; Moderately to Slightly Weathered; Soft to Medium Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing	25.0
						RS-2			220.4 Greenish Grey and Reddish Brown; Slightly to Very Slightly Weathered; Moderately Hard; Indurated Triassic Mudstone Transitioning to Siltstone by 33.7 feet with Wide Fracture Spacing	29.1
									214.7 Green, Pink, White, and Grey; Moderately to Slightly Weathered; Moderately Hard to Hard; Moderately Indurated to Indurated; Micaceous; Fine to Coarse Grained Triassic Sandstone with Wide Fracture Spacing	34.8
									205.0 Reddish Brown and Greenish Grey; Moderately to Slightly Weathered; Medium Hard to Moderately Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing and with Iron Clasts	44.5
									201.7 Greenish Grey and Reddish Brown; Slightly to Very Slightly Weathered; Moderately Hard to Hard; Indurated Triassic Mudstone with Wide Fracture Spacing	47.8
									198.5 Coring Terminated at Elevation 198.5 feet in Non-Crystalline Rock (Very Slightly Weathered Triassic Mudstone)	51.0

NCDOT BL... SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

N.C.D.O.T. GEOTECHNICAL UNIT
CORE BORING REPORT

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. B2-B	BORING LOCATION 22+66	OFFSET 24 ft RT	ALIGNMENT -L-	0 HR. 3.1
COLLAR ELEV. 249.5 ft	NORTHING 803337.68	EASTING 2007754.72	24 HR. 4.3
TOTAL DEPTH 51.0 ft	DRILL MACHINE Mobile B-57	DRILL METHOD 3-7/8" Tricone Wash/HQ Core	HAMMER TYPE 140 lb. Manual
DATE STARTED 10/9/02	COMPLETED 10/9/02	SURFACE WATER DEPTH NA	
CORE SIZE HQ	TOTAL RUN 26.0 ft	DRILLER B. Shull	

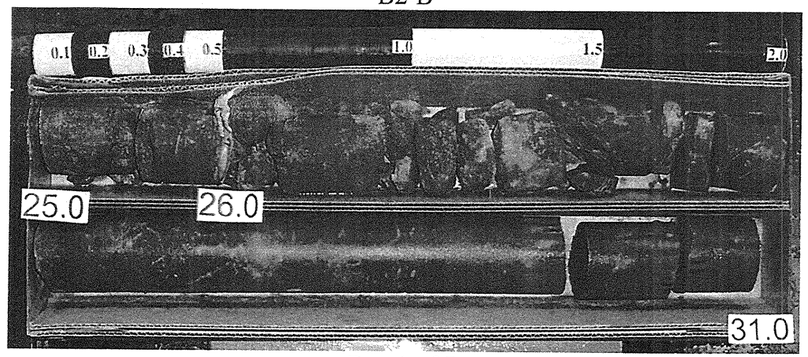
ELEV. (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
										Begin Coring @ 25.0 ft
224.5	25.0	1.0	6:38	(50% 0.5)	(0% 0.0)		(46% 1.9)	(0% 0.0)		224.5 Greenish Grey and Reddish Brown; Moderately to Slightly Weathered; Soft to Medium Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing 25.0
223.5	26.0	5.0	9:32 3:57 5:58 5:18 4:30	(66% 3.3)	(38% 1.9)					
218.5	31.0						(100% 5.7)	(100% 5.7)		220.4 jts generally @ 0° to 10° 29.1
		5.0	4:59 4:41 4:14 3:00 2:25	(100% 5.0)	(100% 5.0)	RS-2				1 jt @ 45° Greenish Grey and Reddish Brown; Slightly to Very Slightly Weathered; Moderately Hard; Indurated Triassic Mudstone Transitioning to Siltstone by 33.7 feet with Wide Fracture Spacing
213.5	36.0						(98% 9.5)	(98% 9.5)		214.7 No natural breaks 34.8
		5.0	1:28 1:15 1:30 2:30 2:55	(96% 4.8)	(96% 4.8)					Green, Pink, White, and Grey; Moderately to Slightly Weathered; Moderately Hard to Hard; Moderately Indurated to Indurated; Micaceous; Fine to Coarse Grained Triassic Sandstone with Wide Fracture Spacing
208.5	41.0									
		5.0	2:41 2:43 2:41 20:31 16:47	(100% 5.0)	(84% 4.2)					2 jts @ 0° at 35.0 feet Siltstone from 35.0 feet to 35.5 feet Dark grey mudstone from 42.8 feet to 43.3 feet
203.5	46.0						(100% 3.3)	(45% 1.5)		205.0 Reddish Brown and Greenish Grey; Moderately to Slightly Weathered; Medium Hard to Moderately Hard; Indurated Triassic Mudstone with Very Close to Close Fracture Spacing and with Iron Clasts 44.5
		5.0	14:07 5:01 4:47 4:45 4:26	(100% 5.0)	(80% 4.0)					
198.5	51.0						(100% 3.2)	(100% 3.2)		201.7 jts generally @ 0° to 10° 47.8
										198.5 4 jts @ 25° Greenish Grey and Reddish Brown; Slightly to Very Slightly Weathered; Moderately Hard to Hard; Indurated Triassic Mudstone with Wide Fracture Spacing 51.0
										No natural breaks Coring Terminated at Elevation 198.5 feet in Non-Crystalline Rock (Very Slightly Weathered Triassic Mudstone)

NCDOT CORE SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

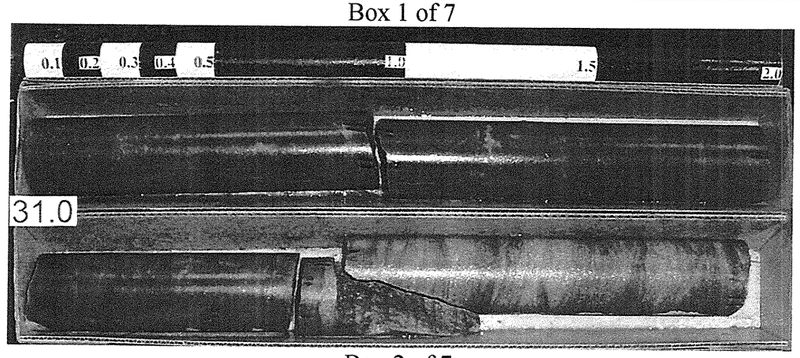
CORE PHOTOGRAPHS

Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

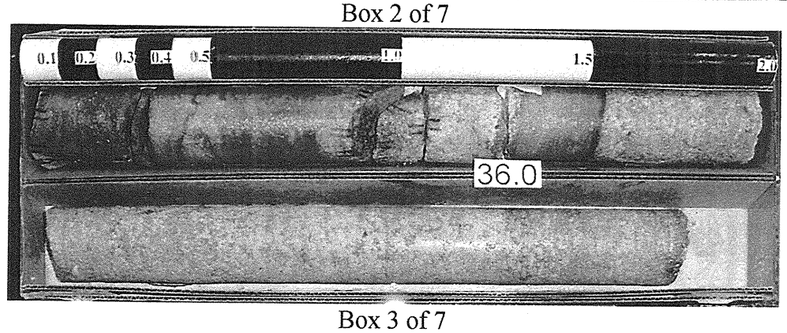
B2-B



Box 1 of 7



Box 2 of 7



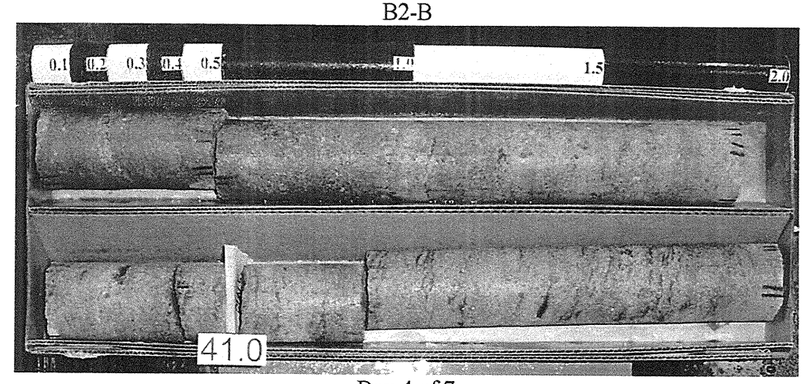
Box 3 of 7

(SCALE = 1:4)

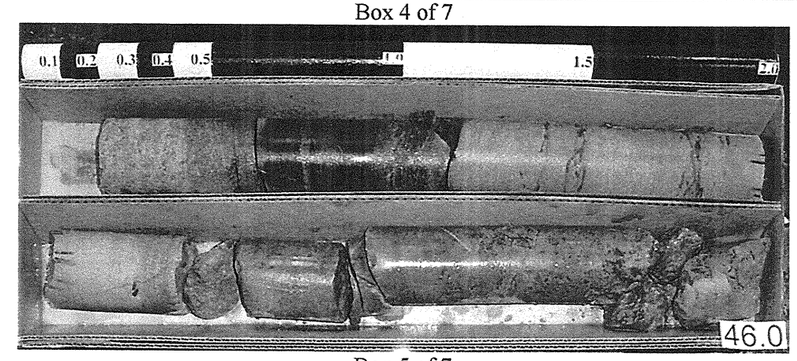
CORE PHOTOGRAPHS

Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

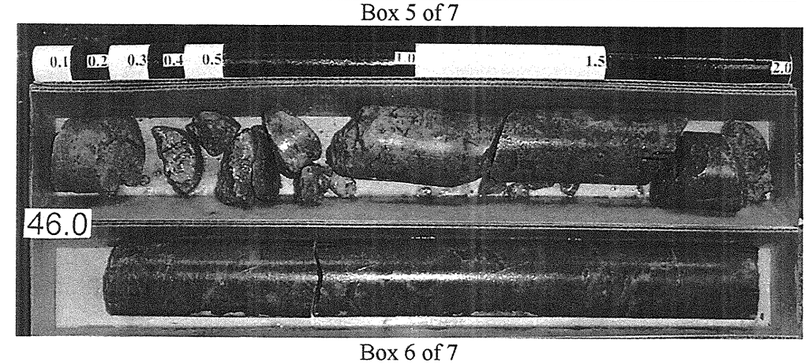
B2-B



Box 4 of 7



Box 5 of 7



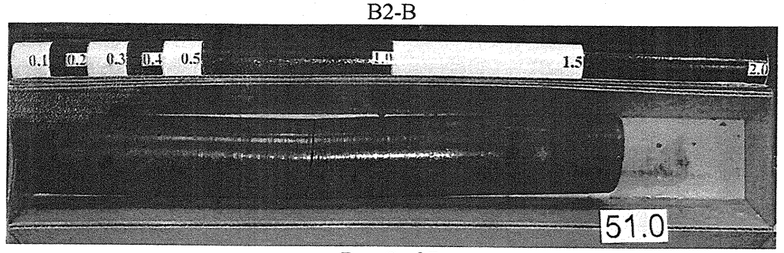
Box 6 of 7

(SCALE = 1:4)

CORE PHOTOGRAPHS

Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
NCDOT Project No. 8.2353001 (B-3450)

B2-B



Box 7 of 7

(SCALE = 1:4)

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. EB2-A	BORING LOCATION 22+89	OFFSET 20 ft LT	ALIGNMENT -L-	0 HR. 10.8
COLLAR ELEV. 256.7 ft	NORTHING 803343.85	EASTING 2007705.52	24 HR. 10.5
TOTAL DEPTH 43.5 ft	DRILL MACHINE CME 850	DRILL METHOD 3-7/8" Tricone Wash Rotary	HAMMER TYPE 140 lb. Automatic
DATE STARTED 9/18/02	COMPLETED 9/18/02	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	
256.7										
255.7	1.0								ROADWAY EMBANKMENT FILL: Soft to Very Soft Tan, Grey, and Brown Clayey Coarse to Fine Sandy SILT with Gravel and a Trace of Organics (Decayed Plant Material)	256.7 / 0.00
253.2	3.5	4	2	1	3		M/W			
250.7	6.0	2	2	2	4	SS-13	16.2%			
248.2	8.5	WOH	WOH	WOH	WOH		W/S		ALLUVIAL: Soft Grey Coarse to Fine Sandy Silty CLAY with a Trace of Organics (Decayed Plant Material)	248.7 / 8.0
243.2	13.5	2	2	2	4				ALLUVIAL: Loose Tan-Grey Fine to Coarse SAND with Traces of Clay and Silt	244.7 / 12.0
238.2	18.5	4	4	5	9		W		ALLUVIAL: Medium Stiff Grey and Brown Coarse to Fine Sandy Silty CLAY	239.7 / 17.0
233.2	23.5	2	4	4	8		W			
228.2	28.5	2	3	3	6	SS-14	30.3%			228.2 / 28.5
223.2	33.5	6	11	32	43	SS-15	14.1%		RESIDUAL: Hard Grey and Brown Clayey Fine Sandy SILT	225.7 / 31.0
218.2	38.5	60/0.2			60/0.2				WEATHERED ROCK: Brown Triassic Mudstone	219.7 / 37.0
213.2	43.5	60/0.2			60/0.2				WEATHERED ROCK: Grey Triassic Sandstone	213.2 / 43.5
		60/0.0			60/0.0				Boring Terminated with SPT Refusal at Elevation 213.2 feet on Non-Crystalline Rock (Triassic Sandstone)	

NCDOT BORE SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

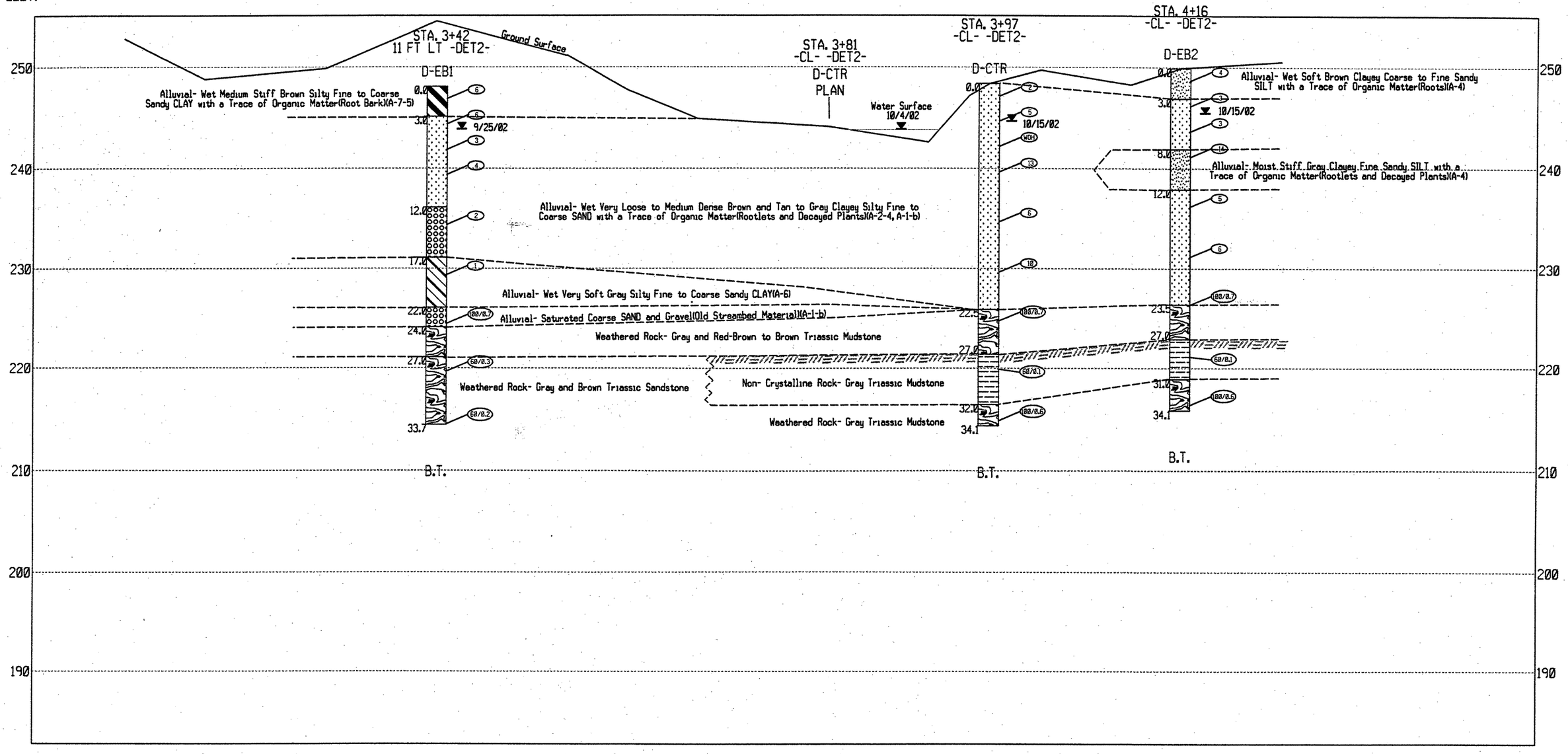
N.C.D.O.T. GEOTECHNICAL UNIT
BORING LOG

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST J. L. Love
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. EB2-B	BORING LOCATION 22+96	OFFSET 19 ft RT	ALIGNMENT -L-	0 HR. 12.5
COLLAR ELEV. 256.9 ft	NORTHING 803363.94	EASTING 2007739.47	24 HR. 12.5
TOTAL DEPTH 40.3 ft	DRILL MACHINE CME 550X	DRILL METHOD HSA/SPT	HAMMER TYPE 140 lb. Automatic
DATE STARTED 9/5/02	COMPLETED 9/5/02	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	
256.9										
254.5	2.4								ROADWAY EMBANKMENT FILL: Medium Stiff Orange-Brown Silty Fine to Coarse Sandy CLAY With Some Mica and a Little Gravel	256.9 / 0.00
249.5	7.4	2	3	5	8	SS-16	12.5%			250.8 / 6.1
244.5	12.4	1	1	1	2	SS-17	15.8%		ALLUVIAL: Very Soft Grey-Brown Silty Coarse to Fine Sandy CLAY	248.0 / 8.9
239.5	17.4	1	WOH	1	1				ALLUVIAL: Very Loose Grey Brown Coarse to Fine SAND with Wood Pieces 18.2 feet to 18.9 feet	
234.5	22.4	1	WOH	1	1		W			236.0 / 20.9
229.5	27.4	1	1	1	2		M		ALLUVIAL: Very Soft Grey Coarse to Fine Sandy Silty CLAY	229.3 / 27.6
224.5	32.4	WOH	WOH	5	5		S		ALLUVIAL: Very Loose Tan Fine to Coarse SAND	228.3 / 28.6
		100/0.4			100/0.4				RESIDUAL: Medium Stiff Red and Grey Coarse to Fine Sandy Silty CLAY	228.0 / 28.9
219.5	37.4	60/0.1			60/0.1				WEATHERED ROCK: Triassic Mudstone	219.4 / 37.5
									NON-CRYSTALLINE ROCK: Triassic Sandstone	216.6 / 40.3
									Boring Terminated by Auger Refusal at Elevation 216.6 feet in Non-Crystalline Rock (Triassic Sandstone)	

NCDOT BORE SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02



SCALE IN FEET

0 5 10

VERT. SCALE

0 5 10

HORZ. SCALE

TRIGON

ENGINEERING CONSULTANTS, INC.

PROFILE ALONG CL -DET2-

Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Rd.)

Durham County, North Carolina

Project No. 8.2353001	TIP No. B-3450
Federal No. BRSTP-1116(4)	Vert. Scale 1" = 10'
Date 11/4/02	Horiz. Scale 1" = 10'
Drawn by DRK	Drawing No. 8

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. D-EB1	BORING LOCATION 3+42	OFFSET 11 ft LT	ALIGNMENT -DET2-
COLLAR ELEV. 248.1 ft	NORTHING 803206.92	EASTING 2007666.13	0 HR. 3.5 / 24 HR. 4.3
TOTAL DEPTH 33.7 ft	DRILL MACHINE CME 850	DRILL METHOD 3-7/8" Tricone Wash Rotary	HAMMER TYPE 140 lb. Automatic
DATE STARTED 9/24/02	COMPLETED 9/24/02	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	
248.1										
247.1	1.0								ALLUVIAL: Medium Stiff Brown Silty Fine to Coarse Sandy CLAY with a Trace of Organic Matter (Root Bark)	248.1 / 0.00
244.6	3.5	2	3	3	6	SS-18	37.4%		ALLUVIAL: Loose to Very Loose Brown and Tan to Grey Clayey Silty Fine to Coarse SAND with a Trace of Organic Matter (Rootlets)	245.1 / 3.0
242.1	6.0	2	3	3	6					
239.6	8.5	2	2	1	3		W			
234.6	13.5	WOH	2	2	4		W			236.1 / 12.0
229.6	18.5	2	1	1	2	SS-19	W		ALLUVIAL: Very Loose Grey Fine to Coarse SAND with Traces of Silt and Clay	231.1 / 17.0
224.6	23.5	2	1	WOH	1		W		ALLUVIAL: Very Soft Grey Silty Fine to Coarse Sandy CLAY	226.1 / 22.0
219.6	28.5	14	33	67/0.2	100/0.7		W		ALLUVIAL: Coarse Sand and Gravel (Old Streambed Material)	224.1 / 24.0
		60/0.3			60/0.3				WEATHERED ROCK: Grey and Brown Triassic Mudstone	221.1 / 27.0
214.6	33.5	60/0.2			60/0.2				WEATHERED ROCK: Grey and Brown Triassic Sandstone	214.4 / 33.7
									Boring Terminated at Elevation 214.4 feet in Weathered Rock (Triassic Sandstone)	

NCDOT BO... SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	ID. B-3450	COUNTY Durham	GEOLOGIST D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			GROUND WATER (ft)
BORING NO. D-CTR	BORING LOCATION 3+97	OFFSET CL	ALIGNMENT -DET2-
COLLAR ELEV. 248.4 ft	NORTHING 803262.16	EASTING 2007654.40	0 HR. 3.7 / 24 HR. 3.8
TOTAL DEPTH 34.1 ft	DRILL MACHINE Mobile B-57	DRILL METHOD 3-7/8" Tricone Wash Rotary	HAMMER TYPE 140 lb. Manual
DATE STARTED 10/14/02	COMPLETED 10/14/02	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	
248.4										
247.4	1.0								ALLUVIAL: Very Loose to Medium Dense Tan Clayey Silty Fine to Coarse SAND with a Trace of Organic Matter (Rootlets)	248.4 / 0.00
244.9	3.5	1	1	1	2		M			
242.4	6.0	2	3	2	5	SS-20				
239.9	8.5	WOH	WOH	WOH	WOH		W			
234.9	13.5	6	6	7	13		W			
229.9	18.5	2	1	5	6		W			
224.9	23.5	6	4	6	10		W			
219.9	28.5	75	25/0.2		100/0.7					225.9 / 22.5
		60/0.1			60/0.1				WEATHERED ROCK: Red-Brown Triassic Mudstone	221.4 / 27.0
214.9	33.5	60	40/0.1		100/0.6				NON-CRYSTALLINE ROCK: Grey Triassic Mudstone	216.4 / 32.0
									WEATHERED ROCK: Grey Triassic Mudstone	214.3 / 34.1
									Boring Terminated at Elevation 214.3 feet in Weathered Rock (Grey Triassic Mudstone)	

NCDOT BORE SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

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

SHEET 1 OF 1

PROJECT NO. 8.2353001	**ID.** B-3450	**COUNTY** Durham	**GEOLOGIST** D. Goodnight
SITE DESCRIPTION Bridge No. 122 Over Sandy Creek on SR 1116 (Garrett Road)			**GROUND WATER (ft)**
BORING NO. D-EB2	**BORING LOCATION** 4+16	**OFFSET** CL	**ALIGNMENT** -DET2-	**0 HR.** 4.6
COLLAR ELEV. 249.9 ft	**NORTHING** 803280.55	**EASTING** 2007648.54	**24 HR.** 4.6
TOTAL DEPTH 34.1 ft	**DRILL MACHINE** Mobile B-57	**DRILL METHOD** 3-7/8" Tricone Wash Rotary	**HAMMER TYPE** 140 lb. Manual
DATE STARTED 10/14/02	**COMPLETED** 10/14/02	**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	
249.9										
248.9	1.0								249.9	0.00
246.4	3.5	2	2	2	4	SS-21	23.8%		ALLUVIAL: Soft Brown Clayey Coarse to Fine Sandy SILT with a Trace of Organic Matter (Roots) 246.9	3.0
243.9	6.0	3	2	1	3				ALLUVIAL: Very Loose Tan Clayey Silty Coarse to Fine SAND with a Trace of Organic Matter (Decayed Plants and Rootlets)	
241.4	8.5	2	1	2	3				241.9	8.0
236.4	13.5	2	5	9	14	SS-22	20.0%		ALLUVIAL: Stiff Grey Clayey Fine Sandy SILT with a Trace of Organic Matter (Rootlets and Decayed Plants) 237.9	12.0
231.4	18.5	2	2	3	5				ALLUVIAL: Loose Grey Clayey Silty Fine to Coarse SAND	
226.4	23.5	2	3	3	6				226.4	23.5
221.4	28.5	25	75/0.2		100/0.7				WEATHERED ROCK: Grey Triassic Mudstone 222.9	27.0
216.4	33.5	60/0.1			60/0.1				NON-CRYSTALLINE ROCK: Grey Triassic Mudstone 218.9	31.0
		80	20/0.1		100/0.6				WEATHERED ROCK: Grey Triassic Mudstone 215.8	34.1
									Boring Terminated at Elevation 215.8 feet in Weathered Rock (Grey Triassic Mudstone)	

NCDOT BORE SINGLE 07102016.GPJ NC_DOT.GDT 11/12/02

GEOTECHNICAL UNIT FIELD SCOUR REPORT

PROJECT: 8.2353001 ID: B-3450 COUNTY: Durham

DESCRIPTION(1): Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)

INFORMATION ON EXISTING BRIDGES Information obtained from: X field inspection
___ microfilm(Reel: ___ Pos: __)
X other Bridge Survey and Hydraulic Design Report dated 5/10/02

COUNTY BRIDGE NO. 122' BRIDGE LENGTH 75' NO. BENTS IN: CHANNEL 1 FLOOD PLAIN 1

FOUNDATION TYPE: Steel H-Piles and timber abutments, interior bent-2 H-piles have concrete bases

EVIDENCE OF SCOUR(2):

ABUTMENTS OR END BENT SLOPES: Deep ravines and drainages intersect main channel on downstream side. Wing walls and abutments appear to be rotting in places.

INTERIOR BENTS: Not evident

CHANNEL BED: Large scour deptression directly under the existing bridge

CHANNEL BANKS: Undercutting of banks directly under existing bridge; trees falling into the channel away from existing bridge.

EXISTING SCOUR PROTECTION:

TYPE(3): Boulders/rip rap under existing bridge; timber wing/retaining walls

EXTENT(4): Boulders and rip rap are only in the channel underneath the existing bridge

EFFECTIVENESS(5): minimal; large scour depression is evident underneath the existing bridge

OBSTRUCTIONS(6) (DAMS,DEBRIS,ETC.): Fallen trees are across channel at various points upstream and downstream of existing bridge; old timber piles from previous bridge under existing bridge; tires, mattress, and other debris under existing bridge and in channel.

DESIGN INFORMATION

CHANNEL BED MATERIAL(7) (SAMPLE RESULTS ATTACHED): Fine to coarse SAND (A-3 and A-1-b)

CHANNEL BANK MATERIAL(8) (SAMPLE RESULTS ATTACHED): Variably clayey and variably silty fine to coarse SAND (A-1-b and A-2-4), very clayey fine to coarse very sandy SILT (A-4), and silty coarse to fine very sandy CLAY (A-6)

FOUNDATION BEARING MATERIAL(9): weathered rock and non-crystalline rock (triassic mudstone and sandstone)

CHANNEL BANK COVER(10): hardwood trees, grass, brush, wood debris

FLOOD PLAIN WIDTH(11): Approximately 500 feet

FLOOD PLAIN COVER(12): hardwood trees, grass, brush, wood debris

DESIGN INFORMATION CONT.

STREAM IS _____ DEGRADING ___X___ AGGRADING (13)

OTHER OBSERVATIONS AND COMMENTS: wood debris from an earlier bridge is lying under the existing bridge; broken off timber piles are protruding from the channel amid boulders

CHANNEL MIGRATION TENDENCY (14): channel is meandering through soft alluvial materials; there is a high potential for stream migration over next 100 years

REPORTED BY: Paul Nwosu DATE: 11/1/2002
Trigon Engineering Consultants, Inc.

GEOTECHNICALLY ADJUSTED SCOUR ELEVATION (15):

1 EFA tube was submitted to the Materials and Test Lab and adjusted scour will be provided by the Hydraulics Unit based on the EFA results.

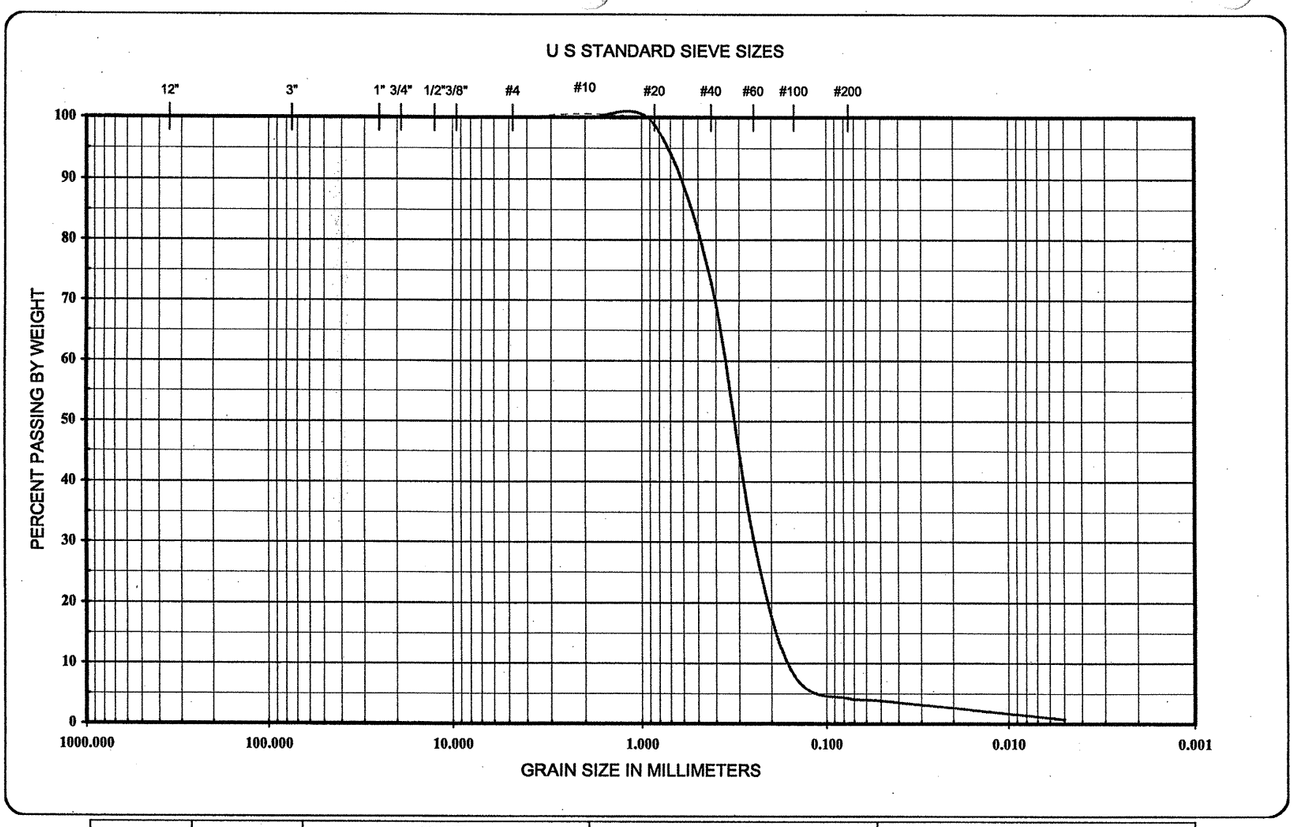
REPORTED BY: Cheryl A Vonnegleed DATE: 11/18/2002
NCDOT GEOTECHNICAL UNIT

INSTRUCTIONS

(1) GIVE THE DESCRIPTION OF THE SPECIFIC SITE GIVING ROUTE NUMBER AND BODY OF WATER CROSSED.
(2) NOTE ANY EVIDENCE OF SCOUR AT THE EXISTING END BENTS OR ABUTMENTS (UNDERMINING, SLOUGHING, SCOUR LOCATIONS, DEGRADATIONS, ETC.)
(3) NOTE ANY EXISTING SCOUR PROTECTION (RIP RAP, ETC.)
(4) DESCRIBE THE EXTENT OF ANY EXISTING SCOUR PROTECTION.
(5) DESCRIBE WHETHER OR NOT THE SCOUR PROTECTION APPEARS TO BE WORKING.
(6) NOTE ANY DAMS, FALLEN TREES, DEBRIS AT BENTS, ETC.
(7) DESCRIBE THE CHANNEL BED MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
(8) DESCRIBE THE CHANNEL BANK MATERIAL: A SAMPLE SHOULD BE TAKEN FOR GRAIN SIZE DISTRIBUTION, ATTACH LAB RESULTS.
(9) DESCRIBE THE FOUNDATION BEARING MATERIAL,
(10) DESCRIBE THE BANK COVERING (GRASS, TREES, RIP RAP, NONE, ETC.
(11) GIVE THE APPROXIMATE FLOOD PLAIN WIDTH (ESTIMATE).
(12) DESCRIBE THE FLOOD PLAIN COVERING (GRASS, TREES, CROPS, ETC.)
(13) CHECK THE APPROPRIATE SPACE AS TO WHETHER THE STREAM IS DEGRADING OR AGGRADING
(14) DESCRIBE THE POTENTIAL OF THE BODY OF WATER TO MIGRATE LATERALLY DURING THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS).
(15) GIVE THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION EXPECTED OVER THE LIFE OF THE BRIDGE (APPROXIMATELY 100 YEARS). THIS CAN BE GIVEN AS AN ELEVATION RANGE ACROSS THE SITE, OR ON A BENT BY BENT BASIS WHERE VARIATIONS EXIST. DISCUSS RELATIONSHIP BETWEEN THE HYDRAULICS THEORETICAL SCOUR AND THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION. THE GEOTECHNICALLY ADJUSTED SCOUR ELEVATION IS BASED ON THE ERODABILITY OF MATERIALS WITH CONSIDERATION FOR JOINTING, FOLIATION, BEDDING ORIENTATION AND FREQUENCY; CORE RECOVERY PERCENTAGE; PERCENTAGE RQD; DIFFERENTIAL WEATHERING, SHEAR STRENGTH; OBSERVATIONS AT EXISTING STRUCTURES; OTHER TESTS DEEMED APPROPRIATE; AND OVERALL GEOLOGIC CONDITIONS AT THE SITE.

PROJECT #: 8.2353001 (B-3450)
COUNTY: Durham
DESCRIPTION: Bridge No. 122 over Tributary to Sandy Creek on SR 1116 (Garrett Road)

	CHANNEL BED MATERIAL		CHANNEL BANK MATERIAL				
SAMPLE #	G-3 (SBD-1)	G-4 (SBD-2)	G-1 (SBK-1)	G-2 (SBK-2)	SS-5	SS-8	SS-10
RETAINED #4	0	0	1.0%	0%	0%	0%	1%
PASSING #10	100%	100%	97%	100%	98%	94%	98%
PASSING #40	73%	31%	73%	68%	77%	47%	91%
PASSING #200	4%	3%	13%	29%	40%	8%	68%
COARSE SAND	70%	93%	61%	51%	35%	71%	12%
FINE SAND	26%	4%	26%	24%	28%	22%	23%
SILT	3%	2%	4%	14%	17%	3%	32%
CLAY	1%	1%	9%	11%	20%	4%	33%
LL	12	8	15	22	23	15	37
PI	NP	NP	NP	NP	6	NP	17
AASHTO CLASSIFICATION	A-3 (0)	A-1-b (0)	A-2-4 (0)	A-2-4 (0)	A-4 (0)	A-1-b (0)	A-6 (10)
STATION	22+35	22+36	22+25	22+70	22+08	22+60	22+66
OFFSET	19' RT	15' LT	19' RT	12' LT	19' LT	11' LT	24' RT
DEPTH	0-0.5'	0-0.5'	0-0.5'	0-0.5'	1.0-2.5'	3.5-5.0'	1.0-2.5'



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
SBD-1	G-3	0.0-0.5	NA	12	NP	NP	Brown Fine to Coarse SAND (A-3)

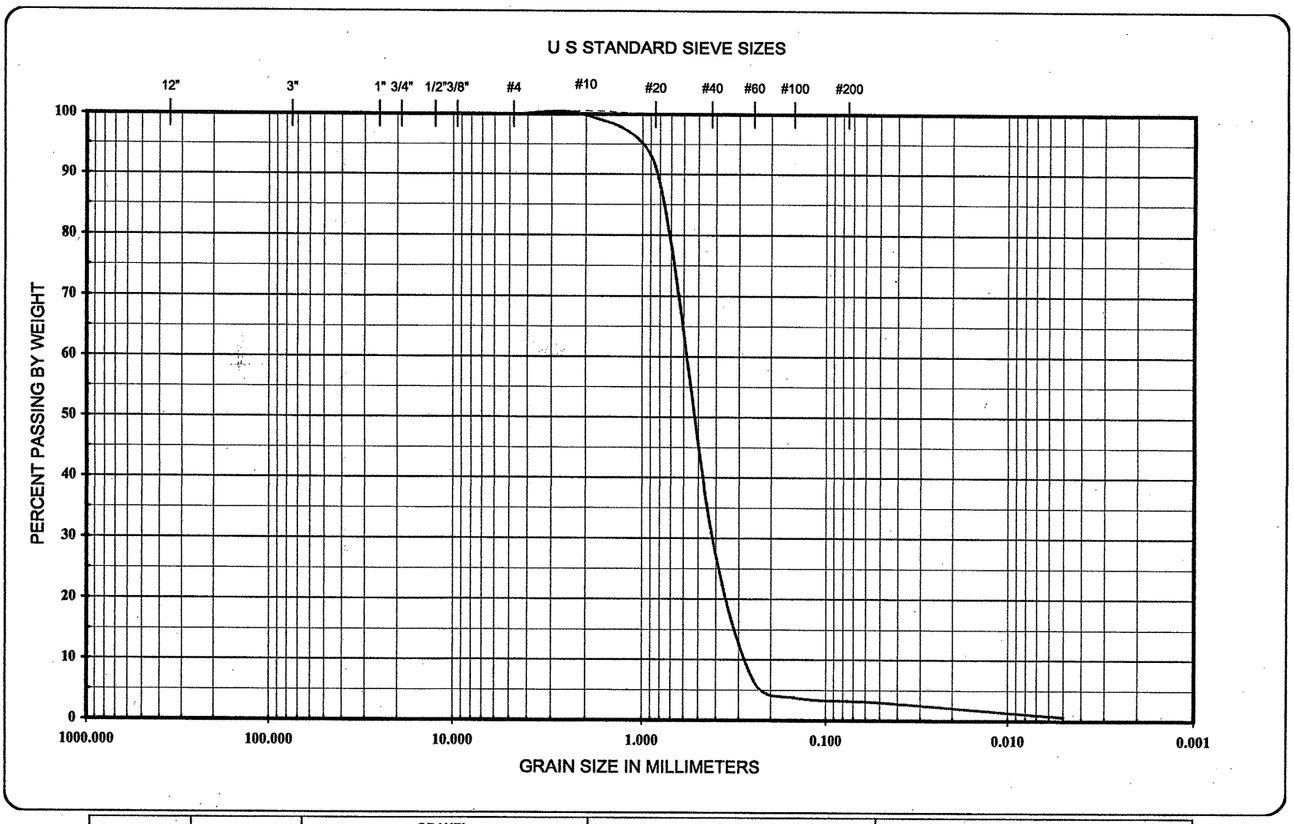
GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 122)

071-02-016

10/17/2002

TRIGON



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
SBD-2	G-4	0.0-0.5	NA	8	NP	NP	Brown Coarse SAND (A-1-b)

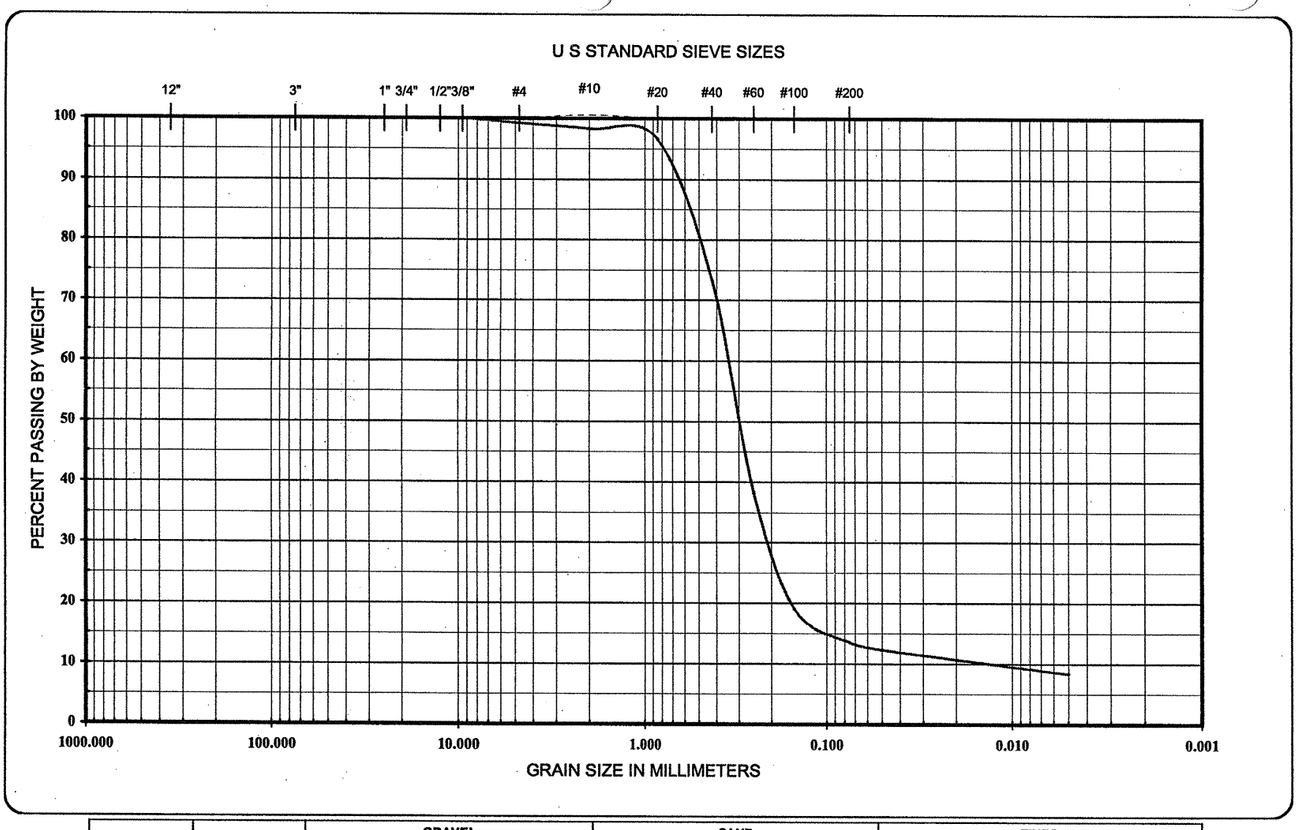
GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 122)

071-02-016

10/17/2002

TRIGON



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
SBK-1	G-1	0.0-0.5	NA	15	NP	NP	Brown Fine To Coarse SAND (A-2-4) with a trace of clay and silt

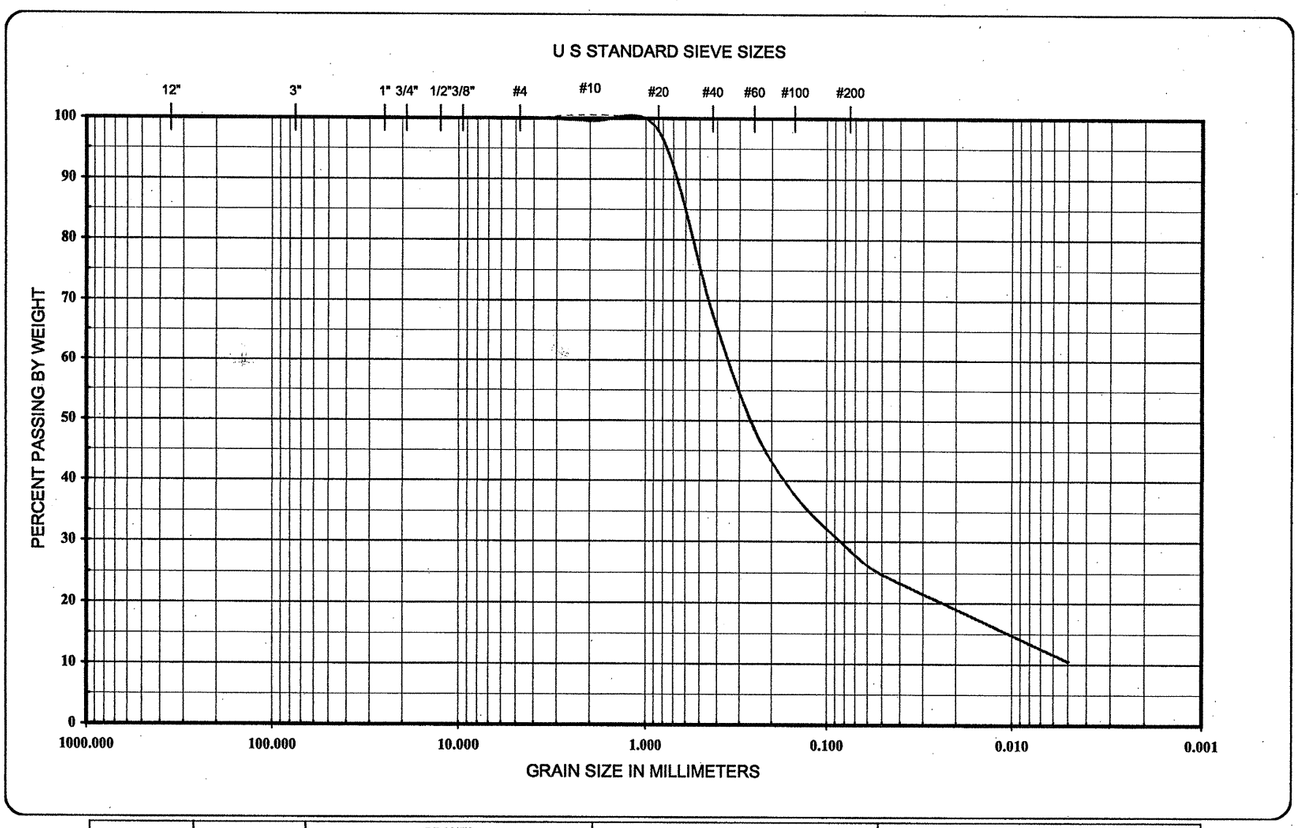
GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 122)

071-02-016

10/17/2002

TRIGON



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
SBK-2	G-2	0.0-0.5	NA	22	NP	NP	Brown Clayey Silty Fine to Coarse SAND (A-2-4)

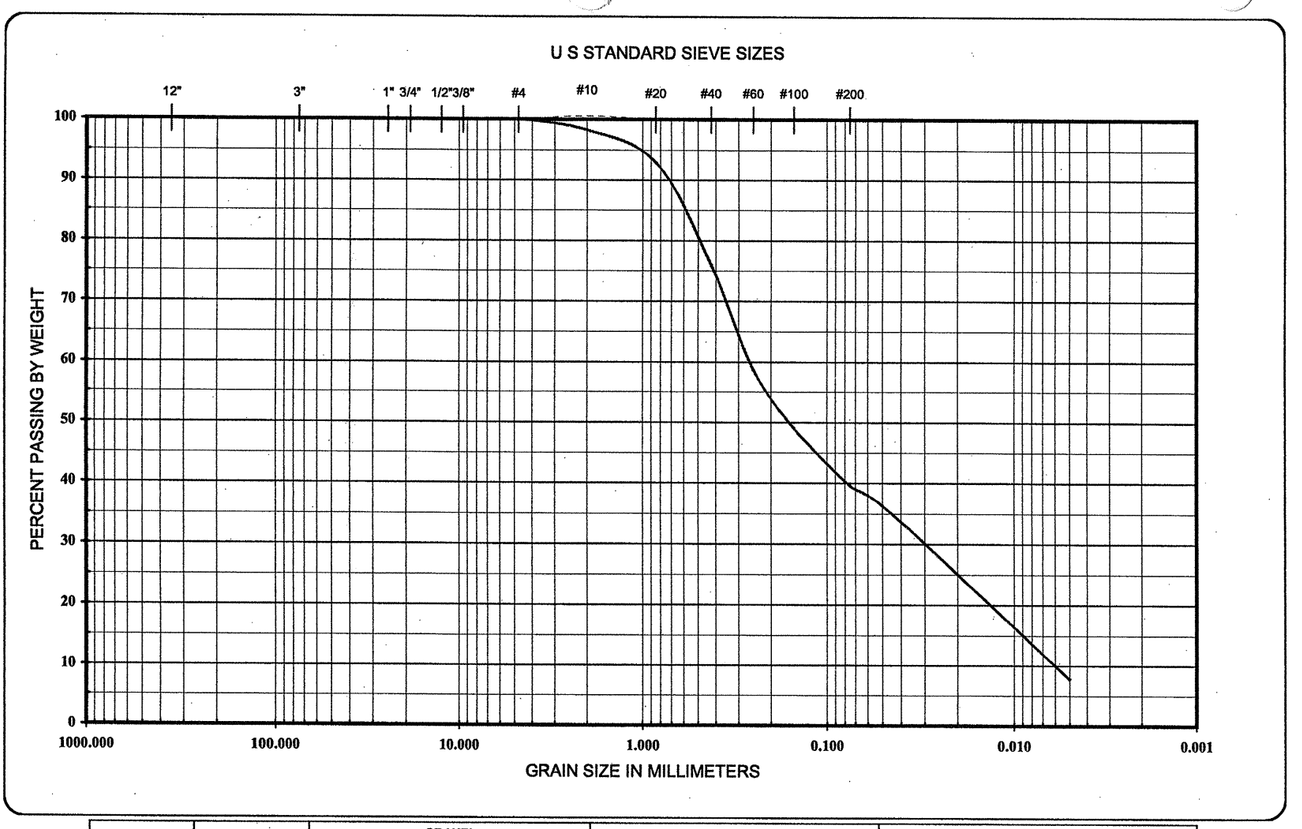
GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 122)

071-02-016

10/17/2002

TRIGON



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
B1-A	SS-5	1.0-2.5	16.5	23	17	6	Tan Very Clayey Fine to Coarse Sandy SILT (A-4)

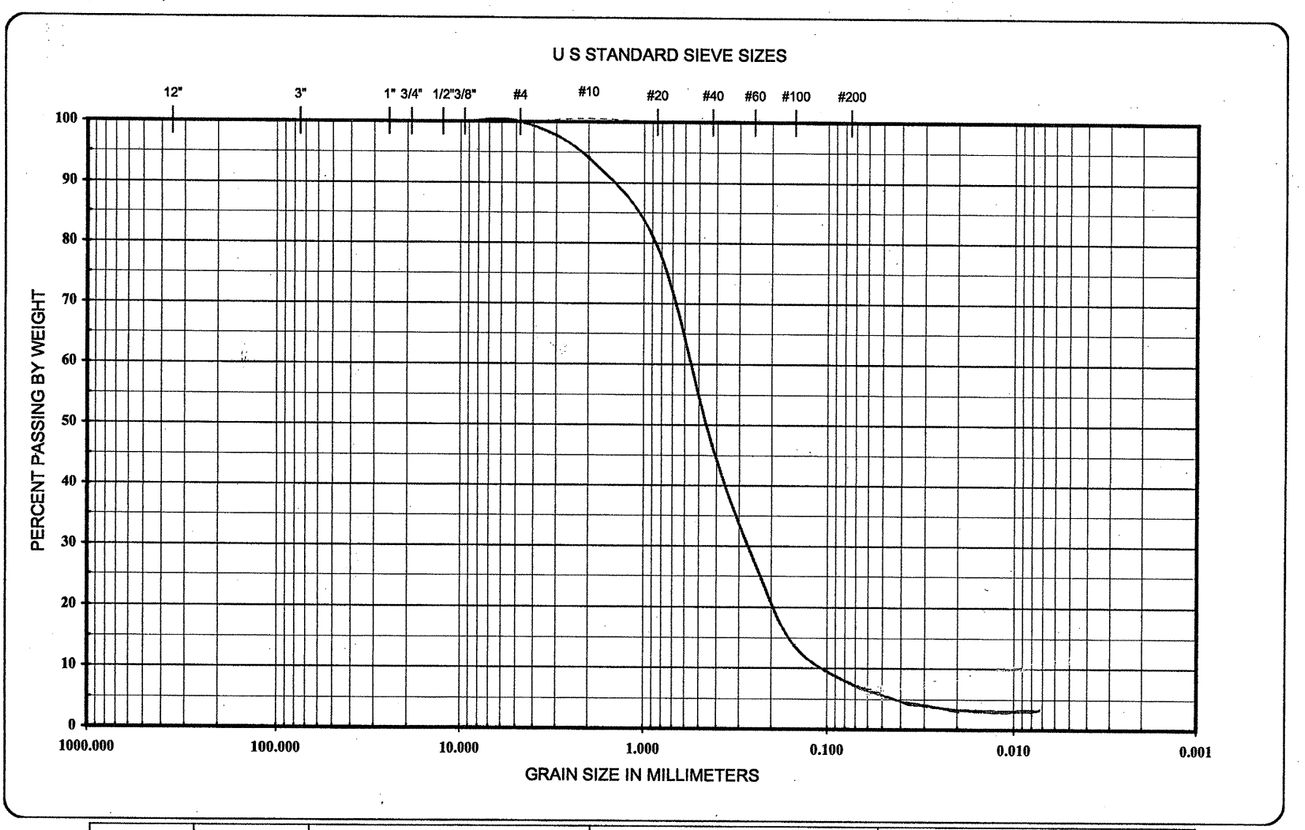
GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 122)

071-02-016

10/17/2002

TRIGON



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
B2-A	SS-8	3.5-5.0	23.3	15	NP	NP	Grey Fine to Coarse SAND (A-1-b) with a trace of clay and silt

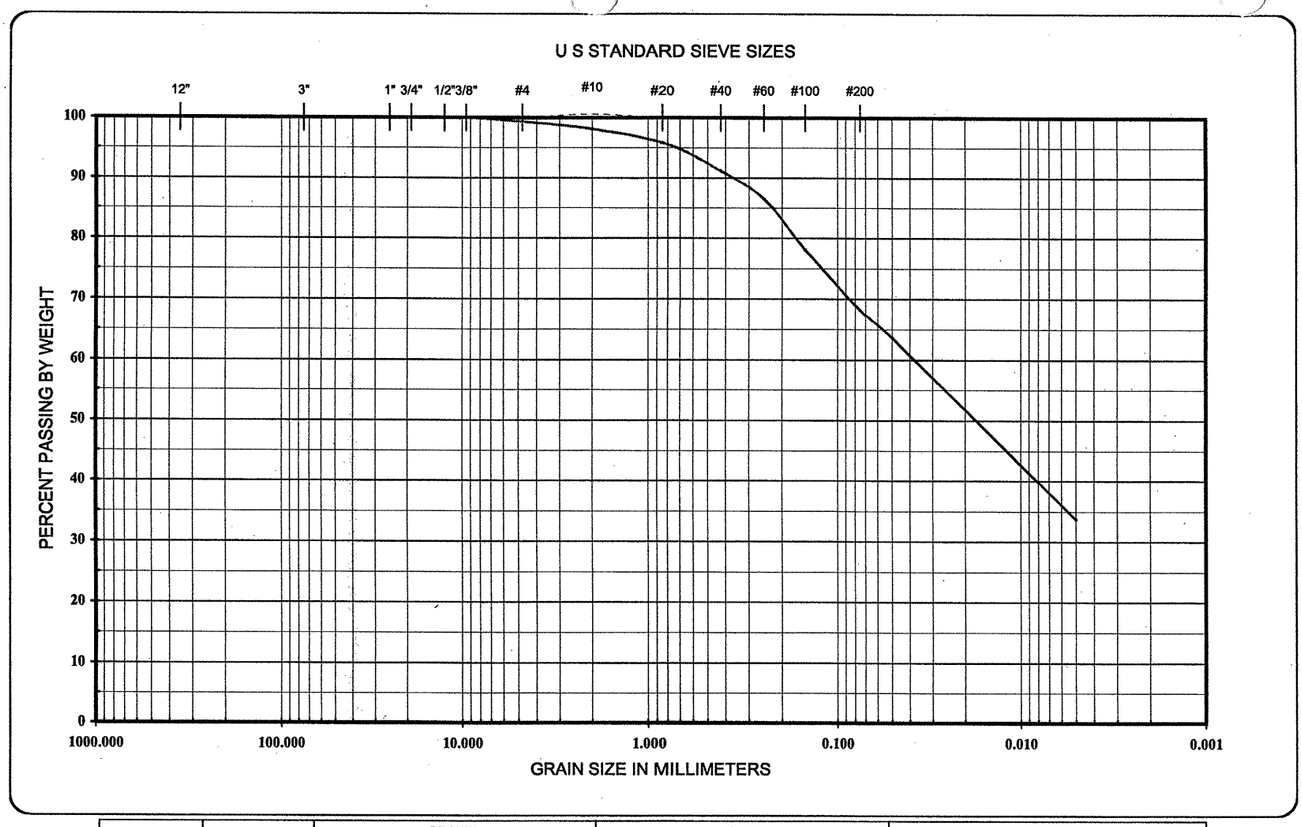
GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 122)

071-02-016

10/17/2002

TRIGON



BOULDERS	COBBLES	GRAVEL		SAND		FINES	
		COARSE	FINE	COARSE	FINE	SILT	CLAY

BORING NO.	SAMPLE NO.	ELEVATION OR DEPTH	NMC %	LL	PL	PI	CLASSIFICATION
B2-B	SS-10	1.0-2.5	22.6	37	20	17	Red-Brown Silty Coarse to Fine Sandy CLAY (A-6)

GRAIN SIZE DISTRIBUTION

B-3450 (Bridge No. 122)

071-02-016

10/17/2002

State Project No. 8.2353001
TIP No. B-3450
Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
Durham 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.)	Organic Content (%)	L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Pass #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
EB1-A	1.0-2.5	SS-1	16.2	A-6 (1)	7	-	35	20	15	62	57	37	34	15	30	35	20
EB1-A	8.5-10.0	SS-2	20.1	A-4 (3)	1	-	27	18	9	99	93	57	51	12	36	27	25
EBI-A	23.5-25.0	SS-3	-	A-6	-	5.3	-	-	-	-	-	-	-	-	-	-	-
EB1-B	1.0-2.5	SS-4	14.4	A-6 (2)	9	-	37	22	15	84	64	40	37	32	24	21	23
EB1-B	13.5-15.0	SS-5	-	A-3 (0)	8	-	13	NP	NP	97	51	8	7	77	16	3	4
B1-A	1.0-2.5	SS-6	16.5	A-4 (0)	4	-	23	17	6	98	77	40	36	35	28	17	20
B1-A	13.5-15.0	SS-7	27.8	A-6 (7)	5	-	30	19	11	100	100	80	76	1	23	46	30
B1-B	1.0-2.5	SS-8	24.7	A-6 (12)	8	-	37	21	16	100	96	79	75	7	18	38	37
B2-A	3.5-5.0	SS-9	-	A-1-b (0)	5	-	15	NP	NP	94	47	8	7	71	22	3	4
B2-A	8.5-10.0	SS-10	29.6	A-6 (16)	2	-	39	20	19	100	96	95	78	5	17	42	36
B2-B	1.0-2.5	SS-11	22.6	A-6 (10)	6	-	37	20	17	98	91	68	63	12	23	32	33
B2-B	18.5-20.0	SS-12	28.2	A-4 (3)	13	-	28	20	8	98	98	68	56	2	41	34	23
EB2-A	3.5-5.0	SS-13	16.2	A-4 (1)	4	-	28	19	9	92	85	47	42	14	40	26	20
EB2-A	23.5-25.0	SS-14	30.3	A-6 (11)	6	-	35	21	14	100	97	81	75	6	19	44	31
EB2-A	28.5-30.0	SS-15	14.1	A-4 (3)	43	-	30	23	7	99	97	68	56	3	40	41	16
EB2-B	2.4-3.9	SS-16	12.5	A-6 (3)	8	-	40	26	14	85	63	42	40	33	20	22	25
EB2-B	7.4-8.9	SS-17	15.8	A-6 (3)	2	-	21	9	12	97	89	55	49	16	35	30	19

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

TRIGON ENGINEERING CONSULTANTS, INC.
GREENSBORO, NORTH CAROLINA
Trigon Job Number: 071-02-016
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State Pr[illegible] No. 8.2353001
TIP No. B-3450
Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)
Durham 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)	Organic Content (%)	N-Value (blows/ ft.)	L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Pass #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
D-EB1	1.0-2.5	SS-18	37.4	A-7-5 (7)	-	6	44	23	21	99	74	63	62	29	9	22	40
D-EB1	13.5-15.0	SS-19	-	A-1-b (0)	-	2	15	NP	NP	94	21	13	11	81	6	8	5
D-CTR	3.5-5.0	SS-20	-	A-2-4 (0)	-	5	19	NP	NP	100	70	26	24	51	25	15	9
D-EB2	1.0-2.5	SS-21	23.8	A-4 (1)	-	4	28	20	8	100	92	45	41	20	40	26	14
D-EB2	8.5-10.0	SS-22	20.0	A-4 (2)	-	14	29	20	9	100	99	53	44	4	52	29	15
SBK-1	0.0-0.5	G-1	-	A-2-4 (0)	-	NA	15	NP	NP	97	73	13	12	61	26	4	9
SBK-2	0.0-0.5	G-2	-	A-2-4 (0)	-	NA	22	NP	NP	100	68	29	25	51	24	14	11
SBD-1	0.0-0.5	G-3	-	A-3 (0)	-	NA	12	NP	NP	100	73	4	4	70	26	3	1
SBD-2	0.0-0.5	G-4	-	A-1-b (0)	-	NA	8	NP	NP	100	31	3	3	93	4	2	1

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

TRIGON ENGINEERING CONSULTANTS, INC.
GREENSBORO, NORTH CAROLINA
Trigon Job Number: 071-02-016
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LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 8.2353001 (B-3450))
F.A. NO.: BRSTP-1116(4)
COUNTY: Durham
DESCRIPTION: Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road)

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	B1-A	32.0-32.4	Triassic Sandstone	TRC	100%	0.452	0.2064	151.60	3,197	15,250	0.009
RS-2	B2-B	32.0-32.4	Triassic Mudstone	TRC	100%	0.413	0.2064	163.3	5,191	25,000	0.009