STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4651	1A	36
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
33817.1.1	N/A	P.E.	
		CONST.	

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33817.1.1 I.D. NO. B-4651

F.A. PROJECT N/A

COUNTY UNION

PROJECT DESCRIPTION REPLACEMENT OF BRIDGE No. 251 ON SR 1508 OVER CROOKED CREEK

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.

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.

INVESTIGATED BY S&ME, INC. PERSONNEL S. JOHNSON

CHECKED BY A.F. RIGGS, JR. K. PLUMMER

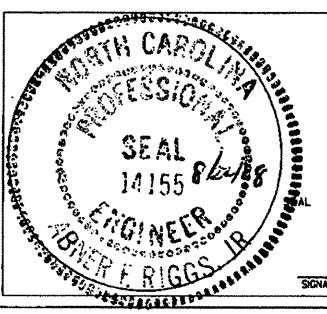
SUBMITTED BY S&ME, INC. J. LYNCH

DATE AUGUST 22, 2008 J. MILLWOOD

J. CANTRELL

P. PHELPS

T. PEREZ



SIGNATURE

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

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STRUCTURE

SUBSURFACE INVESTIGATION

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
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	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/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT- CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING.
- STATIC WATER LEVEL AFTER 24 HOURS.
- PW — PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA
- HC — HOLE CAVE
- 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
- MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE

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
- ☐ CME-45
- ☐ CME-750
- ☐ PORTABLE HOIST
- ☒ OTHER DIEDRICH D-50
- ☐ OTHER_____

ADVANCING TOOLS:
- ☐ 2-17/18" DRAG BIT
- ☐ 6" CONTINUOUS FLIGHT AUGER
- ☐ 8" HOLLOW AUGERS
- ☐ HARD FACED FINGER BITS
- ☐ TUNG.-CARBIDE INSERTS
- ☒ CASING ☒ W/ ADVANCER
- ☒ TRICONE 2-7/8 " STEEL TEETH
- ☐ TRICONE _____ " TUNG.-CARB.
- ☒ CORE BIT
- ☒ OTHER 2-1/4" H.S.A.

HAMMER TYPE:
☒ AUTOMATIC ☒ MANUAL

CORE SIZE:
- ☐ -B_____
- ☒ -N 02
- ☐ -H_____

HAND TOOLS:
- ☐ POST HOLE DIGGER
- ☐ HAND AUGER
- ☐ SOUNDING ROD
- ☐ VANE SHEAR TEST
- ☐ OTHER _____

REVISED 09/15/00

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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.

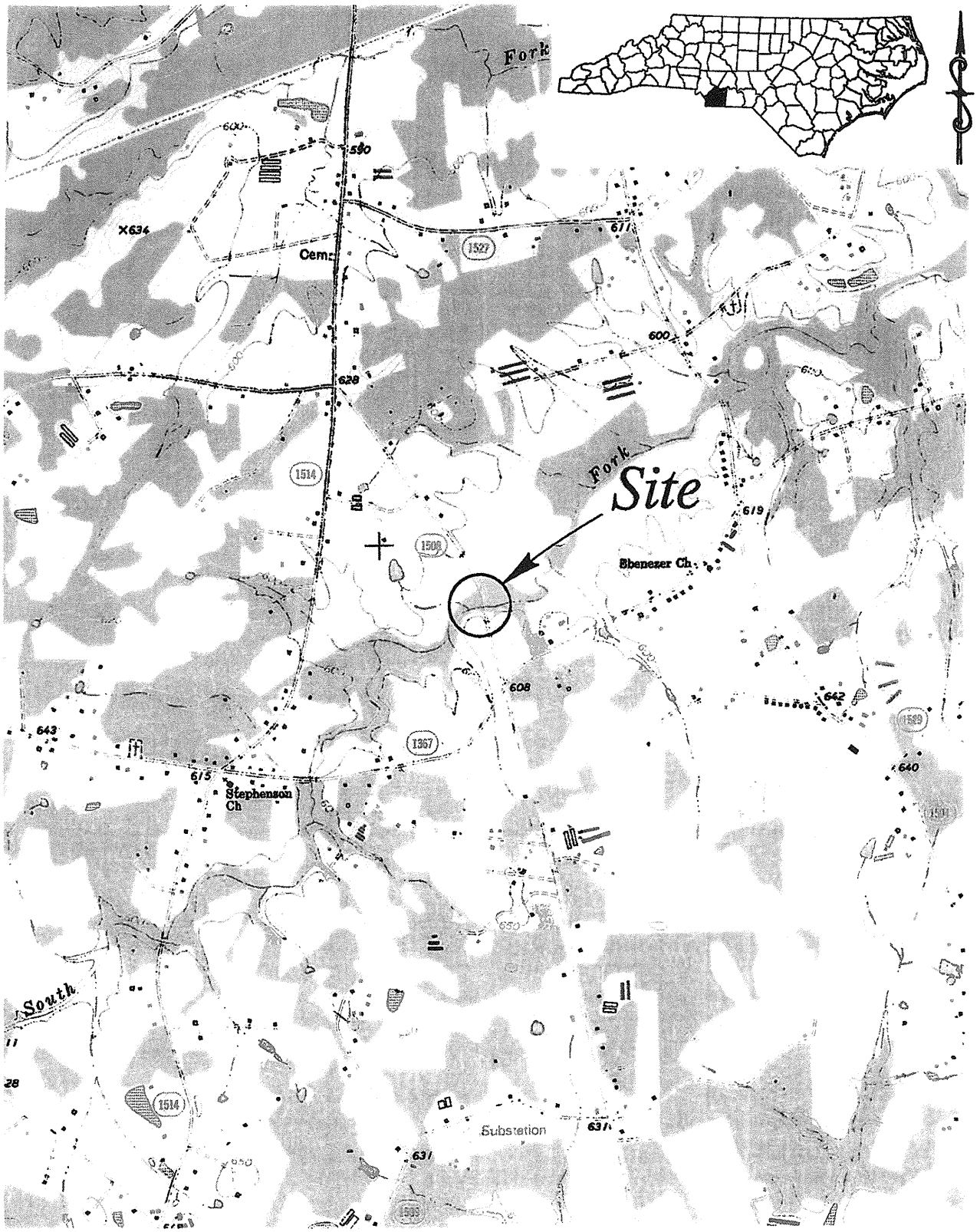
TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: RAILROAD SPIKE IN BASE OF TELEPHONE POLE LOCATED AT STATION -BL- 19+90, 30' LEFT (STATION -L- 18+09.18, 29.52' RIGHT) ELEVATION: 591.34'

NOTES:

REVISED 09/15/00

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-4651	33817.1.1	3	36



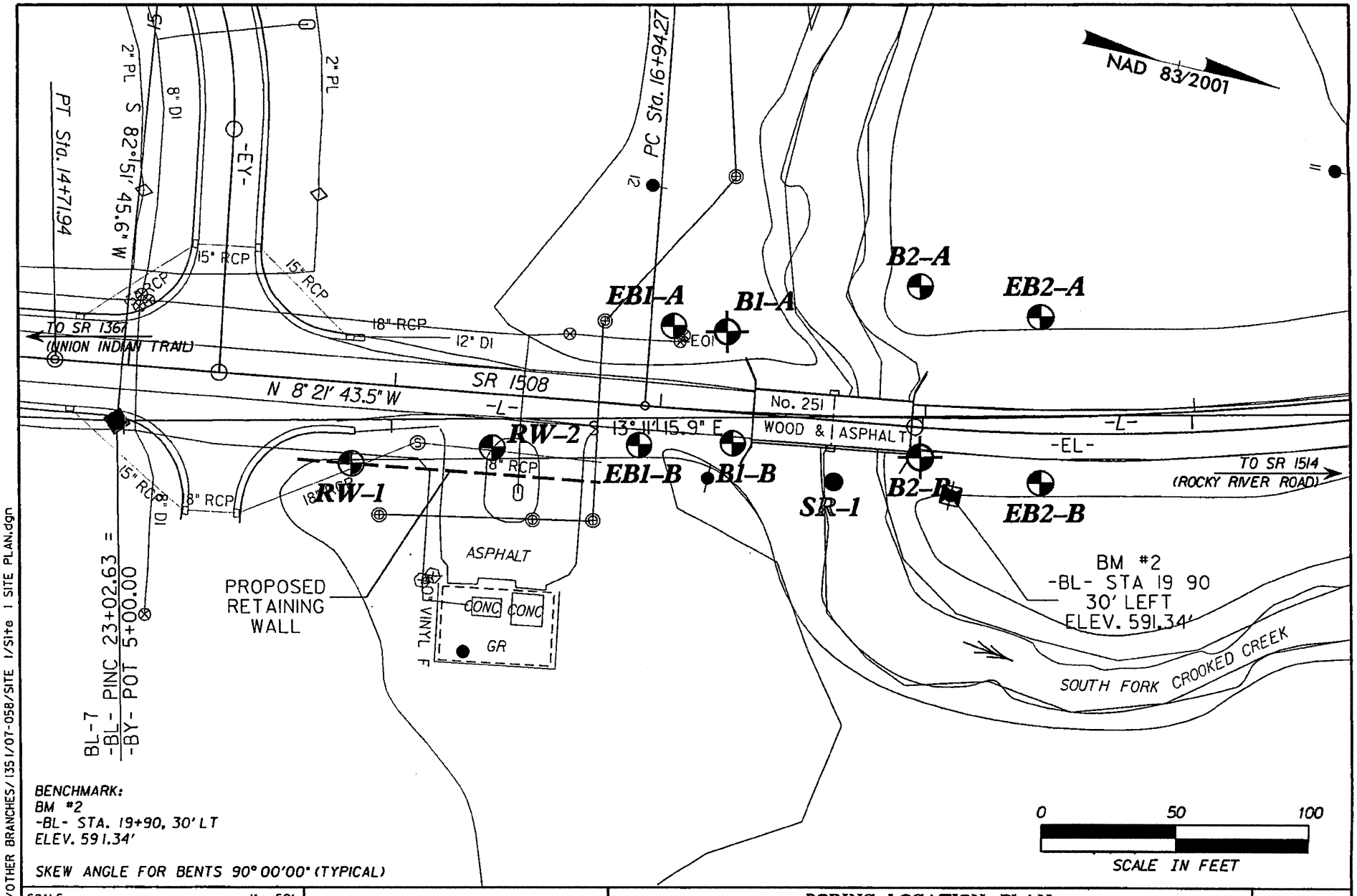
SCALE:	1:24,000
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	AUGUST 2008
JOB NO.	1051-08-170

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING • TESTING

SITE VICINITY MAP

REPLACEMENT OF BRIDGE No. 251
ON SR 1508 OVER CROOKED CREEK
STATE PROJECT NO. 33817.1.1 TIP NO. B-4651
FEDERAL I.D. NO. N/A
UNION COUNTY, NORTH CAROLINA

S:PROJECTS/2008/08-170/GEOTECH/CADD/B-4651 SITEVIC



BENCHMARK:
BM #2
-BL- STA. 19+90, 30' LT
ELEV. 591.34'

SKEW ANGLE FOR BENTS 90° 00'00" (TYPICAL)

SCALE:	1" = 50'
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	AUGUST 2008
JOB NO.	1051-08-170

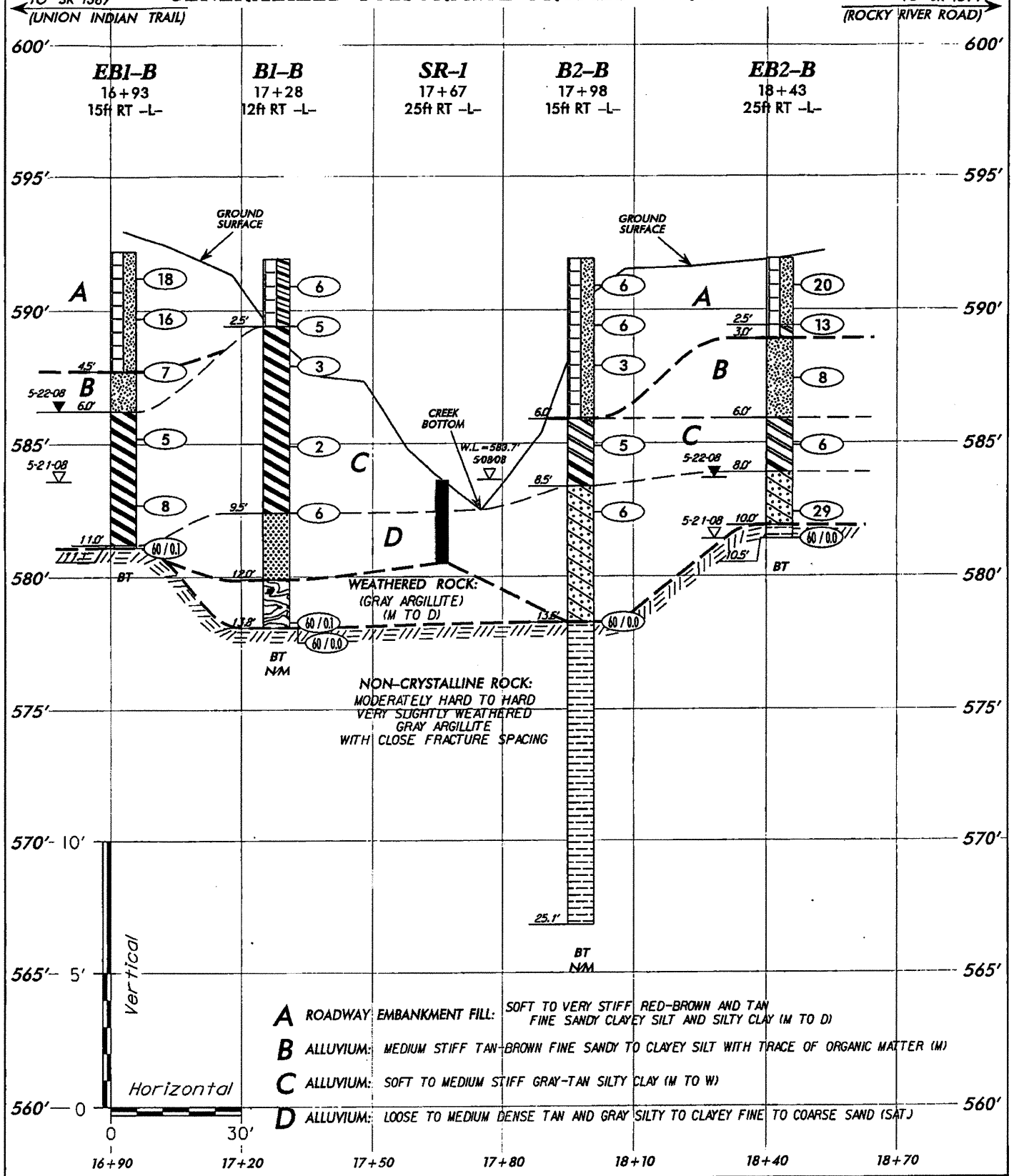
S&ME
ENVIRONMENTAL SERVICES
ENGINEERING · TESTING

BORING LOCATION PLAN
REPLACEMENT OF BRIDGE No. 251
ON POPLIN RD. (SR 1508) OVER SOUTH FORK CROOKED CREEK
TIP No. B-4651 STATE PROJECT No. 33817.1.1
FEDERAL ID No. N/A
UNION COUNTY, NORTH CAROLINA

SHEET NO. 4

S:PROJECTS/2007/OTHER BRANCHES/1351/07-058/SITE 1/Site 1 SITE PLAN.dgn

GENERALIZED SUBSURFACE PROFILE 25' RIGHT OF -L-



A ROADWAY EMBANKMENT FILL: SOFT TO VERY STIFF RED-BROWN AND TAN FINE SANDY CLAYEY SILT AND SILTY CLAY (M TO D)

B ALLUVIUM: MEDIUM STIFF TAN-BROWN FINE SANDY TO CLAYEY SILT WITH TRACE OF ORGANIC MATTER (M)

C ALLUVIUM: SOFT TO MEDIUM STIFF GRAY-TAN SILTY CLAY (M TO W)

D ALLUVIUM: LOOSE TO MEDIUM DENSE TAN AND GRAY SILTY TO CLAYEY FINE TO COARSE SAND (SAT)

SCALE:	(V) 1"=5' (H) 1"= 30'
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	JUNE 2008
JOB NO.	105 1-08-170

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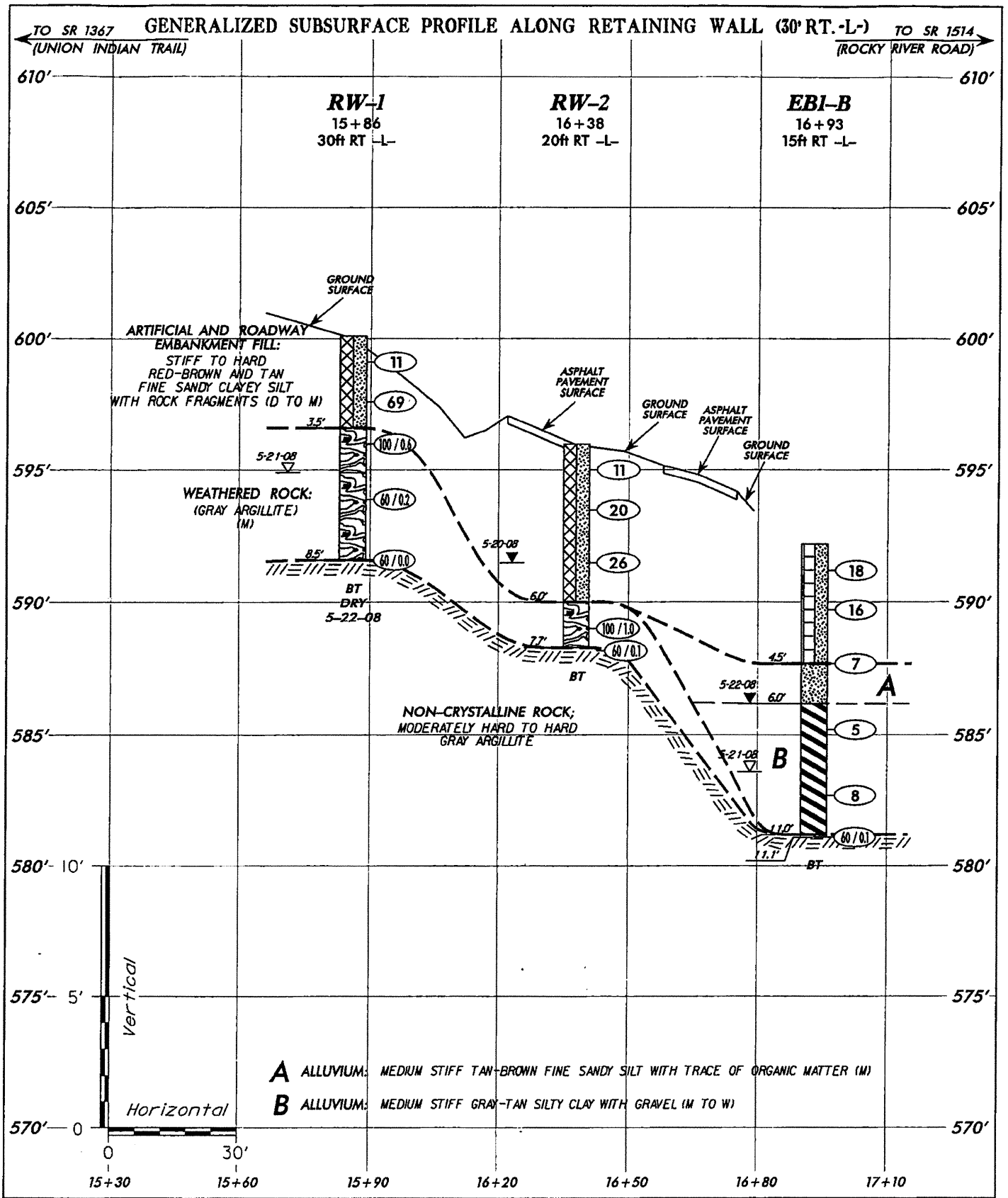
GENERALIZED SUBSURFACE PROFILE 25' RIGHT OF -L-
FROM STA. 16+90 TO STA. 18+40
REPLACEMENT OF BRIDGE No. 251
ON POPLIN RD (SR 1508) OVER SOUTH FORK CROOKED CREEK
TIP No. B-4651 STATE PROJECT No. 33817.1.1
FEDERAL ID No. N/A
UNION COUNTY, NORTH CAROLINA

SHEET NO. 5

S:\PROJECTS\2008\08-170\GEOTECH\CADD\B-4651 PROFILE-XSEC



SCALE:	(V) 1"=5' (H) 1"= 30'
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	JUNE 2008
JOB NO.	1051-08-170

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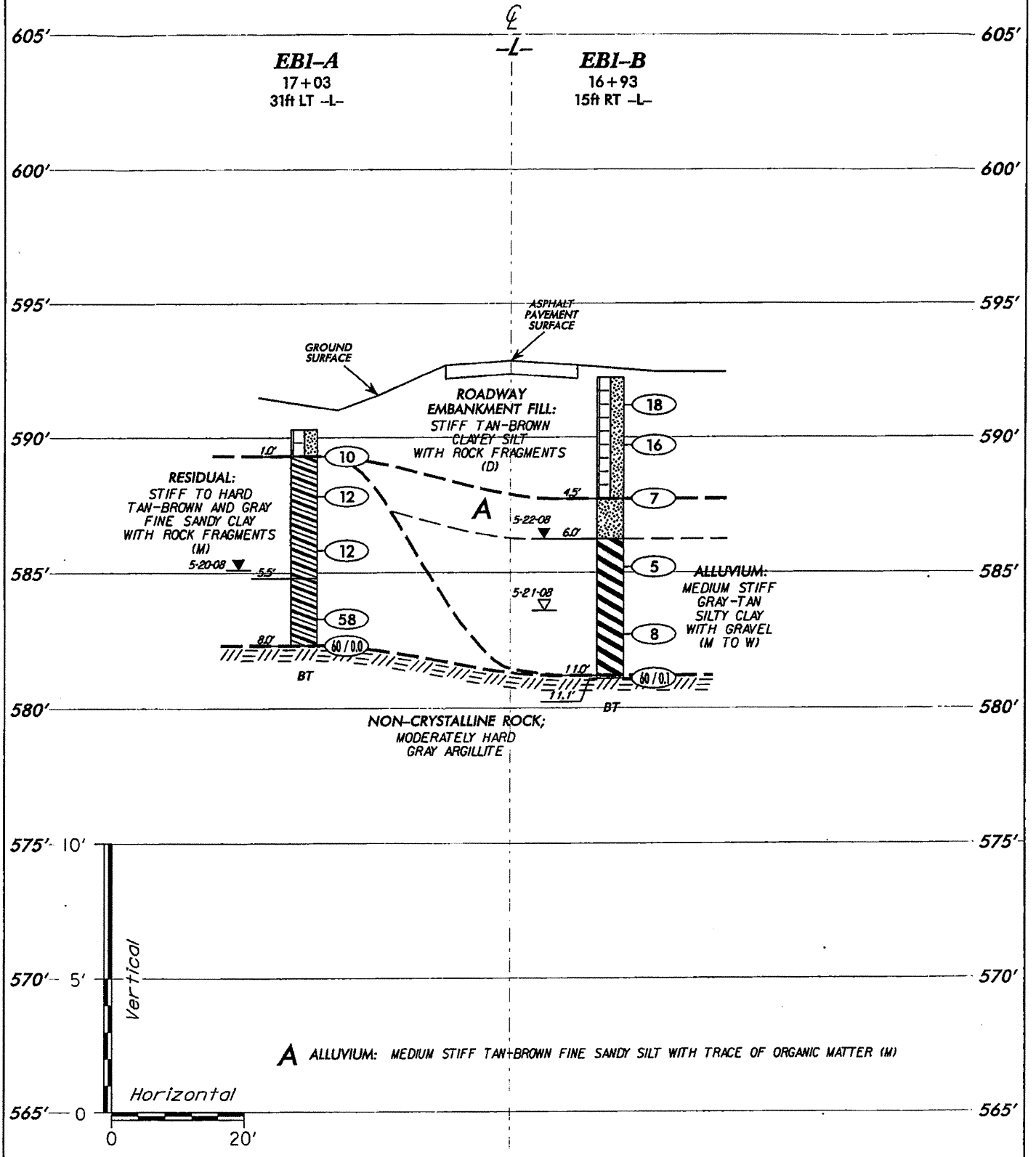
GENERALIZED SUBSURFACE PROFILE ALONG RETAINING WALL (30' RT.-L-)
FROM STA. 15+45 TO STA. 16+80
REPLACEMENT OF BRIDGE No. 251
ON POPLIN RD. (SR 1508) OVER SOUTH FORK CROOKED CREEK
TIP No. B-4651 STATE PROJECT No. 33817.1.1
FEDERAL ID No. N/A
UNION COUNTY, NORTH CAROLINA

SHEET NO. 6

S:\PROJECTS\2008\08-170\GEOTECH\CADD\B-4651 PROFILE-XSEC

GENERALIZED SUBSURFACE CROSS SECTION THROUGH END BENT No. 1



SCALE:	(V) 1"=5' (H) 1"= 20'
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	JUNE 2008
JOB NO.	1051-08-170

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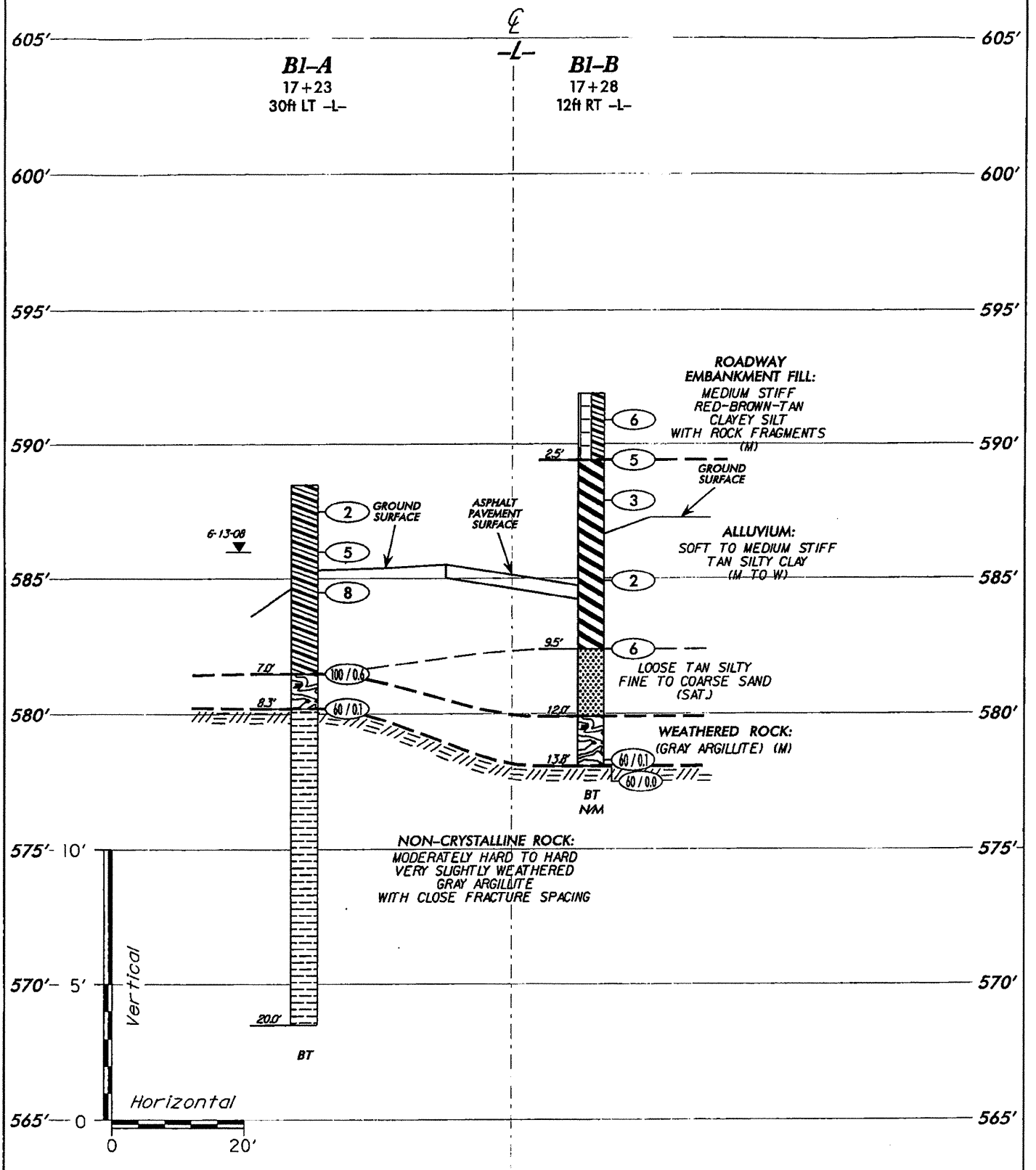
GENERALIZED SUBSURFACE CROSS SECTION
THROUGH END BENT No. 1
REPLACEMENT OF BRIDGE No. 251
ON POPLIN RD. (SR 1508) OVER SOUTH FORK CROOKED CREEK
TIP No. B-4651 STATE PROJECT No. 33817.1.1
FEDERAL ID No. N/A
UNION COUNTY, NORTH CAROLINA

SHEET NO. 7

S:\PROJECTS\2008\08-170\GEOTECH\CADD\B-4651 PROFILE-XSEC

GENERALIZED SUBSURFACE CROSS SECTION THROUGH INTERIOR BENT No. 1



SCALE:	(V) 1"=5' (H) 1"= 20'
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	JUNE 2008
JOB NO.	1051-08-170

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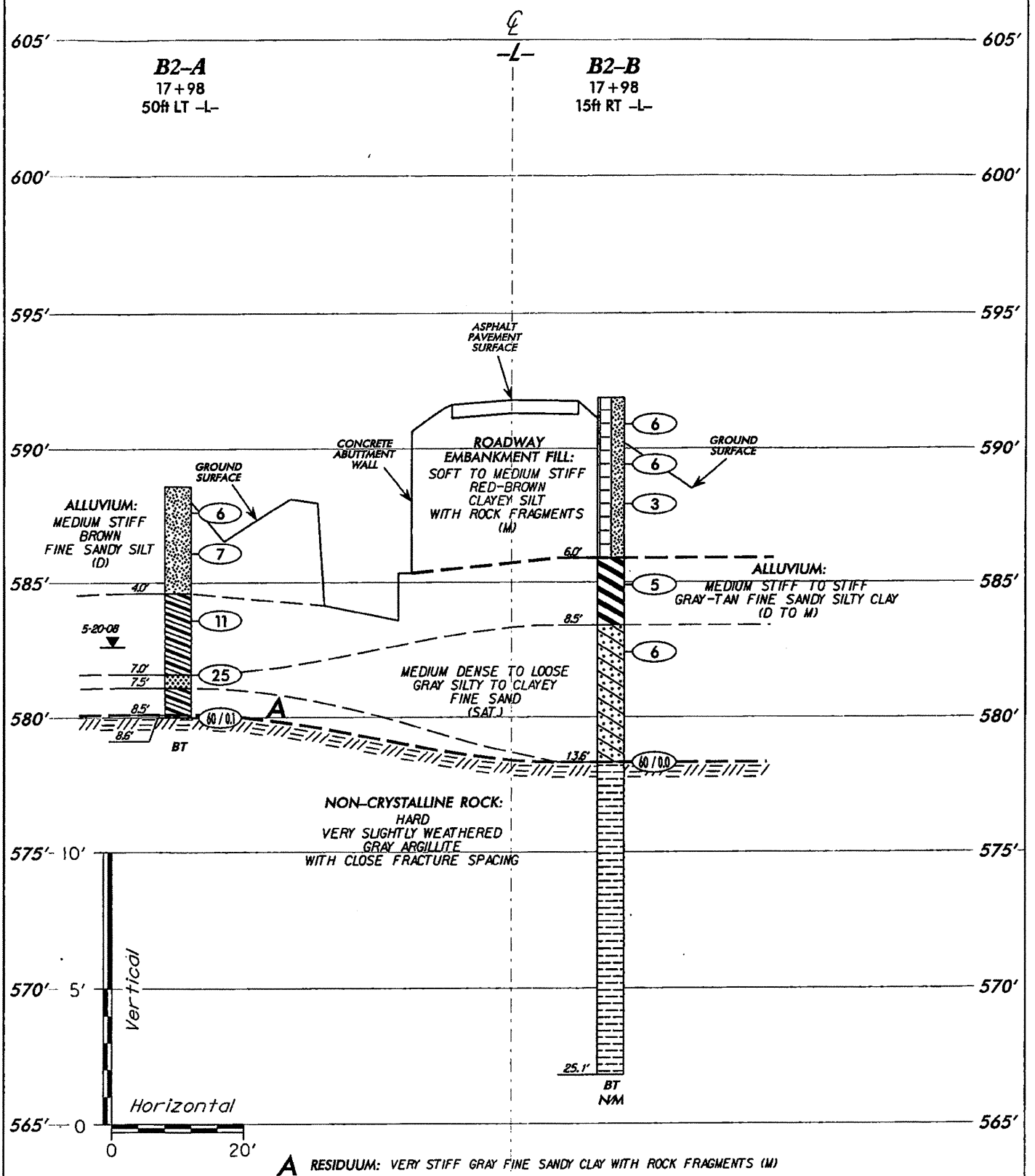
ENVIRONMENTAL SERVICES
ENGINEERING · TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH INTERIOR BENT No. 1
REPLACEMENT OF BRIDGE No. 251
ON POPLIN RD. (SR 1508) OVER SOUTH FORK CROOKED CREEK
TIP No. B-4651 STATE PROJECT No. 33817.1.1
FEDERAL ID No. N/A
UNION COUNTY, NORTH CAROLINA

SHEET NO. 8

S:\PROJECTS\2008\08-170\GEOTECH\CADD\B-4651 PROFILE-XSEC

GENERALIZED SUBSURFACE CROSS SECTION THROUGH INTERIOR BENT No. 2



A RESIDUUM: VERY STIFF GRAY FINE SANDY CLAY WITH ROCK FRAGMENTS (M)

SCALE:	(V) 1"=5' (H) 1"= 20'
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	JUNE 2008
JOB NO.	1051-08-170

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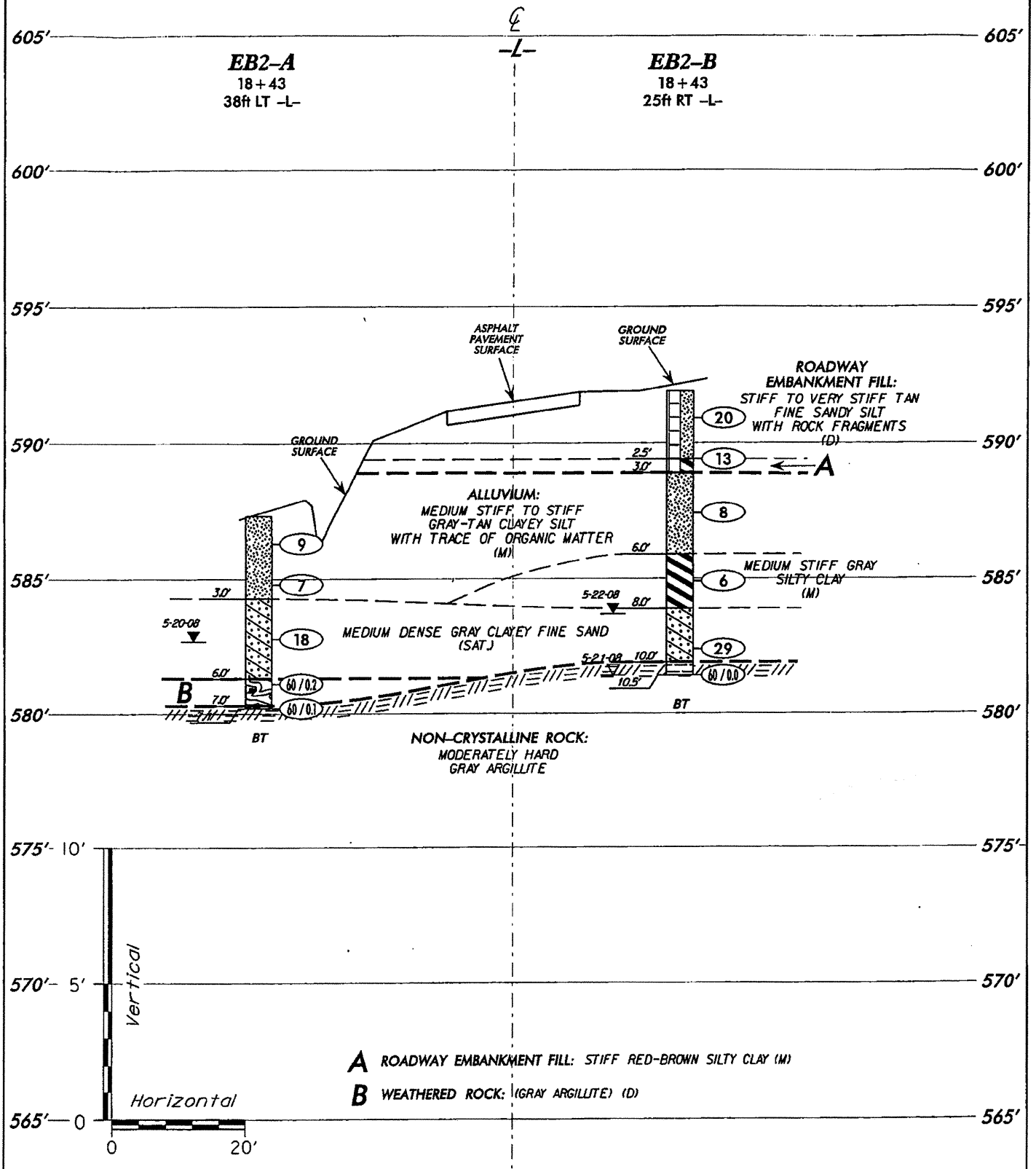
ENVIRONMENTAL SERVICES
ENGINEERING · TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH INTERIOR BENT No. 2
REPLACEMENT OF BRIDGE No. 251
ON POPLIN RD. (SR 1508) OVER SOUTH FORK CROOKED CREEK
TIP No. B-4651 STATE PROJECT No. 33817.1.1
FEDERAL ID No. N/A
UNION COUNTY, NORTH CAROLINA

SHEET NO. 9

S:\PROJECTS\2008\08-170 GEOTECH\CAD\B-4651 PROFILE.MSEC

GENERALIZED SUBSURFACE CROSS SECTION THROUGH END BENT No. 2



SCALE:	(V) 1"=5' (H) 1"= 20'
CHECKED BY:	AFR
DRAWN BY:	TRP
DATE:	JUNE 2008
JOB NO.	1051-08-170

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING · TESTING

GENERALIZED SUBSURFACE CROSS SECTION
THROUGH END BENT No. 2
REPLACEMENT OF BRIDGE No. 251
ON POPLIN RD. (SR 1508) OVER SOUTH FORK CROOKED CREEK
TIP No. B-4651 STATE PROJECT No. 33817.1.1
FEDERAL ID No. N/A
UNION COUNTY, NORTH CAROLINA

SHEET NO. 10

S:\PROJECTS\2008-08-170\GEOTECH\CADD\B-4651 PROFILE-XSEC

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33817.1.1	ID. B-4651	COUNTY Union		GEOLOGIST K.Plummer
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek				GROUND WTR (ft)
BORING NO. EB1-A	STATION 17+03	OFFSET 31ft LT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 590.3 ft	TOTAL DEPTH 8.0 ft	NORTHING 488,140	EASTING 1,527,893	24 HR. 5.2
DRILL MACHINE BK-51	DRILL METHOD 2-1/4" HSA			HAMMER TYPE Manual
START DATE 05/19/08	COMP. DATE 05/19/08	SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
	595										
590	590.3	0.0								590.3 GROUND SURFACE	0.0
	588.8	1.5	4	4	6	10		D		589.3 **Roadway Embankment Fill:** Stiff Tan-Brown Clayey SILT (A-4) With Rock Fragments	1.0
	586.8	3.5	4	5	7	12		M		**Residual:** Stiff Tan-Brown Gray Fine Sandy Clay (A-6)	
585	584.3	6.0	6	6	6	12		W		584.8	5.5
	582.3	8.0	20	25	33	58		M		**Residual:** Hard Gray Fine Sandy Clay (A-6) With Rock Fragments 582.3	8.0
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 582.3 ft on Non-Crystalline Rock: Gray Argillite.	
580										1) Advanced 2-1/4" HSA to 8.0 feet.	
575											
570											
565											
560											
555											
550											
545											
540											
535											
530											
525											
520											
515											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33817.1.1	**ID.** B-4651	**COUNTY** Union	**GEOLOGIST** K.Plummer
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 16+93	**OFFSET** 15ft RT	**ALIGNMENT** -L-	**0 HR.** 8.6
COLLAR ELEV. 592.2 ft	**TOTAL DEPTH** 11.1 ft	**NORTHING** 488,137	**EASTING** 1,527,940	**24 HR.** 6.0
DRILL MACHINE BK-51	**DRILL METHOD** 2-1/4" HSA		**HAMMER TYPE** Manual
START DATE 05/21/08	**COMP. DATE** 05/21/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 11.0 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
	595									
	592.2	0.0								592.2 GROUND SURFACE 0.0
590	590.7	1.5	8	9	9	18		D		**Roadway Embankment Fill:** Very Stiff Tan Fine Sandy Silt (A-4) With Rock Fragments
	588.7	3.5	10	7	9	16		D		
	586.2	6.0	4	4	3	7		D		587.7 4.5
585			5	3	2	5		M		586.2 **Alluvium:** Medium Stiff Tan-Brown Fine Sandy Silt (A-4) With Trace of Organic Matter 6.0
	583.7	8.5	2	2	6			W		**Alluvium:** Medium Stiff Gray-Tan Silty Clay (A-7-6) With Gravel
	581.2	11.0	60/0.1			8 60/0.1		W		581.2 11.0
580										581.1 **Non-Crystalline Rock:** Moderately Hard Gray Argillite 11.1
575										Boring Terminated with Standard Penetration Test Refusal at Elevation 581.1 ft in Non-Crystalline Rock: Moderately Hard Gray Argillite.
570										1) Advanced 2-1/4" HSA to 11.0 Feet.
565										
560										
555										
550										
545										
540										
535										
530										
525										
520										
515										

NCDOT BORE SINGLE 170.GPJ NC_DOT.GDT 6/26/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33817.1.1	**ID.** B-4651	**COUNTY** Union		**GEOLOGIST** K.Plummer
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 17+23	**OFFSET** 30ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 588.5 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 488,160	**EASTING** 1,527,890	**24 HR.** 2.5
DRILL MACHINE Diedrich D-50	**DRILL METHOD** 3-1/4" HSA,NQ2 Core Barrel			**HAMMER TYPE** Automatic
START DATE 06/12/08	**COMP. DATE** 06/12/08	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 8.3 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
	590									
	588.5	0.0								ELEV. (ft) 588.5 GROUND SURFACE DEPTH (ft) 0.0
	587.0	1.5	WOH	1	1	2		M		**Alluvium:** Soft to Medium Stiff Tan Silty CLAY (A-6)
585	585.5	3.0	2	2	3	5		M		
			2	3	5	8		W		
	582.5	6.0								
			3	30	70/0.1	100/0.6		D		581.5 7.0
580	580.3	8.2	60/0.1			60/0.1				580.2 **Weathered Rock:** (Gray Argillite) 8.3
										Non-Crystalline Rock: Moderately Hard to Hard Very Slightly Weathered Gray Argillite With Close Fracture Spacing
575										
570										568.5 20.0
										Boring Terminated at Elevation 568.5 ft in Non-Crystalline Rock: Hard Very Slightly Weathered Gray Argillite.
565										1) Advanced 3-1/4" HSA to 8.2 feet.
										2) Approximate Drilling Fluid Density 62.4 pcf.
560										3) Advanced NQ2 Core Barrel from 8.3 to 19.9 feet.
										4) Creek Water Used as Drilling Fluid.
555										5) No Loss of Drilling Fluid Observed.
550										
545										
540										
535										
530										
525										
520										
515										
510										

NCDOT BORE SINGLE 170.GPJ NC_DOT.GDT 6/26/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

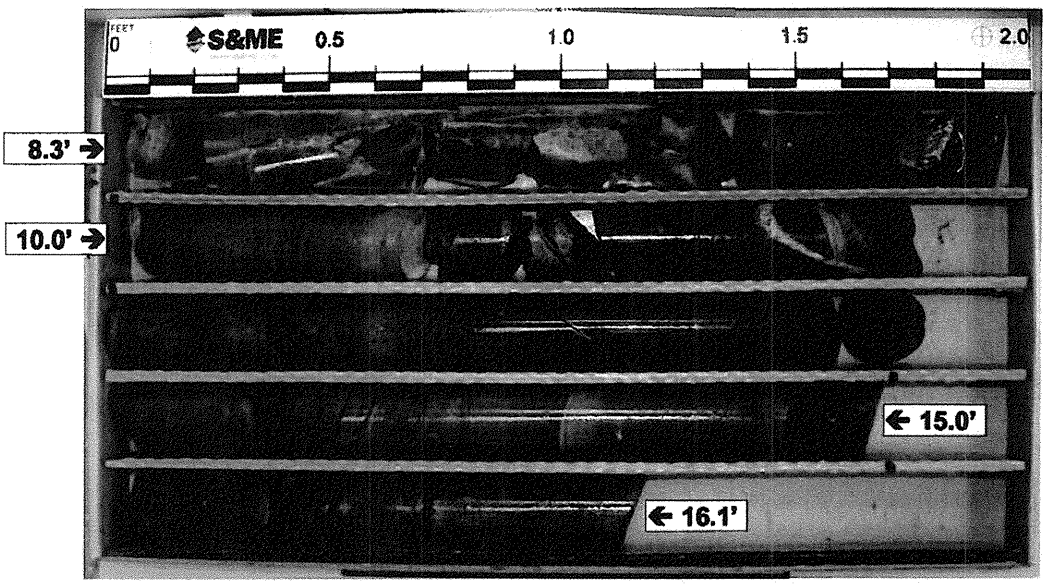
PROJECT NO. 33817.1.1	**ID.** B-4651	**COUNTY** Union	**GEOLOGIST** K.Plummer	
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 17+23	**OFFSET** 30ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 588.5 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 488,160	**EASTING** 1,527,890	**24 HR.** 2.5
DRILL MACHINE Diedrich D-50	**DRILL METHOD** 3-1/4" HSA,NQ2 Core Barrel		**HAMMER TYPE** Automatic	
START DATE 06/12/08	**COMP. DATE** 06/12/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 8.3 ft	
CORE SIZE NQ2	**TOTAL RUN** 11.7 ft	**DRILLER** J.Millwood		

ELEV (ft)	RUN 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
	580.2										Begin Coring @ 8.3 ft
	580.2	8.3	1.7	3:30	(1.7)	(0.0)		(11.6)	(7.2)		580.2 **Non-Crystalline Rock:** Moderately Hard to Hard Very Slightly Weathered Gray Argillite With Close Fracture Spacing-1 Vertical Fracture From 8.4 to 9.2 Feet, 6 Fractures at 15°, 14 Fractures at 35°, 5 Fractures at 45° 8.3
	578.5	10.0		1:30/0.7	100%	0%		99%	62%		
			5.0	3:30	(4.9)	(3.3)					
575				1:30	98%	66%					
				2:00							
				2:00							
	573.5	15.0		2:00							
			5.0	2:15	(5.0)	(3.9)					
				1:30	100%	78%					
570				2:00							
				2:00							
	568.5	20.0		2:15							568.5 20.0
											Boring Terminated at Elevation 568.5 ft in Non-Crystalline Rock: Hard Very Slightly Weathered Gray Argillite.
565											1) Advanced 3-1/4" HSA to 8.2 feet.
											2) Approximate Drilling Fluid Density 62.4 pcf.
											3) Advanced NQ2 Core Barrel from 8.3 to 19.9 feet.
560											4) Creek Water Used as Drilling Fluid.
											5) No Loss of Drilling Fluid Observed.
555											
550											
545											
540											
535											
530											
525											
520											
515											
510											
505											

NCDOT CORE SINGLE 170.GPJ NC_DOT.GDT 7/9/08

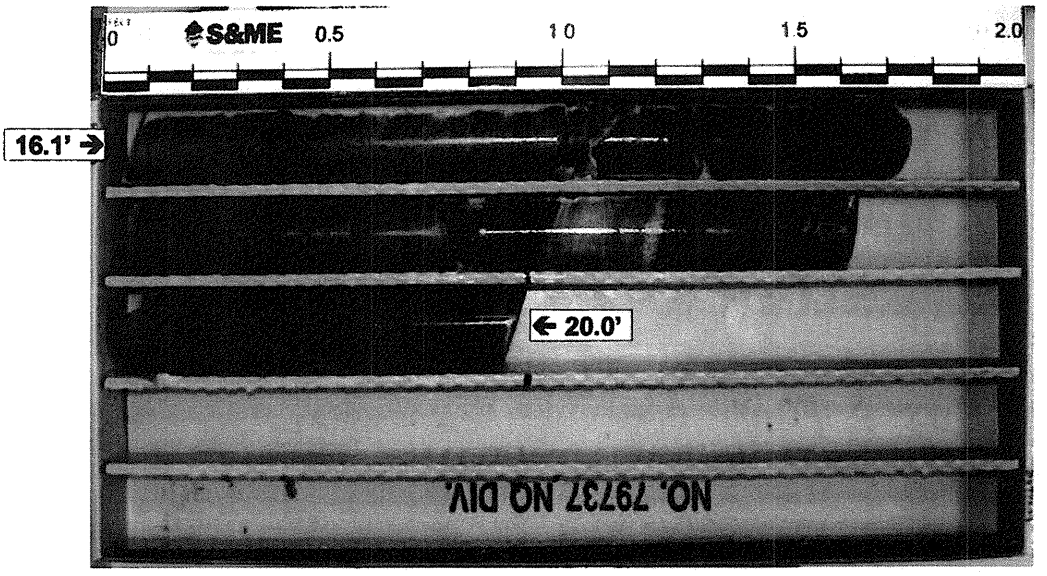
CORE PHOTOS

Project No.: 33817.1.1	*ID No.:* B-4651	*Location:* Union Co., NC	*Boring No.:* B1-A
Site Description: Bridge No. 251 on SR1508 over South Fork Crooked Creek			*Driller*: J. Millwood
Collar Elev.: 588.5 ft.	*Core Size:* NQ2	*Equipment:* Diedrich D-50	*Geologist*: K. Plummer
Elev. at T.D.: 568.5 ft.	*Total Depth:* 20.0 ft.	*Total Run:* 11.7 ft.	*Date*: 6/12/2008



Box 1 of 2

Top of Box @ 8.3 feet; Bottom of Box @ 16.1 feet



Box 2 of 2

Top of Box @ 16.1 feet; Bottom of Box @ 20.0 feet

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33817.1.1	**ID.** B-4651	**COUNTY** Union	**GEOLOGIST** K.Plummer
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 17+28	**OFFSET** 12ft RT	**ALIGNMENT** -L-	0 HR. N/M
COLLAR ELEV. 591.9 ft	**TOTAL DEPTH** 13.8 ft	**NORTHING** 488,171	**EASTING** 1,527,931	24 HR. N/M
DRILL MACHINE Diedrich D-50	**DRILL METHOD** 3-1/4" HSA		**HAMMER TYPE** Automatic
START DATE 06/12/08	**COMP. DATE** 06/12/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
	595										
	591.9	0.0								591.9 GROUND SURFACE	0.0
590	590.4	1.5	4	3	3	6		M		**Roadway Embankment Fill:** Medium Stiff Red-Brown-Tan Silty CLAY (A-6) With Rock Fragments	
	588.9	3.0	2	2	3	5		W		589.4	2.5
			2	1	2	3		W		**Alluvium:** Soft Tan Silty CLAY (A-7-6)	
	585.9	6.0									
585			1	1	1	2		W			
	583.4	8.5									
			WOH	1	5	6		Sat.		582.4	9.5
580						1				**Alluvium:** Loose Tan Silty Fine to Coarse SAND (A-2-4)	
	578.4	13.5								579.9	12.0
										Weathered Rock: (Gray Argillite)	
	578.1	13.8	60/0.1			60/0.1		M		578.1	13.8
575			60/0.0			60/0.0		M		Boring Terminated with Standard Penetration Test Refusal at Elevation 578.1 ft on Non-Crystalline Rock: Hard Gray Argillite.	
										1) Advanced 3-1/4" HSA to 13.8 feet.	
570											
565											
560											
555											
550											
545											
540											
535											
530											
525											
520											
515											

NCDOT BORE SINGLE 170.GPJ NC_DOT.GDT 6/26/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33817.1.1	ID. B-4651	COUNTY Union		GEOLOGIST K.Plummer
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek				GROUND WTR (ft)
BORING NO. B2-A	STATION 17+98	OFFSET 50ft LT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 588.6 ft	TOTAL DEPTH 8.6 ft	NORTHING 488,227	EASTING 1,527,857	24 HR. 6.0
DRILL MACHINE BK-51	DRILL METHOD 2-1/4" HSA			HAMMER TYPE Manual
START DATE 05/19/08	COMP. DATE 05/19/08	SURFACE WATER DEPTH N/A		DEPTH TO ROCK 8.5 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
	590									ELEV. (ft) DEPTH (ft)
	588.6	0.0								588.6 GROUND SURFACE 0.0
	587.1	1.5	3	3	3	6		D		**Alluvium**: Medium Stiff Brown Fine Sandy Silt (A-4)
585	584.6	4.0	3	4	3	7		D		584.6 4.0
	582.6	6.0	4	5	6	11		D		**Alluvium**: Stiff Gray Fine Sandy Clay (A-6)
580	580.1	8.5	5	5	20	25		M		581.6 7.0
			60/0.1			60/0.1				581.1 **Alluvium**: Medium Dense Gray Silty Fine Sand (A-2-4) 7.5
										580.1 **Residuum**: Very Stiff Gray Fine Sandy Clay (A-6) With Rock Fragments 8.5
575										580.0 **Non-Crystalline Rock**: Moderately Hard Gray Argillite 8.6
570										Boring Terminated with Standard Penetration Test Refusal at Elevation 580.0 ft in Non-Crystalline Rock: Hard Gray Argillite.
565										1) Advanced 2-1/4" HSA to 8.5 feet.
560										
555										
550										
545										
540										
535										
530										
525										
520										
515										
510										

NCDOT BORE SINGLE 170.GPJ NC_DOT.GDT 6/26/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33817.1.1	ID. B-4651	COUNTY Union	GEOLOGIST K.Plummer
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek			GROUND WTR (ft)
BORING NO. B2-B	STATION 17+98	OFFSET 15ft RT	ALIGNMENT -L-	0 HR. N/M
COLLAR ELEV. 591.9 ft	TOTAL DEPTH 25.1 ft	NORTHING 488,241	EASTING 1,527,921	24 HR. N/M
DRILL MACHINE Diedrich D-50	DRILL METHOD 3-1/4" HSA w/Rotary Wash,NW2 Core Barrel		HAMMER TYPE Automatic
START DATE 06/12/08	COMP. DATE 06/12/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 13.6 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
	595									ELEV. (ft) DEPTH (ft)
	591.9	0.0								591.9 GROUND SURFACE 0.0
590	590.4	1.5	4	4	2	8		M		**Roadway Embankment Fill:** Soft to Medium Stiff Red-Brown Clayey SILT (A-4) With Rock Fragments
	588.9	3.0	3	4	2	6		M		
			2	1	2	3		M		
	585.9	6.0								585.9 6.0
585			4	2	3	5		M		**Alluvium:** Medium Stiff Gray-Tan Silty CLAY (A-7-6) With Trace of Organic Matter
	583.4	8.5								583.4 8.5
			4	3	3	6		Sat.		**Alluvium:** Loose Gray Clayey Fine SAND (A-2-6)
580										
	578.3	13.6								578.3 13.6
			60/0.0			60/0.0				**Non-Crystalline Rock:** Hard Very Slightly Weathered Gray Argillite With Close Fracture Spacing
575										
570										
										566.8 25.1
565										Boring Terminated at Elevation 566.8 ft in Non-Crystalline Rock: Hard Very Slightly Weathered Gray Argillite.
560										1) Advanced 3-1/4" HSA to 13.6 feet. 2) Advanced Casing to 13.6 feet. 3) Approximate Drilling Fluid Density 62.4 pcf. 4) Advanced NQ2 Core Barrel from 13.6 to 25.1 feet. 5) Creek Water Used As Drilling Fluid. 6) No Loss of Drilling Fluid Observed.
555										
550										
545										
540										
535										
530										
525										
520										
515										

NCDOT BORE SINGLE 170.GPJ NC_DOT.GDT 6/26/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

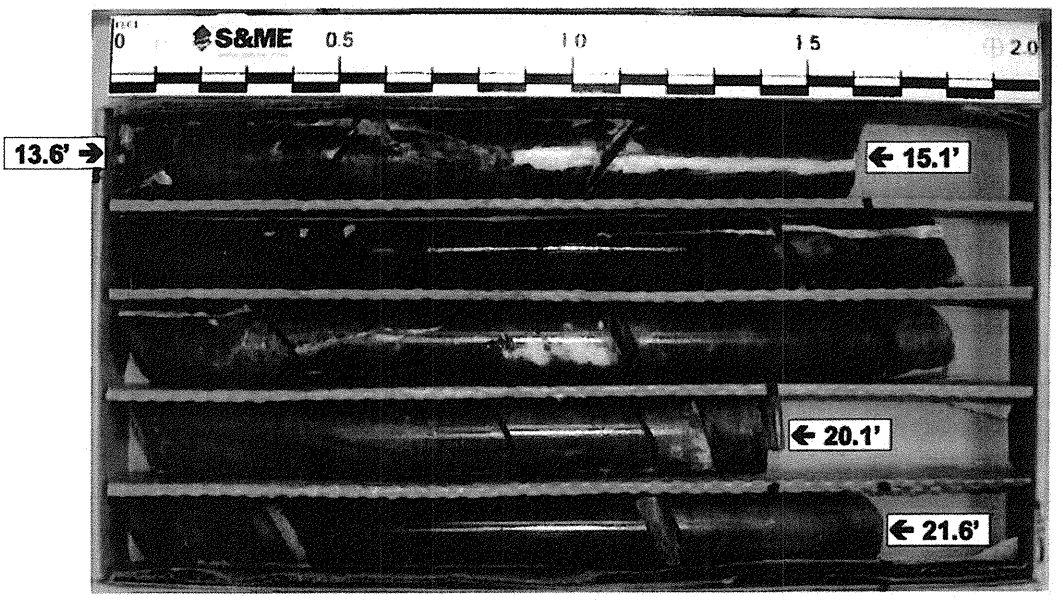
PROJECT NO. 33817.1.1	**ID.** B-4651	**COUNTY** Union	**GEOLOGIST** K.Plummer
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 17+98	**OFFSET** 15ft RT	**ALIGNMENT** -L-	0 HR. N/M
COLLAR ELEV. 591.9 ft	**TOTAL DEPTH** 25.1 ft	**NORTHING** 488,241	**EASTING** 1,527,921	24 HR. N/M
DRILL MACHINE Diedrich D-50	**DRILL METHOD** 3-1/4" HSA w/Rotary Wash,NW2 Core Barrel		**HAMMER TYPE** Automatic
START DATE 06/12/08	**COMP. DATE** 06/12/08	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 13.6 ft
CORE SIZE NQ2	**TOTAL RUN** 11.5 ft	**DRILLER** J.Millwood	

ELEV (ft)	RUN 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
	578.3										Begin Coring @ 13.6 ft
	578.3	13.6	1.5	1:30	(1.5)	(0.5)		(11.3)	(8.1)		ELEV. 578.3 — **Non-Crystalline Rock**: Hard Very Slightly Weathered Gray Argillite With Close Fracture Spacing and Vertical Quartz Vein-1 Vertical Fracture from 13.6 to 14.6 feet, 12 Fractures at 35°, 1 Vertical Fracture from 16.9 to 17.2 feet, 2 Fractures at 15°, 1 Fracture at 45° — DEPTH 13.6
	576.8	15.1		N=60/0.0	100%	33%		98%	70%		
575			5.0	1:30/0.5	(4.8)	(4.0)					
				2:15	96%	80%					
				2:15							
				2:00							
	571.8	20.1		2:15							
				2:15							
			5.0	2:00	(5.0)	(3.6)					
570				2:00	100%	72%					
				2:00							
				2:00							
	566.8	25.1		2:00							ELEV. 566.8 — DEPTH 25.1
565											Boring Terminated at Elevation 566.8 ft in Non-Crystalline Rock: Hard Very Slightly Weathered Gray Argillite.
											1) Advanced 3-1/4" HSA to 13.6 feet.
											2) Advanced Casing to 13.6 feet.
560											3) Approximate Drilling Fluid Density 62.4 pcf.
											4) Advanced NQ2 Core Barrel from 13.6 to 25.1 feet.
											5) Creek Water Used As Drilling Fluid.
555											6) No Loss of Drilling Fluid Observed.
550											
545											
540											
535											
530											
525											
520											
515											
510											
505											
500											

NCDOT CORE SINGLE 170.GPJ NC_DOT.GDT 7/9/08

CORE PHOTOS

Project No.: 33817.1.1	*ID No.:* B-4651	*Location:* Union Co., NC	*Boring No.:* B2-B
Site Description: Bridge No. 251 on SR1508 over South Fork Crooked Creek			*Driller:* J. Millwood
Collar Elev.: 591.9 ft.	*Core Size:* NQ2	*Equipment:* Diedrich D-50	*Geologist:* K. Plummer
Elev. at T.D.: 566.8 ft.	*Total Depth:* 25.1 ft.	*Total Run:* 11.5 ft.	*Date:* 6/12/2008



Box 1 of 2

Top of Box @ 13.6 feet; Bottom of Box @ 21.6 feet

Box 2 of 2

Top of Box @ 21.6 feet; Bottom of Box @ 25.1 feet

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33817.1.1	ID. B-4651	COUNTY Union	GEOLOGIST K.Plummer
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek			GROUND WTR (ft)
BORING NO. EB2-A	STATION 18+43	OFFSET 38ft LT	ALIGNMENT -L-	0 HR. N/M
COLLAR ELEV. 587.3 ft	TOTAL DEPTH 7.1 ft	NORTHING 488,274	EASTING 1,527,859	24 HR. 4.6
DRILL MACHINE BK-51	DRILL METHOD 2-1/4" HSA		HAMMER TYPE Manual
START DATE 05/19/08	COMP. DATE 05/19/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 7.0 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
	590									
	587.3	0.0								587.3 GROUND SURFACE 0.0
	585.8	1.5	3	4	5	9		M		**Alluvium:** Medium Stiff to Stiff Gray-Tan Clayey Silt (A-4) With Trace of Organic Matter
585	583.8	3.5	3	3	4	7		M		584.3 3.0
			8	7	11	18		Sat		**Alluvium:** Medium Dense Gray Clayey Fine Sand (A-2-6)
	581.3	6.0						D		581.3 6.0
580	580.3	7.0	60/0.2			60/0.2				**Weathered Rock:** (Gray Argillite)
			60/0.1			60/0.1				580.3 **Non-Crystalline Rock:** Gray Argillite 7.0
										580.2 7.1
575										Boring Terminated with Standard Penetration Test Refusal at Elevation 580.2 ft in Non-Crystalline Rock: Moderately Hard Gray Argillite.
570										1) Advanced 2-1/4" HSA to 7.0 feet.
565										
560										
555										
550										
545										
540										
535										
530										
525										
520										
515										
510										

NCDOT BORE SINGLE 170.GPJ NC_DOT.GDT 6/26/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33817.1.1	ID. B-4651	COUNTY Union		GEOLOGIST K.Plummer
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek				GROUND WTR (ft)
BORING NO. EB2-B	STATION 18+43	OFFSET 25ft RT	ALIGNMENT -L-	0 HR. 10.5' CI
COLLAR ELEV. 591.9 ft	TOTAL DEPTH 10.5 ft	NORTHING 488,287	EASTING 1,527,920	24 HR. 8.2
DRILL MACHINE BK-51	DRILL METHOD 2-1/4" HSA			HAMMER TYPE Manual
START DATE 05/21/08	COMP. DATE 05/21/08	SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
	595										
	591.9	0.0								591.9 GROUND SURFACE	0.0
590	590.4	1.5	14	11	9	20		D		**Roadway Embankment Fill:** Stiff to Very Stiff Tan Fine Sandy Silt (A-4) With Rock Fragments	
	588.4	3.5	8	7	6	13		M		589.4	2.5
			2	3	5	8		M		**Fill:** Stiff Red-Brown Silty CLAY (A-7-5)	
	585.9	6.0								588.9	3.0
585			2	3	3	6		M		**Alluvium:** Medium Stiff Tan Clayey Silt (A-4)	
	583.4	8.5								585.9	6.0
			8	15	14	29				**Alluvium:** Medium Stiff Gray Silty Clay (A-7-6)	
	581.4	10.5						Sat.		583.9	8.0
580			60/0.0			60/0.0		D		**Alluvium:** Medium Dense Gray Clayey Fine Sand (A-2-7)	
										581.9	10.0
										Weathered Rock: (Gray Argillite)	
										581.4	10.5
										Boring Terminated with Standard Penetration Test Refusal at Elevation 581.4 ft on Non-Crystalline Rock: Moderately Hard Gray Argillite.	
										1) Advanced 2-1/4" HSA to 10.5 feet.	
575											
570											
565											
560											
555											
550											
545											
540											
535											
530											
525											
520											
515											

NCDOT BORE SINGLE 170.GPJ NC_DOT.GDT 6/26/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33817.1.1	ID. B-4651	COUNTY Union		GEOLOGIST K.Plummer
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek				GROUND WTR (ft)
BORING NO. RW-1	STATION 15+86	OFFSET 30ft RT	ALIGNMENT -L-	0 HR. 5.2' CI
COLLAR ELEV. 600.1 ft	TOTAL DEPTH 8.5 ft	NORTHING 488,033	EASTING 1,527,970	24 HR. Dry
DRILL MACHINE BK-51	DRILL METHOD 2-1/4" HSA			HAMMER TYPE Manual
START DATE 05/21/08	COMP. DATE 05/21/08	SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
	605									ELEV. (ft) DEPTH (ft)
600	600.1	0.0								600.1 GROUND SURFACE 0.0
	598.6	1.5	7	6	5	11		M		**Artificial Fill:** Stiff to Hard Tan Fine Sandy Silt (A-4) With Rock Fragments
	596.6	3.5	15	19	50	69		M		596.6 3.5
595	594.1	6.0	80	20/0.1		100/0.6		D		**Weathered Rock:** (Gray Argillite)
	591.6	8.5	60/0.2			60/0.2		D		591.6 8.5
590			60/0.0			60/0.0		D		Boring Terminated with Standard Penetration Test Refusal at Elevation 591.6 ft on Non-Crystalline Rock: Hard Gray Argillite.
585										1) Advanced 2-1/4" HSA to 8.5 feet.
580										
575										
570										
565										
560										
555										
550										
545										
540										
535										
530										
525										

NCDOT BORE SINGLE 170.GPJ NC_DOT.GDT 6/26/08

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33817.1.1	ID. B-4651	COUNTY Union	GEOLOGIST K.Plummer
SITE DESCRIPTION Bridge No. 251 on S.R. 1508 over South Fork Crooked Creek			GROUND WTR (ft)
BORING NO. RW-2	STATION 16+38	OFFSET 20ft RT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 596.0 ft	TOTAL DEPTH 7.7 ft	NORTHING 488,083	EASTING 1,527,953	24 HR. 4.5
DRILL MACHINE BK-51	DRILL METHOD 2-1/4" HSA		HAMMER TYPE Manual	
START DATE 05/19/08	COMP. DATE 05/19/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
	600										
	596.0	0.0								596.0 GROUND SURFACE	0.0
595	594.5	1.5	2	5	6	11		M		**Artificial Fill:** Stiff to Very Stiff Red-Brown-Tan Clayey SILT (A-4) With Rock Fragments	
	592.5	3.5	5	13	7	20		M			
590	590.0	6.0	1	1	25	26		M		590.0	6.0
	588.4	7.6	40	60/0.4		100/1.0		D		588.3 **Weathered Rock:** (Tan Argillite)	7.7
			60/0.1			60/0.1		D		Boring Terminated with Standard Penetration Test Refusal at Elevation 588.3 ft on Non-Crystalline Rock: Gray Argillite.	
585										1) Advanced 2-1/4" HSA to 7.6 feet.	
580											
575											
570											
565											
560											
555											
550											
545											
540											
535											
530											
525											
520											

NCDOT BORE SINGLE 170.GPJ NC_DOT.GDT 6/26/08

SUMMARY OF LABORATORY TEST DATA

S&ME

Soil Classification and Gradation

S&ME Project #:	**1051-08-170**			Test Date:	6/25/2008
State Project No.:	33817.1.1	County:	Union	Report Date:	6/17 - 6/25/08
Federal ID No.:	N/A	TIP No.:	B-4651		
Project Name:	**Bridge No. 251 on SR 1508 Over South Fork**				
Client Name:	Ko & Associates				
Client Address:	Raleigh, North Carolina				

Boring No.	Sample No.	Sample Depth (Feet)	AASHTO Classification	Total % Passing Sieve #				Total Mortar Fraction				LL	PL	PI	Moisture Content %
				10	40	60	200	Coarse Sand	Fine Sand	Silt	Clay				
Bank	S-1	0 - 1	A-7-6 (4)	71	59	55	48	23	14	31	32	41	27	14	38.1
Bed	S-2	0 - 1	A-7-5 (1)	83	56	47	37	44	13	28	15	45	32	13	35.7

Notes:

Technical Responsibility: B. Riggs _____ Geotechnical Engineer

Signature *Position*

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33817.1.1 TIP: B-4651 COUNTY: Union

DESCRIPTION(1): Bridge No. 251 on SR 1508 Over South Fork Crooked Creek

EXISTING BRIDGE

Information from: Field Inspection x Microfilm ____ (reel ____ pos: ____)
Other (explain) Provided Hydraulic Report

Bridge No.: 251 Length: 60.5' Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2
Foundation Type: Shallow foundations

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: Evidence of some erosion at End Bents No. 1 and No.2.

Interior Bents: None observed

Channel Bed: Some scour beneath bridge (north side of channel)

Channel Bank: North bank upstream of bridge and south bank downstream of bridge

EXISTING SCOUR PROTECTION

Type(3): Timber abuntments and wing walls at both end bents.

Extent(4): Wing walls extend past the abutments.

Effectiveness(5): Scour protection appears to be working

Obstructions(6): Tree debris along both sides of bridge

INSTRUCTIONS

1 Describe the specific site's location, including route number and body of water crossed.
2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
3 Note existing scour protection (e.g. rip rap).
4 Describe extent of existing scour protection.
5 Describe whether or not the scour protection appears to be working.
6 Note obstructions such as dams, fallen trees, debris at bents, etc.
7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
10 Determine the approximate floodplain width from field observation or a topographic map.
11 Describe the material covering the floodplain (e.g. grass, trees, crops).
12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoritical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): Tan Brown Fine to Coarse Sandy Silty CLAY (A-7-5)

Channel Bank Material(8): Tan Brown Fine to Coarse Sandy Silty CLAY (A-7-6)

Channel Bank Cover(9): Low growing vegetation, grassy areas and large to small diameter hardwood trees.

Floodplain Width(10): 50 feet south of bridge to approximately 400 feet to the north of the bridge.

Floodplain Cover(11): Residential areas to the south and wooded and agricultural areas to the north.

Stream is(12): Aggrading ____ Degrading x Static ____

Channel Migration Tendency(13): Channel Migration appears to be to the North.

Observations and Other Comments: Heavy tree debris upstream&downstream of bridge, sand bar in creek east of bridge (downstream), newly constructed pump station southeast of bridge

Reported by: _____ **Date:** 5/19/2008

Abner F. Riggs, Jr.

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

	BENTS										
	B1	B2	B3	B4							
Left	581.5	580.1									
Right	579.9	578.3									

Comparison of DSE to Hydraulics Unit theoretical scour:

DSE determined by: _____ **Date:** _____

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	Bank	Bed					
Sample No.	S-1	S-2					
Retained #4	22.3	3.3					
Passed #10	71	83					
Passed #40	59	56					
Passed #200	48	37					
Coarse Sand	23	44					
Fine Sand	14	13					
Silt	31	28					
Clay	32	15					
LL	41	45					
PI	14	13					
AASHTO	A-7-6(4)	A-7-5(1)					
Station	17+30	17+67					
Offset	25 FT RT	25 FT RT					
Depth	0-1	0-1					

Particle Size Analysis of Soils

AASHTO T 88 as Modified by NCDOT

S&ME Project #: **1051-08-170** Report Date: 6/25/2008

Project Name: **Crooked Creek Bridge** Test Date(s): 06/18 - 06/23/2008

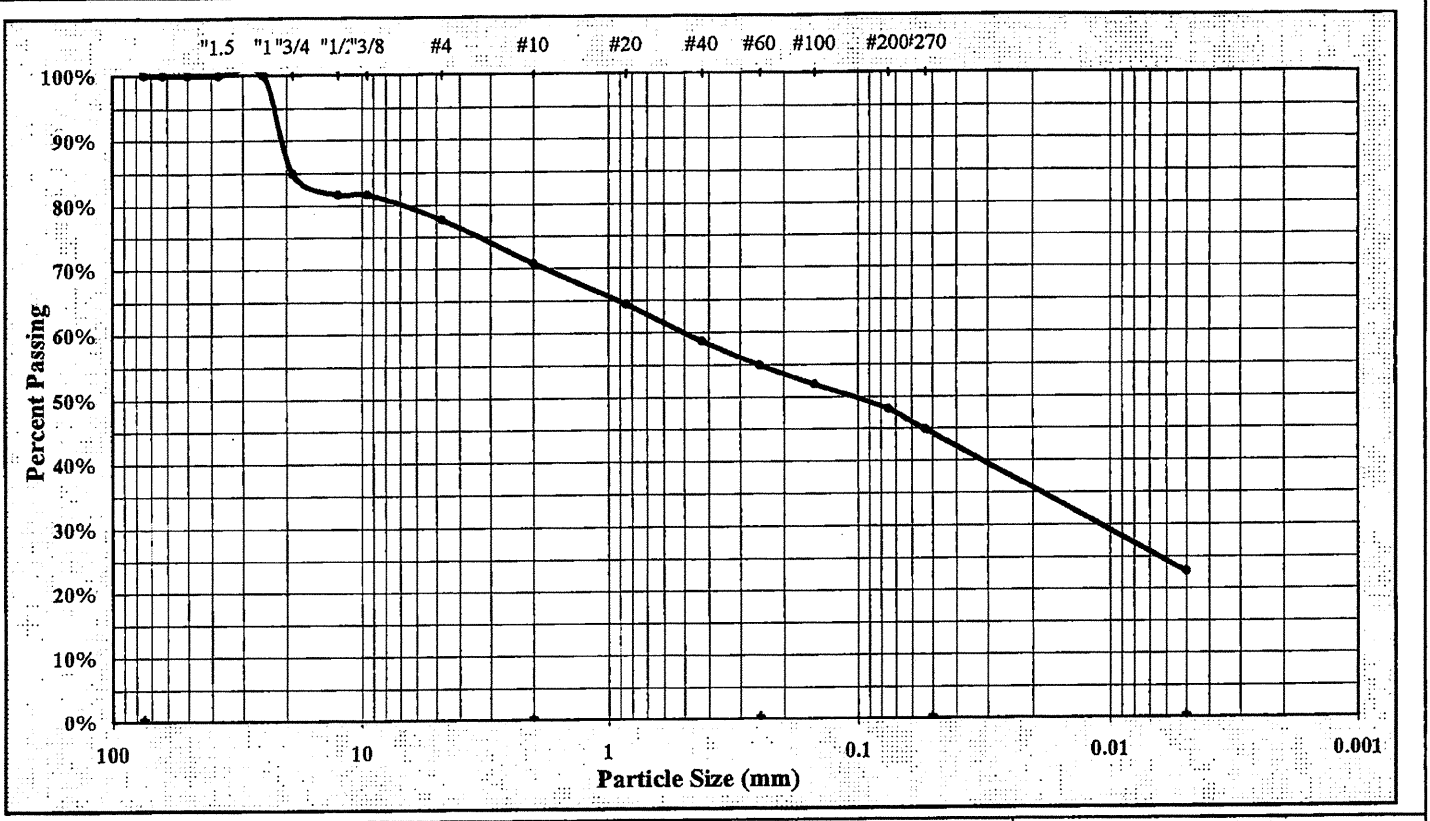
Client Name: Ko & Associates, Inc.

Client Address:

State Project #: 33817.1.1 F.A. Project No: NA TIP NO: B-4651

Boring #:	Channel Bank	Sample #: S-1	Sample Date: 5/19/08
Location:	STA 17+30	Offset: 25 FT RT.	Depth: 0 - 1.0'

Sample Description: Tan Brown Fine to Coarse Sandy Silty CLAY A-7-6 (4)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	1.0"	Coarse Sand	15.9%	Silt	22.0%
Gravel	29.2%	Fine Sand	10.1%	Clay	23.0%
Apparent Relative Density		Moisture Content	38.1%	% Passing #200	48.0%
Liquid Limit	41	Plastic Limit	27	Plastic Index	14

Soil Mortar (-#10 Sieve)

Coarse Sand	22.5%	Fine Sand	14.2%	Silt	31.3%	Clay	32.0%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Mal Krajan _____ Laboratory Supervisor

Signature *Signature*

S&ME

Particle Size Analysis of Soils

AASHTO T 88 as Modified by NCDOT

S&ME Project #: **1051-08-170** Report Date: 6/25/2008

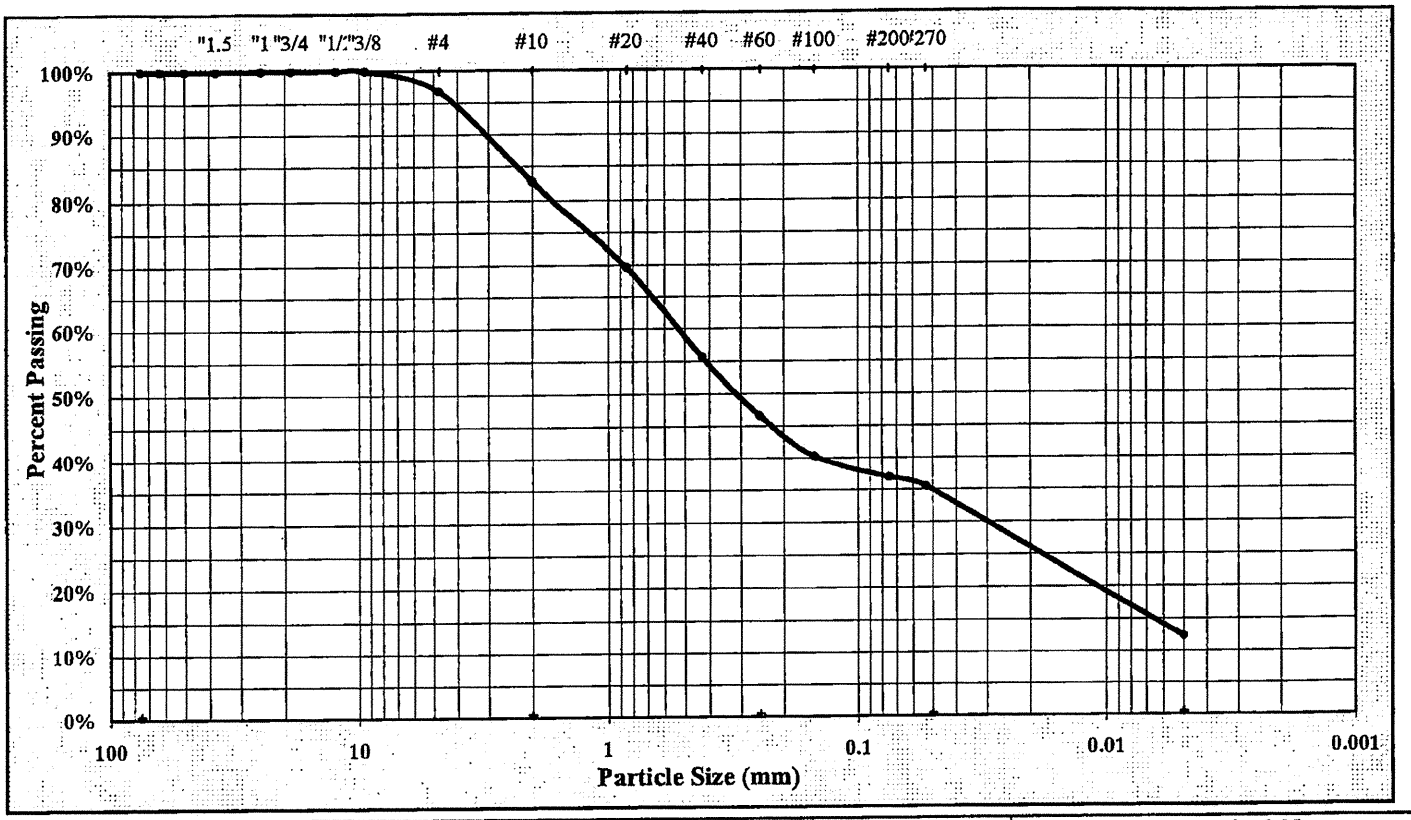
Project Name: **Crooked Creek Bridge** Test Date(s): 06/18 - 06/23/2008

Client Name: Ko & Associates,Inc.

Client Address:

State Project #: 33817.1.1 F.A. Project No: NA TIP NO: B-4651

Boring #:	Channel Bed	Sample #: S-2	Sample Date: 5/19/08
Location:	STA 17+67	Offset: 25 FT RT.	Depth: 0 - 1.0'
Sample Description:		Tan Brown Fine to Coarse Sandy Silty CLAY	A-7-5 (1)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and > 0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	3/8"	Coarse Sand	36.2%	Silt	23.0%
Gravel	17.3%	Fine Sand	11.0%	Clay	12.0%
Apparent Relative Density		Moisture Content	35.7%	% Passing #200	36.9%
Liquid Limit	45	Plastic Limit	32	Plastic Index	13

Soil Mortar (-#10 Sieve)

Coarse Sand 43.8% Fine Sand 13.3% Silt 28.0% Clay 14.9%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T87: Dry Preparation of Disturbed Soil and Soil Aggregate Samples for Test

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO M 145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Mal Krajan _____ Laboratory Supervisor

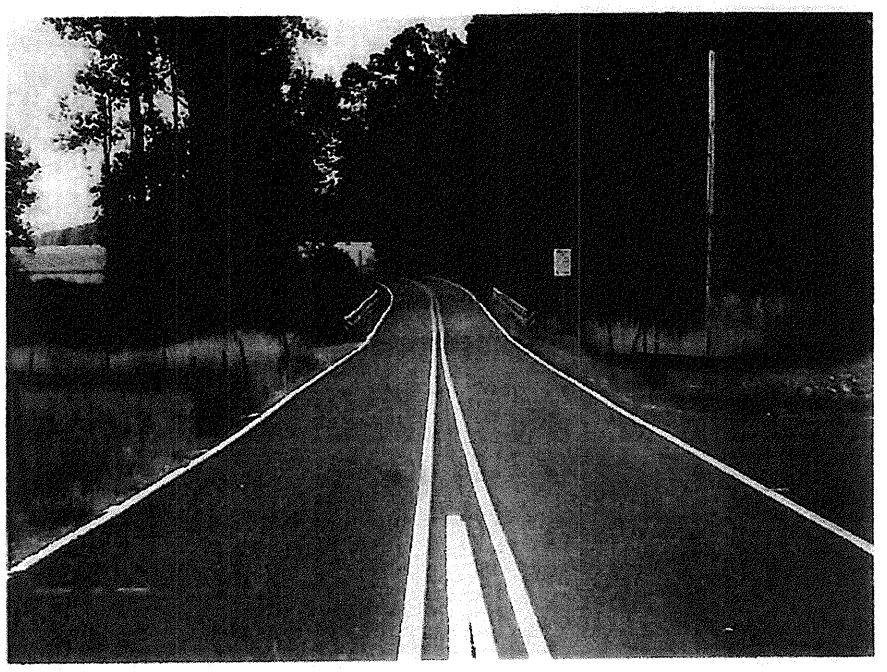
Signature *Signature*

PHOTOGRAPHIC RECORD
Bridge No. 251 On Poplin Rd. (SR 1508) Over South Fork Crooked Creek

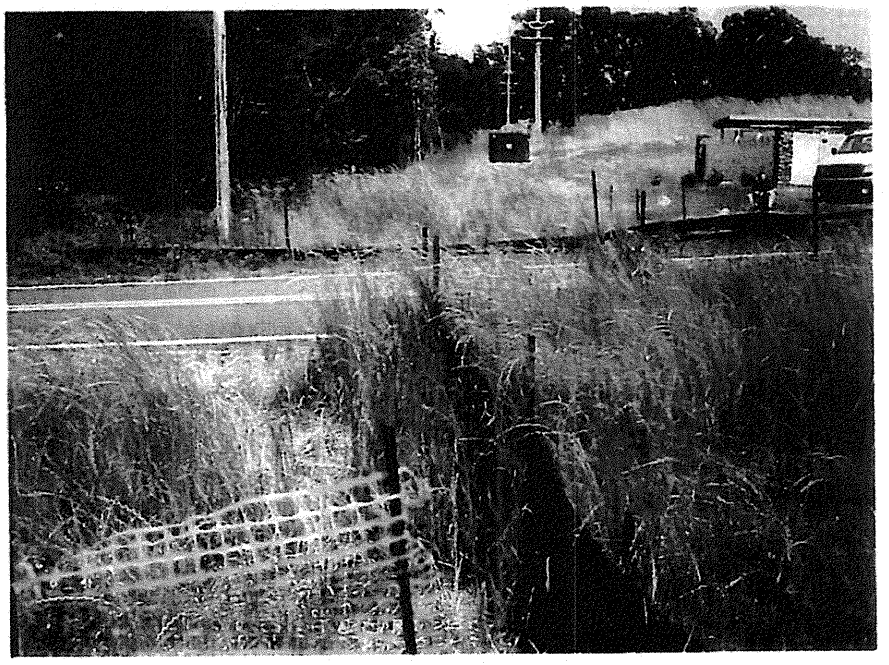
Photograph No. 1:
This photograph was taken from the right side of the -L- alignment, looking north, along the proposed Retaining Wall.

Photograph No. 2:
This photograph was taken from the right side of the -L- alignment, looking south, along the proposed Retaining Wall.

PHOTOGRAPHIC RECORD
Bridge No. 251 On Poplin Rd. (SR 1508) Over South Fork Crooked Creek



Photograph No. 3:
This photograph was taken from the south approach along the centerline of the -L- alignment, looking north.



Photograph No. 4:
This photograph was taken from left side of the -L- alignment, looking east, across proposed End Bent No. 1.

PHOTOGRAPHIC RECORD
Bridge No. 251 On Poplin Rd. (SR 1508) Over South Fork Crooked Creek

Photograph No. 5:
This photograph was taken from right side of the -L- alignment, looking west, across proposed End Bent No. 1.

Photograph No. 6:
This photograph was taken from the centerline of the -L- alignment, looking west, across proposed Interior Bent No. 1.

PHOTOGRAPHIC RECORD
Bridge No. 251 On Poplin Rd. (SR 1508) Over South Fork Crooked Creek

Photograph No. 7:
This photograph was taken from the centerline of the -L- alignment, looking east, across proposed Interior Bent No. 1.

Photograph No. 8:
This photograph was taken from the existing bridge, looking west (upstream).

Photograph No. 9:
This photograph was taken from the existing bridge, looking east (downstream).

Photograph No. 10:
This photograph was taken from the centerline of the -L- alignment, looking west, across proposed Interior Bent No. 2.

PHOTOGRAPHIC RECORD
Bridge No. 251 On Poplin Rd. (SR 1508) Over South Fork Crooked Creek

Photograph No. 11:
This photograph was taken from the centerline of the -L- alignment, looking east, across proposed Interior Bent No. 2.

Photograph No. 12:
This photograph was taken from the centerline of the -L- alignment, looking west, across proposed End Bent No. 2.

PHOTOGRAPHIC RECORD
Bridge No. 251 On Poplin Rd. (SR 1508) Over South Fork Crooked Creek

Photograph No. 13:
This photograph was taken from the centerline of the -L- alignment, looking east, across proposed End Bent No. 2.

Photograph No. 14:
This photograph was taken from the north approach along the centerline of the -L- alignment, looking south.