STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	33409.1.1 (B-4043)	1	22
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
		P.E.	
		CONST.	

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 33409.1.1 I.D. NO. B-4043

F.A. PROJECT BRZ-1424(4)

COUNTY BURKE

PROJECT DESCRIPTION BRIDGE NO. 51 ON SR-1424 OVER PARKS CREEK

SITE DESCRIPTION

CONTENTS:

CAUTION NOTICE

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INVESTIGATED BY C A DUNNAGAN PERSONNEL M M HAGER

CHECKED BY W D FRYE, Jr G K ROSE

SUBMITTED BY W D FRYE, Jr L E LANKFORD

DATE JANUARY 2006

DRAWN BY: C A DUNNAGAN

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NORTH CAROLINA LICENSED SEAL 10981 GEOLOGIST CHARLES ANDREWS DUNNAGAN

ID: B-4043

CONTRACT:

PROJECT REFERENCE NO.	SHEET NO.
33409.1.1 (B-4043)	2 OF 22

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)						SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2			A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6 A-2-7				A-7-5 A-7-6			
SYMBOL													
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX 35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
LIQUID LIMIT PLASTIC INDEX	6 MX		NP	40 MX 10 MX	41 MN 10 MX	40 MX 41 MN 11 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

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 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 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 0.50 0.5 TO 1.0 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	2.00	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, YELLOW-BROWN, 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 IS 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 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT CPT DPT RPT — 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
- RM - RESILIENT MODULUS SAMPLE
- RS - ROCK SAMPLE
- RT - RECOMPACTED TRIAXIAL SAMPLE
- CBR - CALIFORNIA BEARING RATIO 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, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] OTHER _____
- [ ] OTHER _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N XWL
- [ ] -H_____

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
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 ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
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 GEOLOGIST'S 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 GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
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 THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT 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 (FP) - 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 (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (ROD) - 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 THAT 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, THAT 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 BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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 (SROD) - 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 (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BM #1- RAILROAD SPIKE IN 18" SYCAMORE, -BL- STA. 14+55, 28' RT
ELEVATION: 1029.10 FT.

NOTES:

REVISED 03/07/05

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

February 6, 2006
(Revised 30 October, 2006)

STATE PROJECT: 33409.1.1 (B-4043)
F. A. PROJECT: BRZ-1424(4)

COUNTY: Burke

DESCRIPTION: Bridge No. 51 on SR-1424 over Parks Creek

SUBJECT: Geotechnical Report – Foundation Investigation

Introduction

This project is located in northeastern Burke County, approximately 3.0 miles from the Caldwell county line. The existing structure is to be replaced with a triple-span bridge. The span lengths are 35.0 feet, 55.0 feet and 35.0 feet. The bridge and approaches are in a slight right-hand curve. The skew will be 120 degrees.

The subsurface investigation was conducted using a CME-550 drill machine with an automatic drive hammer. The borings were drilled with -N- casing and advancer. Standard Penetration Tests were performed at intervals of 5.0 feet. Soil samples were taken and submitted for testing of quality. The sample test results were not available at the time of this writing. Rock core was retrieved from 5 of the 8 borings using -NXWL- equipment.

Geology and Rock Characteristics

The rocks underlying this project are primarily granite gneisses with zones of biotite gneiss. Overall, the rock is slightly weathered and hard, with frequent layers that are soft to medium hard and severely weathered. Although the Recoveries were fairly good, the RQD's rarely were above 50 percent.

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LOCATION:
CENTURY CENTER COMPLEX
BUILDING B
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

Foundation Material

End Bent One

The boring for EB1-A encountered roadway embankment from the surface. This material is comprised of approximately 8.0 feet of silty clay with sand and occasional gravel. An intermittent cobble or boulder is also present. This embankment was apparently constructed directly upon weathered rock.

The weathered rock is about 4.5 feet thick before grading into moderately to slightly weathered granite gneiss. Coring at EB1-A was begun at 14.7 feet (elevation 1020.8) and terminated at 23.9 feet (elevation 1011.6). The Recoveries were 57 and 34 percent; the RQD's were 21 and 0 percent. Neither a 0-hour nor a static (24-hour) groundwater level was recorded in this boring.

The boring for EB1-B encountered alluvium at the surface. The alluvium here consists of 7.5 feet of silty clay underlain by another 6.0 feet of silty sand. The sand horizon has occasional lenses of sandy silt. The alluvium was deposited directly upon weathered rock. The weathered rock continues for another 7.0 feet before grading into hard, fresh granite gneiss. Coring was begun at 20.4 feet (elevation 1008.2) and terminated at 29.6 feet (elevation 999.0). Recoveries were 81 and 80 percent; RQD's were 80 and 74 percent. Static groundwater was measured at 5.6 (elevation 1023.0).

Interior Bent One

The boring for B1-A encountered a minor amount of roadway embankment at the surface. Immediately below this is approximately 10.0 feet of alluvium. The alluvial horizon is composed of silty sand with trace amounts of organic material. The contact between the alluvium and saprolite occurred at 11.2 feet (elevation 1020.7). The saprolite is a 5.0 feet of sandy silt with clay. The saprolite increases in density until it is classifiable as weathered rock by approximately 16.5 feet (elevation 1015.4). This boring was terminated in weathered rock at 22.0 feet (elevation 1002.3). The static groundwater level was measured at 8.7 feet (elevation 1023.2).

The boring for B1-B encountered alluvium at the surface. The upper alluvial horizon consists of 4.0 feet of slightly micaceous sandy silt. Underlying this is another 10.0 feet of coarse sand and gravel. This lower horizon also contains occasional cobbles and boulders. A minor amount of silty sand saprolite separates the alluvium and weathered rock. Weathered rock was encountered at 15.0 feet (elevation 1012.2); it continues another 3.0 feet before grading into hard, slightly weathered granite gneiss. Coring was begun at 19.1 feet (elevation 1008.1) and terminated at 45.0 feet (elevation 982.2). The Recoveries ranged from 68 to 98 percent (85 percent average). The RQD's were from 36 to 78 percent (53 percent average). Static groundwater in B1-B was recorded at 3.9 feet (elevation 1023.3).

Interior Bent Two

The boring for B2-A encountered alluvium at the surface. The alluvial column consists of three horizons. The upper horizon is 5.5 feet of sandy silt. The middle horizon is 4.0 feet of silty sand. The lower horizon is about 4.0 feet of silty sand and gravel. The alluvium was deposited

upon saprolite. The saprolite is comprised of 12.0 feet of sandy silt with mica. The contact between saprolite and weathered rock is gradational and estimated to be at 25.0 feet (elevation 1004.7). The boring was terminated at 30.2 feet (elevation 999.5) in weathered rock. Static groundwater was measured at 6.8 feet (elevation 1022.9).

The boring for B2-B also began in alluvium. At this site, the alluvium consists of 11.5 feet of silty sand with a thin basal layer of gravel. A thin horizon of silty sand saprolite separates the alluvium and weathered rock. Weathered rock was reached at 13.5 feet (elevation 1013.7). Coring was begun in the biotite gneiss at 15.3 feet (elevation 1011.9) and terminated at 34.2 feet (elevation 993.0). The Recoveries were from 50 to 97 percent (83 percent average); RQD's were from 16 to 54 percent (32 percent average). Static groundwater was measured in this boring at 4.5 feet (elevation 1022.7).

End Bent Two

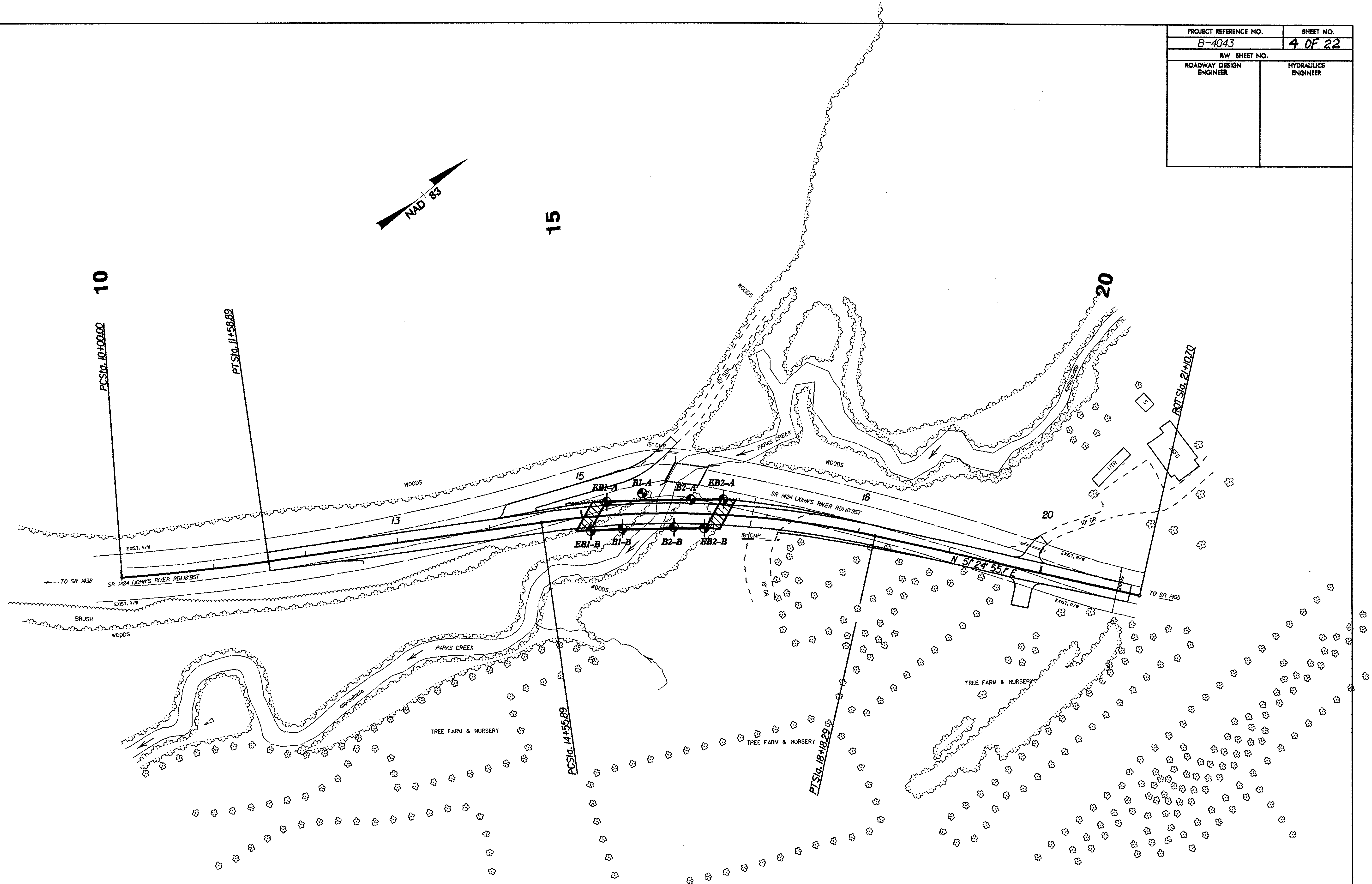
Alluvium is present from the surface at EB2-A. This consists of a 7.5 feet layer of sandy silt underlain by another 8.5 feet of silty sand and gravel. Organic material is present in trace amounts. The alluvium was deposited upon saprolite, which consists of 4.0 feet of sandy silt with mica. The contact between saprolite and weathered rock was noted in the field at 20.3 feet (elevation 1008.4). The boring was terminated in weathered rock at 35.7 feet (elevation 993.0). Static groundwater was not recorded in this boring.

The boring for EB2-B encountered two distinct alluvial horizons. The first, starting at ground surface, consists of almost 5.0 feet of interlayered silty sand and sandy silt. This horizon also contains minor amounts of organic material. The second horizon is comprised of 8.0 feet of silty sand and gravel with a boulder layer at 11.2 feet. Weathered rock underlays the alluvium, starting at 12.8 feet (elevation 1013.8). Coring was begun in granite gneiss at 14.5 feet (elevation 1012.1) and terminated at 28.4 feet (elevation 998.2). The Recoveries ranged from 56 to 98 percent (77 percent average); the RQD's were from 8 to 46 percent (27 percent average). Static groundwater occurred at this site at 3.7 feet (elevation 1022.9).

Respectfully Submitted,

Charles A. Dunnagan, L.G.
Project Engineering Geologist

PROJECT REFERENCE NO.	SHEET NO.
B-4043	4 OF 22
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



REVISIONS

8/17/99

26-JAN-2006 14:14

PROFILE 15.0' RIGHT OF CENTERLINE

BRIDGE NO.51, 33409.1.1 (B-4043)

EB1-B
15+08,
15.0' RT

B1-B
15+43,
15.0' RT

B2-B
16+00,
15.0' RT

EB2-B
16+33,
15.0'RT

1030
1020
1010
1000
990

4
3
100/.5
100/.6
11
14
100/.3
5
2
100/.8
2
4
100/.5

1/06

ALLUVIUM: BROWN SILTY CLAY, SILTY SAND, SANDY SILT AND SILTY SAND WITH GRAVEL AND COBBLES, WET TO SATURATED

CREEK SURFACE 1/06

ALLUVIUM: BROWN SANDY SILT AND SILTY SAND WITH BASAL GRAVEL LAYER, WET TO SATURATED

ALLUVIUM: BROWN SILTY SAND WITH BASAL GRAVEL LAYER, SLI ORGANIC, SATURATED

WEATHERED ROCK

SAPROLITE

CORE 1: 20.4'-24.6'
REC=81% RQD=81%

CORE 2: 24.6'-29.6'
REC=80% RQD=74%

BT

CORE 1: 19.1'-20.0'
REC=78% RQD=78%

CORE 2: 20.0'-25.0'
REC=98% RQD=50%

CORE 3: 25.0'-30.0'
REC=98% RQD=56%

CORE 4: 30.0'-35.0'
REC=78% RQD=40%

CORE 5: 35.0'-40.0'
REC=68% RQD=36%

CORE 6: 40.0'-45.0'
REC=92% RQD=60%

BT

CORE 1: 15.3'-19.2'
REC=97% RQD=36%

CORE 2: 19.2'-24.2'
REC=50% RQD=16%

CORE 3: 24.2'-29.2'
REC=96% RQD=54%

CORE 4: 29.2'-34.2'
REC=90% RQD=20%

BT

CORE 1: 14.5'-18.4'
REC=77% RQD=28%

CORE 2: 18.4'-23.4'
REC=56% RQD=8%

CORE 3: 23.4'-28.4'
REC=98% RQD=46%

BT

0 10 20

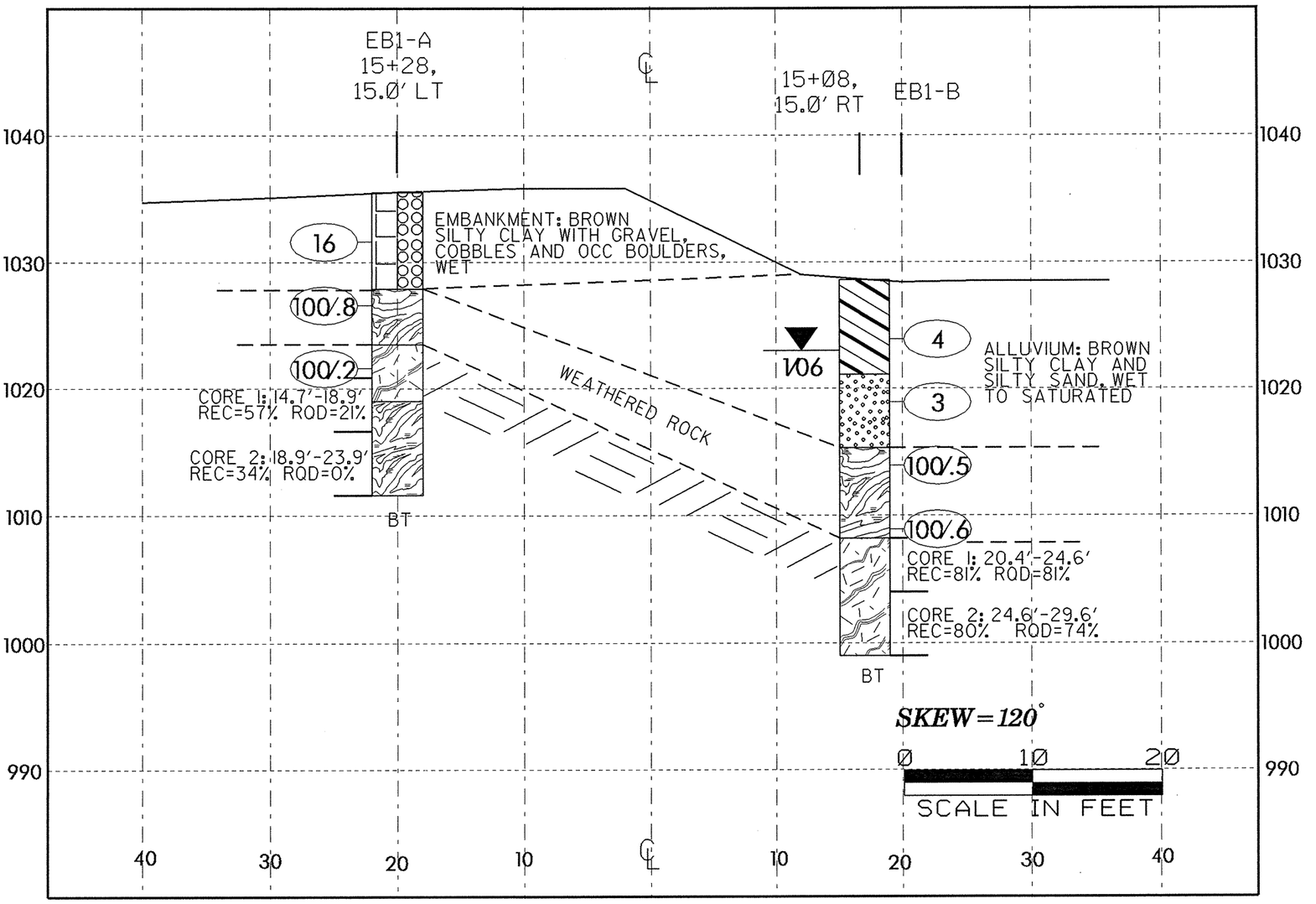
SCALE IN FEET

SKEW=120°

15+00 -L- 15+50 -L- 16+00

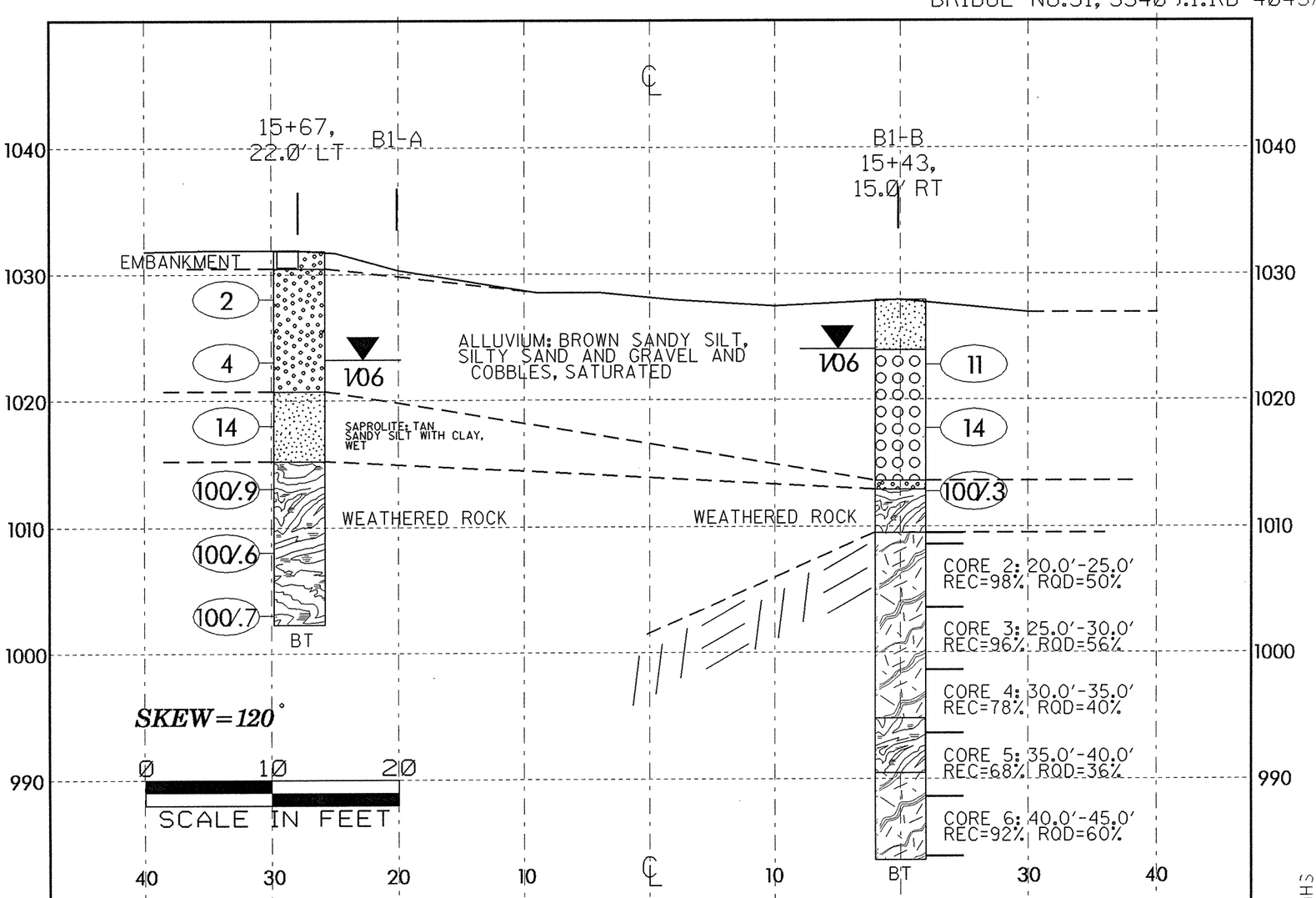
CROSS SECTION THROUGH END BENT ONE

BRIDGE NO.51, 33409.1.1(B-4043)



CROSS SECTION THROUGH INTERIOR BENT ONE

BRIDGE NO.51, 33409.1.1(B-4043)



CROSS SECTION THROUGH INTERIOR BENT TWO

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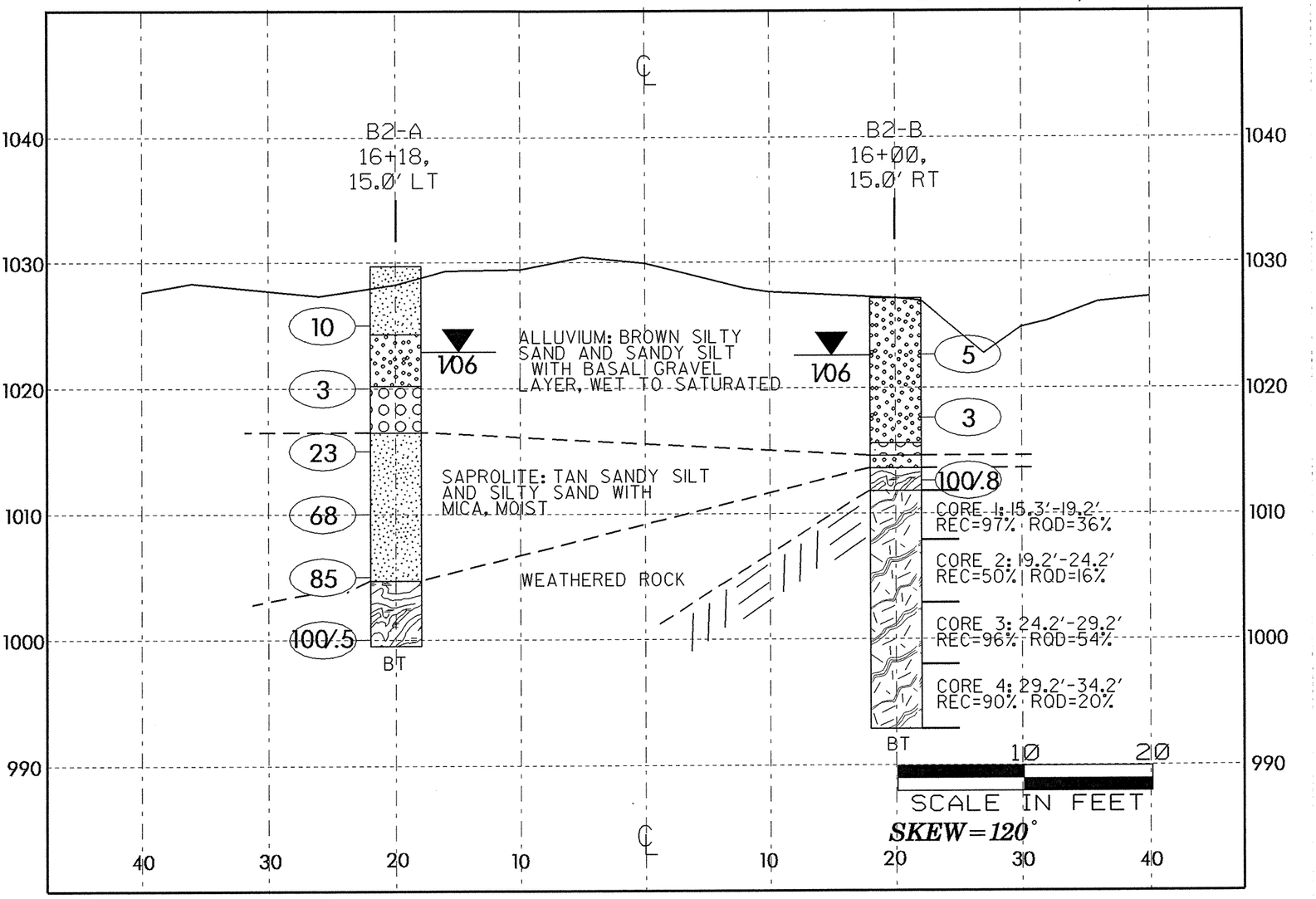
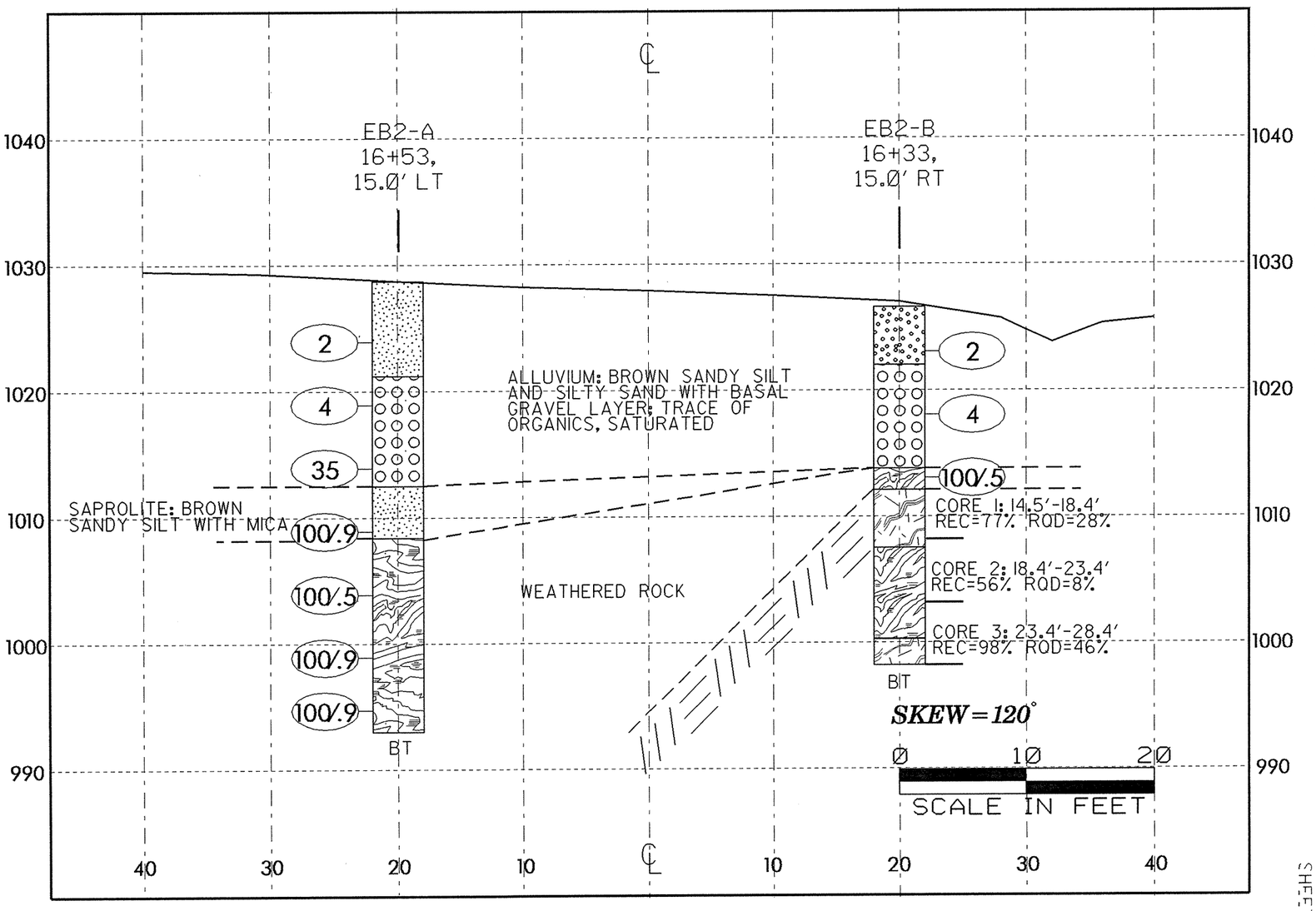


CROSS SECTION THROUGH END BENT TWO

BRIDGE NO.51, 33409.1.1(B-4043)



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33409.1.1	**ID** B-4043	**COUNTY** BURKE	**GEOLOGIST** M M HAGER
SITE DESCRIPTION BRIDGE NO. 51 ON SR-1424 OVER PARKS CREEK			**GND WATER**
BORING NO EB1-A	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 15+28.000	**OFFSET** 15.00ft LT	**24 HR** N/A
COLLAR ELEV 1035.47ft	**TOTAL DEPTH** 23.90ft	**START DATE** 1/10/06	**COMPLETION DATE** 01/10/06
DRILL MACHINE CME 550	**DRILL METHOD** SPT CORE BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log EB1-A, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1035.47						Ground Surface				
1030.00	3.90	3	11	5	1.0	16	SS-5			EMBANKMENT: BROWN SILTY CLAY WITH GRAVEL, COBBLES AN OCC BOULDERS, WET
	8.90	46	54		0.8	100				WEATHERED ROCK OF GRANITE GNEISS
1020.00	13.90	100			0.2	100				CRYSTALLINE ROCK: GRANITE GNEISS
										INTERLAYERS OF SAPROLITE AND WEATHERED ROCK OF GRANITE GNEISS
1011.57						BORING TERMINATED AT ELEV 1011.57 IN ROCK				

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SHEET 1 OF 1

DATE 17-Jan-06

CORE BORING REPORT

PROJECT: 33409.1.1 I. D. NO: B-4043 BORING NO: EB1-A GEOLOGIST: C A Dunnagan

DESCRIPTION: Bridge No. 51 on SR-1424 over Parks Creek

COUNTY: Burke COLLAR ELEVATION: 1035.5 FT. TOTAL DEPTH: 23.9 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1020.8	14.7		4.2	2.4 57	0.9 21		Light gray granite gneiss. Hard; moderately to slightly weathered with medium hard and severely weathered zone from 15.4' to +/- 15.6'. a) Occasional parts along foliation @ 40°.
1016.6	18.9						16.4
1016.6	18.9		5.0	1.7 34	0.0 0		Brown granite gniess. Soft to medium hard; very severely to severely weathered. a) Abundant parts along foliation @ 40°. b) Occasional joints @ 80°.
1011.6	23.9						

CORING TERMINATED AT ELEVATION 1011.6 FT.

DRILLER: G K Rose CORE SIZE: NXWL EQUIPMENT: CME-550

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33409.1.1	**ID** B-4043	**COUNTY** BURKE	**GEOLOGIST** M M HAGER
SITE DESCRIPTION BRIDGE NO. 51 ON SR-1424 OVER PARKS CREEK			**GND WATER**
BORING NO EB1-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 15+08.000	**OFFSET** 15.00ft RT	**24 HR** 5.60ft
COLLAR ELEV 1028.61ft	**TOTAL DEPTH** 29.60ft	**START DATE** 1/17/06	**COMPLETION DATE** 01/17/06
DRILL MACHINE CME 550	**DRILL METHOD** SPT CORE BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log EB1-B, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	BLOW CT 6in	BLOW CT 6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1028.61						Ground Surface				
	4.70	0	0	4	1.0	4	SS-7	▼		ALLUVIUM: BROWN SILTY CLAY, WET
1020.00	9.70	3	2	1	1.0	3				ALLUVIUM: BROWN SILTY SAND, SATURATED
	14.70	46	54		0.5	100				WEATHERED ROCK OF GRANITE GNEISS TO CRYSTALLINE ROCK
1010.00	19.70	82	18		0.6	100				CRYSTALLINE ROCK: GRANITE GNEISS
1000.00										
999.01						BORING TERMINATED AT ELEV 999.01 IN ROCK				

SHEET 1 OF 1

DATE 18-Jan-06

CORE BORING REPORT

PROJECT: 33409.1.1 I. D. NO: B-4043 BORING NO: EB1-B GEOLOGIST: C A Dunnagan

DESCRIPTION: Bridge No. 51 on SR-1424 over Parks Creek

COUNTY: Burke COLLAR ELEVATION: 1028.6 FT. TOTAL DEPTH: 29.6 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1008.2	20.4		4.2	3.4 81	3.4 81		Light grya granite gneiss. Mostly hard and fresh with soft, severely weathered zones at 25.5ft to 25.6ft and 28.6ft to 28.8ft. a) Occasional parts along foliation at 30°. b) Occasional joints @ 10°. c) Occasional joints @ 80°.
1004.0	24.6						
1004.0	24.6		5.0	4.0 80	3.7 74		
999.0	29.6						

CORING TERMINATED AT ELEVATION 999.0 FT.

DRILLER: G K Rose CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33409.1.1	**ID** B-4043	**COUNTY** BURKE	**GEOLOGIST** M M HAGER	
SITE DESCRIPTION BRIDGE NO. 51 ON SR-1424 OVER PARKS CREEK				**GND WATER**
BORING NO B1-A	**NORTHING** 0.00		**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 15+67.000		**OFFSET** 22.00ft LT	**24 HR** 8.70ft
COLLAR ELEV 1031.91ft	**TOTAL DEPTH** 29.60ft	**START DATE** 1/19/06		**COMPLETION DATE** 01/19/06
DRILL MACHINE CME 550	**DRILL METHOD** SPT CORE BORING			**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A			**Log B1-A, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	BLOW CT 6in	BLOW CT 6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1031.91						Ground Surface				
1030.00										EMBANKMENT: BROWN SILTY SAND
	3.90	0	0	2	1.0	2				ALLUVIUM: TAN SILTY SAND, SLI ORGANIC, SATURATED
	8.90	0	1	3	1.0	4	SS-10	▼		
1020.00										SAPROLITE: TAN SANDY SILT WITH CLAY, SLI MIC, WET
	13.90	4	6	8	1.0	14	SS-11			
	18.90	11	45	55	0.9	100				WEATHERED ROCK OF GRANITE GNEISS
1010.00										
	23.90	15	78	22	0.6	100				
	28.90	58	42		0.7	100	SS-12			
1002.31						BORING TERMINATED AT ELEV 1002.31 IN ROCK				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33409.1.1	**ID** B-4043	**COUNTY** BURKE	**GEOLOGIST** D O CHEEK
SITE DESCRIPTION BRIDGE NO. 51 ON SR-1424 OVER PARKS CREEK			**GND WATER**
BORING NO B1-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** 4.50ft
ALIGNMENT -L-	**BORING LOCATION** 15+43.000	**OFFSET** 15.00ft RT	**24 HR** 3.90ft
COLLAR ELEV 1027.22ft	**TOTAL DEPTH** 45.00ft	**START DATE** 1/12/06	**COMPLETION DATE** 01/12/06
DRILL MACHINE CME 550	**DRILL METHOD** SPT CORE BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log B1-B, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1027.22						Ground Surface				
	5.10	5	6	5	1.0	11	SS-6	▼		ALLUVIUM: BROWN SANDY SILT WITH MICA, WET
1020.00										ALLUVIUM: SILTY SAND WITH GRAVEL AND COBBLES, SATURATED
	10.10	2	3	11	1.0	14				
	15.10	100			0.3	100				SAPROLITE: BROWN SILTY SAND
1010.00										WEATHERED ROCK OF GRANITE GNEISS
										CRYSTALLINE ROCK: GRANITE GNEISS
1000.00										
990.00										
982.22						BORING TERMINATED AT ELEV 982.22 IN ROCK				

1/22

SHEET 1 OF 1

DATE 17-Jan-06

CORE BORING REPORT

PROJECT: 33409.1.1 I. D. NO: B-4043 BORING NO: B1-B GEOLOGIST: C A Dunnagan

DESCRIPTION: Bridge No.51 on SR-1424 over Parks Creek

COUNTY: Burke COLLAR ELEVATION: 1027.2 FT. TOTAL DEPTH: 45.0 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET	REC. %	RQD. FEET	RQD. %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1008.1	19.1		0.9	0.7	78	0.7	78		Light gray granite gneiss. Hard; very slightly weathered to fresh. a) Occasional joints @ 25°. 20.5
1007.2	20.0		5.0	4.9	98	2.5	50		Brown granite gneiss. Very soft to soft. Severely to moderately severely weathered. a) Abundant parts along foliation @ 30°. b) Occasional joints @ 10°. c) Occasional joints @ 80°. 27.7
1002.2	25.0		5.0	4.8	96	2.8	56		
997.2	30.0								Light gray to brown-gray granite gneiss. Hard; very slightly weathered with occ thin moderately severely weathered seams. a) Occasional parts along foliation @ 30° (b) Occ joints @ 45°. 33.1
997.2	30.0		5.0	3.9	78	2.0	40		
992.2	35.0								Brown-gray granite gneiss. Medium hard; very severely weathered to moderately severely weathered. a) Parts along foliation @ 30°. (b) Occasional joints @ 80°. 37.4
992.2	35.0		5.0	3.4	68	1.8	36		
987.2	40.0								Gray granite gneiss. Slightly weathered to fresh. Hard. a) Occasional parts along foliation @ 30° to 60°.
987.2	40.0		5.0	4.6	92	3.0	60		
982.2	45.0								

CORING TERMINATED AT ELEVATION 982.2 FT.

DRILLER: G K Rose CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33409.1.1	**ID** B-4043	**COUNTY** BURKE	**GEOLOGIST** M M HAGER
SITE DESCRIPTION BRIDGE NO. 51 ON SR-1424 OVER PARKS CREEK			**GND WATER**
BORING NO B2-A	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 16+18.000	**OFFSET** 15.00ft LT	**24 HR** 6.80ft
COLLAR ELEV 1029.72ft	**TOTAL DEPTH** 30.20ft	**START DATE** 1/23/06	**COMPLETION DATE** 01/24/06
DRILL MACHINE CME 550	**DRILL METHOD** WASH BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log B2-A, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1029.72						Ground Surface				
	4.70	0	4	6	1.0	10		▼		ALLUVIUM: BROWN SANDY SILT, WET
1020.00	9.70	2	2	1	1.0	3				ALLUVIUM: BROWN SILTY SAND, SATURATED
	14.70	12	12	11	1.0	23				ALLUVIUM: GRAY SILTY SAND WITH GRAVEL, SATURATED
1010.00	19.70	24	35	33	1.0	58	SS-13			SAPROLITE: TAN SANDY SILT WITH MICA, MOIST
	24.70	32	41	44	1.0	85				
1000.00 999.52	29.70	91	9		0.5	100				WEATHERED ROCK OF GRANITE GNEISS
						BORING TERMINATED AT ELEV 999.52 IN WEATHERED ROCK.				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33409.1.1	**ID** B-4043	**COUNTY** BURKE	**GEOLOGIST** M M HAGER
SITE DESCRIPTION BRIDGE NO. 51 ON SR-1424 OVER PARKS CREEK			**GND WATER**
BORING NO B2-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 16+00.000	**OFFSET** 15.00ft RT	**24 HR** 4.50ft
COLLAR ELEV 1027.15ft	**TOTAL DEPTH** 34.20ft	**START DATE** 1/25/06	**COMPLETION DATE** 01/25/06
DRILL MACHINE CME 550	**DRILL METHOD** SPT CORE BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log B2-B, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1027.15						Ground Surface				
	4.30	3	2	3	1.0	5		▼		ALLUVIUM: BROWN SILTY SAND, MOIST TO WET
1020.00	9.30	2	2	1	1.0	3	SS-14			
	14.30	8	100		0.3	100				ALLUVIUM: SAND AND GRAVEL, SATURATED
1010.00										SAPROLITE: TAN SILTY SAND, MOIST
										WEATHERED ROCK OF GRANITE GNEISS
1000.00										GRANITE GNEISS WITH INTERLAYERS OF WEATHERED ROCK OF GRANITE GNEISS AND SAPROLITE OF WEATHERED ROCK.
992.95						BORING TERMINATED AT ELEV 992.95 IN ROCK				

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SHEET 1 OE1

DATE 26-Jan-05

CORE BORING REPORT

PROJECT: 33409.1.1 I. D. NO: B-4043 BORING NO: B2-B GEOLOGIST: C A Dunnagan

DESCRIPTION: Bridge No. 51 on SR-1424 over Parks Creek

COUNTY: Burke COLLAR ELEVATION: 1027.2 FT. TOTAL DEPTH: 34.2 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET %	RQD. FEET %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1011.9	15.3		3.9	3.8 97	1.4 36		
1008.0	19.2						Brown-gray biotite gneiss with interlayers of granite gneiss. Moderately severely weathered; medium hard. Very severely to severely weathered (and soft) zones at 16.3ft to 16.7ft, 23.6ft to 24.2ft, 30.9ft to 31.2ft, 31.7ft to 32.1ft and 33.9ft to 34.2ft.
1008.0	19.2		5.0	2.5 50	0.8 16		
1003.0	24.2						a) Abundant parts along foliation @ 30°.
1003.0	24.2		5.0	4.8 96	2.7 54		b) Occasional joints @ 25°. c) Occasional joints @ 85°.
998.0	29.2						d) Occasional joints @ 50°.
998.0	29.2		5.0	4.5 90	1.0 20		
993.0	34.2						

CORING TERMINATED AT ELEVATION 993.0 FT.

DRILLER: G K Rose CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33409.1.1	**ID** B-4043	**COUNTY** BURKE	**GEOLOGIST** M M HAGER
SITE DESCRIPTION BRIDGE NO. 51 ON SR-1424 OVER PARKS CREEK			**GND WATER**
BORING NO EB2-A	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 16+53.000	**OFFSET** 15.00ft LT	**24 HR** N/A
COLLAR ELEV 1028.69ft	**TOTAL DEPTH** 35.70ft	**START DATE** 1/09/06	**COMPLETION DATE** 01/09/06
DRILL MACHINE CME 550	**DRILL METHOD** SPT CORE BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH N/A	**DEPTH TO ROCK** N/A		**Log EB2-A, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1028.69						Ground Surface				
	4.80	0	0	2	1.0	2	SS-1			ALLUVIUM: TAN SANDY SILT WITH TRACE ORGANICS, SATURATED
1020.00	9.80	3	2	2	1.0	4	SS-2			ALLUVIUM: TAN SILTY SAND AND GRAVEL, SATURATED
	14.80	11	18	17	1.0	35				
1010.00	19.80	18	31	69	0.9	100	SS-3			SAPROLITE: BROWN SANDY SILT WITH MICA
	24.80	92	8		0.5	100				WEATHERED ROCK OF GRANITE GNEISS
1000.00	29.80	48	42	58	0.9	100	SS-4			
992.99	34.80	28	73		1.0	100				
						BORING TERMINATED AT ELEV 992.99 IN WEATHERED ROCK				

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 33409.1.1	**ID** B-4043	**COUNTY** BURKE	**GEOLOGIST** M M HAGER
SITE DESCRIPTION BRIDGE NO. 51 ON SR-1424 OVER PARKS CREEK			**GND WATER**
BORING NO EB2-B	**NORTHING** 0.00	**EASTING** 0.00	**0 HR** N/A
ALIGNMENT -L-	**BORING LOCATION** 16+33.000	**OFFSET** 15.00ft RT	**24 HR** 3.70ft
COLLAR ELEV 1026.61ft	**TOTAL DEPTH** 28.40ft	**START DATE** 1/19/06	**COMPLETION DATE** 01/20/06
DRILL MACHINE CME-550	**DRILL METHOD** SPT CORE BORING		**HAMMER TYPE** AUTOMATIC
SURFACE WATER DEPTH	**DEPTH TO ROCK** N/A		**Log EB2-B, Page 1 of 1**

ELEV	DEPTH	BLOW CT 6in	6in	6in	PEN (ft)	BLOWS PER FOOT 0 25 50 75 100	SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
1026.61						Ground Surface				
	3.60	0	0	2	1.0	2		▼		ALLUVIUM: TAN TO GRAY SILTY SAND AND SANDY SILT, SLI ORGANIC, SAT
1020.00	8.60	1	2	2	1.0	4				ALLUVIUM: GRAY SILTY SAND AND GRAVEL WITH BOULDERS FROM 12.3FT, SAT
	13.60	100			0.4	100				WEATHERED ROCK OF GRANITE GNEISS
1010.00										CRYSTALLINE ROCK: GRANITE GNEISS
										WEATHERED ROCK WITH INTERLAYERS OF SAPROLITE OF GRANITE ROCK
1000.00										
998.21						BORING TERMINATED AT ELEV-998.21 IN ROCK				CRYSTALLINE ROCK: GRANITE GNEISS

1-1/22

SHEET 1 OF 1

DATE 20-Jan-06

CORE BORING REPORT

PROJECT: 33409.1.1 I. D. NO: B-4043 BORING NO: EB2-B GEOLOGIST: C A Dunnagan

DESCRIPTION: Bridge No. 51 on SR-1424 over Parks Creek

COUNTY: Burke COLLAR ELEVATION: 1026.6 FT. TOTAL DEPTH: 28.4 FT.

ELEV. (FEET)	DEPTH (FEET)	DRILL RATE MIN./FT.	RUN (FEET)	REC. FEET	REC. %	RQD. FEET	RQD. %	SAMP. #	FIELD CLASSIFICATION AND REMARKS
1012.1	14.5		3.9	3.0	77	1.1	28		Light brown and gray granite gneiss. Moderately hard to hard. Mod severely weathered to moderately weathered with occ very severely weathered seams. a) Abundant parts along fol @ 20°. b) Occasional joints @ 45°. c) Occasional joints @ 20°.
1008.2	18.4								
1008.2	18.4		5.0	2.8	56	0.4	8		19 Brown-gray granite gneiss. Very severely to severely weathered; soft. a) Abundant parts along foliation @ 20°. b) Occasional joints @45°. c) Occasional jonts @ 20°.
1003.2	23.4								
1003.2	23.4		5.0	4.9	98	2.3	46		26.3 Brown-gray to gray granite gneiss. Mod to sli weathered; hard. a) Occ parts along fol @ 20°. (b) Joint @ 80°. © Joint @ 10°.
998.2	28.4								

CORING TERMINATED AT ELEVATION 998.2 FT.

DRILLER: G K Rose CORE SIZE: NXWL EQUIPMENT: CME-550

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: 33409.1.1 TIP: B-4043 COUNTY: Burke

DESCRIPTION(1): Bridge No. 51 on SR-1424 over Parks Creek

EXISTING BRIDGE

Information from: Field Inspection X Microfilm ____ (reel ____ pos: ____)
Other (explain) ____

Bridge No.: 51 Length: 35ft Total Bents: 2 Bents in Channel: 0 Bents in Floodplain: 2
Foundation Type: Piles

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None noted.

Interior Bents: ____

Channel Bed: None noted.

Channel Bank: Moderate amount from EB2-A to 15 feet upstream; and from EB1-B to 20 feet downstream.

EXISTING SCOUR PROTECTION

Type(3): Pile and panel wall with boulder rip-rap at EB2 site; cobble rip-rap at EB1 site.

Extent(4): EB2-A to 15 feet upstream; EB1-B to 20 feet downstream.

Effectiveness(5): Swell.

Obstructions(6): None noted.

DESIGN INFORMATION

Channel Bed Material(7): Silty sand with gravel.

Channel Bank Material(8): Silty sand.

Channel Bank Cover(9): Shrubs and trees.

Floodplain Width(10): Eb1+0; EB2>100 feet.

Floodplain Cover(11): Grass and tree farm.

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

Channel Migration Tendency(13): West

Observations and Other Comments: DSE values supplied by W D Frye, Jr. l (21 Nov 2006)

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

BENTS										
B1	B2	B3	B4							
1018	1013.5									

Comparison of DSE to Hydraulics Unit theoretical scour:

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

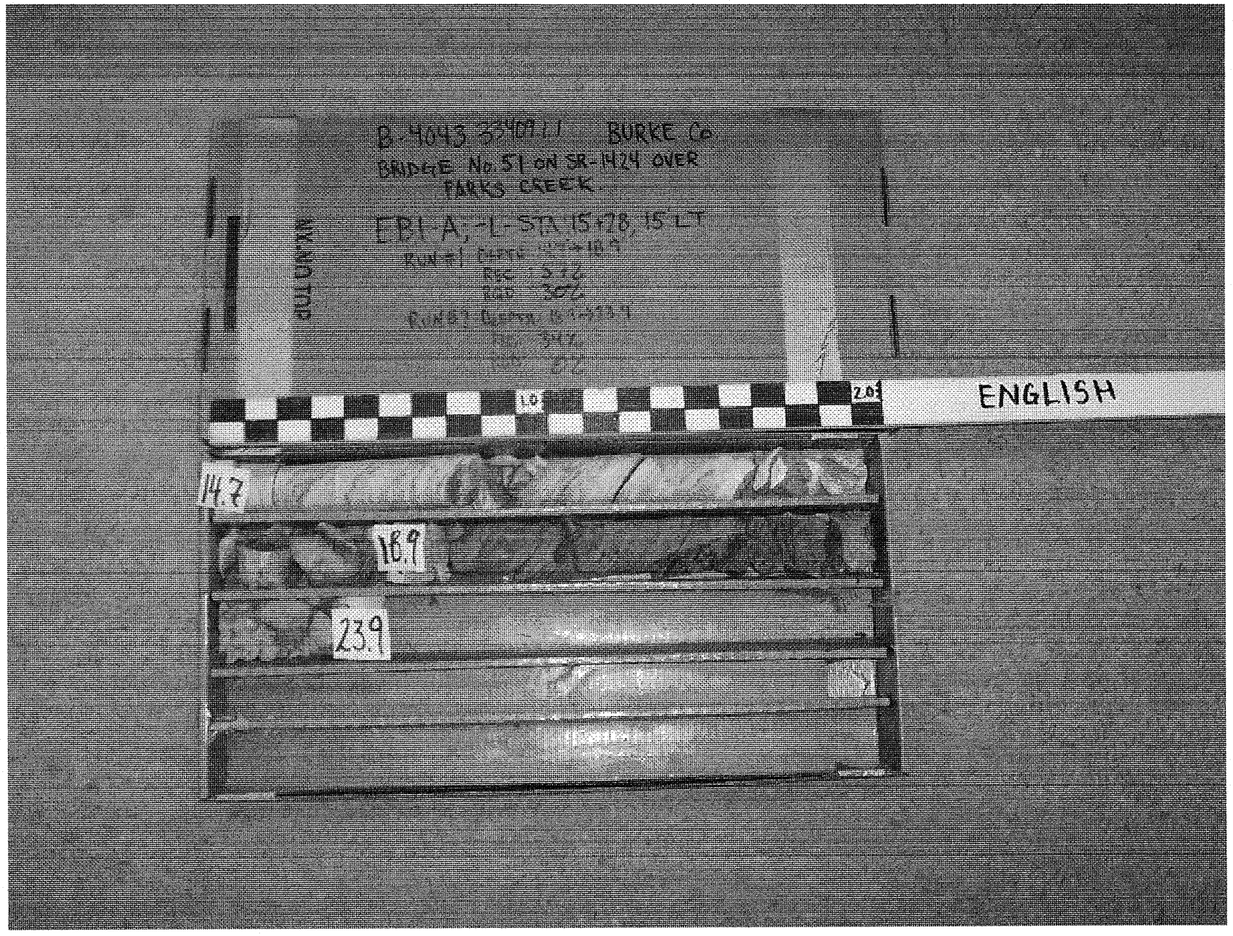
Bed or Bank							
Sample No.							
Retained #4							
Passed #10							
Passed #40							
Passed #200							
Coarse Sand							
Fine Sand							
Silt							
Clay							
LL							
PI							
AASHTO							
Station							
Offset							
Depth							

Template Revised 02/07/06

Reported by: C A Dunnagan **Date:** 12/21/2005

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.

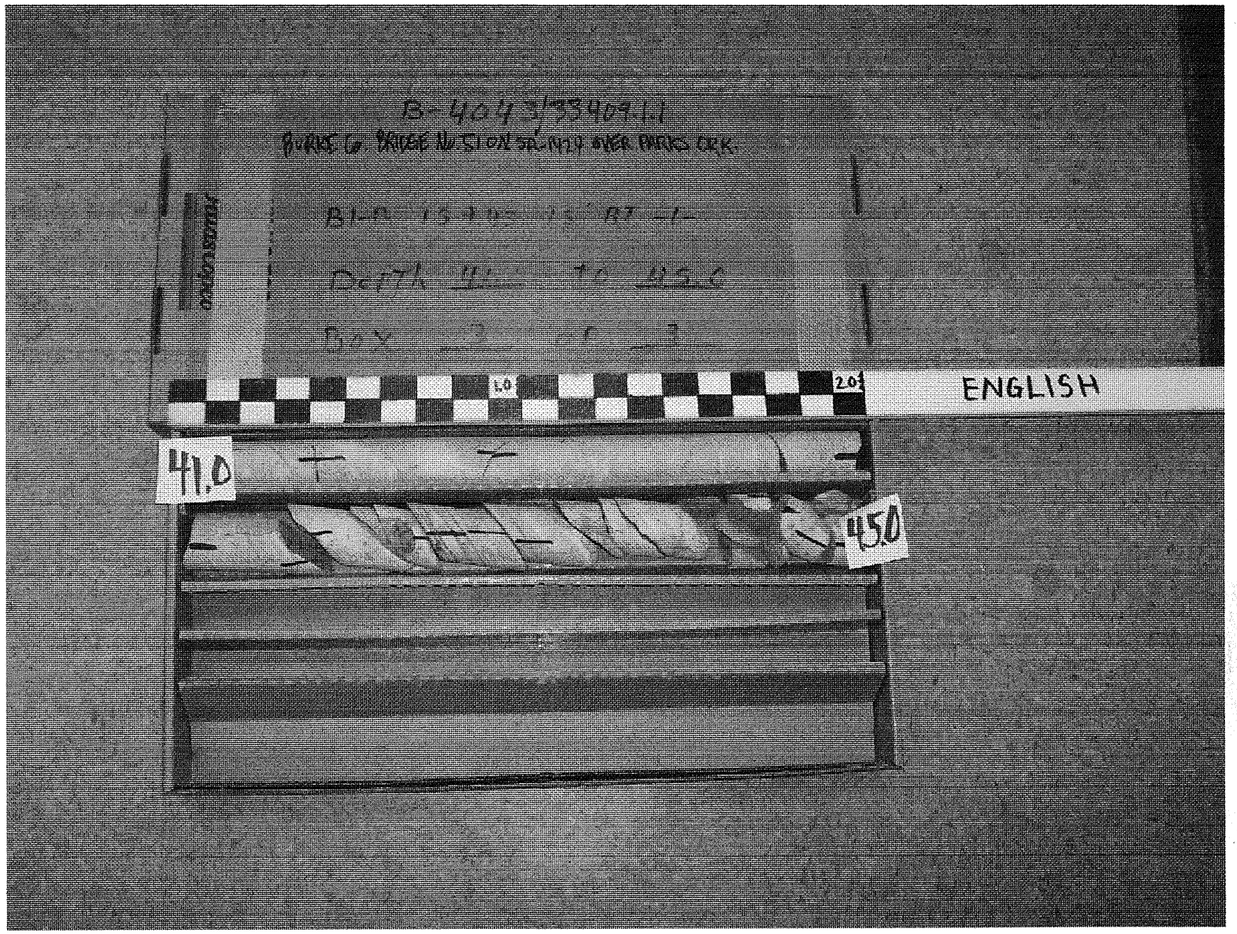


33409.1.1 (B-4043)
Burke County
Bridge No. 51 on SR-1424 over Parks Creek
EB1-A
Box 1 of 1

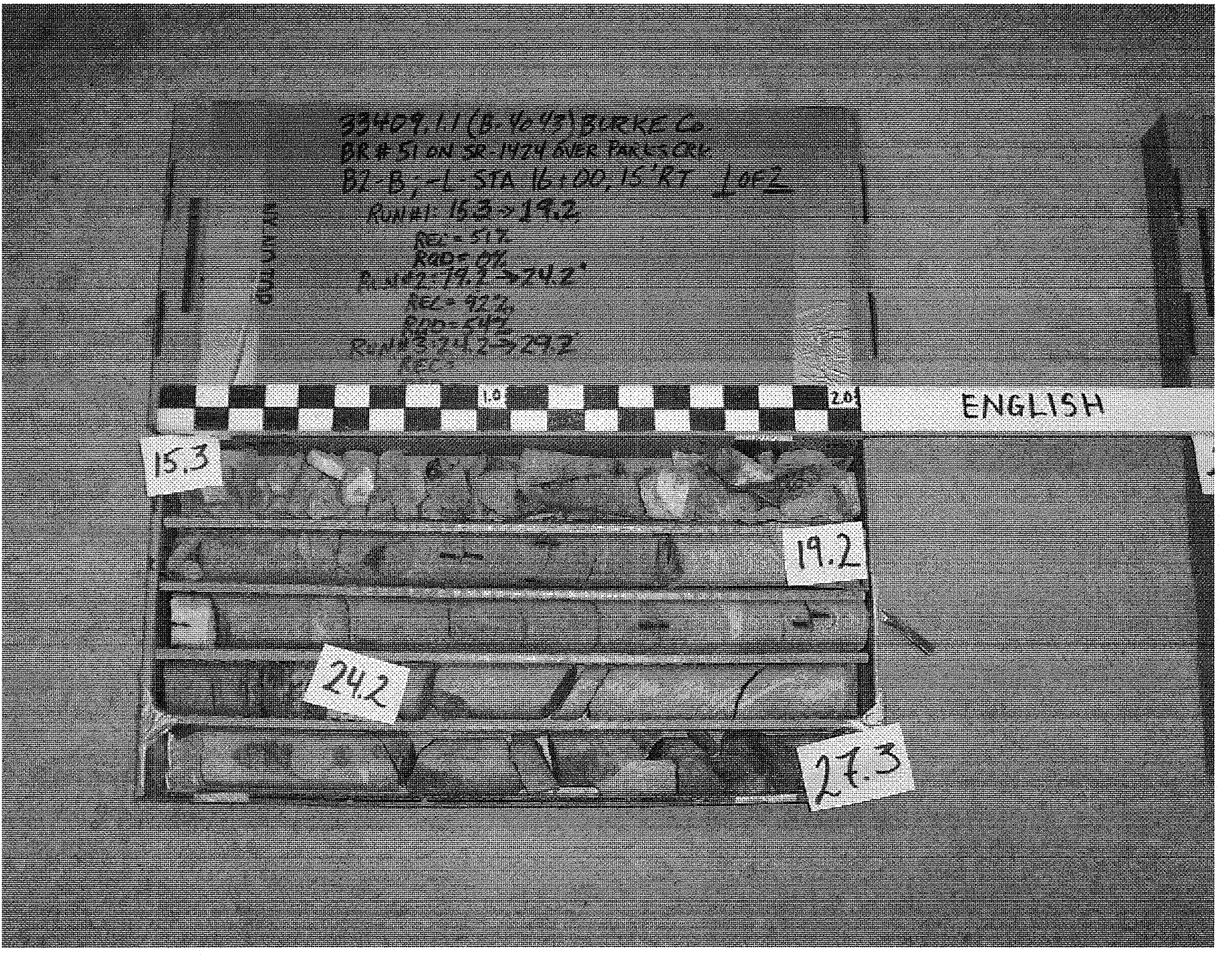
33409.1.1 (B-4043)
Burke County
Bridge No. 51 on SR-1424 over Parks Creek
EB1-B
Box 1 of 1

33409.1.1 (B-4043)
Burke County
Bridge No. 51 on SR-1424 over Parks Creek
B1-B
Box 2 of 3

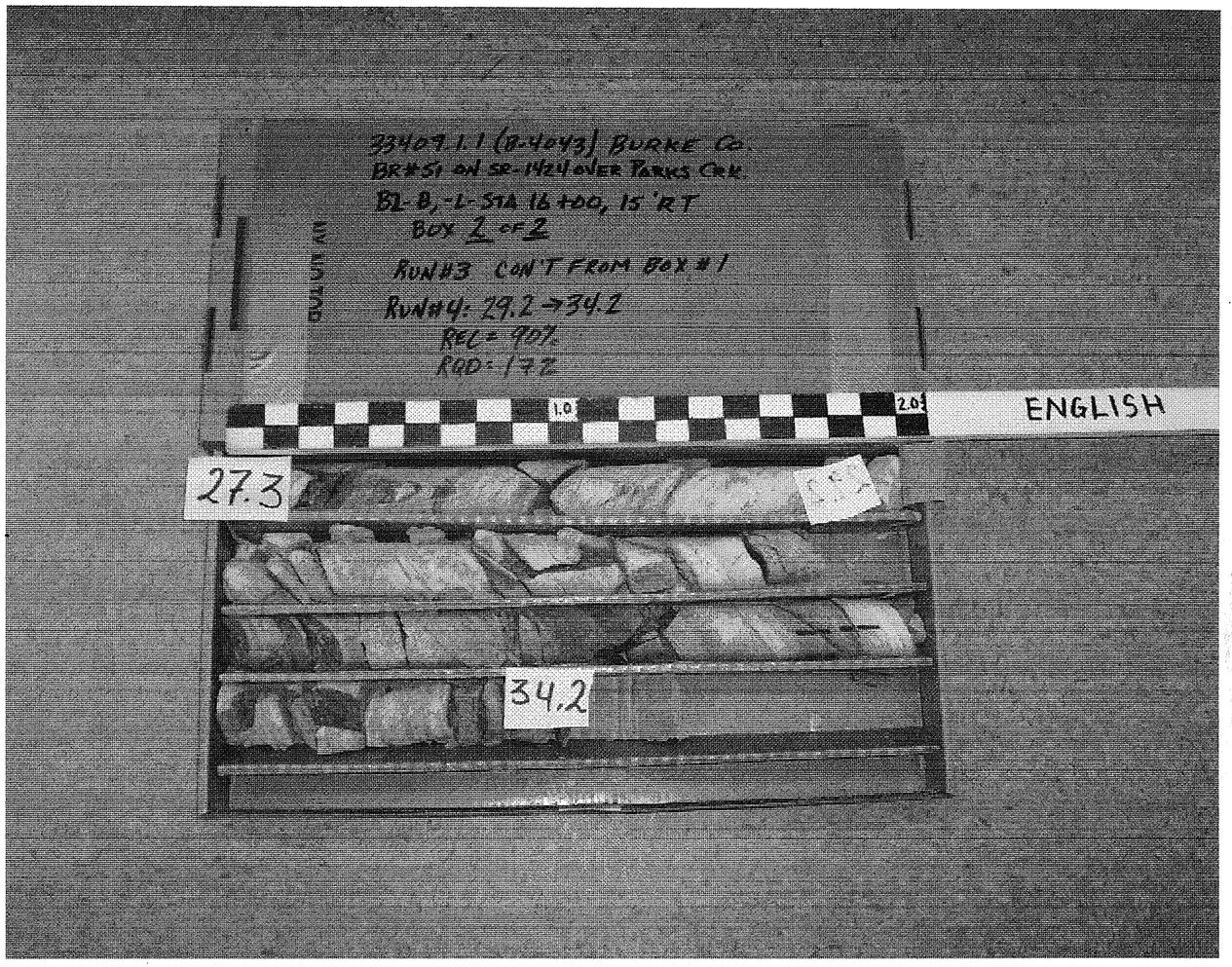
33409.1.1 (B-4043)
Burke County
Bridge No. 51 on SR-1424 over Parks Creek
B1-B
Box 1 of 3



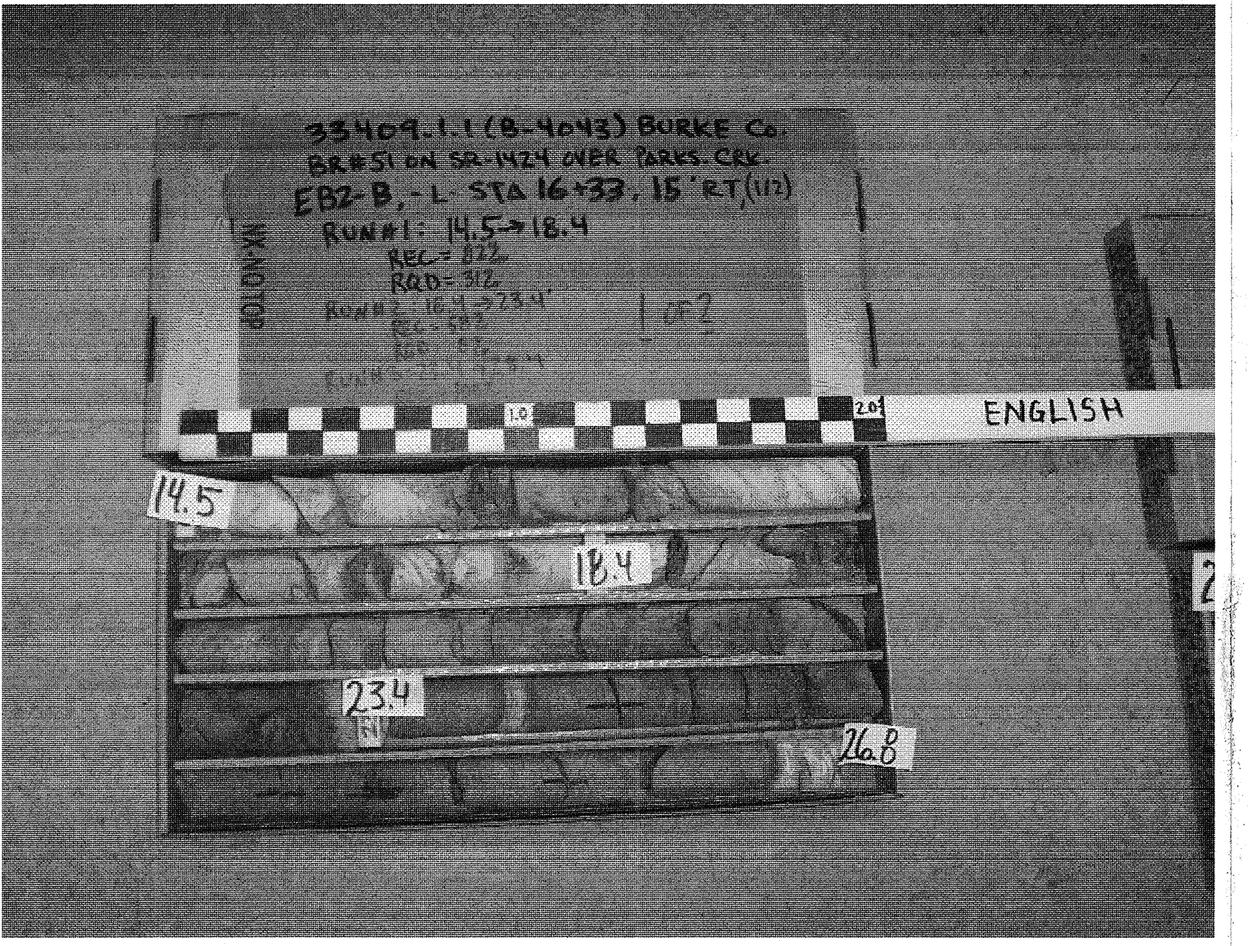
33409.1.1 (B-4043)
Burke County
Bridge No. 51 on SR-1424 over Parks Creek
B1-B
Box 3 of 3



33409.1.1 (B-4043)
Burke County
Bridge No. 51 on SR-1424 over Parks Creek
B2-B
Box 1 of 2



33409.1.1 (B-4043)
Burke County
Bridge No. 51 on SR-1424 over Parks Creek
B2-B
Box 2 of 2



33409.1.1 (B-4043)
Burke County
Bridge No. 51 on SR-1424 over Parks Creek
EB2-A
Box 1 of 2

33409.1.1 (B-4043)
Burke County
Bridge No. 51 on SR-1424 over Parks Creek
EB2-A
Box 2 of 2