STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	~~8B.2076144~~	1	23

BD-5108A

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. ~~8B.207614.4~~ BD-5108A F.A. PROJ. N/A

COUNTY RANDOLPH

PROJECT DESCRIPTION BRIDGE NO. 206 ON SR 1002 OVER FORK CREEK AT STATION 10+20.4

CONTENTS

PERSONNEL

C.M. WHALEN

B.D. WORLEY

F&H PERSONNEL

INVESTIGATED BY C.A. YOUNGBLOOD

CHECKED BY K.B. MILLER

SUBMITTED BY K.B. MILLER

DATE AUGUST, 2010

CAUTION NOTICE

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

NORTH CAROLINA LICENSED SEAL 1959 GEOLOGIST CHERYL A. YOUNGBLOOD

8/23/10

DRAWN BY: C.A. YOUNGBLOOD, C.M. WHALEN

PROJECT REFERENCE NO.	SHEET NO.
~~38.2076141~~ BD5004	2

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 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, PI ≤ LL - 30 A-7-6, PI > LL - 30			
SYMBOL														
% PASSING # 10 # 40 # 200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX									GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
				30 MX	30 MX	30 MX	30 MX	30 MN	30 MN	30 MN	30 MN			
LIQUID LIMIT	6 MX		NP	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

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 ($TONS/FT^2$)
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 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	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	2.00	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
- 25/005 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT / RPT / DPT / VST / PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING W/ CORE
- SPT N-VALUE
- REF — SPT REFUSAL

ABBREVIATIONS

AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST
BT - BORING TERMINATED	MICA. - MICACEOUS	WEA. - WEATHERED
CL. - CLAY	MOD. - MODERATELY	γ - UNIT WEIGHT
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	γ_d - DRY UNIT WEIGHT
CSE. - COARSE	ORG. - ORGANIC	SAMPLE ABBREVIATIONS
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	B - BULK
DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC	SS - SPLIT SPOON
e - VOID RATIO	SD. - SAND, SANDY	ST - SHELBY TUBE
F - FINE	SL. - SILT, SILTY	RS - ROCK
FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY	AT - RECOMPACTED TRIAXIAL
FRAC. - FRACTURED, FRACTURES	TCR - TRICONE REFUSAL	CBR - CALIFORNIA BEARING RATIO
FRAGS. - FRAGMENTS	w - MOISTURE CONTENT	
HI. - HIGHLY	V - VERY	

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B-____
- [X] -N- Q
- [ ] -H-____

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

REVISED 09/23/09

PROJECT REFERENCE NO.	SHEET NO.
~~8B.2076M.1~~ BD-5108A	2A

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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, DIABASE, 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 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 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 (RQD) - 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 (SRQD) - 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.

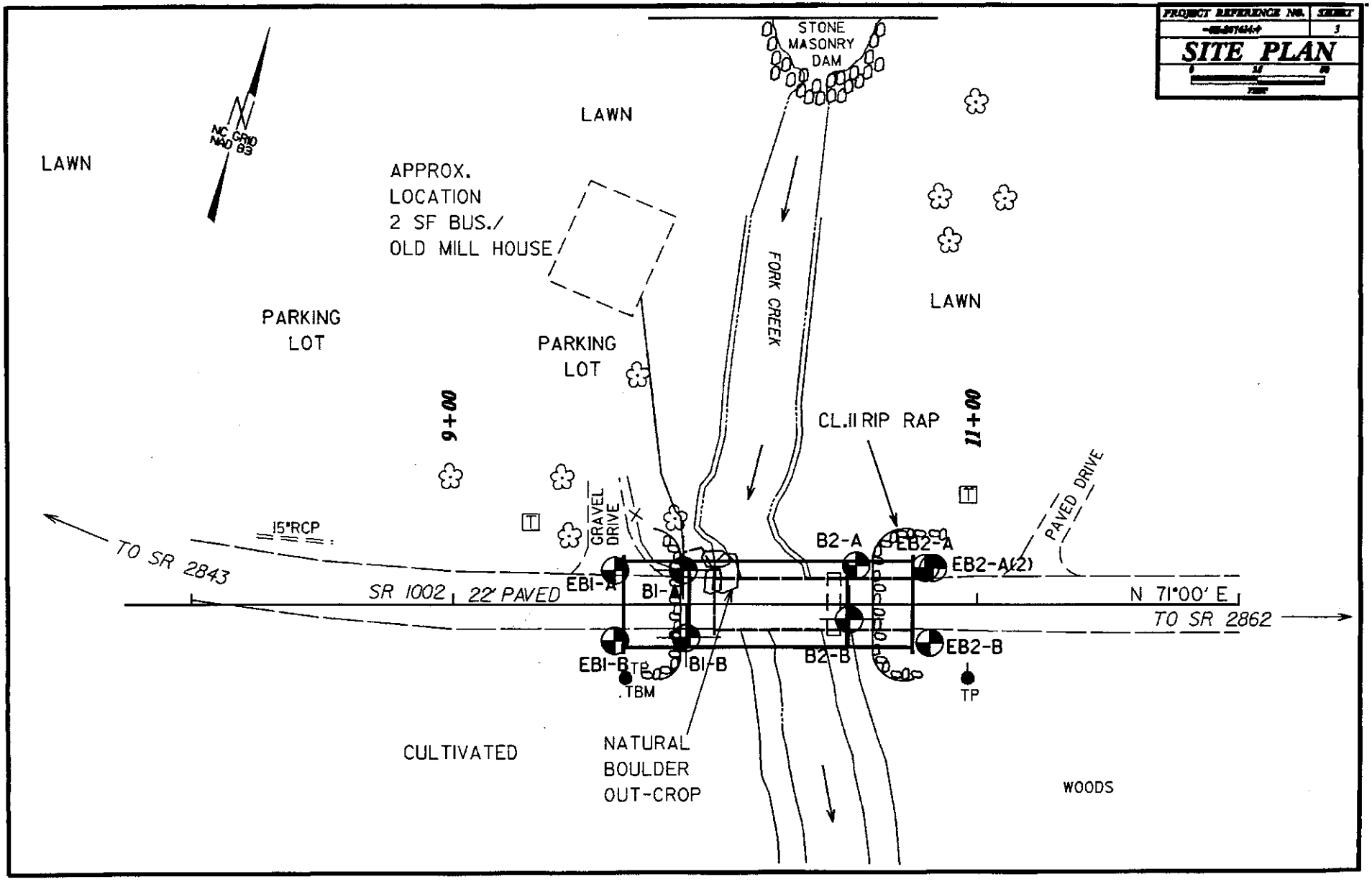
TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: TBM: NAIL IN BASE OF TELEPHONE POLE
9+66, 28' RT.
ELEVATION: 100.00 FT.

NOTES:
ELEVATION FOR TBM IS ASSUMED.

REVISED 09/23/09

BD-5108A


PROJECT REFERENCE NO.
SHEET NO.
3
SITE PLAN
STONE MASONRY DAM
LAWN
LAWN
NC GRID NAD 83
APPROX. LOCATION 2 SF BUS./ OLD MILL HOUSE
FORK CREEK
LAWN
PARKING LOT
PARKING LOT
9+00
11+00
CL.II RIP RAP
GRAVEL DRIVE
PAVED DRIVE
15"RCP
TO SR 2843
SR 1002
22' PAVED
N 71°00' E
TO SR 2862
EBI-A
BI-A
B2-A
EB2-A
EB2-A(2)
EBI-B
BI-B
B2-B
EB2-B
TBM
TP
CULTIVATED
NATURAL BOULDER OUT-CROP
WOODS

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. ~~8B-2076144~~	**ID.** ~~N/A~~ BD-5108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 9+62	**OFFSET** 13 ft LT	**ALIGNMENT** SR 1002 — **0 HR.** 10.5 Caved
COLLAR ELEV. 99.3 ft	**TOTAL DEPTH** 16.7 ft	**NORTHING** 656,529	**EASTING** 1,784,666 — **24 HR.** 10.4 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 07/13/10	**COMP. DATE** 07/13/10	**SURFACE WATER DEPTH** 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)
100										99.3 GROUND SURFACE 0.0
										99.1 ROADWAY EMBANKMENT 0.6
95	95.1	4.2	5	4	5	9		D		Asphalt and ABC Stone
										RESIDUAL
90	90.1	9.2	16	30	25	55				Tan, Orange and White, Sandy Silt
85	85.1	14.2	100/0.4			100/0.4				85.1 14.2
	82.6	16.7	60/0.0			60/0.0				WEATHERED ROCK (MetaVolcanic) 82.6 16.7
80										Boring Terminated with Standard Penetration Test Refusal at Elevation 82.6 ft on Crystalline Rock (MetaVolcanic)
75										
70										
65										
60										
55										
50										
45										
40										
35										
30										
25										
20										

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. ~~8B.2076144~~	**ID.** ~~N/A~~ BD-5108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 9+62	**OFFSET** 14 ft RT	**ALIGNMENT** SR 1002 — **0 HR.** 7.5 Caved
COLLAR ELEV. 99.8 ft	**TOTAL DEPTH** 11.9 ft	**NORTHING** 656,507	**EASTING** 1,784,675 — **24 HR.** 7.4 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 07/13/10	**COMP. DATE** 07/13/10	**SURFACE WATER DEPTH** 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)
										99.8 GROUND SURFACE	0.0
										ARTIFICIAL FILL Orange sandy silt	
	95.3	4.5	21	26	28	54		D		96.2	3.6
										RESIDUAL Tan white sandy silt	
	90.3	9.5	18	67	33/0.3	100/0.3				89.8	10.0
	87.9	11.9	60/0.0			60/0.0				**WEATHERED ROCK** (Metavolcanic) 87.9	11.9
										Boring Terminated with Standard Penetration Test Refusal at Elevation 87.9 ft on Crystalline Rock (MetaVolcanic)	

100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20

NCDOT BORE SINGLE 8B2076144_GEO_BRDG206.GPJ NC_DOT.GDT 08/24/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. ~~8B.2076144~~	**ID.** ~~N/A~~ BD-5108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.	
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 9+88	**OFFSET** 13 ft LT	**ALIGNMENT** SR 1002	**0 HR.** 8.8 Caved
COLLAR ELEV. 98.6 ft	**TOTAL DEPTH** 20.6 ft	**NORTHING** 656,539	**EASTING** 1,784,693	**24 HR.** 8.6 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 07/14/10	**COMP. DATE** 07/14/10	**SURFACE WATER DEPTH** 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)
100										98.6 GROUND SURFACE	0.0
	96.2	2.4								ROADWAY EMBANKMENT Tan-Brown, Sandy Silt	
95			2	2	2	4		D			
	93.7	4.9	2	3	4	7		D			
	91.1	7.5	2	4	7	11				89.4	9.2
90										89.3 WEATHERED ROCK (MetaVolcanic)	9.3
85							RS-1			CRYSTALLINE ROCK (MetaVolcanic)	
80										78.0	20.6
75										Boring Terminated at Elevation 78.0 ft in Crystalline Rock (MetaVolcanic)	
70											
65											
60											
55											
50											
45											
40											
35											
30											
25											
20											

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. ~~8B.207614.1~~	**ID.** ~~N/A~~ BD-6108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 9+88	**OFFSET** 13 ft LT	**ALIGNMENT** SR 1002 — **0 HR.** 8.6 Caved
COLLAR ELEV. 98.6 ft	**TOTAL DEPTH** 20.6 ft	**NORTHING** 656,539	**EASTING** 1,784,693 — **24 HR.** 8.6 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 07/14/10	**COMP. DATE** 07/14/10	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ	**TOTAL RUN** 11.3 ft		

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
89.3											ELEV. (ft) / DEPTH (ft)
											Begin Coring @ 9.3 ft
	89.3	9.3	1.3	5:14/1.3	(1.1) 85%	(1.0) 77%		(10.6) 96%	(9.6) 85%		89.3 — 9.3 **CRYSTALLINE ROCK**
	88.0	10.6	5.0	3:31/1.0							Light Gray, Very Slight to Slightly Weathered, Very Hard to Hard, Moderately Close to Closely Fractured Felsic MetaVolcanic
85				3:14/1.0							
				3:17/1.0	(5.0) 100%	(4.6) 92%	RS-1				R1=12, R2=17, R3=20, R4=12, R5=7
				3:14/1.0							RMR=68
	83.0	15.6		2:56/1.0							Rock Type=E
			5.0	2:41/1.0	(4.7) 94%	(4.0) 80%					
80				3:04/1.0							
				2:44/1.0							
				2:33/1.0							
	78.0	20.6		3:00/1.0							78.0 — 20.6
75											Boring Terminated at Elevation 78.0 ft in Crystalline Rock (MetaVolcanic)
70											
65											
60											
55											
50											
45											
40											
35											
30											
25											
20											
15											
10											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. ~~8B 2076144~~	**ID.** ~~N/A~~ BD-5108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.	
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 9+89	**OFFSET** 13 ft RT	**ALIGNMENT** SR 1002	**0 HR.** 10.5 Caved
COLLAR ELEV. 99.0 ft	**TOTAL DEPTH** 21.4 ft	**NORTHING** 656,619	**EASTING** 1,784,710	**24 HR.** 7.7
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 07/14/10	**COMP. DATE** 07/14/10	**SURFACE WATER DEPTH** 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)
100	99.0	0.0								99.0 GROUND SURFACE	0.0
	96.5	2.5	7	6	4	10		D		ROADWAY EMBANKMENT Tan Yellow Sandy Silt	
95			2	6	28	34		D			
										93.3	5.7
90										92.8 ROADWAY EMBANKMENT Rip Rap	6.4
										89.8 RESIDUAL Orange Sandy Silt	9.2
85										CRYSTALLINE ROCK (Metavolcanic)	
80										77.6	21.4
75										Boring Terminated at Elevation 77.6 ft in Crystalline Rock (MetaVolcanic)	
70											
65											
60											
55											
50											
45											
40											
35											
30											
25											
20											

NCDOT BORE SINGLE 8B2076144_GEO_BRDG206.GPJ NC_DOT.GDT 08/24/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. ~~8B.207614.4~~	**ID.** ~~N/A~~ BD-5108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.	
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 9+89	**OFFSET** 13 ft RT	**ALIGNMENT** SR 1002	**0 HR.** 10.5 Caved
COLLAR ELEV. 99.0 ft	**TOTAL DEPTH** 21.4 ft	**NORTHING** 656,519	**EASTING** 1,784,710	**24 HR.** 7.7
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 07/14/10	**COMP. DATE** 07/14/10	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 12.9 ft			

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
93.3											ELEV. (ft) / DEPTH (ft)
											Begin Coring @ 5.7 ft
	93.3	5.7									
	92.6	6.4	0.7	1:31/0.7 0:50/1.0	(0.6) 86%	(0.0) 0%					93.3 / 5.7 **ROADWAY EMBANKMENT** Rip Rap 92.6 / 6.4
90				0:29/1.0 1:29/0.8							89.8 **RESIDUAL** Orange Sandy Silt 9.2
	89.8	9.2									**CRYSTALLINE ROCK**
			2.2	2:11/1.2 2:19/1.0	(2.2) 100%	(1.8) 82%		(12.1) 99%	(11.4) 93%		Gray, very slight to slightly weathered, hard , moderately close to very close fracture, felsic metavolcanic. Two zones of very close fracture spacing at 15.0 to 15.2 feet and 18.1 to 18.3 feet.
	87.6	11.4									
			5.0	2:44/1.0 1:53/1.0 2:20/1.0 2:02/1.0 2:04/1.0	(4.9) 98%	(4.9) 98%					
85											
	82.6	16.4									
			5.0	2:17/1.0 2:17/1.0 1:54/1.0 1:59/1.0 2:04/1.0	(5.0) 100%	(4.7) 94%					
80											
	77.6	21.4									77.6 / 21.4 Boring Terminated at Elevation 77.6 ft in Crystalline Rock (MetaVolcanic)
75											
70											
65											
60											
55											
50											
45											
40											
35											
30											
25											
20											
15											

NCDOT CORE SINGLE #B2076144_GEO_BRDG206.GPJ NC_DOT.GDT 08/24/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. ~~8B.2076144~~	**ID.** ~~N/A~~ BD-5108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.	
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 10+53	**OFFSET** 15 ft LT	**ALIGNMENT** SR 1002	**0 HR.** 6.0 Caved
COLLAR ELEV. 88.3 ft	**TOTAL DEPTH** 9.7 ft	**NORTHING** 656,564	**EASTING** 1,784,751	**24 HR.** 5.8 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 07/14/10	**COMP. DATE** 07/14/10	**SURFACE WATER DEPTH** 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)
90											
	87.3	1.0	WOH	WOH	WOH	0.				88.3 GROUND SURFACE	0.0
85										ALLUVIAL Tan red clayey silt 85.3	3.0
	84.2	4.1	1	2	3	5.				RESIDUAL Tan brown clayey silt	
80											
	79.2	9.1	1	60/0.1		60/0.1				78.7 CRYSTALLINE ROCK Metavolcanic	9.6
75										78.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 78.6 ft in Crystalline Rock (MetaVolcanic)	9.7
70											
65											
60											
55											
50											
45											
40											
35											
30											
25											
20											
15											
10											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. ~~8B.207014.4~~	**ID.** ~~N/A~~ BD-5108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.	
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4				**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 10+51	**OFFSET** 6 ft RT	**ALIGNMENT** SR 1002	**0 HR.** FIAD
COLLAR ELEV. 87.4 ft	**TOTAL DEPTH** 29.9 ft	**NORTHING** 656,557	**EASTING** 1,784,755	**24 HR.** N/A
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 07/15/10	**COMP. DATE** 07/15/10	**SURFACE WATER DEPTH** 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)
90										87.4 GROUND SURFACE 0.0
85										**RESIDUAL** Dark red brown sandy silt with wood fragments, gravel and rip rap from 2.3 to 3.2 ft.
	82.2	5.2	9	4	5	9		D		80.2 7.2
80										**CRYSTALLINE ROCK** Metavolcanic 77.7 9.7
										76.5 **CRYSTALLINE ROCK** Chlorite Schist 10.9
75										74.3 **CRYSTALLINE ROCK** Metavolcanic 13.1
							RS-2			72.0 **CRYSTALLINE ROCK** Chlorite Schist 15.4
70										**CRYSTALLINE ROCK** Metavolcanic
										66.7 20.7
65										**CRYSTALLINE ROCK** Metavolcanic
60										60.7 26.7
										CRYSTALLINE ROCK Chlorite Schist
										57.5 29.9
55										Boring Terminated at Elevation 57.5 ft in Crystalline Rock (Clorite Schist)
50										
45										
40										
35										
30										
25										
20										
15										
10										

NCDOT BORE SINGLE 8B2076144_GEO_BRDG206.GPJ NC_DOT.GDT 08/24/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. ~~8B-2076144~~	**ID.** ~~N/A~~ BD-5108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 10+51	**OFFSET** 6 ft RT	**ALIGNMENT** SR 1002 — **0 HR.** FIAD
COLLAR ELEV. 87.4 ft	**TOTAL DEPTH** 29.9 ft	**NORTHING** 656,557	**EASTING** 1,764,755 — **24 HR.** N/A
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER Contract Driller	**START DATE** 07/15/10	**COMP. DATE** 07/15/10	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ	**TOTAL RUN** 22.7 ft		

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
80.2											ELEV. (ft) / DEPTH (ft)
											Begin Coring @ 7.2 ft
	80.2	7.2	2.7	2:06/1.0 2:13/1.0 1:43/0.7	(2.4) 89%	(0.0) 0%		(2.4) 96%	(0.0) 0%		80.2 / 7.2 **CRYSTALLINE ROCK** Gray, moderately weathered, moderately hard, very closely fractured felsic metavolcanic rock.
	77.5	9.9									77.7 / 9.7
			5.0	1:47/1.0 1:41/1.0 1:50/1.0 2:13/1.0 2:18/1.0	(5.0) 100%	(3.2) 64%		(1.2) 100%	(0.0) 0%		76.5 / 10.9 **CRYSTALLINE ROCK** Light green, very slightly weathered, soft, very closely fractured chlorite schist.
75								(2.2) 100%	(2.2) 100%		74.3 / 13.1
	72.5	14.9					RS-2				
			5.0	2:34/1.0 2:05/1.0 2:05/1.0 2:25/1.0 2:07/1.0	(4.6) 92%	(4.0) 80%		(1.9) 83%	(1.3) 57%		72.0 / 15.4 **CRYSTALLINE ROCK** Gray, very slightly weathered, very hard to hard, moderately close fracture spacing metavolcanic rock. R1=12, R2=20, R3=10, R4=12, R5=7 RMR=61 Rock Type=E
70								(5.0) 94%	(4.6) 91%		
	67.5	19.9									66.7 / 20.7
			5.0	1:50/1.0 2:43/1.0 2:53/1.0 2:18/1.0 2:02/1.0	(5.0) 100%	(2.4) 48%		(6.0) 100%	(1.4) 23%		**CRYSTALLINE ROCK** Light green, very slightly weathered, moderately hard, close to very closely fractured chorite schist.
65											**CRYSTALLINE ROCK** Gray, very slight to slightly weathered, hard , moderately close to very closely fractured metavolcanic rock.
	62.5	24.9									60.7 / 26.7
			5.0	3:18/1.0 2:08/1.0 5:02/1.0 2:19/1.0 4:06/1.0	(5.0) 100%	(1.0) 20%		(3.2) 100%	(0.5) 16%		**CRYSTALLINE ROCK** Gray, very slightly to slightly weathered, hard, close to very closely fractured metavolcanic rock.
60											57.5 / 29.9 **CRYSTALLINE ROCK** Light green, slightly weathered hard to moderately hard, close to very closely fractured chlorite schist.
	57.5	29.9									Boring Terminated at Elevation 57.5 ft in Crystalline Rock (Clorite Schist)
55											
50											
45											
40											
35											
30											
25											
20											
15											
10											
5											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. ~~8B.2076144~~	**ID.** ~~N/A~~ BD-5108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.	
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 10+80	**OFFSET** 14 ft LT	**ALIGNMENT** SR 1002	**0 HR.** FIAD
COLLAR ELEV. 98.3 ft	**TOTAL DEPTH** 6.9 ft	**NORTHING** 656,582	**EASTING** 1,784,777	**24 HR.** N/A
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 07/13/10	**COMP. DATE** 07/13/10	**SURFACE WATER DEPTH** 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)
100										98.3 GROUND SURFACE 0.0
95	95.8	2.5	2	2	WOH	2				**ROADWAY EMBANKMENT** Orange red silty clay
	93.3	5.0	2	1	WOH	1				91.4 6.9
90										Boring Terminated by Auger Refusal at Elevation 91.4 ft on RipRap
85										Moved Boring location due to RipRap.
80										
75										
70										
65										
60										
55										
50										
45										
40										
35										
30										
25										
20										

NCDOT BORE SINGLE 8B2076144_GEO_BRDG206.GPJ NC_DOT.GDT 06/24/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. ~~8B.207614.4~~	**ID.** ~~N/A~~ BD-5108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.	
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4				**GROUND WTR (ft)**
BORING NO. EB2-A(2)	**STATION** 10+83	**OFFSET** 14 ft LT	**ALIGNMENT** SR 1002	0 HR. 12.9 Caved
COLLAR ELEV. 98.3 ft	**TOTAL DEPTH** 19.0 ft	**NORTHING** 656,585	**EASTING** 1,764,777	24 HR. 12.8 Caved
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 07/13/10	**COMP. DATE** 07/13/10	**SURFACE WATER DEPTH** 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)
100										98.3 GROUND SURFACE 0.0
95										**ROADWAY EMBANKMENT** Orange Red, Silty Clay
										91.4 6.9
90	90.4	7.9	3	4	4	8		D		90.4 **ROADWAY EMBANKMENT** 7.9 Rip Rap and Cobbles
										RESIDUAL Orange red to White Tan Clayey Silt
85	85.4	12.9	5	8	11	19		M		
80	79.4	18.9	60/0.1			60/0.1				79.4 18.9
										79.3 **CRYSTALLINE ROCK** 19.0 (MetaVolcanic)
75										Boring Terminated with Standard Penetration Test Refusal at Elevation 79.3 ft in Crystalline Rock (MetaVolcanic)
70										
65										
60										
55										
50										
45										
40										
35										
30										
25										
20										

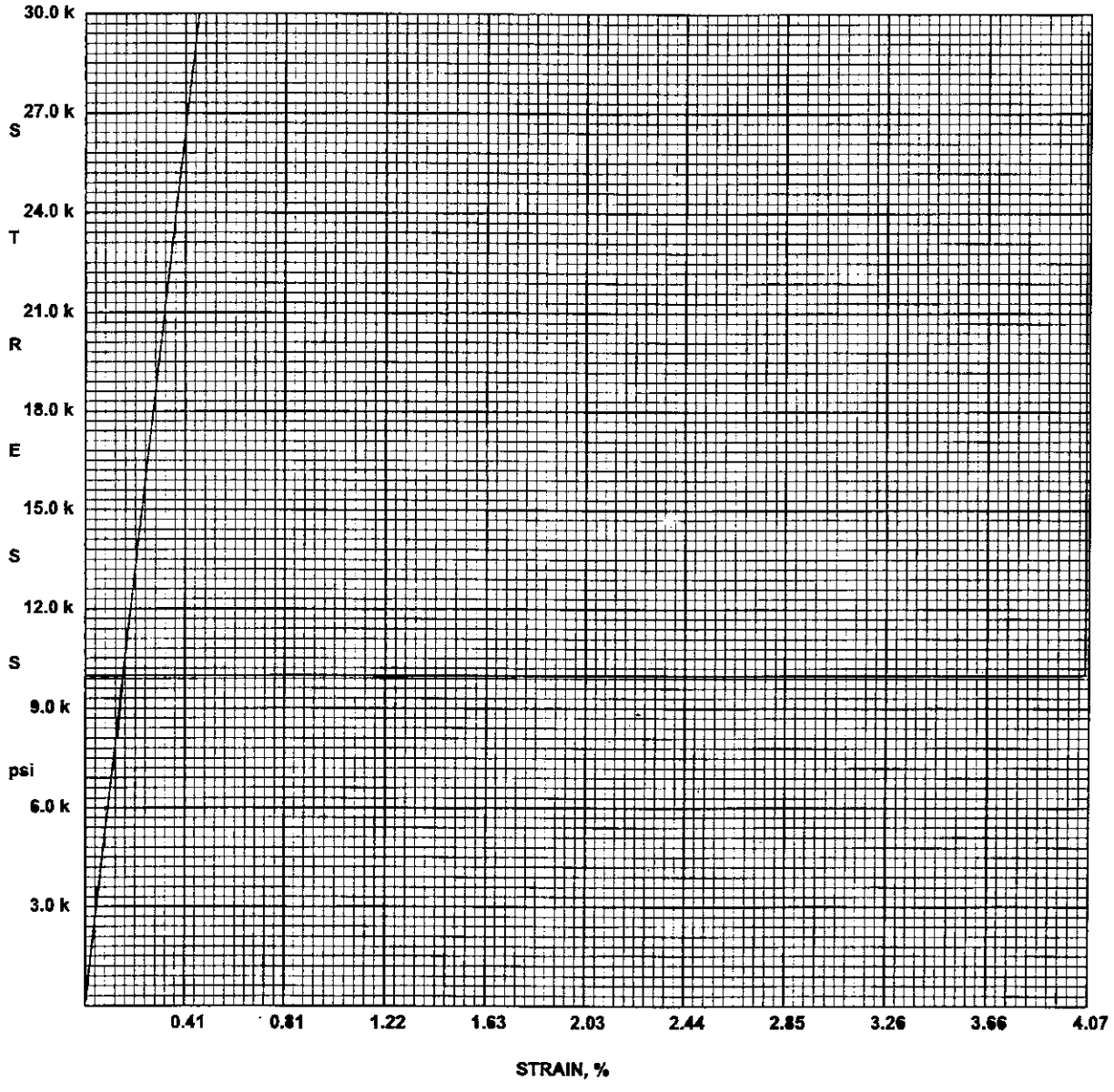
NCDOT BORE SINGLE 8B2076144_GEO_BRDG206.GPJ NC_DOT.GDT 08/24/10

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. ~~8B.207614.4~~	**ID.** ~~N/A~~ BD-5108A	**COUNTY** RANDOLPH	**GEOLOGIST** Whalen, C. M.	
SITE DESCRIPTION Bridge No. 206 on SR 1002 over Fork Creek at Station 10+20.4				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 10+82	**OFFSET** 15 ft RT	**ALIGNMENT** SR 1002	**0 HR.** 14.5 Caved
COLLAR ELEV. 97.7 ft	**TOTAL DEPTH** 26.1 ft	**NORTHING** 656,555	**EASTING** 1,784,789	**24 HR.** 11.3
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
DRILLER Contract Driller	**START DATE** 07/13/10	**COMP. DATE** 07/13/10	**SURFACE WATER DEPTH** 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)
100										97.7 GROUND SURFACE 0.0
95	95.3	2.4	WOH	WOH	WOH	0				**ROADWAY EMBANKMENT** Orange red silty clay. One foot of Rip Rap at 8.5 feet.
	92.8	4.9	1	1	1	2				
90	90.8	6.9	16	20	3	23				90.2 7.5
	87.9	9.8	3	3	5	8				89.2 **ROADWAY EMBANKMENT** 8.5 Rip Rap and Cobbles **RESIDUAL** Red yellow clayey silt
85	82.8	14.9	3	6	8	14				
80	80.3	17.4	46	54/0.3		100/0.8				79.8 17.9 **WEATHERED ROCK** (MetaVolcanic)
75	75.3	22.4	39	26	20	46				77.7 20.0 **RESIDUAL** Tan brown silty sand
	71.7	26.0	60/0.1			60/0.1				71.8 25.9 71.8 **CRYSTALLINE ROCK** (MetaVolcanic) 26.1 Boring Terminated with Standard Penetration Test Refusal at Elevation 71.8 ft in Crystalline Rock (MetaVolcanic)
70										
65										
60										
55										
50										
45										
40										
35										
30										
25										
20										

NCDOT BORE SINGLE 8B207614_GEO_BRDG206.GPJ NC_DOT.GDT 08/24/10



North Carolina Dept. of Transportation
Division of Highways
Materials and Tests
Physical Testing Laboratory

Rock Compression

Lab Number	359077
Project #	~~BD-207614.4~~
County	Randolph
Tip ID	~~n/a~~ BD-5108A
Structure Description	Bridge No. 206 on SR 1002 over Fork Creek
Test Date	08/09/2010

Sample No.:	RS-1
Diameter, in:	1.9800
Area, in²:	3.0791
Specimen, in:	3.93
H/D Ratio:	1.985
Weight, lbf:	1.1700
Unit Weight, lbf/ft3:	167.1
Ultimate, lbf:	90700
Ultimate, ksi:	29.5
Ultimate, ksi:	29.4
40% Ult. Load, lbf:	36300
Sec Mod @ 40%, Mpsi:	0.29

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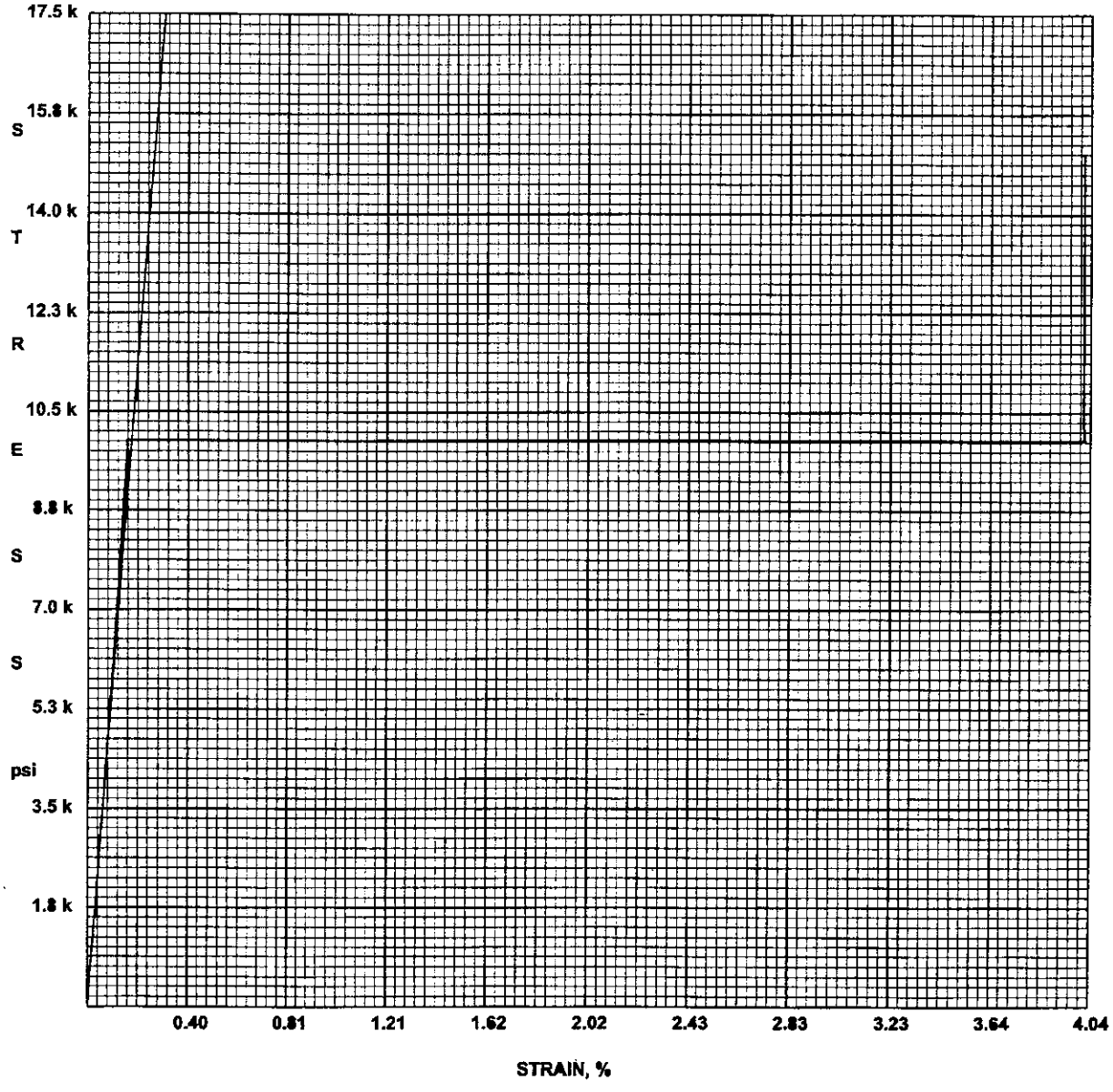

North Carolina Dept. of Transportation
Division of Highways
Materials and Tests
Physical Testing Laboratory

Rock Compression

Lab Number	359077
Project #	~~8B.207614.4~~
County	Randolph
Tip ID	~~n/a~~ BD-5108A
Structure Description	Bridge No. 206 on SR 1002 over Fork Creek
Test Date	08/09/2010

Sample No.:	RS-2
Diameter, in:	1.9900
Area, in²:	3.1103
Specimen, in:	3.93
H/D Ratio:	1.975
Weight, lbf:	1.2200
Unit Weight, lbf/ft3:	172.5
Ultimate, lbf:	46700
Ultimate, ksi:	15.03
Ultimate, ksi:	15.01
40% Ult. Load, lbf:	18700
Sec Mod @ 40%, Mpsi:	6.03

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SN: 205692-R3 V7.02.05

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT

FIELD SCOUR REPORT

WBS: ~~8B.207614.4~~ TIP: BD-5108A N/A COUNTY: Randolph

DESCRIPTION(1): Bridge No. 206 on SR 1002 over Fork Creek

EXISTING BRIDGE

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

Bridge No.: 206 Length: 76' Total Bents: 3 Bents in Channel: 0 Bents in Floodplain: 3
Foundation Type: Timber piles and concrete piers

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: EB1: some scour under existing wing wall and natural rock outcrop footing.
EB2: recently replaced due to wear thus no scour.

Interior Bents: Very little scour near existing footing

Channel Bed: No visible scour pockets

Channel Bank: channel bank is undercut and trees leaning toward the creek.

EXISTING SCOUR PROTECTION

Type(3): Riprap

Extent(4): Riprap covering existing end bent slope were end bent was replaced.

Effectiveness(5): Good

Obstructions(6): Fork Creek Mill dam 300 feet up stream from 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): Alluvial, silty sand with Riprap

Channel Bank Material(8): Residual, sandy, clayey silt

Channel Bank Cover(9): Grass and Brush

Floodplain Width(10): 600 feet

Floodplain Cover(11): Grass, trees and brush

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

Channel Migration Tendency(13): South to Southwest

Observations and Other Comments: Existing EB1 was built on a MetaVolcanic rock outcrop

DESIGN SCOUR ELEVATIONS(14) Feet X Meters ____

BENTS

B1	B2									
89.3'	78.6'									

Comparison of DSE to Hydraulics Unit theoretical scour:
The scour was adjusted on B1 to the top of rock elevation. Scour on B2 agrees with the Hydraulics Unit theoretical scour elevation.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

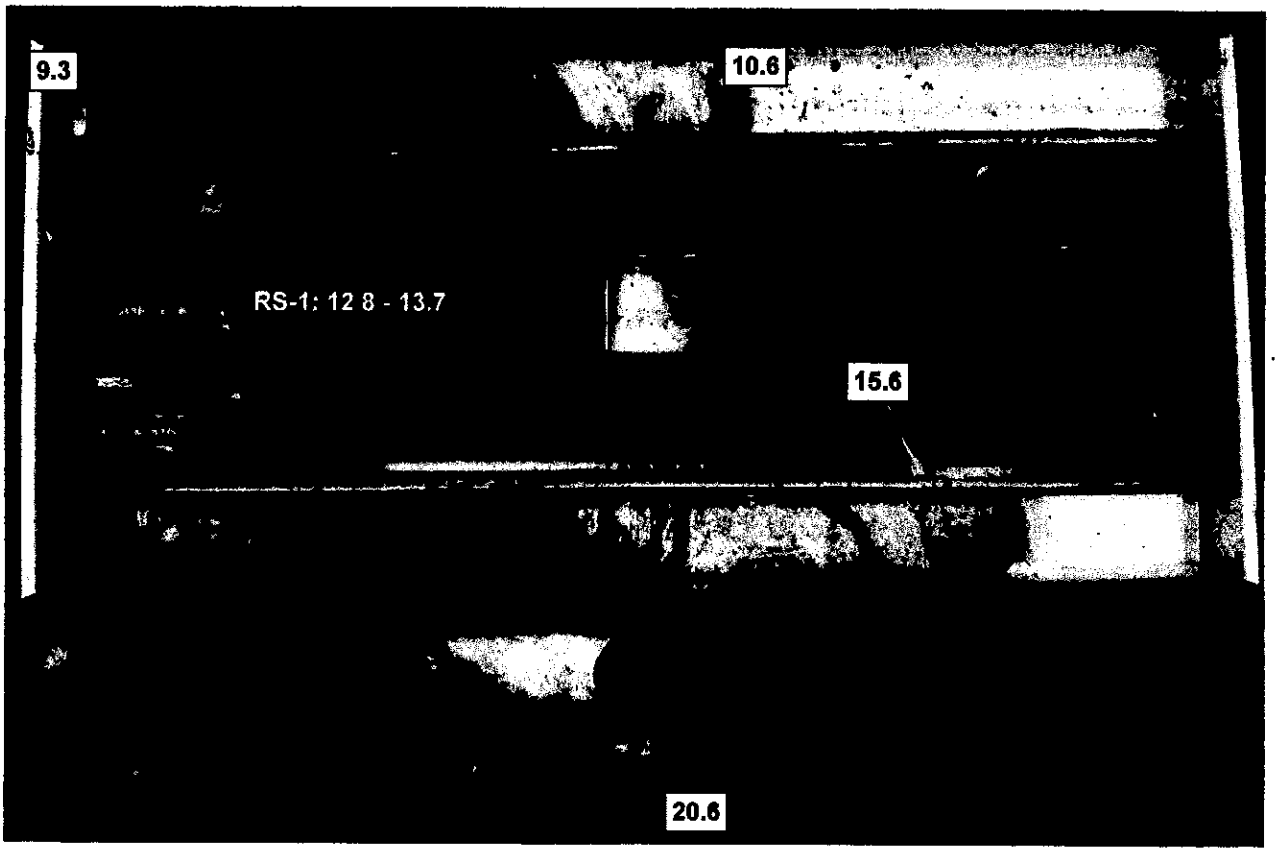
Bed or Bank	No						
Sample No.	samples						
Retained #4	were						
Passed #10	tested.						
Passed #40							
Passed #200							
Coarse Sand							
Fine Sand							
Silt							
Clay							
LL							
PI							
AASHTO							
Station							
Offset							
Depth							

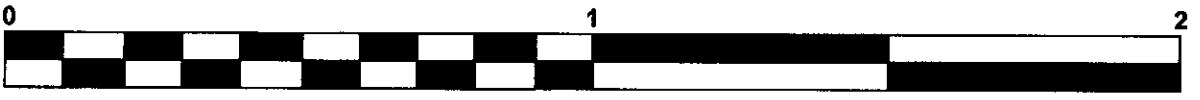
Reported by: Cheryl A Upchurch Date: 8/23/10

CORE PHOTOGRAPHS

B1-A

BOXES 1 & 2: 9.3-20.6 FEET



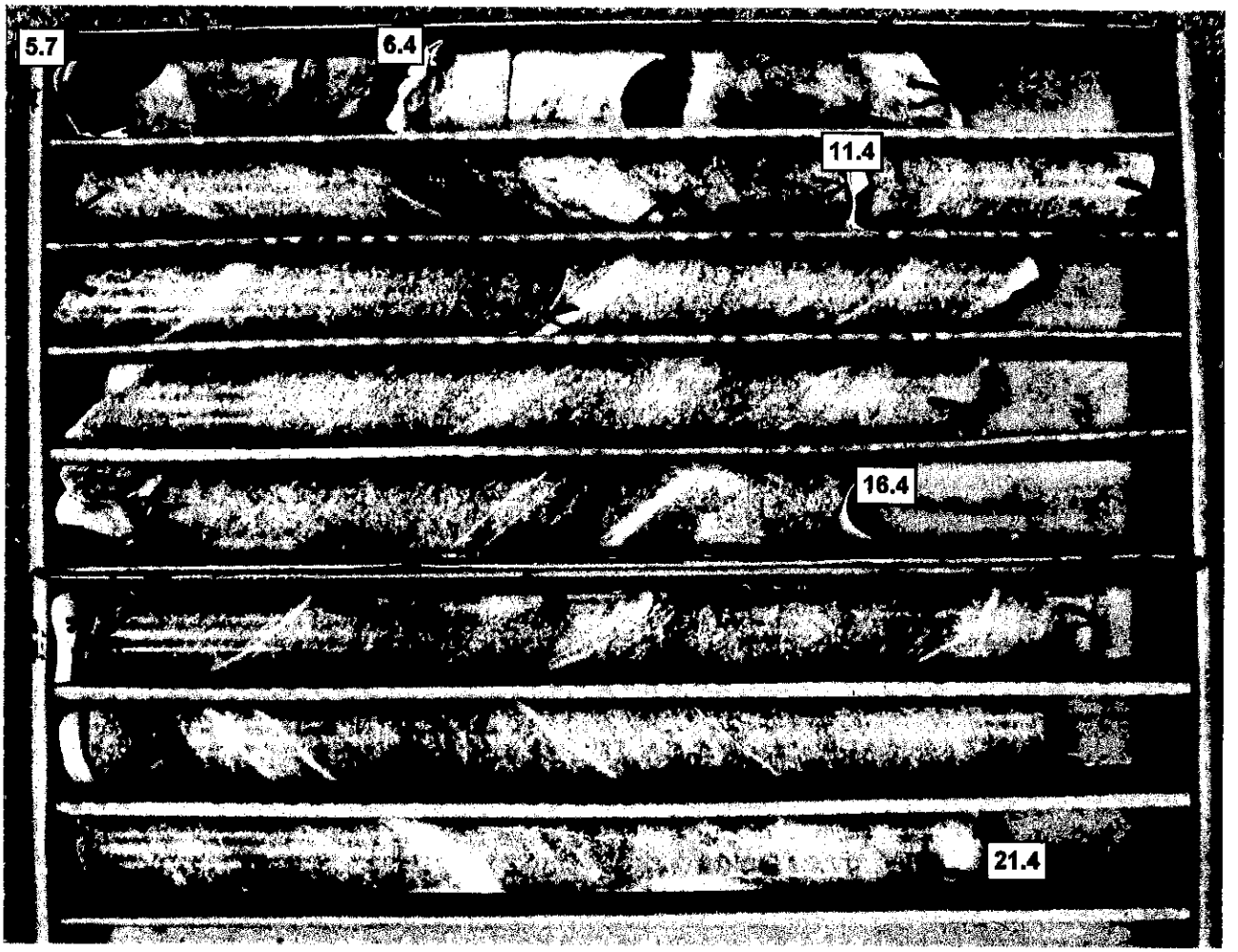


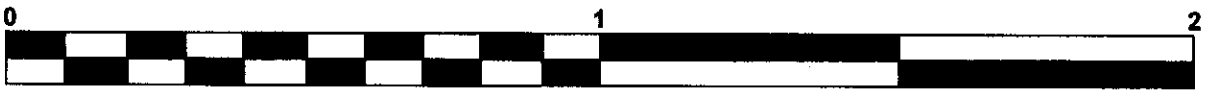
FEET

CORE PHOTOGRAPHS

B1-B

BOXES 1 & 2: 5.7-21.4 FEET

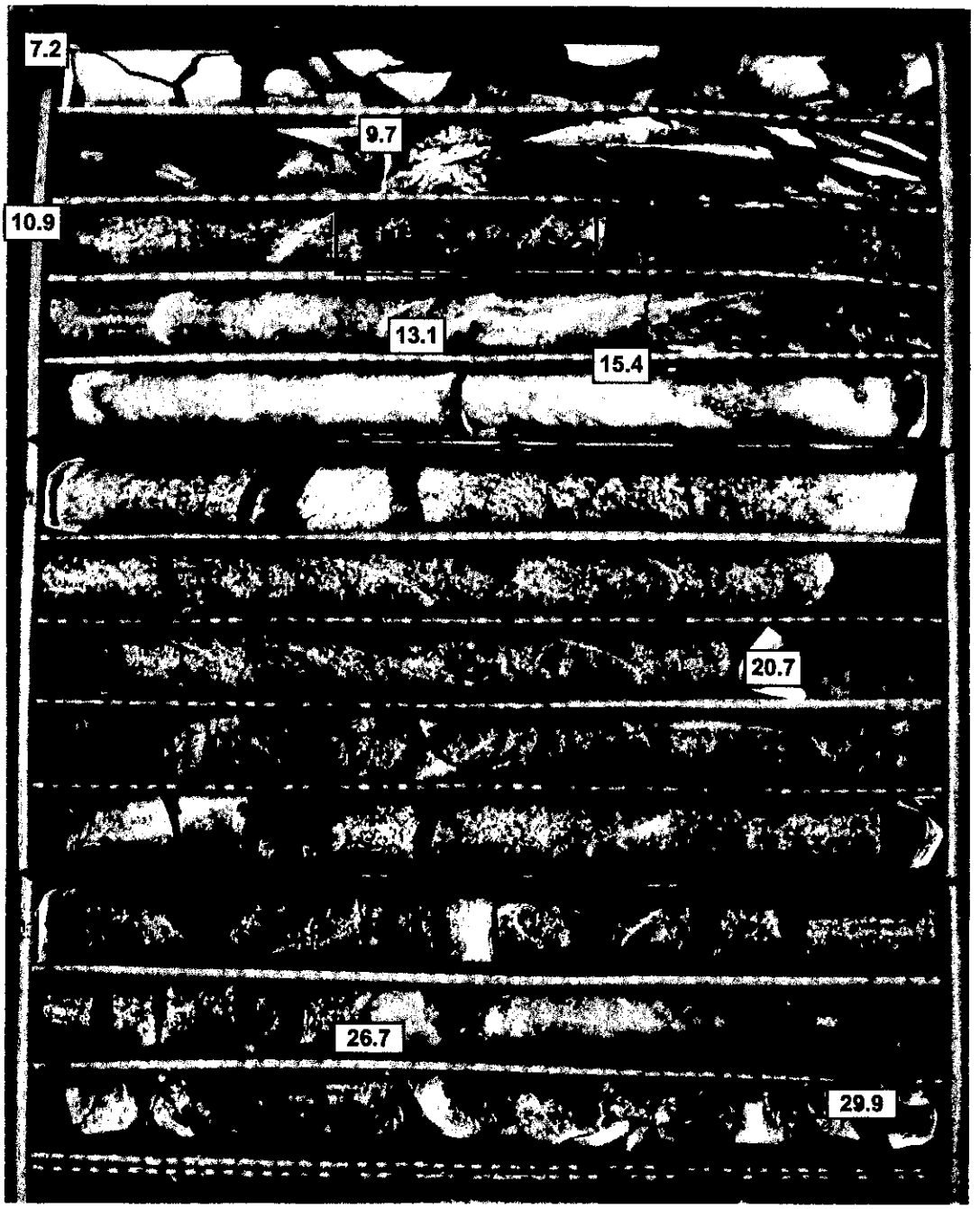




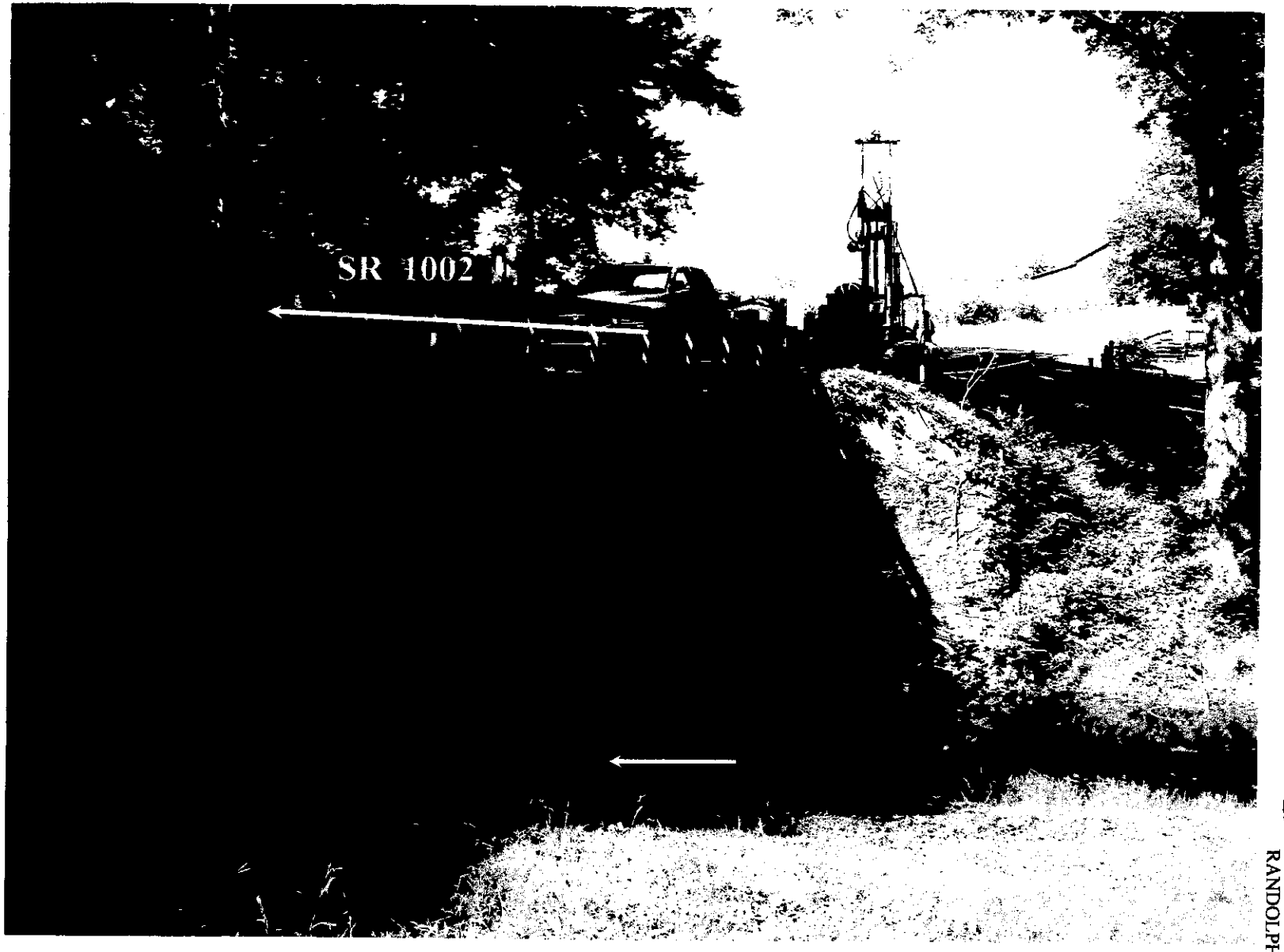
FEET

CORE PHOTOGRAPHS

B2-B



BRIDGE NO. 206 ON SR 1002 OVER FORK CREEK



SHEET 23 OF 23
~~BD-5068(B)~~
RANDOLPH CO.